ZEV Action Plan

An updated roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025

Governor's Interagency Working Group on Zero-Emission Vehicles

Governor Edmund G. Brown Jr.
October 2016

2016 ZEV ACTION PLAN

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Office of Governor Edmund G. Brown Jr.

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INTRODUCTION AND PURPOSE

In 2012, Governor Brown issued Executive Order B-16-12 directing state government to help accelerate the market for zero-emission vehicles (ZEVs) in California. This Executive Order calls for 1.5 million ZEVs in California by 2025 and establishes several milestones on the pathway toward this target. The Administration's 2013 ZEV Action Plan then identified specific actions state government would take to meet the milestones of the Executive Order.

Implementation of the 2013 ZEV Action Plan has been successful: California's ZEV market has grown significantly and state agencies have completed a number of important actions. The State Legislature continues to champion ZEV technologies, passing several important laws to facilitate market expansion. In addition, the State Legislature has appropriated millions of dollars from the Greenhouse Gas Reduction Fund to advance ZEV technologies, including incentives for purchase of light-duty ZEVs, grants to implement zero-emission drayage truck demonstration projects and incentives for ZEV truck and bus purchases, among others. This updated 2016 ZEV Action Plan outlines progress to date and identifies new actions state agencies will take in continued pursuit of the milestones in the Governor's Executive Order.

This 2016 Action Plan highlights the following priorities for ZEVs:

- Raising consumer awareness and education about ZEVs;
- Ensuring ZEVs are accessible to a broad range of Californians;
- Making ZEV technologies commercially viable in targeted applications the medium-duty, heavy-duty and freight sectors; and
- Aiding ZEV market growth beyond California.

This 2016 ZEV Action Plan introduces new actions to meet these priorities and build California's ZEV market, remove barriers to future market growth and ensure this transition benefits our state and its residents. The intent is to clearly communicate what state government will do to advance ZEVs and serve as a "to-do" list for the Governor's Office and state agencies to enhance interagency coordination.

The 2016 ZEV Action Plan is the product of an interagency working group led by the Governor's Office. This plan benefited from extensive input from stakeholders including the California Plug-in Electric Vehicle Collaborative (PEVC) and the California Fuel Cell Partnership (CaFCP). PEVC and CaFCP are broad-based public-private partnerships of industry, non-government organizations and government entities that collaborate to advance ZEVs. The Governor's Executive Order specifically directs collaboration with these two organizations.

Overview of ZEV Technologies

ZEV technologies include hydrogen fuel cell electric vehicles (FCEVs) and plug-in electric vehicles (PEVs), which include both pure battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). This 2016 Action Plan also addresses medium- and heavy-duty vehicles, as well as zero-emission technologies for public transit and freight transport.

BEVs are purely electric and, depending on the model, offer between 60 to just under 300 miles per complete charge.[1] PHEVs are compatible with electric charging and conventional gas fueling, generally operating purely on electricity before using gasoline to extend the driving range. Most PHEVs have a driving

1 https://www.fueleconomy.gov/feg/evtech.shtml

range between 10 and 50 all-electric miles and up to 400 gasoline hybrid miles.[2] FCEVs use hydrogen to generate electricity using on-board fuel cells. FCEVs convert hydrogen into electric power within a vehicle through use of a fuel cell rather than storing electricity on-board in batteries. With a maximum driving range of about 300 miles and a quick 3-5 minute fueling time, FCEVs are a promising technology within California's ZEV portfolio.[3]

BEVs and FCEVs share two fundamental attributes: they use electric drive motors with zero tailpipe emissions. Based on the mix of California's grid electricity and renewable hydrogen requirements, California's PEVs and FCEVs use electricity and hydrogen, respectively, that emit approximately two-thirds less carbon dioxide compared to gasoline.[4]

State of the ZEV Market

California is one of the world's largest markets for light-duty ZEVs, with PEV ownership in the state exceeding 230,000 vehicles.[5] As of summer 2016, Californians drive 47% of all ZEVs on the road in the U.S., while the U.S. comprises about one-third of the world ZEV market.[6] BEVs and PHEVs comprise the majority of ZEVs on California's roads today, since FCEVs are just becoming commercially available.

The national light-duty PEV market continues to expand, with total sales over 500,000 vehicles as of summer 2016.[7] In 2015, nearly every major automaker announced plans for promising new ZEV models. Today over 20 PEV models are available in California, with the Nissan LEAF, Chevrolet Volt, Tesla Model S, and the Ford Fusion Energi leading sales in the U.S. in 2015.[8]

The metropolitan regions of Los Angeles, San Diego and the San Francisco Bay Area lead the state in PEV sales. ZEV adoption has been greatest in Los Angeles County and Santa Clara County, followed by Alameda, Orange, and San Diego Counties. Statewide, nearly 60% of issued rebates have been for BEVs, while 40% have been for PHEVs.[9]

Hundreds of FCEVs are also now driving on California's roads, with automakers introducing commercial models for the first time. In 2014, the Hyundai Tucson FCEV marked the beginning of commercial introduction. The Toyota Mirai entered the market in late 2015 with close to 2,000 pre-orders, and the latest Honda Clarity is anticipated in late 2016. Mercedes and Honda have run demonstration-scale lease programs with the B-Class F-CELL and FCX Clarity for several years. Approximately 300 FCEVs operating in California are mostly located Los Angeles, Orange County and the San Francisco Bay Area.

To spur additional innovation and broader transportation electrification, several state programs are aimed at accelerating development and commercialization of near zero- or zero-emission applications for medium- and heavy-duty vehicles. The California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program is a unique state program that provides purchase vouchers to offset incremental costs of eligible hybrid and zero-emission medium- and heavy-duty vehicles as well as engines certified to the cleanest optional low

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2 http://www.afdc.energy.gov/vehicles/electric_basics_phev.html
3 http://www.driveclean.ca.gov/Search_and_Explore/Technologies_and_Fuel_Types/Hydrogen_Fuel_Cell.php
4 http://cafcp.org/sites/default/files/W2W-2014_Final.pdf
5 http://www.pevcollaborative.org/sites/all/themes/pev/files/9_sept_PEV_cumulative.pdf
6 http://energy.gov/eere/vehicles/fact-918-march-28-2016-global-plug-light-vehicle-sales-increased-about-80-2015
7 http://www.pevcollaborative.org/sites/all/themes/pev/files/9_sept_PEV_cumulative.pdf
8 http://www.afdc.energy.gov/data/10567
9 https://cleanvehiclerebate.org/eng/rebate-statistics

NOx standards. To date, 18 manufacturers have deployed about 2,500 hybrid and zero-emission vehicles through this program. In addition, the Alternative Renewable Fuel and Vehicle Technology Program provides grant funding to develop innovative medium- and heavy-duty technologies. As of December 2015, this program provided close to $93 million to accelerate the demonstration, scale up, and deployment of medium- and heavy-duty technologies.

Expanding Transportation Electrification

While light-duty ZEVs are the most visible step forward toward transportation electrification, the state's transportation and climate goals require a broad, multi-modal approach to transportation electrification beyond individual passenger vehicles. In 2015, Governor Brown announced an ambitious set of climate goals, including reducing petroleum use in California by up to 50% from 2015 levels by 2030 and reducing greenhouse gas emissions 40% below 1990 levels by 2030. In 2016, the State Legislature passed and Governor Brown signed Senate Bill 32, codifying the 2030 greenhouse gas reduction goal. In addition, Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, established widespread electrification of the transportation sector as a statewide policy that is necessary to meet the state's 2030 and 2050 climate goals, as well as the state's air quality requirements. Implementing these ambitious goals will require sustained investments, ongoing policy innovation and state agency leadership and coordination.

California's high-speed rail program represents the backbone of the state's transition to electrified transportation. Powered by 100% renewable energy, high-speed rail will produce a significant "mode shift" in transportation by expanding consumer choice for travel, reducing medium- and long-distance car and airplane trips and enabling transit-oriented communities. High-speed rail stations are being planned and designed to connect to regional public transit and enable ZEV use when passengers drive to stations. Linking high-speed rail to ZEV buses and cars is essential to achieve the level of transformation of California's transportation system called for by the Governor and the State Legislature.

The California Sustainable Freight Action Plan has also been developed to meet the state's transportation objectives. Governor Brown issued Executive Order B-32-15 in July 2015 that directed state agencies to develop this integrated action plan to improve freight transportation system efficiency, transition to zero-emission technologies and strengthen California's competitiveness. Our robust and complex freight industry is a key part of California's economy and a large part of our transportation system. An effective transition to an electrified transportation system over time must include this sector. Transitioning vehicles and equipment in the freight industry to zero-emission capabilities is particularly important to reduce pollution in local communities near freight transportation hubs such as freeways, border crossings, truck stops, airports, seaports, railyards, warehouses and distribution centers.

State agencies need to remain forward-looking in their efforts to accelerate electrification of California's transportation system. New technology innovations, such as autonomous vehicles and equipment, promise to transform the way people and freight move. Improved battery and fuel cell configurations, smart charging connected to electricity grids and wireless charging are examples of technologies that also will directly impact how the ZEV market expands and evolves. New business models and markets, such as transportation network companies, introduce further changes to the transportation system. Considering all of these changes, state agencies need to invest time and resources to understand and harness these emerging technologies. State activities, such as funding and producing applied research and continuing to prioritize public-private collaboratives, such as the PEVC and the CaFCP, are more important than ever.

STATE PROGRESS TO DATE SUPPORTING ZEV EXPANSION

In the three years since the 2013 ZEV Action Plan, state agencies have maintained important ZEV programs while completing several new actions to accelerate ZEV deployment. These efforts include the following actions:

Maintaining Proven ZEV Incentives

- ZEV Rebates: The State of California continues to provide sizable monetary rebates for the purchase or long-term (30 months or more) lease of ZEVs: $5,000 for FCEVs, $2,500 for BEVs, and $1,500 for PHEVs. Revenue from the state's Air Quality Improvement Program (AQIP) and Greenhouse Gas Reduction Fund (GGRF) provide funding for this important initiative as it has grown in size. Beginning March 29, 2016, the program implemented two significant changes: an income cap prohibiting rebates for higher-income consumers and an additional $1,500 rebate for low- and moderate-income consumers. In September 2016, the State Legislature passed and Governor Brown signed Senate Bill 859, requiring the California Air Resources Board to lower the gross annual income thresholds, increase rebate payments by $500 for low-income applicants and prioritize rebate payments for low-income applicants. The new income limits, which apply through June 2017, are $150,000 for single filers, $204,000 for head-of-household filers and $300,000 for joint filers.

- HOV Lane Access: ZEV drivers continue to have access to high occupancy vehicle (HOV) lanes. White HOV decals are provided to BEV and FCEV drivers and green decals are provided to PHEV drivers. White decals are currently not limited in number, and the amount of authorized green decals was increased to 85,000 beginning July 1, 2015. As of December 2015, all 85,000 green decals were issued. In early 2016, the Administration proposed a legislative change to allow an unlimited amount of green decals to be issued until the current expiration of the green decal program on January 1, 2019. In September 2016, the State Legislature passed and Governor Brown signed Senate Bill 838, lifting the cap on green decals. The expiration date remains unchanged. The Administration will continue to work with the State Legislature and stakeholders to establish a long-term plan for the green and white HOV decal programs.

  Auto dealers selling new vehicles that are eligible for white and green HOV decals can now obtain these decals in advance from the state's Department of Motor Vehicles, which allows dealers to provide HOV decals to consumers at the point of sale.

Advancing Light-Duty Vehicle Pilot Projects for Lower-Income Consumers and Disadvantaged Communities

- Since 2014, the California Air Resources Board has dedicated $19 million to four light-duty vehicle pilot projects aimed at increasing the use of advanced technology light-duty vehicles to benefit lower-income consumers and disadvantaged communities. These projects include vehicle retirement and replacement programs in the San Joaquin Valley and South Coast air districts, car sharing and mobility options projects in Los Angeles and Sacramento, increased incentives for disadvantaged community public fleets statewide and a financing assistance project in the San Francisco Bay Area.

Adopting Statutory Changes to Expand ZEV Use

- In 2013, the State Legislature re-authorized two programs that provide as much as $100 million annually towards innovative transportation and fuel technologies, including PEV charging and hydrogen station infrastructure, through 2024: the Air Quality Improvement Program (AQIP), administered by the California Air Resources Board, and the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP), administered by the California Energy Commission.

- In 2014, the State Legislature passed and Governor Brown signed the California Charge Ahead Initiative (Senate Bill 1275), a landmark bill supporting consumer incentives and rebates to enable one million ZEVs on California's roads by January 1, 2023. The law requires the California Air Resources Board to adopt programs that benefit disadvantaged communities, including projects that provide grants for fleet managers to replace polluting medium- and heavy-duty vehicles with cleaner vehicles. Another 2014 law, Senate Bill 1204, established the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program to fund purchase incentives for commercially available heavy-duty zero and near zero-emission technologies.

- In 2015, the State Legislature passed and Governor Brown signed into law the Clean Energy and Pollution Reduction Act of 2015 (Senate Bill 350) which established as a statewide policy widespread electrification of the transportation sector. The law promotes additional investments in electrification by investor-owned electric utilities, based on guidance developed by the California Public Utilities Commission. Proposed investments should improve access to electricity as an economical and alternative transportation fuel, leverage vehicles as a resource to integrate a grid powered by 50% renewable electricity, and reduce emissions of air pollutants and greenhouse gases.

Accelerating ZEV Market Growth Outside of California

- Multi-State Collaboration: In 2013, Governor Brown, along with governors of seven other states, signed a multi-state ZEV Memorandum of Understanding (MOU). The MOU commits the states to program coordination to deploy at least 3.3 million ZEVs in these states by 2025. This MOU was followed in May 2014 by a Multi-State ZEV Action Plan, which outlined 11 key actions to work towards the 3.3 million ZEV goal. States, automakers and other stakeholders are now actively working to implement the plan.

- International Coordination: In 2015, California led the founding of the International ZEV Alliance, a collaboration of countries and subnational governments to accelerate the global development of ZEVs. The 14 participant jurisdictions in the ZEV Alliance are working together to share best practices for incentives, utility programs and consumer outreach. In December 2015 at the United Nations Climate Change negotiations, the Administration joined 12 countries, states and provinces announcing that it would strive to make *all* passenger vehicle sales ZEVs as quickly as possible, and no later than 2050.

Expanding PEV Charging Networks

- Utility Programs: The California Public Utilities Commission authorized two PEV charging infrastructure pilots in January 2016 in Southern California. The Charge Ready Program, administered by Southern California Edison, calls for approximately 1,500 charging stations at 150 workplaces, multi-unit dwellings, fleets and destination centers, and requires time-of-use rates and demand response capabilities for these facilities. The Power Your Drive Program, administered by San Diego Gas & Electric, authorizes roughly 3,500 charging stations at 350 workplaces and multi-unit dwellings,

as well as a vehicle-grid integration rate to incentivize charging that is responsive to dynamic, location-based electricity rates that will help integrate renewable energy and avoid infrastructure and capacity upgrades. The programs are intended to complement private investments to maintain a competitive PEV market. Utilities will install 10% of the infrastructure and expenditures in disadvantaged communities. Pacific Gas & Electric also has an application for approximately 7,500 level 2 chargers and 100 fast charging stations pending before the California Public Utilities Commission. With learnings from these initial programs, the California Public Utilities Commission will consider future expanded programs.

- CPUC Settlement Agreement with NRG Energy: The California Public Utilities Commission entered into a settlement agreement with NRG Energy Inc. to bring to California a statewide network of charging stations for PEVs, including at least 200 public fast-charging stations and the infrastructure for up to 10,000 privately-owned charging stubs (make-readies) at multi-family residences, workplaces and other locations.

- Strengthened Building Standards: Newly constructed residential and most non-residential buildings will be PEV-capable as a matter of state law. The California Building Standards Commission adopted changes to the California Green Building Standards Code (Title 24, Part 11 Green Building Standards Code) requiring all newly constructed parking lots and housing to put electrical capacity in place to easily install PEV chargers. Effective January 2017, the number of parking spaces that must be PEV-capable increases to 6% for most non-residential buildings.

- Clarified Accessibility Requirements: In January 2016, California adopted the first PEV charging station accessibility requirements in the nation, providing clear standards and guidance to ensure charging stations are accessible to ZEV users with disabilities.

- Accurate Measurement and Sale of Electricity as a Fuel: In April 2016, the California Department of Food and Agriculture entered into an interagency agreement with the California Energy Commission to develop specifications and accuracy tolerances for the commercial (non-utility) measurement of electricity as a motor vehicle fuel dispensed from PEV charging equipment.

- Increased Signage: In March 2013, the California Department of Transportation issued a directive standardizing signage for public PEV charging stations and hydrogen fueling stations on highways and roads across the state. The California Manual on Uniform Traffic Control Devices also now permits signage for alternative fuel charging on highways in urban areas.

- Corridor Charging: The California Energy Commission is working to complete the California segments of the West Coast Electric Highway, funding networks of DC fast chargers along key interregional highway corridors. The California Energy Commission provided $8.8 million for 61 DC fast chargers along north-south corridors for Interstate 5, U.S. Highway 101 and State Highway 99. A second solicitation for $9.9 million to support east-west highway corridors was released in January 2016.

  In September 2015, California signed a Letter of Intent with the New Energy and Industrial Technology Organization (NEDO) of Japan to support the installation of 30-50 DC fast chargers from Monterey to Lake Tahoe via Sacramento.

- Workplace Charging: In partnership with the California Plug-In Electric Vehicle Collaborative, Governor Brown hosted two high-level convenings of CEOs (in 2013 and 2015) at the "Drive the Dream" event to encourage companies across California to commit to expanding workplace charging.

In 2015, the California Pollution Control Financing Authority, with $2 million in seed capital provided by the California Energy Commission, launched the Electric Vehicle Charging Station Financing program. The program provides a loan loss reserve for eligible borrowers to finance the acquisition and installation of PEV chargers at small businesses, multi-unit dwellings, and in disadvantaged communities.

- Assessments and Data: The California Energy Commission funded the National Renewable Energy Laboratory to complete a Statewide Plug-in Electric Vehicle Infrastructure Assessment. This quantitative assessment provides a framework for evaluating the need for PEV charging infrastructure across the state and provides a range of estimates for the number of chargers needed to support our ZEV deployment goals.

  All electric charging installations and hydrogen fueling stations in California are now reported to the National Renewable Energy Laboratory Alternative Fuels Data Center database to provide a clearinghouse for information that can be utilized to develop mapping applications pursuant to legislation signed by Governor Brown in 2013.

Supporting Hydrogen Station Network Growth

- Network Development: The California Energy Commission provided nearly $81 million in capital funding to support 49 hydrogen stations in California and $12.6 million in test and evaluation processes, mobile refueling, and operations and maintenance support. As of summer 2016, 22 retail stations are fully open to the public, 6 stations are open non-retail (serving customers on an automaker by automaker basis), and another 23 are in varying stages of development (from local planning approval to construction).

- Accurate Measurement and Sale of Hydrogen as a Fuel: In January 2014, the California Department of Food and Agriculture's Division of Measurement Standards adopted hydrogen fuel quality specifications to assure drivers and manufacturers that vehicles receive the high-purity hydrogen essential to reliable operation of FCEVs. The California Department of Food and Agriculture also established a hydrogen fuel quality laboratory capable of analyzing hydrogen for FCEVs.

  In June 2014, the California Department of Food and Agriculture's Division of Measurement Standards adopted regulations for hydrogen gas measuring devices that enable commercial sale of hydrogen as a motor fuel. Hydrogen dispensers have since passed inspection using these new regulations, allowing hydrogen to be sold directly to retail consumers.

Increasing Local ZEV Readiness and Infrastructure Development

- Leadership: The Governor's Office of Business and Economic Development established a new Zero-Emission Vehicle Infrastructure Unit. This unit works full-time to partner with local governments and businesses to streamline PEV and FCEV infrastructure permitting process and provide subject matter expertise.

- Guidance: The Governor's Office of Planning and Research issued the *2013 ZEV Community Readiness Guidebook* to provide helpful information to local and regional governments, community leaders and residents transitioning to ZEVs. The Guidebook contains information on model local incentives to accelerate the ZEV market.

The Governor's Office of Business and Economic Development issued a *Hydrogen Station Permitting Guidebook* that recommends actions for local governments to facilitate deployment of hydrogen fueling stations including codes and standards, parking and zoning policies, fueling processes and overall best practices.

- Readiness Funding: Ten PEV regional readiness plans were completed, and eleven more funded by the California Energy Commission. Readiness plans include PEV charging station deployment strategies, opportunities to streamline permitting and inspection of PEV chargers, updated building codes and actions for consumer education and outreach. In addition, 13 grants have been given to local and regional governments to implement their plans.

Vehicle-Grid Integration

- Roadmap and Working Group: The California Independent System Operator, California Energy Commission, and California Public Utilities Commission, in partnership with external stakeholders, developed a Vehicle-Grid Integration (VGI) Roadmap. The roadmap identifies pathways to enable service providers and utilities to manage vehicle charging and discharging to help maintain the stability of the electricity grid while preserving drivers' mobility needs. Progress has already been made on actions in the VGI Roadmap, including successful VGI demonstration projects and the formation of an interagency task force.

- Innovative Projects: The California Independent System Operator, the California Energy Commission and the California Public Utilities Commission worked with the U.S. Department of Defense and Southern California Edison to implement a vehicle-to-grid system that allows the Los Angeles Air Force Base to use its non-tactical PEV fleet as an ancillary services resource in the wholesale electricity market.

  The California Public Utilities Commission worked with Pacific Gas & Electric to develop a pilot project that explores how automakers could reduce the upfront purchase cost of PEVs using the grid value from smart charging, leveraging vehicle batteries for secondary storage and understanding behaviors.

  San Diego Gas & Electric completed a pilot project under which it bid geographically dispersed energy storage systems and PEV fleets whose charge could be modulated to the California Independent System Operator energy markets.

- Research Funding: The California Public Utilities Commission approved the second triennial Electric Program Investment Charge plans, administrated by the California Energy Commission and the three large electric investor-owned utilities. Each investment plan includes research into PEV technologies. Under the second investment plan, the California Energy Commission is planning a $16 million VGI-specific solicitation which also includes a required match funding leverage component.

Expanding Use of ZEVs in State Government

- Fleet Vehicles: State agencies fulfilled the Governor's Executive Order directive that ZEVs must comprise 10% of state light-duty fleet purchases by 2015. For fiscal year 2014/2015, ZEVs accounted for 11.74% of the state's light-duty fleet purchases. In February 2016, the Department of General Services updated its two-year statewide vehicle contracts, which expand the number of ZEVs now available to agencies and help to ensure success in future years. The Department of General Services will continue to add new vehicle models to contracts as they enter the market.

- Parking: The Department of General Services created a state government-wide ZEV Parking Policy, effective in early 2014, which provides parking benefits for ZEV drivers at state-owned buildings, parking lots and properties.

Supporting Commercialization of Medium- and Heavy-Duty Technologies

- Early Funding: The California Energy Commission has provided over $109 million for California companies to expand manufacturing facilities and conduct in-service demonstrations of zero-emission medium- and heavy-duty advanced technologies for trucks, buses and freight movement. In addition, the California Air Resources Board is spending $50 million from fiscal year 2014/2015 to demonstrate zero-emission drayage trucks and zero- and near zero-emission heavy-duty and off-road vehicles operating at multi-source facilities. The projects will accelerate the introduction of advanced technologies on the cusp of commercialization into the freight sector as well as deploy supportive charging and fueling infrastructure.

  Through the Proposition 1B Trade Corridor Improvement Fund and Goods Movement Emission Reduction Program, the state was able to leverage over $5.5 billion to deliver over 90 transportation projects and more than 13,000 clean truck, locomotive, and marine vessel technology projects in California. Funding and developing these projects will be critical to address the challenges companies in this nascent market face to access private capital. Vehicle demonstrations made possible by these investments will be located in disadvantaged communities throughout California.

- Pilot Deployment Projects: The California Air Resources Board is administering $25 million from fiscal year 2014/2015 for large-scale zero-emission truck and bus pilot commercial deployments, with another $60 million proposed for fiscal year 2016/2017. The projects would place a significant number of early commercial zero-emission heavy-duty vehicles in a handful of strategic hubs, encouraging advanced technology clusters with infrastructure, marketing, workforce training and other synergies. Nearly all projects will be located within disadvantaged communities.

- Increased Data: The California Air Resources Board gathered data on medium- and heavy-duty ZEV deployment status in California and nationally and made these data publicly available through BEV and FCEV Technology Assessments.

Additional Actions

- LCFS Implementation: The California Air Resources Board completed the Low Carbon Fuel Standard (LCFS) rulemaking, which includes the issuance of credits for electric mass transit (both battery and fuel cell powered). The California Air Resources Board also certified new hydrogen fuel pathways in 2015, with AC Transit becoming the first opt-in participant to generate credits using a hydrogen fuel pathway. Credits have a monetary value and are tradable in the LCFS credit market to petroleum refiners and other regulated parties that need credits to meet their obligations.

  Investor-owned utilities are required to use revenue generated by LCFS credits through residential charging to benefit PEV drivers under the re-adopted LCFS regulations and California Public Utilities Commission decisions. The California Public Utilities Commission directed the utilities to return the revenue as an up-front rebate or annual credit to drivers.

- Volkswagen Settlement: In June 2016, California and the federal government reached a settlement with Volkswagen stemming from Volkswagen's violations of emission control requirements. To mitigate in part for the environmental harms from the violations, Volkswagen agreed to invest $800 million in California in zero-emission infrastructure and access over a ten year period. Eligible investments include fueling infrastructure, public education and marketing programs, efforts to increase access among consumers to ZEVs and creation of "Green City Programs." Investments must be brand neutral. Under the settlement, Volkswagen will submit ZEV investment plans every 30 months; the California Air Resources Board will provide comments and approve each plan after those comments are addressed. (Volkswagen also will invest an additional $1.2 billion to promote the transition to zero-emission vehicles in states outside California.)

  In addition to investments in zero-emission vehicles and access, Volkswagen agreed to invest $381 million to reduce NOx emissions and will place the funds into a mitigation trust over three years, to be administered by an independent trustee.

- Fleet Partnerships: The California Energy Commission and the California Air Resources Board initiated a working relationship with the Department of the Navy in an effort to transition up to 500 of their non-tactical vehicles to ZEVs.

- Local Research Centers: The California Energy Commission funded four centers (two in Northern California, one in the Central Valley, and one in Southern California) to promote adoption and deployment of alternative fuels and advanced vehicles. The centers serve their respective regions by partnering with local organizations to develop alternative fuels and clean technology, create jobs and drive economic growth.

- ZEV Manufacturing: The California Alternative Energy and Advanced Transportation Financing Authority approved $122 million in sales and use tax exclusions for the purchase of equipment used to develop and manufacture BEVs and PHEVs from 2013 to 2016.

- Rooftop Solar and ZEVs: Thanks to changes in the requirements of the Net Energy Metering Program, owners of distributed generation systems, such as rooftop solar photovoltaic systems, can now size their load based on projections of future ZEV ownership.

STRUCTURE OF THE 2016 ZEV ACTION PLAN

Actions called for in this 2016 ZEV Action Plan are grouped into sections according to six broad objectives, each of which contains two sub-sections: "Light-Duty," which focuses on light-duty passenger vehicles, and "Medium- and Heavy-Duty," which includes actions for medium-duty, heavy-duty and freight applications.

Six broad goals for state government to advance ZEVs include:

1. **Achieve mainstream consumer awareness of ZEV options and benefits**
2. **Make ZEVs an affordable and attractive option for drivers**
3. **Ensure convenient charging and fueling Infrastructure for greatly expanded use of ZEVs**
4. **Maximize economic and job opportunities from ZEV technologies**
5. **Bolster ZEV market growth outside of California**
6. **Lead by example integrating ZEVs in to state government**

State agency abbreviations used throughout this document include:

CARB	California Air Resources Board
CAEATFA	California Alternative Energy and Advanced Transportation Financing Authority
CBSC	California Building Standards Commission
CDFA	California Department of Food and Agriculture, Division of Measurement Standards
HCD	California Department of Housing and Community Development
DMV	California Department of Motor Vehicles
State Parks	California Department of Parks and Recreation
Caltrans	California Department of Transportation
CEC	California Energy Commission
CalEPA	California Environmental Protection Agency
HSR	California High-Speed Rail Authority
CAISO	California Independent System Operator
CNRA	California Natural Resources Agency
CPCFA	California Pollution Control Financing Authority
CPUC	California Public Utilities Commission
CalSTA	California State Transportation Agency
CWDB	California Workforce Development Board
DGS	Department of General Services
DSA	Divison of the State Architect
EDD	Employment Development Department
ETP	Employment Training Panel
GO-Biz	Governor's Office of Business and Economic Development
OPR	Governor's Office of Planning and Research
GO	Office of Governor Edmund G. Brown Jr.
OSFM	Office of the State Fire Marshal
SGC	Strategic Growth Council

Achieve mainstream consumer awareness of ZEV options and benefits

Continued expansion of the ZEV market fundamentally relies on broader consumer awareness of ZEVs. Therefore, achieving mainstream consumer awareness of ZEV options is the highest priority of the 2016 ZEV Action Plan.

Despite the wide variety of light-duty ZEVs available today, most consumers have not considered these vehicles for purchase or lease. According to a recent study, only 19% of Californians have investigated ZEV ownership, test driven a ZEV, or actually own a ZEV. Only 17% of Californians surveyed are aware that the state offers rebates for vehicles.[10]

The portion of Californians who are aware that ZEVs exist and are available must increase significantly to achieve market transformation. In fact, achieving Governor Brown's goal of 1.5 million ZEVs in California requires that 15%—or one out of six—of new car purchases must be ZEVs by 2025. To date, ZEVs have reached up to 3%—one out of approximately 30—of new car purchases. Between 2040 and 2050, nearly 100% of new passenger vehicles sold in California must be ZEVs in order to meet the state's long-term climate goals.[11]

ZEVs, like any new consumer technology, require time for public understanding, acceptance and broad adoption. As a start, more drivers need to know that ZEVs are an attractive and increasingly cost-effective option for their vehicle needs. Also, research demonstrates that peer-to-peer recommendations and direct experience driving or riding in the vehicles continue to be important for consumers who are considering switching to ZEVs. Electrifying public transportation, such as transit buses and passenger rail, will also provide Californians with multiple points of ZEV technology exposure.

This priority area for the 2016 ZEV Action Plan primarily focuses on the light-duty vehicle market, where individual consumers are central to market expansion, rather than the medium-duty and heavy-duty market. The market for medium- and heavy-duty vehicles is ultimately driven by business decisions of larger organizations, such as ports and large freight companies, as well as small businesses. Promoting awareness of ZEV technologies in this business environment is important, but fundamentally different than building awareness among mainstream vehicle consumers.

Light-Duty

Significantly increase consumer familiarity, knowledge and interest in ZEVs	Lead	Supporting	Timeframe
Develop a broad, statewide consumer awareness campaign for light-duty ZEVs that aims to reach the public with a coordinated, simple message. This effort will require public-private partnerships and should coordinate with both PEVC and CaFCP.	GO	CARB, CEC, CPUC	2017
Explore working with the U.S. Department of Energy to initiate a national education campaign on ZEVs.	GO	CARB, CEC, CPUC	2017

10 http://www.arb.ca.gov/research/apr/past/12-332.pdf
11 http://www.arb.ca.gov/regact/2014/zev2014/zev14isor.pdf
12 For example, the PEVC recently proposed a public-private partnership concept aimed at rapidly accelerating ZEV sales in California through a broad public outreach and hands-on experience campaign.

Significantly increase consumer familiarity, knowledge and interest in ZEVs (cont.)	Lead	Supporting	Timeframe
Support a public campaign that enables 20 million test drives of ZEVs by Californians in all regions of the state by 2025, working with national, regional and local partners.	GO	CARB, CEC, CPUC	2017
Increase familiarity of ZEVs by promoting ZEV use in car sharing services, rental car opportunities, and carpool and vanpool programs.	CARB	--	2016, Ongoing
Expand targeted car sharing and van pooling in disadvantaged communities, including programs in the Central Valley to transport farm workers, beyond pilot projects.	CARB	--	2016, Ongoing

Increase visibility of ZEV benefits and fueling options	Lead	Supporting	Timeframe
Use DMV registration mailings to provide information to consumers about the benefits of ZEV ownership and incentives. For example, upon payment of vehicle registration each year, the DMV would mail ZEV information with registration stickers.	DMV	CARB	January 2017
Expand consumer awareness of High Occupancy Vehicle (HOV) and High Occupancy Toll (HOT) lane access for ZEVs, including approving and installing highway signs that indicate this access.	Caltrans	DMV	Ongoing
Facilitate installation or update signage directing consumers to PEV charging and hydrogen fueling stations.	Caltrans	CEC	Ongoing
Support utility efforts, including partnerships between utilities, infrastructure developers and other stakeholders, to accelerate the adoption of ZEVs and educate consumers about the benefits of ZEV transportation. Identify appropriate approaches for utility investment in education and outreach programs that build awareness of ZEVs in low-income, moderate-income and disadvantaged communities.	CPUC	--	2016, Ongoing
Support broad-scale commercialization of zero-emission fuels to increase access, consumer awareness and confidence in ZEV technologies. Consumers become comfortable with products and technologies they see in use every day.	CDFA	--	Ongoing
Improve the state's DriveClean.ca.gov website to integrate ZEV information from relevant state agencies and provide more useful and user-friendly information to consumers about the cost of ZEV ownership and their eligibility for incentives. Consider utilizing mixed media platforms, including social media, stories, photos and videos of driving experiences.	CARB	--	2017
Better publicize the Governor's Environmental and Economic Leadership Award (GEELA) category for dealerships to ensure dealers are aware of the opportunity. Consider a new category of GEELA awards to recognize outstanding efforts for public and private fleets leading in ZEV acquisition and infrastructure deployment.	CARB	CalEPA	2017

Medium- and Heavy-Duty

Expand use of zero-emission buses in public transportation	Lead	Supporting	Timeframe
Consider adopting a regulation to transform transit fleets to zero-emission technology. Consider setting a target number of zero-emission buses in public, private, and school fleets by 2020.	CARB	--	2017
Consider sponsoring zero-emission bus riding events in local communities.	CARB	--	2017
Support zero-emission school bus deployments, especially in low-income and disadvantaged communities, throughout California. Reach out to school boards and facilities managers with educational materials. Provide funding to enhance the Lower-Emission School Bus Program for replacement buses.	CARB	--	2016, Ongoing
Establish a partnership between state government, bus manufacturers and suppliers, and local transit agencies to share information about zero-emission technology development on an ongoing basis, align supply and demand for these technologies and coordinate to identify and overcome barriers to zero-emission bus deployment.	GO	CARB	2016, Ongoing
Support implementation of CaFCP's Fuel Cell Electric Bus Roadmap which outlines a pathway to deploy zero-emission fuel cell electric buses in preparation for commercialization.	CARB	--	Ongoing
Utilize Greenhouse Gas Reduction Funds appropriated for public transportation to prioritize pilot projects that validate the operational capacity of zero-emission buses and support the purchase and operation of zero-emission public transit. Conduct outreach to help transit agencies find and understand state and federal funding opportunities.	CalSTA, Caltrans	CARB	2016, Ongoing

Build consumer awareness and public visibility of other medium- and heavy-duty technologies	Lead	Supporting	Timeframe
Consider adopting a rule to transform shuttle bus service in universities to zero-emission technologies.	CARB	--	2018
Consider funding for zero-emission shuttle buses that operate at airports, rental car facilities and other visible applications.	CARB	--	2017
Establish a consumer-oriented information clearinghouse website for medium- and heavy-duty vehicles and equipment.	CARB	Caltrans, GO-Biz	2017
Consider hosting a medium and heavy-duty zero-emission fleet forum, or similar venue, to increase awareness of fleet incentives and opportunities. Engage small businesses and rural communities through new and existing efforts including the California Freight Advisory Committee.	CARB, Caltrans	--	2017

Build consumer awareness and public visibility of other medium- and heavy-duty technologies (cont.)	Lead	Supporting	Timeframe
Consider hosting forums to discuss the status of the zero-emission vehicle market, including supply chains, technology development, commercial viability and the role of regional and local economic development organizations in supporting this industry. Tailor forums to various stakeholder groups as appropriate: vehicle owners, facility owners, utilities, ratepayers, and others.	GO-Biz, CEC	--	2017
Establish a sustainable freight think tank to provide foresight into the innovative future of freight transport and identify the transformative technologies, solutions, partnerships and critical steps for implementation.	CARB	--	Ongoing

Deliver high-speed rail across the state	Lead	Supporting	Timeframe
Complete necessary planning, mitigation and pre-development activities and continue to construct the high-speed rail system from Los Angeles to San Francisco.	HSR	--	Ongoing
Complete local and regional public transit improvements to modernize and integrate transit systems and support additional ridership on zero-emission transit vehicles.	CalSTA, Caltrans	HSR	Ongoing
Include zero-emission transit strategies in the upcoming State Rail Plan and the Statewide Transit Strategic Plan.	Caltrans	--	2018, Ongoing
Ensure the state meets its commitment that high-speed rail is powered by 100% renewable energy.	HSR	--	Ongoing

Make ZEVs an affordable and attractive option for drivers

The state can make ZEVs an affordable and attractive option for California drivers by maintaining incentives, making it easier to obtain them, and promoting broad access to vehicles and infrastructure. Until economies of scale lead to cost reductions and a fully self-sustaining ZEV market, both financial and non-monetary incentives will continue to play a critical role in making ZEVs cost competitive with conventional vehicles. As the ZEV market continues to grow, the state will continue to refine incentive programs to effectively target incentives where they motivate consumer decisions and achieve the greatest impact.

For light-duty ZEVs, rebates continue to stimulate purchases. As of summer 2016, the Clean Vehicle Rebate Project provided over 150,000 consumer rebates.[13] The program now includes an income cap for higher-income consumers that allows for increased rebates for low- and moderate-income consumers. Increased dealership engagement and positive consumer experiences are critical to expanding the ZEV market. Providing broader support to dealerships to develop ZEV expertise, along with supportive services and products, will improve consumer confidence as expanded audiences become more familiar with ZEV technology.

As medium- and heavy-duty zero-emission technologies become a widespread market reality, continued efforts to reduce lifecycle costs and support early deployment projects will increase viability. In addition to tracking market growth for medium- and heavy-duty zero-emission technologies, the state can provide necessary platforms to share solutions and early market data across jurisdictions for complex, interconnected freight transportation systems.

Light-Duty

Reduce upfront cost of owning or leasing a ZEV	Lead	Supporting	Timeframe
Develop and implement a long-term plan for the Clean Vehicle Rebate Project (CVRP) that identifies funding needs, and appropriate income limits, to support and accelerate the deployment of ZEVs to reach the 2020 and 2025 ZEV adoption goals and to ensure broad accessibility. This includes a strategy to refine the program over time as increasing volumes are sold, ensure that the CVRP, the Enhanced Fleet Modernization Program (EFMP), and other incentive programs make ZEVs accessible to lower-income consumers and stimulate use of ZEVs in areas disproportionately impacted by air pollution, and incentivize adoption of ZEVs by new and existing fleets.	CARB	--	2016, Ongoing
Continue to consider point of sale programs for lower-income ZEV buyers to reduce the amount of down payment required.	CARB	--	Ongoing
Consider a statewide financial assistance program for low- to moderate-income individuals leasing or purchasing ZEVs that would provide a loan loss guarantee for financial institutions or buy down interest rates.	CARB	--	2017, Ongoing

13 https://cleanvehiclerebate.org/eng/rebate-statistics

Reduce upfront cost of owning or leasing a ZEV (cont.)	Lead	Supporting	Timeframe
Fund community-based pilot programs for the Enhanced Fleet Modernization Program (EFMP) that improve outreach to low-income consumers and increase clean vehicle replacement through low-interest financing and financial counseling.	CARB	--	2017, Ongoing
Consider a reduction in sales tax, registration fees and local air quality fees for ZEVs.	GO	--	2017

Help dealers promote leases and sales	Lead	Supporting	Timeframe
Provide broader state support for dealerships. Explore models for incentives to dealers and provide concise informational materials to help educate sales staff about ZEVs. Increase collaboration with EDD to leverage potential funding opportunities for sales staff training.	CARB	EDD	2017
Create simple, consistent, consumer-focused informational materials explaining state and federal incentives to display in dealer showrooms. Coordinate with DMV mailers.	CARB	DMV	2017

Maintain and expand non-monetary incentives	Lead	Supporting	Timeframe
Maintain ZEV access to High Occupancy Vehicle (HOV) and High Occupancy Toll (HOT) lanes.	Caltrans	--	Ongoing
Assess strategies to integrate ZEVs with local mass transit such as discounted fees and preferential parking.	OPR	--	2017
Provide templates for local governments and private companies to establish preferential parking policies for ZEVs and encourage these policies.	OPR	CARB	2017
Consider providing free or discounted access for zero-emission off-highway vehicles in certain recreational areas.	State Parks	CARB	2017
Create an inventory of all off-highway motor vehicle recreation trails best-suited for ZEV use (include charging opportunites and distance between locations). Increase presence of ZEV options in off-highway motor vehicle recreation promotional and information.	State Parks	---	2017
Consider regulations that would create or expand upon emissions-based credit programs for zero-emission motorcycles, off-highway recreational vehicles, off-highway utility vehicles, and small off-road engine emissions equipment.	CARB	--	2018

Medium- and Heavy-Duty

Reduce cost of ownership	Lead	Supporting	Timeframe
Explore ways to reduce the upfront cost of heavy-duty zero-emission vehicles through various market-based strategies, such as a sales tax waiver on the entire or incremental cost, preferential lanes, and low interest loans. Other states typically do not charge sales tax on public transit buses.	GO	--	2017
Consider additional funding for zero-emission public transit buses, as buses will provide technology transfer to other medium- and heavy-duty vehicle sectors.	GO	CARB	2016, Ongoing
Consider increasing the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP) voucher amount per bus for zero-emission heavy-duty buses to help cover the incremental cost for the vehicle's weight class. As bus costs decrease due to battery and fuel cell economies of scale, consider reducing voucher amounts proportionally.	CARB	--	2018, Ongoing
Consider modifying financial incentives for zero-emission heavy-duty vehicles to include repowered vehicles, remanufactured vehicles, and aftermarket up-fits of hybrid and electric drive technologies.	CARB	--	2017
Consider incentives to convert existing diesel-fueled rail, including freight and passenger light rail, to ZEV technology.	CARB	CEC	2018, Ongoing
Consider long-term funding strategies for the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program.	CARB	CEC	2016, Ongoing
Work with air districts and stakeholders to develop a strategy to secure sufficient incentives to accelerate fleet turnover and enable outreach to fleet owners.	CARB	--	Ongoing
Extend credit generation opportunities under the Low Carbon Fuel Standard to zero-emission and near zero-emission freight transportation applications.	CARB	--	2017
Support the Air Quality Improvement Program (AQIP) and Low Carbon Transportation Funding Plan to accelerate and expand adoption of certified zero- and near zero-emission vehicles and equipment, and introduce incentives for the production of very low carbon fuels for vehicles and equipment that do not yet have zero-emission technology options.	CARB	--	2016

Expand demonstration and early deployment	Lead	Supporting	Timeframe
Adopt and implement the Innovative Technology Regulation to provide near-term certification flexibility to encourage development of the next generation of innovative medium- and heavy-duty engine and vehicle technologies, particularly plug-in hybrid trucks and buses with significant all-electric range.	CARB	--	2016
Establish a verification process for zero-emission trucks and buses that confirms manufacturer performance claims.	CARB	--	2020
Ensure continued investments in advanced technology demonstrations and deployments under the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) to provide transportation solutions in medium-, heavy-duty and freight sectors.	CEC	--	Ongoing
Consider demonstration-phase incentives and subsequent regulations to require purchase and use of medium- and heavy-duty zero-emission technologies in airport ground support equipment, airport shuttles, forklifts in distribution centers, warehouse delivery, rail yards, transport refrigeration units and other applications.	CARB	--	2018-2019
Pilot the use of medium- and heavy-duty ZEV technologies in high-speed rail construction efforts, where appropriate.	HSR	--	2016, Ongoing
Consider adopting a last-mile delivery regulation.	CARB	--	2018
Support the CaFCP's Medium- and Heavy-Duty Fuel Cell Electric Vehicle Action Plan to evaluate technology development status, barriers to adoption and potential actions needed to advance ZEV technologies.	CARB, CEC	--	2016, Ongoing

Support data and research accessibility	Lead	Supporting	Timeframe
As ZEVs expand in more sectors, conduct a survey of relevant medium-, heavy-duty and freight stakeholders to assess their awareness of available technologies in their sector and willingness to develop, demonstrate or deploy these technologies. Include information on relevant incentives.	CARB	--	2017
Gather data on medium- and heavy-duty ZEV deployment status in California and nationally, and make these data publicly available (e.g., similar to the PEVC's sales tracker).	CARB	--	2017

Ensure convenient charging and fueling infrastructure for greatly expanded use of ZEVs

California has made considerable progress deploying ZEV infrastructure, but much more remains to be done. A massive scale up of charging and fueling stations is needed to support 1 million ZEVs by 2020 and 1.5 million ZEVs by 2025. The consumer confidence needed to adopt light-duty ZEVs relies in large part on adequate charging and fueling infrastructure. Medium- and heavy-duty ZEV deployments will also require expanded infrastructure capabilities to increase market viability.

In 2014, the state completed an initial analysis of the number of PEV charging stations required to meet ZEV goals.[14] The analysis suggests upwards of 1,000,000 charge points are needed at homes, workplaces and public locations by 2020. Excluding home charging, there are approximately 11,000 charge points in California, supporting more than 230,000 PEVs on the road.[15] As of summer 2016, 22 hydrogen stations are open to consumers for retail fueling, enabling FCEV drivers to travel between and around Los Angeles, Orange County, Santa Barbara, Sacramento, the San Francisco Bay Area and Lake Tahoe. Three dedicated hydrogen stations support 20 fuel cell electric buses (with another 11 on the way), and 61 battery electric buses deliver service to 8 distinct transit regions.[16] This network will need to grow to 100 stations to enable FCEVs to reach beyond early adopters and will need to continue to add capacity to keep up with projected demand. A variety of medium- and heavy-duty freight transportation pilot projects have been developed, but additional efforts are required to scale the market and facilitate infrastructure growth for ZEV technologies in freight applications.

Light-Duty

Support infrastructure planning and investment by public and private entities	Lead	Supporting	Timeframe
Develop and implement strategies to ensure that publicly-funded PEV chargers remain open, reliable and convenient to the general public. Similar operations and maintenance funding already exists for hydrogen stations.	CEC	--	2017
Develop guidance for utility investment, evaluate utility proposals and monitor implementation of PEV charging infrastructure deployments.	CPUC	--	2016, Ongoing
Establish a data collection system on PEV charging infrastructure usage, reliability, location and other relevant data to inform and make recommendations that improve infrastructure planning and subsequent reductions in infrastructure costs. This effort would support broad PEV grid impact analyses.	CEC	CARB, CPUC	2017
Address PEV charging station congestion in areas of high adoption by exploring and demonstrating new charging and pricing strategies to deploy stations and expand infrastructure capacity where necessary.	CEC	--	Ongoing
Assess and develop strategies to increase availability of PEV charging and hydrogen fueling stations in areas of low PEV and FCEV adoption and in disadvantaged communities.	CEC	--	Ongoing

14 http://www.nrel.gov/docs/fy15osti/60729.pdf
15 http://www.afdc.energy.gov/fuels/electricity_locations.html
16 Zero-emission bus data from the California Air Resources Board.

Support infrastructure planning and investment by public and private entities (cont.)	Lead	Supporting	Timeframe
Consider providing additional incentives for PEV charging and hydrogen fueling from renewable energy sources.	CEC	--	2017
Create resources and outreach opportunities to broaden the diversity of stakeholders that are aware of and benefit from ZEV grant opportunities.	CEC	--	Ongoing
Expand utilization of CPCFA's Electric Vehicle Charging Station Financing program. Consider modifications to the program, such as improving outreach efforts, reducing barriers to utilization and piloting with diverse technology to expand the program's effectiveness.	CPCFA	CEC	2016
Maintain infrastructure support through ongoing oversight of the retail fueling businesses serving ZEV owners and operators. Both PEV and FCEV dispensing equipment must be evaluated, approved and monitored to ensure accurate, equitable and legal trade is maintained.	CDFA	--	Ongoing
Provide outreach to ZEV fuel providers and retailers regarding the advertising, labeling and method of sale requirements to ensure a consistent retail environment.	CDFA	--	2016
Continue to issue an annual FCEV and hydrogen fueling station network evaluation to guide future investments in hydrogen supply infrastructure – including anticipated geographic distribution, coverage and data needed to prioritize station locations – and support market expansion of FCEVs and renewable hydrogen production.	CARB	CEC	2016, Ongoing
Collaborate with industry and applicable associations to develop a ZEV infrastructure database to identify market participants, best practices and case studies.	CEC	GO-Biz	2017
Encourage the installation of PEV charging infrastructure at select campgrounds and off-highway recreational vehicle areas, enabling the use of zero-emission off-highway vehicles and encouraging the use of light-duty PEVs for long-distance trips.	State Parks	CEC	2017
Complete a robust planning effort to identify park units most likely to experience high demand for ZEV infrastructure (consider proximity to large population centers, popular destinations, and ZEV ownership within a certain radius of the park unit.)	State Parks	--	2017
Assess options to increase electric grid capacity and charging options at remote park units.	State Parks	CPUC	2017

Support local efforts to prepare communities for an increase in ZEVs on the road	Lead	Supporting	Timeframe
Monitor local government adoption of the California Green Building Standards Code PEV charging infrastructure requirements (including "reach" standards), as well as the conversion rate of PEV-capable infrastructure into actual chargers in new construction.	CARB	CBSC	Ongoing
Monitor publication and dissemination of newly adopted PEV charging station accessibility standards and continue to provide educational outreach, technical support and assistance.	DSA	--	Ongoing
Publish a fact sheet for PEV charging accessibility standards.	DSA	--	October 2016
Pursue strategies to promote conversion of parking spaces to PEV charging spaces in new or existing destination, commercial and workplace locations without jeopardizing requirements or use permits relating to total number of parking spaces.	CARB	CBSC, DSA	2017
Incorporate PEV charging infrastructure into high-speed rail station sites in coordination with local jurisdiction ZEV infrastructure planning.	HSR	--	Ongoing
Encourage the installation of energy storage and other demand-side management infrastructure related to ZEVs as part of the Greenhouse Gas Reduction Fund investments made by agencies such as Caltrans, through the Transit and Intercity Rail Capital and Low Carbon Transit Operations programs, and the Strategic Growth Council, through the Affordable Housing and Sustainable Communities program, in order to manage PEV charging with the grid and support hydrogen storage and production.	Caltrans, SGC	CalEPA, OPR	Ongoing
Encourage Metropolitan Planning Organizations (MPOs) to develop and adopt regional ZEV infrastructure plans and policies as part of their regional transportation corridor planning, including coordination of station maintenance to ensure ongoing charging and fueling availability.	Caltrans	CEC	2016, Ongoing
Coordinate with the Federal Highway Administration and Metropolitan Planning Organizations (MPOs) to raise awareness of the option to use Congestion Mitigation & Air Quality (CMAQ) grant funding to support PEV charging and hydrogen fueling station deployment for public access and fleet applications.	Caltrans	CARB	2016
Update *Zero Emission Vehicles in California: Community Readiness Guidebook* initially published in 2013.	OPR	GO-Biz	2016
Continue to support activities identified in Regional ZEV Readiness Plans such as infrastructure permitting, siting and installation processes as well as ZEV awareness, local government code adoption and training, ZEV charging and fueling infrastructure signage and the development of new regional ZEV readiness plans.	CEC	CARB, Caltrans	Ongoing

Support local efforts to prepare communities for an increase in ZEVs on the road (cont.)	Lead	Supporting	Timeframe
Work with local governments to identify permitting and development issues for PEV charging installations. Develop a plan to improve processes and help reduce costs. Leverage CEC Regional ZEV Readiness Plans and other existing resources.	GO-Biz	OPR, CBSC	2017
Continue to disseminate best practices to PEV charging station owners and operators.	OPR, GO-Biz	DGS	Ongoing
More widely disseminate the interpretation of existing law that the offering of free public PEV charging by state and local government entities is not considered a gift of public funds.	GO	--	2016
Explore opportunities to assess the technical and financial feasibility of PEV charging infrastructure at schools where projects feature co-location of distributed energy generation with infrastructure for light-duty ZEVs and zero-emission school buses.	CEC	--	2016

Make home charging easy to install and use, with a special focus on Multi-Unit Dwellings (MUDs), disadvantaged and low- and moderate-income communities	Lead	Supporting	Timeframe
Continue to increase the number of PEV-capable parking spaces in new residential buildings. Assess strategies to increase PEV charging options in existing residential buildings.	HCD	CBSC, CARB	2017
Explore funding options for PEV charging infrastructure installations in disadvantaged, low- and moderate-income communities and neighborhoods with a high concentration of MUD complexes.	CEC	HCD	2016
Explore incentives for managers and property owners of existing residential buildings to install make-ready PEV infrastructure and charging equipment. Coordinate with existing pilot programs and investments.	CEC	CARB, CPUC, HCD	2016
Support regional collaboration to increase PEV infrastructure in MUDs, such as pilot programs, case studies of success stories and outreach to property owners and decision makers. Leverage PEVC working group and materials on this topic.	GO-Biz	--	Ongoing

Support major expansion of workplace charging	Lead	Supporting	Timeframe
Expand types of financial incentives for employers and commercial property managers to install workplace PEV charging, including the possibility of a simple rebate that reduces costs for employers to install PEV charging.	CEC	--	2017
Ensure that businesses that lease buildings and want to install PEV charging stations will not be prevented from doing so by their landlords.	GO	--	2016, Ongoing

Support major expansion of workplace charging (cont.)	Lead	Supporting	Timeframe
Consider incentives for workplaces to install make-ready infrastructure and PEV charging equipment, including incentives for grid-integrated charging. Coordinate with existing pilot programs and investments.	CPUC	--	2016
Work directly with the PEVC, CaFCP and other relevant parties to amplify workplace charging outreach efforts and increase awareness of PEV charging and hydrogen fueling options for employees.	GO-Biz	CEC, CPUC	2016, Ongoing

Support expansion of DC fast-charging networks	Lead	Supporting	Timeframe
Track the development of DC fast chargers across California to identify where gaps may exist between regions. Continue funding or other incentives to stimulate station development along interregional corridors.	CEC	--	2017
Install public DC fast chargers at a minimum of 30 locations, including highway rest stops and other strategically located Caltrans properties. Utilize the CEC DC fast charger corridor gaps analysis related to the West Coast Electric Highway to inform decisions.	Caltrans	CEC, CARB, GO-Biz	2018

Ensure a network of hydrogen fueling stations to support the commercial launch of FCEVs	Lead	Supporting	Timeframe
Build out an initial network of 100 hydrogen fueling stations while continuing to assess the pace of FCEV fleet size expansion, projections of consumer need and the status of hydrogen fueling technologies and costs, as required by AB 8.	CEC	CARB, GO-Biz	2023
Identify at least three strategically located Caltrans properties to support development of retail hydrogen stations.	Caltrans	CEC, CARB GO-Biz	2016
Explore the placement of hydrogen fueling stations at rest stops.	Caltrans	CEC, CARB GO-Biz	2016
Continue to work with utilities to streamline power connections for hydrogen stations.	GO-Biz	--	Ongoing
Expand incentives or strengthen revenue streams available to early market hydrogen station and fuel providers, including Low Carbon Fuel Standard credits, and enhance outreach to hydrogen providers.	CARB	CPUC, CEC	2017
Establish a reciprocal supportive relationship with federal agencies interested in operating FCEV fleets with the purpose of building public hydrogen stations on federal property in California.	GO-Biz	CEC	Ongoing
Support hydrogen proposals for federal Renewable Identification Numbers (RINs) to further incentivize renewable hydrogen in California.	CEC, CARB	--	2017

Ensure a network of hydrogen fueling stations to support the commercial launch of FCEVs (cont.)	Lead	Supporting	Timeframe
Develop and implement the Hydrogen Station Equipment Performance (HyStEP) device to ensure hydrogen fuel dispensers follow industry standard protocols in SAE J2601.	CDFA, CARB	--	2017
Work with the U.S. Department of Energy to develop hydrogen contamination detectors.	CDFA, CARB	--	2018
Continue to certify the accuracy of hydrogen fuel dispensers.	CDFA	--	Ongoing
Explore measures to help station operators reduce the retail price of hydrogen fuel.	CEC, CARB	GO-Biz	2018
Proactively support the permitting and acceptance of hydrogen stations through direct outreach to local permitting authorities and community influencers.	GO-Biz	--	Ongoing
Identify state fire training instructors to undergo "Train the Trainer" and work with the CaFCP to integrate a proactive training program for first responders located in communities with hydrogen stations.	OSFM	--	2017

Integrate charging and hydrogen production to optimize use of the state's electricity infrastructure	Lead	Supporting	Timeframe
Expand scope of vehicle-grid integration (VGI) interagency task force to ensure technology research is coordinated with the development of standards, procurement policies and tariffs. Help ensure vehicle interactions with the energy system are harmonized across utility territories and ratepayer investments return maximum benefits for the grid.	CPUC	GO, CAISO	2016
Support state- and federally-funded VGI pilots that help commercialize applications that aggregate vehicles as distributed energy resources, enhance communication, and control functionality between vehicle and grid infrastructure, and derive value for vehicles (PEV or FCEV) as flexible load and storage in grid support applications. Recognize and leverage research initiatives to assess the grid impacts of an integrated transportation and electricity system by exploring partnerships with laboratories, industry and academia.	CPUC	CEC, CAISO	Ongoing
Explore funding strategies and initiatives (informed by VGI pilot projects) to develop renewable hydrogen from surplus renewable energy and link to transportation end-uses.	CEC	--	2016
Develop or enable operational strategies and rate designs for charging and hydrogen fueling infrastructure that both protect against negative grid impacts and minimize costs. This can include PEV electricity rates that encourage vehicle adoption, utilize home or workplace electrical infrastructure and optimize electric grid performance, including integration of renewable energy and avoidance of grid congestion.	CPUC	CAISO	2016, Ongoing

Medium- and Heavy-Duty

Support medium- and heavy-duty zero-emission infrastructure planning by public and private entities	Lead	Supporting	Timeframe
As medium- and heavy-duty ZEVs approach commercial viability outside of fleet operations, establish a regional network plan for public charging and hydrogen infrastructure.	CEC, CARB	--	2019
Evaluate potential for state-owned land to provide no-cost leasing options for public transit agencies or fleets to build charging or fueling infrastructure.	Caltrans, DGS	CARB	2017
Continue to develop standards and protocols to evaluate hydrogen and electric medium- and heavy-duty fueling. Efforts should include the standards, specifications and legal requirements adopted by CDFA for ZEV fueling dispensers.	CARB	CDFA	Ongoing
Consider infrastructure co-location opportunities that can support light-duty, medium-duty and heavy-duty electric vehicle charging and hydrogen fueling station applications in connector site stations (stations along major routes that connect distinct areas of high potential for PEV and FCEV adoption).	CARB, CEC	GO-Biz	Ongoing
Identify opportunities to utilize additional renewable electricity generation and daytime over-generation for the fueling of zero-emission vehicles and equipment in the freight sector.	CEC	--	Ongoing

Expand funding opportunities for medium- and heavy-duty infrastructure	Lead	Supporting	Timeframe
Assess infrastructure requirements and consider prioritizing funding for infrastructure to support zero-emission medium and heavy-duty vehicles.	CEC	CARB	2017, Ongoing
Provide funding for research, development and demonstration focused on improving fueling infrastructure for medium- and heavy-duty zero-emission vehicles through technology advancement, equipment optimization, cost reduction and ease of scaling up.	CEC	CARB	2019
Explore opportunities for utilities to support charging infrastructure for transit fleets and other medium- and heavy-duty customers.	CPUC	--	2017
Consider expanding state funding programs and advocate for expanded federal funding to support expansion of ZEV infrastructure for public and private fleets.	CEC	--	Ongoing

Complete integrated freight planning efforts	Lead	Supporting	Timeframe
Complete a long-term plan for sustainable freight transport that meets all requirements of Executive Order B-35-12 including establishing targets, identifying public policies, programs and investments to achieve the targets, and initiating work on pilot projects.	GO	CalSTA, Caltrans, CARB, CEC, CalEPA, CNRA, Go-Biz	July 2016
Support development of key infrastructure projects that will help enable adoption and operation of zero-emission technologies along major freight corridors, at the ports of Los Angeles, Long Beach and Oakland, at freight distribution centers and hubs and as part of connected vehicle transportation systems.	Caltrans, CARB	CEC	2016, Ongoing
Leverage available planning funds, in collaboration with the state's Metropolitan Planning Organizations (MPOs), to evaluate implementation of zero-emission technologies in freight corridors, intelligent transportation systems and reflect planning efforts in regional transportation plans.	Caltrans	CEC, CARB	Ongoing
Update the project selection criteria in the state's Trade Corridor Investment Fund and other freight-related transportation infrastructure funding programs to ensure projects that integrate zero-emission technologies receive appropriate recognition of benefits in the project selection process.	Caltrans	--	2016, Ongoing
Work with the State Legislature to enact legislation that enables distribution of federal Fixing America's Surface Transportation Act funds based on high-priority state and regional improvements to California's freight corridors as identified in transportation plans and programs.	Caltrans	--	2016, Ongoing

Ensure electricity rates are fair and reasonably enable the electrification of public transportation and freight	Lead	Supporting	Timeframe
Consider approaches to help mitigate or manage demand charges for high power uses such as electric buses, fast chargers, transit systems, hydrogen production and freight movement by evaluating effectiveness of rate designs and complementary deployment of energy management, distributed generation and energy storage measures.	CPUC	CARB	2016, Ongoing
Evaluate commercial electricity tariffs that could be applied to public transit, fleets and the freight sector that encourage electrification, promote efficient utilization of grid resources and allow for recovery of utility capital costs.	CPUC	CAISO	2016, Ongoing

Maximize economic and job opportunities from ZEV technologies

California's policy climate, geography, talent base and financial incentives drive market potential making it a center of ZEV technology development, innovation and manufacturing. Major ZEV companies are headquartered and manufacturing in California, and nearly every major automaker has an office and workforce in the state. In addition to traditional automotive design and production, California-based companies are leading the way in autonomous driving, ride-sharing and other connected transportation systems. These technologies, in California and around the world, are ushering in a new transportation paradigm.

The ZEV market in California continues to present a significant economic opportunity for the state. Companies developing ZEV technologies benefit from locating in California. New, innovative job opportunities exist throughout the supply chain ranging from machinists and vehicle mechanics to sales and engineering specialists. ZEV-related manufacturing often creates stable, high-paying jobs with transferable skills for both vehicle and infrastructure applications. Moving forward, state government will play a central role connecting regions to share best practices, gathering economic data to measure ZEV market growth and ensuring our workforce is trained to meet future needs.

Light-Duty

Promote transparency on the impact of ZEV companies and their technology development in California	Lead	Supporting	Timeframe
Create a core workgroup of leaders from state agencies and regional industry partnerships to conduct ongoing benchmarking of the state's ZEV sector, including identifying existing and new companies located in California, job growth, in-demand skills, region-specific sector data and other key statistics to ground economic development efforts in a shared understanding across regions.	GO-Biz	CWDB, CEC	2017
Establish a ZEV industry classification strategy to streamline ZEV-related economic data collection and establish a database of ZEV economic activity.	GO-Biz	EDD	2017
Continue to identify and connect ZEV-related companies to available incentive opportunities.	GO-Biz	ETP	Ongoing
Expand funding support for California manufacturers producing ZEVs and components through CEC and the State Treasurer's Office.	CEC	CAEATFA	Ongoing
Support the participation of diverse business enterprises in the ZEV value chain through available state funding programs.	CEC	ETP	Ongoing
Host a forum, or similar venue, to discuss the status of ZEV market technology and long-term sustainability, including supply chains, technology development, workforce expansion and the role of regional and local economic development organizations in supporting this industry. Encourage small businesses to participate.	GO-Biz	CEC, ETP	2017

Support demonstration and commercialization of ZEV technologies by California companies	Lead	Supporting	Timeframe
Establish strategies to improve the ability of small businesses to deploy ZEVs in their fleets.	CEC, CARB	GO-Biz	2017
Engage automotive and technology industries to develop a strategy to maximize the number of fully autonomous vehicles that are ZEVs.	GO, OPR	CARB, CEC	2017
Support new market opportunities for battery recycling and develop a commercialization pathway for second life applications of PEV batteries, including creating an ongoing stakeholder dialogue for feedback and recommendations.	CEC	CPUC	2017
Investigate how the state could support efforts to improve the customer/host experience as well as the driver experience, including software development, mobile apps, in-vehicle navigation, pricing and other elements provided by technology companies.	GO-Biz	--	Ongoing

Support ZEV workforce expansion and regional collaboration	Lead	Supporting	Timeframe
Support regional ZEV industry partnerships that integrate economic development and workforce strategies to create jobs and prepare workers for opportunities in the advanced transportation sector. Create a system for information sharing.	GO-Biz	CWDB, HSR, ETP	2017
Develop and implement strategies to utilize California's Innovation Hub (iHub) network as a foundation for coordination to help ZEV-related companies leverage regional expertise and resources. Connect existing, new and relocated businesses to the iHub network, CWDB and other outside resources.	GO-Biz	CWDB, ETP	2017
Promote development of ZEV maintenance programs at state universities and community colleges and peer mentoring among current ZEV mechanics.	GO-Biz	CWDB	2017
Facilitate and encourage cross-regional peer collaboration with the aim of joint learning and solutions by documenting and sharing regional best practices (such as ZEV outreach templates, training modules and infrastructure permitting procedures), addressing common barriers to ZEV adoption across regions and jointly advocating for policy solutions.	CEC	GO-Biz, OPR, CWDB	Ongoing

Medium- and Heavy-Duty

Increase business-related support for medium-, heavy-duty and freight technologies	Lead	Supporting	Timeframe
Work with companies in the zero-emission medium-, heavy-duty and freight supply chains to understand what they need to manufacture in California. Facilitate collaboration among state, local and federal partners to maximize in-state manufacturing opportunities.	GO-Biz	ETP	Ongoing
Provide funding to public transit agencies with zero-emission bus operating experience and community colleges to create an education and training curriculum that can be used by other fleets.	CARB	GO-Biz, Caltrans	2017
Convene stakeholders to identify and implement steps to ensure that the existing and future workforce meets the needs of the California transport system.	GO-Biz	CWDB, ETP	2017
Establish a robust, integrated system of pre-apprenticeship pipelines and journey-level upskilling programs in the top twenty mission-critical occupations in the freight industry.	GO-Biz	CWDB	2017
Span the state with a network of regional training partnerships, driven by local industries and connected to seamless supply-side coalitions of community, workforce, labor and education partners, that can guarantee a consistent, high-quality supply of skilled labor to manufacture, build, operate and maintain the state's zero emissions freight infrastructure.	GO-Biz	CWDB, ETP	2017
Develop a freight handbook document that identifies best practices for the siting, design and operation of freight facilities that minimizes exposure to air toxics, incorporates the use of clean technologies and alternative fueling infrastructure and maximizes the capacity of transportation infrastructure.	CARB, Caltrans, CEC	--	2016

Bolster ZEV market growth outside of California

While California is a leader in ZEV deployment, transformation of the transportation sector will ultimately require collective efforts from jurisdictions worldwide. Every ZEV sold outside of California benefits our state by growing economies of scale and reducing greenhouse gas emissions. California can learn from experiences in other jurisdictions, where different strategies have proven successful, and share our own insights as well.

Under the leadership of Governor Brown, the state has taken several actions to expand the ZEV market worldwide. In 2013, Governor Brown helped organize governors from seven other U.S. states to sign a Memorandum of Understanding, and subsequently develop the Multi-State ZEV Action Plan, to reach a target of 3.3 million ZEVs in these jurisdictions by 2025. In the same year, California joined Oregon, Washington and British Columbia to establish a goal of 10% ZEVs in public and private fleets by 2016. Soon after, the West Coast Electric Fleets initiative was created to provide peer-to-peer contact among fleet managers and decision-making tools to accelerate adoption.

Most recently, California co-founded the International ZEV Alliance, a collaboration of leading jurisdictions to accelerate the global deployment of ZEVs. The ZEV Alliance includes the Netherlands, Norway, the United Kingdom, Germany, California, the seven states signatories to the Multi-State ZEV Action Plan, British Columbia and Québec. At the United Nations Climate Conference in December 2015, the ZEV Alliance members committed to make all passenger vehicle sales in their jurisdictions ZEVs as fast as possible, and no later than 2050. The jurisdictions are working together on best practices in incentives, the roles of utilities, and consumer outreach. Through these coalitions, and many other channels of cooperation that exist, California will continue efforts to bolster ZEV market growth beyond our state.

Light-Duty

Continue working with the U.S. states that signed a Memorandum of Understanding on ZEV programs in October 2013 and released an Action Plan in May 2014	Lead	Supporting	Timeframe
Support a broad consumer awareness campaign in the ZEV states.	CARB	--	2016, ongoing
Support zevstates.us website that covers information about ZEVs in various states and links to state-specific sites.	CARB	--	Ongoing
Support point of sale rebates in all ZEV states.	GO	CARB	Ongoing
Support non-monetary incentive reciprocity across states.	GO	CARB	Ongoing
Support re-establishment of a federal tax credit for ZEVs.	GO	CARB	Ongoing
Support FCEV infrastructure feasibility study through H2USA, a national public-private partnership to advance FCEVs nationwide.	GO	CARB	Ongoing
Evaluate consumer purchase trends and purchasing decisions.	GO	CARB	Ongoing
Share learning and best practices to help develop codes and standards for ZEV installations across states.	GO	CARB	Ongoing
Support standardized roadside and other signage.	GO	Caltrans	Ongoing

Bolster ZEV market growth outside of California

Build coalitions of jurisdictions working to promote and deploy ZEVs	Lead	Supporting	Timeframe
Expand the International ZEV Alliance and incorporate global best practices into California policies.	CalEPA	GO, CARB, CEC	Ongoing
Share information and experiences with other U.S. states and jurisdictions interested in adopting the ZEV mandate.	CARB	--	Ongoing
Continue and build upon existing partnerships such as the MOU with "Coast to Coast E-Mobility" in the Netherlands and the MOU with Japan's New Energy and Industrial Technology Organization. Explore new partnerships and opportunities for collaboration.	GO	--	Ongoing
Collaborate with governments and public-private partnerships in other jurisdictions leading on hydrogen and fuel cell deployment, such as Japan's Research Association of Hydrogen Supply/Utilization Technology and Germany's National Organization Hydrogen and Fuel Cell Technology.	CARB	CEC, CDFA	Ongoing
Continue to work with U.S. Department of Energy grant project team to leverage combined purchasing power in the development of a nationwide, aggregated ZEV purchasing solicitation and execution of a final nationwide ZEV contract, available for use by most state and local governments.	DGS	GO	Ongoing
Coordinate with the World Bank and the International Monetary Fund to promote the use of grants and financing to support ZEV procurement, PEV charging and hydrogen fueling station deployment for public access and fleet applications.	GO	--	2018

Share technical foundations and best practices	Lead	Supporting	Timeframe
Review best practices in California for investor- and publicly-owned utility efforts to accelerate ZEV adoption and infrastructure deployment in a manner that benefits ratepayers and supports the electrical grid. Seek to disseminate best practices through national or international forums.	CPUC	CEC	2017, Ongoing
Participate in national data collection, analysis and aggregation projects and initiatives developing information about hydrogen fueling science and technologies. For example, investigate hydrogen feedstocks, pathways, station capacities and implementation milestones to optimize the planning and development of California's hydrogen fueling stations.	CEC	--	Ongoing

Share technical foundations and best practices (cont.)	Lead	Supporting	Timeframe
Participate in H2USA and the Hydrogen and Fuel Cell Technical Advisory Committee, a congressionally chartered advisory committee to the U.S. Secretary of Energy, and other national and international standards development organizations to support federal programs to advance fuel cells and hydrogen.	CEC, CARB	GO-Biz, CDFA	Ongoing
Help reduce hydrogen fueling station costs by participating in and encouraging public and private sector partnerships that focus on lowering costs of station development and operations through research and investigations into materials, manufacturing and operations challenges including compression, storage and dispensing.	CEC	--	Ongoing

Medium- and Heavy-Duty

Enable ZEV fleet expansion outside California	Lead	Supporting	Timeframe
Work with Oregon, Washington and British Columbia to implement and expand the West Coast Electric Fleets initiative. Recruit additional public and private fleets to join this effort.	GO	CalEPA, CEC, DGS	2016
Invite the U.S. Conference of Mayors to collaborate on a national municipal fleets ZEV goal and provide the tools and lessons learned from Pacific Coast Collaborative efforts.	CalEPA	--	2016-2017

Support ZEV deployment in medium-, heavy-duty and freight applications worldwide	Lead	Supporting	Timeframe
Work with U.S. Department of Energy to support a major research and development program led by U.S. truck manufacturers for zero-emission medium- and heavy-duty truck power trains.	CARB, CEC	GO-Biz, Caltrans	2017
Collaborate with state and federal agencies, as well as regional air districts, through the U.S. Environmental Protection Agency's Clean Air Technology Initiative (CATI) and other forums to discuss ways to align policies and limited investments to develop technologies that benefit the freight sector.	CARB, CEC	--	Ongoing
Work with the U.S. Environmental Protection Agency and U.S. Department of Energy to establish performance targets for zero-emission heavy-duty vehicles, including zero-emission bus systems-level optimization that reduces cost and weight in conjunction with increased fuel economy.	CARB	--	2017

Support ZEV deployment in medium-, heavy-duty and freight applications worldwide (cont.)	Lead	Supporting	Timeframe
Work with the U.S. Environmental Protection Agency to promulgate more stringent national requirements for newly manufactured locomotives to include technology providing zero-emission track-mile capabilities.	CARB	--	2016
Consider advocating the U.S. Environmental Protection Agency for research, development and demonstration of zero-emission track-mile and zero-emission locomotives.	CARB	--	2017
Collaborate with international ports demonstrating electrification of freight facilities (including warehouse and distribution centers), service equipment and shore power to expand ZEVs globally.	CARB, CEC	--	Ongoing
Advocate for increased funding in the federal transportation bill for zero-emission medium- and heavy-duty vehicle research, development, deployment and procurement programs.	GO	--	Ongoing

Lead by example integrating ZEVs into state government

The State of California strives to be a leader in ZEV adoption by integrating ZEVs into the state fleet, sharing best practices, and expanding workplace charging and incentives for employees. Public entities represent a highly visible area for ZEV expansion. Growing ZEV deployment in state government demonstrates these technologies at a large scale, helps to meet environmental targets for governmental operations and expands consumer awareness among employees and constituents.

The state's Department of General Services (DGS) is charged with implementing the section of Executive Order B-16-12 that mandates the purchase of an increasing amount of ZEVs in the state vehicle fleet and supporting efforts at state agencies to increase ZEV adoption. In 2015, the first year of implementation, 11.74% of state fleet purchases were ZEVs, exceeding 10% ZEV purchasing goal. Agencies are on pace to meet the 25% goal for 2020.

To help with increased ZEV adoption, DGS established statewide contracts for ZEVs and charging equipment. Statewide contracts enable expedited purchase and use of charging stations and software systems to avoid each agency negotiating its own agreement for services. State agencies currently are able to purchase an expanding array of new ZEV models (PEVs, FCEVs and medium- and heavy-duty ZEVs) as vehicles are introduced to market and contracts are established. DGS is working to expand ZEV procurement options for state agencies, including financing and potentially leasing, which will provide additional flexibility.

Light-Duty

Expand state fleet ZEV integration goals through 2025	Lead	Supporting	Timeframe
Establish new goals for state fleet ZEV purchases so that 50% of annual light-duty fleet purchases are ZEVs by 2025.	DGS	GO-Biz	2016
Continue to expand the number of ZEVs available on state contracts in order to further integrate ZEVs into the state fleet.	DGS	--	Ongoing
Evaluate and update Executive Order B-18-12's ZEV purchasing exemption for public safety vehicles with special performance requirements to ensure that ZEVs are integrated into public safety mobile assets under all feasible circumstances.	DGS	--	2016

Install necessary charging and fueling infrastructure to support ZEV fleet purchases	Lead	Supporting	Timeframe
Issue guidance to state agencies on how to develop a comprehensive ZEV infrastructure plan that identifies the anticipated number and location of PEV chargers and access to hydrogen stations necessary to support anticipated ZEV fleet purchases and employee needs.	DGS	GO-Biz	2016
Support state agencies in their efforts to implement infrastructure plans enabling increased use of ZEVs.	DGS	GO-Biz	Ongoing
Closely monitor the use of the purchasing contracts for PEV charging equipment. Continue to explore creative approaches to minimize costs and improve installation.	DGS	--	Ongoing

Improve methods for state agencies to acquire and utilize light-duty ZEVs in their fleets	Lead	Supporting	Timeframe
Provide departments the option of leasing and/or financing ZEVs for every ZEV available on statewide contract.	DGS	--	2020, Ongoing
To the extent that models are available, offer at least one ZEV option for every light-duty fleet vehicle type.	DGS	--	2020
Continue to use the DGS-hosted quarterly Statewide Equipment Council as a vehicle for peer-to-peer information sharing among the various state agency fleet managers. Ensure that information regarding ZEV purchasing processes, policies, infrastructure and technology is regularly discussed.	DGS	--	Ongoing

Expand workplace charging and create incentives for employee adoption	Lead	Supporting	Timeframe
Assist state agencies in the development and implementation of workplace charging plans that will result in PEV charging availability in at least 5% of workplace parking spaces at state-owned facilities.	DGS	GO-Biz	2016, Ongoing
Maintain preferential parking policies for ZEVs in state-owned or operated parking garages. Encourage more facilities to adopt similar policies and provide support.	DGS	GO	2016, Ongoing

Share the state's experiences and best practices	Lead	Supporting	Timeframe
Play an active role in various professional associations of fleet managers to share California's efforts to expand its ZEV fleet and install charging infrastructure.	DGS	Caltrans	Ongoing
Develop a list of funding sources available to support local government procurement of ZEVs and supporting infrastructure for their fleets. Conduct outreach to local governments to share best practices.	GO-Biz	DGS, CARB, CEC	2016

Medium- and Heavy-Duty

Increase access to medium- and heavy-duty ZEV options	Lead	Supporting	Timeframe
Continue to work with key state agencies with large medium- and heavy-duty vehicle fleets to determine needs and plans for ZEV procurement.	DGS	--	Ongoing
Provide more flexibility for state agencies in meeting ZEV purchasing requirements by expanding the offering of medium- and heavy-duty ZEVs on statewide contracts that earn credits.	DGS	CARB	2018

APPENDIX

State Government Polices

Clean Energy and Pollution Reduction Act of 2015 (SB 350)
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350

Vehicle retirement and replacement: Charge Ahead California Initiative (SB 1275)
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1275

California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program (SB 1204)
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1204

2012 Governor Executive Order to set target of 1.5 million ZEVs by 2025 (B-16-12)
https://www.gov.ca.gov/news.php?id=17472

2013 ZEV Action Plan
https://www.opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_(02-13).pdf

California Department of General Services Executive Order B-16-12 Implementation Plan
www.dgs.ca.gov/ofam/Programs/FARS/ZEV.aspx

2015 Governor Executive Order on sustainable freight (B-32-15)
https://www.gov.ca.gov/news.php?id=19046

California Sustainable Freight Action Plan
http://www.casustainablefreight.org/

State of California's ZEV Efforts Outside of California

Multi-State ZEV MOU
http://www.arb.ca.gov/newsrel/2013/8s_zev_mou.pdf

Multi-State ZEV Action Plan
http://www.nescaum.org/documents/multi-state-zev-action-plan.pdf

International ZEV Alliance
http://www.zevalliance.org/

ZEV Programs and Resources

California Air Resources Board Advanced Clean Cars Program
www.arb.ca.gov/msprog/consumer_info/advanced_clean_cars/consumer_acc.htm

California Heavy Duty Vehicle Incentive Program
www.californiahvip.org

California Energy Commission "Drive" website
www.energy.ca.gov/drive

California Public Utilities Commission ZEV Customers Page
www.cpuc.ca.gov/General.aspx?id=5397

APPENDIX

ZEV Programs and Resources (cont.)

"DriveClean" Plug-In Electric Vehicle Resource Center
www.DriveClean.ca.gov/pev

Clean Vehicle Rebate Project
https://cleanvehiclerebate.org/eng

California Fuel Cell Partnership

California Fuel Cell Partnership Website: www.cafcp.org

A California Road Map: The Commercialization of Hydrogen Fuel Cell Vehicles
http://cafcp.org/sites/default/files/Roadmap-Progress-Report2014-FINAL.pdf

CaFCP Frequently Asked Questions
http://cafcp.org/sites/default/files/FCEV_factbooklet.pdf

Current List of Hydrogen Stations
http://cafcp.org/sites/default/files/h2_station_list.pdf

A Road Map for Fuel Cell Electric Buses in California: A zero-emission solution for public transit
http://cafcp.org/sites/default/files/A%20Roadmap%20for%20Fuel%20Cell%20Electric%20Buses%20in%20California.pdf

California Plug-in Electric Vehicle Collaborative

California Plug-in Electric Vehicle Collaborative website: http://www.pevcollaborative.org/

California Plug-In Electric Vehicle Collaborative 2015 Annual Report
http://www.pevcollaborative.org/sites/all/themes/pev/files/CPEV_annual_report_web_0.pdf

Plugging in at Work: How to Effectively Install, Share and Manage Electric Vehicle Charging Stations
http://www.pevcollaborative.org/sites/all/themes/pev/files/WPC_2.0_web.pdf

PEV Collaborative Resources for Workplace Charging
http://www.pevcollaborative.org/workplace-charging

PEV Collaborative Resources for Charging at Multi-unit Dwellings
http://www.pevcollaborative.org/MuD

Maps and Apps, Today's Mapping and Location-Based Services for Plug-In Electric Vehicle Charging Infrastructure Report
http://www.pevcollaborative.org/sites/all/themes/pev/files/PEV_Maps_Apps_120827.pdf

PEV Communication Guides
www.evcollaborative.org/policy-makers

Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC