

# **2015 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**

**April 2015**

## **Introduction and Purpose**

In March 2012, Governor Brown issued an executive order directing state government to help accelerate the market for zero-emission vehicles (ZEVs) in California. This executive order established several milestones on a path toward 1.5 million ZEVs in California by the year 2025. Soon after, the *2013 ZEV Action Plan* was created to identify specific strategies and actions state government would take to meet the milestones of the executive order.

In two short years, the ZEV market in California has grown significantly and state agencies have completed many of the actions called for in the *2013 ZEV Action Plan*. The State Legislature has also continued to champion these technologies, passing several important laws to facilitate ZEV market expansion. This updated *2015 ZEV Action Plan* outlines progress to date and identifies new actions state agencies will take in continued pursuit of the milestones in the executive order.

Since 2013, new priorities have emerged within the State's transition to a low-carbon future. These priorities include ensuring ZEVs are accessible to a broad range of Californians, scaling-up new ZEV technologies for medium and heavy duty vehicles, and accelerating ZEV market growth beyond California. These priorities are reflected in this plan through the creation of new goal areas that complement those established in the 2013 plan. With this updated *2015 ZEV Action Plan*, the State will continue to build upon successes in growing the ZEV market, remove barriers to future market growth, and ensure that ZEV growth benefits our state and its residents.

For the purposes of this action plan, ZEVs 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 plan also address medium- and heavy-duty vehicles, as well as zero-emission technologies for public transportation and freight transport.

This action plan is the product of an interagency working group led by the Governor's Office that includes several state agencies, and includes 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 among industry, non-government organizations and government entities that collaborate to advance ZEVs. The Governor's Executive Order specifically directs collaboration with these two organizations.

## **Expanding Transportation Electrification**

In January 2015, Governor Brown announced an ambitious set of climate goals, including reducing petroleum use in cars and trucks in California up to 50 percent by 2030. Achieving this goal will require broad electrification of the transportation sector, and efforts will need to be sustained far beyond transitioning light-duty passenger vehicles to ZEV technologies. Freight, rail and other medium- and heavy-duty applications are central to goods and passenger movement in California and advancing zero-emission technologies in these areas will help to meet the Governor's petroleum reduction goal, as well as reducing localized pollution and greenhouse gas emissions.

California's High Speed Rail (HSR) 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 that will reduce medium and long-distance car trips and airplane trips. High speed rail also allows Californians to utilize ZEV technology without owning a car.

Medium and heavy duty vehicles that carry freight and passengers across the State form another key part of California's transportation sector that will transition to low and zero-emission technologies. Transitioning these vehicles to cleaner technologies is particularly important to reduce pollution in local communities that currently compromise public health. While state programs are already underway to scale-up new technologies in this part of the transportation sector, more work can and should be done. Actions called for in this plan on medium and heavy-duty applications align with sustainable freight strategies that are being developed by CARB, Caltrans and sister agencies.

## **State of the ZEV Market**

### Overview

California is the world's single largest market for ZEVs, with plug-in electric vehicle ownership in the State surpassing 120,000 vehicles. Hundreds of fuel cell electric vehicles are also on the road and auto companies have announced that several fuel cell electric vehicles will enter the commercial market in 2015. As of January 2015, Californians drive 40% of all ZEVs on the road in the United States, while the U.S. comprises about half of the world market.

Two kinds of PEV technology dominate the market in California – battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). BEVs are purely electric and current models vary in range, offering between 80 to just over 300 miles per complete charge. PHEVs are compatible with electric charging and conventional gas fueling, generally operating purely on electricity before tapping into gasoline storage for extended range. The all-electric range of PHEVs varies, but most current models have a range of between 10 and 40 all-electric miles and up to 400 gasoline hybrid miles.

PEVs and FCEVs share two fundamental attributes: they use electric drive motors with zero tailpipe emissions. Rather than storing electricity on-board in batteries, FCEVs generate electricity on-board using hydrogen and fuel cells. With a range of about 300 miles per full tank, FCEVs are expected to become a growing portion of California's ZEV portfolio, particularly in larger vehicle applications.

### ZEV Sales

Over 21 PEV models are available in California today, with the Nissan Leaf, Chevrolet Volt, Tesla Model S, Toyota Prius PHV, Ford Fusion Energi, and Fiat 500e leading U.S. sales.

The national PEV market continues to expand—2014 sales surpassed 2013 sales by over 22,000 PEVs and January 2015 sales surpassed those of January 2014 by nearly 400. The year 2014 welcomed four new brands to the PEV market with the entry of the Cadillac, Mercedes Benz, Porsche Hybrid, Kia Soul EV, and Volkswagen.

The metropolitan areas of Los Angeles, San Diego region, and the San Francisco Bay Area lead the State in PEV sales. As data from the CARB Clean Vehicle Rebate Project shows, ZEV adoption has been greatest in Los Angeles and Santa Clara Counties, where 24,835 and 14,399 rebates have been issued, respectively. Alameda, Orange, and San Diego County are also areas of high ZEV concentration. Uptake has been slower in the northern and eastern parts of the State. Statewide, approximately 55% of issued rebates have been for BEVs, while 45% have been for PHEVs.

FCEVs are currently available for lease or sale on a limited basis, and offerings will expand later this year. Currently, 125 FCEVs are registered with the California Department of Motor Vehicles, mostly located Los Angeles, Orange County and the San Francisco Bay Area. Several hundred additional FCEVs with out-of-state registration are also in use through automaker demonstration programs. FCEVs became commercially available in 2014 with the introduction of the Hyundai Tucson FCEV. The Toyota Mirai is expected to enter the market in late 2015, and Honda has announced a commercial launch for 2016. Mercedes and Honda have run demonstration-scale lease programs with the B-Class F-CELL, and FCX Clarity for several years.

### **State Progress to Date Supporting ZEV Expansion**

In two short years, state agencies have completed many actions called for in the *2013 ZEV Action Plan* to accelerate usage of ZEVs.

Completed actions called for in *2013 ZEV Action Plan* include:

- Purchase rebates for ZEVs have been extended through 2015. Sizable state rebates continue to be available for purchase or long-term 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 cap-and-trade pollution control program have provided funding for this important program as it has grown in size.
- ZEV drivers continue to have access to high occupancy vehicle (HOV) lanes. White HOV decals provided to BEV drivers and green decals provided to PHEV drivers expire January 1, 2019. The amount of authorized green decals was increased to 70,000 beginning January 1, 2015.
- Auto dealers selling new vehicles that are eligible for white and green HOV Clean Air Vehicle decals can 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.
- State agencies are on track to fulfill the Governor's Executive Order directive that ZEVs must comprise 10% of agencies' light-duty fleet purchases by 2015 and 25% of these purchases by 2020. In January 2014, the Department of General Services issued Management Memo 13-02, outlining state fleet purchasing rules for ZEVs. In addition, two-year statewide vehicle contracts are now in place, ensuring state fleet rules and policies allow the full range of ZEVs to compete for state contracts.
- 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.
- Newly constructed residential and non-residential buildings will be more EV-friendly as a matter of state law. The California Building Standards Commission, in conjunction with the California Department of Housing and Community Development, instituted changes to the California Building Code requiring all recently constructed parking lots or housing to put electrical capacity in place to easily install EV chargers.

- In 2013, legislation extended two programs that provide as much as \$100 million annually towards innovative transportation and fuel technologies, including electric vehicle charging and hydrogen station infrastructure – 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, through 2024.
- 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.
- A ZEV Infrastructure Project Manager now works full-time in the Governor’s Office to partner with local governments and businesses to streamline hydrogen and electric vehicle charging station permitting process and provide subject matter expertise.
- In June 2014, the California Department of Food and Agriculture’s Division of Measurement and Standards adopted regulations for hydrogen gas measuring devices that enable commercial sale of this hydrogen. Hydrogen dispensers have since passed inspection using these new regulations, allowing hydrogen to be sold directly to retail consumers.
- 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.
- 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.
- Ten PEV regional readiness plans were completed thanks to funding by the California Energy Commission. These plans include EV charging station deployment plans, strategies to streamline permitting and inspection of EV chargers, updated building codes, and actions for consumer education and outreach. Recently, an additional \$5.6 million in funding was made for new regional alternative fuel readiness plans and implementation activities.
- A Vehicle Grid Integration (VGI) Roadmap was developed by the California Independent System Operator, California Energy Commission, and California Public Utilities Commission in partnership with external stakeholders. This 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.
- A Statewide Plug-in Electric Vehicle Infrastructure Assessment was completed by the National Renewable Energy Laboratories, thanks to funding by the California Energy Commission. This quantitative assessment provides a framework for evaluating the need for EV charging infrastructure across the State.

- The California Energy Commission developed a statewide DC fast charger corridor gaps analysis that informs a solicitation to fund the completion of the West Coast Electric Highway, identifying key interregional highway corridors where infrastructure investments should be prioritized.
- Owners of distributed generation systems, such as rooftop solar photovoltaic systems, can now size their load based on projections of future ZEV ownership under the California Solar Initiative and Self-Generation Incentive programs thanks to changes in those programs' requirements
- The California Public Utilities Commission approved the first triennial Electric Program Investment Charge (EPIC) plans administered by the California Energy Commission and the three large electric investor-owned utilities. Each investment plan includes research into PEV technologies, including the California Energy Commission's plan to use \$410 million to advance technologies and strategies that optimize the benefits of PEVs to the grid.
- Three centers have been established by California Energy Commission funding (two in Northern California 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, and in turn creating jobs to help drive economic growth.
- The California Public Utilities Commission authorized investor-owned utilities to sell Low Carbon Fuel Standard credits generated by plug-in electric vehicle drivers and directed the utilities to return the revenue as an up-front rebate or annual credit to drivers.
- Several innovative ZEV research pilots have been launched. For example, the California Independent System Operator and the California Public Utilities Commission worked with the Department of Defense and Southern California Edison to implement a pilot that allows the Los Angeles Air Force base to use its civil PEV fleet as a bi-directional grid resource in the wholesale electricity market. The California Public Utilities Commission worked with PG&E to develop and complete an RFP that allows automakers to provide grid value from vehicle smart charging and second-life vehicle batteries.

Additional state actions that were not specifically called for in the 2013 action plan but support expansion of the ZEV usage include:

- In 2013, Governor Brown, along with governors of seven other states, signed a multi-state zero-emission vehicle Memorandum of Understanding (MOU). The memorandum commits the states to program coordination that will enable at least 3.3 million zero-emission vehicles to be in use by 2025. The 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.
- In 2014, Governor Brown signed into law the California Charge Ahead Initiative, a landmark bill supporting consumer incentives and rebates to enable one million ZEVs on California's roads by 2020. The law requires ARB 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.

A full list of completed actions from the *2013 ZEV Action Plan* is included in the appendix, as well as legislation signed by Governor Brown in 2013 and 2014 supporting acceleration of the ZEV market.

### **Structure of the 2015 Action Plan**

Actions called for in this 2015 action plan are grouped under seven broad goals that the Brown Administration has prioritized. The action plan, and its specific details provided below, is intended to clearly communicate what state government will do in the coming months and years to advance ZEVs. The action plan is also intended to serve as a “to-do” list for the Governor’s Office and state agencies that enhances interagency coordination moving forward.

Seven broad goals for State government to advance ZEVs include:

- 1. Build Consumer Awareness and Demand**
- 2. Enable Necessary Infrastructure**
- 3. Promote Broad Access to ZEVs**
- 4. Transform Vehicle Fleets**
- 5. Expand use of Zero Emission Rail, Freight, and Other Medium- and Heavy-Duty Technologies**
- 6. Capture Economic Development Opportunities**
- 7. Support National and International ZEV Deployment**

The following abbreviations are used to denote the responsible agencies:

BSC	Building Standards Commission
CARB	California Air Resources Board
Caltrans	California Department of Transportation
CDFA	California Department of Food and Agriculture, Division of Measurement Standards
CEC	California Energy Commission
EDD	Employment Development Department
HSR	California High Speed Rail Authority
HCD	California Housing and Community Development Department
ISO	California Independent System Operator
ETP	California Labor and Workforce Development Agency, including the Employment Training Panel and Workforce Investment Board
CPUC	California Public Utilities Commission
DGS	Department of General Services, including the Division of the State Architect and Building Standards Commission
GO-Biz	Governor’s Office of Business and Economic Development
OPR	Governor’s Office of Planning and Research
CWIB	California Workforce Investment Board

## Build Consumer Awareness and Demand

The market for zero-emission vehicles has grown significantly since commercial introduction of PEVs in late 2010. A wide variety of PEVs are now available at several price points that are attracting new consumers beyond the early technology adopter segment. California consumers also now have the choice to drive FCEVs as new models enter the market that provide excellent driving range and fast refueling. As the PEV and FCEV markets expand, the State can help keep ZEVs attractive and affordable to Californians by maintaining incentives and promoting ZEV benefits, fostering an easier buying experience, and supporting opportunities for lower-income residents to utilize the vehicles.

California ZEV sales represent 40% of the U.S. market and Californians drive one out of every six ZEVs in use today around the world. As of January 2015, over 120,000 PEVs were on California's roads. Despite this significant penetration, the market for these technologies is still nascent considering the over 31 million vehicles in our state. State government actions should enable this relatively small consumer market for ZEVs to continue to expand in the coming years.

Consumer education is critical to building interest in ZEV vehicles, which includes demonstrating the benefits of ZEVs and equipping consumers with information before they reach the auto dealership. Also, more work is needed to educate dealers and encourage their sales staff to become "ZEV ambassadors" at the point of sale. Dealer expertise during the buying or leasing process, along with supportive services and products, will improve buyer confidence as expanding audiences become more familiar and interested in PEVs and FCEVs. Furthering partnerships with auto makers, electric utilities, auto dealers, consumer groups and other stakeholders is important to broaden consumer awareness and establish a ZEV buying or leasing experience that is embraced by the mainstream market.

Financial incentives continue to play a critical role in making ZEVs cost competitive with conventional vehicles during the early phases of their deployment, until economies of scale lead to cost reductions and a fully self-sustaining market. The State's Clean Vehicle Rebate Project has provided consumer rebates for over 90,000 vehicles through January 2015, stimulating early consumer acceptance of these technologies. As the ZEV market continues to grow, the State will refine its financial incentive programs to most effectively target incentives where they motivate consumer decisions.

Specific strategies to support consumers within California's expanding ZEV market are outlined below.

### ***Strategies and Actions***

#### **Strategy: Reduce up-front costs of owning or leasing ZEVs**

- Develop and implement a long term, sustainable plan for the Clean Vehicle Rebate Project (CVRP) with adequate funding to support and accelerate the deployment of ZEVs to reach the 2020 and 2025 ZEV adoption goals. This includes a strategy to refine the program over time as increasing volumes are sold, ensure that the CVRP, the Enhanced Fleet Modernization Program, and other incentive programs make ZEVs accessible to lower income consumers, and stimulate use of ZEVs in areas disproportionately impacted by air pollution. (CARB)

- Ensure that the distribution of Low Carbon Fuel Standard Credits for PEV use directly benefits PEV customers. (CPUC)

**Strategy: Make it easier to purchase or lease a ZEV at the dealership**

- Develop and offer better informational tools for ZEV buyers, including a Dealer Recommendation program, a Buyer's Checklist, and concise informational materials that can educate auto dealers and sales staff about ZEVs. (CARB)
- Develop a voluntary window sticker explaining available incentives. (CARB)
- Continue to offer funding for sales staff training regarding ZEV technologies. (EDD)

**Strategy: Maintain and expand non-monetary incentives for use of ZEVs**

- Maintain ZEV access to High Occupancy Vehicle (HOV) lanes and High Occupancy Toll (HOT) lanes. (Caltrans)
- Expand consumer awareness of HOV/HOT lane access for ZEVs, including by approving and installing highway signs that indicate this access. (Caltrans)
- Maintain preferential parking policies for ZEVs in State-owned or operated parking garages. (DGS)
- Provide templates for local governments and private companies to provide preferential parking policies to ZEVs and encourage these policies. (OPR)

**Strategy: Promote consumer awareness of ZEVs through public education, outreach and direct driving experiences**

- Support partnerships between utilities and other stakeholders to accelerate the adoption of PEVs, educate consumers about the benefits of PEV transportation, facilitate utility identification of PEV owners, and increase adoption of PEV electricity rates and programs. (CPUC)
- Develop a one-page document that is sent to ZEV owners thanking them for their purchase, explaining the environmental benefits of this decision and encouraging them to share their experience with others. This document will be sent in the packet along with HOV decals. Include a link to a website where drivers can download fact sheets to share with interested public who ask about their vehicle, giving them the tools to become ZEV ambassadors. (DMV, CARB)
- Refresh and expand the State's Driveclean.ca.gov website to centralize ZEV information from all state agencies and pursue AdWords campaign to promote the website. This website should regularly update information for public and private customers to understand the total cost of ownership of ZEVs and help buyers determine if they are qualified for incentives. (CARB)

- Support a public campaign that enables 20 million test-drives of ZEVs by Californians over the next eleven years (2015-2025). (GO)
- Provide targeted information about advanced technology vehicles on Driveclean.ca.gov through an application programming interface (API) from used and new vehicle databases, and work with these databases to improve the ZEV technology information provided. (CARB)
- Consider working with nationally-based Ad Council and the U.S. Department of Energy to run a national education campaign on ZEVs. (GO, CARB)

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## Enable Necessary Infrastructure

California has made considerable progress deploying ZEV infrastructure, but much more remains to be done. As noted in the *2013 ZEV Action Plan*, the widespread use of ZEVs relies on adequate fueling and charging infrastructure for these vehicles, including expansion of the charging infrastructure as the PEV market grows and completion of an initial network of hydrogen fueling stations to support the commercial launch of FCEVs.

To date, over 1,900 public electric vehicle charging stations have been installed in California, including over 200 fast charging stations. According to a survey of PEV owners conducted by the California Center for Sustainable Energy – the administrator of the State’s Clean Vehicle Rebate Project – approximately 65 percent of ZEV owners that utilized the rebate have installed level two chargers at home, over 40 percent have access to workplace charging, and driver satisfaction with public charging is increasing. For FCEVs, up to 29 hydrogen fueling stations are estimated to be open by the end of 2015, enabling FCEV drivers to travel from San Diego to Lake Tahoe with multiple fueling options in Los Angeles, Orange County and the Bay Area, where the commercial market for fuel cell vehicles will launch.

The State has completed an initial analysis of the number of electric vehicle charging stations needed to meet the Executive Order goals, which suggest upwards of 900,000 charge points may be needed by 2020. State agencies have funded more than 9,000 commercial, workplace, fleet, and residential charging stations, and provided incentives to encourage ZEV infrastructure installations. A challenge leading up to 2020, when the State’s major metropolitan areas must be ready to accommodate one million ZEVs, will be determining how best to sustain this infrastructure growth. Facilitating and standardizing the process for permitting and installing PEV infrastructure, finding solutions to provide access to charging for multi-family dwellings and workplaces, expanding ZEVs into the medium- and heavy-duty vehicle realm, and continuing to investigate ways to smoothly integrate PEVs into the State’s electricity grid remain top priorities.

The State has also provided funding for 54 hydrogen fueling stations, making significant progress toward the initial network of 100 stations that will serve as the backbone for the commercial launch of FCEVs. Certification of hydrogen dispensers is underway and the first commercial leases of FCEV began in the summer of 2014. Now that these stations have been funded, station operators must complete construction and open stations while automakers bring FCEVs to market.

Strategies and actions are listed below that incorporate lessons learned over the last two years and outline new actions to provide sufficient infrastructure to support one million ZEVs by 2020.

### ***Strategies and Actions***

#### **Strategy: Support light duty ZEV infrastructure planning and investment by public and private entities**

- Implement a pilot financing program to eligible small businesses that would leverage private capital for ZEV equipment acquisition and installation. The sustainable financing program would help to accelerate ZEV infrastructure development, mitigate financing risk associated with emerging ZEV technologies, leverage limited public funds, and provide for the recycling of funds to sustain new loans. (CEC, 2015)

- Annually issue a Statewide Hydrogen Infrastructure Network Assessment to guide future investments in hydrogen supply infrastructure – including anticipated geographic distribution and data needed to prioritize where to locate stations – and support market expansion of FCEVs and renewable hydrogen production. (CARB, CEC)
- Consider funding data collection and survey development on charging infrastructure costs, market and financing trends and other relevant data to inform and make recommendations that improve infrastructure planning and subsequent reductions in infrastructure costs. The State, in partnership with industry, would collaborate to discuss data needs and availability and how analysis could inform policy and investments. (CEC)
- Collaborate with industry and applicable associations to develop a database of ZEV infrastructure participants, best practices information, and case studies. The information would be incorporated into the OPR Community Readiness Guidebook and would be used, among others, by contractors, planners, and the public. (CEC, GO-Biz, ongoing)
- Identify the appropriate role for utility investment in electric vehicle charging equipment and infrastructure that increases electric miles driven and improves utilization of the electrical grid. (CPUC)
- Encourage the installation of ZEV energy storage and other demand-side management infrastructure related to ZEVs as part of the Strategic Growth Council’s implementation of the Affordable Housing & Sustainable Communities program, in order to maximize vehicle charging during times of sufficient electric supply or over-generation and minimize charging during times of constrained electric supply. (SGC, OPR)

**Strategy: Support local government efforts to prepare communities for increased PEV usage and the coming commercialization of FCEVs**

- Issue 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 locations, and overall best practices. The guidebook will build upon the *2013 ZEV Guidebook* by providing more detailed guidance about ensuring access to fueling infrastructure and will be coordinated with existing guides and other information sources, including DOE and H2USA. (GO-Biz)
- Develop and carry out a plan for working with local government to ensure streamlined permitting of PEV charging, including simplifying and standardizing permitting for home chargers to make the siting and installation process inexpensive and efficient. (OPR, GO-Biz)
- Establish a programmatic environmental impact report (EIR) for hydrogen fueling stations that local jurisdictions can use to satisfy CEQA requirements for a variety of station arrangements, including greenfield developments. (GO-Biz)
- Encourage metropolitan planning organizations to adopt Sustainable Communities Strategies (SCS) that broadly address sustainable transportation infrastructure through the inclusion of electric vehicle infrastructure policies and strategies, including but not limited

to the incorporation of regional PEV Readiness Plans and Neighborhood Electric Vehicle Plans into the SCS. (ARB)

- Encourage metropolitan planning organizations to develop and adopt regional zero emission vehicle infrastructure plans and policies as part of their regional transportation corridor planning, including coordination of station maintenance to ensure ongoing fueling/recharging availability and minimize the potential for stranded vehicles. (CEC, ARB, Caltrans)
- 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 signage, and the development of new regional ZEV readiness plans. (CEC, ongoing)
- Support regional collaboration on increasing multi-unit dwelling infrastructure, such as by supporting pilot programs and documenting case studies of success stories. (GO-Biz, CWIB)

**Strategy: Make it easier to use public PEV infrastructure**

- Support the clarification of existing law such that the offering of free public electric vehicle charging by state and local government entities is not considered a gift of public funds. (GO)
- Address electric vehicle charging station congestion in areas of high PEV adoption by exploring and demonstrating new refueling and pricing strategies to deploy EVCS and expanding charging infrastructure capacity where necessary. (CEC, ongoing)
- Continue to disseminate best practices to electric vehicle charging station owners and operators. (OPR, DGS)
- Support the exploration, through appropriate research grants, of alternative non-price based mechanisms to increase charging space turnover. (CEC, 2017)
- Consider leveraging Proposition 39 funding efforts to include complementary strategies to deploy charging infrastructure in school facilities. (CEC, 2016)
- Support five-year warranties and maintenance plans for publicly funded chargers. (CEC)

**Strategy: Make home charging easy to install and use, with special focus on multi-unit dwellings.**

- Consider incentives for residential building managers and property owners to install electric vehicle charging stations, including adapting incentives to include level 2 charging, grid-integrated charging as well as make-ready installations. (CEC)
- Increase the number of ZEV-ready parking structures and commercial buildings through approved state building code, effective July 1, 2015, mandating electric vehicle charging infrastructure installation in newly constructed non-residential buildings. (BSC)

- Consider supporting a program that educates and informs multi-unit dwelling owners and decision makers regarding electric vehicle charging installations in multi-unit dwellings. Multi-unit facilities that are prepared to install charging infrastructure can encourage prospective tenants to buy or lease a PEV and be ready to respond to funding solicitations. (CEC, ongoing)
- Require ZEV-ready new homes through changes to the State's building code. (HCD)
- Create electricity rates and programs for PEV home charging that incentivize charging operations and optimize electric grid performance. (CPUC)

**Strategy: Support major expansion of workplace charging**

- Provide financial incentives for employers and commercial property managers to install workplace charging, including the possibility of a simple rebate that reduces costs for employers to construct charging, building upon electric vehicle planning readiness efforts. (CEC)
- Organize another high-level convening of corporate leaders to encourage companies across California to commit to expanding workplace charging. This event would build on the success of the Governor's "Drive the Dream" in 2013. (GO)
- Ensure that businesses that lease buildings and want to install charging stations will not be prevented from doing so by their landlords. (GO)

**Strategy: Support expansion of DC fast-charging networks**

- Explore the placement of fast-chargers at Caltrans rest stops. (Caltrans, CEC)
- Track the development of fast chargers across California to identify where gaps may exist between regions. Consider funding or other incentives to stimulate station development along these interregional corridors. (CEC, 2016)
- Streamline the siting and permitting process for fast chargers, including simplifying and standardizing permitting to increase efficiency and reduce costs. (GO-Biz)

**Strategy: Ensure a minimum network of hydrogen fueling stations for the commercial launch of fuel cell electric vehicles between 2015 and 2017**

- Build out an initial network of 100 hydrogen refueling stations while continuing to assess the pace of FCEV fleet size expansion, projections of consumer need, and the status of hydrogen refueling technologies and costs, as required by AB 8. (CEC, ARB, GO-Biz)
- Expand incentives available to early market hydrogen station providers, including possibly Low Carbon Fuel Standard credits. (CPUC, ARB)

- Support hydrogen proposals for Renewable Identification Numbers (RINs) to further incentivize renewable hydrogen in California. (CEC, ARB)
- Advocate renewing the Federal income-tax credit for the purchase of PEVs and FCEVs. (GO, CARB)
- Develop and implement the Hydrogen Station Equipment Performance (HyStEP) device to ensure hydrogen fueling pumps follow industry standard protocols in SAE J2601. (DMS)
- Develop a hydrogen contamination detector. (CARB, DMS)
- Continue to certify the accuracy of hydrogen refueling pumps. (DMS)
- Consider identifying infrastructure co-location that can support light-duty, medium-duty, and heavy-duty hydrogen fueling station applications in connector site stations (stations along major routes that connect distinct areas of high potential for FCEV adoption). (CEC, ARB, GO-Biz)
- Pro-actively support the permitting and acceptance of hydrogen fueling stations through direct outreach to local authorities having jurisdiction and community influencers. (GO-Biz)

**Strategy: Integrate electric vehicle charging and hydrogen production in a manner that optimizes use of the State's energy grid**

- Establish a task force to ensure agencies coordinate on vehicle grid integration (VGI) research activities and policy framework development. (GO)
- Develop operational strategies that will help to offset or defray the economic impact of peak demand charges associated with the electrical load generated by DC fast charging and hydrogen infrastructure. (CPUC)
- Support VGI pilots that help develop implementation use cases, communication functionality and application value, including pilots designed to assess load impact per number of vehicles under various charging patterns driven by time-of-use rates, dynamic pricing, and fixed fee charging. (CPUC, CEC, CAISO)
- Develop time-of-use or dynamic pricing structure or incentives that maximize vehicle charging during times of sufficient electric supply or over-generation and minimize charging during times of constrained electric supply. (CPUC, CAISO)
- Consider strategies to enable cost-effective access to in-front-of-the-meter renewable electricity generation for plug-in and hydrogen fueling infrastructure. (CPUC)
- Conduct research projects to demonstrate power-to-gas to export hydrogen as a transportation fuel, serve as energy storage, provide grid-integration solutions for load shifting, and regulate frequency. (CPUC, CEC, CAISO)

## Promote Broad Access to ZEVs

As consumer choices in the ZEV market grow, ensuring broad access to these vehicles is necessary to reach the State's aggressive ZEV adoption targets. As noted earlier, the Governor's Executive Order sets a target of 1.5 million vehicles by 2025, which is estimated to require that ZEVs represent one out of every six new car purchases by 2025. Reaching these ambitious targets requires that ZEVs be accessible to Californians across geographies and income levels.

Ensuring broad access to ZEVs is also important to meet legally required pollution reduction mandates. Currently, several areas of the State are out of compliance with the U.S. Clean Air Act due to excessive levels of localized pollution. Many of these areas also have very low ZEV adoption rates. The San Joaquin Valley Air District, for example, where mobile sources account for 80% of smog pollution, is home to only 1.5% of California's registered PEVs. Increasing ZEV usage in such areas will improve air quality.

The transportation sector is also the single largest source of greenhouse gas emissions in California, accounting for approximately 38% of total emissions. Significant emission reductions will require widespread ZEV adoption in every region of the State.

To-date, ZEV purchases are rapidly increasing some areas, such as Los Angeles, San Diego and the Bay Area, with lower adoption levels in other regions. Many regions with low ZEV adoption have longer average driving distances, lack charging infrastructure, and have high populations of disadvantaged, low-income, and moderate-income communities. All communities in California should have access to ZEVs and low-emission transportation and the many benefits of these technologies should be shared statewide.

In 2014, Governor Brown signed into law the Charge Ahead California Initiative, which aims to increase access to ZEVs for disadvantaged, low-income, and moderate-income communities to improve air quality, lower greenhouse gas emissions, and promote overall benefits that low-emission technologies provide. The initiative directs the Air Resources Board, through the Air Quality Improvement Program (AQIP), to develop a forward looking funding plan to meet the goal of 1 million ZEVs on California roads by 2020, while ensuring disadvantaged, low-income, and moderate-income communities benefit from the transition.

Through AQIP and other programs, new and improved financial incentives in regions with low uptake will be important to increase ZEV adoption. State programs that encourage replacement of high-polluting vehicles, including the Enhanced Fleet Modernization Program, will be revised to increase utilization and allow more consumers to participate. The State will also develop community-based pilot programs for car sharing and van pooling and expand funding for zero-emission public transit in disadvantaged communities.

### **Strategy: Increase access to ZEVs for low and moderate income consumers and build awareness of these choices in disadvantaged communities.**

- Continue to offer rebates under the Clean Vehicle Rebate Project (CVRP) for the purchase or long-term lease of ZEVs, consistent with statutory guidance in SB 1275 (Charge Ahead California Initiative). (CARB)

- Consider providing higher rebate amounts and other incentives for the purchase of light-, medium- and heavy-duty public and private fleets located within or benefitting disadvantaged communities. (CARB)
- Improve state programs that encourage vehicle retirement and replacement to increase utilization and pair these programs with ZEV vehicle incentives in a manner that enables low to moderate income consumers to replace highly-polluting vehicles with ZEVs or other low-pollution transportation options, such as public transportation and car-sharing. (CARB)
- Fund community-based pilot programs for the Enhanced Fleet Modernization Program (EFMP) that improve outreach to low income motorists and increase clean vehicle replacement through low-interest financing and financial counseling. (CARB)
- Develop and implement a pilot project for targeted car sharing and van pooling in disadvantaged communities, including establishing ZEV car sharing fleets and van pools in the Central Valley to transport farm workers. (CARB)
- 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)
- Provide funding to Lower-Emission School Bus Program to provide ZEV replacement school buses for lower-income children in disadvantaged communities. (CARB)
- Increase availability of charging stations in areas of low PEV adoption and in disadvantaged communities to encourage PEV sales. (CEC, ongoing)

**Strategy: Expand the use of zero-emission buses in public transportation.**

- Consider setting a target number of zero emission buses in public, private, and school fleets by 2020. (CARB)
- Consider establishing 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)
- Implement the Fuel Cell Bus Roadmap, which outlines a pathway to deploy zero-emission heavy-duty, and off-road vehicles and equipment in preparation for commercialization. Example strategies include support for clusters of zero emission vehicles and equipment to operate fleets at a volume that will reduce manufacturing costs and provide significant throughput in the fueling infrastructure. (CARB)
- Utilize cap and trade auction proceeds appropriated for public transportation to enable demonstration projects that validate the operational capacity of zero-emission buses and support the purchase and operation of zero-emission public transit. (CARB)

- Adopt regulation to transform public transit fleets to zero-emission technology. (CARB)
- Consider expanding three year demand charge waiver for plug-in electric buses to a minimum of 12 years. (CPUC)
- Help transit agencies understand funding opportunities to adopt zero emission buses within the recently signed Federal Transportation Law (MAP-21) and State funding, including cap-and-trade programs designated for ZBuses. (Caltrans, CARB).
- Advocate for increased funding in the federal transportation bill for ZBus research, development, and deployment and procurement programs. (GO)
- Support electric school bus deployments in low-income, urban school districts throughout California. (CARB)
- Expand regulatory and funding support for zero-emission public transit and necessary infrastructure benefiting disadvantaged and low and moderate income communities and develop a lasting program that builds ZEV buses in local public transit fleets. (GO, CARB)

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## **Expand Zero Emission Freight, Rail, and Other Medium- and Heavy-Duty Technologies**

Goods movement in California comprises a key part of our state's economy. The ports of Los Angeles, Long Beach and Oakland facilitate a large portion of our country's international trade, and trains and trucks move these goods to other parts of the nation. This transportation system is an economic industry in its own right, and makes other important industries such as construction, manufacturing, agricultural export and retail sales possible.

California's freight transportation system differs significantly from our state's passenger vehicle environment, and will require different approaches to achieve ZEV market penetration. Reducing pollution in the freight system is complex, with links between zero and near zero-emission vehicles, fueling infrastructure, renewable hydrogen and electricity sources, and electricity grid stability. Effective State and local government planning and collaboration will be needed to ensure that incentive programs, partnerships, regulatory measures, and even local land use decisions work in cooperation to help provide sufficient infrastructure and support needed to improve the efficiency of the freight sector while expanding the use of zero-emission and near zero-emission technologies.

Public transportation also plays an important role in our state's economy. Buses, subways, light rail and railroads provide mobility to tens of millions of Californians each day. Expanding public zero-emission transportation options is important as our state moves toward a population of 50 million residents. Public transportation also provides a unique opportunity to advance zero-emission medium- and heavy-duty technologies, given the typical use patterns of buses with centralized fueling in a fleet operation setting. Additionally, public transportation technology improvements often directly benefit disadvantaged communities.

Heavy-duty engines power the vehicles and equipment that drive freight and public transportation. These engines are also a major source of pollution that affects public health and our climate, emitting a significant portion of localized pollution in the State's air basins as well as greenhouse gas emissions. Improving the environmental performance of these engines is important so that California can comply with the U.S. Clean Air Act and meet its ambitious environmental goals. State government is committed to encouraging the adoption of clean technologies in the freight and public transit sectors in a manner that improves the overall efficiency of the goods movement sector and enhances our State's economic performance over the long term.

ZEV technologies will play a meaningful role in reducing pollution from freight and passenger rail systems. Heavy-duty truck demonstration projects funded by local, state, and federal agencies are helping to spur innovations in early-stage zero-emission technologies. Proven technologies help ports to eliminate emissions from ships when berthed at shore and from trucks when being unloaded at distribution centers. Hybrid technologies have been demonstrated in heavy-duty truck, commercial harbor craft, and cargo handling equipment applications. High speed rail promises to bring a new clean, efficient, zero-emission transportation choice for consumers and passenger rail to California, and zero-emission technologies can be fostered to achieve zero-emission track miles in key parts of California's freight rail system.

At this stage in zero-emission technology development for heavy duty applications, incentives play an important role in the demonstration and commercialization of emerging zero-emission technologies. Demonstration funding can support technology transfer from light-duty vehicles to

the more challenging heavy-duty operations, while attracting private capital investments in California.

As technologies advance from the demonstration phase to early commercialization, incentives help to reduce the higher initial cost that can be a barrier to market success. State incentives for hybrid and zero-emission trucks and buses have resulted in deployment in California in far greater numbers than the rest of the nation. Continued incentives for the freight sector will increase the use of zero-emission technologies and help California meet air quality and climate change goals.

### ***Strategies and Actions***

#### **Strategy: Complete integrated planning among state agencies to develop appropriate incentives, partnership and regulatory approaches to expand the use of zero-emission vehicle technologies in the freight sector.**

- Complete a long-term plan for sustainable freight that enables the State to meet federal pollution reduction requirements in a manner that enhances the long term efficiency of goods movement. (CARB, CalSTA, GO-Biz)
- Collaborate with state and federal agencies through the US Environmental Protection Agency's Clean Air Technology Initiative (CATI) to discuss ways to align policies and limited investments to develop technologies that benefit the freight sector. (CEC, CARB, ongoing)

#### **Strategy: Ensure that electricity rates for industrial, commercial and institutional customers are fair and reasonably enable the electrification of freight and public transportation.**

- Develop electricity tariffs for 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)

#### **Strategy: Expand demonstration and commercialization of zero-emission and near zero-emission technologies in the heavy-duty and off-road sectors.**

- Ensure that funding programs for hybrid and zero-emission trucks and buses provide funding to help California fleets purchase hybrid and zero-emission trucks, supporting the development and commercialization of zero-emission technology. (CARB)
- 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)
- Establish a verification process for zero-emission buses that confirms manufacturer performance claims. (CARB)

- Explores ways to reduce the up-front purchase cost of heavy-duty zero-emission vehicles through various market-based strategies, such as a sales tax waiver, preferential lanes, and low interest loans. (GO)
- Consider modifying financial incentives for heavy-duty ZEVs to include retrofitted vehicles, remanufactured vehicles, and after-market up-fits of hybrid and electric drive technologies. (CARB)
- Complete Low Carbon Fuel Standard (LCFS) rulemaking, which includes a proposal to issue LCFS credits for electric mass transit; such LCFS 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 LCFS obligations. (CARB)
- Continue work to develop standards and protocols to evaluate hydrogen and electric medium and heavy duty refueling. (CARB)
- Consider providing funding for zero-emission shuttle buses that operate at airports, rental car facilities, and other applications. (CARB)
- Consider rules to require demonstration and ultimately purchase of zero-emission local delivery trucks in urban applications. (CARB)
- Consider rules to require purchase and use of heavy-duty zero emission technologies once fully demonstrated in airport ground support equipment, forklifts in distribution centers and other applications. (CARB)

**Strategy: Support medium- and heavy-duty ZEV infrastructure planning and investment by public and private entities**

- Consider revising demand charges to encourage zero-emission vehicle use in the heavy-duty vehicle sector and support long-term funding for charging and hydrogen fueling stations for heavy-duty ZEVs. (CEC, CARB)
- Establish regional network plan for public charging and hydrogen infrastructure for heavy-duty zero-emission vehicles that are operated by individual owners/operators. (CEC, CARB)
- Evaluate the placement and quantity of hydrogen infrastructure that would enable the commercialization of heavy-duty fuel cell electric vehicles in long haul operation. (CARB)
- Provide funding for research, development, and demonstration focused on improving fueling infrastructure for heavy-duty ZEVs through technology advancement, equipment optimization, cost reduction, and ease of scaling up. (CEC, CARB)
- Standardize electric vehicle charging protocols in heavy-duty applications. (ARB, CEC)

**Strategy: Build awareness about new heavy-duty technologies and support businesses' use of these technologies**

- Establish a consumer-oriented information clearinghouse website for heavy-duty vehicles and equipment that may include information regarding technology, available vehicles, funding opportunities, and an environmental scoring system. (CARB, Caltrans, GO-Biz)
- Explore establishing a ZEV Fleets Users Forum, convening a power-to-gas stakeholder working group and establishing of a state policy coordinator to manage existing state and local ZEV policies and incentives for private fleets. (CARB)
- Assist companies in the heavy-duty ZEV supply chain in finding business solutions that allow for cost reductions and greater certainty for suppliers and buyers. (GO-Biz, ongoing)
- Incentivize companies within the ZBus supply chain to manufacture in California. (GO-Biz)
- Ensure continued investments in advanced truck technology demonstrations and deployments under the Alternative and Renewable Fuel and Vehicle Technology Program that will provide transportation solutions to the various freight sectors. (CEC, ongoing)

**Strategy: Deliver High Speed Rail across the State**

- Complete necessary planning, mitigation and pre-development activities for the rail program from Los Angeles to San Francisco. (HSR)
- Complete local and regional public transit improvements in Southern California, Northern California and the Central Valley that link local transportation systems with the high speed rail. (HSR)
- Develop methods to meet the State’s commitment that the High Speed Rail be powered by 100% renewable energy. (HSR)

**Strategy: Support expansion of new technologies at California ports and key freight transportation corridors**

- Support development of key infrastructure projects that will help enable adoption and operation of zero emission technologies along the I-710 zero emission freight corridor, at the ports of Los Angeles, Long Beach and Oakland, at freight distribution centers and hubs, and as part of connected vehicle transportation systems. (CARB, Caltrans, CEC)
- Extend credit generation opportunities under the Low Carbon Fuel Standard to zero-emission and near zero-emission freight transportation applications. (CARB)

## Transform Fleets

Public vehicle fleets represent a highly visible area for ZEV expansion. Growing the use of ZEVs in government fleets demonstrates these technologies at a large scale, helps to meet environmental targets for governmental operations, and expands consumer awareness among constituents. Utilizing ZEVs in city and state fleets also helps policy makers better understand the opportunities and practical challenges of integrating ZEVs into our traditional transportation system.

Private companies are also demonstrating leadership by integrating ZEVs into their fleets. Companies like UPS and FedEx have deployed a range of zero-emission vehicle technologies to move goods across the State. Other companies with fleets dominated by light duty vehicles are trading out older vehicles for ZEVs, and in the process introducing new technologies to employees.

The State's Department of General Services (DGS) is charged with implementing Executive Order 16-2012, which mandates the purchase of an increasing amount of ZEVs into the State vehicle fleet. (A copy of this Executive Order is provided as an appendix to this Plan.)

DGS is leading the effort to meet the targets of the Executive Order and has already accomplished many of the actions outlined in the *2013 ZEV Action Plan*. DGS required three-year implementation plans from all fleet-operating departments to address how they would meet the goal of having 10 percent of fleet purchases of light-duty vehicles to be zero-emission by 2015. Departments are on track to meet this 10% purchase goal.

Additionally, DGS is currently installing EVSE at DGS-operated parking facilities to enable all state departments to utilize ZEV vehicles. DGS also established statewide contracts for multiple zero-emission vehicles and electric vehicle service equipment (EVSE) that can be used by state agencies as well as local governments. These contracts enable the expedited purchase and use of charging stations and software systems and avoid each agency negotiating its own agreement for charging services. Expanding adoption of ZEVs into the fleet as vehicle replacements occur each year and ensuring proper fueling infrastructure for these vehicles will continue to be a focus of State departments.

State agencies will also be able to purchase an expanding array of new ZEV models as these vehicles are introduced to market, including PEVs, FCEVs, and medium and heavy duty ZEVs. Also, DGS will enable the leasing of ZEVs, which provides an important new option for agencies.

### ***Strategies and Actions***

#### **Strategy: Install necessary charging and fueling infrastructure to enable 10% light-duty ZEV purchases by 2015 and 25% ZEV purchases by 2020**

- Identify potential infrastructure needs based on agency ZEV acquisition requests and assist departments in proactively identifying the number of chargers needed, current electrical system capacity, and access compliance issues through coordinated infrastructure studies triggered by PEV purchases. (DGS)
- Support state agencies in their efforts to obtain and install the necessary charging infrastructure at state properties to enable use of new electric vehicles purchased by departments. (DGS)

- Find alternate vehicle charging models/technologies which would help mitigate the time and cost needed for full charging and fueling infrastructure upgrades. (DGS)

**Strategy: Improve methods for state agencies to acquire and utilize ZEVs in their fleets**

- Provide departments the option of leasing ZEVs. (DGS)
- Continue to use the DGS hosted quarterly Statewide Equipment Council as a vehicle for peer-to-peer information sharing amongst the various State agency fleet managers. Ensure that information regarding ZEV purchasing processes, policies, infrastructure, and technology are regularly addressed and discussed. (DGS)
- Closely monitor the use of the purchasing contracts for EVSE and consider refinements to improve installation of equipment. (DGS)
- Determine the amount and type of charging and refueling infrastructure necessary for state departments to be made ready for ZEV fleet purchases. (DGS)

**Strategy: Lead effort to expand ZEVs in public and private fleets beyond state government**

- Consider expanding state funding programs that support expansion of ZEV infrastructure to enable charging and hydrogen infrastructure projects for private fleets. (CEC, ongoing)
- Facilitate the utilities' return of LCFS credits to private sector fleets to reduce operational costs and increase the amount of credits generated for the LCFS program. (CPUC, CARB)
- Work with Oregon, Washington and British Columbia to expand West Coast Electric Fleets, an initiative comprised of governments and companies who have committed to expanding ZEVs in their fleets. (GO, DGS)
- Play an active role in various professional associations of fleet managers to share California's efforts to expand its ZEV fleet. (DGS)
- Develop list of funding sources available (or potentially available) to support local government procurement of ZEVs and supporting infrastructure for their fleets. (CARB, DGS)

## Capture Economic Development Opportunities

Expanding use of zero-emission vehicles in California brings clear economic benefits to California. Each consumer who transitions to electric vehicles saves thousands of dollars in fuel costs over the life of that vehicle, which they reinvest into the State's economy through consumer spending. Similar to consumer savings from improvements to energy efficiency in buildings, appliances and consumer electronics over recent decades, consumer fuel savings will generate significant indirect economic benefits to the State.

Expansion of ZEV technologies also presents a significant economic development opportunity for the State. Companies developing ZEV technologies benefit from locating in California, considering the size of the ZEV market here and our government's supportive policy environment and financial incentives. Clean, advanced transportation (including ZEVs) is the fastest growing segment of California's clean economy, reaching about 8,500 jobs in 2012, more than twice the amount in 2002. The ZEV industry includes jobs throughout the supply chain, ranging from machinists and vehicle mechanics, to sales and engineering. Nearly three-fourths of the 23 common ZEV occupations have an average annual wage of more than \$40,000. In addition, more than half of the occupations identified typically require less than a bachelor's degree, providing opportunities for workers across skill levels.

California businesses are leading in ZEV technology innovation. In the 2012-2013 time period, California was a national leader in transportation-related patents, ranking first or second among states in battery technology, fuel cells, and hybrid/EV systems patents. In 2013, California cleantech companies received \$1.4 billion in venture capital investment, nearly half of the U.S. total. Advanced transportation was the second largest segment of investment in the State, with companies attracting over \$250 million in venture capital in 2013.

While the State continues to expand the consumer market for ZEVs, it also has targeted actions to ensure that ZEV businesses grow and thrive in California. State agencies have developed strategies to build off the existing critical mass of ZEV companies in California to expand this sector and ensure California workers are prepared to fill the jobs that these companies generate. The State's approach to promoting economic and workforce development through ZEV growth includes launching and supporting regional ZEV industry partnerships. These partnerships are organized region-by-region in order to take advantage of distinct business clusters and educational/workforce institutions in each of the State's regions. These partnerships also work directly with state agencies to leverage state programs and resources that can be helpful each region. By integrating business development efforts with workforce development, these regional partnerships align job creation strategies with employment training to ensure that Californians are prepared for growing job opportunities in local ZEV industries.

Outlined below are strategies to help businesses locate and grow in California, support technology innovation, prepare the workforce with skills in demand from ZEV companies, and to bolster regional ZEV industry partnerships in advance of these goals. State actions to integrate economic and workforce strategies, attract and retain ZEV companies, provide ongoing support for research, development, and demonstration of new technologies, and prepare workers will continue to make California the epicenter for the growing ZEV industry.

## ***Strategies and Actions***

### **Strategy: Strengthen regional ZEV industry partnerships**

- 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, CWIB, CEC)
- Establish ZEV industry classifications to streamline ZEV-related economic data collection and establish a data base of ZEV economic activity. (GO-Biz, EDD)
- 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 and California Workforce Investment Board resources. (GO-Biz, CWIB)
- 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. Utilize benchmarking activity and workgroup to identify opportunities and create a system for information sharing. (CWIB, GO-Biz, HSR, ETP)
- Facilitate and encourage cross-regional peer collaboration with the aim of joint learning and solutions, such as by documenting and sharing regional best practices (e.g. ZEV outreach templates, training modules, infrastructure permitting procedures), addressing common barriers to ZEV adoption across regions, and jointly advocating for policy solutions. (CEC, CWIB, GO-Biz, ETP)
- Promote development of maintenance programs at state universities and community colleges. (CWIB, GO-Biz)

### **Strategy: Support demonstration and commercialization of ZEV technologies by California companies**

- Work directly with the PEV Collaborative, California Fuel Cell Partnership and CalETC to simplify and encourage the expansion and utilization of workplace charging and hydrogen fueling infrastructure at or near workplaces. (GO-Biz, CPUC, CEC)
- Support new market opportunities for battery recycling and develop a commercialization pathway for second life applications of PEV batteries, including creating an on-going stakeholder dialogue for feedback and recommendations. (CPUC, CEC)
- Continue funding support for California manufacturers producing ZEVs and components through the California Energy Commission and State Treasurer's Office. (CEC, STO)

- Continue to identify and connect ZEV-related companies to available incentive opportunities, both within and outside the Governor's Office of Business and Economic Development. (GO-Biz)
- Establish strategies to improve the ability of small businesses to deploy ZEVs in their fleets. (CEC, CARB, GO-Biz)

**Strategy: Provide transparency on the impact of ZEV companies and their technology development throughout regions of the State**

- Host a forum to discuss the status of the ZEV market, including supply chains, technology development, and the role of regional and local economic development organizations in supporting this industry. These analyses will be tailored to various stakeholder groups as appropriate: ZEV owners, facility owners, utilities, electricity ratepayers, and others. (CEC, GO-Biz, ongoing)

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## Support National and International ZEV Deployment

While California state government is helping to expand the ZEV market, other US states and countries around the world are also acting to accelerate ZEV deployment. Every ZEV sold outside of California benefits our State, by growing economies of scale in ZEV manufacturing that reduces the costs of ZEV vehicles and fueling infrastructure. ZEV deployment in other places also supports the growth of ZEV technology companies located here and achieves global environmental benefits, including reducing greenhouse gas emission. California can learn from experiences in other jurisdictions, where different strategies have been advances, as well as share our government's own experiences and insights.

Governor Brown helped to organize Governors from seven other U.S. states to sign a Memorandum of Understanding (MOU) in October 2013, which includes a collective target of 3.3 million ZEVs on the road by 2025. These states include California, Oregon, Connecticut, Rhode Island, Maryland, Massachusetts, Vermont, and New York, Oregon, Rhode Island, and Vermont. These eight states followed-up on the MOU by developing a Multi-State ZEV Action Plan in May 2014 with several similar actions from California's *2013 ZEV Action Plan*. In October 2014, these eight states announced that more than 250,000 ZEVs have been registered in their jurisdictions.

Governor Brown also joined with Governors from Oregon and Washington, and the Premier of British Columbia to sign the Pacific Coast Action Plan on Climate and Energy in October 2013. This agreement is part of the shared effort among these four jurisdictions called the Pacific Coast Collaborative that begun in 2007. The 2013 PCC agreement included a collective target of 10% ZEV purchases in public and private fleets by 2016. In pursuit of this target, the PCC has created West Coast Electric Fleets, an organization that includes public and private fleets that are integrating ZEVs. This group provides peer-to-peer contact among fleet managers and decision making tools that accelerate ZEV adoption in public and private fleets.

California is also collaborating with other countries that are important early markets for zero-emission vehicles. For example, Governor Brown and Japanese Ambassador Sasae signed a Memorandum of Cooperation in September 2014, pledging coordination on ZEV development. This MOU opened the door for collaboration with Japan's Department of New Energy and Industrial Technology Development (NEDO), which is expected to result in 30-50 DC Fast Chargers in Northern California. California also works with China on issues including ZEV deployment, and a Policy Lab developed by UC Davis and CATARC will help speed ZEV adoption in China. The Air Resources Board and China's National Development and Reform Commission co-chair the Policy Lab's advisory board, and witnessed an MOU signing in September 2014.

The Plug-In Vehicle Collaborative, a public-private partnership including several California agencies, signed an MOU with a similar Dutch partnership, Coast-to-Coast E-Mobility in October 2013. CalEPA signed a Letter of Intent with the Dutch Ministry of Environment endorsing the MOU and pledging further cooperation. The CEC signed an MOU in March 2015 with the Vice Governor of the Netherlands to collaborate on best practices for ZEV infrastructure implementation.

Through these existing partnerships and new collaborations that develop, California will continue to learn from experiences in other states and countries and encourage other jurisdictions to adopt and meet strong ZEV deployment targets.

## ***Strategies and Actions***

### **Strategy: Continue working with the US states that signed a Memorandum of Understanding on ZEV Programs in October 2013 and released an Action Plan in May 2014**

- Create a website that covers information about ZEVs in various states and links to State specific sites. (CARB)
- Establish common decal for ZEVs across all states. (GO, CARB)
- Establish nonmonetary incentive reciprocity across states. (GO, CARB)
- Establish “Point of Purchase Rebates” in all ZEV states. (GO, CARB)
- Support re-establishment of FCEV federal tax credit. (GO, CARB)
- Conduct FCEV infrastructure feasibility study. (GO, CARB)
- Evaluate consumer purchase trends and purchasing decisions. (GO, CARB)
- Develop codes and standards for ZEV installations across states. (GO, CARB)
- Implement standardized roadside and other signage. (GO, CARB)
- Pool regional ZEV purchases. (GO, CARB)

### **Strategy: Build coalitions of jurisdictions working to promote and deploy ZEVs**

- Share information and experience with U.S. states and other jurisdictions interested in adopting the ZEV mandate. (CARB)
- Create and help to manage an international consortium of governments that are committed to accelerating ZEV deployment. (GO, CARB)
- Help to reduce hydrogen refueling 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)
- Participate in national data collection, analysis, and aggregation projects and initiatives to promulgate information about characteristics related to hydrogen refueling science and technologies, i.e., hydrogen feedstocks, pathways, station capacities, and implementation milestones to optimize the planning and development of California’s hydrogen refueling stations. (CEC, ongoing)

### **Strategy: Enable ZEV fleet expansion outside California**

- Implement the West Coast Electric Fleets program through the Pacific Coast Collaborative, which includes recruiting additional public and private fleets to join this effort. (CEC, CARB)
- Working with Pacific Coast Collaborative jurisdictions, expand the electric fleets initiatives nationally through Clean Cities Coalitions and other partners. (CARB)
- Invite the US Conference of Mayors to collaborate on a national municipal fleets ZEV goal and provide the tools and lessons learned from Pacific Coast Collaborative efforts. (CARB)

**Strategy: Collaborate with other jurisdictions on hydrogen and fuel cell technical foundations**

- Participate in H2USA, a national public-private partnership to advance FCEVs nationwide, and the Hydrogen and Fuel Cell Technical Advisory Committee, a Congressionally chartered advisory committee to the U.S. Secretary of Energy regarding federal programs to advance fuel cells and hydrogen. (CEC, CARB, GO-Biz)
- 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)

**Strategy: Support ZEV deployment in medium- and heavy-duty vehicles worldwide**

- Collaborate with international ports demonstrating electrification of service equipment, shore power, and freight to expand ZEVs globally. (CARB, CEC, ongoing)
- AQMD’s and transportation planning agencies on implementation of sustainable freight strategies at non-port facilities. (CARB, Caltrans, CEC, ongoing)

## Appendix

[GOVERNOR'S EXECUTIVE ORDER; COMPLETED ACTIONS FROM 2013 ZEV ACTION PLAN; 2013-2014 ZEV LEGISLATION SIGNED BY GOVERNOR BROWN; MULTISTATE ZEV MOU; LINKS TO ADDITIONAL RESOURCES]

Washington State Legislature: Joint Transportation Committee "Electric Vehicle Charging Station Networks Study" <http://leg.wa.gov/JTC/Pages/ElectricVehicleChargingStationNetworksStudy.aspx>

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