

Californias Advanced Clean Cars Midterm Review

Appendix E: Zero Emission Vehicle Complementary Policies in California and Section 177 ZEV States

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I. Introduction

California needs to transform the light-duty vehicle sector to achieve its criteria pollutant and GHG emissions reduction goals. The first step in the multi-faceted approach to creating a market for zero-emission vehicles (ZEV), meaning battery electric vehicles (BEV) and fuel cell electric vehicles (FCEV), and plug-in hybrid electric vehicles (PHEV) in California was the adoption of the ZEV regulation in 1990. Subsequently a number of complementary measures were adopted to help address the needs of a new market, including incentive programs, infrastructure deployment, and the formation of public private partnerships.¹

Governor Jerry Brown issued two executive orders to support and strengthen the growing ZEV market in California. Executive Order (EO) B-16-2012 directed California to “encourage the development and success of zero-emission vehicles to protect the environment, stimulate economic growth and improve the quality of life in the State.”² EO B-16-12 sets a target of reaching 1.5 million ZEVs and PHEVs on California’s roadways by 2025. It also establishes a longer term target of reducing transportation-related greenhouse gas emission by 80 percent below 1990 levels by 2050. EO B-16-12 is reflected in calls for collective action to support ZEV commercialization that have resulted in agreements with other states and countries. These collective actions are intended to catalyze growth in both the national and international ZEV markets, allowing automakers to achieve economy of production scale and subsequently price parity with conventional internal combustion engine vehicles. Complementing EO B-16-12 is EO B-18-12,³ which ordered State agencies to identify and pursue opportunities to provide electric vehicle (EV) charging stations and accommodate future charging infrastructure demand at employee parking facilities in new and existing state buildings.

Nine other states have adopted California’s ZEV regulation: Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont. These are called the Section 177 ZEV states, and together with California represent nearly 30 percent of light-duty vehicle sales in the United States.⁴ In 2013, seven of the nine Section 177 ZEV states and California signed a Memorandum of Understanding (MOU) committing to take the necessary steps to achieve a target of 3.3 million cumulative ZEV and PHEV sales by 2025.⁵

Achieving this target will require that California and the Section 177 ZEV states overcome barriers to the adoption of these vehicles. In April 2015, the National Academies of Science issued a report titled “Overcoming Barriers to Electric Vehicle Deployment,”⁶ which emphasized

¹ This broader set of initiatives along with the ZEV regulation is commonly referred to as the California ZEV Program.

² The full text for Executive Order B-16-2012 can be accessed at the following website:

<https://www.gov.ca.gov/news.php?id=17472>

³ The full text for Executive Order B-18-2012 can be accessed at the following website:

<https://www.gov.ca.gov/news.php?id=17508>

⁴ See Appendix B

⁵ MOU 2013. Memorandum of Understanding. October 24, 2013, Can be accessed and downloaded at

<http://www.zevstates.us/about-us/>, click on “Memorandum of Understanding” link

⁶ NAP, 2015. National Academies Press. “Overcoming Barriers to Deployment of Plug-in Electric Vehicles”

<https://www.nap.edu/catalog/21725/overcoming-barriers-to-deployment-of-plug-in-electric-vehicles>

that ZEV regulatory requirements have been effective in increasing plug-in electric vehicle (PEV), meaning BEVs and PHEVs, production. The report also stated that market success would not be achieved through vehicle requirements alone. The three main barriers noted were the high cost of technology, lack of fueling infrastructure,⁷ and low consumer awareness.

Initial research is beginning to evaluate the effectiveness of the varying complementary policies and their impact on ZEV sales and vehicle usage. However, the challenge with the main barriers (e.g., consumer awareness, fueling infrastructure needs, and incremental vehicle costs) is large enough that California has recognized the need to implement additional non-regulatory actions to support the market, beyond the current efforts described in this appendix. For example, major new initiatives are being launched with broad consumer awareness campaigns, as well as infrastructure investments with the help of electric utilities (via California Senate Bill 350), to help bridge the gap. Staff plans to more carefully study the impact of these complementary policies in the next several years, to inform regulation proposals and also the implementation of the complementary policies. Preliminary analysis has been conducted, and a discussion on consumer acceptance of ZEVs and PHEVs in response to current policies is included in Appendix B.

A recent study by the International Council on Clean Transportation (ICCT) begins to evaluate the effectiveness of current ZEV complementary policies on ZEV sales in local markets. The study, “Sustaining Electric Vehicle Market Growth in U.S. [United States] Cities,”⁸ develops statistical correlations between current ZEV sales and the presence of market enabling factors such as infrastructure, consumer campaigns, high occupancy vehicle (HOV) lane access, etc. Although this study cannot be used to forecast what policies are needed to support the 2025 ZEV regulation sales targets, it provides important insights about which factors are more or less influential in today’s market conditions. The statistical correlations show a combination of policies are needed to encourage ZEV sales, but these correlations will change in the coming years as ZEV market conditions change. Changes anticipated include the introduction of 200+ mile BEVs priced under \$40,000 that will use infrastructure in a different way, the potential sunset of HOV exemptions for ZEVs in California in 2019, the potential expiration of federal vehicle tax incentives for several major automakers in the next few years, changing eligibility requirements for state purchase rebates, and other factors.

Prior ICCT analysis also studied this topic, including a 2014 study, “Driving Electrification – A Global Comparison of Fiscal Incentive Policy for Electric Vehicles”⁹ which found that multiple factors influence PEV uptake. The study called out California as exemplifying “a comprehensive electric-drive strategy that goes beyond fiscal incentives.” As noted above, staff intends to study the market carefully, in partnership with other agencies, as well as academic researchers, to ensure new policies are adequately informed.

⁷ See Appendix D for staff’s assessment of PEV infrastructure in California and the Section 177 ZEV states.

⁸ ICCT. 2016, International Council on Clean Transportation. Lutsey, N. et al., “Sustaining Electric Vehicle Market Growth in the U.S. Cities” October 2016. <http://www.theicct.org/leading-us-city-electric-vehicle-2016>

⁹ ICCT. 2014, International Council on Clean Transportation. Peter Mock and Zifei Yang, “Driving Electrification – A Global Comparison of Fiscal Incentive Policy for Electric Vehicles” May 2016. http://www.theicct.org/sites/default/files/publications/ICCT_EV-fiscal-incentives_20140506.pdf

Norway provides an example beyond California of the type of uptake that is achievable with an aggressive suite of complementary policies. As in the United States (U.S.), three of the most important motivators in Norway for ZEV sales are fuel savings, time savings derived from access to lesser-congested roads, and financial incentives (a sales tax exemption) associated with vehicle purchase. But, in addition to the U.S. equivalent of reduced utility rates, HOV lane access, and vehicle purchase incentives, Norway also offers free ferries, parking and charging and lower road fees.¹⁰ The largest incentive by far is the sales tax waiver. As a result, PEVs in Norway are generally less expensive than their ICE counterparts.¹¹ These policies in aggregate have allowed PEV uptake in Norway to achieve critical mass, growing to 6 percent by 2013 and 30 percent by late 2016.

The take away from the existing research of U.S. markets and the Norwegian experience is that California and the Section 177 ZEV states will need to continue to be creative in identifying and implementing complementary policies that promise a more rapid ZEV uptake. The need to accelerate ZEV sales in the coming years, coupled with the projection of continued high incremental costs for ZEVs through 2025, highlights that existing complementary policies are important but insufficient to ensure California and the Section 177 states meet the 2025 targets.

This appendix discusses the suite of complementary policies that are being pursued at the international, federal, state, and local levels to address these and other barriers to a robust and growing ZEV market. Those policies include financial incentives such as vehicle tax credits, rebates, registration fee reductions or exemptions, lower electric utility rates, and high-occupancy vehicle lane exemptions. This appendix also discusses necessary activities to promote partnership-building, the development of quasi-governmental organizations to coordinate activities, and initiatives to grow infrastructure, encourage research and development, and conduct outreach and education. It concludes with a discussion of the organizations that are working to promote ZEVs, the broader agreements between California and other countries and states, and commitments to increase the number of ZEVs in government fleets.

II. Tax Credits, Rebates, Grants, and Exemptions

Consumer incentives play an important part of market development when the cost of new technology is high. The starting manufacturer's suggested retail price (MSRP) of most PEVs on the market today is between \$25,000 and \$35,000, with many models being offered at prices twice as high.¹² When compared with a sales-weighted average MSRP of \$25,000 for all passenger cars, it is clear that incentives can help some consumers with their purchase decision of a ZEV or PHEV by reducing prices to be closer to the price range of conventional vehicles. When asked, currently 70% of current PEV owners (who received a vehicle rebate

¹⁰ Hanley 2016. Steve Hanley, Gas2.0.org (article) "Norway May Pull Back on Some EV Incentives," February 29, 2016; <http://gas2.org/2016/02/29/norway-may-pull-back-on-some-ev-incentives/>

¹¹ Young 2013. Angelo Young, International Business Times (article). "Tesla Owners In Norway Get \$134,000 Tax Break, Which Is More Than The Base Price Of The Model S." December 13, 2013. <http://www.ibtimes.com/tesla-owners-norway-get-134000-tax-break-which-more-base-price-model-s-1507740>

¹² See Appendix B, Section III.A.4 for further analysis on MSRPs for PEVs.

from California) indicated the federal and state purchase incentives played either an extremely or very important role in their purchase decision.¹³ This section explores the current monetary incentives offered on the Federal and State level.

II.A. Federal

II.A.1. Qualified Plug-In Electric Drive Motor Vehicle Tax Credit

The Qualified Plug-in Electric Drive Motor Vehicle Tax Credit varies by the capacity of the vehicle's battery pack, awarding a \$2,500 credit for vehicles with a five kilowatt-hours (kWh) battery and an additional \$417 credit per kWh up to a maximum of \$7,500. The tax credit begins phasing out for each manufacturer when its nationwide cumulative sales of qualified PEVs reach 200,000 vehicles. Based on historic sales rates, staff estimates at least four manufacturers would reach this threshold prior to 2025. Leading manufacturers General Motors and Nissan would reach it first possibly by 2022 followed by Ford and Tesla, though increasing sales of existing vehicles and introduction of new products would likely accelerate this timeline. An extension of the tax credit is not being discussed in Congress, which may create challenges for forthcoming products. Most PEVs are leased, and in these transactions, the automotive dealer generally applies for the credit. In turn, the dealer typically applies the credit as a down payment, reducing monthly lease payments accordingly.

II.A.2. Alternative Fuel Infrastructure Tax Credit

Fueling equipment for natural gas, liquefied petroleum gas (propane), liquefied hydrogen, electricity, ethanol, or diesel fuel blends containing a minimum of 20% biodiesel installed between January 1, 2015, and December 31, 2016, is eligible for a tax credit of 30% of the cost, not to exceed \$30,000. Permitting and inspection fees are not included in covered expenses. Fueling station owners who install qualified equipment at multiple sites are allowed to use the credit towards each location. Consumers who purchased qualified residential fueling equipment prior to December 31, 2016, may receive a tax credit of up to \$1,000. Unused credits that qualify as general business tax credits, as defined by the Internal Revenue Service (IRS), may be carried backward 1 year and carried forward 20 years.

II.A.3. State Energy Program (SEP)

The State Energy Program (SEP) is a federally funded, state managed program that provides grants to states for programs geared towards energy efficiency and renewable energy. SEP also facilitates state-based activities such as supporting and identifying transportation programs that accelerate use of alternative fuels. To date, the program has awarded \$67 million to 103 competitive projects in 36 states. While Section 177 ZEV states should not overlook SEP as a potential ZEV infrastructure financing mechanism – Hawaii and Nevada have used SEP grants to install a small number of PEV EVSEs – it is doubtful that this program is scalable to the level necessary to support the broader infrastructure needs of the Section 177 ZEV states.

II.A.4. Fuel Cell Motor Vehicle Tax Credit

The Fuel Cell Motor Vehicle Tax Credit allows for a tax credit up to \$8,000 for qualified light-duty vehicle purchases depending on vehicle's fuel economy. The tax credit will expire on

¹³ See Appendix B, Section III.C.2.d for further analysis of the role of incentives in purchase decisions.

December 31, 2016. Multiple trade associations, along with other industry partners, are working to ensure that a tax credit is available beyond the December 31, 2016 expiration date.¹⁴

II.A.5. Alternative Fuel Excise Tax Credit

The Alternative Fuel Tax Credit allows suppliers to receive a \$0.50 per gallon federal tax credit for the liquefied hydrogen that is sold for the use of motor vehicles. This tax credit has been extended multiple times but has an expiration date of December 31, 2016.

II.A.6. Airport ZEV and Infrastructure Incentives

Under this program, public airports can receive funding for up to 50% of the eligible cost to obtain on-road ZEVs that are specifically used for the airport as well as provide the fueling infrastructure to support such vehicles. This incentive is provided under the Clean Air Act and priority is given to airports in nonattainment areas. The Federal Aviation Administration has awarded \$24.5 million in grants so far.

II.B. States

More than half of all U.S. states have incentives. Addressed here are incentives offered by California and the Section 177 ZEV states. Other states with notable programs to advance ZEV adoption are also recognized.

Table 1 - ZEV State Incentives

State	Rebates, Tax Credits or Exemptions	Utility Discounts	HOV Access	Charger Incentive
California	Yes	Yes	Yes	Varies
Connecticut	Yes	Yes	No ¹⁵	Yes
Maine	No	Yes	No	No
Maryland	Yes	Yes	Yes	Yes
Massachusetts	Yes	Yes	No	Yes
New Jersey	Yes	Yes	PHEVs ¹⁶	Yes
New York	Yes ¹⁷	Yes	Yes	Yes
Oregon	Yes	Yes	No	Yes
Rhode Island	Yes	No	N/A	Yes
Vermont	Yes	Yes	N/A	Yes ¹⁸

¹⁴ FCHEA 2016. Fuel Cell and Hydrogen Energy Association. Telephone call with Morry Markowitz, FCHEA President. September 2016

¹⁵ There only 38 HOV lane miles divided among 3 limited access highways in Connecticut.

¹⁶ Conventional hybrids and PHEVs are allowed to access HOV lanes in New Jersey. New Jersey has a HOV lane between exits 11 and 14 on the New Jersey Turnpike. This represents about 30 miles of roadway in both directions.

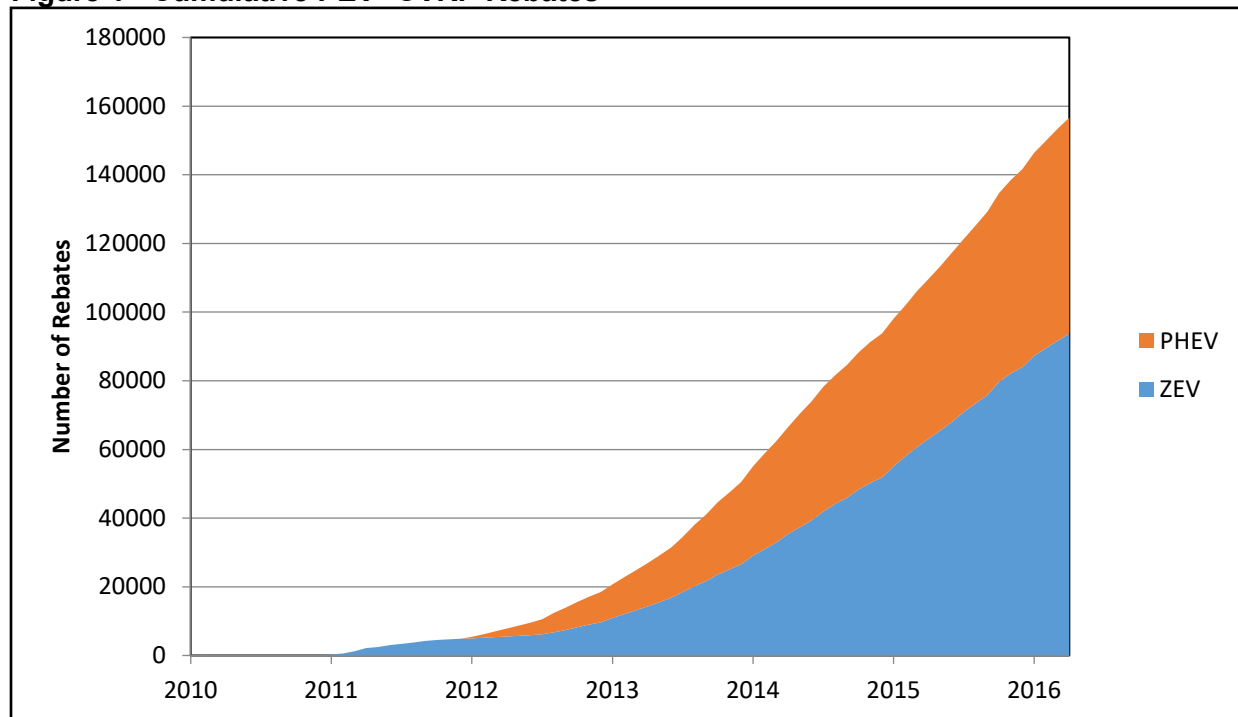
¹⁷ New York's consumer incentive program is under development and will commence shortly.

¹⁸ Vermont offers EVSE financing: <http://www.driveelectricvt.com/charging-stations/financing>

II.B.1. California

At the state level, the ARB's Clean Vehicle Rebate Project (CVRP),¹⁹ created under Assembly Bill (AB) 118 in 2007 and now primarily funded by proceeds from California's greenhouse gas cap and trade program provides rebates of \$5,000 for FCEVs, \$2,500 for BEVs, and \$1,500 for those PHEVs that meet the definition of transitional ZEV or TZEV.²⁰ Since its inception in April 2010, CVRP has provided \$340 million in rebates to incentivize the sale or lease of more than 160,000 FCEVs, BEVs and PHEVs.²¹ This represents almost three-quarters of ZEVs and PHEVs sold since 2010 in California. To ensure the most effective use of funding, the CVRP guidelines are reviewed annually. Recent program changes include income caps, a PHEV range requirement, and a greater emphasis on getting ZEVs into disadvantaged communities. For example, supplemental targeted scrap and replacement incentive funding – which, in aggregate with CVRP, can provide up to \$9,500 – is available for lower-income consumers.

Figure 1 - Cumulative PEV* CVRP Rebates



*In addition, over 500 FCEV rebates have been processed since 2010.

The California Energy Commission (Energy Commission) has also provided grants for the placement of electric vehicle supply equipment (EVSE) throughout the state. Currently active

¹⁹ For eligibility requirements and a list of eligible vehicles, go to <https://cleanvehiclerebate.org/eng>.

²⁰ A transitional zero emission vehicle (TZEV) is a PHEV certified to meet the 150,000 mile super ultra low emission vehicle (SULEV) exhaust emission standard, the zero evaporative emission standard, 150,000 mile on-board diagnostic requirements, and a performance and defects warranty of 15 years or 150,000 miles on the emission control components and 10 years or 150,000 miles on the zero-emission energy storage device used for traction power (such as a battery, ultra-capacitor, or other electric storage device).

²¹ CVRP, 2016. Clean Vehicle Rebate Project. "CVRP Rebate Statistics" <http://cleanvehiclerebate.org/eng/rebate-statistics> (ARB generated Figure 1 using these rebate statistics)

Energy Commission grants will establish a direct current fast charging network along the two major north-south corridors – Interstate 5 and Highway 99 – eliminating gaps in the West Coast Electric Highway. The Energy Commission has also provided grants to 10 communities throughout the state to assist those communities in developing their ZEV readiness plans. Finally, the California Pollution Control Financing Authority administers an EVSE program for small businesses.

Locally, four air districts provide vehicle incentives: the Antelope Valley Air Quality Management District provides a rebate of \$1,000 to residential consumers; the Bay Area Air Quality Management District provides a rebate of \$2,500 to agency fleets; the San Joaquin Valley Air Pollution Control District (SJVAPCD) provides \$3,000 to consumers, up to \$9,500 for low-income consumers, and up to \$20,000 to public agencies; and the South Coast Air Quality Management District (SCAQMD) provides up to \$9,500 for low-income consumers. The City of Riverside and El Dorado County provide rebates of \$500 and \$1,000, respectively, and the Transportation Authority of Marin provides rebates of \$2,500 to fleets. One electric utility, the Sacramento Municipal Utility District (SMUD) also provides vehicle rebates of \$300 to PEV consumers in SMUD territory. These local vehicle rebates are in addition to the federal tax credit and CVRP rebate.

Five electric utilities and the SCAQMD provide rebates of up to \$1,000 for residential EVSEs. Four utilities provide rebates of up to \$1,000 for workplace EVSE, and the SJVAPCD provides grants of up to \$50,000 for public agencies and businesses. In addition to the local rebates and grants, NRG EVgo provides free EVSE wiring at businesses and apartment buildings in California.

II.B.2. Section 177 ZEV States

II.B.2.i Connecticut

At the state level, the Connecticut Department of Energy and Environmental Protection created the Connecticut Hydrogen and Electric Automobile Purchase Rebate (CHEAPR) program for highway-capable FCEVs, BEVs, and PHEVs. CHEAPR provides \$5,000 rebates for the purchase or lease of a new FCEV; \$750 rebates to PHEVs or BEVs with fewer than 10 or 20 kilowatt-hours of battery capacity, respectively; \$1,500 rebates to PHEVs or BEVs with 10-18 or 20-25 kilowatt-hours of battery capacity, respectively; and \$3,000 to PHEVs or BEVs with greater than 18 or 25 kilowatt-hours of battery capacity, respectively. Additionally, the registration fee for ZEVs is less than half the cost of a registration for a regular passenger vehicle. Pure ZEVs are also exempt from emissions testing, the associated \$40 administrative fee, the two-year \$20 testing fee, and the \$5 greenhouse gas reduction fee.

EVCONNECTICUT, a PEV Charging Infrastructure Grant Program, makes funding – up to 100 percent of the project cost – available to municipalities, state agencies, and private businesses to install EVSE. Under the program, Connecticut placed 214 Level 2 EVSEs along main transportation corridors in the state and funded direct current fast chargers (DCFC) at two service (travel) plazas. The Level 2 EVSEs and DCFCs installed under this program must be available to the public at no cost for three years.

The Connecticut Clean Fuel Program, administered by the Department of Transportation provides grants to municipalities and public agencies for the purchase, operation, and maintenance of alternative fuel vehicles. To date, this program has awarded ten grants for 7 BEVs, 11 PHEVs, and 10 neighborhood electric vehicles (NEV).

Connecticut has earmarked \$450,000 for the development of future hydrogen refueling infrastructure.

II.B.2.ii Maryland

At the state level, Maryland offers a PEV tax credit of up to \$3,000 based on the battery capacity of the vehicle in kilowatt-hours. Maryland's Department of the Environment is working to extend this tax credit, which has already provided 4,369 credits, and possibly increase the amount of funding per year in anticipation of growing sales. The Maryland Energy Administration offers a rebate equal to 50 percent of the cost of qualified EVSE and installation up to a maximum of \$900 for individuals, \$5,000 for businesses, and \$7,500 for retail service stations.

Maryland's Departments of the Environment and Transportation, the Maryland Energy Administration, and the Maryland Attorney General's Office developed a \$2 million Electric Vehicle Infrastructure Program to install dual standard (CHAdeMO and SAE Combo) DCFCs at 21 locations across the state. To date, the program has issued 743 rebates totaling almost \$1.3 million. Approximately 70 percent of the rebates have been residential, but approximately 73 percent of the total has been commercial. The state also provided \$1 million in funding for Level 2 EVSEs at eight of the state's passenger rail facilities.

II.B.2.iii Massachusetts

Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) and is a Department of Energy Resources program, funded through the Regional Greenhouse Gas Initiative proceeds, that offers rebates of up to \$1,500 for PHEVs and \$2,500 for customers of BEVs. To date, MOR-EV has rebated almost 2,700 PEVs. PEVs with an MSRP of \$60,000 or more are limited to a rebate of \$1,000. Massachusetts also provides grant funding for public and private fleets to purchase alternative fuel vehicles and infrastructure, as well as idle reduction technology.

The Massachusetts Electric Vehicle Incentive Program (MassEVIP) is a Department of Environmental Protection program that provides incentives to eligible municipalities, state agencies, and state universities and colleges for the acquisition of PEVs and the installation of Level 2 dual-head EVSEs. Incentives for BEVs are \$7,500 per vehicle, while incentives for PHEVs are \$5,000 per vehicle. Incentives for dual head Level 2 EVSEs range from \$7,500 to \$13,500 and are dependent upon the number of PEVs acquired. MassEVIP's Workplace Charging Program has awarded funding for 161 vehicles and 444 EVSEs of which 341 have been installed.

Massachusetts exempts vehicles powered exclusively by electricity from state motor vehicle emissions control inspections.

II.B.2.iv New Jersey

New Jersey exempts new or used ZEVs sold, rented or leased in the state from state sales tax. It also exempts these vehicles from annual use taxes.

The “It Pay\$ to Plug In” workplace charging grant program provides grants to employers to offset the cost of purchasing and installing EVSE. The New Jersey Department of Environmental Protection will reimburse applicants up to \$250 per Level 1 EVSE and up to \$5,000 per Level 2 EVSE. To date, the program has provided grants to 35 applicants for the installation of approximately 100 Level 2 EVSEs. Additionally, Public Service Electric and Gas (PSE&G) has provided a total of 60 free EVSEs for 11 locations belonging to employers who have five or more employees committed to owning PEVs. PSE&G retains ownership of the EVSE, and the employer pays electricity and installation costs.

New Jersey exempts vehicles powered exclusively by electricity from state motor vehicle emissions control inspections.

II.B.2.v New York

New York is developing a consumer rebate program to be administered by New York State Energy Research and Development Authority (NYSERDA) that will provide rebates of up to \$2,000 to eligible FCEVs, BEVs, and PHEVs.

New York is also developing two municipal rebate programs that will be administered by the Department of Environmental Conservation. The first program is a business tax credit of 50 percent of the cost of purchasing and installing an EVSE (capped at \$5,000). The credit is solely for business use. The second program will provide rebates of between \$750 and \$5,000 for BEVs, PHEVs, or FCEVs purchased or leased by municipalities (including counties). The combined budget for the infrastructure and vehicle programs this fiscal year (April 1, 2016 through March 31, 2017) is \$3 million. The legislation includes an expiration date of April 1, 2023. Funding will be determined each year.

In 2012 and 2013, NYSERDA selected more than 20 partners to install Level 2 EVSEs. They were selected with a diversity of geography, business models, and location types in mind, and span public, workplace, multi-family, and fleet charging settings. NYSERDA contributed an average of about 65% of the EVSE and installation costs, and did not dictate the business model the EVSE owner was required to use for generating value from the EVSE. To date they have installed nearly 700 EVSEs statewide. NYSERDA is also planning upcoming programs to bring down the cost of EVSE installations through initiatives such as a purchasing collaborative, further incentives for workplace and multi-family charging, and a pilot of an EVSE leasing model.

New York exempts vehicles powered exclusively by electricity from state motor vehicle emissions control inspections.

II.B.2.vi Oregon

Oregon provides fleet, business, and residential tax credits. The state’s Energy Incentives Program provides both fleet and refueling infrastructure tax credits to trade, business, or rental property owners with a business site in Oregon, or to Oregon non-profit organizations, tribes, or

public entities. The fleet credit is for 35 percent of the certified incremental cost of projects to replace two or more alternative fuel vehicles (including those fueled by electricity or hydrogen). The infrastructure credit is for 35 percent of the certified cost of projects to purchase and install fleet, public, multi-unit dwelling, and workplace EVSEs. Oregon additionally offers a tax credit for 50 percent of the cost of residential EVSEs, up to \$750.

II.B.2.vii Rhode Island

Driving Rhode Island to Vehicle Electrification (DRIVE) is a new PEV rebate program administered by the Rhode Island Office of Energy Resources. DRIVE provides \$500 rebates to PEVs with fewer than 7 kilowatt-hours of battery capacity, \$1,500 to PEVs with 7 to 18 kilowatt-hours of battery capacity, and \$2,500 to PEVs with greater than 18 kilowatt-hours of battery capacity.

The Rhode Island Charge Up! Program offers incentives to state agencies and municipalities interested in installing EVSE at publically accessible facilities, and supports the purchase or lease of EVs for integration into public sector fleets. Qualified public sector applicants may be eligible to receive a total award of up to \$75,000 to support their adoption of clean transportation solutions.

The Office of Energy Resources awarded \$781,225 in American Reinvestment and Recovery Act Funding to site and install a network of 50 publicly available Level 2 EVSEs. The Office of Energy Resources encourages operators of publicly available EVSEs to make fueling available for free.

Rhode Island exempts vehicles powered exclusively by electricity from state motor vehicle emissions control inspections.

II.B.2.viii Vermont

Drive Electric Vermont is partnering with Vermont auto dealers to offer a point-of-sale incentive of \$750 for PEVs with fewer than 15 kilowatt-hours of battery capacity and \$1,000 for PEVs with 15 or more kilowatt-hours of battery capacity. The program also incentivizes dealers \$250. Funding is limited to the first 200 consumers.

II.B.3. Other States

II.B.3.i Colorado

Colorado offers an income tax credit of up to \$6,000 for purchase of a PEV. The Colorado Energy Office (CEO) and Regional Air Quality Council (RAQC) provides grants to support PEV adoption in fleets. RAQC grants cover 80 percent of the incremental cost of a qualified PEV, up to \$8,260. Both CEO and RAQC grants fund 80 percent of the cost of EVSE, up to \$6,260.

II.B.3.ii Georgia

Georgia offers an income tax credit of 10 percent of the cost of an EVSE, up to \$2,500. Georgia also exempts vehicles powered exclusively by electricity from state motor vehicle emissions inspections.

II.B.3.iii Washington

Washington exempts ZEVs from state sales and use tax. Washington also exempts vehicles powered exclusively by electricity from state motor vehicle emissions testing.

III. Utility Rate Reductions

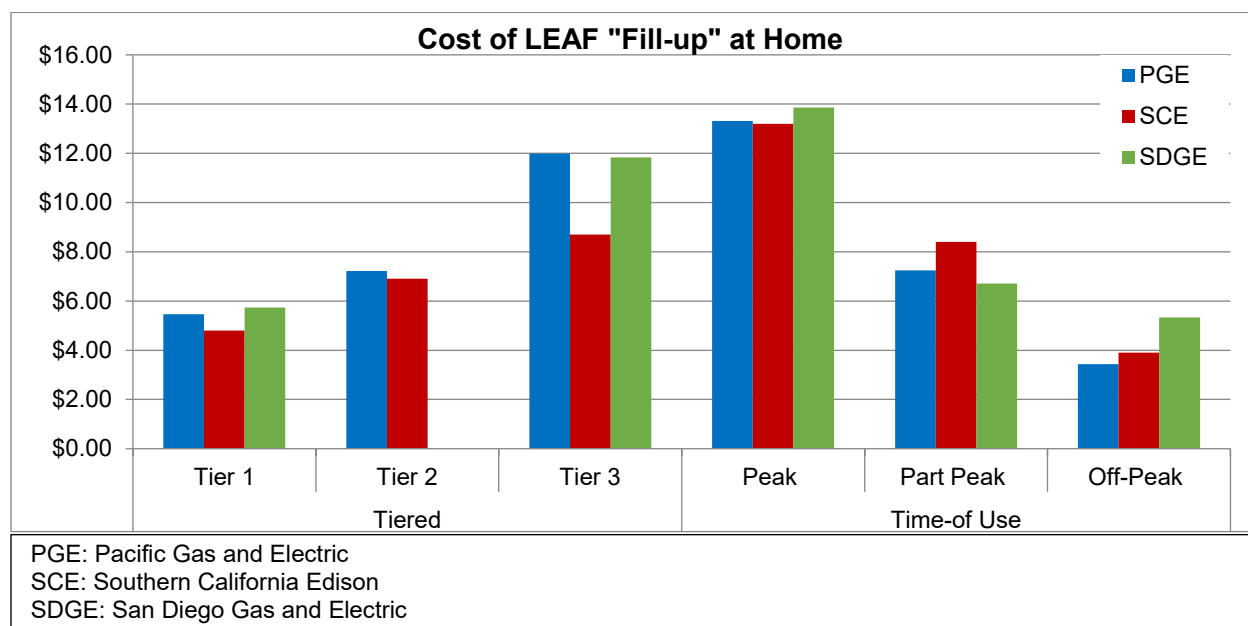
In general, utilities in California promote energy conservation using a tiered pricing structure. Under this structure, the unit price of a kilowatt-hour of electricity increases above given usage thresholds. As a result, the addition of PEV charging to a home's energy consumption could result in part or all of the additional incremental energy use being priced at a higher rate than that for the rest of the home. To incentivize PEV charging, some utilities offer a variable rate structure called time-of-use (TOU) pricing. Under this pricing structure, homeowners are charged varying energy rates depending on the time of day and the season when the energy is used. The benefit to the consumer of TOU pricing is that it allows homeowners who charge PEVs during off-peak hours (typically very late evening to early morning in the warmer half of the year and evening to mid-morning in the cooler half of the year) to do so at a rate that is discounted below that of the tiered rate structure. TOU periods often coincide with inactivity periods for most homeowners' vehicles. The benefit to the utility is twofold. First, the utility can curtail charging during peak periods, which limits the need to bring online electricity produced by typically more expensive and dirtier power plants that only operate during periods of peak demand. Second, the utility can improve the efficiency of those power plants that are operated 24 hours per day by balancing the load over more hours.

More than 60% of California respondents aware of special rates offered by their utilities use or plan to use EV electricity price rate for charging at home, though when including those with utilities that do not offer such rates or are unsure of what rates they use, the share falls to 40%. However, in Massachusetts only about 10% of consumers use or plan to use EV rates, which likely reflects more limited availability as Northeast utilities are only beginning to offer charging discounts.²² As more states work with their utilities to help make electricity price rates available, consumers could be further convinced to purchase a PEV. Continued engagement with utilities will also become more important as more renewable electricity sources are incorporated which may modify the optimal charging times for vehicles.

Figure 2 below graphically illustrates the cost savings that can be obtained by a consumer charging a 30 kilowatt-hour Nissan LEAF during off-peak hours versus charging under a standard tiered pricing structure within the three largest IOUs (representing approximately 80 percent of PEV charging) in California.

²² See Appendix B, Section III.C.1.e for more CVRP Consumer Survey and MOR-EV Survey results pertaining to intention and use of EV rates.

Figure 2 - Time of Use versus Tiered Utility Rate Pricing in California



III.A. California

The three large investor owned utilities (IOU) and five publicly owned utilities (POU) in California provide lower TOU rates (often in conjunction with a second meter). A sixth POU provides a per kilowatt-hour discount, and a seventh POU provides flat monthly rates.

III.B. Section 177 ZEV States and Other States

As there are more than 500 electric utilities in the U.S. and rates are continually under review, the count of utilities offering TOU pricing targeted to PEV charging during times when there is excess capacity is constantly changing. Some utilities encourage PEV owners to use TOU rates that were previously in place, while others have established separate TOU pricing specifically for PEV owners. As the number of PEVs on the road increase, many utilities outside of California are beginning to explore TOU pricing through pilot programs, while some are holding open proceedings to establish permanent programs.

IV. HOV Lane Access

Another way government has incentivized ZEVs and PHEVs is through exemptions on the use of HOV lanes. This was an incentive that worked well with conventional HEVs, helping spur demand in California in the early 2000s. As described in Appendix B, early PEV consumers reported HOV lane access as a top motivation in their PEV purchase decision given the level of congestion found on California’s freeway network.²³ As seen in Figure 73 of Appendix B, greater than 50 percent of the respondents to that survey said that HOV lane access was either

²³ See Appendix B, Sections III.C.2.c. and III.C.2.d. for further analysis of PEV purchase motivations and the role of incentives based on California CVRP Consumer Survey data.

very or extremely important. However, HOV lane access is set to expire for PEVs in California, and few other states offer HOV lane access, or have limited HOV lane miles available. HOV lanes do not exist in all states, in some cases because congestion is not an issue. Therefore, exemptions for ZEVs in HOV lanes do not currently have the same value for drivers in all states. California's experience at least appears to warrant additional research into the level to which HOV lane access in other ZEV states could serve as a PEV uptake motivator.

IV.A. Federal

IV.A.1. High Occupancy Vehicle (HOV) Lane Exemption

The U.S. Department of Transportation (U.S. DOT) is tasked with planning and executing HOV lane programs. HOV lanes, also known as carpool lanes, allow vehicles to operate in designated lanes with a specified number of passengers in the vehicle. Qualifying inherently low-emission vehicles (ILEV) and hybrid electric vehicles (HEVs) displaying a state-issued exemption sticker are allowed to operate in HOV lanes regardless of the number of passengers. Although it is a federal policy, states are responsible for issuing and enforcing the exemption. The exemption for ILEVs ends September 20, 2019 and the exemption for remaining vehicles ends September 30, 2025.

IV.B. California

California issues white decals to operators of federally inherently low-emission vehicles (BEV/FCEV) and green decals to qualifying PHEVs. These decals allow single occupant access to HOV lanes. Decal distribution for both white and green decals is unlimited and provides HOV lane access until January 1, 2019.

IV.C. Section 177 ZEV States

Maryland and New York allow PEV single occupant access to HOV lanes. New Jersey allows conventional hybrids and PHEVs to access HOV lanes.

IV.D. Other States

Arizona, Colorado, District of Columbia, Florida, Georgia, North Carolina, Tennessee, Utah, Virginia, allow single occupant access to HOV lanes. Colorado and Arizona do not grant access to new ZEVs and PHEVs, but allow vehicles that have previously received exemption to travel in HOV lanes to continue to do so.

V. State Level Initiatives, Coalitions, and Actions

PEV consumer awareness is low, both in California, and across the Section 177 ZEV states. Often government can help increase awareness through broad campaigns and initiatives.²⁴

Additionally, as charging and hydrogen infrastructure is often cited as a barrier to consumer acceptance of ZEVs and PHEVs, state and local governments can play either a direct role in funding or installing infrastructure or a more indirect, though equally relevant, role streamlining the permitting process for these installations or establish best practices for other property

²⁴ See Appendix B, Section III.B for additional discussion of current consumer awareness levels and barriers to adoption.

managers or site hosts. Governments and supporting partners can also help to coordinate the multiple, simultaneous efforts to reduce redundancy and ensure an efficient deployment of infrastructure.

V.A. California

V.A.1. Regional Planning

The Energy Commission has awarded PEV readiness grants to more than ten regions throughout the state to create a unified statewide approach to the planning and implementation of PEV charging infrastructure and other market supporting actions. These grants have allowed communities to develop planning strategies for distribution of charging with interregional corridor plans or sub-regional planning studies. The California PEV Collaborative and the Energy Commission aligned their respective programs in 2012 such that the U.S. Department of Energy (U.S. DOE) Clean Cities grants focused on five core readiness elements communities will need near-term (“capacity building”), while the Energy Commission grants allowed the communities to expand PEV readiness in other, more substantial ways in the long term.²⁵

V.A.2. PEV Resource Center

The PEV Resource Center²⁶ is an online buying guide that provides consumers with information on PEV technology, maintenance and costs, charging and charging infrastructure, incentives, and safety. The local search function allows consumers to identify all federal, state, and local incentives available within a given zip code. The PEV Resource Center website is hosted by DriveClean,²⁷ an ARB-maintained online buying guide that provides consumers with greenhouse gas and smog ratings information for clean and efficient light-duty vehicles regardless of fuel or technology.

V.A.3. Building Code Development

ARB staff has worked with the Building Standards Commission (BSC) and Housing and Community Development (HCD) to develop building standards that require installation of PEV charging infrastructure in new commercial buildings and homes. The Green Building Standards (CALGreen) Code includes requirements for PEV charging infrastructure in new buildings to support future installation of Level 2 charging stations. All new single and two-family dwellings and townhouses with attached private garages must install PEV charging infrastructure. Multi-family dwellings with 17 or more units on the building site must install PEV charging infrastructure in 3 percent of total parking spaces. Non-residential buildings with parking lots that have 51 spaces or more, must install PEV charging infrastructure in 3 percent of parking spaces. Effective January 1, 2017, parking lots with 10 or more parking spaces must install PEV charging infrastructure in about 6 percent of parking spaces.

All new buildings must install raceway, which is the conduit or pipe that future wiring can be pulled through, and must provide adequate panel capacity to support future Level 2 charging. New buildings must also identify that the building is PEV-capable as part of the site plan, on the

²⁵ Since this alignment, the Energy Commission has funded additional EV readiness efforts and information can be found at their program website: http://www.energy.ca.gov/2013-ALT-01/documents/Regional_Readiness_Grants.pdf

²⁶ Access the PEV Resource Center: <http://driveclean.arb.ca.gov/pev/>

²⁷ Access DriveClean: <http://driveclean.arb.ca.gov/>

electrical panel, and at the termination point for the raceway. The CALGreen Code requirements for PEV charging infrastructure in new construction will help to meet California's demand for EV charging in 2020 and beyond. However, because it is not required in the CALGreen Code, it will be essential for EVSEs to be installed in these new buildings to ensure the charging spaces become fully "PEV-ready" and available for immediate use by PEV drivers. ARB staff is planning to measure the rate of installation of PEV chargers in new buildings to track achievement of statewide goals. ARB staff will also continue to provide suggested code changes based on future updates to projections for PEV charging infrastructure needs.

V.B. Section 177 ZEV States

V.B.1. Connecticut

State, local, and non-government entities have worked alone and in collaboration to advance the ZEV MOU, clean fuels, and fueling. The Connecticut Electric Vehicles Infrastructure Council is comprised of state agencies, municipalities, and industry, and laid the foundation to prepare Connecticut for rapid and seamless integration of ZEVs into the market. The Connecticut Automotive Retailers Association supports the design and implementation of incentives and dealer awards and encourages auto dealers to install free public PEV charging at their local dealerships. The Connecticut Department of Energy and Environmental Protection issues annual grant awards (Connecticut's four U.S. DOE's Clean Cities coalitions) to conduct outreach to advance alternative fuel vehicles and to work with fleets. Connecticut's Green Bank aims to leverage public funds to encourage greater private investment in clean technology for transportation. Finally, the Connecticut Fund for the Environment and local Sierra Club have been actively conducting outreach and education to promote ZEV public policy.

On the infrastructure side, Connecticut has begun installing EVSEs in state parks with large visitor turnout and is growing the state's hydrogen refueling network. For example, the City of Hartford, the Connecticut Center for Advanced Technology, a private developer and an automaker are collaborating to leverage the build of a hydrogen station at the junction of two major highways in Hartford, halfway between New York City and Boston.

V.B.2. Maine

Maine recently partnered with the Province of Quebec to establish a PEV corridor between Quebec City and Old Orchard Beach, Maine, a popular tourist destination for Quebecois by summer 2017. The joint task force includes state agencies, Maine Turnpike Authority, Hydro-Quebec, Central Maine Power, Quebec Transportation and Department of International Relations, Efficiency Maine Trust, Greater Portland Council of Governments (GPCOG) and Electric Mobility Northeast.

GPCOG received a grant from Central Maine Power to install 17 Level 2 EVSEs in central and southern Maine. GPCOG also received a grant from Nissan to lease a Leaf for several years and promote the vehicle to several municipalities and area businesses, which resulted in 5 municipalities and 1 business purchasing or leasing a PEV and installing 14 EVSEs.

Electric Mobility Northeast is working with Nissan and a grocery chain to install 5 DCFC stations in central and southern Maine.

Maine has adopted a policy to promote the development, implementation, availability, and use of smart grid technology. The policy includes the goal of integrating advanced electric storage and peak-reduction technologies, such as PEVs, into the electric system.

V.B.3. Maryland

Maryland's Electric Vehicle Infrastructure Council (EVIC), established through legislation introduced in 2011, works to collaboratively promote PEVs. EVIC was charged with the evaluation of incentives for the ownership of ZEVs and the purchase of PEV charging equipment; the development of recommendations for a statewide infrastructure plan; and the development of other potential policies to promote the successful integration of ZEVs into Maryland's communities and the transportation system.

EVIC has been instrumental in shepherding legislation establishing or extending HOV lane access, tax credits for vehicles, and rebates for charging infrastructure. As a result of their action plans and infrastructure efforts, there are now charging stations at many transit stations throughout the state.

Maryland's Departments of the Environment and Transportation and the Maryland Energy Administration, are working with a private contractor to develop a state-funded education and outreach program for EV. The focus areas of the program are to: (1) promote ZEVs (using outreach and education materials and vehicle and charger incentives), (2) identify potential workplace charging locations, and (3) conduct outreach to property owners of both commercial and residential properties.

V.B.4. Massachusetts

The Massachusetts Zero-Emission Vehicle Commission (ZEV Commission) is comprised of individuals from the Executive Office of Energy and Environmental Affairs, the Departments of Transportation, Energy Resources, and Environmental Protection, the Division of Standards, City of Boston, a second community named by Massachusetts Municipal Association as well as stakeholders from the environmental and business communities, utilities, auto dealers, refueling equipment and automakers, and parking company owners/operators.

The ZEV Commission will study the economic and environmental benefits and costs of increased use of ZEVs. The ZEV Commission is tasked with filing an action plan to the legislature and providing guidance to the Commonwealth on ZEV related matters including but not limited to encouraging the purchase and lease of ZEVs (in part, through incentives), further expanding access to refueling infrastructure; and identifying strategies for removing barriers to ZEV deployment.

The Mass Drive Clean Campaign is a "first in the nation" state-sponsored ZEV test drive program. Eight test drive events were held primarily at workplaces in 2015. The 2016 campaign expands to 16 events.

V.B.5. New Jersey

The New Jersey Department of Community Affairs has developed a streamlined permitting guide to installing EVSE at residences. The document describes the instances under which a permit would be required.

V.B.6. New York

New York's Departments of Environmental Conservation and Transportation and NYSEERDA were a driving force behind the formation of the Transportation Climate Initiative (TCI).

The New York State Interagency ZEV Workgroup was established in January 2014, with initial participation by nine key agencies: the Departments of Environmental Conservation, Transportation, Motor Vehicles, Public Service, and State (Codes Division), the Office of General Services, the Thruway Authority, the Power Authority, and NYSEERDA. The workgroup has since expanded to include 18 state agencies and two New York City agencies (Citywide Administrative Services and Transportation). This group is working from the Multi-State ZEV Action Plan²⁸ to address New York specific items while several members work closely with the other MOU signatory states on regional issues.

V.B.7. Oregon

Since 2009, Oregon has been involved in multiple in-state initiatives to complement the mandatory ZEV program, including the Governor's Alternative Fuel Vehicle Infrastructure Working Group, Transportation Electrification Executive Council, Ten-Year Energy Plan, and Statewide Transportation Strategy.

Oregon is now reorganizing the way its state agencies collaborate to effectively implement actions needed to facilitate increasing adoption of ZEVs. Previous limited-duration committees addressing issue clusters (energy, transportation, global warming, etc.) are expected to be replaced by groups more directly focused on promoting ZEVs. Oregon's Departments of Transportation, Environmental Quality, and Energy, as well as Business Oregon and the Transportation Research and Education Consortium, are the leading agencies in these efforts. In the future, other agencies and organizations are expected to join the core groups including the Department of Administrative Services, Building Codes, electric utilities, the Oregon PUC, Oregon cities, and the public/private partnership Drive Oregon.

V.B.8. Rhode Island

The Rhode Island ZEV Working Group (working group) – comprised of the State's Departments of Environmental Management and Transportation, Office of Energy Resources, and the Ocean State Clean Cities Coalition – was established to expand access to refueling infrastructure, encourage ZEV procurement (partly through incentives), and identify strategies to remove barriers to deployment. The working group is collaborating with state and quasi-state agencies, municipalities, private and nonprofit companies, auto dealers, and utility providers. Their goals include creating a Rhode Island ZEV implementation plan based on the multi-state ZEV, spurring market growth through private, municipal, consumer and dealership incentives, quantifying necessary infrastructure and planning for the future, and expanding consumer awareness.

V.B.9. Vermont

In response to the damage caused by Tropical Storm Irene, and in acknowledgment of projections of more frequent and more intense storms in the future, Governor Shumlin convened a Climate Cabinet in May 2011. The Climate Cabinet is chaired by the Secretary of the Agency

²⁸ TCI and the Multi-State ZEV Action Plan are discussed in the Broader Agreements and Alliances Section.

of Natural Resources, includes senior officials from eight state agencies, and supports both the expansion of the State's market for EV, and the electrification of the state's own motor pool. The State's Agency of Transportation, Department of Motor Vehicles, Department of Environmental Conservation, and Agency of Natural Resources as well as Drive Electric Vermont, the Vermont Clean Cities Coalition, and the Vermont Energy Investment Corporation are just some of the participants in the Climate Cabinet activities.

In 2014, the same year Vermont joined the multi-state MOU, the Climate Cabinet developed a Vermont ZEV Action Plan and formed a multi-agency ZEV implementation team to support and drive its implementation. In 2015, the Cabinet worked closely with the Department of Public Service to prepare an updated Comprehensive Energy Plan (CEP) for Vermont. CEP puts a major focus on the transition from fossil fuels to the use of ZEV and LEV technologies as an integral step, striving to make 10 percent of the total light-duty passenger fleet electric by 2025.

Drive Electric Vermont is a statewide coalition of policy makers, industry leaders, and ordinary citizens that meets regularly to coordinate and expand efforts to expand the PEV market in Vermont. The coalition was initially formed and funded through a memorandum of understanding between the Agency of Transportation, the Agency of Natural Resources, the Vermont Public Service Department, and a nonprofit called the Vermont Energy Investment Corporation that convenes and manages the coalition. The program is working to increase: (1) PEV awareness and vehicle purchases, (2) availability of workplace and public charging infrastructure, and (3) state and local policy support.

Working with DEV, the State also reached an agreement with Quebec-based Electric Circuit to establish a "Green Corridor" between Burlington, Vermont and Montreal. This 138-mile corridor currently has over 40 charging stations. Government officials on both sides of the border hope the corridor will help promote PEV tourism in the region.

VI. Federal Initiatives, Coalitions, and Actions

VI.A. Clean Cities

The U.S. DOE Clean Cities Program encourages cities to reduce petroleum use across the United States. Nearly 100 Clean Cities Coalitions provide a national network of regional partnerships, projects, and technical expertise. California has 12 Clean Cities Coalitions; the nine Section 177 ZEV states have 18 coalitions combined.

Clean Cities has awarded \$400 million for alternative fuel and vehicle projects. In 2011, \$8.5 million was awarded for 16 regional PEV readiness projects, including projects in California, New York, and Oregon.

VI.B. EV Everywhere

EV Everywhere is a U.S. DOE project to expand the PEV market across the U.S. through partnerships, outreach, and research and development. More than 250 employers have joined the EV Everywhere Workplace Charging Challenge in committing to support and provide workplace charging. These efforts have resulted in more than 600 workspaces with over

5,500 charging stations accessible to nearly 1 million employees. EV Everywhere recently provided nearly \$2.5 million for “Plug In Electric Vehicle Local Showcases.” Almost \$1.5 million was awarded to ride and drive projects focused in Connecticut, Massachusetts, Oregon, Rhode Island, and Vermont.

VI.C. Fixing America’s Surface Transportation Act – Designation of Alternative Fuel Corridors (FAST Act)

Under the Fixing America’s Surface Transportation Act (FAST) Act, formerly called the National Alternative Fuels Corridors Act, the U.S. Secretary of Transportation is required to designate national fueling corridors for electric, hydrogen, propane, and natural gas vehicles. The goal is to improve the mobility of vehicles by increasing alternative fuel infrastructure across the country. The initial deadline is December 2016; every five years the fueling corridor will be evaluated for strategic infrastructure expansion.

The FAST Act also authorizes the General Services Administration (GSA) Administrator, or the head of a Federal agency, to install, construct, operate, and maintain on a reimbursable basis a battery recharging station (or allow, on a reimbursable basis, the use of a 120-volt electrical receptacle for battery recharging) in a parking area that is in the custody, control, or administrative jurisdiction of the GSA or the Federal agency for the use of only privately owned vehicles of Federal employees and others who are authorized to park in such area to the extent such use by only privately owned vehicles does not interfere with or impede access to the equipment by Federal fleet vehicles.

VII. Supporting Organizations

This appendix has already discussed some of the barriers to ZEV deployment and adoption and many of the policies that have been put in place to diminish those barriers. Supporting organizations, which are typically public-private partnerships, are essential to understanding barriers and identifying solutions to grow the ZEV market. The members of these partnerships can include government, non-governmental organizations, universities, and vehicle and infrastructure companies. Members convene, collaborate, and communicate on emerging ZEV market trends. They also work together, harnessing the collective expertise of their members, to address challenges and promote the technology.

VII.A. California

VII.A.1. California Plug-in Electric Vehicle Collaborative (PEV Collaborative)

The PEV Collaborative is a partnership between California public and private entities charged with a goal to accelerate the PEV market. This organization is comprised of 47 members representing automakers, infrastructure providers, utilities, government agencies, environmental non-profit organizations, academic institutions, and the California Legislature. The PEV Collaborative has developed resources on multi-unit dwellings and workplace charging installations, conducted a regular webinar series on relevant topics, and coordinates a PEV Ride-and Drive Series at regional fairs and special events. Analysis of the survey responses from these ride and drives indicates that 76% of participants were more likely to consider acquiring a PEV after test driving one. The impact of exposure to PEVs through participation in

ride and drive events and car-sharing programs has been shown to have a positive effect on attitudes towards PEVs and increase interest in PEV adoption.²⁹

“Drive The Dream” is a signature event for the PEV Collaborative, in which business leaders and Governor Brown engage and announce investments in workplace charging and other incentives to advance the PEV market. Following successful California events in 2013 and 2015, the PEV Collaborative co-sponsored “Drive the Dream Vermont” in Fall 2015.

VII.A.2. California Fuel Cell Partnership

The California Fuel Cell Partnership (CaFCP) is a collaboration of 36 government agencies, automakers, and energy and fuel cell technology providers. CaFCP is committed to promoting FCEV commercialization with its concomitant energy efficiency, air quality, and greenhouse gas emission benefits. CaFCP members collaborate on activities that advance the technology such as codes and standards development for the design, construction and operation of hydrogen refueling stations, first responder training, and consumer education and outreach. Examples of the success of this collaboration include development of the Hydrogen Station Equipment Performance (HyStEP) device, which will reduce the time to commission new stations, and the technology to meter dispensed hydrogen so that stations can be certified to sell the fuel.

VII.B. Section 177 ZEV States

VII.B.1. Northeast States for Coordinated Air Use Management (NESCAUM)

NESCAUM is an association of air pollution regulatory agencies from Connecticut, Massachusetts, Maine, New Hampshire, New York, New Jersey, Rhode Island and Vermont. The association provides scientific, technical, analytical, and policy assistance to ZEV programs for its member states and additional states implementing the ZEV and low-emission vehicle regulations. NESCAUM also coordinates implementation of the Multi-State ZEV Action Plan and activities of the multi-state ZEV Implementation Task Force.

VII.C. National

VII.C.1. Electric Drive Transportation Association

The Electric Drive Transportation Association (EDTA) is an industry trade association promoting hybrid, PHEV, BEV, and FCEV drive technologies and infrastructure. EDTA conducts public policy advocacy, provides education and awareness, and enables industry networking and collaboration. EDTA is comprised of more than 70 members and partners including vehicle and equipment manufacturers, energy companies, technology developers, component suppliers, government agencies and others.

VII.C.2. Fuel Cell & Hydrogen Energy Association (FCHEA)

The Fuel Cell and Hydrogen Energy Association (FCHEA) is a trade partnership that aims to accelerate fuel cell and hydrogen energy technology commercialization. FCHEA is comprised of a multi-tiered membership of 51 members representing automakers, component and system

²⁹ PEVC 2016. PEV Collaborative. *Best. Ride. EVer! Final Report*. 2016 2/29/2016 [cited 2016 3/24/2016]; http://www.pevcollaborative.org/sites/all/themes/pev/files/PUBLIC_PEVC%20Best.Ride.EVer!%202015%20Final%20Report.pdf

manufacturers, fuel producers and providers, government laboratories and agencies, and utilities.

VII.C.3. H2USA

H2USA is a public/private collaboration to promote the success of hydrogen fuel cell vehicles and fueling infrastructure across the U.S. The organization is comprised of 44 participants representing energy companies, automakers, government agencies, fuel cell suppliers, non-profit organizations, and materials and components suppliers.

VII.C.4. Plug In America (PIA)

Plug-In America (PIA) is a non-profit PEV advocacy group. PIA expresses that their goal is to “accelerate the shift to plug-in vehicles powered by clean, affordable, domestic electricity to reduce our nation’s dependence on petroleum, improve air quality and reduce greenhouse gas emissions.” PIA works with consumers, policymakers, automakers and others. In 2015, through their National Drive Electric Week events in 41 states and 7 Canadian provinces, PIA reached out to more than 130,000 potential PEV consumers.

VII.C.5. Sierra Club

The Sierra Club is a non-profit environmental organization focused on resource conservation. Its “Rev Up EVs” campaign has been deployed in ten key states. Member volunteers visited local dealers to see, ask about, and test drive electric cars, and then provided feedback on the experience to the organization. The Sierra Club has used these findings to advocate for best practices that encourage EV sales. The Sierra Club continues to help ZEV advocates, the auto industry, and government agencies learn what is working well and what could be improved in the EV marketplace.

VIII. Broader Agreements and Alliances

To date, California’s ZEV program has resulted in the placement of several hundred thousand ZEVs and PHEVs on California roads and a growing network of ZEV charging and hydrogen fueling stations. The ZEV program has also influenced ZEV policy around the world. Increasing collaboration at the state, national, and international levels has helped – and will continue to help – address challenges to ZEV market expansion, including global technology development and cost reduction and thus, will allow California to achieve its emission reduction targets. There is much to learn from each region’s experience, and these joint efforts are important in tackling the remaining hurdles to ZEV growth in California and beyond.

VIII.A. State Level

VIII.A.1. California ZEV Action Plan

The role of EO B-16-12, which directs state government to help accelerate the market for ZEVs in California, was previously mentioned. Governor Brown’s EO B-16-12 established several milestones for success. The ZEV Action Plan, developed in 2013, identifies those specific strategies and actions that 11 California state government agencies will need to take to meet

the milestones of the executive order. The 2016 ZEV Action Plan,³⁰ released in October 2016, outlines progress to date and identifies new actions that state agencies will take in continued pursuit of those same milestones. The 2016 plan places greater emphasis on consumer awareness (both vehicle options and benefits), vehicle affordability, convenient refueling infrastructure, the integration of ZEVs into state government fleets, and the growth of the ZEV market outside of California. It also broadens California's zero-emissions focus to include medium- and heavy-duty vehicles and freight applications. The 2016 plan commits the state to: (1) meeting a ZEV purchase goal of 50 percent by 2025 for its government fleet, and (2) equipping at least 5 percent of the workplace parking spaces at state facilities with charging station infrastructure. The 2013 and 2016 ZEV Action Plans provide a mechanism for multiple state agencies to work together for successful implementation.

VIII.B. Multi-State Level

VIII.B.1. Multi-state ZEV MOU, ZEV Action Plan, and ZEV Task Force

In October 2013, California signed a MOU with Connecticut, Massachusetts, Maryland, New York, Oregon, Rhode Island, and Vermont to collaborate on strategies for transforming the transportation sector over the next 11 years, with the ultimate goal being to significantly reduce greenhouse gas and smog-causing emissions. Since then, interested stakeholders, including state regulators, the auto industry, infrastructure developers, and others have shared information and best practices to help move this groundbreaking effort forward.

On the heels of the release of the 2013 California ZEV Action Plan, the MOU states released a Multi-state ZEV Action Plan in May 2014. The plan identifies 11 key actions to be taken by the plan's partners to build the market, provide consistent codes, standards, and tracking, and improve the ZEV driver's experience. The Multi-state ZEV Task Force, comprised of members from each state and coordinated by NESCAUM, is addressing the action items in the plan, including advancing infrastructure needs and supporting ZEV sales.

VIII.B.2. Transportation Climate Initiative (TCI)

TCI consists of the environmental, energy and transportation agencies from 11 Northeast and Mid-Atlantic states (Connecticut, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont) as well as the District of Columbia. TCI's Clean Vehicles and Fuels Workgroup has been intimately involved in advancing ZEV technology and enabling policies in both Section 177 ZEV states and non-Section 177 jurisdictions. For example, TCI developed branding of the Northeast Electric Vehicle Network, which is not just a network of EVSEs but a network of more than 100 companies, organizations, and jurisdictions that have pledged to work to support EV use. They have also successfully applied for various federal grants to develop materials such as best practices guidelines for a variety of ZEV audiences.

VIII.B.3. Pacific Coast Collaborative (PCC)

Alaska, British Columbia, California, Oregon and Washington make up the Pacific Coast Collaborative (PCC). PCC establishes a formal basis for cooperative action, a forum for

³⁰ GO 2016. California Governor's Office. 2016 ZEV Action Plan. October 2016.
https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf

leadership and information sharing, and a common voice on issues facing Pacific North America. PCC is committed to supporting and promoting innovation and the adoption of new transportation technologies including ZEVs and PHEVs. To accelerate adoption of these new technologies and stimulate private infrastructure investment, the Pacific coastal jurisdictions are working to establish a "green highway" for alternative fuel vehicles, including ZEVs and PHEVs along the Interstate 5/Highway 99 corridor leading from Southern California to Whistler, British Columbia.

VIII.C. International Level

VIII.C.1. International ZEV Alliance (IZA)

The International ZEV Alliance (IZA) is a collaboration of national and subnational governments working together to accelerate the adoption of ZEVs around the world. The participants set ambitious, achievable long-term targets for ZEV deployment, take actions to achieve those targets as appropriate in each jurisdiction, and encourage and support other jurisdictions in setting and achieving ambitious ZEV targets. The IZA counts among its members California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont, all of whom are also members of the Multi-state ZEV MOU Task Force.

VIII.C.2. Netherlands MOU

The PEV Collaborative, signed an MOU with a similar Dutch partnership, Coast-to-Coast E-Mobility, in October 2013. California Environmental Protection Agency signed a Letter of Intent with the Dutch Ministry of Environment endorsing the MOU and pledging further cooperation. The California Energy Commission signed an MOU in March 2015 with the Vice Governor of the Netherlands to collaborate on best practices for ZEV infrastructure implementation.

VIII.C.3. Japanese Memorandum of Cooperation

On September 5, 2014, Governor Brown and Japanese Ambassador Sasae signed a Memorandum of Cooperation (MOC), pledging coordination on ZEV development. This MOC opened the door for collaboration with Japan's Department of New Energy and Industrial Technology Development (NEDO) on a research project, which will result in 30-50 DC fast chargers in Northern California travel corridors allowing travel from the Pacific Ocean to Lake Tahoe.

VIII.C.4. Chinese MOU

One day later, on September 6, 2014, the University of California, Davis and the China Automotive Technology and Research Center signed a five-year MOU establishing the China-U.S. ZEV Policy Lab. The policy lab will promote ZEV-related policy design and vehicle development, helping speed ZEV commercialization in China and the U.S. The ARB and China's National Development and Reform Commission co-chair the policy lab's advisory board, and witnessed the MOU signing.

IX. Vehicle Acquisition and Fuel Use Requirements for Fleets

Broad government actions can help promote technology and increase awareness. Federal, state, and local governments can lead by example by including ZEVs and PHEVs into vehicle fleets. Current fleet initiatives are discussed below.

IX.A. Federal

Under the Energy Policy Act (EPAAct) of 1992, 75 percent of new light-duty vehicles acquired by covered federal fleets must be alternative fuel vehicles (AFV). The AFV designation was amended in 2008 to include HEVs, FCEVs, and advanced lean burn vehicles. Federal fleets are also required to use alternative fuels in dual-fuel vehicles unless the U.S. DOE determines an agency's vehicle requests qualify for waivers; grounds for a waiver include lack of alternative fuel availability and cost restrictions (per EPAAct 2007, section 701).

Additional requirements for federal fleets were included in the Energy Independence and Security Act of 2007, including low GHG-emitting vehicle acquisition requirements (Section 141), federal fleet conservation requirements (Section 142), and renewable fuel infrastructure installation requirements (Section 246).

To address these requirements, U.S. DOE promulgated Executive Order 13693, issued in March 2015, which requires federal agencies with 20 vehicles or more to improve fleet and vehicle efficiency through the elimination of non-essential vehicles and achieve a 30 percent reduction of fleet-wide GHGs relative to a fiscal year (FY) 2014 emissions baseline by FY 2025. Covered agencies must also install telematics systems on certain new vehicles; submit annual vehicle acquisition data; ensure that by December 31, 2020, and December 31, 2025, 20 percent and 50 percent, respectively, of light-duty vehicle acquisitions are ZEVs or PHEVs; and plan to install charging and other infrastructure to support new ZEV and PHEV acquisitions.

IX.B. California

Governor Brown's EO B-16-12 requires "that California's state vehicle fleet increase the number of its zero-emission vehicles through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles be zero-emission by 2015 and at least 25 percent of fleet purchases of light-duty vehicles be zero-emission by 2020."

California's Department of General Services (DGS) Office of Fleet and Asset Management issued Management Memo 13-04 in January, 2013 providing direction to all state agencies under the Governor's executive authority regarding how to meet the fleet ZEV purchase requirements. Through June 2016, DGS has approved for purchase more than 450 ZEVs for use in the DGS fleet. This number does not include ZEVs that have been placed in other state agency fleets.

IX.C. Section 177 States

Connecticut has begun integrating ZEVs into the State fleet; many Connecticut towns and municipalities have PEVs in town fleets.

Under the Massachusetts Electric Vehicle Incentive Program, municipalities and state agencies have acquired PEVs and installed charging stations. To date municipalities have purchased

216 PEVs and installed 72 charging stations and state agencies have acquired 19 PEVs and installed 76 charging stations.

New York State's DOT will be acquiring a fleet of 24 PHEVs that will be distributed for use mostly at its equipment and crew depots. Six level two, networked chargers have been purchased to service a portion of the PHEV fleet but most of the cars will utilize level I chargers.

Oregon requires 10 percent ZEVs in fleet purchases.

Rhode Island requires that a minimum of 25 percent of new light-duty state fleet purchases and leases will be ZEVs by 2025. In achieving energy reduction goals, state agencies are also encouraged to install additional EVSEs at State properties.

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