



Supporting the Plug-In Electric Vehicle Market

Best Practices from State Programs

GEORGETOWN CLIMATE CENTER
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Cassandra Powers

December 2014

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Acknowledgements

This report is an outgrowth of a plug-in electric vehicle (PEV) workshop

conducted by the Georgetown Climate Center (GCC) for states participating in the Transportation and Climate Initiative (TCI). The report identifies best practices discussed by TCI jurisdictions and invited guests at the workshop, and highlights state PEV buyer incentive programs, DC fast charger programs, and initiatives designed to raise PEV awareness.

The author would like to thank the staff from TCI for participating in the workshop and providing input and feedback on this report, the invited guests from the California Air Resources Board, Oregon Department of Transportation, and Washington Department of Transportation for sharing valuable lessons from their PEV programs, and the Center for Sustainable Energy for their insight and review. In addition, the author would like to thank GCC's Executive Director, Vicki Arroyo, and Deputy Director, Kathryn Zyla, for their guidance and input.

The workshops and report were made possible with generous support from the John Merck Fund. GCC is grateful for the support of the John Merck Fund and our other Transportation and Climate Initiative supporters, the Rockefeller Brothers Fund, Barr Foundation, Oak Foundation, and Surdna Foundation.

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Glossary

PEV: Plug-in electric vehicle (both battery-electric vehicles and plug-in hybrid electric vehicles)

BEV: Battery-electric vehicle (e.g., Nissan Leaf)

ZEV: Zero-emission vehicle

PHEV: Plug-in hybrid electric vehicle (e.g., Chevy Volt)

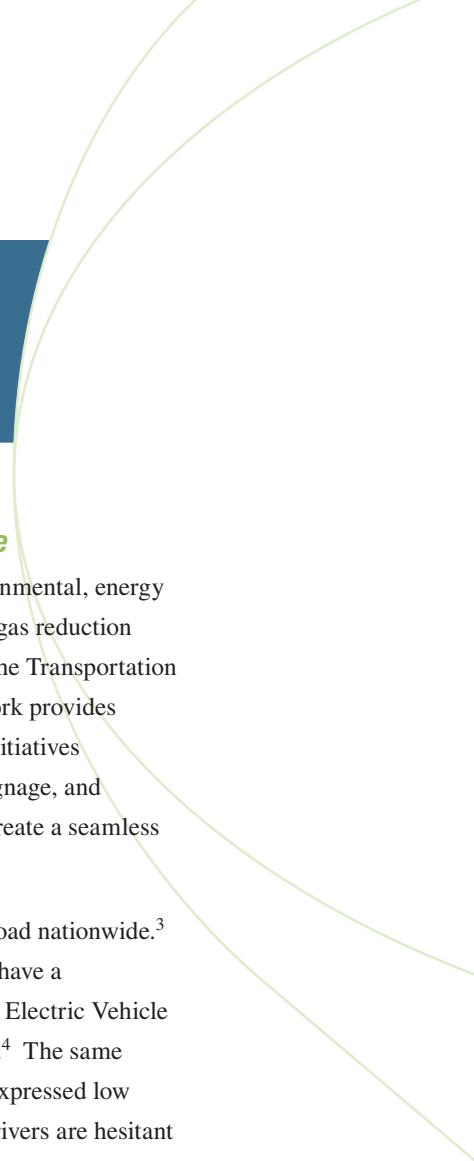
HEV: Hybrid electric vehicle (e.g., Toyota Prius)

EVSE: Electric vehicle supply equipment

FCEV: Fuel cell electric vehicle

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Introduction

States across the country are taking bold actions to support the deployment of plug-in electric vehicles (PEVs). PEVs have significant environmental, energy security, and economic benefits, and their widespread adoption can help states achieve greenhouse gas reduction goals.¹ To realize the benefits of alternative fuel vehicles and reduce barriers to their deployment, the Transportation and Climate Initiative (TCI) launched the Northeast Electric Vehicle Network in 2011.² The Network provides resources and helps states and communities implement PEV and electric vehicle charging station initiatives throughout the TCI region. By working together to reduce regulatory barriers, promote common signage, and coordinate investment in vehicles and charging infrastructure, the northeast states are working to create a seamless driving experience for PEV drivers from Maine to DC.

PEV deployment has grown significantly since 2011, and there are now over 275,000 PEVs on the road nationwide.³ There are, however, a number of challenges that still inhibit widespread PEV adoption. Most PEVs have a manufacturer-suggested retail price of \$30,000 or above (before the federal tax credit), and a recent Electric Vehicle Consumer Survey found that many consumers wanted to pay less than \$25,000 for electric vehicles.⁴ The same survey reveals that many consumers have generally favorable attitudes about electric vehicles, but expressed low awareness of specific vehicles and understanding of vehicle benefits.⁵ In addition, potential PEV drivers are hesitant to purchase battery-electric vehicles because of their range and a perceived lack of publicly available fast charge infrastructure, (“DC fast chargers” can recharge a PEV battery to 80 percent capacity in approximately 30 minutes.) To address these financial, infrastructure, and information challenges and support the early PEV market, states in the TCI region and elsewhere are launching innovative programs to engage new audiences. In addition, governors from six of the northeast states joined Oregon and California in signing a Zero Emission Vehicle Memorandum of Understanding (ZEV MOU), and are working with one another to address the above barriers with the goal of putting 3.3 million zero-emission vehicles on the roads in their states by 2025.⁶

In June 2014, representatives from TCI convened a PEV workshop in Boston, Massachusetts, to learn about innovative state programs, explore opportunities for TCI’s work to align with goals of states whose governors have committed to the ZEV MOU, and identify actions that TCI can take to advance PEV deployment in the region. This report captures best practices in state-sponsored PEV programs, as presented at TCI’s PEV workshop. The following case studies describe successful PEV buyer incentive programs, DC fast charging programs, and PEV awareness initiatives that can serve as models for other states.

Lowering Vehicle and Equipment Costs

Many potential PEV buyers view the up-front cost of electric vehicles as a barrier to PEV adoption. In an effort to reduce this cost, states have launched buyer incentive programs, such as vehicle rebates and tax credits, sales tax waivers, and high-occupancy vehicle (HOV) lane access. In addition, states are providing PEV and PEV infrastructure incentives to municipalities or businesses. Described below are several state-sponsored buyer incentive programs designed to lower the cost of PEVs and PEV infrastructure.

PEV Rebate and Tax Credit Programs

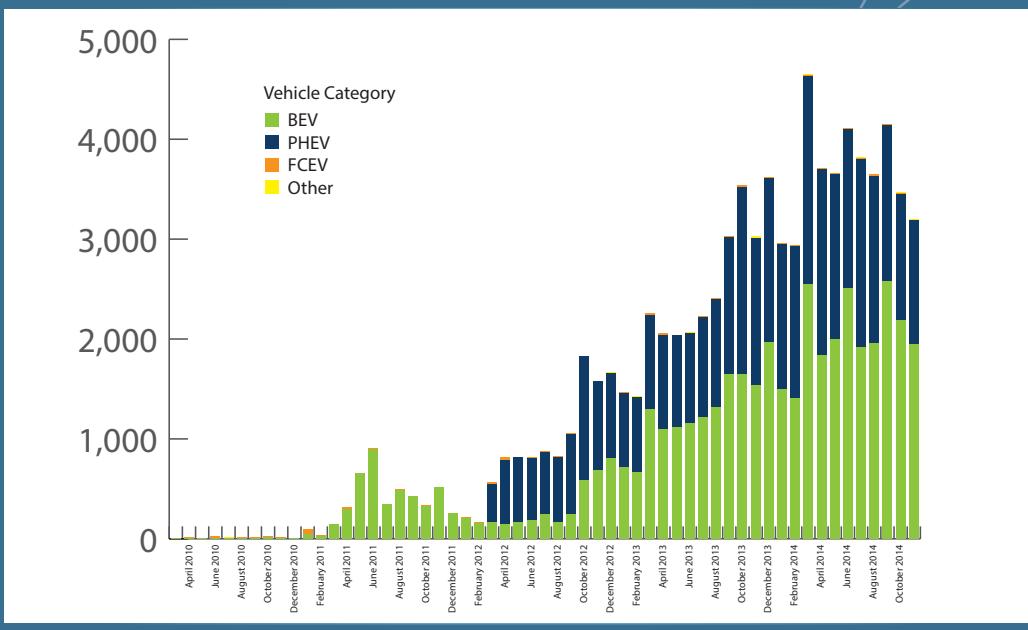
Several states offer rebates or tax credits for consumers who purchase PEVs or PEV infrastructure. Both approaches reduce the cost of the vehicle, although states are increasingly turning to rebates and other point-of-purchase incentives to allow buyers to benefit from the cost savings at the time of purchase rather than waiting until they file their taxes.

California's Clean Vehicle Rebate Project

California's Clean Vehicle Rebate Project (CVRP) has been issuing rebates to PEV drivers in California since 2010. CVRP is a voluntary incentive program established under the California Alternative and Renewable Fuel, Vehicle Technology, Clean Air and Carbon Reduction Act of 2007 and managed by the California Air Resources Board.⁷ Originally funded by a dedicated revenue stream of smog abatement, vessel registration, and equipment identification plate fees,⁸ project funding will be increased with funds from California's Cap and Trade program beginning in fiscal year 2014-2015. CVRP is designed to promote the purchase of advanced clean passenger vehicles, and offers rebates for individuals, non-profits, government entities, and business owners who purchase or lease an eligible vehicle.⁹ At the onset of the program in 2010, incentives included rebates of up to \$5,000 for zero-emission vehicles (ZEVs), but in response to growing demand, the California Air Resources Board reduced the maximum rebate amount to \$2,500 for ZEVs. In addition, in FY 2011-2012, a new vehicle category, plug-in hybrid (PHEVs), became eligible for a rebate amount of \$1,500.¹⁰ California's rebate program directly supports the goals of California's Zero Emission Vehicle program, which requires 15.4 percent of new vehicles sold within the state to be ZEVs or PHEVs by 2025.¹¹

Since the program's launch, 83,926 rebates have been issued.¹² Approximately 46 percent of the rebates have been issued or reserved by plug-in hybrid electric vehicle drivers, just under 54 percent have been issued or reserved by battery-electric vehicle drivers, and .66 percent have been issued to owners of fuel cell electric vehicles (FCEVs) or other vehicles, such as neighborhood electric vehicles (i.e., battery-electric vehicles that have a top speed of

FIGURE 1: Clean Vehicle Rebate Project Rebates by Month¹⁵



Center for Sustainable Energy (2014).

approximately 25 miles per hour and are limited to roads with posted speed limits of 35 miles per hour or less).¹³ Over \$175.6 million in rebate funding has been issued or reserved to date.¹⁴

A grantee is selected annually via competitive solicitation to implement the CVRP. The Center for Sustainable Energy (CSE), a non-profit organization based in California, has been selected as the administrator since project inception with the primary responsibility of processing rebates. CSE maintains a website with information on the CVRP, accepts applications and issues rebates, and collects and disseminates information about program usage. In addition, CSE administers an Electric Vehicle Consumer Survey of CVRP rebate recipients. The survey has collected information on demographic characteristics, PEV electricity rate awareness and usage, dealership experience, decision factors for buying a PEV, and other information from CVRP recipients since 2012.¹⁶

This survey has been instrumental in helping California understand demographic trends and buyer motivation. For example, survey results reveal that the vast majority of respondents are male with a bachelor's degree or higher, live in and own a detached home, and make over \$100,000 per year. Thirty-eight percent of respondents who purchased their vehicles between September 2012 and October 2014 checked "saving money on fuel costs" as their primary decision factor when purchasing a PEV, followed by 22 percent selecting "reducing environmental impacts" and 15 percent selecting "HOV lane access."¹⁷ HOV access has been considered a critical factor for many early adopter PEV owners; however, this survey shows that it is only one of many factors that PEV owners consider before buying a vehicle.¹⁸ Gathering this information can help policymakers understand what factors are most important to PEV owners, helping to develop more effective policies and programs.

California's early investment in rebates for clean vehicle technologies will prime the market for the larger number of vehicles needed over the next decade and beyond to meet California's vehicle commitments, air quality standards, and climate change goals. As ZEV and PHEV technologies improve and manufacturers begin to

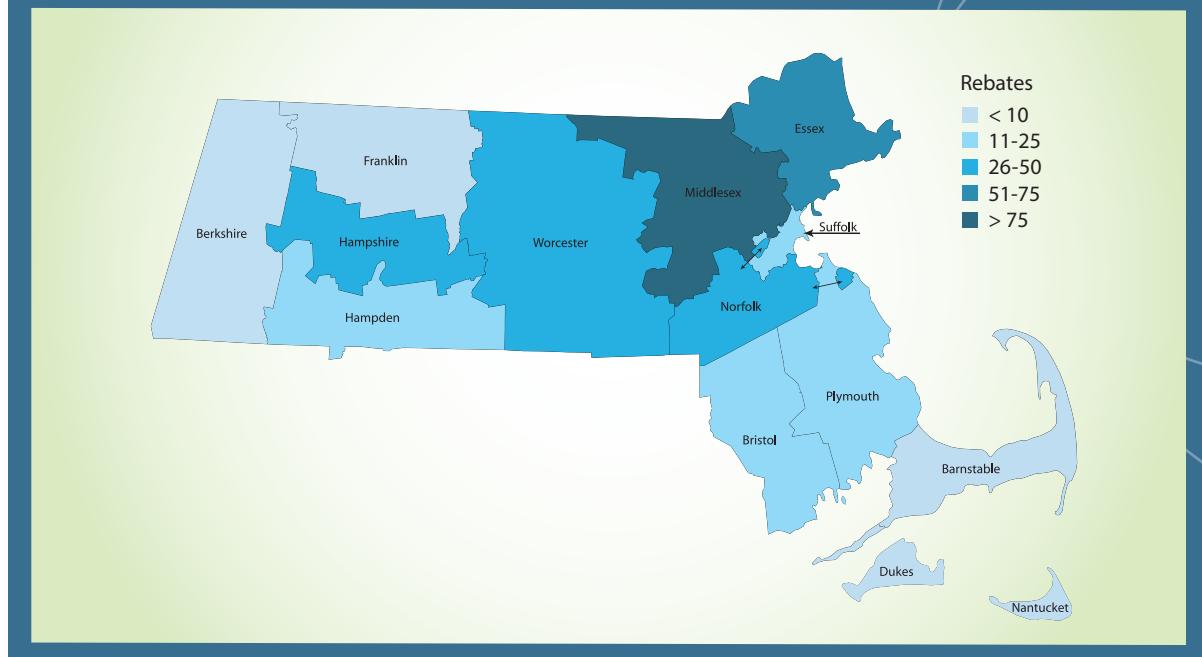
produce more vehicles, CVRP helps increase consumer demand for advanced clean vehicles and plays an important role in educating consumers. By supporting the purchase of ZEVs, California is building demand and supporting manufacturers to increase production volumes that will bring down vehicle costs over time.

Massachusetts Offers Rebates for Electric Vehicles (MOR-EV)

In an effort to reduce the up-front cost of electric vehicles, Massachusetts launched the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) program in 2014. MOR-EV provides consumer rebates of up to \$2,500 for purchase or lease of a plug-in hybrid or electric vehicle registered in the state. MOR-EV is administered by the Massachusetts Department of Energy Resources, and is funded by auction proceeds from the Regional Greenhouse Gas Initiative (RGGI).¹⁹ Since 2008, Massachusetts has received more than \$178 million in RGGI proceeds, and has directed more than 90 percent of those funds into clean energy programs and initiatives, including its Energy Efficiency Investment Plans and the Green Communities Designation and Grant Programs.²⁰ DOER and the Massachusetts Executive Office of Energy and Environmental Affairs administer the RGGI funds, and while most of the money is spent on energy efficiency programs, a portion of the money is being used for other clean energy projects. In 2014, \$2 million was set aside by DOER to administer the MOR-EV program, which was officially launched in June 2014. Because the funds were already allocated to clean energy projects, the MOR-EV program did not require legislative approval.

Like California, Massachusetts has been tracking rebate usage, and has also used the rebate program to gather information about the adoption and distribution of electric vehicles in the state. Massachusetts offers a different rebate amount based on the size of a PEV's battery. Buyers of BEVs and PHEVs with battery capacity greater than 10 kilowatt-hours (kWh) (called "PHEV+") are eligible for a \$2,500 rebate, and PHEVs with battery capacity less than 10 kWh are eligible for a \$1,500 rebate. Since the program's launch, 452 rebates have been reserved or issued to PEV

FIGURE 2: Number of Rebates Applied for or Issued Under the “Massachusetts Offers Rebates for Electric Vehicles” Program²³



Center for Sustainable Energy (2014).

drivers in Massachusetts.²¹ Sixty-three percent of the rebates issued thus far have been for battery-electric vehicles, 23 percent have been for PHEV+ vehicles, and 13 percent have been for other PHEVs. A significant portion of the rebates have been issued to PEV drivers who live in the greater Boston area, and fewer rebates have been issued to PEV drivers in the rural areas of the state. Over 80 percent of 254 Massachusetts residents who responded to a survey after receiving their rebate said that the incentive funding was an “extremely” or “very” important factor in making it possible for them to acquire their vehicle.²² The MOR-EV survey also includes questions on anticipated charging behavior, and indicates that 65 percent of rebate applicants have or plan to install a Level 2 charging station.

Despite the early popularity of the MOR-EV program, there is a concern that many new and potential PEV owners are not aware of the rebate. This is due in part to the fact that not all PEV car dealers are familiar with or share information about PEVs and the program. To address this issue, Massachusetts agency staff, stakeholders such as the Massachusetts Automobile Dealers Association, the MOR-EV contractor (the Center for Sustainable Energy) and MOR-EV subcontractor (NESCAUM) will be working with dealers throughout the state to share information about the rebate program and PEVs generally. This education gap at the dealership level is considered an important barrier to PEV adoption, and states like Massachusetts are beginning to engage dealerships directly to ensure that thorough and accurate information is given to potential PEV buyers.

MOR-EV has helped increase PEV adoption in Massachusetts. As noted above, the rebate program was a critical factor in rebate applicants’ decision to purchase a PEV. The rebate has already been taken advantage of by a significant number of drivers, and by reaching out to dealerships, the state will help ensure that information about the rebate reaches an even broader audience. Moreover, by collecting data on demographic trends and PEV and electric vehicle supply equipment (EVSE) usage, Massachusetts will be able to track PEV buyer characteristics, anticipate future trends, and adjust programs accordingly.

Maryland’s Electric Vehicle Supply Equipment Rebate Program

Maryland first offered a vehicle excise tax credit and HOV lane access for PEVs in 2010. In 2011 the Electric Vehicle Infrastructure Council was established through legislation proposed by Governor O’Malley, and was charged with the evaluation of incentives for ownership of PEVs 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 PEVs into Maryland’s communities and the transportation system.²⁴ Acting on the Council’s recommendations, the state has expanded its incentive programs to include an income tax credit to help offset the cost of PEV charging equipment—later modified to a point-of-purchase rebate—and continued the PEV tax credit and HOV lane access²⁵ with some modifications.²⁶

The first iteration of the PEV tax credit offered a flat \$2,000 credit per vehicle. Experience showed that this over-promoted smaller-battery cars, which yield fewer environmental benefits than PEVs with larger batteries. The small-battery plug-in Prius quickly used up most of the allocated funds. The legislature addressed this problem in 2013 by creating three tiers of credits based on battery capacity but capped the credit at \$1,000. The 2014 “Electric Vehicles and Recharging Equipment-Rebates and Tax Credits” law²⁷ changed the value of the credit to \$125 times the kWh battery capacity of the vehicle, raised the cap to \$3,000 per vehicle, and extended the program through June 30, 2017. This higher cap and tiered structure will allow the state to provide greater incentives to vehicles with larger batteries and greater environmental benefits.



Electric Vehicle Incentives

Plug-in electric vehicles offer lower operating costs and cleaner air for all Marylanders. Read below for incentives available to Maryland citizens and businesses that purchase or lease these vehicles.

1. Federal Income Tax Credit

A federal tax credit is available to buyers of new plug-in electric vehicles based on battery capacity and ranges. The credit ranges from **\$2,500 to \$7,500**. For model year 2014, the credits are as follows:

Toyota Prius Plug-In Hybrid: **\$2,500**
Ford Fusion Energi & C-Max Energi: **\$4,007**
Chevrolet Volt, Nissan Leaf, Tesla Model S, others: **\$7,500**



Note that this credit, which became available in 2009, will begin to phase out once auto manufacturers meet their sales quota.

To get this credit: Complete IRS Form 8936, Qualified Plug-in Electric Drive Motor Vehicle Credit and submit with your income tax return. Scan codes above or use links at <http://bit.ly/lqkakwP>

2. Maryland Excise Tax Credit

A Maryland excise titling tax credit of \$125/kWh of battery capacity up to \$3,000 is available to buyers and lessees of qualifying new plug-in electric vehicles. The credit is effective July 1, 2014 through June 30, 2017 and credits are processed subject to the availability of funds. Business entities may also qualify for the tax credit on up to ten vehicles.



To get this credit: Complete Form VR 334 and submit to the Maryland Motor Vehicle Administration. Your dealership can assist you with this. Scan codes above or use links at <http://bit.ly/lqkakwP>

3. Use of High Occupancy Vehicle (HOV) Lanes

As a driver of a plug-in electric vehicle titled and registered in Maryland, you are allowed to use all HOV lanes in Maryland regardless of the number of passengers provided you obtain and display an HOV permit on the vehicle. The permit will be valid from October 1, 2010 through September 30, 2017.



HOV lanes in Maryland:

- The I-270 southbound HOV lane extends from I-370 to the Capital Beltway (I-495) in Montgomery County and is operational during the morning peak period from 6:00 a.m. to 9:00 a.m.
- The I-270 northbound HOV lane operates on a 19-mile stretch from the Capital Beltway to MD 121 (Clarksburg Road) and is operational during the evening peak period from 3:30 p.m. to 6:30 p.m.
- The HOV lanes run east and west on a 7.5-mile stretch of US 50 between the Capital Beltway (I-95 / I-495) and US 301 (Crain Highway) in Prince George's County and are in operation 24 hours /day.

To get this benefit: Complete Form VR 335 and submit to the Maryland Motor Vehicle Administration then put the decal on your car. Your dealership can assist you with this. Scan codes above or use links at <http://bit.ly/lqkakwP>

4. Rebates for Charging Stations

Plug-in electric vehicles can be charged through regular 120-volt household electrical outlets (known as Level 1 charging), 240-volt systems (known as Level 2 charging) and higher voltage DC Fast Charge stations. Rebates are available for all of these charging systems and cover 50 percent of the equipment and installation cost up to a limit (\$900 for residential, \$5,000 for commercial and \$7,500 for service stations) for systems purchased and installed between July 1, 2014 and June 30, 2017.

Grants are also available for solar photovoltaic canopies installed at parking garages where the array is charging at least four electric vehicle charging stations.

To apply for the rebate or grant: Complete the Electrical Vehicle Supply Equipment (EVSE) rebate forms and solar canopy grant forms using the links at <http://bit.ly/lqkakwP>

The above electric vehicle flyer, which highlights incentives and rebates, is distributed by the State of Maryland.

The same 2014 law²⁸ repealed the PEV charging equipment income tax credit and replaced it with an enhanced rebate program.²⁹ The rebate is available for individuals, businesses, and local and state government offices, and may be used for the purchase and installation of PEV charging equipment. Maryland has committed \$600,000 per fiscal year through June 30, 2017, to the rebate program. Recipients can receive up to 50 percent of purchase and installation costs, but the rebate is capped at \$900 for residential customers, \$5,000 for commercial entities, and \$7,500 for retail service stations. There is no limit on the number of chargers to which the charging equipment rebate can be applied, and the rebate may be applied toward Level 2 or DC fast charger installations.³⁰

The 2014 law seeks to address several problems that came to light under the repealed equipment tax credit program. First, the original PEV tax credit program was underused. Of \$1.6 million program funds available from 2011 to 2014, only 126 awards were made totaling \$23,653 in tax credits for both residential and commercial chargers.³¹ The new PEV charging equipment rebate added installation costs—which can be as much as or more than equipment costs—as eligible expenses. The new rebate also raised both the percent of total eligible expenses (from 20 percent to 50 percent) and the \$400 per-charger cap. Since government entities are not taxed, they cannot receive tax credits for PEV charging equipment; by changing the incentive to a rebate, governments may now participate in the program. The modification also removed a limit of 30 chargers per business, in recognition that site owners typically don’t own the charging stations. This change allows third-party business entities with a statewide presence to install chargers at multiple sites.

The Maryland Electric Vehicle Infrastructure Council received feedback from dealers and others that it was difficult to obtain and confidently communicate the details of each incentive program. In response to this concern, the state created a flyer that provides a brief overview of the federal income tax credit, Maryland excise tax credit, HOV lane access, and rebates for charging stations, and includes QR codes that the reader can easily scan to access the most up-to-date information and application forms for each incentive. This flyer is being distributed to dealerships and directly to consumers, and is a helpful tool for learning about current PEV and EVSE incentives.

Maryland’s switch to an EVSE rebate reflects a larger trend of states providing point-of-purchase incentives, so that PEV drivers can realize the economic benefits immediately or soon after purchase. Depending on the time of year the vehicle or equipment is purchased, tax credits can take over a year to reach a consumer, whereas rebates are often awarded in a matter of weeks. In addition, by creating an easy-to-understand flyer with links to each incentive’s website, the state is able to ensure that dealerships and consumers receive timely and accurate information on available PEV programs.

Incentives for Municipalities and Businesses

Some states are offering incentives to municipalities and businesses to encourage the purchase of PEVs and PEV charging equipment. Providing funds to municipalities and businesses is one way that states can reach a large number of potential PEV drivers with a limited amount of resources. These programs sometimes attach guidelines that the award recipient must follow to receive funding. For example, states may make funding available to organizations at specific locations to encourage the development of a charging station network. Similarly, states may require that EVSE installed with funds from a grant program be made accessible to the public.

Massachusetts' Electric Vehicle Incentive Program (MassEVIP)

In 2013, the Massachusetts Department of Environmental Protection (DEP) launched the Massachusetts Electric Vehicle Incentive Program (MassEVIP) to help organizations acquire electric vehicles and charging stations. The initial round of funding was available for cities and towns in Massachusetts, and the second round of funding was available for municipalities, public universities, state fleets, and car-share companies. Through a competitive solicitation, DEP provides incentive awards of between \$2,500 and \$7,500 toward the acquisition (purchase or lease) of battery-electric vehicles or plug-in hybrid electric vehicles, and up to \$15,000 to install Level 2 dual-head charging stations when an organization purchases at least one BEV.³² MassEVIP is funded with \$2.5 million from Massachusetts' Motor Vehicle Inspection Program Trust Fund through legislation enacted in 2012. In 2013 and 2014, the \$2.5 million in funding was used by DEP to establish and implement MassEVIP.

In 2014, Massachusetts also introduced "MassEVIP: Workplace Charging," which offers grants to employers for the acquisition of Level 1 and Level 2 PEV charging stations. Massachusetts employers with 15 or more employees in non-residential places of business are eligible, and DEP will provide 50 percent of the funding (up to \$25,000) for hardware costs to employers installing Level 1 and Level 2 charging stations. The goal of the program is to encourage PEV adoption by providing added charging capacity at the workplace. According to a survey of MOR-EV recipients, 48 percent of respondents indicated that they did not have charging at their workplace, but would use a charging station at work if it were available.³³ Workplace charging can enhance range confidence, extend the PEV driver's daily range, and also act as a primary charging location for PEV drivers who live in a multi-unit dwelling or do not have access to a charging station at home.

MassEVIP is an example of how states can use limited resources to support PEV adoption. By providing funding to municipalities and other public institutions, the state is able to encourage the strategic placement of publicly available charging stations and also increase PEV deployment at those organizations. Moreover, by providing incentives to employers, the state can reach a wide consumer base and encourage PEV adoption.

Expanding DC Fast Charge Infrastructure

Vehicle technology has advanced in recent years, and the number of publicly available charging stations has increased significantly. However, many consumers are still wary of purchasing PEVs because they believe the vehicles will not be able to meet their daily driving needs. The vast majority of charging takes place at home or at the workplace; however, studies have also shown that PEV owners will drive their vehicle farther when publicly available DC fast chargers are nearby. To provide reassurance to potential PEV drivers and enable PEV travel, states are investing in strategically placed DC fast chargers.

West Coast Electric Highway

The West Coast Electric Highway is a network of DC fast charging stations located every 25 to 50 miles along the Interstate 5 (I-5) corridor and other major roadways in the Pacific Northwest. The network aims to enable regional travel by building range confidence and providing needed infrastructure along major thoroughfares. The project is a collaborative effort between the Washington Department of Transportation, Oregon Department of Transportation, and the California Governor's Office interagency group. The network was originally supported with funds from the U.S. Department of Energy's American Recovery and Reinvestment Act, and received additional funding through the U.S. Department of Transportation's TIGER program for installing more DC fast chargers in Oregon.³⁴ The stations



Vehicle charging at a West Coast Electric Highway fast charger

Washington State Department of Transportation

use a CHAdeMO connector and operate at the 50kW power level, which enables PEVs to charge to approximately 80 percent of their battery capacity in 30 minutes or less. CHAdeMO is a connector standard developed by the Tokyo Electric Power Company, and all Japanese PEVs (such as the Nissan Leaf) are compatible with the standard. The network continues to expand as participating jurisdictions invest in additional fast chargers and promote the network. For example, Oregon has deployed fast chargers along arterials radiating out from I-5 to major destinations like Mt. Hood, Central Oregon, and the entirety of Oregon's portion of U.S. 101, making 363 miles of Oregon coastline more accessible to PEVs.

Participating jurisdictions have taken a variety of approaches when investing in and siting stations. Oregon and Washington initially invested in DC fast chargers along the north-south I-5 corridor, and placed the stations at rest areas or other highly visible businesses near the interstate. The goal of these early stations was to offer DC fast chargers at prominent locations, in order to give drivers the confidence they need to make longer trips. Because of this, sites were not chosen based solely on their projected usage. This was a strategic decision, designed to maximize visibility, raise PEV awareness, and demonstrate that longer PEV trips are possible.

One of the distinguishing features of West Coast Electric Highway stations is the bold branding present on all stations funded through this program. Washington and Oregon only allow this branding on West Coast Electric Highway-approved DC fast charger stations. The states wanted to ensure that stations associated with the West Coast Electric Highway met certain standards, and limiting branding to a select number of state-funded stations enabled greater control. This brand is also an effective way to demonstrate regional connectivity, and convey a seamless driving experience. The west coast has been recognized as a leader in PEV charging infrastructure, largely because of the coordinated West Coast Electric Highway, their strategic investment in highly visible stations, and their deliberate branding effort.



Washington State Department of Transportation

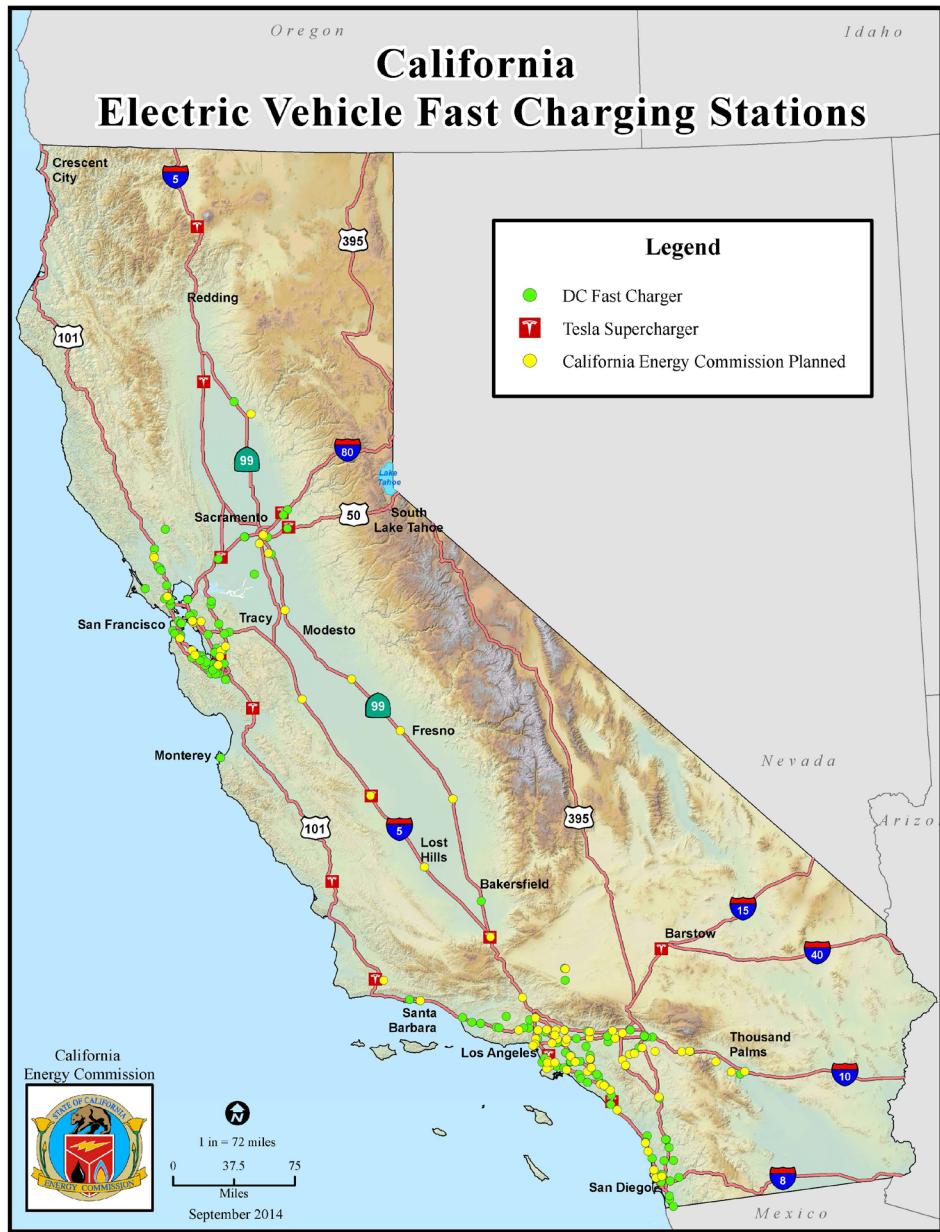
State-Level Initiatives

Individual states are also investing in DC fast chargers to boost range confidence and encourage PEV travel within their state. This includes investment in metropolitan-area DC fast chargers, as well as corridor chargers to enable travel between urban areas.

California

In addition to partnering with Oregon and Washington on the West Coast Electric Highway, the federal, state, and local governments, as well as private investors, have invested in DC fast chargers across California. California's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) authorizes the California Energy Commission to develop and deploy alternative and renewable fuels and advanced transportation technologies to

FIGURE 3: Electric Vehicle Fast Charging Stations in California



California Energy Commission (Sept. 2014).

help attain the state's climate change policies.³⁶ Through the ARFVTP, the Energy Commission has invested more than \$38 million in over 9,300 commercial, workplace, residential, and DC fast chargers.³⁷ Investment in DC fast chargers (and charging infrastructure generally) has followed regional vehicle population densities, and as such DC fast charger placement has radiated out of urban areas.³⁸ Through the ARFVTP, the Energy Commission provides funding for infrastructure investment based on regional PEV readiness plans, and the stations are placed at sites recommended by the regional transportation agency or other applicant.³⁹

Energy company NRG is also installing a significant number of DC fast chargers throughout the state. Under a March 2012 settlement with the California Public Utilities Commission, NRG will spend nearly \$90 million over four years to construct a minimum of 200 fast chargers in California.⁴⁰ These stations will complement those being installed by the state.

While investment in DC fast chargers has grown out of urban areas, additional infrastructure is planned for the I-5 and Highway 99 corridors connecting the Oregon border to Sacramento and south to San Diego to complete the West Coast Electric Highway.⁴¹ Recently, the ARFVTP awarded 10 fast chargers along highway 99 and Interstate 5 in the Central Valley corridor.⁴² The Energy Commission is currently undertaking an inter-regional DC fast charger “gaps” analysis, which will identify additional corridors for investment. These could include corridors between the Bay Area and Sacramento, the West Coast Electric Highway portion of California north of Sacramento to the Oregon border, and the corridors traveling east to Nevada and Arizona.⁴³ The Energy Commission also released a 2014-2015 Investment Plan Update for the ARFVTP, which includes general plans for PEV infrastructure investments for the 2014-2015 fiscal year.⁴⁴ New PEV infrastructure solicitations are planned for issue within the first quarter of 2015. By working with regional transportation agencies and continuing to coordinate with other public and private sector partners, California is aiming to maximize charging station use and enable PEV travel.

Connecticut

In 2013, the State of Connecticut launched the “EVConnecticut” branding campaign to introduce electric vehicles to its residents. Primary objectives were to alleviate PEV “range-anxiety” (or establish “range-confidence”) and promote PEV deployment, with the goal of doubling the number of PEV charging stations currently available in the state.⁴⁵ EVConnecticut promotes PEV deployment in a variety of ways, including by funding the installation of PEV charging stations through the Electric Vehicle Charging Station Incentive Program. Through this program, the state is offering grants to public and private entities to offset the cost of Level 2 EVSE equipment and installation. Additionally, the state is working with Northeast Utilities on a pilot program to position DC fast chargers at the Darien, Greenwich, and Madison service plazas.⁴⁶

The initial DC fast charger locations were chosen because they could be co-located with planned Tesla Motors charging equipment (“Superchargers”). Tesla worked with the state of Connecticut to install Superchargers at service plazas along the I-95 corridor. With Tesla already installing electric vehicle supply equipment and supporting infrastructure, the state saw an opportunity to install additional state-sponsored DC fast chargers during the construction period. This allowed the state to reduce costs while providing DC fast chargers in parallel with Tesla’s proprietary network.

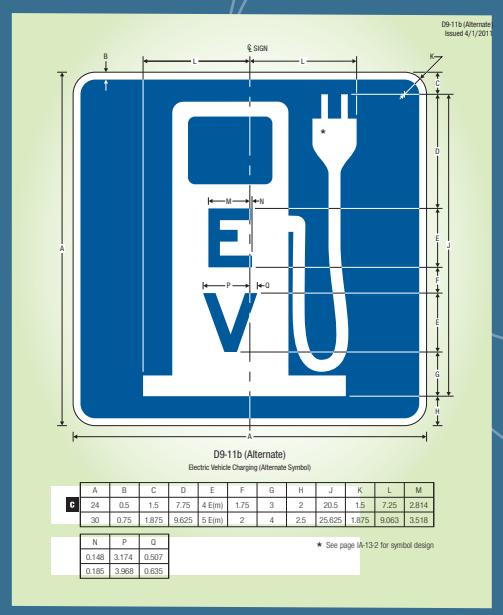


Charging stations at the Merritt Parkway Northbound Service Plaza in Greenwich, Connecticut

Connecticut Department of Transportation

Connecticut has found trailblazing (or “wayfinding”) signs useful to direct PEV drivers to the new DC fast charger locations, and is currently using signs that have been tentatively approved by the Federal Highway Administration (FHWA). FHWA’s Manual on Uniform Traffic Control Devices (MUTCD) sets minimum standards and provides guidance to ensure uniformity of signs and traffic control devices across the nation, and includes guidance for PEV highway signs.⁴⁷ FHWA has issued interim approval for the optional use of an alternate General Service symbol sign that provides road users direction to electric vehicle charging facilities that are open to the public.⁴⁸ This sign is an alternate to the previously approved PEV general service sign, which closely resembles a gasoline pump.⁴⁹ Connecticut (along with Oregon, Washington, and others) is currently using the sign to direct highway users to DC fast chargers and other publicly available EVSE where the conditions for acceptable sign use exist; however, the symbol has not been permanently adopted by MUTCD. Therefore, the state must record every location where the sign is placed; if the symbol is not permanently approved the state will be required to

FIGURE 4: Alternate Electric Vehicle Charging Service Symbol Sign



U.S. Department of Transportation

remove the interim signs. While consistent signs help identify charging stations to drivers, states may be hesitant to invest in signs until FHWA has completed its official rulemaking.

Connecticut staff noted that several additional considerations should be taken into account when investing in fast chargers, or any other publicly available EVSE. These include station maintenance plans; payment arrangements for charging station use, including possible subsidies for electricity dispensed from PEV chargers; existing utility rate structures, including electrical “demand charges” if applicable; and the ramifications of converting existing parking stalls for conventional vehicles to charging stalls for PEVs. In addition, staff noted the importance of thinking through the level of DC fast charger that should be installed. The state installed fast chargers of minimum 40 kW power rating. Although 25kW (or less) DC fast chargers are less expensive than 50kW chargers, they do not recharge vehicles as quickly and thus require vehicles to occupy parking and charging stalls for longer periods of time.

Connecticut’s experience demonstrates the value of building on existing projects to provide greater services to PEV drivers. By co-locating their initial DC fast chargers with Tesla Superchargers, the state was able to save money on construction costs. In addition, by using the FHWA interim approved highway sign, the state is able to direct PEV drivers to the fast chargers while using signs that are consistent with FHWA guidance.

Raising PEV Awareness

Publicly available PEV infrastructure is becoming more prevalent, and buyer incentive programs are helping build the PEV market in states across the country. However, lack of information on available vehicles, benefits, and incentives is still a barrier to market growth. Recognizing the need to promote their own programs and raise awareness generally, states are entering into new partnerships and launching innovative PEV awareness programs.

Innovative Partnerships

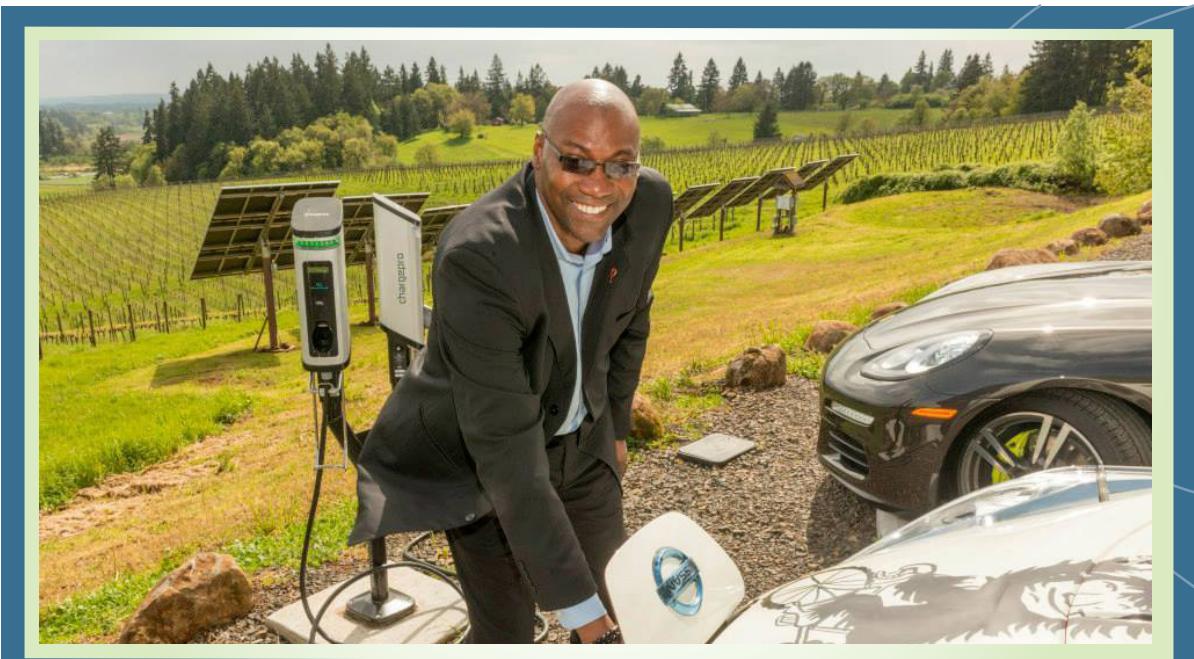
States are partnering with private companies, non-profit organizations, and others on innovative PEV programs. Working with these entities can help raise the profile of PEV projects, and also relieve the state of some of the burden of program administration. In addition, state agencies that have traditionally worked on PEV issues are increasingly collaborating with other state agencies on PEV projects. This cross-disciplinary partnership can help PEV policies gain traction both within state government, and amongst PEV consumers.

Oregon Electric Byways

Oregon has launched an ambitious PEV tourism campaign to promote PEV travel and raise awareness of Oregon's extensive charging network. Through the West Coast Electric Highway, the state of Oregon installed DC fast charging stations along I-5 and other major routes, and is continuing to build a network of Level 2 and DC fast charging stations throughout the state. In an effort to raise awareness of the fast charging network and promote PEV travel, the state's Chief EV Officer, based in the state's Department of Transportation, worked with Travel Oregon to develop Oregon Electric Byway itineraries.⁵⁰ These itineraries connect the PEV driver with charging stations along popular tourism routes and also highlight tourism destinations with PEV charging.

Under the program, Oregon hosted "Plug & Pinot," a countryside wine tour that connected wine enthusiasts with wineries, such as the co-founder of Plug & Pinot's EV Alliance, Winderlea Winery, restaurants, and other wine country businesses that offer PEV charging. To kick off the Plug & Pinot event, Oregon's Chief EV Officer joined former Portland Trailblazer Jerome Kersey to visit the wineries and promote the event. Plug & Pinot was heavily covered by the local media, and within a week of the event, three additional wineries contacted the Electric Byways office for more information and hired electricians to install charging stations at their sites.⁵¹

The Oregon Electric Byways program is an example of how innovative partnerships can be used to raise PEV awareness and promote PEV travel. The program itself is a collaboration between two non-traditional partners—the state Department of Transportation and state tourism agency—and offers a host of resources that build range confidence in a proactive, fun way. The program has received widespread media attention, and has helped to brand



Former Portland Trailblazer Jerome Kersey plugs in a Nissan Leaf during Plug & Pinot.⁵²

Travel Oregon

Oregon as a PEV leader.⁵³ Moreover, the Electric Byways' Plug & Pinot event took partnerships a step further by engaging a local celebrity. The former Trailblazer's participation helped the event garner local media attention. These non-traditional partnerships helped elevate the state's PEV programs and are continuing to build range confidence and raise PEV awareness in Oregon.

Sustainable Jersey

In 2009 the New Jersey Department of Environmental Protection and the New Jersey Board of Public Utilities partnered with the College of New Jersey, the New Jersey League of Municipalities, and other experts to launch Sustainable Jersey, a voluntary certification program for municipalities in New Jersey that want to "go green." The state provided initial funding for the program, although the program itself is now a 501(c)3 non-profit organization based at the College of New Jersey. Sustainable Jersey provides tools, training, and financial incentives to support communities as they develop sustainability programs, and provides "certification" to municipalities who take specific actions to green their community.⁵⁴ In 2014, Sustainable Jersey worked with the state, universities, and

FIGURE 5: Sustainable Jersey Certification⁵⁵

ELECTRIC VEHICLES		
Make Your Town Electric Vehicle Friendly		15 Points <input type="checkbox"/>
Public Electric Vehicle Charging Infrastructure		15 Points <input type="checkbox"/>

other subject-matter experts to introduce electric vehicle “actions” that communities can take that will count towards certification. This is the first sustainable communities certification program in the country that has introduced alternative fuel vehicle actions as qualifying actions in their certification program.

New Jersey’s state agencies continue to participate in program development for the Sustainable Jersey actions and integrate Sustainable Jersey into a number of existing grant programs to provide an incentive for municipalities to participate. This partnership has allowed the state to support PEV and sustainable community initiatives at no cost to the state, and has also relieved the state of much of the administrative burden.

High-Profile Public Events

States are also hosting or participating in high-profile public events to raise PEV awareness. These events often include appearances by prominent figures, ride-and-drives (i.e., PEV vehicle displays and test drives), and a major policy announcement, and are able to draw media attention while providing information on PEVs and new PEV programs.

California’s Drive the Dream

In 2013, Governor Jerry Brown and more than 50 corporate leaders met at an event called “Drive the Dream” to raise PEV awareness and announce acceleration in the adoption of PEVs and workplace charging in California. Drive the Dream was organized by the California PEV Collaborative, a non-profit organization with approximately 40 members, including California state agencies, car companies, and other PEV stakeholders. The PEV Collaborative wanted to demonstrate widespread commitment to PEVs and promote workplace charging by gathering commitments from CEOs in California to provide workplace charging for their employees. In return for their commitments, CEOs had the opportunity to participate in a high-level discussion with the Governor and other corporate leaders to explore



Gov. Jerry Brown and corporate leaders at the “Drive the Dream” event⁵⁷

Plug-In Electric Vehicle Collaborative

opportunities and obstacles to continued market growth. At the event, Governor Brown announced that he intended to sign two key bills to support electric vehicles in California.⁵⁶ The event also featured an automotive showcase with 16 new PEV models, and was open to the public.

Drive the Dream combined public-private partnerships with a high-profile event that simultaneously raised PEV awareness and secured real commitments to promote PEV deployment. The PEV Collaborative has continued to work with the companies to help them develop workplace charging programs, and in early 2014 surveyed participants to gauge the value of the event and get a progress report on workplace charging commitments. All surveyed participants gave positive reviews of Drive the Dream, and nearly all reported that they were on track with their commitments or had already completed their work.⁵⁸ In addition the survey revealed that the Governor's engagement was key to the event's success, that his commitment to PEVs sent a strong, positive message, that press coverage was an important element, and that publicizing participants' environmental stewardship added to their reputations. The extensive press coverage of the event itself, corporate participation, and information gleaned from the follow-up survey demonstrates that high-profile events with gubernatorial involvement can be an effective way to secure PEV commitments from the private sector and support PEV deployment.

Conclusion

To support the early PEV market, states across the country are launching innovative programs to reduce the up-front cost of the vehicle, provide publicly available charging infrastructure, and raise PEV awareness. States with PEV rebate programs are tracking program effectiveness by capturing statistics on program use, and in the case of California and Massachusetts, are surveying rebate applicants to learn more about demographic characteristics and buyer motivations. These data collection efforts will help the states understand buyer motivations and behavior, and in turn craft meaningful and effective policies and programs. States are also increasingly turning to rebates and other point-of-purchase incentives to encourage consumers to purchase PEVs, and are offering incentives to businesses, municipalities, and other organizations to maximize their return on investment and reach a broad group of stakeholders.

States are also investing in the strategic placement of DC fast chargers to boost range confidence and promote PEV travel. In the Pacific Northwest, Oregon and Washington have coordinated DC fast charger placement at highly visible locations along the I-5 corridor, with the goal of raising awareness and promoting interstate travel. Similarly, Connecticut co-located DC fast chargers with Tesla Superchargers at major rest areas, to minimize cost and enable PEV travel across the state. California has invested in DC fast chargers within and between metropolitan areas, in order to maximize station usage and enable travel within the state's large urban areas, and is also expanding the DC fast charger network to other areas throughout the state.

These jurisdictions are at varying stages of DC fast charger investment, although all have indicated the importance of branding and wayfinding signage. The West Coast Electric Highway brand communicates interconnectedness, and has gained recognition as a coordinated network of stations that are reliable and available to the public. Some states use the FHWA interim wayfinding signs, although since these signs have not been finalized, uncertainty exists over their longevity. Nonetheless, states have found that branding and wayfinding signs, as well as strategically siting stations at highly visible locations, can maximize use and encourage PEV adoption.

Finally, states are increasingly finding that consumer education is critical, both to raise awareness of PEVs generally, and to share information about state-sponsored PEV programs. By working with dealerships, providing easy-to-understand information directly to consumers, partnering with private companies and other entities, and by hosting or participating in high-profile public events, states are able to share information about the benefits and availability of PEVs, as well as state policies and programs. A combination of incentive programs, fast charger investment, PEV awareness activities, and other efforts is needed to support the early PEV market, and by following the lead of the TCI states and others, jurisdictions across the country can make real progress toward achieving their PEV and greenhouse gas reduction goals.

Image and Figure Credits

Images

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- P. 13:** Connecticut Department of Transportation, Charging Stations at the Merritt Parkway Northbound Service Plaza in Greenwich, CT.
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Figures

FIGURE 1: California CVRP Rebates by Month (p. 3)

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FIGURE 2: Number of Rebates Applied for or Issued Under the “Massachusetts Offers Rebates for Electric Vehicles” Program (p. 4)

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FIGURE 3: Electric Vehicle Fast Charging Stations in California (p. 11)

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FIGURE 4: Alternate Electric Vehicle Charging Service Symbol Sign (p. 13)

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FIGURE 5: Sustainable Jersey Certification (p. 16)

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Endnotes

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