The California Energy Commission

Zero-Emission Vehicles in California

California's transportation sector accounts for nearly 40 percent of the state's greenhouse gas (GHG) emissions and is a major contributor to local air pollution. The primary source of these emissions is gasoline-fueled internal combustion engine vehicles. Today, hundreds of thousands of plug-in hybrid electric vehicles and millions of partial-zero-emission vehicles operate on California highways. To significantly reduce both GHG emissions and air pollution from this sector, California's state agencies, including the California Energy Commission, have developed a series of policies and actions to encourage the use of zero-emission vehicles (ZEVs).

What Are ZEVs?

ZEVs are plug-in electric vehicles and hydrogen fuel cell electric vehicles. The benefits of ZEVs extend beyond just reducing air emissions. They include reducing fuels costs to consumers over the life of their vehicles and decreasing California's dependence on fossil fuels. Reducing dependence on these fuels helps California address vulnerabilities caused by potential supply disruptions, price spikes, and the transfer of wealth to petroleum-exporting countries that may be hostile to the United States. In addition, ZEVs bolster California's innovation-based clean technology sector and can potentially provide benefits to the state's electricity system by storing energy and dispatching it during times of high electricity demand.

Plug-In Electric Vehicles (PEVs)

PEVs use electricity as a primary fuel source to drive an electric motor that powers a vehicle. PEVs use batteries to store electricity from the electric system (grid) by recharging at home or at designated recharging stations. There are two types of PEVs that are commercially available: battery electric vehicles and plug-in hybrid electric vehicles. Each technology offers a range of features and functionality.

Battery electric vehicles (BEVs) run completely on electricity stored in batteries and have an electric motor that powers the vehicle. These vehicles may also be referred to as all-electric vehicles or electric vehicles (EVs) and have no tailpipe emissions. Currently, most BEVs have a range of 50–100 miles on a single charge.

Plug-in hybrid electric vehicles (PHEVs) combine an electric drive system with a gasoline-fueled internal combustion gasoline engine. Like BEVs, these vehicles plug into the electricity system to recharge the onboard battery, but also have a refillable gasoline tank. PHEVs operate in electric mode first and then switch to or blend with gasoline power, as necessary. These vehicles release air emissions only when running on the internal combustion engines and require maintenance comparable to a traditional gasoline vehicle. PHEVS typically have a driving range (250-400 miles).

Fuel Cell Electric Vehicles (FCEVs)

FCEVs create electricity from hydrogen fuel and oxygen. Hydrogen, stored on board the vehicle as a compressed gas, is safe and becoming commercially available. When running low, the tank is refilled at designated hydrogen fueling stations. FCEVs take 3 to 7 minutes to fill and have a range similar to gasoline-fueled internal combustion engine vehicles (250-400 miles). In an FCEV, hydrogen is 2-3 times more efficient than gasoline in an internal combustion engine vehicle. Hydrogen is nontoxic, noncorrosive, and environmentally benign and can be produced locally from a variety of sources, including natural gas, water, and biogas.

Governor Edmund G. Brown Jr. Executive Order B-16-12

Overview

Accelerating the ZEV market is a cornerstone of California's long-term transportation strategy. Recognizing the great benefits of ZEVs, as well as the challenges to expanding the market, Governor Edmund G. Brown Jr. issued an executive order in March 2012 to "encourage the development and success of ZEVs." It directs state government to meet a series of milestones toward a long-term target of 1.5 million ZEVs on California's roadways by 2025. To achieve this goal, the Governor's Interagency Working Group on ZEVs developed the *California ZEV Action Plan*, which details more than 100 state government actions to accelerate the ZEV market.

California ZEV Action Plan

The *California ZEV Action Plan* is the product of an interagency working group led by the Governor's Office that includes several state agencies and associated entities and builds upon significant work already undertaken by these agencies. The action plan is a compilation of extensive input from outside stakeholders, including the California Plug-in Electric Vehicle Collaborative (PEVC) and the California Fuel Cell Partnership (CaFCP), two broad-based, public-private partnerships, with industry, nongovernment organizations, and government members that collaborate to advance ZEVs.

The plan was adopted in 2013 and identifies four broad goals and actions that state agencies will take to meet the executive order milestones:

» Complete needed infrastructure planning.

» Expand consumer awareness.

» Transform vehicle fleets.

» Grow jobs and investment in the private sector.

Encouraging ZEV Adoption

A wide range of financing and funding options exists for consumers, commercial fleets, and local governments to further ZEV adoption, including regulations and incentives. For example, the California Air Resources Board (ARB) ZEV regulation requires large-volume and intermediate-volume vehicle manufacturers to bring to and operate in California a certain percentage of ZEVs including clean plug-in hybrids, clean hybrids, and clean gasoline vehicles with near-zero tailpipe emissions. ARB also administers the Air Quality Improvement Program that provides vouchers for the purchase of hybrid truck and buses, as well as rebates to consumers for purchasing ZEVs.

The Energy Commission funds the installation of PEV charging stations and FCEV fueling equipment through the agency's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)

ARFVTP is driving California toward a cleaner more efficient vehicle transportation system. Over the next 10 years the Energy Commission will invest nearly $1 billion to support projects that reduce the state's dependency on petroleum, increase the number of ZEVs on California's roadways and create new jobs and industries.