

Plug-In Electric Vehicles in California

Review of Current Policies, Related Emissions Reductions for 2020, and Policy Outlook

Maggie Witt, Matthew Bomberg, Timothy Lipman, and Brett Williams

California's emissions reduction goals for criteria air pollutants (CAPs) and greenhouse gases (GHGs) have encouraged policies that support plug-in electric vehicles (PEVs). This paper explores current and planned policies that promote PEVs, potential emissions benefits from PEV adoption in California by 2020, and future policy directions. The reviewed policies include the zero-emission vehicle regulations, the low-carbon fuel standard, and the clean car standards, which all require GHG reductions. Policies prompted by the California Public Utilities Commission Alternative-Fueled Vehicle Rulemaking decision and existing and planned PEV incentive programs are among the forthcoming and expected policies that are discussed. An analysis was conducted to estimate and to value GHG and CAP emissions reductions from PEVs in California by 2020. Results of this analysis show that the reduction in tailpipe emissions dominate any added power plant emissions and value the benefits at \$750 to \$1,500 per vehicle in an expected PEV penetration scenario (where PEVs are predominantly plug-in hybrid vehicles) and \$1,000 to \$2,500 per vehicle in an aggressive penetration scenario (in which battery electric vehicles comprise one-third of all PEVs). The assignment of monetary value to benefits provided a basis for justifying future PEV subsidy programs. The policy review and emissions analysis set the stage for a discussion of California's PEV-related policy outlook, including possible policy directions that would coordinate PEV-related programs, distinguish electric fuel from electricity used for other purposes, and provide stable, long-term incentives for PEV deployment.

California's efforts to reduce emissions of criteria air pollutants (CAPs) and greenhouse gases (GHGs) have contributed to statewide policy setting that encourages the transition from conventional vehicles to plug-in electric vehicles (PEVs). PEVs include plug-in hybrid vehicles (PHVs) and battery electric vehicles (BEVs), both of which use electricity as a transportation fuel in addition to or instead of gasoline, which—in California—is more GHG intensive than electricity.

M. Witt, Transportation Sustainability Research Center, University of California, Berkeley, 310 Barrows Hall, Berkeley, CA 94720. M. Bomberg, T. Lipman, and B. Williams, Transportation Sustainability Research Center, University of California, Berkeley, Suite 280, 2150 Allston Way, Berkeley, CA 94704. Current affiliation for B. Williams: Electric Vehicles and Alternative Fuels, Luskin School of Public Affairs, University of California, Los Angeles, 3323 School of Public Affairs Building, Los Angeles, CA 90095-1656. Corresponding author: M. Witt, witt.maggie@gmail.com.

Transportation Research Record: Journal of the Transportation Research Board, No. 2287, Transportation Research Board of the National Academies, Washington, D.C., 2012, pp. 155–162.
DOI: 10.3141/2287-19

This paper explores the current policy setting for and emissions benefits of PEVs and concludes with possible directions for future policy. The remainder of the paper's sections are organized as follows: a review of existing GHG-reducing policies and explanation of how they may affect the rate and magnitude of PEV deployment in California; consideration of the expectations about future policies and description of how these are likely to affect California's PEV-related policy environment; presentation of an analysis of the impacts of GHG and CAP emissions of PEVs in California by 2020, including an estimate of the magnitude of emissions savings and a valuation of the attendant social benefits; and finally a discussion of future PEV-related policies for California.

CURRENT PEV-RELATED POLICIES IN CALIFORNIA

Motivated largely by public health concerns about criteria pollutants, California established policies and programs to cut emissions and to shift to PEVs and alternative fuels years before attention to climate change gained prominence. One such program, created in 1990, was the Low Emission Vehicle Program that included a regulation on zero-emission vehicles (ZEVs). More than a decade later, as knowledge and awareness of climate change grew, California became the first state to establish requirements for reductions in GHG emissions. These targets require emissions reductions in all economic sectors, including transportation. Consequently, the California Air Resources Board (CARB) incorporated GHG reductions into existing programs (e.g., the ZEV program) and created new programs (e.g., the Low Carbon Fuel Standard). Similarly, the Pavley Clean Car Standards Assembly Bill (AB) 1493 are expected to support PEV adoption by establishing standards for GHG emissions for new vehicles sold in California.

California's Existing GHG Policies: Executive Order S-3-05 and AB32

In 2005, Governor Schwarzenegger's Executive Order S-3-05 set statewide goals of reducing GHG emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050 (1). In 2006, the goal of 1990 levels by 2020 became law with the passage of AB32: The Global Warming Solutions Act of 2006.

In strategizing to meet AB32 goals, CARB inventoried statewide GHG emissions to identify sources and allocate reduction requirements. The inventory revealed that California's transportation sector generates more than one-third of statewide GHGs annually (2). Accordingly, CARB assigned 36% of the necessary reductions to the transportation sector.