

UC Office of the President

Policy Briefs

Title

Driving California's Transportation Emissions to Zero

Permalink

<https://escholarship.org/uc/item/8934k2ps>

Author

Chiu, Sam

Publication Date

2021-04-01

DOI

10.7922/G2BZ64BG

Driving California's Transportation Emissions to Zero

For questions and/or media inquiries contact Sam Chiu at sachiu@ucdavis.edu.

April 2021

Issue

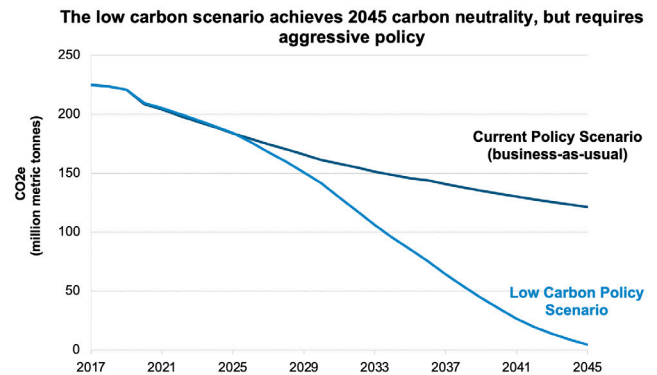
California has long been a global leader in clean energy and climate policy, and it has demonstrated how industrial economies can reduce greenhouse gas (GHG) emissions while supporting strong economic growth and promoting equitable and just outcomes. In September 2018, Executive Order B-55-18 set a target for the state to achieve carbon neutrality by 2045. The University of California Institute of Transportation Studies (UC ITS) produced the first comprehensive research report analyzing the policy options that could put California's transportation sector on a path to be carbon-neutral by 2045 while also centering equity, health, and workforce impacts. The report, summarized in this brief, presents a study conducted by 23 researchers from the four branches of the UC ITS located at UC Berkeley, UC Irvine, UC Davis, and UCLA.

To capture the complexity of the transportation system, the study compared a feasible low carbon scenario that meets the 2045 target against a "business-as-usual" (BAU) scenario, which reflects the currently implemented policies. The study examined three "alternative" low carbon scenarios that also achieve 2045 carbon neutrality. The policy analysis was divided into subsectors, including light-duty vehicles, medium- and heavy-duty vehicles, vehicle miles traveled (VMT), and fuels. The study analyzed the implications of policy choices, focusing on three topics: health, equity and environmental justice, and workforce and job impacts.

Key Research Findings

California's transportation system can achieve carbon neutrality by 2045 by shifting away from the business-

as-usual scenario (Figure 1). Transitioning to a carbon neutral transportation system requires aggressive policies and incentives aimed towards: a rapid transition from conventional, internal-combustion-engine vehicles to zero-emission vehicles (ZEVs); reducing VMT; and deploying clean fuels.



Cost of Low Carbon Scenario Minus Cost of Current Policy Scenario: Stronger decarbonization policies than the current policies will save California in transportation costs, starting in 2030

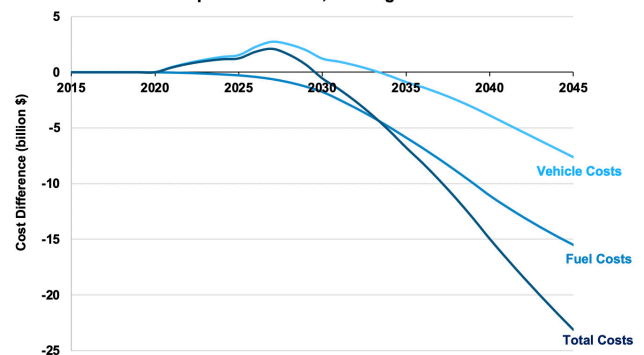


Figure 1 (top) emissions reductions and Figure 2 (bottom) cost of low carbon scenario minus cost of current policy scenario

Transitioning to a carbon-neutral transportation system can help California achieve equity and air quality goals.

The technologies and policies that reduce GHG emissions typically reduce air pollutants as well, especially diesel emissions. Effective policies can help ensure that the more than \$28 billion in health benefits of this transition are equitably distributed.

Carbon neutrality requires up-front investment but yields long-term benefits that outweigh costs (Figure 2).

Depending on the technologies and policies adopted, total public and private costs increase initially through the 2020s, but, as battery and other costs decline, the lower fuel and maintenance costs of electric vehicles outweigh the modest additional vehicle purchase costs. The result is a net economic benefit by the 2030s. When air quality and avoided climate change impacts is considered, the net benefits are substantially higher.

Substantial additional policy support is needed to accelerate ZEV adoption and reduce VMT.

Policies as of 2020, reflected in the BAU scenario, will not achieve the 2045 carbon neutrality target nor the 40% GHG reduction for 2030 adopted in SB 32. Additional policies are needed to accelerate the sales of ZEVs, including additional vehicle purchase incentives, funding of charging and hydrogen infrastructure, and vehicle sales mandates. Policies are also needed to reduce VMT, including limiting road expansion, incentivizing shared mobility, enhancing public transit, and improving infrastructure for walking, bicycles, and scooters. Policies to expand ZEV adoption and lower VMT must prioritize mobility access for disadvantaged communities.

California will need a significant supply of low-carbon liquid fuels.

Even with the focus on ZEVs, there will be millions of conventional vehicles on the road well into the 2040s, and substantial fuel demand from aircraft, boats, and some specialized vehicles. California will need 2-3 billion gallons of low-carbon liquid fuel to satisfy these demands to attain the 2045 target.

Research presented in this policy brief was made possible through funding received by the University of California Institute of Transportation Studies (UC ITS) from the State of California through the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The UC ITS is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, the UC ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

Project ID UC-ITS-2020-65 | DOI: 10.7922/G2BZ64BG

Transitioning to a carbon neutral transportation system will both disrupt and create jobs.

While some sectors of the economy may experience job loss, such as gasoline and diesel retail stations, others will see a significant workforce expansion resulting in more than 7 million additional full-time equivalent job-years between 2020 and 2045.

Policy Implications and Future Work

California will need to adopt additional policies to achieve carbon neutrality in the transportation sector, though most of these policies would likely yield net health, jobs, and economic benefits. Compelling policy options include:

- **ZEV Policies** – Increased vehicle sales mandates, vehicle purchase subsidies including non-government (such as feebates), and support for rapid expansion of electricity and hydrogen fueling infrastructure.
- **Low Carbon Fuel Policies** – Incentives for very-low carbon fuels and stronger Low Carbon Fuel Standard (LCFS) targets.
- **VMT Reduction Policies** – Incentives, regulations, and infrastructure investments that disincentivize the use of single-occupant vehicles and enhance the attractiveness of low-carbon (and pooled) travel.
- **Equity Policies** – All ZEV, fuel, and VMT policies should enhance social equity by increasing mobility, health, and economic well-being in disadvantaged communities, by empowering communities to prioritize actions.

More Information

This policy brief is drawn from the report “Driving California’s Transportation Emissions to Zero” prepared by the UC ITS. The report can be found on the UC ITS website at www.ucits.org/research-project/2179.