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To Price or Not to Price: Determining the Future of Road Financing in an Era of Climate Change

### **Permalink**

<https://escholarship.org/uc/item/3ns8b47j>

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### **Publication Date**

2023-06-16

### **DOI**

10.17610/T67G83

June 2023

# To Price or Not to Price: Determining the Future of Road Financing in an Era of Climate Change



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## Issue

American transportation finance has relied on federal funding from the Highway Trust Fund, namely through the gas tax, as its main revenue source for transportation projects. However, the diminishing purchasing power of the gas tax has forced states to increasingly turn to alternative forms of transportation funding for state and local projects.

The most popular, and arguably the most feasible, of these alternatives is supplementing or replacing gas tax with a road user charge. But this new funding scheme raises a number of questions and challenges related to implementation, especially as new vehicle technologies, like electric vehicles, saturate the market. While pilot programs and research often mention electric vehicles and plug-in hybrid electric vehicles in their scope, most do not explore how carbon emissions may change when adding a price to driving, since electric vehicles do not currently pay for their road use. This research seeks to answer one central research question: What are the environmental implications of a road user charge system that requires electric vehicle participation?

## Methods

In order to address this question, the researcher developed a carbon model to project carbon emissions based on vehicle miles traveled for three different road financing scenarios:

**Scenario 1: Existing Conditions:** vehicles that burn gas continue to pay a gas tax.

**Scenario 2: Dual Funding Scheme:** vehicles burning gas continue to pay the gas tax while electric vehicles pay a mileage-based road user charge.

**Scenario 3: Full Transition:** all vehicles pay a mileage-based road user charge in place of a gas tax.

This model employed data on vehicle miles traveled from the California Air Resources Board's EMFAC2021 (v1.0.2) Emissions Inventory, and classified vehicles based on the Congressional Budget Office's vehicle classifications. Furthermore, to illustrate consumer behavior changes as a result of new pricing mechanisms, the researcher applied short- and long-run gas tax elasticities based on the University of Pennsylvania's Wharton School of Business Budget Model.

## Findings

Based on this model, a dual funding scheme, where gas-powered vehicles continue to pay the gas tax and electric vehicles pay a road user charge, yields the least amount of carbon emissions in both the short and long run (Figure 1).

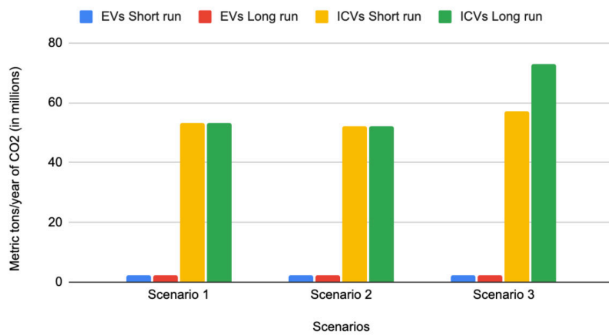


Figure 1. Total carbon dioxide emissions in 2035

A universal road user charge system (completely eliminating the gas tax) produces the most carbon emissions. Replacing the gas tax with a road user charge reduces the price of driving for gas-powered vehicles, since all vehicles are charged for miles driven rather than paying taxes based on their vehicle’s fuel efficiency. With lower fiscal barriers, there is little financial incentive to drive fuel efficient vehicles enabling carbon emissions to skyrocket.

However, since carbon emissions declined for electric vehicles when priced for using the road, results suggest that there are environmental benefits to attaching a price per mile driven on electric vehicles. Pricing driving for all vehicles affords an opportunity to both reduce the carbon footprint of driving while also filling the funding gap.

## Conclusions

Choosing between a dual funding scheme and a complete replacement of the gas tax with a road user charge is an issue of climate priorities since both systems are expected to fill funding gaps. In states that do not highly value climate improvements, an outright replacement of the gas tax might be easiest to address the road funding crisis. For states like California, with ambitious goals to reduce air

pollution, congestion, vehicle miles traveled, and carbon emissions, a dual funding scheme is appropriate. However, a more sophisticated universal road user charge scheme which customizes fees based on vehicle class and fuel type, charging less fuel efficient vehicles higher user fees per mile, can achieve the same climate goals.

To address these funding and climate issues policy makers should:

- **Establish federal guidance suggesting a dual funding scheme to address the transportation funding crisis and to support national climate goals.** The federal government should also provide clear direction that underlines the environmental ramifications of abolishing the gas tax altogether.
- **Replicate the model in other states.** This research relies on California’s progressive political landscape. To understand the impact of a road user charge in other states, researchers should reproduce this model in other states using other vehicle miles traveled data.
- **Adopt a dual funding model in California.** This will bridge the funding gap while simultaneously reducing carbon emissions. Alternatively, a universal road user charge system may be possible, even considering climate goals, when adding customized road user fees based on vehicle class and fuel type. Both options address existing goals and encourage further electric vehicle adoption.
- **Develop supportive policies for electric vehicles and plug-in hybrid electric vehicles in California.** Currently, plug-in hybrids pay gas taxes for the fuel they consume, and many states require additional special fees for fuel efficient vehicles in an effort to bridge road financing gaps. To motivate further fuel efficient vehicle adoption, California should exempt plug-in hybrids from paying gas taxes and remove special fees.



Seiberg, R. (2023). Charging the Future: Assessing the environmental impact of a road user charge with mandatory electric vehicle participation (Master’s capstone, UCLA). Retrieved from: <https://escholarship.org/uc/item/7kh529nv>