

The End of Neutrality? Fuel Standards, Technology Neutrality, and Stimulating the Electric Vehicle Market

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1. Motivations underlying the research

Widespread electrification of the transportation sector is a key component of most strategies for deep decarbonization of the U.S. economy. A key element of most visions for achieving climate stabilization involves the widespread transition of the transportation sector to electricity via the adoption of electric vehicles (electric vehicles).

One policy tool for supporting electric vehicle growth that has drawn interest are the clean fuel standards, such as the Federal Renewable Fuel Standard and California's Low Carbon Fuel Standard. Traditionally, these policies offer credits to suppliers of low carbon transportation sources that suppliers can sell to producers of higher-carbon transportation fuels. Moreover, these policies have traditionally been positioned as "technology-neutral" standards that score a broad set of fuels based upon their life-cycle carbon intensity. A clean fuel standard is designed to promote clean or renewable transportation in a way that is most easily applied to blends of lower-carbon fuel used in similar (internal combustion engine) vehicles.

Adapting a clean fuel standard to promote specific and dramatically different transportation technologies, such as hydrogen or electricity, necessitates scoring vastly different technologies on the common metric of "carbon-intensity" so that credits or debits can be awarded and assessed. The assumptions necessary to do so reshape and redefine the nature and function of a clean fuel standard. To the extent that these assumptions create favorable conditions for specific decarbonization pathways, the standard loses one of its main initial benefits: technological neutrality. If, though, such policy focuses on vehicle purchases and infrastructure through a set of uncertain assumptions, it is no longer a "fuel" standard.

2. A short account of the research performed

We discuss the policy challenges presented by a goal of rapid large-scale expansion of electric vehicles. We summarize the three channels by which policies can encourage electric vehicle adoption: vehicle cost, operating (or fuel) costs, and infrastructure support.

To date, the most substantial policy support for electric vehicle adoption focuses on lowering the upfront vehicle cost through tax credits and a variety of other direct and indirect subsidies. In this paper, we explore the tradeoffs arising from the use of a clean fuel standard as an alternative policy approach to stimulating electric vehicle adoption. The primary compromise we highlight is that for a clean fuel standard to direct sufficient revenues to promote substantial electric vehicle adoption, policymakers often change fuel standards in a fundamental way as to no longer be a technologically neutral.

We describe how California's LCFS offers one such example -- awarding credits for activities other than selling low-carbon fuels (such as installing charging stations) and directing revenues from electricity sales toward vehicle rebates, rather than lowering the price of charging. We highlight the formulae used to award credits to alternative fuel vehicles and infrastructure and note how they do not reward projects based on carbon abatement potential. As one illustration, the program contains no incentives for biofuels infrastructure, such as the installation of E85 pumps. In doing so, the LCFS undermines its value as a tool to encourage decarbonization pathways based purely on their abatement potential.

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3. Main conclusions and policy implications of the work

The electrification of transportation constitutes a transition of immense scale. Although previous research estimates that a 10% decrease in the purchase price may increase electric vehicle sales by 10% - 35%, the policy resources needed to expand the share electric vehicles in line with goals to fully electrify may be enormous. Adoption can be accelerated by improving the value proposition to buyers, as has already occurred via a proliferation of models, longer driving range, and more charging stations. But governments consistently reveal a belief that substantial support for the industry remains necessary, and increasingly use clean fuel standards to aid electric vehicle adoption.

Although the minimal fiscal requirements of a clean fuel standard may seem tempting to policymakers seeking to further spur electric vehicle adoption, advantaging specific technological pathways sacrifices one of the main attractions of fuel standards, technological neutrality. This loss is meaningful in settings, like decarbonization of transportation, where there is significant uncertainty about the ultimate identity and mix of fuels and solutions that can best achieve policy goals. In such settings, the value of rewarding abatement based the amount of carbon savings achieved, rather than how a project provides it, is particularly great.