The decarbonization of the light-duty vehicle (LDV) fleet in the United States is an important policy priority for the coming decades. Government policy has the potential to accelerate the transition of the LDV fleet to electric vehicles. We consider several forms of government policy: subsidized construction of charging stations, refundable tax credits for electric vehicles, and a tradable permit system for vehicle manufacturers. Our objective is to evaluate forms of these policies that are capable of achieving a target 50% sales share of zero emissions vehicles by 2030. Our results indicate that charging station subsidies are extremely effective relative to alternative proposals, as measured by impact for a given fiscal expenditure.
proposed to spur electrification of the US EV fleet. Broadly, these include building charging infrastructure, subsidizing the costs of purchasing or driving EVs, and regulatory approaches that use existing legal authorities of the Environmental Protection Agency (EPA) to regulate CO2 emissions and the Department of Transportation (DOT) to regulate the fuel economy.

In order to evaluate this suite of policies for expediting electrification of the LDV fleet, we applied a joint model of charging station supply and EV demand. We then simulate the diffusion path of EVs under different policy scenarios including refundable tax credits, charging station subsidies, and tradeable allowances, and varied the size of the subsidies and total program budgets for both vehicles and charging stations to obtain the share of battery EVs, the reduction in greenhouse gases, and total governmental outlays.

Specifically, the three policies we evaluated are as follows: (1) government-subsidized production of new charging stations through a cost-sharing program in which the government pays a percentage subsidy to each charging station built until the federal budget allocation is spent, at which point the program ends; (2) a rebate for the purchase of electric vehicles that reduces the sticker price of electric vehicles, reducing the price of EVs relative to ICEs through a point-of-sale rebate to the consumer, a point-of-sale dealer rebate, or a refundable tax credit; (3) a policy that sets both the fuel efficiency of ICE vehicles and mandates the fraction of EVs sold, both by class of vehicle.

Based on the application of the model to these policies, we make two important findings. First, there is a great deal of heterogeneity (in terms of impact on EV penetration per dollar of government expenditure) across the policies studied. Second, none of the three policies studied in isolation is capable of reaching 50% EV penetration in the market for new vehicles without a very large price tag; instead, a combination of policies is likely to provide the most impact on EV penetration.

Two reasons are cited to explain these conclusions. First, for individuals who cannot install their own chargers, for example because they park on a street or live in an apartment building, buying an EV simply is not an option, regardless of how deep the subsidy is. For them, providing additional charging stations makes it possible to purchase an EV. Even for consumers who have their own personal charging stations, the current low density of on-the-road level 3 chargers makes long-distance travel challenging at best. For them, additional level 3 chargers reduce range anxiety and make it possible to use EVs in the way that drivers now use ICEs.

Second, much of spending on tax credits is inframarginal; it consists of transfers to individuals who would have purchased an electric vehicle whether or not the tax credit we study exists. And although individuals are highly responsive to changes in the relative price of cars or electric vehicles, an appreciably large subsidy for EV purchases would amount to hundreds of billions of dollars in government transfers.

References
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Since 1977, CEEPR has been a focal point for research on energy and environmental policy at MIT. CEEPR promotes rigorous, objective research for improved decision making in government and the private sector, and secures the relevance of its work through close cooperation with industry partners from around the globe. CEEPR is jointly sponsored at MIT by the MIT Energy Initiative (MITEI), the Department of Economics, and the Sloan School of Management.