National Center for Sustainable Transportation
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POLICY BRIEF

Sustainable Incentives for Accelerating the Zero Emission Vehicle Transition

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Issue

Effective policy tools are urgently needed to enable the United States (US) to keep pace with international climate goals. Leveraging lessons from existing programs is crucial for reducing transportation-related emissions on-time. "Feebates"—fees applied to the purchase of vehicles with higher emissions and rebates for clean ones—have become an effective and increasingly common strategy for shaping vehicle markets in European countries. Unlike direct subsidy schemes, feebate policies create strong price signals. Feebate frameworks may be a useful tool given their flexibility and effectiveness. If designed well, they redistribute public revenues instead of functioning as a tax. A holistic policy framework that will accelerate the transition to zero emission vehicles (ZEVs) in the US will likely include strong federal policies such as sales mandates, purchase fees for higher emission vehicles, and purchase incentives for ZEVs. Feebate frameworks are flexible and effective and may be a useful tool.

Researchers from the University of California, Davis examined what makes a feebate policy work and how this strategy can be leveraged to shift US vehicle markets. The research included a review and analysis of feebate mechanisms in France, Germany, the United Kingdom (UK), Italy, and Sweden (Figure 1). Vehicle sales data by fuel type from 2017 to 2021 were evaluated to determine the key factors of an effective feebate policy.

Key Research Findings

A true feebate policy structure works best: Feebates wherein the "fee" and "rebate" are introduced through one policy, as in France and Sweden, lead to more efficient resource allocation. Across feebate designs, the use of fees on internal combustion engine vehicles to support rebates on ZEVs can be achieved with relatively low average fees per vehicle, in the range of 2 to 8% over the estimated manufacturer's suggested retail price.

Define vehicle emission classes (gCO_2/mi): Classification is a key first step in the feebate design strategy, followed by an assessment of vehicle prices within each emission class.

Identify an efficient fee parameter: Focusing on a single fee parameter, like CO_2 emissions, is simple and effective. Where emission taxes are a challenge, taxation based on attributes such as weight, length, or engine capacity is an alternate approach.

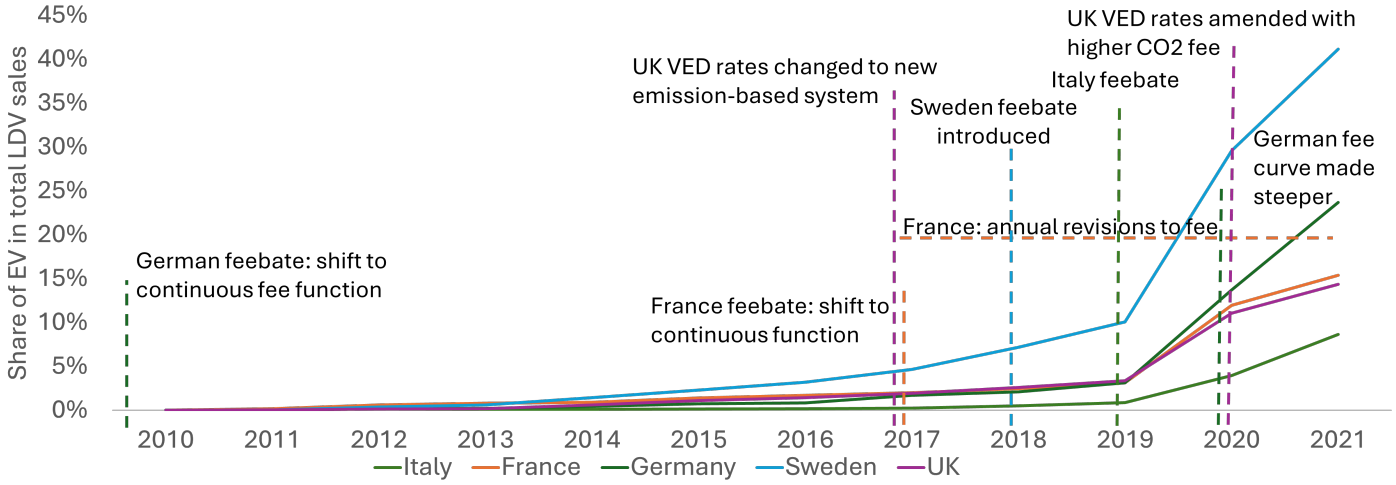

Figure 1. Timeline of market share of electric vehicles vs. total light duty vehicle sales (solid lines) and feebate policies across key European countries. UK VED rates refer to vehicle excise duty rates.

Adopt continuous fees and tiered rebates: Fees that increase nonlinearly for every unit increase in emissions prevent system gaming by manufacturers. For rebates, stepwise benefits will likely channel buyers towards ZEVs (Figure 2).

Design feebate to maximize impact and adjust periodically: An analysis of the vehicle market can show whether a single "pivot point" at which fees shift to rebates or a "donut-hole," where neither a fee nor a rebate are applied for a central range of emissions, will be more effective.

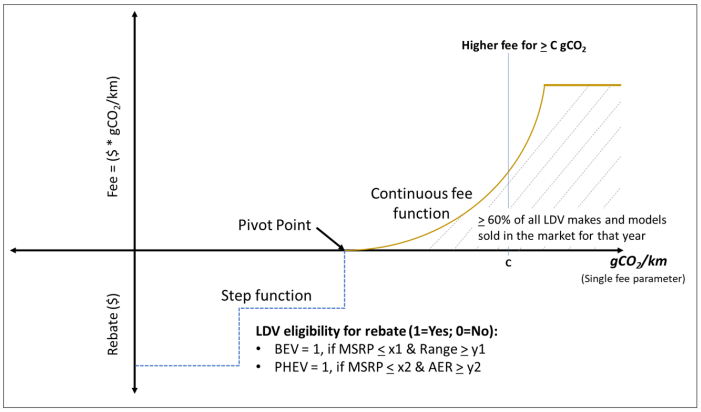

Figure 2. Key elements of a feebate design with a pivot point, stepped rebates, and a continuous nonlinear increase in fees.

Additional elements of an effective feebate policy include data collection, adaptive management, standards for rebate-qualifying vehicles, point-of-purchase impact, and equity assurances.

Policy Implications

Feebate policies are not new to the US. There have been various national- and state-level attempts to enact such regulations to spur the ZEV transition. In March 2024, light duty vehicle (LDV) greenhouse gas (GHG) regulations were announced by the US Environmental Protection Agency (US EPA). These standards are projected to result in an industry-wide average target for the LDV fleet of 85 grams of CO_2/mile (gCO_2/mi) in 2032. This represents a nearly 50% reduction in the fleet emissions target, relative to 2026 standards (US EPA 2024). With the growing sales share of sport utility vehicles (SUVs) and light duty trucks, over half of LDV sales are in the 300 gCO_2/mi emission class or above. As manufacturers aim to comply with new GHG regulations by 2032, selling electrified models will be a key pathway.

The timeline for US EPA GHG regulations and the requirements of the Inflation Reduction Act pose challenges to supply chains, vehicle affordability, and consumer perceptions. Each of these concerns will incur significant system costs and must be addressed to achieve ZEV transition goals between 2030 and 2035.

A feebate mechanism can propel the transition by generating additional market revenue, accelerating the pace, and averting pressure on government budgets. Funds could be allocated to create a strong buffer for variable EV prices and to ensure affordability for an equitable transition to vehicle electrification.

Adopting a strong market mechanism, such as a feebate, and making investments with public capital will clearly signal the government's intent to manufacturers. This is likely to have a multiplier effect, encouraging private entities to invest in the ZEV transition, as well.

More Information

This policy brief is drawn from "Sustainable EV Market Incentives: Lessons Learned from European Feebates for a Zero Emission Future" and "Sustainable EV Market Incentives: Equitable Revenue-Neutral Incentives for Zero-emission Vehicles in the United States," white papers from the National Center for Sustainable Transportation, authored by Aditya Ramji and Lewis Fulton of the University of California, Davis. The papers can be found on the NCST website at https://ncst.ucdavis.edu/project/evaluating-revenue-neutral-incentive-systems-zero-emission-ldvs.

For more information about the findings presented in this brief, contact Aditya Ramji at adiramji@ucdavis.edu.

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