Do Clean Fuel Standards Drive Electric Vehicle Adoption? Evidence from Oregon and California

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This proposal sets out a realistic, feasible, and policy-forward empirical study of whether clean fuel standards (CFS) directly accelerate the transition to electric vehicles (EVs), and through which market mechanisms they do so. California's Low Carbon Fuel Standard (LCFS) and Oregon's Clean Fuels Program (CFP) reduce the average carbon intensity of transportation fuels via tradable performance credits. Electricity earns credits based on its carbon advantage over petroleum fuels, and program rules allow utilities and charging providers to monetize those credits to lower effective charging costs, reform tariffs, and expand public fast-charging networks. The LCFS also features a Credit Clearance Market with an inflation-indexed price ceiling that stabilizes compliance costs, while Oregon's CFP explicitly authorizes electric utilities to generate credits from residential charging and to devote proceeds to transportation electrification. These institutional features create exactly the kind of quasi-experimental variation needed to trace policy signals into market outcomes and, ultimately, technology adoption.

The intended contribution is to deliver the first integrated, causal evidence chain from policy to market to behavior for LCFS-style programs, expressed in units that matter for policy design. Rather than asking simply whether LCFS/CFP increases EV uptake, we propose to quantify three elasticities that regulators can act upon: the pass-through from credit prices to consumer-facing charging costs (cents per kilowatt-hour and dollars per mile), the responsiveness of public fast-charging deployment to credit-market shocks, and the elasticity of EV registrations with respect to those program-induced changes in costs and infrastructure. By reporting these elasticities at six- to twelve-month horizons, with uncertainty bands and transparent identification checks, the study will make LCFS/CFP directly comparable to purchase subsidies, fuel-economy standards, and other instruments in the decarbonization toolkit.

The institutional setting provides credible quasi-experimental variation. California launched LCFS in 2011, Oregon followed with CFP in 2016, and both jurisdictions have periodically adjusted benchmark stringency, clarified banking guidance, and operated within price collars or clearance mechanisms. Electricity credits are accrued and monetized by regulated utilities and private charging providers, but the channels through which value reaches drivers, tariff riders, demand-charge reforms, make-ready investments, and direct rebates vary across utilities and over time. Neighboring Western states without LCFS-style policies provide a plausible counterfactual for EV adoption dynamics once fuel prices, federal and state purchase incentives, and macroeconomic conditions are controlled. This heterogeneity allows the project to separate policy-induced movements from coincident trends and to attribute effects to the mechanism that matters for electrification: the effective price of charging and the accessibility of chargers.

We will assemble a monthly panel for 2009–2025 covering Oregon and California alongside a donor pool of otherwise similar Western states that did not operate LCFS-style policies for most of the sample. EV registrations will be harmonized at the state level and, where feasible, at the county level, drawing on the Atlas EV Hub's Open Vehicle Registration Initiative and state motor-vehicle agency releases. Charging conditions will be measured using the U.S. Department of Energy's Alternative Fuels Data Center inventory of Level-2 and DC fast chargers, disaggregated by access type. Retail electricity rates will be taken from the U.S. Energy Information Administration's EIA-861M (monthly) and EIA-861 (annual) collections and merged with utility EV tariff filings to construct a driver-relevant effective charging-cost index that reflects tariff riders, demand-charge reforms, and credit-funded rebates. Clean-fuel credit markets will be represented by monthly prices, traded volumes, bank

balances, and statutory benchmark schedules (including LCFS Credit Clearance Market parameters). Controls will include gasoline and diesel prices, federal and state EV purchase incentives, unemployment and inflation, and local demographics (income, urbanization, multi-unit dwelling share, and vehicle ownership). Each step in constructing the effective-cost index will be documented so that the price faced by drivers, not just posted tariffs, is transparent and replicable.

The empirical strategy proceeds in three linked steps designed for a project that has not yet been executed, with claims framed as hypotheses and all primary specifications pre-registered. First, we will estimate the pass-through from clean-fuel credit prices to effective charging costs and to infrastructure deployment. Fixed-effects panel models with distributed lags will relate these outcomes to credit prices while absorbing state and month shocks, wholesale power costs, and utility-specific tariff reforms. Documented changes in benchmark stringency, clearance rules, and banking guidance will be treated as quasi-experimental events that shift credit prices independently of short-run charging demand. Where filings permit, utility-by-year fixed effects will absorb slow-moving regulatory heterogeneity. In parallel, a Bartik-style instrument that interacts exogenous stringency paths with cross-utility exposure to EV load will provide a second source of plausibly exogenous variation. Second, we will estimate the impact of LCFS/CFP exposure on adoption using modern difference-in-differences and event-study estimators appropriate for staggered policy timing. Specifically, we will use Sun–Abraham estimators for dynamic treatment effects and the Callaway–Sant'Anna framework for multi-period DiD, with stacked designs to guard against contamination by already-treated units. Identification will be probed through pre-trend diagnostics, permutation inference, leave-one-state-out checks, and placebo treatments assigned to non-policy states. Synthetic difference-in-differences will serve as a robustness benchmark, especially for county-level border comparisons where spillovers are plausible. Third, we will link the mechanism to behavior via a two-stage design. In the first stage, effective charging costs (and, in alternative specifications, DC fast-charging density) will be instrumented with exogenous variation arising from the pass-through analysis. In the second stage, EV registrations will be regressed on these instrumented market variables, recovering adoption elasticities attributable to LCFS/CFP-induced changes rather than to coincident trends. Heterogeneity by urbanization, income, baseline charger density, and housing type will be explicitly examined to assess distributional consequences and to inform equity-oriented revenue-use rules.

Because this is a proposal for a study that has not yet been executed, we state expectations as testable hypotheses rather than claims. The first hypothesis is that pass-through exists but is partial and heterogeneous, increasing where tariff riders explicitly return credit value and where demand-charge reforms reduce DC fast-charging operating costs. The second hypothesis is that EV registrations are positively elastic with respect to reductions in effective charging costs and expansions in fast-charging availability, with stronger responses for battery-electric vehicles than for plug-in hybrids. The third hypothesis is that benefits are initially uneven across space and income, favoring urban counties with higher baseline charger density unless credit revenues are explicitly earmarked to broaden coverage to rural corridors, multi-unit dwellings, and low-income customers.

Feasibility is high because the project relies on public and regulatory data and does not require confidential microdata or human-subjects review. The AFDC station inventory, EIA-861M/EIA-861 retail rate series, and Atlas EV Hub registration data are routinely updated and accessible. LCFS and CFP documentation, including electricity-specific crediting and spending guidance, is regularly published by CARB and the Oregon DEQ. A pre-analysis plan will fix the primary estimators, horizon definitions, and the construction of the effective-cost index before estimation. The timeline anticipates final data harmonization through late 2025, estimation and robustness checks in early 2026, and a full draft prepared for presentation at the May 21, 2026, conference in Washington, D.C.

The fit with Environmental and Energy Policy and the Economy is direct. The journal emphasizes credible, policy-relevant economics on urgent energy and environmental questions. By delivering

transparent elasticities that tie LCFS/CFP credit-induced changes in charging costs and infrastructure to EV adoption and by mapping those elasticities to design levers such as price-ceiling parameters in the LCFS Credit Clearance Market, banking guidance, and revenue-use rules for electricity credits, this project provides actionable evidence for regulators as multiple jurisdictions revisit program settings and consider alignment with federal incentives. The novelty lies in connecting established modern methods to an unanswered and actionable question at the center of state decarbonization policy.

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