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Evaluating the costs and outcomes of Oregon's Clean Fuels Program: Advancing carbon intensity goals for sustainable development

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Keywords

Biofuel costs (B5, B10), carbon intensity, Clean Fuel Program, credit market dynamics, electric vehicle infrastructure, sustainable transportation policy

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ABSTRACT

This study investigates the long-run determinants of ethanol carbon intensity (CI) under Oregon's Clean Fuels Program (CFP), with a focus on the relationship between biofuel costs, credit market dynamics, and electric vehicle (EV) infrastructure. Using monthly data from 2018 to 2024, we apply a set of econometric techniques, including fully modified ordinary least squares (FMOLS), instrumental variables (IV–2SLS), dynamic OLS with robust and quantile estimators, bootstrap simulations, and nonlinear specifications. The results reveal three key dynamics. First, CFP average credit prices consistently reduce ethanol CI. This reinforces the central role of market-based incentives. This effect, however, is nonlinear: while moderate credit price increases yield strong compliance responses, marginal returns diminish at higher values. Second, the costs of diesel (B5) and gasoline (E10) are negatively associated with ethanol CI. This reflects the program's performance-based design, where higher costs often signal stronger credit generation, tighter supply, and cleaner blending strategies. Third, EV infrastructure, particularly DC fast charging (DCFC), significantly reduces ethanol CI, though with diminishing marginal benefits at higher levels of deployment. An interaction analysis further demonstrates that credit prices are more effective in reducing CI when EV infrastructure is more developed. This underscores the synergy between market signals and infrastructure expansion. These findings highlight the effectiveness of Oregon's performance-based clean fuel standard in mobilizing multiple compliance pathways. The results support a balanced policy mix that stabilizes credit markets, safeguards biofuel supply, and accelerates EV infrastructure deployment. By demonstrating robust and nonlinear drivers of CI reduction, this study provides important insights for states and regions seeking to design integrated, adaptive, and low-carbon fuel policies.