

Assessing the Economic Viability and Scalability of Carbon Capture (CCS) in Louisiana: A Comparative Analysis of the 45Q Tax Credit and the EU Emissions Trading System

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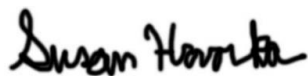
Abstract:

Industrial CCS is a critical strategy for mitigating greenhouse gas emissions in high-emission sectors. This study examines CCS implementation and economic feasibility in Louisiana, a state with extensive industrial activity and favorable legislative support. It evaluates key subsectors contributing to industrial CO₂ emissions, including chemicals, power plants, petroleum and natural gas systems, LNG, refineries, and metals, based on emissions intensity and economic viability for CCS adoption.

A key focus is assessing financial mechanisms supporting CCS deployment, particularly the 45Q tax credit, which incentivizes CO₂ sequestration. The analysis explores the 45Q tax credit's expiration and a potential transition to a cap-and-trade system modeled after the EU ETS, considering its current implementation and post-expiration period. This transition poses economic uncertainties related to capital expenditures (CapEx) and operational expenditures (OpEx) across industries, analyzed using a comprehensive cost estimation framework incorporating cost multipliers and public data.

The research methodology integrates emissions data from the EPA FLIGHT (2023) database with techno-economic modeling to evaluate CCS implementation costs. By applying interpolation techniques to various published simulation data, this study estimates CapEx and OpEx for various subsectors and constructs a comparative financial model assessing the viability of CCS under both the 45Q tax credit and an EU ETS-inspired cap-and-trade system. The study also considers sensitivity analyses to address economic uncertainties, commercial and operational variabilities, and project contingencies.

The findings highlight the cost variability of CCS implementation across industrial subsectors and assess the potential economic trade-offs between direct financial incentives and market-based emissions trading. This study contributes to the broader discourse on industrial decarbonization by providing a comparative analysis of financial structures supporting CCS, with policy recommendations to enhance the economic sustainability of CCS projects in Louisiana and beyond.



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