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TEXAS LBJ School

NEW WORK ON CCUS ECONOMICS AND POLICY

CCS-7, The University of Texas at Austin

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Cockrell School of Engineering

Bureau of Economic Geology

Project Sponsor

Alfred P. Sloan Foundation

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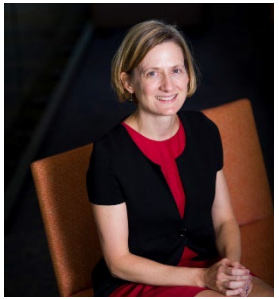
Core project team



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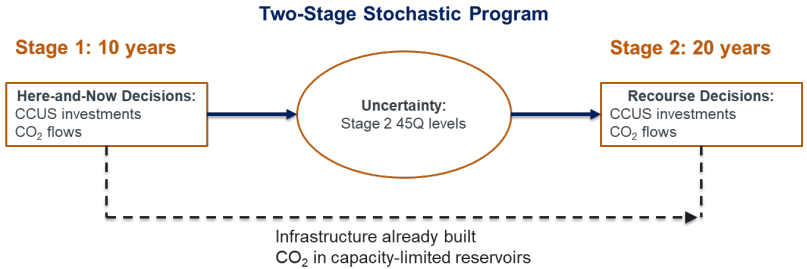
Core research projects underway

- **Effects of policy uncertainty and risk aversion on CCUS investments** (Colombe, Leibowicz, Mendoza)
- **Characterizing the local air pollution impacts of CCUS deployment** (Waxman, Huber-Rodriguez, Olmstead)
- **Policy instrument choice for carbon capture incentives** (Stemmler, Waxman)
- **"Perspectives" piece on U.S. federal tax incentives for CCUS (45Q)** (Olmstead, Leibowicz, Mason, Waxman, Huber-Rodriguez, Stemmler)
- **CCUS investment decisions under uncertainty** (Cochran, Mason)

Effects of policy uncertainty and risk aversion on CCUS investments

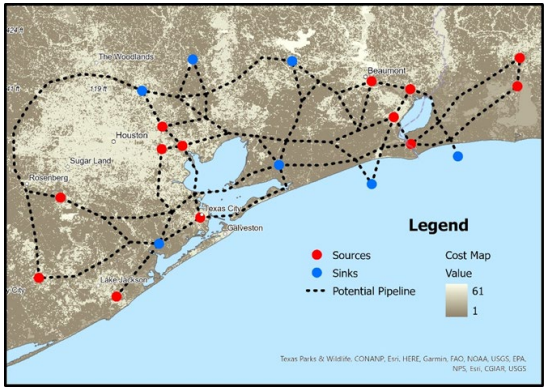
(Colombe, Leibowicz, Mendoza)

1. To what extent does **policy uncertainty** diminish CCUS infrastructure investments?
2. How does the effect of policy uncertainty on CCUS investments depend on the degree of investor **risk aversion**?



- Policy uncertainty and risk aversion reduce total expected CO_2 captured, but by at most 7% in our scenarios
- A more risk-averse investor may actually capture CO_2 more rapidly

Case study: TX-LA Gulf Coast



Winner, Best Student Paper
USAEE, 2023!

Characterizing local air pollution impacts of CCUS

(Waxman, Huber-Rodriguez, Olmstead)

- What would would be the human health effects of CCUS deployment via emissions of $PM_{2.5}$, NOx, SO_2, VOCs, and NH_3?
- How do these impacts compare with the benefits of reduced CO_2?
- Stay tuned for preliminary results – Dr. Waxman presents later today!

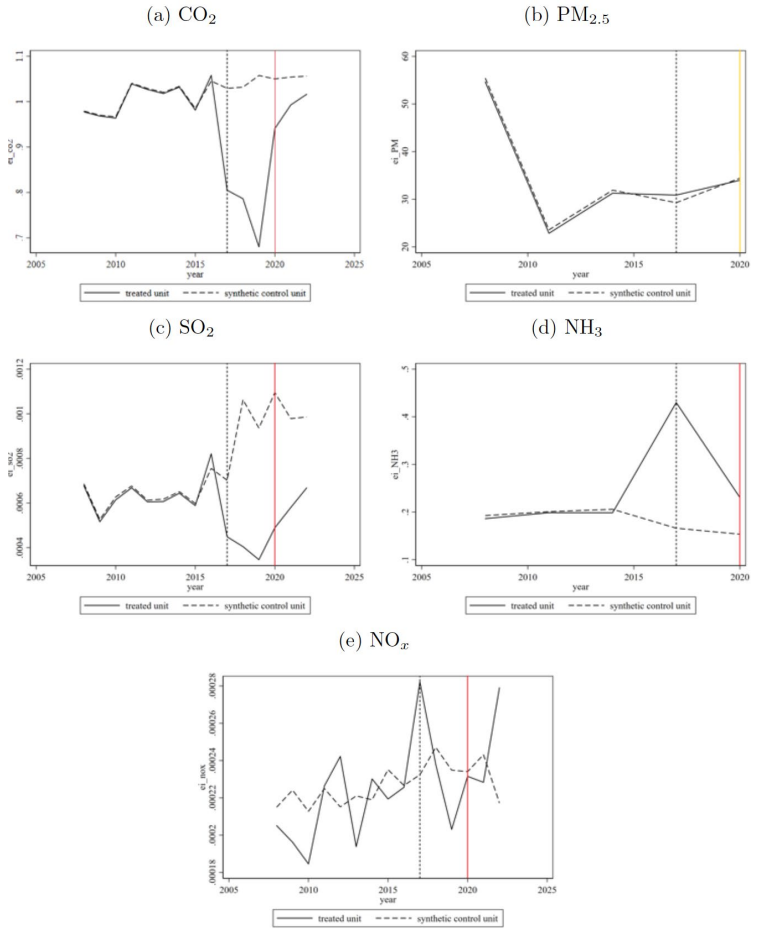


Figure 3: Synthetic Control Method: Petra Nova

Policy instrument choice for carbon capture incentives

(Stemmler, Waxman)

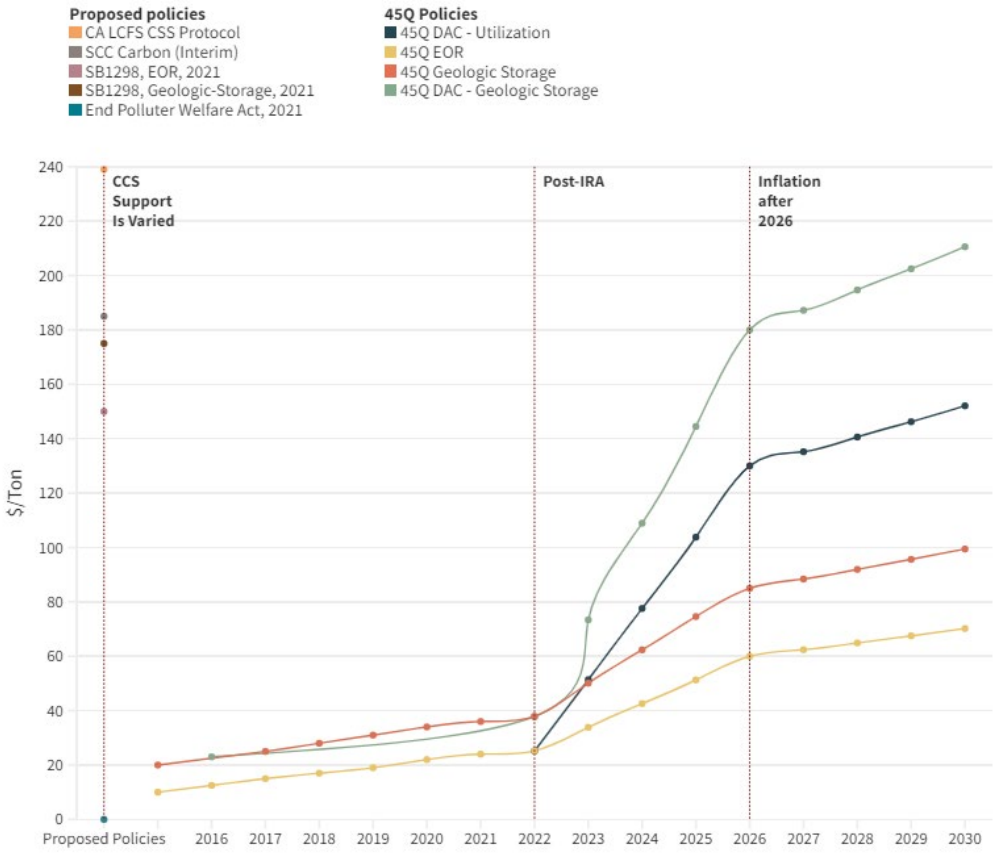
- Current US Federal tax incentives (45Q) provide a tax credit of $85/ton CO_2 (geologic storage).

- How does this incentive compare to other policies: carbon tax, R&D subsidies, clean energy standards?
  - A firm that was not profitable under a $85/ton carbon tax will be under 45Q subsidy.
  - A firm with 2 plants: high CO_2 & low CO_2 may be incentivized to use high-CO_2 plant.
  - Implications of subsidizing based on emissions/storage, relative to other energy transition subsidies (e.g., PTC for renewable electricity).

Perspectives on 45Q

(Olmstead, Leibowicz, Mason, Waxman, Huber-Rodriguez, Stemmler)

- 45Q subsidy presents economic/policy challenges.
  - Fiscal costs may be higher than expected.
  - Incentive needed in perpetuity for continued deployment.
  - Likely effects on industry composition.



CCUS investments under uncertainty

(Cochran, Mason)

- **Economic model of firms'** decision to invest in CCUS, based on three factors:
  - **Irreversibility:** Investment in CCUS is a sunk cost.
  - **Timing:** A firm can choose when to invest in CCUS –invest now or wait.
  - **Uncertainty:** A firm does not know the future rewards of the investment.

- **Research Question:** Given uncertainty in electricity prices and policy incentives (e.g., 45Q), what is the optimal time to invest in CCUS?

- **Results:** Reducing expected future electricity price and policy uncertainty both ➢earlier investment.
  - Example: Policymakers can reduce uncertainty by extending 45Q and by maintaining the size of the credit over time.

Seed grant recipients

Market Design Implications of CO_2 Capture and Storage Infrastructure

University of Dayton and Carbon Solutions LLC

PIs: Joseph Duggan Jr., Jonathan Ogland-Hand, Michael Ford, Richard Middleton

Mapping the Source Space for Carbon Capture and Utilization

University of Texas at Austin

PI: Michael Baldea

Robust Carbon Dioxide Utilization Markets

University of Waterloo

PI: Juan Moreno-Cruz

The economic consequences of carbon capture, utilization & storage projects: Evidence from housing markets in the U.S. & China

University of Maryland at College Park

and China University of Petroleum, Beijing

PIs: Yueming (Lucy) Qiu, Yingdan Mei, Pengfei Liu

Economically Viable Carbon Capture for Electro-Decarbonization of the US Economy

New York University

PIs: Charalmpos Avraam, Yury Dvorkin, and Alice Nuz

Capturing Carbon But Not Its Co-Pollutants: CCUS in the Electricity System and the Challenge of Just Decarbonization

University of Massachusetts, Amherst

PIs: Paola Furlanetto, Bridget Diana, Erin Baker, Michael Ash

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Thank you!

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