



U.S. DEPARTMENT OF
ENERGY

Fossil Energy and
Carbon Management

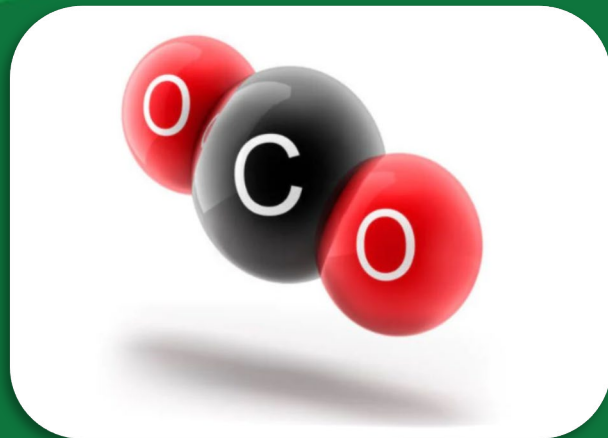
Key Issues to Consider, and DOE Tools to Support Decision-Making

USE-IT Act CCUS Permitting Taskforce

Robert Smith

*Carbon Transport and Storage (CTS) Program
Office of Fossil Energy and Carbon Management*

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Key Pipeline Issues to Consider

- Anticipated volumes and distance to be traveled
- New construction or possible re-use of existing infrastructure or ROWs
- Analyze potential environmental impacts over the project lifespan
- Analyze the economic performance (i.e., capital cost, operating cost, and revenue) of the project
- Route Optimization:
 - ❑ Transport safety and risk assessment considerations
 - ❑ Disadvantaged community and environmentally sensitive areas
 - ❑ Engaging communities – flexibility to adjust based on feedback

SimCCS Pipeline Network Model

Purpose: An optimization software (2019 R&D 100 Award) for integrated system design that enables researchers, stakeholders, and policy makers to design CCS infrastructure networks

Key Capabilities

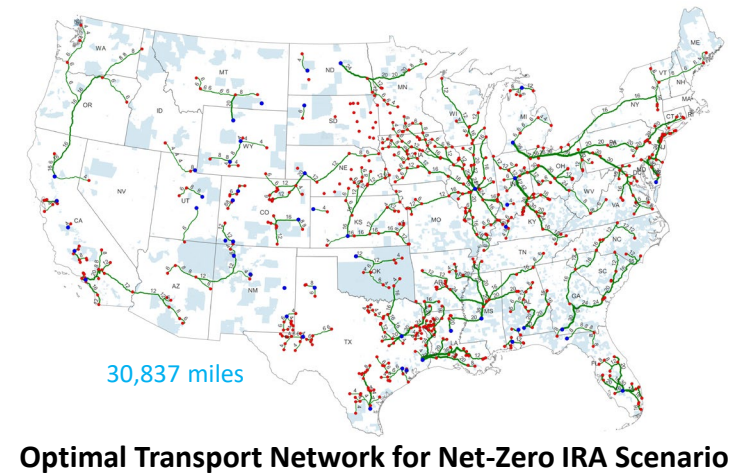
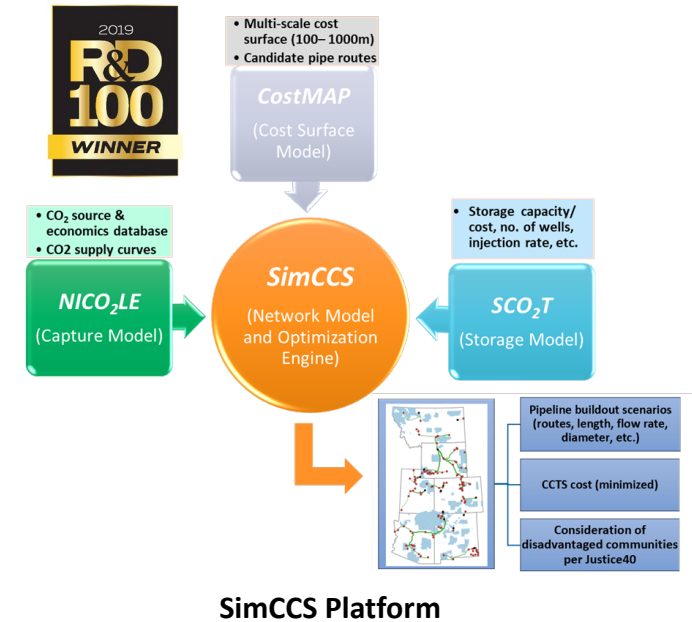
- National-, regional-, and commercial-scale transport network modeling and cost analysis
- Phase-based modeling to account for dynamic nature of future CO₂ capture and storage
- Actively expanding tool for multi-modal transport modeling – pipeline, rail, ship, etc.
- Account for the impact of disadvantaged community and environmentally sensitive areas
- Expanding tool for transport safety and risk assessment considerations (*planned*)

Inputs

- Locations of CO₂ sources and sinks, capture amounts & costs, storage resources & costs

Outputs

- Optimal transport network, pipeline lengths, diameters, flow rates, costs, etc.



FECM/NETL CO₂ Transport Cost Model (CO₂_T_COM)

Purpose: Calculate revenues, costs and financial performance for a CO₂ pipeline

Capabilities

- Excel-based technoeconomic model for a point-to-point pipeline transporting CO₂ as a liquid that uses natural gas pipeline capital costs as foundation for pipeline costs
- Includes financial model that assumes pipeline is operated by a profit-maximizing entity

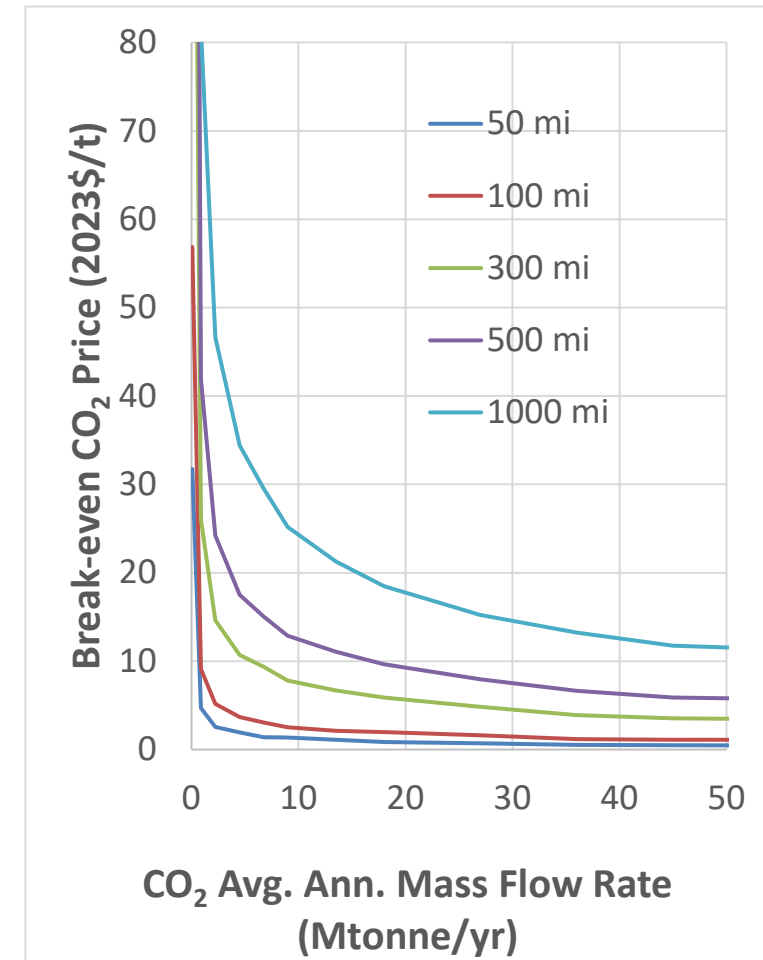
Inputs

- Pipeline length, maximum and average annual mass flow rates, duration of operation

Outputs

- Capital costs, operations and maintenance costs, break-even price for transporting CO₂
- Combination of standard pipeline diameter and number of booster pumps that gives the lowest break-even CO₂ price
- Excel macro provides results for combinations of pipeline lengths and mass flow rates

Additional Info: <https://netl.doe.gov/energy/analysis/search?search=CO2TransportCostModel>



Smart CO₂ Transport-Route Planning Tool & Database

Purpose: A smart tool that supports safe & sustainable CO₂ transport planning through identifying potential routes and evaluating corridors, utilizing an underlying geodatabase representative of considerations, including critical environmental and human considerations.

Capabilities

- Stand-alone, open-source tool evaluates existing or potential routes against 50+ transport factors
- Applies supervised machine learning algorithm to optimize potential routes
- Interoperable tool & data design to work with other government, commercial, and regulatory capabilities

Inputs

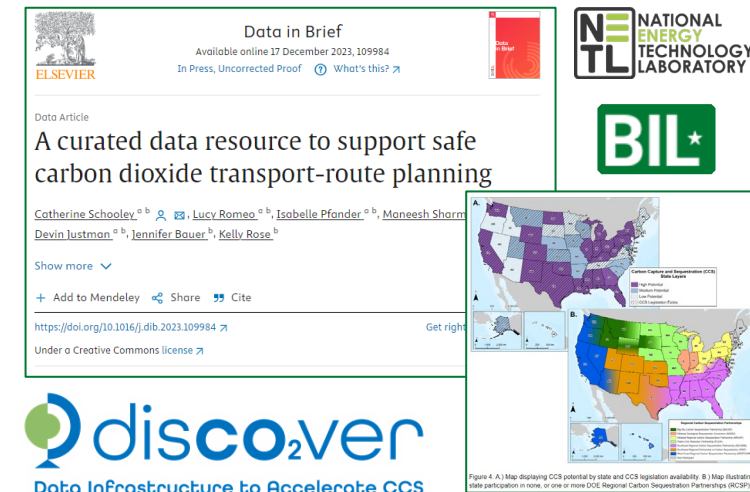
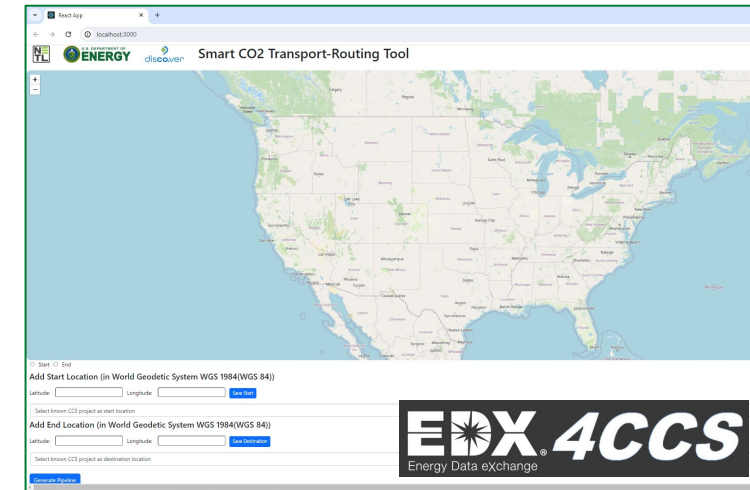
- Start and end locations, optional preset CCS project locations are provided
- Existing or potential corridor for evaluation

Outputs

- Identified route spatial layer
- Route report detailing key factors (*e.g., environmental justice, social justice, natural hazards, soil considerations, etc.*)

Additional Info:

- **Tool** – *Expected Release Summer 2024* on <https://edx.netl.doe.gov/sites/disco2ver-alpha/>
- **Database** - <https://edx.netl.doe.gov/dataset/ccs-pipeline-route-planning-database-v1>
- **Database Publication** - <https://www.osti.gov/biblio/2242556>





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Thank You!



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<https://www.energy.gov/fe/office-fossil-energy>

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Amanda Raddatz Bopp

Director, Carbon Transport & Storage Division

Email: amanda.raddatzbopp@hq.doe.gov

Robert Smith

Carbon Transport Program Manager

Email: robert.smith8@hq.doe.gov

Kevin Dooley

Carbon Transport Engineer

Email: kevin.dooley@hq.doe.gov

