CO2_S_COM: Modeling the cost of onshore CO_2 storage in saline reservoirs

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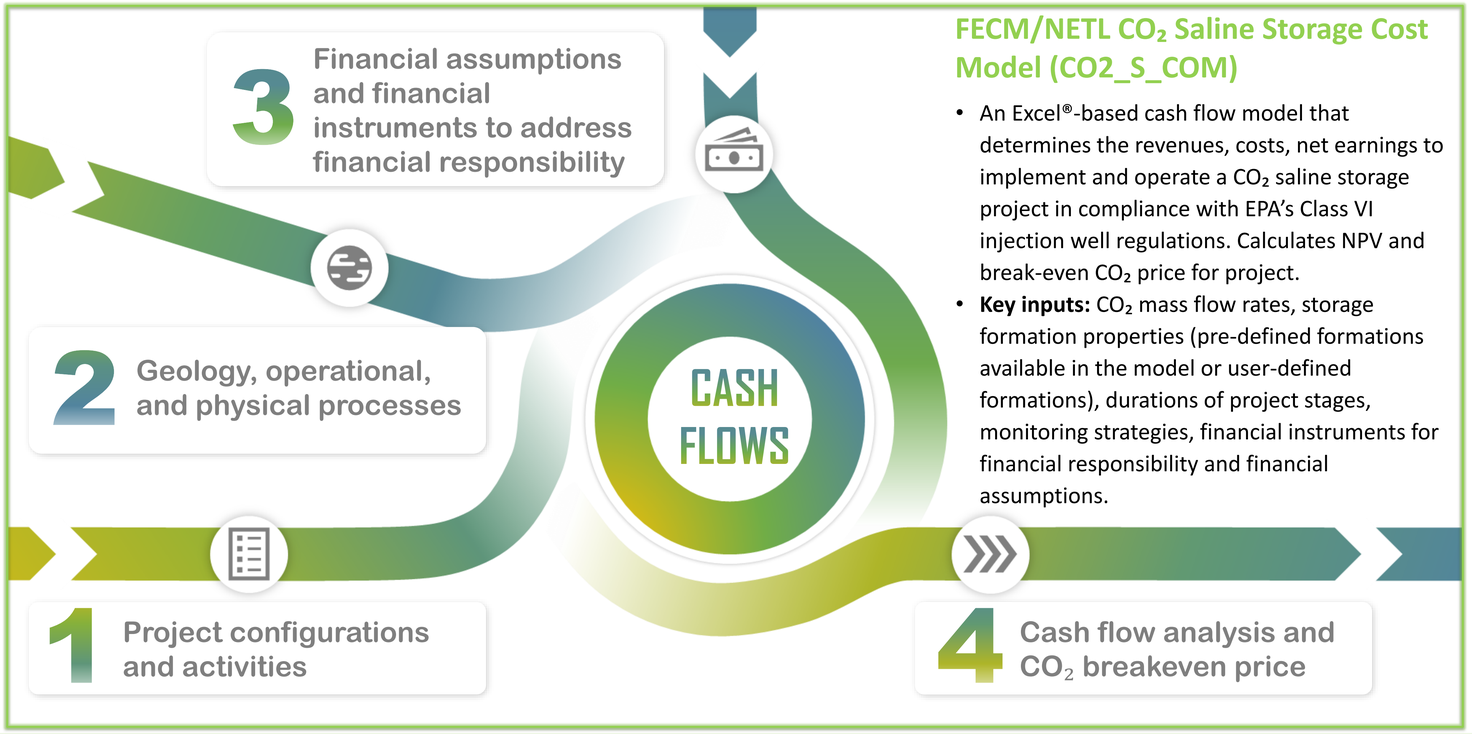
Overview

As the US and the world strive towards ambitious Net-Zero goals, carbon capture, utilization, and storage (CCUS/CCS) will be necessary for reaching these goals. Therefore, understanding the financial performance of the components of CCUS is critical. For one of these components, NETL's CO_2 storage technoeconomic model CO2_S_COM calculates cash flows for revenues, costs, taxes and net earnings and provides metrics such as the breakeven cost of storage that can be used to evaluate the financial performance of a CO_2 storage project. This poster highlights the functions and features of CO2_S_COM and demonstrates its practical application with various cases and examples. CO2_S_COM can be used to evaluate the economic viability of CO_2 storage in a specific area, or it can be combined with other technoeconomic models to examine integrated CCUS systems.



FECM/NETL CO_2 Saline Storage Cost Model (CO2_S_COM)

- An Excel®-based cash flow model that determines the revenues, costs, net earnings to implement and operate a CO_2 saline storage project in compliance with EPA's Class VI injection well regulations. Calculates NPV and break-even CO_2 price for project.
- **Key inputs:** CO_2 mass flow rates, storage formation properties (pre-defined formations available in the model or user-defined formations), durations of project stages, monitoring strategies, financial instruments for financial responsibility and financial assumptions.

Features

314	Storage formations with geologic data covering the lower 48 states (increased from 228 formations)
44	CCS activity categories covering planning, data acquisition, leasing, permitting, well drilling, monitoring, sampling, and more
8	Financial instruments with trust fund, escrow account, letter of credit, surety bond, insurance, self-insurance
NEW	Pressure interference factor to refine estimates of CO_2 prospective storage resource
NEW	Scenario analysis to automate what-if assumptions and outcomes

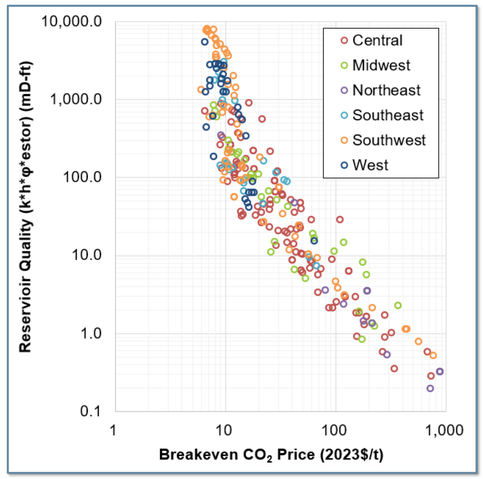
CO2_S_COM Use Case Examples

CO2_S_COM can be used independently to (1) screen storage project required first-year breakeven prices and cash flows; (2) relationships between storage reservoir quality and breakeven prices; (3) regional storage capacity and costs; or be used together with other models to (4) assess 45Q policy impacts; (5) explore low CCS options for sources; and many other use cases.

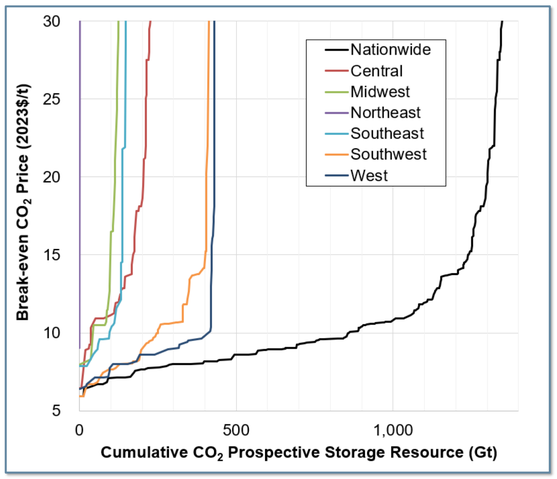
(1 - 5) CO2_S_COM has been used to provide CO_2 saline storage costs and CO_2 saline storage project infrastructural data for numerous external models, studies, and analyses. ▼

- Energy Information Administration's **National Energy Modeling System (NEMS)**
- National Renewable Energy Laboratory's **Regional Energy Deployment System (ReEDS) Model**
- Intermountain West Energy Sustainability & Transitions **(I-WEST) Initiative's Phase One Final Report** (2022)
- DOE Office of Policy's **CCUS Supply Chain Study** (2022)
- DOE Office of Energy Efficiency & Renewable Energy's **Energy Earthshots Initiative: Hydrogen Shot**
- DOE Headquarter's **Analysis of CCS in Missouri** with Spire Energy (2023)
- National Petroleum Council's **Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use, and Storage Report** (2019)
- Coal-fired Power Plant **CCS in Wyoming study** (2020)
- Power Plant **CCS in Greece analysis** (2021)

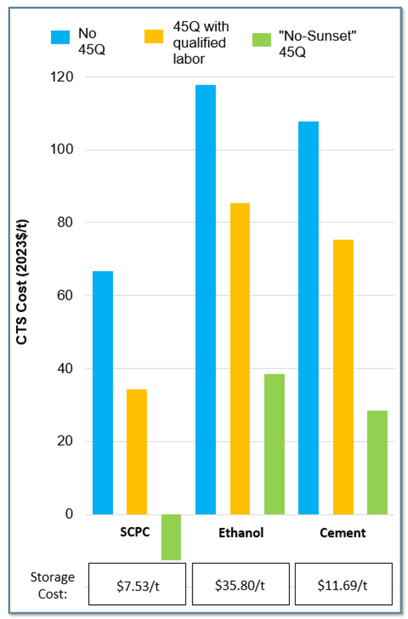
(2) CO2_S_COM used to develop cross plot showing relationship between storage reservoir quality and break-even storage cost for reservoirs in model's geologic database. ▼



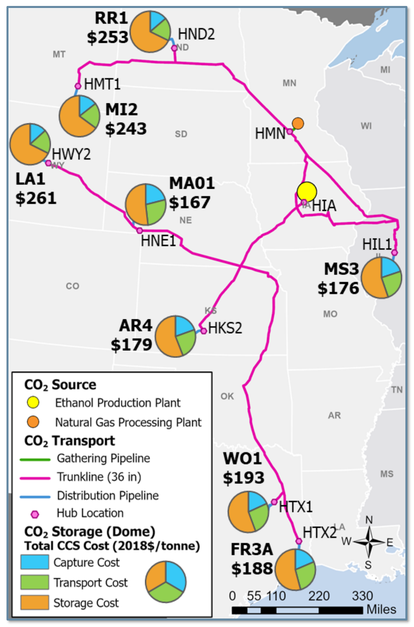
(3) CO2_S_COM used to model storage cost implications on storage capacity within U.S. regions. Storage capacity accounts for potential pressure interference between storage projects deployed in the same storage reservoir. ▼



(4) CO_2 capture, transport, and storage (CTS) costs from NETL's CO_2 capture data and output from CO2_T_COM and CO2_S_COM to assess the impact of the 45Q (2022) on three source types located in Missouri. ▼



(5) Combining with NETL's CO_2 capture cost data, CO2_T_COM, and CO2_S_COM, cost benefit analysis explore overall CCS costs to provide a holistic view for informed decisions (2023). ▼



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