



U.S. DEPARTMENT OF
ENERGY

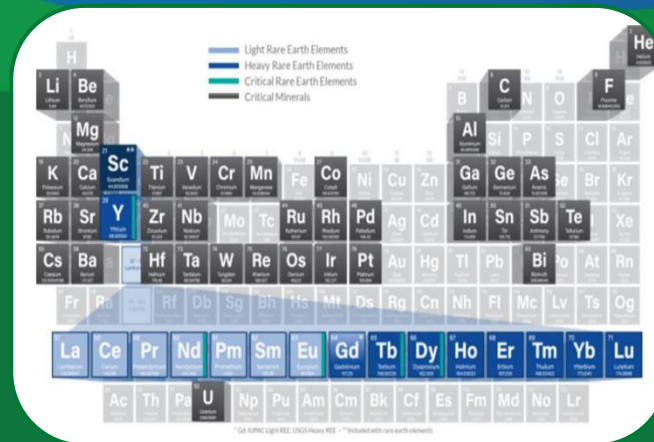
Fossil Energy and
Carbon Management

DOE's Roadmap for CO₂ Transport Fundamental Research Workshop

John Litynski

*Division Director, Carbon Transport and Storage
U.S. DOE Office of Fossil Energy and Carbon Management*

February 21, 2023



FECM Strategic Vision Released April 5, 2022

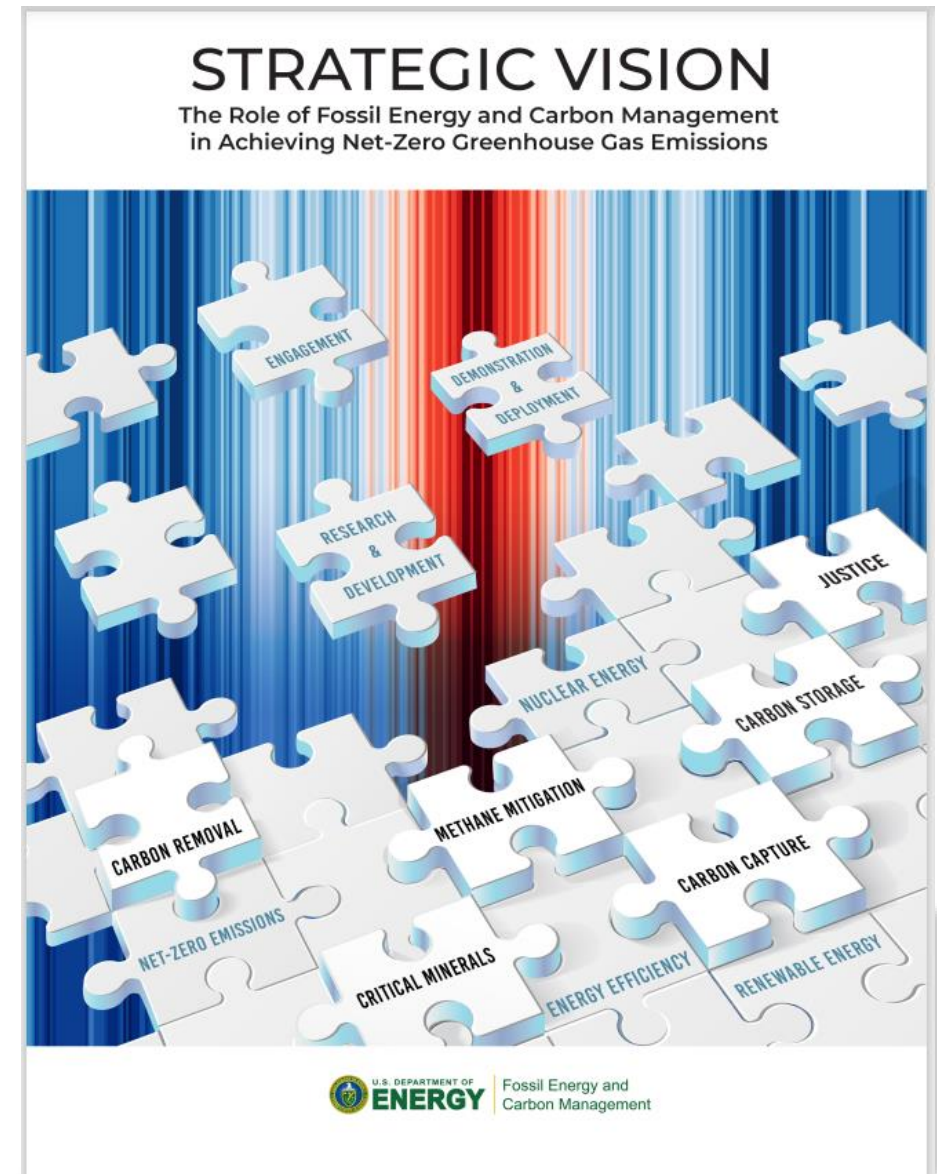
Office of Fossil Energy and Carbon Management

DOE-FE is now DOE-FECM

New name for our office reflects our new vision

President Biden's goals:

- 50 percent emissions reduction by 2030
- CO₂ emissions-free power sector by 2035
- Net zero emissions economy by no later than 2050



<https://www.energy.gov/fecm/strategic-vision-role-fecm-achieving-net-zero-greenhouse-gas-emissions>



U.S. DEPARTMENT OF
ENERGY

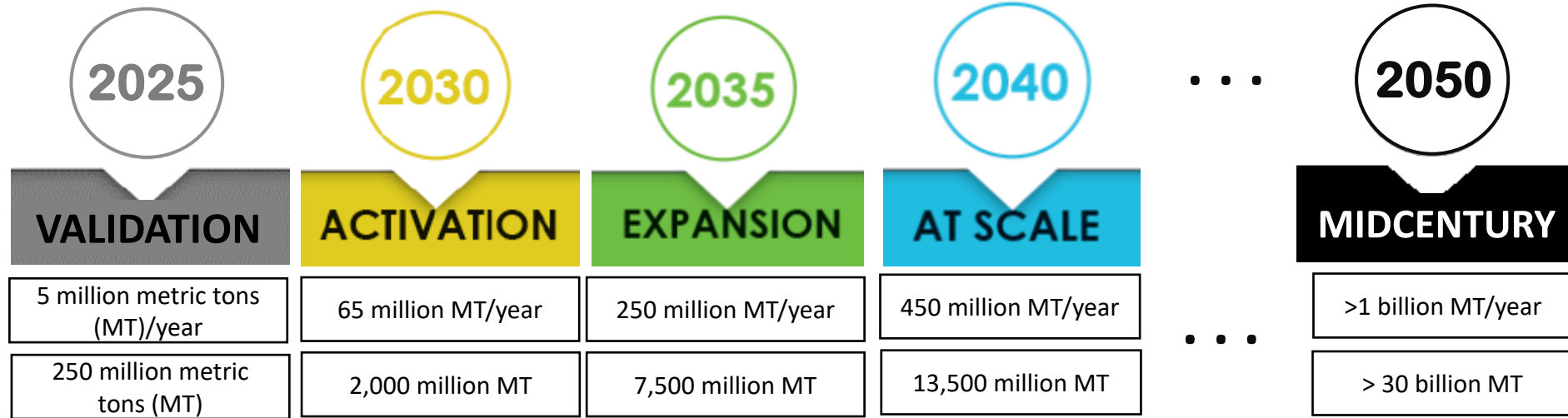
Fossil Energy and
Carbon Management

Rapid CCS industry growth for decarbonization



CarbonSAFE Targets

Injectivity
Commercial Storage Potential



Biden Administration Executive Order 14008
Tackling the Climate Crisis at Home and Abroad

50-52 percent reduction in economy-wide net greenhouse gas pollution in 2030 from 2005 levels

Net-zero emissions from the power sector by 2035

Net-zero emission economy by 2050

External Metrics and Goals

The National Academies of SCIENCES ENGINEERING MEDICINE
↑CCUS 10-fold by 2030

ipcc
INTERGOVERNMENTAL PANEL ON climate change
Cumulatively sequester 350-1,000 GT by 2050

BIL Developing the Entire Value Chain

Transport and Storage Infrastructure Required for Deployment



Point Source Capture

- CCUS Integrated Demos: \$2.5 billion (OCED)
- Carbon Capture Large Pilot: \$1 billion (OCED)



Hubs

- Regional Direct Air Capture Hubs: \$3.5 billion
- Hydrogen Hubs: \$8 billion (OCED)



Carbon Transport Systems

- FEED Studies for Transport Systems: \$100 million
- CIFIA – Loans and Future Growth Grants: \$2.1 billion



Carbon Dioxide Utilization and Storage

- Carbon Storage Validation and Testing: \$2.5 billion
- Carbon Utilization Program: \$310 million

Project Applications Require New Plans:

- Community and Stakeholder Engagement
- Diversity, Equity, Inclusion, and Accessibility
- Justice40 Initiative
- Quality jobs

Bipartisan
Infrastructure Law
Programs |

Department of Energy



Fossil Energy and
Carbon Management

<https://www.energy.gov/fecm/solicitations-and-business-opportunities>

Inflation Reduction Act for CCS – Highlights

Sec. 13104 - EXTENSION AND MODIFICATION OF CREDIT FOR CARBON OXIDE SEQUESTRATION. (45Q)

DOE Loan Programs Office

- \$11.7 billion in total for LPO to support issuing new loans.
- Authorizes New loan program, the Energy Infrastructure Reinvestment (EIR) Financing Program (Sec.1706)
 - Loans up to \$250 billion retool, repower, repurpose or replace energy infrastructure to mitigate GHGs
- Enhanced **Title 17 Innovative Clean Energy Loan Guarantee Program**
 - Additional \$40 billion of loan authority through 2026 - \$3.6 billion in credit subsidy

USDA SEC. 22004. USDA ASSISTANCE FOR RURAL ELECTRIC COOPERATIVES - \$9.7B

Multiple provisions that benefit, CCS, hydrogen, and CDR

Legislation Language:
Guarantee loans to projects that retool, repower, repurpose, or replace energy infrastructure that has ceased operations, or enable operating energy infrastructure to **avoid, reduce, utilize, or sequester air pollutants or anthropogenic emissions of greenhouse gases.**



U.S. DEPARTMENT OF
ENERGY

Fossil Energy and
Carbon Management

Federal Agencies — Addressing Regulatory, Safety Oversight, and Leasing for CCS

US Council on Environmental Equality (CEQ) - USE IT. Public Law 116-260, 134 Stat 1182.

- Identify challenges and successes for responsible permitting and provide recommendations to improve responsible permitting CCUS and Pipelines. Candidates to serve on the Federal and OCS Task Force.

US EPA - BIL Sec 40306. SECURE GEOLOGIC STORAGE PERMITTING.

- Federal Class VI Permitting Program - \$25M (\$5M/yr FY22-26)
- State Permitting Program Grants.- \$50,000,000 (FY22-26)

Department of Interior SEC. 40307. GEOLOGIC CARBON SEQUESTRATION ON THE OUTER CONTINENTAL SHELF

- Developing regulation for the permitting and leasing of federal offshore assets for CCS. (No funding)

DOT - PHMSA and other offices

- May 2022 - PHMSA Announces New Safety Measures to Protect Americans From Carbon Dioxide Pipeline Failures
- Evaluation of Freight (Rail, Trucking, Shipping)

DOI BLM

- National Policy for the Right-of-way Authorizations Necessary for Site Characterization, Capture, Transportation, Injection, and Permanent Geologic Sequestration of Carbon Dioxide in Connection with Carbon Sequestration Projects
<https://www.blm.gov/policy/im-2022-041>

States — Addressing Regulatory, Safety Oversight, and Leasing for CCS

California Senate Bill SB 905 - Carbon sequestration: Carbon Capture, Removal, Utilization, and Storage

- Unified permit application and centralized project database
- Defines:
 - financial responsibility,
 - pore space ownership (surface owner)

Wyoming SF0047 Senate Act - Carbon storage and sequestration-liability

- Pore space authority lies with Oil and Gas Conservation Commission
- Certificate of Completion:
 - Until issued: Injector owns CO₂
 - Once issued: title and custody of CO₂ transferred to state

Indiana Senate Bill 442 - Underground CO₂ storage to be considered a public use and service

- Pore space ownership/rights can be acquired if 60% of storage unit already under agreement
- State may obtain ownership after 12 years, if injection has ceased

North Dakota

- Certificate of Completion
 - Until issued: Operator owns CO₂ and pore space
 - Once issued: ownership of site transfers to state (no sooner than 10 years after injection ends)
- EOR can be converted to storage

UIC Class VI Primacy

- EPA has granted primacy to **ND** and **WY**
- **WV, TX, AZ, CO, LA, others** are seeking primacy for Class VI

Any Questions?

For More Information

NETL Carbon Storage

<https://netl.doe.gov/coal/carbon-storage>

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

HOME RESEARCH NEWSROOM BUSINESS

CARBON STORAGE TECHNOLOGY

Research Coal

Core Storage R&D
Storage Infrastructure
Strategic Program Support
NATCARB/Atlas
Program Plan
Project Portfolio
Publications
Carbon Storage Newsletter
FAQs
Contacts

Storage Infrastructure

Developing carbon storage infrastructure through regional characterization, training, and small- and large-scale field projects.

The objective of DOE's Carbon Storage program is to develop and advance the effectiveness of onshore and offshore CCS technologies, reduce the challenges to their implementation, and prepare them for widespread commercial deployment in the 2025-2035 timeframe. [Read more about the Carbon Storage Program.](#)

PROGRAM TECHNOLOGY AREAS

- Core Storage Research & Development
- Storage Infrastructure
- Strategic Program Support

Geologic Storage, Simulation, and Risk | Regional Carbon Sequestration Partnerships | NATCARB

@NationalEnergyTechnologyLaboratory

@NETL_News

CARBON STORAGE INTERACTIVE PROJECT MAP

2019 Mapbox | OpenStreetMap

Filter by Project Number: (All)

Technology Area: (All)

Icon Size: 5

Icon Spread Factor: 0.1

Decrease the Icon Spread Factor to show overlapping Projects at their true locations.

Technology Area	Project Count
Storage Complex Efficiency and Security	26
Monitoring, Verification, Accounting, and Assessment	24
Characterization Field Projects	25
Regional Carbon Sequestration Partnerships Initiative	15
Fit-for-Purpose Projects	14
Wellbore Integrity and Mitigation	6
Risk and Integration Tools	5

For More Project Information
CLICK a Location Icon,
then Click the More Information Hyperlink to open in a new window

U.S. DEPARTMENT OF ENERGY

Office of Fossil Energy

www.fe.doe.gov

Office of FOSSIL ENERGY

SCIENCE & INNOVATION

Carbon Capture, Utilization and Storage Research

Home » Science & Innovation » Clean Coal and Carbon Management » Carbon Capture, Utilization and Storage Research

The Carbon Capture, Utilization and Storage R&D program advances safe, cost effective, capture and permanent geologic storage and/or use of CO₂. The technologies developed and large-volume injection tests conducted through this program will be used to benefit the existing and future fleet of fossil fuel power generating facilities by creating tools to increase our understanding of geologic reservoirs appropriate for CO₂ storage and the behavior of CO₂ in the subsurface.

- Carbon Capture

@FossilEnergy

@Fossil Energy Gov



U.S. DEPARTMENT OF ENERGY

Fossil Energy and Carbon Management