Join the FECM Carbon Management Webinar

DECEMBER 1, 2021 at 12:01 p.m. EST

U.S. DEPARTMENT OF ENERGY | Fossil Energy and Carbon Management

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Dr. Jennifer Wilcox

PRINCIPAL DEPUTY ASSISTANT SECRETARY and ACTING ASSISTANT SECRETARY

OFFICE OF FOSSIL ENERGY AND CARBON MANAGEMENT

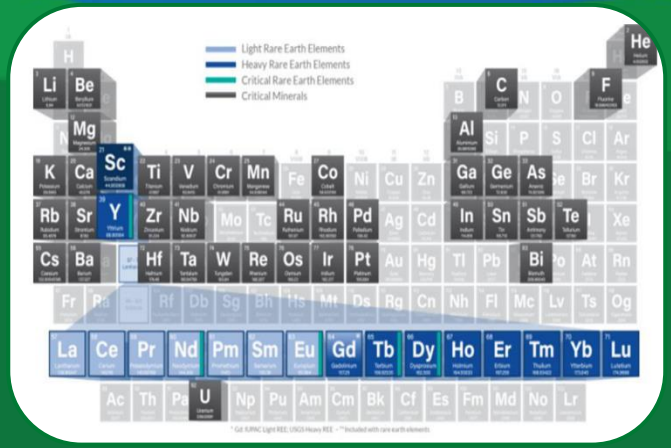
U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

Fossil Energy and Carbon Management Overview

Dr. Jennifer Wilcox
PRINCIPAL DEPUTY ASSISTANT SECRETARY and ACTING ASSISTANT SECRETARY

December 1, 2021





FECM in Context

- **New climate goals** – The Administration has set three major goals: 50% emissions reduction by 2030, 100% clean electricity by 2035, and net-zero carbon emissions by 2050
- **New goals on justice and equity** – The Administration, through Executive Orders, has created numerous efforts around communities: Justice40 Initiative, Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization
- To align with these goals, FECM's focus should be on two major categories across all fossil fuels:
  - Mitigation of environmental impacts from resource recovery and use
  - Management of carbon dioxide emissions from fossil fuel use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FE to FECM: A New Mission

- The mission of the Office of Fossil Energy and Carbon Management is to minimize the environmental impacts of fossil fuels while working towards net-zero emissions. The Office's programs use research, development, demonstration, and deployment (RDD&D) approaches to advance technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors.
- Priority areas of technology work include point-source carbon capture, hydrogen, methane emissions reduction, critical mineral production, and carbon dioxide (CO_2) removal to address the accumulated CO_2 emissions in the atmosphere.
- The Office recognizes that global decarbonization is essential to meeting climate goals and works to engage with international colleagues to leverage expertise in these areas.
- The Office is committed to improving the conditions of communities impacted by the legacy of fossil fuel use and to supporting a healthy economic transition that accelerates the growth of good-paying jobs.

RDD&D Priorities

Demonstrate and Deploy Point Source Carbon Capture

RDD&D for CCS in the power and industrial sectors to enable wider, strategic commercial deployment to meet net-zero emissions goals by 2050.

Advance Carbon Dioxide Removal & Low Carbon Supply Chains for Industry

Air capture and mineral carbonation projects and develop novel approaches to recycle carbon emissions.

Low-Carbon Industrial Supply Chains

Develop novel approaches to recycle carbon emissions into value-added products such as concrete, steel, chemicals, and fuels using systems-based carbon management approaches consistent with realizing a net-zero carbon economy by 2050.

Accelerate Carbon-Neutral Hydrogen (H_2)

Develop technologies that leverage the natural gas infrastructure for H_2 production, transport, storage, & use, coupled to carbon management.

Reduce Methane Emissions

Develop technologies and deploy regional initiatives to monitor and reduce methane emissions from fossil fuel infrastructure including coal, oil, and gas.

Advance Critical Minerals, Rare Earth Elements (REE), and Mine Remediation

Improving REE separation/recovery technologies to manufacture products from CO_2 and carbon ores and to address current market and process economics. Advancing R&D to address abandoned mines.

Increase Efficient Use of Big Data and Artificial Intelligence

Use AI, machine learning, and data analysis to create learning algorithms within a large dataset to help discover new material, optimize processes, and run autonomous systems.

Address the Energy Water Nexus

Improve our efficient use of scarce water resources and advance water remediation technologies to address the environmental impacts related to produced or displaced water associated with oil, gas, and coal industries, in addition to that associated with dedicated CO_2 storage.

Invest in Thoughtful Transition Strategies

Invest in technologies and approaches and deploy regional initiatives to help create an equitable and just transition to a net-zero carbon economy in energy communities.

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Dr. Shuchi Talati

CHIEF OF STAFF

OFFICE OF FOSSIL ENERGY AND CARBON MANAGEMENT

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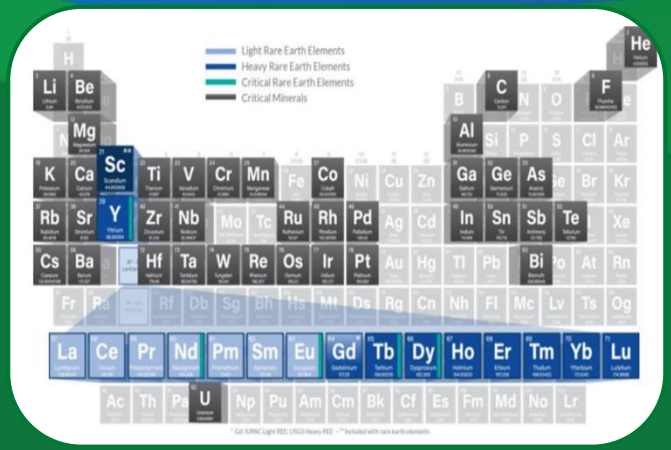
Carbon Dioxide Removal

Dr. Shuchi Talati, Chief of Staff

December 1, 2021



What is CDR?

- **Carbon dioxide removal:** approaches that remove CO_2 from the atmosphere and durably store it in geological, terrestrial, or ocean reservoirs, or in products.
  - CDR includes enhancement of biological or geochemical sinks but excludes natural CO_2 uptake not directly caused by human intervention.
  - CDR is NOT point source carbon capture and storage of emissions from the fossil power sector and heavy industry (CCS). CCS would be added to existing industry.

- Multiple major studies (IPCC 1.5, AR6, NASEM, IEA) have shown that CDR will be a necessary part of the portfolio of solutions, alongside mitigation and adaptation, to reach our climate goals and limit harm to climate vulnerable communities and nations.
  - Models project that removal of 5-15 Gt/year will be needed by 2050
- The question that remains is the extent to which CDR will be needed, how different approaches will be applied, and where projects should be sited.
- Considerations include energy, land, water, infrastructure for transportation and storage, justice, and labor issues.

ENERGY earthshots
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Carbon Negative

Durable and scalable carbon dioxide removal under $100/net metric ton within a decade

Carbon Negative Shot defines key performance elements for a **necessary** and **nascent** industry which can help ensure CDR is a **responsive and responsible** tool so that multiple true, durable removal pathways can be deployed at their most affordable cost at the scale required to address the climate crisis.

1. Less than **$100/net metric ton CO_2e** for both capture and storage
2. Robust accounting of full lifecycle emissions
3. High-quality, durable storage with costs demonstrated for MRV **for at least 100 years**
4. Enables necessary gigaton-scale removal

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Dr. Emily Grubert

DEPUTY ASSISTANT SECRETARY

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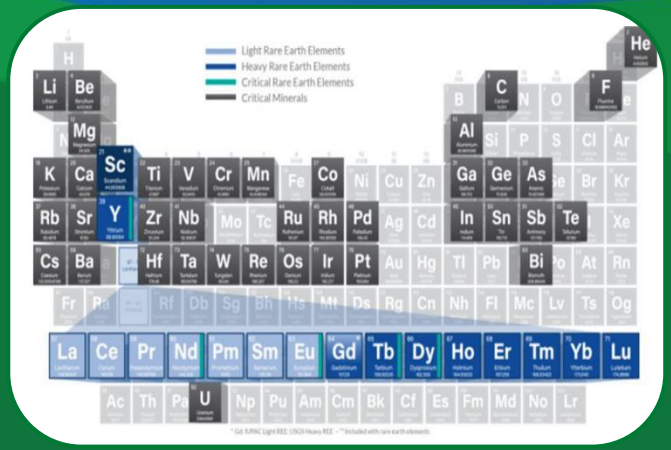
Carbon Management in the Bipartisan Infrastructure Law

Emily Grubert, Deputy Assistant Secretary, Carbon Management

December 1, 2021



Carbon Management Funding in the Bipartisan Infrastructure Law

Through the Bipartisan Infrastructure Law, DOE will deploy approximately **$10 billion** in new direct carbon management funding over 5 years:

- Carbon Dioxide Removal through Direct Air Capture
  - Regional DAC Hubs: **$3.5 billion**
  - DAC Technology Prize Competition: **$115 million**
- Engineered Stack Capture
  - Carbon Capture Demonstrations and Large Pilots: **$3.5 billion**
  - Carbon Capture Technology Program: **$100 million**
- Carbon Dioxide Utilization and Storage
  - Carbon Storage Validation and Testing: **$2.5 billion**
  - Carbon Utilization Program: **$310 million**

Additional Carbon Management Funding

DOE will deploy additional funding for hydrogen hubs (at least one of which will include carbon management) and project financing.

- Clean Hydrogen
  - Hydrogen hubs: **$8 billion**, for at least four projects, including at least one using fossil fuels with carbon management
- Carbon Dioxide Transportation
  - Carbon Dioxide Transportation Infrastructure Finance and Innovation Program Account: **$2.1 billion**

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Adam Wong

DIRECTOR FOR STRATEGIC ENGAGEMENT

OFFICE OF CARBON MANAGEMENT

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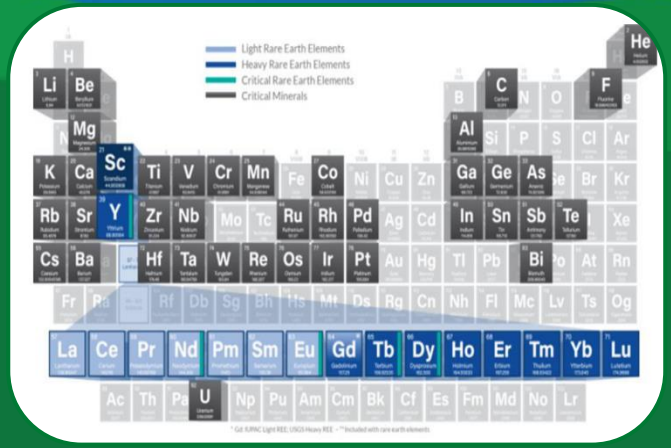
International and Domestic Carbon Management Collaboration Efforts

Adam Wong, Director for Strategic Engagement

December 1, 2021



Key Multilateral International Partnerships

- Clean Energy Ministerial (CEM) Carbon Capture, Utilization & Storage (CCUS) Initiative
- Asia CCUS Network
- International Energy Agency (IEA)
- Carbon Sequestration Leadership Forum (CSLF)
- Accelerating CCS Technologies (ACT)
- Mission Innovation (MI): Carbon Dioxide Removal (CDR)

FECM Memorandum of Understanding with U.S. Geological Survey

- Cooperation regarding assessments of global, regional, and national carbon dioxide storage resources
- Collaborate with international governments, geologic surveys, and other organizations
- Technical assistance through discussions, meetings, workshops, and research activities
- Better understanding of current and potential resources for geologic CO_2 storage

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John Litynski, P.E.

DIRECTOR FOR CARBON TRANSPORT AND STORAGE

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CarbonSAFE Notice of Intent

John Litynski, P.E.
Director for Carbon Transport and Storage

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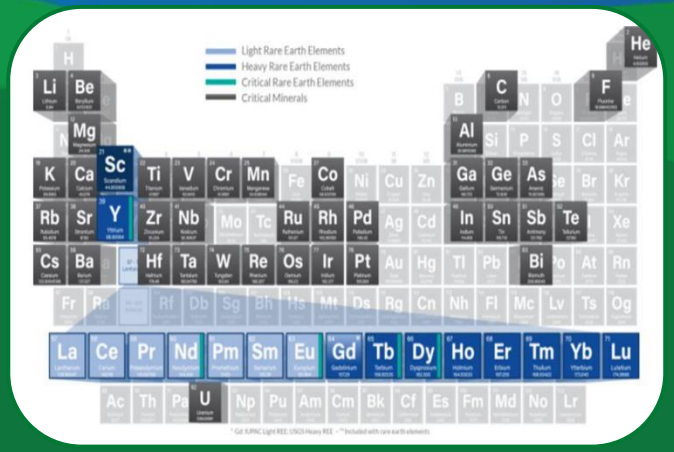
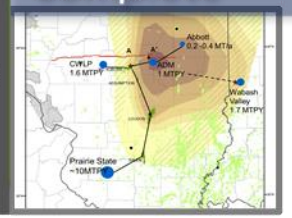


What is Carbon Storage Assurance Facility Enterprise (CarbonSAFE)?

Phase I: Integrated CCS Pre-Feasibility
18-month initiative

- Formation of a team; development of a feasibility plan; and high-level technical evaluation of the sub-basin and potential CO2 sources
- Thirteen projects funded

Complete



Phase II: Storage Complex Feasibility
2–year initiative

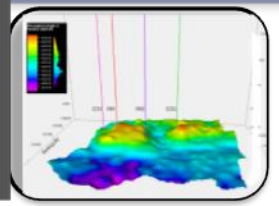
- Data collection; geologic analysis; analysis of contractual and regulatory requirements; subsurface modeling; risk assessment; evaluate monitoring requirements; and public outreach
- Six projects funded

Active

Phase III: Site Characterization and Permitting
3-year initiative

- Detailed site characterization; obtain Underground Injection Control (UIC) Class VI Permit to construct; CO_2 Capture Assessment; NEPA approvals
- Five Projects funded

Active



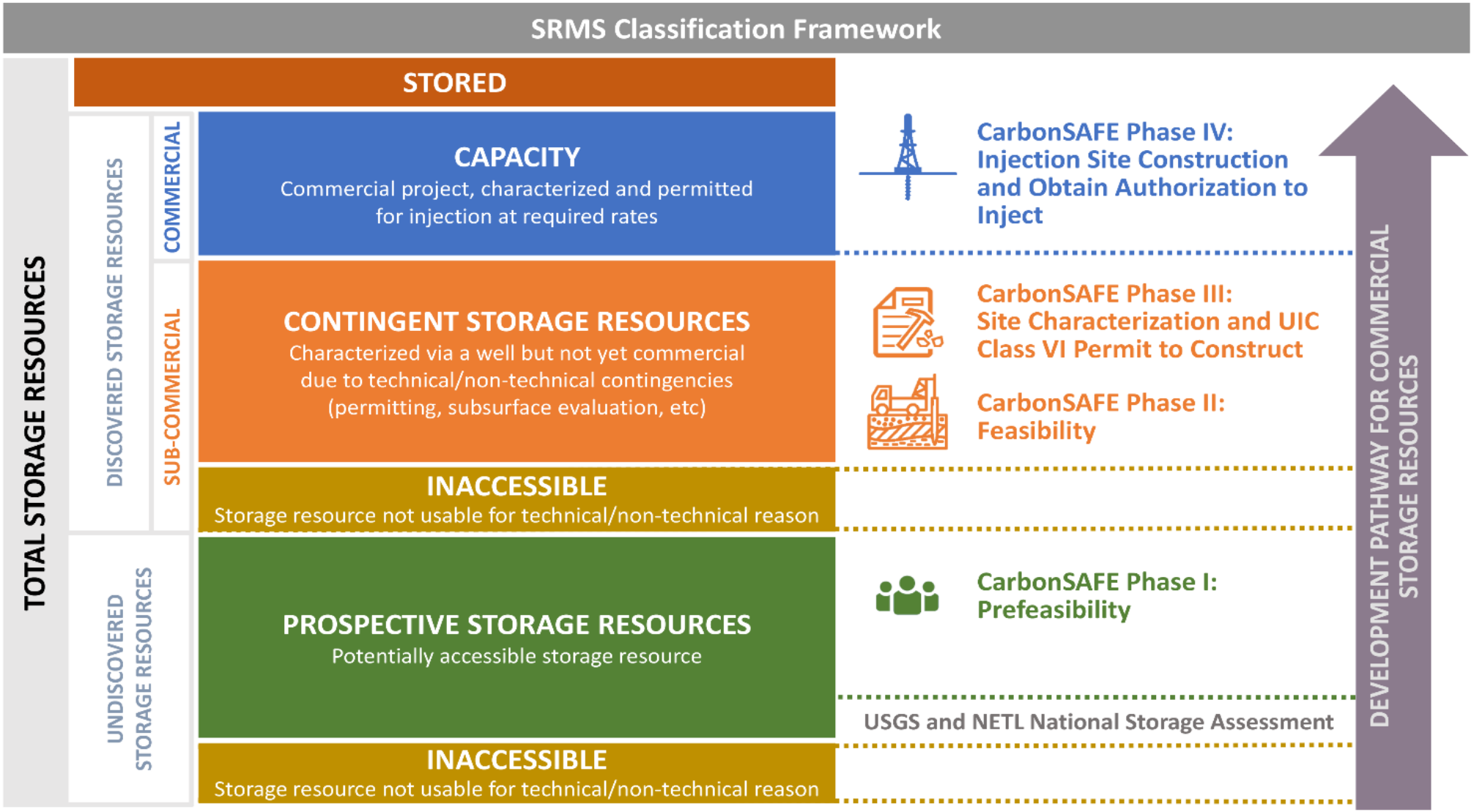
Phase IV: Construction of Storage Complex
2.5-year initiative

- Drill and complete injection and monitoring wells; obtain UIC Class VI authorization to inject; develop risk and mitigation plans
- Subject to funding

Future Funding

- CarbonSAFE addresses knowledge gaps associated with the development of a large-scale CO_2 storage complex.
- Projects envisioned as staged efforts to develop an integrated CCS storage complex constructed and permitted for operation in the 2025-2035 timeframe.
- 13 pre-feasibility projects (Phase I) were selected November 2016; $15M total DOE funding.
- 6 feasibility projects (Phase II), two are currently active; $60M total DOE funding.
- 5 site characterization and permitting projects (Phase III) are currently active; $85M total DOE funding.

R&D to Prepare Storage Capacity for Final Investment Decisions



Notice of Intent to Release Funding Opportunity Announcement
CarbonSAFE Projects

Up to $33.2 million in appropriated funds from Carbon Storage R&D Program within FECM

Objectives:

- Accelerate deployment of on- or offshore geologic storage projects at scale.
- Research intends to expand our understanding of how to identify, characterize and permit CO_2 storage complexes for future commercial development.
- Storage complexes, should be capable of safely and efficiently storing:
  - A minimum of 50 million metric tons of CO_2 within a 30-year period.
  - Larger scale facilities storing at least 50 million metric tons within a 10-year period.
- The complexes should be able to provide reliable storage for CO_2 delivered from existing or planned regional pipeline infrastructure and CO_2 source(s).

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Questions?

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