September 5, 2024

Four Corners Carbon Storage Hub Virtual Briefing

Office of Fossil Energy & Carbon Management

U.S. Department of Energy

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

Briefing Logistics

Is this briefing being recorded?

Yes, this briefing is being recorded and will be posted on the FECM website.

Will the slides be shared?

Yes, a copy of the presentation slides will be shared via email with registrants and on the FECM website.

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Meeting Agenda

- Welcome
- FECM Overview
- Carbon Storage Assurance Facility Enterprise Program (CarbonSAFE) Overview
- Four Corners Carbon Storage Hub Project Overview
- Q&A Session
- Next Steps and Resources
- Closing

Introductions

Sarah Forbes
Director,
Carbon Management Technologies,
FECM

Traci Rodosta
Senior Program Manager, Carbon Storage Infrastructure,
FECM

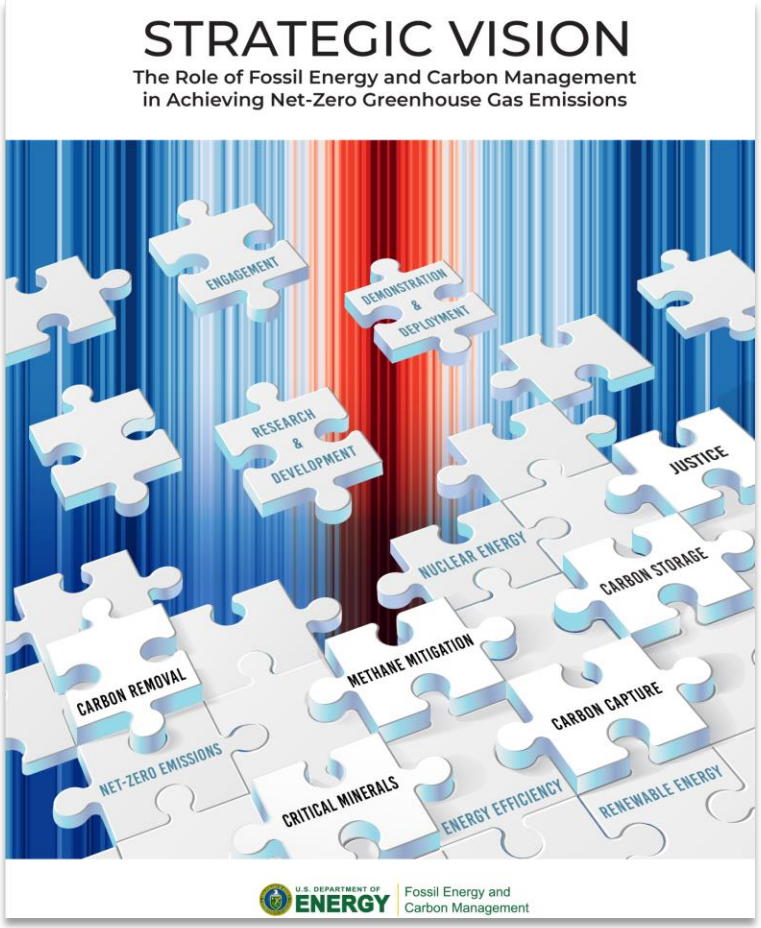
William Aljoe
Technology Manager, Carbon Storage Infrastructure,
NETL

Kelli Roemer, Ph.D.
Social Science Advisor, Engagement Division,
FECM

FECM Overview

Sarah Forbes, Director of Carbon Management Technologies

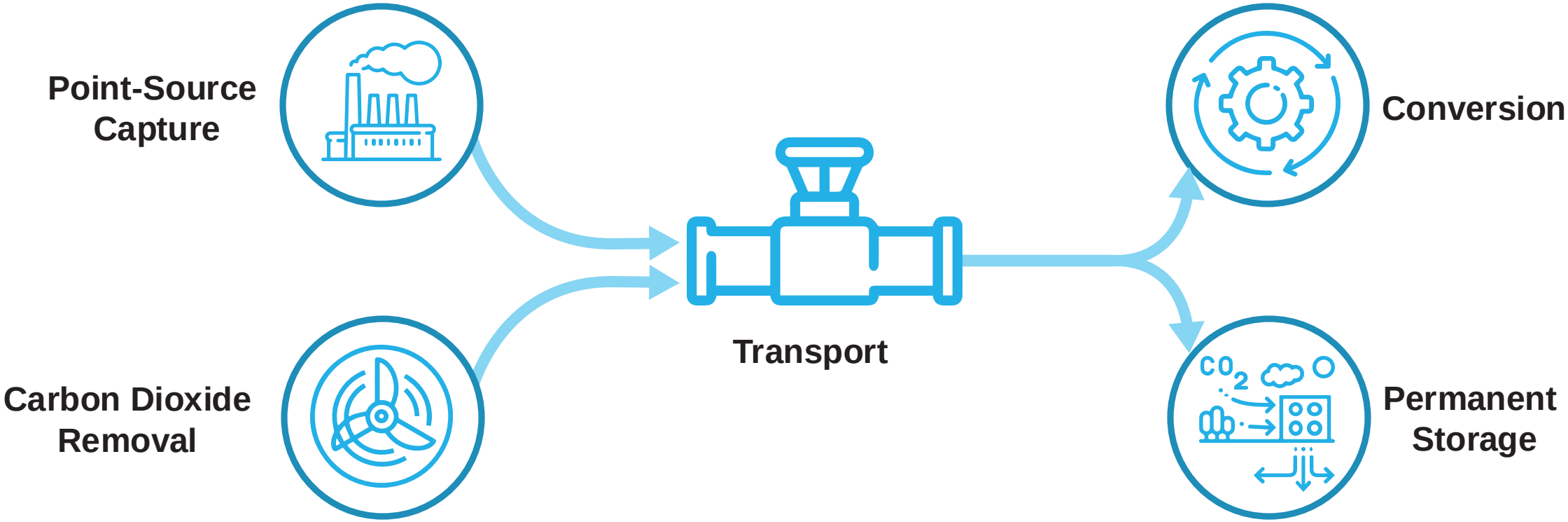
Fossil Energy and Carbon Management Overview



- Two areas of focus:
  - Carbon management
  - Resource sustainability
- Office of Carbon Management:
  - TRL 3-5 grant funding:
    - Engineering studies
    - Benchtop research
    - Small pilots and demos

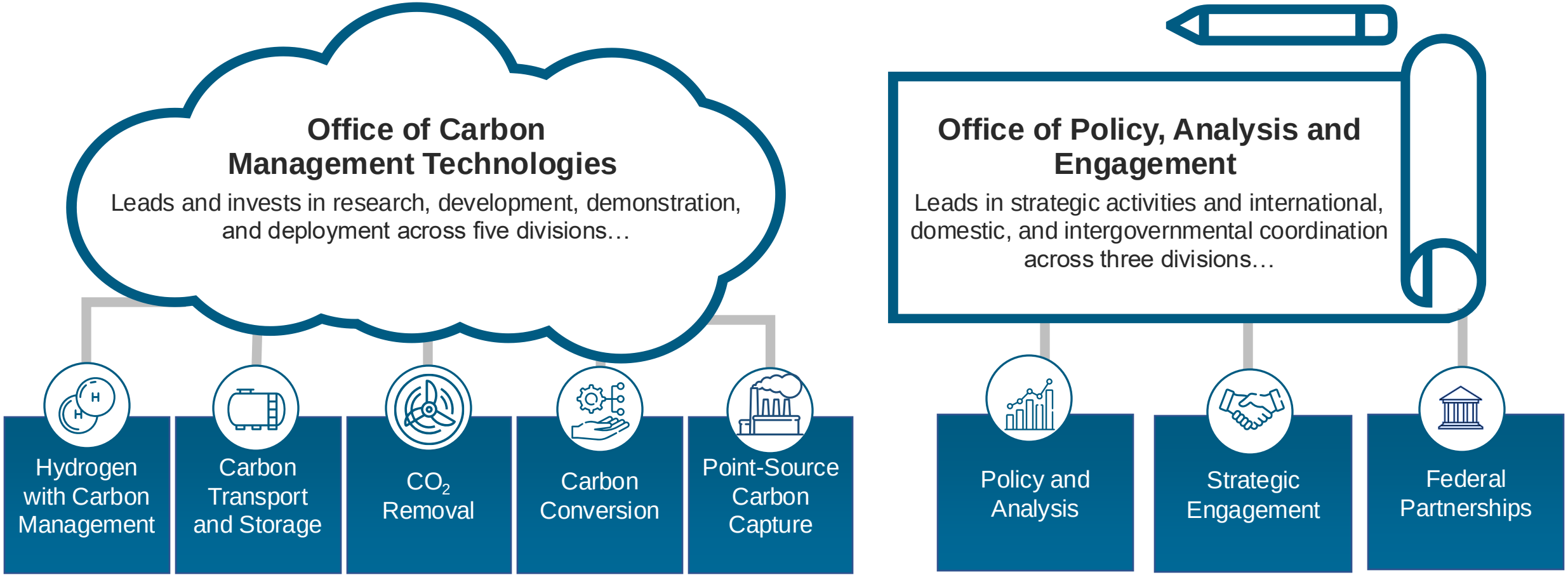
Source: FECM 2022 Strategic Vision

Carbon management is a *system of technologies*

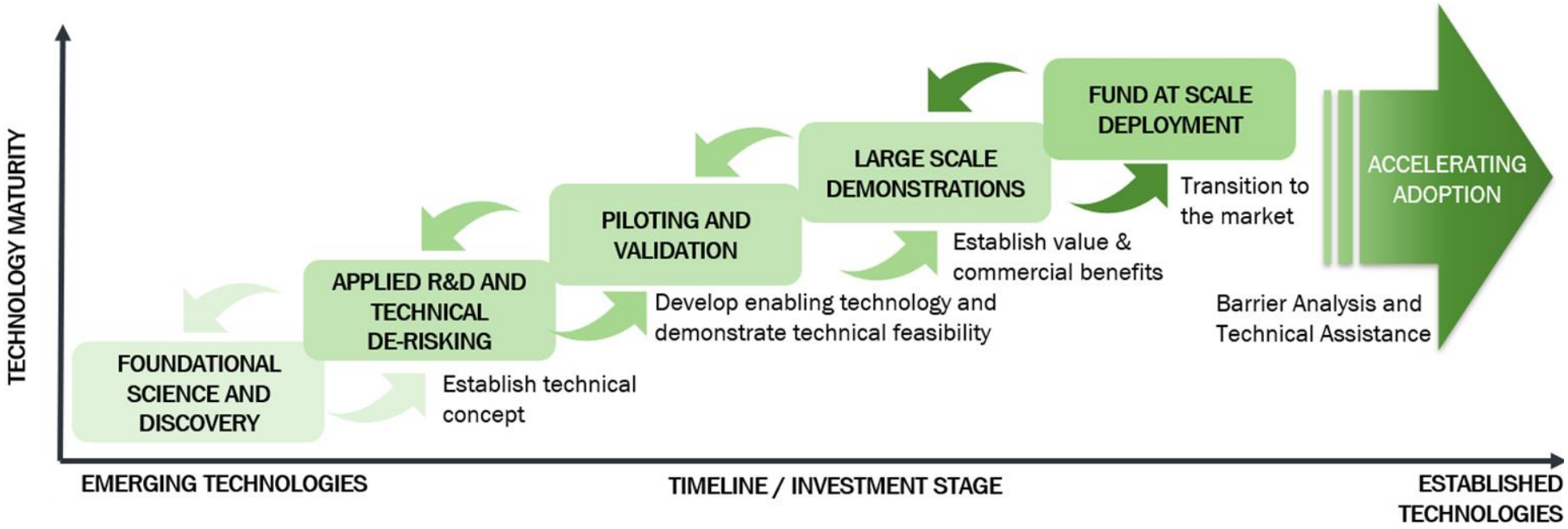


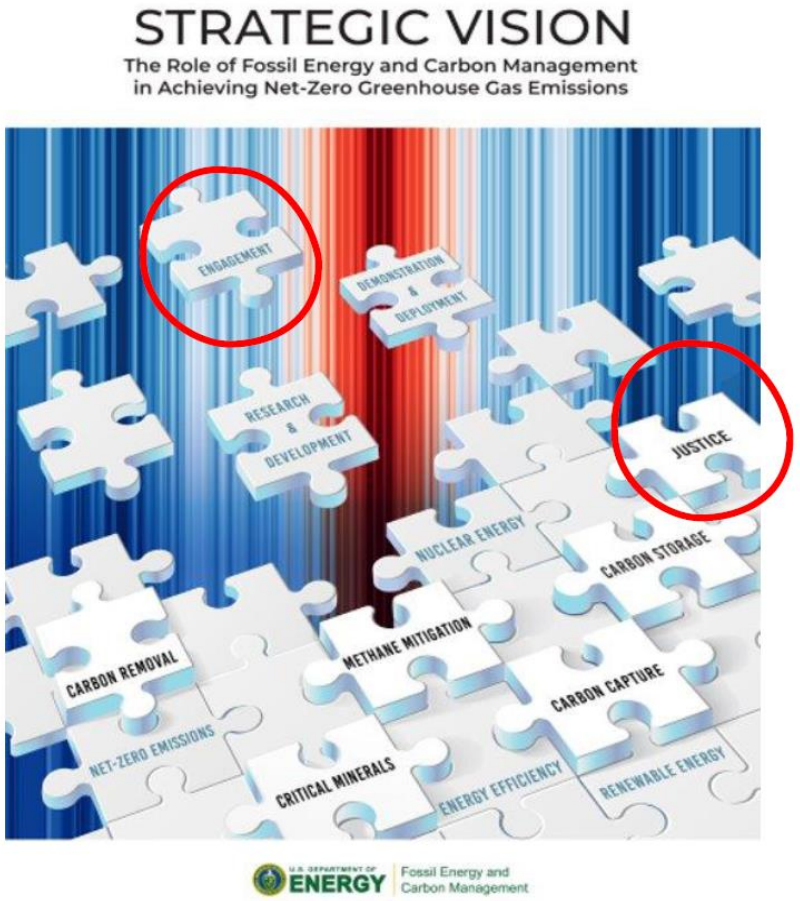
Office of Carbon Management

Focused on minimizing the environmental and climate impacts of fossil fuels and industrial processes, while working to achieve net-zero GHG across our economy



Research, Development, Demonstration, & Deployment (RDD&D) Continuum

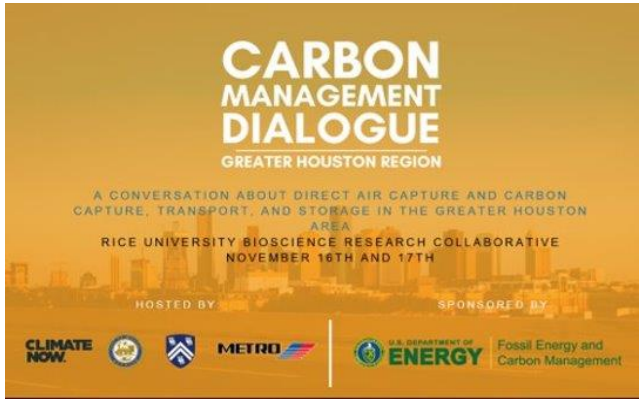




[FECM's Strategic Vision]

[Planning for Societal Considerations & Impacts]

FECM Carbon Management Workshops



Recent Carbon Management Workshops in Houston, Texas and Pueblo, Colorado.
[Carbon Interactive Workshops Report 2023]

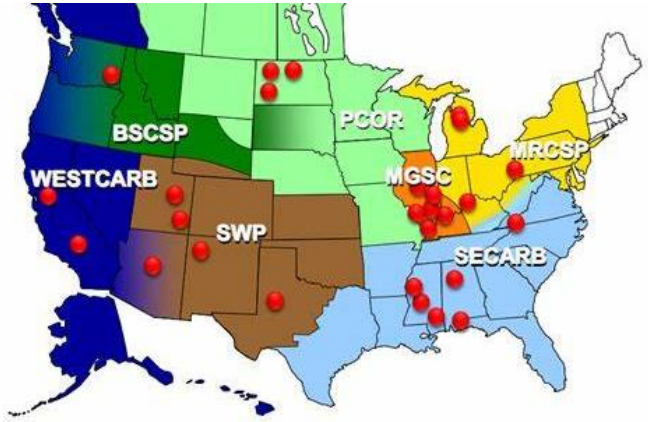
CarbonSAFE Program, NEPA and Permitting, & Community Benefit Plans

Traci Rodosta, William Aljoe, and Kelli Roemer

Building on 20 years of CO_2 storage experience

Regional Characterization

Small-scale Projects



Large-scale Projects

carbon SAFE

Carbon Storage Assurance Facility Enterprise (SAFE)

2003 — 2008 — 2013 — 2018 — 2023

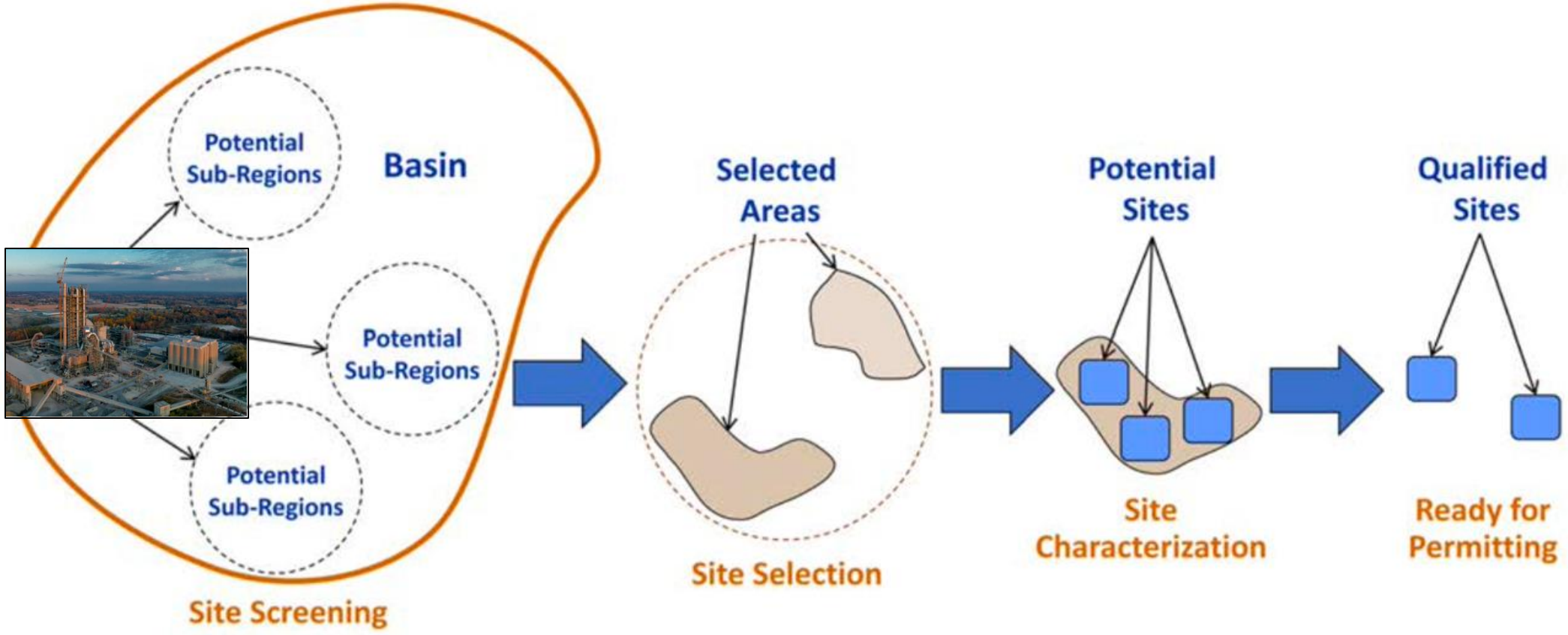
CarbonSAFE 2017-Present

Large-scale Projects 2008-2021

Small-scale Projects 2005-2013

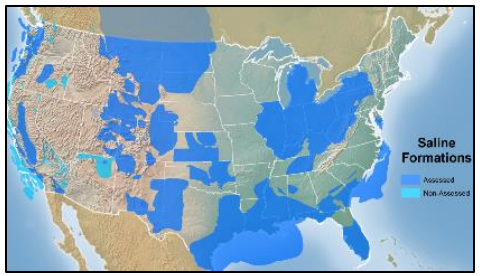
Regional Characterization

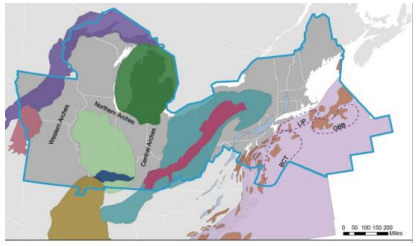
Site selection and characterization process

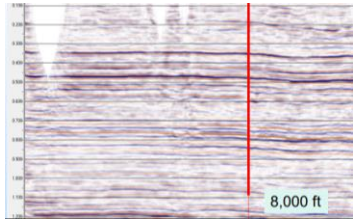


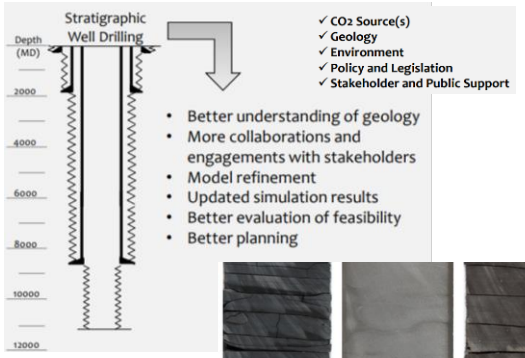
CarbonSAFE Activities—Project Phases

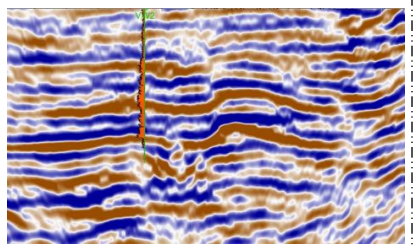
Phase I. Pre-feasibility (12-18 months)	Phase II. Storage Complex Feasibility (18-24 months)	Phase III. Site Characterization/Permitting (18-36 months)	Phase IV. Construction (< 30 months)

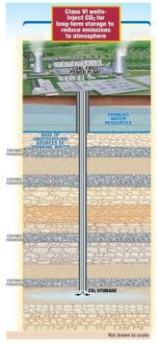


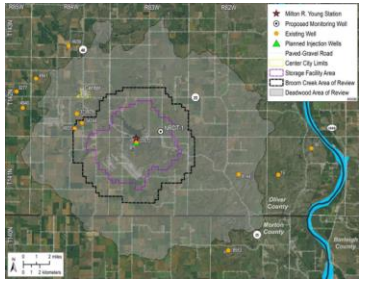






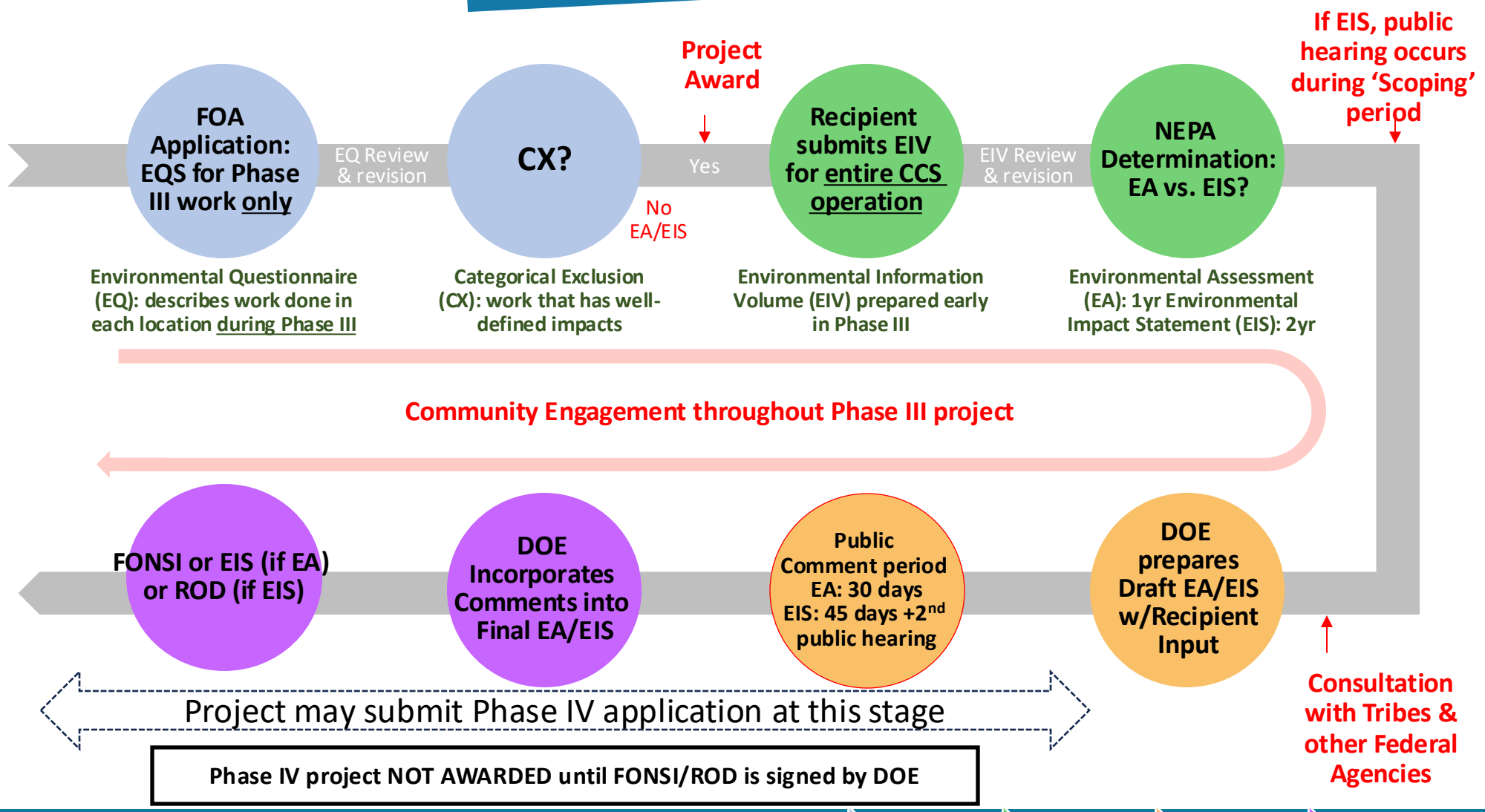




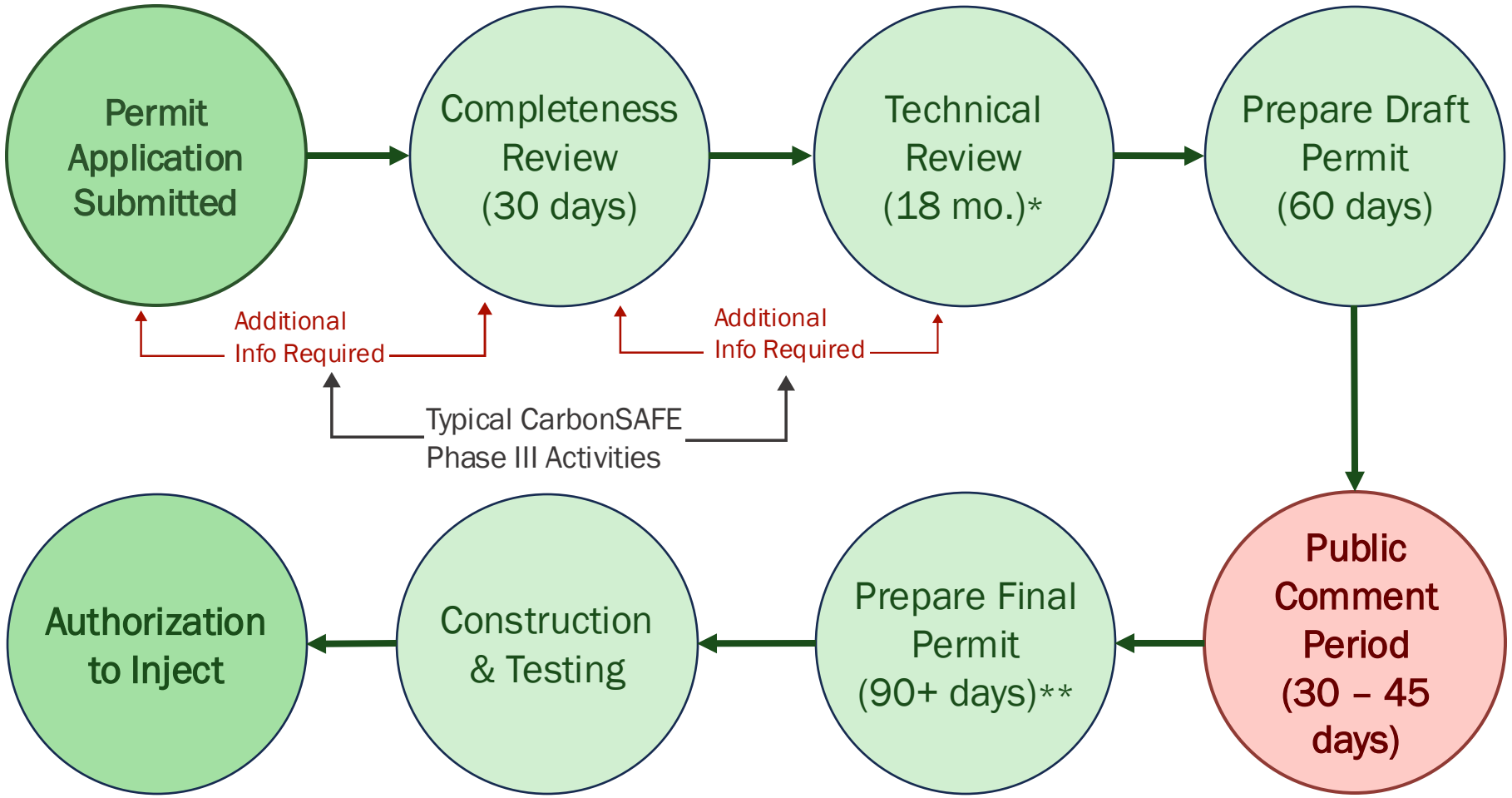


Community Benefits Plans

CarbonSAFE Phase III Projects:
Public Comment Opportunities (NEPA)



EPA Class VI Permitting:
Public Comment Opportunity



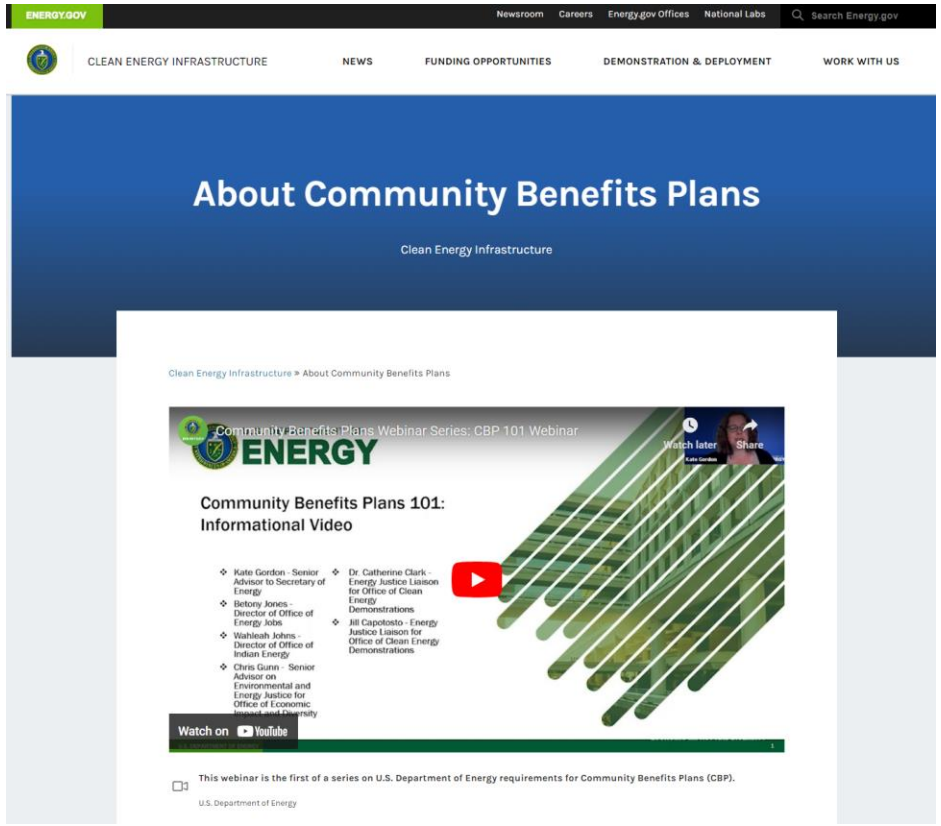
Projects may apply for and receive Phase III awards anytime during Class VI Application review process

***Projects cannot apply for Phase IV awards until Class VI Application is in Technical Review**

****Projects cannot receive Phase IV awards until Final Permit is complete**

Community Benefit Plans are required for all phases and project types

- Included in technical review process
- Typically, up to 20% of overall score
- Reviewed by experts and practitioners



Learn more: [Community Benefit Plans]

Community Benefit Plans address four priorities

1. Community and Labor Engagement
2. Quality Jobs and Workforce Development
3. Diversity, Equity, Inclusion, and accessibility
4. Justice 40 Initiative

Planning for Societal Considerations & Impacts

Community Benefit Plans address four priorities

1. Community and Labor Engagement
2. Quality Jobs and Workforce Development
3. Diversity, Equity, Inclusion, and accessibility
4. Justice 40 Initiative

In Feasibility and Characterization projects, CBPs emphasize:

- Research and analysis to develop detailed plans
- Early engagement and partnerships to identify mutual goals
- Two-way engagement mechanisms
- Energy and environmental justice assessment
- Actions to develop formal agreements

Learn more: **Guidance for Developing Community Benefit Plans**

Project Overview

Bipartisan Infrastructure Law (BIL): Four Corners Carbon Storage Hub: CarbonSAFE Phase III Project

DE- FE0032442

William Ampomah

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Assistant Professor /Research Engineer

New Mexico Tech

Four Corners Storage Hub CBP Team

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Dr. William Ampomah (PI)
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Project Overview

Project Performance Dates:

09/01/2024– 08/31/2027

Project Overview: Objectives

- The overall objective of this proposed project is to develop a storage hub within the Four Corners region
- To perform comprehensive commercial-scale site characterization at three different storage facilities (sites) within San Juan Basin located in northwest New Mexico to accelerate the deployment of integrated carbon capture and storage (CCS) technology within the region.
- The data collected by the characterization and environmental analysis will be used to prepare, submit, and attain a Class VI permit from the Environmental Protection Agency (EPA) to inject and store at a minimum 50 million tons of CO2 at each storage facility.
- The developed models will consider the ongoing saltwater disposal operations as well as other CO2 storage project(s) currently under consideration including the San Juan CarbonSAFE Phase III site (DE-FE0031890).

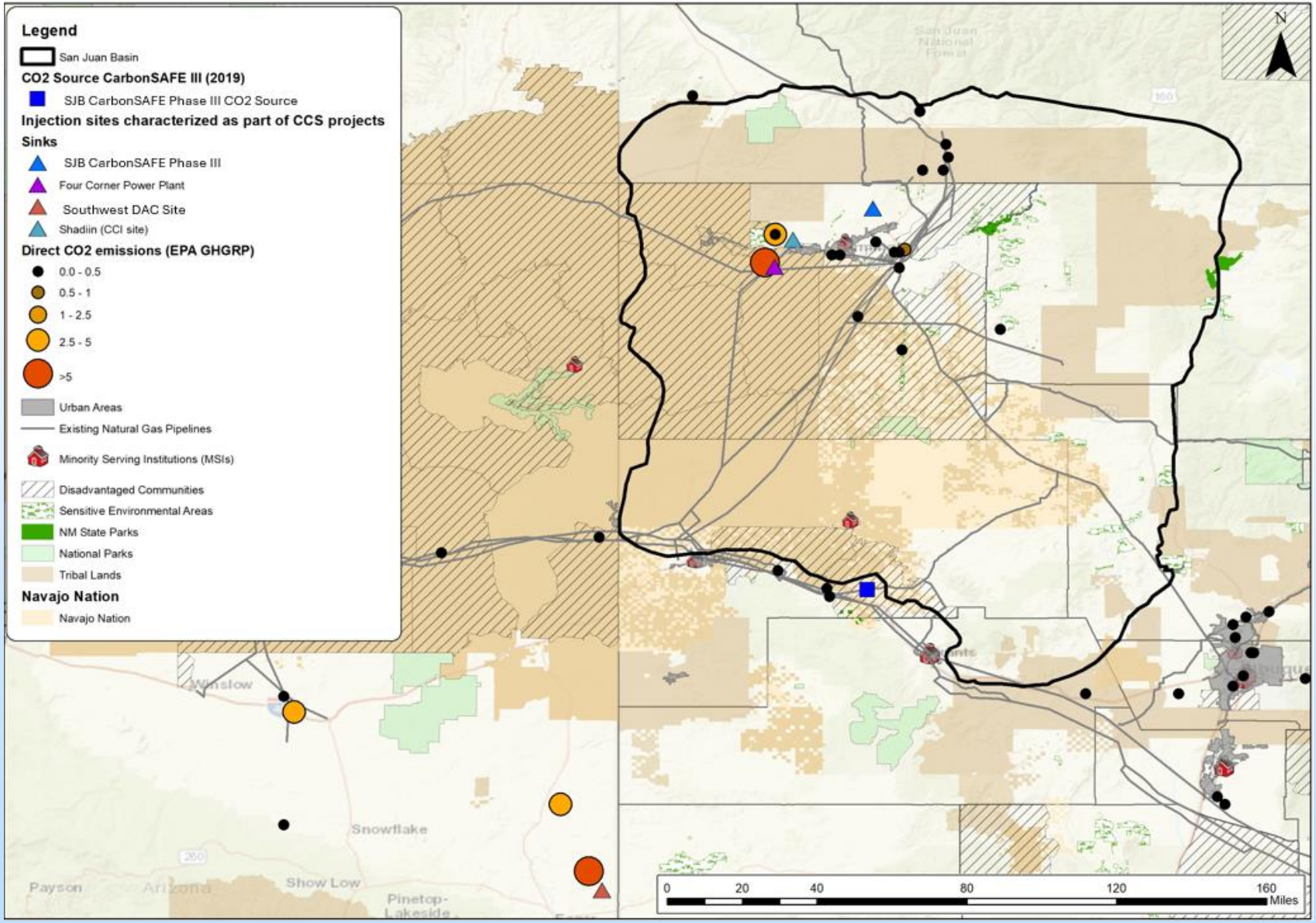
All Objectives, Locations, Participants, Approach, Scope, Community Benefits, etc. are merely proposed and are still being negotiated with DOE.

Project Overview: Objectives

- An Environmental Information Volume (EIV) will be completed to assess any NEPA-related issues for the chosen capture, transport, and storage site.
- CO2 sources feasibility study will be performed for all considered sources.
- A pipeline FEED study will be conducted to include pipelines connecting CO2 from sources to storage facilities.
- A risk mitigation plan will be developed after all the potential risks are identified and characterized.
- A storage field development plan will be developed to document the strategy for developing the three storage facilities to maximize storage capacity while minimizing risks, describe elements of storage facilities and the cost plan of proposed project life.
- The project will initiate the business and financial plans and documents needed for the final project investment decision for each storage facility.
- The project will execute a thorough Community Benefits Plan. This will consist of targeted community outreach programs to educate the public and promote energy and environmental justice to ensure that the project benefits are realized by local and regional communities including the disadvantaged communities (DACs)

All Objectives, Locations, Participants, Approach, Scope, Community Benefits, etc. are merely proposed and are still being negotiated with DOE.

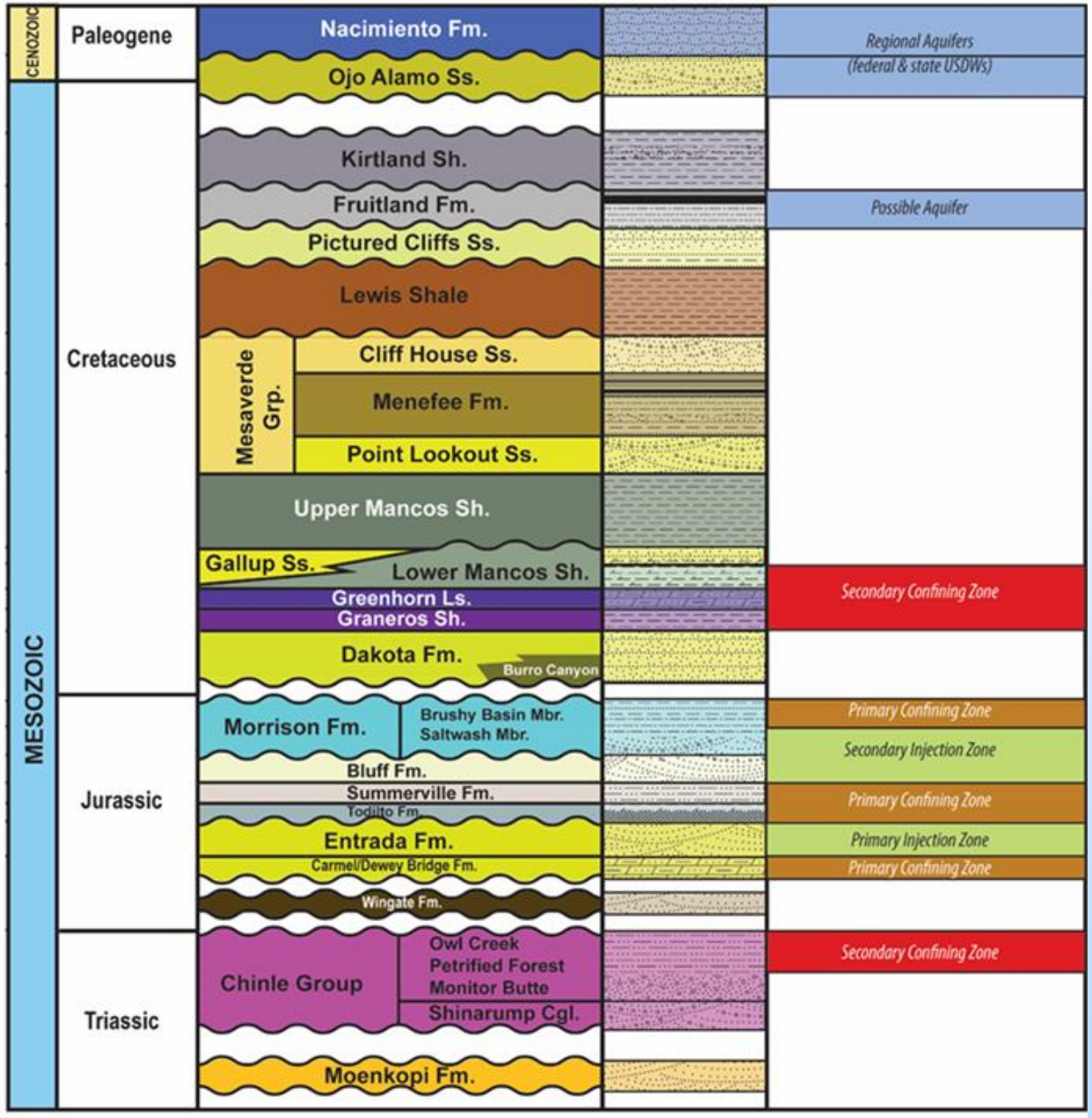
Four Corners Carbon Management Hub

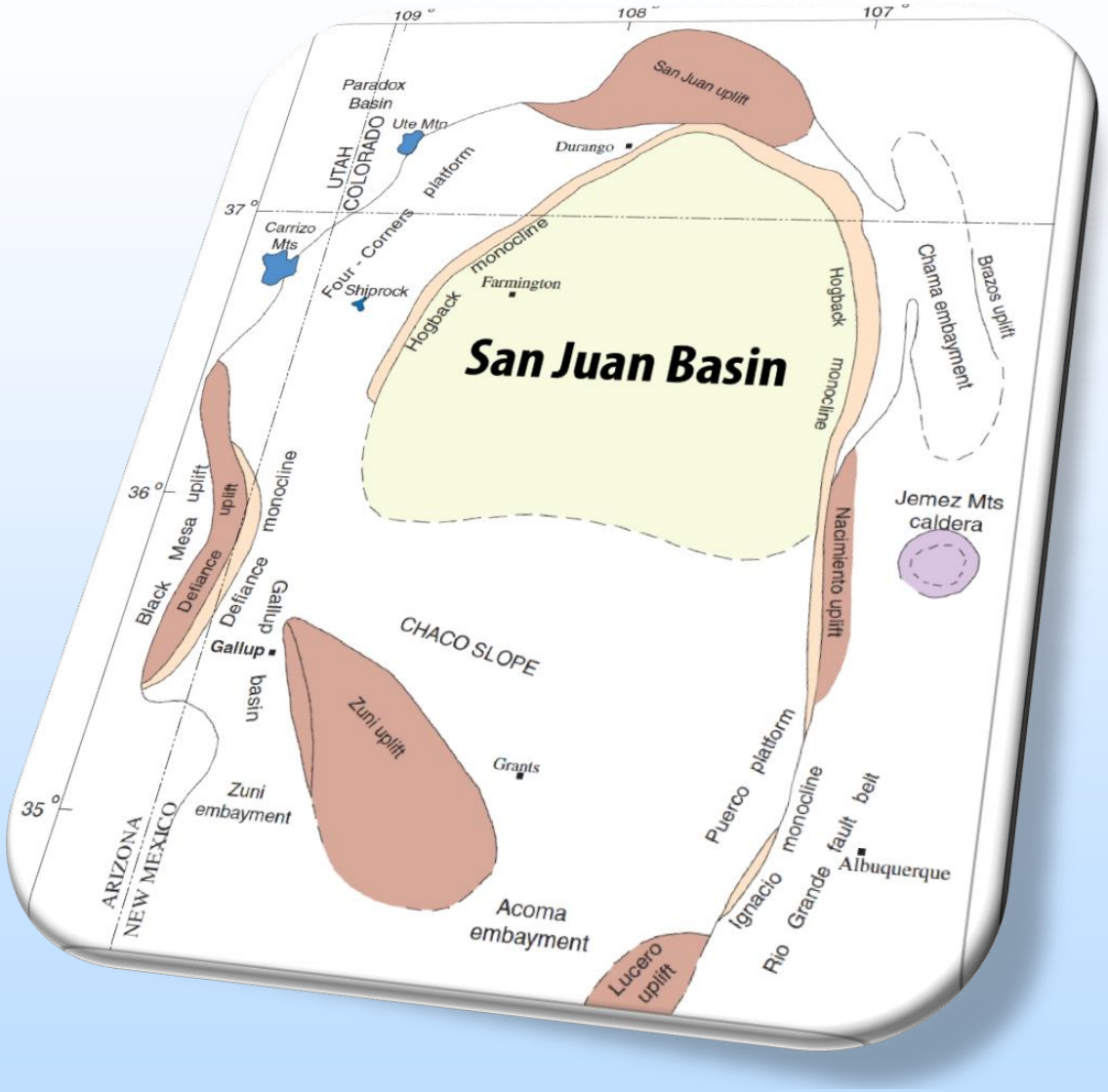


- CUSP Four Corners Regional Initiative
- SJB CarbonSAFE Phase III Project
- Four Corners Carbon Storage Hub Project
- Four Corners Power Plant Integrated CCS Project

All Objectives, Locations, Participants, Approach, Scope, Community Benefits, etc. are merely proposed and are still being negotiated with DOE.

San Juan Basin Storage Complex





Four Corners Storage Hub Project Facts

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Key Project Facts

- Perform Site Characterization of 3 storage sites within San Juan Basin
- Source CO2 from *Four Corners Power Plant* emits at least 10 million metric tons
- Prepare and submit Underground Injection Control (UIC) Class VI applications for 3 sites
- Meet Environmental requirements for characterization work and integrated project
- Prepare Storage Field Development Plan
- Execution of the Community Benefits Outcomes and Objectives (CBOO).

Characterization Plan

- Drill 2 characterization wells
- Acquire ~ 1000 ft of Core, sampled drilling cuttings, advanced log suites measurements, fluid sampling
- Re-enter one additional well to acquire well logs and other information
- Acquire two approximately 29 mi^2 3D seismic, license 53.725 miles 2D seismic lines
- Perform suites of laboratory experiments and numerical models to support UIC VI applications

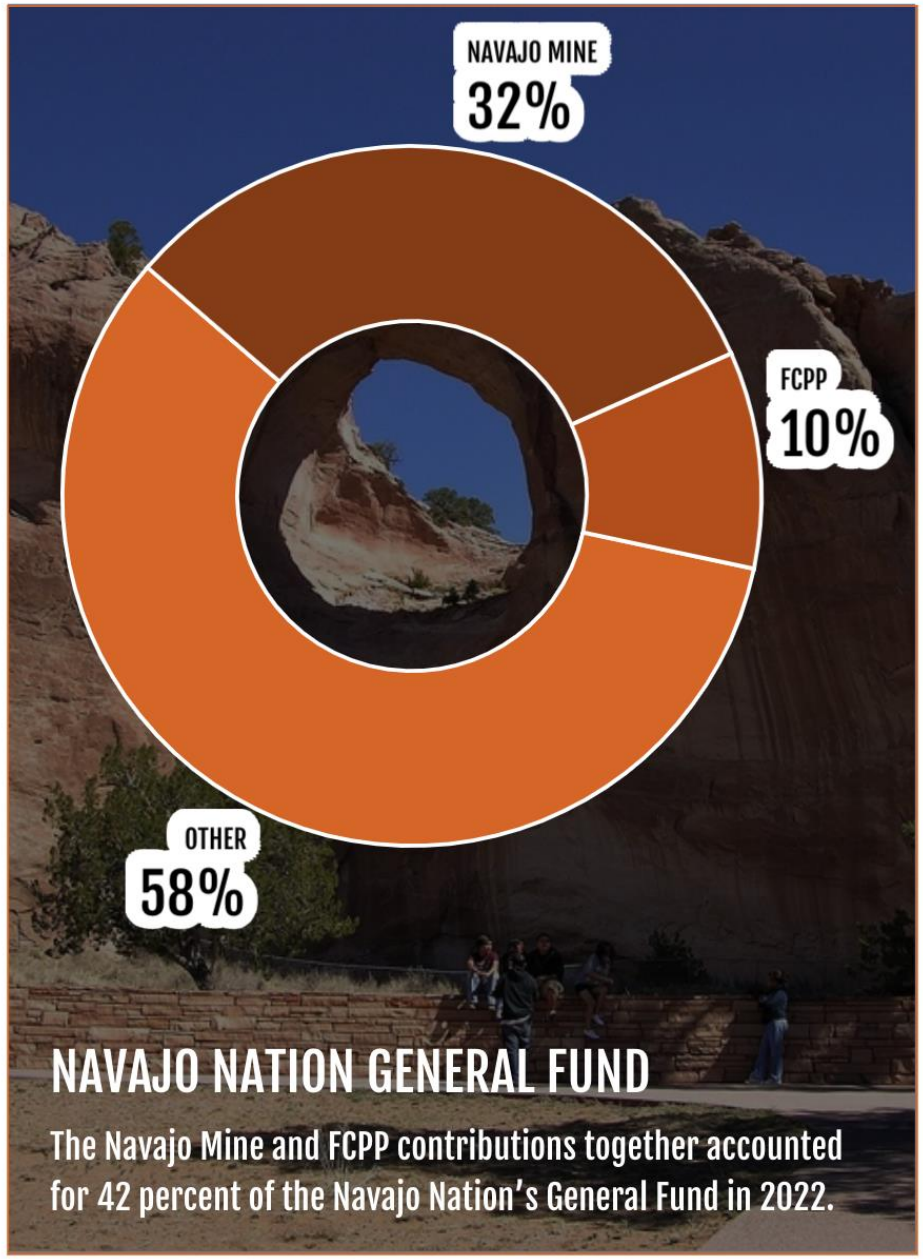
DIGGING DEEP FOR A BRIGHTER FUTURE

The Importance of Navajo Mine & Four Corners Power Plant (FCPP)

Navajo Mine is at the heart of NTEC's operations and is an economic hub for the Navajo Nation and its members. It provides stable jobs, consistent energy resources, and support to the community. The Navajo Mine and Four Corners Power Plant together account for tremendous contributions to the Nation.

The combined royalties, taxes, wages, and vendor/contractor payments made by Navajo Mine and FCPP in 2022 alone contributed $179.9 million directly to the Nation's economy. Of that, $79 million went to the Navajo Nation.

Support	Navajo Mine	FCPP
Taxes & Royalties	$61,040,000	$17,950,000
Employment Wages	$53,800,000	$37,210,000
Navajo Vendors/Contractors	$7,010,000	$2,910,000
Navajo Mine & FCPP Economic Impact on the Navajo Nation in 2022		**$179,920,000**



CBP Milestones

CBP Milestones

Category and Commitment	Existing or Planned	Budget Period 1 milestone	Budget period 2 milestone	Budget period 3 milestone
Community and Labor Engagement				
Community Benefits Agreement	☒ Yes ☐ Not at this time	Parties and scope identified	Final Agreement Draft	Agreement signed
Collective Bargaining Agreement (operating jobs)	☒ Yes ☐ Not at this time	Unions identified	Report engagement with unions	
Project Labor Agreement (construction jobs)	☒ Yes ☐ Not at this time	Parties and scope identified	Initial discussions and meeting	Final scoping report
Community Workforce Agreement	☒ Yes ☐ Not at this time	Parties and scope identified	Initial discussions and contact/ stakeholder list	Final scoping report
Develop Outreach Material	☒ Yes ☐ Not at this time	Annual project meeting	Website online	
Community feedback and data incorporated into the project	☒ Yes ☐ Not at this time	Three Workshops	Two Workshops	Two Workshops

CBP Milestones

Investing in Quality Jobs				
Total Number of Permanent Operations Jobs:	0			
Number of Construction phase jobs:	0			
Commitments to support workforce education and training	☒ Yes ☐ No		Three project fact sheets and training material	Partnership with local education institution to develop training program
Assessment of economic impact and job creation	☒ Yes ☐ No		Initial white paper on economic and job creation impact	Revised, white paper on economic and job creation impact

All Objectives, Locations, Participants, Approach, Scope, Community Benefits, etc. are merely proposed and are still being negotiated with DOE.

CBP Milestones

Diversity, Equity, Inclusion, and Accessibility				
Local recruitment efforts. Ensure local communities have access to jobs.	☒ Yes ☐ No	Advertise the project and its potential job creation to under-represented groups and local communities.		Report on efforts to create partnership with training and placement programs for underrepresented workers
Targeted recruitment efforts. Ensure under-represented groups have access to jobs.	☒ Yes ☐ No	Advertise the project and its potential job creation to under-represented groups and local communities.		Report on efforts to create partnership with training and placement programs for underrepresented workers
Partnering or contracting with Minority -Serving Institutions (MSIs) or businesses majority owned or controlled by underrepresented persons or groups of underrepresented persons	☒ Yes ☐ No	MSI and underrepresented business Identification	MSI and underrepresented business Engagement	
Partner with quality pre-apprenticeship or apprenticeship readiness program	☐ Yes ☒ No			
Advancing Diversity, Equity, Inclusion, and Accessibility	☒ Yes ☐ No	Define a list of specific topics to be covered	Present a DEIA focused topic during a team meeting, discuss and get feedback	Report and evaluate potential improvements or topics of interest

Justice40 Initiative				
Identifies benefits/impacts to disadvantaged communities	☒ Yes (Farmington area and Navajo communities) ☐ No			
Reduction in energy costs	☐ Yes ☒ No			
A decrease in environmental exposure and burdens	☐ Yes ☒ No			
An increase in access to low-cost capital	☐ Yes ☒ No			
An increase in quality job creation, the clean energy job pipeline, and job training for individuals	☒ Yes ☐ No	Refer to DEIA section.	Refer to DEIA section.	Refer to DEIA section.
Increases in clean energy enterprise creation and contracting	☐ Yes ☒ No			
Increases in energy democracy, including Tribal nation ownership or community ownership of project assets	☐ Yes ☒ No			
Increased parity in clean energy technology access and adoption	☐ Yes ☒ No			
An increase in energy and climate resilience	☐ Yes ☒ No			
Energy and Environmental Justice Baseline Assessment	☒ Yes ☐ No	Report on Energy and Environmental Justice Baseline Assessment		
Energy and Environmental Justice Impact Assessment	☒ Yes ☐ No		Report on Energy and Environmental Justice Impact Assessment	
Report on the project contribution to the Justice40 initiative	☒ Yes ☐ No			White paper

Community and Stakeholder Engagements To Date

- We had several meetings with Navajo Nation's Resource Development Committee members over the last three months
- We attended the Chapters technology meeting, July 1-3, 2024, at San Juan College and passed out CO2 sequestration fact sheets.
- Attended the Navajo Nation Energy summit in Albuquerque, NM, June 4-6, 2024
- Attended the Clean Energy Summit for Dine' Leaders at Flagstaff, AZ April 2024
- Outreach to Nenahnezad Chapter officials
- Outreach to Nenahnezad Chapter community members,
- Participated in Four Corners Energy Conference, Farmington, NM, May 2024
- Participated in the Southwest CCS Symposium, Tempe AZ, May 2024
- Presented Four Corners storage projects to San Juan County Commission
- Presented Four Corners storage projects to Farmington City Council Meeting
- Developed relationship with Four Corners Economic Development
- Developed strong relationship with NTEC Helium subsurface group. Will provide permitting and environmental support
- Collaboration with Four Corners Clean Energy Alliance to develop a workforce Development workshop for the Navajo Nation, and San Juan College
- Outreach to board members and administration of Central Consolidated School district
- Outreach to industry and community on workforce development at the NMOGA conference, Farmington, NM, August 2024
- Participated in NGO Meeting in Farmington

Project Facts Sheet

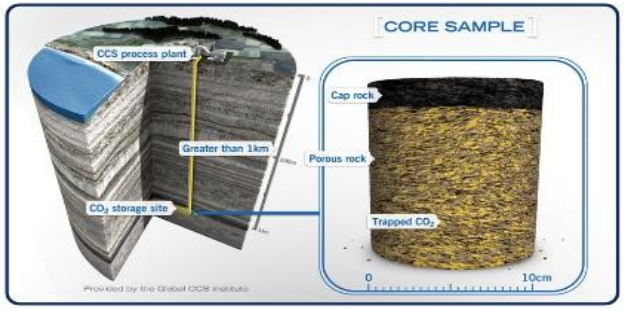
Contact *William.Ampomah@nmt.edu*
for more project information

The Four Corners Carbon Storage Hub

CarbonSAFE Phase III

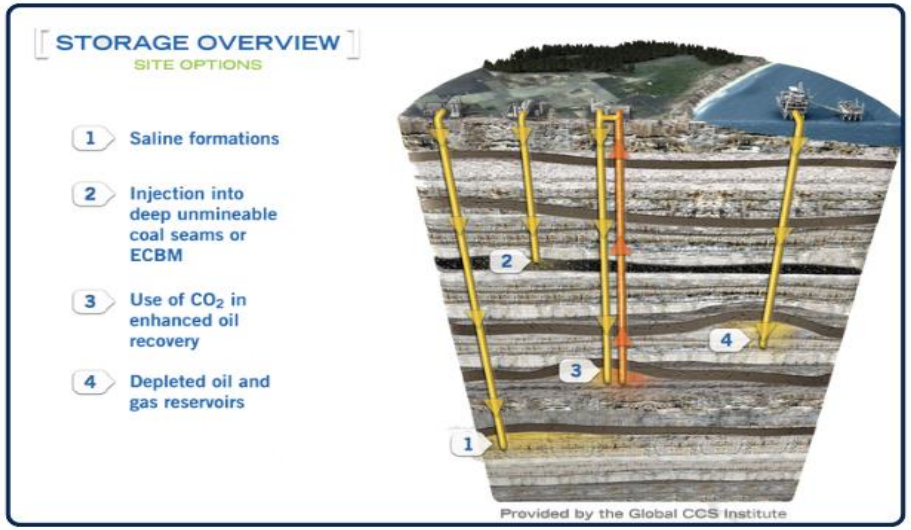
ABOUT THE PROJECT

The Four Corners Carbon Storage Hub: CarbonSAFE Phase III Project is a significant initiative aimed at developing a large-scale Carbon Capture and Storage (CCS) system in the San Juan Basin, located in northwestern New Mexico. Managed by the Petroleum Recovery Research Center at New Mexico Institute of Mining and Technology, this project focuses on comprehensive site characterization to ensure the geological suitability for permanent CO_2 storage.



PROJECT OBJECTIVES

- Conduct detailed site assessments at three proposed locations within the San Juan Basin to confirm their capacity to securely store 50 million metric tons of CO_2 over 30 years.
- Prepare and obtain the necessary Underground Injection Control (UIC) Class VI permits for CO_2 injection.
- Retrofit nearby industrial sources with advanced CO_2 capture technology to capture approximately 6-7 million metric tons of CO_2 annually, which will be stored locally within the basin.



The Four Corners Carbon Hub project is part of the broader CarbonSAFE program, which seeks to address key gaps in the deployment of CCS technologies and reduce technical risks associated with large-scale CO_2 storage.

This project will integrate data from new and existing sources to create detailed site-specific datasets for accurate modeling and risk assessment. Our work will include evaluating storage capacity, CO_2 behavior, seal integrity, and potential seismic activity. Community engagement to inform and involve local stakeholders in the CCS process will be emphasized throughout the project.

Connect with us on http://www.prrc.nmt.edu

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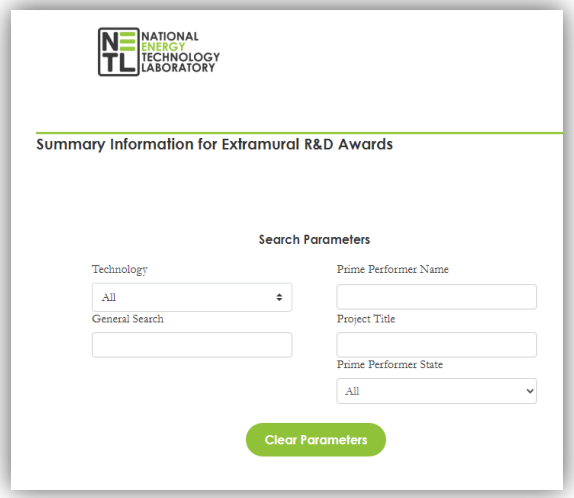
Question & Answer Session

Ground Rules for Discussion

- Submit questions using the Q&A feature.
  - You can also see and upvote other questions that have been asked.
- One idea per question
- It is okay to build on the ideas of others
- Clarifying questions are okay

Stay connected

- For more information about the Four Corners Carbon Storage Hub Project contact: William.Ampomah@nmt.edu
- Information about awarded FECM projects can be found on the NETL Project Landing Page
- To stay informed of upcoming FECM events and activities
  - FECM_Engagement@hq.doe.gov
  - FECM Event Calendar



National Energy Technology Lab
Project Landing Page

Carbon Management Resources

Carbon Storage Program

- CarbonSAFE Initiative
- EPA Class VI Well Information
- Planning for Societal Considerations and Impacts
- Community Benefit Plans in Carbon Management FAQs

FECM Resources

- Carbon Management Resources Portal
- Carbon Management CONNECT Mapping tool
- Responsible Carbon Management Initiative Principles

Other DOE Resources

- Interactive Diagram for DOE's Carbon Management Provisions
- Office of Clean Energy Demonstration Carbon Capture Programs
- About Community Benefit Plans
- DOE Justice40 General Guidance
- Community Benefit Agreement (CBA) Toolkit

Thank you!

For more information, please visit: energy.gov/fecm

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