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

DE- FE0032442


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U.S. Department of Energy

National Energy Technology Laboratory
Annual Review Meeting

August 5-9, 2024

# Presentation Outline

- Project Goals
- Overview of Four Corners Carbon Management Hub
- Tasks
- Deliverables and Milestones
- Summary

# Project Overview

- Funding Profile
- Project Performance Dates:

09/01/2024– 07/31/2027

| Updated budget (20240410) | FY 2024 | | FY 2025 | | FY 2026 | | Total | |
|---|---|---|---|---|---|---|---|---|
| | DOE Funds | Cost Share | DOE Funds | Cost Share | DOE Funds | Cost Share | DOE Funds | Cost Share |
| New Mexico Institute of Mining and Technology | $ 31,104,943 | $ 460,720 | $ 3,297,564 | $ 501,890 | $ 2,216,327 | $ 472,814 | $ 36,618,834 | $ 1,435,424 |
| University of Utah | $ 130,583 | $ 32,645 | $ 135,992 | $ 33,998 | $ 134,066 | $ 33,516 | $ 400,641 | $ 100,159 |
| University of New Mexico | $ 101,702 | $ 30,592 | $ 119,969 | $ 31,557 | $ 104,314 | $ 19,348 | $ 325,985 | $ 81,497 |
| The University of Houston | $ 136,579 | $ 34,144 | $ 249,391 | $ 62,023 | $ 144,030 | $ 36,333 | $ 530,000 | $ 132,500 |
| Wheaton College | $ 16,388 | $ 16,515 | $ 32,314 | $ 17,955 | $ 15,940 | $ 16,868 | $ 64,642 | $ 51,338 |
| Tallgrass | $ 166,666 | $ 183,565 | $ 166,666 | $ 183,565 | $ 166,666 | $ 183,565 | $ 499,998 | $ 550,695 |
| Los Alamos National Laboratory | $ 1,125,249 | $ - | $ 1,610,341 | $ - | $ 677,756 | $ - | $ 3,413,346 | $ - |
| Sandia National Laboratories | $ 230,441 | $ - | $ 423,541 | $ - | $ 216,018 | $ - | $ 870,000 | $ - |
| Enchant Energy Corporation | $ - | $ 42,257 | $ - | $ 42,257 | $ - | $ 42,257 | $ - | $ 126,771 |
| Rock Flow Dynamics | $ - | $ 1,178,600 | $ - | $ 1,178,600 | $ - | $ 1,178,600 | $ - | $ 3,535,800 |
| Schlumberger | $ - | $ 4,536,380 | $ - | $ 131,052 | $ - | $ 131,052 | $ - | $ 4,798,484 |
| Total ($) | $ 33,012,551 | $ 6,515,418 | $ 6,035,778 | $ 2,182,897 | $ 3,675,117 | $ 2,114,353 | $ 42,723,446 | $ 10,812,668 |
| Total Cost Share % | | 16.48% | | 26.56% | | 36.52% | | 20.20% |

# **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 develop a thorough societal considerations and impacts strategy through 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.

# Project Participants

- **New Mexico Tech**
- **Dr. William Ampomah (PI)**
- Dr. Robert Balch
- Dr. Sai Wang
- Mr. George El-kaseeh
- Mr. Luke Martin
- Dr. Alex Rinehart
- Dr. Adewale Amosu
- Dr. Robert Czarnota
- Dr. Tan Nguyen
- Dr. Dana Ulmer-Scholle
- Dr. Robert Czarnota
- Mr. Jean Lucien Fonquergne
- Dr. Jianjia Yu
- Dr. Martin Reyes Correa
- Dr. Juan Han
- Mr. Jason Simmons
- Dr. Brian Borchers
- Dr. Hamid Rahnema
- Dr. Her-Yuan Chen
- Dr. Sajjad Esmaeilpour
- Dr. Ranalda Tosie
- Post-Doctoral Researchers (7)
- Graduate and undergraduate Students (17)

- **University of Utah**
- **Dr. Nathan Moodie**
- Dr. Kevin McCormack
- Dr. Ting Xiao
- Dr. Brian McPherson

- **University of Houston**
- **Dr. Dimitrios G Hatzignatiou**
- Dr. Yingcai Zheng
- Dr. Robert R. Stewart
- Dr. John Patrick
- Dr. Ganesh C. Thakur

- Wheaton College
- Dr. Andrew Luhmann

- **University of New Mexico**
- **Dr. Janie Chermak**
- Dr. Yuting Yang

- **LANL**
- **Dr. Bailian Chen**
- Dr. Shaoping Chu
- Dr. Meng Meng
- Dr. Aleksandra Pachalieva
- Dr. Ting Chen
- Dr. Lianjie Huang
- Dr. Rajinder Singh
- Dr. Prashant Sharan
- Dr. Bulbul Ahmmed
- Dr. Zhiwei Ma

**Sandia National Laboratories**
- Dr. Shruti Mishra
- Dr. Jason Heath
- Dr. Thomas A. Dewers

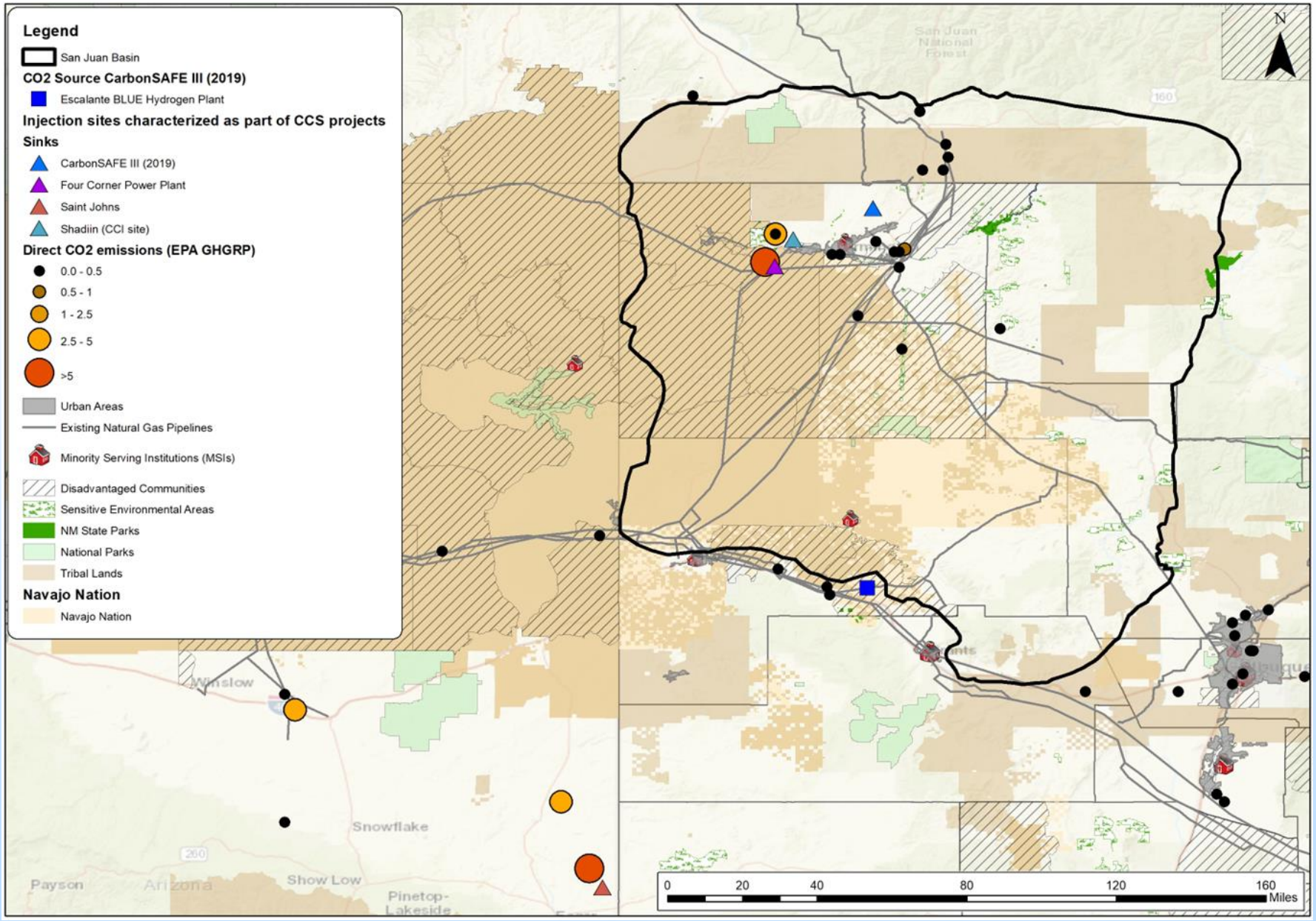
**Contractors**
- Dr. Tom Bratton; Mr Sam Wood; Dr. Ron Parker; Mr. Wally Drangmeister; Mr. Steve Gray; Mr. Eric Burnett ; Ms. Candace Cady;

- Fracture Studies, AHS, Daniel B. Stephens & Associates, Inc. ;

**Industry**
- Enchant Energy
- Tallgrass Energy
- Navajo Transition Energy Company (NTEC)
- Navajo Agricultural Products Industry
- Conerstone Business Solutions
- Shandinn Holdings LLC
- SLB
- Rock Flow Dynamics

**Project partners**

# Four Corners Storage Hub (Locations)

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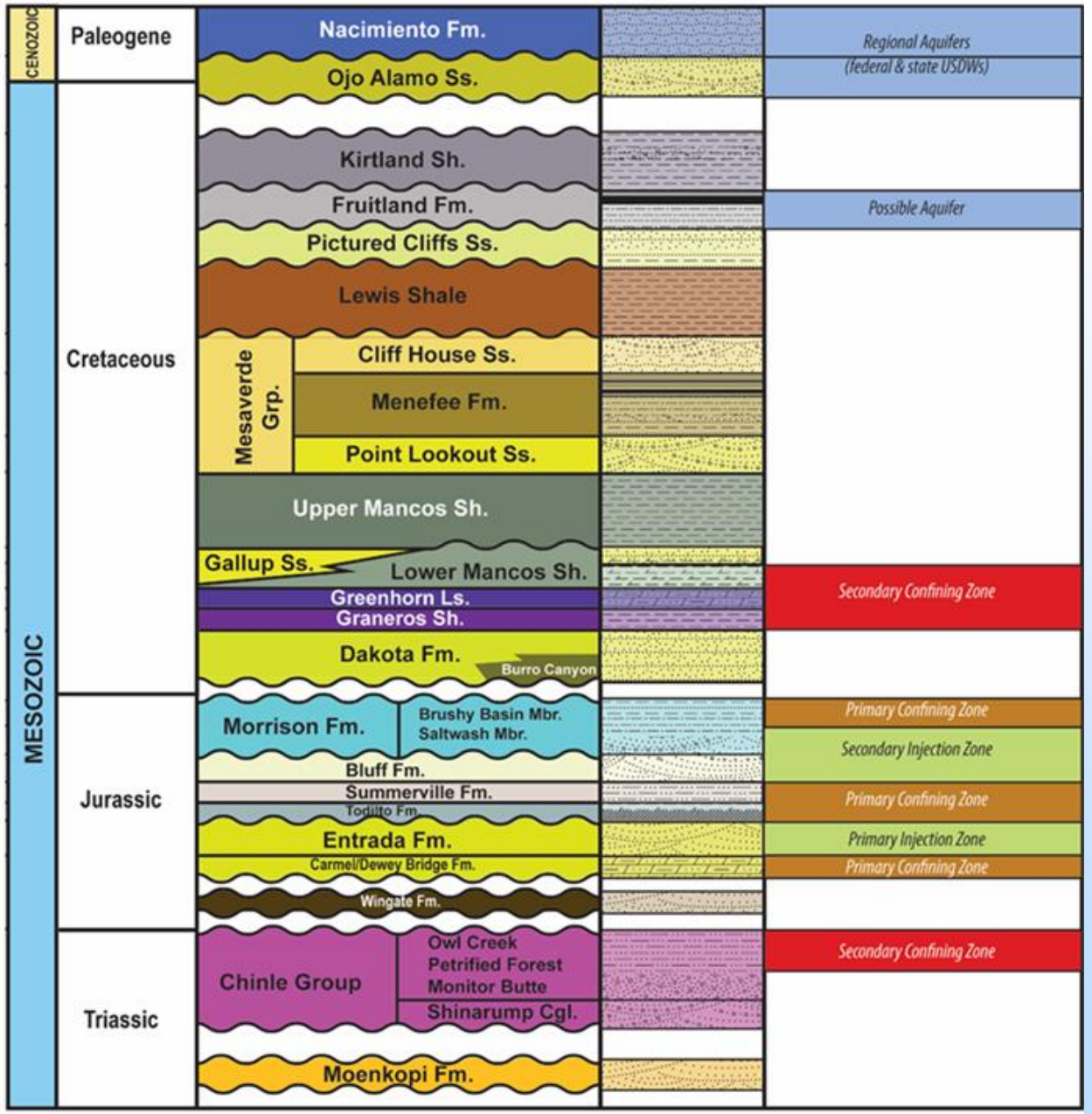
# Storage Complex @ FCCMH



# 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 and others.
- Prepare and submit 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, perform mini-frac and step rate test
- Re-enter one additional well to acquire well logs and other information
- Acquire ~ 1000 ft of Core, sampled drilling cuttings, advanced log suites measurements, fluid sampling
- Perform suites of laboratory experiments and numerical models
- Acquire 2 3D seismic, license multiple 2D seismic lines

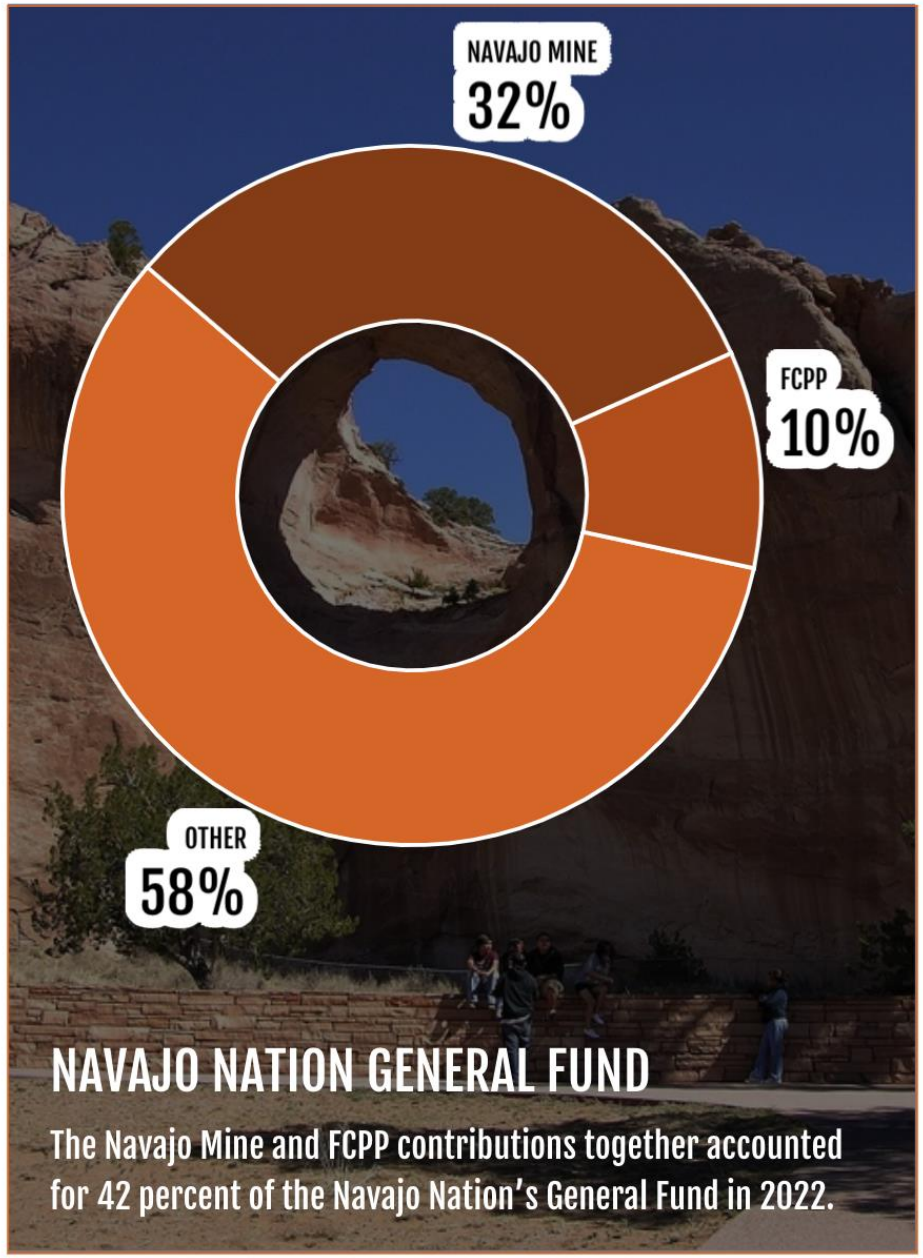
# DIGGING DEEP FOR A BRIGHTER FUTURE

## 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** |

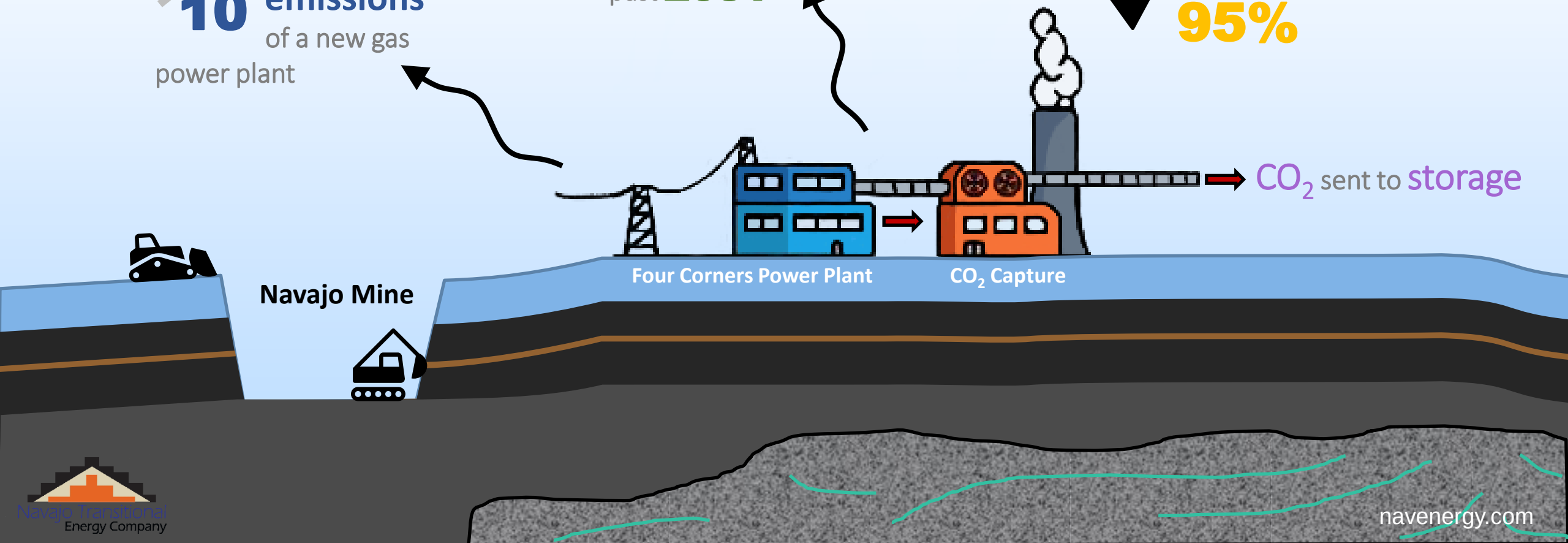


# Carbon Capture Process

**FCPP** with **carbon capture** will emit **1/10** the **$CO_2$ emissions** of a new gas power plant

Carbon Capture would help **extend the life** of **Navajo Mine** and **FCPP** past **2031**

Reduce $CO_2$ emissions **by more than 95%**




Navajo Transitional Energy Company

navenergy.com

# Project Scope/ Technical Approach

Task 1.0 - Project Management and Planning

Task 2.0 – National Environmental Protection Act (NEPA)

Task 3.0 – UIC Class VI “Authorization to Construct”

Task 4.0 – Detailed Site Characterization of the Commercial-Scale CO2 Storage Sites

Task 5.0 – Storage Field Development Plan

Task 6.0 – CO2 Source(s) Feasibility Study

Task 7.0 - Pipeline Front-End Engineering Design (FEED) Study

Task 8.0 - Business and Financial Plans and Arrangements

Task 9.0 - Community Benefits Outcomes and Objectives



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# Task 1 Project Management

Subtask 1.1 - Project Management Plan: The recipient will update the PMP as necessary and maintain it throughout the project.

Subtask 1.2 - Coordination with other CCUS Projects in the San Juan Basin: This subtask will focus on the potentially duplicative activities in the San Juan Basin and ensure there is no duplication of effort between companion projects.

Subtask 1.2.1 – Project Coordination with “Subsurface Seismic Structural Characterization of the Hogback Monocline and Thermal Characterization of the San Juan Basin, New Mexico” (DE-FE0032369):

Subtask 1.2.2 – Project Coordination with “CUSP: Four Corners Regional Initiative” (DE-FE0032363)

# Task 2.0 National Environmental Policy Act (NEPA)

**Subtask 2.1 Preparation and Submission of an Environmental Information Volume (EIV):** The recipient will complete one or more EIVs to assess any NEPA-related issues at the selected transport routes and storage sites. The purpose of the EIV(s) is to initiate analyses of the chosen transport routes and storage sites from a NEPA perspective. The EIVs for the chosen capture sites are outside the scope of this project and will be completed by others. The completed EIV(s) will provide all initial environmental data and details about the proposed actions to take place through the post injection site care period. This subtask will be completed prior to the end of BP1.

**Subtask 2.2 Preparation and Submission of NEPA Documentation:** Following DOE NEPA office review of the EIV(s), the recipient will assist the DOE NEPA office with preparation of the documentation required for the probable NEPA class of action (Categorical Exclusions, Environmental Assessment or Environmental Impact Statement). DOE will lead the development of the documentation but will require input from the recipient.

# Task 3.0 UIC Class VI “Authorization to Construct

- Site Characterization
- Area of Review (AoR) Delineation
- Corrective Action
- Injection Well Construction
- Testing and Monitoring during Operation
- Plugging, Post-Injection Site Care (PISC), and Site Closure
- Financial Responsibility

# Task 4.0 Detailed Site Characterization of the Commercial-Scale CO2 Storage Sites

Subtask 4.1 Evaluate Available Data

Subtask 4.2 New 3D Seismic Survey

Subtask 4.3 Field Activities

Subtask 4.4 Reservoir and Caprock Characterization

Subtask 4.5 Geological Modeling and Simulation

Subtask 4.6 – Risk Analysis and Mitigation

# Task 5.0 Storage Field Development Plan

Subtask 5.1 – Storage Field Development Plan Overview

Subtask 5.2 – Storage Field Development Plan Package

Subtask 5.3 Well Field Development Cost Estimate

Subtask 5.4 Well Field Development FEED Study Final Report

# Task 6.0 CO2 Source(s) Feasibility Study

Subtask 6.1 Source stream composition investigation:

Subtask 6.2 Assessment of capture technology and techno-economic analysis (TEA)

Subtask 6.2.1 Gas emission data collection

Subtask 6.2.2 Carbon capture technology evaluation

Subtask 6.2.3 Preliminary process design and TEA analysis

# Task 7.0 Pipeline Front-End Engineering Design (FEED) Study

Subtask 7.1 Pipeline route optimization and associated surveys/investigations:

Subtask 7.2 Design Basis Document

Subtask 7.3 Key design calculations

Subtask 7.4 Preliminary Hazard and Operability Analysis (HAZOP)

Subtask 7.5 Critical safety and risk assessment

Subtask 7.6 Potential of repurposing existing pipeline and utilizing rights-of-way for CO2 transport

Subtask 7.7 Construction and Environmental Specifications

Subtask 7.8 Project cost estimate

# Task 8.0 Business and Financial Plans and Arrangements

Subtask 8.1 Business Plan

Subtask 8.2 Project Financing Plan

Subtask 8.3 Financial Model

Subtask 8.4 Contracts

Subtask 8.5 Site Ownership & Control documentation

Subtask 8.6 Agreement(s) with Stakeholders and Affected Communities

Subtask 8.7 Permits

Subtask 8.8 Schedule



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

# Task 9.0 Community Benefits

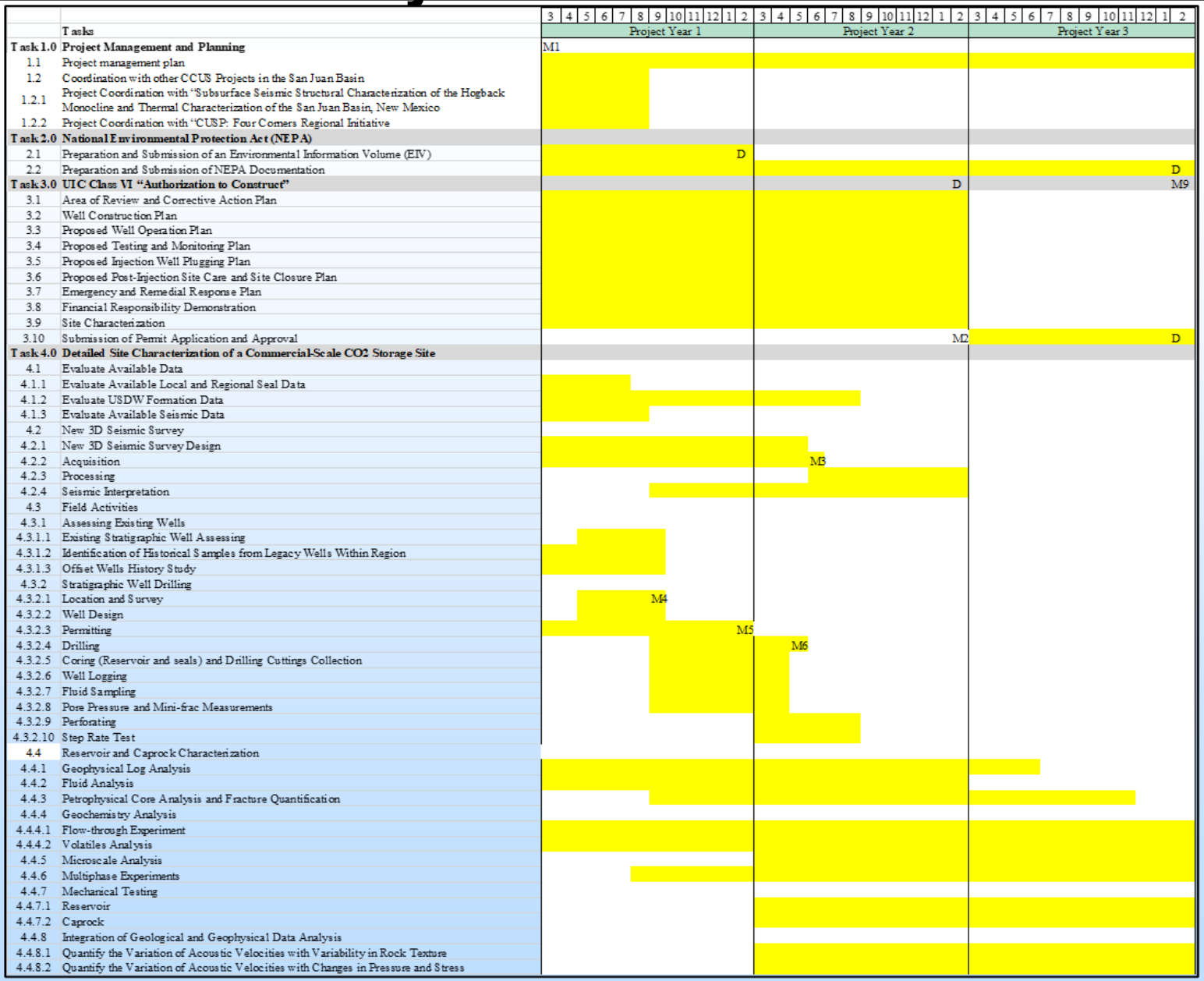
Subtask 9.1: Community and Labor Engagement: This task will include all activities necessary to fulfill the Community and Labor Engagement commitments and milestones in the CBOO.

Subtask 9.2 Investing in Job Quality and a Skilled Workforce: This task will include all activities necessary to fulfill the Investing in Job Quality and a Skilled Workforce commitments and milestones in the CBOO.

Subtask 9.3 Diversity Equity Inclusion and Accessibility: This task will include all activities necessary to fulfill the Diversity Equity Inclusion and Accessibility commitments and milestones in the CBOO.

Subtask 9.4 Justice40 Initiative: This task will include all activities necessary to fulfill the Justice40 Initiative commitments and milestones in the CBOO.

# Project Timeline

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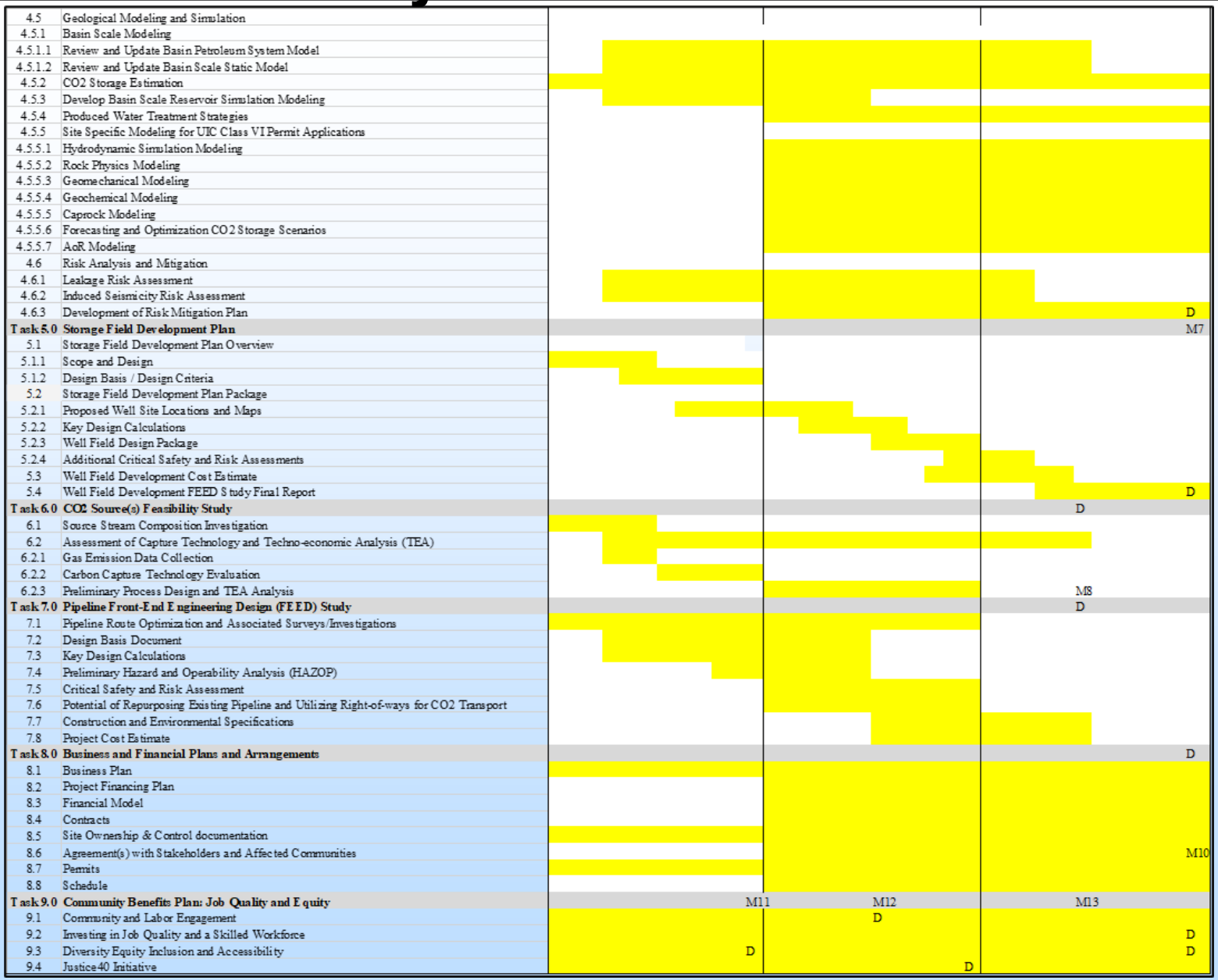
# Project Timeline

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# Project Milestones

| Task / Subtask | Milestone Title & Description | Planned Completion date | Verification method |
|---|---|---|---|
| 1.0 | Kickoff Meeting | 90 days after award | Attend and present at DOE kickoff meeting |
| 2.1 | Submittal of EIV(s) | End of BP1 | EIV(s) submitted to DOE and DOE determines EIV(s) is complete |
| 2.2 | EA or EIS issued by DOE | End of BP3 | Finding of No Significant Impact or Record of Decision issued by DOE |
| 4.3.2.1 | Land access granted and stratigraphic well permits submitted | 7 months after award | Land access granted and permits received by permitting authority |
| 4.3.2.3 | Stratigraphic well permits approved for each site | 12 months after award | Stratigraphic well drilling permits received from permitting authority |
| 4.3.2.4 | Stratigraphic well drilling and logging completed for each site | 15 months after award | Complete well drilling and logging. Daily drilling reports available. |
| 4.2 | 3D Seismic permitting and data acquisition completed for each site | 16 months after award | Receive permit to acquire 3D seismic data. Seismic data submitted to NMT. |
| 3.10 | EPA Class VI permit to construct submitted for each site | End of BP2 | Received submission notice from EPA stating application is administratively complete |
| 3.10 | EPA Class VI permit approved for each site | End of BP3 | Received UIC Class VI permit notice from EPA for each site |



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# 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<br>☐ Not at this time | Parties and scope identified | Final Agreement Draft | Agreement signed |
| *Collective Bargaining Agreement (operating jobs)* | ☒ Yes<br>☐ Not at this time | Unions identified | Report engagement with unions | |
| *Project Labor Agreement (construction jobs)* | ☒ Yes<br>☐ Not at this time | Parties and scope identified | Initial discussions and meeting | Efforts report. Executed agreement prior to construction |
| *Community Workforce Agreement* | ☒ Yes<br>☐ Not at this time | Parties and scope identified | Initial discussions and contact/ stakeholder list | Efforts report. Executed agreement prior to construction |
| *Develop Outreach Material* | ☒ Yes<br>☐ Not at this time | Annual project meeting | Website online | |
| *Community feedback and data incorporated into the project* | ☒ Yes<br>☐ Not at this time | Three Workshops | Two Workshops | Two Workshops |

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# 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<br>☐ 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<br>☐ No | | Initial white paper on economic and job creation impact | Revised, white paper on economic and job creation impact |



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# CBP Milestones

| Diversity, Equity, Inclusion, and Accessibility | | | | |
|---|---|---|---|---|
| *Local recruitment efforts. Ensure local communities have access to jobs.* | ☒ Yes<br>☐ 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<br>☐ 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<br>☐ No | MSI and underrepresented business Identification | MSI and underrepresented business Engagement | |
| *Partner with quality pre-apprenticeship or apprenticeship readiness program* | ☐ Yes<br>☒ No | | | |
| *Advancing Diversity, Equity, Inclusion, and Accessibility* | ☒ Yes<br>☐ 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 |



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# CBP Milestones

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



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# Project Deliverables

| Task/ Subtask Number | Deliverable Title | Due Date |
|---|---|---|
| **1.0** | Project Management Plan | Update due 30 days after award. Revisions to the PMP shall be submitted as requested by the NETL Project Manager. |
| **1.0** | Final Risk Register | Update 90 days after award. Revisions to the risk register shall be submitted as requested by the NETL Project Manager. |
| **2.1** | Environmental Information Volume(s) | At the end of Budget Period 1 |
| **2.2** | NEPA Documentation (EA or EIS) | Due at project completion |
| **3.0** | Applications for Underground Injection Control Class VI Permit to Construct | At the end of Budget Period 2 |
| **4.6** | Risk Assessment and Mitigation Plan | At the end of Budget Period 3 |
| **4.0** | Geologic Catalog of Materials | At end of each Budget Period |
| **5.4** | Storage Field Development Plan supported by AFE's | At the end of Budget Period 3 |
| **6.0** | $CO_2$ Source(s) Feasibility Study | 30 months after award |
| **7.0** | $CO_2$ Pipeline FEED Study | 30 months after award |
| **8.0** | Initial draft of business and financial plans | At the end of Budget Period 3 |



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# SOPO Goals, Objectives, Success Criteria

| Objective/ Decision Point | Success Criteria |
|---|---|
| Complete NEPA work [Task 2] | EIVs are submitted and an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) is completed. |
| Complete and submit the UIC Class VI permit to construct application packages [Task 3] | The permit application packages for all the proposed storage sites are submitted, reviewed, and approved by EPA Region VI. |
| Complete storage characterization efforts of the Four Corners region [Task 4] | Identification of several storage reservoirs within the region with commercial scale storage capacity. |
| Complete stratigraphic well construction and data collection during the drilling and completion phases [Task 4] | The stratigraphic wells receive the drilling permit and are drilled and completed successfully. All the proposed logging, coring, fluid sampling activities are completed. |
| Develop the Storage Field Development Plan for the basin [Task 5] | The Storage Field Development Plan is well developed and documented. |
| Gather and catalog $CO_2$ emissions (point) source data [Task 6] | Consolidate updated $CO_2$ source and capture data for the Four Corners region into a single database for prioritization of CCUS options. |
| Pipeline Front-End Engineering Design (FEED) Study completed [Task 7] | Consolidate Rights-of-Way and pipeline data for the Four Corners region into a single database with emphasis on cost minimization between major sources and sinks. |
| Develop the Business and Financial Plans and Arrangements [Task 8] | Business and Financial Plans and Arrangements are completed and documented. |
| Conduct community outreach and public engagement of identified stakeholders. Assess Environmental Justice & Justice40 impact to Disadvantaged Communities [Task 9] | Project is well recognized and accepted by the local communities and stakeholders. Positive project environmental and economic impacts to Disadvantaged Communities is identified and quantified. |



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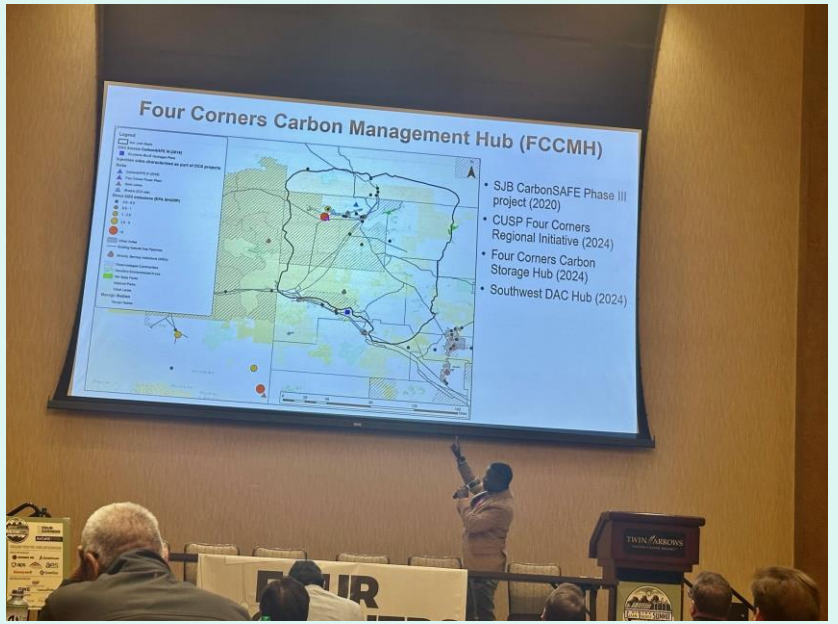
# Community and Stakeholder Engagements so far

- 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
- Presented at Clean Energy Summit for Navajo Nation officials, April 23, 2024
- Presented Four Corners storage projects to San Juan County Commission
- Presented Four Corners storage projects to Farmington City Council Meeting
- Developed strong relationship with NTEC Helium subsurface group. Will provide permitting and environmental support
- Strong engagement with NAPI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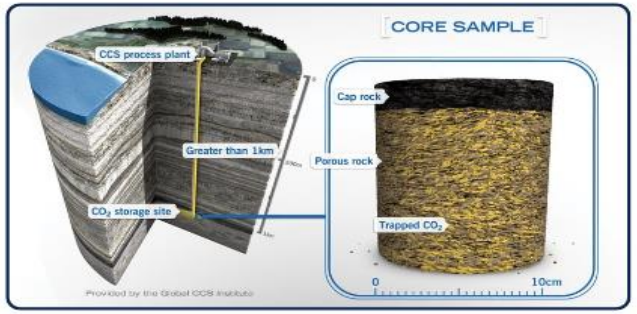
# Project Facts Sheet

# The Four Corners Carbon Storage Hub

**CarbonSAFE Phase III**

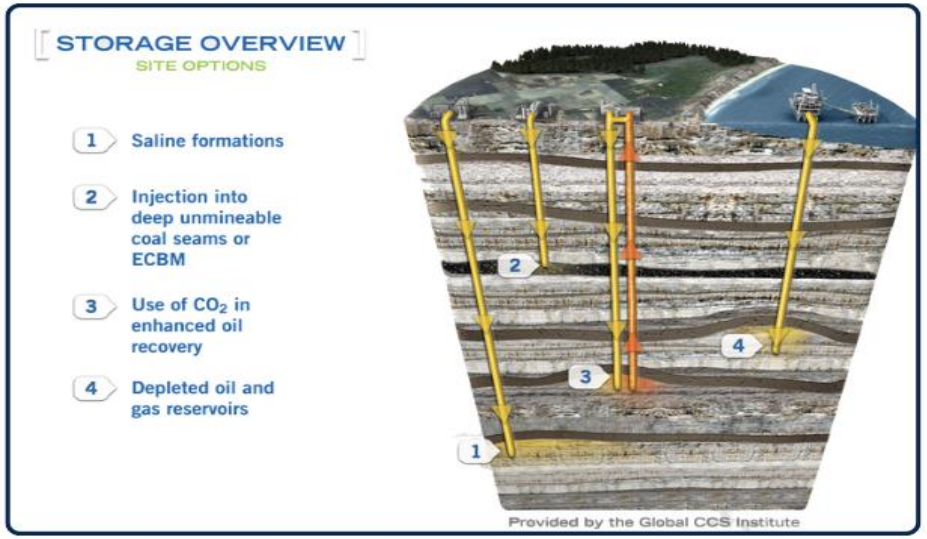
## ABOUT THE PROJECT

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.

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# Project Risk

| ITEM | SOURCE<br>G, R or Other | RISK ASSESSMENT<br>(Identification & Evaluation of Risk Events)<br>• Description and Evaluation<br>• Probability (Low, Moderate or High) - explain<br>• Impact (Low, Moderate or High) - explain | DEGREE OF RISK<br>(See Risk Calculation Chart) | RISK MANAGEMENT<br>(Response & Mitigation Strategies)<br>*All High-risk events/categories must include a detailed evaluation; response plan; mitigation strategy; and critical oversight (actions to monitor events deemed critical) are required.* |
|---|---|---|---|---|
| 1.02 | R | Inadequate controls for funds management. A lesson learned from the SJB CarbonSAFE III project is that the invoice submittal sent by the vendors may be delayed by several days. There could be instances where drilling costs are not clearly relayed to operators on time for immediate action.<br><br>Probability: Moderate<br>Impact: Moderate | **Moderate** | NMT will utilize reimbursement payment system with DOE's evaluation and approval and with subrecipients. The payment will be processed via invoice. All the subrecipients and vendors will need to provide the detailed invoice each month and be evaluated by Sponsored Project Administration (SPA) at NMT. NMT procurement, SPA, and NMT technical team will work closely to prevent cost overruns. NMT will utilize a Microsoft based project management system including Microsoft Project to track field tasks in relation to costs prior to payment of invoices. Field tickets from drilling activities must be matched to invoices prior to payment. NMT is hiring a cost analyst specifically to provide support to the project administration in tracking drilling related expenses to avoid cost overruns. |
| 2.02 | R | Long lead time of the chrome casing. The premium casing needs to be transported from the abroad mill factory and may cause the delay of the shipment.<br>Also, the project start date could impact the material availability.<br><br>Probability: Moderate<br>Impact: Moderate | **Moderate** | NMT enrolled the CRA company as the premier vendor providing the chrome casing and NMT is maintaining the dialog with CRA management team to assure NMT/ Tres Management will have the priority to access their chrome casing. Once the project is awarded, NMT will work with Tres Management and CRA to procure the chrome casing which has a long lead time. This might result in a storage fee which is very minimal. |



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

# Project Risk

| ITEM | SOURCE G, R or Other | RISK ASSESSMENT (Identification & Evaluation of Risk Events) • Description and Evaluation • Probability (Low, Moderate or High) - explain • Impact (Low, Moderate or High) - explain | DEGREE OF RISK (See Risk Calculation Chart) | RISK MANAGEMENT (Response & Mitigation Strategies) *All High-risk events/categories must include a detailed evaluation; response plan; mitigation strategy; and critical oversight (actions to monitor events deemed critical) are required.* |
|---|---|---|---|---|
| 2.06 | R | Agreement structure, adequacy of budget periods, decision point definitions, time allotted for decisions. There could be a potential lengthy well permitting process on the Navajo Nation land. A long permitting timeline for the wells and 3D seismic aquisition could delay analysis needed to support the UIC Class VI permit submission and might impact the timeline for budget periods and/or decision points.<br><br>Probability: Moderate<br>Impact: Moderate | **Moderate** | NMT allocated one year for stratigraphic well permitting, which is expected to be conservative. The project will also advance using existing data in the area to commence the UIC Class VI permit preparation. This will reduce any potential delays that could be caused by the lengthy permitting process. A no-cost extension could be utilized to advance project scope resulting from uncontrollable delays that materialize. |
| 3.08 | R | Approval of Class VI permits may take considerable amount of time that goes beyond the scheduled three years of the project<br><br>Probability: Moderate<br>Impact: Moderate | **Moderate** | This has been the experience on other funded CarbonSAFE projects including the SJB CarbonSAFE. We will monitor the timeline for the permit application, submission and reviewing process to information DOE accordingly if no cost extension would be needed to while waiting for final approval from EPA. |
| 4.01 | R | Lack of site ownership and access. The location of proposed wells requires a lease and rigrous permitting requirements especially on Tribal (Navajo Nation) lands. The permitting and leasing processes could be lengthy and subsequently delay projects progress in achieving objectives on schedule.<br><br>Probability: Moderate<br>Impact: Moderate | **Moderate** | NTEC, NNOGC, and several other will assist in the permitting and drilling of the proposed characterization wells. As part of the project negotiations, NTEC provided the project with their leased area map. NTEC controls some of the areas and/or operates close to the two selected FCPP storage sites. Shadinn Holding committed their site accessibility and permission to re-enter the Pathfinder well for site characterization. |



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# Acknowledgements

The project would like to thank DOE for the award opportunity through DE-FE0032442 and our partners. We would like to acknowledge additional support from existing projects within the Four Corners Region and project partners.

# Organization Chart