



Tri-State CCS Hub

CarbonSAFE Phase III

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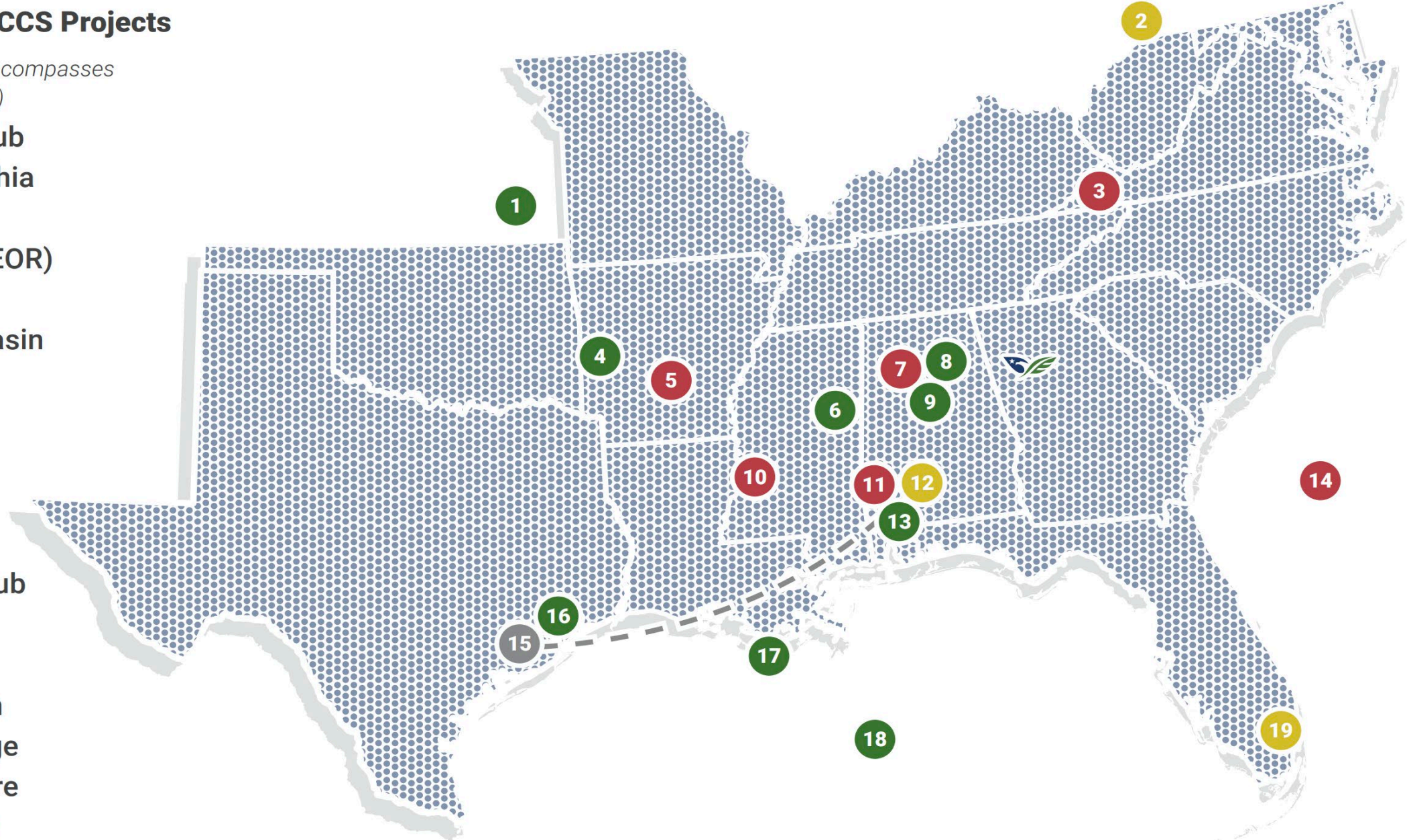
Note that the project is not currently under award, and as a result, I am unable to entertain questions.



Current and Former CCS Projects

- 1. SECARB-USA (*encompasses majority of our region*)
- 2. Tri-State CCS Hub
- 3. Central Appalachia
- 4. Foreman FEED
- 5. Arkansas (CO₂-EOR)
- 6. Kemper County
- 7. Black Warrior Basin
- 8. Project OASIS
- 9. NCCC (DAC)
- 10. Cranfield
- 11. Citronelle
- 12. SEDAC Hub
- 13. Lingleaf CCS Hub
- 14. SOSRA
- 15. Petra Nova
- 16. Univ. of Houston
- 17. Project Lochridge
- 18. SECARB Offshore
- 19. Project ACCESS

● Open Project ● Under Negotiation
● Closed Project ● Technology Transfer



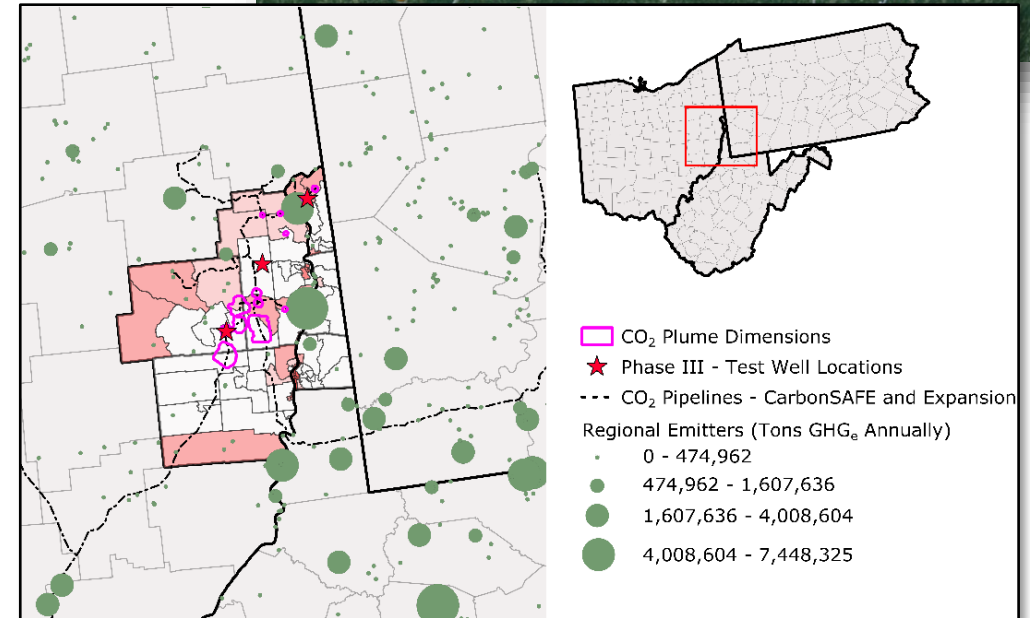
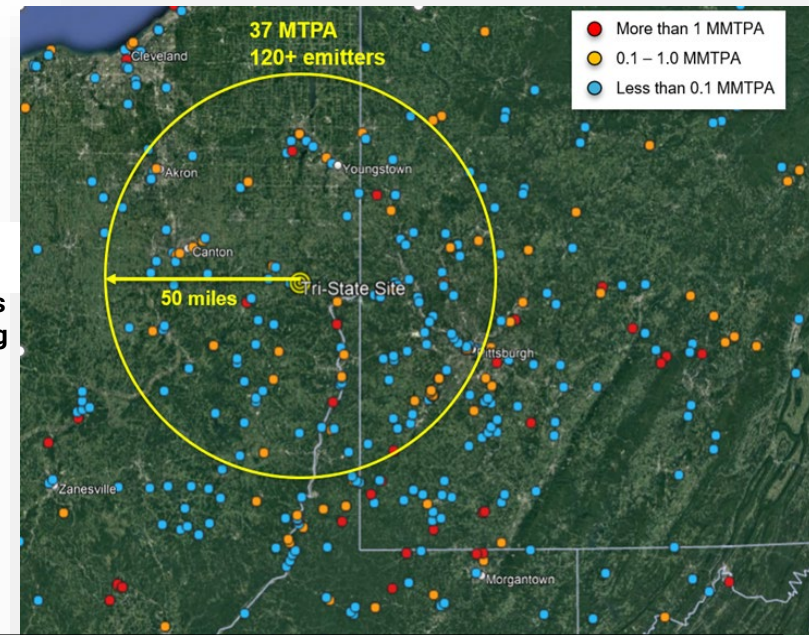
Overview

TRI-STATE CCS HUB BUCKEYE • REDBUD • OAK GROVE

- The Tri-State CCS Hub seeks to significantly reduce carbon dioxide (CO₂) emissions in an industrial region of eastern Ohio, the adjacent northern panhandle of West Virginia, and western Pennsylvania
- Demand for CO₂ storage solution
 - Over 120 facilities within 50 miles of the project area emitting over 37 Mmtpa, **approximately 20 Mmtpa have shown support**
- Opportunity to coordinate project development activities between multiple state and federal agencies - applicability to other industrial clusters

Period of Performance: 36 months (dates TBD)
Overall Budget: \$69,060,837 (\$13,812,663 cost-share)

Map illustrating the location of emitters in the Tri-State region. The circle represents a 50-mile radius surrounding the centroid of the Tri-State CCS Hub project location.

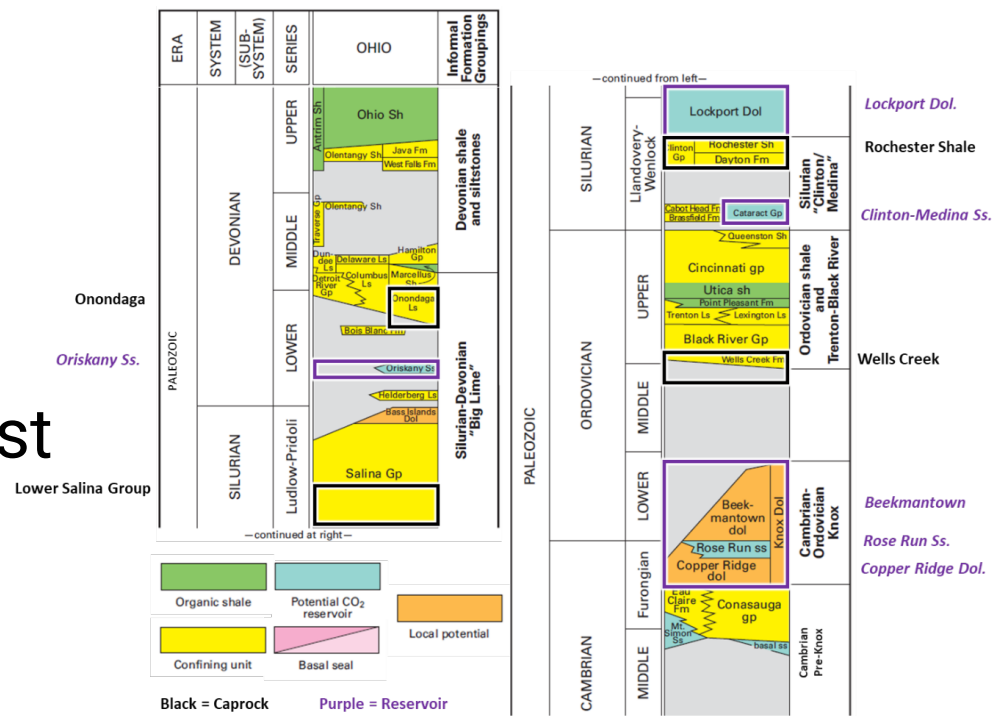


Three-county area of the Tri-State CCS Hub with the location of emitting facilities (green circles). Also shown is population density by census tract.



Background

- CarbonSAFE to focus on three-county area in Ohio (Harrison County, Jefferson County) and West Virginia (Hancock County)
- Targeting multiple CO₂ storage intervals in the Paleozoic section (Cambrian through Devonian)
- Numerous interbedded shale and limestone formations
- Regionally heterogenous, requiring distributed hub model
- P50 estimates of 1,128 MMT
 - Fairly large area used for calculation



Left: Stratigraphic column depicting the stratigraphic position of proposed reservoirs (highlighted in purple) and caprocks (highlighted in black) within the TSCCS project (modified from Perry, 2022). Bottom: Formation properties for the deep and shallow storage intervals.

Attribute	Oriskany	Lockport	Clinton	Beekmantown	Rose Run	Copper Ridge
Mean Formation Depth (ft., elev.) ¹	-4044	-5430	-6051	-9141	-9707	-9857
Gross Reservoir Thickness, mean (ft.) ¹	18	368	142	568	27	337
Average Total Porosity (%) ¹	4	3	5	3	3	3
Average Permeability (mD) ¹	6.1	2.8	2.3	0.2	0.1	0.2
Estimated TDS Estimate Range (ppm) ²	229,432	266,708	281,777	351,247	363,428	365,901
Lithology	Sandstone	Dolomite	Sandstone	Dolomite	Sandstone	Dolomite
Depositional Environment	Clastic Shallow Shelf	Reef	Shallow marine	Peritidal Shelf	Peritidal Shelf	Peritidal Shelf



Scope of Work

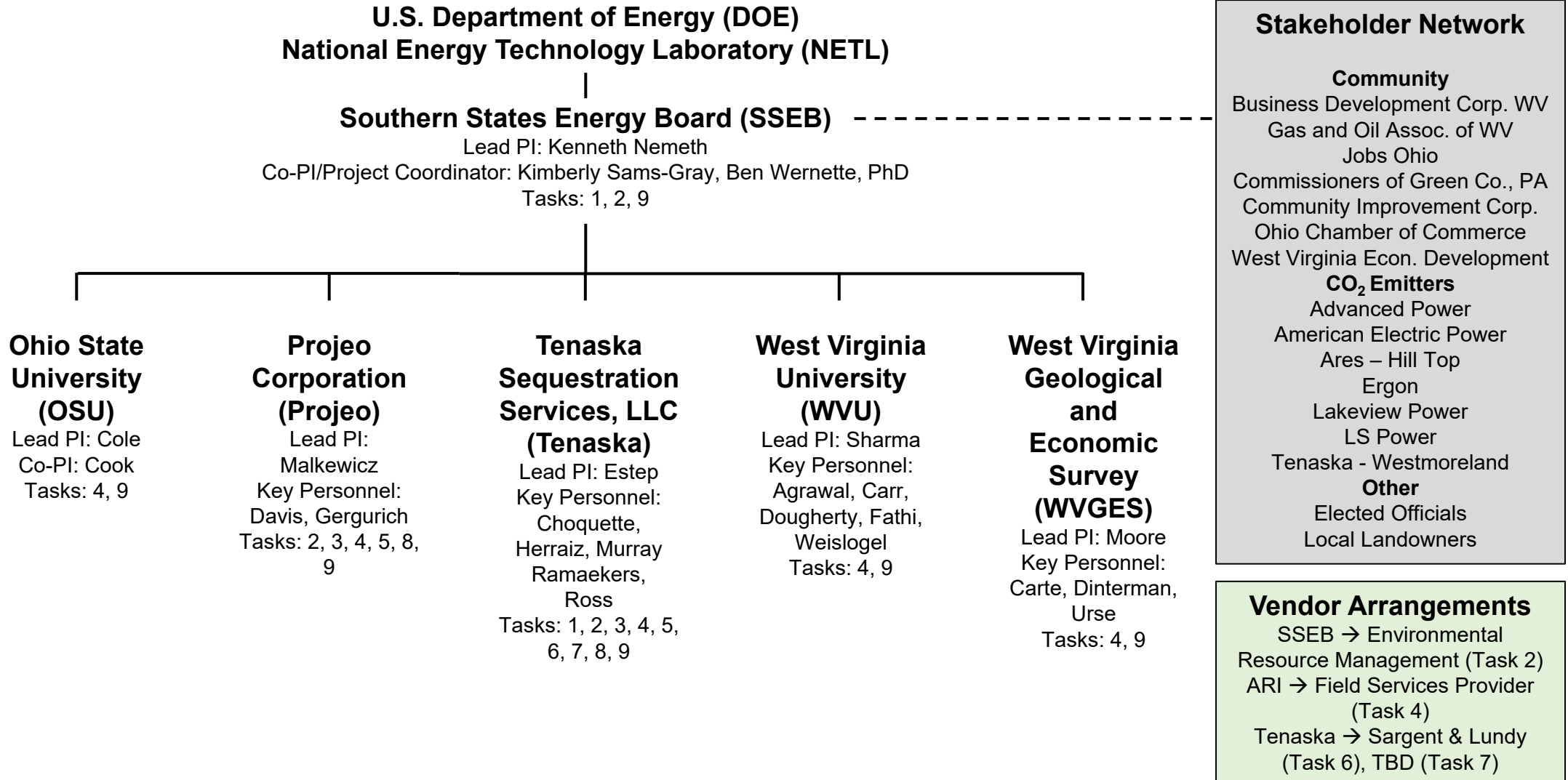
Task	Relevant Considerations
Task 1 – Project Management and Planning	Multiple Decision Points
Task 2 – National Environmental Protection Act	General Strategy of Reducing Project Impacts by Utilizing Existing ROWs
Task 3 – UIC Class VI Permit Application	Collaboration with Multiple Federal and State Agencies
Task 4 – Detailed Site Characterization	Seismic Acquisition, Three Stratigraphic Wells (downhole, core) Completed as Monitoring Wells
Task 5 – Storage Field Development Plan	Existing Well Penetrations in Region – over 400
Task 6 – CO ₂ Source Feasibility Study	Numerous Facilities with Different Emissions Profiles
Task 7 – CO ₂ Pipeline FEED Study	Extensive Network, Challenging Terrain
Task 8 – Business and Financial Plans	Requisite Land Agreements
Task 9 – Community Benefits Plan	Focus on Community Input, Interstate Coordination



Decision Point	Date	Success Criteria
Decision Point 1	TBD	<ul style="list-style-type: none"> • NETL Project Kick-Off Meeting Complete • Host Initial Community Workshop Focused on Activities and Goals • Submit Report and Presentation to DOE-NETL Detailing Regulator and Community Interactions and Efforts to De-Risk Drilling Program; including: <ol style="list-style-type: none"> 1. Detailed accounting of discussions with Local, State, and Federal Community Leaders 2. Community Interactions and feedback, and steps taken to address community concerns in project planning; and evaluation of communication effectiveness
Decision Point 2	TBD	<ul style="list-style-type: none"> • Complete Acquisition of Seismic Data • Drill Stratigraphic Test Well No. 1 <ul style="list-style-type: none"> ○ Preliminary assessment of drilling program including available data from drilling activities
BP1	Project Mid Point	<ul style="list-style-type: none"> • All project milestones are achieved and verified. • All project deliverables are completed and submitted to DOE/NETL. • Achieve BP1 objectives, include: <ul style="list-style-type: none"> ○ Class VI UIC permit application submitted ○ Submit NEPA Environmental Information Volume ○ Complete Seismic Acquisition ○ Host Initial Project DEIA Workshop ○ Host Community Engagement event and incorporate into Project Decision Making ○ Initiate Community Benefits Plan ○ Drill at least one stratigraphic test well
Project Completion	TBD	<ul style="list-style-type: none"> • All project milestones are achieved and verified • All project deliverables are completed and submitted to DOE/NETL • Achieve all project objectives, including: <ul style="list-style-type: none"> ○ Demonstrate that the subsurface saline formations at the Storage Complex can store at least 50 million metric tons of captured CO₂ safely and permanently over a 30-year period ○ Conduct meaningful engagement and two-way communications with communities and stakeholders, execute far-reaching educational and career program ○ Obtain Class VI UIC permits ○ Mature understanding of regional CO₂ sources ○ Develop a comprehensive pipeline FEED to support future pipeline construction; ○ Develop storage field development plan ○ Identify commercial project risks and develop a comprehensive mitigation strategy; and ○ Complete the NEPA process



Tri-State Organization Chart



Work to Date

- Respond to negotiations requests from DOE-NETL
- Update stratigraphic test authorization for expenditures (AFEs)
- Tenaska continues to mature site access agreements and emitter relations
- Held community meetings to discuss project activities
- One of six planned Class VI permit apps submitted - admin complete
- Webpage: www.tristateccs.com



Top: Image from the Tri-State CCS webpage. Bottom: Photograph of an outreach event in the Tri-State area. Both images courtesy of Tenaska.



Schedule

- Period of performance: 36 months, TBD
- Fairly aggressive in BP1 with decision points based on progress
 - Opportunity to derisk the project
- Three stratigraphic test wells
- Seismic acquisition
- Community engagement and incorporation into project decision making
- Requisite permitting completed
- NEPA compliance

Tri-State CCS Hub Schedule	Budget Period 1												Budget Period 2											
	Year 1						Year 2						Year 3											
	2024	2025	2026	2027	2028	2029	2024	2025	2026	2027	2028	2029	2024	2025	2026	2027	2028	2029						
Task 1.0 - Project Management and Planning																								
Subtask 1.1 - Data Management Plan																								
Subtask 1.2 - Cybersecurity Plan																								
Task 2.0 - National Environmental Policy Act (NEPA)																								
Subtask 2.1 - Preparation and Submission of an Environmental Impact Statement (EIS)																								
Subtask 2.2 - Preparation and Submission of NEPA Documentation																								
Task 3.0 - UIC Class VI Authorizations in Consent																								
Subtask 3.1 - UIC Class VI Permit Application based Upon Characterization Results																								
Subtask 3.2 - Technical Review and Plan Update																								
Task 4.0 - Detailed Site Characterization of a Commercial-Scale CO ₂ Storage Site																								
Subtask 4.1 - Well Site Selection, Risk Assessment, and Design																								
Subtask 4.2 - Seismic Data Acquisition and Processing																								
Subtask 4.3 - Characterization Well Drilling and Geologic Data Collection																								
Subtask 4.4 - Seismic Data Analysis																								
Subtask 4.5 - Reserve Market Update																								
Subtask 4.6 - Necessary Landowner and Other Legal Requirements for Commercial Operations																								
Task 5.0 - Storage Field Development Plan																								
Subtask 5.1 - Storage Site Operations																								
Subtask 5.2 - Estimation of Storage Site Construction, Operation, and Closure Costs																								
Subtask 5.3 - Storage Knowledge Management System (SKMS) Program																								
Subtask 5.4 - Communication Plan																								
Task 6.0 - CO ₂ Storage Feasibility Study																								
Subtask 6.1 - CO ₂ Storage Characterization																								
Subtask 6.2 - Capture Characterization																								
Subtask 6.3 - CO ₂ Storage Feasibility Study																								
Task 7.0 - Pipeline FEED Study																								
Subtask 7.1 - Pipeline FEED Study																								
Task 8.0 - Business and Financial Plans and Arrangements																								
Subtask 8.1 - Project Financing Plan and Financial Model																								
Subtask 8.2 - Project Contracts, Permitting, and Agreements																								
Subtask 8.3 - Preliminary Business Plan																								
Task 9.0 - Community Benefits Plan																								
Subtask 9.1 - Community and Labor Engagement																								
Subtask 9.2 - Improving Job Quality and a Skilled Workforce																								
Subtask 9.3 - Diversity, Equity, Inclusion, and Accessibility (DEIA)																								
Subtask 9.4 - Justice40 Initiative																								
Subtask 9.5 - Technical Outreach																								

SUBJECT TO CHANGE





Thanks!

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Southern States Energy Board

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Acknowledgements

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