SOUTHEAST REGIONAL CO_2 UTILIZATION
SECARB-USA
and STORAGE ACCELERATION PARTNERSHIP

SOUTHERN STATES ENERGY BOARD

SECARB-USA: A Year in Review

DE-FE0031830
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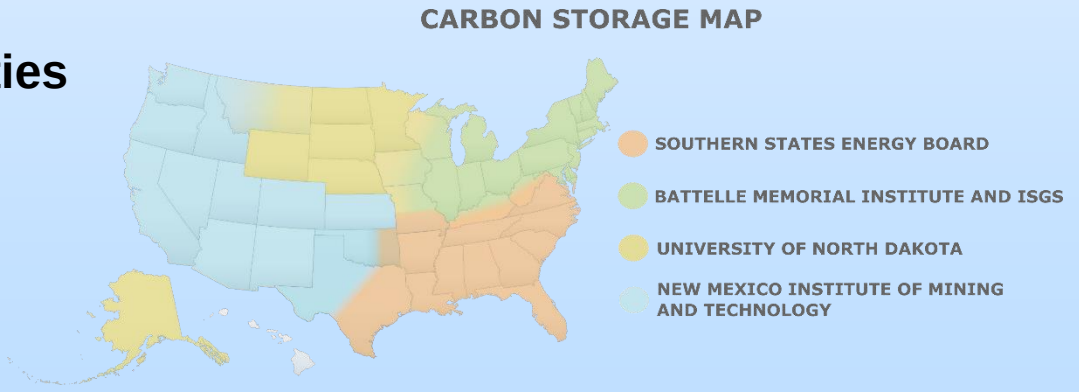
Project Partners

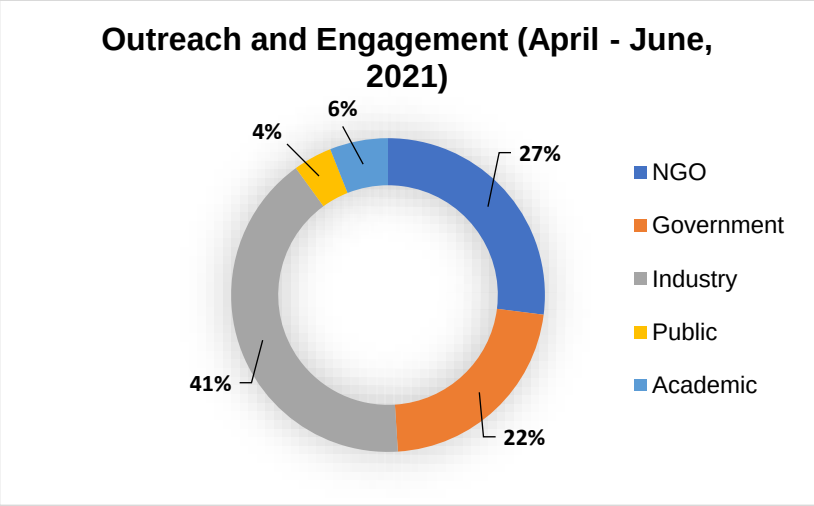
Presentation Outline

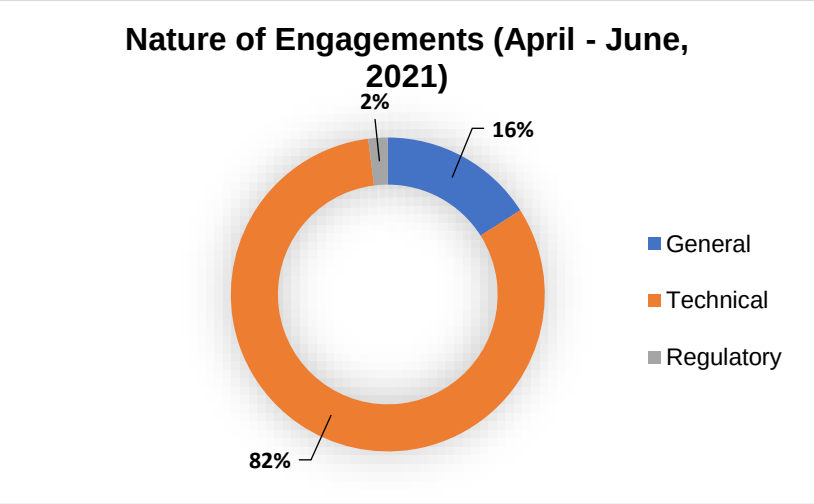
- **Technical Status, Accomplishments to Date, Lessons Learned**
  - Commercial interest upswing!
  - General Outreach and Engagement
  - Cost of Site Characterization
  - Industry Partner Commitment
  - Infrastructure Buildout Scenarios
  - Non-technical challenges report
  - Outreach and cross partnership collaboration
- **Accomplishments**
- **Ongoing and Planned Activities**
- **Mandatory Appendix**



Commercial Interest Upswing

- The SECARB-USA team continues to host regular meetings with stakeholders in the region
- Nature of engagements are generally technical in nature
- In total, 51 separate meetings during Q2 of 2021
- Importantly, SECARB-USA technical expertise and past work commonly contributes to knowledge shared during these meetings



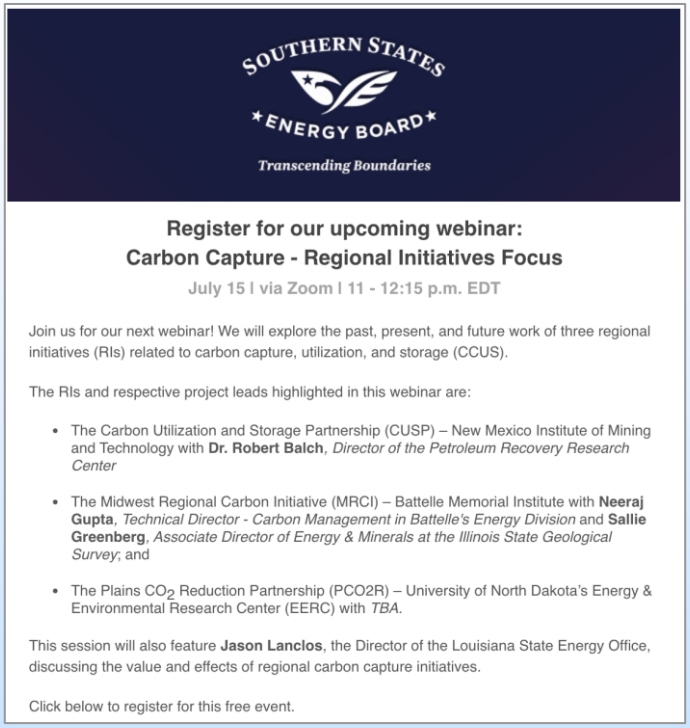


General Outreach and Engagement

- Continue to coordinate activities with the other Regional Initiatives to avoid duplication of effort

- Currently participating in regularly outreach and engagement working group meetings with the other Regional Initiatives

- The Southern States Energy Board hosted a Regional Initiative Webinar to provide stakeholders with overview of regional CCUS successes and challenges
  - Over 100 registrants
  - Representation from each of the four Regional Initiatives
  - Director of the Louisiana State Energy Office



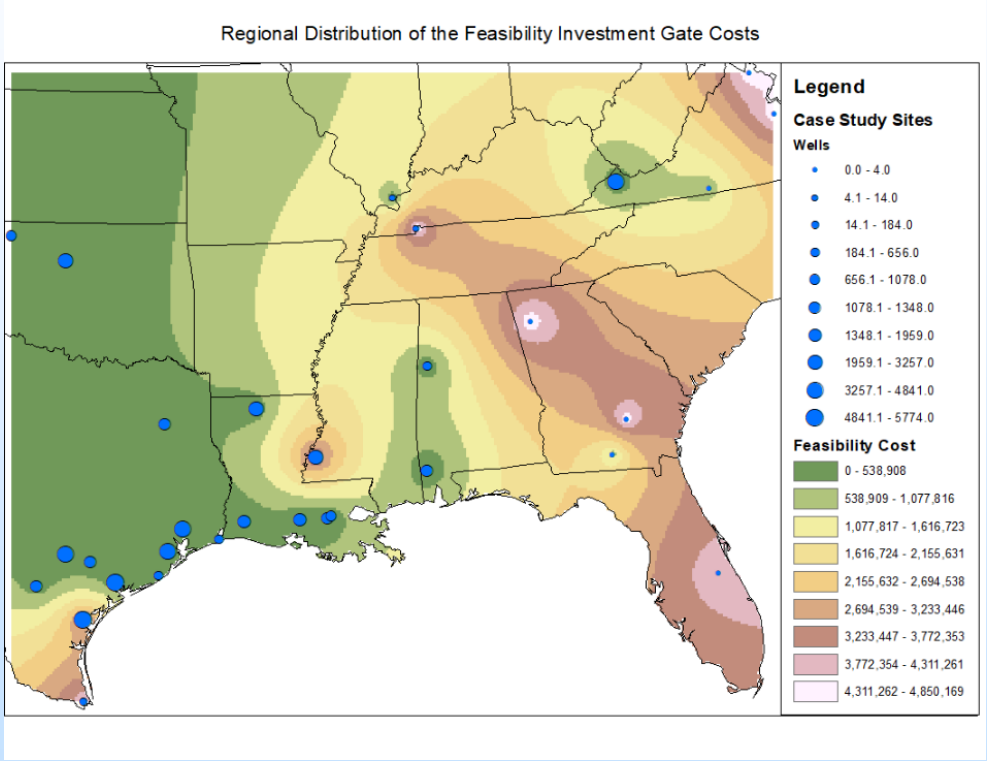
SSEB Regional Initiative Webinar registration landing page

Study of Cost of Site Characterization: Motivation

- Recurrent question from industries considering CCS as part of GHG emissions reduction portfolio schedule of cost – especially cost of early stages prior to investment decision
- Study to assess portfolio pre-permitting costs
- Rubric of 42 categories for data density and urgency
- Completed by 11 SECARB team members for 31 sites
- Costs are modest, but experience shows that risk of project not reaching investment decision are relatively high
- Taylor Barnhart, UT-Austin, thesis work

Value of Exiting Data to Lowering Feasibility Assessment Cost

- Regional distribution of the feasibility investment gate costs (green=low) with well density (IHS Markit database) within 10 miles of each site (blue dots)
- There is strong correlation with existence of 3-D seismic with high well density
- Data density allows for identification of areas requiring further research and investment



Feasibility costs associated with a suite of prospective storage complexes in the region - allows for identification of areas within the region that require additional research and interment

Industry Partners Adding to Regional Knowledge

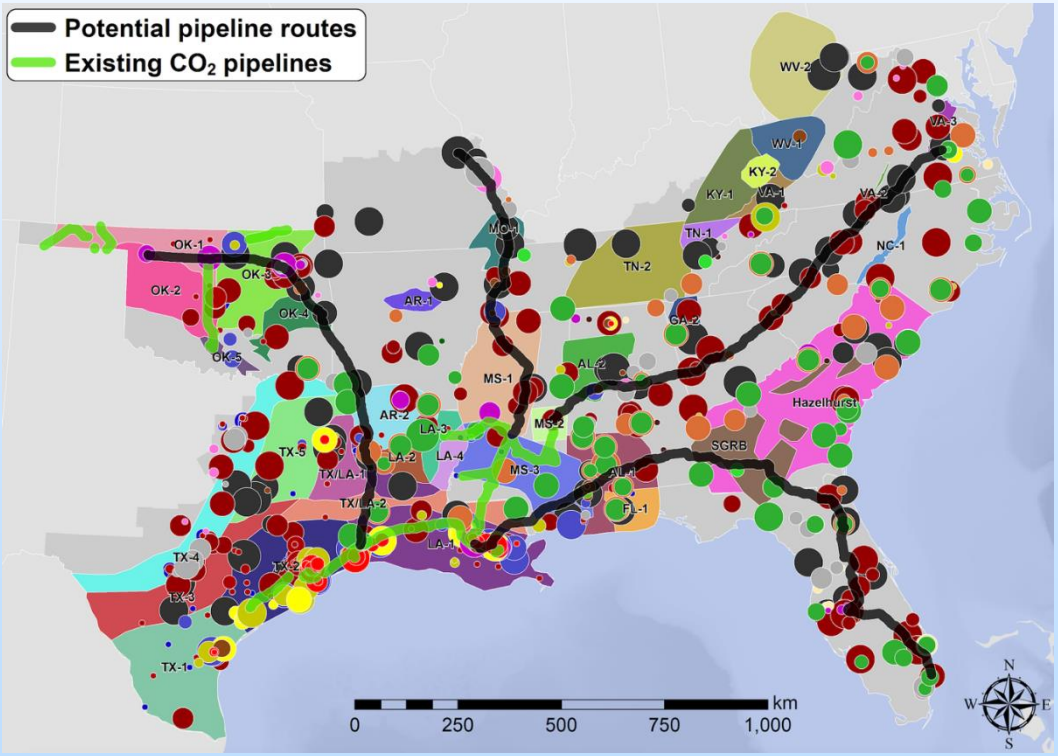
- Industry partner Southern Company is planning stratigraphic test bores in regions with limited data density
- Southern Company-funded test bores planned for Bartow County, GA and Shelby County, AL
  - 'CCUS Wildcat Wells'
- Working closely with SECARB-USA partners (SSEB, Advanced Resources International)
- Produced data will be added to the SECARB-USA regional knowledge base

Approximate location of Southern Company's planned stratigraphic test bores


Bartow Co. site preparation

Technical Status – Regional Infrastructure

- Using SimCCS$^{2.0}$ and CostMAP, potential CO_2 pipeline routing was developed with an emphasis on using existing gas and powerline easements to connect 45Q-eligible sources with the identified Sub-Basins. This initial analysis will be used as one resource as the team develops the forthcoming Techno-Economic Analysis of Infrastructure Buildout Scenarios (Work Product 4.1.b)



Prospective Sub-Basins, existing CO_2 pipelines, proposed CO_2 pipeline routing and 45Q eligible sources

Technical Status – Non-Technical Challenges

Initial Inventory of Non-Technical Challenges to CCUS Development

- Under subtask 5.2: Non-Technical Challenges to CCUS Deployment, the Southern States Energy Board (SSEB) will define and identify An Inventory of Non-Technical Challenges to CCUS Deployment

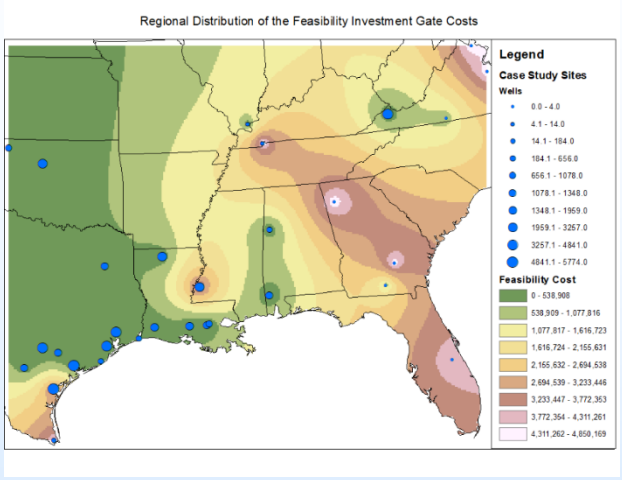
- The Industry and NGO Working Group was comprised of individuals from the following organizations and companies:

Clean Air Task Force[1] (observer)
Environmental Defense Fund
SAS Institute Inc.
Denbury Resources Inc.
Mitsubishi Heavy Industries America
Southern Company

- Prioritized challenges included UIC class VI requirements, state primacy, technology and education challenges, monetizing 45Q, and infrastructure challenges

Accomplishments to Date

- Prepared a needs assessment framework for storage complexes
- Established a data quality methodology and identified 40 prospective sub-basins in the SECARB region
- Developed a sub-basin framework for future CO_2 infrastructure development
- In coordination with the SECARB-USA industry stakeholder network, developed a list of non-technical challenges to the commercial deployment of carbon capture technologies
- The team has identified data required to advance a prospective storage complex towards permit readiness (i.e., Class VI UIC) and the general costs associated with collecting this data



Regional distribution of feasibility investment gate costs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INITIAL INVENTORY OF NON-TECHNICAL CHALLENGES TO CCUS DEPLOYMENT

EXECUTIVE SUMMARY

September 29, 2020

Report Type: Work Product 5.2

Report Issue Date: September 2020

DOE Award Number: DE-FE0031830

Submitting Organization

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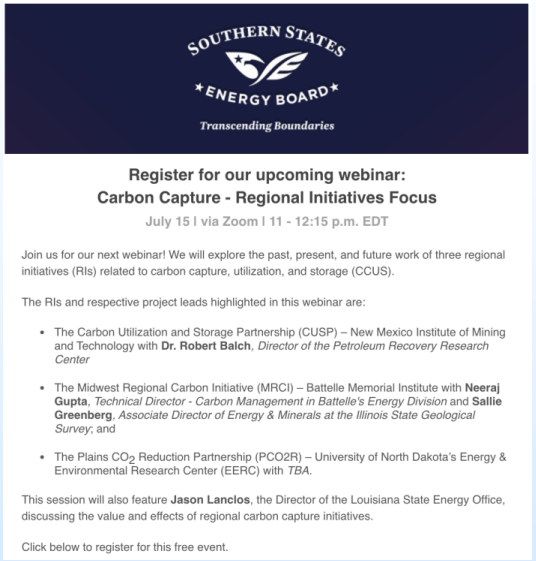
Non-Technical challenges document (Task 5.2)

Accomplishments to Date (continued)

- Hosted discussions with interested stakeholders and utilized SECARB-USA data to inform conversations
- SSEB Regional Initiative Webinar on July 15, 2021, to discuss the successes and challenges of the other initiatives
- Work with industry partners that are actively pursuing CCUS research in the region



SOUTHERN STATES ENERGY BOARD

Transcending Boundaries

Register for our upcoming webinar:
Carbon Capture - Regional Initiatives Focus

July 15 | via Zoom | 11 - 12:15 p.m. EDT

Join us for our next webinar! We will explore the past, present, and future work of three regional initiatives (RIs) related to carbon capture, utilization, and storage (CCUS).

The RIs and respective project leads highlighted in this webinar are:

- The Carbon Utilization and Storage Partnership (CUSP) – New Mexico Institute of Mining and Technology with **Dr. Robert Balch**, *Director of the Petroleum Recovery Research Center*
- The Midwest Regional Carbon Initiative (MRCI) – Battelle Memorial Institute with **Neeraj Gupta**, *Technical Director - Carbon Management in Battelle's Energy Division* and **Sallie Greenberg**, *Associate Director of Energy & Minerals at the Illinois State Geological Survey*; and
- The Plains CO_2 Reduction Partnership (PCO2R) – University of North Dakota's Energy & Environmental Research Center (EERC) with *TBA*.

This session will also feature **Jason Lanclos**, the Director of the Louisiana State Energy Office, discussing the value and effects of regional carbon capture initiatives.

Click below to register for this free event.

SSEB Regional Initiative Webinar registration landing page

Southern Company-funded stratigraphic test boring operations in Bartow County, GA

Ongoing and Planned Activities

- Expand the SECARB-USA industry stakeholder network to include hard to abate industries (e.g., pulp and paper) and continue industry outreach efforts
- Continue to characterize a portfolio of prospective storage complexes with the goal of identifying costs required to advance representative complexes towards permit readiness (Task 2.1.b Milestone on track for 9/30/2021) and develop risk register
- Coordinate with the other Regional Initiatives where possible (e.g., outreach efforts)
- SSEB will host a SECARB-USA informational webinar for interested stakeholders
- Proposed 5/2021: Evaluate infrastructure buildout and source-sink matching scenarios and build an online dashboard to display these data
- Proposed 5/2021: Permit and drill a stratigraphic test well in northwest Georgia to further characterize the geology for a storage complex opportunity where little data currently exists
  - A $0 federal and $2.8 million cost-share commitment to support this effort is pending approval by DOE/NETL.

Lessons Learned

- Observed increase in industry interest in CCUS
- Identification of areas in the region that may require additional data and further investment
- Industry Partners contribution to Regional Initiative mission
- Lots to learn from the experiences of the other Regional Initiatives (outreach, etc.)

Project Summary

- Recent increase in Industrial and other interest
  - 51 separate meetings during Q2 of 2021
- Cost of site characterization
  - Data rubrics allow for the determination of investment at each decision gate
- Techno-economic progress and plans
  - Will build on the current site characterization work and regional knowledge base
- Non-technical challenges report
  - Highlights challenges to the deployment of CCUS and utilized by other DOE-funded studies.
- Outreach and cross partnership collaboration
  - Ongoing in the form of outreach and communication working groups and webinars

SOUTHEAST REGIONAL CO_2 UTILIZATION

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Thank You!

Benefit to the Program

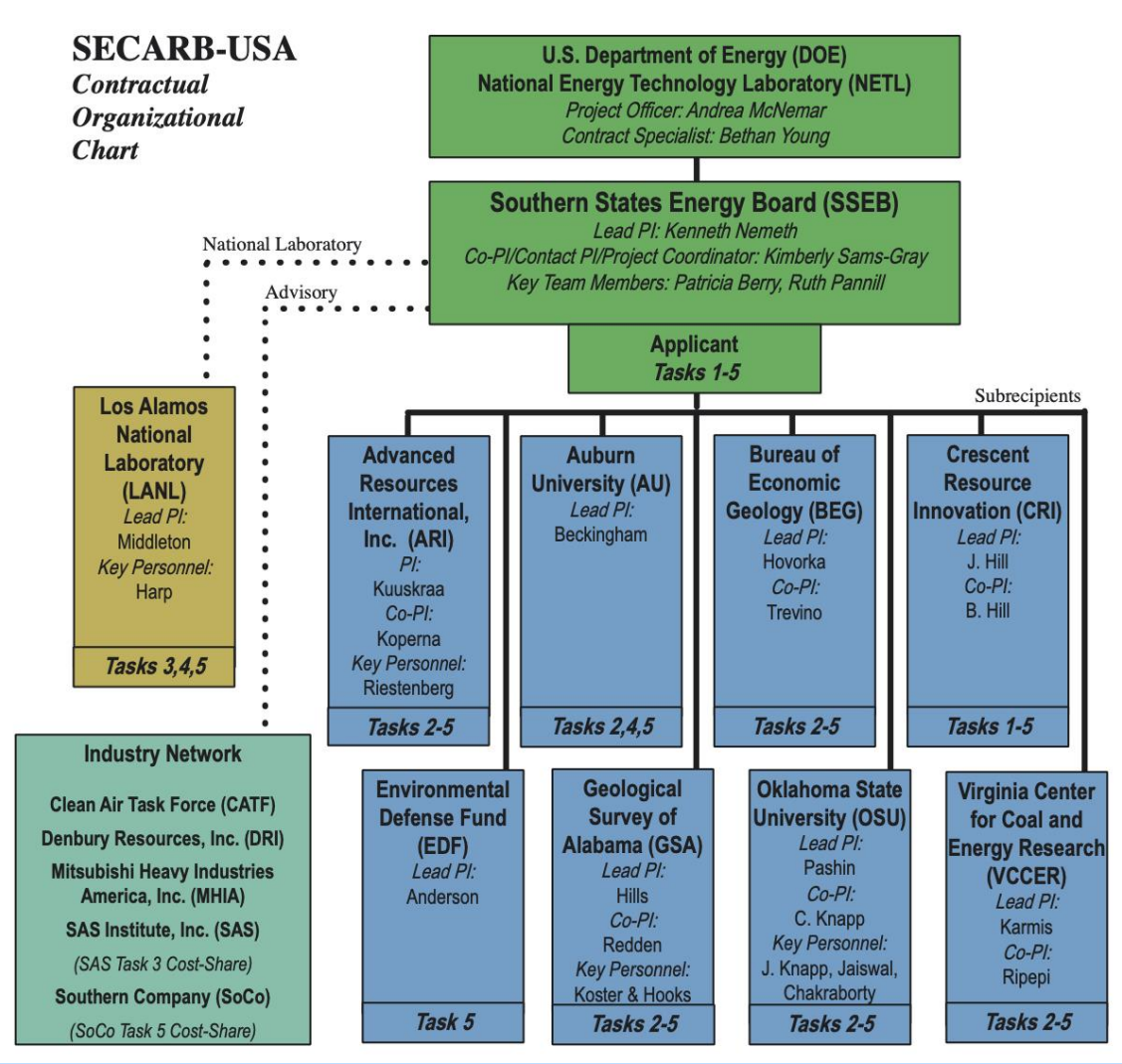
- The “Southeast Regional CO_2 Utilization and Storage Acceleration Partnership” (SECARB-USA) project supports the U.S. Department of Energy (DOE) Office of Fossil Energy's (FE) mission to help the United States meet its need for secure, affordable, and environmentally sound fossil energy supplies by utilizing the advancements made by the Regional Carbon Sequestration Partnership (RCSP) Initiative to continue to identify and address knowledge gaps.
- This regional initiative encompasses the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and portions of Kentucky, Missouri, Oklahoma, Texas, and West Virginia.

Project Overview

Goals and Objectives

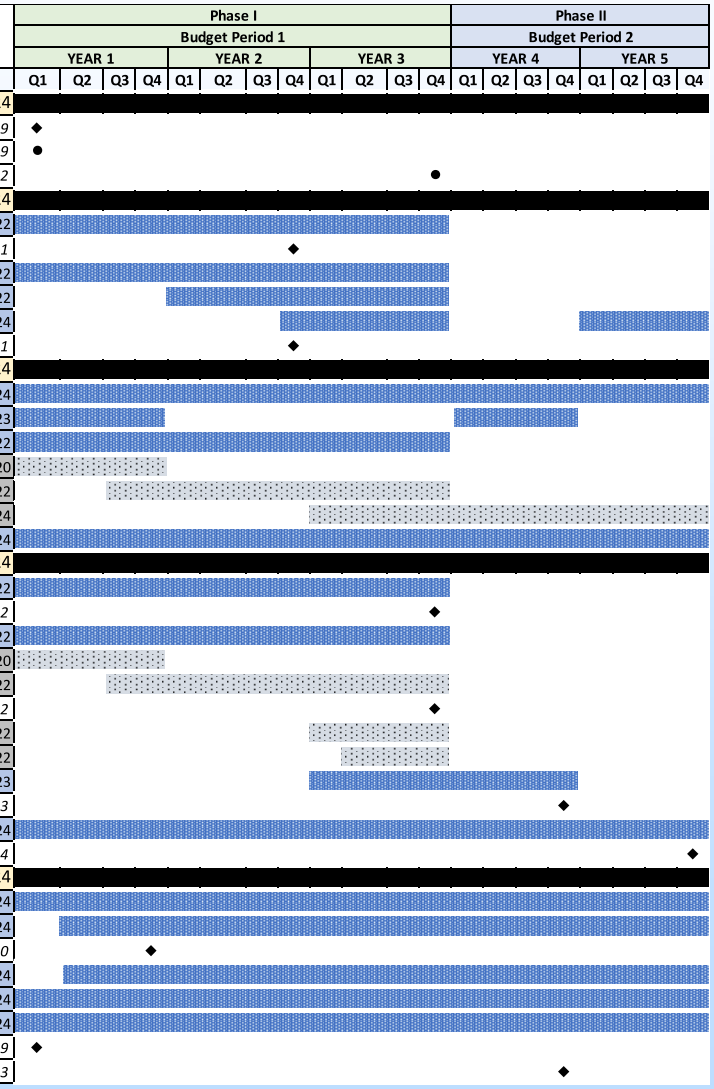
- The primary objective of the project is to identify and address regional onshore storage and transport challenges facing commercial deployment of carbon dioxide (CO_2) capture, utilization, and storage (CCUS) technologies.

Organization Chart



Gantt Chart

SECARB-USA Project Timeline	◆ Milestone ● Decision Point	
TASK DESCRIPTIONS	Start Date	End Date
TASK 1.0: PROJECT MANAGEMENT AND PLANNING	10/1/19	9/30/24
Milestone: Implement Project Management Plan	*11/1/19*	*11/1/19*
Decision Point 1: Negotiation/Implementation of PMP	*10/1/19*	*10/1/19*
Decision Point 2: Negotiation /Implementation of Phase II/BP2	*9/30/22*	*9/30/22*
TASK 2.0: TECHNICAL CHALLENGES	10/1/19	9/30/24
Subtask 2.1: Needs Assessment Framework for Storage Complexes	10/1/19	9/30/22
Milestone: Complete Needs Assessment Framework for Storage Complexes	*9/30/21*	*9/30/21*
Subtask 2.2: Expanded Regional Characterization	10/1/19	9/30/22
Subtask 2.3: Optimization, Containment, Verification Strategies Update and Application	10/1/20	9/30/22
Subtask 2.4: Risk Needs for 2025 Commercial Deployment	10/1/21	9/30/24
Milestone: Host First Partners Meeting on Risk Needs for 2025 Commercial Deployment	*9/30/21*	*9/30/21*
TASK 3.0: DATA COLLECTION, SHARING, AND ANALYSES	10/1/19	9/30/24
Subtask 3.1: Data Management Plan	10/1/19	9/30/24
Subtask 3.2: Analyze and Update Existing CO2 Source and Sink Databases	10/1/19	9/30/23
Subtask 3.3: Regional Assessment Toolset(s) Validation	10/1/19	9/30/22
Subtask 3.3.1: Assembling the Scenario Library	10/1/19	9/30/20
Subtask 3.3.2: SCO2T Tool Application	4/1/20	9/30/22
Subtask 3.3.3: Analysis Using NRAP Tool(s)	10/1/21	9/30/24
Subtask 3.4: Machine Learning Initiative	10/1/19	9/30/24
TASK 4.0: REGIONAL INFRASTRUCTURE	10/1/19	9/30/24
Subtask 4.1: Infrastructure Assessment	10/1/19	9/30/22
Milestone: Completed Infrastructure Assessment	*9/30/22*	*9/30/22*
Subtask 4.2: Regional Site Readiness	10/1/19	9/30/22
Subtask 4.2.1: Data Quality Methodology	10/1/19	9/30/20
Subtask 4.2.2: Storage Complex Data Readiness Evaluation	4/1/20	9/30/22
Milestone: Completed Storage Complex Data Evaluation	*9/30/22*	*9/30/22*
Subtask 4.2.3: Storage Complex Readiness Validation, Valuation, and Augmentation	10/1/21	9/30/22
Subtask 4.2.4: Regional Application of Storage Complex Readiness	1/1/22	9/30/22
Subtask 4.3: Socioeconomic Impacts of CCUS and Workforce Readiness	10/1/21	9/30/23
Milestone: Report on Socioeconomic Impacts of CCUS and Workforce Readiness	*9/30/23*	*9/30/23*
Subtask 4.4: Identification of Potential New CCUS Projects	10/1/19	9/30/24
Milestone: Completed Final Regional Commercialization Plan	*9/30/24*	*9/30/24*
TASK 5.0: REGIONAL TECHNOLOGY TRANSFER	10/1/19	9/30/24
Subtask 5.1: Stakeholder Engagement Plan	10/1/19	9/30/24
Subtask 5.2: Non-Technical Challenges to CCUS Deployment	1/1/20	9/30/24
Milestone: Inventory Initial List of Non-Technical Challenges for CCUS	*9/30/20*	*9/30/20*
Subtask 5.3: CCUS Business Cases Under New and Existing Tax Policies	1/1/20	9/30/24
Subtask 5.4: CCUS Educational Series	10/1/19	9/30/24
Subtask 5.5: Technology Transfer and Knowledge Dissemination	10/1/19	9/30/24
Milestone: Participate in Project Kickoff Meeting	*12/31/19*	*12/31/19*
Milestone: Host Stakeholders Meeting to Share Results from BP1	*9/30/23*	*9/30/23*



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