DOE Kickoff Meeting March 5-6, 2024

Utah Geological Survey

Utah Statewide Carbon Storage Assessment: Geological Data Gathering, Analysis, Sharing, and Engagement



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Project Overview:

- Aggregate, produce, analyze, and disseminate organized and accurate geological data for effective carbon storage (CS) in the state of Utah
- Create an interactive website application ("Web App") that allows the visualization, storage, and systematic download of CS assessments
 - Includes underlying geological metadata
 - Regional and local scales
- Strongly consider societal and environmental impacts
 - Focus on disadvantaged communities
- Include social justice frameworks in all tasks and interactions
- Set the stage for future business investment in the state, and fulfill national decarbonization goals by progressing low-risk, economic, commercial scale Carbon Capture Utilization and Storage (CCUS) projects in the state of Utah

This project seeks to provide an assessment of the CS resources in the state of Utah, display that assessment and its underlying data in a user-friendly web application, and create a well-organized digital database for evergreen management of CS data moving forward.

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Project Overview

- There are limited CO₂ sources in Utah
 - Coal fired power plants, natural gas power plants
- Most sources are concentrated near population centers
 - E.g., Wasatch Front
- Likely a need for storage away from primary CO₂ sources
 - Direct Air Capture (DAC)
 - Carbon transport via pipelines

"sinks in search of sources"



2022 EPA flight data; https://ghgdata.epa.gov/ghgp/



Project Plan

- 1. Project Management and Planning
- 2. Community Benefits Plan
- 3. Data Model Definition and Web Application Development
- 4. Data Gathering
- 5. Assessment of Carbon Storage Potential by Geologic Region
- 6. Assessment of Carbon Storage Potential: Key Reservoir/Seal Pairs
- 7. New Data Collection to Reduce Data Gaps



Our Project Team

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- Task 1: Project Management
- Task 2: Diversity, Equity, Inclusion & Accessibility
- All Technical Tasks

Energy and Geoscience Institute

- Task 7: Petrophysical, fluid,
 and reservoir modeling
 - CO₂ volume estimates

Geology & Geophysics

GEOLOGY GEOPHYSICS

Task 6 & 7: Reservoir and • Seal mapping; New data collection



Anthropology & Sociology

Task 2: Community Benefits Plan





geology.utah.gov

University of Utah





Task 2: Societal Considerations and Impacts (SCI) Assessment Plans

- Diversity, Equity, Inclusion, and Accessibility Plan*
- Justice40 Initiative Plan
 - Census Identification of Disadvantaged Communities
 - Household Surveys
 - Individual Interviews
- Economic Revitalization and Job Creation Questionnaire
- Community and Stakeholder Engagement Plan
 - Public Friendly Outreach
 - Technical Community Outreach
 - Participation in Regional and National CCUS Outreach Efforts



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*This plan is required to meet federal DOE grant obligations

Justice40 and Community Feedback

- Goal: Enhance community engagement around issues of energy and environmental justice
 - Multi-scale (census tracts, households, and individuals)
 - Mixed-methods (quantitative and qualitative)
- Lead by the University of Utah Anthropology/Sociology departments
- Develop a preliminary Energy and Environmental Justice (EEJ) assessment



DAC: Meets >1 burden threshold and the socioeconomic threshold

DAC: Meets 1 burden threshold and the socioeconomic threshold

Non DAC

*Data from the Climate and Economic Justice Screening Tool https://screeningtool.geoplatform.gov/en/#4.89/39.04/-116.27



Community and Stakeholder Engagement Plan: Outreach

Technical Community Outreach



Public Friendly Outreach



Participation in Regional and National CCUS Outreach Efforts



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Diversity, Equity, Inclusion, and Accessibility Plan*

A UGS employee committee dedicated to diversity, inclusion, and accessibility efforts was established in 2020: this committee will serve as partners and resources on this project. Examples of committee accomplishments:

- Created guide for hiring practices and bias training
- Facilitate discussions on relevant topics
- Created employee welcome packet for information equity

Specific efforts as applied to this research include:

- Information accessibility: language translation, open access publications
- Indigenous inclusion: land acknowledgements, indigenous place-names
- *Team accountability*: everyone needs to attend a relevant educational event
- Mentorship: intentionally target early-career folks for training and involve them in the publication process



*This plan is required to meet federal DOE grant obligations



Task 3: Data Model Definition and Web App Development

Data Model Development

- Geospatial Database Development
 - ArcGIS enterprise geodatabase, or open-source geospatial database
- Web Application (Beta) Development & Updates





https://geology.utah.gov/apps/intgeomap/?view=scene&scale=1813311&zoom=8.35&lat=39.48501&lng=-111.56892&layers=footprints%2C500k%2C100k%2C24k&tilt=1&heading=358&elev=613560&exag=2.5&base=ustopeOgy.utah.gov

Task 4: Data Gathering

- Integration of Existing Carbon Storage Data
 - Well logs, petrophysical data (e.g., porosity, permeability)
 - Cores, cuttings
 - Outcrop data (e.g., measured stratigraphic columns)
- Identification of Data Gaps and Limitations

Utah Core Research Center (UCRC)









DNR

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Task 4: Data Gathering









Currently Funded Projects

New Proposals In Progress

Previous Work

Proposal: RITAP FOA: Uinta-Piceance Region

 Uinta Basin CarbonSAFE Phase 2

Proposal: San Rafael Swell CarbonSAFE Phase 2

San Rafael Swell CarbonSAFE Phase 1

> Southwest Partnership (SWP): Colorado Plateau (NATCARB)

SWP Aneth CO₂ EOR



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Task 5: Assessment of Carbon Storage Potential by Geologic Region

- Objective: Create a high-level summary so non-experts can understand the CS potential of each region
 - Review of Existing Carbon Storage and Geologic Data by Region
 - Add Relevant Data into the Web Application (Beta)
 - Allow spatial navigation to understand CS
 resources and provide data download options
- Deliverable: Regional Assessment Report





Task 6: Assessment of Carbon Storage Potential: Key Reservoir/Seal Pairs

- 1. Reservoir & Seal layer mapping
- 2. CS Prospect Risking and Favorability Ranking
- 3. Carbon Storage Resource Polygons
- 4. Highlight regions with few, or no existing geologic data and these areas will be a focus for data gap resolution activities (Task 7)
- 5. Publish Web Application (Production Release)



https://www.gis-pax.com/play-mapping/traffic-light-maps-vs-split-risking-maps/

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DNR

Example

- Possible reservoirs:
 - Basalts

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- Salt domes
- Navajo, Kaibab, Leadville/Redwall Limestone etc.
- Polygon attributes could include:
 - reservoir thickness
 - subsurface depth
 - dominant fracture sets
 - paleo-depositional environment
 - stratigraphic architecture
 - rock property information such as porosity, permeability, framework mineralogy, and geochemistry.





Task 7: New Data Collection to Reduce Data Gaps

- Data Gap Reduction through New Data Collection
 - University of Utah GG
- Petrophysical and Fluid Property Assessment
 - EGI
- Reservoir Modeling for Regional CO₂ Volume Estimates
 - EGI
- Add New Geologic Data into Web Application (Production Release)
 - UGS Data Management





Project Deliverables:

Task/Subtask	Deliverable Title	Due Date
Number		
1.0 & 1.1	Update PMP and DMP	Within 30 days after award
1.3	Final Report	24 months after award
1.4	Data Submitted to NETL-EDX	12 & 24 months after award
2.1, 2.2, & 2.4	SCI Plan (includes Justice40 and the Community Engagement and Stakeholder Plans)	Within 90 days after award
2.1, 2.2, & 2.4	SCI Updates and Final Reports	12 & 24 months after award
3.2	Geospatial Database	24 months after award
3.3, 5.2	Web Application (Beta Version)	6 months after award
4.2	Data Gaps Report	12 months after award
5.3	Regional Assessment Report	12 months after award
6.1 & 6.2	Reservoir and Seal Polygon Maps	18 months after award
6.3	Risk / Uncertainty Maps	24 months after award
6.4	Favorable CS Resource Maps	24 months after award
6.5 & 7.4	Web Application (Production Release)	24 months after award
7.3	Regional CO ₂ storage volume estimates	24 months after award



Future Steps:

- Continue updating webapp and database
- Make all data publicly available
- Publish relevant information in academic journals
- Incorporate geothermal, wind, and other new energies?
- Set the stage for future low-carbon business investment in Utah







Thank you.

Gabi St Pierre, Michael Vanden Berg, & Eugene Szymanski

UGS Project Team

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