Illinois Basin West CarbonSAFE

DE-FE0032340

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Illinois State Geological Survey

U.S. Department of Energy

National Energy Technology Laboratory

2024 Carbon Management Research Project Review Meeting

August 5-9, 2024

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Illinois State Geological Survey
PRAIRIE RESEARCH INSTITUTE

Illinois Basin West Project Team

City Water, Light & Power
Springfield, IL

INDUSTRIAL PARTNER / HOST SITE

ILLINOIS

PRIME

PROJECT MANAGEMENT, SUBSURFACE GEOLOGICAL CHARACTERIZATION, STORAGE COMPLEX MODELING

SUBRECIPIENT

Elysian

3rd PARTY DEVELOPER

SUBRECIPIENT

Projeo

WELL DESIGN, DRILLING AND SEISMIC PERMITTING AND SUPERVISION

SUBRECIPIENT

Visage
CLEAN ENERGY CONSULTING

COMMUNITY BENEFITS STAKEHOLDER ENGAGEMENT

Program Overview

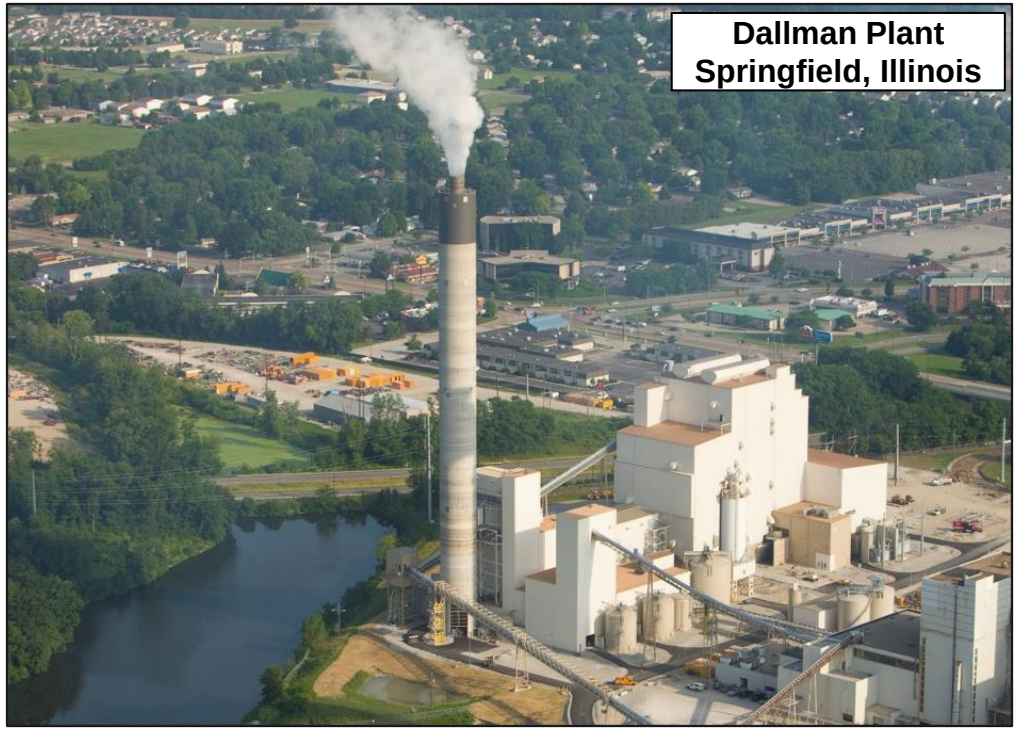
- **Project Funding***
  - Federal Share: $17.7M
  - Non-Federal Share $4.4M
  - Total: $22.1M

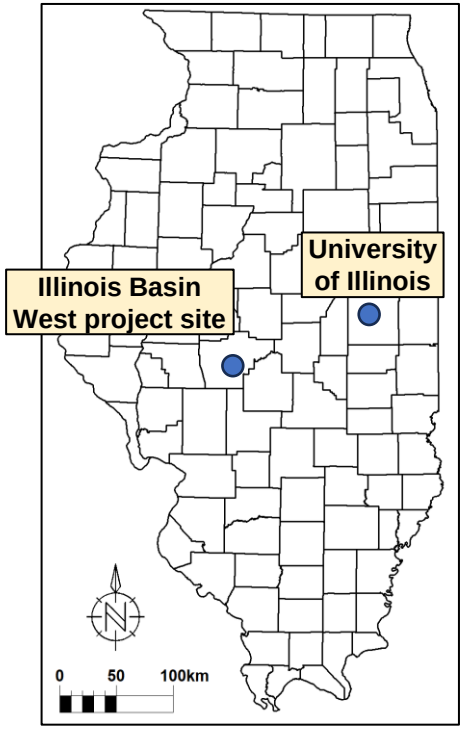
- **Project Performance Dates***
  - BP1 (August 1, 2024 – July 31, 2026)
  - BP2 (August 1, 2026 – July 31, 2027)

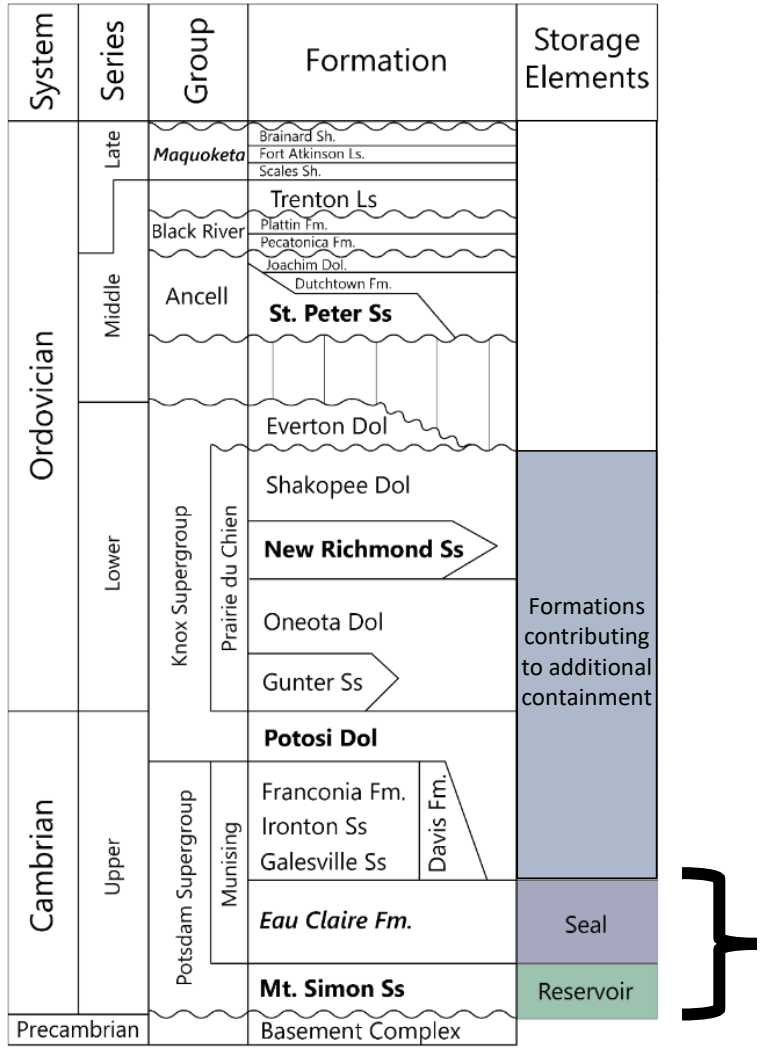
- **Overall Project Objectives**
  - Characterize the Cambrian Mt. Simon Sandstone/Eau Claire Formation storage complex near the Dallman Power Plant in Springfield, Illinois
  - Submit Underground Injection Control (UIC) Class VI permits to obtain EPA consent to construct injection wells

** Estimates provided; Project under negotiation for award.*

Illinois Basin West Project





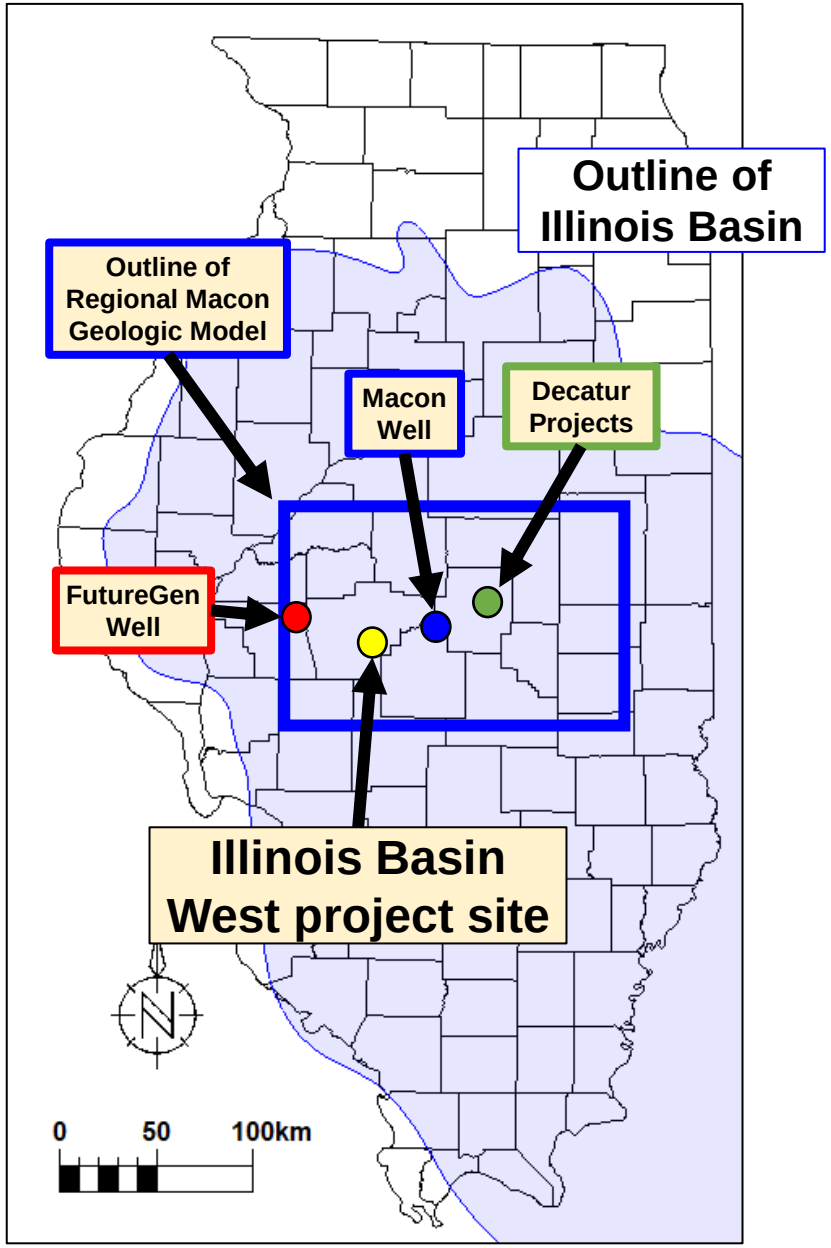


- **Significant Project Location – Western flank of Illinois Basin**
  - Lacks detailed characterization for CO_2 storage
  - Located near Springfield, Illinois, with CO_2 supplied by the Dallman Coal-Fired Power Plant

Stratigraphic column of Cambrian-Ordovician of the Illinois Basin, showing Mt Simon Sandstone storage reservoir and overlying Eau Claire Formation containment interval.

Background

- **Builds on previous Illinois DOE-funded projects researching the Cambrian Mt. Simon Sandstone/Eau Claire Formation storage complex**
  - FutureGen 2, Morgan County (2011)
    - Project included 2D seismic and FutureGen characterization well; project cancelled before injection wells drilled
    - Poor Mt. Simon Sandstone reservoir quality
  - Macon CarbonSAFE Phase II (2016-2022)
    - Phase II CarbonSAFE Project included 2D seismic and T.R. McMillen characterization well
    - Excellent Mt. Simon Sandstone reservoir quality
    - Regional Macon geologic model utilized for IBW application
  - Decatur, Illinois projects (IBDP + ICCS, 2014-present)
    - Currently injecting CO_2 sourced from ADM ethanol plant; cumulative injection >4M tonnes
    - Excellent Mt. Simon Sandstone reservoir quality
- **Illinois Basin West will be an important data point to help advance commercial CCS on the west flank of the Illinois Basin**



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Integrated Carbon Capture & Storage (CCS) Projects

- **The Illinois Basin West Project supports overall implementation of CCS at the Dallman Power Plant as part of an integrated Project Team**
- **Additional DOE-supported Projects are located at the Dallman Power Plant**
  - Large Carbon Capture Pilot (DE-FE0031581)
  - 21st Century Power Plant (DE-FE0031995)
  - Selected for Carbon Capture Demo FEED study (FOA-2738)

Dallman Power Plant

Large Pilot equipment (under construction)

Ribbon-cutting ceremony for Carbon Capture Large Pilot Construction Site, DE-FE0031581 June 11, 2024, Springfield, Illinois. Tallest central column is about 190 feet tall.

Key Milestones

- **Budget Period 1 (24 months):**
  - Environmental Information Volume (6 months after award)
  - NEPA documentation (12 months after award)
  - Submit Class VI permit applications (end BP1); Key associated activities:
    - Acquire ~100 linear miles of 2D seismic data
    - Drill a ~5800’ MD characterization well to Precambrian basement, obtain extensive core and log data
    - Analyze site-specific data sufficient to develop geological and numerical models to predict site performance
  - Risk assessment and mitigation plan (end of both BP1 and BP2)
- **Budget Period 2 (12 months):**
  - Pipeline FEED study, Storage Field Development Plan, CO2 Source and Feasibility Study, and Initial Business and Financial Plans
- **Work on Community Benefits plan continues throughout entire 3-year Project**

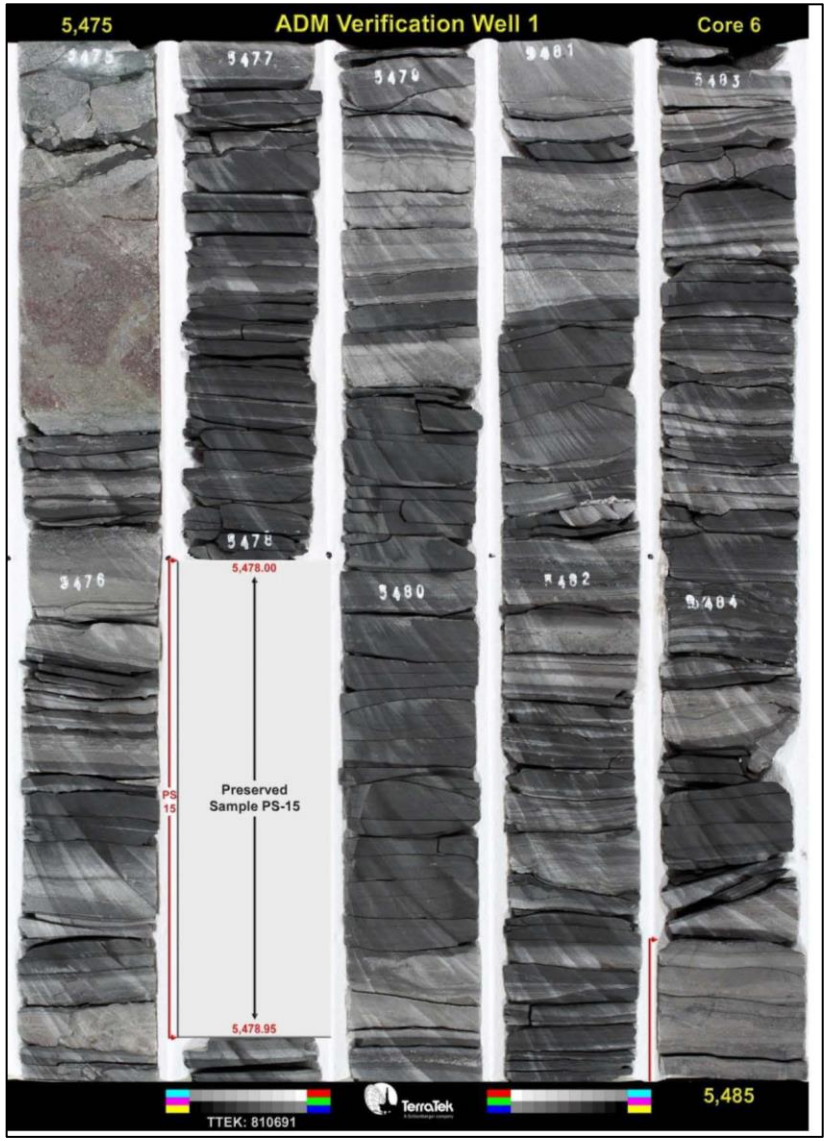
Success Criteria and Risks/Mitigation

- **Success Criteria:**
  - Execute data acquisition, including seismic data and drilling of the characterization well
  - Data acquired is fully analyzed in the context of geologic characterization
  - Underground Injection Class VI permits are submitted to the EPA
  - Community is engaged and informed, and benefits to impacted communities from this project and the future integrated CCS project are positive

- **Risks and Mitigation Strategies**
  - Primary Mt. Simon Sandstone geology unsuitable – consider secondary storage zone
  - Negative public response – develop early engagement strategy and build upon City Water Light & Power's existing community outreach programs
  - Project cost over runs – monitor costs, particularly during drilling of the characterization well

Project Status

- **Project is still under negotiation for award**
- **Illinois Basin West is supporting two post-doctoral research positions at the Illinois State Geological Survey; both post-docs have been hired**
- **Post-doc projects:**
  1. "A stratigraphic, depositional, and geomechanical study of the Eau Claire Formation in the Illinois Basin"
     - The Eau Claire Formation is the confining zone (topseal) to the Mt. Simon Sandstone for many planned and ongoing CCS projects in the Illinois Basin
     - There is a dearth of regional Illinois Basin-wide studies of the Eau Claire
  2. "Petrophysical Studies of the Cambro-Ordovician Storage Complex of the Illinois Basin: Mt. Simon Sandstone, Eau Claire Formation, and the Knox Supergroup"
     - Petrophysical models, predictive methods for porosity/permeability/lithology, utilization of "vintage" log data (wells pre-1980).



Eau Claire Formation core from IBDP VW1 well; dominated by fissile shale with minor siltstone and glauconite

Community Benefits Summary

- **City Water Light & Power (CWLP) engagement efforts:**
  - Previous engagements with the community likely to continue with Illinois Basin West:
    - Public input and comment at Springfield City Council meetings
    - CWLP media releases and social media updates
    - Engagement with local and national organizations such as the Illinois Farm Bureau, Sangamon Valley Sierra Club, NAACP, National Lung Association, Illinois Environmental Council, and others
  - City and CWLP unionized workforces have been active partners
- **Planned DEIA activities included in Community Benefits plans related to education:**
  - Paul Potter Geoscience Internship Program
    - Paid internships targeting students from HBCU's and underrepresented students from other institutions such as community colleges
  - HBCU STEM to Geoscience Pipeline (HS2GP) Program
    - Partnership to increase geoscience majors between HBCU's, six other universities, and four state geological surveys.
- **Project SMART Goal #2 is to summarize and quantify participation of interns and student researchers for groups underrepresented in STEM, including student testimonials.**

Next Steps

Next Steps

- Complete negotiations, begin project
- Begin permitting and acquisition of 2D seismic survey
- Procure rig for 2024 spud of characterization well
- Begin work on Community Benefits
- Work cooperatively with the other DOE-supported projects at Dallman Plant

After Project

- Integrate Illinois Basin West project findings with Large Pilot and Demo FEED projects
- Move forward with construction including full capture units, drilling of CO_2 injection wells, and related infrastructure

T.R. McMillen #2 well

Characterization well for Macon CarbonSAFE Phase II

2D Seismic Acquisition for Illinois Storage Corridor CarbonSAFE Phase III