



Joint Minerals, Business & Economic Development Committee

October 28, 2022

Agenda

- Tallgrass Overview
 - Low Carbon Development
 - Trailblazer Conversion Project
- CO₂ Overview
 - Geology & Existing Infrastructure
 - Carbon Capture & Sequestration
 - Monitoring & Reporting
 - CO₂ Plume Considerations
- Keys to Success



Tallgrass Overview

Tallgrass Overview

Blackstone



850+ Employees

Operating Across 11 States

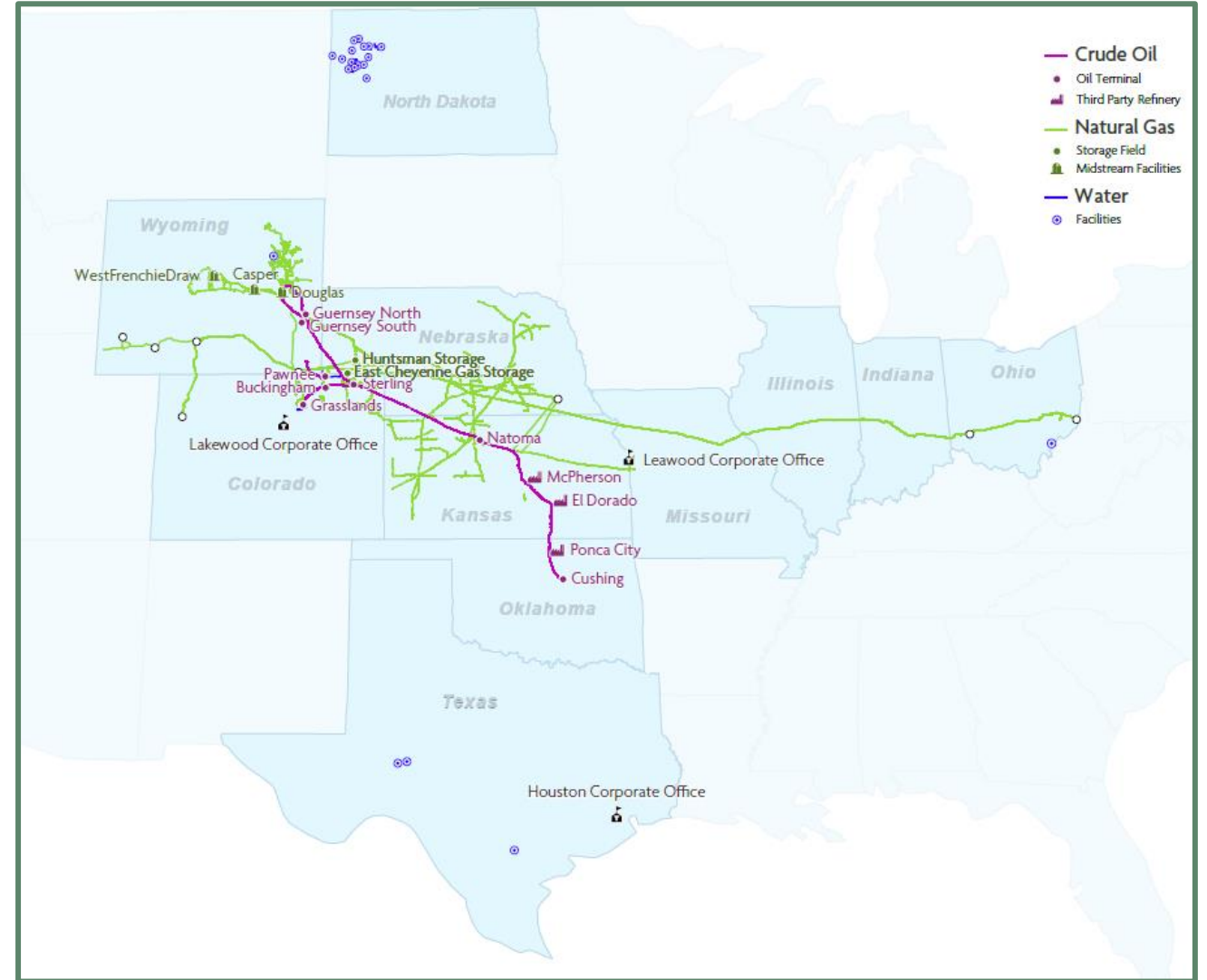
Wyoming Investment

\$4 Million in Taxes (2021)

\$107.5 Million in Capital Investment (2021)

144 Wyoming Employees

~\$86K Average Salary



Low Carbon Development – H₂ and CCS

Decarbonized hydrogen businesses, multiple CO₂ projects and infrastructure development



HYDROGEN

- **DOE H₂ project (U.S. Dpt. Of Energy grant)**
 - Initial engineering of a 97%+ CO₂ capture unit on a 220MMSCFD H₂ ATR in partnership with Haldor Topsoe, BASF, Technip, University of Wyoming
- **Escalante Hydrogen**
 - Conversion of a 250MW coal power plant to 100% H₂ firing including new H₂ production with 95% CO₂ capture and sequestration
- **Black Hills Cheyenne**
 - Demonstration of H₂ combustion in a commercial NGCC with WEA, Black Hills (owner), GE and Black & Veatch

CO₂

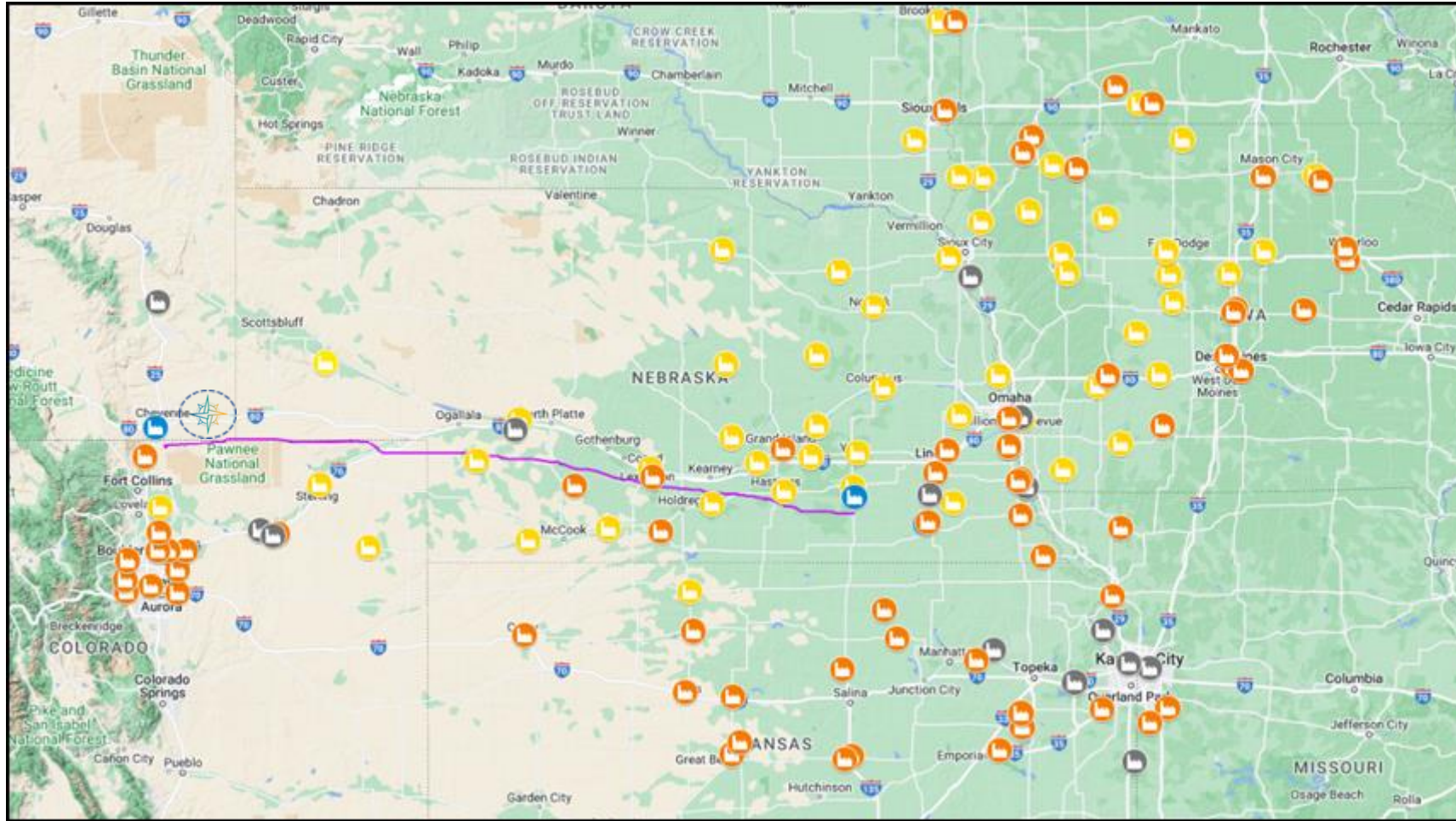
- **Trailblazer CO₂ pipeline**
 - Conversion of ~390 miles of a 36" pipeline from natural gas to CO₂ to transport 10 MTPY+ CO₂
- **CO₂ sequestration hub (with Wyoming Energy Authority)**
 - Developing a sequestration hub, including characterization well drilling and class VI permit application







Trailblazer & Rockies Express Pipelines

Minimal new natural gas infrastructure will facilitate the ability to serve all existing Trailblazer customers through the Rockies Express (REX) Pipeline



Trailblazer Conversion Project



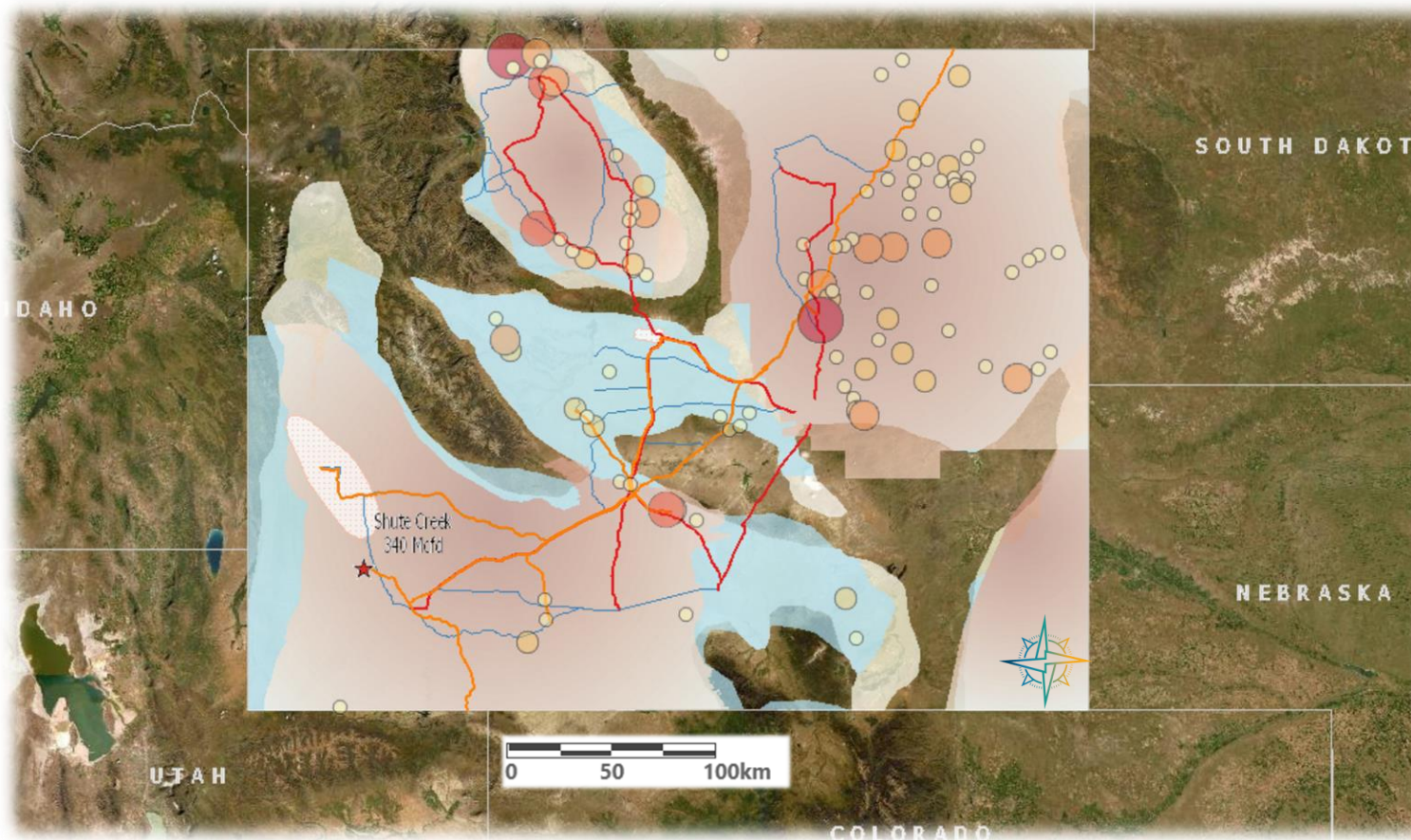
 TPC CO ₂ trunkline	 Tallgrass WEA Funding and SE Wyoming CO ₂ Sequestration Hub	 Gas Plant	 Coal Plant
		 Ammonia Plant	 Ethanol Plant



- Trailblazer is an existing 436 mile 36" natural gas pipeline; Tallgrass will convert 392 miles to CO₂ service
- CO₂ captured at emission source
- Trailblazer has the capacity to transport more than 10 million tons of gaseous CO₂ per year
- Permanent geologic sequestration of CO₂ in southeastern Wyoming
- Target in-service Q2 2024
- **Safety:** Since 2012, Trailblazer has had a strong safety record with no unintended leaks and no major injuries to Tallgrass personnel or the public







CO₂ Overview

Geology & Existing Infrastructure






 Tallgrass/WEA test well
 Tallgrass sequestration hub

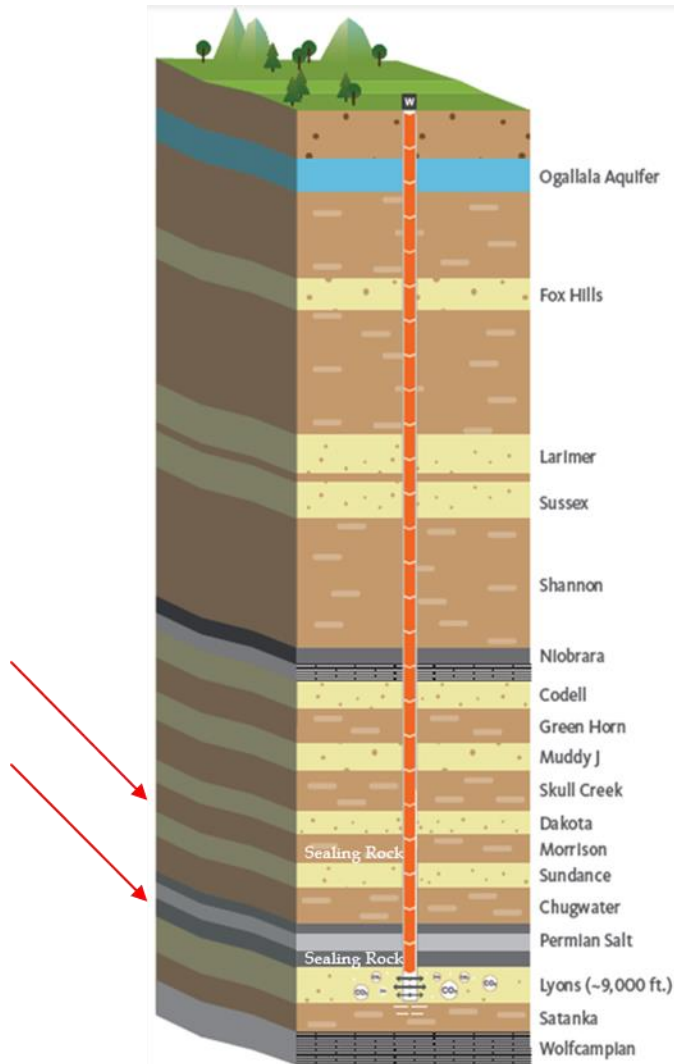
Favorable geology for CO₂ sequestration

-  Shale basins
-  Saline formations
-  Sedimentary basins
-  EOR field

Existing infrastructure with 700+ miles of CO₂ pipelines and programmatic corridors established

-  Existing CO₂ pipeline
-  Wyoming pipeline corridor initiative
-  Pre-approved CO₂ pipelines

Carbon Capture & Sequestration



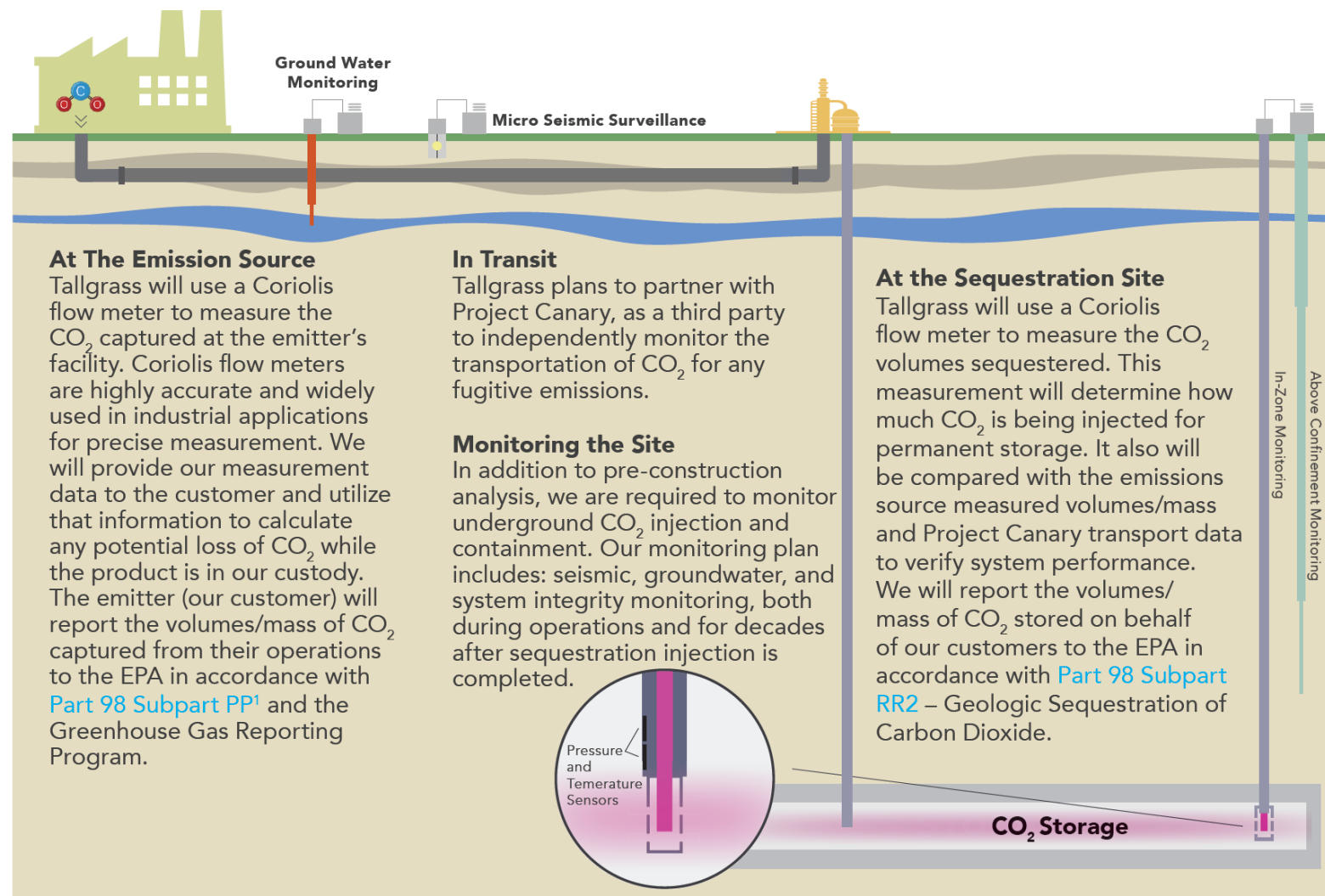
Geology

- Three characteristics are necessary to safely and effectively store large volumes of CO₂
 - 1) Rock formations must have enough millimeter-sized pores to provide the capacity to store CO₂
 - 2) Pores in the rock must be connected and permeable so that they naturally accept the CO₂ and allow it to spread out within the formation
 - 3) A cap rock or sealing barrier must be at the top of the formation to contain the CO₂ permanently
- The Sundance and Lyons formations meet the necessary requirements for sequestration and reside below 8,000'
- Tallgrass is coordinating with the State of Wyoming and the Wyoming Energy Authority (\$4.1m grant) in the development of the Sequestration Hub

Monitoring & Reporting

How Do We Know CO₂ is Being Permanently Stored?

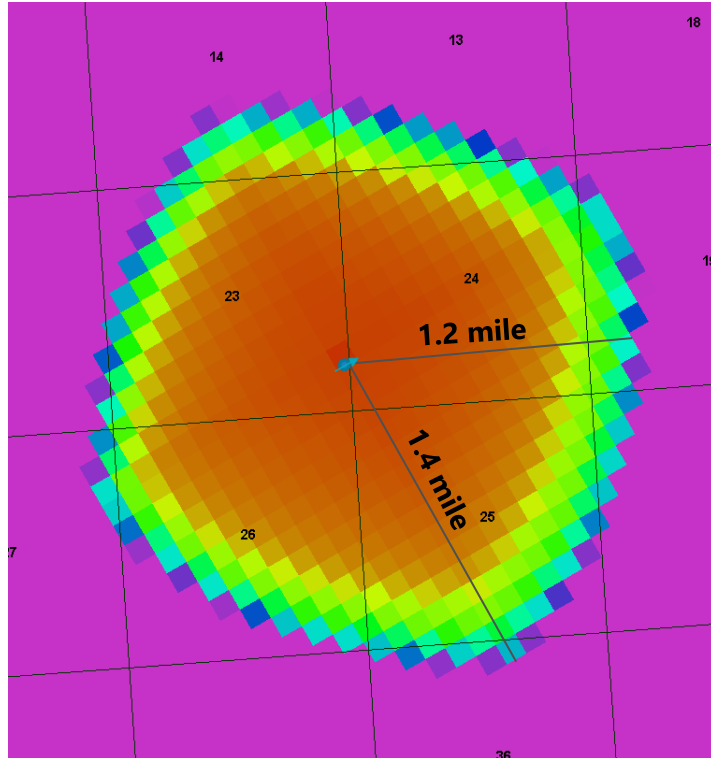
- The EPA and Wyoming Department of Environmental Quality require an approved monitoring, reporting, and verification (MRV) plan before development.
- Upon approval and permitting, the MRV requires ongoing monitoring and reporting for the duration of the injection phase and for decades after injection concludes.
- One of the toughest operational permits in the country.



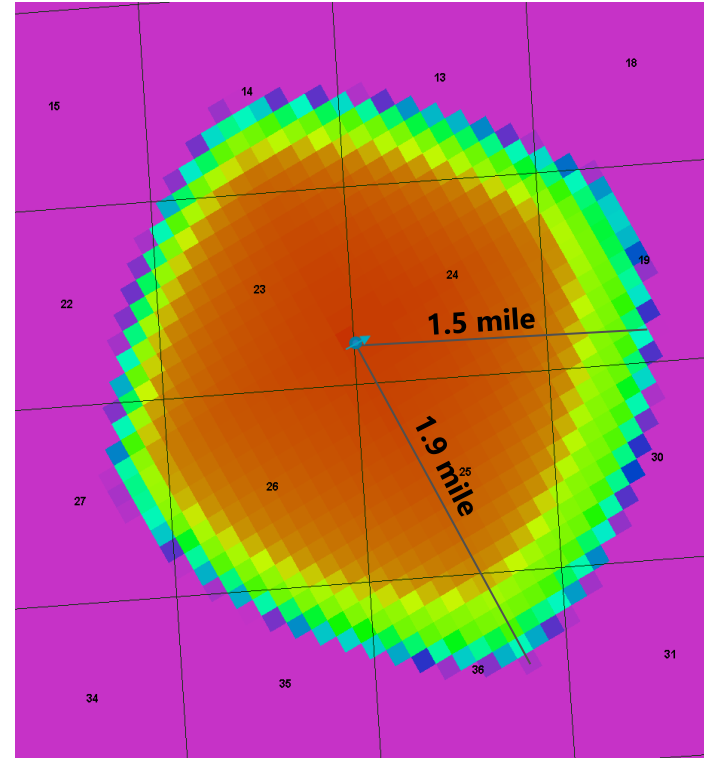
CO₂ Plume Considerations

Wyoming geology is capable of CO₂ sequestration in multiple areas in the state, but formation characteristics results in larger CO₂ plumes than the US Gulf Coast

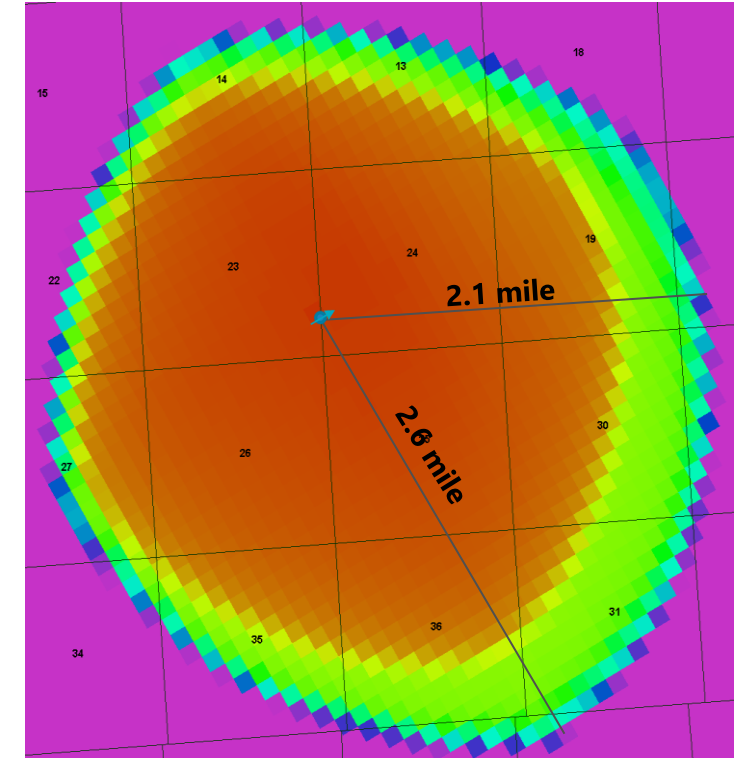
3 yr



5 yr



10 yr





Keys to Success

Keys to Successful Development

Cost-effective CO₂ capture at an emissions source

- High concentration of CO₂
- High utilization rate to offset high upfront capital costs
- Continued technological improvement and development of economies of scale

Feasible sequestration formation with adequate storage capacity

- Requires significant upfront analysis and capital to determine site feasibility and capability

Proximity between CO₂ source and sequestration site

- Can be accomplished through build out of pipeline networks like Trailblazer

Clear regulatory framework for sequestration

- Wyoming is a leader in the country

Surface/pore space owner support

- First agreements of their kind
- Requires significant community engagement, education, and collaboration

Questions?