



Bipartisan Infrastructure Law (BIL): Carbon Storage Complex Feasibility for Commercial Development in Paradise Kentucky

2024 FECM / NETL Carbon Management Research Project Review Meeting

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Project Overview

Funding: (\$9.0M DOE, \$2.25M Cost Share)

Performance Dates: 2 years

(~Fall 2024 to ~Fall 2026 award pending)

Project Team: Battelle, TC Energy,

Tennessee Valley Authority (TVA), Kentucky Geological Survey (KGS)

Objective: Evaluate the capacity of the Knox Group in western Kentucky to sequester 84MT of CO₂ in proximity to the TVA operated Paradise Combined Cycle Power Plant



Project Objectives

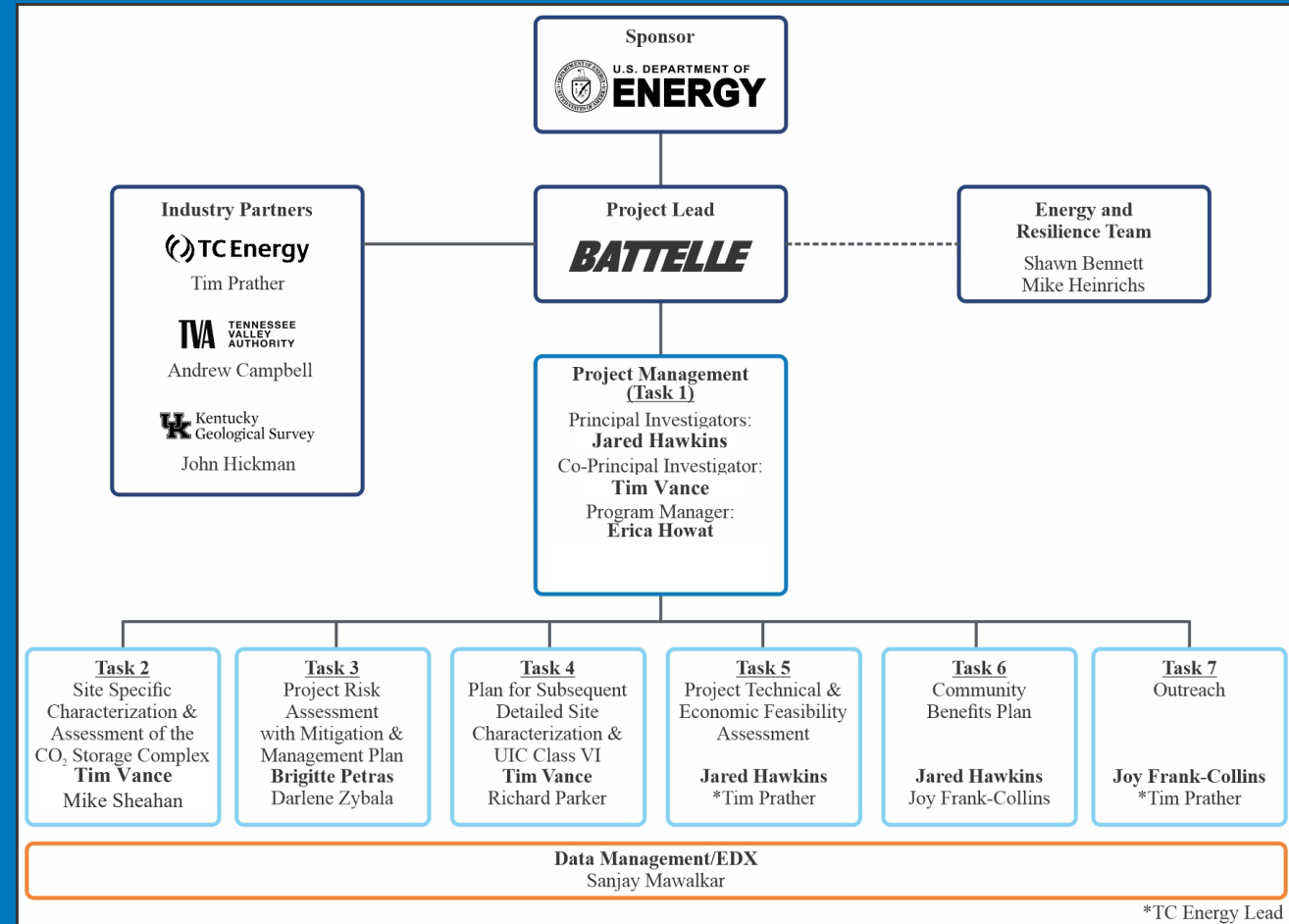
1- Confirm storage feasibility to safely store 84 MMT over 30 years

2- Develop risk mitigation plan for technical and non-technical risks

3- Plan for Underground Injection Control (UIC) Class VI Permitting

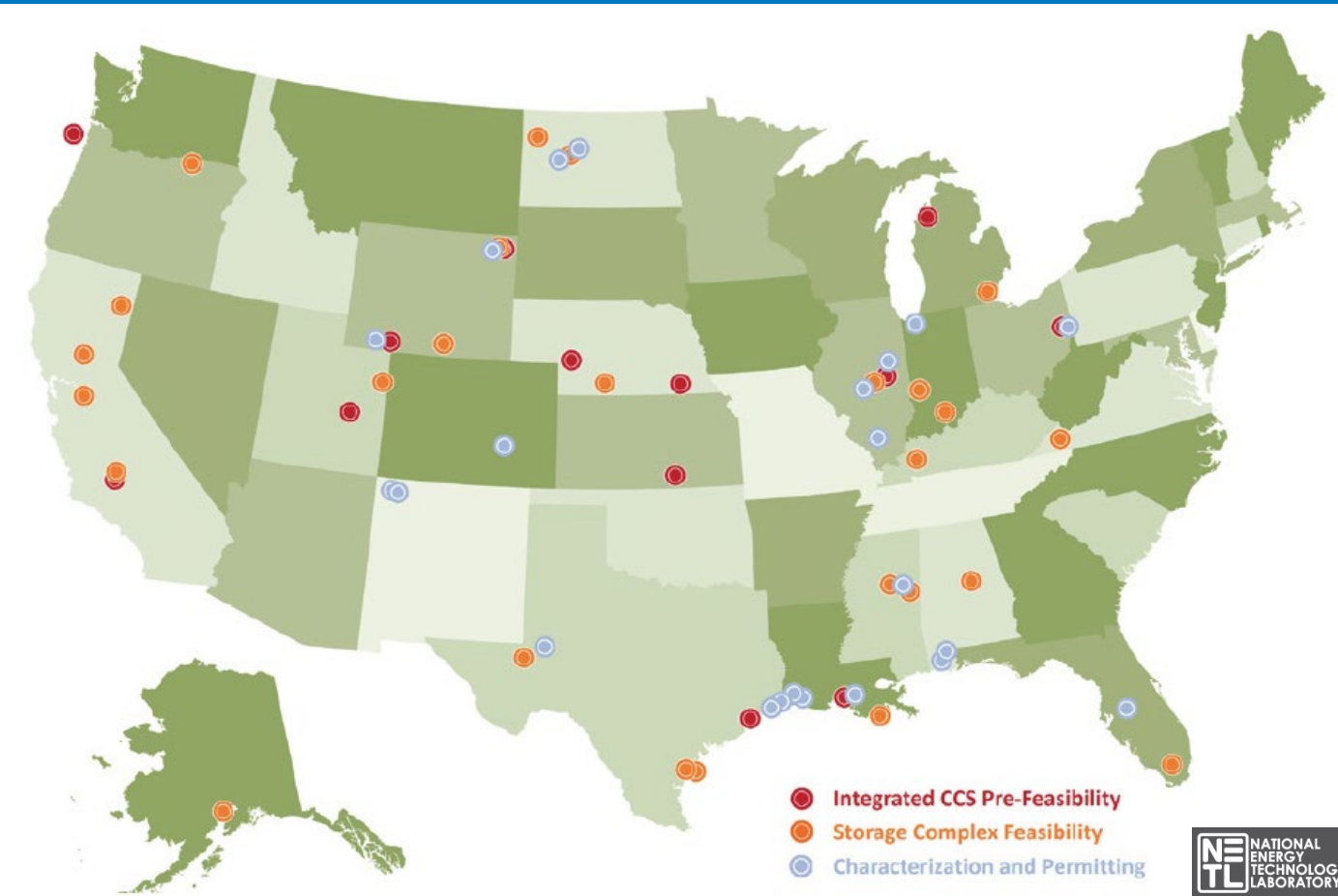
4- Determine economic feasibility and plan to acquire pore space rights

5- Develop a Community Benefits Plan and execute stakeholder outreach



Kentucky CarbonSAFE Opportunity

Southernmost CarbonSAFE in the Illinois Basin



First CarbonSAFE project in Kentucky

Project focused on evaluating carbonate reservoirs for storage, which is less common than using siliciclastic reservoirs

Lessons learned can be shared across the Eastern and Midwest regions

Upside opportunity to create a future CCS hub along the southern Ohio River Valley region

Paradise Kentucky History

The TVA Paradise facility has been producing power for over 60 years



Two 704 MW coal fired units came online in 1963

When first installed, they were the largest units in world

A 971 MW third unit was added to the facility in 1970

All coal units at the site were decommissioned from 2017-2020

Paradise Kentucky History

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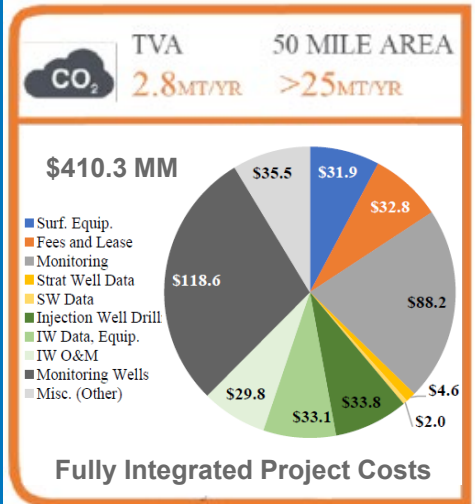
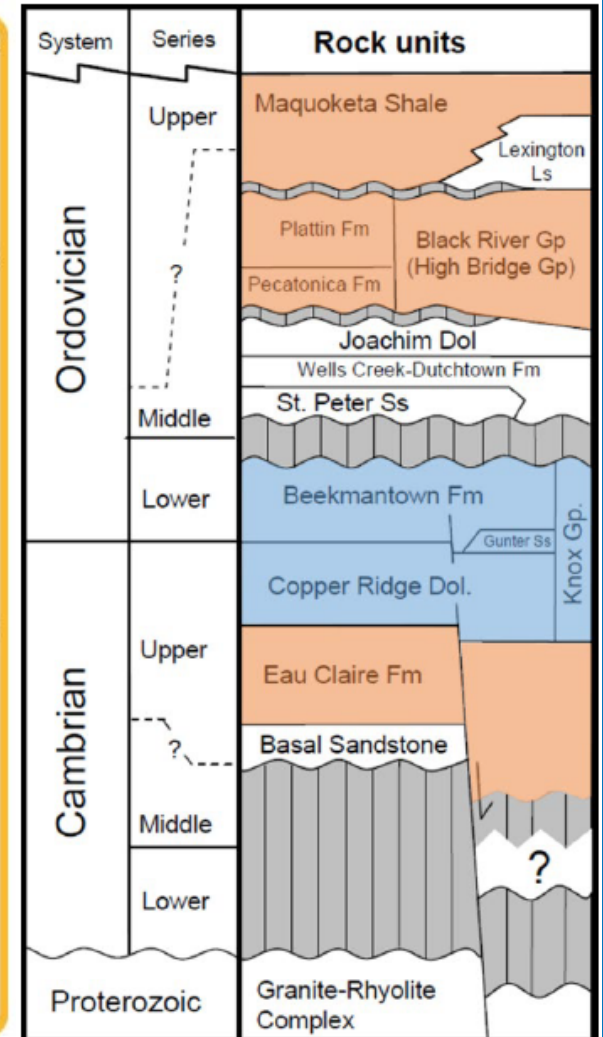
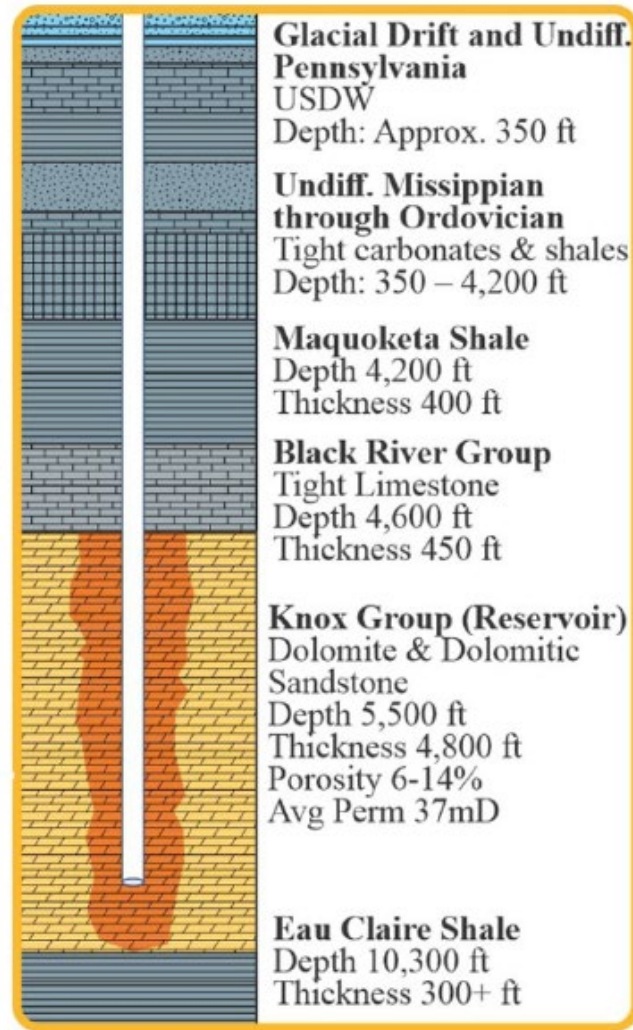
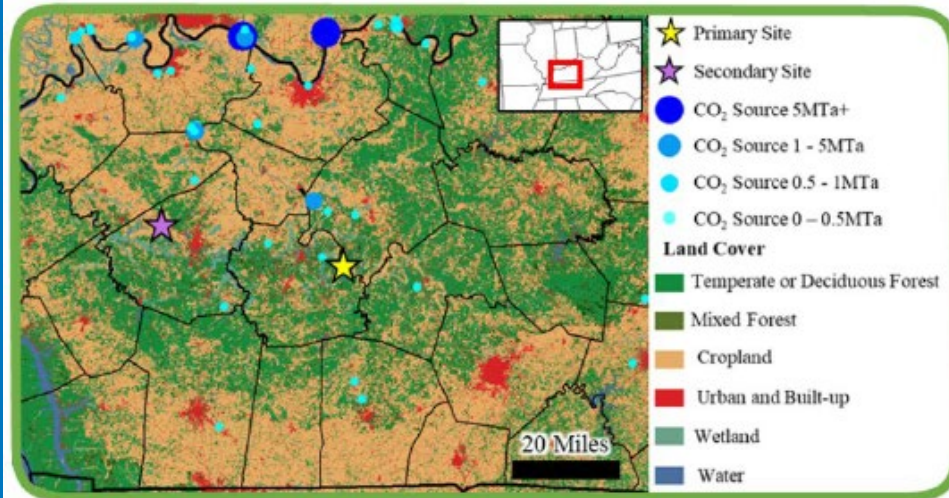


A 3 train, 1100 MW combined cycle natural gas power plant began operations at the site in 2017

Total facility costs for the new natural gas plant totaled ~\$1B

Adding a CO2 capture system to the plant would employ 400+ workers during the construction phase, and 25 permanent workers to operate the system

Technology Background

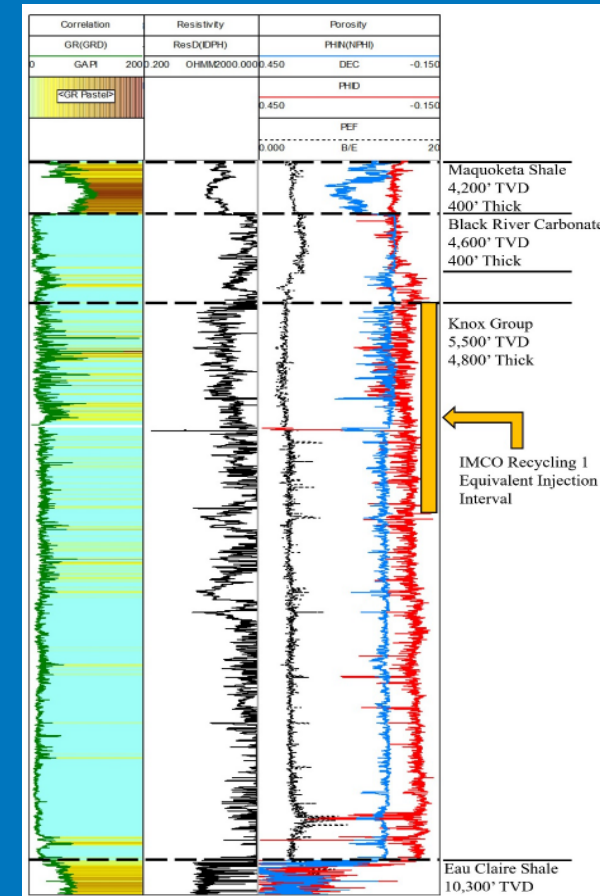
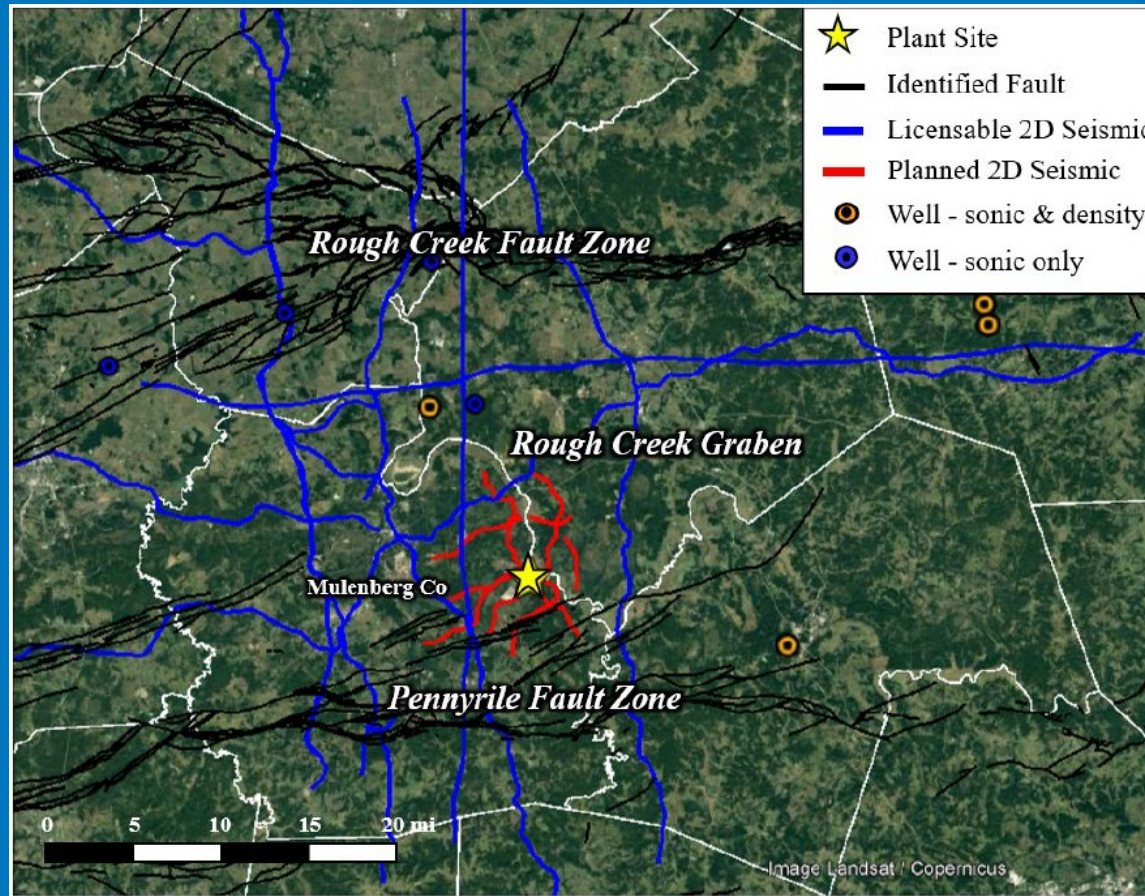


- COMMUNITY BENEFITS**
- Clean Air
 - Jobs
 - Education and Training
 - Community Investments and Improvement
- OPEN MULTI-BASIN POTENTIAL**
- Southern Illinois Basin
 - Appalachian Basin
 - Black Warrior Basin
 - Midcontinent Region

Advancing Commercial CCS, Opening New CCS Fairways, & Investing in Communities

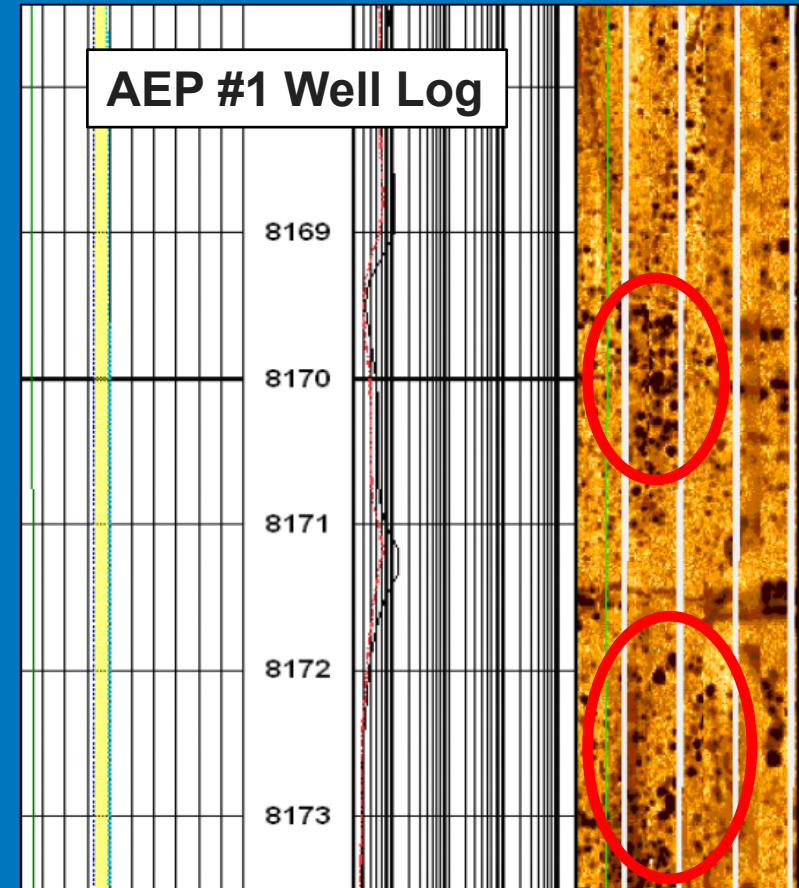
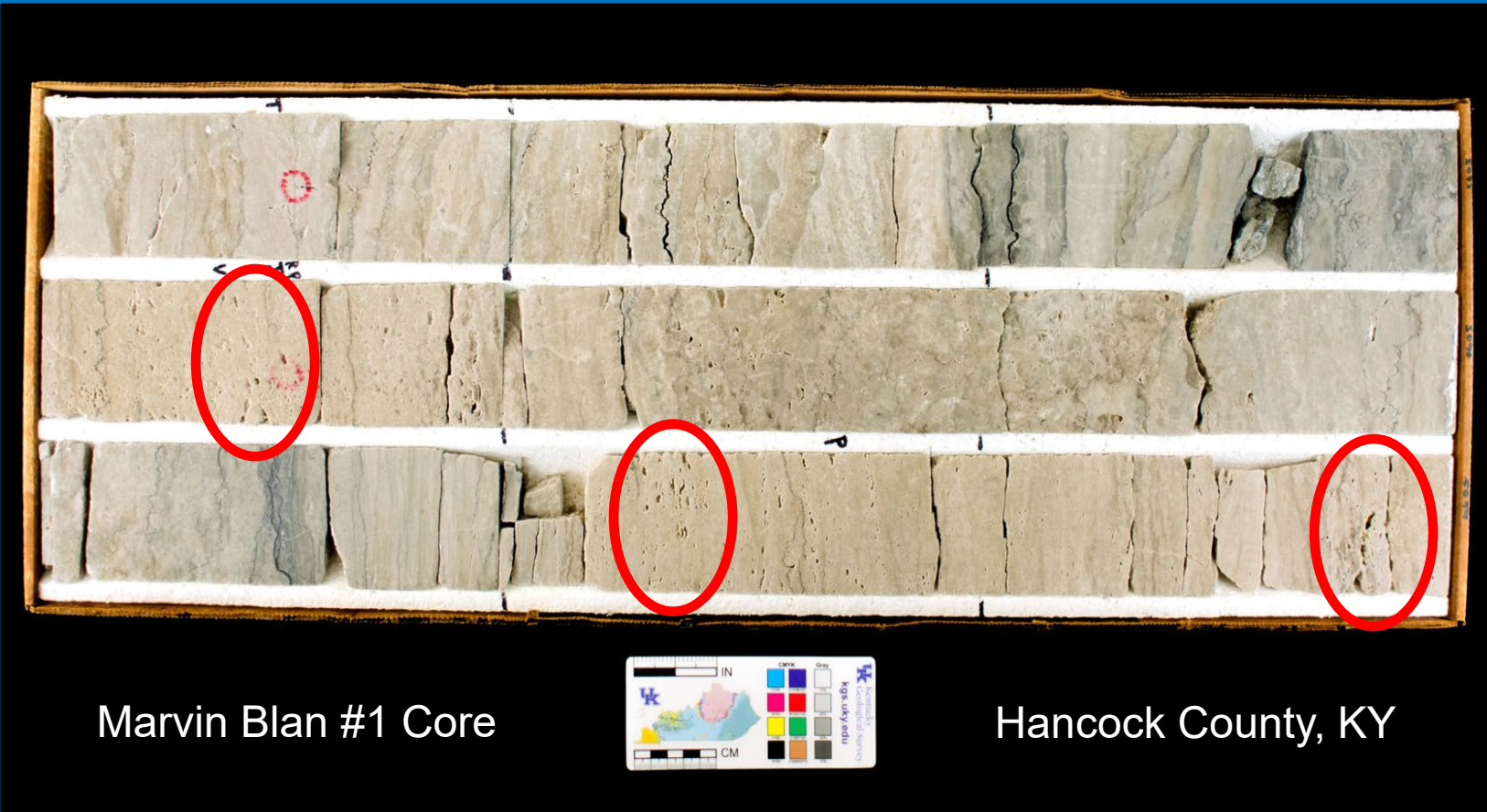
Technology Background

Existing wells and regional seismic data will enable the project team to evaluate the subsurface ahead of stratigraphic test well drilling



Technology Background

Whole core acquisition and advanced well logging tools will enable the team to identify “vuggy” zones of enhanced porosity and storage potential

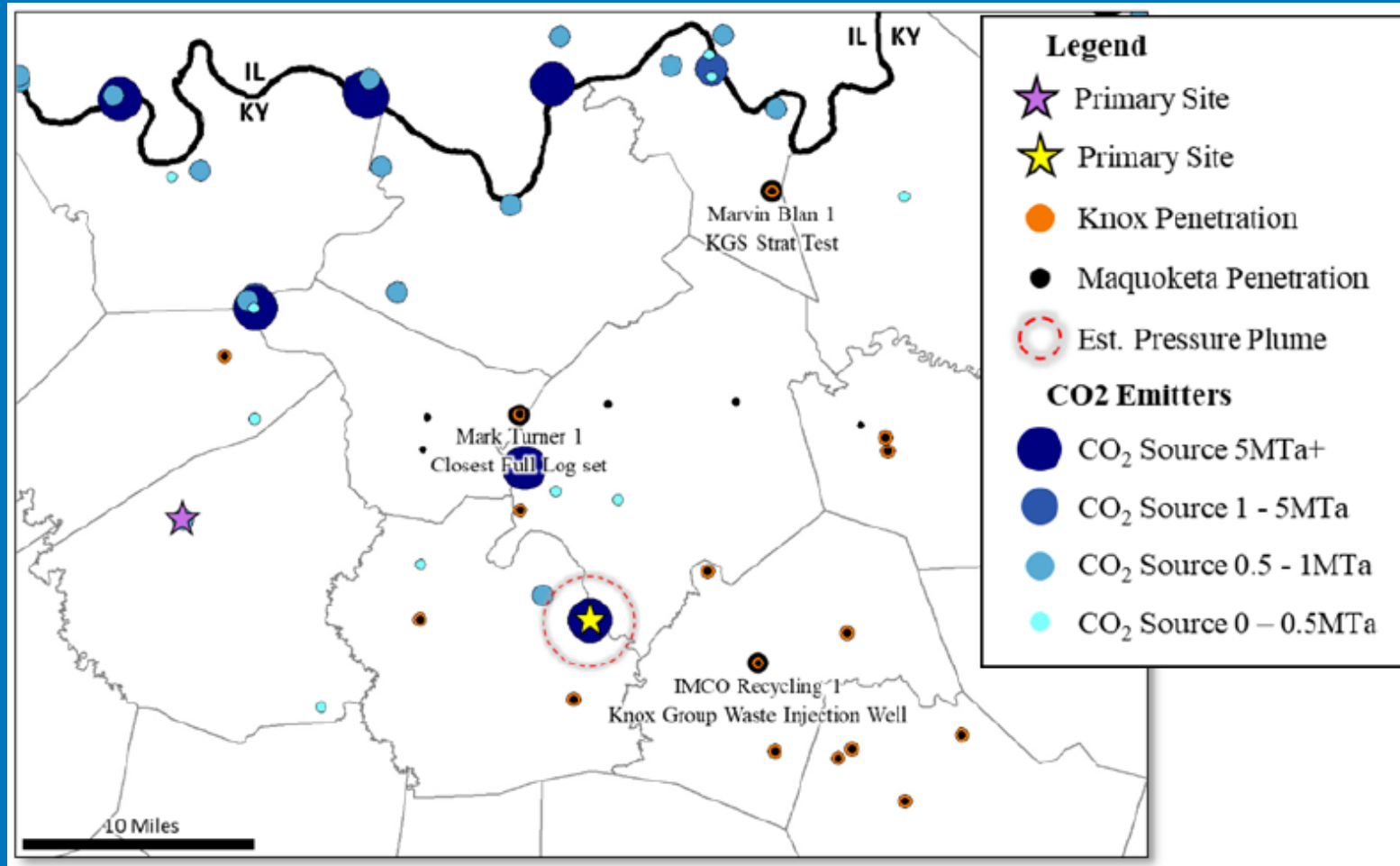


Technology Background

Large CO₂ emitters within <50 miles of the Paradise Power Plant

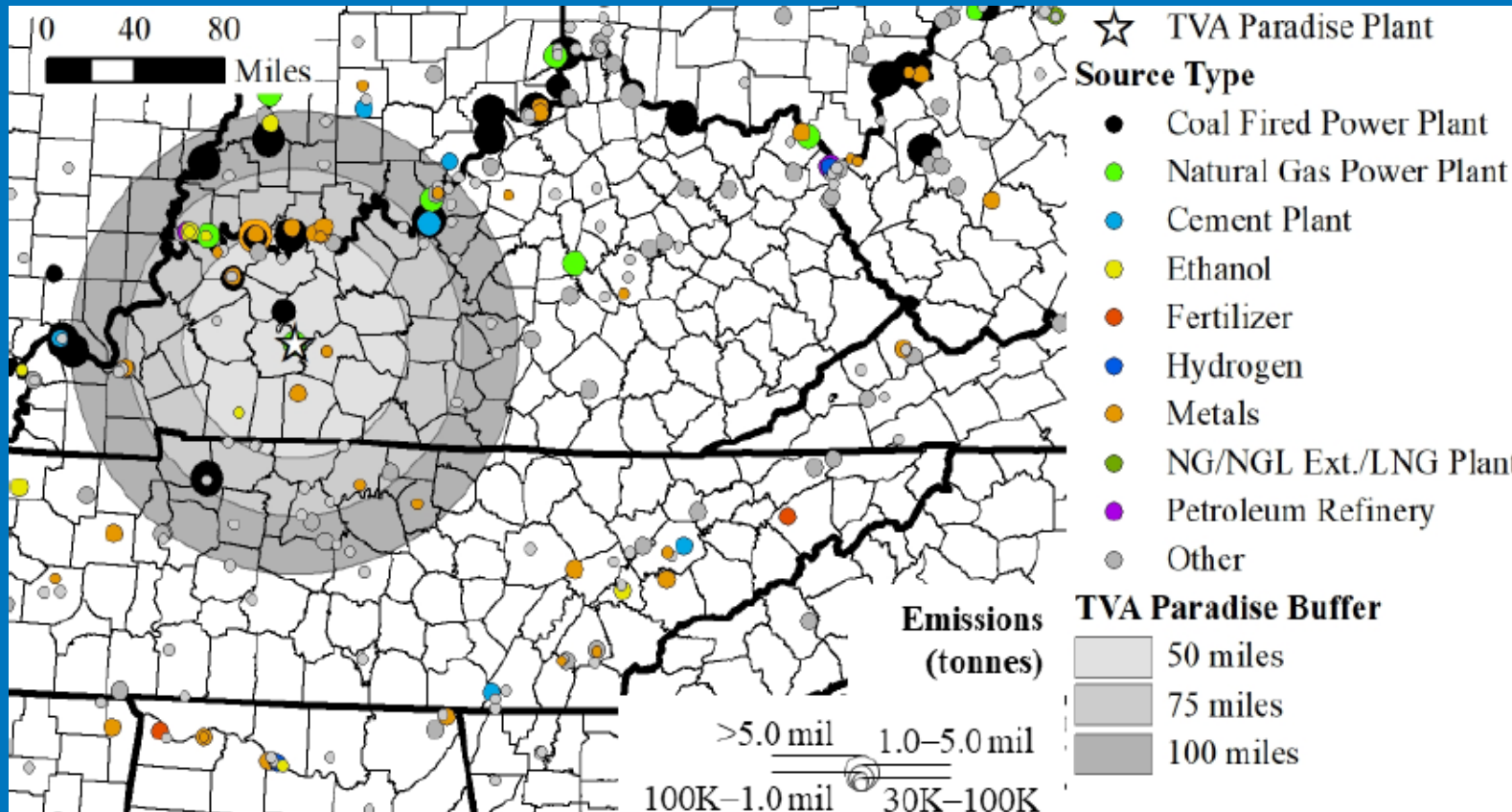
Plant Name	Source Type	Emissions (MT/yr)	Distance from Site
Paradise	Power Plant	2.8	Primary Source
DB Wilson	Power Plant	3.3	14 miles
RD Green	Power Plant	2.6	38 miles
Rockport	Power Plant	5.1	46 miles
Alcoa	Power Plant, Metals	5.7	48 miles
FB Culley	Power Plant	2.4	48 miles

Total emissions of 21.9 MT/yr could be integrated into a regional storage hub



Technical Background

Upside Opportunity to Expand into Regional CCS Hub



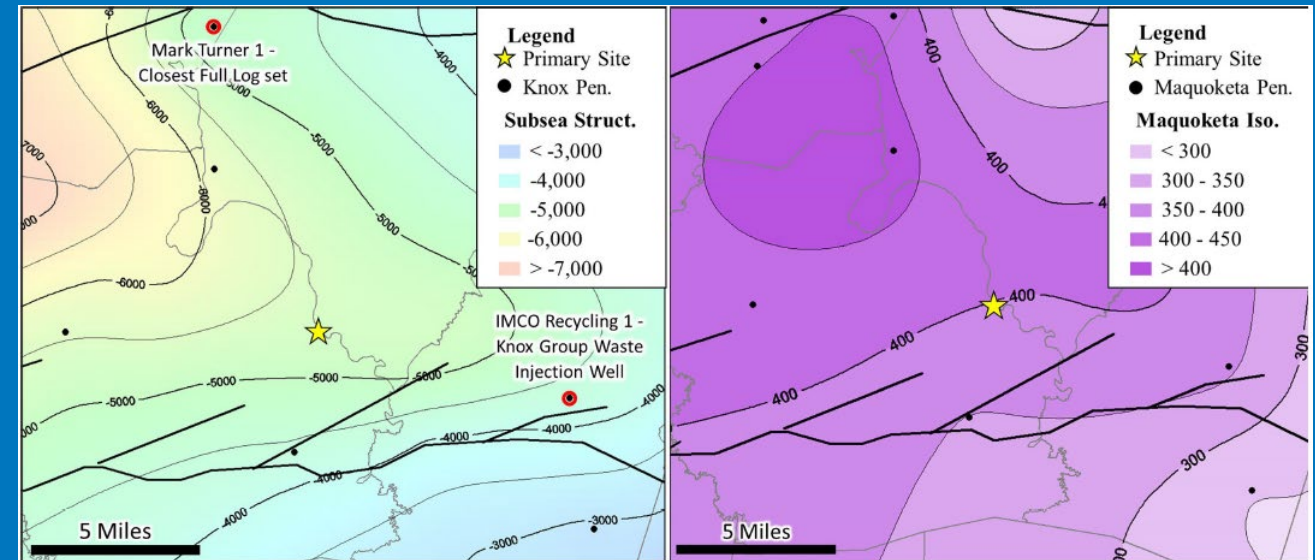
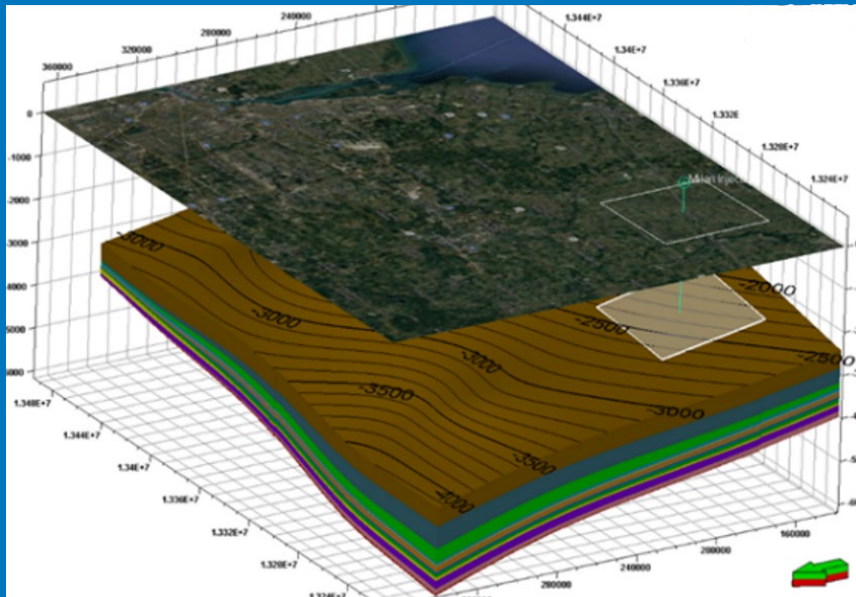
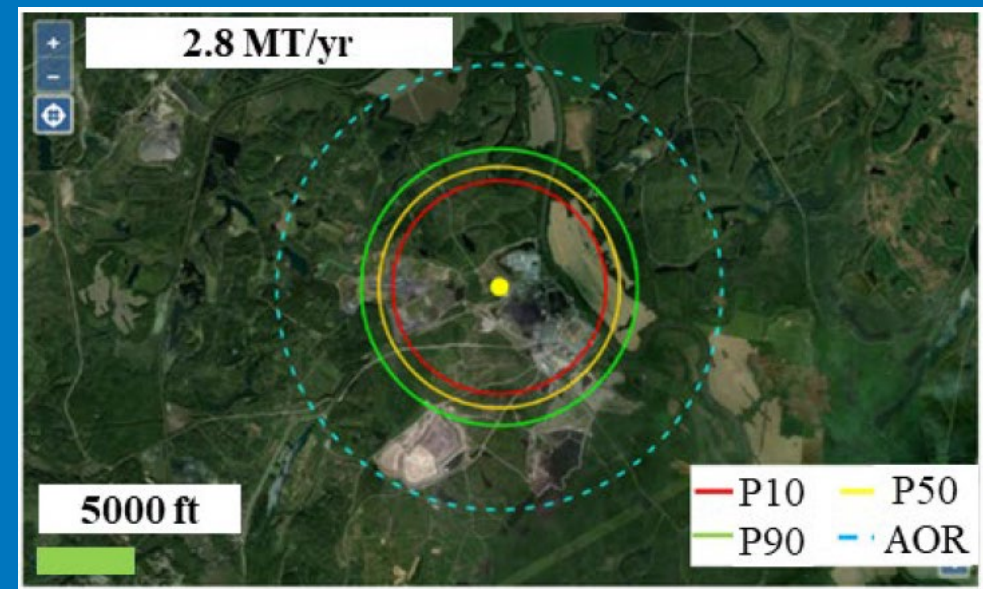
50 Miles- 21.9 MT/YR

75 Miles- 43.5 MT/YR

100 Miles- 80.3 MT/YR

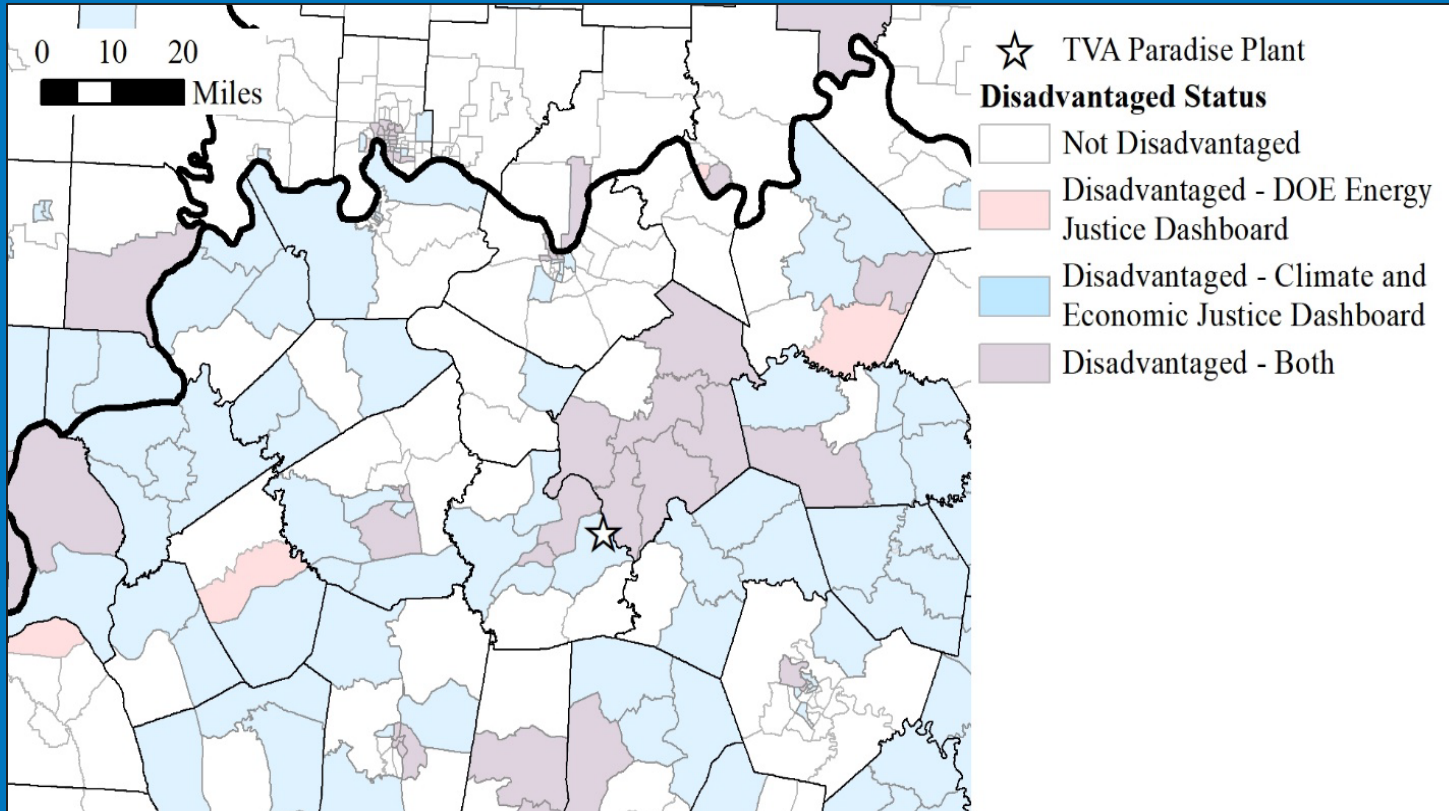
Subsurface Analysis & Modeling

- Static Earth Models
- Dynamic Simulations
- Caprock Integrity Analysis
- Storage Complex Design



Community Benefits

Project can make a positive impact on the local community in a region that faces numerous challenges compared to the overall state



Measure	Tract #9607	Tract #9607+surr.	Muhlenberg Co.	Kentucky
Coal employment	99 th	94 th	99 th	48 th
Disabled population	99 th	88 th	89 th	69 th
Unemployed	96 th	68 th	59 th	52 nd
Fossil energy employment	95 th	90 th	95 th	52 nd
Transportation costs	94 th	93 rd	92 nd	71 st
Mobile home	94 th	85 th	85 th	59 th
Job access	85 th	80 th	84 th	61 st
No internet access	85 th	84 th	78 th	59 th
Less than HS education	77 th	72 nd	76 th	57 th
Population 65 and older	76 th	68 th	67 th	51 st
Low-income population	74 th	65 th	68 th	58 th
Single parents	68 th	47 th	33 rd	51 st
Energy burden	65 th	61 st	64 th	48 th

Summary

1- Characterize and quantify the storage volumes of western Kentucky

2- Evaluate the primary storage complex at the Paradise power plant location

3- Promote a CCS Hub for Kentucky and help TVA decarbonize other operations

4- Identify key technical and non-technical risks to ensure successful deployment of the project during the two-year period of performance

5- Develop characterization, monitoring and storage plans for advancement of future project phases

6- Draft UIC Class VI permit documents

7- Conduct techno-economic assessment of the project to ensure advancement of future phases

8- Engage with local communities to create DEIA and J40 goals that support current and future phases of development

BATTELLE

It can be done