Central Appalachian Basin (CAB) CarbonSAFE Integrated Prefeasibility Study

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INTRODUCTION

The Central Appalachian Basin is an important area to curb CO₂ emissions to the atmosphere and limit the effects of climate change due to the region’s reliance on fossil fuels for power generation, and heavy presence of chemical manufacturing, petrochemical processing, and steel production. The Central Appalachian Basin CarbonSAFE Integrated Prefeasibility Study used existing information to evaluate CO₂ sources, complete a sub-basinal analysis, predict dimensions and infrastructure requirements for commercial scale (>50 million metric tons) CO₂ storage complex, and evaluated the economic feasibility. Two “Selected Areas” co-located near depleted oil and gas fields were identified and a plan was developed to obtain additional characterization data. Economics are challenging, although there is opportunity for associated storage via CO₂-EOR. Overall, CCUS offers an attractive value proposition through its role in developing affordable energy, a cleaner environment, and economic opportunities amenable to this region.

TECHNICAL APPROACH AND CO₂ source assessment

- Performed sub-basinal analysis and CO₂ source assessment
- Gathered existing data for reservoir characterization, caprock/trapping assessment and geohazards assessment
- Created capacity maps and structure contours for Cambrian-Ordovician Units
- Developed capacity estimates for depleted oilfields and production
- Identified deepest USDW formations in Ohio (~ 1,100 ft)
- Found low seismic risk from induced seismicity and regional stress (many UIC wells with no induced seismicity)
- Used Class II brine disposal well data to identify high transmissivity (160,000-500,000 md-ft) and injectivity in Cambrian age vuggy flow zones in A & B areas.

- The CO₂ source assessment identified many large CO₂ point sources:
  - 32 coal-fired power plants,
  - 8 natural gas combined cycle (NGCC) plants,
  - 35 industrial CO₂ sources,
  - 2 future ethane cracker plants,
  - 10 future natural gas power plants
  - 1 planned coke plant
- The project team selected candidates for source-sink scenarios for pipeline routing and down selected six (4 existing and 2 future) for detailed economic analysis.

FUTURE WORK

Although the project was not selected for Phase II funding, the accomplishments of this project are a significant step forward for CCUS
- Promising storage resources within stacked reservoirs offer opportunities to develop CCS in the region
- Many industrial CO₂ sources need viable storage to have capture
- New technologies incorporating affordable carbon capture may spur CCS development
- Financial drivers could help with cost gaps
- 45Q and supplements to 45Q
- CO₂-EOR (Ohio is 10th largest oil producing state)
- Proving injectivity and storage capacity is next key step
- Existing 2-D and 3-D seismic data and deep wells provide low cost opportunities for future research