

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



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GEOLOGIC SCREENING CRITERIA FOR SEQUESTRATION OF CO₂ IN COAL: QUANTIFYING POTENTIAL OF THE BLACK WARRIOR COALBED METHANE FAIRWAY, ALABAMA

Background

The amount of carbon dioxide (CO₂) in the Earth's atmosphere has risen substantially since the start of the industrial age. This increase is attributed widely to the burning of fossil fuels, and if current trends in resource utilization continue, anthropogenic CO₂ emissions will triple during the 21st century. Among the principal ways CO₂ emissions from power plants can be addressed is to sequester this greenhouse gas in geologic formations. Within the geologic formations that can potentially store CO₂ are unminable coalbeds. Coalbeds are an especially attractive target because coal can store large quantities of gas. In this process of being adsorbed, the CO₂ displaces adsorbed methane. Thus, the sequestered CO₂ serves as a sweep gas to enhance recovery of coalbed methane.

The coalbed methane fairway of the Black Warrior basin is a logical location to develop screening criteria and procedures from numerous standpoints. According to the U.S. Environmental Protection Agency, Alabama ranks 9th nationally in CO₂ emission from power plants and two coal-fired power plants are within the coalbed methane fairway. More than 34 billion cubic meters of coalbed methane have been produced from the Black Warrior basin, which ranks second globally in coalbed methane production. Production is now leveling off, and enhanced coalbed methane recovery has the potential to offset impending decline and extend the life and geographic extent of the fairway far beyond current projections.

The Geological Survey of Alabama and its partners are conducting research to determine the amount of CO₂ that can be stored in the Black Warrior coalbed methane region of Alabama.

Primary Project Goal

The primary goal of this project is to develop a screening model that is widely applicable, quantify CO₂ sequestration potential in Black Warrior CBM fairway, and apply screening modeling to identify favorable demonstration sites for CO₂ sequestration.

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PROJECT PARTNERS

Geological Survey of Alabama
Tuscaloosa, Alabama

University of Alabama

Alabama Power Company
Birmingham, Alabama

Jim Walter Resources
Brookwood, Alabama

COST

Total Project Value: \$1,398,068
DOE \$ 789,565
Non-DOE Share: \$ 608,503

Objectives

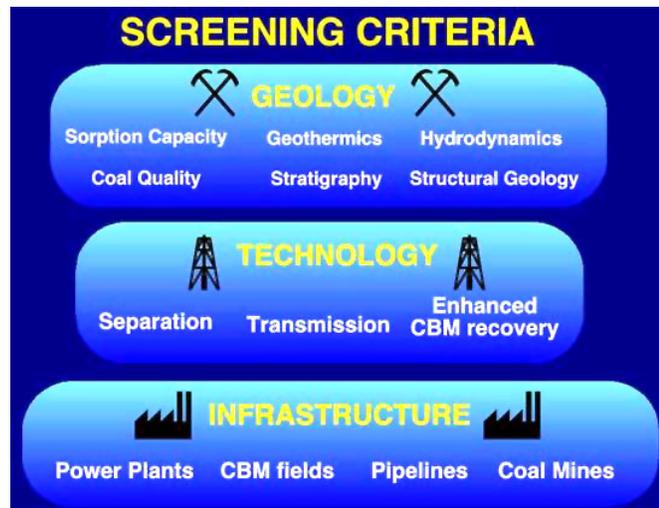
- Develop a geologic screening model for CO₂ sequestration sites that is widely applicable.
- Quantify the CO₂ sequestration potential of coals in the Black Warrior coalbed methane fairway, where two coal-fired power plants operate adjacent to a thriving coalbed methane industry.
- Apply the screening model to identify sites favorable for demonstration of enhanced coalbed methane recovery and mass sequestration of CO₂ emitted from coal-fired power plants in this basin of Alabama.

Accomplishments

Subsurface geological analyses have been performed on the Pottsville formation from the Black Warrior coalbed methane fairway. Hydrologic and geothermic data have been collected from more than 2,800 well logs and are being used to calculate reservoir pressure and geothermal gradient. Preliminary results confirm that coal can sorb significantly more carbon dioxide than methane while having relatively little capacity for nitrogen.

Benefits

The developed screening model will provide a widely applicable tool for evaluating potential geological sites for sequestration of CO₂. Ultimately, this project will result in sequestration of CO₂ and enhanced methane recovery from unmineable coalbeds. The technology results of the project will be transferred to the public, academia, and industry for application toward ultimate commercialization of sequestration technologies.



Variables that will be used to develop the screening model.