

PROJECT facts

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

Sequestration

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MIDWEST REGIONAL CARBON SEQUESTRATION PARTNERSHIP (MRCSP)—PHASE II

Background

As part of a comprehensive effort to assess options for sustainable energy systems, the U.S. Department of Energy has selected the seven partnerships of state agencies, universities, and private companies that will form the core of a nationwide network that will help determine the best approaches for capturing and permanently storing gases that can contribute to global climate change. All together, the partnerships include more than 244 organizations, spanning 40 states, three Indian nations, and four Canadian provinces.

The seven partnerships will develop the framework needed to validate and potentially deploy carbon sequestration technologies. They will evaluate and determine which of the numerous sequestration approaches that have emerged in the last few years are best suited for their specific regions of the country. They will also begin studying possible regulations and infrastructure requirements that would be needed should climate science indicate that sequestration be deployed on a wide scale in the future. Phase II is a 4-year program focused on demonstrating and validating promising CO₂ sequestration opportunities in the seven regions.

Description

The Midwest Regional Carbon Sequestration Partnership (MRCSP) has been established to assess the technical potential, economic viability, and public acceptability of carbon sequestration within its region. The MRCSP region consists of seven contiguous states: Indiana, Kentucky, Maryland, Michigan, Ohio, Pennsylvania, and West Virginia. A group of leading universities, state geological surveys, non-governmental organizations and private companies, led by Battelle, has been assembled to carry out this important research.

The MRCSP's Phase II research program will center on taking the large theoretical sequestration potential identified in the MRCSP's Phase I research program and through a series of first-of-their-kind field validation tests, show how the region's large, well-distributed and competitively priced sequestration potential can be used to simultaneously advance economic growth and environmental protection. Specifically, the MRCSP will conduct two or more small-scale CO₂ injection field tests in the region's deep geologic reservoirs to demonstrate the safety and

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PARTNERS

American Electric Power

AJW Inc.

Baard Energy

Babcock & Wilcox

Battelle Memorial Institute

British Petroleum

CEED

Chicago Climate Exchange

Cinergy Corp.

CONSOL Energy Inc.

Constellation Energy

DTE Energy

First Energy

Indiana Geological Survey

Kentucky Geological Survey

Maryland Geological Survey

**Michigan Basin Core Research
Laboratory**

effectiveness of geologic sequestration systems. The MRCSP also will conduct small-scale field validation tests of terrestrial sequestration to show how the stored carbon can be measured and monitored and how carbon credits could be traded in voluntary greenhouse gas markets. Another key component of the MRCSP's Phase II activities will be an innovative "piggyback drilling" program pioneered by Battelle that will allow the Partnership to leverage the ongoing and extensive investments made by local oil-and-gas-drilling companies to gather "real world" sequestration-related data, such as core samples from deep geologic formations. Throughout Phase II, the MRCSP will continue crucial work initiated in Phase I to map and define the sequestration potential of the region, as well as important efforts to understand key regulatory issues and a first-ever systematic attempt to engage and inform stakeholders about this important class of technologies.

Primary Project Goal

The overall goal of MRCSP's Phase II project is to identify the technical, economic, and social considerations associated with terrestrial and geologic CO₂ sequestration and creating viable pathways for its deployment.

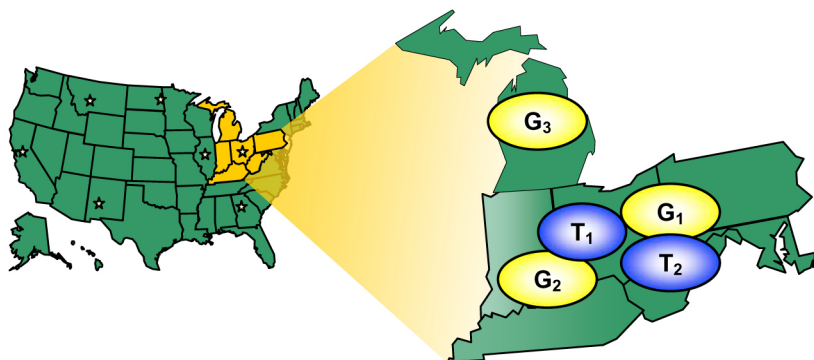
Objectives

- Continue to identify greenhouse gas sources and assess the ability and cost of capturing and sequestering these emissions
- Continue to engage the public and elected officials at all levels and dialog on the issues and potential values associated with terrestrial and geologic sequestration
- Conduct two or more small-scale carbon dioxide injection field tests in the region's deep geologic reservoirs
- Demonstrate the safety and effectiveness of geologic sequestration systems
- Conduct small-scale terrestrial carbon sequestration field tests to demonstrate measurement techniques associated with carbon storage

Benefits

Under U.S. DOE's auspices, a team of over 30 industry and research organizations, led by Battelle, is conducting the MRCSP's Phase II efforts. In Phase II the MRCSP is evaluating the feasibility of sequestering carbon in both geological formations and terrestrial ecosystems in the MRCSP seven-state area. Never before has such a team worked together to advance key energy and climate management technologies, such as CO₂ sequestration, in this seven-state region. The Phase II project will take the first steps towards demonstrating whether there is a cost-effective way to reduce CO₂ emissions in the high-emissions Midwest region. The result will yield an important foundation of knowledge for stakeholders in the region to use to develop robust carbon mitigation strategies.

Field Projects



Midwest Regional Carbon Sequestration Partnership

Geologic Opportunities

Phase I of the MRCSP's research conservatively documented more than 470 gigatons of theoretical potential CO₂ storage capacity in the region's deep geologic formations. This would yield more than 600 years of storage capacity if every existing large point source in the region sought to store all of their CO₂ for the next 200 years. Since there is absolutely no need for such a drastic program of emissions reductions where all large CO₂ point sources immediately begin to capture and store all of their CO₂, it is safe to say the MRCSP region has literally centuries of potential geologic CO₂ storage capacity. We also conservatively estimate that, if fully exploited, at least 400 million barrels of oil and an astonishing 16.2 Tcf of methane could be produced from the region's depleted oil fields and deep coal seams under CO₂ recovery methods.

The MRCSP is evaluating several potential Phase II pilot geologic CO₂ injection projects summarized below:

Appalachian Basin Saline Reservoir Sequestration Test (G1)

This project provides an opportunity to test an integrated CO₂ capture, handling, and injection system in the Appalachian Basin, which has a total potential capacity of 162,000 Million Tonnes of CO₂. FirstEnergy plans to test an enhanced version of the Powerspan NH₃ scrubbing technology to capture CO₂ from the stack of its R.E. Burger plant in eastern Ohio. The MRCSP Phase II project will evaluate the feasibility of injecting approximately 10,000 tonnes into the saline formations of the Appalachian Basin.

Mount Simon Sandstone Saline Reservoir Sequestration Test (G2)

This candidate field test will involve either an operational power plant or a greenfield site for a potential future power plant. This project would inject over 3,000 tonnes of CO₂ in the area of the Mt. Simon Sandstone formation.

PARTNERS (cont.)

National Regulatory Research Institute

Ohio Coal Development Office

Ohio Corn Marketing Program

Ohio Division of Geological Survey

Ohio Environmental Council

Ohio Soybean Council

Ohio State University

Pacific Northwest National Laboratory

Pennsylvania Geological Survey

Schlumberger Limited

Stanford University

The Keystone Center

WestVirginia Geological and Economic Survey

WestVirginia University

Western Michigan University

CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

COST

Total Project Value

\$18,067,378

DOE/Non-DOE Share

\$14,299,996 / \$3,767,382

Michigan Basin Saline Reservoir Sequestration Test (G3)

This project is an injection test using approximately 10,000 tonnes of CO₂ from a gas processing plant in the gas fields developed by the MichCon subsidiary of DTE Energy in the northern part of the Michigan Basin and injecting that CO₂ into the Mt. Simon Sandstone, Sylvania Sandstone, or Bois Blanc Dolomite.

Terrestrial Opportunities

There are approximately 10.7 million hectares (Mha) of productive cropland, 1.7 Mha of eroded cropland and 0.6 Mha of minelands within the MRCSP. These lands are found in each of the seven MRCSP states. Reclaimed minelands are concentrated in Kentucky, Ohio, West Virginia, and Pennsylvania. Adoption of risk management programs would sequester 13.6 million tons (MT) of CO₂ on productive cropland, 11.4 MT CO₂ on eroded cropland, and 5.9 MT CO₂ on reclaimed minelands. If fully implemented, terrestrial carbon sequestration in these ecosystems would offset more than 500 MT of CO₂ credits over a typical project lifetime of 20 years.

The MRCSP is evaluating two Phase II pilot terrestrial carbon sequestration projects summarized below.

Demonstrating Soil Carbon Sequestration in Agriculture (T1)

This project will employ measurement, monitoring and verification (MMV) protocols and technologies on existing farm lands to determine the actual rate of sequestration and potential for the region's farm lands, which have a potential capacity of 250 MT of CO₂ over the next 20 years, to use different tillage practices to increase the carbon stored in agricultural soils. The Chicago Climate Exchange will be engaged to determine how to market these carbon credits.

Demonstrating Carbon Sequestration in Reclaimed Mine Soils (T2)

Sites throughout the region will employ MMV protocols and technologies on mined lands, a 100 MT CO₂ sink potential, to determine the reclamation and land management practices that increase the rate of carbon sequestration in mined soils and potential for the region's mined lands to implement these practices. Value-added products include carbon credits, improved water quality, and wood products.

FOR MORE INFORMATION about the
Midwest Regional Carbon Sequestration
Partnership (MRCSP) please see
www.mrcsp.org