



About the Midwest Regional Carbon Sequestration Partnership



The Midwest Regional Carbon Sequestration Partnership (MRCSP)

The MRCSP was established to assess the technical potential, economic viability and public acceptability of carbon sequestration within its region. The MRCSP is one of seven regional carbon sequestration partnerships established nationwide by the Department of Energy (DOE) as part of its overall strategy to develop robust, cost-effective options to mitigate carbon dioxide (CO₂) emissions that contribute to climate change.

The MRCSP region originally consisted of seven contiguous states: Indiana, Kentucky, Maryland, Michigan, Ohio, Pennsylvania, and West Virginia. New York became a member state in 2007, New Jersey in 2009 and Delaware in 2015. A group of leading universities, state geological surveys, nongovernmental organizations and private companies, led by Battelle, has been assembled to carry out this important research.

The DOE's Regional Carbon Sequestration Program is being implemented in three incremental phases: the Characterization Phase; the Validation Phase; and the Development Phase. MRCSP initiated work in October 2003 under a two-year, Characterization Phase project which focused on developing a comprehensive assessment of CO₂ sources and sequestration opportunities in the MRCSP region. Based on this mapping activity, the MRCSP developed recommendations for several small-scale geologic and terrestrial field tests to be conducted under the Validation Phase of the program (2005-2010). During this Validation Phase (Phase II), multiple, small-scale geologic and terrestrial field tests were conducted throughout the MRCSP region. MRCSP is now initiating the Development Phase of the research, which will involve a larger-scale geologic field test.

The knowledge gained from this research will be of broad value to the regional economy and will help ensure that the region can play a leading role in developing innovative technologies that are likely to be needed in the future. In the long run, the MRCSP aims to:

- Develop practical solutions for reducing carbon emissions to the atmosphere.
- Assess the real-world potential for carbon storage in the MRCSP region.
- Establish the foundation for future commercial deployment of carbon storage in the MRCSP region.

The MRCSP Team

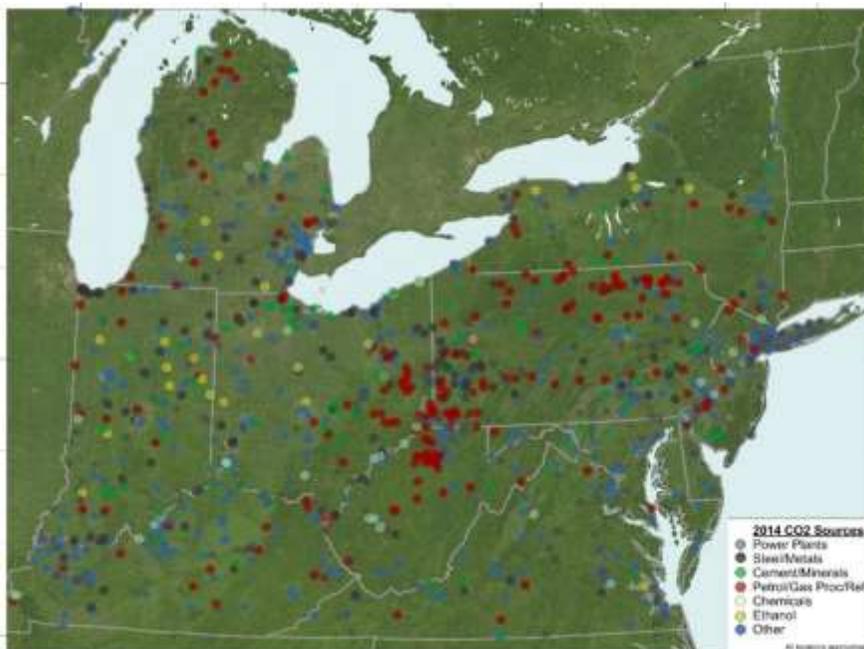
The MRCSP currently consists of nearly 40 members. All are contributing technical knowledge, expertise and cost sharing in various amounts. DOE, through the National Energy Technology Laboratory (NETL), is the single largest sponsor of the MRCSP's research. The Ohio Coal Development Office is the second largest funding organization followed by a number of the region's largest energy companies and other participating organizations.

The MRCSP's members are categorized broadly into two groups, the research team and the industry partner team. The research team includes many of the MRCSP region's leading universities, state geological surveys, research firms and a regional, environmental nongovernmental organization. The industry partner team includes state energy agencies, energy companies, suppliers to the energy industry, and agricultural entities active in the region.

CO₂ Sources in the MRCSP Region

Due to its large and diverse economy, the MRCSP region includes a large variety of agricultural and industrial sources of manmade greenhouse gases. Most of these emissions are in the form of CO₂; however, a portion of these greenhouse gases are in the form of other gases (e.g., methane, nitrous oxide, and fluorinated gases). Therefore, when scientists speak of these other greenhouse gases, they speak of them in terms of their climate change impact equivalence to CO₂ emissions.

While distributed sources such as agriculture, transportation, and home heating account for a large portion of CO₂ emissions in the MRCSP region, over half of CO₂ emissions are linked to stationary point sources. Power plants in the MRCSP region account for approximately 51% of the region's CO₂ point source emissions.

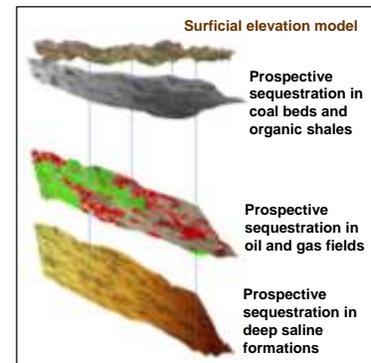


Map showing Locations of Large Point Sources of CO₂ emissions and Type in the MRCSP Region

MRCSP's Geologic and Terrestrial CO₂ Reservoirs

The MRCSP has a great potential for both geologic and terrestrial sequestration. Deep geologic formations include many large areas of deep saline formations, depleted gas formations and unmineable coal seams. There also are a large number of depleted reservoirs that could use CO₂ to help boost domestic oil production while simultaneously sequestering CO₂ in a process known as enhanced oil recovery (EOR). Gaining a better understanding of the distribution of these formations across nine states and their ability to sequester CO₂ is a continuing focus of MRCSP's geologic research.

Terrestrial options in the MRCSP region include eroded and non-eroded (prime) cropland, marginal land, mineland, and wetland and marshland. For example, the region contains a large area of degraded and abandoned minelands that, if properly restored, could serve as an important terrestrial sequestration reservoir.



Deep Geologic Formations in the MRCSP Region

Candidate geologic sequestration reservoirs will be more than a kilometer below the surface and geologically isolated from any sources of potable water.

MRCSP Characterization Phase Activities

During the first phase of the program (2003–2005), the MRCSP:

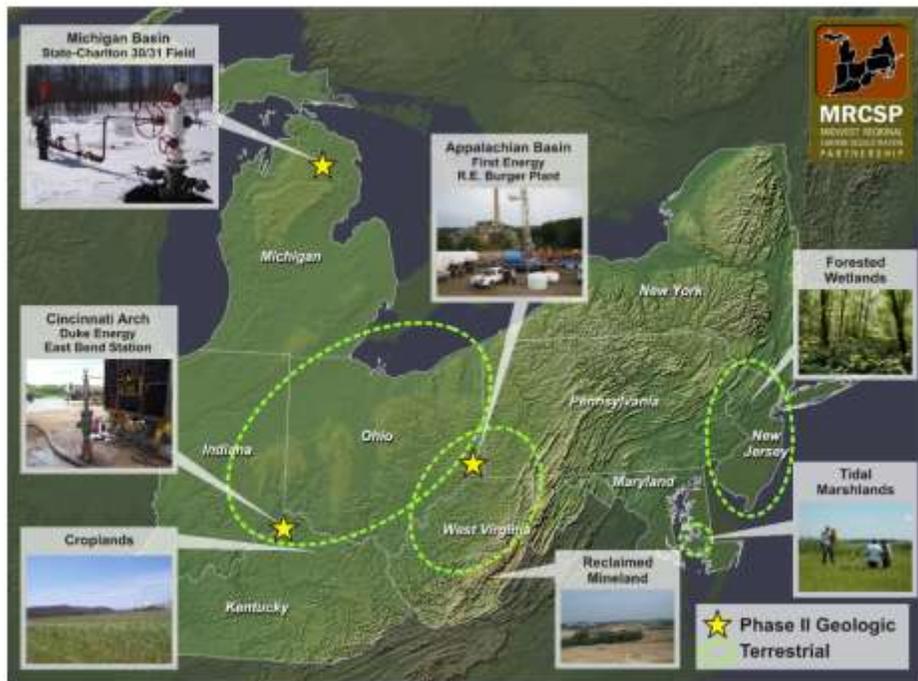
- Identified CO₂ sources in the region
- Assessed the cost of capturing CO₂ from these sources
- Assessed the region's potential for storing CO₂ in deep geologic reservoirs and terrestrial ecosystems
- Identified critical issues for technology deployment, safety, economics, regulations and public acceptability
- Engaged stakeholders to inform them about carbon sequestration and obtain their feedback.

MRCSP Validation Phase Activities

Building on its initial research foundation, the MRCSP conducted a series of small-scale field validation tests over an approximate four-year period (late 2005 – early 2010). Field tests like these are critical aspects of advancing our knowledge of sequestration technologies and how they will perform in the real world. Specifically, the MRCSP conducted:

- Three small-scale, CO₂ injection field tests in different types of regional geologic reservoirs to demonstrate the safety and effectiveness of geologic sequestration systems.
- Four terrestrial sequestration projects in a variety of land types (cropland, reclaimed mineland, and wetland and marshland) to measure the impact of improved management practices and increase our understanding of sequestration opportunities in the region.
- Innovative “piggyback drilling” pioneered by Battelle that allowed the MRCSP to leverage ongoing and extensive investments made by local oil and gas drilling companies to gather sequestration data such as core samples from deep geologic formations.

- Research initiated during the Characterization Phase to further map and define the region's sequestration potential.
- Continued work to develop an understanding of key regulatory issues.
- Processes to engage and inform stakeholders about this important class of technologies.



Phase II Geologic and Terrestrial Project Locations

Three terrestrial and three geologic field tests were completed to demonstrate the safety and effectiveness of carbon sequestration. The field tests provided significant results for the entire region, and better define the technical and economic aspects of carbon capture and storage

MRCSP Development Phase Activities

Development Phase research responds to the need to further increase our scientific knowledge in preparing for future commercialization. Beginning in 2008, the research in this phase is building on the knowledge and experience gained in previous phases to move beyond the small-scale validation field tests to implement a substantially larger-scale injection of CO₂. During the Development Phase, MRCSP will inject approximately one million net tons of CO₂ into a geologic reservoir of regional significance during a four-year period.

For More Information

For more information about carbon sequestration, the MRCSP, and its activities, visit www.mrcsp.org. In addition to information and links to other sources about climate change and sequestration, the site includes snapshots and detailed descriptions of the geologic tests. Contact can also be made through the Web site and with T.R. Massey, Battelle, at 614-424-5544, masseytr@battelle.org.