MIDWEST GEOLOGICAL SEQUESTRATION CONSORTIUM

ILLINOIS BASIN - DECATUR PROJECT

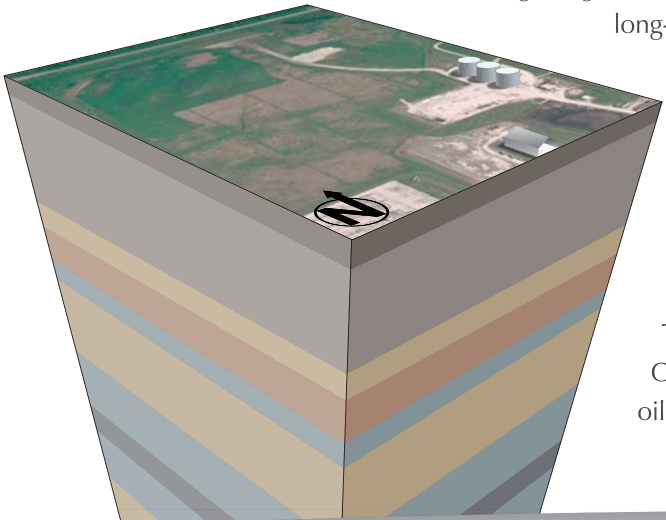
Exploring

the technical and economic feasibility of geologic sequestration

About CCUS

Carbon Capture, Utilization & Storage

The release of carbon dioxide (CO_2) into the atmosphere occurs through natural processes and through the burning of fossil fuels for energy. And, although CO_2 is a gas we encounter every day as part of the air we breathe, many scientists believe the release of CO_2 on a large scale from the combustion of fossil fuels and from CO_2 production during industrial processes is having an impact on the Earth's climate. Reducing the amount of CO_2 released into the atmosphere may slow the global climate trends that have been observed in the last several decades.

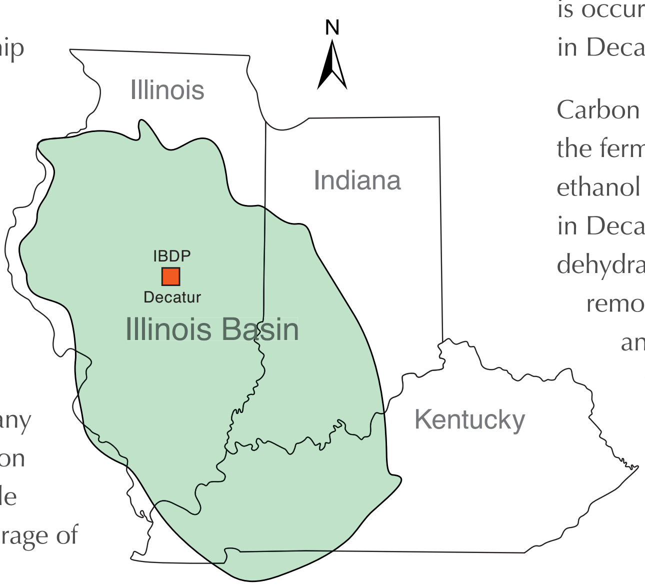


Carbon Capture, Utilization, and Storage (CCUS) is a process in which CO_2 is captured prior to emission and isolated from the Earth's atmosphere for use or storage in deep rock formations. CCUS of CO_2 by injection into the subsurface is a promising technology under study around the world. Carbon dioxide is captured at large emissions sources, processed, transported to a storage site, and injected into geologic formations for recovery of oil or for very long-term storage. Three types of subsurface formations can be used—all of which exist in the Illinois Basin: coal formations too deep for mining and development in the foreseeable future, depleted or mature oil and natural gas reservoirs, and deep saline reservoirs that contain non-potable water. The technologies necessary to make CCUS possible are adapted from existing oil and gas exploration, natural gas storage, and environmental monitoring technologies. Carbon dioxide injection into coal is being tested for methane recovery by replacing the naturally occurring, adsorbed methane with CO_2.

Injection of CO_2 into oil reservoirs has been practiced as an oil recovery method for over 30 years. Saline reservoirs have been used for natural gas storage in the Illinois Basin for decades and are now being tested for CO_2 storage.

MGSC | Midwest Geological Sequestration Consortium

The Midwest Geological Sequestration Consortium (MGSC) is one of seven national research partnerships created by the U.S. Department of Energy (US DOE) to advance carbon sequestration technologies nationwide. MGSC is funded by the US DOE through the National Energy Technology Laboratory via the Regional Carbon Sequestration Partnership Program and by a cost share agreement with the Illinois Department of Commerce and Economic Opportunity, Office of Coal Development, through the Illinois Clean Coal Institute.



MGSC is partnering with the Archer Daniels Midland Company (ADM) and Schlumberger Carbon Services to conduct a large-scale demonstration of geological storage of 1 million metric tons (1.1 million U.S. tons) of CO_2 over a three-year injection period. This integrated CO_2 storage project called the Illinois Basin – Decatur Project (IBDP) is occurring at the ADM plant location in Decatur, Illinois.

Carbon dioxide is being captured from the fermentation process used to produce ethanol at ADM's corn processing complex in Decatur. A dedicated compression and dehydration facility built for this project removes water from the CO_2 stream and then compresses the dry CO_2 to a liquid-like dense phase. The compressed CO_2 then travels through a mile-long pipeline to the wellhead where it is injected deep into the Mount Simon Sandstone saline formation at a depth of 7,000 feet (2,135 meters).

The Mount Simon is the thickest and most widespread saline reservoir in the Illinois Basin and one of the most significant potential carbon storage resources in the United States. While the industrial processes required to make carbon sequestration possible have been known for quite some time, they have never been applied at the scale required to significantly reduce CO_2 emissions as part of a global emissions reduction strategy.

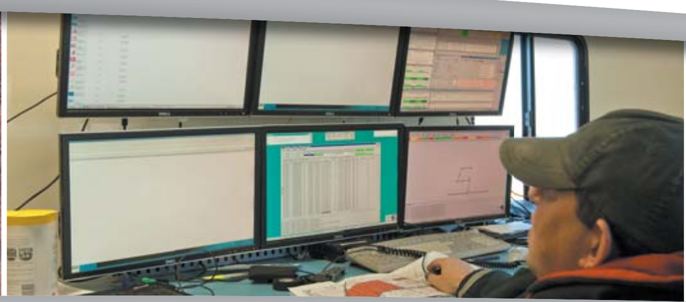
The objectives of the project are to validate the capacity, injectivity, and containment of the Mount Simon which represents the primary carbon storage resource in the Illinois Basin and the Midwest Region.

Site Selection & Characterization

Site selection and characterization progress from general knowledge to specific details acquired in the search for a reservoir-seal system that provides capacity, injectivity, and containment. Beginning in 2003, the MGSC undertook a comprehensive study of the Illinois Basin storage potential and determined that East-Central Illinois offered some of the best geological characteristics for developing a site to demonstrate storage of CO_2 in a deep saline reservoir. The initial regional characterization showed that the Mount Simon Sandstone offered sufficient depth, thickness, and porosity to contain CO_2, and the overlying rock unit, the Eau Claire Shale, provided the necessary seal for safe and effective storage. Demonstrating the storage capabilities of the Mount Simon at a finer scale was the logical next step. Thus, the Illinois Basin – Decatur Project (IBDP) was born when ADM offered a site adjacent to their facility in Decatur, Illinois where high-purity CO_2 from ethanol production was available in an area with potentially suitable geology.

To further characterize the site, several two-dimensional geophysical lines were run in the fall of 2007 and an injection well was drilled in 2009, which confirmed that the IBDP site was suitable, as suggested by the regional characterization process.

Today, the IBDP is an integrated industrial CCUS system from source to reservoir. The project includes deep injection, observation, and geophysical wells, which are instrumented to monitor and further



characterize the Mount Simon. Carbon dioxide is captured, dehydrated, and compressed to a liquid-like dense phase, which is then delivered to the injection well via pipeline. Throughout the injection process, CO_2 is monitored at the near surface and deep subsurface.

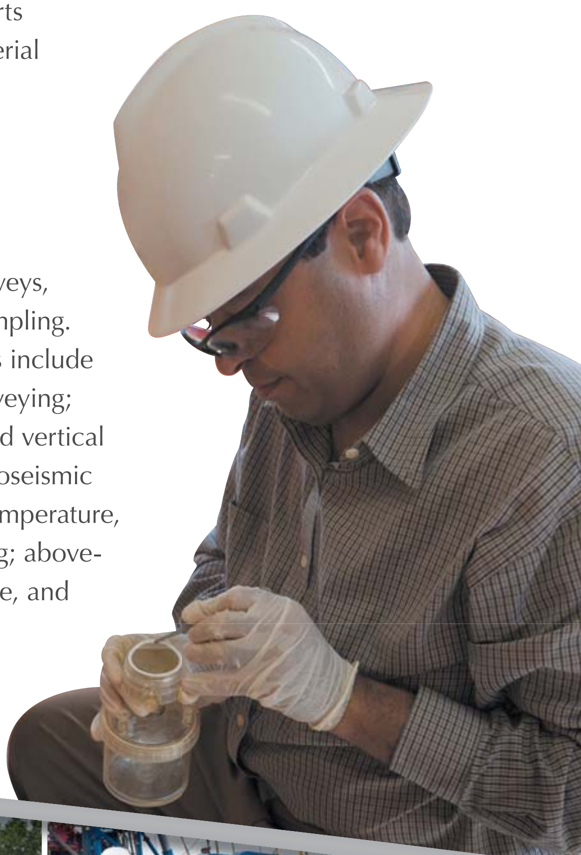
Basically, site characterization never stops. We continue to learn more about the Mount Simon, the Eau Claire, and their internal structure as we monitor the injected CO_2, carry out cased-hole logging in the wells, and conduct repeat geophysical surveys. Characterization of the site will continue through the injection period (through fall 2014) and post-injection monitoring period (through fall 2017).

MVA | Monitoring, Verification & Accounting

The MGSC Phase III IBDP Monitoring, Verification, and Accounting (MVA) Program is a coordinated effort between the Illinois State Geological Survey, Schlumberger Carbon Services, ADM, Lawrence Berkley National Laboratory, University of Illinois, TRE-Canada and the Carbon Capture Project, Physical Sciences Incorporated, Illinois Department of Transportation and others.

The extensive MVA program involves environmental measurements, monitoring, and computer modeling throughout the life of the project and is focused on the 0.25 mi^2 (0.65 km^2) project site. Near-surface and subsurface monitoring are integral efforts to reach MVA and project goals of (1) establishing pre-injection environmental conditions to evaluate potential impacts from CO_2 injection, (2) demonstrating that project activities are protective of human health and the environment, and (3) quantifying and tracking CO_2 stored in the Mount Simon Sandstone saline reservoir. Up to 24 months of pre-injection baseline data have been collected since IBDP began.

Near-surface monitoring efforts include near-infrared color aerial imagery acquisition, surface deformation monitoring, net CO_2 flux monitoring, soil gas sampling, soil CO_2 flux monitoring, high-resolution electrical earth resistivity surveys, and shallow groundwater sampling. Subsurface monitoring efforts include two-dimensional seismic surveying; three-dimensional seismic and vertical seismic profiles; passive microseismic monitoring; injection zone temperature, pressure, and fluid monitoring; above-caprock temperature, pressure, and fluid monitoring; and open and cased-hole logging.



Research monitoring was initiated in 2009 and will conclude in 2017, after the three-year injection and three-year post-injection periods. Injection was initiated under a Class I – Non-hazardous Underground Injection Control (UIC) permit issued by the Illinois Environmental Protection Agency and will be completed under a Class VI UIC permit issued by the U.S. Environmental Protection Agency.

The IBDP site is also being used to develop and field test carbon storage-related MVA instrumentation and technology for deployment at future CCUS projects.

Global Knowledge Sharing

Through the Prairie Research Institute at the University of Illinois, scientists at the MGSC and Illinois State Geological Survey's Advanced Energy Technology Initiative are engaged in several additional CCUS research projects designed to answer fundamental questions about regional geology, carbon capture technologies, and environmental monitoring.

We are committed to knowledge sharing, capacity building, and development of industry best practices. As one of a handful of demonstration projects to successfully inject significant volumes of CO_2 into a saline reservoir, IBDP serves as baseline for the development of CCUS projects in the Illinois Basin, the Midwestern US, and around the world. Our knowledge sharing programs further support the commercial implementation of CCUS by leveraging the valuable insights gained through IBDP into the deployment of integrated systems, from wellhead to reservoir, necessary for safe and effective CO_2 storage.

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For more information about these projects, please contact us at (217) 244-4068 or visit our website at **www.sequestration.org**

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