

Large-Scale Infrastructure Planning for Carbon Capture, Utilization and Storage

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Background/Objectives. Carbon capture, utilization, and storage (CCUS) will require a large-scale buildout to accommodate transport and storage of CO₂ captured from point sources or direct air capture (DAC) systems. Because this infrastructure is largely not yet in place, its development can be optimized through careful planning and common infrastructure. This proposed presentation will discuss the considerations for optimizing this infrastructure development, including determining the right size, makeup, and location for infrastructure buildout; fostering public acceptance; accounting for environmentally and culturally sensitive areas; and ensuring equity and fairness in the sharing of benefits and burdens of any potential CCUS system. The work is completed as part of the Midwest Regional Carbon Initiative (MRCI) (midwestccus.org).

Approach/Activities. Integrated CCUS projects will be analyzed for infrastructure needs using the Scalable Infrastructure Model for Carbon Capture Storage (SimCCS) as well as information from the United States Environmental Protection Agency (U.S. EPA), Energy Information Administration (EIA), and the Pipeline and Hazardous Materials Safety Administration (PHMSA) to determine the requirements for CO₂ transport and storage systems. Scenarios will be developed to demonstrate infrastructure buildout for projects in up to four distinct areas in the Midwestern United States. The scenarios fit into one of three project types:

- Limited: CO₂ from a single source or small group of sources injected into a single underlying or nearby sink area.
- Hub: CO₂ from several sources feeding into a central trunkline delivered to a large sink or wellfield for storage.
- Distributed: CO₂ from several sources feeding into a central trunkline, along which several smaller scale projects are in discrete areas.

Each of these buildout scenarios will be evaluated to determine their feasibility, economics and business case, possible benefits, and potential public acceptance. Next steps for each scenario will also be discussed.

Results/Lessons Learned. Preliminary results from three of the four buildout scenarios have been completed (Central Ohio Limited Scenario, Central Indiana Hub Scenario, and the Ohio-West Virginia-Pennsylvania Distributed Scenario). Results from these scenarios have been summarized to show some high-level trends:

- The assumptions of CO₂ source and sink locations is a significant factor affecting infrastructure buildout.
- Considering Energy, Equity, and Environmental Justice (EEEJ) issues is not only the right thing to do, they do not impact the region-wide infrastructure development at a large scale in the Midwestern United States.
- The careful siting of CO₂ pipelines may offer significant benefits for shared infrastructure and monitoring at storage locations.

By the time of the presentation, we also expect to comment on the business case, jobs and economic impacts created by the system, and the burdens of the systems.