

# Northern Michigan Basin CarbonSAFE Integrated

Award Number: DE-FE0029276

## Project Summary:

As part of the Integrated CCS Pre-Feasibility phase of the Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative, Battelle Memorial Institute carried out studies to establish the feasibility of developing an integrated commercial-scale carbon capture and storage (CCS) site that will utilize deep geologic strata in the Northern Michigan Basin (Figure 1). The project identified major sources of carbon dioxide (CO<sub>2</sub>), conducted a sub-basinal geologic storage assessment, and determined the parameters for the proposed storage facility. Testing of National Risk Assessment Program (NRAP) tools was incorporated into several steps of the project. A major emphasis of the work was to develop an effective team capable of addressing the technical, economic, legal, engineering, surface, and public acceptance issues related to implementation of a real-world storage project in the Northern Michigan Basin.

**Figure 1: Project location map.** The project area is denoted by the red rectangle in the northwest part of the state.

## Project Outcomes:

This project concept represents a highly viable opportunity that could be advanced and brought closer to realization with additional support. The study found that two saline reservoirs, the Saint Peter Sandstone (SPSS) and the Bass Island Dolomite, are both present across the entire study area and are both strong candidates for hosting a 50 million metric ton storage complex. Of the two, the SPSS is preferred because it occurs at greater depths below the primary zones of oil and gas production. In addition to the two saline reservoirs, the Northern Michigan Basin region hosts the Northern Pinnacle Reef Trend, a collection of more than 800 Niagaran-age pinnacle reefs, that provide a low-risk, value-added CO<sub>2</sub> storage option that can be used in conjunction with saline storage in the storage complex. The Michigan Department of Natural Resources, which manages large tracts of land where the project can be located, has indicated interest in allowing state-owned land to be used for a geologic CO<sub>2</sub> storage site. Legal analysis of Michigan policies, regulations, and practices found that Michigan has a regulatory climate that is generally favorable for CO<sub>2</sub> storage. Results of a focused outreach program conducted with key stakeholders demonstrate a high level of support for the storage complex concept. At least nine existing and three potential new CO<sub>2</sub> sources were determined to be attractive candidates for the establishment of a regional CCS hub. The economic analysis indicated that the availability of the recently enacted tax credits will go a long-way toward closing the cost and revenue gaps, especially when combined with value-added options such as CO<sub>2</sub>-enhanced oil recovery.

## Presentations, Papers, and Publications

[Final Report: Integrated Pre-Feasibility Assessment for a Northern Michigan Basin CarbonSAFE CO<sub>2</sub> Storage Complex](#) (September 2018) – Mark Kelley, Autumn Haagsma, Paul Champagne, Neeraj Gupta, Meghan Harley Yugulis, Jared Hawkins, Joel Main, Ashwin Pasumarti, Joel Sminchak, Stephanie Weber, Bob Mannes, Rick Pardini, Kim Sanders, William Harrison, Wayne Goodman, Sara Wade, Sara L. Cunningham, James Neal, Diana H. Bacon, Inci Demirkanli, Signe K. White, Susan Carroll, Richard Middleton, Sean Patrick Yaw

**Prime Performer:**  
*Battelle Memorial Institute*

**Principal Investigator:**  
*Dr. Neeraj Gupta*

**Project Duration:**  
*1/1/2017 – 6/30/2018*

**Performer Location:**  
*Columbus, Ohio*

**Program:**  
*Carbon Transport & Storage*

