

AN ADAPTIVE MANAGEMENT APPROACH TO CO₂ STORAGE PROJECTS

Charles D. Gorecki, Scott C. Ayash, Ryan J. Klapperich, James A. Sorensen, John A. Hamling, Edward N. Steadman, and John A. Harju

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

ABSTRACT

As part of the U.S. Department of Energy National Energy Technology Laboratory Regional Carbon Sequestration Partnership Program, the Plains CO₂ Reduction (PCOR) Partnership is advancing the science of carbon capture and storage (CCS) by conducting large-scale demonstration projects. The PCOR Partnership recognizes that every CCS project presents unique, site-specific challenges based upon varying geologic and operational characteristics. To meet these challenges, an adaptive management approach has been developed that ensures successful project implementation while remaining adaptable to each project's unique attributes.

The PCOR Partnership's adaptive management approach consists of four main components: site characterization; modeling and simulation; risk assessment; and monitoring, verification, and accounting (MVA). Each component is continually evaluated and updated throughout the lifetime of the project, with the results of each evaluation serving as input for the remaining components. This iterative cycle is repeated throughout all project phases, from feasibility study through postclosure monitoring. First, site characterization data are used to populate models and guide simulation activities. A "fit-for-purpose" strategy is used to build models and run simulations to answer specific questions related to geologic uncertainties and technical risks and to guide monitoring locations and timing. Second, data gathered during site characterization and modeling activities serve as inputs to the risk assessment, with the results helping guide the activities of the former in subsequent iterations. In turn, the risk profile evolves based on increased knowledge and implementation of monitoring and/or remediation strategies. Finally, MVA techniques are selected to address specific geologic uncertainties and technical risks identified by the other components in the adaptive management approach. MVA is used to produce data sets that can guide operational decisions to improve project performance. The PCOR Partnership's adaptive management approach allows the site-specific nature of any CCS project to be taken into account and creates a dynamic environment where monitoring strategies can be adjusted to an evolving risk and operational profile. Thus the MVA techniques deployed will always target relevant technical risks and ensure that the most cost-effective, technically viable, site-specific strategies will be used throughout the life of a project.