Carbon Capture & Sequestration

CCS Fact Sheet

Monitoring, Verification, and Accounting

This research focus area is aimed at providing an accurate accounting of stored carbon dioxide (CO_2) and obtaining a high level of confidence that it will remain sequestered indefinitely. Much of the effort involves field tests to fully characterize geologic storage sites, validate models and prior findings, and develop measurement, monitoring, and verification instrumentation (MVA).

Monitoring, Verification, and Accounting Research

MVA research seeks to obtain:

- **Instruments** that can precisely detect carbon dioxide in a storage reservoir and/or measure its movement and its physical and chemical state.
- The **capability** to interpret and analyze the results from such instruments.
- The **ability to use modeling** to predict how movement and/or chemical reactions of carbon in the reservoir will affect (1) the permanence of storage, (2) the environmental impacts within the reservoir, and (3) any impacts on human health.
- **Best practices and procedures** that can be used to respond to any detected changes in the condition of the stored carbon and thus mitigate losses of carbon and/or negative impacts on the environment and human health.

A successful effort will enable sequestration project developers to ensure human health and safety and prevent damage to the host ecosystem. The goal is to provide sufficient information and safeguards to enable developers to obtain permits for sequestration projects. MVA also seeks to support a system of emissions reduction credits that approach 100 percent of injected CO_2, contributing to the economic viability of sequestration projects. Finally, MVA will provide improved information and feedback to sequestration practitioners, thus accelerating technology progress.

Monitoring, Verification, and Accounting Efforts

MVA efforts are divided into two sub-areas:

1. **Geologic formations:** MVA systems that focus on below-ground CO_2 draw upon a significant capability developed for fossil fuel exploration and production. Work is directed at: 1.) refining existing CO_2 detection technologies and developing new ones, and 2.) developing models of subsurface systems that enable processing and analysis of information from detection devices. Measurement technologies being investigated include surface-to-borehole seismic, micro-seismic, cross-well electromagnetic, and

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electrical resistance tomography. This area is less mature and is focused on detecting leaks or deterioration in reservoirs and assessing ecological impacts of geologic carbon storage.

2. **Terrestrial ecosystems:** Traditional methods for measuring carbon in terrestrial ecosystems (e.g., measuring tree diameters and analyzing soil samples in an off-site laboratory) are labor-intensive and costly. Automated technologies that offer lower-cost and more detailed, timely information that can be used to proactively manage sequestration sites are being developed.