



# Southwestern United States Carbon Sequestration Training Center

## Background

The focus of the Department of Energy's (DOE) Carbon Storage Program is to develop and advance technologies that will significantly improve the effectiveness of geologic carbon storage, reduce the cost of implementation, and prepare for widespread commercial deployment between 2025 and 2035. Research conducted to develop these technologies will ensure safe and permanent storage of carbon dioxide (CO<sub>2</sub>) to reduce greenhouse gas (GHG) emissions without adversely affecting energy use or hindering economic growth.

Geologic carbon storage involves the injection of CO<sub>2</sub> into underground formations that have the ability to securely contain the CO<sub>2</sub> permanently. Technologies being developed for geologic carbon storage are focused on five storage types: (1) oil and natural gas reservoirs; (2) saline formation; (3) unmineable coal seams; (4) basalts; and (5) organic-rich shales. These technologies will work towards meeting carbon storage programmatic goals of (1) estimating CO<sub>2</sub> storage capacity +/- 30 percent in geologic formations; (2) ensuring 99 percent storage permanence; (3) improving efficiency of storage operations; and (4) developing Best Practices Manuals. Deploying these technologies in commercial-scale applications will require a drastically expanded workforce trained in carbon capture and storage (CCS)-related disciplines, including geologists, engineers, scientists, and technicians. Training to enhance the existing CCS workforce and to develop new professionals can be accomplished through focused educational initiatives in the CCS technology area.

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), through funding provided by the American Recovery and Reinvestment Act (ARRA) of 2009, awarded seven projects to receive more than \$8.4 million in funding to develop regional carbon storage technology training centers in the United States. The seven projects are facilitating the transfer of knowledge and skills required for development, operation, and monitoring of commercial CCS projects. Training activities are focusing on the applied engineering and science of CCS for site developers, geologists, scientists, engineers, regulators, and technicians to provide a technology transfer platform for geologic CO<sub>2</sub> storage activities. These training centers help meet the DOE Carbon Storage Program's goal of developing CCS infrastructure in the United States.

## Project Description

New Mexico Institute of Mining and Technology, in partnership with Texas A&M University and the University of Utah, developed a regional carbon storage technology training center for the southwestern United States (CO<sub>2</sub>TC). The purpose of this training center was to increase the CCS workforce through the development and implementation of academic programs, specialized classes, continuing education, professional development, and public awareness.

## NATIONAL ENERGY TECHNOLOGY LABORATORY

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## PROJECT FACTS

Carbon Storage - ARRA - Infrastructure

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### PARTNERS

Texas A&M University  
University of Utah

### PROJECT DURATION

**Start Date**   **End Date**  
11/16/2009   12/31/2012

### COST

**Total Project Value**  
\$1,149,132  
**DOE/Non-DOE Share**  
\$936,155 / \$212,977



### PROJECT NUMBER

DE-FE0001731

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The project built on current outreach and education programs to recruit and prepare students in the region for careers related to the geologic storage of CO<sub>2</sub>. Students were engaged at all educational levels, from K-12 to generate early interest, to secondary education students by providing their teachers with classroom tools and training, to college students from several disciplines that cover all aspects of the CCS industry (i.e., MBA programs, law, computer science, humanities, social & behavioral science, etc.). The training center also conducted outreach and continuous updated training courses for current professionals inclusive of industry, non-governmental organizations, the general public, and the media to provide greater awareness of the importance of geologic carbon storage.

## Goals/Objectives

The goal of this project was to significantly increase the availability of carbon storage educational opportunities in the southwestern region of the United States. The overall objectives were to generate early interest and increase the number of workers available to the CCS industry by developing and implementing academic programs, specialized classes, continuing education, professional development, and public awareness.

## Accomplishments

- As of the completion of this project, a total of 2,598 Professional Development Hours (PDHs) and 60 Continuing Education Units (CEUs) have been obtained, and over 100 students have participated in CCS training (Figure 1).
- The Keystone Center Teacher Training in Salt Lake City, UT offered a course entitled CSI: Climate Status Investigations to broaden the scope and quality of national science education with a balanced, non-biased, comprehensive, and interdisciplinary approach to the study of an issue pivotal to our students' generation - global climate change. The training was held at the McGillis School.
- CO<sub>2</sub>TC conducted several training and outreach initiatives relating to secondary school educators and students. These initiatives were focused on creating awareness of CCS issues and knowledge and sparking student interest in science and engineering topics related to CCS. The CO<sub>2</sub>TC conducted 3 multi-day educator-centered classes and two three-day short courses for high school students. In addition, the CO<sub>2</sub>TC developed a Carbon Bond® game for engaging younger students.
- CO<sub>2</sub>TC university level training was structured to interest students in careers in CCS and to introduce skills needed for work in this field. The project team developed four college level courses (an undergrad CCS class, a reservoir/caprock field project class, and a graduate CCS class that was taught twice). Total enrollment in these four courses was 49 students.
- CO<sub>2</sub>TC professional training activities addressed working CCS professionals through a webinar series that was focused on outreach and education, a hydrologic modeling short course (STOMP modeling), and professional training for teachers.

## Benefits

A key benefit of this project was to create an established and better trained workforce well-versed in the necessary best-practices needed to make an impact to future CCS operations throughout the United States and worldwide. Regionally, a significant portion of the captured CO<sub>2</sub> within the southwestern region can be used for enhanced oil recovery (EOR) to increase domestic production and reserves. The overall benefit of the program was to accelerate implementation, deployment and verification of carbon storage by increasing the quantity and quality of professionals involved in the exploration, characterization and implementation of geologic carbon storage sites.



*Figure 1. Photo taken from one of the field component of one of the high school courses in which students examine outcrop rocks relevant to geologic carbon storage.*