



the **ENERGY** lab

## PROJECT FACTS

### Carbon Storage - Training Center

# Alliance for Sequestration Training, Outreach, Research and Education (STORE)

## Background

Carbon capture utilization and storage (CCUS) technologies offer great potential for mitigating carbon dioxide (CO<sub>2</sub>) emissions emitted into the atmosphere without adversely influencing energy use or hindering economic growth. Deploying these technologies in commercial-scale applications will require a drastically expanded workforce trained in CCUS related disciplines, including geologists, engineers, scientists, and technicians. Training to enhance the existing CCUS workforce and to develop new professionals can be accomplished through focused educational initiatives in the CCUS technology area. Key educational topics include simulation and risk assessment; monitoring, verification, and accounting (MVA); geology-related analytical tools; site characterization, methods to interpret geophysical models; methods for designing and completing CO<sub>2</sub> injection and monitoring wells; and methods for conducting public outreach activities in areas where CCUS projects may occur.

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) selected seven projects to receive more than \$8.4 million in funding to develop regional carbon storage technology training centers in the United States. The majority of this funding is provided by the American Recovery and Reinvestment Act (ARRA) of 2009. The seven projects are facilitating the transfer of knowledge and skills required for development, operation, and monitoring of commercial CCUS projects. Training activities are focusing on the applied engineering and science of CCUS for site developers, geologists, scientists, engineers, regulators and technicians to provide a technology transfer platform for geologic CO<sub>2</sub> storage activities. The awarded projects will produce a workforce with both technical and non-technical skills and competencies needed to successfully implement and deploy CCUS technologies.

## CONTACTS

### Traci Rodosta

Carbon Storage Technology Manager  
National Energy Technology Laboratory  
3610 Collins Ferry Road  
PO Box 880  
Morgantown, WV 26507  
304-285-1345  
traci.rodosta@netl.doe.gov

### Andrea Dunn

Project Manager  
National Energy Technology Laboratory  
626 Cochran Mill Road  
P.O. Box 10940  
Pittsburgh, PA 15236  
412-386-7594  
andrea.dunn@netl.doe.gov

### Hilary Olson

Project Director/Principal Investigator  
University of Texas at Austin  
1 University Station, C0300  
Austin, TX 78712-0228  
512-471-8356  
olson@ig.utexas.edu

### Steven Bryant

Lead Principal Investigator  
University of Texas at Austin  
1 University Station, C0300  
Austin, TX 78712-0228  
512-471-3250  
steven\_bryant@mail.utexas.edu

## PARTNERS

Sandia Technologies, LLC  
Striker Communications



## NATIONAL ENERGY TECHNOLOGY LABORATORY

Albany, OR • Anchorage, AK • Morgantown, WV • Pittsburgh, PA • Sugar Land, TX

Website: [www.netl.doe.gov](http://www.netl.doe.gov)

Customer Service: 1-800-553-7681



U.S. DEPARTMENT OF  
**ENERGY**

## PROJECT DURATION

### Start Date

11/16/2009

### End Date

09/01/2013

## COST

### Total Project Value

\$941,380

### DOE/Non-DOE Share

\$941,380/\$0

Government funding for this project is provided in whole or in part through the American Recovery and Reinvestment Act.



## Project Description

NETL, in partnership with the University of Texas at Austin, has developed the Alliance for Sequestration Training, Outreach, Research and Education (STORE), which is a regional carbon storage technology training center for the Gulf Coast states that facilitates national and global development and deployment of CCUS technology. The training center accomplishes this through technology transfer events; webinars; student, professional, and public training courses; seminars; and communication through newsletters, email tech alerts, and a website (<http://www.storeco2now.com>). This training makes a vital contribution to the scientific, technical, and institutional knowledge needed to develop commercial CCUS projects. By providing educational and training programs necessary to produce a skilled professional CCUS workforce, the University of Texas at Austin helps the nation meet the need to capture and store large amounts of CO<sub>2</sub>. In addition, the center promotes transfer of regional CCUS technology expertise, provide the public, CCUS industry and other interested parties with a variety of professional services, and works with all stakeholders to advance CCUS from demonstration stage to deployment.

## Goals/Objectives

The primary objective of the DOE's Carbon Storage Program is to develop technologies to safely and permanently store CO<sub>2</sub> and reduce Greenhouse Gas (GHG) emissions without adversely affecting energy use or hindering economic growth. The Programmatic goals of Carbon Storage research are: (1) estimating CO<sub>2</sub> storage capacity in geologic formations; (2) demonstrating that 99 percent of injected CO<sub>2</sub> remains in the injection zone(s); (3) improving efficiency of storage operations; and (4) developing Best Practices Manuals (BPMs).

The primary goal of STORE is to promote better understanding of CCUS, science, and engineering technology. STORE's efforts are helping to create a skilled workforce for the CCUS industry, and fostering the public understanding required to advance the United States in its energy security and its leadership position with regard to climate change mitigation technology by:

- Providing world-class technology transfer, training, and CCUS expertise through educational programs and instructional materials (examples in Figures 1 and 2).



Figure 1: Photo of STORE participants at a CO<sub>2</sub> injection field site

- Delivering a training and communications program through an established technology transfer network with online capabilities, thus making the educational products globally accessible.
- Developing a self-sustaining CCUS training program through an active sponsorship program and appropriately priced user fees.

The expected outcomes of this information transfer project are the improvement of public awareness and understanding regarding global climate change and CO<sub>2</sub> storage as well as a skilled workforce in geology, geophysics, geomechanics, geochemistry (Figure 1), and reservoir engineering disciplines that will enhance the development and deployment of CCUS technology (Figure 2).



*Figure 2: Discussion of fluid flow in porous medium*

## Accomplishments

- As of March 2012, a total of 413 Continuing Education Units (CEUs) have been obtained, and close to 350 people have participated in CCUS training.
- The program has developed and provided one-day short courses and presentations at national and international CCUS-related conferences. The courses are related to emerging workforce trends in the U.S. energy and mining industry, carbon storage monitoring and environmental impacts, and storage of CO<sub>2</sub> in geologic formations
- STORE has developed and presented a 2-day course related to critical issues surrounding energy, water and climate, three critical factors associated with CCUS.
- STORE members provided a CCUS-related educational workshop for 50 visiting students from Norway's University of Stavanger.
- STORE hosted a visit from Tim Dixon of the International Energy Agency's Greenhouse Gas Research and Development Programme. Tim presented on the Intersection of Science, Technology and International Climate Policy in Carbon Capture and Storage to professionals at the Texas Bureau of Economic Geology, undergraduate freshmen in University of Texas at Austin's Department of Petroleum and Geosystems Engineering, and graduate students in the Department of Petroleum and Geosystems Engineering and the Department of Chemical Engineering.

- STORE developed a short course that discusses the scale at which carbon storage and EOR will be needed to operate successfully. Topics covered included; (1) key physical properties of CO<sub>2</sub>; (2) important physical, chemical phenomena in CO<sub>2</sub> injection; (3) multiphase rock/fluid properties affecting injection and production; (4) interference between multiple injection wells reducing injection rate per well; (5) efficient screening of a large number of reservoirs for optimal CO<sub>2</sub> EOR candidates; and (6) design and implementation of commercial-scale Monitoring, Verification and Accounting (MVA) programs for CO<sub>2</sub> EOR. CEUs will be awarded by STORE.
- STORE members collaborated with the EarthLabs program on a teacher workshop. The portion of this web-based curriculum developed by STORE provides an introduction to carbon capture and storage technology and a discussion of the recent Durban Climate Conference. Other partners in this effort include: Center for Science Teaching and Learning at TERC in Cambridge, Massachusetts, the Science Education Resource Center (SERC) at Carleton College in Northfield, Minnesota, and the TXESS Revolution program at The University of Texas at Austin.
- STORE organized a public-private regional delegation to Texas and Mississippi to focus on commercial enhanced oil recovery using carbon dioxide for tertiary production, or CO<sub>2</sub>-EOR. The delegation visited commercial CO<sub>2</sub>-EOR operations and received expert briefings about technical, economic, project development. Environmental aspects of EOR and successful policies and public-private partnerships that have helped expand the commercial CO<sub>2</sub>-EOR industry in the Gulf Coast region were also discussed.
- Developed a new course that is a cross-disciplinary, project-based course for students at The University of Texas at Austin covering new technologies for greenhouse gas emissions reductions

## Benefits

The overall benefit of this project is a trained workforce that can accelerate the development and deployment of CCUS projects. Effective transfer of knowledge, technology, best practices, and lessons learned to the workforce will yield reduced costs, improved industry efficiency, increased CO<sub>2</sub> storage, accelerated implementation of CO<sub>2</sub> projects and enhanced environmental compliance for the nascent CCUS industry.

