the ENERGY lab

PROJECT FACTS

Carbon Sequestration

Geological Sequestration Training and Research Program in Capture and Transport: Development of the Most Economical Separation Method for CO_2 Capture

Background

Increased attention is being placed on research into technologies that capture and store carbon dioxide (CO_2). Carbon capture and storage (CCS) technologies offer great potential for reducing CO_2 emissions and, in turn, mitigating global climate change without adversely influencing energy use or hindering economic growth.

Deploying these technologies in commercial-scale applications requires a significantly expanded workforce trained in various CCS specialties that are currently under-represented in the United States. Education and training activities are needed to develop a future generation of geologists, scientists, and engineers who possess the skills required for implementing and deploying CCS technologies.

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) has selected 43 projects to receive more than $12.7 million in funding, the majority of which is provided by the American Recovery and Reinvestment Act (ARRA) of 2009, to conduct geologic sequestration training and support fundamental research projects for graduate and undergraduate students throughout the United States. These projects will include such critical topics as simulation and risk assessment; monitoring, verification, and accounting (MVA); geological related analytical tools; methods to interpret geophysical models; well completion and integrity for long-term CO_2 storage; and CO_2 capture.

Project Description

NETL is partnering with Tuskegee University (TU) to provide fundamental research and hands-on training and networking opportunities to undergraduate students at TU in the area of CO_2 capture and transport with a focus on the development of the most economical separation methods for CO_2 capture. The bulk of the cost of CO_2 sequestration is determined by the CO_2 capture step and subsequent added cost of electricity. It is, therefore, vital to find more economical methods for CO_2 capture.

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U.S. DEPARTMENT OF ENERGY

PROJECT DURATION

Start Date
12/01/2009

End Date
11/30/2012

COST

Total Project Value
$296,511

DOE/Non-DOE Share
$296,511 / $0

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

Separation of CO_2 from a mixture of gases can be accomplished through various membranes, adsorption, and physical and chemical absorption. TU will evaluate these separation methods and develop mathematical models that can be used to identify the most economical procedures for CO_2 separation.

Goals/Objectives

The project objectives include:

1. Adapting existing CCS course material and teaching methods into a short course that introduces the suite of CCS technologies and deployment issues to the university community. The short course will be conducted annually and will cover all aspects of CCS systems with an emphasis on pre-combustion CO_2 capture with hydrogen production. The course will address the critical issues of capture costs, energy requirements, and purity of CO_2 streams.

2. Establishing a CO_2 capture laboratory to conduct data analysis and develop mathematical models for CO_2 capture.

3. Offering internships with industry leaders (e.g., Southern Company's National Carbon Capture Center) and research organizations active in the CO_2 capture field.

4. Establishing the Tuskegee CCS Network for professors and students and linking it to other national CCS university groups, industry, and research organizations. The network will contribute to the creation of a CCS workforce and facilitate hands-on training opportunities and future research collaborations.

Benefits

Overall the project will make a vital contribution to the scientific, technical, and institutional knowledge base needed to establish frameworks for the development of commercial-scale CCS. The research models developed through this effort can be used to identify the most economic procedures for CO_2 separation, and pinpoint hurdles to efficient and cost-effective CO_2 capture in other technologies.