



the **ENERGY** lab

PROJECT FACTS

Clean Coal Power Initiative (CCPI 2)

Demonstration of a Coal-Based Transport Gasifier

Background

Coal is an abundant and indigenous energy resource and currently supplies almost 38 percent of the United States' electric power. Demand for electricity, vital to the nation's economy and global competitiveness, is projected to increase by almost 28 percent by 2040. The continued use of coal is essential for providing an energy supply that supports sustainable economic growth. Unfortunately, nearly half of the nation's electric power generating infrastructure is more than 30 years old and in need of substantial refurbishment or replacement. Additional capacity must also be put in service to keep pace with the nation's ever-growing demand for electricity. It is in the public interest to upgrade the nation's energy infrastructure with the latest and most advanced viable technologies to achieve greater efficiencies, environmental performance, and cost-competitiveness.

The U.S. Department of Energy (DOE) Office of Fossil Energy, through the National Energy Technology Laboratory, is charged with the implementation of the DOE's Clean Coal Power Initiative (CCPI). The intent behind the CCPI is to leverage public and private investment to secure low-cost energy production and protect the environment. The goal of this program is to demonstrate a new generation of innovative coal-utilization technologies in a series of projects carried out across the country. These demonstrations are conducted on a commercial scale to prove the technical feasibility of the technologies and to provide technical and financial information for future applications. The U.S. Department of Energy awarded Southern Company Services a cooperative agreement under the CCPI Round 2 Program to provide direct financial support for the development and deployment of the Transport Integrated Gasification (TRIG™) technology that is being utilized by the project.

Project Description

The Kemper County Project (Kemper County Energy Facility) is a lignite-fueled integrated gasification combined-cycle (IGCC) facility being constructed in Kemper County, Mississippi. The plant design incorporates the air-blown TRIG™ technology jointly developed by Southern Company, KBR, and DOE at the Power Systems Development Facility in Wilsonville, Alabama. Mississippi Power Company (MPC), a Southern Company subsidiary, will own and operate the plant. The facility will employ state-of-the-art emission controls to produce electricity from lignite in an efficient and environmentally friendly manner and will also assist MPC in achieving key strategic objectives of fuel and geographical diversity, and cost stability, while providing a reliable economic resource to meet customer needs.

CONTACTS

Michael Knaggs

Director
Office of Major Demonstrations
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304- 285-4926
michael.knaggs@netl.doe.gov

Diane Revay Madden

Project Manager
National Energy Technology Laboratory
626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
412-386-5931
diane.madden@netl.doe.gov

Tim Pinkston

Participant Project Manager
Southern Company Services Inc.
42 Inverness
Birmingham, AL 35242-4809
205-992-5042
tepinkst@southernco.com

PARTNERS

Mississippi Power Company
KBR, LLC

PROJECT DURATION

Start Date	End Date
01/30/2006	05/01/2018

COST

Total Project Value

~ \$3,000,000,000*

DOE/Non-DOE Share

\$270,000,000 / \$2,800,000,000

*Note: The cost above includes scope in which DOE is not participating in cost sharing under the CCPI.

NATIONAL ENERGY TECHNOLOGY LABORATORY

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

Website: www.netl.doe.gov

Customer Service: 1-800-553-7681



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Lignite reserves near the plant site owned by Mississippi Power Company and developed and mined by Liberty Fuels, a subsidiary of North American Coal Corporation, will supply the feedstock for the IGCC plant. The estimated nameplate capacity of the plant will be 830 MW with a peak net output capability of 582 MW. The peak capacity of 582 MW occurs when using syngas in the combustion turbine coupled with natural gas firing in the heat recovery steam generator duct burners. During syngas-only operations, the plant will achieve a net generating capacity of 524 MW and a heat rate of 12,150 Btu/kWh. The facility will employ advanced emissions control equipment to produce marketable byproducts of ammonia, sulfuric acid, and carbon dioxide. Over 65 percent of the carbon dioxide will be captured, making the Kemper County Energy Facility's carbon emissions comparable to a natural gas-fired combined cycle power plant. The commercial operation date of the Kemper County IGCC plant will be May 2014.

The estimated 3 million metric tons of CO₂ per year captured from the Kemper County Energy Facility gasification process will be transported via pipeline to two off takers for use in enhanced oil recovery operations at depleted oil production fields in Mississippi.

Goals/Objectives

The primary objective of this project is to demonstrate the operation of a commercial-scale, air-blown transport gasifier technology and integrate it with a combined-cycle island. Other objectives of the project include (1) operating an advanced syngas cleanup system that includes sulfur removal and recovery; high temperature, high-pressure particulate filtration; and ammonia recovery and mercury removal; (2) demonstrating high availability, high thermal efficiency,

low cost, and low emissions of the IGCC in commercial operating mode; and (3) operating an integrated CO₂ capture and compression system with the intent to capture and geologically sequester 65 percent of the CO₂ via enhanced oil recovery.

Benefits

The TRIG™ technology offers a simpler and more robust method for generating power from low-rank coal than other alternatives. It is unique among coal gasification technologies in that it is cost-effective when using both low rank coals and coals with high moisture or ash content. These coals make up half of the proved reserves in the U.S. and throughout the world. Moreover, the transport gasifier is capable of both air- and oxygen-blown operation. This inherent flexibility will allow future applications of this technology to be readily adapted to other applications beyond power generation, such as the production of chemicals used in industrial operations.

Moreover, the inclusion of CO₂ control as part of the project is critical to the future deployment of coal-based power generation in both the United States and the world. Installation of advanced power generation facilities is an important part of the strategy to become energy independent.



Aerial View of Kemper County Energy Facility (December 2012)