PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

POWER GENERATION & UTILITY FUELS

PARTICIPANTS

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SPONSORS

Kentucky Dept. of Energy Development & Independence
LG&E-KU (PPL)
Duke Energy
Kentucky Power (AEP)
East Kentucky Power Cooperative
EPRI

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Carbon Management Research Group

(An industrial, governmental and academic consortium advancing carbon capture and management technologies)

Overview

Teaming with Kentucky's major power companies, the University of Kentucky's Center for Applied Energy Research has formed a consortium (CMRG). The group will carry out a $24M ten-year program of research to development and demonstrate cost-effective and practical technologies for reducing and managing CO_2 in existing coal-fired electric power plants. The intention is to position electric utilities to respond to a carbon-constrained economy prior to the imposition of environmental rules. Its purpose is to maintain and strengthen coal's competitive advantage as a least-cost fuel for electricity production, while improving environmental quality.

Larger-scale CO_2 capture research is costly, often making it too high-risk for a single utility or governmental agency to undertake. This research alliance spreads both costs and risks. It also provides an opportunity to solve electric power generation problems in an affordable way.

Technical Focus

Three research projects on CO_2 capture and separation will be carried out:

Project I is a fundamental study under real coal-derived flue gas conditions. The study focuses on scrubber configurations, formulations of new solvents, technologies to enhance CO_2 capture and reduce the energy penalty, process optimization, metal corrosion, solvent management, as well as the environmental impact from solvent evaporation and degradation under coal-derived flue gas.

Project II is necessary for subsequent engineering scale-up. A 0.5~1MWth portable slip-stream pilot plant will be constructed to demonstrate post-combustion CO_2 capture technologies at power plants. The test sites will be selected based on boiler configurations and coal types. The project focuses on the system operability (particulate matter impact), solvent management as related to coal types, gaseous and dissolved constituents, long-term verification, and material corrosion. At each site, a three-month parametrical study will be conducted to verify the results and findings obtained from the CAER's pilot-plant. Two solvents will be used (a 30% MEA for the baseline, followed by a commercial solvent or CAER-developed solvent.

Project III, chemical looping combustion, is more appropriate for the next generation of power plants, and is a longer-term solution. However, chemical looping combustion technology could prove to be the most cost-effective means for CO_2 control. This study will scale up work previously performed at the CAER involving oxygen carriers in a pilot gasification/ combustion reactor.