PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

POWER GENERATION & UTILITY FUELS

Application of A Heat-Integrated Post-combustion CO_2 Capture System with Hitachi Advanced Solvent into Existing Coal-Fired Power Plant

The University of Kentucky Research Foundation is designing, constructing, and testing an innovative heat integration method that will utilize waste heat from a carbon capture system for heat integration and improve steam turbine efficiency. The process also implements a process concept (working with the heat integration method) that increases the solvent's carbon dioxide (CO_2) capture rate and capacity in the scrubber. The process utilizes an advanced solvent system that has several advantages over conventional amine solvents. For example, the solvent exhibits lower heat of regeneration, higher capacity, and lower solvent degradation. Assuming the same degree of heat integration as the DOE reference case, and the same CO_2 compression technology, the proposed process coupled with advance solvent could drop the twenty-year levelized incremental cost of electricity from 46.3 to 23.3 mills/kWh excluding transportation, storage and monitoring cost as well as the direct fixed operation cost associated with carbon capture system and make-up power production.

The novel concepts and advanced solvent used in this study will be tested in a 0.7 MWe slipstream facility, and should significantly improve the overall plant efficiency when integrated with the CO_2 capture system. The technologies and concepts being tested can be used to retrofit existing coal-fired power plants.

The specific objectives of the investigation are to:

- Develop and deploy a novel heat integration scheme.
- Determine the performance of the advanced solvent at the proposed conditions and scale.
- Collect the necessary information/data on mass and energy balance, solvent degradation (rate and products), and corrosion to provide a full techno-economic and environmental health and safety analysis at a 550-MWe commercial-scale level.

Test Facility for 0.7 MWe Slipstream Study

PARTICIPANTS

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LG&E/KU

Hitachi Power Systems America

Electric Power Research Institute

Smith Management Group

SPONSORS

DOE- NETL

Kentucky Department of Energy Development and Independence

Carbon Management Research Group

PROJECT VALUE

DOE - $14.55 Million

Cost share - $4.72 Million

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