

# PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

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## POWER GENERATION & UTILITY FUELS

### Development and Heat Optimization in an Amine-based CO<sub>2</sub> Scrubber

The capture of CO<sub>2</sub> from the flue gas of natural gas/coal fired power plants, using Amine absorption, is a viable short to medium term strategy for mitigation of CO<sub>2</sub> emissions. The amine scrubbing process is the only technology that is available commercially for extracting CO<sub>2</sub> from post-combustion flue gas. While it has been successfully used for natural-gas purification, it poses several technical challenges for coal-fired derived flue gas, and new research in this area could be fertile. Another issue is the energy requirements for the CO<sub>2</sub> capture/desorption devices. For example, steam must be diverted from the steam turbine in order to strip the CO<sub>2</sub> out of the amine following capture. The energy required for CO<sub>2</sub> capture and sequestration is estimated to reduce a power plant's output by about 30 percent which equates to a very substantial 60-70% increase in the cost of electricity (COE). Cost reductions for CO<sub>2</sub> capture, with emphasis given to heat optimization, will be a major focus of this research. Even for emerging IGCC technologies, the cost of carbon capture is estimated to reduce the efficiency by as much as 1/5th with a COE increase of about 30%.

In this project, a bench-scale open tower heat-integrated scrubber will be built with 4" ID at flow rate approximately 30SCFM and 2 seconds residence time. The scrubber will be equipped with three to four headers and one to two trays. The SO<sub>2</sub>, NO<sub>x</sub>, and mercury will be spiked. The impact of various scrubber technologies and operating conditions on CO<sub>2</sub> capture will be observed. The development of new or modified adsorbents is also being investigated. Tested gas is generated from natural-gas burners with flue gas recirculation to insure the appropriate CO<sub>2</sub> concentration.

