FETC SUCCESS
U.S. Department of Energy
Federal Energy Technology Center

CLEAN AFFORDABLE POWER

- [x] fossil energy
- [ ] environmental
- [ ] energy efficiency
- [ ] other

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A Process for Air Pollution Abatement

States Impacted:
Illinois, Pennsylvania, Eastern Coal Producing States

Benefit Areas:
Environmental Quality Improved, New Technology Development

Participants:
Federal Energy Technology Center, Southern Illinois University, Riley Stoker LEBS Team

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Description

Releasing sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) into the atmosphere can have adverse environmental implications, such as acid rain formation and visibility impairment due to the formation of smog and regional haze. The Federal Energy Technology Center (FETC) has implemented a research program to examine ways of removing significant quantities of these pollutants from the flue gas produced during coal-fired combustion.

As an example, the Moving-Bed Copper Oxide Process was developed by FETC, in partnership with various companies interested in demonstrating the technology at a larger scale. It employs a dry sorbent composed of alumina spheres impregnated with copper and is capable of simultaneously removing SO_2 and NO_x from flue gas. The sorbent is contained in a moving-bed reactor, where flue gas flows across the bed. Salable sulfur-containing by-product is produced when the spent sorbent is regenerated.

FETC orginally worked with Alcoa under a Cooperative Research and Development Agreement (CRADA) to develop a copper-impregnated sorbent with various physical and chemical characteristics. Another CRADA was conducted with a consortium of companies interested in commercializing the process, while another cooperative venture involved a small business interested in converting the stream off the regenerator to elemental sulfur, a salable commodity. Successful testing has been conducted in the Life-Cycle Test System, a pilot-scale research facility at FETC. The Moving-Bed Copper Oxide Process is an excellent candidate for advanced power systems that seek to minimize parasitic power for flue gas cleanup and to maximize pollutant removal.

Goals

High efficiency removal of SO_2 and NO_x from flue gas, while also producing a salable by-product is the goal of this research.

Tangible Benefits

National: This dry, regenerable scrubbing technology will provide cost-effective means for removing SO_2 and NO_x from flue gas, as well as helping to prevent the discharge of sludge wastes typically associated with wet scrubbing in power plants across the United States. The fact that the Moving-Bed Copper Oxide Process results in the production of a salable byproduct will be especially beneficial to those areas of the country where waste disposal is an issue because of limited land availability.

Regional: This process has been chosen as the flue gas cleanup subsystem for controlling emissions in a future technology demonstration led by Riley Stoker under the DOE's Low Emission Boiler System (LEBS) program. It has been tested at larger scale at Southern Illinois University's Illinois Coal Development Park and will be implemented at demonstration-scale in an advanced power plant.

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