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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States Impacted:
Arkansas, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Montana, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, Texas, Utah, Wisconsin, Wyoming

Benefit Areas:
Environment, Lower-Cost Electricity, Energy Security, Waste Remediation, Greenhouse Gas Reduction, Operational Cost Savings

Participants:
Northern States Power Company, Foster Wheeler Development Corporation, Duke Power, Dairyland Power Cooperative, EPRI, D.B. Riley, Arkansas Power & Light, Wisconsin Power & Light, AmerenCIPS, AmerenUnion Electric, Sauder Woodworking, Duke Power, Arizona Public Service, Nevada Power, Minnesota Power, Great River Energy, Montana–Dakota Utilities, North Dakota Industrial Commission, Illinois Geological Survey, Knife River Coal Mining Company, and Microbeam Technologies Inc.

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Ash Behavior in Power Systems

Description

Various options for alleviating the problems associated with ash deposits in boilers have been explored, including fuel switching and blending, fuel cleaning, use of additives, changes in boiler design (e.g., boiler size, tube spacing, soot blowers), and use of predictive models for optimizing boiler operation and fuel selection.

Efficient combustion and gasification of coal, petroleum residuum, waste derived fuels, and biomass are contingent on solving the problems related to ash. Slag deposits in the radiant zone of a boiler and fouling deposits on convective surfaces reduce overall boiler efficiency and can severely limit operational availability. The successful operation of systems such as cyclone and pulverized coal, integrated gasification combined cycle, pressurized fluidized-bed combustion, indirect-fired hot-air combined cycle, supercritical boilers, and other advanced power systems requires efficient handling of ash deposits.

Goals

The goal is to use a fundamental understanding of ash behavior to design power systems, select and blend fuels, and optimize operating conditions to improve power-generating efficiency and reduce emissions of acid gases, particulates, hazardous toxic metals, and greenhouse gases.

Tangible Benefits

National: A major benefit of the research on ash behavior is the increased utilization of the most abundant fossil energy resource in the U.S. — coal. Research aimed at more efficient, effective, and environmentally acceptable power is a great energizer for the national economy and for resource preservation.

Regional: Regions throughout the United States have been impacted by this research program through (1) the decreased operation and maintenance costs for coal-fired energy utilities through testing and using lower-cost fuels and improved overall plant efficiency; (2) state agencies receiving valuable research and development technology for boiler operation, fuel selection, coal cleaning, and other technologies; and (3) improved coal-mining strategies. The total economic impact for these regions is estimated at $4,000,000 per year.