PROJECT facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
FEDERAL ENERGY TECHNOLOGY CENTER

ADVANCED CLEAN/EFFICIENT
POWER systems

PS008.0697

RECOVERING LOST HEAT AND REDUCING POLLUTANTS—UPGRADING THE CONDENSING HEAT EXCHANGER

PRIMARY PROJECT PARTNERS

Babcock & Wilcox Company
Alliance, OH

MAIN SITE

Babcock & Wilcox Company
Alliance Research Center
Alliance, OH

Environmental Control
Technology Center
Barker, NY

TOTAL ESTIMATED COST

$1,767,616 (Phase I)

COST SHARING

DOE	**$1,205,950**
Non-DOE	**$561,666**

Project Description

Deregulation of the electric utilities is generating a competitive climate that encourages lower production costs through improved operating efficiency. One result is the development of new boiler-efficiency technologies. During the past 12 years, condensing heat exchangers using Teflon™ covered internal components have been used in more than 100 industrial installations, most commonly with boilers firing oil or natural gas. Condensing heat exchangers significantly increase boiler efficiency by recovering heat from the exiting flue gas, which is normally maintained at a modest temperature to prevent downstream corrosion.

An advance now under way is the Integrated Flue Gas Treatment (IFGT) system, an innovative upgrade to the commercial condensing heat exchanger design. In addition to increasing waste heat recovery, the IFGT system has shown improved pollutant-removal capability. The system has the potential to meet the market needs of both the electric utilities and industry. The Babcock & Wilcox project will determine IFGT performance in terms of erosion resistance and pollutant-removal efficiencies for the particle-laden streams of coal-fired boilers.

The project consists of two parallel test scenarios. The first uses a small test unit located at the Babcock & Wilcox Alliance Research Center (ARC) to investigate pollutant-removal efficiency with up to four different coals. The pilot-scale unit will allow researchers to investigate a range of variables broader than would be possible with a full-scale unit. The second scenario will be conducted at the Electric Power Research Institute's Environmental Control Technology Center (ECTC). Here a commercial-sized condensing heat exchanger will be exposed to coal flyash for one year to evaluate the erosion resistance of the Teflon™ covered heat exchanger tubes. These tests will provide the data necessary to design IFGT pollutant-removal systems for a variety of coal-fired applications.

Program Goal

Coal represents 94% of proven U.S. fossil fuel reserves, but burning coal for energy produces harmful emissions. Tighter environmental standards to take effect in the year 2000 will require U.S. coal-based power plants to be much cleaner and more efficient than today's technology allows. This project seeks to develop innovative solutions that reduce environmental emissions while simultaneously improving the performance of current and future pulverized-coal-fired boilers to ensure the clean, economical use of U.S. coals.

Recovering Lost Heat and Reducing Pollutants—Upgrading the Condensing Heat Exchanger

CONTACT POINTS

Ralph T. Bailey
Babcock & Wilcox Company
Alliance, OH
(330) 829-7353
(330) 823-0639 fax
ralph.t.bailey@mcdermott.com

William P. Barnett
U.S. Department of Energy
Federal Energy Technology Center
Pittsburgh, PA
(412) 892-6139
(412) 892-5917 fax
barnett@fetc.doe.gov

Project Partners

Ohio Coal Development Office
Columbus, OH
(cofunding)

Electric Power Research Institute
Palo Alto, CA
(cofunding)

Project Benefits

The Integrated Flue Gas Treatment (IFGT) condensing heat exchanger is expected to effectively remove air toxics in vapor or fine-particulate forms—especially mercury, selenium, and boron—from coal-fired boilers. Air toxics can get through conventional pollution-control devices such as baghouses and electrostatic precipitators. The low-temperature operation and gas-liquid contact of the IFGT will combine the effects of condensation, dissolution, and scrubbing to remove pollutants from particle-laden streams. Moreover, since the water content of the emitted flue gas will be lower, any associated plume will be less visible.

An additional important benefit is that while most other pollutant-removal equipment is parasitic, the IFGT system produces net energy that can be returned to the power cycle, thus lowering the amount of carbon dioxide released for power generation.

Effective emissions control and improved operating efficiency combine to promote the use of cheaper, more abundant domestic fuels while meeting national environmental goals and satisfying local emissions regulations. Through projects like these, a wider array of domestic energy resources will become available. This in turn will reduce our dependence on foreign fuels.

Cost Profile

(Dollars in Thousands)

	Prior Investment	FY95	FY96	FY97	Future Funds
Department of Energy*	$612	—	$267	$327	$1,351
Private Sector Partners	—	—	$374	$188	$695

* Appropriated Funding

Key Milestones