

Conf-910114--1

**COLLABORATIVE PROJECTS IN COAL CONVERSION TECHNOLOGY
OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT IN INDIA**

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DE91 006338

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To be presented to the
Engineering Foundation Conference
on Environmental and Economic Impacts
of Coal Utilization

Santa Barbara, California

January 20-25, 1991

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*Research sponsored by the U.S. Department of Energy, under contract DE-AC05-840R21400 with the Martin Marietta Energy Systems, Inc.

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**COLLABORATIVE PROJECTS IN COAL CONVERSION TECHNOLOGY
OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT IN INDIA**

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ABSTRACT

The Indian power sector depends heavily on the utilization of coal for generation of electricity. With an annual growth rate of 12% in power demand, supply of electricity presents a formidable challenge. To meet anticipated loads, the Indian power sector has an ambitious plan to install over 38,000 MW in the Eighth Plan (1990-1995) and 64,000 MW thereafter, making a total of over 100,000 MW in additional capacities in the next decade. This would mean a trebling of the current installed capacity of approximately 50,000 MW. About 65 percent of the future installed capacity will be derived from thermal power stations using high-ash content (40-45%) Indian coals. This provides a formidable challenge to the scientists, engineers, environmentalists, and private and public sectors. The technological, environmental, and resource problems have to be addressed within the frame-work of limited capital availability, poor energy resource endowments, and the growing awareness and concern of environmental degradation from fossil-fired power plants. The pace and direction of the Indian efforts can be accelerated through strong ties and collaborative efforts between the United States and India.

In May 1983, The Government of India (GOI) and USAID initiated the Alternative Energy Resources Development (AERD) project with a coal conversion component comprising of six collaborative coal projects.

- (1) Evaluation of freeboard performance in a fluidized bed combustor (FBC)
- (2) Scale-up of an atmospheric fluidized bed combustion boiler
- (3) Rheology, stability, and combustion of coal-water slurries
- (4) Beneficiation of the fine coals in dense media cyclones
- (5) Hot gas cleanup and separation
- (6) Cold gas cleanup and separation

The Pittsburgh Energy Technology (PETC) of the U.S. Department of Energy (USDOE) under a Participating Agency Service Agreement (PASA) had the management responsibility for implementing the collaborative coal projects. In the FBC projects, the Oak Ridge National Laboratory (ORNL) and Bharat Heavy Electricals Ltd. (BHEL), Trichy, India, were designated as the lead institutions for the collaborative efforts. A 2.0 MW(t) experimental FBC research test facility was designed, erected, and commissioned at BHEL, Trichy, with maximum flexibility and state-of-the-art hardware and instrumentation to perform a wide range of parametric tests on high-ash (up to 65%) content coals and coal washery rejects. The facility is now generating engineering data relevant to the design and operation of FBC boilers up to 30 MW(e) in size, fired on high-ash coals and rejects.

The successful completion of the above coal projects in June 1987 led to a strong interest by the participants in the AERD coal conversion projects to continue the involvement of USAID and the U.S. Department of Energy in a follow-on series of projects within the framework of the AERD project criteria, viz.,

- (1) Strong U.S.-India collaboration by centers of excellence in both countries.
- (2) Environmental impact and pollution control measures for coal conversion technologies.
- (3) Hands-on training and testing performed by Indian engineers along side their U.S. counterparts.
- (4) Technology transfer and follow-on commercialization addressed and planned for in the early phases of the project through involvement of U.S. and Indian private sectors.
- (5) Cost sharing by the Indian counterpart at a level near 50% in order to leverage the U.S. dollars and provide a show of corporate commitment.

The AERD coal projects identified for USAID support and are currently being implemented are:

- (1) Development of pollution control strategies for abatement of NO_x/SO_x emissions from fossil fired power plants.
- (2) Development of slagging combustors for power generation utilizing high-ash Indian coals.
- (3) Advanced diagnostic studies for prediction of life expectancy of existing power plants.
- (4) Characterization of Indian coals minerals for combustion and gasification.
- (5) Environmental and natural resource analysis of coal cycle.
- (6) Techno-economic assessment of Integrated Coal Gasification Combined Cycle (IGCC) technology utilizing high ash Indian coals

A review of the coal projects that have been successfully completed and the projects being implemented will be presented. The goal of these projects is the establishment of a sound data base and indigenous capability to address the technological options for efficient, cost-effective and environmentally sound power generation utilizing high ash Indian coals.