

- fossil energy
- environmental
- energy efficiency
- other

HIGH PERFORMANCE POWER SYSTEM

States Impacted:

Alabama, California, New Jersey, New York, and all states with coal-fired capacity

Benefit Areas:

Environment, Energy Security, Technology Leadership, Lower Cost of Electricity

Participants:

Bechtel, Foster Wheeler Corporation, Siemens-Westinghouse

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Description

Foster Wheeler Development Corporation (FWDC) has designed a commercial-scale, coal-fired, combined-cycle, power generating system that has efficiencies exceeding 47 percent (HHV), and nitrogen oxide (NO_x) and sulfur dioxide (SO₂) emissions at less than 0.025 Kg/GJ (0.06 lb/MBtu).

The FWDC system combines coal pyrolysis with a high-temperature advanced furnace (HITAF) to achieve the emissions reductions and increased efficiencies. This project is supported under FETC's High Performance Power Systems (HIPPS) program. Future plans include modification for testing in circulating mode, which may be more readily scaled to utility capacities. In addition, integrated operation of a larger pyrolyzer with a commercial gas turbine is planned for the Power Systems Development Facility in Wilsonville, Alabama.

Goals

The objectives of the project are to design and demonstrate a coal-fired system for power generation with an efficiency of at least 47 percent and emissions of acid rain precursors far below currently required levels. Another goal is to reduce the cost of power generation, based primarily on the reduced fuel consumption, since coal-fired stations today operate generally with efficiencies of only 33 to 35 percent.

Tangible Benefits

National: The adoption of HIPPS technology to older coal-fired equipment will improve air quality, while retaining coal as the major source of electricity generation in the U.S. The Foster Wheeler technology is suitable for repowering existing stations: adding a pyrolyzer and a gas turbine while keeping the original boiler, steam generator, and coal-handling facilities. This would improve the overall efficiency of the plant dramatically at lower cost and in the near term. The technology is also suitable for new installations.

Regional: Certain regions of the U.S. currently have undesirable levels of SO₂ and NO_x, which contribute to acid rain and to excessive ozone. Atmospheric transport of pollutants across state and regional boundaries is also a problem. Substitution of advanced technologies such as HIPPS would substantially diminish these problems without any disruption in the nation's supply of reliable, inexpensive power.

Local: Research and development work on the Foster Wheeler system is in progress in Alabama, New Jersey, and New York. Bechtel Corporation (the A&E sub-contractor) is located in California. The adoption of HIPPS technology would assure continuing employment benefits in New Jersey, since Foster Wheeler is one of the major suppliers of power-generating equipment.