the ENERGY lab

PROJECT FACTS

Clean Coal Power Initiative (CCPI)

Increasing Power Plant Efficiency: Lignite Fuel Enhancement

(Completed March 31, 2010)

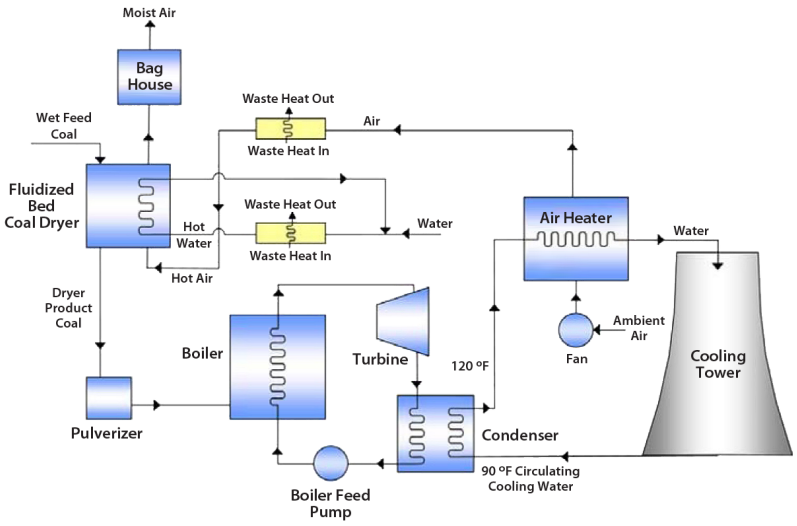
Project Description

The objectives of this project are to demonstrate a unique system for drying lignite with waste heat, thereby enhancing the lignite's value as a fuel and to quantify the benefits of that enhancement in power plant performance.

Great River Energy, the prime participant in this demonstration project, collaborated with the Electric Power Research Institute (EPRI); Lehigh University; Barr Engineering, a Minneapolis, Minnesota firm with expertise in lignite and coal handling; and Falkirk Mining Company, the lignite coal supplier.

The project was conducted at the Great River Energy's Coal Creek Station in Underwood, North Dakota. The demonstration activities focused on using waste heat in the plant to lower the moisture content of lignite, which typically has about 40 percent moisture.

The project was implemented in two phases. First, a prototype dryer module was designed, constructed, and demonstrated to supply one-fourth of the dry coal required for the 546 MW Unit 2 at the Coal Creek Station. In the second phase, following successful demonstration of the prototype dryer, Great River Energy designed, constructed, and operated four full-scale dryers needed for the full power operation of Unit 2 as part of the CCPI project. GRE also installed four more dryers



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PARTNERS

Great River Energy (GRE)
Underwood, ND

PROJECT DURATION

Start Date
07/09/2004

End Date
03/31/2010

COST

Total Project Value
$31,512,215

DOE/Non-DOE Share
$13,518,737 / $17,993,478

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on Unit 1 with its own funds, thus retrofitting the entire Coal Creek Station with lignite dryers. Construction and testing were completed on March 31, 2010.

The effect of coal drying on plant performance was measured and optimum operating conditions were determined. The figure shown on the previous page depicts how the coal drying system was integrated into the existing Coal Creek Station.

Benefits

This project offers a creative approach for using the low-value, waste heat normally available in power plants to increase the plant efficiency, reduce pollution, and improve economics. This demonstrated technology could be applied to increase the generating capacity, efficiency, and cost-effectiveness of units that burn high-moisture coal.

Currently in the U.S., units totaling more than 100 GW installed capacity are burning coal with inherently high moisture content. Application of this technology could result in a reduction in the emissions from coal-fired power plants because the plants will require less coal after it is dried to produce the same amount of power.

In this project, the moisture in the lignite was lowered by about ten percentage points. This is estimated to yield a 2 percent to 4 percent efficiency improvement (or heat rate reduction) with an attendant benefit of reduced SO_2, mercury, carbon dioxide, nitrogen oxides, and ash emissions per unit of electricity output. This technology increases the efficiency and reduces emissions of plants burning lignite, Powder River Basin coals, and other high moisture coals.

Coal Creek Station