

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



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PARTICIPANT

Great River Energy (GRE)
Underwood, ND

ADDITIONAL TEAM MEMBERS

Electric Power Research Institute
(EPRI) (collaborator)
Lehigh University
(collaborator)



Clean Coal Power Initiative (CCPI)

9/2008

INCREASING POWER PLANT EFFICIENCY: LIGNITE FUEL ENHANCEMENT

Project Description

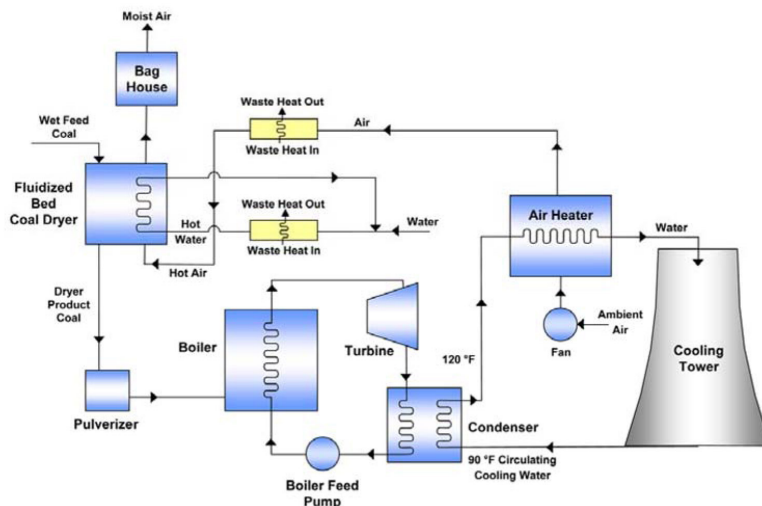
The objective of this project is to demonstrate that the moisture reduction of lignite coal will increase its value as a fuel in power plants.

Great River Energy, the prime participant in this demonstration project, is collaborating 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 will be conducted at the Great River Energy's Coal Creek Station in Underwood, North Dakota. The demonstration activities will focus on using waste heat in the plant to lower the moisture content of lignite, which typically has about 40 percent moisture.

A phased implementation is planned. First, a full-scale prototype dryer module will be designed to supply one-fourth of the dry coal required for a 546 MW unit at the Coal Creek Station. In the second phase, following successful demonstration of the prototype dryer, Great River Energy will design, construct, and perform full-scale long-term operational testing on a complete set of dryer modules needed for the full power operation of one 546 MW unit.

Coal will be dried to a number of different moisture levels. The effect of coal drying on plant performance will be measured and optimum operating conditions will be determined. The following figure depicts how the coal drying system will be integrated into the existing Coal Creek Station.



ADDITIONAL TEAM MEMBERS (CONT.)

Barr Engineering
(lignite and coal handling)

Falkirk Mining Company
(lignite coal supplier)

LOCATION

GRE's Coal Creek Station
Underwood, McLean County, ND

ESTIMATED PROJECT DURATION

54 months

COST

Total Estimated Cost
\$31,512,215

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

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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. When demonstrated, this 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 would be lowered by about ten percentage points. This is estimated to yield a 2.8 percent to 5 percent efficiency improvement (or heat rate reduction) with an attendant benefit of reduced SO₂, mercury, carbon dioxide, nitrogen oxides, and ash emissions per unit electricity output. This technology increases the efficiency of plants burning lignite, Powder River Basin coals, and other high moisture coals.



Coal Creek Station