DryFining™

Fuel Enhancement Process
The DryFining™ fuel enhancement process developed by Great River Energy refines or beneficiates lignite coal through a thermal drying and mechanical segregation process. Drying utilizes residual or waste heat to raise the heating value of the coal per pound. The refining component segregates the lignite stream and removes the higher density compounds that contain higher levels of sulfur and mercury.

Great River Energy has proven results at its Coal Creek Station, a 1,180-megawatt lignite coal-fired plant in North Dakota, which has used DryFine lignite since 2009. Through the DryFining fuel enhancement process, fuel quality is upgraded to its original design specifications. Fuel moisture is reduced from 38 to 28 percent, and higher heating value is increased from 6,200 to 7,100 BTU. This lignite could be dried further. However, returning the heating value to the original boiler design is the best operating condition for this particular plant. DryFining drives off fuel moisture before combustion, reducing the total volume of flue gases throughout the entire balance of plant and increasing overall plant efficiency while reducing operating cost.

**Increases overall plant efficiency by ~4%**

**Reduces emissions:**
- Sulfur dioxide > 40%
- Mercury – up to 40%
- Nitrogen oxide > 20%
- Carbon dioxide ~ 4%

**Saves more than $20 million in annual O&M**
Over 25 years of operation, the quality of the coal delivered to Coal Creek Station had deteriorated from the 6,800 Btu/lb design specification to about 6,200 Btu/lb, and the moisture in the coal had increased to about 38 percent by weight. As a result, more fuel was required for the plant to achieve its nameplate capacity, which increased the volume of flue gas and overworked the induced draft fans. Plus, processing the additional coal required all of the plant’s pulverizers to operate at full capacity, leaving little opportunity for regular maintenance. It took up to 50 percent more hot air from the primary air fans to dry the higher moisture coal and move it along the conveyors to the burners. This also limited the amount of available air for burner optimization for NOx control.

DryFining at Coal Creek Station

Reduced fuel moisture lowers:
- flue gas volume
- flue gas velocities
- exit gas temperature
- power for mills
- power for FD & ID fans
- duct erosion & maintenance

Less:
- SO₂ 40%
- CO₂ 4%
- NOₓ 20%
- Hg 40%
- Ash 2.5%

10% less DryFine Feedstock

More MW/ton
Less flue gas
Lower velocities
Less evaporation
Lower stack temp
Great River Energy dries and refines additional quantities of lignite at its Coal Creek Station near Underwood, N.D., and then transports that DryFine coal to its Spiritwood Station east of Jamestown, N.D. That product is shipped over 150 miles in enclosed rail cars to prevent moisture from reentering the coal. At full capacity, Spiritwood Station uses approximately 610,000 tons of DryFine coal annually.

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**For more information on DryFine Technology commercialization**

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**About Great River Energy**

Great River Energy is a not-for-profit wholesale electric cooperative, serving 28 distribution cooperatives in Minnesota and Wisconsin. Great River Energy owns and maintains a resource mix that includes 12 power plants and more than 4,700 miles of transmission lines, making it the second largest power supplier in Minnesota. Great River Energy offers more than 3,500 megawatts (MW) of generation capability that consists of a diverse mix of baseload and peaking power plants, including coal, refuse-derived fuel, natural gas and fuel oil, as well as wind generation.

greatriverenergy.com

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**Powering what’s possible**