

Spiritwood Station

Meeting Future Energy Needs

The Spiritwood Station plant under construction east of Jamestown, North Dakota is the first of its kind in the state. The plant will generate two primary products: electricity and steam. The electricity will be used to power our homes and businesses. The steam will be used by Cargill Malt, a key partner within the industrial park near Spiritwood, North Dakota.

COMBINED HEAT & POWER PLANT

Spiritwood Station is being built by Great River Energy. When it goes online, the plant is designed to generate up to 76 megawatts of baseload electricity and up to 23 megawatts of peaking electricity for the regional energy market. Generation will be limited to 50 megawatts initially due to transmission constraints.

Spiritwood Station will also supply steam to the Cargill Malt plant near Spiritwood, North Dakota. Otter Tail Power Company, as the local service provider, will supply electricity to the Cargill Malt plant.

HIGHLY EFFICIENT PLANT

Most conventional coal-based power plants are 30 to 35 percent efficient. Spiritwood Station will be 40 to 66 percent efficient depending on the amount of steam provided to the site partners. Plant efficiency with Cargill Malt alone will be increased to 40 percent. The addition of additional partners to use the remaining available steam could help the plant achieve a virtual doubling of efficiency to 66 percent. Combined heat and power plants such as Spiritwood Station are highly energy efficient because they take advantage of the energy in the steam, some of which is normally released to cooling towers. Instead, Spiritwood will sell some of that steam to Cargill Malt for use in its

production processes. That makes use of the heat energy in the steam – a wise and efficient use of resources.

HIGH QUALITY FUEL SOURCE

Spiritwood Station's fuel source will be lignite, which will be converted to a higher-efficiency fuel through innovative technologies. The lignite will be dried and refined at Great River Energy's Coal Creek Station near Underwood, ND. About 610,000 tons of lignite per year will be dried and refined. The resulting



Construction of Spiritwood Station the spring of 2010.

product—DryFine™—will be shipped to Spiritwood Station in enclosed rail cars. DryFine™ has numerous benefits. Lignite is a high moisture fuel source. Removing moisture results in a higher BTU value per pound, so the plant burns less fuel. It also results in reduced emissions, lower transportation costs and lower maintenance costs. The refining process removes higher density products which contain more sulfur and mercury. This also helps reduce emissions.



BEST AVAILABLE CONTROL TECHNOLOGIES

In addition to utilizing beneficiated lignite, Spiritwood Station will use Best Available Control Technologies to control emissions. State-of-the-art technologies will make Spiritwood Station one of the cleanest coal-based power plants in the world.



This photo shows construction of Spiritwood Station the spring of 2010.

WASTEWATER WATER SOURCE

The primary sources of water for the Spiritwood Station will be wastewater from the Cargill Malt plant and water from the City of Jamestown and Stutsman Rural Water District.

BACK-UP BOILERS

Two back-up natural gas boilers will be available to provide a full supply of process steam if the electric generating system is down for maintenance.

PLANT SITE

The plant will be located about one mile south of Spiritwood, North Dakota, on a 100-acre site adjacent to Cargill Malt. The plant itself will sit on about 10 acres.

CONSTRUCTION IMPACT

Construction of Spiritwood Station began in mid-October 2007. The plant will have a significant impact on the local economy through the creation of 600 construction jobs and 43 operating jobs: 24 direct jobs at the combined heat and power plant, and 19 indirect jobs for transportation of the beneficiated lignite from Underwood to Spiritwood.

OTHER BENEFITS

When fully operational, Spiritwood Station will provide competitively-priced electricity for the region. It will also have a positive impact on the agricultural industry by providing steam to operate Cargill Malt, which uses barley.

DAKOTA SPIRIT AgENERGY

Great River Energy and Inbicon A/S, the cellulosic biorefinery technology subsidiary of DONG Energy in Denmark, are working together to develop and build a cellulosic biorefinery at the plant site.

The biorefinery, Dakota Spirit AgEnergy, would convert biomass such as wheat straw into cellulosic ethanol, C5 molasses (feed grade or chemical feedstock) and purified lignin pellets (solid fuel, a portion of which would be co-fired with DryFine™ at Spiritwood Station).

Great River Energy is pursuing the biorefinery to improve the design efficiencies for Spiritwood Station.

ABOUT GREAT RIVER ENERGY

Great River Energy is a not-for-profit wholesale electric cooperative, serving 28 distribution cooperatives in Minnesota. It is the second largest power supplier in Minnesota. Great River Energy owns and operates two power plants in North Dakota:

- Stanton Station, located near Stanton, North Dakota, and operational since 1966.
- Coal Creek Station, located near Underwood, North Dakota, and operational since 1979.



For more information about this project and Great River Energy, visit www.GreatRiverEnergy.com or call Lyndon Anderson, North Dakota communications supervisor at 701-391-0759.