



Spiritwood Station

The Spiritwood Station plant east of Jamestown, N.D., is a combined heat and power plant – the first of its kind in the state.

Combined heat and power

Combined heat and power plants produce two products – steam and electricity. Steam from Spiritwood Station powers an adjacent agriculture processing plant – the Dakota Spirit ethanol biorefinery. Spiritwood Station also has the capacity to generate up to 99 megawatts of electricity for homes, farms and businesses in the regional energy market.

A highly efficient plant

Most conventional coal-based power plants are 30 to 35 percent efficient. As a combined heat and power plant, Spiritwood Station is highly energy efficient because it takes advantage of the energy in the steam. That steam is typically released to cooling towers in a conventional power plant. Spiritwood Station achieves about 45 to 50 percent thermal efficiency with its key partner— the Dakota Spirit ethanol biorefinery. Efficiencies could be even higher with additional steam customers.

Executive order

President Barack Obama signed an Executive Order on August 30, 2012, to expand the use of combined heat and power, including the deployment of 40 additional gigawatts of capacity in the United States by 2020. The use of combined heat and power provides an opportunity to accelerate energy efficiency efforts at industrial facilities. This can help factories improve the competitiveness of manufacturing, lower energy costs, free up future capital for businesses to invest, reduce air emissions and create jobs.

High-quality fuel sources

Spiritwood Station uses DryFine™ lignite coal and natural gas from WBI Energy, Inc., to generate steam and electricity.

Natural gas is a very clean and efficient energy resource and is used at varying rates in Spiritwood Station depending on availability and market prices.

DryFine lignite is a higher-efficiency fuel which is processed utilizing innovative technologies at Great River Energy's Coal Creek Station near Underwood, N.D. The raw product – up to 610,000 tons of lignite coal per year – is dried and refined to make DryFine lignite which is then shipped to Spiritwood Station in enclosed rail cars.



As a combined heat and power plant, Spiritwood Station generates steam and electricity.

DryFine lignite has numerous benefits. Lignite is a high-moisture coal. 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. In addition, 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 natural gas and DryFine lignite, Spiritwood Station uses state-of-the-art control technologies to control emissions. Those technologies include:

- A circulating fluidized bed boiler technology which has inherently lower emissions compared to a more conventional pulverized boiler. Nitrogen oxide emissions are reduced because of the lower operating temperatures of such a technology. The addition of limestone as boiler bed material also reduces sulfur dioxide emissions.
- Selective non-catalytic reduction technologies to reduce NOx emissions.
- A spray dryer absorber to reduce sulfur dioxide emissions.
- A high-efficiency baghouse to collect particulate matter.

The state-of-the-art control technologies makes Spiritwood Station a very clean plant.



Spiritwood Station uses Best Available Control Technologies to control emissions.

Packaged boilers

Three packaged natural gas boilers are available to provide a full supply of process steam if the combined heat and power plant is down for maintenance.

Plant site

The plant is located about one mile south of Spiritwood, N.D., on a 100-acre site. The plant itself sits on about 10 acres.

Operating impact

Spiritwood Station, which was fully operational on November 1, 2014, has a significant impact on the local economy through 51 operating jobs. This includes 32 direct jobs at the combined heat and power plant, and 19 indirect jobs for transportation of the DryFine lignite from Underwood to Spiritwood.

Other benefits

Spiritwood Station has a positive impact on the agricultural industry by providing steam to operate the Dakota Spirit ethanol biorefinery, which uses corn from and markets distillers grains to area farmers.

The plant also provides competitively priced electricity for the region.

About Great River Energy

Great River Energy, based in Maple Grove, Minn., is a not-for-profit wholesale electric cooperative, serving 28 distribution cooperatives in Minnesota. It is the second largest power supplier in Minnesota.

For more information about this project and Great River Energy, visit greatriverenergy.com or contact Lyndon Anderson, leader, communications at 701-391-0759.