

Reaching the Peak

Co-ops Meet the Need when Demand Is High

MEETING THE ELECTRICAL NEEDS OF RURAL ELECTRIC consumers in the region is a complex business.

Many factors, such as weather, equipment failure, fuel supply and uncertain demand for power are involved in producing energy to meet consumer demand 24 hours a day.

The best insurance for dealing with these factors is to have additional generating capacity in the form of peaking stations.

A peaking station usually runs when demand on the grid exceeds baseload generation capacity in the region.

Peaking stations are capable of moving from stand-by mode to full load within minutes and some can be operated remotely. They often run during extreme winter heating and summer cooling days. They are essential for ensuring system-wide reliability when demand for capacity has been exceeded.

In a nutshell, the purpose of a peaking station is to be ready to run.

The peaking facilities listed here are part of Basin Electric Power Cooperative's generating assets. Basin Electric owns 2,599 megawatts (MW) and operates 3,518 MW of electric generating capacity of which 953 MW is for participants of the Missouri Basin Power Project (MBPP), and 80 MW is jointly owned by Basin Electric and its Class D member, Corn Belt Power Cooperative, Humboldt, Iowa. Basin Electric's electric generation facilities are in North Dakota, South Dakota, Wyoming and Iowa.

Earl F. Wisdom Generating Station Unit 2 Wisdom Station II

Earl F. Wisdom Generating Station Unit 2 is a Basin Electric peaking power resource.

The unit is a partnership between Basin Electric and Corn Belt Power Cooperative, Humboldt, Iowa. Corn Belt is a member-owner of Basin Electric and operates and maintains the units. Basin Electric and Corn Belt each have a 40-MW ownership share in the 80-MW natural gas/oil-fired combustion turbine.

Wisdom Unit 2 is located near Spencer, Iowa, next to the existing Earl F. Wisdom Generating Sta-

tion Unit 1, a coal-based unit owned and operated by Corn Belt. Ground-breaking for the project began on Oct. 29, 2003, and the project was completed during the spring of 2004 for an approximate cost of \$40 million.

The unit runs during times of peak power demand.

Groton Generation Station

Groton Generation Station, Basin Electric's peaking station near Groton, S.D., has two generating units. Each 95-MW unit is powered by a GE LMS100® simple-cycle gas turbine.



Unit 1 went into commercial operation on July 1, 2006, and Unit 2 went into commercial operation on July 1, 2008.

The station is fueled by natural gas supplied from Dakota Gasification Company via the Northern Border Pipeline and is connected to the electrical grid connected via a nearby substation operated by Western Area Power Administration.

The station operates as peaking capacity during high market conditions and is used to meet Basin Electric's power pool obligations. The additional 192 megawatts available from the station assists Basin Electric in meeting its summer peak load obligations.

Groton Generation Station Unit 1 was the first commercial application of the GE LMS100® simple-cycle gas turbine. It was also named one of *POWER Magazine's* Top Plants as one of six model gas-fired plants for 2007.

Madison Peaking Units

The Madison peaking units are a joint project by Basin Electric Power Cooperative, the city of Madison, S.D., and East River Electric Power Cooperative in Madison, S.D., that resulted in five 2-MW Caterpillar diesel electric generating units and construction of a 6,050-square-foot generator building in Madison.

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The diesel units serve as a peaking resource for Basin Electric and backup generation for the city of Madison. Basin Electric has contracted with the city of Madison to purchase the units' output to fulfill member system peak load demand and to meet reserve power supply requirements.

Owned by the city of Madison, the peaking units and a new substation and four new circuits are valued at \$5.5 million.

East River Electric, a Basin Electric Class A member, spearheaded the project and has committed to transport the units' output to the grid and provide the communications link between the city of Madison and Western Area Power Administration's operations offices in Watertown, S.D.

The city of Madison had already planned an upgrade to the city's electrical system, which included a new 10-megavolt-amperes (MVA) substation, designed to meet the growing load of a nearby industrial park.

Operated remotely from the Leland Olds Station (LOS), near Stanton, N.D., the five 2-MW units have an output of 10 MW. The units became commercially available in April 2005.

Spirit Mound Station

The Spirit Mound Station is an oil-fired peaking station near Vermillion, S.D. The plant has two generating units and primarily runs on an as-needed basis when the demand for electricity exceeds the capacity of baseload facilities. That usually occurs during periods of extreme hot or cold temperatures, increased agricultural loads or emergencies.



The station, which began commercial operation in 1978, can be remotely operated from LOS in North Dakota. It can be brought up to full load within 30 minutes. That is in contrast to coal-based facilities like LOS, which take hours.

Winter operation capacity is 120 MW and summer opera-

tion capacity is 104 MW, for both units. The station uses No. 2 fuel oil, which is stored in containers that hold up to 8 million gallons of fuel. When in use, the station consumes 100 gallons of fuel per minute.

Spirit Mound does not operate often; however, it plays an important role in maintaining system reliability.

Wyoming Distributed Generation Project

Power produced at baseload generating plants is often delivered from the plant to points hundreds of miles away from where it is needed.

Often it's more practical to build power plants next to areas where the power is needed. This is called distributed generation. Basin Electric's largest such project is the Wyoming Distributed Generation (WDG) Project in the Powder River Basin of northeast Wyoming.

The WDG Project is a response to the coal-bed methane (CBM) development in northeast Wyoming. The project, consisting of nine natural gas-fired combustion turbine generators (CTGs), supplies energy and voltage support to Basin Electric's largest member, Powder River Energy Corporation (PRECorp). The CTGs are remotely operated as needed from the Antelope Valley Station near Beulah, N.D.

Though PRECorp's service territory is largely rural, it is experiencing coal, oil and natural gas development. One of the fastest growing industries there is the CBM development. CBM is a form of natural gas that forms when coal is formed. Absorbed into coal, CBM is released when water is removed from coal seams to lower pressure.

The Wyoming CTGs are the largest distributed generation project in Basin Electric's history. Situated among three sites – Hartzog, Arvada and Barber Creek – they each house three 5-MW CTGs. The WDG project has a total capacity of 45 MW. The units first synchronized online in the summer of 2002.

Because the CBM drilling sites are remotely located, a power source and transmission infrastructure was not immediately available. The deployment of CTGs at three interconnected sites near Gillette, Wyo., at the end an expanded distribution system, will meet the gas developers' immediate needs.

On the Horizon

Culbertson Generation Station Adds to Peaking Pool

Basin Electric has begun the process to obtain permits to construct and operate its first generating resource in Montana – a natural gas-fueled peaking unit located eight miles northeast of Culbertson, Mont. An approximately \$100 million project, the unit will be called the Culbertson Generation Station.

The unit will be sited near a compressor station on the Northern Border Pipeline to use natural gas from Basin Electric's subsidiary, Dakota Gasification Company, via the pipeline, to spin its turbine. Basin Electric will be using General Electric's LMS100® simple-cycle gas turbine to provide about 91 megawatts (MW) of power to the region. Fuel oil is not planned as a "back-up" fuel at this time, but – if required – the turbine is capable of being modified to use fuel oil at a later date.

Several regulatory approvals must be obtained before work can begin, giving an approximate construction start date of the spring of 2009 and anticipated completion by spring of 2010.

The peaking station will interconnect with an existing 115,000-volt transmission line operated by Western Area Power Administration.

Deer Creek Station to Act as Intermediate Power Supply

The proposed Deer Creek Station is a 300-megawatt combined-cycle power plant to be located near the town of White in eastern South Dakota. The project was approved by Basin Electric's board of directors in July 2007 and is scheduled to be completed in the spring of 2012.

Construction will take about 16 months. When the plant is operational, it will employ between 25 and 30 people.

Deer Creek Station will be the first combined-cycle power plant in Basin Electric's fleet of generating units. The plant features two turbine-generator sets: one turbine fired by natural gas, while the other is driven by steam. Both of the turbines are connected to generators. The power plant will use natural gas from Basin Electric's Dakota Gasification Company via the Northern Border Pipeline and it will be tied into existing transmission lines.

The power plant is needed to meet growing member load requirements and will serve as an intermediate power supply, which is designed to "cycle" with demand, typically running about 12 to 16 hours a day when demand for electricity is higher.