

# Co-ops Expanding

**“Peaking stations have to be ready to run literally on a moment’s notice.”**

by Brenda Kleinjan

**W**HEN BASIN ELECTRIC POWER COOPERATIVE dedicated more than \$100 million in new power supplies this fall as part of its ongoing commitment to meeting electric cooperative members’ energy demands, the supplies included an innovative, new turbine.

A newly designed gas turbine, called the LMS100® developed by GE Energy, is the force behind the new Groton Generation Station, a 95-megawatt peaking plant just south of Groton, S.D. In fact, the turbine is so new that South Dakota hosts the first one ever made.

The Groton Station helps meet a growing demand for electricity by Basin Electric’s membership, including more than 30 Touchstone Energy® Cooperatives in South Dakota and western Minnesota.

During the dedication of the new station, Basin Electric officials announced that a second unit will be constructed at Groton and is scheduled to be completed by 2008.

Natural gas consumed by the Groton Station is produced at the Great Plains Synfuels Plant near Beulah, N.D. The Synfuels Plant is the only commercial-scale coal gasification plant in the United States; it’s owned and operated by Dakota Gasification Company, a subsidiary of Basin Electric. Natural gas from the plant is transported to Groton Station via the Northern Border Pipeline. A 12-mile tap line from Northern Border to the Groton Station completes the delivery process.

Bill Jayne, GE Energy’s regional executive

director, described the LMS100 as a combination of two gas turbine technologies – heavy-duty, which are the large, heavy metal gas turbines; and aeroderivatives, the engines that actually fly on the wings of airplanes.

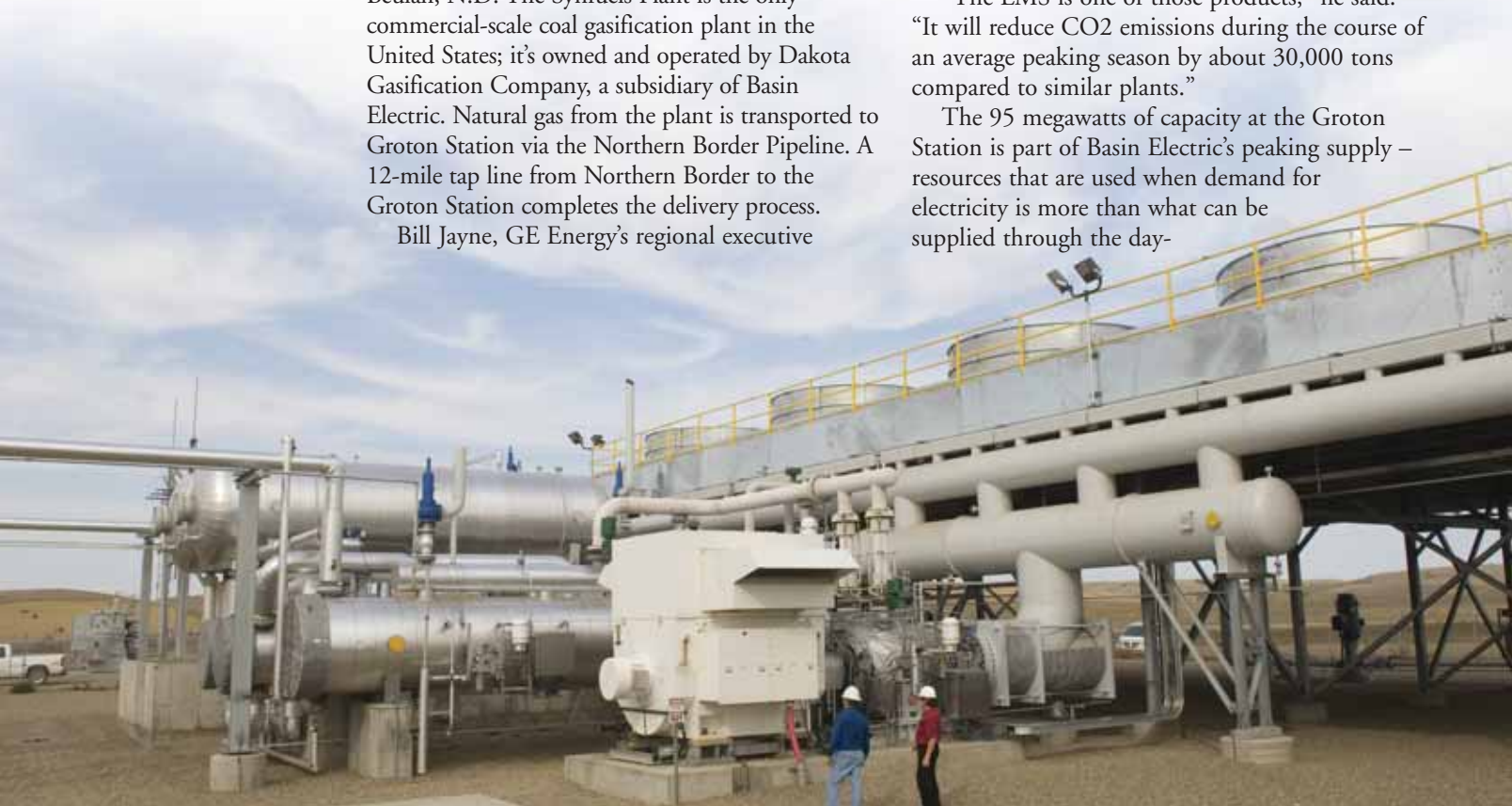
“We’ve combined these two technologies into one unit here (at the Groton Generation Station). It is a fantastic piece of equipment,” said Jayne.

Jayne said the LMS100 offers 45 percent simple-cycle efficiency and can be at full load from a cold start in about 10 minutes. “The LMS100 provides unparalleled flexibility in following and cycling through the needs of the utility in either a peaking or a mid-range application.”

Another important factor about the LMS100, Jayne pointed out, is it’s extremely environmentally friendly. It is one of a few products developed by GE Energy that qualifies for its ecomagination initiative. He said ecomagination is where GE focuses imagination and technology expertise on products and services that will significantly improve the energy efficiency or the environmental friendliness of those products.

“The LMS is one of those products,” he said. “It will reduce CO2 emissions during the course of an average peaking season by about 30,000 tons compared to similar plants.”

The 95 megawatts of capacity at the Groton Station is part of Basin Electric’s peaking supply – resources that are used when demand for electricity is more than what can be supplied through the day-



to-day baseload sources.

“Peaking stations have to be ready to run literally on a moment’s notice,” said Daryl Hill, spokesperson for Basin Electric. The cooperative maintains more than 300 MW of peaking capacity.

The addition of the Groton Station and a new heat recovery endeavor brings Basin Electric’s generation capacity to more than 3,500 MW. A megawatt is the equivalent of 1,000 kilowatt hours. A 100-watt light bulb burning for 10 hours uses one kilowatt-hour.

In October, Basin Electric celebrated the addition of 22 megawatts of generating capacity supplied by four Recovered Energy Generation (REG) power plants that are “fueled” by hot exhaust.

The power plant equipment for the REG projects is supplied, installed, owned and operated by Ormat, headquartered in Sparks, Nev. Basin Electric will purchase the electricity under terms of a purchase power agreement with an Ormat subsidiary. Basin Electric will purchase the electricity produced by the project and will integrate it with its other generating facilities.

Ron Rebenitsch, Basin Electric’s manager of member marketing, said the project involves using the hot exhaust gases from existing compressor stations located along the Northern Border Pipeline to generate electricity. The compressors are driven by natural gas-fueled turbines. “The heat in the compressor exhaust is recovered using heat exchangers. The recovered heat is then used to vaporize a fluid to drive a turbine/generator set,” he said. “The exhaust temperature is about 900 degrees F.” The Northern Border Pipeline travels in a southeasterly direction across North Dakota and South Dakota as it carries natural gas from Canada to the Chicago area.

The plants are located near St. Anthony in North Dakota and near Wetonka, Clark and Estelline in South Dakota.

Rebenitsch said the new generators are considered to be base load generation, meaning they’ll run almost continuously.

Ormat has electricity producing installations on every continent in the world, including an installation near Gold Creek, Alberta, Canada, similar to what will be built for Basin Electric.

The project is an integral part of Basin Electric’s generating family that includes two coal-based power plants in North Dakota – the Antelope Valley Station, Beulah, and the Leland Olds Station, Stanton; a coal-based power plant in Wyoming – the Laramie River Station, Wheatland; an oil-based peaking station – the Spirit Mound Station, Vermillion, S.D.; a natural gas-fueled peaking station near Spencer, Iowa; nine combustion-turbine generators (natural gas) in the Gillette, Wyo., area; four wind turbines – two near Minot, N.D., and two near Chamberlain,

**Opposite:** Four heat recovery projects such as this one at St. Anthony, N.D., are among recent additions to Basin Electric Power Cooperative’s electric capacity. *Photo by Steve Crane, Basin Electric Power Cooperative* **Inset:** Groton Generation Station, a 95- megawatt peaking station south of Groton, S.D., helps meet the growing demand for electricity. *Photo courtesy of GE and should not be used or recreated without express written consent of GE.*

S.D.; and three wind farms owned and operated by FPL Energy, Juno Beach, Fla. Basin Electric purchases the production from them. One is located near Edgeley/Kulm, N.D.; the other is near Highmore, S.D. Each have a capacity of 40 MW. A third farm located near Wilton, N.D., has a capacity of 49.5 MW.

Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, N.D. It generates and transmits electricity to 120 member rural electric systems in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota and Wyoming. These member systems distribute electricity to about 1.8 million consumers.

## By the Numbers

### GROTON GENERATION STATION

**Type:** Peaking station, one unit

**Fuel:** Natural gas supplied via 12-mile pipeline that taps Northern Border Pipeline. Natural gas produced at Great Plains Synfuels Plant, Beulah, N.D.

**Generating Capacity:** 95 megawatts (one megawatt of capacity could serve the needs of about 1,000 average residential homes)

**Generator:** supplied by GE Energy and manufactured by Brush Electrical Machines, LTD, Loughborough, England; 13.8-KV, 131-MW capacity

**Turbine:** Featuring the first commercial installation of the LMS100 simple-cycle gas turbine generator developed by GE Energy. The unit is capable of delivering 100 MW of power at an unparalleled 45 percent simple-cycle efficiency in just 10 minutes.

**Turbine Horsepower:** 126,444 horsepower

**Water Supply:** WEB Water Development, Aberdeen, S.D.

### HEAT RECOVERY PROJECTS

Construction started in September 2005; operational 2006 (Three operating; Fourth at Estelline, S.D., in start-up)

**Four sites:** St. Anthony, N.D.; Wetonka, Estelline and Clark in South Dakota

#### 5.5 MW capacity/site (22 MW total):

East River Electric Power Cooperative provided South Dakota interconnections; Mor-Gran-Sou Electric Cooperative provided North Dakota interconnection

Ormat (Sparks, Nev.) owns/operates sites;

Basin Electric buys electricity produced; considered base load generation

**Electricity produced by using heat from exhaust at compressor stations along the Northern Border Pipeline**

Considered to be renewable generation

