

Pioneer Generation Station will be small, but vital

By Andrea Blowers

It will be small compared to other units in Basin Electric's generation fleet, but the Pioneer Generation Station will be no less significant. In fact, once constructed, the Pioneer plant will quickly and effectively fulfill one very critical need in the burgeoning oil fields in northwest North Dakota and eastern Montana: transmission voltage support. An added bonus is that the unit will also be able to support generation needs as those continue to grow rapidly throughout the area.

"Pioneer will be a 45-megawatt generation peaking facility, similar to the Groton and Culbertson units, just half the size," says Myron Steckler, Pioneer Generation Station project manager. The facility will be located approximately 15 miles northwest of Williston, directly adjacent to a gas processing facility called Stateline I (see sidebar) currently under construction. Both facilities will be tied into a Mountrail-Williams Electric Cooperative substation.

According to Steckler, the turbine at the plant will be a GE LM6000, which, like the GE LMS100 units at Culbertson and Groton, is aeroderivative technology and will be operated in simple-cycle mode. The critical component of this installation is that it will have a synchronous condensing clutch, which is similar only to the first unit at Groton. (See sidebar to learn more.)

"The synchronous condensing clutch is going to be significant for the unit, particularly in the next several years while transmission is being constructed in the area,"

Steckler says. He says before the Pioneer facility was considered, there were plans to install a D-VAR device for dynamic reactive power support in the area. "Because the need for transmission in the area was increasing faster than transmission could be constructed, we knew something had to be installed

quickly to support the amount of electrical pressure, or voltage, on the system," Steckler says.

The synchronous condensing clutch fulfills the same need as a D-VAR device. In addition to supporting the transmission needs in the area, staff recognized a generation facility could help satisfy the ever growing demand for generation.

The original plan for the D-VAR would have cost upwards of \$15 million-\$20 million, but once transmission was built in 2017, the need for the device would have diminished. "The justification for changing plans to add the generation facility with the synchronous condensing clutch fills the need for voltage support, and once transmission comes online we still have generation, a peaking facility that can produce power," Steckler says.

Steckler adds that with any project in the area, securing housing and a qualified work force for the project will be a challenge. He says other challenges will exist once the facility



Myron Steckler
Basin Electric

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Did you know

The Pioneer Generation Station is named after an abandoned rural school in the area called Pioneer School.





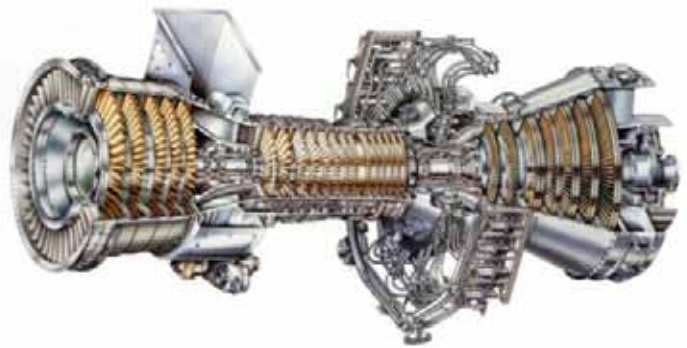
comes online. The first is fuel. A significant portion of the available natural gas in the area will be supplied from the Stateline I Gas Plant, which will be capturing waste gas from oil drilling rigs that would otherwise be flared. The gas will instead be piped into the plant, cleaned up and sent into the Williston Basin Pipeline for other uses.

The heating value of the gas that will be available will be variable, which brought challenges in the selection of a gas turbine that can burn the higher BTU (British thermal unit) fuel. It will also bring challenges to the controls in operating the unit. "Once the gas is processed, the BTU of the gas will swing from 1,000 to 1,200 in this area. That's because after the plant cleans up the gas, it will have two parts, methane and ethane. Typical natural gas doesn't have ethane in it," Steckler says.

The gas plant will be able to separate the gases, but initially will not have a separate pipeline to transport the ethane out of the area. "Once they get the ethane pipelines in place, they'll have the option to strip the it out, depending on the ethane versus natural gas market, and the fuel for the plant will be typical pipeline quality gas, around 1,000 BTUs," he says.

Another initial challenge will be water. Water is required for NOx (nitrogen oxides) control and for cooling the combustion air during the warmer seasons. "We are looking into several options including the possibility of working with the area rural water supplier," Steckler says.

Steckler says permitting for the plant is under way as well as work to secure contracts for equipment and construction. Construction is scheduled to start in early summer 2012 with commercial operation set for early 2013.



The turbine at the plant will be a GE LM6000, which is aero-derivative technology, and will be operated in simple-cycle mode.

ONEOK announces Stateline I Gas Plant

In October 2010, ONEOK Partners announced that it will be investing in a new 100 million cubic feet per day natural gas processing plant in western Williams County. The new "Stateline I" plant is expected to be complete during the third quarter of 2012.

Source: The Pipeline Publication, December 2010

Synchronous condensing clutch

A synchronous condensing clutch allows the turbine to uncouple from the generator, allowing the generator to provide fast-acting reactive power on a high-voltage electric transmission system. First, the turbine rolls up the generator and synchronizes it onto the grid. Then the clutch opens up and the turbine rolls down, turns off and the generator continues to rotate synced onto the grid. It allows the generator to support the voltage on the grid without the turbine having to run. Essentially, the generator is synced to the grid like a very large motor.