# Power Plants Produce Electricity Without Fuel

By
T.W. Schoening

A NEW INNOVATION IN ELECTRIC GENERATION – generating electricity without fuel – was unveiled during ceremonies Oct. 17 at a heat-recovery power plant near Aberdeen. Among the scores of visitors braving chilling winds to tour the new technology were project participants from local Touchstone Energy® Cooperatives.

The ceremonies celebrated the recent start-up of "heat-recovery generators" at Northern Border Pipeline compressor stations in the Dakotas. Four generating units were installed during the past year by Ormat Technologies, Inc., along the pipeline that travels 1,200 miles, carrying natural gas from Canada to the Chicago area.

These new generators are producing electricity without burning any fuel or creating any emissions. The units are "fueled" by the hot exhaust vapors from the natural gas pipeline compressors, according to Ormat CEO Hezy Ram.

Ormat, which owns and operates the units, traditionally uses its heat-recovery technology to capture energy from geothermal sites, such as hot springs, around the world. This is the first time this technology is being used in this kind of industrial setting in the world, Ram said. With thousands of pipeline compressor stations around the nation, this technology has a bright future for generating environmentally benign electricity.

Touchstone Energy Cooperatives are purchasing the output from the units for distribution to electric cooperative members in the region. East River Electric Power Cooperative constructed three substations and 13 miles of transmission lines to deliver the electricity from the three South Dakota units to the electric grid. East River dispatchers in Madison will also control the substations' breakers of the units near Wetonka, Clark and Estelline/Clear Lake. The fourth unit was installed near St. Anthony, N.D.

Jeff Nelson, general manager of East River

Electric Power Cooperative, said the good working relationship among project partners Ormat, Northern Border and electric cooperatives made this environmentally friendly project possible.

"This project demonstrates the Touchstone Energy Value of Innovation," Nelson said. "These units are capturing energy that was formerly vented to the atmosphere to generate electricity. Because the generators do not burn fuel or create emissions, they are equivalent to renewable energy."

Electric cooperatives continue to lead the way in developing renewable energy in the Dakotas, Nelson explained. Currently, cooperative members receive electricity from 93 commercial-size wind turbines in the region. "When we total traditional Missouri River hydropower, wind power and these new heat recovery units, approximately 38 percent of East River's power supply comes from renewable resources."

The power plant equipment for the heat recovery projects is owned and operated by Ormat, headquartered in Reno, Nev. The four units have the capacity to serve 20,000 average homes and will run nearly continuously, when the pipeline compressors operate.

Ron Rebenitsch, manager of member marketing for project partner Basin Electric Power Cooperative, 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. Basin Electric purchases the output from the heat recovery generators for use by distribution cooperatives in the region.

"The heat in the compressor exhaust stack 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." Ormat engineers now report that with the heat-recovery generators running, stack exhaust temperatures now average around 200 degrees F.

With the addition of the 33-turbine Wilton Wind Farm and four waste heat recovery generators to its portfolio this year, Basin Electric now has 158 MW of renewable energy for serving members. This "green energy" effort is 81 percent toward the Basin Electric membership goal of 10 percent of its members' demand for electricity from renewable resources by 2010.

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.

Ormat Technologies, Inc. (NYSE: ORA) is a vertically integrated company primarily engaged in the geothermal and recovered energy power business. The company designs, develops, builds, owns and operates geothermal and recovered energy-based power plants. Additionally, the company designs, manufactures and sells geothermal and recovered energy power units and other power generating equipment and provides related services. Ormat products and systems are covered by more than 70 patents. Ormat currently has operations in the United States, Israel, the Philippines, Guatemala, Kenya and Nicaragua.

Northern Border Pipeline Company is a general partnership that owns and operates a 1,249-mile interstate pipeline that transported approximately 22 percent of all Canadian gas imported into the United States in 2005. The partners are a subsidiary of ONEOK Partners, L.P., which operates the pipeline through an affiliate, and TC PipeLines, LP, with each owning a 50 percent general partner interest. A subsidiary of ONEOK, Inc. (NYSE: OKE) is general partner of ONEOK Partners, L.P. and, along with its subsidiary, collectively owns 45.7 percent of ONEOK Partners, L.P. TC PipeLines, LP is managed by its general partner, TC PipeLines GP, Inc., an indirect, wholly-owned subsidiary of TransCanada Corporation.

East River Electric Power Cooperative, headquartered in Madison, S.D., is a power supply cooperative that delivers wholesale power through a 2,600-mile transmission system to 21 member electric distribution systems. These distribution systems in turn provide retail electricity to more than 85,000 homes and businesses in a 36,000-square-mile service area, covering 41 counties in eastern South Dakota and nine counties in western Minnesota. East River and its member cooperatives belong to an alliance of 630 Touchstone Energy Cooperatives in 45 states, delivering energy and energy solutions with integrity, accountability, innovation and commitment to community.


**Above: This map shows the locations of the four heat-recovery generators located along the Northern Border Pipeline. Opposite Page: Ormat CEO Hezy Ram (right) explains the technology of a heat-recovery generator to East River Electric Power Cooperative General Manager Jeff Nelson, left, and East River and FEM Electric Cooperative Director Alden Flakoll, center, during a tour of the new unit Oct. 17 near Aberdeen. The generator (on the right) is fueled by hot exhaust from a Northern Border Pipeline compressor. The generator (on the left) produces enough electricity for 5,000 average homes.**