

## Energy Security



America's energy security depends on a carefully designed strategy to boost domestic energy production, reduce dependence on foreign oil, and protect the environment.

Basin Electric Power Cooperative (Basin Electric) advocates a defined energy policy that gives industry certainty when planning for generation and transmission infrastructure, research and development of low-carbon emission technology, and energy efficiency and conservation efforts. Such certainty would also provide for long-term tax incentive structures.

Throughout its history, Basin Electric has forged ahead with building a secure power supply system, focusing on diversity, stability, and innovation. The result: low-cost, environmentally responsible electricity for its membership.

### Security

Through its subsidiary Dakota Gasification Company (Dakota Gas), Basin Electric operates a facility that's a model for energy security: the Great Plains Synfuels Plant (Synfuels Plant) near Beulah, North Dakota.

The Synfuels Plant demonstrates what is possible and necessary to secure America's energy future. The facility produces energy from an affordable resource – coal – that's available abundantly within America's own borders. And it has been capturing and shipping carbon dioxide (CO<sub>2</sub>) boosting oil production closer to home since 2000.

The Synfuels Plant is a leader in CO<sub>2</sub> sequestration, participating in one of the largest carbon capture and storage projects in the

world. The CO<sub>2</sub> is compressed and sent via a 205-mile pipeline to Weyburn, Saskatchewan, where it's used for enhanced oil recovery in the Weyburn and Midale oil fields. Since the plant began capturing CO<sub>2</sub> in 2000, over 44 million metric tons of CO<sub>2</sub> have been successfully captured and delivered to customers.

Dakota Gasification Company participated in an international research project coordinated by the Petroleum Technology Research Center in Regina, Saskatchewan. A goal was to develop an understanding of CO<sub>2</sub> geological storage and develop a Best Practices Manual that can be used to guide future CO<sub>2</sub> sequestration projects. The study was based on the Weyburn and Midale CO<sub>2</sub> storage sites. Sponsors from government, academia, and industry contributed to the study. The final phase of the study was completed in 2011.

Electrical transmission plays an important role in energy security, as well. Besides the existing 2,400 miles, Basin Electric built a 190-mile 345-kV transmission line from its Antelope Valley Station north of Beulah, North Dakota, around the western edge of Lake Sakakawea into the Tioga, North Dakota, area. The entire 190-mile line was placed in service in 2017, and includes construction of three new substations and modifications to four existing substations.

Basin Electric has completed the North Killdeer Loop Phase I, a 30-mile, 345-kV line and two new substations. Phase II of this 60-mile project is currently under consideration.

### Innovation

Basin Electric studied the feasibility of capturing CO<sub>2</sub> from its Antelope Valley Station, and completed a front-end engineering and design study. The study determined that, at that time, it was not economical to move the Antelope Valley Station project forward.

Basin Electric is currently engaged with regional partners for the Department of Energy's CarbonSAFE program. The goal of the program is to develop a long-term CO<sub>2</sub> sequestration solution.

### Diversity

Basin Electric is diversifying its power supply. As of the end of 2022, the cooperative has more than 1,800 megawatts (MW)\* of

renewable net generating capacity in its portfolio, including wind and recovered energy generation. It has built the nation's largest wind projects solely owned and operated by a cooperative:

- Basin Electric owns two wind generation projects in North Dakota: the 77 turbines of PrairieWinds 1, commissioned in 2009, and the three remaining turbines of Minot Wind (the oldest two turbines at the site were decommissioned in early 2022). Both projects are located south of Minot, North Dakota.
- In 2011, Basin Electric commissioned the largest wind project in the nation operated by a cooperative, the 162-MW Crow Lake Wind Project, in central South Dakota. The project consists of 108 GE 1.5-MW turbines: one of which is owned by Mitchell Technical College (MTC), Mitchell, South Dakota, for training wind technology students. After commissioning, the project received a software upgrade that allows the turbines to rotate faster, producing more power. The upgrade effectively increased the total project's net output to 172 MW.
- Basin Electric also owns and operates a small wind project at Chamberlain, South Dakota.
- Basin Electric purchased the Great Plains Synfuels Plant in 1988 when 2 percent of Dakota Gas' revenue came from additional products other than natural gas. Today, 75 percent of Dakota Gas' revenue is derived from additional products. Through diversification, Dakota Gas produces 13 products with the addition of urea, diesel exhaust fluid, and liquified CO<sub>2</sub> in January 2018.

## Recent Projects

- In 2019, and 2022, Basin Electric committed to purchasing the output from two additional wind projects for a total of 342 MW. The term of the first project began 1/1/2023, and the other is expected to come online by the end of 2023, and is forecasted to bring the total to more than 2,100 MW of wind capability, more than doubling Basin Electric's wind generation portfolio since 2015.
- Since 2019, Basin Electric has committed to purchasing the output from five utility-scale solar projects: a 114-MW and a 20-MW project in South Dakota and one 20-MW and two 75-MW projects in Montana. The cooperative is continuing to

investigate additional solar options.

- Basin Electric installed a series of 45-MW simple-cycle natural gas-fired combustion turbines in western North Dakota, three at Pioneer Generation Station near Williston and six at Lonesome Creek Station near Watford City, the first of which went into commercial operation in 2013, and the last of which went into commercial operation in October 2021. In addition, 12 natural gas-fired reciprocating internal-combustion engines were installed at Pioneer Generation Station. In total, the two western North Dakota sites will bring a combined capacity of more than 510 MW.
- Basin Electric's Deer Creek Station began commercial operation in 2012. The 297-MW natural gas-fired combined cycle power plant is located near Elkton, South Dakota.
- Basin Electric's Pioneer Generation Station Phase IV (PGSIV) will be located near the existing Pioneer Generation Station northwest of Williston, North Dakota. The cooperative plans to construct about 600 megawatts (MW) of natural gas generation, which will be a combination of combustion turbine and reciprocating engine units. The first phase of the project includes one simple-cycle combustion turbine, which will produce up to 250 MW, a series of reciprocated engines totaling about 110 MW, and 15 miles of 345-kilovolt transmission line, all to be in service in 2025. The second phase includes an additional simple-cycle combustion turbine to produce up to 250 MW to be in service in 2026.

## Conservation and Efficiency

Basin Electric is increasing conservation and efficiency at its facilities:

- Several facilities have geothermal heat pumps.
- Headquarters building efficiency is being improved through replacing window caulking, installing frequency drives, efficient HVAC controls, more efficient lighting, and more.
- Basin Electric is one of the first utilities in the world to proactively implement Ormat Technologies' energy generation from gas turbine exhaust. The technology uses exhaust heat from natural gas pipeline compression stations to generate electricity.

\* The actual renewable energy attributes (aka green tags or RECs) of much of that generation was allocated to members or sold to others. No claims of environmental attributes may be claimed for any part of Basin Electric's power supply, unless those attributes are assigned to the power claimed as green or renewable.