

Innovations and Industry Firsts

Since its inception in 1961, Basin Electric Power Cooperative (Basin Electric) has participated in many first-of-its-kind projects and commissioned many serial number-one pieces of equipment. While the cooperative does not actively seek out participation in research and development, it will be the first to step into the arena when prudent to meet the needs of the membership.

Cooperative Innovations



In the mid-1960s, Basin Electric proposed model laws to the North Dakota Legislature to protect the air, water, and land. The cooperative advocated legislation requiring mined land reclamation and prohibiting dumping industrial wastes into the rivers.

In 1970, Basin Electric initiated the People's Housing Program to help relieve the critical shortage of adequate rural housing in the region. This program later received national acclaim.

In 1973, Basin Electric announced a joint project with Class A member Tri-State Generation and Transmission Association to build a 100-megawatt (MW) direct current (DC) tie in Stegall, Nebraska. This was the nation's first DC tie linking the eastern and western transmission systems.

Basin Electric moved into mine management when it assumed responsibility in 1982 for the ownership and operation of the Glenharold Mine, the lignite source for Leland Olds Station until 1993. Again, Basin Electric pioneered another first for a rural electric entity by forming a subsidiary, Basin Cooperative Services, in 1982 to manage the mine and other non-electric utility functions. In 2012, Glenharold Mine became one of the few surface mines in North Dakota to achieve full bond release from the Public Service Commission.

Basin Electric is the first utility in the nation to issue a request for proposals from carbon dioxide (CO₂) removal technology providers. As a result, Basin Electric completed a front-end engineering and design study exploring the feasibility of capturing CO₂ from its Antelope Valley Station.

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 CO₂ sequestration solutions.

Leland Olds Station Stanton, North Dakota



In 1966, Basin Electric commissioned Leland Olds Station Unit 1, the first pulverized lignite coal-fired boiler. The unit was the largest lignite-burning baseload power plant in the Western Hemisphere.

The first precipitator on a lignite-fired boiler was commissioned on Leland Olds Station Unit 1 in 1974.

In 1976, Basin Electric commissioned Leland Olds Station Unit 2, the first 400-plus MW cyclone lignite coal-fired boiler.

Methods to modify ash-fouling characteristics of lignite to reduce soot blower operation and enhance boiler efficiency were first tested at Leland Olds Station. The methods involved adding limestone to the coal as it was burned in Unit 1, and injecting vermiculite into the Unit 2 furnace. These methods were used for many years before another method, which includes adding magnesium hydroxide, was implemented in 2009. This method has proven to be even more beneficial.

Leland Olds Station is the only power plant in North Dakota that uses a v-slot coal unloading system. It's a v-shaped hopper and enclosure, about the length of six rail cars, with a capacity of about 6,000 tons.

Laramie River Station

Wheatland, Wyoming



The Laramie River Station is part of the Missouri Basin Power Project, a partnership with originally six and today four electric utilities, that provides power to homes and businesses in Minnesota, Iowa, South Dakota, Nebraska, Colorado, and Wyoming. The project includes the Laramie River Station, Grayrocks Reservoir, and high-voltage transmission lines. Laramie River Station is unique because it delivers electricity to two separate electrical grids. Unit 1 is connected to the Eastern Interconnection, while units 2 and 3 are connected to the Western Interconnection.

Laramie River Unit 3 was the first commercial application of a dry reactor scrubber technology when it came online in 1982.

Two years before construction of Laramie River Station began, Basin Electric officials representing the members of the Missouri Basin Power Project met with local and county government officials and civic and business leaders in Wheatland and Platte County to form the Platte County Task Force. The Laramie River Station was the largest construction project in the country at the time. The impact alleviation efforts not only helped secure a productive relationship with the community and the state, but also served as an example that was subsequently copied by other major construction projects.

The Laramie River Station was designed in the mid to late 1970s to be a zero process water discharge facility.

During the Missouri Basin Power Project's development process, the owners established a multi-million-dollar fund to help protect and preserve the habitat of the Whooping Crane and other migratory waterfowl along the Platte River in the Big Bend area of Nebraska.

Antelope Valley Station

Beulah, North Dakota



Antelope Valley Station's boilers were the largest in physical dimensions of any others in the world at the time of construction.

Basin Electric commissioned the first full-scale dry flue gas rotary atomizer desulfurization application at Antelope Valley Station in 1983.

The counter flow forced draft cooling towers are serial numbers one and two.

Antelope Valley Station's boilers employ the most soot blowers of any facility in the world – 397 per unit. The power plant's water supply system has a raw water intake with an inlet that is about 70 feet below the typical water level of Lake Sakakawea. The inlet feeds into a tunnel that runs about 180 feet beneath the lake bed to the pump house.

Dry Fork Station

Gillette, Wyoming



The more than 6 million safe man-hours amassed by the construction workforce at the Dry Fork Station is one of the best safety records in the industry, evidenced by comparison to industry averages. The industry average for this magnitude of major construction is about 39 lost-time incidents.

The reflux circulating fluidized bed scrubber is the largest of this design.

The Magaldi dry bottom ash removal system is the first new installation in the United States.

The air-cooled condenser is the largest in North America and the first application of this technology in Basin Electric's generating fleet.

Dry Fork Station was the first Basin Electric coal plant to install activated carbon injection for mercury removal and selective catalytic reduction with ammonia injection for control of nitrogen oxides.

In 2016, officials broke ground on the Integrated Test Center at Dry Fork Station, which will provide space for researchers to develop commercially viable uses for CO₂ emissions from coal-fired power plants.

Deer Creek Station

Brookings, South Dakota



In 2012, Deer Creek Station commissioned the first combined-cycle power plant in the Basin Electric generation fleet.

Spirit Mound Station

Vermillion, South Dakota



Spirit Mound Station was the first Basin Electric generating facility in South Dakota, commissioned in 1978. The two 60 MW oil-fired combustion turbines provide 120 MW of electricity, primarily on an as-needed basis. The facility can be remotely operated.

Wind & Other Clean Generation



Wind

Basin Electric owns and operates two wind projects that are the largest owned solely by a cooperative in the United States: the 162-MW Crow Lake Wind Project in South Dakota and the 115.5-MW PrairieWinds 1 in North Dakota. The turbines are the first GE turbines in the United States to have service lifts installed.

Recovered Energy Generation

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 compressor stations to generate electricity.

Wind-to-Hydrogen

One of the first demonstration projects of wind-to-hydrogen technology, located near Minot, North Dakota, was completed by Basin Electric, the Department of Energy, and other partners. The project investigated the potential for storage of wind-generated electricity by using wind energy to power a commercial hydrogen generator to

separate the hydrogen and oxygen contained in water. The hydrogen was then stored and used as transportation fuel. This plant was decommissioned and dismantled.

Peaking Power Plants



Groton Generation Station Unit 1 near Groton, South Dakota, was the first commercial application of General Electric's LMS100° simple-cycle turbine technology. It went into commercial operation in 2006. Unit 2 also employs the same technology.

Basin Electric's first aeroderivative gas turbines were commissioned in three remote areas of Wyoming in 2002. Each of the three stations has combustion gas turbines, which produce 6 MW each, for a total of 48 MW.

Culbertson Generation Station, commissioned in 2010, is Basin Electric's first power plant in Montana, and is the state's largest cooperative-owned power plant.

In 2017, Pioneer Generation Station commissioned the first reciprocating engines in the generation fleet. There are 12 engines, all rated at 9.3 MW each and burn natural gas.

William J. Neal Station

Velva, North Dakota (now dismantled)



The first biomass system in a lignite coal-fired boiler was commissioned in 1982 at the William J. Neal Station near Velva, North Dakota. The boiler was modified to burn sunflower seed hulls.

Dakota Gasification Company Great Plains Synfuels Plant Beulah, North Dakota



The Great Plains Synfuels Plant (Synfuels Plant) near Beulah, North Dakota, is the only commercial-scale coal gasification plant in the United States that manufactures natural gas.

The first anhydrous ammonia plant from North Dakota lignite-derived synthesis gas was commissioned at the Synfuels Plant in 1996.

The flue gas desulfurization unit is the first commercial application of General Electric's ammonia scrubber technology. It came online in 1997.

In 2000, the Synfuels Plant commissioned the first capture and sequestration of CO₂ emissions from a coal process energy facility.

The Synfuels Plant supplies CO₂ to one of the world's largest carbon capture and storage projects in Saskatchewan. About 8,000 metric tons of CO₂ can be captured and sent to Canada daily.

The three CO₂ compressors are serial numbers one, two, and three.