

**Testimony of Matt Greek, Senior Vice President of Research, Development and
Technology, Basin Electric Power Cooperative
Before the Senate Committee on Energy and Natural Resources
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Introduction

Good morning Chairman Murkowski, Ranking Member Cantwell, and members of the committee. My name is Matt Greek, I'm the Senior Vice President of Research, Development and Technology at Basin Electric Power Cooperative (Basin Electric) headquartered in Bismarck, North Dakota. I'm also a member of the National Coal Council, the Lignite Energy & Research Councils, the Carbon Utilization Research Council, a director of the Missouri Slope Areawide United Way and a registered professional engineer.

Thank you for the invitation to speak this morning about rural energy. Basin Electric is a generation and transmission cooperative that provides wholesale electricity to 141 rural electric cooperatives who serve three million consumers in nine states across a high voltage transmission system over 2,349 miles (owned and maintained). To put this in perspective, the Washington D.C. metro area has a population of approximately six million people. Basin Electric serves half of that population across nine states stretching from the Canadian to the Mexican border, right through the heart of America. Basin Electric has a diverse generation portfolio consisting of approximately 6,698 megawatts of coal, natural gas, wind, recovered energy, oil, nuclear power, and market purchase agreements. Our generation resources participate in both the Midcontinent Independent System Operator (MISO) and Southwest Power Pool (SPP) regional transmission organizations.

In North Dakota, Basin Electric operates two, two unit coal-based power plants, the Antelope Valley Station and Leland Olds Station. Our subsidiary, the Dakota Gasification Company, operates the Great Plains Synfuels Plant that produces synthetic natural gas from lignite coal, and a number of co-products including anhydrous ammonia, and a newly-commissioned urea plant that began operation earlier this year. The facility is also one of the largest carbon dioxide sequestration projects in the world, capturing nearly 35 million tons of CO² since 2000. The CO² is shipped via pipeline to the Weyburn oil field in Saskatchewan and utilized for enhanced oil recovery. Basin Electric subsidiary PrairieWinds has also developed nearly 300 megawatts of wind generation since 2009. We also have power purchase agreements for over 1,000 megawatts of additional wind power.

To meet the demands of the rapid development in the Bakken oil fields in Western North Dakota, Basin Electric just completed deployment of approximately 500 megawatts of natural gas-fired electric generation and over 200 hundred miles of 345-kV transmission infrastructure. As a result, we now own and operate simple cycle natural gas turbines and reciprocating engine generation at the Pioneer Generation Station, along with simple cycle natural gas turbines at the Lonesome Creek Station. It is this oil and natural gas development in the Bakken field that is playing a critical role in the nation's drive for energy independence.

In Wyoming, Basin Electric is a member of the Missouri Basin Power Project that owns the Laramie River Station in Wheatland and is operated by Basin Electric. We also operate one of the

newest additions to the coal-based fleet, the Dry Fork Station outside of Gillette, which commenced operation in 2011. Basin Electric also built and operates a simple cycle natural gas turbine at the Culbertson Station in Montana.

Finally, Basin Electric also placed the Deer Creek Station - a 300 megawatt natural gas combined cycle plant near Elkton, South Dakota - into service in 2012. We also operate a two unit simple cycle natural gas turbine at the Groton Station.

Carbon-Constrained Future

As I've described, Basin Electric and its members have invested billions in capital in recent years to secure its fossil-based generation. In addition to new facilities, such as Dry Fork and Deer Creek, Basin Electric has and continues to invest in up-to-date environmental controls for its existing facilities. At the same time, we have sought to diversify our portfolio with renewable generation and low-cost power purchase agreements enabled by the renewable Production Tax Credit (PTC).

Going forward, Basin Electric is actively-engaged in ensuring that these assets can continue to operate in a carbon-constrained future. One of the biggest factors driving our long-term planning involves what the Environmental Protection Agency (EPA) ultimately does about carbon dioxide (CO²) regulation. The Clean Power Plan would have been devastating to rural electric cooperatives. Basin Electric has been involved with other utilities and our national trade association in supporting commonsense carbon management regulation that recognizes the improvements made to existing plants, sets a standard that is achievable with cost-effective technologies that can be applied to the facility itself, and allows for maximum flexibility to achieve a unit-based standard. We filed comments with the EPA to that effect and look forward to working with the agency as it moves ahead with this process.

Looking further into the future, Basin Electric has expanded its interest in developing carbon capture solutions to help "crack the code" with respect to cost-effective clean coal technologies that capture, utilize, and sequester CO². Basin Electric is a partner with the Integrated Test Center (ITC) that is nearing completion at our Dry Fork Station. Using flue gas provided by Dry Fork, this test facility will provide space for researchers to explore new and innovative solutions to turn CO² into a marketable commodity. The State of Wyoming invested in the design and construction of this facility, and will oversee its operation. Just last week, the finalists that will participate in the ITC were announced - five teams from several different countries will have a chance to compete for the \$20 million Carbon XPRIZE.

In addition to the ITC, Basin has been exploring options to commercialize Allam Cycle technology for future power generation. The Allam Cycle, developed by NET Power, is a new power cycle that utilizes oxy-fired natural gas to produce supercritical CO², which is then used as the working fluid in a turbine to generate power with near-zero emissions. Given Basin Electric's long history with coal gasification at the Great Plains Synfuels Plant, and our interest in continuing to utilize North Dakota's vast lignite reserves, we are optimistic that this technology can be deployed with gasified coal. At this point, Basin Electric, and its partners - ALLETE Clean Energy, the Lignite Energy Council, North Dakota Industrial Commission, and the Energy and Environmental

Research Center (EERC), have been conducting research on syngas combustion and feasibility while NET Power continues construction on its demonstration facility near Houston, Texas.

The EERC was recently awarded funding by the U.S. Department of Energy (DOE) under phase I of the Fossil Fuel Large-Scale Pilots program that was announced in August 2017 to support this research. I would like to take this opportunity to express our support for the DOE's fossil R&D program, and stress its importance in helping to deploy carbon capture technologies. Basin Electric remains a committed partner, but the investment we and our members can make is limited when the risk is high and other options are available for power generation. Simply put, unless DOE can help make the economics work, utilities cannot move forward with these kinds of projects.

As a not-for-profit electric cooperative, Basin Electric has a fiduciary responsibility to its members to provide electric generation at the least cost. Basin Electric has worked to achieve this goal by diversifying its portfolio with wind and market purchases. Basin Electric has a vested interest in generation sources with long-term fuel certainty, such as coal, that provide affordable power and serve as the backbone of the electric grid. However, in the near-term historically-low natural gas prices continue to drive new generation decisions while regulatory uncertainty makes new coal construction a cost-prohibitive option. The DOE's large-scale pilots program and other support provided through the National Energy Technology Laboratory is critical to help prove out the Allam Cycle and other technologies, mitigate the risk of uncertainty, and allow for commercial deployment by Basin Electric and other utilities.

Finally, to this end, we appreciate members of this committee and others for the bipartisan support of the 45Q carbon capture tax credit that was recently expanded and improved with passage of the Bipartisan Budget Act earlier this year. This tax credit will go a long way towards closing the cost gap for potential carbon capture projects. We also support introduction of the Utilizing Significant Emissions with Innovative Technologies (USE IT) Act. This legislation will provide further assistance to relieve the regulatory and financial barriers to carbon capture utilization and sequestration technology development.

Other Challenges with Providing Rural Energy

Basin Electric owns and/or maintains thousands of miles of electrical transmission (2,349 miles) across several states, with portions crossing federal lands controlled by the United States Forest Service (Forest Service), Bureau of Land Management (BLM), and the United States Army Corps of Engineers (US COE). In addition, our member electric cooperative systems have significantly more miles of distribution infrastructure crossing federal lands. Increasing regulatory requirements have added complexity, time, and cost to transmission and distribution line siting, construction, and maintenance. Today the cost to construct a new high-voltage transmission line can range from \$1 to \$1.5 million per mile. In addition, it has become increasingly difficult to manage existing rights-of-way across federal lands.

Generally speaking, many electric co-ops extend service to the "last mile" for people in the most remote and rugged areas, and co-op lines often cross federal lands managed by the Forest Service and BLM. Therefore, Forest Service and BLM reviews are often required for co-ops to do routine

power line maintenance and vegetation management – including required tree trimming, as well as system upgrades to improve reliability. Delays in application reviews and renewals can keep co-op projects on hold for several months to over a year and add tens of thousands of dollars in costs.

Such delays also create unnecessary liability risks for electric co-ops, which can be held responsible for damages if a hazardous tree or other vegetation comes into contact with a power line and causes a fire before the Forest Service or BLM give the co-op approval to address the problem. Forest Service and BLM efforts to address the lack of uniformity in their standards, review processes and decisions led to some improvements. We appreciate the committee's efforts to advance vegetation management and liability relief legislation, which was recently included as part of the omnibus appropriations bill.

However, as generation continues to be built in response to resource availability and transported to load - as is the case with most renewable generation - it is important that federal laws such as the National Environmental Policy Act, Endangered Species Act, and Migratory Bird Treaty Act are implemented to appropriately manage the impacts of transmission and infrastructure development, and not serve as a barrier.

Market Challenges Impacting Rural Energy

As discussed above, Basin Electric is heavily-invested in both coal and natural gas generating assets. Due to the challenges associated with serving rural electric cooperatives over vast areas, large generating plants provide the most efficient means of serving load. The development of competitive wholesale markets has provided both challenges and opportunities for Basin Electric and its members. However, as the renewable Production Tax Credit has driven market prices down, it has become increasingly apparent that power markets could be improved to fairly compensate all generation for the services that it provides. While Basin Electric supports development of renewables, the large saturation of wind in the SPP market does create new dynamics on the grid, and therefore more reliance on other forms of generation to provide power when wind is not available.

With the volatility of wind generation, there is uncertainty for daily resource operation in the marketplace. Unlike our natural gas generation, our coal units were not designed to regularly cycle on and off, and potentially need days of notice to come on and offline. So when loads are moderate or low and wind is significantly high on a given day (resulting in very low or negative market prices for energy), coal units are backed down to their minimum generation levels (which may still be a relatively high rate of production) and incur financial losses.

These units, however, cannot be taken off line because they may be needed to supply energy in the market the very next day when wind drops to very low levels or loads increase. While wind is subsidized through tax incentives, the market provides no compensation for coal generation to remain on stand-by as an offset to the losses incurred when the wind blows. Additionally, wind levels can change abruptly throughout the day, forcing other generation, primarily fossil fuel-based, to start up or “ramp up” from lower generation levels.

Last fall, the DOE issued a notice of proposed rulemaking to require compensation for these generation sources. While Basin Electric believed that the DOE proposal was too broad in scope, and would have had negative market impacts, we support the Federal Energy Regulatory Commission's efforts to further explore this issue and develop equitable market rules, and some form of standby or ramp compensation for coal and other dispatch able generation sources.

Conclusion

In closing, serving rural America with affordable and reliable electricity is not without its challenges. However, the cooperative model was started to specifically address those challenges and continues to evolve to serve its mission. Basin Electric has undergone a number of changes in recent years and believe that we are well-positioned to serve our members to the end of the line now and well into the future.

Thank you for the opportunity to discuss our thoughts on providing energy to rural America and the role the Federal Government can continue to play. I would be happy to answer any questions you might have.