Testimony on Senate Bill 2014

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Jason Bohrer, Chairman of the Lignite Research Council
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Good afternoon. My name is Mike Holmes, and I am the director of the Lignite Research Development and Marketing Program. I am joined by Jason Bohrer, the Chairman of the Lignite Research Council. We come before you today in support of continued funding of the Lignite Research, Development and Marketing Program under Senate Bill 2014. We will provide a summary of the program scope and funding, and then highlight a number of the successful results from the North Dakota investments.

The Lignite Research, Development and Marketing Program includes R&D related to "new" technology options for clean and efficient use of lignite. The program is a State/Industry partnership and maintains synergy with the Renewable Energy and Oil & Gas Research Programs as we work toward optimum use of regional resources for clean, efficient, low-cost reliable power while reducing the carbon footprint. The lignite industry benefits from the program as it continues to supply energy to regional residents and industry, while strengthening the economy through creation of jobs and affordable electricity.

The program is primarily funded through the ND Coal Severance Tax of 37.5 cents on every ton of coal mined in the state, as well as a two cents per ton R&D tax. Assuming 30 million tons of annual production – which has been the targeted average going back to 1988 – the severance tax produces $11.25 million in revenues, split 70/30 between coal counties and the Coal Trust Fund. Of the Coal Trust Fund, 50 percent is dedicated to lignite R&D, and 20 percent is dedicated to Clean Coal Projects. The lignite R&D program receives approximately $8.5 million a biennium, which is administered by the Industrial Commission, with oversight and guidance from the Lignite Research Council. Over this past biennium, an additional $10 million was provided by the State from the Strategic Infrastructure and Improvements Fund for supporting the Advanced Energy Technology (AET) projects directed at late-stage evaluation of technologies under consideration for commercial application in North Dakota. Analysis of the fund budget shows that the program is on a path of utilizing the funding available for the current biennium, depending on the projects that are awarded in the upcoming grant round.

After the Lignite Research Council approves a grant proposal, it is then forwarded to the NDIC, which is comprised of the governor, the attorney general and the commissioner of agriculture, for their consideration of final approval. Again, the NDIC is a partner with the regional lignite industry in the Lignite Research, Development and Marketing Program. State dollars are leveraged with industry investments as well as funding from the United States Department of Energy (DOE) for research, development and demonstration projects. Since 1987 when the partnership began, the state has invested more than $90 million in lignite research funds. Total investment in more than 200-plus projects is in excess of $750 million, including industry and federal funding.

As priorities for the Lignite Research, Development and Marketing Program are developed, we work closely with industry to ensure that the industry needs are addressed as well as the State's priorities. As a result of this planning effort a lignite industry roadmap was developed and is periodically updated as priorities change. The high-level summary of research priorities includes:

- Support continued options to enhance performance of the existing fleet
- Invest in transformational research (Next generation of Lignite conversion systems that integrate CO_2 capture)
- Focus on Carbon Capture Utilization & Storage (CCUS)
- Leverage international R&D breakthroughs
- Renewed Focus
    - Additional value propositions for lignite (new markets)
    - Polygeneration opportunities (coproducts in addition to electricity)

The Lignite Research Development and Marketing Program is a well-recognized and respected program within North Dakota and beyond. There have been numerous successes throughout the history of the program. A small sampling is provided below.

- Optimized operations and cleanability with high-sodium North Dakota lignite.
- Meeting regulatory requirements for sulfur and nitrogen oxides.
- Addressing mercury and trace elements while reducing capture cost by more than a factor of 20.
- Successful campaigns to promote resilient energy and reliability
- Support of the only US coal-to-synfuels plant (Dakota Gasification Company).
- Supporting early work leading to the Spiritwood Industrial complex and the Great River Energy Dryfining coal upgrading technology.

More recently, the investments in carbon capture utilization and storage (CCUS) technology developments have led to commercial interest in capture of CO_2 from North Dakota power plants. The CO_2 can then be stored, either directly in saline formations or during use for enhanced oil recovery in the Williston Basin. In either case a significant federal tax credit can be used to drive the economics while creating additional jobs. Commercial application of the technology in North Dakota would provide two major benefits to the State. These include the critical value of extending the life of our plants and providing a source of CO_2 for producing additional oil from conventional wells nearing the end of economic viability, as well as enhancing oil production in the Bakken. A project titled Project Tundra has been awarded $20 million in funding from the Lignite Research Program ($46 million total project size) to perform an engineering study and evaluate the commercial viability of CCUS at the Milton R Young Station (industry leads of Minnkota Power Cooperative and ALLETE). The Project Tundra team is finishing up their economic evaluation and evaluating options to improve the overall economics of the project. A similar study is currently being performed for the Coal Creek Station.

Previously, North Dakota legislators provided funding to support development of the Allam Cycle technology for application in future lignite-fired power plants. Development of the Allam Cycle technology progressed on two fronts. A $150 million, 50 Megawatts (thermal) demonstration of the technology on natural gas was performed at La Port, Texas, separate from our efforts under the Lignite Research Development and Marketing Program. They made good progress and are pursuing commercial natural gas-fired applications. Initial North Dakota efforts to address potential challenges for application to lignite were completed and the summary report addressed recommendations for gasifier selection, materials of construction for sensitive components, syngas cleanup, and initial studies on the syngas combustion. Additional funding was obtained from the U.S. Department of Energy to further evaluate the needs to address syngas combustion and plan for a future large pilot system.

The diverse range of R&D projects under the Lignite Research Program includes investigations of emerging markets for our 800-year supply of North Dakota lignite. North Dakota has always been a leader in developing value-added uses for the lignite resource. Examples include three types of fertilizers

at the Great Plains Synfuels Plant (among their many products), leonardite as a soil amendment and other applications and the activated carbon production that is proceeding toward commercial application at Valley City. One of the current emerging markets under investigation is extraction of rare earth elements (REEs) and other critical minerals (CMs) from lignite.

North Dakota has become engaged in a domestic effort to develop technologies focused on REEs from coal and coal-related materials, under a U.S. Department of Energy (DOE) program. The goal is technical and economic viability of domestic REE production. The group of elements known as REEs comprise strategic ingredients for a number of industries. They are important to a range of products including magnets, lasers, catalysts, computer components, cell phones, medical devices, a range of electronics and many other products. The U.S. currently imports nearly all of our REEs, and continued availability is critical to our economy and national security. China currently dominates the market. Coal and coal by-products have been identified as a source of REEs with good potential to provide a domestic supply that can be both technically and economically viable.

North Dakota is among a number of states playing a key role in this effort. The North Dakota Geologic Survey (NDGS) performed pioneering work to assess REE occurrence in the region. Technology developers and industry have partnered on a number of projects focused on commercially viable production of REEs from North Dakota lignite and related materials. Early results show promise in terms of the amount of REEs in North Dakota lignite and the ease of recovering it.

The next step is to continue work in the pursuit of commercial viability. The best way to attain viability is to demonstrate readily recoverable sources of REEs and integrate the REE recovery into existing mines and power plants to optimize the economics. The DOE continues to develop financial opportunities to help support these needs, which provides significant leveraging of North Dakota investments.

In addition, the technology development efforts under the grant program, a small unmatched portion of the funding provides budget flexibility for administration of the program and small studies. The small studies range from evaluation of the economic impact of current and evolving lignite industry, review of the emerging market opportunities for utilization of the North Dakota Lignite resource, evaluation of projected electricity demand growth, and information in support of transmission planning and legal challenges related to the state lignite industry. As an example, a recent study performed by North Dakota State University (NDSU), found that the overall impact of the lignite coal industry in the State is $5.4 billion in economic activity and 13,000 long-term jobs (including direct and indirect jobs). A related study completed last year by the EERC and NDSU, showed that the addition of CCUS to the five largest power plants could create between 8,000 to 15,000 additional jobs, depending on the amount of the CO_2 that is utilized for enhanced oil recovery. In addition, the reliable, clean, low-cost electricity made possible by North Dakota lignite is the cornerstone of the economy of the State and extended region.

These are just a few of the many successes and current opportunities. In addition to the activities under the Lignite Research Development and Marketing Program, there are other complimentary activities directed at promoting commercial application of CCUS. We are always happy to provide you with additional information on these or any of the many ongoing projects and opportunities for North Dakota related to our tremendous lignite resource.