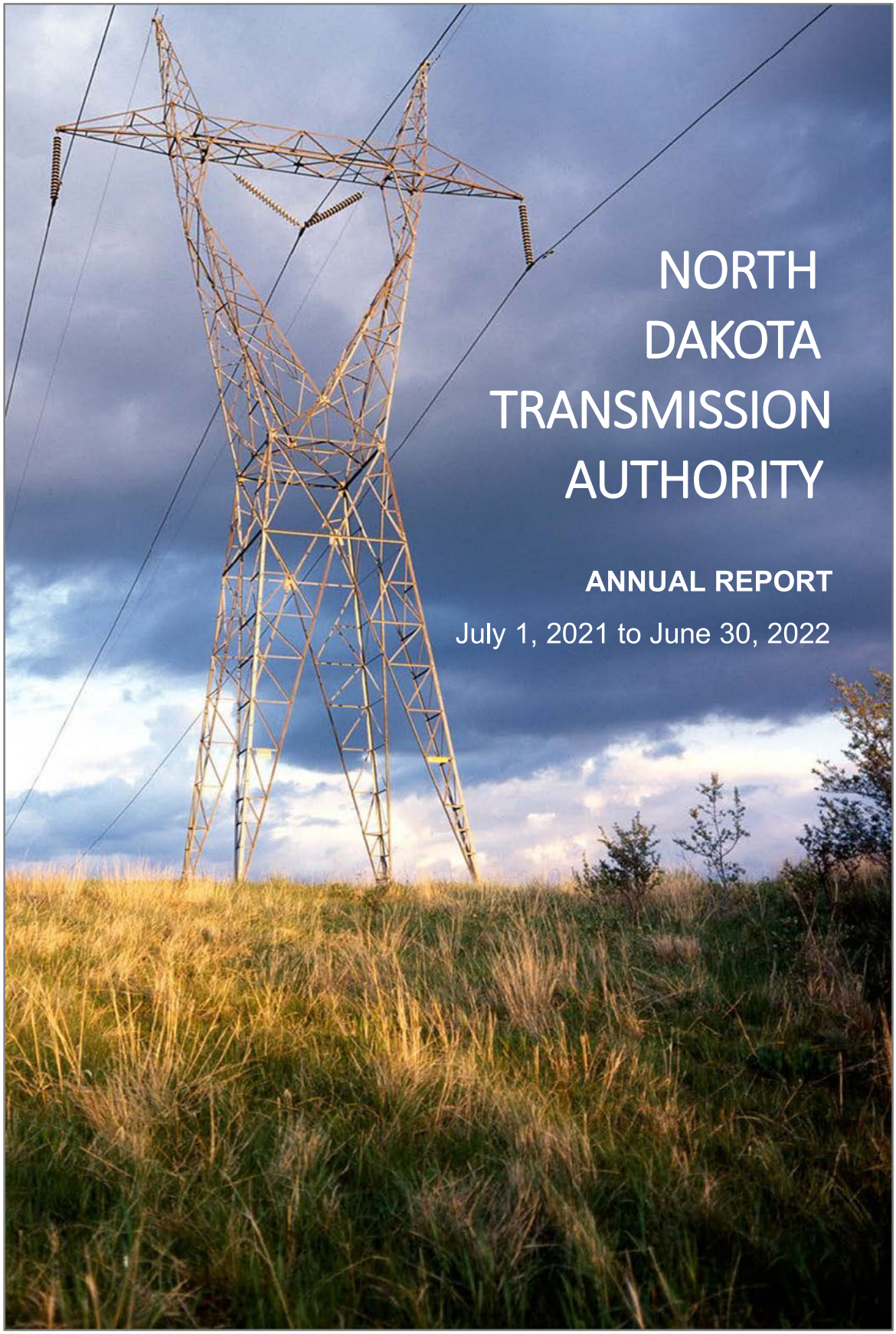

NORTH
DAKOTA
TRANSMISSION
AUTHORITY
ANNUAL REPORT
July 1, 2021 to June 30, 2022

OVERVIEW

The North Dakota Transmission Authority (Authority) was created by the North Dakota Legislative Assembly in 2005 at the request of the North Dakota Industrial Commission. The Authority's mission is to facilitate the development of transmission infrastructure in North Dakota. The Authority was established to serve as a catalyst for new investment in transmission by facilitating, financing, developing and/or acquiring transmission to accommodate new lignite and wind energy development. The Authority is a builder of last resort, meaning private business has the first opportunity to invest in and/or build needed transmission.

By statute, the Authority membership is comprised of the members of the North Dakota Industrial Commission. John Weeda was appointed Director of the Authority in February 2018. The Director works closely with the Industrial Commission Administrative Office staff. The Authority receives no direct general fund appropriation.

SUMMARY OF ACTIVITIES

Whether the issue is project development or legislative initiatives, the Authority is actively engaged in seeking ways to improve North Dakota's energy export capabilities along with transmission capabilities within the state. To be successful Authority staff must understand the technical and political challenges associated with moving energy from generator to satisfied customer. Outreach to existing transmission system owners and operators and potential developers in order to understand the nuances of successful transmission infrastructure development is necessary. Another key element for success is working with officials at the state and federal levels to ensure that legislation and public policy are designed to support the movement of electricity generated from North Dakota's abundant energy resources to local, regional, and national markets.

NORTH DAKOTA INDUSTRIAL COMMISSION

Doug Burgum

Governor

Drew H. Wrigley

Attorney General

Doug Goehring

Agriculture Commissioner

John Weeda, Director

ND Transmission Authority

Claire Vigesaa, Deputy Director

ND Transmission Authority

NORTH DAKOTA TRANSMISSION AUTHORITY (NDTA)

STATUTORY AUTHORITY

Statutory authority for the Transmission Authority is found in chapter 17-05 of the North Dakota Century Code. Section 17-05-05 N.D.C.C. delineates the powers of the Authority, including:

1) make grants or loans to borrow money
2) issue up to $800 million in revenue bonds
3) enter lease-sale contracts
4) own, lease, rent and dispose of transmission facilities
5) enter contracts to construct, maintain and operate transmission facilities
6) investigate, plan, prioritize and propose transmission corridors; and
7) participate in regional transmission organizations.

Before the Authority may exercise its power to construct transmission facilities, it must follow a process defined by statute to ensure public participation and comment. In particular, the Authority must publish a notice describing the need for the transmission project. Entities interested in construction of the facilities or furnishing services to satisfy the identified needs have 180 days to respond by filing a notice of intent. If the Authority receives a notice of intent from an interested entity, it may not exercise its power to construct unless the Authority makes a finding that doing so would be in the public interest. In making such a finding, the Authority shall consider the economic impact to the state, economic feasibility, technical performance, reliability, past performance, and the likelihood of successful completion and ongoing operation.

The Authority may finance approved projects through the issuance of bonds. Under current law up to 30 percent of the cost of a project may be financed by selling bonds that include the moral obligation of the State of North Dakota. In other words, up to $240 million of the Authority's $800 million total bonding authority may be sold with the moral obligation of the state. The moral obligation component enhances the marketability of the Authority's bonds.

In 2022 the NDTA, for the first time, utilized the authority granted to make loans as a support to NEXUS in purchasing the DC line from Coal Creek Station in North Dakota to Delano, Minnesota.

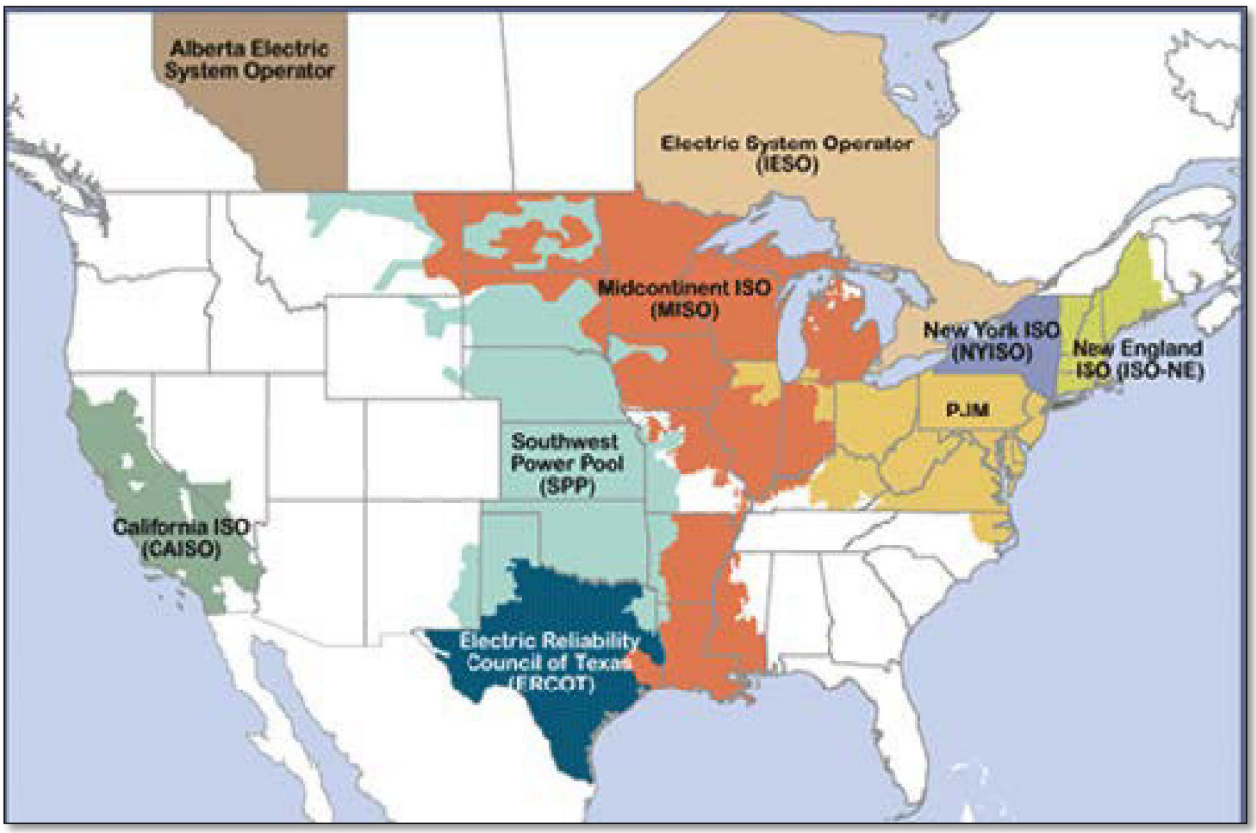
PLANNING

A major portion of the Authority's workload includes observation and achieving a high level of understanding of regional transmission planning. To accomplish this task, the Authority monitors the efforts of regional transmission organizations (RTOs) that represent North Dakota transmission developers. Authorized and recognized by the Federal Energy Regulatory Commission (FERC), RTOs oversee the efficient and reliable operation of the transmission grid. While RTOs do not own any transmission assets, they do provide non-discriminatory access to the electric grid, manage congestion, assure reliability, provide billing and settlement services, and oversee planning, expansion, and interregional coordination of electric transmission.

Many North Dakota service providers have long been participants in the Midcontinent Independent System Operator (MISO). The MISO footprint covers the service territories of Otter Tail Power (OTP), Montana-Dakota Utilities (MDU), Great River Energy (GRE), Xcel, Missouri River Energy Services (MRES), and a small amount of transmission assets owned by Upper Missouri Power Cooperative. In addition, they have an agreement with Minnkota Power Cooperative that provides them with many of the same services. In October 2015, the Western Area Power Administration (Western) and Basin Electric Power Cooperative (BEPC) officially joined the Southwest Power Pool (SPP), bringing the entire state of North Dakota under the transmission planning of RTOs. In addition, BEPC members Mountrail-Williams Electric Cooperative and Central Power Electric Cooperative, Roughrider Electric Cooperative and Mor-Gran-Sou Electric Cooperative have also joined SPP due to their transmission ownership. Combined, North Dakota utilities and transmission developers are part of an extremely complex system that oversees the transmission of over 200,000 megawatts of electricity across 100,000 miles of transmission lines so that utilities can deliver power to homes and businesses in all or part of 20 states.

MISO and SPP also operate the power markets in their respective territory. Pricing for selling electricity into the grid and for buying electricity from the grid is managed by them. This process determines which generating units will be providing generation at any point in time and which units will provide various ancillary services to sustain voltage, assure reliability, etc.

Regional Transmission Organization and Independent System Operators



FERC-Recognized Regional Transmission Organizations and Independent System Operators (www.ferc.gov)

ND Transmission Authority Planning

The North Dakota Transmission Authority periodically conducts independent evaluation of factors that affect the adequacy of transmission in North Dakota. Two studies of that nature were recently completed.

POWER FORECAST 2021

To help understand the demand for electricity in the growth area in the oil producing counties, the NDTA commissioned Barr Engineering to do an update to the Power Forecast 2019 estimating the growth over the next 20 years. The 2021 update and the full study can be obtained from the North Dakota Industrial Commission web site: Power Forecast Study - 2021 Update (nd.gov)

The 2021 update incorporates industries that have expressed interest in locating in North Dakota through encouragement that the Clean Sustainable Energy Act provided and the abundance of natural gas available due to the increasing gas-to-oil ratio in the Bakken wells. Another important factor in the forecast is the likelihood of carbon capture and sequestration from Lignite fired power plants, ethanol plants and to pipelines bringing CO2 to North Dakota for sequestration service.

In summary, the Power Forecast 2021 Update projects an increase of 10,000 GWhr in energy demand over the next 20 years under the consensus scenario and approximately 2200 to 2500 MW of capacity to meet demand. These projections were highly dependent on industrial development and are coordinated with a forecast used by the ND Pipeline Authority.

The timing and implementation of resources to meet this growing demand is a significant challenge for the utilities that have the obligation to serve. The generation options for meeting the increased capacity demand are highly biased toward wind generation and natural gas generation. As seen in the Interconnection Queues below there is a large interest in increasing wind generation options, but natural gas generation to firm up the weather dependent generation may see an increase in the queue.

Generator Interconnection Queue and Transmission Plan Review

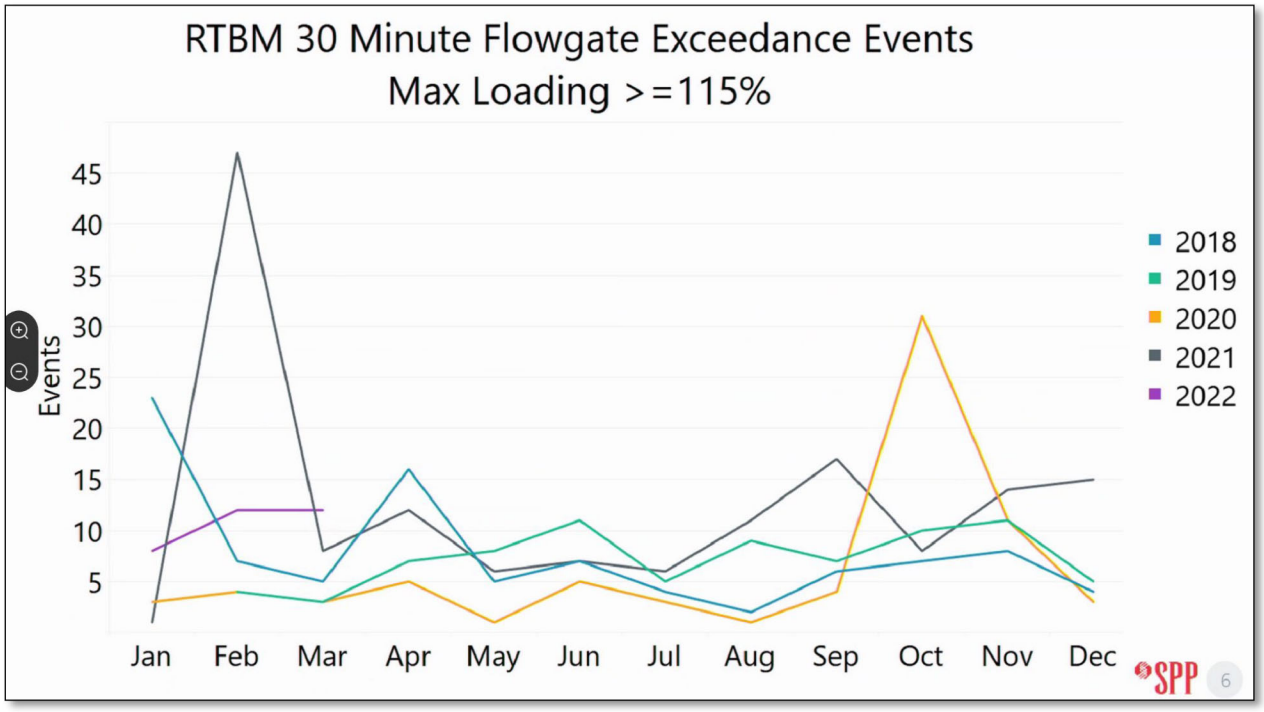
MISO TRANSMISSION EXPANSION PLANNING (MTEP)

Both MISO and SPP are engaged in transmission planning processes to accommodate the growth of renewable generation and the need to move that generation to the markets. The MISO Board is addressing the first tranche of the MISO Long Range Transmission Plan in the July 2022 Board meeting. This tranche will be included as an amendment to the MTEP 2021 to avoid delay in starting the projects. That tranche includes $10.3 Billion of transmission expansion in the upper MISO region. Projects included are expected to have a beneficial impact on North Dakota and will enable reasonable cost for transmission interconnects as listed in the queue below. As much as possible those lines are planned along existing right-of-way to enhance the permitting and construction process. Even with that benefit it is expected that most of the lines will not be in-service for six to ten years in the future.

The MISO Transmission Expansion Plan (MTEP) is developed annually through an inclusive and transparent stakeholder process. MISO evaluates various types of projects through the MTEP process that, when taken together, build an electric infrastructure to meet local and regional reliability standards, enable competition among wholesale capacity and energy suppliers in the MISO markets, and allow for competition among transmission developers.

SPP Integrated Transmission Planning process (ITP)

Transmission planning is becoming increasingly complex as the generation mix transitions to a greater portion of intermittent generation resources. The changing mix coupled with redistribution of generation resource locations puts strains on existing transmission networks, potentially changing flow directions for the network. The table below demonstrates the increase in flowgate exceedance events for SPP over the last four years.



Like other Regional Transmission Organizations, SPP has increased staff resources focused on reliability and system resilience. SPP has several member groups/staff reviewing data/trends and working on new policies/procedures to address reliability and resiliency issues.

The planning process (Integrated Transmission Plan -ITP) at SPP has been overwhelmed with generation interconnections over the past few years, however SPP made adjustments to get the planning process back on track in 2022. Further, SPP has collaborated with MISO in the JTIQ study to identify mutually beneficial transmission development at the SEAMS.

As the grid system has matured and incorporated new technologies, transmission and generation operators have a tremendous amount of data to be used in the planning process. SPP staff continue

to strengthen and adapt their planning models to leverage the data and to accurately apply information to develop transmission options to meet the region's need.

MISO-SPP Joint Transmission Study (JTIQ)

The Midcontinent Independent System Operator (MISO) and Southwest Power Pool (SPP) collaborated on a year-long transmission study designed to identify transmission projects with comprehensive, cost effective and efficient upgrades. Both RTOs were looking for solutions to historical challenges facing generation interconnection customers in areas where their boundaries connect, also known as seams. The study began in December 2020.

This joint study focused on solutions that the RTOs believed would offer benefits to both their interconnection customers and end use consumers of RTO member companies. While MISO and SPP had an existing Joint Operating Agreement that allowed them to work through reliability issues, existing processes did not include the simultaneous evaluation of benefits, or allocation of cost, to both load and interconnection customers.

Each RTO's existing interconnection processes will proceed as planned. The study ran parallel to those with subsequent results expected to be incorporated at the appropriate time. Any projects identified by the joint study will need to be approved by the Board of Directors of the respective RTOs before moving ahead. Some projects in the joint study also appear in the long-range planning of the respective RTOs. An example of that is the 345kv line from Ellendale to Jamestown, North Dakota.

The completion of this study is imminent, both RTOs would like to have their FERC filing(s) made by end of year 2022. Both MISO and SPP desire to have board approval in early 2023. Several of the alternatives that were ranked well in the preliminary analysis would benefit North Dakota. The most direct impact was a proposed line from Jamestown to Ellendale. Additional lines proposed in the Big Stone area would help reduce congestion that has impacted the market in the Ellendale area where North Dakota has a number of large wind projects, and more being proposed.

TRANSMISSION CONSTRUCTION & IMPROVEMENTS

There have been several transmission projects completed in recent years. Currently smaller projects are underway that enhance the transmission available to North Dakota generators and their access to the energy markets. The transmission improvements are summarized below.

SPP PROJECTS

Basin Electric Power Cooperative Western North Dakota Projects

The Neset-to-Northshore 230kV transmission project is an approved reliability network upgrade from Southwest Power Pool (SPP) in 2020. The project is in Mountrail County and includes a new 230-kV terminal at Neset substation, a new 230/115-kV substation called Northshore (approximately 15 miles north of New Town), and a new 230-kV transmission circuit from Neset-to-Northshore. That project is nearing completion and is expected to be energized in late 2022.

To meet the load growth and reliability needs of the Basin Electric member service territory, multiple projects were approved out of the SPP 2021 Integrated Transmission Planning process in May of 2022. The projects in North Dakota included the addition of approximately 200 miles of 345-kV transmission lines along with a new substation as well as additions to existing substations. The largest of the projects has been dubbed the "East Loop project" and will extend from the Leland Olds 345-kV substation around the east end of the Lake Audubon and continue up to the existing Tande 345-kV substation near Tioga, North Dakota. A new substation near Parshall, North Dakota will also segment this East Loop line creating a load delivery location. The second project is a new 345-kV line from Roundup-to-Kummer Ridge which will connect two existing 345-kV substations near Killdeer and Johnson's Corner respectively. An additional load-serving substation will also be constructed on the Judson-to-Tande 345-kV transmission line. That substation is expected to be completed in 2024. The East Loop and Roundup-to-Kummer Ridge projects have an expected completion in late 2025.

Though it's not new construction, Basin Electric continues to complete age and replacements projects at various substations.

Transmission studies continue to be completed within the various SPP processes to identify reliability upgrades needed in this region. Basin Electric and its members monitor the load growth in the area and submit plans for approval as needs develop. They work closely with SPP on the various transmission tariff studies that SPP completes.

MISO PROJECTS

Minnkota Power Cooperative (North Dakota)

Minnkota projects include replacement of a high voltage transformer (230/115 kV) at Drayton, North Dakota in 2023 ($3.2M). Various high voltage structure replacements and foundation repairs are being done as part of the HV maintenance and hardware replacement programs ($11.7M). A new 69/230 kV substation to improve reliability is proposed for the Grand Forks area in 2023 and will include the new tap substation on the existing Prairie-Winger 230 kV line ($9.3M). Rebuilds of existing 69 kV transmission lines and distribution substations is ongoing, as well as breaker and protective relaying replacements/upgrades.

Minnkota Power Cooperative (Minnesota)

Minnkota will be involved in a series of projects to improve reliability of the NW Minnesota bulk electric system. These projects include both 230 kV transmission substation work and 115 kV line and

substation work and are tentatively scheduled to be constructed in the 2023-2024 timeframe. Included in this work is a joint project with Otter Tail Power to build 7 miles of new 115 kV line north of Grand Forks by Oslo, Minnesota that interconnects the existing 230 kV and 115 KV systems in that area for better reliability in the region.

Ottertail Power Company (OTP)

On July 25, 2022, the Midcontinent Independent System Operator (MISO) approved a portfolio of 18 new transmission projects representing approximately $10.3B of investment. These projects, identified through MISO's Long-Range Transmission Planning process, or LRTP, are the first of four planned portfolios of projects that MISO is planning to identify over the next few years to ensure a reliable, resilient, and cost-effective transmission system for customers across the Midwest region as the generation fleet transitions. The Tranche 1 portfolio of projects includes a Jamestown – Ellendale 345 kV Project and a Big Stone South (South Dakota) – Alexandria (Minnesota) – Cassie's Crossing 345 kV Project, the latter of which merits inclusion in this report because it will facilitate additional generation transfer from North Dakota.

Jamestown – Ellendale 345 kV Project

Otter Tail Power Company and Montana-Dakota Utilities Co. are partnering to build the Jamestown-Ellendale 345 kV Project. The project is expected to include 85-95 miles of new 345 kV line and to leverage existing rights-of-way (e.g., highway and transmission corridors) to the extent possible. Otter Tail and Montana-Dakota are in the early stages of project development with an in-service date expected in late 2028. MISO has developed an estimated cost of $438.7 million for the Jamestown – Ellendale 345 kV Project. The Jamestown-Ellendale 345 kV Project will strengthen the connections between the existing 345 kV systems and relieve excessive loading on the 230 kV system leading to the ability to increase the transport of energy out of the Dakotas, reduce congestion, improve fuel savings, and maintain the reliability of the transmission system in the future.

Big Stone South – Alexandria – Cassie's Crossing 345 kV Project

The Big Stone South – Alexandria – Cassie's Crossing 345 kV project includes two distinct line segments. The Big Stone South-Alexandria segment will involve approximately 100-130 miles of new 345 kV line and leverage existing rights-of-way (e.g., highway and transmission corridors). The Alexandria-Cassie's Crossing segment will primarily use the spare circuit position on the existing structures along Interstate 94 from Alexandria to Monticello (i.e., the CAPX2020 Fargo-Monticello line) and continue southeast a short distance to a new Cassie's Crossing 345 kV switching station in Sherburne County. MISO has published an overall estimated cost of approximately $573.5 million with a proposed in-service date in 2030. Otter Tail is in ownership discussion with potential co-owners in the overall project and has not yet finalized ownership arrangements.

In addition to providing reliability and economic benefits, the Jamestown – Ellendale 345 kV Project and the Big Stone South – Alexandria – Cassie's Crossing 345 kV Project - - in combination with the other projects approved in MISO's first portfolio of LRTP projects - - will enable the interconnection of future generation and increase the transfer capability throughout the region.

MISO/SPP Joint Targeted Interconnection Queue (JTIQ) Study

In parallel with MISO's LRTP process that led to the first portfolio of projects, MISO and the Southwest Power Pool (SPP) also completed a technical analysis called the Joint Targeted Interconnection Queue (JTIQ) study. The JTIQ effort was initiated in mid-2020 to address transmission system needs that exist along the SPP-MISO seam which are resulting in delays in processing regional generation interconnection queues. MISO and SPP released a final JTIQ report in March 2022 that included 7 projects with an estimated cost of $1.65B. Included within the recommended portfolio was the Jamestown-Ellendale 345 kV Project, an electrically equivalent alternative to the Big Stone South – Alexandria – Cassie's Crossing 345 kV Project, and a Big Stone South – Hankinson – Bison 345 kV Project.

Great River Energy High Voltage Direct Current (HVDC) Refurbishment

On June 30, 2021, an announcement was made that Rainbow Energy of Bismarck, North Dakota has reached agreement to purchase the Coal Creek Station and the DC line from there to Delano, Minnesota. The deal closed on May 1, 2022. The line is now owned by NEXUS line division of Rainbow Energy. NEXUS contracted with Great River Energy to continue to operate and maintain the line. As part of the overall deal, Great River Energy will contract for 400 Megawatts of wind energy near the Coal Creek Station that will be part of the energy carried by the DC line to Minnesota.
This plan retains a similar number of jobs at the plant and the mine. In addition, the carbon capture systems and additional electric loads on the plant site have promise of additional construction and operating jobs.

Xcel Energy

At the end of June 2021 Xcel Energy announced plans to build a gas fired generation plant in North Dakota. In addition, Xcel plans to continue addition of renewable generation in the area and transmission improvements to accommodate those additions.

Montana-Dakota Utilities Transmission Improvements

MDU is continuing transmission projects in 2022 for North Dakota started in previous years, primarily focused on transmission near the Heskett Power Station, the 230 kV transmission system from Mandan to Ellendale, and replacing aging infrastructure around the service territory in North Dakota.

Transmission upgrades continue in Mandan near the Heskett Plant. A large 115 kV substation addition at MDU's Mandan Substation and a new 115/69/41.6 kV substation were placed in service in 2022. Several transmission line rebuilds/reroutes were completed to interconnect the new substation projects, allow retirement of the Heskett Plant, and the addition of Heskett 4 Combustion Turbine.

MDU continues the work to upgrade the 230 kV system for the Emmons Logan Wind Farm, replacing transmission line structures on the Mandan to Ellendale 230 kV system. Parts of this project are currently under construction and will continue through October 2022.

Other transmission projects in North Dakota consist of rebuilding existing transmission lines and substations due to age and condition. The larger projects are in the areas of Beulah, Tioga, Crosby, and Zahl.

Minnesota Power High Voltage Direct Current System

Minnesota Power is exploring a modernization of its High Voltage Direct Current (HVDC) system that currently connects North Dakota (at Center) and Minnesota (near Duluth). The project would replace the technology installed in the late '70s to newer HVDC technology at the ends of the lines and provide an increase of capacity as a result. Minnesota Power officials have begun public information discussions with North Dakota officials in preparation for this project.

Grid United

Grid United has been taking specific action toward building a DC line from St. Anthony, North Dakota to Colstrip, Montana. They are currently reporting that 80% of the landowners along the route in North Dakota and Montana have given consent for survey work to be completed. Environmental and cultural resource studies are underway and WAPA signed an MOU with Grid United to be designated as the lead Federal Agency.

FUTURE TRANSMISSION CONCEPTS

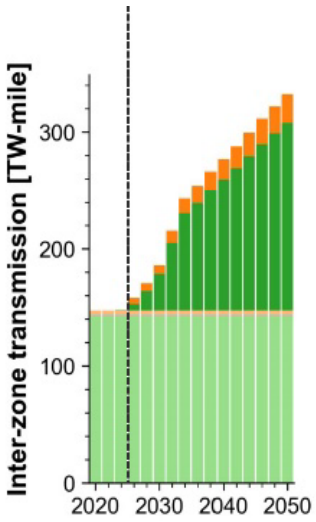
SOO Green - The SOO Green Renewable Rail project (SGRR) is a 2,100 MW, 349-mile, 525 kV underground high voltage direct current (HVDC) transmission line from Iowa to Illinois, linking utility-scale renewable generation in MISO with customers in PJM. Winslow Ward who headed up that project reported that is has been sold and the following news reveals some of the details:

Two powerful backers have signed on to a 2,100-megawatt transmission project to bring renewable generation from Iowa to Illinois.

German energy engineering firm Siemens and Copenhagen Infrastructure Partners, a Danish fund specializing in renewables, acquired the SOO Green Renewable Rail from its developer, the *Wall Street Journal* reported. Siemens will also supply the high-voltage DC equipment for the effort.

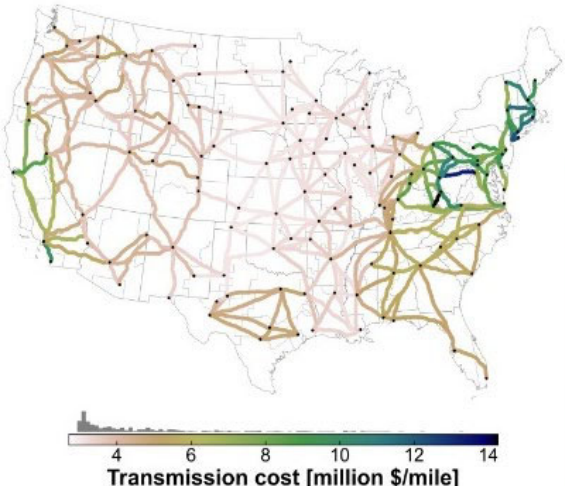
DOE - DOE, National Renewable Energy Laboratory (NREL) and Pacific Northwest Nation Laboratory (PNNL) are conducting a National Transmission Planning Study to identify interregional and national strategies to accelerate cost-effective decarbonization. While North Dakota is part of the study region, early results are showing transmission needs in other parts of the nation of much greater magnitude than this region. The graphics below show some of the work that is being done and questions that are being addressed.

Key capacity-expansion questions for the TRC



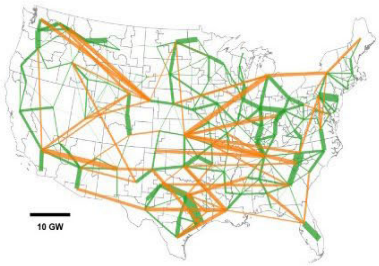
1. In what year should new, **currently unplanned** transmission capacity additions start to be allowed?

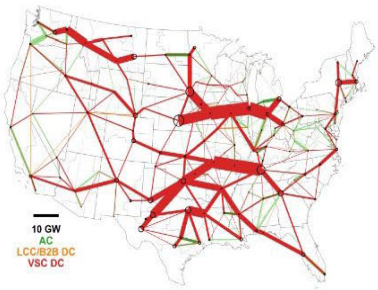
Should it depend on technology, location, or other factors?



2. Are the assumed **cost and performance** characteristics appropriate?

Are there other characteristics that should be considered?





3. Is it worthwhile to consider both **LCC** and **VSC** DC, or other high-capacity options?

4. **What geographic resolution** for transmission construction is needed for actionable findings? (Total TW-miles, inter-region capacities, individual lines…?)

NORTH DAKOTA UTILITY SCALE GENERATION REPORT (all data is in calendar year)

CURRENT GENERATION RESOURCES

Renewable generation - North Dakota has 4250 MW of wind generation in service.

Solar generation - North Dakota does not currently have any utility scale generation facilities in service, although some are in the MISO and SPP queues.

Thermal coal generation - North Dakota currently has thermal coal generation in service at six locations. These sites include a total of 10 generating units. The combined capacity of the units is approximately 4,048 MW. The average capacity factor for 2021 was from 65% to 91% on the generating plants excluding the Heskett station slated for retirement.
Montana-Dakota Utilities retired the 44-MW coal-fired Lewis & Clark Station in Sidney, Montana at year-end 2020 and Units 1 and 2 at the 100-MW Heskett Station in Mandan, North Dakota in the first quarter of 2022. In the first half of 2023 they will be adding an additional gas fired unit at that site.

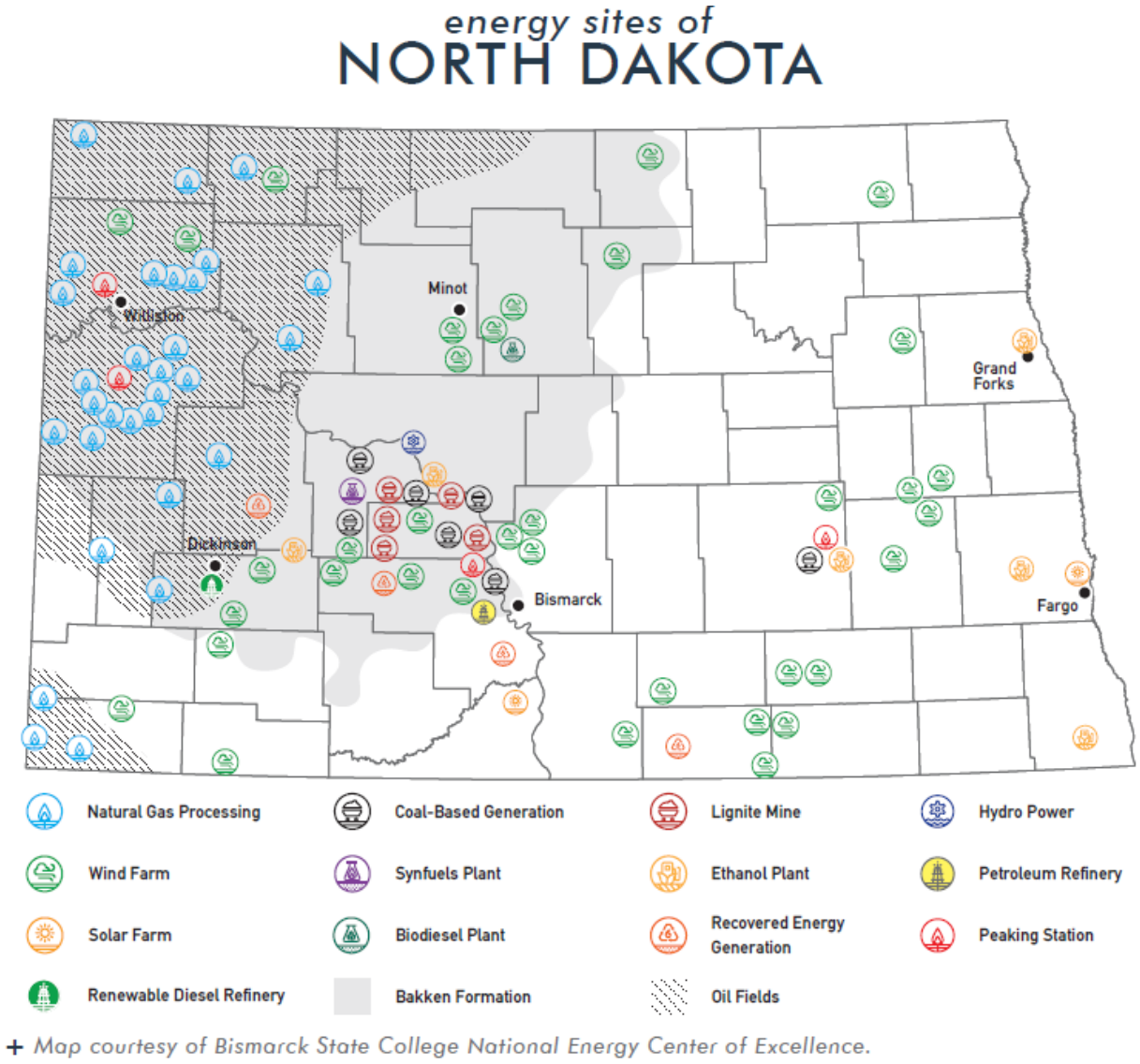
Rainbow Energy closed on a transaction to buy the Coal Creek Station and the DC transmission line on May 1, 2022. Their plans are to continue to operate the plant in a similar manner. They will be moving forward with the CO2 capture assessment that was started by Great River Energy. In addition, approximately 400 MW of wind generation is planned for that area of McLean County to utilize the capacity that will be available on the DC line.

Hydro generation - North Dakota has one hydro generation site containing 5 units with a total capacity of 614 MW. The average capacity factor declined and in 2021 was approximately 43%. Volume of water flowing in the river has been a limiting factor in hydro generation during drought years.

Natural gas generation - North Dakota has three sites for electric generation utilizing natural gas. These three sites contain 21 generating units with total capacity of 596.3 MW. These units are reciprocating engines and gas turbines. There is a variation in summer capacity due to performance of gas generators in hot weather. The two locations in western North Dakota have been running at much higher capacity factors than a typical natural gas peaking plant. This is driven by the low cost of natural gas in the Bakken region and the high and uniform demand. The unit at Mandan on the other hand operates a limited amount to respond to peak demand. Total generation in North Dakota using Natural gas for 2021 was 1.445 GWhr. This amount has been steady for 2019 thru 2021.

Total Generation - The combined total of all types of utility scale generation is approximately 8,863 MW. The 4,000 MW of wind generation receives a reduced capacity accreditation in the ISO of approximately 600 MW since it is intermittent. This is representative of the amount that is estimated to be available for the peak demand in the summer. Newer installations have been able to demonstrate a little higher capacity for accreditation.

CURRENT GENERATION & ENERGY RESOURCES



+ *Map courtesy of Bismarck State College National Energy Center of Excellence.*

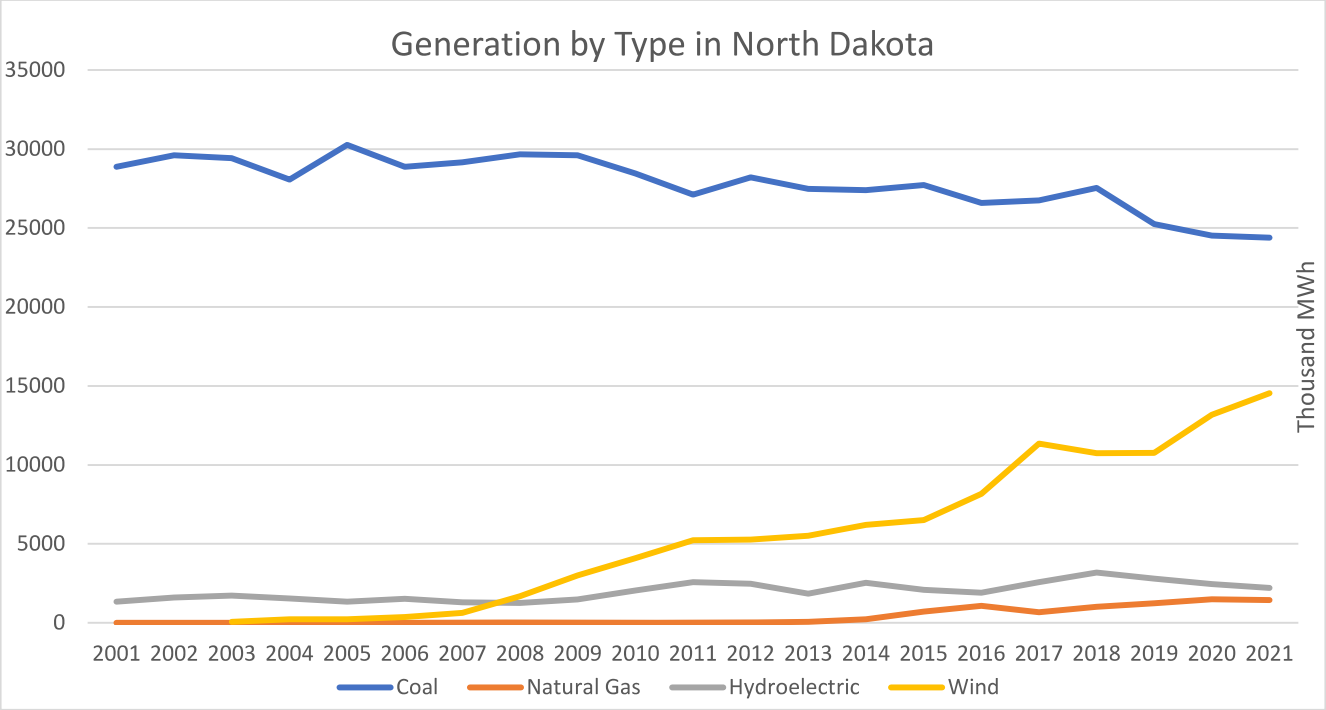
ELECTRIC GENERATION MARKET & UTILIZATION

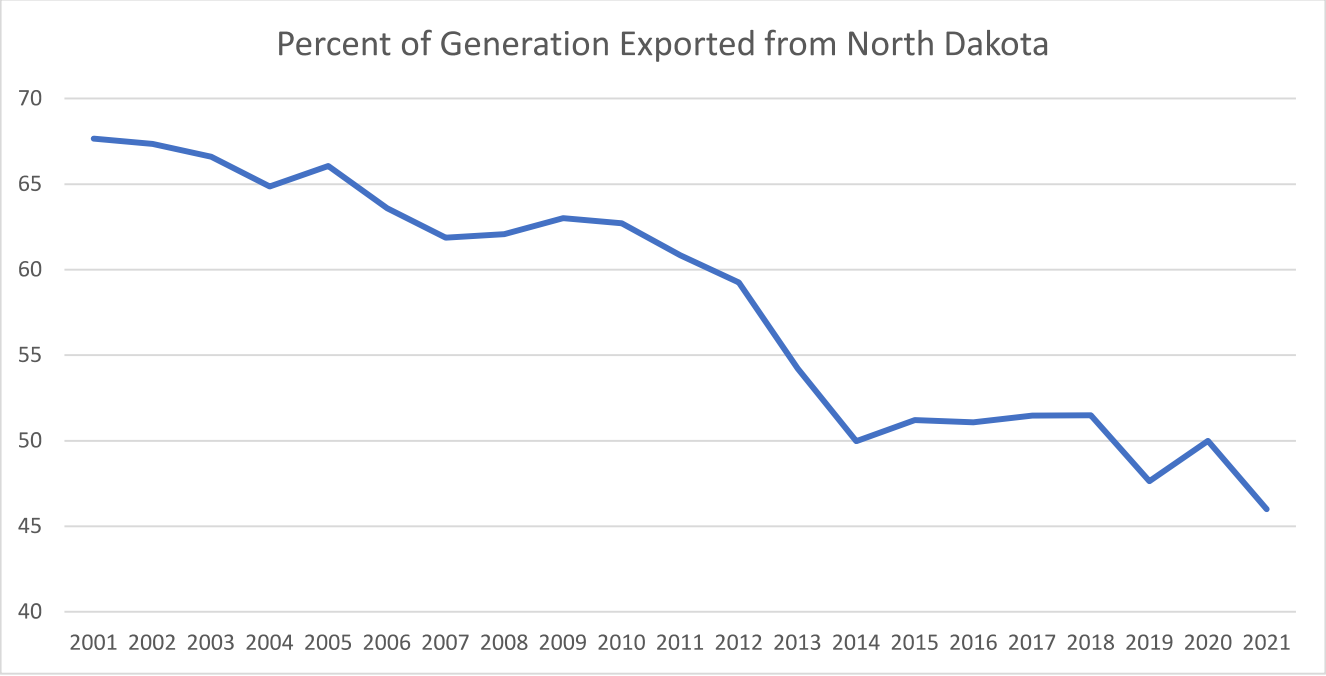
Electric energy utilization

North Dakota has been a major exporter of electricity since the development of thermal lignite generation in western North Dakota beginning in the 1960s. Transmission was developed along with the generation to export the electric generation primarily to markets to the east. In more recent years North Dakota has become noted as an excellent source of wind generation and additional transmission development has taken place to accommodate getting the additional generation to market.

The Energy Information Administration provides data on electric generation for the United States. The information below is derived from their data. In 2020 a total of 42,705 MWhr was generated from all

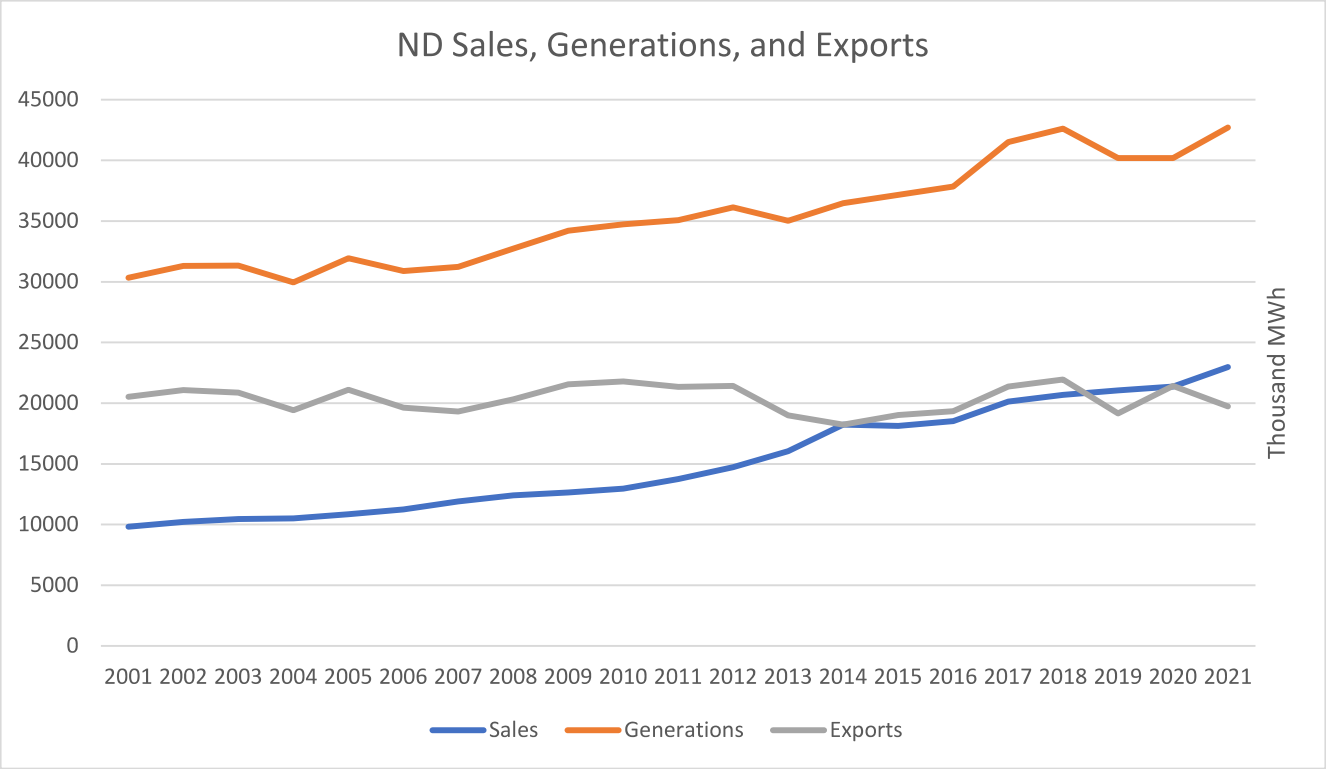
sources in North Dakota. Of that total 46% was exported outside of the state. Wind generation in 2020 was 31% of total generation for North Dakota. Industrial/Demand in North Dakota grew by nearly 11%.



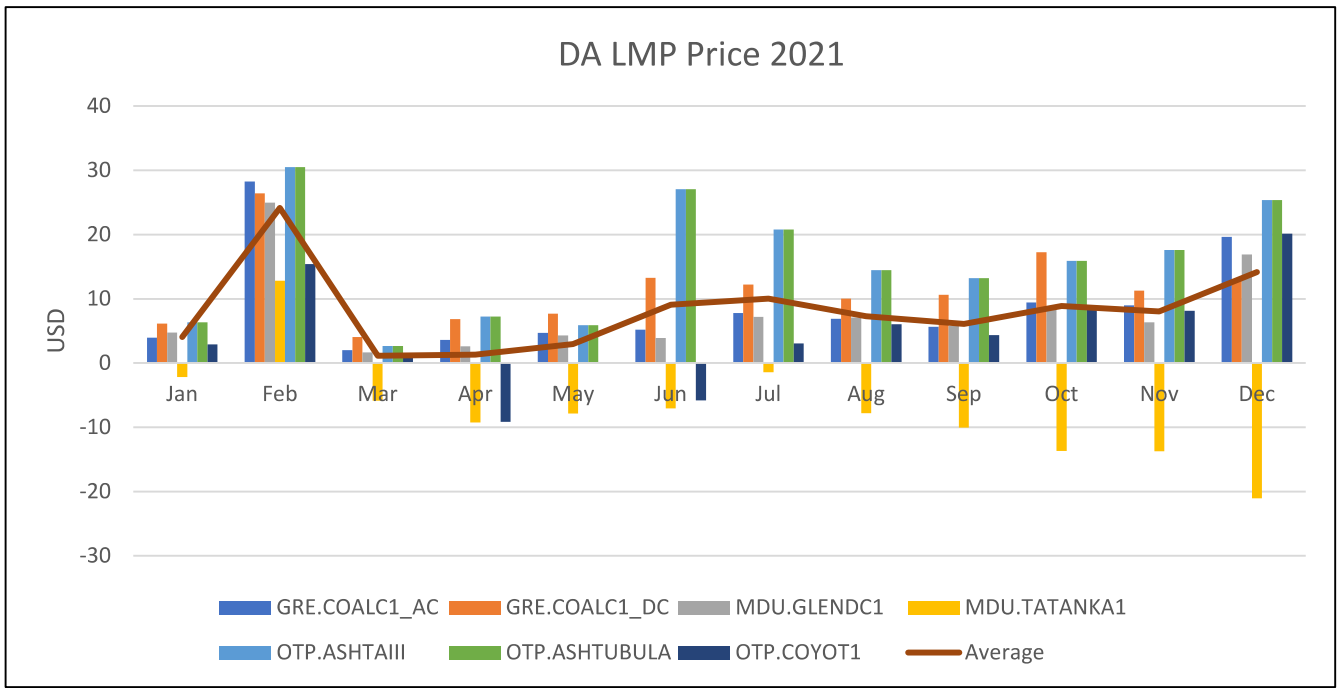


While demand in markets outside of North Dakota and in all but the western part of North Dakota has remained quite flat in recent years, the growth of demand in the Bakken region has been notable. Growth of total generation in the last 16 years has grown from 29,936 MWhr to 42,705 MWhr. Retail sales have grown from 10,516 MWhr to 22,975 MWhr due in large part to growth associated with

Bakken oil development. Industrial consumption in North Dakota grew over 11% over 2020 and the power forecast projects a steady increase.



Wholesale Electric Market - With North Dakota being a net exporter of electricity, the wholesale market price is important to the generators in the state. The graphs below reflect the market price for a variety of locations into which North Dakota electricity is marketed both in the MISO and in the SPP areas.

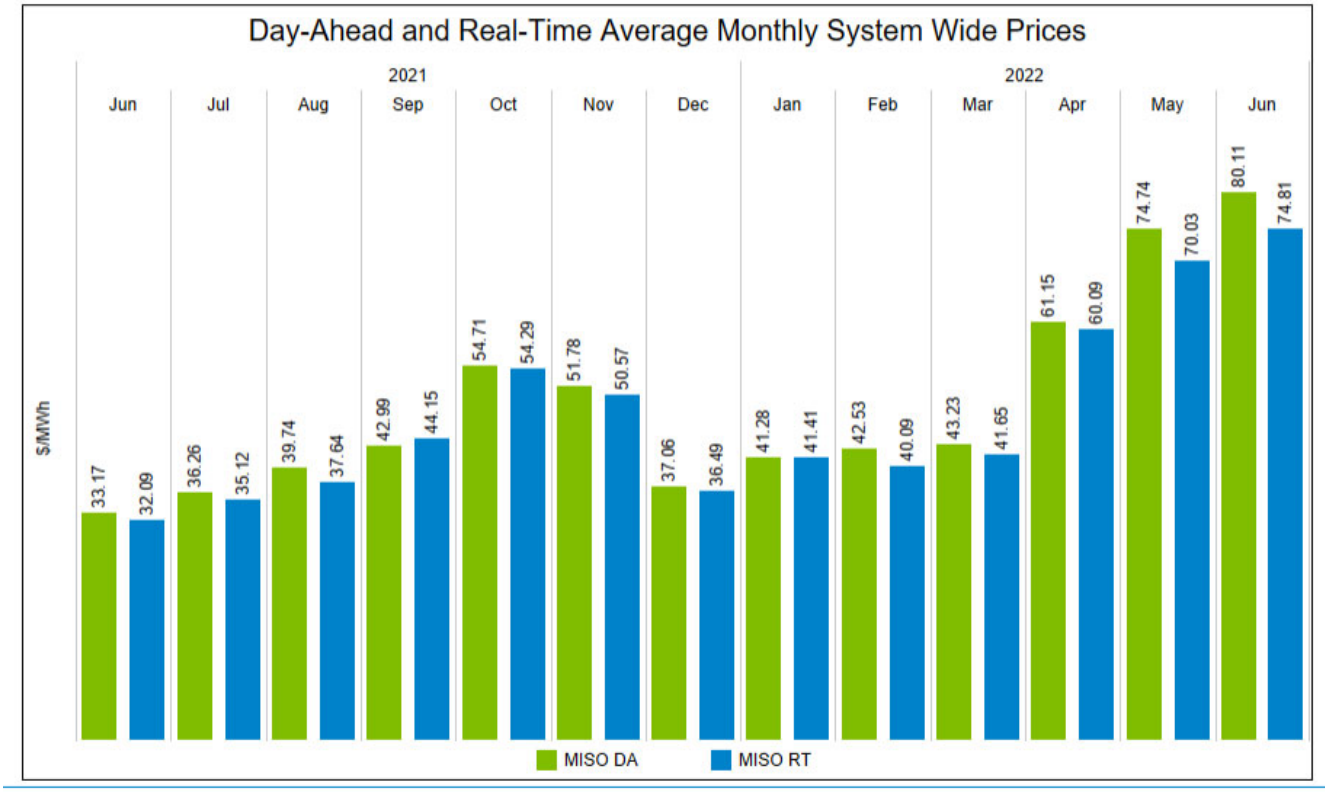


The graph below shows the impact of the February 2021 shortages and the effect of covid related impacts, transmission outages and low natural gas prices and wind generation being priced low in the market. The market strengthened at the end of 2021 and continued in 2022 as shown on the graph below. The negative pricing apparent at a couple of the nodes is troublesome to all types of generation.

Periodic review of real time Locational Marginal Prices (LMP) on the MISOenergy.org website show a spread in pricing between North Dakota and other states to the south and east especially during times of high demand. Adequate transmission capacity between locations would tend toward more equal pricing as generating resources can be moved through transmission to locations of demand.

The graphic below shows strengthening of the average MISO market.

MISO System-wide Day-Ahead and Real-Time Locational Marginal Pricing



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Note: MISO System-Wide price is based on the monthly hourly average of the active hubs
Source: MISO Market and Operations Analytics Department

GRID RESOURCE ADEQUACY

Both the MISO and SPP grid operators have issued warnings in 2022 about the adequacy of the generation resources on the grid to meet demand in peak situations. During 2022 it has become

increasingly apparent that the pace of change desired is not matching the pace of change achievable. Take for example that prior to 2016, MISO didn't have any grid events that required them to activate the use of its emergency procedures. Since 2016, MISO has had 41 MaxGen events requiring the use of emergency procedures. Many in the industry are projecting that realistic goals will still have us 50% dependent on fossil fueled energy in 2050. Fossil fuel resources can be decarbonized to a large extent by that time, but the ability to be 100% carbon free by that date is becoming more and more unlikely. It is especially unrealistic to project 100% renewable energy by that time as most renewable options are weather dependent and technology for storage is still projected to be very expensive and not available in the massive amount that would be required.

Governor Bergum issued a challenge goal for North Dakota to be carbon neutral in our combined energy and agriculture industries by 2030. His vision is to achieve that goal thru innovation and not mandates. This initiative attracted the attention of several interests that would like to bring industries and technolgies to North Dakota in support of that goal. The initiative would also encourage retaining conventional generation in North Dakota by leading through carbon capture and sequestration technologies. Agriculture practices, enhanced oil recovery, sequestration of CO2 from ethanol production and several other technologies are leading the way toward that goal.

Energy Information Administration (EIA) has conducted studies and issued reports on the energy future as follows.

https://www.eia.gov/outlooks/aeo/pdf/AEO2022_ReleasePresentation.pdf

https://www.eia.gov/outlooks/aeo/IIF_credit/pdf/Alt_Policies_Credits.pdf.

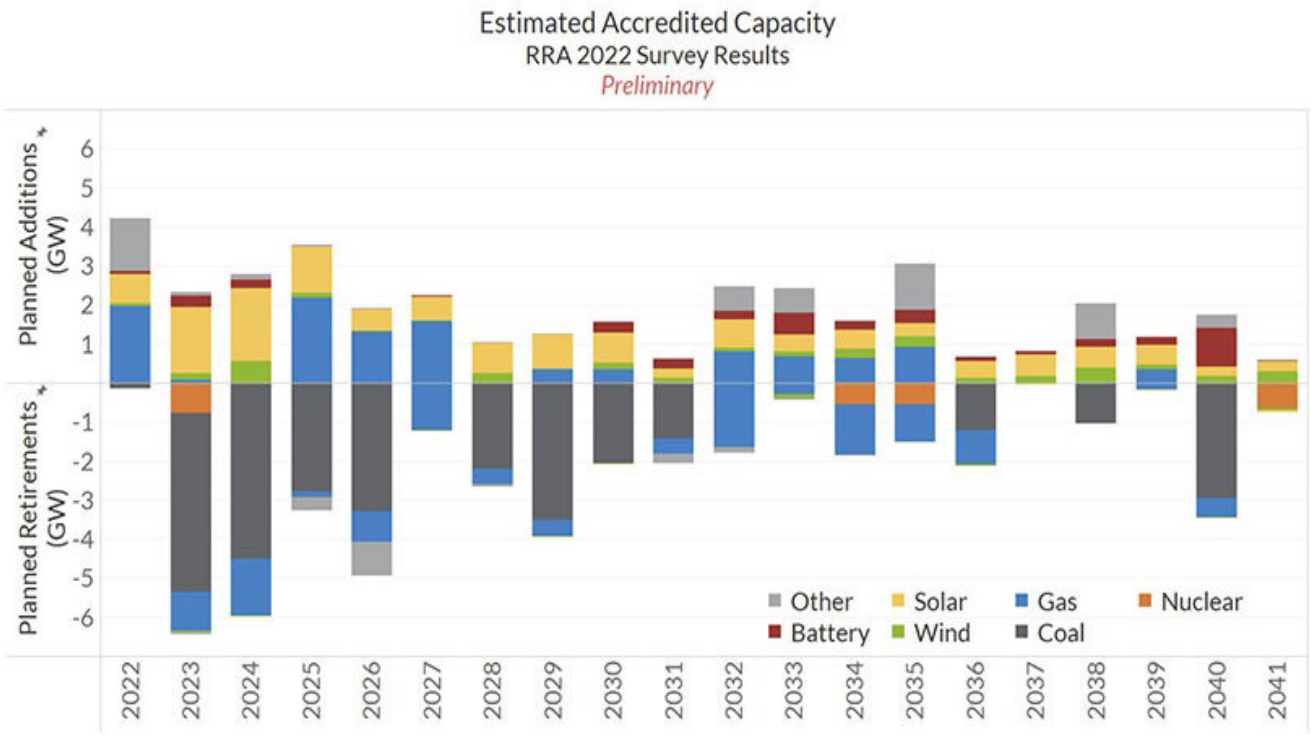
The ISOs will clearly state that they are not responsible for resource adequacy. Instead, they point to states being responsible for capacity thru their public utility commissions regulating load serving entities. In many states that is a fallacy because entities such as our member cooperatives are not regulated by the public utility commission so therefore resource decisions have no oversight either on the state level or the ISO level.

In MISO there is an annual capacity auction. The capacity auction in recent years has been very low, such as $5 per MW month. In April 2022 the auction results were $236.66 per MW month. Suddenly the base load capacity that members in MISO own has a much more realistic value to motivate continued operation. Some members such as Great River Energy and Hoosier were far enough along in the retirement process that their base load plants are being sold to independent power producers. That will keep the base load in the mix while freeing the members to pursue other forms of power supply. Along with the results of the capacity, MISO has submitted a revised capacity tariff to FERC for approval. They refer to the revised approach as a seasonal construct. It requires members to meet capacity obligations for all four seasons rather than just the summer peak. MISO also issued a warning that capacity for summer 2022 may be short if the summer peaks increase to higher-than-average levels.

MISO and other ISOs clearly state they are not responsible for resource adequacy but recently MISO and SPP have both become more engaged in looking at their processes to see how they can incent resources that are dispatchable and have attributes that contribute to stability of the grid. These modifications are directed at the construct of the resource adequacy of each of the RTOs. The approaches vary but the intent of both ISOs is to find ways in their tariffs and capacity accreditation requirements to reward the resources that bring those attributes to the grid that increase stability, reliability and resilience.

The following graphic from MISO that was included in an article by Amanda Durish Cook on 6/20/2022 shows a bleak picture of capacity additions and retirements that was presented at the MISO Q2 Board meeting.

MISO Capacity projections



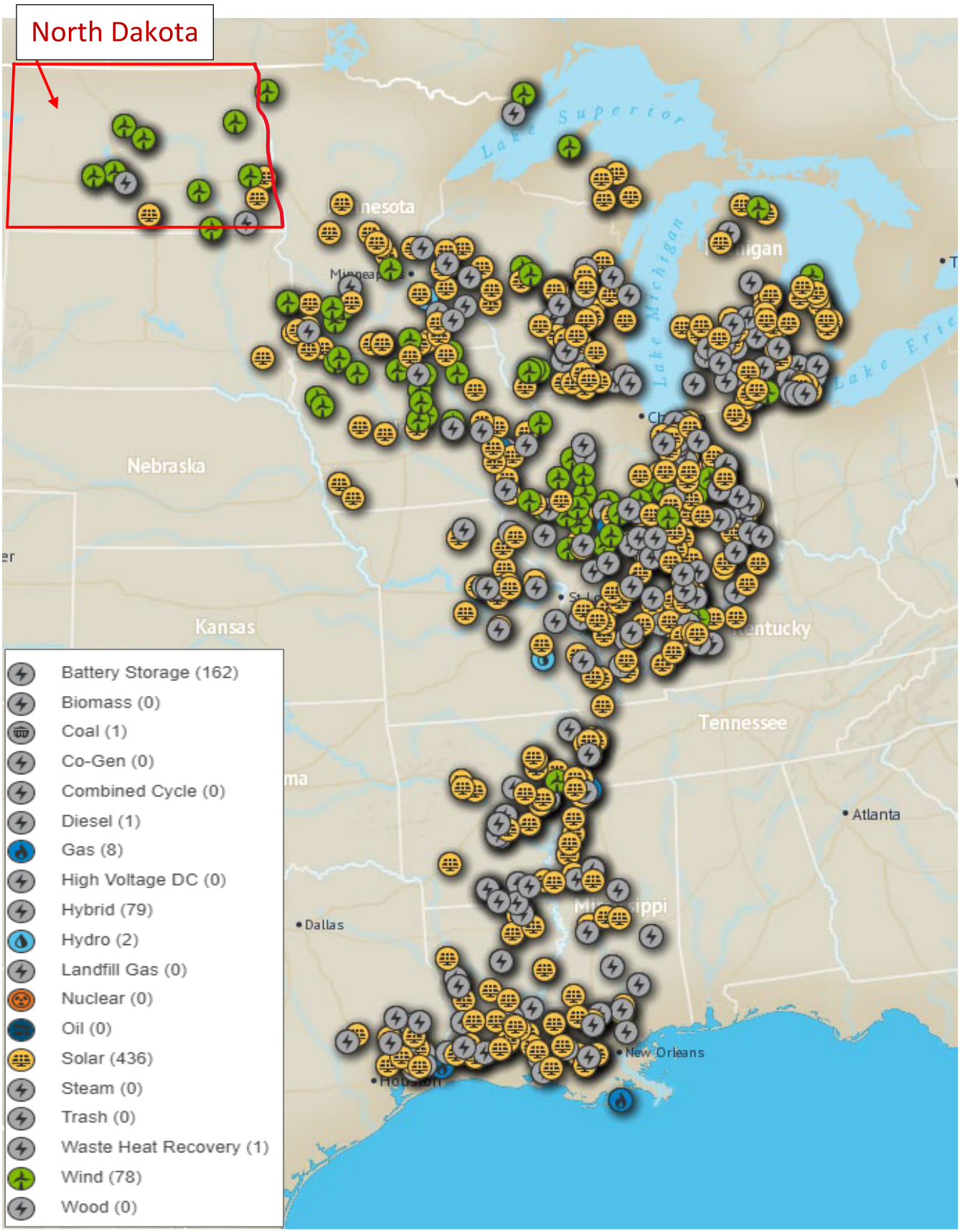
Estimated accredited capacity: 16.6% for wind; 35% for solar, 87.5% for battery, 90% for coal, 90% for gas, and 95% for nuclear

QUEUES FOR TRANSMISSION ACCESS

A good measure of potential for growth in the industry and future demand for transmission expansion is reviewing the projects in queue at MISO, Minnkota Power Cooperative and SPP. The projects in queue include both wind generation and utility scale solar generation.

The graphic below demonstrates the magnitude of generation interconnection projects in the MISO queue, systemwide.

North Dakota has 17 projects totaling 3225. The wind projects are 1940 MW and 1085 MW of solar projects and 200 MW of battery storage in the MISO queue. The wind interest is up slightly from 2020 while the solar interest is up the most and battery storage is in the queue for the first time.


North Dakota
Nebraska
Kansas
Tennessee
Atlanta
Dallas
New Orleans
Battery Storage (162)
Biomass (0)
Coal (1)
Co-Gen (0)
Combined Cycle (0)
Diesel (1)
Gas (8)
High Voltage DC (0)
Hybrid (79)
Hydro (2)
Landfill Gas (0)
Nuclear (0)
Oil (0)
Solar (436)
Steam (0)
Trash (0)
Waste Heat Recovery (1)
Wind (78)
Wood (0)

MISO QUEUE

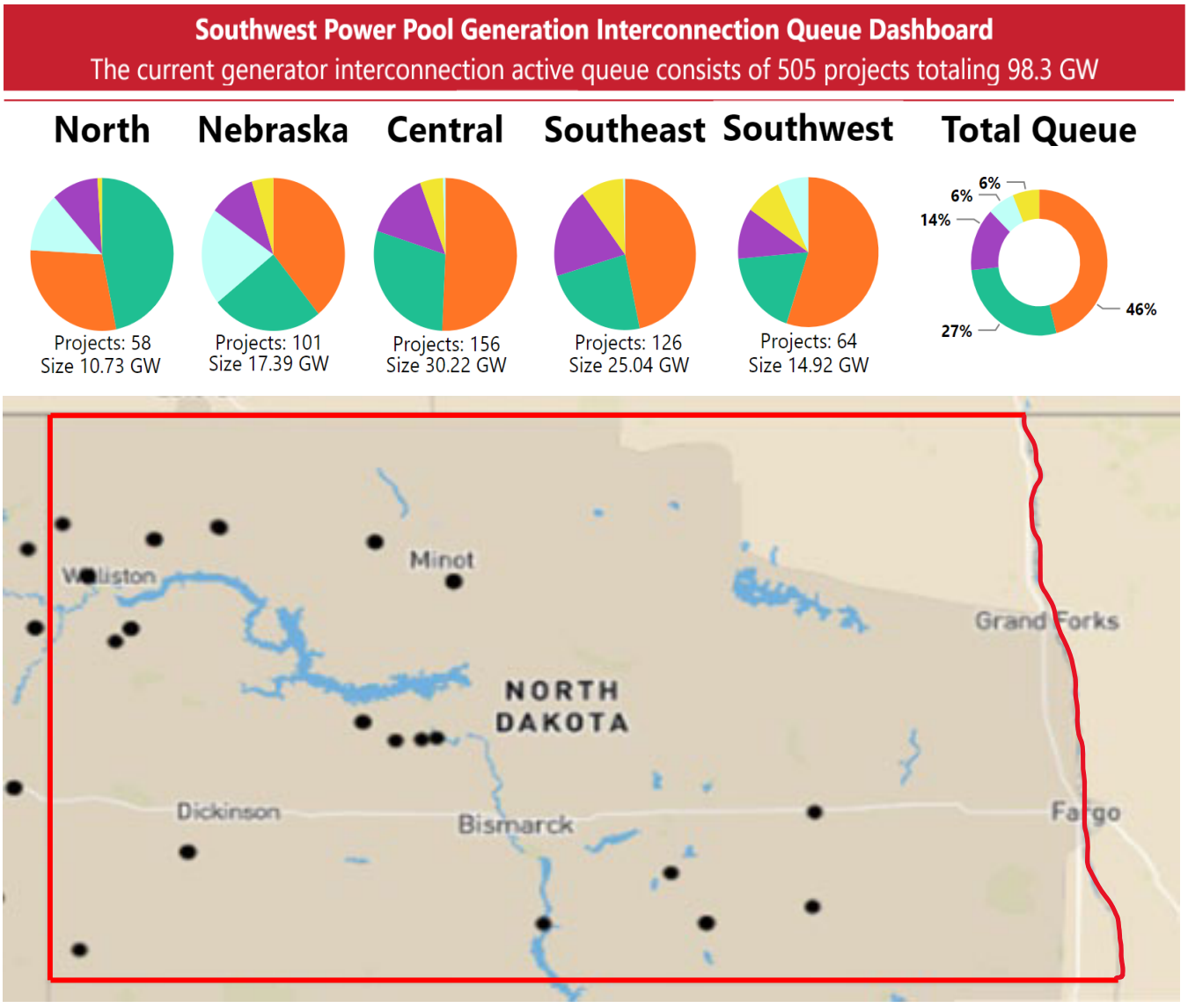
The MISO queue includes 3225 MW of new generation capacity. The Wind generation total is 1990 MW, the solar generation is 1085 MW and battery storage is 200 MW. The wind component is similar to recent years. There is an increase in solar generation and the battery storage is new.

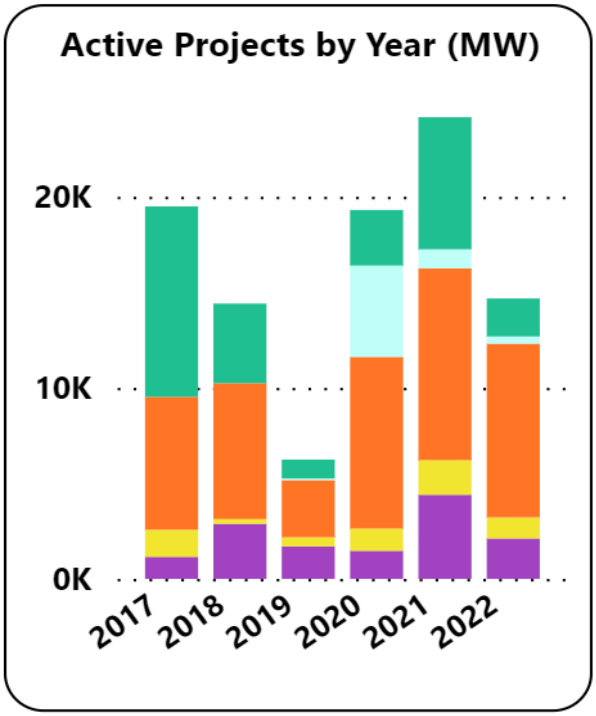
Project #	Application In-Service	Transmission Owner	County	POI Name	Summer MW	Fuel
J1456	09/01/23	Otter Tail Power Company	Sheridan	Harvey - Underwood 230 kV Line Tap	300	Wind
J1588	09/01/23	Northern States Power (Xcel Energy)	Cass	Bison 345kV	200	Solar
J1622	06/01/24	Otter Tail Power Company	Sheridan	Harvey-Underwood 230kV	100	Solar
J1754	04/01/23	Great River Energy	McHenry	McHenry ND	200	Wind
J1852	06/01/25	Northern States Power (Xcel Energy)	Cass	Bison-Alexandria 345kV	200	Solar
J1893	04/01/24	Montana-Dakota Utilities Company	Morton	Mandan 230 kV	500	Wind
J1961	10/01/26	Otter Tail Power Company	Cass	Buffalo 115kV	190	Wind
J1990	10/01/25	Otter Tail Power Company	Stutsman	Ellendale 345kV	250	Wind
J2080	05/01/24	Minnesota Power (Allete Inc.)	Oliver	Square Butte East 230 kV	200	Wind
J2084	11/01/24	Montana-Dakota Utilities Company	Emmons	Linton NW (not in power flow case yet)	45	Solar
J2085	11/01/24	Montana-Dakota Utilities Company	Emmons	Linton NW 115 kV (radial to Wishek 115 kV)	40	Solar
J2086	03/31/25	Otter Tail Power Company	Barnes	Buffalo 345 kV	500	Solar
J2094	11/30/22	Otter Tail Power Company	Sargent	Forman 230 kV Substation	100	Battery Storage
J2097	05/01/25	Minnesota Power (Allete Inc.)	Morton	Tri-County 230 kV Substation	100	Wind
J2101	10/30/24	Montana-Dakota Utilities Company	Morton	Mandan 230 kV	100	Battery Storage
J2157	05/01/25	Minnesota Power (Allete Inc.)	Morton	Tri-County 230 kV Substation	100	Wind
J2250	04/01/24	Otter Tail Power Company	Stutsman	Ellendale sub 345 kV (46.009357, -98.567742)	200	Wind

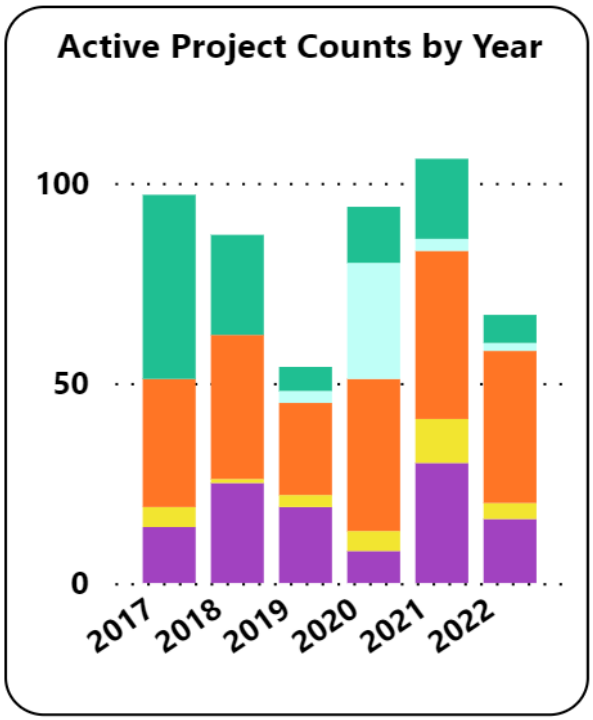
SPP QUEUE

SPP total queue is thirty-one projects for 6075.5 MW total. This queue is very large, but does show some diversity. A total of 1268 MW of thermal generation are in the queue. These are fully dispatchable. A total of 605 MW are storage which is dispatchable for at least short periods of time. A total of 1,866 MW are thermal which does have a generation profile that helps offset the lower wind generation in the daytime hours.

The Dashboard below demonstrates the Generation Queue over the whole SPP region. There are 13 wind projects (2,276 MW), 7 solar projects (1,866 MW), 6 storage battery projects (605 MW), and 5 thermal projects (1328.5 MW) in the SPP queue for North Dakota.







Cluster	MW	Projects
01 NORTH	**10,727.52**	**58**
Battery/Storage	1,131.90	9
Hybrid	110.00	1
Solar	3,121.00	15
Thermal	1,343.65	6
Wind	5,020.97	27
02 NEBRASKA	**17,390.00**	**101**
Battery/Storage	1,805.64	14
Hybrid	845.00	3
Solar	6,807.69	39
Thermal	3,571.32	24
Wind	4,360.35	21
03 CENTRAL	**30,223.38**	**156**
Battery/Storage	4,317.90	35
Hybrid	1,570.00	7
Solar	15,330.30	71
Thermal	166.56	4
Wind	8,838.62	39
04 SOUTHEAST	**25,035.65**	**126**
Battery/Storage	4,847.30	41
Hybrid	2,453.00	13
Solar	11,689.51	51
Thermal	109.00	1
Wind	5,936.84	20
05 SOUTHWEST	**14,921.57**	**64**
Battery/Storage	1,640.00	13
Hybrid	1,240.00	5
Solar	8,213.47	33
Thermal	1,059.00	2
Wind	2,769.10	11
Total	**98,298.12**	**505**

Disclaimer: The data provided is for information purposes only and is subject to change without notification. Questions? Email: gistudies@spp.org.

GEN Queue Position	Proposed In Service Date	MW	GEN Type	County	State	Point of Interconnection
GEN-2017-010	10/31/2022	200.1	Wind	Bowman	ND	Rhame 230 kV Substation
GEN-2017-048	8/30/2024	300	Wind	Williams	ND	Neset 230 kV Substation
GEN-2017-214	12/1/2020	100	Wind	Ward	ND	Logan 230kV Substation
GEN-2017-215	12/1/2020	100	Wind	Ward	ND	Logan 230kV Substation
GEN-2017-216	12/1/2020	100	Wind	Ward	ND	Logan 230kV Substation
GEN-2017-235	12/1/2020	50	Wind	Ward	ND	Logan 230kV Substation
GEN-2017-236	12/1/2020	50	Wind	Ward	ND	Logan 230kV Substation
GEN-2018-008	9/30/2021	252	Wind	McIntosh	ND	Groton-Leland Olds 345kV Line
GEN-2018-010	12/1/2021	74.1	Battery	Montrail	ND	Tande 345kV Substation
GEN-2018-039	12/31/2020	72	Solar	LaMoure	ND	Edgeley 115kV Substation
GEN-2018-067	10/30/2020	255	Wind	Williams	ND	New switching station on Judson-Tande 345kV line
GEN-2019-037	12/1/2023	150	Solar	Mercer	ND	BEPC 230kV Substation
GEN-2020-006	11/1/2023	250	Solar	Bowman	ND	Bowman 230kV Substation
GEN-2020-014	6/17/2021	60.5	Gas	Alexander	ND	Lonesome Creek 115kV
GEN-2020-021	11/30/2023	235	Wind	Sioux	ND	LeLand Olds-Fort Thompson 345kV
GEN-2020-091	11/2/2025	150	Solar	Alexander	ND	Patent Gate Substation 115 kV
GEN-2021-008	5/9/2026	270	Solar	McKenzie	ND	345kV Bus at BEPC Patent Gate Substation
GEN-2021-010	4/1/2027	231	Battery	Williams	ND	Wheelock 115 kV
GEN-2021-011	4/1/2027	74.9	Battery	Williams	ND	Wheelock 115 kV
GEN-2021-016	4/1/2025	250	Wind	McIntosh	ND	Tap Leland Olds – Groton 345 kV
GEN-2021-017	4/1/2025	74.9	Storage	McIntosh	ND	Tap Leland Olds – Groton 345 kV
GEN-2021-024	7/31/2023	203.04	Wind	LaMoure	ND	WAPA 230kV Jamestown Substation
GEN-2021-072	6/1/2024	600	Solar	Mercer	ND	345kV Transmission Line from Antelope Valley to Leland Olds Substation
GEN-2021-094	8/1/2024	446.5	Combustion Turbine	Mercer	ND	AVS 345kV Substation
GEN-2021-095	8/1/2025	446.5	Combustion Turbine	Mercer	ND	AVS 345kV Substation
GEN-2021-100	9/15/2026	50	Battery	Mercer	ND	Line side tap using single breaker on Beulah to Center 42kV Feeder
GEN-2022-009	7/1/2023	125	Thermal	Williams	ND	Judson Substation 345
GEN-2022-010	7/1/2023	250	Thermal	Williams	ND	Judson Substation 345
GEN-2022-011	6/1/2024	374	Solar	Stark	ND	230kV Daglum Substation
GEN-2022-012	6/1/2024	100	Battery	Stark	ND	230kV Daglum Substation
GEN-2022-037	4/1/2025	181	Wind	Burke	ND	Pioneer 115kV Substation

MINNKOTA QUEUE

The Minnkota Power Queue includes 7 projects. Two are solar for 342 MW and 5 are wind.

Minnkota Queue Position	Interconnect Request	Generation Type	POI Location County / State	Point of Interconnection
MPC03600	195.5	SOLAR	Richland, ND	Frontier-Wahpeton 230 kV
MPC03700	146.6	SOLAR	Richland, ND	Frontier-Wahpeton 230 kV
MPC03800	230.0	WIND	Eddy, ND Wells, ND	Center-Prairie 345 kV
MPC03900	140	WIND	Eddy, ND Wells, ND	Center-Prairie 345 kV
MPC04100	204	WIND	Grand Forks, ND	Prairie 230 kV
MPC04300	400	WIND	Steele, ND	Center-Prairie 345 kV
MPC04400	200	WIND	Grand Forks, ND	Center-Prairie 345 kV
	1516.1			

Capacity factors for Wind Generation in the region- North Dakota has the highest capacity factor in the region. The investment dollars for wind generation will get a better return on investment if the transmission capacity is available to get the generation to market. Since the market demand is primarily to the east that is where the transmission capacity need is the greatest. Wisconsin, Michigan, Illinois, and Indiana are states where renewable energy is in demand and where planners would like to be able to transfer generation from North Dakota. Developers weigh the higher return available and the higher prices at the eastern market nodes against the cost of transmission to reach those markets. Currently, however, the high transmission costs are preventing development in North Dakota with market focus on that region. Resolving that transmission barrier is a focus of the NDTA.

In the SPP area the path to market is not as clear, but the size of the queue shows a strong interest by developers. So far high interconnection costs have not resulted in projects being cancelled in large numbers.

RENEWABLE ENERGY CERTIFICATES

Each unit of electricity generated from a renewable source such as wind or solar carries with it a Renewable Energy Certificate (REC). The REC program is authorized by the United States Environmental Protection Agency (USEPA)to encourage renewable generation. The REC is a separate commodity from the electron delivery. The RECs can be utilized as evidence that the party that "retires" the REC as they utilize electricity supports renewable generation. The REC does not carry a time of

day, season, or transmission obligation. As such, RECs are used to meet pledges to utilize renewable energy beyond the ability of the grid to deliver on a real time basis.

Many companies are using the RECs as evidence of their commitment to renewable energy. The challenges of grid attributes needed as we move toward a higher level of renewable energy on the grid is not addressed by the use of RECs so it is important to recognize that a commitment beyond the use of RECs will be required in the near future.

GOVERMENT ACTION

Another function of the Authority staff is to act as a resource for elected officials and policymakers and provide the necessary information to help make informed decisions. Whether the issue involves working on state energy policy regarding transmission development, or commenting on federal transmission legislation and regulations, the Authority serves as a resource for decision-makers. In the last year the Authority was involved on several fronts working with the following entities: The EmPower ND Commission, Governor's Office, the North Dakota Legislature, Attorney General's Office, Department of Commerce, the ND Public Service Commission, the Bank of North Dakota, and the ND Congressional Delegation.

- **EmPower ND Commission** - The Authority was an active participant in the EmPower ND Commission work. Authority activities included briefing the Commission on transmission issues in North Dakota and participating in development of Commission goals.

- **North Dakota Legislature** - the 2021 legislative session was deeply involved in energy issues for which they sought NDTA input. Added an annual resilience report to the responsibilities of the NDTA.

- **Interagency Coordination** - As important as everything else discussed in this report, is the coordination of efforts among the various government entities with oversight, or interest in transmission development. Regular meetings are held with the representatives from the Public Service Commission to discuss transmission issues and receive updates from RTOs.

- **ND Pipeline Authority –** Coordinate on energy forecasts, oil field demand, new technologies and other developments that will impact the grid from a demand or supply standpoint.

- **Clean Sustainable Energy Authority (CSEA) –** Participate in the technical review committee and provide input to the CSEA members on the potential benefit of projects to North Dakota and their relationship to the electric grid.

- **WIND** - NDTA works with the group of developers through their trade association to collect information about renewable projects and to share activities of the NDTA.

- **Midwest Governors Association (MGA)** - NDTA has worked closely with the Governor's office to monitor and participate in activities of MGA. Even though North Dakota is not officially as member of MGA the interaction has been helpful in bringing the North Dakota message to the region.

  The Public Service Commission, the Governor's staff and the NDTA participated in the Midwest Governors association work on setting goals for grid modernization. The goal of a carbon neutral North Dakota has an impact on the conversation. The MGA states are expressing interest in learning more about how the goal can be achieved. A seminar was held in August 2021 to present the vision.

CONCLUSION

The electric transmission system in North Dakota is operating well and serving the load reliably with the current generation under average conditions but peak demand times are becoming uncertain. Prior to 2016, MISO didn't have any grid events that required them to activate the use of its emergency procedures. Since 2016, MISO has had 41 MaxGen events requiring the use of emergency procedures. SPP similarly has issued and increasing number of alerts in times of high demand. Already in 2022 over 194 alerts have been issued. Transmission congestion is increasing and in parallel with that the wholesale prices are more volatile. The increased retail demand in North Dakota has contributed to the current good operation of the grid. With forecast demand in North Dakota increasing due to new industries the state must make every effort to keep grid stability at the expected high levels for consistent operation with high load factors.

The combined Queues of the three entities is 10,816.6 MW. This is a massive increase if it all came to pass and is in the queue in spite of the indications spelled out in this report that point to a limited amount of transmission available to reach markets with this generation. As with most commodities, congestion in the system that delivers product to market results in low commodity prices at the point of production. The ISOs at a meeting with the North Dakota Public Service commission made it clear that their interconnection process does not evaluate the impact of a project on congestion of delivering the electricity to market.

In the Long-Range Transmission projects approved by MISO in July 2022, the cost will be spread across the consumers load in the appropriate portion of the MISO footprint. Thus a portion of those costs will be paid by North Dakota Consumers. The projects that have been proposed by the Joint MISO/SPP study process are proposed to be paid 90% by generation and 10% by the load.

The pace of change to the grid is a cause of concern to many in the industry. North Dakota has made a clear declaration the "all of the above" energy resources are embraced and supported. The present situation encourages us to continue that path in the electric industry as well. There is a lot of opportunity in North Dakota for increased generation if it is done in a manner that complements the resources that have been a dependable supply in the past.

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Thanks for the Energy Information Administration (EIA), Southwest Power Pool (SPP), Midcontinent Independent System Operator (MISO), area utilities and WIND and their members especially.

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