APPENDIX D

RESILIENCE OF THE ELECTRIC GRID IN NORTH DAKOTA

JULY 2024

ANNUAL REPORT

NORTH DAKOTA TRANSMISSION AUTHORITY

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.

STATUTORY AUTHORITY

By statute, the Authority membership is comprised of the members of the North Dakota Industrial Commission. Claire Vigesaa was appointed Executive Director of the Authority on July 28, 2023. The Executive Director works closely with the Industrial Commission Administrative Office staff.

The third Annual Report on the status of the Resilience of the Electric Grid in North Dakota has been prepared as directed by the 67th legislative Assembly in Senate Bill No. 2313 and is being provided to the Legislative Council and North Dakota Industrial Commission with copies being sent to the Midcontinent Independent System Operator (MISO) and the Southwest Power Pool (SPP) and Minnkota Power Cooperative (MPC).

The resilience of the Electric Grid is dependent on the generation and transmission portion of the electric grid working together seamlessly. This report explores the adequacy of generation and the ability of the transmission system to deliver the generation to location where it is in demand. The system must also be able to withstand adverse conditions from weather events and from equipment failures.

NORTH DAKOTA INDUSTRIAL COMMISSION

DOUG BURGUM
Governor

DREW H. WRIGLEY
Attorney General

DOUG GOEHRING
Agriculture Commissioner

NORTH DAKOTA TRANSMISSION AUTHORITY

CLAIRE VIGESAA
Executive Director
ND Transmission Authority

ELECTRIC RESILIENCE DEFINED:

They define electric resilience as the ability of the system and its components (both equipment and human) to (1) prepare for, (2) anticipate, (3) absorb, (4) adapt to and (5) recover from non-routine disruptions, including high impact-low frequency (HILF) events in a reasonable amount of time.

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EXECUTIVE SUMMARY

Electric supply and demand must always be balanced to maintain relatively constant frequency and voltage. During normal operations, small changes in demand occurring in each moment must be matched by corresponding changes in resource output to maintain balance. If the supply-demand gap becomes too large, this imbalance could lead to emergency operations of the grid. In extreme cases, outages and damage to equipment or appliances could occur.

Every machine, technology and software supplying electricity makes different contributions to grid reliability. Not every resource must provide all types of reliability services, but the entire portfolio must be able to respond appropriately to keep the grid in balance.

To maintain stability, each service available in the portfolio acts in a particular time frame. Fast frequency response occurs in the seconds immediately following a disturbance to slow decline and is followed by primary frequency response which stabilizes frequency. Economic dispatch operates at a five-minute time steps while longer time steps are typically managed by automatic or manual dispatch through market mechanisms.

When major disturbances occur, sufficient disturbance ride-through capabilities to maintain frequency and voltage are needed to keep resources running through instability.

Traditionally, grid operators obtained services from large thermal units and rotating machines such as coal-fired, nuclear, or hydro-electric power plants for stability. The physical attributes of these generation sources provided valuable grid enhancing service. Their large spinning mass provides inertia, contributing to stability. The proposed retirement of dozens of coal plants is raising concerns about the ability to operate the grid without the significant grid enhancing attributes of the large spinning generator mass.

North Dakota investor-owned utilities and cooperatives have a strong history of building and maintaining a dependable grid. The utilities and our communities face challenges to keep the grid reliable in the face of pressures from EPA on fossil fuel generation coupled with the growth in electrical demand for data centers, electrification, increased domestic manufacturing and general economic growth.

RISKS TO GRID RELIABILITY

The North American Electric Reliability Corporation (NERC) has identified five significant evolving and interdependent risks to grid reliability. Those five include:

Energy Policy: With increase legislative focus on decarbonization, decentralization and electrification, energy policy is expected to drive rapid change. NERC emphasizes that there is great need to increase coordination and collaboration among all policy makers, regulators as well as the operators and owners of the bulk electric system. With the higher proportion of variable and renewable fueled resources, resource adequacy and capacity accreditation must be critically assessed.

Grid Transformation: NERC recommends that operators ensure sufficient operating flexibility; ensuring that flexible ramping/balancing capacity is available to meet the changing patterns of variability and new characteristics of system performance.

Extreme Weather Events: As for extreme weather events, NERC recommends that grid operators conduct special assessments of extreme event impacts and creating simulation models to establish protocols/procedures for system recovery and resiliency. Further, planning and construction of transmission infrastructure should be accelerated.

Security: To combat both physical and cyber security threats, recommendations include the facilitation/development of planning approaches, models, and simulation to reduce the number of critical facilities. Ultimately mitigating impacts relative to the exposure to attacks.

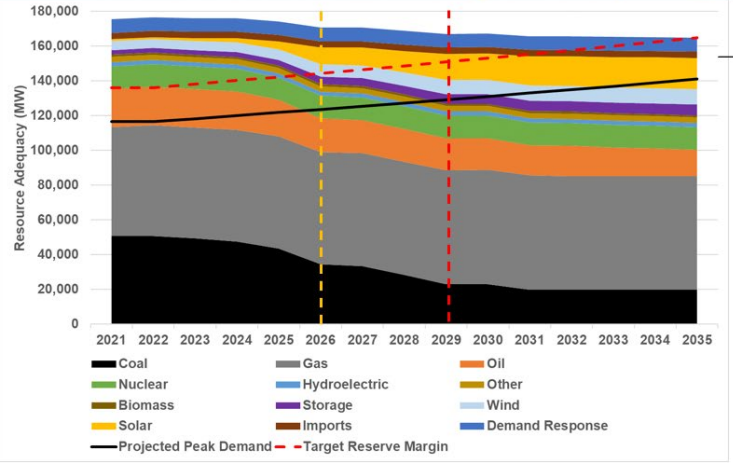
Critical Infrastructure Interdependencies: Recent storm events have exposed weaknesses in the coordination of natural gas supplies as well as water resources and digital communications.

GRID RELIABILITY – GENERATION RESOURCE ADEQUACY STUDIES

The NDTA commissioned three studies this past year. Two of the studies were focused on grid reliability and generation resource adequacy, a response to EPA's proposed MATS and Final Carbon Rule. Both studies indicated dire consequences to grid reliability due to the forced closure of dispatchable coal generation units. The following graph demonstrates the impact in the MISO footprint from the proposed MATS rule, click link here. The graph shows that MISO becomes reliant upon wind, solar, imports or demand response to meet its target reserve margin in 2026, but MISO would still have enough dispatchable capacity to meet its projected peak demand. The percentage of MISO's projected peak demand that will be met by dispatchable resources in 2028 falls to 104 percent in the Full scenario, reflecting the loss of 2,264 MW of lignite power plants in North Dakota.

In this scenario, the MISO region will no longer have enough dispatchable capacity to meet its projected peak demand in 2029, and it will rely on non-dispatchable resources, imports or storage to meet its target reserve margin.

Full Scenario RA is Maintained by Replacing Retiring Capacity with New Resources Using EPA Capacity Values, But…



Year	% Intermittent	% Storage	% Dispatchable
2023	6%	2%	131%
2024	7%	2%	128%
2025	9%	3%	122%
2026	13%	4%	112%
2027	14%	4%	109%
2028	16%	4%	104%
2029	18%	4%	98%
2030	18%	4%	97%
2031	19%	5%	92%
2032	19%	4%	91%
2033	19%	4%	89%
2034	19%	4%	87%
2035	19%	4%	85%

Estimated firm capacity using EPA's accreditation values for wind, solar, storage (100%), and thermal resources (100%). EPA assumes a 16.8 percent reserve margin. Different than MISO cleared UCAP (unforced [accredited] capacity). Red indicates intermittent generation is necessary to meet Target Reserve Margins. The rest of the reserve margin not covered in the table consists of load modifying resources.

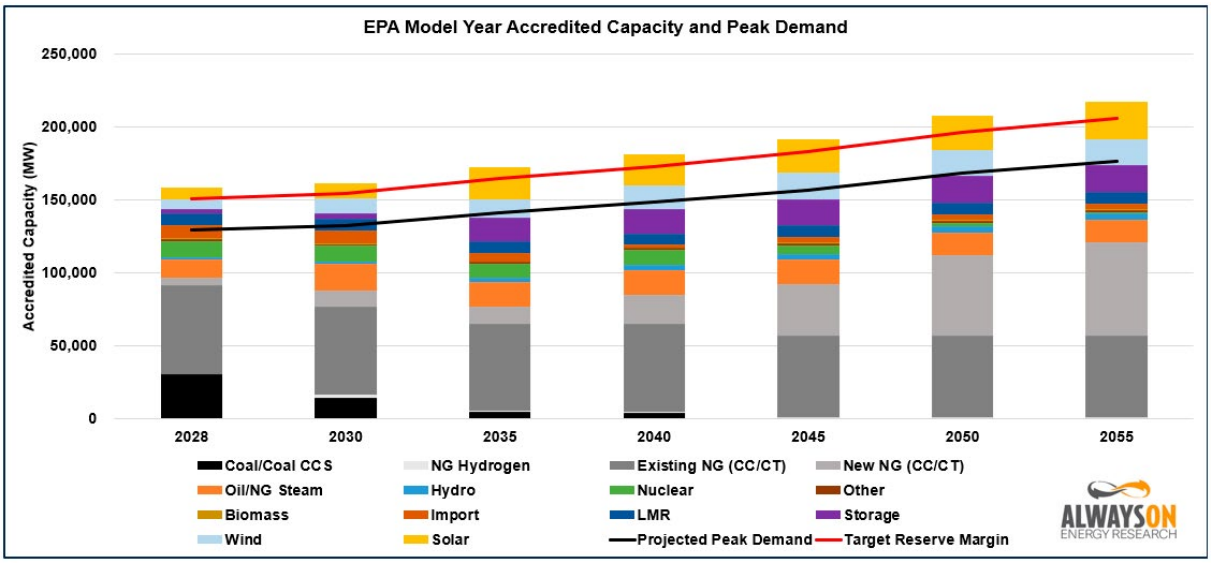
- *2023 – 2025: Adequate dispatchable capacity*
- *2026 – 2028: Reserve margin depends on W/S/B*
- *2029 – 2035: Peak Demand depends on W/S/B*

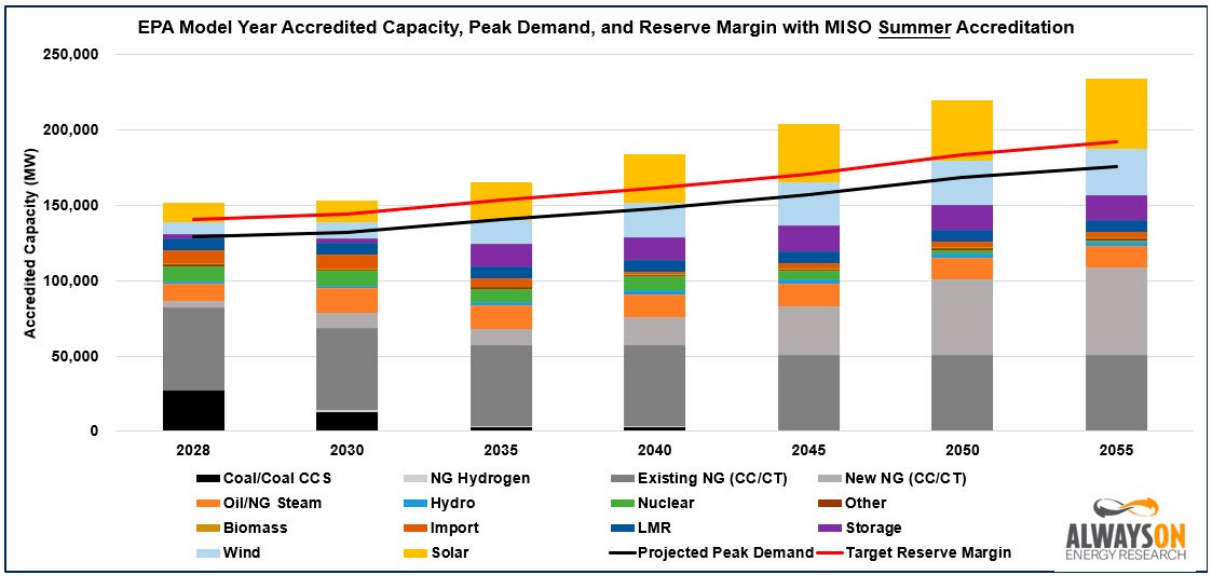
The amount of dispatchable capacity available to meet projected peak demand in 2028 falls to 104 percent in the Full scenario, reflecting the closure of all the lignite capacity in MISO that year.

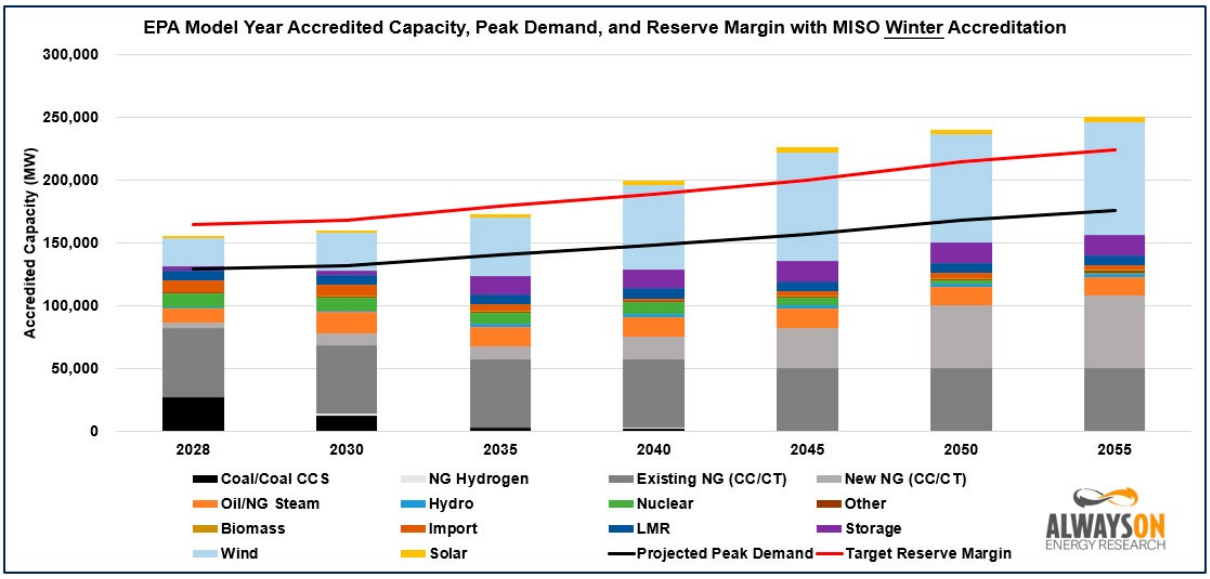
The NDTA also commissioned a grid impact study upon both MISO and SPP, click link here, with respect to the EPA's proposed Final Carbon Rule. The primary finding, which is drawn substantially from the Rule's administrative record, finalized rule and regulatory impact analysis, is not technologically feasible for lignite-based power generation facilities, will foreseeably result in the retirement of lignite power generation units, and will negatively impact consumers of electricity in the Midcontinent Independent Systems Operator (MISO) and Southwest Power Pool (SPP) systems by reducing the reliability of the electric grid and increasing costs for ratepayers. The analysis builds upon grid reliability data and forecasts from the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC), and it assesses what is likely to happen to grid reliability if the Greenhouse Gas Rule forces some or all of North Dakota's lignite power generation units to retire. We determined that the closure of lignite-fired powered power plants in the MISO & SPP footprints would increase the severity of projected future capacity shortfalls, i.e. rolling blackouts, in the MISO & SPP systems even if these resources are replaced with wind, solar, battery storage, and natural gas plants. In reaching that determination, we have accepted EPA's estimates for capacity values of intermittent and thermal resources.

Moreover, building such replacement resources would come at a great cost to MISO and SPP ratepayers. Replacing the retired coal, natural gas, and nuclear units in EPA's modeled MISO grid with the new wind, solar, battery storage, and natural gas facilities would cost an additional $381.9 billion through 2055 compared to the current operating costs of the existing fleet.

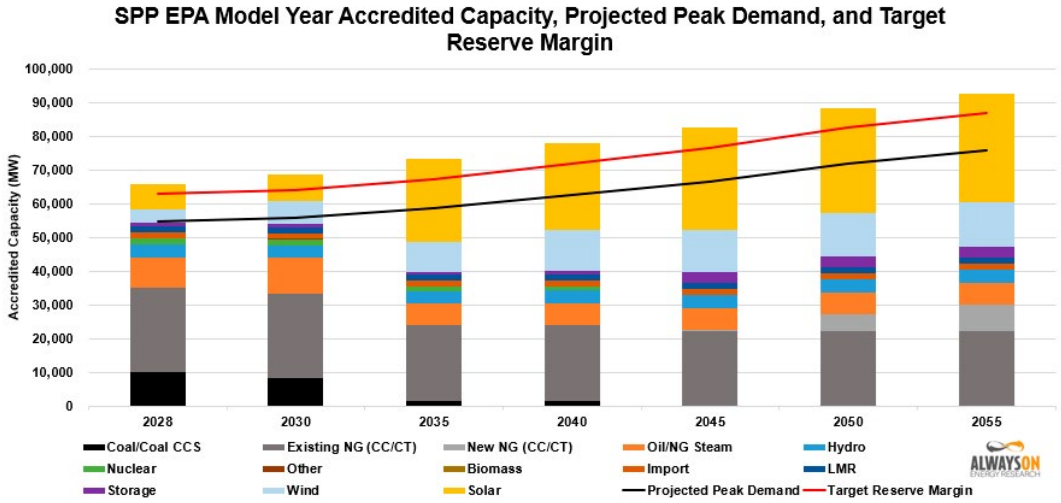
In SPP, replacing the retired coal, natural gas, and nuclear units in EPA's modeled grid with the new wind, solar, battery storage, and natural gas facilities would cost an additional $65.6 billion compared to the costs of operating the existing generation fleet.


EPA Model Year Accredited Capacity and Peak Demand
Accredited Capacity (MW)
250,000
200,000
150,000
100,000
50,000
0
2028
2030
2035
2040
2045
2050
2055
Coal/Coal CCS
NG Hydrogen
Existing NG (CC/CT)
New NG (CC/CT)
Oil/NG Steam
Hydro
Nuclear
Other
Biomass
Import
LMR
Storage
Wind
Solar
Projected Peak Demand
Target Reserve Margin
ALWAYSON
ENERGY RESEARCH

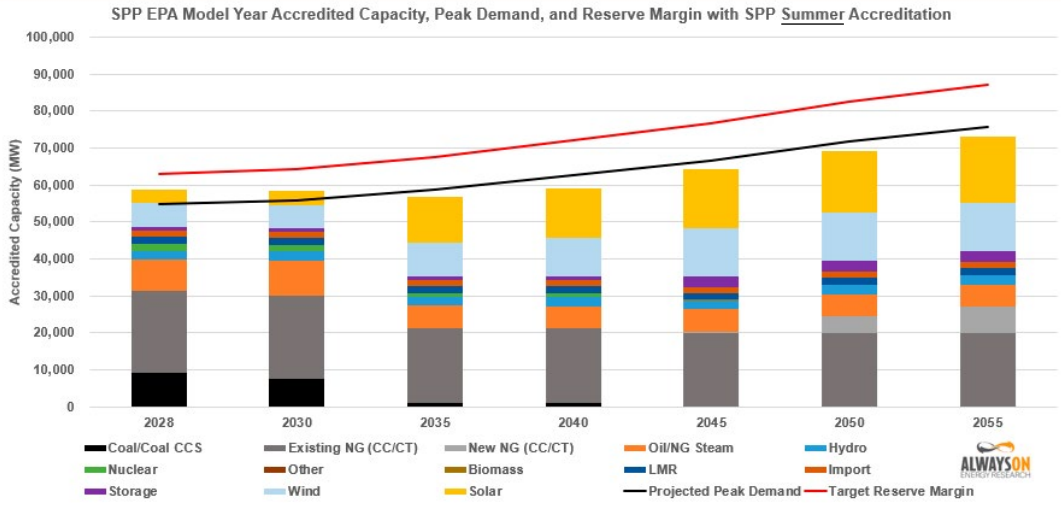

EPA Model Year Accredited Capacity, Peak Demand, and Reserve Margin with MISO Summer Accreditation
Accredited Capacity (MW)
250,000
200,000
150,000
100,000
50,000
0
2028
2030
2035
2040
2045
2050
2055
Coal/Coal CCS
NG Hydrogen
Existing NG (CC/CT)
New NG (CC/CT)
Oil/NG Steam
Hydro
Nuclear
Other
Biomass
Import
LMR
Storage
Wind
Solar
Projected Peak Demand
Target Reserve Margin
ALWAYSON
ENERGY RESEARCH


EPA Model Year Accredited Capacity, Peak Demand, and Reserve Margin with MISO Winter Accreditation
Accredited Capacity (MW)
300,000
250,000
200,000
150,000
100,000
50,000
0
2028
2030
2035
2040
2045
2050
2055
Coal/Coal CCS
NG Hydrogen
Existing NG (CC/CT)
New NG (CC/CT)
Oil/NG Steam
Hydro
Nuclear
Other
Biomass
Import
LMR
Storage
Wind
Solar
Projected Peak Demand
Target Reserve Margin
ALWAYSON
ENERGY RESEARCH

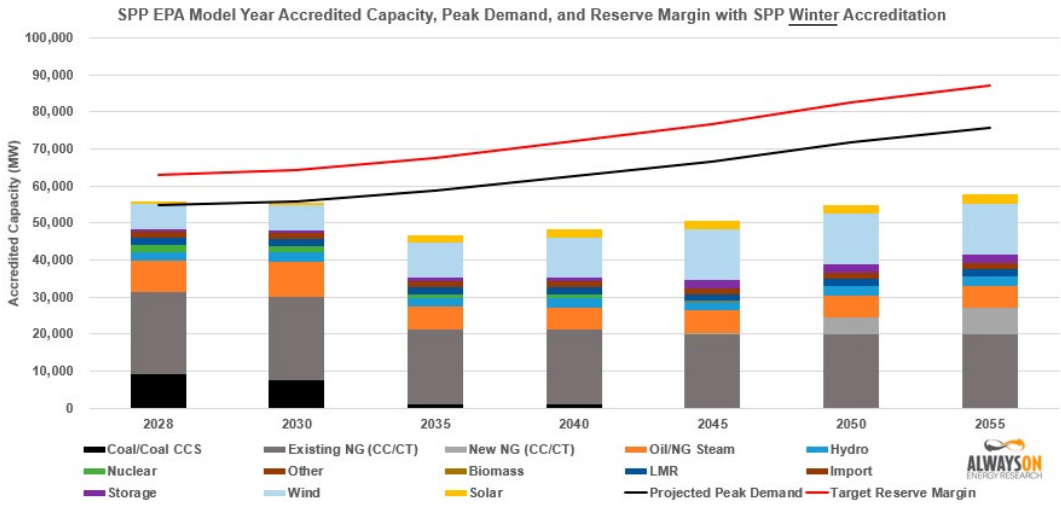
"Firm" Capacity Using EPA's Accreditation



EPA "Firm" Capacity Using SPP Accreditation in Summer



EPA Accredited Capacity Using SPP Accreditation in Winter



TRANSMISSION CAPACITY STUDY

Power Systems Engineering (PSE) was commissioned to complete a North Dakota Transmission Capacity Study. The first phase of the study included research into available recent transmission studies covering North Dakota. PSE reviewed those studies, identified projects, and formulated conclusions based on the results. Included in this phase was a summary of the currently proposed generation and transmission projects in the state and their reported impact on ND transmission capacity.

The second phase of the study focuses on key analyses of ND transmission capacity: steady-state powerflow analysis and optional dynamic stability analyses. PSE will develop near-term, and long-term transmission models to perform steady-state assessments of ND transmission capacity. The study is to be completed in the 3rd quarter of 2024.

REGIONAL TRANSMISSION ORGANIZATION (RTO) WORK ON GENERATION RESOURCE ADEQUACY & GRID RELIABILITY

SOUTHWEST POWER POOL (SPP)

Over the last year, SPP set its sights on advancing the Aspire 2026 strategic plan and achieving key corporate goals, including improving grid resilience, reforming its generator interconnection study processes, and mitigating resource adequacy risks.

Historically, SPP's approach to ensuring resource adequacy has required load-responsible entities to demonstrate that sufficient accredited capacity will be available to meet peak demand and an incremental planning reserve margin. Acknowledging that SPP and its stakeholders must adapt with a changing energy landscape, the organization took major strides in 2023 to assess and modernize its resource adequacy approach.

In a joint effort with the Regional State Committee of state regulators, Board of Directors, and stakeholders, SPP created the Resource and Energy Adequacy Leadership Team (REAL Team) to expeditiously address strategic resource adequacy policies. The team developed a multi-year work plan and has already implemented several resource adequacy improvements:

- Established a framework to create a separate winter season resource adequacy requirement.
- Approved a policy that clarifies expectations for generator availability.
- Created a method to ensure entities can comply with the increased planning reserve margin without overly punitive penalties.
- Completed the 2023 probabilistic study to determine the next summer and winter planning reserve margin requirements.
- Created new policies to change how SPP accredits conventional and renewable generators to ensure energy is available when the system needs it. Conventional generators will be accredited based on past performance, while renewables will be accredited based on how much demand they can effectively serve.
- Improved generation outage policies to allow additional days when SPP can reliably take outages.
- Enhanced transmission planning models to account for new demand and unlock additional capacity during extreme conditions.
- Developed an estimate for the "value of lost load" within the region and evaluating use cases within Resource Adequacy and Transmission Planning for the metric. A "value of lost load" metric represents how much customers would be willing to pay to avoid an outage.

The REAL team's work continues with an ambitious workplan for the next few years to implement further policy improvements.

MIDCONTINENT INDEPENDENT SYSTEM OPERATOR (MISO)

MISO has been working on several fronts to address generation resource adequacy and grid reliability. MISO established a Seasonal Capacity Auction in April 2023. This auction is held once a year for each season. MISO has also proposed a Reliability Based Demand Curve that is pending at FERC. MISO changed the market rules/construct to ensure that there is a 'slope' to the demand curve (so, capacity prices increase as we get tighter in the capacity market) instead of what MISO had previously – which was a 'vertical' demand curve. Prices were either 1) extremely low ($2MW/Day) in a surplus market, or 2) the highest price allowed – Cost of New Entry ($236.66 MW/Day) when MISO was short. If FERC provides a favorable outcome, MISO would implement the capacity market changes in the 2025/2026 planning year.

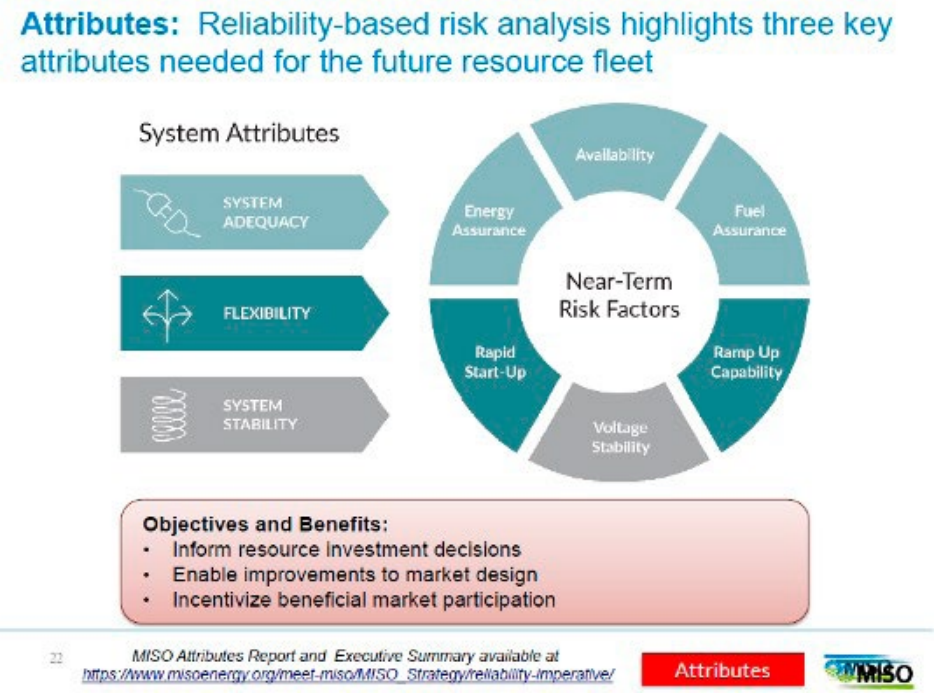
MISO has also proposed changes as to how they accredit resources based on two factors, how the class of resources performs, and then specifically – how well the individual unit performance does during the times MISO needed the resources. This is proposed for all resources type except some demand response. Previously, and when MISO was capacity long, the calculation was varied by resource type and was not as refined. Solar, for example, was given an accreditation of 50%. As the resource mix and times of need is becoming for specific, different, and varied – MISO is narrowing in on more refined calculation.

Because the equation allows for a more 'tightened' calculation of what is needed, even though resources are given a lower accreditation value, the total 'need' and amount need will likely decrease (making this change likely MW neutral across the footprint, however, some utilities will need more, and some less capacity MWs depending on their system mix). MISO has filed at FERC in March 2024 for implementation in the 2028/2029 planning year.

MISO is also addressing Resource Accreditation for Load Modifying Resources (LMR), a specific type of Demand Response. MISO has recently released to stakeholders it's proposal to change accreditation for load modifying resources in the MISO footprint. This change is controversial and affects another potential 'up to' 12 GW on the MISO system. MISO is planning to file at FERC in 3rd quarter 2024 – but is hearing feedback from stakeholders currently. MISO wants to limit load modifying resource (turning down your load) to those that can respond in 30 minutes, where today, it's up to six hour response time.

MISO issued a Attributes Roadmap last in 2023. In the report, MISO identified three major areas of action - System Adequacy, Flexibility, and System Stability as near term actions/needs. MISO further called out 27 areas of action and referred each to MISO subgroups to work on over the next few years:

- System Adequacy (10 Tasks) – Modernize the resource adequacy construct
- Flexibility (7 Tasks) – Focus market signals on emerging flexibility needs
- Voltage Stability (10 Tasks) – Require capabilities to strengthen the grid



NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the Electric Reliability Organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves nearly 400 million people.

Each year, NERC is responsible for independently assessing and reporting on the overall reliability, adequacy, and associated risks that could impact the upcoming summer and winter seasons as well as the long-term, 10-year period. As emerging risks and potential impacts to reliability are identified, special assessments are conducted that provide similar technical framework and insights about the range and specific aspects of these to guide steps that may be warranted. Unbiased judgment of industry's plans for maintaining electric reliability in the future are founded on solid engineering through collaborative and consensus-based assessments.

By identifying and quantifying emerging reliability issues, NERC is able to provide risk-informed recommendations and support a learning environment for industry to pursue improved reliability performance. These recommendations, along with the associated technical analysis, provide the basis for actionable enhancements to resource and transmission planning methods, planning and operating guidelines, and NERC Reliability Standards. The following two graphics represent risk assessments for the nation, winter and summer.

WINTER RELIABILITY RISK AREA SUMMARY – 2023-2024

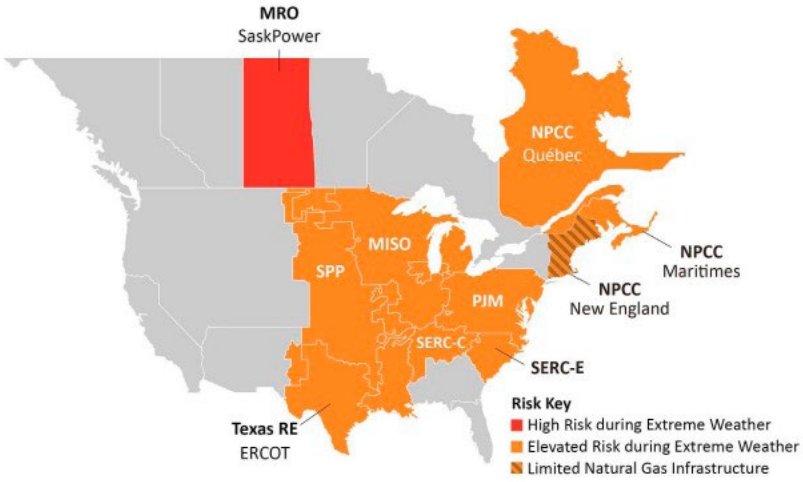


Figure 1: Winter Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Low	Sufficient operating reserves expected

SUMMER RELIABILITY RISK AREA SUMMARY – 2024

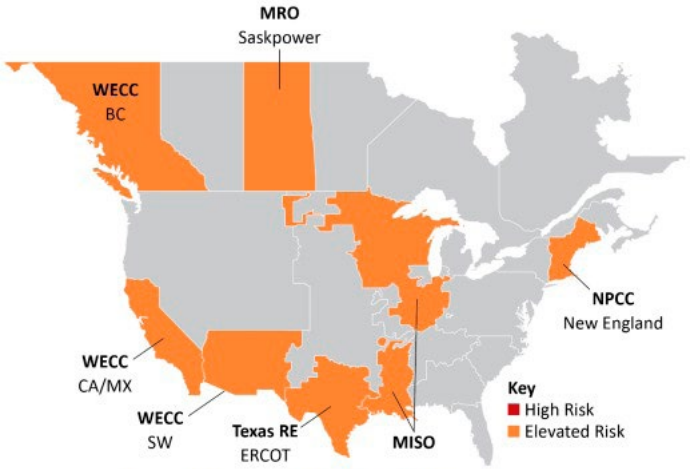


Figure 1: Summer Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Normal	Sufficient operating reserves expected

MIDWEST RELIABILITY ORGANIZATION (MRO)

The MRO operates as a cross-border Regional Entity headquartered in Saint Paul, Minnesota. The MRO region spans the provinces of Saskatchewan and Manitoba, and all or parts of the states of Arkansas, Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wisconsin. The region includes approximately 225 organizations that are involved in the production and delivery of electric power, including municipal utilities, cooperatives, investor-owned utilities, transmission system operators, federal power marketing agencies, Canadian Crown Corporations, and independent power producers.

MRO's primary responsibilities are to: ensure compliance with mandatory reliability standards by entities who use, own, or operate the North American bulk power system; conduct assessments of the grid's ability to meet electric power demand in the region; and analyze regional system events. Additionally, MRO creates an open forum for stakeholder experts in the region to discuss important topics related to addressing risk and improving reliable operations of the grid. MRO serves as a vital link between grid owners, users, operators, and other stakeholders who share common reliability interests in the region.

The North Dakota Transmission Authority became a member of this organization for the first time in November 2023. The NDTA Executive Director participates in the "adjunct sector" of the organization. North Dakota transmission utilities are participants and members of the organization. The MRO provides a valuable forum to discuss grid reliability and generation resource adequacy risks.

ND GRID RESILIENCY REPORT

The NDTA supports the development of the ND Grid Resiliency Plan, a section in the North Dakota State Energy Security and Resiliency Plan. The report is updated annually with help from the EERC staff. Threats to North Dakota's electric grid include extreme weather events, changing generation fuel mix, resource adequacy, supply chain interruptions, aging infrastructure, and physical/cyber-attacks. This report provides information that will help communities ensure that the electric grid infrastructure is more resilient when catastrophic events occur. North Dakota utilities have a long history of expeditious and safe system restorations following floods, winds and ice storms. The 2023 December Ice Storm manifested the collaborative spirit among investor-owned utilities and cooperatives working to safely restore vital electric service to North Dakotans.

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DISCLAIMER

This report utilizes data from various sources. Those sources are appreciated for their willingness and availability. If users of this report utilize that information, please go to the source to assure the most accurate and up to date information.

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

NORTH DAKOTA TRANSMISSION AUTHORITY

2024 ANNUAL REPORT

PREFACE

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By statute, the Authority membership is comprised of the members of the North Dakota Industrial Commission. Claire Vigesaa was appointed Executive Director of the Authority in July 2023. The Executive Director works closely with the Industrial Commission Administrative Office staff and receives direct general fund appropriation.

NORTH DAKOTA INDUSTRIAL COMMISSION

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Agriculture Commissioner

NORTH DAKOTA TRANSMISSION AUTHORITY

CLAIRE VIGESAA
Executive Director
ND Transmission Authority

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.

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EXECUTIVE SUMMARY

The 68th ND Legislative Session appropriated general fund dollars to the North Dakota Industrial Commission (NDIC) for the operation of the North Dakota Transmission Authority (NDTA). Karen Tyler, NDIC Executive Director, designated office space for the NDTA Executive Director within the NDIC office suite on 14th floor of the Capitol. Prior to this action, the NDTA director was in the Lignite Energy Council building and was funded through the Enhance, Protect and Preserve Fund.

The 2023-2024 fiscal year brought significant change to the Authority beyond the office location and funding mechanism. The NDIC acting as the NDTA was a recipient of a Department of Energy Infrastructure Investment and Jobs Act Formula Grant and awarded Grid Resilience Grants to four utilities operating in ND.

Executive Director Vigesaa met with each transmission owner operating in the state to understand the scope of their operation within North Dakota, hear concerns, and discuss grid reliability challenges.

The NDTA became a member of the Midwest Reliability Organization in their Adjunct Sector, opening the door to engagement on grid reliability concerns.

The NDTA was engaged in several studies to substantiate concerns North Dakota has with EPA proposed rules that would harm or eliminate fossil fuel generation. The studies showed that both the MATS rule and Finalized 111d/Greenhouse Gas Rule would result in premature retirement of lignite power generation facilities, reducing the reliability of the electric grid and increasing costs to the ratepayer.

The unprecedented growth forecast for the region/country due to domestic manufacturing movement, data center development and industry electrification underscores the need to keep all dispatchable generation in place for years to come. The Regional Transmission Organizations, industry, the North American Electric Reliability Organization, and the Midwest Reliability Organization are adamant and aligned in purpose to retain these valuable legacy generation facilities to have the generation resource adequacy/capacity to keep the "lights on."

Electric transmission is top of mind, North Dakota has several 345kV transmission projects moving toward construction from east central ND to western ND. One of North Dakota's HVDC lines is being modernized and momentum is building on the proposed HVDC line from Colstrip MT to St Anthony/Center ND. We can expect to see continued interest in transmission development; like highways, wider lanes and additional on/off ramps present opportunities for all types of generation to have access to markets, creating more value for our ND produced energy.

BUDGET

The 68th ND Legislative Assembly appropriated $300,000 to operate the NDTA for the 2023-2025 biennium. The Legislative Assembly also appropriated $1,124,856 for the 15% match requirement for the FY22/FY23 IIJA Grid Resilience Formula Grant Program. This match enabled North Dakota to access $7,499,037 in DOE funds for grid enhancing project awards to utilities serving North Dakota consumers.

The NDTA accessed funds from both the NDIC lignite litigation budget as well as the Enhance, Protect & Preserve fund to commission a ND Transmission Capacity Study and EPA rule impact studies on Mid-Continent Independent System Operator (MISO) and the Soutwest Power Pool (SPP).

The NDTA has financed one project, Rainbow Energy's purchase of the NEXUS HVDC line that originates at Coal Creek Station and terminates in the Minneapolis area. The bond financing's term is 20 years with interest at a rate of 3.55% per annum secured by the mortgaged property.

Photo courtesy Andrew Spratta – McKenzie Electric Cooperative

ACTIVITIES

IIJA GRID RESILIENCE GRANTS: The $7,499,037 DOE award (for FY22 & FY23) under the Bipartisan Infrastructure Law – Section 40101(d) created a new activity for the NDTA. The 68th ND Legislative Assembly voted to provide the 15% state match, $1,124,856. The ND Industrial Commission entered a contract with EERC to provide grant administrative support. Applications were solicited in October 2023 for projects in North Dakota that would "prevent outages and enhance the resilience of the electric grid". Twelve applications were received, totaling $17,355,257 in requests. Outside technical reviewers scored the applications; the NDIC granted four awards at their December 2023 commission meeting. The four projects and impact are shown in the table below.

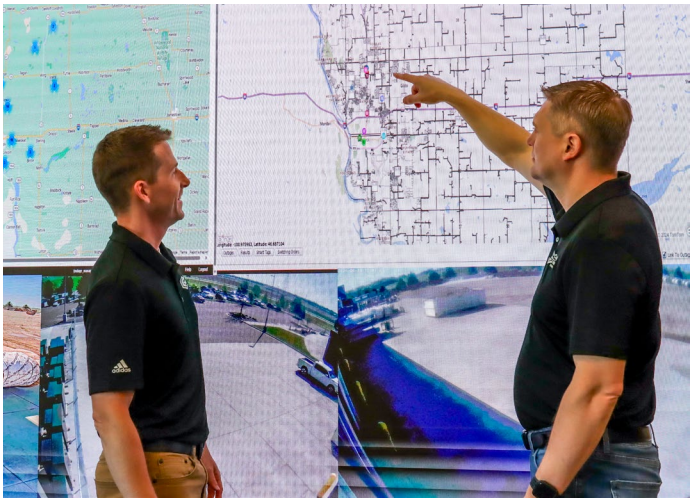
Utility	Award ($)	Project Description
Capital Electric Cooperative	$321,930	Converting OVHD to URD State/Fed Hwy Crossings
Otter Tail Power Company	$4,432,088	Next-Generation Grid Resiliency
Northern Plains Electric Cooperative	$586,000	Electronic SCADA Recloser Installation
McKenzie Electric Cooperative	$2,843,075	Capacitor Banks, Communications, SCADA Controls

$21 invested for every state dollar appropriated

Over 750 miles of power line upgrades

54 overhead crossings converted to underground

Deployment of new technologies for inspections and vegetation management



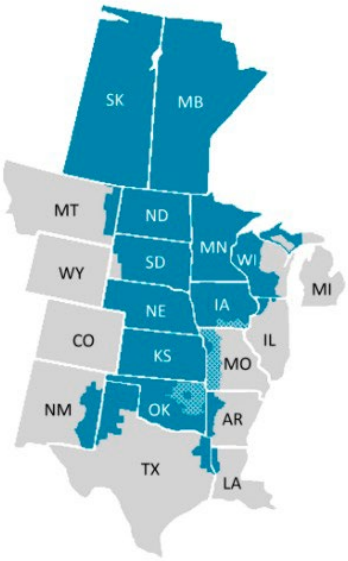
Capital Electric Cooperative and Otter Tail Power Company were recipients of the first round of IIJA Grid Resilience Grant. Left photo: Capitol Electric Cooperative staff ***Greg Owen****, Manager of Engineering, and* ***Paul Fitterer****, CEO. Right photo: Otter Tail Power Company Transmission Engineering staff* ***Dylan Stupca****,* ***Stacie Hebert****,* ***JoAnn Thompson****,* ***Michael Riewer*** *and* ***Jason Weiers****.*

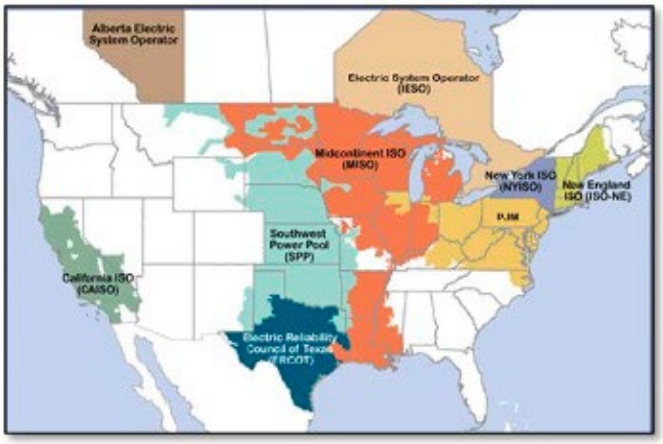
In January 2024 DOE opened the application process for FY24 IIJA Grid Resilience Formula Grants, North Dakota would be eligible for $3,885,295. An application was submitted in April; since the ND Legislature doesn't meet until 2025, the ND Industrial Commission's Lignite Research Council provided "gap" support for the 15% match enabling North Dakota to access the FY24 funding.

GRID RESILIENCE AND INNOVATION PARTNERSHIP (GRIP) – DOE GRANT: For the GRIP opportunity, a state entity is required to be the primary applicant. The NDIC, at their December 2023 commission meeting moved to accept that role for the North Dakota Association of Electric Cooperatives grant application. That application did not get DOE encouragement to move forward. However, Grid United's GRIP project application received DOE encouragement to apply. In March 2024, the NDIC moved to support collaboration and participation with the Montana Department of Commerce for Grid United's GRIP application to support the North Plains Connector project.

MIDWEST GOVERNORS ASSOCIATION (MGA): The MGA established an initiative (MID-GRID 2035) for regional transmission education and planning to position the Midwest as a modern energy producer and low-cost energy provider, with the goal to establish a long-term transmission grid vision for the region. The NDTA participated in three conferences held by the MGA, MID-GRID 2035 quarterly meeting at SPP Headquarters – September 2023, the MGA Transmission Summit in Detroit – November 2023 and the MGA Transmission Summit in Welch, MN – April 2024.

MIDWEST RELIABILITY ORGANIZATION (MRO): On October 25, 2023, the NDTA became a member of the MRO in the Adjunct Sector. MRO's primary responsibilities are to: ensure compliance with mandatory reliability standards by entities who use, own or operate the North American bulk power system; conduct assessments of the grid's ability to meet electric power demand in the region; and analyze regional system events. Additionally, MRO creates an open forum for stakeholder experts in the region to discuss important topics related to addressing risk and improving reliable operations of the grid. MRO serves as a vital link between grid owners, users, operators, and other stakeholders who share common reliability interests in the region. The organization presents opportunities to learn with electric grid operators in the region. Board representation from our constituents include Darcy Neigum-MDU, JoAnn Thompson-Otter Tail Power Company, Lloyd Linke-WAPA, Priti Patel-Great River Energy, and Sandra Johnson-Xcel Energy. The MRO serves the area depicted by blue in the map to the right.





REGIONAL TRANSMISSION ORGANIZATIONS: As shown on the map to the left, North Dakota is served by two regional transmission organizations, Mid-Continent Independent System Operator (MISO) and the Southwest Power Pool (SPP). The NDTA attends numerous committee meetings for both MISO and SPP to keep abreast of initiatives that impact grid reliability, particularly for North Dakota. Both RTOs are undergoing transformative shifts due to significant load growth, changing generation mixes and transmission development.

NORTH DAKOTA PUBLIC SERVICE COMMISSION: The NDTA appreciates the proximity to ND PSC staff and the open door to the three commissioners. We share/compare insights to mutually support a reliable grid and affordable energy for North Dakota. Meeting highlights include the semi-annual ND PSC meeting with MISO and SPP.

ND ENERGY DEVELOPMENT AND TRANSMISSION COMMITTEE: The NDTA presented to the interim committee on three occasions; the first in August 2023 to discuss grid reliability concerns and share highlights of the NDTA's generation resource adequacy studies on MISO & SPP, second in December to share information on proposed transmission grid expansion in North Dakota and lastly, in June 2024, to share the results of the EPA Impact Studies commissioned by NDIC/NDTA.

NORTH DAKOTA DEPARTMENT OF COMMERCE: The NDTA meets quarterly with ND Department of Commerce staff to discuss economic development needs relating to electric generation and transmission. The NDTA also collaborates with the Department of Commerce staff on the ND State Energy Plan (the ND Grid Resiliency Plan portion). This report is updated annually with help from the EERC.

GOVERNOR'S OFFICE: The NDTA works closely with the Governor's energy staff on grid related topics.

ENVIRONMENT/SOCIAL/GOVERNANCE STEERING COMMITTEE: As executive director of the NDTA, I was privileged to serve on the ESG steering committee. The committee was established by SB 2289, directing the energy development and transmission committee to study the ESG impacts and develop a state-wide energy policy. Charlie Gorecki-EERC and Kelvin Hullet-BND chaired the committee. Kayla Ver Helst, Sustainability Officer for the Bank of North Dakota served as the project lead for the ESG study.

TRANSMISSION OWNERS & DEVELOPERS: The NDTA purposed to meet with each transmission owner/developer at their office/headquarters. The meetings on site have proved to be very helpful; gaining a better understanding of the transmission owner's goals, challenges and initiatives.

OUTREACH: There is significant interest in learning about the electric grid and reliability. The NDTA is available to present to associations, communities, and other entities upon request. The NDTA presented to the following associations this past year:

American Coalition on Renewable Energy-Policy Forum, Washington D.C.

Mid-West Electric Association Annual Meeting, Denver CO

Western Dakota Energy Association – Dickinson, ND

Lignite Energy Council – Bismarck, ND

ND Petroleum Council – Bismarck, ND

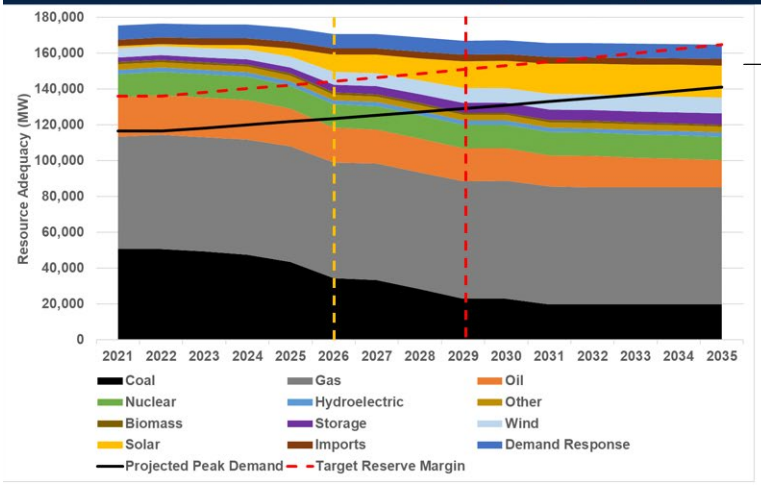
Executive Director Vigesaa participated in the ACORE policy forum, sharing North Dakota grid reliability concerns.

Pictured: ***Bill Murray****-Dominion Energy,* ***Nate Hill****-Amazon Web Services,* ***Jeff Dennis****-Grid Deployment Office,* ***Claire Vigesaa****-NDTA,* ***Sarah Webster****-Pattern Energy*

NDTA STUDIES

The North Dakota Transmission Authority periodically conducts independent evaluation of factors that affect the grid reliability of electric transmission in North Dakota. In 2024, three studies were commissioned, the Impact of EPA's MATS Rule on Generation Adequacy, DOE's Final Carbon rule impact study on MISO & SPP, and a North Dakota Transmission Capacity Study. The first study (click link here) provided an analysis of the proposed Mercury and Toxic Air Standards rule. The study revealed dire consequences to grid reliability and generation resource adequacy. The MATS rule would essentially shutter ND Lignite coal generation, a critical dispatchable generation resource. The graph below shows that by 2026, MISO would depend on intermittent resources for power reserve margins and by 2029, would be dependent on intermittent generation resources to meet peak demand.

Full Scenario RA is Maintained by Replacing Retiring Capacity with New Resources Using EPA Capacity Values, But…



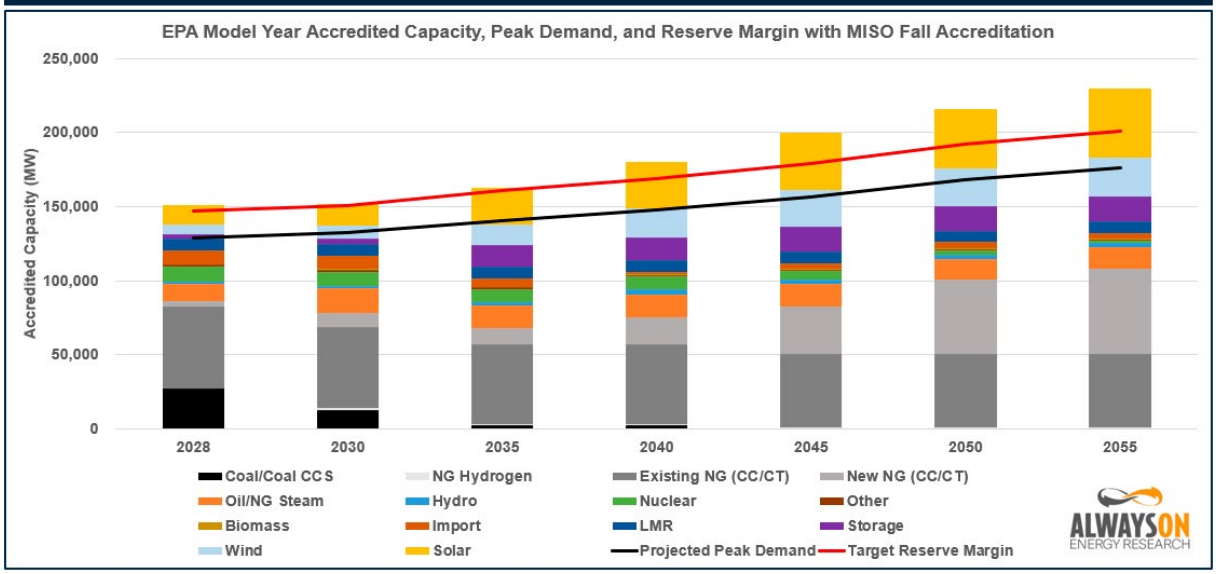
Year	% Intermittent	% Storage	% Dispatchable
2023	6%	2%	131%
2024	7%	2%	128%
2025	9%	3%	122%
2026	13%	4%	112%
2027	14%	4%	109%
2028	16%	4%	104%
2029	18%	4%	98%
2030	18%	4%	97%
2031	19%	5%	92%
2032	19%	4%	91%
2033	19%	4%	89%
2034	19%	4%	87%
2035	19%	4%	85%

Estimated firm capacity using EPA's accreditation values for wind, solar, storage (100%), and thermal resources (100%). EPA assumes a 16.8 percent reserve margin. Different than MISO cleared UCAP (unforced [accredited] capacity). Red indicates intermittent generation is necessary to meet Target Reserve Margins. The rest of the reserve margin not covered in the table consists of load modifying resources.

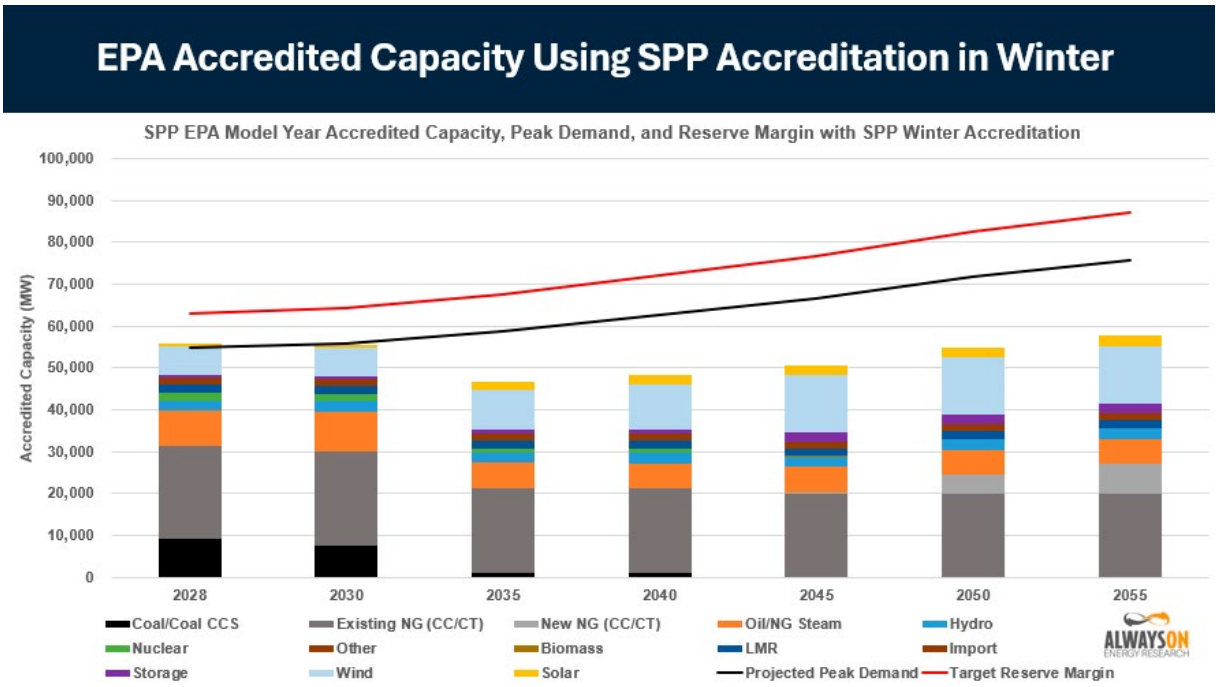
- *2023 – 2025: Adequate dispatchable capacity*
- *2026 – 2028: Reserve margin depends on W/S/B*
- *2029 – 2035: Peak Demand depends on W/S/B*

The second study, Final Carbon rule impact study (click link here), on MISO and SPP manifested even more dire consequences to grid reliability and generation resource adequacy. As noted in the slide below, the study shows that MISO will be dependent on non-dispatchable generation to meet projected peak demand in winter 2028.

EPA Accredited Capacity Using MISO Accreditation in Winter



The study also shows that SPP would have dire consequences from the proposed EPA Carbon Rule; depending on non-dispatchable generation in 2028 for winter peak demand and post 2030…impossible to meet demand.



The third study, the North Dakota Transmission Capacity Study, assessed the capacity of the ND transmission grid. The first phase of the study was completed in February, this phase summarized the current proposed generation and transmission projects in the state and reported their impact on ND transmission capacity. The second phase will provided key analyses of ND transmission capacity: steady-state powerflow analysis. The study developed long-term transmission models to perform steady-state assessments of ND transmission capacity. The study is to be completed in the third quarter of 2024.

GRID RELIABILITY CONCERNS

The MRO Regional Risk Assessment published in February 2024 identified the following risks as high (see table below).

Risk	Priority
Uncertain Energy Availability	EXTREME
Generation Unavailability During Extreme Cold Weather	HIGH
Supply Chain Compromise	HIGH
Inadequate Inverter-based Resource and Distributed Energy Resource Performance and Modeling	HIGH
Material and Equipment Availability	HIGH
Physical Attacks	HIGH
Malicious Insider Threat	HIGH
Loss of Essential Reliability Services	HIGH

This is the first time a risk was ever identified as "extreme"; Uncertain Energy Availability was listed as an extreme priority. The report noted that conventional baseload generation that is available on demand is being retired and replaced with resources that possess limited energy availability due to uncertain fuel supplies that are increasingly weather dependent. New generation resources are largely inverter-based and perform much differently than conventional resources, reducing essential reliability services to the grid. The North American Electric Reliability Corporation (NERC) shared the that NERC's peak generation capacity has decreased by 4% over the last ten years. At the same time, NERC's summer peak demand has risen 3%! A reliable grid cannot be maintained with these opposing trends.

NERC Reliability Risk Assessment's over the last two seasons is alarming (see graphs below). Our region was in the "elevated risk" region for both winter 2023-24 and summer 2024. Elevated risk means that there is potential for insufficient operating reserves in above-normal conditions.

2023-2024 Winter Reliability Risk Area Summary

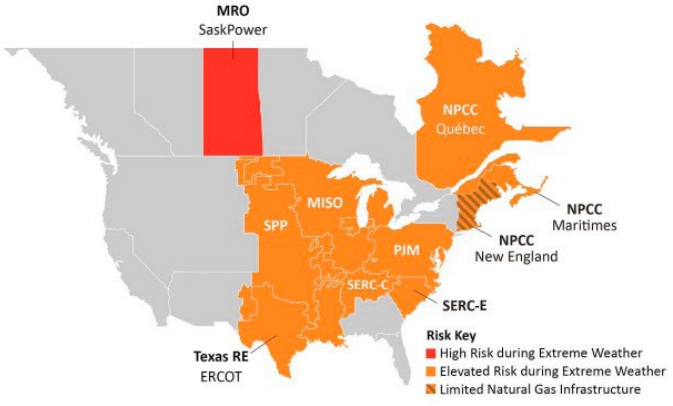


Figure 1: Winter Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Low	Sufficient operating reserves expected

2024 Summer Reliability Risk Area Summary

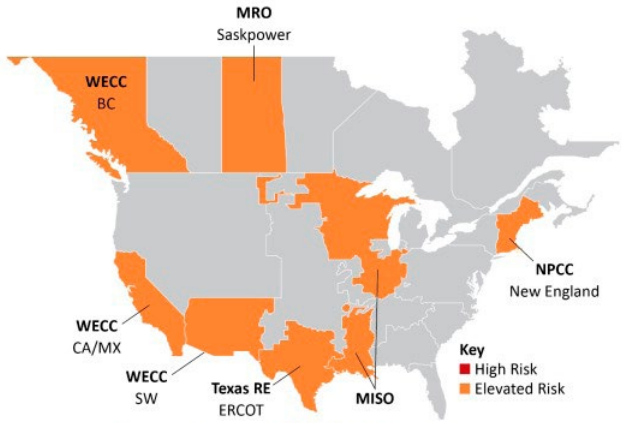


Figure 1: Summer Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Normal	Sufficient operating reserves expected

The electric grid is a complex machine, reliability begins with the generator; therefore, proper planning, solid maintenance & operation and fuel supply are vital. Transmission line congestion, weather events, equipment failures, and physical/cyber-attacks can have a significant impact on transmission performance. Because we live in a world where power supply is absolutely required for health, safety, food production/preservation, communication and security; the grid must be built with redundancy or multiple paths to keep the lights on.

REGIONAL TRANSMISSION OPERATORS

North Dakota is served by two RTOs, Midcontinent Independent System Operator (MISO) and the Southwest Power Pool (SPP).

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, MISO has an agreement with Minnkota Power Cooperative that provides them with many of the same services. Western Area Power Administration (WAPA) and Basin Electric Power Cooperative (BEPC) are members of the Southwest Power Pool. SPP BEPC members Mountrail-Williams Electric Cooperative and Central Power Electric Cooperative, Roughrider Electric Cooperative and Mor-Gran-Sou Electric Cooperative have also joined SPP individually due to their transmission ownership.

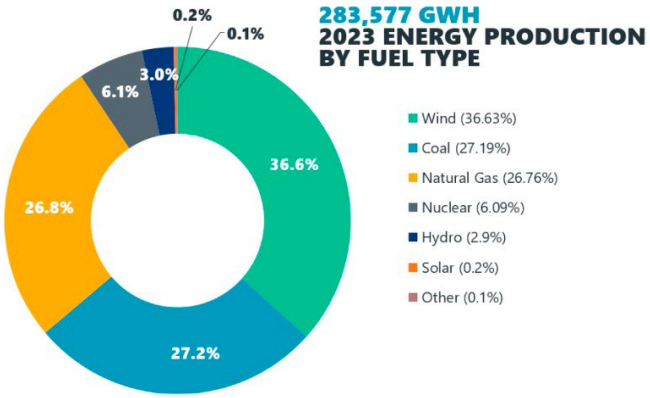
Combined, North Dakota utilities and transmission developers are part of an extremely complex system that oversees the transmission of over 40 million MWhs/year of electricity across 100,000 miles of transmission lines so that utilities can deliver power to homes and businesses in all or part of 20 states.

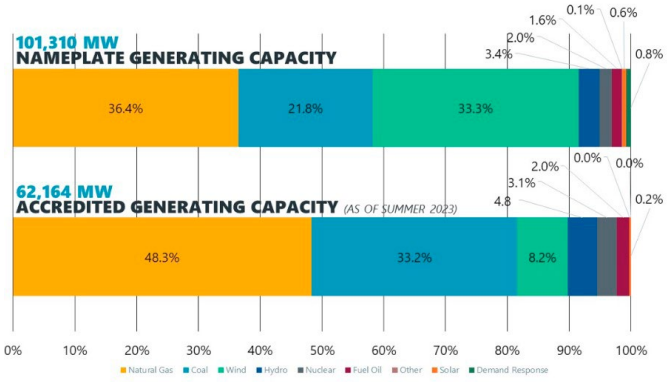
MISO and SPP also operate the power markets in their respective territory. Pricing for selling electricity into the grid and for buying electricity from the grid is managed by them. This process determines which generating units will be providing generation at any point in time and which units will provide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

WAPA is the Transmission Operator for the SPP transmission network in North Dakota. ND PSC Commissioner Randy Christmann serves on the SPP Regional State Committee. Victor Shock, Director, Public Utilities Division, Chris Hanson and Leif Clark ND PSC also participate in SPP committee work. ND PSC Commissioner Julie Fedorchak represents the ND PSC on the MISO Advisory Committee. ND PSC staff, Robert Frank and Adam Ranfandt.also participate in MISO committee work.

SOUTHWEST POWER POOL (SPP)

SPP has a diverse fleet of approximately 1,000 generating plants to produce energy to meet the demand of the region. SPP's region spans 14 states, North Dakota being on the far north of the region. Electricity is moved from generation to the customers on a network of 72,820 miles of high voltage transmission lines. The table below shows the energy production in SPP's region by type in 2023.





SPP's nameplate capacity is illustrated above and represents the total potential output of every generating unit registered in SPP's market: 101,310 MW. As of summer 2023, SPP's accredited capacity – the amount of generation SPP can reasonably expect to be available at a given time was 62,164 MW, greater than the region's record peak load of 56,184 MW set on August 21, 2023.

In the past 10 years, SPP's wind capacity has dramatically increased to more than 15,000 turbines at 250 wind resources in the Eastern Interconnection, representing an installed capacity of 33,000 MW. The maximum wind output for 2023 was 23,838 MW on March 16th while the lowest output was 111 MW on June 5, 2023. During these intervals, other generation types like coal, natural gas and nuclear units play a critical role in maintaining reliability.

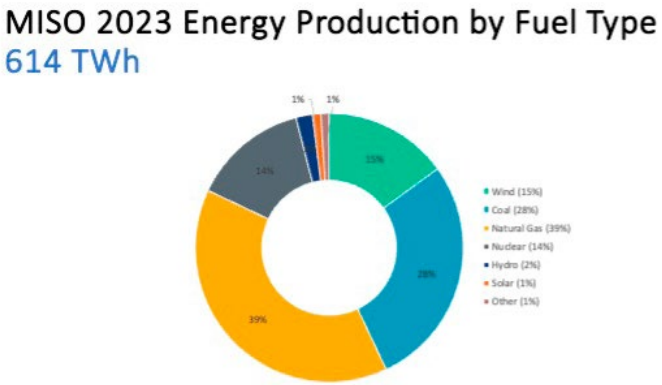
In recent years, SPP's role in ensuring resource adequacy has become more complex as a result of more frequent extreme weather events, load growth and the changing generation mix. SPP stakeholders & staff continue to develop programs/tariffs to assure that reliability, resource adequacy and generation attributes are appropriately acknowledged.

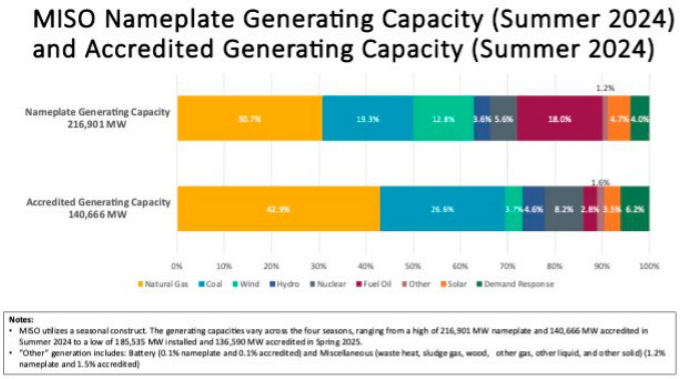
The electric grid is a dynamic machine requiring careful planning to ensure that electrons are available to load in real time. In 2023, 17 transmission upgrades were completed by SPP members at a construction cost of $138 million. Within SPP's comprehensive list of transmission projects for a 20-year planning horizon, there are 76 projects estimated to cost $822 million that will be constructed over the next six years in nine different states.

MID-CONTINENT INDEPENDENT SYSTEM OPERATOR (MISO)

MISO is an independent, not-for-profit, member-based organization focused on managing the flow of high-voltage electricity across its region, facilitating one of the world's largest energy markets, and planning the grid of the future. MISO serves in 15 U.S. states and Manitoba, Canada, providing transmission services to 45 million people. MISO has 2,956 generation units in its footprint and has 75,000 miles of transmission line in its portfolio.

The table below shows the energy production in MISO's region by type in 2023.





MISO's nameplate capacity is illustrated above and represents the total potential output of every generating unit registered in MISO's market: 216,901 MW. As of summer 2024, SPP's accredited capacity – the amount of generation MISO can reasonably expect to be available at a given time was 140,666 MW.

As an independent, not-for-profit organization, MISO does not have authority over resource planning decisions; that is the purview of the states and utilities. However, MISO does play vital roles in helping the states and utilities manage the energy resource mix transformation. MISO leverages its regional perspectives and regional data to provide the data, modeling, analysis, trends, and insights to help inform the decision-making of resource planners. This includes the OMS-MISO Survey results, the MISO Regional Resource Assessment, Futures Planning Scenarios, and the Attributes Roadmap.

MISO's markets provide price signals that incentivize resource adequacy and the mix of needed attributes. Similarly, the annual Planning Resource Auction results help shape investment decisions.

The recent implementation of several key initiatives also supports the effective management of the bulk electric system. The new Seasonal Resource Adequacy Construct better reflects the risks the region now faces in winter and shoulder seasons due to fleet changes, more frequent and severe extreme weather, electrification, and other factors. The Reliability-Based Demand Curve, which is scheduled for full implementation in 2025, will provide accurate capacity price signals to support effective investment and retirement decisions.

MISO's Long-Range Transmission Planning (LRTP) process is facilitating the development of the regional transmission lines necessary to support the growth of new generation.

MISO's primary transmission planning efforts includes the MISO Transmission Expansion Plan (MTEP) and MISO's Long-Range Transmission Planning (LRTP) initiative.

MTEP is a comprehensive planning process consisting of projects proposed by Transmission Owners and MISO's LRTP initiative. MTEP projects include both new transmission lines and upgrading or replacing existing lines.

LRTP is a MISO initiative focused on designing and recommending new transmission projects needed to improve the ability to move electricity across the MISO region from where it is generated to where it is needed, reliability and at the lowest possible cost.

Across the MISO region, MTEP24 includes 186 proposed transmission projects under consideration, including 7 in North Dakota. Seven North Dakota projects have been approved and are awaiting construction – including a MISO-proposed LRTP Tranche 1 project, a 345 kV line between Jamestown and Ellendale, ND.

Tranche 2 is being drafted and is expected to be considered by MISO's Board of Directors in late 2024. The draft portfolio includes several 765 kV lines, which, compared to 345 kV lines, provide greater flexibility for future needs and load growth, optimize right-of-way usage, and better accommodate the transfer of energy over long distances.

Looking forward, MISO is working with stakeholders to develop solutions to the potential scarcity of key system reliability attributes, as the new resources coming online do not possess the same operational characteristics (such as availability, flexibility, and voltage stability) as the generation resources they are replacing. MISO is also working with stakeholders to finalize a FERC filing, planned for mid-2024, to update resource accreditation methodology to better reflect what the system can actually expect from resources during high-risk periods.

MISO has been focusing on resource accreditation as it relates to grid reliability and resource adequacy. MISO held its first seasonal capacity auction in April of 2023. Further, they developed a reliability based demand curve (sloped demand curve) proposal that is being considered at FERC. MISO desires to have this approved and in place for the 2025/2026 planning year.

MISO has proposed changes to their accreditation of resources, based how the class of resources performs and more specifically how well the individual unit performs at critical need times. This change refines accreditation, an important change as the generation resource mix changes. Similarly, MISO has proposed a change in resource accreditation for load modifying resources (a specific type of demand response). MISO wants to limit load modifying resources to those that can respond in 30 minutes versus six hours.

MISO issued an Attributes Roadmap in 2023. They identified three major areas of action, system adequacy, flexibility, and system stability. Much emphasis is on system attributes.

Attributes: Reliability-based risk analysis highlights three key attributes needed for the future resource fleet

GENERATOR INTERCONNECTION (GI) QUEUE

The generation interconnection queue represents new generators who are waiting in line to be analyzed and connected to the grid. These queues have been overwhelming the last few years.

SPP has made great strides in clearing the backlog. SPP processed 93 Generation Interconnection Agreements in 2023, 78 of them in the last two quarters.

The current SPP queue represents approximately 3,126 MW for North Dakota:	**MISO's generation queue (7,023 MW active queue) for North Dakota is as follows:**
Solar - 35%	Solar - 11.2%
Wind - 32%	Wind - 52.7%
Battery/Storage - 8%	Battery/Storage - 10.7%
Balance Hybrid/Thermal - 25%	Hybrid - 25.4%

MISO has 250MW of wind with an approved Generators Interconnection Agreement but not yet operational

TRANSMISSION PROJECTS

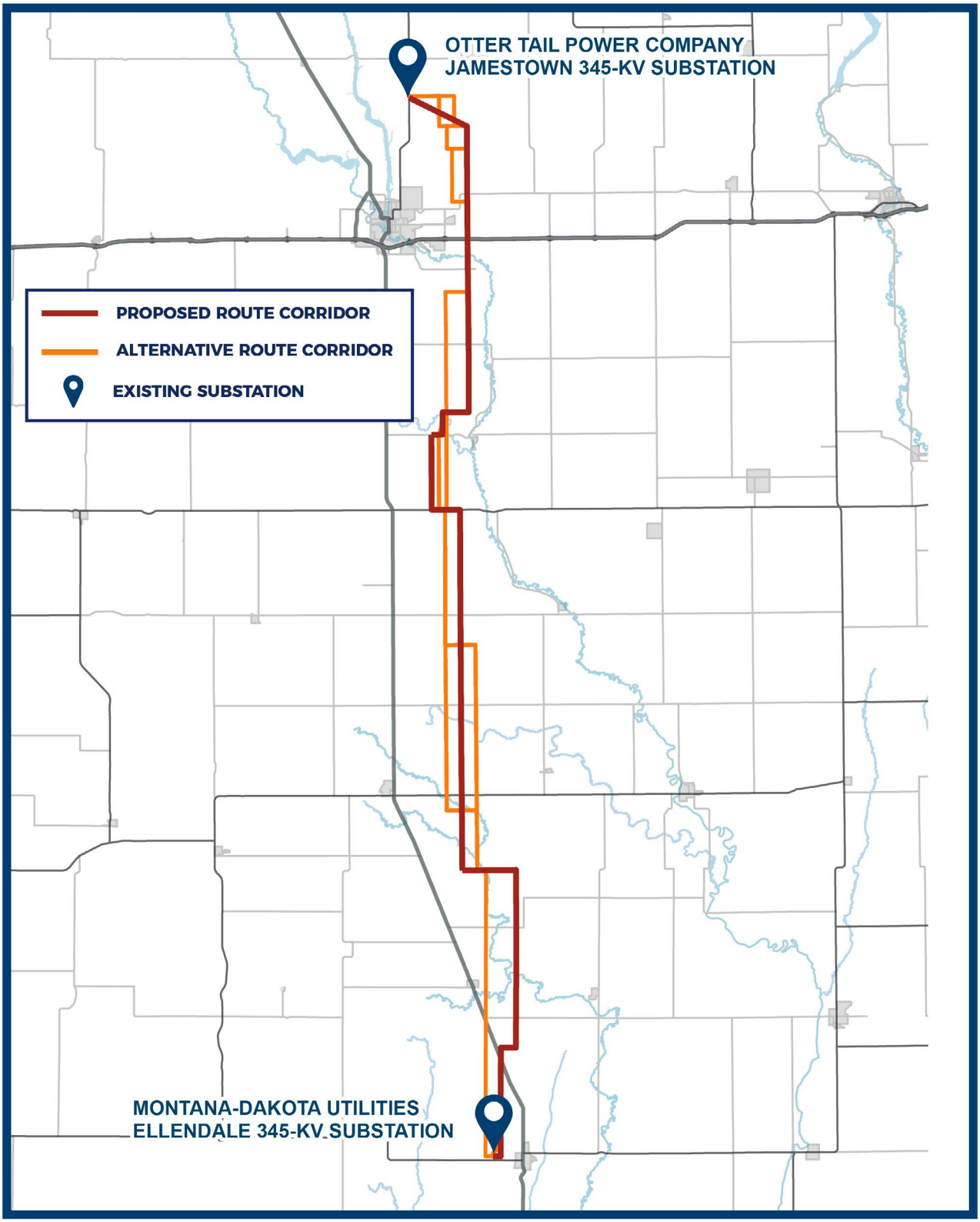
Transmission line development is an exhaustive process, often taking 8-10 years from idea to operation. The load growth, particularly in Western ND has been phenomenal but challenging for the power supplier and transmission developers. Today, there is significant transmission congestion in the Watford City/Williston region as well as in Southeast North Dakota. Fortunately, there are several transmission projects approved and well on their way to construction to alleviate the congestion, accommodate load growth, improve grid reliability and consumer security. The projects are as follows:

BASIN ELECTRIC POWER COOPERATIVE

Round up to Kummer Ridge 345kV– 35 miles	2025
Pioneer Generation Station Additions 583 MW	2025
Leland Olds – Tioga 345kV -175 miles	2026
Wheelock to SK 230kV 50 miles	2027
Tande – SK 230kV 60 miles	2027
Statcom – New Town	

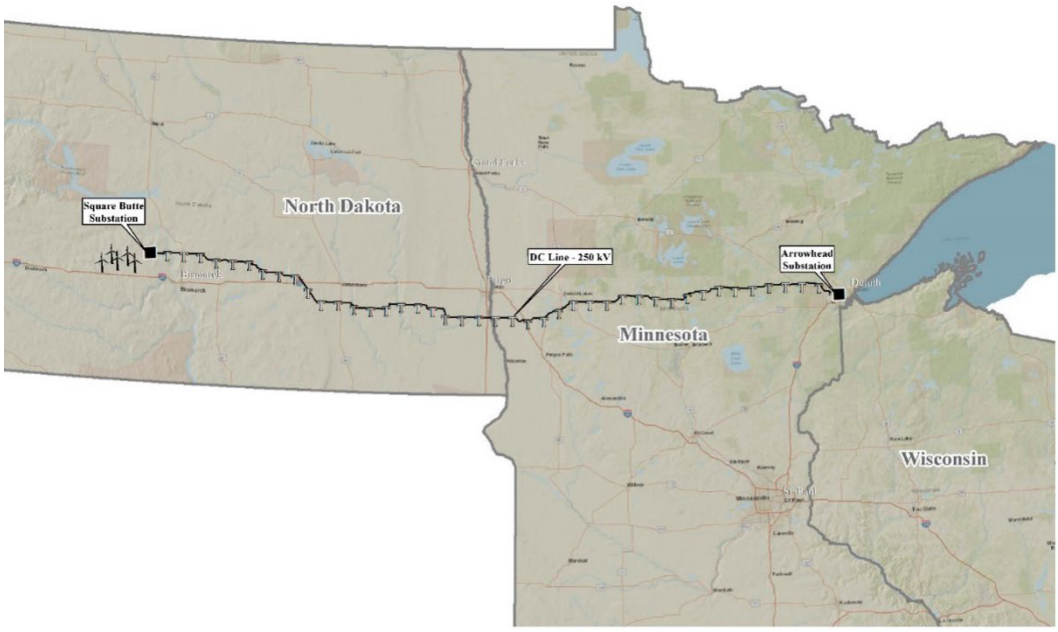
OTTER TAIL POWER COMPANY AND MONTANA DAKOTA UTILITIES

Otter Tail Power Company and Montana Dakota Utilities are jointly developing a 345kV transmission line and substations from Jamestown to Ellendale, named the JETx Project. The project is scheduled to be completed in 2028.



MINNESOTA POWER ALLETE

Minnesota Power Allete has embarked on a HVDC Modernization Project on their HVDC line from Center ND to Duluth, MN; increasing the transmission capacity from 550MW to 900 MW with potential to increase to 1,500 MW. The project work occurs at either end of the HVDC line at the converter stations. The modernization project will also enable electricity to flow either direction and is slated to be complete at the end of the decade.



JOINT TARGETED INTERCONNECTION QUEUE (JTIQ)

JTIQ project is a "seams" project involving both MISO and SPP. The Bison-Hankinson-Big Stone portion of the JTIQ addresses congestion issues in southeast North Dakota. The project was awarded DOE grant funds in 2023. Work continues on cost allocations for the project. The North Dakota portion will likely be a joint project with Xcel Energy and Otter Tail Power Company.

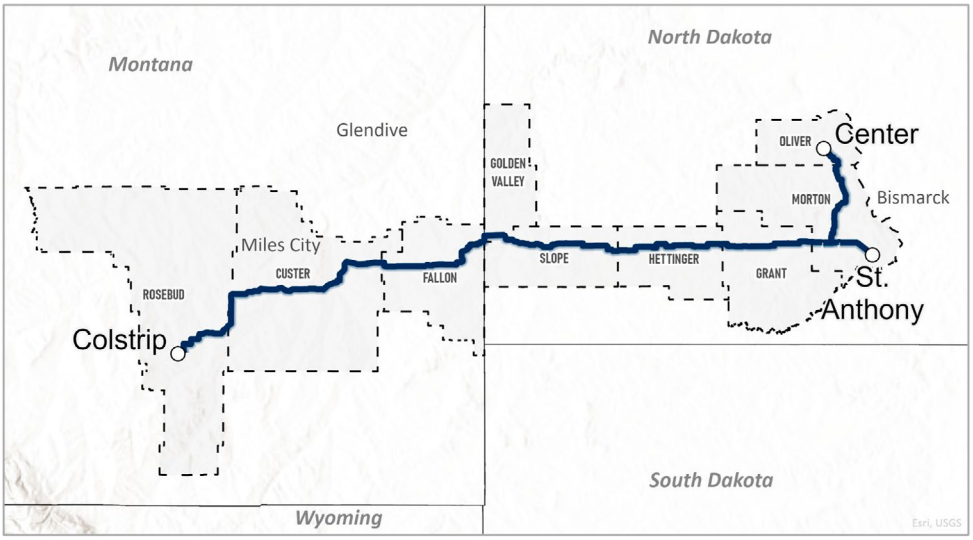
Original JTIQ Portfolio	Location by RTO	2021 Conceptual Cost E&C
Bison – Hankinson – Big Stone South	MISO	$476 M
Lyons Co. – Lakefield (was Brookings - Lakefield*)	MISO	$331 M*
Raun – S3452	MISO – SPP	$144 M
Auburn – Hoyt	SPP	$90 M
Sibley 345 Bus Reconfiguration	SPP	$19 M

**The Brookings Co-Lakefield 345kV in the original JTIQ project portfolio will be replaced by a shorter Lyons Co – Lakefield 345kV project due to an approved MISO MTEP 22 project Brookings Co - Lyons Co 345kV double circuit line.*

Bold = North Dakota substations at Bison and Hankinson

GRID UNITED

Grid United's North Plains Connector Project is a 525kV 400 mile HVDC line that will span two states, from Colstrip MT to St. Anthony ND & Center ND. The line will have 3,000 MW of capacity and connect three electric transmission regions, the West Interconnect, MISO and SPP. The project construction is scheduled to begin in 2027. This is a merchant line, Grid United is not a utility with defined consumers.



RAINBOW ENERGY

Rainbow Energy completed the Arc Substation in November 2023. The Arc Substation has 192 MW capacity and provides service to data processing load on site. Rainbow Energy will be building another substation, the Rainbow Substation on site as well. The Rainbow Substation will have 180 MW capacity and will serve as an aggregation point for wind energy and serve data/AI load.

Rainbow Energy staff present 2023 financial results to the Bank of North Dakota and the North Dakota Transmission Authority at their headquarters in Bismarck– March 2024

WESTERN AREA POWER ADMINISTRATION (WAPA)

WAPA, Upper Great Plains Region (WAPA-UGP), together with Basin Electric, installed Dynamic Line Rating (DLR) sensors on WAPA-UGP Williston 2 – Watford City – Charlie Creek 230 kV line on Mary 15, 2024. As of December 2023, the Watford City – Charlie Creek 230 kV flowgate (#5717) had accumulated over $300 million of Day Ahead congestion. WAPA-UGP recognized the opportunity and value of implementing these DLR sensors on Williston 2 – Watford City – Charlie Creek 230 kV as a least cost solution to relieve congestion. This solution provides WAPA-UGP with the opportunity to assess real-time DLR impacts using a very specific single line scenario. This project is a first-of-its-kind for WAPA and Basin and is anticipated to benefit not only the North Dakota region but also the Southwest Power Pool as a whole.

XCEL ENERGY

Xcel Energy is working to develop the grid of the future to ensure that generation outlet and resource adequacy is met now and into the future. Specifically, Xcel Energy is working on the following projects:

- Xcel Energy is completing the 2nd circuit from the Brookings Co-Twin Cities 345 kV line to help with the congestion concerns in southwest Minnesota.
- Xcel Energy has completed several congestion related projects and have funded several Market Participant Projects outside of Xcel's service territory to help bring immediate congestion relief.
- Xcel Energy is involved with three projects from the MISO Long Range Transmission Plan (LRTP) Tranche 1 projects. These project will help address transfer capabilities across the MISO system from the west to east towards the load centers.
  - MISO LRTP Project #2: Big Stone-Alex new 345 kV line, completion of the 2nd circuit from Alex-Monticello 345 kV CAPX line
  - MISO LRTP Project #4: New 345 kV line from Wilmarth-North Rochester-Tramval
  - MISO LRTP Project #5: New 345 kV line from Tremval-Eau Claire-Jump River
- Xcel Energy is working with stakeholders and MISO to develop the LRTP Tranche 2 portfolio to propose a 765 kV network in the upper Midwest that will help with intra-regional transfer capability, increasing system reliability and resilience.
- Xcel Energy is working on future portfolios with stakeholders and MISO to develop the long-range vision plan post Tranche 2.

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DISCLAIMER

This report utilizes data from various sources. Those sources are appreciated for their willingness and availability. If users of this report utilize that information, please go to the source to assure the most accurate and up to date information.

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