

# NORTH DAKOTA TRANSMISSION AUTHORITY

ANNUAL REPORT

July 1, 2017 to June 30, 2018

# 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. Tyler Hamman was appointed Director of the Authority in July 2015. Tyler resigned in August, 2017 and John Weeda was appointed in February 2018. The Director works closely with the Executive Director of the NDIC, Ms. Karlene Fine. The Authority has no other staff, and 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 have an understanding of 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



Wayne Stenehjem  
Attorney General



Doug Goehring  
Agriculture Commissioner

## NORTH DAKOTA TRANSMISSION AUTHORITY



John Weeda  
Director

# 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 into lease-sale contracts;
- 4) own, lease, rent and dispose of transmission facilities;
- 5) enter into contracts to construct, maintain and operate transmission facilities;
- 6) investigate, plan, prioritize and propose transmission corridors; and
- 7) participate in regional transmission organizations.

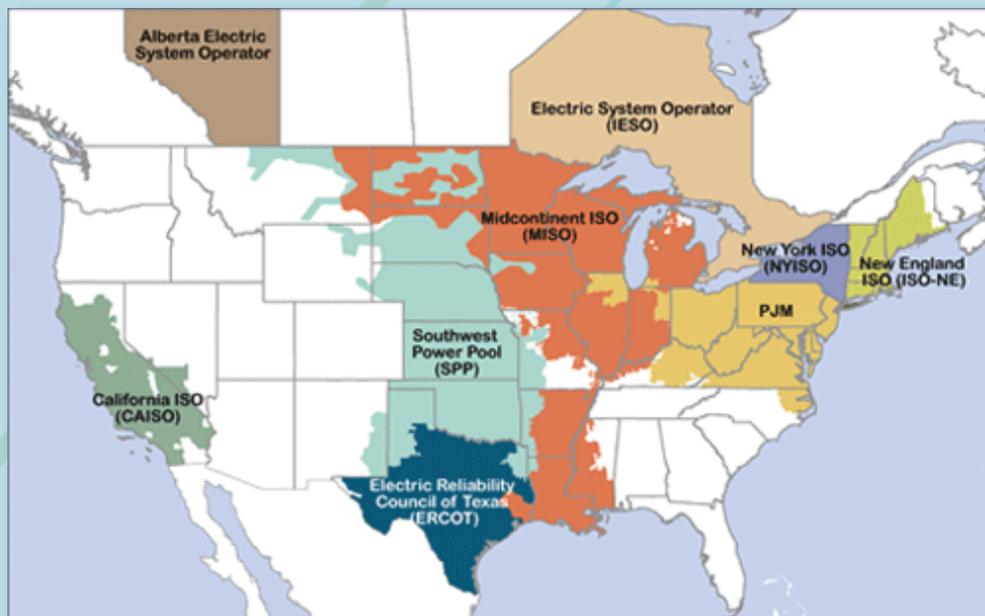
Before the Authority may exercise its power to construct transmission facilities, it must follow a process defined by statute to ensure public participation and comment. In particular, the Authority must publish a notice describing the need for the transmission project. Entities interested in construction 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.

## KEY ELEMENT: 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 closely monitors and participates in 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, 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, and Missouri River Energy Services (MRES). 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. 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.



FERC-Recognized Regional Transmission Organizations and Independent System Operators  
([www.ferc.gov](http://www.ferc.gov))

## **MISO TRANSMISSION EXPANSION PLANNING (MTEP)**

MTEP15: The 12th edition of the MTEP recommended the approval of 345 new transmission projects totaling \$2.75 billion to the MISO Board of Directors, including 90 Baseline Reliability Projects (BRPs). MTEP15 projects that 4,600 miles of transmission lines will be upgraded along existing corridors, and 3,100 miles of new transmission line will be constructed over the 10-year planning horizon.

In North Dakota, MTEP15 recommended that MISO approve three Generation Interconnection Projects (GIPs), and two BRPs. These projects include upgrades to transformers, new substations, and rebuilt or new transmission. Of particular note, it is recommended that a new 230kV and 115kV lines be constructed in Ward County, between Minot to the McHenry Substation. At approximately \$63.3 million, the joint project between BEPC and Xcel is among the top ten largest in the MTEP15. Work is underway and is expected to be in-service by September 2018.

MTEP16: 10 transmission projects in North Dakota approved by MISO Board of Directors in the MTEP16 for total investment of \$37 million. While the majority of projects consist of substation and breaker upgrades, MTEP16 does include a new 115kV transmission line from Ellendale to Leola, South Dakota.

## **MISO-SPP Joint Transmission Study**

Following approval by the SPP Seams Steering Committee, and the MISO Interregional Planning Stakeholder Advisory Committee, it was agreed that the two RTOs would conduct a joint study to look at the newly created Integrated System “seam” between their markets in the Upper Midwest (primarily North Dakota, South Dakota, and Iowa). Seam issues are generally trading barriers that can arise when there are differences between market rules and designs that can affect the efficiency and reliability of transmission where two RTOs border each other.

## **TransGrid-X 2030**

MISO, SPP and a number of others are participating in evaluation of a major grid expansion that would include transmission across ISO marketing areas from the eastern part of the US to the west coast. The National Renewable Energy Lab has recently completed an analysis of energy that would move back and forth through such a grid allowing for more consistent availability of renewable energy to a broad part of the country when renewable generation is available and demand dictating need for energy.

**North Dakota Utility Scale Generation report** *(all data is in calendar year)*

**Renewable generation-** North Dakota has approximately 3000 MW of wind generation at more than 30 locations in service. The average capacity factor for 2017 (measure of actual generation to maximum possible at rated capacity) for the fleet of North Dakota wind generators is between 40 and 50%.

**Solar generation-** North Dakota does not currently have any utility scale generation facilities in service.

**Thermal coal generation-** North Dakota currently has thermal coal generation in service at seven locations. These sites include a total of 12 generating units. The combined capacity of the units is approximately 4000 MW. The average capacity factor for 2017 was 76.5%.

**Hydro generation-** North Dakota has one hydro generation site containing 5 units with a total capacity of 583 MW. The average capacity factor for 2017 for the hydro unit was 57.8%.

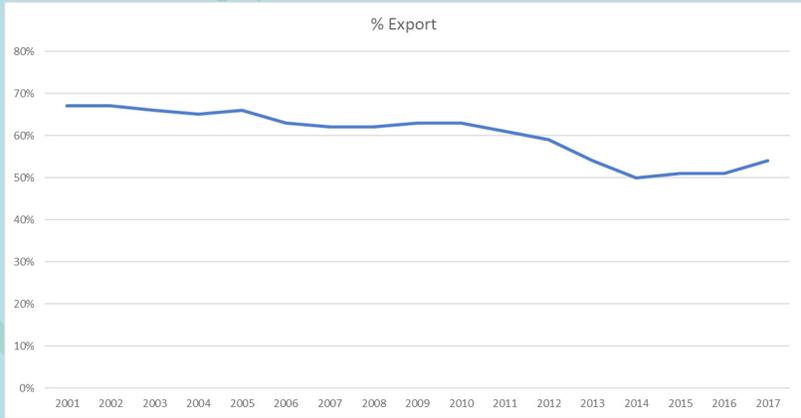
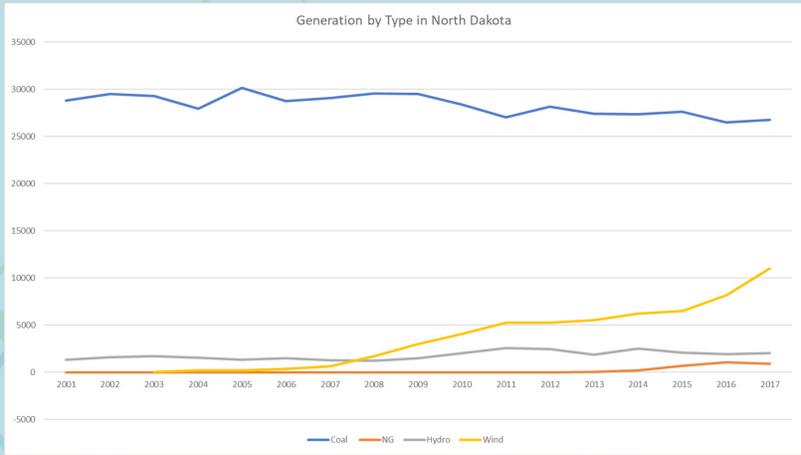
**Natural gas generation-** North Dakota has three sites for electric generation utilizing natural gas. These three sites contain 7 generating units for a total nameplate capacity of 7 natural gas generators owned by electric utilities. Nameplate capacity totals 451.0 MW. Summer Capacity is 328.0 MW. These units are reciprocating engines and gas turbines. The large variation in summer capacity is due to performance of gas generators in hot weather.

The combined total of all types of utility scale generation is over 8000 MW.

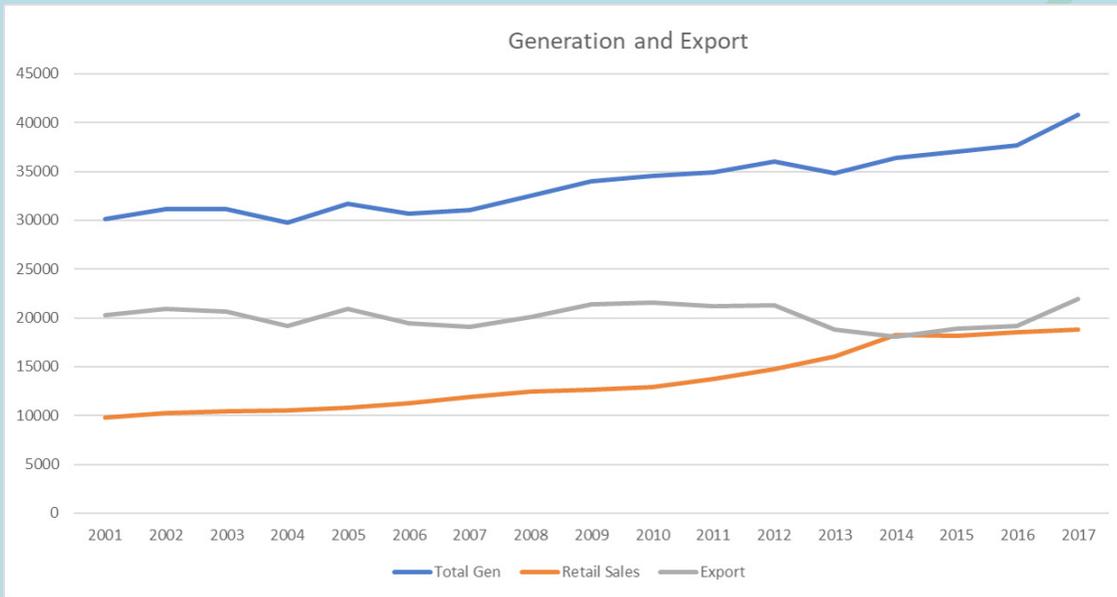
**Electric energy utilization**

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 2017 a total of 40,776 MWhr was generated from all sources in North Dakota. Of that total 54% was exported outside of the state.

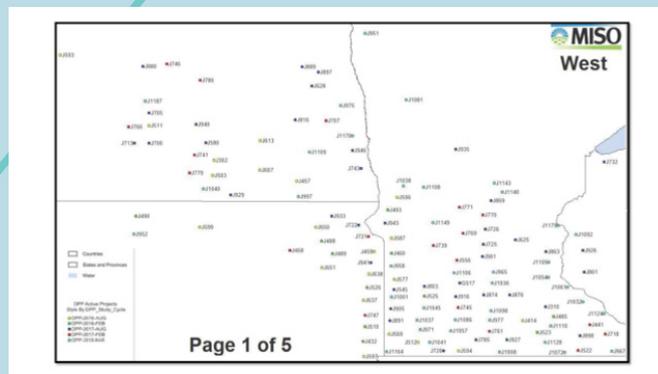


While demand in markets outside of North Dakota and in all but the western part of North Dakota has remained quite flat in recent years, the growth of demand in the Bakken region has been notable. Growth of total generation in the last 15 years has grown from 30,136 MWhr to 40,776 MWhr. Retail sales has grown from 9810 MWhr to 18,843 MWhr due in large part to growth associated with Bakken oil development.



### Generation in Queue 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 both MISO and SPP. The projects in Queue include both wind generation and utility scale solar generation. The MISO Queue includes 33 projects in North Dakota for a total of 5,280 MW capacity. Four of those projects are designated as solar and 28 as wind.



## MISO Queue - Total MW 5,280.54

County	State	POI Name	Summer MW	Winter MW	Fuel	Generating Facility	Request Status
McIntosh County	ND	Wishek Junction 230 kV Substation	250	250	Wind	WT Wind Turbine	Active
Cass County	ND	Bison 345kV Substation	207	207	Wind	WT Wind Turbine	Active
Cass County	ND	Bison 345 kV Substation	200	200	Solar	PV Photovoltaic	Active
Mercer County	ND	Stanton 230 kV Substation	151.8	151.8	Wind	WT Wind Turbine	Active
Emmons County, Logan County	ND	230kV Heskett-Wishek	100	100	Wind	WT Wind Turbine	Active
Dickey County	ND	Merricourt Substation	150	150	Wind	WT Wind Turbine	Active
Emmons County, Logan County	ND	230 kV Heskett-Wishek, 20 miles NW of Wishek	100	100	Wind	WT Wind Turbine	Active
Oliver County	ND	GRE Stanton Substation 230 kV bus, Stanton ND	200	200	Wind	WT Wind Turbine	Active
Burleigh County	ND	Wishek to Heskett 230kV	305.9	305.9	Wind	WT Wind Turbine	Active
Williams County	ND	Trioga 4 230kV Substation (MDU)	224	224	Wind	WT Wind Turbine	Active
Logan County	ND	Wishek - Heskett 230kV line	150	150	Wind	WT Wind Turbine	Active
Stutsman County	ND	Jamestown Substation 115kV	100	100	Wind	WT Wind Turbine	Active
Grand Forks County, Nelson County	ND	Prairie 230kV Substation	400	400	Wind	WT Wind Turbine	Active
Morton County	ND	Tri-county 230 kV substation	100	100	Wind	WT Wind Turbine	Active
Morton County	ND	Tri-county 230kV sub	100	100	Wind	WT Wind Turbine	Active
Barnes County	ND	Buffalo 345kV	300	300	Wind	WT Wind Turbine	Active
Oliver County	ND	Square Butte 230kV Substation	300	300	Wind	WT Wind Turbine	Active
Emmons County, Logan County	ND	Wishek - Linton 115kV	51	51	Wind	WT Wind Turbine	Active
Cass County	ND	Bison 345kV Substation	211	211	Wind	WT Wind Turbine	Active
McHenry County, McLean County, Ward County	ND	Stanton-McHenry 230kV	200	200	Wind	WT Wind Turbine	Active
Oliver County	ND	Square Butte 230kV Substation	3.84	3.84	Wind	WT Wind Turbine	Active
Emmons County, Logan County	ND	Bismarck-Unton 115kV	51	51	Wind	WT Wind Turbine	Active
Sheridan County	ND	Harvey - Underwood 230kV Line	200	200	Wind	WT Wind Turbine	Active
Cass County	ND	Buffalo 115kV Substation	60	60	Solar	PV Photovoltaic	Active
Ward County	ND	Magie City 230kV sub	150	150	Wind	WT Wind Turbine	Active
Nelson County	ND	Ramsey - Prairie 230kV Line Tap	150	150	Wind	WT Wind Turbine	Active
Grand Forks County	ND	Prairie - Ramsey 230 kV line	190	190	Wind	WT Wind Turbine	Active
McIntosh County	ND	Wishek 115 kV Substation	25	25	Solar	PV Photovoltaic	Active
Burleigh County	ND	Jamestown - Center 345kV Line	100	100	Wind	WT Wind Turbine	Active
Cass County	ND	Bison 345kV Substation	200	200	Solar	PV Photovoltaic	Active
Cass County	ND	Buffalo 115kV Substation	150	150	Wind	WT Wind Turbine	Active
LaMoure County	ND	Elliendale 230kV Substation	200	200	Solar	PV Photovoltaic	Active
			Total MW	5280.54			

The SPP Queue includes 15 projects in North Dakota totaling 2,005 MW.

## SPP Queue - Total MW 2,005

Generation Interconnection Number	Nearest Town or County	State	CA	In-Service Date	Capacity	Service Type	Generation Type	Substation or Line	
GEN-2016-108	Mercer	ND	WAPA	6/1/2019	202ER	Wind	Wind	Antelope Valley Station-Charlie Creek 345kV	
GEN-2016-130	Mercer	ND	WAPA	12/31/2019	202ER	Wind	Wind	Leland Olds 345 kV	
GEN-2016-151	Burke	ND	WAPA	12/31/2019	202ER	Wind	Wind	Tande 345kV	
GEN-2016-152	Burke	ND	WAPA	12/31/2019	102ER	Wind	Wind	Tande 345kV	
GEN-2016-155	Burleigh	ND	WAPA	12/31/2017	1.3ER	Wind	Wind	Hilken 230kV	
GEN-2017-010	Bowman County	ND	BEPC	12/31/2019	200.1ER	Wind	Wind	Rhame 230 kV Sub	
GEN-2017-048	Williams County	ND	BEPC	12/1/2020	300ER	Wind	Wind	Trioga - Williston 230 kV	
GEN-2017-214	Ward	ND		12/1/2020	100ER/NR	Wind	Wind	Logan 230kV station	
GEN-2017-215	Ward	ND		12/1/2020	100ER/NR	Wind	Wind	Logan 230kV station	
GEN-2017-216	Ward	ND		12/1/2020	100ER/NR	Wind	Wind	Logan 230kV station	
GEN-2017-235	Ward	ND		12/1/2020	50ER/NR	Wind	Wind	Berthold 115kV station	
GEN-2017-236	Ward	ND		12/1/2020	50ER/NR	Wind	Wind	Berthold 115kV station	
GEN-2018-008	McIntosh	ND		9/30/2021	252ER/NR	Wind	Wind	Groton-Leland Olds 345kV	
GEN-2018-010	Montrail	ND		12/1/2021	74.1ER/NR	Battery	Battery	Tande 345kV	
GEN-2018-039	LaMoure	ND		12/31/2020	72ER/NR	Solar	Solar	Edgeley 115kV substation	
					Total	2005.5			

## Renewable Energy Credits

Each unit of electricity generated from a renewable source such as wind or solar carries with it a renewable energy credit (REC). The REC program is authorized by the USEPA to encourage renewable generation. The REC is a separate commodity from the electricity. 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 component so can be used as desired toward most mandatory or voluntary renewable energy obligations.

## KEY ELEMENT: OUTREACH

Outreach is another significant element of the Authority's mission. To accomplish this task, the Authority works with interested parties, either through one-on-one contacts, or through participation with other organizations, agencies, and programs focused on transmission. These interactions are essential to identify issues and develop solutions to further improve and expand electric transmission in North Dakota.

### Transmission Updates

There have been a number of transmission projects completed in the past four years and a number are underway that expand the transmission available to North Dakota generators or may in some way affect transmission or generation in North Dakota. Transmission owners and generation owners generally agree that these improvements have removed most of the congestion that has been affecting generation reaching existing markets. There is occasional congestion related curtailment of generation when line outages occur, but most curtailment is due to market demand. The transmission improvements are summarized briefly below.

**CapX2020** - CapX2020 is a Minnesota-based initiative of 11 utilities to upgrade and expand the transmission grid in the Upper Midwest. CapX2020 partners have worked together to plan and build nearly 800 miles of new high-voltage transmission lines across Minnesota, Wisconsin, North Dakota, and South Dakota, with a total investment of \$2.1 billion. New transmission lines designed to serve the expected growth and meet regional Renewable Energy Standard (RES) requirements as listed below have been constructed and placed in service by the end of 2017.

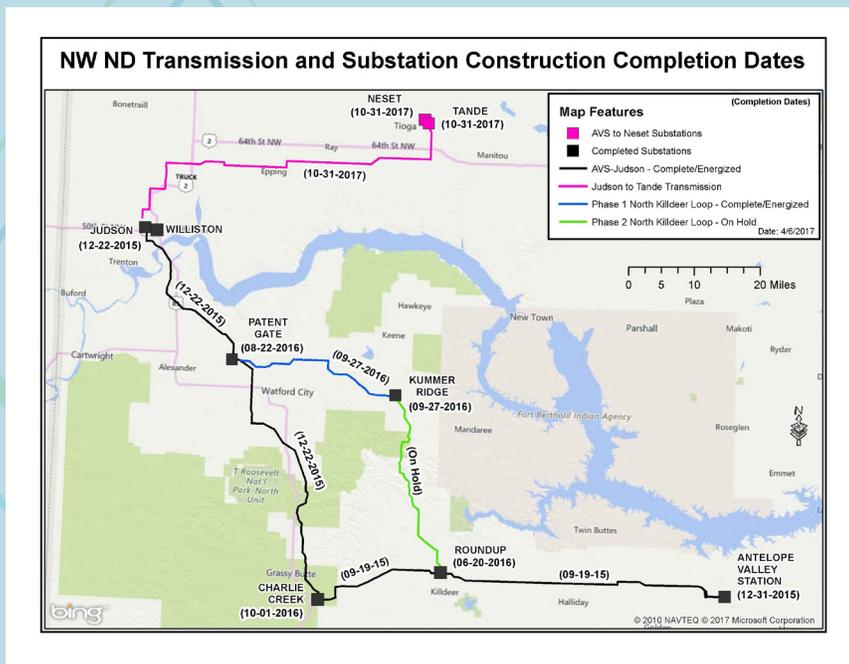
**Bemidji-Grand Rapids, 68 miles, 230-kV**  
**Fargo-St. Cloud-Monticello, 240 miles, 345-kV**  
**Hampton-Rochester-La Crosse, 150 miles, 345-kV**  
**Brookings County-Hampton, 200 miles, 345-kV**  
**Big Stone South-Brookings County, 70 miles, 345-kV**

**Minnkota Power Cooperative Project** – In 2014, Minnkota saw the completion of its largest-ever capital investment in transmission facilities. The \$353 million, 250-mile Center to Grand Forks (CGF) line transports energy from the Milton R. Young Station near Center, N.D., to Minnkota's service territory in eastern North Dakota and northwest Minnesota.

**Basin Electric Power Cooperative Western ND Project** - In response to growth in western North Dakota related to oil and gas development, BEPC constructed a 200-mile 345kV line from the Antelope Valley Station (AVS) to the Nenet Substation near Tioga, North Dakota. Construction of the AVS to Judson Substation, near Williston, line segment began in 2014 and was placed in service in 2015. The final segment to Nenet was placed in-service in 2017.

BEPC completed Phase I of the North Killdeer Loop in 2016. This project consists of approximately 28-miles of 345kV line and two substations that tie into the AVS-Nenet Line west of Watford City. It delivers power to the service territory of the McKenzie Electric Cooperative. Phase II of the North Killdeer Loop, which will be placed north of Killdeer is on hold pending approval from the Southwest Power Pool.

BEPC also has other plans to be implemented at such time as demand dictates. They will monitor the growth in the area and submit plans for approval as the need develops.



AVS to Nenet Line, including North Killdeer Loop

Image Courtesy of Basin Electric Power Cooperative

**Big Stone South to Ellendale (BSSE)** - Construction began in 2016 on the Big Stone South to Ellendale MVP line. BSSE is a 150-175 mile transmission line from the Big Stone South substation to the proposed Ellendale substation near Ellendale, North Dakota. Montana-Dakota Utilities Co. and Otter Tail Power Company will jointly own the line. MISO has scheduled the line to be in service by 2019.

### **Great River Energy High Voltage Direct Current (HVDC) Refurbishment -**

In December 2015, GRE's Board of Directors approved the largest transmission refurbishment project in the organization's history. GRE's 436-mile HVDC line has provided 99 percent reliability since being put into service in 1978, transporting power from the Coal Creek Station in Underwood, N.D., to the Dickinson Converter Station in Buffalo, MN. There, electric power is converted to alternating current and distributed within GRE's service territory in Minnesota. GRE intends to invest approximately \$200 million to overhaul converter stations, replace valve electronics, and upgrade components to improve performance and extend the life of the HVDC line, project planning studies and design began in 2016 and the upgraded system will be placed in-service in 2019.

**Montana-Dakota Utilities Subtransmission Improvements -** MDU is continuing to focus on several projects to replace aging subtransmission infrastructure. Work completed through 2017 includes replacing large power transformers at Dickinson and Mandan, installing reactors and upgrading facilities at Wishek, and protection & control upgrades at several substations. In 2018, MDU continued work on transmission projects in Watford City, upgrades in Ellendale for the BSSE line, and equipment replacements in Bismarck.

**Great Northern Transmission Line Project -** The Great Northern Transmission Line Project includes approximately 225 miles of new 500 kV transmission line connecting Manitoba to northeastern Minnesota's Iron Range. While not directly impacting North Dakota, the Great Northern Transmission Line is an integral component to realizing the regional benefits of synergies between flexible Canadian hydropower resources and intermittent wind resources in North Dakota and the rest of the Upper Midwest, as demonstrated in MISO's Manitoba Hydro Wind Synergy Study. Minnesota Power is continuing to work on their portion of the project. The investment by Minnesota Power is expected to be \$300 to \$350M for completion.

**Xcel Energy Transmission Development Company -** Xcel Energy Transmission Development Company, LLC (XETD) received a conditional approval in November of 2014 for a transmission Formula Rate for inclusion in the MISO Open Access Transmission, Energy and Operating Reserve Markets Tariff. XETD is a transmission-only company established by Xcel Energy Inc. to, among other things, develop and own transmission projects in the MISO region. With development of the FERC Order 1000 competitive bid process now complete, XETD will be an active participant in transmission development in the MISO region.

## KEY ELEMENT: GOVERNMENT ACTION

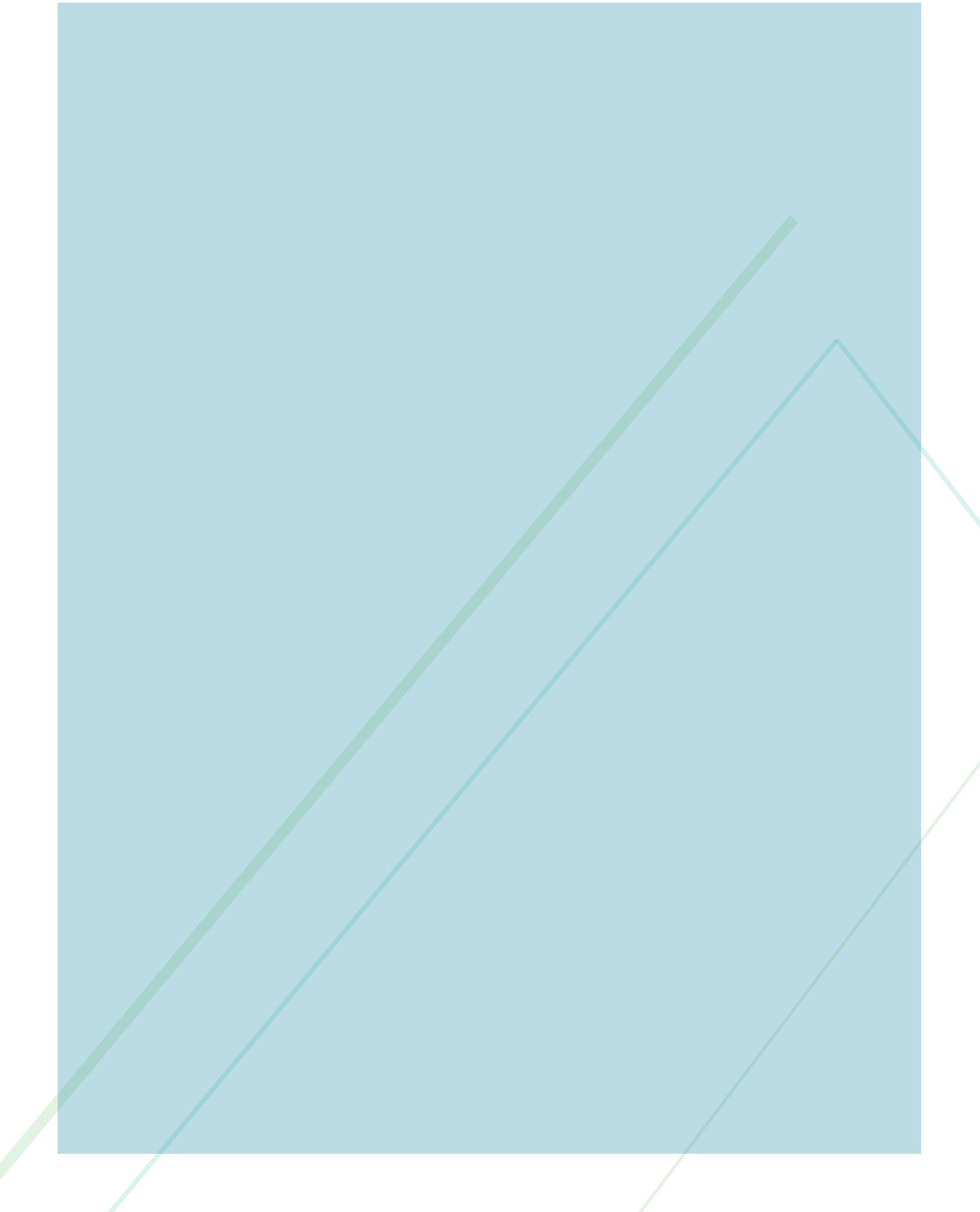
Another function of the Authority staff is to act as a resource for elected officials and policymakers, and provide the necessary information to help make informed decisions. Whether the issue involves working on state energy policy regarding transmission development, or commenting on federal transmission 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, Attorney General's Office, Department of Commerce, the ND Public Service Commission, and the ND Congressional Delegation.

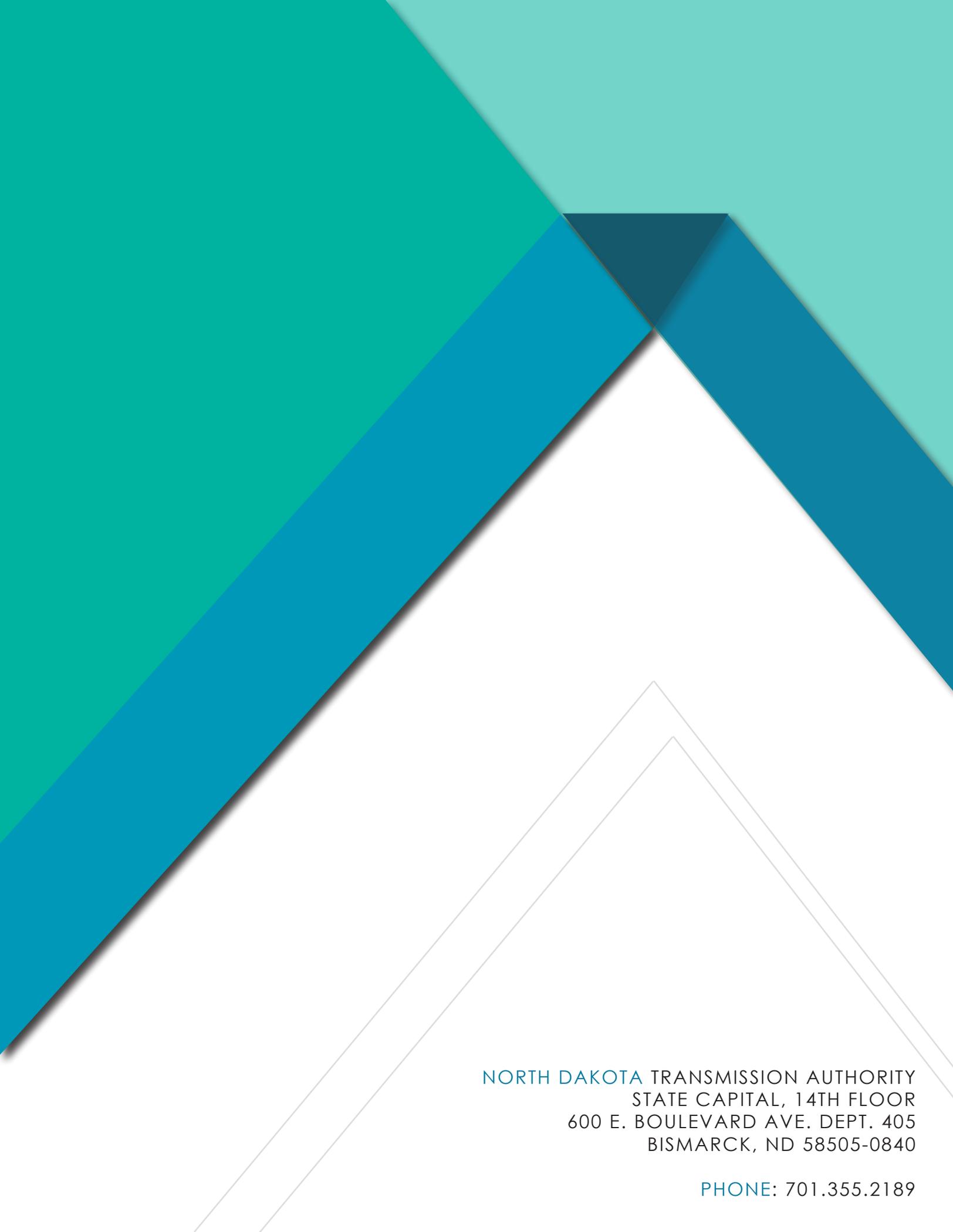
- **EmPower ND Commission** - The Authority was an active participant in the EmPower ND Commission work. Authority activities included briefing the Commission on transmission issues in North Dakota and participating in development of Commission goals. The 2016 EmPower ND report highlighted transmission as a key infrastructure need in North Dakota, and expressed support for continued support of R&D funding to facilitate development of transformational energy technologies, as well as enhance understanding of integration between traditional and renewable electric generation sources.
- **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. In particular, regular meetings are held with the representatives from the Public Service Commission to discuss transmission issues and receive updates from RTOs. On occasion other offices request technical support and policy guidance from Authority staff.

# CONCLUSION

The electric transmission system in North Dakota is in good condition for the needs at this point in time. The increased retail demand in North Dakota has contributed to the current good operation of the grid. The physical work that is being done will continue to enhance the grid and update older portions. No major expansions are in the current planning. The size of the queues at MISO and SPP is evidence of the continuing interest to add generation which reach the limits of the existing grid as expansion occurs. The evidence that the current markets have adequate supply also suggests that growth of the generation capability needs to reach additional markets both within North Dakota and in other states to be optimally utilized.

This picture of the future is evidence that North Dakota needs to be looking forward to the need for additional transmission. The national grid as envisioned by the NREL study presented at the TransGrid 2030 conference is an avenue that would achieve the access to markets and transmission to get the electricity there. Active participation in this or similar concepts as they develop is important. If North Dakota is not represented and the grid happens, but not in North Dakota, the additional generation in North Dakota could be stranded by future congestion in the transmission system.





NORTH DAKOTA TRANSMISSION AUTHORITY  
STATE CAPITAL, 14TH FLOOR  
600 E. BOULEVARD AVE. DEPT. 405  
BISMARCK, ND 58505-0840

PHONE: 701.355.2189