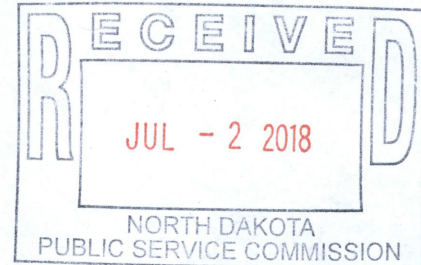


2302 Great N. Drive  
Fargo, ND 58102  
(701) 241-8632  
dave.sederquist@xcelenergy.com

July 2, 2018

—Via Electronic Filing & Federal Express—

Darrell Nitschke, Executive Secretary  
North Dakota Public Service Commission  
600 East Boulevard, Dept. 408  
Bismarck, ND 58505



RE: NORTHERN STATES POWER COMPANY  
BIENNIAL TEN-YEAR PLAN

Dear Mr. Nitschke:

In accordance with Section 49-22-04 of the North Dakota Century Code, Northern States Power Company, doing business as Xcel Energy, hereby submits 10 copies of its Annual Ten-Year Plan for Major Generation and Transmission Facilities in the state of North Dakota. The information contained in the report is in compliance with the rules and regulations of the North Dakota Public Service Commission, as well as the provisions of the Settlement Agreement in Case No. PU-10-657.

In compliance with section 69-06-02-02, notice of the filing has been given to each state agency and officer entitled to notice as designated in section 69-06-01-05. A service list is attached.

Please feel free to contact me at [dave.sederquist@xcelenergy.com](mailto:dave.sederquist@xcelenergy.com) or (701) 241-8632 if you have any questions regarding this report.

Sincerely,

DAVID H. SEDERQUIST  
SR. REGULATORY CONSULTANT  
XCEL ENERGY

Enclosures

c: Service List (WITHOUT ENCLOSURES)

## CERTIFICATE OF SERVICE

I, Carl Cronin, hereby certify that I have this day served notice of the foregoing document on the attached list of persons by delivery by hand or by causing to be placed in the U.S. mail at Minneapolis, Minnesota.

TEN-YEAR PLAN FOR MAJOR GENERATION AND TRANSMISSION FACILITIES IN THE STATE OF NORTH DAKOTA

Dated this 2nd day of July 2018

/s/

---

Carl Cronin  
Regulatory Administrator

Northern States Power Company d/b/a Xcel Energy  
2018 North Dakota Ten-Year Plan  
Service List – Notice of Filing

Darrell Nitschke  
Executive Secretary  
North Dakota Public Service Commission  
600 East Boulevard Ave., Dept. 408  
Bismarck, ND 58505

Aeronautics Commission  
PO Box 5020  
Bismarck, ND 58502

Attorney General  
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600 East Boulevard Ave., Dept. 125  
Bismarck, ND 58505

Department of Agriculture  
State Capitol Building, 6<sup>th</sup> Floor  
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Bismarck, ND 58505-0020

Department of Health  
State Capitol Building  
2nd Floor Judicial Wing  
600 East Boulevard Ave.  
Bismarck, ND 58505-0200

Department of Human Services  
State Capitol, Judicial Wing  
600 East Boulevard Ave., Dept 325  
Bismarck, ND 58505-0250

ND Department of Labor & Human Rights  
State Capitol, 13<sup>th</sup> Floor  
600 East Boulevard Ave.  
Bismarck, ND 58505-0340

Department of Commerce  
Division of Economic Development & Finance  
Century Center  
1600 East Century Ave., Suite 2  
PO Box 2057  
Bismarck, ND 58502-2057

Energy Development Impact Office  
1707 N. 9th St  
PO Box 5523  
Bismarck, ND 58506-5523

Game & Fish Department  
100 North Bismarck Expressway  
Bismarck, ND 58501-5095

North Dakota Industrial Commission  
Geological Survey  
1016 East Calgary Ave.  
Bismarck, ND 58503

Governor's Office  
State Capitol Building, 1<sup>st</sup> Floor  
600 East Boulevard Ave., Dept 101  
Bismarck, ND 58505-0001

Department of Transportation  
608 East Boulevard Ave.  
Bismarck, ND 58505-0700

State Historical Society of North Dakota  
Heritage Center, Capitol Grounds  
612 East Boulevard Ave.  
Bismarck, ND 58505-0830

Indian Affairs Commission  
State Capitol, 1<sup>st</sup> Floor Judicial Wing – Rm 117  
600 East Boulevard Ave.  
Bismarck, ND 58505-0300

Job Service of North Dakota  
1000 East Divide  
PO Box 5507  
Bismarck, ND 58506-5507

State Land Department  
1707 N. 9<sup>th</sup> St.  
PO Box 5523  
Bismarck, ND 58506-5523

Parks and Recreation Department  
1600 East Century Ave., Suite 3  
Bismarck, ND 58503-0649

Soil Conservation Committee  
2718 Gateway Ave., Ste. 104  
Bismarck, ND 58503-0585

State Water Commission  
900 East Boulevard Ave., Dept. 770  
State Office Building  
Bismarck, ND 58505-0850

United States Department of Defense  
Minot Air Force Base  
201 Summit Drive  
Minot, ND 58701

United States Fish and Wildlife Service  
3425 Miriam Avenue  
Bismarck, ND 58501

United States Army Corps of Engineers  
1513 South 12<sup>th</sup> Street  
Bismarck, ND 58504

Federal Aviation Administration  
Bismarck Airports District Office, BIS-ADO-600  
2301 University Drive, Building 23B  
Bismarck, ND 58504

North Dakota Transmission Authority  
c/o North Dakota Industrial Commission  
600 E. Boulevard Ave., Dept 405  
State Capitol, 14<sup>th</sup> Floor  
Bismarck, ND 58505-0840

North Dakota Pipeline Authority  
c/o North Dakota Industrial Commission  
600 E. Boulevard Ave., Dept 405  
State Capitol, 14<sup>th</sup> Floor  
Bismarck, ND 58505-0840

**TEN-YEAR PLAN FOR  
MAJOR GENERATION AND  
TRANSMISSION FACILITIES**

**TO THE**

**NORTH DAKOTA  
PUBLIC SERVICE COMMISSION**

**SUBMITTED BY  
NORTHERN STATES POWER COMPANY,  
A MINNESOTA CORPORATION  
JULY 2, 2018**



**Northern States Power Company  
2018 North Dakota Ten-Year Plan**

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**STATE OF NORTH DAKOTA  
BEFORE THE  
NORTH DAKOTA PUBLIC SERVICE COMMISSION**

IN THE MATTER OF THE 2018 TEN-YEAR  
PLAN OF NORTHERN STATES POWER  
COMPANY, DOING BUSINESS AS XCEL  
ENERGY

TEN-YEAR PLAN

**INTRODUCTION**

Northern States Power Company, doing business as Xcel Energy with operations in North Dakota, (Xcel Energy or the Company) is pleased to submit our biennial Ten-Year Plan to the North Dakota Public Service Commission (Commission) in compliance with Section 49-22-04 of the North Dakota Century Code.

The NSP-Minnesota operating company (NSPM) has service territory in North Dakota, South Dakota, and Minnesota. NSP-Wisconsin (NSPW) has service territory in Wisconsin and Michigan. The Company operates the NSPM and NSPW generation and transmission as the NSP System. We presently serve approximately 92,000 retail electric customers in North Dakota around Fargo, Grand Forks, and Minot, and 54,000 natural gas customers in the Fargo and Grand Forks areas. The Company owns just over 430 miles of transmission lines and 20 substations (69kV and above) in North Dakota.

This Ten-Year Plan contains expanded information in compliance with the Settlement Agreement in Case No. PU-07-776 and Order points in Case Nos. PU-08-907 and PU-08-908 including:

- A summary of the major generation and transmission investments and purchase agreements we plan to pursue over the next 5 years; and
- A schedule of anticipated future applications for Advance Determination of Prudence (ADP) (Appendix B).
- A report of reductions in energy production at its base load generation units due to the existence of wind generation, and the impacts and costs of cycling coal plant production to accommodate off-peak wind generation (Appendix C).

## I. ELECTRIC GENERATION FACILITIES

### A. Existing Facilities

In this section, we describe the general location, size, and type of all facilities in North Dakota to be owned or operated by Xcel Energy during the next ten years, as well as those facilities to be removed from service during the ten-year period.

#### 1. *Border Winds Wind Facility.*

The company owns and operates the 150 MW Border Winds wind facility near Rolla, North Dakota. The facility is comprised of 75 Vestas V100 2.0 MW turbines with variable pitch blades. The Border Winds footprint spans nearly 25,000 acres in the northeastern part of Rolette County. The plant went into service in December, 2015.

#### 2. *Courtenay Wind Facility.*

The company owns and operates the 200 MW Courtenay wind facility north of Jamestown, North Dakota. The facility is comprised of 100 Vestas V100 2.0 MW turbines with variable pitch blades. The Courtenay facility spans nearly 25,000 acres in northeastern Stutsman County. The plant went into service in December, 2016.

#### 3. *Purchases of Power Produced in North Dakota.*

In its previously filed 2016 Ten-year Plan, the Company reported that it had a Transmission Service Agreement (TSA) known as the “Stanton Displacement Agreement” in which 188 MW was supplied from Great River Energy’s Stanton Unit, located in the vicinity of Stanton, North Dakota, for NSP’s North Dakota loads. However, Great River Energy (GRE) retired the Stanton unit in 2017, and the TSA was terminated on October 22, 2017. FERC accepted the termination of the TSA in Docket No. ER17-2344-000.

Xcel Energy also has a twenty-year power purchase agreement (PPA), through January 18, 2026, with Acciona Wind Energy USA for energy supplied from its 11.88 MW Velva Windfarm located in McHenry County, North Dakota.

See Appendix A for a listing of *all* generating plants owned and operated by Xcel Energy that serve the Company’s Upper Midwest (NSP) System.



## **B. Proposed Facilities – Next Five Years**

In this section, we provide the locations of the preferred sites for all electric generating facilities tentatively planned to be constructed in North Dakota within the next five years. In addition, we provide brief summaries of key generation additions contemplated within the larger NSP System, per the terms of the Settlement in Case No. PU-07-776.

We note that the Company filed its 2016-2030 Upper Midwest Resource Plan (IRP) with the Minnesota Public Utilities Commission (MPUC) (Docket No. E002/RP-15-21) on January 2, 2015, and filed a substantive supplement on January 29, 2016. Copies of the plan and supplement were also filed with the North Dakota Commission (Case No. PU-15-019). The MPUC approved the IRP in October 2016.

The Company plans to file its next IRP on February 1, 2019. Our resource plan modeling includes a planning scenario based on meeting North Dakota requirements – specifically, the exclusion of environmental externalities, as required by N.D.C.C. §49-02-23, and removing energy-related mandates imposed on the Company by other states.

We propose to continue to fulfill our future NSP System electric generating resource needs through multiple resource acquisition processes including competitive bidding, Company ownership, PPAs, and demand side management.<sup>1</sup> This multi-pronged and flexible approach to resource acquisitions facilitates multiple generation technologies and locations.

### ***North Dakota Generation***

#### *1. Foxtail Wind.*

The Company is pursuing the addition of 1,850 MW of wind on its NSP System as a result of a comprehensive RFP issued in September 2016. As part of this portfolio, the Company is constructing a 150 MW wind facility in Dickey County on a 20,000 acre site about 20 miles west of Ellendale, North Dakota. It is anticipated that commercial operations will commence by September 2019.

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<sup>1</sup> While the Company has included proposed resources in its Resource Plan, at this point there are no specific plans with sufficient information for listing in the Anticipated ADP Petitions table in Appendix B.

2. *Clean Energy #1 Wind.*

As part of its 1,850 MW wind portfolio proposal, the Company has entered into a PPA with Allete Clean Energy (ACE) for the purchase of power from a 100 MW wind facility being constructed in Dickey County on a 20,000 acre site about 20 miles west of Ellendale, North Dakota. It is anticipated that commercial operations will commence by September 2019.

***Other NSP System Generation***

3. *Other Projects in the 1,850 MW Wind Portfolio.*

The Company solicited several wind projects through an RFP issued in September 2016. As a result, the Company is pursuing multiple wind resources as Power Purchase Agreements, Build-Own-Transfer agreements, and Company self-build projects, totaling 1,850 MW. In addition to the two projects in North Dakota, there are seven other sites located in South Dakota, and Minnesota. ADP's were filed for these projects with the Commission on March 29, 2017 in Case No. PU-17-120 and October 10, 2017 in Case No. PU-17-372. We submitted supplemental filings on May 18, 2018 and March 23, 2018, in each respective docket, that address the impacts of the Tax Cuts and Jobs Act (TCJA) on the costs of the propose wind projects. The dockets are still pending. Below is the list of wind projects located outside of North Dakota with commercial operation dates indicated.

<b>Wind Farm</b>	<b>Size</b>	<b>Location</b>	<b>COD</b>
Blazing Star I Wind Farm	200 MW	Hendricks, MN	2019
Blazing Star II Wind Farm	200 MW	Hendricks, MN	2020
Freeborn Wind Farm	200 MW	Glenville, MN	2020
Crowned Ridge Wind Farm	300 MW	Watertown, SD	2019
Crowned Ridge Purchase Agreement	300 MW	Watertown, SD	2019
Lake Benton Wind Farm	100 MW	Lake Benton, MN	2019
Dakota Range Wind Farm	300 MW	Watertown, SD	2021

4. *Mankato Energy Center Unit 2.*

In 2015, the Minnesota Commission approved a proposal made by the Calpine Corporation for the expansion of the Mankato Energy Center (MEC). The Company subsequently filed an ADP Application with the North Dakota Commission for 345 MW of capacity and associated energy to be added to the NSP System through a 20-year PPA with MEC in Case No. PU-15-96. On March 23, 2016, the Commission

dismissed our application without prejudice. Commercial operation is anticipated for 2<sup>nd</sup> Quarter 2019.

### **C. Proposed Facilities – Next 10 Years**

At this time, specific plans for additional electric generation facilities in the State of North Dakota over the next 10 years include the 150 MW Foxtail wind energy facility and the 100 MW Clean Energy #1 PPA as previously discussed.

Additionally, on March 9, 2016, the Commission approved the First Revised Negotiated Agreement between the Company and Commission Advocacy Staff that included a commitment by the Company to build generation in North Dakota. Specifically, the terms of the agreement are as follows:

*By the end of 2025, [the Company] will build or have located in eastern North Dakota a natural gas-fired electric generation facility with a capacity of at least 200 MW. The combustion turbine will be treated as an [Xcel Energy] System resource and its costs will be allocated to all states and customers served by the [Xcel Energy] System. If the combustion turbine is not in-service by December 31, 2025, [the Company] will refund to its North Dakota customers 50 percent of the revenues collected from North Dakota customers that exceed the revenues that would have been collected from January 1, 2016 through December 31, 2025 if North Dakota customers had paid an adjusted system average cost for fuel, and energy and associated capacity, for the six biomass PPAs identified in the Negotiated Agreement.<sup>2</sup>*

The Commission's March 9, 2016 Order also outlined the need for a long-term Resource Treatment Framework (RTF) to appropriately address resource energy policy differences in the states within the NSP System, which the Company was required to file with the Commission by January 1, 2017.<sup>3</sup> The Company filed its RTF proposal on December 31, 2016, consistent with the terms of the Negotiated Agreement. The RTF docket is still pending before the commission.

See Appendix B for a schedule of the pending and future ADP requests by the Company for generation resources.

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<sup>2</sup> *N. States Power Co. 2013 Elec. Rate Increase Application et al.*, Case Nos. PU-12-813, PU-13-706, PU-13-707, PU-13-708, PU-13-742, PU-13-743, PU-13-194, PU-13-195, ORDER APPROVING SETTLEMENT at 4 (N.D. P.S.C. Mar. 9, 2016).

<sup>3</sup> *Id.*

## II. ELECTRIC TRANSMISSION FACILITIES

### A. Existing Facilities

Our existing electric transmission line facilities in North Dakota are listed in Table 1 below. We have no plans to retire any electric transmission facilities in North Dakota within the next 10 years.

**Table 1. NSP North Dakota Transmission Lines**

Line Description	Line Number	kV	Line Mileage
Bison-Alexandria SS (MRES)	0955	345	135.7
<b>Total 345 kV</b>			<b>135.7</b>
Letellier-Drayton	912	230	28.7
Prairie-Grand Forks (WAPA)	916	230	6.8
Maple River-Wahpeton (MPC)	910	230	3.6
Maple River-Sheyenne	911	230	6.6
Sheyenne-Fargo(WAPA)	915	230	4.3
Sheyenne-Lake Park (MPC)	911	230	1.4
Audubon (OTP)-Hubbard (MP)	909	230	38.3
Glenboro (MHEB)-Peace Garden	920	230	2.0
Peace Garden-Rugby (OTP)	920	230	54.4
<b>Total 230 kV</b>			<b>146.1</b>
Maple River-Red River	839	115	5.6
Maple River-Cass County	839	115	2.7
Cass County Tap-Moderow (MPC)	839	115	1.9
Moderow (MPC)-Sheyenne	839	115	1.5
Cass County-Sheyenne	866	115	3.5
Mallard-Souris	860	115	5.3
Souris-Velva	850	115	19.6
Velva-McHenry	850	115	5.2
McHenry-Neal	850	115	0.2
Prairie-Nordic1	5510	115	2
Prairie-Nordic2	5511	115	1.98
<b>Total 115 kV</b>			<b>49.48</b>

Ada-Ada (MPC)	757	69	3.1
Gateway-Grand Forks Steam	746	69	0.9
Gateway-Prairie	746	69	5.5
Grand Forks (WAPA)-Central	786	69	4.6
Central-Sugar Hills	786	69	0.8
Sugar Hills-Park	786	69	0.8
Prairie-Emerado	772	69	13.3
Prarie-Thompson	733	69	8.5
Thompson-Reynolds	773	69	7
Reynolds-South	773	69	10
South-Hillsboro Tap	773	69	8.6
Hillsboro Tap-Hillsboro	773	69	1.9
Hillsboro-Trail County	773	69	1
Trail County-Elm River	773	69	9.3
South-Mayville (MPC)	768	69	12
Mayville (MPC)-Mayville	768	69	1.2
Mayville-Hatton	768	69	14.8
Elk Valley-Larimore	776	69	1.7
<b>Total 69 kV</b>			<b>105.0</b>

## B. Proposed Facilities – Next Five Years

In this section, we provide a brief description of significant transmission developments planned by the Company on its NSP System in North Dakota, which includes updates on previously proposed facilities.

### 1. *Fargo Load Serving*

NSPM's yearly planning assessments have indicated that the existing Fargo area 115 kV system and the 230-115 kV transformers are deficient in the ability to serve the load during double contingency conditions. NSPM performed the "Fargo Load Serving Study" to identify transmission plan to address these load serving deficiencies in this area, and determined that a five mile 115 kV line from Maple River substation to Red River substation would be the least cost option.

The facilities include building five miles of new 115 kV line from Maple River substation to Red River substation, and substation work at Maple River and Red River to accommodate the new line. The Commission approved our application for Red River-Maple River 2<sup>nd</sup> 115 kV line. The expected in-service date is by the end of 2019.

## 2. *Minot Load Serving Plan*

A joint study with Basin Electric Power Cooperative, Western Area Power Administration, and Central Power Electric Cooperative has been completed for the Minot Area. NSP is proposing to construct a new 20 mile 230 kV from GRE's existing McHenry substation to a new propose NSP 230/115 kV substation called Magic City. The new 230 kV will help offload the existing 115 kV lines in the area and provide additional transformation capacity and voltage support to the Minot area. The expected in-service date is the end of 2018.

### **C. Proposed Facilities – Next 10 Years**

Xcel Energy participated in a large regional Multi Value Project (MVP) study with Midcontinent Independent System Operator (MISO) to determine what large regional transmission build-outs would be necessary to increase the overall reliability and efficiency of the transmission system. The costs of these projects are being shared to beneficiaries across the entire MISO North/Central footprint. These projects qualify for MVP cost treatment based on their contributions to increased reliability, economic benefits, or supporting compliance with one or more of the states' renewable requirements.

In addition to the MISO MVP process, Xcel Energy participates in transmission planning with a larger group of utilities called the Minnesota Transmission Owners (MTO). The MTO consists of all of the investor-owned, cooperative, and municipal utilities that own transmission facilities 100 kV and above in Minnesota. Several MTO members (e.g., Xcel Energy, Great River Energy, Otter Tail Power, etc.) also own significant transmission facilities in North Dakota.

## **III. NATURAL GAS PIPELINE FACILITIES**

### **A. Existing Facilities**

We operate an 11.9 mile intrastate natural gas pipeline facility in the state of North Dakota, from an interconnection with Williston Basin Interstate Pipeline Company near Mapleton, North Dakota, to our natural gas distribution system in Fargo, North Dakota. The Commission granted a Certificate of Public Convenience and Necessity and Corridor Certificate for this facility in Case No. PU-400-89-426. We have no plans to retire any intrastate natural gas pipeline facilities in North Dakota within the next 10 years.

## **B. Proposed Facilities - Next Five Years**

At this time we do not have plans to construct any new intrastate natural gas pipeline transmission facilities in North Dakota within the next five years.

## **C. Proposed Facilities - Next 10 Years**

At this time we do not have formal plans to construct any new intrastate natural gas pipeline transmission facilities in North Dakota within the next 10 years. However, we are continually reviewing the potential for serving additional gas retail demand in eastern North Dakota. We will inform the Commission if these projects become viable.

## **IV. REGIONAL COORDINATION**

All major transmission planning performed by the Company is now coordinated through MISO on a regional basis. MISO issues its annual transmission expansion plan MTEP after coordinated planning and stakeholder review.

As a result of complying with the Federal Energy Regulatory Commission Order No. 890 rules, MISO has also implemented Sub-Regional Planning Meetings as part of their annual MTEP development process. We participate in the Western Region meetings. These Sub-Regional Planning meetings provide forums for stakeholder input and coordination of plans and we actively participate in each one. This joint planning is intended to maximize use of existing facilities and minimize the amount of new facilities. More information regarding this joint planning is available at the following link:

<https://www.misoenergy.org/planning/transmission-studies-and-reports/#nt=%2Freport-study-analysis?type%3AMTEP&t=10&p=0&s=&sd=>

Another example of coordination by the utilities is the formalization of the MTO organization, as noted above. In addition to the biennial transmission planning work of the MTO, the MTO utilities also coordinate their transmission planning activities with MISO's MTEP process.

The Company participates in all MISO targeted planning studies, which are studies that happen outside the normal MTEP process. MISO has performed three targeted studies in the last two years.

The first targeted study was the Renewable Integration Impact Assessment. The primary purpose of the Renewable Integration Impact Assessment (RIIA) is to methodically find system integration inflection points driven by increasing levels of renewable generation. Industry studies have shown that the complexity for renewable integration escalates non-linearly with increasing penetrations of renewables. Over certain ranges of renewable penetration, complexity is constant when spare capacity and flexibility exist, but at specific penetration levels when they are depleted, complexity rises dramatically. These are system inflection points, where the underlying infrastructure and/or system operations need to be modified to reliably achieve the next tranche of renewable deployment. This study aims to find those inflection points, and examine potential solutions to mitigate them. This study is available at the following link:

<https://cdn.misoenergy.org/20170927%20PAC%20Item%20003i%20Renewable%20Integration%20Impact%20Assessment%20Assumptions%20Document89950.pdf>

The second study was the Southwest Power Pool Coordinated System Plan. This study was performed to examine if any potential transmission projects between the two markets had mutual benefits. The study examined seven unique transmission projects for the regional planning process. MISO and SPP staff worked together with stakeholders from both markets to determine benefits through a collaborated effort. The transmission options were tested using Adjusted Production Cost (APC) benefits. No projects met the criteria for selection. The Southwest Power Pool Coordinated System Plan is available at the following link:

<https://cdn.misoenergy.org/MTEP17%20Book%203%20Policy%20Landscape106028.pdf>

Finally, MISO performed the Footprint Diversity Study. This studies focus was on the transfer rights between MISO North and MISO South using MISO operated facilities. The primary focus was on potential ways to increase the interface capability using economic drivers. Thirty Five transmission projects were analyzed for potential benefits and none passed the minimum 1.25 Benefit/Cost ratio needed to move on in the next phase of the analysis. The Footprint Diversity Study is available at the following link:

<https://cdn.misoenergy.org/MTEP17%20Book%201%20Transmission%20Studies106030.pdf>



## V. ENVIRONMENTAL PROTECTION

Specific environmental information and efforts to involve land-use planning agencies will be provided to the Commission in future regulatory filings pertaining to specific facilities identified for construction.

## VI. DEMAND PROJECTIONS

The NSP System integrates electric generation and transmission to serve customers in North Dakota, South Dakota, Minnesota, Wisconsin, and Michigan. The North Dakota portion of the NSP System's 25-year historical native energy requirements and non-coincident peak demand are shown in Table 2. We produce long-range "median" NSP System forecasts of native energy requirements, summer peak, and winter peak demand. For planning purposes, we also develop a bandwidth to supplement our median forecasts. These scenarios are intended to describe uncertainty in a business-as-usual context: a relatively narrow range of U.S. economic growth with no fundamental change in the relationship between the regional and national economies. Table 3 shows the long-range system forecast of native energy requirements, summer peak, and winter peak demand for the NSP System. Table 4 shows the North Dakota portion of the NSP System forecast.

The forecast for the NSP System is based on forecasts of state jurisdictional sales by major customer class: residential (with and without space heating), small commercial and industrial, and large commercial and industrial. Each customer class is modeled independently for the five states in the NSP System. The native energy requirements are determined by applying a loss factor on total sales.

The NSP System peak is apportioned to state jurisdictions based on their native energy requirements and respective load factors. Consequently, the summer and winter "coincident peak loads" provided in Table 4 represent the North Dakota jurisdiction customer demand at time of the NSP System seasonal peak demand. This coincident peak demand is appropriate for generating capacity requirement forecasting.

"Non-coincident" peak demand is also used in evaluating transmission capacity requirements. This is because the transmission system must be able to supply the full local customer demand at all times. Due to load diversity caused primarily by weather variations among states within the NSP System, peak customer demands in our North Dakota service area can be higher than it is during the hour in which the total system peak demand occurs. These local "non-coincident" peak demands are also factored in

to the determination of the need for transmission improvements required for load serving functions.

**Table 2. Historical Energy and Peak Load Requirements  
North Dakota portion of NSP System (1989 – 2017)**

<b>Year</b>	<b>Energy (GWh)</b>	<b>Annual Growth</b>	<b>Non-Coincident Peak Load (MW)</b>	<b>Annual Growth</b>
1989	1,844		374	
1990	1,904	3.3%	399	6.7%
1991	1,925	1.1%	373	-6.5%
1992	1,883	-2.2%	376	0.8%
1993	1,771	-5.9%	333	-11.4%
1994	1,796	1.4%	360	8.1%
1995	1,916	6.7%	362	0.6%
1996	1,984	3.5%	382	5.5%
1997	1,911	-3.7%	351	-8.1%
1998	1,958	2.5%	352	0.3%
1999	1,950	-0.4%	363	3.1%
2000	2,053	5.3%	370	1.9%
2001	2,048	-0.2%	384	3.9%
2002	2,119	3.5%	403	4.8%
2003	2,171	2.4%	395	-2.0%
2004	2,158	-0.6%	403	2.2%
2005	2,289	6.1%	426	5.7%
2006	2,353	2.8%	439	3.0%
2007	2,378	1.1%	463	5.5%
2008	2,478	4.2%	427	-7.8%
2009	2,379	-4.0%	427	0.0%
2010	2,422	1.8%	445	4.2%
2011	2,441	0.8%	449	0.9%
2012	2,419	-0.9%	468	4.2%
2013	2,479	2.5%	453	-3.2%
2014	2,491	0.5%	444	-2.0%
2015	2,418	-2.9%	456	2.7%
2016	2,379	-1.6%	436	-4.4%
2017	2,348	-1.3%	423	-3.0%

**Table 3. Forecast of NSP System Energy and Peak Load Requirements  
(2018 - 2036)**

<b>Year</b>	<b>Energy (GWh)</b>	<b>Summer Peak Load (MW)</b>	<b>Winter Peak Load (MW)</b>
2018	43,773	9,060	6,316
2019	43,427	9,004	6,289
2020	43,473	9,015	6,265
2021	43,257	9,050	6,269
2022	43,279	9,110	6,291
2023	43,198	9,144	6,290
2024	43,265	9,188	6,292
2025	43,186	9,222	6,301
2026	43,330	9,283	6,338
2027	43,703	9,391	6,431
2028	44,495	9,525	6,520
2029	44,592	9,600	6,581
2030	44,938	9,691	6,663
2031	45,302	9,780	6,765
2032	46,259	9,962	6,930
2033	47,005	10,203	7,092
2034	47,977	10,432	7,253
2035	49,008	10,654	7,453
2036	50,394	10,912	7,681

**Average Annual Growth Rate, 2018-2036**

<b>% Growth:</b>	<b>0.8%</b>	<b>1.0%</b>	<b>1.1%</b>
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**Notes:**

- 1) Peak Load is *coincident* to the NSP System peak.
- 2) Winter Peak = MISO Winter Peak season, 2016 is 2016 - 2017 winter peak.
- 3) Peak Load is the Base Peak (uninterrupted)

**Table 4. Forecast of Energy and Peak Load Requirements  
North Dakota portion of NSP System (2018 – 2036)**

<b>Year</b>	<b>Energy (GWh)</b>	<b>Summer Peak Load (MW)</b>	<b>Winter Peak Load (MW)</b>
2018	2,405	377	390
2019	2,399	377	387
2020	2,391	375	384
2021	2,378	376	385
2022	2,375	377	385
2023	2,376	380	386
2024	2,380	381	386
2025	2,373	383	386
2026	2,373	383	387
2027	2,370	384	389
2028	2,381	385	389
2029	2,390	385	389
2030	2,404	386	389
2031	2,426	387	388
2032	2,458	387	388
2033	2,483	388	388
2034	2,515	389	388
2035	2,554	390	388
2036	2,607	390	388

**Average Annual Growth Rates, 2018-2036**

<b>% Growth:</b>	<b>0.4%</b>	<b>0.2%</b>	<b>0.0%</b>
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- Notes:**
- 1). Peak Load is *coincident* to the Xcel Energy system peak.
  - 2). Winter Peak = MISO Winter Peak season, 2018 is 2018 - 2019 winter peak.
  - 3). Peak Load forecast growth from 2028 - 2036 is based on average summer and winter ND peak growth rates from 2018 through 2027.

**APPENDIX A**  
**List of Xcel Energy Upper Midwest Generating Plants**

<u>Resource</u>	<u>Fuel</u>	<u>Capacity</u>	<u>Location</u>
Sherburne County	Coal	2,238 MW	Becker, MN
Prairie Island	Nuclear	1,100 MW	Red Wing, MN
Monticello	Nuclear	671 MW	Monticello, MN
High Bridge	Natural Gas CC	530 MW	St. Paul, MN
Allen S. King	Coal	511 MW	Oak Park Heights, MN
Riverside	Natural Gas CC	454 MW	Minneapolis, MN
Wheaton	Natural Gas, Fuel Oil	430 MW	Wheaton, WI
Angus Anson	Natural Gas CT	327 MW	Sioux Falls, SD
Black Dog	Gas, Coal	282 MW	Burnsville, MN
Nobles	Wind	201 MW	Worthington, MN
Courtenay Wind Farm	Wind	200 MW	Courtenay, ND
Pleasant Valley Farm	Wind	200 MW	Austin, MN
Border Winds	Wind	150 MW	Rolla, ND
French Island	Wood, Refuse	140 MW	La Crosse, WI
Grand Meadow	Wind	100 MW	Dexter, MN
Jim Falls	Hydro	60 MW	Chippewa River, WI
Bay Front	Coal, Wood, Nat Gas	56 MW	Ashland, WI
Wissota	Hydro	40 MW	Chippewa River, WI
Holcombe	Hydro	35 MW	Chippewa River, WI
Cornell	Hydro	33 MW	Chippewa River, WI
St. Croix Falls	Hydro	26 MW	St. Croix River, WI
Chippewa Falls	Hydro	24 MW	Chippewa River, WI
Red Wing	Refuse	18 MW	Red Wing, MN
Wilmarth	Refuse	18 MW	Mankato, MN
Flambeau	Natural Gas, Fuel Oil	17 MW	Park Falls, WI
Hennepin Island	Hydro	14 MW	Minneapolis, MN
Dells	Hydro	13 MW	Chippewa River, WI
Big Falls	Hydro	9 MW	Flambeau River, WI
Cedar Falls	Hydro	7 MW	Red Cedar River, WI
Menomonie	Hydro	5 MW	Red Cedar River, WI
Apple River	Hydro	3 MW	Apple River, WI
Ladysmith	Hydro	3 MW	Flambeau River
Superior Falls	Hydro	2 MW	Montreal River, WI
Thornapple	Hydro	2 MW	Flambeau River, WI
Trego	Hydro	2 MW	Namekagon River, WI
Riverdale	Hydro	1 MW	Apple River, WI
Saxon	Hydro	1 MW	Montreal River, WI
White River	Hydro	1 MW	White River, WI
Hayward	Hydro	0 MW	Namekagon River, WI
	<b>Total</b>	<b>7,924</b>	

**APPENDIX B**  
**Schedule of ADP Filings**

Pending ADP Petitions

<b>Project</b>	<b>Date Filed</b>	<b>Case No.</b>
1,550 MW Wind Generation	3/29/2017	PU-17-120
Biomass PPA Terminations	6/30/2017	PU-17-270, 271, 322
300 MW Dakota Range Wind	10/10/2017	PU-17-372

Anticipated ADP Petitions

<b>Project</b>	<b>Estimated Date</b>
North Dakota CT	Completion by 2026

## **APPENDIX C**

### **Report on the Effect of Wind Generation on Baseload Plants**

In the Commission's orders on the Company's applications for Advance Determination of Prudence for the Nobles and Merricourt Wind Projects dated August 12, 2009 in Case Nos. PU-08-907 and PU-08-908, the Commission included the following order points:

2. NSP will report to the extent possible, as part of its annual 10-year plan, all reductions in the energy produced at its base load generation units that would not have occurred except for the existence of wind generation. The report will include the time of the event, length of the event, base load plant affected and the amount of energy not produced at the base load plant during the event.
3. NSP will report, as part of its next 10-year plan, on the impacts and costs associated with taking coal plant production up and down to accommodate wind resources during off peak hours.

#### **Order Point 2**

In response to order point 2, we performed an analysis of the NSP system performance over 8,760 hours from the first hour on April 1, 2017 through the last hour on March 31, 2018. To establish a criteria as to what would constitute reductions in energy production, we looked at the set points for each unit established in our Energy Management System. Units have an economic maximum and an economic minimum set point that comprise the normal dispatch range. For the purposes of this study, we assumed that any time a unit was not operating at its economic maximum, it was "backed down". We then attributed the cause of the reduced baseload production each hour to load, wind, market dispatch, or some combination based on the net energy position for the NSP system over the hour.

As an example, let's assume load is 500 MWs, wind is 100 MWs and Sherco Unit 1 is the only baseload resource online with a maximum capability of 680 MWs. By itself, the NSP system would only need 400 MWs from Sherco to serve load. If the unit were in fact dispatched to 400 MWs by MISO, we would attribute 180 MWs of backed down generation to our load ( $680 - 500$ ), and 100 MWs to the wind. If MISO backed the unit down further to 300 MWs, the additional 100 MW reduction would be attributed to market dispatch. There are also times when baseload units remain loaded above the level necessary to serve the NSP system load net of wind generation due to the market wide demand for energy.

It is important to note that the cause of reductions in baseload energy production cannot be determined with certainty given the regional dispatch of generation in MISO. Wind generation may play a role in MISO market dispatch decisions, but the



Company does not have enough information to determine definitively the cause of these decisions. Nevertheless, the analysis described above provides a reasonable framework for assessing the impact of wind on the NSP system.

The results show that the total amount of energy that was not produced that could have been produced during the study period if no baseload generation was backed down was 2,514,261 MWhs. Wind production contributed to 1,295,715 MWh or 51.5% of MWhs backed down. Changes in customer load accounted for 45,063 MWh or 1.8% of the MWhs backed down. MISO Market Dispatch was responsible for 1,173,484 MWh or 46.7% of the MWhs backed down. There were many hours where baseload generation was backed down for a combination of market dispatch, wind production and customer loads.

Out of the 365 days evaluated, there were 328 cycles in which wind generation contributed to backing down base load generation. We define a cycle as the period of time over which the base load generation was backed down. As an example, on April 6, 2017, base load generation was backed down for three consecutive hours in part due to wind generation. This was considered a cycle. On May 16, 2017, base load generation was backed down for one hour in part due to wind generation. This was also counted as one cycle.

### **Order Point 3**

The Company complied with Order Point 3 in its 2010 ten-year plan.