



414 Nicollet Mall  
Minneapolis, MN 55401

October 23, 2024

—Via Electronic Filing—

Will Seuffert  
Executive Secretary  
Minnesota Public Utilities Commission  
121 7<sup>th</sup> Place East, Suite 350  
St. Paul, MN 55101

RE: INITIAL COMMENTS  
NOBLES COUNTY SUBSTATION  
DOCKET NO. E999/CI-24-316

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, submits the enclosed Initial Comments per the Commission's September 23, 2024, NOTICE OF COMMENT PERIOD.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served on the parties on the attached service list. Please contact Taige Tople at [taige.d.tople@xcelenergy.com](mailto:taige.d.tople@xcelenergy.com) or me at [jody.l.londo@xcelenergy.com](mailto:jody.l.londo@xcelenergy.com) if you have any questions regarding this filing.

Sincerely,

/s/

JODY LONDO  
DIRECTOR, REGULATORY POLICY AND STRATEGIC ANALYSIS

Enclosure  
cc: Service List

STATE OF MINNESOTA  
BEFORE THE  
MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Hwikwon Ham	Commissioner
Valerie Means	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

IN THE MATTER OF THE INVESTIGATION  
INTO TRANSMISSION-CURTAILMENT  
MATTERS, DRIVERS, AND POTENTIAL  
SOLUTIONS TO LIMITATIONS RESULTING  
FROM THE NOBLES COUNTY  
SUBSTATION

DOCKET NO. E999/CI-24-316

**COMMENTS**

**INTRODUCTION**

Northern States Power Company, doing business as Xcel Energy, submits these Comments to the Minnesota Public Utilities Commission in response to its September 23, 2024 Notice of Comment in the above-referenced docket. The Notice follows the Commission's June 7, 2024 Order in the Biennial Transmission Projects Report,<sup>1</sup> which directed Commission Staff to open a docket to develop a record on transmission-curtailement matters, their drivers, and potential solutions for limitations resulting from the Nobles substation.<sup>2</sup> We provide a brief background and overview of the issue, outline the actions we have taken, and respond to the specific questions in the Notice.

**I. BACKGROUND AND OVERVIEW**

This docket was initiated following Comments from EDF Renewables and Murray County, submitted in response to the Minnesota Transmission Owners' 2023 Biennial Transmission Projects Report (BTPR).<sup>3</sup> EDF Renewables operates multiple wind farms in southwestern Minnesota and raised concerns about increasing grid instability and congestion leading to more frequent curtailment of its wind farms over the past

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<sup>1</sup> See Docket No. E999/M-23-91.

<sup>2</sup> See ORDER ACCEPTING REPORT at 4, 6.

<sup>3</sup> See Docket No. E999/M-23-91.

four years. Murray County raised the same issue, discussing its concerns about declining tax revenue from increased curtailment of wind farms in the county.

Both parties requested that the Commission require transmission owners to provide a supplemental filing describing: (1) the extent to which the projects proposed in the BTPR will improve congestion and curtailment in southwestern Minnesota, (2) the causes of stability, thermal, and other issues in the area, (3) studies by the Midcontinent Independent System Operator (MISO) and local transmission organizations on the congestion concerns and any proposed solutions, and (4) a plan by the transmission owners to resolve the stability issues in the area. In its Order approving the BTPR, the Commission directed its Staff to open a discrete docket focused on “develop[ing] a record on transmission-curtailment matters, drivers, and potential solutions for limitations resulting from the Nobles substation.”<sup>4</sup>

The stability, thermal, and congestion issues affecting the grid in southwestern Minnesota have two primary causes – one short-term and one long-term. There have been short-term increases in congestion, and therefore curtailments, over the past two years while the Company and other transmission owners completed necessary maintenance and upgrades to transmission equipment in the area. During these periods, certain transmission lines were offline, and the transmission grid could not handle all the wind production in the area while remaining stable. To prevent grid instability, MISO limited generation at certain substations, which led to increased curtailments at many wind farms connected to the affected substations. The short-term issue has been resolved because the maintenance and upgrades to our transmission equipment in the area has been completed. With all our transmission lines in the area back online, curtailments at nearby wind farms have returned to normal levels.

The long-term issue is that wind generation in this wind-rich area has grown more quickly than the current transmission grid in the area can fully handle. If all the wind farms in this area generated energy at their full capacity, the transmission grid would quickly become overwhelmed on high production days. During this time, MISO curtails the excess generation beyond what the transmission grid can handle to ensure system reliability. MISO’s dispatch model is economic and thus prioritizes the least-cost generation, which generally comes from newer wind farms that can take advantage of production tax credits (PTCs). Older wind farms without PTCs produce more expensive wind energy and are curtailed first.

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<sup>4</sup> See ORDER ACCEPTING REPORT at 4, 6, *In the Matter of the 2023 Minnesota Biennial Transmission Projects Report*, Docket No. E999/M-23-91 (June 7, 2024).

We have taken many measures over the past twenty-five years to address the long-term cause of congestion in the area, by continuing to increase the capacity of our transmission grid. We completed the Buffalo Ridge projects in 1998, which added 425 megawatts (MW) of capacity to the local transmission grid. The Lake Benton I and II projects were finished in 2002, which upgraded the area's transmission equipment to handle 825 MW. We also concluded the Buffalo Ridge Incremental Generation Outlet project in 2008, which developed transmission lines that increased the capacity to 1,175 MW in the region. Our latest efforts include a recent proposal submitted to MISO to replace an aging 115 kV transmission line with a double circuit line to increase transmission capacity in the area. We are also currently proposing a reconfiguration of a new 345 kV transmission line between Lyon County and Jackson County to run through Chanarambie Township in southwestern Minnesota. The two proposed projects would help transfer energy from southwest Minnesota to less congested parts of the transmission grid.

We believe that our proposed projects will help improve the remaining congestion, which is at the root of wind farm curtailments in the area. Our proposed projects, along with MISO's proposed projects discussed below, will add a significant amount of capacity to the transmission grid in the area, ensuring that the transmission grid can handle the increased generation from both existing and new wind farms in the area.

In Section II, we respond to the specific Notice questions about congestion in southwestern Minnesota. We note that the Company is one of multiple transmission owners in that area, and we respond from this perspective.

## **II. RESPONSE TO NOTICE**

### **1. What are the underlying causes of the stability, thermal, and congestion issues affecting the power grid in southwestern Minnesota, and how do these issues impact existing renewable energy projects as well as potential new projects in development or permitting?**

As stated above, the stability, thermal, and congestion constraints causing curtailments in southwestern Minnesota have two primary causes – one short-term and one long-term. There have been short-term increases in congestion, and subsequently curtailments, while the Company and other transmission owners performed necessary upgrades and maintenance to transmission equipment in the area. This work has been completed and curtailments have returned to normal levels. The long-term cause of congestion in the area is that the wind generation in this wind-rich area of Minnesota has grown more quickly than the current transmission grid in the area can fully handle. MISO's generation dispatch model curtails certain wind farms during high

production periods. The Company and MISO have ongoing projects to increase the capacity of the transmission system in this area so that fewer wind farms are curtailed. Below, we further explain each issue.

### **Short-Term Increased Congestion**

There have been short-term increases in curtailments while the Company and other transmission owners completed necessary maintenance and upgrades on transmission equipment in the area. For example, two of our 345 kV transmission lines were offline for about five months this year while the Company and other transmission owners completed maintenance and upgrades. During this period, the transmission grid could not handle all the wind production in the area and remain stable. To prevent grid instability, MISO limited generation leaving the Fenton, Nobles, and Chanarambie substations.<sup>5</sup> The generation limits led to increased curtailments at many wind farms connected to the affected substations, including the Stoneray and Fenton wind farms owned by EDF Renewables. Stoneray connects to the Chanarambie substation and Fenton connects to the Fenton substation, both affected substations. MISO's temporary generation limits resulted in increased curtailments of both wind farms. There have also been other periods when MISO has limited generation entering substations in southwest Minnesota while transmission lines were offline for maintenance and upgrades on transmission equipment. Wind farms connected to the affected substations were more likely to experience curtailment during these periods.

We have resolved the short-term issue by completing the maintenance and upgrades to our transmission lines. With our upgraded transmission lines back online, curtailments at nearby wind farms have returned to normal levels. Currently, we do not have any scheduled maintenance or upgrades in the next year that would require our transmission lines in this area to be offline.

### **Long-Term Congestion**

The long-term issue is that wind generation in this wind-rich area of Minnesota has grown more quickly than the current transmission grid in the area can fully handle. There are many wind farms in southwestern Minnesota, with even more on the way.<sup>6</sup> If all the wind farms in this area generated energy at their full capacity, the transmission grid would quickly become overwhelmed on high production days. During this time, MISO curtails the excess generation beyond what the transmission grid can handle to ensure system reliability. MISO's dispatch model is economic and

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<sup>5</sup> When generation is limited on the transmission lines leaving these three substations to maintain grid stability, this is known as the FENOCH constraint.

<sup>6</sup> See State permitted wind facilities at: <https://apps.commerce.state.mn.us/eera/web/project-file/12139> (last accessed Oct 19, 2024).

thus prioritizes the least-cost generation, which results in curtailment of older wind farms first.

To understand the curtailment process, it is important to understand how MISO selects energy for its day-ahead market. MISO's dispatch model prioritizes resources on a least-cost basis. The least-cost wind energy typically comes from newer wind farms that have active PTCs. Since 1992, wind farms have received PTCs, providing a tax credit for each kilowatt-hour of electricity generated from qualifying renewable sources. This allows these wind farms to sell energy at lower rates in MISO's marketplace. However, PTCs expire after ten years. The energy from older wind farms with no remaining PTCs carries a higher cost, reducing the likelihood of MISO dispatching all their energy. The energy not dispatched by MISO is the curtailed portion. Every new wind farm in the area has the potential to increase curtailments for existing farms.

MISO's economic dispatch model favors customers by keeping costs low, and their curtailment practices ensure grid reliability by maintaining thermal limits of local transmission lines. However, currently, while transmission development is underway to support increasing levels of renewable resources, these curtailment practices have negative effects on wind farms in the area. Existing wind farms with no PTCs are the most affected because they are the first to be curtailed. An example is Fenton wind farm, owned by EDF Renewables, with no remaining PTCs. Fenton is one of the highest-priced wind farms in the area to bid into MISO's day-ahead market and is thus one of the first to be curtailed when the grid is congested. Wind farms with remaining PTCs are also occasionally curtailed, but to a lesser extent, depending on the amount of wind capacity entering the grid. When existing farms are curtailed and sell less energy, their revenue may decrease, which reduces payments to the municipalities where they are located. New wind farms under development may also be curtailed during peak production periods when they come online and additionally face higher interconnection costs because of the lack of transmission capacity.

The stability, thermal, and congestion constraints in southwestern Minnesota is a complicated issue. However, solutions are underway with a broader expansion of the regional transmission grid, led by MISO and the Transmission Owners, including the Company. We have persistently led efforts to alleviate congestion as more wind farms come online in this area, as explained in our response to Question No. 2 below.

## **2. What regional and local transmission studies on reliability and economic market congestion have been completed?**

As outlined below, the Company has participated in seven transmission studies to help increase reliability and resolve congestion in its Minnesota service territory. These studies span over two decades and demonstrate our persistent efforts to keep expanding the capacity of our transmission grid. Below, we list these studies in chronological order with details about each one. We also note that the Company identified short-, medium-, and long-term measures we are enacting to alleviate congestion in Minnesota in our 2022 Annual Fuel Forecast and Monthly Fuel Cost Charges proceeding.<sup>7</sup>

### **Buffalo Ridge Wind (1996-1998)**

Wind farms first began operating in southwestern Minnesota in the mid-1990s, and the initial Buffalo Ridge Wind study resulted in projects adding 425 megawatts (MW) of capacity to our transmission grid in the area.<sup>8</sup> This was the first instance where the Company increased the transmission grid's capacity in a specific area to handle more energy than the local load. The projects resulting from this study cost almost \$70 million and included upgrading five substations, adding or upgrading more than 10 transmission lines, and adding four new transformers.

### **Lake Benton I and II (1999-2002)**

As more wind farms were developed in southwestern Minnesota, the Company conducted the Lake Benton studies, leading to projects that upgraded the area's transmission equipment to handle a capacity of 825 MW.<sup>9</sup> These projects totaled almost \$140 million and included building two new substations, upgrading four other substations, and adding or upgrading four transmission lines.

### **Buffalo Ridge Incremental Generation Outlet Study (2005-2008)**

This study concentrated on developing smaller scale (115-161 kilovolts (kV)) transmission lines to provide several hundred megawatts of incremental generation outlet capacity.<sup>10</sup> This resulted in a capacity increase to 1,175 MW in southwestern Minnesota.

### **CapX2020 (2004-2017)**

A group of 11 utilities serving several upper Midwest states collaborated to plan, develop, and construct new high-voltage transmission lines worth \$2.1 billion,

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<sup>7</sup> See Compliance Filing, filed December 22, 2021, Docket No. E002/AA-21-295.

<sup>8</sup> See <https://www.osti.gov/biblio/269373>.

<sup>9</sup> See <https://lakebenton.us/windpower>.

<sup>10</sup> See <https://puc.sd.gov/commission/dockets/electric/2008/el08-001/f.pdf> at pages 2–5.

spanning nearly 800 miles across Minnesota, Wisconsin, North Dakota, and South Dakota. This resulted in increasing capacity to 2,400 MW state-wide in Minnesota.

**MISO Multi-Value Project (MVP) Portfolio (2011-2024)**

This portfolio was studied and approved in 2011 as part of MISO's annual transmission expansion plan. These extensive projects helped prevent the curtailment of 11.3 gigawatts of wind energy across all states served by MISO. Unfortunately, this portfolio did not include any projects helping alleviate the congestion, stability, and thermal issues affecting southwestern Minnesota.

**MISO Transmission Expansion Plan 16 Study (2016-2021)**

This study resulted in the construction of an approximately 50-mile 345 kV transmission line between the Company's Wilmarth Substation north of Mankato, Minnesota and ITC Midwest's Huntley Substation south of Winnebago Minnesota. While this line helped alleviate congestion in other parts of Minnesota, it did not help address the constraints facing the transmission grid in southwestern Minnesota.

**MISO Long Range Transmission Planning Tranche 1 Study (2020-Present)**

This study resulted in a portfolio of 18 transmission projects across MISO's region and included adding more than 2,000 miles of transmission lines to help reduce congestion and improve reliability. The study was completed in 2020, but the resulting projects are still ongoing. Unfortunately, this portfolio did not include any projects helping alleviate the congestion, stability, and thermal issues affecting southwestern Minnesota.

3. **What current studies are being conducted by MISO and/or the Minnesota Transmission Owners (MTO) and/or others to assess the congestion and curtailment issues affecting the grid in southwestern Minnesota, specifically in Nobles County, and what potential solutions are being proposed for these limitations?**

Please see our response to Question No. 4 below.

4. **What is the timeline for completing the studies referenced in question 3? What funding source(s) have been identified for completing these studies?**

There are three studies that the Company and Minnesota Transmission Owners (MTO) are currently conducting to assess congestion and curtailment issues in southwestern Minnesota, including those resulting from the Nobles substation. Below, we discuss each study, detailing its purpose, timeline, and funding sources.



The *Nobles County Transformer Study* evaluated adding a third transformer to the Nobles County substation to resolve outages and ensure grid stability in southwestern Minnesota. Currently, the substation has two transformers. When one transformer is offline for routine maintenance, the remaining transformer cannot handle the increased load, leading to outages. The proposed third transformer would help prevent these outages and is projected to be in-service by December 31, 2026. The Company funded this Study and is also funding the project.

The *Buffalo Ridge Right Sizing Study* evaluated replacing an aging 115 kV transmission line with a double circuit line that includes both 115 kV and 345 kV lines. This new line would start in Murray County, just north of Nobles County, and would transfer energy from Nobles County to less congested parts of the transmission grid – reducing curtailments in the area. This project has been submitted to MISO, along with the *Joint Targeted Interconnection Queue Study* (JTIQ) discussed below, and will move into the MISO Transmission Expansion Plan 2025 cycle once approved. This double circuit line is expected to be in-service in the early 2030s if approved by MISO's Board of Directors, which is expected in December 2024. The Company funded this Study and will also fund the project if it is approved.

The *JTIQ* was a joint study by MISO and the Southwest Power Pool (SPP) to evaluate transmission solutions and identify reliability issues for interconnection projects. The study resulted in a portfolio of seven projects that would allow interconnection requests spanning multiple MISO and SPP queue cycles to connect at lower costs than through an individual queue cycle.<sup>11</sup> One of these projects proposed building a new 345 kV transmission line between Lyon County and Jackson County in Minnesota.<sup>12</sup> The Company is currently reconfiguring this line and proposed routing it through Chanarambie Township in southwestern Minnesota. This line, along with the proposed line from the *Buffalo Ridge Right Sizing Study*, would help transfer energy from Nobles County to less congested parts of the transmission grid – reducing curtailments in the county. This project has been submitted to MISO and will move into the MISO Transmission Expansion Plan 2025 cycle once approved. This proposed project will be on the MISO Board of Directors' agenda for approval in December 2025. This line is expected to be in service in the early 2030s. The *JTIQ* was funded by MISO and SPP. The proposed transmission line would be funded by a Department of Energy grant and upgrade charges collected from owners of new

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<sup>11</sup> See <https://cdn.misoenergy.org/JTIQ%20Report623262.pdf>.

<sup>12</sup> See <https://cdn.misoenergy.org/20240618%20PAC-RECBWG%20Item%2002%20JTIQ%20Presentation634859.pdf> at slide 9.

generation interconnections.

5. **Specifically for Xcel Energy and MTO: What is the status of the initiatives referenced in MTO's March 1, 2024 Reply Comments in Docket# M-23-91:**
- a. **2023 MISO Informational Market Congestion Study with an estimated completion date of Q3 2024?**
  - b. **Xcel Energy/Electric Power Institute (EPRI) study to take an in-depth look at the stability concerns of the area and the possible solutions available to address the issues?**
  - c. **MISO Tranche 2 Long Range Transmission Planning (LRTP) projects currently being reviewed with an expected approval at the end of 2024 that will increase outlet from the Buffalo Ridge area?**

We address each referenced initiative in turn below:

*2023 MISO Informational Market Congestion Study:* This initiative involves a near-term congestion study aimed at identifying facilities expected to experience the most congestion across MISO's region and determine necessary transmission upgrades. The Company is not leading or directly involved in this Study. Our contribution was limited to providing feedback on the Study's methodology.<sup>13</sup> According to MISO's public presentations, the Study has identified 10 projects to upgrade transmission lines or transformers across MISO's region.<sup>14</sup> One of these projects includes upgrades to the Stone Lake 345/161 kV Transformer in southwest Minnesota, which the Company owns.<sup>15</sup> MISO is still finalizing this project, and it has not yet been integrated into our internal project development processes.

*Xcel Energy/EPRI Study:* The concept for this Study stemmed from a temporary system reconfiguration request by EDF Renewables to MISO, aiming to reduce wind farm curtailments while we performed upgrades on two of our transmission lines earlier this year. MISO denied the request due to a known local grid stability issue and asked the Company to review the request instead. With the transmission line work quickly approaching, we contacted EPRI for assistance and received a \$75,000

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<sup>13</sup> See [https://cdn.misoenergy.org/PSC%20Stakeholder%20Comment%20on%20MTEP24%20Near%20Term%20Congestion%20Study%20\(PAC-2021-1\)\\_Xcel631788.pdf](https://cdn.misoenergy.org/PSC%20Stakeholder%20Comment%20on%20MTEP24%20Near%20Term%20Congestion%20Study%20(PAC-2021-1)_Xcel631788.pdf). We note that none of our suggestions were incorporated.

<sup>14</sup> See [https://cdn.misoenergy.org/20230927%20PSC%20Item%20006%20Near%20Term%20Congestion%20Study%20\(PAC-2021-1\)630307.pdf](https://cdn.misoenergy.org/20230927%20PSC%20Item%20006%20Near%20Term%20Congestion%20Study%20(PAC-2021-1)630307.pdf) at slide 6.

<sup>15</sup> *Id.*

estimate to study the proposed request. Generally, the requestor funds external study requests. During the Company's discussions, EDF Renewables initially agreed to pay for the study but also sought to expand the scope of it. As discussions continued, EDF Renewables withdrew its funding commitment, and thus the Study was never initiated. We also completed the upgrades on the two transmission lines, and EDF Renewables' initial request only sought a temporary reconfiguration while these lines were offline. Thus, while the study might inform future stability considerations if these particular two lines go offline again, the primary driver for EDF's request has been resolved.

*MISO Tranche 2 LRTP:* This initiative refers to MISO's long-term transmission planning (LRTP) analysis. From MISO's public presentations, the Company expects that two of the approved projects will help mitigate congestion in southern Minnesota.<sup>16</sup> The first project involves upgrading an existing substation in southern Minnesota to a new voltage level to better handle the increased energy production.<sup>17</sup> The second project involves building a new 765 kV transmission line from this substation to load centers in the Twin Cities, helping transfer wind power from congested areas to less congested parts of the grid.<sup>18</sup> According to MISO's public presentations, these projects have not been finalized and will require permit applications filed by the end of 2025.

## **6. What other related issues should the Commission investigate?**

The Company believes the Commission's Notice and this Response address the Commission's Order in the BTPR to develop a record on transmission-curtailment matters, their drivers, and potential solutions for limitations resulting from the Nobles substation.

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<sup>16</sup> See <https://cdn.misoenergy.org/20240315%20LRTP%20Workshop%20Tranche%202%20Anticipated%20Portfolio632013.pdf> at slide 6.

<sup>17</sup> *Id.*

<sup>18</sup> *Id.*

## **CONCLUSION**

The Company appreciates the opportunity to comment on the issues and actions underway to address the stability, thermal, and congestion issues in southwestern Minnesota. We are actively collaborating with MISO and other stakeholders to alleviate the underlying issues and decrease curtailments of wind farms in the area. We look forward to providing further updates on an ongoing basis in the Minnesota Transmission Owners' Biennial Transmission Projects Reports.

Dated: October 23, 2024

Northern States Power Company

## CERTIFICATE OF SERVICE

I, Victor Barreiro, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped  
with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

**DOCKET No.      E999/CI-24-316**

Dated this 23<sup>rd</sup> day of October 2024

/s/

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Victor Barreiro  
Regulatory Administrator

[illegible]

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Carol A.	Overland	overland@legalelectric.org	Legalelectric - Overland Law Office	1110 West Avenue  Red Wing, MN 55066	Electronic Service	No	OFF_SL_24-316_Official 24-316
Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_24-316_Official 24-316
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