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 CERTIFICATE OF NEED APPLICATION FOR THE MINNESOTA ENERGY CONNECTION PROJECT	DOCKET NO. E002/CN-22-131
	COMMENTS

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy (Company or Xcel Energy), respectfully submits these Comments pursuant to the Minnesota Public Utilities Commission's (Commission) June 5, 2024 Notice of Comment Period on the Merits of the Certificate of Need Application (Application) in the above-noted docket. In these Comments, Xcel Energy provides applicable updates since the filing of the Application, including a delay to the in-service date for the Minnesota Energy Connection Project (MNEC Project or Project) generation tie lines (Gen Ties), 11 months, to third quarter (Q3) 2028.

This shift in the in-service date will not affect the Company's coal retirement dates, any interconnecting projects, overall carbon-reduction goals, or our ability to manage our short-term capacity position. And while we are confident in our ability to minimize the impact of this delay and maximize the benefits of this investment for our customers as we continue our carbon emission reductions, we do want to ensure stakeholders know we are now in the challenging part of executing these significant system changes. That is, timelines are tight, supply chains are constrained, coal retirements are fast approaching, system requirements are technical and complex, operational parameters are changing, and other industry players are all seeking the same materials and labor. We are up for the challenge and have no doubt we will be able to execute on the clean energy transition but want to be transparent about these pressures.

Our Application seeks approval to construct the Project, which includes the approximately 160- to 180-mile double circuit 345 kilovolt (kV) Gen Ties connecting the existing Sherburne County Generation Station Substation (Sherco Substation) in Becker, Minnesota, and a new Garvin Substation in Lyon County, Minnesota, and other associated facilities, including intermediate and voltage support substations.

The Project will support Xcel Energy's and the state's transition to clean energy by enabling the predictable and cost-effective interconnection and delivery of at least 1,996 megawatts (MW) of generation to the Sherco Substation point of interconnection POI, providing necessary energy resources and optimizing the reuse of the Company's interconnection rights that will become available as the coal units at Sherco retire by the end of 2030. The Project overall will enable the interconnection of more than 4,000 MW of generation overall and delivery of 1,996 MW that will support the "100 percent by 2040" law that, generally, sets a standard for public utilities to generate or acquire 100% of their energy for Minnesota retail sales from carbon-free resources. Construction of the Gen Ties will support the connection and delivery of approximately 1,000 MWs of resources. Up to 2,000 MW can be interconnected and delivered with the addition of voltage support equipment.

It is for all these reasons, and those discussed in the docket to date, that we continue to respectfully request that the Commission approve the Application on its merits and grant a Certificate of Need for the MNEC Project.

COMMENTS

A. MNEC Project Revised In-Service Date

This is a time of a rapidly changing transmission and increased demand for renewable energy, and the Project is a major transmission project to enable the connection of thousands of MWs of generation resources. The length of the Project, up to 180 miles, and the type of resources that will connect, primarily inverter-based technologies, present technical complexities and sourcing challenges. As described in our August 25, 2023 Project Update to the Commission,[1] Xcel Energy presented in the Application an ambitious schedule for the Project completion- eliminating more than a year from any previous transmission project timelines. Xcel Energy proposed approximately one and a half years for permitting, one year for landowner negotiations and two and a half years for construction activities, for a total just under four years. This would have resulted in an in-service date of September 2027.

As Xcel Energy has worked to identify and retain construction labor resources, advance access to expediting foundation engineering and designs, and procure critical materials, we have determined that this schedule cannot be achieved and that an additional 11 months will be required to place the project in service. The delay is caused by the United States Corps of Engineers (USACE) permitting requirements for Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act approvals. The prior schedule presumed that desktop data could be used to support the USACE process and that independent portions of the Project could be separately

[1] Project Update (Aug. 25, 2023) (eDocket No. 20238-198488-02).

permitted with the USACE. This would allow construction to begin on some segments of the Project while other segments were still being reviewed. However, during on-going consultations, USACE indicated that field surveys, instead of strictly desktop data, will be required and that the pre-construction notification submission to USACE must include the entirety of the approximately 180-mile Project route. To gather the necessary data, then, for a USACE pre-construction notification submission, Xcel Energy will need to secure survey access for a large percentage of any route that is ultimately approved by the Commission. The schedule impacts of land access, survey work, data compilation and pre-construction notification submission development and agency approval are reflected in Table 1 below.

While the USACE required sequencing of the review process is driving the delay, we will also use the additional time to work with impacted landowners to negotiate voluntary agreements. We believe this additional time will enable us to have a higher percent of voluntary easements than we would otherwise. This aligns with our desire to minimize condemnations as much as reasonably possible.

As a result of these factors, the revised in-service date for the Project is Q3 2028. The milestone schedule is provided in Table 1 below.

Table 1: Project Schedule

Activity	Estimated Dates
Minnesota Certificate of Need/Route Permit	March 2025
Survey Access/Land Acquisition	June 2024-2025
Required Federal, State and Local Permits Obtained	Q2 2025-2026
Start Project Construction	Q1 2026[2]
Gen Ties In-Service (1,000 MW enabled)	Q3 2028
Project Complete with all substations built out	Q4 2031

B. 2028 Delayed In-Service Date for MNEC Project has Minimal Impact

The MNEC Project is a critical investment—it is interrelated with many other projects, system plans, and open dockets. In this section, we provide additional context supporting our conclusion that the shift in the in-service date will not impact our Sherco coal retirement dates, any interconnecting projects, or our ability to manage our short-term capacity position.

[2] Tree clearing is scheduled for Q1 2026 with facility construction to commence in Q2 2026.

1. Sherco Coal Retirement

The Q3 2028 in-service date for the MNEC will not affect Xcel Energy's plans to retire Sherco Coal Unit 1 (720 MW) and Sherco Coal Unit 3 (566.4 MW) in 2026 and 2030 respectively. (The Company retired Sherco Coal Unit 2 in 2023.)

To retain the interconnection rights of the retiring coal units at Sherco, replacement generation must be operational by 2029 for Unit 1 and 2033 for Unit 3. Replacement generation will be secured, interconnected to the MNEC Project, and operational in time to meet these deadlines.

2. Firm Dispatchable Docket

One of the dockets the MNEC Project impacts is the Firm Dispatchable Docket.[3] In the Firm Dispatchable Docket, we proposed to construct two 210 MW natural gas combined turbine facilities in Lyon County (Lyon County CTs) that would connect to the end of the MNEC Project. Each CT would have a clutch that can provide the same attributes as a synchronous condenser. The proposed Lyon County CTs in-service date in the Firm Dispatchable Docket was December 2027. If the Lyon County CTs are selected by the Commission and constructed, they would provide some of the stability support needed to operate the MNEC Project. More specifically, in the Certificate of Need Application, we noted that our analysis at the time showed that two synchronous condensers or the Lyon County CTs would be required at the Garvin Substation once the amount of wind and/or solar energy interconnected reaches approximately 1,000 MW. The Application also noted that additional facilities may be required depending on the final generation locations, size and specific available inverter types.[4] As further explained in the attached Direct Testimony of Jason Standing, also filed in the route permit docket, No. 22-132, the Company in July 2024 received the results of dynamic performance and equipment selection study prepared by Electranix Corporation. That study concluded that, absent the CTs, four synchronous condensers will be needed at the Garvin Substation.

In preparation for a Commission decision in the Firm Dispatchable Docket, we undertook due diligence to confirm the timing for the turbine and necessary ancillary equipment. After working closely with our suppliers, we recently determined that December 2028 is the earliest possible in-service date we can achieve given the industry supply constraints that have driven delays in delivering the turbines. This results in a commercial operation date of December 2028 for the Lyon County CT, if approved.

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[3] *Application to the Minnesota Public Utilities Commission for Approval of a Competitive Resource Acquisition Proposal,* MPUC Docket No. E002/CN-23-212.

[4] Certificate of Need Application, p. 77.

The revised date of the Lyon County CTs continues to mean the two projects would be completed close in time to each other, within a few months—but that the delay of the MNEC Project does not impact the Lyon County CTs. If the Lyon County CTs are selected in the Firm Dispatchable docket, they would still provide the offsetting benefits to the Project by providing voltage support.

3. Development Transfer RFP

Another docket the MNEC Project crosses over is our Development Transfer RFP docket (Dev Transfer RFP).[5] This RFP sought 1,200 MW of wind resources that could interconnect to the MNEC Project and come online as early as the end of 2027, to replace the remainder of the open transmission interconnection rights that will be available when Sherco Coal Units 1 and 3 retire.

As discussed in our May 1, 2024 update letter filed in the Dev Transfer RFP docket,[6] the Company has shortlisted several projects. Since that time, the Company has been collaborating with an engineering, procurement, and construction contractor to optimize site layouts and consolidate projects to drive efficiencies and lower Project costs. While negotiations are still ongoing and we have not yet filed for approval of the final portfolio,[7] we can confirm no projects have an in-service date before the MNEC Project is in-service in Q3 2028, thus there are no projects impacted by the delay.

4. Integrated Resource Plan and Short-Term Capacity Position

The final docket in which the MNEC Project is considered is the Resource Plan[8] and our short-term capacity position identified and discussed in that docket. While there are energy and capacity needs identified in the Resource Plan between 2027 and 2032, several other factors are at play and we do not believe there will be a significant impact on these needs as a result of the MNEC Project delay.

a. Short-Term Capacity Position

In the most recently approved integrated resource plan, the Commission concluded that we proved we need to procure 600 MW of solar and 2,150 MW of wind, or an

[5] 2023 Wind Development Transfer Request For Proposals, MPUC Docket No. 23-342.
[6] *See id.*
[7] As previously stated in the Dev Transfer Docket, we expect to bring a portfolio of projects for Commission approval in the fourth quarter of this year.
[8] *2024-2040 Upper Midwest Integrated Resource Plan,* MPUC Docket No. 24-67.

equivalent amount of energy and capacity from a combination of wind, solar, and/or storage between 2027 and 2032 to meet energy and capacity needs.[9]

On February 1, 2024, we submitted our current IRP— the 2024-2040 Upper Midwest Integrated Resource Plan (Resource Plan), which reaffirmed the benefits of the MNEC Project and included significant resource additions beginning in 2027 and through the planning period.

The Company provided its forecasted capacity needs in Chapter 3 of the Resource Plan. We used the forecast of our customers' peak demand and MISO Resource Adequacy requirements as described in the resource plan to forecast our net capacity position for planning purposes. At the time of our resource plan, we anticipated capacity needs beginning in spring and summer of 2027. Tables 3-4 through 3-7 of the Resource Plan provided detailed loads and resources positions through 2040.

The capacity position in the Resource Plan included existing and approved resources including Sherco Solar 1, 2, and 3, Louise, Filmore and Apple River solar. Since we filed the Resource Plan, we executed a five-year power purchase agreement (PPA) with Manitoba Hydro, which includes a system purchase and diversity exchange. The capacity from the Manitoba Hydro PPA and updated capacity position are shown in Table 2, below.

Table 2: L&R Table with Manitoba Hydro PPA

	PY 2025/2026				PY 2026/2027				PY 2027/2028				PY 2028/2029			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
IRP (Need)/Surplus	514	1579	1480	612	637	1416	696	(268)	(338)	566	392	(552)	(937)	(226)	(889)	(1529)
Manitoba Hydro	538		(342)		538		(342)		538		(342)		391		(196)	
Adjusted (Need)/Surplus	**1052**	**1579**	**1138**	**612**	**1175**	**1416**	**354**	**(268)**	**200**	**566**	**50**	**(552)**	**(546)**	**(226)**	**(1085)**	**(1529)**

As demonstrated by Table 2, the capacity from the Manitoba Hydro PPA contributes needed capacity to our system and addresses the forecasted capacity deficit in summer of 2027.

[9] *In the Matter of the 2020-2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel Energy*, MPUC Docket No. E-002/RP-19-368, Order Approving Plan with Modifications and Establishing Requirements for Future Filings, at Ordering¶ 2.A.8.

b. Other Factors to Consider

Although the forecasted capacity deficit in summer of 2027 is currently addressed, there are also several other factors at play. We discuss these below

(1) Ongoing Resource Acquisitions

There are currently three resource acquisitions underway: (1) an acquisition for development transfer projects to interconnect to the MNEC discussed above, (2) a firm dispatchable proceeding currently before the Commission, also discussed above, and (3) the 2024 RFP for 1,600 MW of wind, solar, and storage resources. In addition to the large number of MW and variety of resources we are seeking in all of these RFPs, which make the outcomes hard to predict, many developers are bidding projects in to more than one RFP—which makes forecasting end results even harder.

In addition, we proposed a Distributed Competitive Procurement (DCP) program in our August 9, 2024 Resource Plan Comments which could also add resources to our system in the relevant time frame.

(2) MISO Resource Adequacy Construct Changes

MISO implemented the seasonal resource adequacy construct in 2023. The seasonal construct provides resource adequacy requirements in four seasons and was incorporated into our February 1, 2024 Resource Plan. We expect variations in the seasonal reserve margins and capacity accreditation as market participants adjust to the new construct. In addition, MISO has proposed changes to its resource adequacy construct beyond the transition to a seasonal planning construct. Most notably, on March 28, 2024, MISO filed proposed revisions to its Open Access Transmission, Energy and Operating Reserve Markets Tariff with the Federal Energy Regulatory Commission to implement a new direct loss of load (DLOL) methodology for the purposes of accrediting resources and calculating the planning reserve margin requirements that load serving entities, including the Company, must meet.

The new accreditation methodology has the potential to change the accredited capacity of some resources on our system and our planning reserve margin requirements. If approved, these changes would be implemented in the 2028-29 planning year.

(3) Load Additions

As discussed in our Resource Plan, new load, including new data center loads could impact our need for capacity. Approximately 500 MW of data center load was included in the base load forecast in the February 2024 Resource Plan.

We are confident that through a combination of acquisitions through the resource acquisition proceedings, monitoring of changes to our capacity positions, and mitigation efforts such as short-term capacity purchases, we will be able to manage our near-term capacity position and the MNEC in-service date of Q3 2028.

C. Revised MN Project Costs

We have updated the Project costs to adjust for an in-service date of Q3 2028 and add the cost of two additional synchronous condensers at the Garvin Substation ($120 million in 2024$ unit cost). The costs are provided in Table 3.

Table 3: Project Costs

Route Option	Purple Route/Green Segment Estimated Cost	Blue Route/Green Segment Estimated Cost	Preferred Route Estimated Cost
Transmission Line	$811.7 million	$783.7 million	$789 million
Green Segment	$6.6 million	$6.6 million	$6.6 million
Sherco Solar West Substation Modifications	$12.1million	$12.1 million	$12.1 million
Sherco Substation Modifications	$10.6 million	$10.6 million	$10.6 million
Voltage Support Substation[10]	$85.4. million	$85.4 million	$85.4 million
Intermediate Substation	$19.3 million	$19.3 million	$19.3 million
Garvin Substation	$356.4 million	$356.4 million	$356.4 million
Total	$1.302 billion	1.274 billion	$1.279 billion

D. Additional Comments in Response to MPUC Notice

In the June 6, 2024 Notice of Comment Period on the Merits of the Certificate of Need Application, the Commission requested comments on the following topics: (1) Should the Commission grant a certificate of need for the proposed project; (2) If

[10] Cost of STATCOM has been removed from Application estimate. (-$169.6 million (2024$ unit cost)).

granted, what additional conditions or requirements, if any, should be included in the certificate of need; and (3) Are there other issues or concerns related to this matter?

1. Should the Commission Grant the Certificate of Need?

Yes. The MNEC Project is part of our most recently approved Upper Midwest Integrated Resource Plan, which will reduce carbon emissions more than 85 percent from 2005 levels by 2030 and help the Company deliver 100 percent carbon-free electricity. We will achieve these goals by retiring coal plants in the Upper Midwest, including the three Sherco units totaling approximately 2,000 MW of coal-fired generation, and adding significant amounts of renewable energy. Connecting the new renewable energy to the Sherco Substation enables us to reuse valuable and existing transmission interconnection rights.

We continue to respectfully request that the Commission grant a certificate of need for the Project. As described more fully in the Application, the Project is an integral part of supporting Xcel Energy's and the state's transition to clean energy.

2. If granted, what additional conditions or requirements, if any, should be included in the certificate of need; and

3. Are there other issues or concerns related to this matter?

With respect to the second and third topics open for comment, as part of these Comments, Xcel Energy incorporates the analysis included in the pre-filed Direct Testimony of Joseph Samuel and Jason Standing (**Attachments A** and **B**, respectively). This testimony is being filed in support of the Route Permit Application in Docket 22-132. Because the topics reflected in this testimony are also relevant to the Certificate of Need Application, Xcel Energy also provides the testimony in this docket.

As discussed in the Direct Testimony of Joseph Samuel, Project cost estimates are highly dependent upon route selection and timing of construction. In the interest of implementing ratepayer protections, Xcel Energy is requesting that the Commission approve the proposed Project with a condition similar to the one that the Department of Commerce, Division of Energy Resources, recommended in *In the Matter of the Minnesota Power and Great River Energy for a Certificate of Need and Route Permit for the Northland Reliability Project 345 kV Transmission Line*, MPUC Docket No. E015,ET2/CN-22-416. This condition would require Xcel Energy to do the following:

> 1. provide a final number or cap amount within 90[11] days of the Commission's Order determining the route;

[11] The recommended condition in Docket CN-22-416 was for 60 days. Xcel Energy believes that a 90-day period is better suited to enable the development of refined cost estimates based on final route selection.

2. wait until the first rate case after the proposed Project is placed in-service to recover any cost overruns from Minnesota ratepayers;

3. justify fully the reasonableness of recovering any cost overruns of the proposed Project from Minnesota ratepayers. Xcel Energy must justify any costs (including operations-and-management expense, ongoing capital expense—including revenue requirements related to capital included in rate base—insurance expense, land-lease expense, and property/production tax expense) that are higher than forecasted in this proceeding. Xcel Energy bears the burden of proof in any future regulatory proceeding related to the recovery of costs above those forecasted in this proceeding.

CONCLUSION

The MNEC Project is critical to supporting Xcel Energy's and Minnesota's clean energy transition. Xcel Energy respectfully requests that the Commission approve the Application on its merits and grant a Certificate of Need for the MNEC Project.

Dated: September 6, 2024

Northern States Power Company

Attachment A

Direct Testimony and Schedule
Joseph Samuel

Before the Minnesota Public Utilities Commission
State of Minnesota

In the Matter of the Application of Xcel Energy for a Route Permit for the Minnesota Energy Connection Project in Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon Counties in Minnesota

Docket No. E-002/TL-22-132
OAH Docket No. 23-2500-39782

Direct Testimony of Joseph Samuel
on behalf of
Xcel Energy

September 6, 2024

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Schedule

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Joseph Samuel, and my business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as a Senior Transmission Project Manager by Xcel Energy Services Inc. (XES), the service company provider for Northern States Power Company, doing business as Xcel Energy (Xcel Energy). As part of my job responsibilities, I am the Project Manager for the Minnesota Energy Connection Project (Project) that includes two 345 kilovolt (kV) generation tie lines (Gen-Ties). I am primarily responsible for scope, cost, schedule, and risk management of the Project.

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I obtained a Bachelor of Science in Civil Engineering from the University of Minnesota in 1993. I have held multiple municipal engineering and engineering consulting positions over the past 30 years. I am a Professional Engineer licensed in Colorado, Minnesota, South Dakota and Wisconsin and am a Certified Project Management Professional.

I joined Xcel Energy as a Senior Project Manager for XES in March 2011. I am responsible for managing the budget and schedule of multi-million-dollar transmission line and substation projects. I manage and oversee construction of transmission line and substation projects. I also manage project execution of multi-disciplined teams with internal and external stakeholders and act as

the liaison between the Company and community stakeholders. My resume is attached as **Schedule 1**.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am testifying on behalf of the applicant in this proceeding, Xcel Energy.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide information regarding the Project's schedule and cost.

Q. ARE YOU SPONSORING ANY PORTIONS OF THE ROUTE PERMIT APPLICATION (APPLICATION) SUBMITTED BY XCEL ENERGY FOR THE PROJECT?

A. Yes. I am sponsoring the following sections of the Application:

- 2.4 Transmission Structure and Conductor Design
- 2.7 Project Schedule
- 2.8 Project Costs
- 5.2 Construction Procedures
- 5.4 Maintenance Procedures

II. PROJECT SCHEDULE

Q. WHAT IS XCEL ENERGY'S ANTICIPATED SCHEDULE FOR COMPLETING THE PROJECT?

A. The Application identified an expected permitting and construction schedule with an in-service date of the Gen-Ties in the third quarter of 2027, and the final Project facilities installed by the third quarter of 2031. The Project

schedule has been updated as shown in Table 1, with the Gen-Ties being in-service in the third quarter of 2028. This reflects an 11-month delay in the in-service date for the Project, initially scheduled for third quarter 2027.

Table 1: Schedule

Activity	Estimated Dates
Certificate of Need/Route Permit	March 2025
Land survey access and land acquisition	June 2024 - 2025
Required federal, state and local permits obtained	Q2 2025 – Q2 2026
Start Project construction	Q1 2026[1]
Gen-Ties in-service (1,000 MW enabled)	Q3 2028
Project Complete with all substations built out	Q4 2031

Q. WHY IS THE PROJECT SCHEDULE BEING PUSHED BACK?

A. The Project schedule is being pushed back to reflect U.S. Army Corps of Engineers permitting requirements, which are discussed further in the Direct Testimony of Matthew Langan.

III. PROJECT COSTS

Q. WILL THE CHANGE IN IN-SERVICE DATE AFFECT THE PROJECT COSTS?

A. The 11-month in-service date delay will result in additional costs due to the timing of expenditures and Allowance for Funds Used During Construction (AFUDC).

[1] Tree clearing is scheduled for Q1 2026 with facility construction to commence in Q2 2026.

Q. ARE THERE OTHER FACTORS AFFECTING PROJECT COSTS?

A. Yes. The Project estimates are affected by multiple factors, including land values, anticipated distribution relocations and transmission crossings, and commodity prices. The final Project costs will be dependent on additional factors, including the final route, soil conditions, and materials pricing.

Q. WHAT ARE THE CURRENT UPDATED PROJECT COSTS?

A. The cost of the Project will depend, in part, on the route selected by the Commission. As summarized in Table 2 below, the total Project costs for the two routes/design options proposed in the Application are updated using 2024$ unit costs,[2] the addition of two synchronous condensers at the Garvin Substation, and the removal of a STATCOM at the voltage support substation based on the additional analysis described in the Direct Testimony of Jason Standing. The estimated Project cost for the Preferred Route described in the Direct Testimony of Matthew Langan is also provided. The total Project costs range from $1.274 billion to $1.302 billion 2024$, including escalation and AFUDC. These costs include all transmission line costs, right-of-way costs, risk contingencies for the transmission line and cost for substation modifications at the Sherco Solar West, Sherco, Voltage Support, Intermediate, and Garvin substations. The transmission line is expected to cost approximately $4.4 million per mile (including land acquisition). The costs are shown in Table 2.

[2] The costs were estimated using 2024$ units for costs, with AFUDC and escalated to the date of expenditures.

Table 2: Total Project Costs			
Route Option	**Purple Route/Green Segment Estimated Cost**	**Blue Route/Green Segment Estimated Cost**	**Preferred Route Estimated Cost**
Transmission Line	$811.7 million	$783.7 million	$789 million
Green Segment	$6.6 million	$6.6 million	$6.6 million
Sherco Solar West Substation Modifications	$12.1 million	$12.1 million	$12.1 million
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Garvin Substation[4]	$356.4 million	$356.4 million	$356.4 million
Total	$1.302 billion	$1.274 billion	$1.279 billion

IV. CONCLUSION

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. As outlined above, the Project is estimated to cost between $1.274 billion to $1.302 billion depending on route selected. The Project Gen-Ties are expected

[3] Cost of STATCOM has been removed from Application estimate (-$169.6 million (2024$ unit cost)).

[4] Cost of two additional synchronous condensers have been added to the Application estimate (+$120 million (2024$ unit cost)).

to be in service in the third quarter of 2028. All Project facilities are expected to be installed by the fourth quarter of 2031.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.

JOSEPH M. SAMUEL, PE, PMP LEED AP®

Professional Profile
Professional Engineer and Project Management Professional with 30-years of experience providing professional expertise to private entities, municipalities and the power utility industry. Successful approach to challenging projects. Accomplished and dynamic project leader representing clients, advocating for their interests, and bringing together cross-functional teams.

Areas of Expertise

- Regulatory Approvals/Client Representation
- Underground Construction
- Design/Build Process
- LEED Accreditation / PMP Certification
- Project Budgeting/Cost Analysis
- Team Leader

Professional Licensures / Certifications

- Professional Engineer, licensed in CO, MI, MN, SD, and WI
- National Council of Examiners for Engineering and Surveying (NCEES) record holder
- Project Management Institute - Certified Project Management Professional
- United States Green Building Council (USGBC) - Leadership in Energy and Environmental Design Accredited Professional
- MNDOT/MPCA - Stormwater Pollution Prevention Plan Certified Designer & Certified Site Manager
- Xcel Energy Path to Leadership – Dec 2013

Engineering Experience

Senior Project Manager March 2011 – Present
Xcel Energy (Transmission) - Minneapolis, Minnesota

- Responsible for managing budget and schedule of multi-million dollar transmission line and substation projects
- Design, manage and oversee Construction of overhead & underground transmission lines and substation projects
- Liaison between Xcel, Community, and the public during planning, design and construction phases of a project
- Manage project execution of multi-disciplined teams with internal and external stakeholders

Senior Project Manager November 2008 – March 2011
MSA Professional Services - Oakdale, Minnesota

- Developed and staffed satellite office for 300-person Wisconsin based consulting firm expanding into the Minnesota marketplace
- Responsible for strategic business development and competitive public & private bid selection process
- Responsible for presenting project team, objective and costs during competitive bidding process
- City engineer / liaison for municipality with public and utility companies
- Reviewed and evaluated bids/selection process for city projects
- Designed/construction oversight of municipal infrastructure projects
- Managed the daily operations of multi-discipline design team, & completion of individual projects.
- Office manager responsible for administrative as well as corporate office demands, including staff hiring/retention and development

JOSEPH M. SAMUEL, PE, LEED AP®

Project Manager / Senior Professional Engineer June 1999 - November 2008
RLK-Incorporated - Minnetonka & Oakdale, Minnesota
- Strategic planning for 150-person consulting firm working in a competitive market environment; managed activities of branch office
- Assembled cross disciplined teams to respond to public and private sector request for proposal for planning, design and construction projects
- Prepared environmental planning documents and preliminary / final design documents for public and private clients in municipal, commercial, industrial, and residential markets.

Project Manager September 1995 - June 1999
Melchert Walkky, Inc. - Saint Paul, Minnesota
- Designed and reviewed grading, utility and street construction plans; performed hydrology and hydraulic computations for project sites.
- Computed construction quantities and engineer estimates; wrote construction specifications, prepared project budgets, construction timetables and issued payment requests.

Combat Engineer March 1989 - March 1997
United States Marine Corps - Minneapolis, Minnesota
- Supervised 24 Marines in the Combat Engineer section.
- Awarded 1992 MWSS 471-Det A Marine of the Year.
- Certificate of Commendation - Operation Desert Storm.

Engineer December 1993 - September 1995
Probe Engineering Company, Inc. - Burnsville, Minnesota
- Designed and supervised drafting of preliminary and final construction, grading / erosion control plans, computed hydrology analysis and impact studies for future land developments.

Engineering Intern April 1992 - December 1993
City of Oakdale Engineering Department - Oakdale, Minnesota
- Reviewed construction plans and acted and construction representative for City
- Acted as a liaison between City and utility companies.

Published Articles / Volunteer and Membership / Education

Published Articles
- National Association Industrial and Office Properties (NAIOP) “Brownfield Redevelopment”, 2005
- CE News “Project Case Study: Mixed use meets stakeholders needs”, Nov 2007
- Transmission & Distribution World “Xcel Energy Replaces Underground Transformer”, Dec 2011

Volunteer and Membership
- Otter Lake Elementary Outdoor Classroom, since 2017
- Minnesota Society of Professional Engineers, since 2014
- Xcel Energy – Volunteer Participant, since 2011
- Project Management Institute MN – since 2011
- City of Oakdale Veterans Memorial Committee, 2011

Education
University of Minnesota Civil Engineering Department, Minneapolis, Minnesota: Bachelor of Civil Engineering

Attachment B

Direct Testimony and Schedules
Jason T. Standing

Before the Minnesota Public Utilities Commission
State of Minnesota

In the Matter of the Application of Xcel Energy for a Route Permit for the Minnesota Energy Connection Project in Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon Counties in Minnesota

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Schedules

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE.

A. My name is Jason Standing. I am the Manager for Transmission Planning for Xcel Energy Services, Inc. (XES), the service company affiliate of Northern States Power Company-Minnesota, doing business as Xcel Energy (Xcel Energy).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I obtained a B.S. in Electrical Engineering from the North Dakota State University, Fargo, North Dakota in 1999. In 2011, I obtained a Masters of Business Administration from the University of Minnesota, Minneapolis, Minnesota. I received my Professional Engineer license from the State of Minnesota in 2012.

I have worked for XES since 2004 in the transmission area. I have been in my current position since 2019. My current responsibilities include managing the Transmission Planning Department for Xcel Energy, which includes Northern States Power and Northern States Power Company-Wisconsin. I am the lead planning engineer for the Minnesota Energy Connection Project (Project or MNEC). Prior to joining XES, I was an engineer in various roles for different companies. In these various roles, I have had roles of increasing responsibility in distribution planning, system protection, substation design, field engineering, and project management. My Statement of Qualifications is provided as **Schedule 1**.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is three-fold. First, I provide updated information regarding the equipment required at the Project substations to be able to interconnect up to 1,966 megawatts (MW) of energy with delivery to the Sherco Substation point of interconnection (POI). Second, I address how the length of the 345 kilovolt (kV) transmission lines could adversely impact Project performance. Third, I discuss how line crossings create safety risks and can affect transmission system reliability.

Q. ARE YOU SPONSORING ANY PORTIONS OF THE ROUTE PERMIT APPLICATION (APPLICATION) SUBMITTED BY XCEL ENERGY FOR THE PROJECT?

A. Yes. I am sponsoring the following sections of the Application:

- 2.6 Associated Facilities
- 2.9 Design Options to Accommodate Future Expansion

Q. WHAT SCHEDULES ARE YOU SPONSORING?

A. I am sponsoring one schedule:

- Schedule 1: Statement of Qualifications

II. SUBSTATION FACILITIES

Q. AS PROPOSED, HOW MUCH ENERGY IS THE PROJECT DESIGNED TO INTERCONNECT AND DELIVER TO THE POI?

A. The Project is designed to enable the interconnection and delivery of at least 1,996 MW of energy to the Sherco POI, a substantial portion of which would be wind or solar, which is an inverter-based generation resource.

Q. HOW DOES CONNECTING AN INVERTER-BASED GENERATION RESOURCE IMPACT THE ASSOCIATED FACILITIES NEEDED FOR THE PROJECT TO PERFORM?

A. Inverter-based generation uses power electronics to convert direct current power to alternating current power so it can be synchronized with the electric transmission grid. The electric transmission grid operates at a 60 Hertz frequency and is important in maintaining system stability. Due to the length of the lines (approximately 180 miles) and the type of inverter-based resources (IBR), it is necessary to add reactive support equipment at various points on the lines to help maintain connection to the grid under various operating conditions. It is also necessary to add series compensation due to the length of the lines.

Q. WHAT OTHER CONSIDERATIONS ARE PRESENTED BY INVERTER TYPE GENERATORS?

A. As the amount of renewables on an electric grid increases, there can be system stability needs that are not provided by renewable generators. In particular, voltage stability and recovery are of particular concern for the type of wind generation planned to interconnect to MNEC and due to the length of the transmission lines. If these reliability services are not sufficient, an external fault outside the MNEC lines could cause a loss of wind generation. Based on our transmission and engineering review, these issues are likely to arise on the transmission lines and must be addressed to successfully interconnect 1,996 MW of wind to MNEC.

Q. WHAT SPECIFIC REACTIVE SUPPORT AND SERIES COMPENSATION DID XCEL ENERGY PROPOSE IN THE CERTIFICATE OF NEED APPLICATION (CN APPLICATION)?

A. Our analysis for the CN Application showed that it is necessary to add two synchronous condensers in Lyon County at the proposed Garvin Substation once the amount of wind and/or solar energy interconnected reaches approximately 1,000 MW to ensure stability on the lines. The synchronous condensers at the Garvin Substation would provide system inertia and reactive support during a fault condition on the MNEC lines. Each line would also require 40 percent series compensation, which essentially reduces the length of the lines from an electric standpoint, bringing the remote generation closer to the POI. In addition, a 150 MVA STATCOM was proposed at the voltage support substation, but additional analysis through our consulting engineers showed that STATCOMs would not be sufficient. The CN Application further noted that additional facilities may be required depending on the final generation locations, size, and specific available inverter types.[1]

Q. WHAT DOES A SYNCHRONOUS CONDENSER DO?

A. A synchronous condenser is a rotating machine that is tied to the electrical system that provides reactive support during adverse system conditions and helps with power factor correction on the system.

[1] CN Application, p. 77.

Q. AT THE TIME OF THE CN APPLICATION, DID XCEL ENERGY IDENTIFY AN ALTERNATIVE MEANS OF PROVIDING THE SUPPORT THE SYNCHRONOUS CONDENSERS WOULD PROVIDE?

A. Yes. In the CN Application, Xcel Energy stated that the attributes could be provided by two 210 MW combustion turbines (CTs) near the Garvin Substation, which Xcel Energy has since proposed as a capacity resource in the E002/CN-23-212 docket.

Q. WHAT SPECIFIC FACILITIES DOES XCEL ENERGY PROPOSE?

A. Xcel Energy proposes to construct two natural-gas-fired, simple-cycle, 210 MW CT generators in Lyon County, Minnesota (Lyon County Generating Station). The CT generators would be designed to co-combust up to 30 percent hydrogen upon initial operation and would be located near Garvin, Minnesota, adjacent to the proposed Garvin Substation associated with the Project.

Q. DID XCEL ENERGY CONDUCT FURTHER ANALYSIS TO DETERMINE THE AMOUNT OF VOLTAGE SUPPORT NEEDED AT THE GARVIN SUBSTATION?

A. Yes.

Q. WHAT WERE THE RESULTS OF THAT ANALYSIS?

A. Xcel Energy retained Electranix Corporation to complete an Electromagnetic Transient (EMT) study. This study's primary focus was to determine the operational interactions and optimal solution for the proposed replacement inverter-based generation and the reactive equipment for MNEC. The study found that a STATCOM did not provide adequate support. The EMT study recommended four 110 MVA synchronous condensers be installed at the

Garvin Substation (two on each line) and confirmed that 40 percent series compensation for each line was appropriate—higher levels would interfere with IBR. The study also confirmed that two 210 MW gas CTs with clutches that can disengage the turbine shaft could replace two of the synchronous condensers at Garvin.

III. TRANSMISSION LINE LENGTH

Q. WHAT LINE LENGTHS DID XCEL ENERGY STUDY WHEN DESIGNING THE PROJECT?

A. Xcel Energy evaluated performance of the Project up to 180 miles in length in support of the CN Application and the Application to identify the facilities necessary to deliver 1,996 MW to the POI.

Q. HOW WILL THE PROJECT PERFORM IF THE PROJECT IS LONGER THAN 180 MILES IN LENGTH?

A. For this testimony, we conducted additional analysis on a line length of up to 185 and found that the lines would be expected to perform as designed. However, at 190 miles in length our analysis demonstrated there would be stability issues at the wind farms that would cause them to trip or become damaged at the maximum allowed line series reactive compensation.

IV. LINE CROSSINGS

Q. WHAT ARE LINE CROSSINGS?

A. Line crossings are when one transmission line has to cross over another transmission line, placing the conductors of one transmission line physically over the conductors of the other transmission line.

Q. HOW DO LINE CROSSINGS IMPACT SYSTEM RELIABILITY?

A. Most significantly, there is a greater risk that the outage of one line can result in an outage of the second line at the same time, reducing system resiliency. It can also result in structural damage to both transmission lines – complicating and increasing restoration times.

Q. WHAT SAFETY CONCERNS DO CROSSED LINES PRESENT?

A. New high-voltage transmission line crossings create safety risks because under normal operating conditions, one line may need to remain energized while maintenance work is occurring on the other transmission line at the same location. Taking multiple circuits out of service can stress the remaining system components and lead to overloads and voltage issues, and potentially stability concerns should there be a contingency ("loss of") of another system element at the same time.

Q. WHAT IS CONSIDERED GOOD UTILITY PRACTICE REGARDING ROUTING NEW LINES WITH RESPECT TO EXISTING FACILITIES?

A. Because of the safety and reliability impacts of crossings, good utility practice is to minimize new line crossings when routing new high voltage transmission lines.

V.CONCLUSION

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. Our transmission analysis demonstrates that the Project can interconnect and deliver 1,996 MW of generation to the Sherco POI. I recommend that the Commission grant a route permit for the Project.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.

Jason T. Standing

SUMMARY

Degreed Electrical Engineer experienced in management in government, commercial, and utility markets. Capable of satisfying customer needs and expectations through creative engineering problem solving techniques and accurate communications.

PROFESSIONAL EXPERIENCE

Xcel Energy, Minneapolis, MN 2019-current
Manager Transmission Planning, NSP/NSPW

- Lead a team of transmission experts to develop long-term plans to ensure reliable transmission operations
- Coordination of diverse groups of contributors to develop regional and local plans
- Serve as expert witness in state permitting and regulatory process
- Develop future planning tools and processes to help with the grid of the future

Xcel Energy, Minneapolis, MN 2015-19
Principal Transmission Planning Engineer

- Lead Transmission Planning engineer for the Twin Cities area
- Responsible for training new Transmission Planning engineers
- Involved in local and regional policy with states and RTOs
- Develop computer programming skills and incorporate into Transmission Planning

Xcel Energy, Minneapolis, MN 2014-15
PROMOD Planning Engineer

- Provide Production Cost Modeling for the NSP area
- Evaluate transmission project impacts to generation
- Congestion analysis

Xcel Energy, Minneapolis, MN 2004-14
Senior Specialty Transmission Planning Engineer

- Responsible for leading and improving the Constructability I process for which all new transmission projects must be approved through
- Lead Technical expert for the Hiawatha Certificate of Need
- Lead the MISO MTEP process for NSP and NSPW areas
- Involved with neighboring and regional entities to create cost effective solutions to the regional and bulk transmission issues
- Work closely with MISO to ensure Xcel Energy's interests are being heard through multiple working groups

Wunderlich-Malec Systems, Minnetonka, MN 2002-2003
Project Manager

- Managed the design, electrical system analysis, and procurement for substation projects

- Responsible for delivering cost analysis to the customer, preparing equipment bids, while monitoring expenses
- Provided field support for the construction team to ensure that the substation was delivered on time and to the customer's satisfaction

Design Engineer

- Lead design engineer for the American Transmission Company's new 69 kV substation
- Lead engineer responsible for accurate settings of the system protection relays
- Responsible for ensuring the NEC codes were followed
- Created new drawing sets while updating old drawing sets to ensure accuracy for the customer

Sebesta Blomberg and Associates, Roseville, MN 2000-2002
Project Engineer

- Commissioning specialist whose duties included creating test sheets for various types of electrical equipment, field visits, overseeing testing specialists at the Pentagon and other commercial sites
- Design engineer who used creative problem-solving techniques to redesign customer's 230 kV and 115 kV breaker control panels.
- Developed load flow and system protection studies

Alliant Energy, Madison, WI 1999-2000
Distribution Systems Planner

- Responsible for running load flow analysis for the southern Wisconsin electrical distribution and transmission systems
- Involved in maintaining and updating existing computer models to reflect changes to the physical system
- Prepared cost analysis reports for management

EDUCATION

B.S. in Electrical Engineering, North Dakota State University, Fargo, ND 1999
MBA, University of Minnesota, Minneapolis, MN 2011
Profession Engineer Minnesota, PE 2012

COMPUTER EXPERIENCE

PSSE, PROMOD, Synergi, SKM Power Tools, Microsoft Office