Appendix A

Certificate of Need Application Completeness Checklist

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

Minnesota Energy Connection
Certificate of Need Application
Completeness Checklist

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
Minn. R. 7829.2500, Subp. 2	Brief summary of filing on separate page sufficient to apprise potentially interested parties of its nature and general content	Filing Summary	No
Minn. R. 7849.0200, Subp. 2	Title Page and Table of Contents	Title Page and Table of Contents	No
Minn. R. 7849.0200, Subp. 4	Cover Letter	Cover Letter	No
Minn. R. 7849.0240	Need summary and additional considerations	1.5	No
Subp. 1	Summary of the major factors that justify the need for the proposed facility	1.5	No
Subp. 2	Relationship of the proposed facility to the following socioeconomic considerations:	1.12	No
A.	Socially beneficial uses of the output of the facility	1.12.1	No
B.	Promotional activities that may have given rise to the demand for the facility	1.12.2	No
C.	Effects of the facility in inducing future development	1.12.3	No
Minn. R. 7849.0260	Proposed LHVTL and Alternatives	5.3, 5.6	No
A.	A description of the type and general location of the proposed line, including:	1.3	No
(1)	Design voltage	1.3, 5.6.3	No
(2)	Number, sizes and types of conductors	2.1	No
(3)	Expected losses under projected maximum loading and under projected average loading in the length of the	5.3.2, 5.6.3	Yes – Applicant to instead provide system losses.

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
	line and at terminals or substations		
(4)	Approximate length of the proposed line	1.1, 1.3, 5.3.1	No
(5)	Approximate locations of DC terminals or AC substations on a map	1.1, 1.3	No
(6)	List of likely affected counties	1.3, 8.1	No
B.	Discussion of the available alternatives including:		No
(1)	New generation	5.6.1	No
(2)	Upgrading existing transmission lines	5.6.2	No
(3)	Transmission lines with different voltages or conductor arrays	5.6.3, 5.6.4	No
(4)	Transmission lines with different terminals or substations	5.6.5	Yes, with respect to discussing alternatives which do not begin at the existing Sherco Substation.
(5)	Double circuiting of existing transmission lines	5.6.6	No
(6)	If facility for DC (AC) transmission, an AC (DC) transmission line	5.6.7	No
(7)	If proposed facility is for overhead (underground) transmission, an underground (overhead) transmission line	5.6.8	No
(8)	Any reasonable combination of alternatives (1) – (7)	5.6.11	Yes, with respect to discussing alternatives which do not begin at the existing Sherco Substation.
C.	For the facility and for each alternative in B, a discussion of:		No
(1)	Total cost in current dollars	2.2, 5.6	No
(2)	Service life	7.5	No

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
(3)	Estimated average annual availability	7.6	No
(4)	Estimated annual O&M costs in current dollars	7.5	No
(5)	Estimate of its effect on rates system wide and in Minnesota	2.2.1	
(6)	Efficiency	5.3.2	Yes – Applicant to instead provide system losses.
(7)	Major assumptions made in subitems (1) – (6)		No
D.	A map (of appropriate scale) showing the applicant's system or load center to be served by the proposed LHVTL	Figure 3.2	No
E.	Such other information about the proposed facility and each alternative as may be relevant to determination of need	Chapter 5	No
Minn. R. 7849.0270	Content of Forecast	Chapter 4; Appendix E	Yes – Applicant to instead provide: information which describes the power demand and energy forecasting used to develop the Project, and the type of information used in the Docket RP-19-368; and updated demand and energy forecasting similar to the forecasting used in Docket RP-19-368.
Minn. R. 7849.0280	System Capacity		
	Description of ability of existing system to meet demand forecast including:		
A.	Power planning programs	Appendix E	No
B.	Seasonal firm purchases and sales	Chapter 4; Appendix E	Yes – Applicant to instead provide a

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
C.	Seasonal participation purchases and sales		discussion of the capacity data from the IRP that drives the need for new Transmission. Applicant will also state any updates to the quantity of new generation needed based upon the updated demand and energy forecasting provided under Minnesota Rules 7849.0270.
D.	For each forecast year load and generating capacity for:		
(1)	Seasonal system demand		
(2)	Annual system demand		
(3)	Total seasonal firm purchases		
(4)	Total seasonal firm sales		
(5)	Seasonal adjusted net demand		
(6)	Annual adjusted net demand		
(7)	Net generating capacity		
(8)	Total participation purchases		
(9)	Total participation sales		
(10)	Adjusted net capability		
(11)	Net reserve capacity obligation		
(12)	Total firm capacity obligation		
(13)	Surplus or deficit capacity		
E.	Summer and winter season load generation and capacity in years subsequent to application contingent on proposed facility		
F.	Summer and winter season load generation and capacity including all projected purchases, sales and generation in years subsequent to application		
G.	List of proposed additions and retirements in generating capacity for each forecast year subsequent to application		
H.	Graph of monthly adjusted net demand and capability with difference between capability and maintenance outages plotted		
I.	Appropriateness and method of determining system reserve margins		

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
Minn. R. 7849.0290	Conservation Programs		
A.	Persons responsible for energy conservation and efficiency programs	Appendix E	No
B.	List of energy conservation and efficiency goals and objectives	Appendix E	No
C.	Description of programs considered, implemented and rejected	Appendix E	No
D.	Description of major accomplishments in conservation and efficiency	Appendix E	No
E.	Description of future plans with respect to conservation and efficiency	Appendix E	No
F.	Quantification of the manner by which these programs impact the forecast	Appendix E	Yes – Applicant to instead provide a summary of the conservation information in the IRP and CIP filings.
Minn. R. 7849.0300	Consequence of Delay	5.6.10	Yes – Applicant to instead provide a general evaluation of the consequences of delay.
Minn. R. 7849.0310	Required Environmental Information	Chapter 8	No
Minn. R. 7849.0330	Transmission Facilities		
	Data for each alternative that would require LHVTL construction including:		
A.	For overhead transmission lines		No
(1)	Schematics showing dimensions of support structures	Appendix F	No
(2)	Discussion of electric fields	6.6	No
(3)	Discussion of ozone and nitrogen oxide emissions	6.2	No

Minnesota Rule	Required Information	Application Section(s)	Exemption Granted
(4)	Discussion of radio and television interference	6.4	No
(5)	Discussion of audible noise	6.3	No
B.	For underground transmission facilities:		
(1)	Types and dimensions of cable systems	N/A	No
(2)	Types and qualities of cable system materials	N/A	No
(3)	Heat released in kW per foot of cable	N/A	No
C.	Estimated right-of-way required for the facility	2.1.1	No
D.	Description of construction practices	7.3	No
E.	Description of O&M practices	7.5	No
F.	Estimated workforce required for construction and O&M	7.3, 7.5	No
G.	Description of region between endpoints in likely area for routes emphasizing a three-mile radius of endpoints including:	Chapter 8	Yes – Applicant to instead provide information concerning "major features of the region" within Lyon County.
(1)	Hydrological features	8.3	
(2)	Vegetation and wildlife	8.4	
(3)	Physiographic regions	8.2	
(4)	Land use types	8.5	
Minn. R. 7849.0340	No-Facility Alternative	5.6.10	Yes – Applicant to instead provide a general evaluation of a no-build alternative.

Appendix B

2022 IRP Order

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

In the Matter of the 2020–2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel Energy

ISSUE DATE: April 15, 2022

DOCKET NO. E-002/RP-19-368

ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS

Contents

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PROCEDURAL HISTORY

On July 1, 2019, Northern States Power Company d/b/a Xcel Energy (Xcel or the company) filed a new resource plan (Initial Plan) under Minn. Stat. § 216B.2422 and Minn. R. 7843.0400 covering the period 2020–2034.

On July 18, 2019, the Commission referred the resource plan to the Office of Administrative Hearings to conduct public hearings. The administrative law judge convened five public hearings at various locations throughout Xcel's Minnesota service area, and filed a summary of the comments on December 18, 2019.

On June 30, 2020, Xcel filed a revised resource plan (Supplement Plan). On August 25, 2020, Xcel filed errata to its Supplement Plan.

On June 25, 2021, Xcel filed a resource plan with further revisions (Alternate Plan). On August 19, 2021, Xcel filed errata to its Alternate Plan.

Throughout the proceeding the Commission received comments on Xcel's proposals. These included comments from private individuals as well as the following organizations:

- As You Sow, Boston Common Asset Management, and the Seventh Generation Interfaith Coalition for Responsible Investment
- Becker Township
- The Burnsville Chamber of Commerce
- The Center of the American Experiment
- The Citizens Utility Board of Minnesota (CUB)

- The City of Becker
- The City of Burnsville
- The City of Minneapolis (Minneapolis)
- The City of Monticello and City of Monticello Industrial Economic Development Committee
- The City of Red Wing
- The City of St. Louis Park
- The City of Saint Paul
- Clean Energy Economy Minnesota
- The Coalition of Utility Cities
- The Community Energy Justice Commenters
- Cooperative Energy Futures, the Environmental Law and Policy Center, the Institute for Local Self-Reliance, and Vote Solar (Distributed Solar Parties)
- Covia Holdings Corporation; Flint Hills Resources Pine Bend, LLC; Gerdau Ameristeel US Inc.; Marathon Petroleum Corporation; and USG Interiors, Inc. (Xcel Large Industrials, or XLI)
- Energy We Can't Afford
- Fresh Energy, Clean Grid Alliance, Union of Concerned Scientists, and the Minnesota Center for Environmental Advocacy (Clean Energy Organizations, or CEOs)
- Fresh Energy, Community Stabilization Project, Green & Healthy Homes Initiative, Inquilinxs Unidxs Por Justicia, Minnesota Housing Partnership, National Housing Trust, and Natural Resources Defense Council (Energy Efficiency for All Partners)
- Generation Atomic
- Goodhue County Board of Commissioners
- The International Brotherhood of Electrical Workers, Locals 23, 160, and 949 (IBEW)
- International Union of Operating Engineers, Local 49 (IUOE)
- The Institute for Local Self Reliance, Native Sun, Solar Bear, Minnesota Interfaith Power and Light, MN350, Community Power, St. Paul 350, Izaak Walton League–Minnesota Division, Union of Concerned Scientists, Sierra Club, Land Stewardship Project, Honor the Earth, Minnesota Environmental Partnership, and Clean Up the River Environment
- Laborers' International Union of North America—Minnesota & North Dakota (LIUNA)
- Litty Solar and Energy Releaf
- The Minnesota Department of Commerce (Department), and Deputy Commissioner of Commerce Aditya Ranade
- The Minnesota Office of the Attorney General (OAG)
- The Monticello Industrial & Economic Development Committee
- The Monticello Labor Coalition
- The North Central States Regional Council of Carpenters (Carpenters)
- Northern Natural Gas
- The Prairie Island Indian Community
- St. Paul 350
- The St. Paul Area Chamber
- The Sierra Club
- The Suburban Rate Authority and the Coalition of Local Government Units
- The Sustainable Growth Coalition
- US Solar

- Wright County Board of Commissioners
- Wright County Economic Development Partnership

On January 25 and 27, and February 8, 2022, the Commission met to consider the matter.

FINDINGS AND CONCLUSIONS

I. Summary of Commission Action

In this order, the Commission approves a modified version of Xcel's Alternate Plan that will guide investments through 2034. With the benefit of significant stakeholder engagement spanning more than two years, the Commission is able to approve a plan largely reflecting the positions taken jointly by Xcel, many environmental groups (the CEOs), and many labor groups (the Carpenters, IUOE, and LIUNA). The plan is designed to manage costs for households and businesses; reduce emissions that contribute to climate change; and ensure reliable electric service for Xcel customers. Most significantly, it provides for –

- retiring all of Xcel's coal-powered generators,
- adding substantial amounts of solar- and wind-powered generation,
- reinforcing system reliability,
- exploring options for adding new technology such as energy storage and hydrogen-powered generation, and
- pursuing the process of extending the life of Xcel's Monticello Nuclear Generating Plant (Monticello) in Monticello, Minnesota.

Under this plan, Xcel will reduce its greenhouse gas emissions by 86% relative to 2005 levels; by 2032, 81% of Xcel's electricity will be generated from carbon-free resources.

The plan also directs Xcel to manage the resulting changes for Minnesota's cities, workers, and the Prairie Island Indian Community, and to promote equity among its customers and employees.

II. Resource Planning

A public utility providing electricity to at least 10,000 customers and capable of generating 100 megawatts (MW) of electricity must file a resource plan or report for the Commission's approval, rejection, or modification. A resource plan generally details the projected need for electricity in its service territory for a forecasted period, and the utility's plans for meeting projected need, including the actions it will take in the next five years.[1] Resource plans are evaluated on their ability to:

> A. maintain or improve the adequacy and reliability of utility service;
>
> B. keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints;

[1] Minn. Stat. § 216B.2422; Minn. R. Chap. 7843.

> C. minimize adverse socioeconomic effects and adverse effects upon the environment;
>
> D. enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and
>
> E. limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.[2]

To reliably provide the electricity demanded by its customers, an electric utility considers both supply and demand. The utility can supply electricity through a combination of generation and power purchases, and by reducing the amount of electricity lost through transmission and distribution. The utility can manage customer demand by encouraging customers to conserve electricity or to shift activities requiring electricity to periods when there is less demand on the electric system. A resource plan contains a set of demand- and supply-side resource options that the utility could use to meet the forecasted needs of retail customers.[3] By integrating the evaluation of supply- and demand-side resource options—treating each resource as a potential substitute for the others—a utility can find the least-cost plan that is consistent with legal requirements and policies.

Any number of combinations of resources might permit a utility to match supply with demand under a given set of assumptions. To select a plan that balances the needs for maintaining reliability, reducing adverse environmental and socioeconomic burdens, and minimizing rates, a utility then analyzes various options under a variety of assumptions—including assumptions about unanticipated deviations from forecasts, or unexpected failures of generators or transmission facilities. Computer models help parties evaluate each scenario under a variety of assumptions. Specifically, utilities develop a *base case scenario*, and develop other scenarios as variations on the base case. While the base case scenario has no greater weight than any other scenario, it tends to reflect a conventional, status quo position. After analyzing the various scenarios, the utility selects a *preferred plan*.

Although the Commission must approve, reject, or modify the resource plans of investor-owned utilities, the resource-planning process is largely collaborative and iterative.

The process is collaborative because a wide array of facts and considerations may be relevant to resource choices or deployment timetables. The facts on which resource decisions depend—how quickly an area and its need for electricity will grow, how much electricity will cost over the lifetime of a generating facility or a purchased-power contract, how much conservation potential the service area holds and at what cost—all require the kind of careful judgment that sharpens with exposure to the views of engaged and knowledgeable stakeholders.

The process is iterative because analyzing future energy needs and preparing to meet them is not a static process; strategies for meeting future needs are always evolving in response to changes in actual conditions in the service area. When demographics, economics, technologies, or environmental regulations change, so do a utility's resource needs and its strategies for meeting them.

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[2] Minn. R. 7843.0500, subp. 3.

[3] Minn. Stat. § 216B.2422, subd. 1(d).

III. Resource Acquisition Strategies

A resource planning process will identify the resources a utility should pursue—and, in particular, a resource's size, type, and timing. But where a plan identifies the need for a new resource, it will generally not identify a specific project, developer, or owner, or the specific terms governing a power purchase agreement. Thus, even after identifying the optimal size, type, and timing for a new resource, the Commission still has the task of identifying the optimal method for selecting among resources that meet the size/type/timing requirements.

One option is to acquire a new resource through the Certificate of Need process. Before a developer builds a generator with capacity of 50 MW or more in Minnesota,[4] Minn. Stat. § 216B.243 requires the developer to acquire a Certificate of Need demonstrating that there are no more cost-effective means to meet the alleged need.

But the Legislature provides various exceptions to the Certificate of Need process. For example, Minn. Stat. § 216B.243, subd. 9, eliminates the need for a Certificate of Need for projects that are designed to provide energy to fulfill the state's renewable energy standards or solar energy standards under Minn. Stat. § 216B.1691. And Minn. Stat. § 216B.2422, subd. 5, provides an exception for generators that are selected via a Commission-approved bidding process. Over the last several resource plans, the Commission has developed three bidding processes. These processes are described briefly here, and set forth in greater detail in Appendix A.

Track 1, or the No-Bid process, is a competitive process that applies when Xcel does not plan to submit its own bid.[5] Under No-Bid/Track 1, Xcel solicits proposals to fill an identified need, then evaluates the bids and submits the resulting contracts to the Commission for approval.

Track 2, or the Xcel-Bid Contested Case process, is a competitive process that applies when Xcel does intend to offer its own proposals.[6] Under Xcel-Bid Contested Case/Track 2, Xcel solicits proposals to fill all or part of an identified need. The bids are then sent to a contested case process, allowing parties to file testimony, followed by an evidentiary hearing, briefs, an administrative law judge's recommendation, and ultimately a Commission determination.

Modified Track 2, or the Xcel-Bid Auditor process, also establishes a competitive process that applies when Xcel intends to offer its own proposals.[7] As in the No-Bid/Track 1 process and the Xcel-Bid Contested Case/Track 2 process, Xcel solicits proposals to meet all or part of an identified need. But under Xcel-Bid Auditor/Modified Track 2, Xcel must submit its own proposals a day before any of the bids from other developers are due. Xcel then evaluates all the proposals received based on an established list of factors, and identifies projects to pursue in

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[4] *See* Minn. Stat. § 216B.2421, subd. 2(1).

[5] *In the Matter of Northern States Power Company d/b/a Xcel Energy's Application for Approval of its 2004 Resource Plan*, Docket No. E-002/RP-04-1752, Order Establishing Resource Acquisition Process, Establishing Bidding Process Under Minn. Stat. § 216B.2422, Subd. 5, and Requiring Compliance Filing (May 31, 2006).

[6] *Id.*

[7] *See In the Matter of Xcel Energy's 2016–2030 Integrated Resource Plan*, Docket No. E-002/RP-15-21, Order Approving Plan with Modifications and Establishing Requirements for Future Resource Plan Filings (January 11, 2017).

negotiations. Thereafter, Xcel reports to the Commission its own analysis and recommendations regarding the bids and the results of a third-party auditor's report on the bidding process, among other topics.

IV. Xcel's Prior Resource Plan

Xcel's 2016-2030 resource plan, as approved by the Commission, included the following elements:[8]

The Commission directed Xcel to save an average of 444 gigawatt-hours (GWh) per year through promoting energy efficiency.

The Commission ordered Xcel to develop plans for retiring its aging generators, including the coal-powered Allen S. King Generating Station (King) on the banks of the St. Croix River near Bayport, Minnesota, and the coal-powered Sherburne County Generating Station (Sherco) in Becker, Minnesota.

The Commission approved Xcel's proposal to retire Sherco Unit 2, with a generating capacity of 680 MW, in 2023, and Unit 1, with a capacity of 680 MW, in 2026. Xcel proposed replacing these units with a natural gas-powered combined cycle generator at the Sherco site. But instead, the Commission found it more likely than not that there would be a need for approximately 750 MW of capacity in 2026 and authorized a Certificate of Need proceeding to evaluate the optimal resources to meet Xcel's needs, considering the socioeconomic impact of various alternatives.[9]

The Commission found that Xcel had demonstrated the need to add one natural gas-powered combustion turbine to its system, but had not demonstrated a need to locate the turbine in Fargo, North Dakota, as Xcel had proposed. (Xcel has a regulatory commitment to build a combustion turbine in that state.)

The Commission authorized Xcel to add more solar- and wind-powered generators, and outlined the Xcel-Bid Auditor/Modified Track 2 process to be used for this purpose. The Commission also directed Xcel to plan for the contingency that the process could fail to produce the desired generating capacity.

The Commission ordered Xcel to establish programs by 2023 that would allow the utility to call on customers who subscribe to temporarily reduce their electricity use—that is, provide "demand response"—by an aggregate 400 MW. The Commission also ordered Xcel to explore adding 1,000 MW of demand response by 2025.

Finally, the Commission ordered Xcel to use the same inputs and analysis in its future resource planning as in its Integrated Distribution Planning, discussed below.

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[8] *Id.*

[9] Minn. R. 7843.0500, subp. 3.C.

V. Xcel's Preferred Resource Plans

This proceeding addresses Xcel's 2020–2034 Upper Midwest Integrated Resource Plan—that is, a plan addressing the demand for electricity, and the supply of electricity, in Xcel's service areas in Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin.

Through the course of this proceeding, Xcel filed three resource plans:

- The July 1, 2019 Initial Plan.
- The June 30, 2020 Supplement Plan.
- The June 25, 2021 Alternate Plan.

Each iteration was designed, in part, to address concerns raised regarding the prior plan, as summarized below.

A. Initial Plan

Xcel developed its Initial Plan using the Strategist capacity expansion model, and calculated the cost of electricity from renewable sources on the basis of 2018 data from the National Renewable Energy Laboratory's Annual Technology Baseline (NREL ATB) report.

Xcel's initial preferred plan included many items that the Commission ordered as part of Xcel's last resource plan.[10] For example, Xcel proposed to acquire 400 MW of demand response by 2023. And Xcel proposed to retire the Sherco Unit 2 in 2023, and Unit 1 in 2026.

But in addition, Xcel proposed to retire its remaining coal-powered plants—King (511 MW) in 2028 and Sherco Unit 3 (517 MW) in 2030. Xcel also identified six other fossil-fuel-powered generators that would retire, and three power purchase agreements that would expire, by 2034. All of these changes would help Xcel reduce the amount of greenhouse gases (such as carbon dioxide, or "carbon") that it emits—gases that contribute to climate change.[11]

Again, Xcel proposed to offset this loss of generating capacity by, among other things, adding more solar- and wind-powered generators selected via the Xcel-Bid Auditor/Modified Track 2 process, and adding a new gas-powered combined cycle plant near the Sherco site. Xcel also proposed to seek to extend Monticello's operating life by ten years—to 2040—and to continue operating its Prairie Island Generating Plant (Prairie Island), Units 1 and 2, at least through the end of their current licenses—to 2033 and 2034, respectively.

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[10] *In the Matter of Xcel Energy's 2016–2030 Integrated Resource Plan*, Docket No. E-002/RP-15-21, Order Approving Plan with Modifications and Establishing Requirements for Future Resource Plan Filings (January 11, 2017).

[11] On the need to reduce greenhouse gas emissions, *see* Minn. Stat. § 216H.02, subd. 1; *In the Matter of the Further Investigation into Environmental and Socioeconomic Costs Under Minnesota Statutes Section 216B.2422, Subdivision 3*, Docket No. E-999/CI-14-643, Order Updating Environmental Cost Values, at 9 (January 3, 2018).

Furthermore, Xcel proposed to save, on average, more than 780 GWh per year through 2034 via programs promoting energy efficiency.

B. Supplement Plan

In shifting from its Initial Plan to its Supplement Plan, Xcel switched from using the Strategist model to the EnCompass model. In general, Strategist modeled the amount of generation capacity Xcel would require, and the order for dispatching the generators, by analyzing data from a representative week and extrapolating from these results to estimate needs and strategies for the rest of each year. EnCompass creates capacity expansion plans in the same manner, but then redispatches the plan while simulating all 8,760 hours of the year. The resulting plan reflects both the capital costs from the first run and the production costs from the second run. These changes, among others, permit the model to identify optimal plans that consider adding resources, committing and dispatching those resources, buying and selling electricity on the market, and selling ancillary services—that is, selling capacity for the purpose of supporting the grid's reliability.

Xcel also updated its forecast of the amount of energy its customers would consume, the capacity it would need to deliver this energy, and the NREL ATB data used to estimate the cost of electricity from renewable sources.

Based on this new analysis, Xcel selected a preferred plan that included the Sherco combined cycle plant, but also new gas-powered combustion turbine generators in Lyon County and Fargo, North Dakota; this latter generator was designed in part to fulfill a regulatory requirement in North Dakota. Xcel argued that these generators were needed to provide energy, power, and blackstart capabilities—that is, a capacity to continue or initiate electric generation to help re-energize the transmission grid following an electricity blackout.

C. Alternate Plan

In developing its Alternate Plan, Xcel switched from using EnCompass 4.2 to EnCompass 5.0. Among other benefits, Version 5.0 better models the variability in the output of renewable generators. But Xcel continued to use 2019 NREL ATB data to model the cost of electricity from renewable sources, reasoning that the small benefit that would result from updating this data would not justify the administrative burden for itself and for those analyzing its revised plan.

Xcel also updated its analysis to reflect roughly 1,150 MW of generating capacity—resulting from new or refurbished generators, or extended contracts—that the company had added to its portfolio between the time Xcel filed its Supplement Plan and June 1, 2021. (As a result, Xcel's

modeling did not include a 460 MW solar power project planned for development near the Sherco site (Sherco Solar),[12] nor a proposed 120 MW wind power project.[13])

Based on this analysis, the preferred Alternate Plan would add approximately 3,150 MW of utility-scale solar-powered generation and 2,650 MW of wind-powered generation by 2034 (although the wind-powered additions do not occur within the plan's five-year action plan). These additions represent an increase of approximately 27% over the Supplement Plan's total renewable generating capacity.

Xcel would maintain its plan to retire its coal-powered generators while continuing to operate Prairie Island and extend the life of Monticello. But Xcel no longer recommended adding a combined cycle plant at the Sherco site. Instead, Xcel proposed repowering two existing combustion turbines by 2026 to provide blackstart capacity in the near term, and acquiring two new 400 MW combustion turbines—one in Fargo, North Dakota by 2027, another one in Lyon County, Minnesota by 2029. The Fargo generator would have the attribute of fulfilling a regulatory commitment in North Dakota, while the Lyon County generator would have the attributes of providing energy, system stability, and blackstart capabilities. Xcel stated that these turbines would have the option of running on hydrogen in lieu of natural gas; unlike burning natural gas, burning hydrogen does not release greenhouse gases.

[12] *In the Matter of Xcel Energy's Petition for Approval of the Sherco Solar Project*, Docket No. E-002/M-20-891; *In the Matter of the Application of Xcel Energy for a Route Permit for the West 345 kV Transmission Line for the Sherco Solar Project in Sherburne County*, Docket No. E-002/TL-21-189; *In the Matter of the Application of Xcel Energy for a Route Permit for the East 345 kV Transmission Line for the Sherco Solar Project in Sherburne County*, Docket No. E-002/TL-21-190; *In the Matter of the Application of Xcel Energy for a Site Permit for the up to 460 MW Sherco Solar Project in Sherburne County*, Docket No. E-002/GS-21-191.

[13] *In the Matter of the Application for a Site Permit Amendment to Decommission the Existing Chanarambie and Viking Wind Facilities and Construct the 120-Megawatt Northern Wind Facility in Murray County, Minnesota*, Docket No. IP-7046/WS-20-860.

Xcel also proposed building two transmission lines designed to enable new renewable sources of generation to tie into the regional transmission grid (generation tie-lines, or "gen-tie lines") at the site of the retiring King and Sherco plants. Xcel explained that, to encourage utilities to transition to the use of electricity from renewable sources, the Federal Energy Regulatory Commission (FERC) authorizes the owners of old generators to retain control of the transmission rights associated with those generators to facilitate the interconnection of new generation at the same location. This policy is incorporated into the tariffs of the Midcontinent Independent System Operator, Inc. (MISO), which manages the regional transmission grid.[14] To make use of this valuable transmission right, however, Xcel would have to own these new generators, rather than independent power producers.

For modeling purposes, Xcel described the Sherco gen-tie line as a 345 kilovolt (kV) cable installed on existing transmission towers extending 140 miles southwest to Lyon County. Xcel initially described the King gen-tie line as a single 345-kV cable extending 15 miles east across the St. Croix River into Wisconsin—but during the Commission meeting, Xcel clarified that it would seek to install the cable on existing transmission towers to cross the river, thereby minimizing consequences for the environment.

Finally, Xcel asked the Commission to authorize the company to solicit requests for proposals, and to choose among the proposals, for various generators—including the Lyon County combustion turbine, and the various generators using renewable sources of power—via the Commission's Xcel-Bid Auditor/Modified Track 2 process.

VI. Resource Plan Selection

A. Positions of the Parties and Commenters

While the CEOs, CUB, the Department, and the Sierra Club each offered their own plans, ultimately most parties and commenters developed their final positions relative to the Alternate Plan.

For example, the Distributed Solar Parties and the Sierra Club supported Xcel's proposal to retire King and Sherco, but recommended that Xcel continue to evaluate whether the company should accelerate those retirement dates. They supported authorizing Xcel to build and own the Sherco and King gen-tie lines and generation up to the limits of the company's current interconnection rights, provided that Xcel select the generators using a rigorous competitive bidding process—though they proposed refinements to that process. But these parties did not support extending Monticello's operating life; the Sierra Club specifically opposed it. They objected that Xcel developed its Alternate Plan based on the presumption that Xcel would add new 400 MW combustion turbines in Fargo and Lyon County, rather than letting the model pick the optimal mix of resources—arguing that this practice defeated the purpose of optimization modeling. Also, the Sierra Club argued that the EnCompass model fails to appropriately model the reliability added by having multiple distributed generators with uncorrelated outputs—especially fleets of wind turbines—rather than a few large generators.

In response to this and other feedback, Xcel joined the Carpenters, the CEOs, IUOE, and LIUNA in recommending a variation on its Alternate Plan. These parties and commenters generally

[14] *See* MISO Tariff, Attachment X (Generator Interconnection Procedures), §§ 3.3.1 and 3.7.1.

supported the Alternate Plan, but proposed deferring decisions about the need for adding the combustion turbines in Fargo and Lyon County. Instead, they recommended the following:

- Requiring Xcel to consider and pursue opportunities to deploy storage technologies and renewable resources—including resources powered by hydrogen or clean fuel alternatives—on a schedule faster than in its Alternate Plan, if such deployment would be cost-effective, maintain reliability, and aid in achieving compliance with policies to mitigate climate change.

- Finding that it is more likely than not that there will be a need for approximately 800 MW of additional generic "firm dispatchable" resources between 2027 and 2029, some of which could be located in North Dakota.

- Requiring Xcel in a future proceeding—specifically, a future resource plan, Certificate of Need, or applicable resource acquisition proceeding—to evaluate renewable resources and storage options that can deliver the identified necessary grid attributes to meet this need.

For purposes of this recommendation, these parties and commenters defined "firm dispatchable" to mean a resource or combination of resources that can provide capacity, energy, and energy availability to meet customer demand for extended durations in the context of the system as a whole. They acknowledged that the analysis might also consider characteristics such as the value from production capabilities during potential system restoration events of unknown durations, environmental consequences, costs, and the ability to foster integration of renewable resources into Xcel's system.

These parties and commenters specified that, in the future proceeding addressing this need, Xcel should conduct up-to-date systemwide modeling to update Xcel's need—including capacity, energy, resource adequacy, energy availability, ancillary service, and reliability needs—and to quantify and compare the electric system attributes from each resource option considered to meet the identified grid needs.

The Suburban Rate Authority generally supported this proposed variant on the Alternate Plan, praising the plan to acquire large amounts of generation from renewable sources, and the choice to retire many generators running on fossil fuels.

IBEW acknowledged Xcel's need to shift its sources of electricity to reduce the emission of greenhouse gases, even though this would result in hardship to IBEW members working at some generators—especially the King and Sherco plants. To mitigate these effects, IBEW supported plans to build new generators and to extend the operating life of Monticello.

The Department presented its own proposal that differed from Xcel's in many respects. In particular, the Department argued that over time Xcel's analysis systematically overestimates demand and underestimates capital costs, leading the company to propose needlessly expansive growth. The Department argued that Xcel would be better off extending the life of Prairie Island

rather than Monticello—but also concluded that this matter could be addressed with greater precision in the context of the related Certificate of Need proceeding for Monticello.[15]

Various parties and commenters—including the Center for the American Experiment, the OAG, and XLI—expressed concern that Xcel had not provided adequate cost data supporting its gen-tie proposal. They warned that approving the gen-tie lines might saddle ratepayers with higher rates than necessary. This fact is especially consequential because, according to the Department's modeling, small changes in the cost of solar energy produced large changes in the recommended amount to add to Xcel's system. To provide adequate opportunity to evaluate the gen-tie proposal, XLI recommended that the Commission defer setting retirement dates for Xcel's existing generators.

According to Xcel's estimates, building gen-tie lines to connect to various new energy resources would be substantially cheaper per kilowatt than trying to acquire an equivalent amount of resources through the MISO queue process.[16] In any event, Xcel argued that it is unnecessary to establish the cost of the gen-tie lines in the current docket because, if the Commission authorized Xcel to proceed with its gen-tie proposal, more precise cost data would be developed in the ensuing Certificate of Need process. But Xcel offered to issue a request for information asking potential developers to estimate project cost ranges, and to retain an independent expert to evaluate these estimates.

B. Commission Action

The current resource planning docket has been long, rigorous, and iterative—but the analysis has revealed the state of Xcel's current system, a forecast of Xcel's future needs, and the limits of those forecasts. Most significantly, even Xcel has concluded that the record no longer supports its initial proposal for a new combined cycle gas facility, and has consented to deferring decisions about building two new combustion turbines. As Community Power observed,

> [F]or the first time in the history of Minnesota's [resource planning,] three alternative models have been set forth that demonstrated alternative pathways that are more affordable, cleaner, and aim Minnesota towards local-level resilience to climate risks and economic uncertainty. [Xcel's plan] has been utterly transformed by this engagement and the ability for alternatives to come forward early in the process and the community to react to them.[17]

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[15] While Xcel may not require a new Certificate of Need to extend Monticello's operating life *per se*, Xcel must obtain a Certificate of Need before increasing its capacity for storing spent nuclear fuel, a necessary concomitant of extending Monticello's operations. *See In the Matter of the Application of Northern States Power Company d/b/a Xcel Energy for a Certificate of Need for Additional Dry Cask Storage at the Monticello Nuclear Generating Plant Independent Spent Fuel Storage Installation in Wright County*, Docket No. E-002/CN-21-668. Specifically, Minn. Stat. § 216B.243, subd. 3b, requires Xcel to "address the impacts of continued operation" of the nuclear generator and related facilities.

[16] Xcel reply comments, at 12 (June 25, 2021).

[17] Community Power comments, at 2 (January 27, 2022).

Having analyzed the record and the positions of all parties and commenters, the Commission will adopt the recommendations set forth by the Carpenters, the CEOs, IUOE, LIUNA, and Xcel—with the following modifications.

First, various parties and commenters argued that the record failed to demonstrate that building a combined-cycle generator at the Sherco site would be a prudent investment, and therefore ratepayers should not have to bear the cost of the plant. Ultimately Xcel withdrew its combined-cycle proposal. The Commission concurs with this choice and finds no basis in the record that would justify Xcel recovering the cost of such a project from Minnesota ratepayers.

Second, the Commission will specifically approve the following elements of Xcel's Alternate Plan as filed on June 25, 2021:

1) Each year through 2034, Xcel shall save at least 780 GWh via energy efficiency.

2) Xcel shall continue to acquire 400 MW of incremental demand response by 2023 as ordered in the company's last resource plan.

3) In 2025 and 2026, Xcel may repower existing resources needed for blackstart services.

4) Xcel shall retire King in 2028 and Sherco Unit 3 in 2030. Contrary to the objections raised by XLI and others, multiple resource plan scenarios demonstrated that retiring these units would be a cost-effective option—demonstrating the robustness of this choice.

5) By 2026 Xcel shall acquire –

   - Approximately 720 MW of company-owned solar-powered generation to fully reutilize the interconnection capacity to be made available following the retirement of Sherco Unit 2 (460 MW of which could come from the proposed Sherco Solar project if approved by the Commission) and

   - An additional 600 MW of solar-powered generation unconstrained by interconnection location or ownership.

6) Xcel shall launch proceedings to obtain a Certificate of Need and route permit[18] for transmission lines with a capacity of 345 kVs extended from the locations of the retiring King and Sherco generators designed to permit new energy resources to connect to the MISO transmission grid (gen-tie lines).

[18] Anyone seeking to build a transmission line longer than 1,500 feet and with a capacity of 100 kV or more in Minnesota must first obtain a route permit from the Commission. Minn. Stat. §§ 216E.01, subd. 4; 216E.03, subd. 2.

7) For each gen-tie line for which Xcel obtains the necessary Certificate of Need and route permit, Xcel may own the line and the renewable resources that connect to the line, up to the company's current interconnection rights for that line—approximately 600 MW for King and 2,000 MW for Sherco.

8) Xcel has demonstrated that, between 2027 and 2032, it will need approximately 600 MW more solar-powered generation and 2,150 MW of wind-powered generation on the Sherco gen-tie line—or an equivalent amount of energy and capacity from a combination of wind, solar, and/or storage. Xcel may partially fill this need by acquiring approximately 1,300 MW of company-owned wind, solar, and/or storage resources to fully reutilize the Sherco Unit 1 and Unit 3 interconnections.

9) Xcel has demonstrated that, between 2028 and 2030, it will need approximately 600 MW more company-owned solar and/or storage resources to maximize the use of the King gen-tie line and fully reuse the King interconnection.

10) Any acquisition proceeding for surplus generation on the King and Sherco gen-tie lines, beyond the amount required to fully reuse the Sherco and King interconnections, must be open to either company-owned or non-company-owned resources.

11) Xcel may continue pursuing a ten-year extension for Monticello. Xcel will have the opportunity—and obligation—to explore plans for Prairie Island in a future proceeding, as discussed further below.

The Commission will approve the remainder of Xcel's Alternate Plan for planning purposes, except—consistent with the recommendations noted above—the Commission will make no finding approving combustion turbines in Fargo or Lyon County.

Third, consistent with the parties' and commenters' recommendations, the Commission finds that it is more likely than not that Xcel will need up to 800 MW of generic firm dispatchable resources between 2027 and 2029. While Xcel asked the Commission to make findings about the need for "approximately 800 MW," this request must be balanced against the Department's argument that Xcel's analysis contains a systemic bias in favor of growth. In acknowledgement of this argument, the Commission clarifies that this finding will not, by itself, support plans to acquire more than 800 MW.

Fourth, the Commission concurs on the merits of making a finding about a *generic* 800 MW—that is, a finding of need that is not tied to a specific location or technology. Accordingly, the Commission will decline to adopt language connecting this finding of need to North Dakota because Xcel has not demonstrated to this Commission that the resources must be located there. And regardless of where Xcel builds any of the resources discussed in its resource plan, it should proceed assuming that cost recovery will be based on traditional jurisdictional allocators.

Fifth, the Commission appreciates Xcel's need for firm dispatchable resources, but is not persuaded that these resources must provide energy availability to meet load for extended durations of energy in the context of the system as a whole. Rather, the Commission regards this

factor as one of a number of useful factors to be considered when choosing among firm dispatchable resources.

Sixth, when Xcel conducts the up-to-date system-wide modeling for renewable resources and storage discussed above, it should correct its modeling of wind fleet variability and of exchanges with MISO. This is necessary to ensure that Xcel does not exaggerate the variability of distributed sources of electricity, and thereby underestimate their value to the system.

Seventh, the Commission will accept Xcel's offer to issue a request for information from potential developers of the gen-tie lines, estimating the likely range of project costs. The Commission will direct Xcel to file a thorough description of this request-for-information process and explain how the company might use an independent expert to evaluate the credibility of the proposals and their potential cost ranges. This filing will be due within 30 days.

VII. Resource Acquisition

A. Positions of the Parties and Commenters

The Department recommended authorizing Xcel to pursue new storage-, solar-, and wind-based resources using the No-Bid/Track 1 process and Xcel-Bid Auditor/Modified Track 2 processes, as these processes were described in the Department's February 11, 2021, comments. The Department also proposed additional refinements, including the following:

First, the Department argued that any Xcel document requesting a proposal for peaking resources should refrain from favoring one technology over another—for example, favoring combustion turbines over storage.

Second, the Department argued that Xcel should have to use the Commission-approved No-Bid/Track 1 and Xcel-Bid Auditor/Modified Track 2 bidding process whenever Xcel intends to acquire at least 100 MW for more than five years using solar-powered generators, wind-powered generators, or storage.

Third, the Department expressed concern about circumstances under which Xcel might buy a resource by exercising a Right of First Offer clause in a power purchase agreement. Under such a clause, the resource owner could not sell the resource to a third party without first giving Xcel the opportunity to make an offer for it. Because a rate-regulated utility expects to earn a return on its investments in operating plant, and to recover its investment, the utility may lack the typical incentive to seek the lowest price for an asset. To protect ratepayers from paying rates based on inflated costs, it is customary to limit a utility's opportunity to recover costs that exceed an asset's net book value—that is, the cost of the asset when initially committed to public use, minus depreciation and amortizations. The Department recommended that the Commission adopt this conventional limit on cost recovery.

Finally, the Department emphasized the importance of rigorous modeling, especially regarding the cost of solar energy. As previously discussed, the Department's modeling revealed that small

increases in the predicted cost of solar energy results in large reductions in the amount of solar energy included in an optimal plan.[19]

The CEOs largely supported this proposal—but also recommended authorizing Xcel to pursue firm dispatchable resources using the Xcel-Bid Contested Case/Track 2 process.

CUB and the OAG recommended modifying the Xcel-Bid Auditor/Modified Track 2 process to require Xcel to first file the details of its proposed competitive bidding process—including the following components:

- A list of independent auditors Xcel considered to oversee the bidding process, and a discussion of why the selected independent auditor was chosen.
- The criteria that Xcel will use to evaluate proposals.
- The planned text of the request for proposals.
- The planned timeline for the issuance of the request for proposals, the allowed response time, the date upon which Xcel will submit its self-build proposal (if applicable), and the date upon which Xcel will submit its report to the Commission detailing the bid results, including the independent auditor's evaluation of the bid process.
- Confirmation that the request for proposals will be published publicly and open to any interested developer.
- Confirmation that there will be no geographic limitations on the proposals, other than the requirement that transmission-connected resources be located within the MISO resource zone and distribution-connected resources be located within Xcel's service territory.
- Confirmation that Xcel will consider bids for power purchase agreements (and not merely generators to be sold to Xcel).
- A contingency plan in the event of an unsuccessful bidding process.

Finally, CUB and the OAG recommended that parties have 30 days to raise objection to Xcel's proposal.

Xcel joined the Carpenters, IUOE, and LIUNA in supporting much of the CUB/OAG proposal. But they objected to two aspects in particular. First, the Carpenters, IUOE, and LIUNA argued that the Commission should not entirely preclude geographic limits in a request for proposals—reasoning that Xcel may want to target economic development as a tool to mitigate the economic harms resulting from plant closures, or to help historically disadvantaged communities. Second, they opposed the idea of authorizing all parties to veto Xcel's request for proposals, reasoning that this policy would add needless delay and administrative burden to implementing the changes found necessary in this resource planning docket.

[19] Department comments, at 42 (October 15, 2021).

B. Commission Action

As with its analysis of Xcel's resource plan, the Commission will adopt most of these recommendations, but with modifications.

In authorizing the use of No-Bid/Track 1 and Xcel-Bid Auditor/Modified Track 2, the Commission clarifies that it is approving these procedures for acquiring the specific storage, solar-powered, and wind-powered resources approved above—and specifically, for resources with at least 100 MW of capacity and a duration longer than five years. In contrast, the Commission will approve the Xcel-Bid Contested Case/Track 2 process for acquiring the firm dispatchable resources approved above, as recommended by the CEOs. The Commission does not, at this time, approve the use of any bidding process for resources that are not identified in this resource plan.

The Commission will also adopt the recommendation that Xcel make an informational filing clarifying its proposals before issuing a request for proposals, incorporating many of suggestions proposed by CUB and the OAG. But the Commission clarifies that this filing should address the request for proposals for storage, solar-powered, and wind-powered resources acquired through the Xcel-Bid Auditor/Modified Track 2 process.

The Commission will adopt the CUB/OAG recommendation to require Xcel to affirm that the company will accept proposals for power purchase agreements. But the Commission will grant an exception for any request for proposals issued exclusively for a need the Commission has stated may be limited to company-owned resources, or where the resources are being procured consistent with applicable FERC or MISO requirements.

At this time the Commission will decline the CUB/OAG recommendation to impose a blanket prohibition on including geographic limits in a request for proposals; this is a matter to be addressed on a case-by-case basis in the context of a resource acquisition process itself. On this record, the Commission cannot preclude the possibility that geographic criteria would be relevant for bolstering reliability or blackstart capabilities at a given part of the grid. Elsewhere in this order the Commission will address issues of mitigating harms to workers and facilitating equity to underserved communities—but here the Commission will simply specify that when Xcel files the criteria that it will use to evaluate proposals, those criteria must include consideration of socioeconomic impacts as required by Minn. R. 7843.0500, subp. 3.C.

The Commission will also decline the CUB/OAG recommendation to permit any party to suspend Xcel's request for proposals by filing an objection within 30 days. Parties will retain the same opportunity to file objections as ever, but the Commission will need to evaluate those objections before giving them effect.

The Commission further clarifies that Xcel should not expect to recover more than the net book value of any resource it acquires via exercise of a Right of First Offer clause. Any deviation from this policy will require separate Commission authorization.

Finally, the Commission finds that rigorous modeling matters, especially regarding the cost of solar energy. To ensure that parties evaluate solar-powered resources appropriately, the Commission will direct Xcel to include updated capacity expansion modeling, and forecasted rate impacts, in any proceeding evaluating solar power. In addition, the Commission notes that

the last time Xcel planned to acquire large amounts of energy from renewable sources, it evaluated projects both on an individual basis and collectively as part of a portfolio.[20] This practice ensures that the merits of lower-cost projects are not overlooked by being averaged in with other projects. For proposals offering more than one solar-powered generator, therefore, the Commission will continue its practice of requiring Xcel to model these projects on an individual basis, and as part of a larger portfolio.[21]

VIII. Future Proceedings

As previously noted, resource planning is iterative. In part, this reflects changes within a resource plan docket as parties explore and challenge each other's positions and revise their own; in part, it reflects changes between dockets as the Commission refines its processes. The Commission has discussed some proposed changes above; parties propose still more below.

A. Integrated Distribution Planning

Distributed energy resources are supply- and demand-side resources that can be used throughout a utility's distribution system to meet customers' energy and reliability needs, including such resources as solar-powered generators, energy storage, electric vehicles, demand-side management, and energy efficiency.[22] Integrating these resources into Xcel's distribution grid, and optimizing those resources with bulk system generation to minimize costs and maintain reliability, requires changes to Xcel's current approach to Integrated Distribution Planning.[23]

Distribution planning involves how an electric utility plans its distribution system to ensure it can reliably deliver electricity while meeting customers' needs.[24] Xcel also performs a hosting capacity analysis that examines the utility's capacity to interconnect resources such as solar-powered generators or energy storage facilities to specific locations on the utility's distribution system, and analyzes strategies to enhance the system's ability to accommodate distributed energy resources.

Parties and commenters throughout this proceeding—including Community Power, CUB, the Distributed Solar Parties, Minneapolis, and the Sierra Club—noted that the assumptions that inform Xcel's resource plan models, and the conclusions that flow from them, do not match the assumptions and conclusions in Xcel's Integrated Distribution Plans. But the parties argued that the two plans are necessarily linked: Improved distribution planning will accommodate more distributed energy resources (such as solar-powered generation) and demand (such as electric

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[20] *See In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, Docket No. E-002/M-16-777.

[21] *See In the Matter of Xcel Energy's Wind Repower Portfolio*, Docket No. E-002/M-20-620, Order Approving Wind Facility Repowering Projects, at 8 (January 22, 2021).

[22] *See In the Matter of Distribution System Planning for Xcel Energy*, Docket No. E-002/CI-18-251, Order Approving Integrated Distribution Planning Filing Requirements for Xcel Energy (August 30, 2018).

[23] *See*, for example, *In the Matter of Xcel Energy's Integrated Distribution Plan and Advanced Grid Intelligence and Security Certification Request*, Docket No. E-002/M-19-666, Order Accepting Integrated Distribution Plan, Modifying Reporting Requirements, and Certifying Certain Grid Modernization Project (July 23, 2020); see also Minn. Stat. § 216B.2425, subd. 8 (regarding hosting capacity).

[24] Xcel Initial Plan, Appendix I, at 265 (July 1, 2019).

vehicle charging), thereby expanding the options to be analyzed in resource planning. Accordingly, these parties argued that Xcel should take steps to better align its resource planning with its distribution planning.

In particular, the Distributed Solar Parties offered five specific suggestions.

First, they recommended that Xcel set its targets for deploying distributed energy resources consistent with the approved resource plan. According to the parties, resource planning should drive distribution planning to ensure that Xcel's distribution grid is prepared to integrate the appropriate levels of distributed energy resources. To implement this policy, Xcel should have to explain in its next Integrated Distribution Plan how its planning will ensure an adequate capacity for all the distributed energy resources forecasted.

Second, the parties recommended that Xcel conduct advanced forecasting using its Commission-approved Advanced Planning Tool[25] to better project the levels of distributed energy resources to be deployed at a feeder level. This tool permits Xcel to make more precise forecasts of distributed energy resources and loads. Xcel's Integrated Distribution Plan docket will provide an opportunity for Xcel to explain how it is using its Advanced Planning Tool to improve the transparency of its distribution system.

Third, the parties recommended that Xcel plan investments in hosting capacity and other necessary system capacity to allow adequate additions of distributed generation and electric vehicles. Xcel is required to file hosting capacity analyses that indicate the capacity that each feeder in the distribution system has for adding more distributed energy resources. These studies are also supposed to streamline interconnection studies and inform long-term distribution planning. According to the parties, Xcel should use this analysis to identify and plan improvements in the distribution system that are necessary to increase hosting capacity on circuits where it expects increasing deployment of distributed generation—or where adding distributed energy resources would otherwise help the grid.

Fourth, as a part of its Integrated Distribution Plan, Xcel is required to screen its planned distribution projects to determine whether those projects might be avoided or deferred through the use of "non-wires alternatives." Non-wires alternatives are electric utility system investments and operating practices intended to reduce transmission congestion or distribution system constraints at times of maximum demand in specific grid areas, allowing utilities to defer or avoid installation of traditional "wires and poles" infrastructure.[26] Commenters in Xcel's Integrated Distribution Plan and grid modernization dockets have argued that distributed energy resources owned by customers and third parties cannot fairly compete with traditional utility-owned distribution grid infrastructure unless Xcel improves its analysis of non-wires alternatives. Therefore, parties recommended that Xcel solicit proposals for non-wire alternatives before adding more traditional infrastructure to its distribution grid.

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[25] *See In the Matter of Xcel Energy's Integrated Distribution Plan and Advanced Grid Intelligence and Security Certification Request*, Docket No. E-002/M-19-666.

[26] *Id*., Order Accepting Integrated Distribution Plan, Modifying Reporting Requirements, and Certifying Certain Grid Modernization Projects, at 5 (July 23, 2020)

Fifth, the parties proposed that Xcel develop models that recognize the energy and capacity that aggregated distributed energy resources contribute to its system, especially during periods of peak demand. They argue that, collectively, these resources may be able to provide various bulk power and distribution system services, and virtually respond to dispatch signals. Therefore they argue that in Xcel's next Integrated Distribution Plan, the company should explore programs to coordinate the use of customer-supplied distributed energy resources to defer or avoid more expensive system upgrades.

The Commission finds these concerns to be reasonable, and so will adopt these recommendations—as modified. Specifically, the Commission does not establish deployment targets for distributed generation and electric vehicle additions. Therefore, with respect to the Distributed Solar Parties' first recommendation, the Commission will instead direct Xcel to use a consistent forecast of distributed energy resources in both its resource planning docket and its Integrated Distribution Planning docket. And with respect to the third recommendation, the Commission will direct Xcel to plan investments in hosting capacity and other necessary system capacity to allow distributed generation and electric vehicle additions consistent with the forecast for distributed energy resources. These matters are set forth in the ordering paragraphs.

B. Electrification

Electrification—the demand for electric vehicles, heat pumps, and other things that have traditionally been powered by fossil fuels—will be an important component of future resource plans, both in how Xcel forecasts its load and in the availability of new load flexibility and potential for demand response. Yet Xcel's base case scenario reflects relatively little new electrification.

In response, the Commission will direct Xcel to develop its next resource plan while incorporating forecasts of the extent to which ratepayers adopt new electric technologies for space heating, water heating, and electric vehicles. Xcel must develop and/or improve base case adoption forecasts of the following technologies to include in its overall demand forecast for its next resource plan filing—either through its Integrated Distribution Plan proceedings or through another stakeholder process.

- Adoption of light-, medium-, and heavy-duty electric vehicles.
- Adoption of electric space heating.
- Adoption of electric water heating.
- Electrification of other end uses.
- Increased potential for demand response and load flexibility from an increase in electrification of the four technologies listed above.
- Adoption of distributed solar generators, including customer-sited generators, community solar gardens organized under Minn. Stat. § 216B.1641, and generators that are neither sited by customers nor part of a community solar garden.

C. Advanced Technologies

Resource planning models help a utility evaluate a variety of choices available to find an optimal choice from among the options. But resource planning is only as good as the choices presented to the model. To ensure that Xcel's planning continues to incorporate all options available, the Commission will direct Xcel to analyze advanced technologies for potential adoption.

To this end, the Commission will accept Xcel's offer to report within 60 days on the work the company is doing to support the integration of advanced technologies (including hydrogen fuel and utility-scale energy storage) into its system.

But in addition, and before Xcel's next resource plan, the company must conduct a deeper analysis of storage options—including an evaluation of solar-powered generators coupled with batteries, and the potential role of hydrogen and other clean fuel alternatives in the context of Xcel's portfolio of generators. In preparing this analysis, Xcel must work with stakeholders on a method to fairly compare generation and storage options under consideration. This comparison must consider, among other things, the consequences for the climate resulting from the choice among various generation and storage options, throughout the option's supply chain and life cycle. This analysis will help the Commission in assessing each option's "adverse socioeconomic effects and adverse effects upon the environment…."[27]

D. Advanced Rate Design

CUB noted that Xcel is currently exploring various changes to its tariffs—new rate designs, demand response programs, and other efforts—to shift the timing of customer demand away from periods of maximum demand. But CUB reasoned that these policies will likely reduce Xcel's operating costs, and asked that Xcel account for the anticipated effects of these policies in its next resource plan. The CEOs and Minneapolis also supported this proposal.

Finding the proposal reasonable, the Commission will adopt it.

E. Blackstart Capabilities

Throughout these proceedings, Xcel had asked the Commission to authorize Xcel to take various measures related to ensuring that Xcel maintains the ability to restore the transmission grid in the event of a blackout—and this includes having generators that can function without drawing power from the grid. Ultimately, however, Xcel joined the Carpenters, the CEOs, CUB, the Department, the Distributed Solar Parties, LIUNA, Minneapolis, the Sierra Club, and the UIOE in recommending that the Commission review Xcel's future blackstart needs in a planning meeting or set of planning meetings.

Finding this proposal reasonable, the Commission will adopt it.

[27] Minn. Rule 7843.0500, subp. 3.C.

F. Modeling of Distributed Solar-Powered Generators

Parties disagree about how to evaluate distributed solar-powered generators, including community solar gardens, in computer models.

The Distributed Solar Parties and Sierra Club recommended evaluating bundles of distributed solar-powered generators on the same basis that Xcel models demand-management strategies such as electric efficiency and demand response. Xcel argued that this strategy would not fully account for the cost of distributed solar-powered generators to its customers. In the interest of simplicity, Xcel argued, it evaluates distributed solar-powered generators as a supply-side resource with assumed adoption levels.

This matter cannot be resolved based on the current record. Accordingly, the Commission will direct Xcel to develop a modeling construct for its next resource plan that treats economic solar generators that interconnect with the company's distribution grid as resource additions. In developing this modeling construct, Xcel and stakeholders should address the following factors:

- The option of using a "bundled" approach, similar to how Xcel models energy efficiency and demand response.
- The costs that are borne by the utility, and the costs that are borne by the customer.
- A test of cost-effectiveness.
- Other topics identified by stakeholders.

Finally, the Commission will direct Xcel prospectively (including in the company's next resource plan) to use improved methodologies for modeling load flexibility and demand response.

G. Clean Energy Goals of Local Units of Government

Minneapolis and the Suburban Rate Authority argued that Xcel had missed opportunities to add more renewable sources of generation because the company failed to incorporate the clean energy goals of local units of government into the company's models.

Given these concerns, the Commission will direct Xcel to account for the aggregate clean energy goals of local units of government in the forecasting and modeling for its next resource plan. In particular, Xcel's calculation of needed distributed generation should include consideration of the generation goals of local communities.

H. Criteria for Filing Alternative Plans

Many parties commented on the practical challenges posed by the length of this proceeding and the volume of the record. As a partial remedy, Xcel suggested establishing minimum requirements for anyone proposing to offer an alternative resource plan.

Xcel proposed reducing the number of alternative plans to be analyzed by barring proposals that fail to reflect certain baseline information. The CEOs, Community Power, CUB, Distributed Solar Parties, Minneapolis, and the Sierra Club opposed making any changes to the Commission's current policies.

The Commission notes that it already has standards for filing an alternative resource plan:

> **Proposed alternative resource plans.** Parties and other interested persons may express support for the proposed resource plan filed by a utility. Alternatively, parties and other interested persons may file proposed resource plans different from the plan proposed by the utility. When a plan differs from that submitted by the utility, the plan must be accompanied by a narrative and quantitative discussion of why the proposed changes would be in the public interest, considering the factors listed in part 7843.0500, subpart 3.[28]

Because the Commission finds no fault with this rule, it will decline Xcel's proposal.

I. Rate and Bill Impacts

The Center for the American Experiment and XLI argued that the analysis of Xcel and other stakeholders failed to give adequate attention to the regulatory goal of "keep[ing] the customers' bills and the utility's rates as low as practicable…."[29] Moreover, these parties noted that the state has adopted a policy seeking to set retail electricity rates for each customer class at least five percent below the national average.[30] To this end, these parties recommended that in its next resource plan, Xcel analyze the of rate and bill impacts for each customer class.

Xcel stated that its resource plan analysis already incorporates rate and bill impacts, and that the company intends to provide this type of analysis with its next plan as well.

As no party opposes the proposal that Xcel provide an analysis of rate and bill impacts in its next resource plan, the Commission will adopt this proposal. However, the Commission notes that Xcel offers electric service to various specialized customer classes. To avoid needless complexity, Xcel's obligation to provide rate and bill impacts will be limited to the impacts on the residential, commercial, and industrial classes.

J. Date for Next Resource Plan

Finally, the Commission will direct Xcel to file its next resource plan by February 1, 2024.

IX. Managing Socioeconomic Consequences Arising from Resource Choices

While computer models can suggest optimal strategies for selecting when to retire or refurbish a generator, the Commission must also consider whether a resource plan "minimize[s] adverse

[28] Minn. R. 7843.0300, subp. 11.

[29] Minn. R. 7843.0500, subp. 3(B).

[30] Minn. Stat. § 216C.05, subd. 2(4).

socioeconomic effects…."[31] To prepare for these challenges, Xcel joined with the Center for Energy and Environment (CEE),[32] the Coalition of Utility Cities, the Prairie Island Indian Community, and others in a Host Community Impact Study, designed to explore the financial and social consequences that large power plants have on host communities.[33] Parties recommended various policies for managing and mitigating these effects.

A. Sherco

Various parties and commenters raised valid concerns about how the retirement of Sherco would affect nearby communities. For example, the Coalition of Utility Cities recommended that by December 31, 2023, Xcel file with the Commission and the city of Becker a detailed plan describing the company's plans for the disposition of the Sherco site, equipment, and buffer property. They recommended that the report include at least the following items:

- A detailed description and timeline of any demolition, environmental clean-up, or similar work that will be required by the impending retirement of Sherco Unit 2.

- To the extent possible, a description of the company's plans and a detailed timeline to decommission and demolish electric generating equipment related to Sherco Units 1 and 3.

- A detailed description of the timeline and steps necessary to remediate pollution at the Sherco site.

- A section detailing how the company is working to ensure that plans for site remediation, economic development, or future development and maintenance of power generation, transmission, or distribution infrastructure are consistent with the community's long-range planning and vision.

- A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of how the company is involving Becker in those efforts.

- An update to the Commission on the status of efforts to support Becker's economic development efforts—including, to the extent possible, specific projects and investments the company is assisting Becker to attract.

- A description of Xcel's efforts to work with local governments and other stakeholders—before Xcel initiates any additional proceedings to determine the final length and route of the gen-tie line extending from the Sherco site—to assess and account for local land use and planning impacts of the proposed gen-tie line (assuming the Commission authorizes such a line).

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[31] Minn. R. 7843.0500, subp. 3.

[32] The not-for-profit CEE helps residents, businesses, and communities manage changes in their energy practices to promote a healthier environment.

[33] *See* Xcel Supplemental Plan, Appendix E (June 30, 2020), and the CEE reports cited therein.

- Any other items the Commission or the company sees fit to include.[34]

The Commission finds these proposals reasonable and will adopt them—and expand them as follows.

First, the Commission concurs that Xcel should provide a description of the timeline and steps necessary to remediate pollution at the Sherco site. But in addition, Xcel should provide estimates of the costs involved.

Second, the Commission concurs that Xcel should describe ongoing efforts to evaluate future uses for the plant site, any buffer property owned by the company, or adjacent property, and should describe how Xcel is involving Becker in those efforts. But in addition, Xcel should involve any interested stakeholder in these efforts.

Third, the Commission concurs that Xcel should report on the status of efforts to support Becker's economic development efforts, including projects and investments Xcel is helping Becker to attract. But Xcel's economic development should not be focused exclusively on Becker; it should also address regional needs for economic development.

Fourth, the Commission concurs that, before Xcel starts a new process for building the Sherco gen-tie line, Xcel should describe its efforts to work with local governments and stakeholders to address any anticipated land use and planning challenges. Specifically, the Commission will order Xcel to consult with stakeholders to discuss these plans.

Fifth, if the information necessary to complete any of these items is not available to Xcel at the time of each filing, the company should detail the timeline on which it anticipates it will be able to provide Becker and stakeholders with additional information.

Sixth, Xcel must file an update annually (other than during years when Xcel files a resource plan) providing any new information on each of these items listed above for the Sherco site.

Finally, the Commission will authorize its Executive Secretary to open a new docket regarding the remediation of the site. As part of this docket, Xcel must convene meetings on the subject with interested parties and local units of government. The interested parties must include at least CEE, the CEOs, the Department, DNR, labor unions, the Minnesota Pollution Control Agency (PCA), and Minnesota's Energy Transition Office within the Department of Employment and Economic Development (DEED).[35] The local units of government must include at least the cities of Becker and Monticello, Becker Township, adjacent cities and townships, and Sherburne and Wright counties. By January 1, 2023, Xcel must file a report describing the state of its plans for remediating the Sherco site, and details of its stakeholder outreach and meetings.

[34] Coalition of Utility Cities comments, at 1–2 (February 1, 2022).

[35] Minn. Stat. §116J.5491.

B. King

As with Sherco, various parties expressed concern over the socioeconomic consequences of closing King in the city of Oak Park Heights in Washington County. While many of the concerns are analogous, parties raised additional concerns about the King site because it sits next to the St. Croix, a national scenic riverway.

The Coalition of Utility Cities recommended that by December 31, 2025 (or in Xcel's next resource plan if earlier), Xcel file with the Commission and Oak Park Heights a detailed report describing the company's plans for the disposition of the King site, equipment, and buffer property. They recommended including the following information in the report:

- The company's plans and a detailed timeline to decommission and demolish the electric generation facility.

- A detailed description of the timeline and steps necessary to remediate pollution at the site of the electric generating plant.

- A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of coordination with or involvement of Oak Park Heights in those efforts.

- The status of efforts to support Oak Park Height's economic development efforts—including, to the extent possible, specific projects and investments the company is helping Oak Park Heights to attract.

- Any other items the Commission or the company see fit to include.[36]

Again the Commission finds the proposals of the Coalition of Utility Cities to be reasonable and will adopt them—and expand them in the same manner as it expanded the recommendations regarding the Sherco site. In addition, the Commission will direct Xcel to provide reports on conservation efforts reflecting the uniqueness of the site and surrounding property located in and along the St. Croix National Scenic Riverway.

As with Sherco, the Commission will authorize its Executive Secretary to open a new docket regarding the remediation of the site. As part of this docket, Xcel must convene quarterly meetings on the subject with interested parties and local units of government. The interested parties must include at least CEE, the CEOs, the Department, DNR, the Energy Transition Office, labor unions, the National Park Service, PCA, and the Wild Rivers Conservancy.[37] The local units of government must include at least the city of Oak Park Heights and Washington

[36] Coalition of Utility Cities comments, at 2 (February 1, 2022).

[37] The Wild Rivers Conservancy of the St. Croix and Namekagon describes itself as the official nonprofit partner of the St. Croix National Scenic Riverway (a unit of the National Park Service) working to conserve land, protect water quality, promote stewardship of the river corridor and watershed, and celebrate the river as a national treasure.

County. By January 1, 2023, and annually thereafter, Xcel must file a report describing its stakeholder outreach, the efficient demolition of the King plant, and the remediation of the site and affected lands.

C. Monticello and Prairie Island

Xcel proposes to seek to extend the operating life of Monticello. Xcel has proposed no changes to the operation of the two generating units of Prairie Island in Red Wing, Minnesota, which are licensed to continue operating through 2033 and 2034, respectively. Xcel emphasized that nuclear power provides firm dispatchable energy and capacity without emitting carbon dioxide or other greenhouse gases.

Parties such as CUB, Red Wing, and XLI argued that the record—and Xcel's own analyses—provided a sufficient basis to begin pursuing an extended license for Prairie Island.

In contrast, Minneapolis asked the Commission to require Xcel to work closely with the Prairie Island Indian Community, a sovereign nation, in planning for whether to renew the operating licenses for Prairie Island. And Community Power and Red Wing asked the Commission to require Xcel to begin stakeholder discussions about the future of Prairie Island and address the matter in its next resource plan.

While Xcel did not propose a license extension in this resource plan, the Prairie Island Indian Community expressed concern about the risks associated with the plant's continued operations and the indefinite storage of spent nuclear fuel. The Community recommended that the company provide data and analysis sufficient to provide insight into any technical issues or concerns related to subsequent renewals. In particular, the Community recommended that Xcel provide information in its next resource plan about the following topics:

- Planned investments at Prairie Island.
- Issues related to continuing to operate the aging plant.
- Expectations regarding the future workforce for nuclear plants such as Prairie Island.
- Cyber-security issues or concerns as plants move from analog to digital systems.
- A comprehensive cost/benefit analysis, which includes potential environmental and economic consequences for the Prairie Island Indian Community and its Treasure Island Resort & Casino (Treasure Island) located along the Mississippi River.
- Plans to manage the additional spent nuclear fuel generated over the next 10 or 20 years.
- How fuel stored on site will be removed.
- Additional state permits, Certificates of Need, or federal licenses that will be required.

In response, Xcel generally argued that it is premature to address questions about Prairie Island. According to the company, there will be sufficient time to analyze the matter in a future resource

plan, and after Xcel has had sufficient opportunity to broach the subject with the Prairie Island Indian Community and Red Wing.

As a matter of resource planning, the Commission finds that Xcel is justified in deferring long-term decisions about the future of the Prairie Island plant. But the Commission is concerned that the resulting uncertainty imposes a hardship on people who must make plans contingent on the future of that plant. Community Power, Minneapolis, Red Wing, and the Prairie Island Indian Community each offer reasonable means for addressing this uncertainty, so the Commission will approve their proposals—and will expand on the list of topics Xcel should address in its next resource plan.

First, in addition to reporting on planned investments in Prairie Island, Xcel should also report on planned investments in Monticello.

Second, in addition to conducting a cost/benefit analysis that incorporates consideration of potential environmental and economic consequences for the Prairie Island Indian Community and Treasure Island, Xcel should also address the potential consequences for the neighboring communities.

Finally, while Xcel praises nuclear power as a reliable source of energy and capacity that emits few greenhouse gases, the Commission notes that necessary aspects of the operation—extracting uranium, for example—do have consequences for the climate. As part of Xcel's comprehensive cost/benefit analysis, therefore, the Commission will direct Xcel to analyze how the full supply chain and life-cycle consequences of ongoing generation and storage at each of the facilities affect climate change.

D. Workers

In recommending the retirement of many of its legacy generators—especially King and Sherco—Xcel proposed taking various measures to mitigate the resulting hardships to its workforce. These measures include providing help with resume writing and interviewing, job training, and job shadowing.

In comments filed on March 17, 2020, and March 21, 2021, IBEW asked Xcel to take more extensive measures. For example, IBEW recommended that Xcel provide fully funded apprenticeship and training programs, relocation assistance, retention bonuses for employees staying through coal plant closures, early retirement options, in-house decommissioning work, flexible retraining options, creation and funding for local transition centers, support for union labor to build and operate new generators, and creation of a labor/management task force.

The Commission finds that IBEW's proposals warrant further exploration. The benefits of transitioning to a newer, less polluting electrical grid should not come at the expense of those who have labored to provide our electrical system to date. The Legislature recognized these challenges in establishing Minnesota's Energy Transition Office and providing for an energy transition plan.[38]

[38] Minn. Stat. § 116J.5493.

Accordingly, the Commission will open a new docket focused on the workers at retiring generating facilities in Minnesota, including King and Sherco. As part of this docket, the Commission will direct Xcel to work with IBEW, CEE, DEED and the Energy Transition Office, and Minnesota Building Trades, to develop a comprehensive plan for supporting transitioning workers. The plan should consider the measures outlined in the IBEW's comments dated March 17, 2020, and March 21, 2021, including skills inventories, training and education, worker placement, and potential early retirement buy-out scenarios. By December 31, 2022, Xcel should file the plan with an estimated budget of each measure, timeline for implementation, and a description of additional funding needed by DEED or the Energy Transition Office, if applicable, to implement the plan.

To aid Commission oversight, Xcel should provide detailed reports on its efforts to implement the plan in coordination with CEE, DEED, the Energy Transition Office, and IBEW. Xcel should file these reports beginning December 31, 2023, and annually thereafter.

X. Equity

A. Positions of the Parties and Commenters

Xcel acknowledged that resource planning provides an appropriate forum for addressing issues of equity. Specifically regarding employment diversity, Xcel reported that "[a]t the end of 2019, Xcel Energy's female representation was 23 percent of the workforce and minority representation was 15.4 percent of the workforce… Xcel's female representation of leaders was 20.7 percent and minority representation of leaders was 9.8 percent."[39] The company also states that it "aims to increase these numbers" in its workforce diversity, and "is looking at all of our talent processes … to ensure no bias exists" in promotions.[40]

Various parties and commenters asked Xcel to give greater focus to ensuring equitable treatment of all people, regardless of race, gender, or class. For example, Minneapolis asked the Commission to direct Xcel to do the following:

- Design for the equitable delivery of electricity services and programs for energy-burdened customers in this resource plan.
- Create new options to improve customer access to energy efficiency and renewable energy.
- Submit a plan to bring its workforce's racial and gender diversity in line with the population it serves and with the utility's stated goals.

The Distributed Solar Parties recommended that Xcel design incentives to ensure that distributed generation programs provide equitable access to low-income households, and communities of Black, Indigenous, and People of Color that have disproportionately borne costs of unjust and inequitable energy decisions.

[39] Xcel Supplement Plan, Attachment C, at 2–3.

[40] *Id.*

The Energy Efficiency for All Partners echoed many of these concerns and, joined by the Distributed Solar Parties, recommended the following:

- Practices in furtherance of procedural justice—including deeper engagement with renters; affordable rental property owners; communities of Black people, Indigenous people, and People of Color; and under-resourced individuals—providing resources for engagement and participation, and providing financial support for affected individuals to participate in dockets and decision-making processes.

- The formation of an environmental justice accountability board, which would develop environmental justice-focused initiatives to be incorporated throughout the utility.

B. Commission Action

The Commission concurs that resource plans provide appropriate context for addressing equity issues, and appreciates Xcel's efforts so far. The goal of providing safe, reliable, and reasonable service entails providing it to customers throughout a utility's service area, and throughout its operations. To achieve these ends, it is reasonable to focus on disadvantaged populations—populations that may have not received appropriate attention in the past.

The Commission appreciates Xcel's past and current efforts promoting equity. To build on those efforts, the Commission will direct Xcel to solicit input from members of these historically disadvantaged populations. Accordingly, the Commission will direct Xcel to engage in community outreach and establish a stakeholder group as set forth in the ordering paragraphs.

To ensure appropriate oversight of Xcel's equity efforts, the Commission will direct the company to report each year on its progress in implementing these measures. Starting on January 1, 2023, Xcel must file reports in both its next resource plan and in a new docket to be established to address equity issues.

The Commission will so order.

ORDER

1. Because the record of this proceeding demonstrates that the combined cycle generator proposed for Sherburne County would not be a prudent resource choice, the Commission prohibits Northern States Power Company d/b/a Xcel Energy from recovering the cost of such a plant from Minnesota ratepayers.

2. Regarding Xcel's 2020–2034 Upper Midwest Integrated Resource Plan, the Commission finds as follows:

   A. Xcel's Alternate Plan as filed on June 25, 2021, is approved for planning purposes, and the following elements are specifically approved:

      1) Each year through 2034, Xcel shall save at least 780 gigawatt-hours via energy efficiency.

2) Xcel shall continue to acquire 400 megawatts of incremental demand response by 2023 as ordered in the company's last resource plan.

3) In 2025 and 2026, Xcel shall repower resources needed for blackstart services.

4) Xcel shall retire the Allen S. King Generating Station in 2028, and Sherburne County Generating Station Unit 3 in 2030.

5) By 2026 Xcel shall acquire –

   A) Approximately 720 megawatts of company-owned solar-powered generators to fully reutilize the interconnection capacity to be made available following the retirement of the Sherco Unit 2—460 MW of which could come from the proposed Sherco Solar project if approved by the Commission—and

   B) An additional 600 MW of solar resources unconstrained by interconnection location or ownership.

6) Xcel shall begin Certificate of Need and route permit proceedings for transmission lines with a capacity of 345 kilovolts extending from the locations of the retiring King and Sherco generators designed to permit new energy resources to connect to the transmission grid of the Midcontinent Independent System Operator, Inc.

7) For each gen-tie line for which Xcel obtains the necessary Certificate of Need and route permit, Xcel may own the line and the renewable resources that connect to the line, up to the company's current interconnection rights for that location. Approvals for company ownership of resources interconnecting to the gen-tie lines identified in this order are conditioned on the outcome of the Certificate of Need and route permit decisions for the Sherco and King gen-tie lines.

8) Xcel has demonstrated that, between 2027 and 2032, it will need approximately 600 MW more solar-powered generation and 2,150 MW more wind-powered generation, or an equivalent amount of energy and capacity from a combination of wind, solar and/or storage.

9) Xcel has demonstrated that, between 2028 and 2030, it will need approximately 600 MW of company-owned solar and/or storage resources to maximize the use of the King gen-tie line and fully reuse the King interconnection.

10) Any acquisition proceeding for surplus generation on the King and Sherco gen-tie lines, beyond the amount required to fully reuse the Sherco and King interconnections, must be open to either company-owned or non-company-owned resources.

11) Xcel may pursue extending the operating life of the Monticello Nuclear Generating Plant by ten years.

B. The foregoing findings notwithstanding, the Commission makes no finding specifically approving combustion turbines in Fargo or Lyon County.

C. Xcel shall proceed assuming that cost recovery will be based on traditional jurisdictional allocators for the resources listed in this paragraph.

3. In addition to the resources discussed in Ordering Paragraph 2, the Commission finds that it is more likely than not that there will be a need for approximately, but not more than, 800 MW of generic firm dispatchable resources between 2027 and 2029. In a future resource plan, Certificate of Need application, or applicable resource acquisition proceeding, Xcel shall include an evaluation of renewable resources and storage that can deliver the identified necessary grid attributes to meet the need for approximately, but not more than, 800 MW of generic firm dispatchable resources between 2027 and 2029.

   A. For purposes of Ordering Paragraph 3, "firm dispatchable" means a resource or combination of resources that is able to provide capacity and energy.

   B. Other characteristics for a firm dispatchable resource that may be considered include–
      1) energy availability to meet load for extended durations of energy in the context of the system as a whole,
      2) the value from production capabilities during potential system restoration events of unknown duration,
      3) environmental impacts,
      4) costs, and
      5) the ability to foster integration of renewable resources.

   C. Xcel shall analyze this likely need based on up-to-date system-wide modeling, including corrected modeling of wind fleet variability and of exchanges with MISO, in order to –
      1) establish the capacity, energy, resource adequacy, energy availability, ancillary service, and reliability needs, and
      2) quantify and compare the contribution of the electric system attributes from the different resource options considered to meet the identified grid needs.

4. Within 30 days, Xcel shall file a thorough description of the request-for-information process it plans to conduct before seeking its Certificates of Need for the Sherco and King gen-tie lines. The filing shall discuss the use of an independent expert to analyze the credibility of the proposals and their potential cost ranges.

5. Xcel shall consider opportunities to deploy renewable resources, storage technologies, and resources powered by hydrogen or clean fuel alternatives on a schedule faster than in its Alternate Plan. If deployment would be cost-effective, maintain reliability, and aid in achieving compliance with decarbonization policies, Xcel shall pursue them.

6. Regarding resource acquisition:

    A. Xcel shall use the No-Bid/Track 1 and Xcel-Bid Auditor/Modified Track 2 bidding processes for the solar, wind, and storage resources approved in Ordering Paragraph 2, and use the Xcel-Bid Contested Case/Track 2 contested case bidding process for the firm dispatchable resources as identified in Ordering Paragraph 3 and subject to its requirements.

    B. Documents issued by Xcel making a request for proposals for peaking resources must be technology neutral.

    C. Xcel shall use the Commission-approved No-Bid/Track 1 process and Xcel-Bid Auditor/Modified Track 2 process whenever Xcel intends to acquire at least 100 MW of solar, wind, or storage capacity for more than five years.

    D. When Xcel exercises its Right of First Offer provision to acquire a resource, Xcel shall not recover capital costs exceeding the resource's net book value.

7. Before Xcel prepares a request for proposals using the Xcel-Bid Auditor/Modified Track 2 process to acquire new solar- or wind-powered generators, or new energy storage, Xcel shall file a document detailing its planned competitive bidding process—including, at minimum, the following components:

    A. A list of independent auditors Xcel considered to oversee the bidding process, and Xcel's rationale for the chosen auditor.

    B. The criteria that Xcel will use to evaluate proposals, including but not limited to consideration of socioeconomic impacts.

    C. The planned text of the request for proposals.

    D. The planned timeline for the issuance of the request for proposals; the allowed response time; the date upon which Xcel will submit its self-build proposal (if applicable); and the approximate timeline for Xcel to submit its report to the Commission detailing the bid results, including the independent auditor's evaluation of the bid process.

    E. Confirmation that the request for proposals will be published publicly and open to any interested developer.

F. Confirmation that bids for power purchase agreements will be permitted unless –
   1) the request for proposals is being issued exclusively for a need the Commission has stated may be limited to company-owned resources, and/or
   2) the resources are being procured consistent with applicable requirements of the Federal Energy Regulatory Commission or MISO.

G. A contingency plan in the event of an unsuccessful bidding process.

8. For future petitions seeking new sources of solar-generated electricity, Xcel shall provide updated capacity expansion modeling that forecasts the consequences for rates. For solar acquisition petitions that include more than one project, Xcel shall analyze projects on an individual basis and as a total portfolio.

9. Xcel shall take steps to better align distribution and resource planning, including:

   A. Set the forecasts for distributed energy resources consistently in its resource plan and its Integrated Distribution Plan.

   B. Conduct advanced forecasting to better project the levels of distributed energy resource deployment at a feeder level, using Xcel's advanced planning tool.

   C. Proactively plan investments in hosting capacity and other necessary system capacity to allow distributed generation and electric vehicle additions consistent with the forecast for distributed energy resources.

   D. Improve non-wires alternatives analysis, including market solicitations for deferral opportunities to make sure Xcel can take advantage of distributed energy resources to address discrete distribution system costs.

   E. Plan for aggregated distributed energy resources to provide system value including energy/capacity during peak hours.

10. In its next resource plan Xcel shall, either through its Integrated Distribution System Plan proceedings or through another stakeholder process, develop and/or improve its forecasts of the adoption rate for the following technologies, to be used in Xcel's base case scenario and its overall demand forecast.

    A. Adoption of light-, medium-, and heavy-duty electric vehicles.

    B. Adoption of electric space heating.

    C. Adoption of electric water heating.

D. Electrification of other end uses.

E. Increased potential for demand response and load flexibility from an increase in electrification of the technologies in A–D.

F. Adoption of distributed solar-powered generators—including generators sited by customers, community solar gardens organized under Minn. Stat. § 216B.1641, and generators that are neither sited by customers nor related to community solar gardens.

11. Within 60 days, Xcel shall file a report discussing the work it is doing to support the integration of advanced technologies (including but not limited to hydrogen fuel and utility-scale energy storage) into its system.

12. Xcel shall include in its next resource plan a deeper analysis of (1) storage options, including options combining solar generation and battery storage, and (2) the role of hydrogen and clean fuel alternatives in Xcel's resource mix. In preparation, Xcel shall work with stakeholders to develop a fair basis for comparing the full supply-chain and life-cycle carbon impacts of the generation and storage resource options under consideration to help the Commission evaluate the "adverse socioeconomic effects and adverse effects upon the environment" of each option, pursuant to Minn. R. 7843.0500, subp. 3.C.

13. In its next resource plan, Xcel shall account for anticipated effects of advanced rate design, demand response, and any other efforts to shift customer demand.

14. The Commission will review Xcel's future blackstart needs in a future planning meeting or set of planning meetings.

15. Xcel shall work with stakeholders to develop a modeling construct that enables Xcel, as part of its next resource plan, to model solar-powered generators connected to the company's distribution grid as a resource. Xcel and stakeholders shall address the following factors in developing the modeling construct:

    A. Using a "bundled" approach as is used to model energy efficiency and demand response.

    B. The costs borne by the utility and the costs borne by the customer.

    C. Cost effectiveness tests.

    D. Other topics as identified by stakeholders.

    Xcel shall include improved load flexibility and demand response modeling methodologies prospectively, including in its next resource plan.

16. In its next resource plan, Xcel shall account for local clean energy goals, in aggregate, in forecasting and modeling. In particular, the plan should include consideration of local community generation goals for distributed generation.

17. The Commission declines to adopt additional criteria for parties proposing to offer resource plans that differ from Xcel's plan.

18. In its next resource plan filing, Xcel shall include an analysis of rate and bill impacts for the residential, commercial, and industrial classes.

19. Xcel shall submit its next resource plan by February 1, 2024.

20. Regarding remediation plans for the Sherco site:

    A. The Commission authorizes the Executive Secretary to open a new docket on this topic.

    B. Xcel shall conduct stakeholder meetings regarding the site with interested parties including the city of Becker; adjacent cities and townships including Becker Township and the city of Monticello; Sherburne and Wright counties; the Minnesota Department of Commerce, the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Center for Energy and Environment, the Clean Energy Organizations, the Minnesota Energy Transition Office,[41] and labor unions. By January 1, 2023, Xcel shall file in the new docket details describing updates on the site and the stakeholder outreach and meetings.

    C. Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier—and annually thereafter—Xcel shall submit to the Commission and to the city of Becker a detailed report describing the company's plans for the disposition of the Sherco site, equipment, and buffer property. The report shall include at least the following items:

        1) A detailed description and timeline of any demolition, environmental clean-up, or similar work that will be required by the impending retirement of Sherco Unit 2.

        2) To the extent possible, a description of the company's plans and a detailed timeline to decommission and demolish electric generating equipment related to Sherco Units 1 and 3.

        3) A detailed description of the timeline, estimated costs, and steps necessary to remediate pollution at the Sherco site.

[41] Minn. Stat. § 116J.5491.

4) A section detailing how the company is working to ensure that plans for site remediation, economic development, or future development and maintenance of power generation, transmission, or distribution infrastructure are consistent with the community's long-range planning and vision.

5) A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of how the company is involving interested stakeholders in those efforts.

6) An update to the Commission on the status of efforts to support the city's and region's economic development efforts, including—to the extent possible—specific projects and investments the company is assisting the city and region in attracting.

7) A description of the company's efforts to work with local governments and other stakeholders to assess and account for local land use and planning impacts. Before starting any additional regulatory process to determine the final length and route of the Sherco gen-tie line, Xcel shall consult with stakeholders to discuss the plans.

8) Any other items the Commission or the company sees fit to include.

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

21. Regarding remediation plans for the King site:

A. The Commission authorizes its Executive Secretary to open a new docket on this topic.

B. Xcel shall conduct quarterly stakeholder meetings regarding the King site with interested parties including the city of Oak Park Heights, Washington County, the Department, DNR, the Energy Transition Office, PCA, the National Park Service, CEOs, CEE, the Wild Rivers Conservancy, and labor unions. Xcel shall file in the new docket by January 1, 2023, details describing the stakeholder outreach and updates for the efficient demolition of the King plant and remediation of the site and impacted land.

C. Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier—and annually thereafter—Xcel shall submit to the Commission, the city of Oak Park Heights, and interested stakeholders a detailed report describing the company's plans for the disposition of the King site, equipment, and buffer property. This report should include the following:

1) The company's plans, estimated costs, and a detailed timeline to decommissionand demolish the electric generation facility.

2) A detailed description of the timeline and steps necessary to remediate pollution at the King site.

3) A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of coordination with or involvement of the city and stakeholders in those efforts.

4) The status of efforts to support the region's and city's economic development efforts, including—to the extent possible—specific projects and investments the company is helping the city to attract.

5) An update on conservation efforts to reflect the uniqueness of the site and surrounding property located in and along the St. Croix National Scenic Riverway.

6) Any other items the Commission or the company sees fit to include.

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

22. Xcel shall immediately begin stakeholder discussions exploring the future of the Prairie Island Nuclear Generating Plant.

23. In its next resource plan, Xcel shall file a report explaining the following:

A. Planned investments at the Prairie Island and Monticello, and future plans for Prairie Island.

B. Any aging management issues that may arise from continued operation.

C. Expectations regarding future nuclear workforce.

D. Cyber-security issues or concerns as plants move from analog to digital systems.

E. True comprehensive cost-benefit analysis, which includes potential environmental and economic impacts to the neighboring communities—in particular, the Prairie Island Indian Community and its Treasure Island Resort & Casino.

F. Additional spent nuclear fuel generated over a 10- or 20-year period.

G. How fuel stored on-site will be removed during the next integrated resource plan period.

H. Which additional state permits, Certificates of Need, or federal licenses will be required.

I. The full supply chain and life-cycle carbon impacts of the ongoing nuclear generation and storage at each of the facilities.

24. The Commission authorizes the Executive Secretary to open a new docket regarding workers at retiring generating facilities in Minnesota, including Sherco and King.

A. Xcel—working with the Minnesota Department of Employment and Economic Development and the Energy Transition Office; the International Brotherhood of Electrical Workers, Locals 23, 160, and 949; the Minnesota Building Trades; and the Center for Energy and Environment—shall develop a comprehensive plan for supporting transitioning workers. The plan shall consider the measures outlined in the IBEW comments dated March 17, 2020, and March 21, 2021, including skills inventories, training and education, worker placement and potential early retirement buy-out scenarios. Xcel shall file the plan with the Commission no later than December 31, 2022. The plan shall include an estimated budget for each measure, timeline for implementation, and a description of additional funding needed by DEED or the Energy Transition Office, if applicable, to implement the plan.

B. Beginning on December 31, 2023, and annually thereafter, Xcel shall file a detailed update on its efforts to implement the plan in coordination with CEE, DEED and the Energy Transition Office, and IBEW.

25. Xcel shall engage in community outreach and establish a stakeholder group to do the following:

A. Design for the equitable delivery of electricity services and programs for energy-burdened customers in the company's next resource plan.

B. Create new options to improve customer access to energy efficiency and renewable energy.

C. Draft a plan to be submitted in Xcel's next resource plan to bring the racial and gender diversity of the company's workforce in line with the utility's stated goals.

D. Design incentives to ensure that communities of low-income, Black, Indigenous, and People of Color that have disproportionately borne costs of unjust and inequitable energy decisions have equitable access to programs promoting distributed generation.

E. Adopt practices in furtherance of procedural justice—including deeper engagement with renters; affordable rental property owners; communities of Black, Indigenous, and People of Color; and under-resourced individuals—providing resources for engagement and participation, and providing financial support for impacted individuals to participate in dockets and decision-making processes.

F. Form an environmental justice accountability board which shall develop environmental justice-focused initiatives to be incorporated throughout the utility.

By January 1, 2023, and annually thereafter, Xcel shall file details describing stakeholder outreach and progress in its next resource planning docket, and in a separate docket to be established by the Executive Secretary.

26. This order shall become effective immediately.

BY ORDER OF THE COMMISSION

Will Seuffert
Executive Secretary

This document can be made available in alternative formats (e.g., large print or audio) by calling 651.296.0406 (voice). Persons with hearing or speech impairment may call using their preferred Telecommunications Relay Service or email consumer.puc@state.mn.us for assistance.

APPENDIX A: Commission-Approved Alternative Resource Acquisition Processes for Northern States Power Company d/b/a Xcel Energy (Xcel)[42]

I. No-Bid/Track 1 Process[43]

This track provides an independent auditor's report, use of a standard contract as the starting point in every bidding process, and a contingency plan in the event of an unsuccessful bidding process. The main steps of the process for requesting proposals are as follows.

A. The Commission issues a resource plan order indicating the size, type, and timing of the resources Xcel needs.

B. The Commission –

1. Approves a standard contract to be used by independent power producers for the intermediate, peaking, and wind resources;
2. Requires requests for proposals for the intermediate, peaking, and wind needs identified in the order;
3. Requires Xcel to use an independent auditor to certify that the company used an unbiased process for obtaining and evaluating responses to the request for proposals;
4. Sets the timing for Xcel to file its proposal for each separate resource; and
5. Potentially sets the timing for completion of the resource acquisition process.

C. A targeted request for proposals for peaking, intermediate, or renewable resources is issued (consistent with any timing specified in the Commission order). The request for proposals includes the standard contract.

D. Bidders file their proposals with Xcel pursuant to the request for proposals.

E. Xcel files the contingency plan on the same date that bids are due.

F. Xcel makes selections and begins negotiations with the selected vendor.

G. Xcel files the Independent Auditor certification within 20 days of the selections. (Xcel would not file a "selection report" or similar filing but would proceed directly to negotiations.)

H. Within one year of issuing its request for proposals (or other date specified by the Commission),

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[42] Derived from *In the Matter of the 2020–2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel*, Docket No. E-002/RP-19-368, Department comments, at 93-97 (February 11, 2021).

[43] Derived from *In the Matter of Northern States Power Company d/b/a Xcel's Application for Approval of its 2004 Resource Plan*, Docket No. E-002/RP-04-1752, Xcel compliance filing, at 3-5 (August 28, 2006).

1. Xcel files for approval of a proposed power purchase agreement with the selected vendor. The petition for the power purchase agreement must demonstrate that the proposed contract and its cost recovery would be reasonable.
2. Alternatively, Xcel files a statement of reasons why the negotiations have not been successfully completed. Under the alternative, the Commission could decide whether to have negotiations continue, to have the contingency plan pursued, or consider some other option

I. If the Commission approves the power purchase agreement, the project would proceed to obtain any remaining permits, but a Certificate of Need would not be required pursuant to Minn. Stat. § 216B.2422, subd. 5.

J. Upon receipt of all needed permits, the project proceeds with construction.

Other Details: Consistent with the desire to keep the process moving rapidly, the above process would eliminate pre-filing of the request for proposals with the Commission and interim selection reports that would require comments or otherwise delay the start of negotiation of the power purchase agreement. This would not prevent review of the selections by the Minnesota Department of Commerce (the Department). If the process does not produce a petition for approval of a power purchase agreement following the one-year period, the Commission can determine whether to allow more time, direct the company to move forward with the contingency plan, or seek additional information.

Standard Contract Approval: Xcel submits a standard contract for use in acquiring the peaking generating resource identified in the resource plan order. Because this contract is to be approved prior to use, Xcel provides the standard contract only to the Commission, Department, and Office of Attorney General for approval. The request for proposals includes the approved standard contract and instructs bidders to specify a monetary value with each exception to the standard contract. Additionally, Xcel will instruct bidders to identify exceptions they believe do not have a monetary value.

Independent Auditor Selection: Xcel selects an independent auditor from the list of auditors it maintains for use in the bidding process.

II. Xcel-Bid Contested Case/Track 2 Process[44]

This is a competitive resource acquisition process with the framework of a Certificate of Need-type process in which alternative proposals to Xcel's preferred option are considered. This process applies when Xcel proposes to build its own generating facility and for all baseload resource needs. The main steps of this track are as follows.

A. The Commission issues a resource plan order identifying the size, type, and timing of the resource needs.

B. The Commission sets the date to initiate the competitive process.

[44] *Id*., at 5-7.

C. On the date specified by the Commission, Xcel submits its detailed filing for approval of its preferred resource (such as through a Certificate of Need, a filing containing Certificate of Need quality information for an out-of-state resource, a petition for approval of a power purchase agreement for a baseload resource, or combinations of such filings.)

D. On the same date as Xcel's submission described in Step B, interested competitors (or alternative projects) provide their proposals in similar Certificate of Need-like detail.

E. A contested case (Certificate of Need-like proceeding) is conducted, returning findings and recommendations to the Commission.

F. The Commission considers the developed record and issues its decision.

G. If the Commission selects Xcel's proposal, the Commission order provides the requested (or Commission-modified) approval.

H. If the Commission selects (or prefers) an option that is not Xcel's proposal, Xcel spends up to four months negotiating a power purchase agreement. Following the four-month negotiation period (or earlier as applicable), Xcel petitions for approval of the power purchase agreement. If the parties are unable to reach agreement, Xcel files an explanation with the Commission and requested instruction (such as switching to an alternative proposal or to the company's original proposal).

I. For an approved power purchase agreement, the project would proceed to obtain any remaining permits, but a Certificate of Need would not be required pursuant to Minn. Stat. § 216B.2422, subd. 5.

J. Upon receipt of all needed permits, the project proceeds with construction.

Other Details: The proposal content should be sufficiently detailed so that the Commission can effectively initiate the contested case proceeding and so that no proposal is advantaged or disadvantaged by the level of information provided. For plants to be built in Minnesota, the Certificate of Need rules would apply (except as noted below for alternative proposals). For out-of-state build options, similar quality data should be provided to allow thorough and complete record development. For power purchase agreements, the proposal should include the level of detail provided historically in petitions for approval. Alternative proposals would be granted the following exemptions:

- 7849.0240 subpart 2, part A (socially beneficial uses)
- 7849.0250 subpart B (alternatives to the facility)
- 7849.0250 subpart C (the portion pertaining to alternatives)
- 7849.0270 (peak demand and annual consumption forecasts)
- 7849.0280 (system capacity)
- 7849.0290 (conservation programs)
- 7849.0300 (consequences of delay)

• 7849.0340 (required within 7849.0310, information regarding the alternative of no facility)

Alternative providers would be required to submit a list of supplementary data including the following:

A. Developer experience and qualifications.

B. Pricing of the proposal, including but not limited to the following:

1. The term,
2. In-service date,
3. Contract capacity,
4. Capacity payment,
5. Fixed operations and maintenance payment,
6. Variable operations and maintenance payment,
7. Fuel payment, and
8. Tax-related payments and other costs.

C. Scheduling provisions, including but not limited to –

1. Planned maintenance,
2. Expected minimum load,
3. Ramp rates, and
4. Limitations on operations.

D. Discussion of the guaranteed performance factors, such as construction costs, unit completion, availability, and efficiency.

E. Any other key contract terms the provider requires.

III. Xcel-Bid Auditor/Modified Track 2 Process[45]

A. The Commission issues a resource plan order identifying the size, type, and timing of the resource needs.

B. Xcel issues its request for proposals.

[45] Derived from *In the Matter of Xcel's 2016–2030 Integrated Resource Plan*, Docket No. E-002/RP-15-21, Xcel reply comments, at 9-10 (August 12, 2016).

C. Early in the process (preferably with the filing of the company's self-build proposal, discussed below) Xcel files a contingency plan to address the potential for the bidding process to fail.[46]

D. The day before Xcel receives responses to that request for proposals, Xcel submits its self-build project petition. This petition contains an estimate of final costs for the project and other project details necessary to evaluate the proposal in accordance with the identified selection factors.

E. After receiving bids in response to the request for proposals, Xcel evaluates the bids and select projects for contract negotiation that are in the best interest of its customers. Xcel evaluates the bids using a number of factors, such as –

1. Levelized cost,
2. Financial capability,
3. Project schedule,
4. Project design,
5. Project risks,
6. MISO queue position status,
7. Interconnection and network upgrades,
8. Energy production profile,
9. Site control,
10. Project output delivery plan,
11. Expected turbine availability,
12. Pricing options,
13. Project development milestones,
14. Exceptions to standard contract terms and conditions, and
15. Other relevant factors.

Using these criteria, Xcel selects projects that are in the best interest of its customers and negotiates contracts with each of the developers.

F. Xcel then makes a filing to the Commission that includes the contracts for projects selected from the request for proposals, as well as a comparison between those projects and Xcel's self-build proposal. The company includes a ranking and bid data for all bids received in response to the request for proposals and an analysis of the factors identified above for all projects for which Xcel conducts due diligence. Additionally, the company provides an independent third-party auditor report of its process for requesting proposals, which reviews the company's evaluation of proposals and due diligence, as well as the company's selection of proposals for contract negotiation.

[46] Derived from *In the Matter of Xcel's 2016–2030 Integrated Resource Plan*, Docket No. E-002/RP-15-21, Order Approving Plan with Modifications and Establishing Requirements for Future Resource Plan Filings, at 11, Ordering Paragraph 5.c. (January 11, 2017).

Appendix C

2022 RFI Independent Expert Report prepared by Guidehouse Inc.

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

Xcel Energy

Northern States Power Company

2022 RFI Independent Expert Report

Prepared by Guidehouse Inc. for:

Xcel Energy

Submitted by:

guidehouse.com

12/29/2022

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Executive Summary

Background

The Company's approved Upper Midwest Integrated Resource Plan (IRP) directs the procurement of approximately 600 MW of solar and 2,150 MW of wind – or an equivalent amount of energy and capacity from wind, solar and/or storage – between 2027 and 2032 to maximize the use of the Sherco gen-tie line. The IRP also allows 600 MW of Company-owned solar and/or storage resources to come online between 2028 and 2030 to maximize the use of existing King interconnection facilities

Subsequently, Northern States Power Company, an Xcel Energy operating company (Company) issued a 2022 request for information (RFI) to collect basic information about potential generation assets in development that may be candidates for interconnection to the Company's proposed transmission tie-lines routed back to the existing Sherco or King facilities for reuse of the Company's existing interconnection rights.

The Minnesota Public Utilities Commission (PUC) oversees and regulates public utilities, including the Company. The PUC required the Company retain an Independent Expert (IE), to analyze the credibility of the proposals received and their potential cost ranges. The Company contracted with Guidehouse, Inc. to perform the services of an IE for the RFI as required by appropriate regulations and guidelines. The information collected from the RFI will be evaluated by an IE and used to inform Company efforts to develop renewable generation collector transmission tie lines in support of cost effectively achieving the IRP approved capacity additions on a timely basis. In addition to IE services, the Company contracted with Guidehouse to analyze potential socioeconomic impacts of the RFI portfolio of projects which included workforce development, local economic impacts, landowner impacts and potential incremental tax revenues.

Inflation Reduction Act of 2022

The Inflation Reduction Act (IRA) of 2022 was signed into law after Guidehouse was contracted by the Company to perform IE services and the majority of report development was complete. However, it is important to acknowledge IRA provisions and incentives which are potentially impactful to the development of future energy infrastructure projects including solar, wind and energy storage resources. The IRA creates economic incentives in the form of extended Production Tax Credit (PTC) and Investment Tax Credit (ITC) provisions. Most relevant to the RFI portfolio of projects is the establishment of ITC and PTC for wind and solar projects that begin construction during 2024-2034 time period. Bonus tax credits are offered to projects that meet domestic equipment content requirements or are sited in specific communities including low income or Tribal areas. Additionally, the IRA extends the ITC and PTC incentives to standalone battery storage system which were not previously eligible under existing tax incentive programs unless certain battery charging requirements were met by project developers.

IRA provisions are an important factor to consider when evaluating the economic viability of the wind, solar and storage RFI responses. All RFI responses reviewed by the IE were proposed to be constructed during the 2026-2030 time range which would make them eligible for IRA

incentives. If claimed by RFI respondents, the PTC and ITC incentives have the potential to put downward pressure on the LCOE ranges projected in this report. However, their net impact on LCOE ranges are dependent on numerous other future market conditions including inflation, cost of debt and supply chain strength. RFI respondents did not identify any Tribal lands as part of their siting plans and further analysis is required to determine RFI project potential for bonus tax credits due to siting new facilities in low income communities.

Summary of RFI Project Portfolio

This report (the "Xcel Energy 2022 RFI Final Report" or "Final Report") summarizes the analysis of Guidehouse Inc. as the Independent Expert ("IE"). Guidehouse found the RFI portfolio of projects, if brought online, are generally well suited to satisfy the Company's incremental capacity needs during the 2026-2030 period per the approved IRP. It is the IE's option that the projects proposed by RFI respondents are subject to known risks typically encountered by those seeking to develop renewable generating facilities and therefore the RFI portfolio is not inherently riskier than any other group of development stage projects. Additionally, the RFI portfolio faces low to moderate threat levels for the known risk criteria analyzed by Guidehouse.

Table 1: RFI Responses by Gen-Tie Region

Xcel/NSP Territory Location	Total Capacity by Generation Type			
	Solar (MW)	Storage (MW)	Storage (MWh)	Wind (MW)
Sherco/Lyon County Gen-Tie Region	2,300	2,000	7,600	4,214
King Gen-Tie Region	1,540	641	1,964	0
Other Gen-Tie Region	450	0	0	252
Total	4,290	2,641	9,564	4,466

- The RFI did not require respondents to provide evidence of site control, however most respondents were able to demonstrate some level of land acquisition success or indicated positive initial feedback from local landowners or stakeholders regarding the potential for renewable projects to be sited in their respective communities.
- The majority of projects provided indicative project siting plans that avoided the use of government and tribal lands. Additionally, most projects were proposed outside of areas identified as Wildlife Management Areas (WMA), sensitive species habitats or areas of environmental concern.
- The is some risk for scarcity or competition amongst developers seeking to acquire land in areas with known natural wind and solar resource potential. This risk is most prevalent for the larger, 500MW or greater projects, proposed in vicinity of Lyon County, Minnesota and may impact the commercial viability of these projects.
- The majority of developers were able to demonstrate relevant experience either as Develop-Transfer or Build-Transfer, based on descriptions of past project experience and lists of completed projects which correlated with the project data provided in their RFI response(s).

  - Renewable generation technologies for wind, solar and battery storage proposed by RFI respondents are industry standard equipment and have at least 5 years of operating history in the United States. All RFI respondents face the same equipment acquisition risks which may impact project commercial viability depending on market condition at the time of major equipment procurement.

- The RFI process also seeks to understand the relative cost effectiveness of interconnection options available to the RFI Project Portfolio. With respect to the location of projects proposed under the RFI, three distinct clusters of projects emerged (1) Sherco/Lyon County Gen-Tie Region (2) King Gen-Tie Region (3) Other Gen-Tie Region. The relative effort and feasibility to interconnect incremental renewable energy capacity in each area differs amongst the regions.
  - Analysis performed by Guidehouse for the Sherco/Lyon County Gen-Tie Region indicates that projects have historically encountered higher interconnection costs and experienced lower success rates based on MISO interconnection queue data.
  - Non-RFI projects seeking interconnection in the King Gen-Tie Region have relatively lower interconnection upgrade costs and high observed success rates, but fewer data points exist making this analysis unreliable until additional data is available. Absent incremental transmission network upgrades, interconnection costs for future projects will likely remain steady with average upgrades fees of approximately $73/kW of capacity connected to the system (see section 4.1 for details).
  - Guidehouse did not perform a MISO interconnection data analysis for non-RFI projects in the Other Gen-Tie Region as routing and siting of new transmission to collect and deliver this capacity to an existing Company POI, Sherco or King, was deemed uneconomic and therefore the MISO interconnection queue is the best default interconnection option for these projects.
  - Given the dense clustering of both wind, solar and storage projects in the Sherco/Lyon County Gen-Tie region and historically high regional interconnection costs, it is reasonable to assume that this development zone, with its potentially rich wind and solar resources, will remain untapped until new transmission network upgrades are implemented.
  - Further historical MISO queue analysis and cost-benefit analysis of transmission collector systems for RFI Projects in the King Gen-Tie region are necessary to determine the best interconnection option for solar and solar+storage projects in the area

- Renewable energy projects are resource intensive projects requiring significant amounts of equipment, land, construction materials and human capital to construct. Given the scale of renewable resource need demonstrated by the Company, a number of socioeconomic scenarios are likely to come into play during the procurement and implementation of these projects
  - All phases of project implementation will stimulate workforce development and staff utilization, both directly and indirectly. The development of renewable resources requires a large cross section of workers directly related to the project

including designers, engineers, environmental specialists, permitting agencies, construction labor and management staff. Indirect workforces such as state and local agency staff will also contribute meaningfully to the development of these renewable energy resources.

- Landowners and communities can be impacted in both positive and negative ways. Wind and solar projects require significant amounts of land which is either lease or purchased from owners. This can be a potential net benefit to some landowners who choose to pursue this economic opportunity. Non-landowners may also benefit through the collection of incremental tax revenues benefitting communities where new facilities are constructed. Business owners such as hoteliers, construction materials vendors and other service providers can potentially see increases in complementary economic activity due to prolonged development activity driven by the construction of Company procured renewable generating capacity.
- Other community stakeholders may consider these new resources a disruption to the status quo and have objections to the siting of new facilities due to their potential to obstruct landscapes. Stakeholders may also be concerned about the possibility of eminent domain authority being used to site renewable facilities, although this risk is largely perception based given the Company has no known history using this authority in the pursuit of renewable energy project.

This Final Report summarizes Guidehouse's review and findings as of the date of this report. We relied on documents, correspondence, analyses, and other information provided to us by the Company to perform our work. While we believe this information to be reliable, it has not been independently verified for either accuracy or validity, and no assurances are offered with respect thereto. Guidehouse makes no representations, warranties, or opinions concerning the enforceability or legality of the laws, regulations, rules, agreements, or other similar documents reviewed as part of its work. Guidehouse and its employees are independent contractors providing professional services to the Company and are not officers, employees, or agents of the Company.

1. Generation Technology Cost Trajectories

1.1 Current Generation Project Costs

Guidehouse developed a baseline cost set for the generation types targeted in the RFI. To evaluate the respective future Levelized Cost of Energy (LCOE)[1] of Project proposals received under the RFI, Guidehouse leveraged its internal model to develop long-term cost projections representative of location-specific price forecasts for each asset type in the RFI portfolio. For the purposes of utility resource planning, LCOE can be viewed as the baseline of a competitive power purchase agreement (PPA) benchmark because the LCOE value of a resource indicates the minimum price required for the project owner to recoup its investment while making a minimum target return. Therefore, while PPA price offerings can be expected to come at a premium to the LCOE of a new resource, the metric provides a conservative estimate of future value.

Guidehouse's LCOE model consists of a discounted cash flow analysis to calculate the levelized cost of ownership of an energy resource. The revenue-based analysis creates a power plant model representing a regionally appropriate representative project for the relevant technology and solving for the $/kWh value that results in a minimum levered IRR equal to the assumed cost of equity as well as meeting a minimum debt service coverage ratio (DSCR). Table 2 through

[1] Guidehouse LCOE model and subsequent price data points do not include IRA economic assumptions.

Table 7 below provide the Guidehouse developed input streams to the LCOE model[2].

Table 2: Renewable Capacity Factors

Renewable Capacity Factors[3]			
Region	State	Type	Capacity Factor (%)
MISO - North	MN	Single Axis Tracker	25.5%
MISO - North	SW-MN	Onshore	41.6%

[2] In some instances Guidehouse's independent LCOE assumptions differ notably from Xcel Energy LCOE assumptions.

[3] Assumed 0.5% capacity degradation per year, Capacity Factor in kW-DC to kWh. Source: NREL System Advisory Model

Table 3: Financial Inputs

Financial Inputs	
Parameter	Value
Asset Life / Investment Horizon	25 yr.
Fixed O&M Escalator	0.5%
Target Equity IRR	10.0%
Minimum DSCR	1.30
Cost of Debt	6.0%
Debt Period	25 yr.
Federal Tax Rate	21%

Table 4: Incentives[4]

	Incentives	
	Investment Tax Credit (ITC)[5]	Production Tax Credit (PTC)[6]
2021	26.0%	$0.015/kWh
2022	26.0%	
2023	22.0%	
>2023	10.0%	

Table 5: Depreciation Assumptions

Depreciation Assumptions	
Depreciation Type	MACRS
MACRS Depreciation Life	5

Table 6: Capex[7]

	US	MISO	US	US
Year	Utility Solar	Onshore Wind	4-HR BESS	Solar + BESS
2022	$1.10	$1.52	$1.60	$2.70

[4] During the drafting of this report the Inflation Reduction Act (IRA) of 2022 was passed which could materially alter potential outcomes discussed herein. Guidehouse models do not include impacts of the IRA.

[5] ITC incentives are based on Start of Construction

[6] PTC applies to projects that have started construction prior to January 1st, 2025. The PTC applies for the first 10 years of commercial operation.

[7] Units: Real 2020$/Wdc

Table 7: Baseline Renewable Generation Costs

	Utility-Solar	Wind	BESS	Solar + BESS
	Single Axis Tracker	Onshore	4-HR	4-HR
	$/MWh	$/MWh	$/MWh	$/MWh
2022	$37.7682	$32.9059	$149.5633	$122.5443

1.2 LCOE Influencing Factors

Solar

Guidehouse anticipates a slight decrease in the LCOE of single axis tracker, utility scale solar from 40.86 $/MWh in 2026 to 38.34 $/MWh in 2030[8]. The scale of production and scale of installation both impact the cost of single-axis utility scale solar. Solar panel production has increased continuously from 2000 to 2020.[9] Through 2030 Guidehouse assumes a continuation of the multi-decade growth trend of both supply and demand for solar. Even during the COVID-19 Pandemic, when certain the cost of components that are required to manufacture solar photovoltaics increased suddenly, production was maintained then increased substantially.

Table 8: Solar Photovoltaics Installation by Year (Global)

Year	Solar-GW Installed	Source
2019	115	NREL[10]
2020	107	IEA[11]
2021	173.5	International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS)[12]
2022	260	International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) - forecast[12]

NREL estimates that for every doubling of cumulative PV shipments, the module price drops 23%.[13] However, it is important to note that this module price observation represents a cumulative historical trend and does not reflect recent price increases of solar modules due to global supply constraints and upward inflationary pressure. NREL also reports that the average system size of utility scale installations has trended upwards over the past 7 years.[14] Larger installations mean lower costs per MW, driving the cost down over time. Therefore, with rising scale we can anticipate falling cost. Economies of scale and the technological improvements that come with increased production, as well as falling manufacturing costs paired with supply chain vulnerability drive Guidehouse's forecast of a slight decrease in the LCOE of single axis tracker, utility scale solar between 2026 and 2030.

Policy and trade disruptions may continue to affect pricing through 2030 due to uncertainty across a number of economic indicators including inflation and energy policy adjustments made in response to emerging situations such as the war Ukraine. Manufacturing costs are projected

[8] This future price range assumes that currently observed upward inflationary pressures reverse and solar module production matches pace to meet net global demand generated by an accelerating transition to renewable energy sources. If current trends continue into the future, LCOE forecasts will require adjustment to reflect actual market conditions for projects developed during the 2026-2030 period.

[9] Statista, Annual solar module production globally from 2000 to 2020, https://www.statista.com/statistics/668764/annual-solar-module-manufacturing-globally/

[10] NREL, Q4 2019/Q1 2020 Solar Industry Update. https://www.nrel.gov/docs/fy20osti/77010.pdf

[11] IEA, Solar PV 2020. https://www.iea.org/reports/renewables-2020/solar-pv

[12] PV Magazine, October 2022. https://www.pv-magazine.com/2022/10/19/global-installed-pv-capacity-could-hit-260-gw-in-2022/

[13] NREL, Spring 2022 Solar Industry Update, https://www.nrel.gov/docs/fy22osti/82854.pdf

[14] NREL, Spring 2022 Solar Industry Update, https://www.nrel.gov/docs/fy22osti/82854.pdf

to continue dropping through 2025 and beyond.[15] However, material costs have been vulnerable to recent supply chain disruptions and political rulings, greatly increasing production costs. Polysilicon, a key ingredient in solar production, has 50% of global production localized to the Xinjiang region in China. Therefore, it is highly exposed to variations in local affairs and shipping costs. During the COVID-19 pandemic, disruptions caused an over 200% rise in price for the material. Additionally, the Uyghur Force Labor Prevention Act (UFLPA) placed strict requirements on goods shipped to the US from the Xinjiang region due to concerns over forced labor.[16] The COVID-19 disruptions are considered short term and are unlikely to specifically affect prices from 2026-2030, however sustained growth in global demand for energy produced from solar PV has the potential to dampen long term price declines.

Wind

Guidehouse anticipates a decrease in the LCOE of onshore wind from 37.49 $/MWh in 2026 to 33.53 $/MWh in 2030. The forecast provided by Guidehouse is based off of two fundamental parts: the current LCOE values from the Department of Energy's land-based wind report[17] and the NREL Annual Technology Baseline forecast[18] (ATB). We extend Department of Energy's (DOE) current LCOE into the future using the percentage change from the ATB to obtain the most accurate future projection. The projected decrease is due to market expansion and manufacturing process improvements.

Guidehouse Insights expects a 2.1% compound global annual growth rate from the global wind power market from 2021-2030, with the dominant long term (8-10 year) factors being demand from "zero net carbon emissions policies in China," "investment in research for offshore wind implementation on the US coast," and "advancements in turbine design with better capacity factors for viable projects in areas with low wind speeds".[19] Regarding advancements in turbine design, wind power installations have experienced capacity factor performance gains due to higher hub heights and lower specific powers. Siting installations in areas with lower average wind speeds have caused some reductions in capacity factor but expanded the areas of possible installation.[20] Focusing on the market for just US, onshore wind – 13.4 GW of new capacity was added in 2021, slightly less than was installed in 2020 and following a four-year trend of increasing yearly additions.[21] US onshore wind capacity additions have not been consistent over time, a trend which is expected to continue. The US Department of Energy predicts that wind energy capacity additions will "generally decline through 2023 before rebounding" through 2025.[22]

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[15] NREL, Solar Manufacturing Cost Analysis, https://www.nrel.gov/solar/market-research-analysis/solar-manufacturing-cost.html

[16] PV Magazine, Polysilicon prices rise over 200% in 2022 amid supply shortages, https://pv-magazine-usa.com/2022/07/06/polysilicon-prices-rise-over-200-in-2022-amid-supply-shortages/

[17] US Department of Energy, https://www.energy.gov/eere/wind/articles/land-based-wind-market-report-2021-edition-released

[18] NREL, https://atb.nrel.gov/electricity/2022/data

[19] Guidehouse Insights, https://guidehouseinsights.com/reports/analyst-insight-wind-energy-update-and-forecast-insights

[20] US Department of Energy, https://www.energy.gov/sites/default/files/2022-08/land_based_wind_market_report_2202.pdf

[21] US Department of Energy, https://www.energy.gov/sites/default/files/2022-08/land_based_wind_market_report_2022_ppt.pdf

[22] US Department of Energy, https://www.energy.gov/sites/default/files/2022-08/land_based_wind_market_report_2202.pdf

Manufacturing processes for wind turbines have improved over time, driving down installation costs. Domestically, there are over 500 manufacturing facilities for wind turbine components and assembly. Advancements in “composite materials, automation, and more efficient manufacturing processes” have reduced the cost of production and thereby the cost of installations. Additionally, the construction of wind energy projects requires extreme logistics for the transportation of manufactured components. Improvements and experience have reduced transportation costs, further driving the decrease in price.[23] [24]

[23] US Department of Energy, https://www.energy.gov/eere/wind/wind-manufacturing-and-supply-chain

[24] US Department of Energy, https://www.energy.gov/sites/default/files/2022-02/Wind%20Supply%20Chain%20Report%20-%20Final%202.25.22.pdf

Battery Storage

The cost of energy storage is projected to notably decline by the end of the decade, with Guidehouse Insights anticipating a 41% reduction in lithium-ion cell prices by 2030.[25] Cost reductions are expected to be driven by several factors including expansion of manufacturing capabilities with increased demand in the electric vehicle (EV) market, advances in battery storage technologies, and improvement in material use and cell design.

The EV and stationary energy storage markets, growth trajectories, and cost curves are interconnected with notable overlap in required materials and manufacturing capabilities. Lithium-ion technology is one of the leading technologies for both markets, and the reduction in costs for this technology has been one of the largest contributors to cost declines for stationary energy storage.[26] Even with its importance to stationary energy storage, the EV market accounts for nearly 80% of lithium-ion batteries globally.[27] As such, growth within the EV market can yield concurrent benefits to stationary energy storage. Light-duty (LD) plug-in electric vehicle (PEV) sales are expected to grow from 3.5% of total North American LD vehicles to 31.4% by 2030.[28] Tesla, one of the leading EV OEMs, has seen 25% year-over-year (YoY) growth in LD PEV sales, and has continued to build new facilities as well as ramp production and manufacturing efficiency to new heights at existing factories within the U.S. and internationally. This growth in EV production to meet rising demand can help reduce costs for utility scale energy storage since greater emphasis will be placed on greater and more efficient lithium-ion battery production. The top 15 cell manufacturers by planned capacity implemented about 200 GWh in 2021 alone, and many more new facility announcements are expected industry wide.[29] Additionally, EV duty cycles can be strenuous on lithium-ion batteries, but after completing the decade or so operating life of a PEV, the battery can be repurposed to serve stationary energy storage applications. For energy storage applications that require less frequent battery cycling, on the magnitude of 100-300 cycles per year, reusing lithium-ion batteries may provide the most value. Battery reuse can yield costs around 30-70% less expensive than new battery alternatives.[30]

The cost of raw materials for battery manufacturing, such as lithium carbonate and cobalt, has notably increased. The increase in these costs has been attributed to pandemic-induced supply chain issues as well as an overall imbalance in supply of necessary raw materials with the demand for batteries in other markets, especially EVs. [31] The Federal Consortium for Advanced batteries has raised this as a key challenge and seeks to obtain reliable access to raw and refined materials for existing energy storage technologies, and further research alternatives to

[25] Guidehouse Insights, Market Data: Evolving Market Participation Models for Energy Storage. https://guidehouseinsights.com/reports/market-data-evolving-market-participation-models-for-energy-storage

[26] Guidehouse Insights, Market Data: EV Geographic Forecast- North America. https://guidehouseinsights.com/reports/market-data-ev-geographic-forecast-north-america

[27] Wood Mackenzie, Global lithium-ion battery capacity to rise five-fold by 2030. https://www.woodmac.com/press-releases/global-lithium-ion-battery-capacity-to-rise-five-fold-by-2030/

[28] Guidehouse Insights, Market Data: EV Geographic Forecast- North America. https://guidehouseinsights.com/reports/market-data-ev-geographic-forecast-north-america

[29] Wood Mackenzie, Global lithium-ion battery capacity to rise five-fold by 2030. https://www.woodmac.com/press-releases/global-lithium-ion-battery-capacity-to-rise-five-fold-by-2030/

[30] McKinsey & Company, Second-life EV batteries: The newest value pool in energy storage. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/second-life-ev-batteries-the-newest-value-pool-in-energy-storage

[31] Guidehouse Insights, Market Data: Evolving Market Participation Models for Energy Storage. https://guidehouseinsights.com/reports/market-data-evolving-market-participation-models-for-energy-storage

mitigate supply chain impacts on the cost of stationary energy storage.[32] U.S. imports of lithium-ion batteries have been surging in 2021. There has been ~320,000 metric tons of imports, which is more than double that of 2020.[33] In response, the DOE is investing in enhancing the domestic battery manufacturing capabilities of the U.S. to minimize reliance on the supply chains of other countries.[34] Efforts will look to advance domestic material sourcing, mineral processing, and battery technology production at U.S. facilities.[35] Nonetheless, if material costs for lithium-ion batteries continue to rise, a significant opportunity may emerge for alternative stationary energy storage technologies that do not face the same type of raw material cost limitations. In particular, demand for long duration energy storage technologies, such as flow (e.g., zinc bromine, vanadium), thermal (e.g., latent heat, sensible heat), and mechanical (e.g., gravity, compressed air), continues to rise, but are currently held back by the technology development and wholesale market price signals.[36] Other challenges have rose for the energy storage supply chain, such as Tesla, which noted that declining energy storage deployments in Q2-2022 can largely be attributed to semiconductor challenges. However, rising cost of raw materials is still the most significant driver of recent challenges.

Lithium-ion battery technologies and cell design have advanced, improving system efficiency and cost effectiveness, and ultimately lead to reductions in LCOE. Considering all relevant factors, Guidehouse Insights expects that continued advancements in manufacturing efficiency and capacity and supply-chain improvements in conjunction with incremental research and development (R&D) progress in energy density will drive the additional 41% reduction in average lithium-ion cell prices through 2030.[37]

1.3 Generation Project Cost Forecast

Applying the LCOE model assumptions from Section 1.1 and forward-looking capital cost research detailed in Section 1.2, Guidehouse developed a set of future LCOE ranges for the renewable generation resource types which were included in developer responses to the RFI. Capital expenditures (capex) have a large influence on the forecasted LCOE of a particular resource type. Capex forecasts are subject to variability due to technology and economic parameters detailed in Section 1.2. These parameters are accounted for in Table 9 where low, base and high capex scenarios by generation resource type are presented. These capex scenarios are fed into Guidehouse's LCOE model to generate a range of potential future LCOEs by resource type. Additionally, financing and tax parameters defined in Section 1.1. may impact LCOE forecasts, but detailed sensitivity analyses outside the scope of this report would be required to measure their impact.

[32] DOE, National Blueprint for Lithium Batteries. https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf

[33] S&P Global, US lithium-ion battery imports surge as auto, energy sectors race to meet demand. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/us-lithium-ion-battery-imports-surge-as-auto-energy-sectors-race-to-meet-demand-69048550

[34] DOE, Energy Storage Grand Challenge Roadmap. https://www.energy.gov/articles/department-energy-releases-energy-storage-grand-challenge-roadmap

[35] NREL, Battery Policies and Incentives Database Contributes to U.S. Efforts to Build a Secure Electric Vehicle Battery Supply Chain. https://www.nrel.gov/news/program/2022/battery-policies-and-incentives-database-contributes-to-us-efforts-to-build-a-secure-electric-vehicle-battery-supply-chain.html

[36] Lazard, Levelized Cost of Storage Analysis. https://www.lazard.com/media/451882/lazards-levelized-cost-of-storage-version-70-vf.pdf

[37] Guidehouse Insights, Market Data: Evolving Market Participation Models for Energy Storage. https://guidehouseinsights.com/reports/market-data-evolving-market-participation-models-for-energy-storage

The scenario forecasts below were formulated in a manner specific to each resource. For utility solar and battery storage, Guidehouse relied on industry knowledge and information from past engagements that fed into its estimates of capital components, as well as the expected rate of cost declines. These values were benchmarked against publicly available figures. As for wind, due to a lack of internally available information, Guidehouse opted to develop its forecasts based on a blend of data acquired from outside publications, including the DOE and NREL.

Table 9: Renewable Generation Capex Forecast

	US			MISO			US		
	Utility Solar $/W-DC			Onshore Wind $/W-DC			4-HR BESS $/W-DC		
Year	Low	Base	High	Low	Base	High	Low	Base	High
2026	$0.89	$1.00	$1.10	$1.12	$1.29	$1.33	$1.14	$1.24	$1.79
2027	$0.87	$0.98	$1.08	$1.04	$1.24	$1.28	$1.10	$1.20	$1.77
2028	$0.85	$0.96	$1.05	$0.96	$1.18	$1.23	$1.08	$1.17	$1.75
2029	$0.83	$0.94	$1.03	$0.87	$1.12	$1.17	$1.07	$1.16	$1.74
2030	$0.81	$0.92	$1.02	$0.79	$1.07	$1.12	$1.04	$1.13	$1.72

Table 10: Guidehouse Renewables LCOE Forecast[38]

	Utility-Solar			Wind			Solar + BESS[39]		
	Single Axis Tracker			Onshore			4-HR		
	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh
Year	Low	Base	High	Low	Base	High	Low	Base	High
2026	$37.18	$40.86	$44.16	$33.51	$37.30	$38.05	$112.76	$122.12	$158.70
2027	$36.51	$40.17	$43.42	$31.64	$36.03	$36.93	$110.37	$120.04	$156.94
2028	$35.87	$39.51	$42.71	$29.76	$34.80	$35.80	$108.72	$118.09	$155.54
2029	$35.29	$38.92	$42.02	$27.85	$33.53	$34.65	$107.63	$116.91	$154.16
2030	$34.71	$38.34	$41.39	$25.95	$32.27	$33.54	$105.80	$115.20	$152.62

Company Cost Projections

As an IE, Guidehouse was tasked with developing the forecasted LCOE ranges (Table 10) for the three resource types the Company is seeking to procure under its approved IRP. These independent LCOE forecasts are compared against the Company's forecasts, which are included in the Company's regulatory filings, for the 2026-2030 period in Table 11. There are some notable differences between the two sets of forecasts, the greatest difference occurring for wind projects under the high cost scenario with the Company forecasting an increase in prices while Guidehouse suggesting a future cost decline. The same trend is true for the solar high price scenario with the Company indicating a price increase over time while Guidehouse projects a cost decline, albeit at a lesser rate of decline than the base or low price projections.

[38] LCOE forecasts do not include interconnection costs

[39] Solar + BESS LCOE forecasts driven by additive solar and BESS capex costs

Table 11: Company Cost Projections[40] [41]

	Utility-Solar			Wind		
	Single Axis Tracker			Onshore		
Year	$/MWh Low	$/MWh Base	$/MWh High	$/MWh Low	$/MWh Base	$/MWh High
2026	$28.98	$40.38	$49.20	$26.98	$33.67	$43.27
2027	$27.96	$40.14	$50.18	$26.12	$33.38	$44.14
2028	$26.90	$39.87	$51.19	$25.27	$33.09	$45.02
2029	$25.81	$39.58	$52.21	$24.45	$32.79	$45.92
2030	$24.69	$39.28	$53.25	$23.65	$32.49	$46.84

Table 12: Cost Forecast Comparison

			Utility-Solar			Wind		
			Single Axis Tracker			Onshore		
		Year	$/MWh Low	$/MWh Base	$/MWh High	$/MWh Low	$/MWh Base	$/MWh High
A	**Xcel/NSP Price Forecasts**	**2026**	$28.98	$40.38	$49.20	$26.98	$33.67	$43.27
		2027	$27.96	$40.14	$50.18	$26.12	$33.38	$44.14
		2028	$26.90	$39.87	$51.19	$25.27	$33.09	$45.02
		2029	$25.81	$39.58	$52.21	$24.45	$32.79	$45.92
		2030	$24.69	$39.28	$53.25	$23.65	$32.49	$46.84
B	**Guidehouse Price Forecasts**	**2026**	$37.18	$40.86	$44.16	$33.51	$37.30	$38.05
		2027	$36.51	$40.17	$43.42	$31.64	$36.03	$36.93
		2028	$35.87	$39.51	$42.71	$29.76	$34.80	$35.80
		2029	$35.29	$38.92	$42.02	$27.85	$33.53	$34.65
		2030	$34.71	$38.34	$41.39	$25.95	$32.27	$33.54
C = B - A	**Difference**	**2026**	$8.20	$0.48	-$5.04	$6.53	$3.63	-$5.22
		2027	$8.55	$0.03	-$6.76	$5.52	$2.65	-$7.21
		2028	$8.97	-$0.36	-$8.48	$4.49	$1.71	-$9.22
		2029	$9.48	-$0.66	-$10.19	$3.40	$0.74	-$11.27
		2030	$10.02	-$0.94	-$11.86	$2.30	-$0.22	-$13.30

[40] Xcel Energy, Northern States Power Company. UPPER MIDWEST INTEGRATED RESOURCE PLAN 2020-2034 Reply Comments. Table 24: Sherco and King Gen-tie Renewable Levelized Costs by Year.

[41] Company LCOE forecasts cited in table 10 do not include interconnection costs

1.4 RFI portfolio Potential Total Investment (Capital Expenditures)

Applying the forecasted capital expenditure costs for the 2026-2030 period from Table 9, total potential capital investment for the entire RFI portfolio is estimated. Commercial Operation Dates (COD) for individual projects vary across the RFI portfolio, but all responses reviewed by the IE were compliant with the Company's requested COD range of 2026-2030. The total nameplate capacity of all RFI responses far exceeds the total capacity needed to fully reutilize the Company's existing interconnection rights at the Sherco and King generating stations. The exact mix of RFI project CODs and the associated costs for projects going into service across the compliant range of years is difficult to predict so the total investment potential for all RFI responses in aggregate is estimated using an average capital cost across the range.

It is important to consider that the projects proposed by RFI respondents are predominantly early-stage developments, most do not have existing interconnection study requests or sufficient land rights necessary to complete the project and therefore are not certain to reach commercial operations. Over the 2000-2016 period approximately 24% of projects seeking interconnection to the MISO region actually achieved commercial operations.[42] With this in mind, it is reasonable to expect the final total capital investment across the RFI Gen-Tie regions to be up to 75% less than the total solar, wind and solar + storage capital investment amounts shown in Table 13. Alternative interconnection options, such as the re-powering of existing generating resources or repurposing existing interconnection capacity for the delivery of net new renewable capacity, will likely enable a higher percentage of projects to achieve commercial success. Additionally, projects that use alternative interconnection methods are more likely to maintain their construction schedules and connect to the transmission system at lower cost than similar projects seeking to use the formal MISO interconnection process.

Table 13: Total Potential RFI Capital Expenditures

		US	MISO	US
	Year	Utility Solar	Onshore Wind	Solar + BESS
Total Potential Capex	**2026 ($/MW)**	$999,566	$1,291,474	$2,235,569
	2027 ($/MW)	$978,385	$1,235,750	$2,178,338
	2028 ($/MW)	$958,881	$1,179,884	$2,129,739
	2029 ($/MW)	$940,379	$1,123,876	$2,098,590
	2030 ($/MW)	$922,964	$1,067,727	$2,053,377
	2026-2030 Avg ($/MW).	$960,035	$1,179,742	$2,139,123
	King Gen-Tie Region (MW)	1,540	0	1,964
	Sherco Gen-Tie Region (MW)	2,300	4,214	2,000
	Other Region (MW)	450	0	252
	King Gen-Tie Region	$1,478,453,723	$0	$4,201,236,647
	Sherco Gen-Tie Region	$2,208,080,235	$4,971,432,699	$4,278,245,058
	Other Region	$432,015,698	$0	$539,058,877
	Total	$4,118,549,656	$4,971,432,699	$9,018,540,583

[42] LBNL, April 2021. Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection as of End of 2021. https://emp.lbl.gov/sites/default/files/queued_up_2021_04-13-2022.pdf

2. Credibility of RFI Project Responses

2.1 Project Risks Analyzed

In alignment with the PUC requirement that the IE analyze credibility of RFI proposals achieving commercial operations, Guidehouse and the Company established the following analysis parameters to evaluate the relative implementation risk of each RFI project proposal. In order to facilitate analysis of the agreed upon parameters Guidehouse disseminated RFI information geographically using information provided by respondents.

2.1.1 Geographic Distribution of Projects by Resource Type

Stand-alone solar and solar + storage project proposals received during the RFI were distributed relatively even across three geographic Gen-Tie regions as summarized in Table 1. With the exception of 450MW proposed in the Northern portion of MISO Zone 1 (see 'Other Gen-Tie Region' projects), all solar or solar + storage projects fall within either the Lyon County/Sherco or King Gen-Tie region. This natural clustering of RFI projects enables transmission planners to conceive potential projects to aggregate this future capacity and deliver energy to existing Company POIs.

Wind projects received under the RFI were predominantly proposed in the Lyon County/Sherco Gen-Tie Region, with only one respondent proposing 252MW of wind in the Other Gen-Tie Region. Although this particular project was very low risk due to the experience of the developer, demonstrated land acquisition position and fully executed MISO interconnection agreement, the project's distant physical location was a notable barrier preventing this particular from cost effectively utilizing existing Company POIs. Putting this exception aside, wind projects proposed in the Lyon County/Sherco Gen-Tie region were also conducive to planning new transmission assets to leverage existing company POIs.

2.1.2 Definition of RFI Geographic Regions

The Company's RFI defined four illustrative geographic areas for RFI respondents to indicate a general region where their project may be located. The RFI geographic areas allowed Guidehouse evaluators to group RFI projects within relative proximity to determine if new transmission assets could be planned in such a way as to efficiently collect and deliver the incremental renewable capacity to Company POIs with existing interconnection rights as a means to lower the overall delivered cost of energy to customers. Indicative maps were included in the RFI Main Text and the four areas were defined by the Company as:

1. Figure 2a. Entire Sherco Gen-Tie project region. Contains Sherco County End Point (Figure 2b), Lyon County Area End Point (Figure 2c), and all areas in between these endpoints
2. Figure 2b. Close up of Sherco County End Point (northeast endpoint region of Sherco Gen-Tie project region)
3. Figure 2c. Close up of Lyon County Area End Point (southwest endpoint region of Sherco Gen-Tie project region)
4. Figure 2d. King Gen-Tie project region

After reviewing all RFI responses received by the Company, Guidehouse determined that for the purposes of evaluating the viability of RFI responses and potential for routing for new transmission facilities, it made sense to group the projects geographically into three categories:

1. Lyon County/Sherco Gen-Tie Region
2. King Gen-Tie Region
3. Other Gen-Tie Region

RFI responses naturally clustered into these three district regions and generally aligned with the illustrative maps provided by the Company as part of the RFI. Projects included in a particular RFI Gen-Tie region were conducive to being collected at a central point within the cluster and transferred to either the King or Sherco reuse-POIs by a new transmission line. Projects with no distinct geographic clustering or significant distance between projects were determined to be in the Other Gen-Tie Region and had no reasonable path back to an existing Company POI.

2.1.3 Interconnection Risk

Connecting a renewable generation project to a regional transmission network is an essential step in the development process. The feasibility and cost of interconnection typically critical to a project's ability to proceed in development. To estimate the impact of interconnection issues on RFI projects seeking to come online during the 2026-2030 time period Giudehouse analyzed the interconnection risks summarized in Table 14.

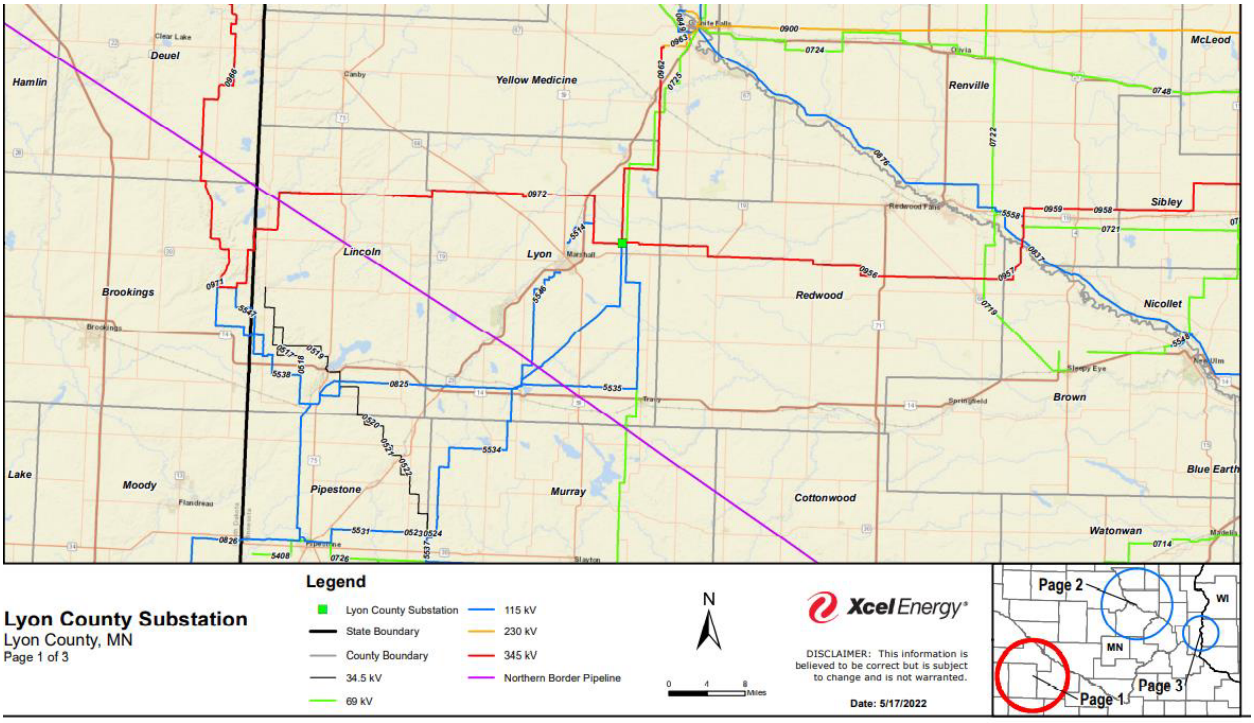
Table 14: Interconnection Risks Analyzed

Risk	Analysis Parameter
1. Proximity to NSP reuse-POI(s) and ROW(s) needed to deliver energy to the NSP transmission system	• RFI portfolio distance to NSP's Sherco and King reuse-POIs The Company provided guidance to respondents that projects in proximity to the following are preferred: • Lyon County, MN • Sherco site • All areas in between Sherco and Lyon County, MN • King site • Western Wisconsin
2. Feasibility of alternative MISO interconnection options	• i. Number of projects competing for transmission capacity near identified project site • ii. Anticipated length of interconnection study process and construction of network upgrades
3. Ultimate project capacity compatibility with NSP reuse-POI(s)	• Design of existing NSP facilities can integrate ultimate planned capacity of RFI portfolio

2.1.4 Lyon County/Sherco Gen-Tie Region

RFI responses in the Lyon County area had the greatest resource diversity by generation type with some respondents proposing novel combinations of solar, wind and storage for a single project. With 4,214MW proposed in the area, this clustering of RFI responses represent a relatively high level of new project development density. Projects proposing to come online in this area are approximately 100-120 miles away from the Sherco reuse-POI depending on their exact location within the Lyon County/Sherco Gen-Tie Region. Based on Figure 1, the Lyon County/Sherco Gen-Tie region has a number of existing Company transmission assets with 345kV, 115kV and 69kV right of ways within approximately 35 miles of all proposed projects. These existing rights of way could be expanded for the purposes of delivering incremental capacity through a new transmission asset. Additionally, the Company's existing Lyon County substation site is suitable for expansion to accommodate a separate collector substation given rural and agricultural[43] adjacent land use.

Figure 1: Lyon County Company Asset Map

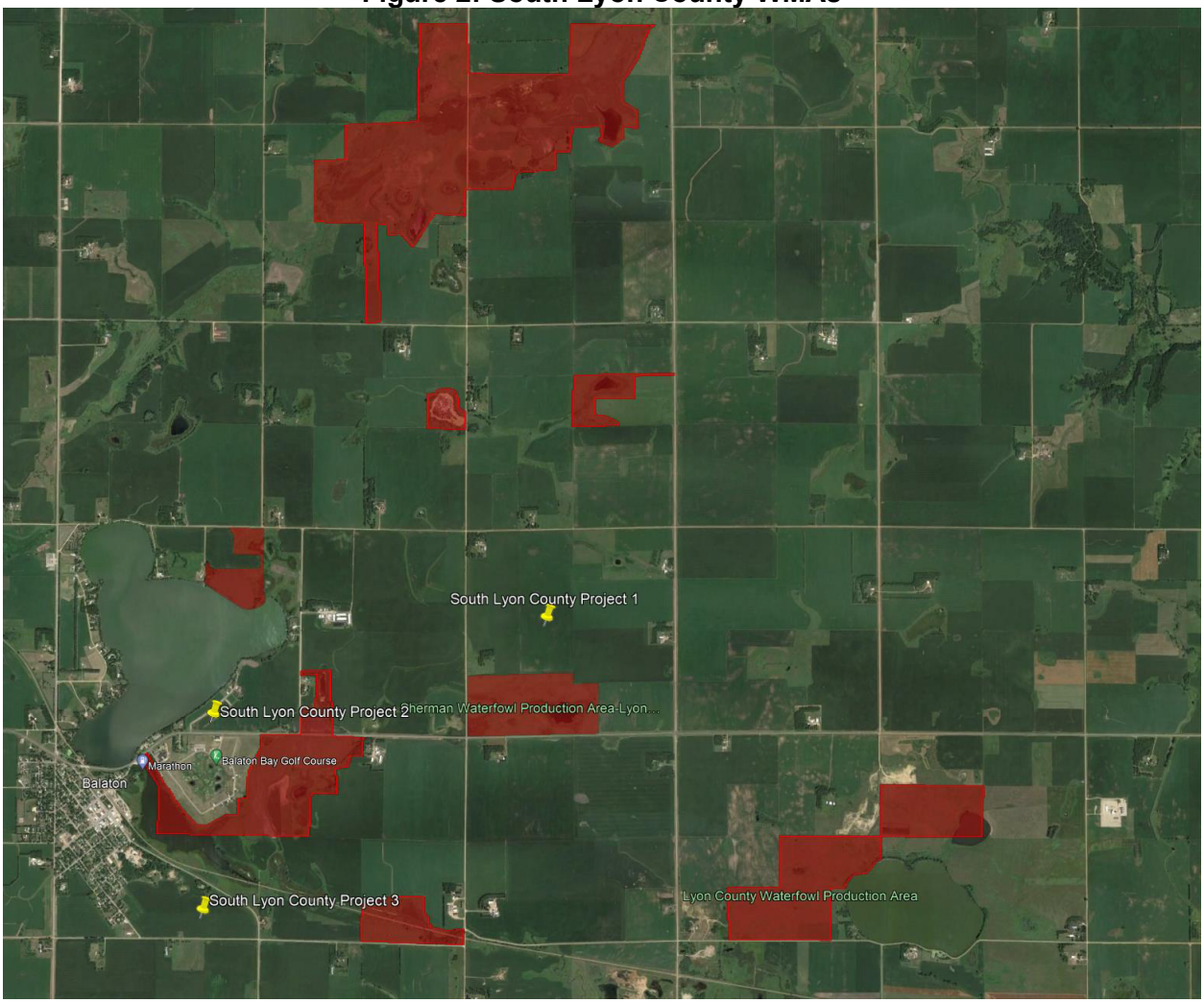


Projects in the northern portion of Lyon County are situated a reasonable distance from populated areas including Minnesota, and Marshall. These projects are also likely to have many transmission routing options due to sparse population density in the area and agriculture as the predominant current land use. However, three RFI portfolio projects around 1,000MW in size each (combined generation types) in the southern portion of Lyon County are proposed near the town of Balaton, MN which has a number of known WMAs (Figure 2, shown in red) within the immediate project areas. Generation interconnection tie lines to connect RFI portfolio projects to a future substation location, which will ultimately interconnect to the Sherco site, may require

[43] Agricultural land means prime farmland but also less desirable and/or fallow areas.

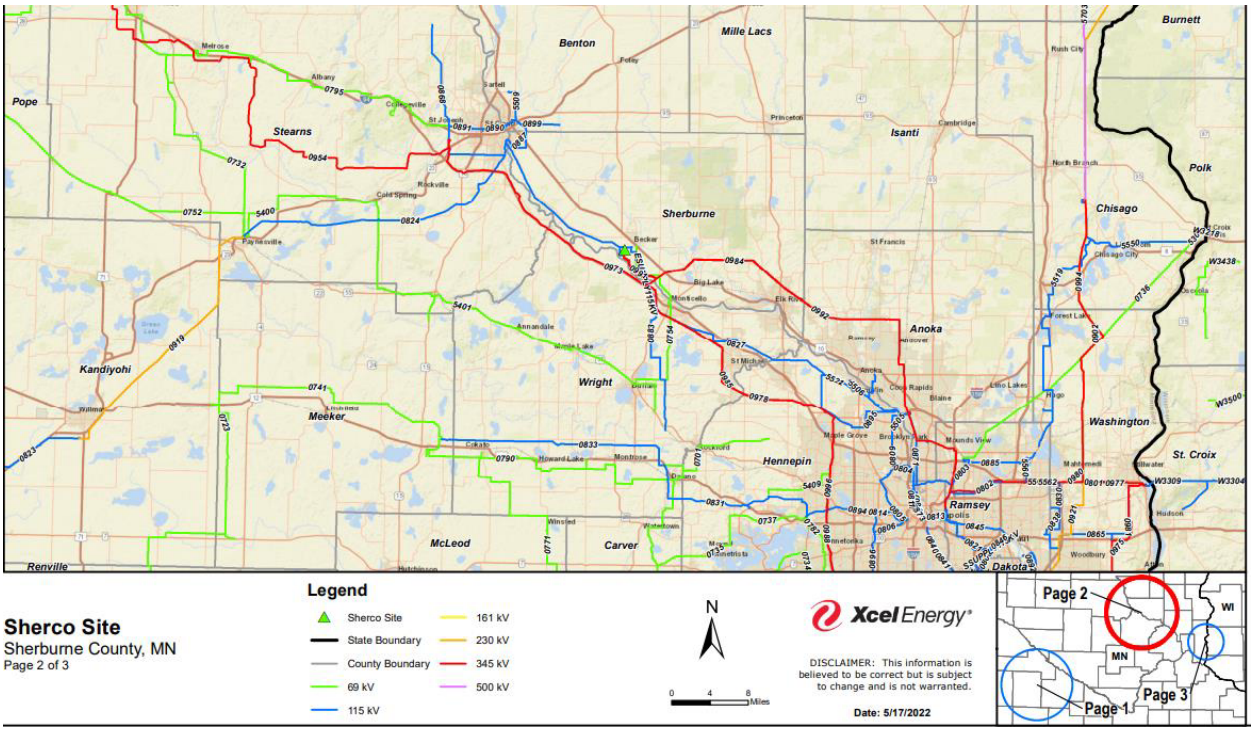
additional study and cost for routing around these environmental sensitivities which introduces interconnection risk specific to these projects.

Figure 2: South Lyon County WMAs



Of the 4,214MW proposed in Lyon/Sherco Gen-Tie Region, three projects totaling 950MW of solar PV generation, 200MW of wind power and 3,200MWh of storage capacity were proposed by RFI respondents outside the Lyon County area. These projects varied in distance from the existing Sherco site from 40 miles to 75 miles. These proposed projects were within 20 to 50 miles of each other and roughly 60 miles from the main cluster of projects scattered around the center of Lyon County. Each projects is located a reasonable distance away from population centers and no material transmission interconnection siting risks were identified. Company provided asset maps indicate these projects are located within 20-30 miles of 69kV transmission lines and within 50-75 miles of an existing 230kV route (Figure 3). Compared to projects close to Lyon County, projects sited in this outer portion of the Gen-Tie region are likely to have higher interconnection costs given their distance from the tighter grouping of projects in the immediate Lyon County area. Carefully planned routing and siting of future Company transmission assets, for the purpose of enabling the economic integration of renewables, can accommodate this physical distance potentially mitigating some of these proximity issues.

Figure 3: Broader Lyon/Sherco Gen-Tie Region Company Asset Map



Per MISO interconnection queue data as of September 2022, a single 200MW solar project is proposed in Lyon County with a proposed COD of September 2023 indicating relatively low natural demand for transmission transfer capacity in the immediate area. However there are approximately 1,800MW proposed projects in the MISO interconnection queue (wind, solar, and storage) in nearby counties including Brown, Murray, Pipestone, Renville, and Wright. Projects pursuing interconnection in these areas may face delays and increase transmission network upgrades costs due to the number of projects in the vicinity. Formal transmission load flow studies are necessary to confirm the magnitude and timing of such upgrades.

One RFI respondent indicated a potential solar project in the Closest to Sherco region as defined by the Company, however the location information provided by the respondent indicated that the project was likely not inside any of the specified RFI regions and was more appropriately located in an 'Other' RFI region category. This 150MW solar project was evaluated is evaluated as being in an Other RFI region in 2.1.6.

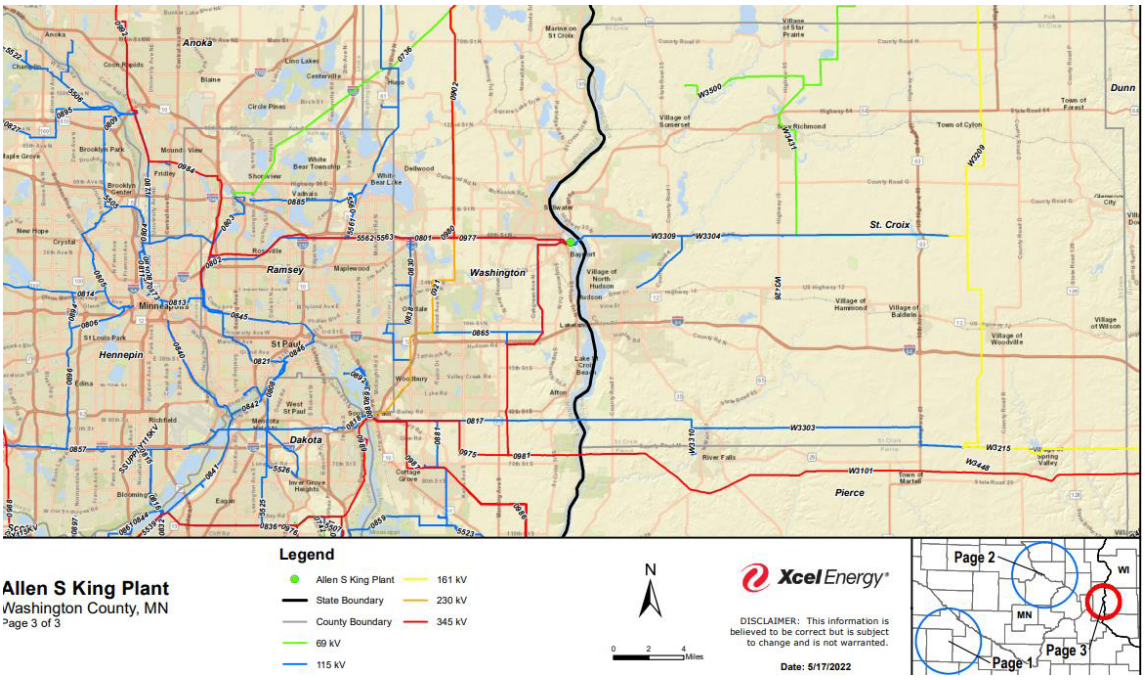
2.1.5 King Gen-Tie Region

Within the King Gen-Tie Region, two projects are within 25 miles and two more are within 60 miles of existing King interconnection facilities. Projects located within 25 miles of King face relatively low risk to connect given their proximity to the Company reuse-POI and an existing 115kV transmission path saddling the two projects whose right of way could potentially be expanded to accommodate future transmission projects. Additionally, there are fewer populations centers between the projects and the King reuse-POI. All projects face similar 'last mile' ROW challenges when approaching King as they are proposed east of the St. Croix River and will have to cross the body of water to connect at King as seen in Figure 4.

The projects within 60 miles require at least one additional water crossing increasing their relative risk but given their relative proximity to each other, new collector systems and transmission paths could be reasonably planned to align these projects to the resources planned within 25 miles of King while avoiding populated areas near the Lake Menomin area. With a combined total of 700MW of solar capacity and 904MWh of storage capacity these four projects exceed King's existing transmission interconnection rights of approximately 600MW and can fulfill the need to reutilize this capacity.

Two additional projects are located within 120 miles of King. The two projects within 120 miles of King represent the highest interconnection risk given their range from the Company reuse-POI, surrounding terrain, which appear to be rolling hills, approximate 60-mile distance between the two respective projects, in addition to multiple townships between the projects and King. Combined these two projects propose 490MW of solar generation and 1,060MWh of storage capacity.

Figure 4: King Gen-Tie Region Company Asset Map



2.1.6 Other-Gen Tie Region RFI Responses

Four projects (three solar and one wind) responding to the RFI either did not fall inside an area specified by the Company in the RFI Main Body document, were situated at least 75 miles from the nearest Company identified reuse-POI or had no discernable natural geographic clustering which would enable the Company to develop new high voltage assets to collect and deliver this incremental renewable capacity to existing POIs at Sherco or King. Additionally, two of the four solar projects proposed in an Other RFI region were proposed by companies with no demonstrated solar PV development experience putting them at relatively higher execution risk. Given the location of these two particular solar projects at the extreme north of the RFI regions indicated in Company asset maps, developing Company owned high voltage assets to deliver renewable capacity from these projects to Sherco or King would be relatively high risk from an interconnection perspective with a potential for stranded transmission assets should these two

projects fail to reach commercial operations. The remaining solar and wind project in the Other RFI region, proposed by developers with demonstrated experience, had extreme geographic distances between them (200+ miles) resulting in likely low-cost efficacy for reutilizing interconnection rights at the nearest company reuse-POI, Sherco, and are best served by the standard MISO interconnection process

2.1.7 Land Acquisition and Site Development Risks

The ability to acquire and develop land in accordance with applicable development standards (environmental, cultural and is essential to the success of a renewable generation project. Guidehouse and the Company established the following key risks and evaluation criteria to assess the applicable land and siting risks facing RFI Projects:

Table 15: Land Acquisition and Site Development Risks

Risk	Analysis Parameter
1. Sufficient land identified to meet project capacity	• Solar power density: approximately 5 acres per MWdc[44] • Wind power density: 0.02 MW/acre[45] • Storage power density: 180MWh/acre[46]
2. Ability to acquire additional land to expand site	• Identification of parcel targeted or availability of land adjacent to project
3. Probability for land scarcity due to project demand	• Number of developers proposing projects in close proximity to each other
4. Area environmental, cultural, and biological site sensitivities	• Projects proposed near known wildlife management areas, sensitive species habitats or environmental hazards
5. Potential for wind turbine waking	• Distance between separate proposed wind projects

When viewed as a portfolio, RFI responses demonstrated relatively low levels of land acquisition and development risk given their predominately rural surroundings and relatively low-density population centers for projects proposed near to cities or towns. According to information provided by RFI respondents no tribal or government lands are required for the development of projects to come online in the 2026-2030 timeframe. One RFI respondent noted that “increases in agricultural commodity prices that have made it more difficult to obtain land agreements” have become a major challenge for renewable energy projects in the Lyon County. This issue very likely applicable to other RFI project areas, and potentially all energy projects seeking to use land currently under cultivation, given their respective surroundings and currently land use. This increase in agricultural commodity prices put both initial development and phased

[44] LBNL, February 1 2022. Land Requirements for Utility-Scale PV: An Empirical Update on Power and Energy Density. https://eta-publications.lbl.gov/sites/default/files/land_requirements_for_utility-scale_pv.pdf

[45] von Krauland, Anna-Katharina, et al. 2021. Onshore wind energy atlas for the United States accounting for land use restrictions and wind speed thresholds. https://www.sciencedirect.com/science/article/pii/S2666955221000460

[46] Guidehouse 2022 estimate based on 2021 installations of utility scale storage capacity.

project expansions at risk, but this risk will likely normalize as the COVID-19 Pandemic recovery progresses into the 2026-2030 timeframe, renewable incentives come into effect, such as the Inflation Reduction Act, and market pressures increase the value of renewable projects due to demand which will increase the ability of developers to compensate landowners effectively. With a few minor exceptions, nearly all RFI responses have not completed any meaningful environmental or sensitive species studies which could create schedule impacts particularly for areas in Lyon County near Wildlife Management Areas (WMA).

Lyon County/Sherco Gen-Tie Region

The Lyon County/Sherco RFI area, which stretches several counties, received the largest quantity of proposed renewable projects with 2,300MW of solar, 7,600MWh of energy storage and 4,214MW of wind capacity. The southern portion of the Lyon County RFI area has the highest potential for land development risks due to a number of issues:

- High concentration of proposed projects near the town of Balaton, including wind and solar which may trigger design and permitting issues due to their proximity to population centers

- Presence of nine WMAs including Gadwall State WMA, Lake Yankton WMA, Sherman Waterfowl Production Area, Garvin State WMA, and others within 4 miles of proposed project GPS coordinates in Lyon County area

- Higher probability for land scarcity due to three projects proposing 1,000MW or greater capacities through phased development; if all three projects in southern Lyon County attempted commercial development at least 100,000 acres could be required when the energy density assumptions in Table 15 are applied to the proposed project capacities

Projects at the northern end of Lyon County do not face the same environmental or land scarcity issues but are proposed to be sited within 15 miles of Marshall the most populous City in the County. The towns of Minneota and Ghent are also within less than 10 miles, although their respective populations are relatively lower than that of Marshall.

A number of wind projects proposed in the Lyon County area demonstrated meaningful land acquisition and development progress with significant acreage secured in addition to formal environmental studies either underway or nearly complete. However, one project proposing over 1,000MW of hybrid renewable capacity (some combination of wind, solar and storage) in the area plans on securing the first tranche of land to support 400MW of wind before transferring the project to the Company. Given the potential for land scarcity in this area and land acquisition success indicated by other RFI respondents some projects carry higher land acquisition risks than others. Additionally, all proposed wind projects in the Lyon County area have GPS coordinates within approximately 20 miles of each other which creates the potential for decreased efficiency of wind turbines due to proximity waking effects from neighboring projects[47]. Given the amount of land required to develop these projects in their proposed locations it is not very likely all projects reach commercial operations which would limit the potential waking impact of neighboring projects, but as proposed the wind turbine waking impact is a factor that may impact the LCOE of these projects.

[47] NREL, January 21 2022. Reducing Wind Turbine Wakes Could Save Wind Farms Millions. https://www.nrel.gov/news/program/2022/reducing-wind-turbine-wakes.html

King Gen-Tie Region

The six RFI portfolio projects proposed within the King Gen-Tie region were clustered within three distinct distances from the existing King power plant: 20 miles, 60 miles and 100+ miles. With 300MW proposed within 20 miles of King, the probably for land scarcity is present but not severe. RFI respondents in this cluster have not secured land easements or initiated contract negotiations but have started early-stage landowner outreach. Based on a desktop scan of the geography the ability for developers to acquire and clear land to expand the proposed projects in later years can likely be achieved at relatively low risk. One solar project in the 20 mile range from King was within 2 miles of two known Waterfowl Production Areas (WPA), Kerber and Risberg, with a 3rd WPA located approximately 4 miles from the project site. Projects located in the 60 mile and 100+ mile distances from King had a minimum 10 mile distance from identified WPAs or WMAs.

The two projects within 60 miles have a higher likelihood of experienced land scarcity and expansion difficulty as both responses are located within one mile of each other. Additionally, the amount of suitable land for solar and storage resources is relatively limited as the project area is bordered by the Chippewa River in the south and relatively higher density vegetation compared to the other 3 RFI regions. Given the proposed solar capacity in close geographic proximity to each other, the risk to acquire or expand projects in this cluster is moderate.

Other RFI Region

As described in Section 2.1.6, four RFI responses (three solar and one wind) responding to the RFI were deemed to be located in an Other RFI Region. The two northern most solar PV projects proposed demonstrated successful land acquisition efforts reporting that approximately 65%-75% of the acreage required for both projects had been secured. The likelihood of securing the remaining land is high given low levels of residential development and commercial activity in near or mid-range proximity to these proposed projects. However, two known WPAs (Aasen and Winger) were located within 3 miles one project and a WMA located within 5 miles of another. Additional research is required to fully understand the permitting and schedule impacts, and respective mitigations, of these wildlife consideration areas, but is reasonable to expect an additional degree of effort required to develop these projects as proposed.

The remaining solar PV project in the Other RFI region indicated nearly all the land required for the project had been acquired which significantly lowers the site development risk for this particular project which is located within 5 miles of a small town and is surrounded by land under cultivation. The nearest WMA area is approximately 6 miles away and preliminary site maps indicate this area is avoided by the project.

Competition for land and availability of land for these solar PV projects do not represent a risk for projects in the Other RFI Region category as they have significant distance between respective projects and ample land has been proactively acquired by the RFI respondents.

A single wind generation project was prosed in the Other RFI Region by a developer with significant applicable development experience and a history of transferring successful projects to counterparties. The respondent indicated 100% of land required for the project had been secured and no environmental or wildlife issues were identified through a desktop review of the surrounding areas. This project is proposed approximately 3 miles away from the City of Wishek North Dakota which may require local discretionary permitting process to apply in addition to

North Dakota Public Service Commission (NDPSC) Wind Facility Siting in North Dakota standards.

2.1.8 RFI portfolio Schedule Risks

A number of execution risk factors face nearly all projects proposed in the RFI portfolio. The most experienced developers will be able to anticipate these risks and plan accordingly during the planning and execution phases of their projects. Depending on the relative development maturity of the project at the time of acquisition, either the Company or the developer will be responsible for mitigating these potential risks in order to reduce or eliminate schedule impacts.

RFI portfolio Schedule Compatibility with Company IRP

The compatibility of RFI responses with the Company's approved IRP schedule is an important part of assessing the overall credibility of the RFI portfolio of projects. Table 16 captures the Company's annual capacity targets by year and reuse-POI as approved in the IRP.

Table 16: Company IRP Capacity Addition Plan

Cumulative Total MW Delivered to POI	Resource Type	2026	2027	2028	2029	2030
Sherco Interconnection	Solar	850	1,450	1,450	1,450	1,450
	Wind	-	-	200	400	1,350
King Interconnection	Solar	-	-	150	550	650
	Storage	-	-	-	-	-

In order to assess the RFI portfolio's relative schedule compatibility with the IRP capacity targets, Guidehouse compared proposed CODs of RFI responses against the values shown in Table 16. For the Sherco Interconnection, the Company plans to add 600MW of additional solar by 2027 and 1,350MW of incremental wind capacity by 2030 with additions starting in 2028. In order to achieve the final 2030 capacity goals 63% of the proposed RFI solar capacity and 32% of RFI wind capacity would need to reach commercial operations. There is some notable misalignment between the desired wind capacity online dates in the IRP and the RFI portfolio which has 60% of the proposed wind capacity coming online in the 2026-2027 range and the balance in the later years of 2028-2029. The proposed online dates for RFI solar projects are reasonably aligned with Company IRP goals but require a much high rate of project success in order to achieve the overall capacity targets. This high rate of success is the most prominent RFI portfolio risk in terms of alignment with the stated capacity addition schedule of the Company's IRP.

In the case of the King Interconnection, the company plans to add 650MW of new solar capacity by 2030. The RFI portfolio is aligned to achieve Company solar IRP goals early in the analyzed time frame with 1,540MW proposed by RFI respondents in the 2026-2027 period. Additionally, relatively low project success rates, 29% for solar and 31% for storage, amongst RFI projects would be necessary to achieve the 2030 goal for the King Gen-Tie Area. Relying on the RFI

portfolio of projects to achieve the Company's solar capacity addition goals as determined in the IRP appear to be relatively low risk in terms of schedule compatibility.

Table 17: RFI Response Indicative Schedules

Cumulative Total MW Delivered to POI	Resource Type	2026	2027	2028	2029	2030	Total
Sherco-Lyon County POI	Solar (MW)	800	700	-	300	500	2,300
	Storage (MW)	600	600	-	300	500	2,000
	Wind (MW)	814	1700	1100	600	-	4,214
King Gen-Tie Area	Solar (MW)	490	1050	-	-	-	1,540
	Storage (MW)	176	465	-	-	-	641
Other POI	Solar (MW)	150	300	-	-	-	450
	Wind (MW)	252	-	-	-	-	252

Developer Track Record

Overall, RFI respondents were predominately nationally active developers of renewable energy projects and were able to demonstrate recent (within the last 5 years) project experience relevant to the renewable generation technology proposed. Additionally, approximately half of the developers submitting projects into the RFI provided project references that had achieved commercial operations in either the upper Midwest territory or MISO Zone 1 which increases the overall credibility of the responses provided in the RFI. The majority of RFI respondents proposed renewable technology in alignment with their actual project experience which also supports the overall credibility of the RFI portfolio. However, there was a notable lack of battery storage experience across RFI respondents with a smaller subset of the most experienced respondents providing examples of storage or solar + storage projects either transferred to acquiring parties or in service. This is does not reflect poorly on the overall viability of solar + storage projects given the relative early stage at which utility scale adoption of this technology.

It is worth nothing that there were two developers with limited or no demonstrated experience who provided responses to the RFI. One of these developers proposed projects in the Other RFI Region representing 600MW out of 4,290MW of solar PV which significantly limits the track record risk these projects contribute to the overall credibility of the RFI portfolio. Another development company with a proposed a solar + storage project in the King region was not able to demonstrate significant experience as a recently established company but provided specific team references and their respective accomplishments developing similar projects. Given that this particular developer's RFI response makes up roughly 20% of total capacity proposed in the region the uncertainty regarding this early-stage organization contributes some execution risk to projects in the King Gen-Tie Area but has marginal impact on the overall credibility of the RFI portfolio.

Labor Risk[48]

The availability of skilled and unskilled labor can have a significant impact on project schedule especially given the potential for high demand due to concurrent projects under development to meet the competing needs of utility IRPs and energy commitments of large-scale commercial companies. Given the relatively rural location of projects within the RFI portfolio, proximity to urban and suburban population groups, which supply labor, materials, and equipment, can have an impact on the ability of a developer to complete a project on schedule. Projects proposed in the King Gen-Tie Region (within 60 miles of King) are within reasonable commuting proximity to Minneapolis and the numerous suburban zones with populations of 70,000 or more people surrounding it. Projects proposed in the Lyon County/Sherco Gen-Tie Region benefit from their approximate 60-mile proximity from Sioux Falls South Dakota, but has a comparably smaller population than the Minneapolis metro area. Projects proposed in the Other Gen-Tie region are able to pull upon labor resources from either Fargo or Bismarck North Dakota as both are within approximately 60 miles of the proposed projects. King and Lyon County/Sherco Gen-Tie Regions face low to moderate levels of labor sufficiency risk due to their proximity to population centers but are aided by a high likelihood of continuous work given the projected quantity of renewable energy projects in the Midwest territory driven in part by the Company's IRP and a highly congested MISO interconnection queue. Projects in the Other Gen-Tie Region face slightly higher labor risk due to a lower number of RFI projects proposed and relatively lower population groups to supply labor within a reasonable commuting distance.

Technology Commercial Track Record

All RFI responses proposed to deploy generation equipment, solar PV modules and wind turbines, with well-established commercial operating history in the United States. Additionally, the majority of RFI responses specified at least one manufacturer for both power generation and power inverter equipment. However, the demand for this equipment is expected to grow significantly during the 2026-2030 period as significant sectors of the broader energy economy have announced transitions plans heavily reliant on renewable sources of electricity such as onshore wind and solar PV. An imbalance between supply and demand increased the installed cost of wind by 7% and fixed axis solar 14% between during the June 2021 to June 2022 period.[49] The COVID 19 pandemic is likely the biggest contributor to these factors with international supply chains disrupted in addition to domestic labor issues and inflationary pressures.

Energy storage equipment availability and price is another realistic commercial risk facing the RFI Project Portfolio. All respondents provided prudent storage equipment assumptions most importantly citing the use of 4-hour duration rated lithium ion-based systems that currently make up the greatest percentage of global deployment of utility scale stationary storage worldwide. NCM and LFP were mentioned as likely battery cell options, both of which are produced at large scale with numerous companies such as Samsung SDI, LG Chem and CATL reporting investment in expanded global manufacturing capacity through 2030.[50] Additionally, the long-term reliability of bi-directional inverters used in solar + storage applications is relatively

[48] During the drafting of this report the Inflation Reduction Act (IRA) of 2022 was passed which could materially alter potential outcomes discussed herein. Guidehouse models do not include impacts of the IRA which include union apprenticeship provisions.

[49] BNEF, 30 June 2022. Cost of New Renewables Temporarily Rises as Inflation Starts to Bite https://about.bnef.com/blog/cost-of-new-renewables-temporarily-rises-as-inflation-starts-to-bite/

[50] Wood Mackenzie, 22 March 2022. Global lithium-ion battery capacity to rise five-fold by 2030. https://www.woodmac.com/press-releases/global-lithium-ion-battery-capacity-to-rise-five-fold-by-2030/

unknown at this stage. The overall impact on the long-term reliability and availability of these assets due to inverter failures will likely be less of an issue than it has been for legacy solar PV assets that were impacted by the consolidation of the solar PV equipment manufacturing which has created minor supply chain issues for owners of solar inverters whose manufacturers are no longer in business or have discontinued supporting legacy product lines.

3. Potential Socioeconomic Risks and Benefits of RFI portfolio

After contracting with Guidehouse to perform the RFI IE scope of work, Xcel and Guidehouse agreed to analyze potential socioeconomic impacts of the RFI portfolio of projects which included workforce development, local economic impacts, landowner impacts and potential incremental tax revenues. Table 18 captures the socioeconomic criteria Xcel and Guidehouse agreed to study.

Table 18: Socioeconomic Factors and Analysis Criteria

Socioeconomic Analysis Factor	Evaluation Criteria
Local/Regional Workforce Development	• Assess relative workforce creation potential by resource type in terms of initial construction and ongoing job creation • Determine potential for phased projects to support medium to long term skilled labor migration vs nomadic construction workforce
Local/Regional Tax Revenues	• Assess potential for tax revenue increases at the RFI portfolio level by resource type
Landowner benefits	• Determine relative alternative value or opportunity cost of repurposing identified sites for RFI Projects
Landowner impacts / proximity to urban centers	• Impacted natural surrounding and views • Community impacts from long term construction projects (traffic congestion, dust, etc.)

3.1 Socioeconomic Analysis

3.1.1 Workforce Development and Local Economic Impacts

The construction of renewable power generation facilities is dependent on skilled and unskilled labor. A broad spectrum of trades are involved throughout the construction process from initial land clearing through final completion and testing of the facility. Early stages of all solar, wind and storage projects require skilled equipment operators and civil constructors who can be pulled from either the local labor pool or may relocate to the RFI Gen-Tie regions for the construction of these projects. These labor trend holds true for other essential trades including electricians, iron workers, carpenters, and other specialized technicians with subject matter expertise in wind, solar and energy storage equipment.

In addition to the labor required for the project, regional construction materials and heavy equipment suppliers will likely experience a short to medium term increase in overall business volume as developers or the Company implement RFI portfolio projects. Beyond materials and equipment, providers of essential services such as housing or hotel, food and entertainment will also potentially benefit from increased sales as the nomadic construction workforce patronizes local businesses and vendors throughout the project lifecycle. This trend could continue throughout the 2026-2030 timeline and beyond as the Company seeks to achieve its IRP goals

in addition to other developers executing projects in renewable energy resource rich areas similar to the geographic areas identified by the RFI portfolio. The potential for these economic impacts are most likely in the Lyon County/Sherco Gen-Tie area as RFI projects have proposed significant quantities of capacity throughout the Company's current IRP implementation cycle. Given the sustained projected capacity build out in this zone, Lyon County stands to benefit over a longer period and may experience permanent growth if projects are successful in this region. However, permanent direct job growth attributable to RFI projects is likely limited to small crews of maintenance staff, likely 2-6 full time employees per 200MW-500MW of nameplate capacity installed. This effect is likely less strong in the King Gen-Tie region as the majority of capacity is proposed to come online by 2027 and additional capacity beyond 600MW is not available at the Company reuse-POI for additional expansion. However, 2 of the 6 RFI projects in the King Area indicated some potential for expansion, so incremental temporary economic activity through during the 2028-2030 period is possible. In addition to the direct economic activity driven by new investment in renewable generation, complementary multi-year construction of capital intense high voltage transmission interconnection facilities are likely to occur in parallel driving additional indirect economic benefits for the respective Gen-Tie Regions.

3.1.2 Landowner Impacts

The development of new renewable generation facilities can impact communities in which they are sited. The impacts of renewable development can be positive or negative with subjective public perception determining how these impacts are ultimately judged by those in proximity to project sites. Negative issues associated with the development of renewable energy projects are typically held by landowners who view wind or solar projects as either visually unappealing, disruptive to status quo economic activity, or a perceived eminent domain threat for either the generating facilities or complementary transmission facilities to deliver the energy produced. The risk of disrupting agricultural economic activity is highest for solar projects proposed in southwest Minnesota as considerable portion of this region is defined by the USDA as either prime Farmland, farmland of state or local importance and prime farmland if drained.[51] Solar projects proposing to be developed on Prime Farmland are exposed to schedule risk due to incremental Environmental Assessment criteria and must justify the use of this land for the siting of solar facilities in alignment with the criteria for awarding exemption or variances to the MPUC rule that prohibits the development of energy generating installations on prime farmland.[52] The Company RFI did not specifically require respondents to describe potential project sites using USDA classifications such as Prime Farmland and the potential impact to specific special interest areas is not assessed in this report.

There is a potential economic opportunity cost for landowners either selling or leasing property to developers of renewable energy projects. One RFI respondent noted that recent increases in agriculture commodity costs had it made it more difficult to obtain land agreements in the Lyon County area. This trend is consistent with recent increases in the prices paid and received for

[51] USDA, November 16 2015. Farmland Classification for Minnesota. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1095806.pdf

[52] MPUC, May 19 2020. Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives. https://mn.gov/eera/web/doc/13929/#:~:text=In%20general%2C%20prime%20farmlands%20have,permeable%20to%20water%20and%20air.

agriculture products as reported by the USDA-NASS. [53] If agriculture commodity prices remain high, owners of productive farmland may be economically better off continuing to cultivate their land instead of leasing or selling to RFI respondents. This trend would impact the implementation risk of the RFI portfolio from a land acquisition perspective.

Visual impacts are most prevalent for solar and wind projects given the potential for glare effects and the typical 80 meter height of wind turbines. The relative impact of these effects are subjective, however the majority of projects are proposed at least 5 miles away from major population centers which limits the overall quantity of people potentially exposed to these issues. Energy storage assets are generally less invasive given their high energy density, which reduces the need for land, and visual impacts similar to that of a typical utility substation.

Positive landowner impacts can include socially beneficial city and county revenues through taxation, diversification of citizen income potential through land leases or sales, and increased local economic activity as described in Section 3.1.1 benefitting owners of business catering to the needs of temporary and permanent workers assigned to renewable energy projects. The potential economic impact to landowners is difficult to measure as land lease or sale prices are typically not made available to the public. It is important to note that the Company has used voluntary agreements the secure land in the past indicating a mutually beneficial transaction in support of renewable energy projects. Land lease or sale prices received for solar projects may be higher on prime farmland as a greater percentage of land is taken out of production for solar projects whereas wind projects allow shared land use with agriculture.

3.1.3 Incremental Tax Revenues

Renewable energy projects and their complementary high voltage interconnection facilities are capital intense investments which have the potential to contribute incremental tax revenues to localities. The approach to taxation of renewable energy projects varies by state with taxes levied on either production, capacity or some combination of both. Taxes by state were provided to Guidehouse by the Company and are documented in Table 19. The potential revenues shown in Table 20 assume all RFI projects achieve commercial operations. Guidehouse does not provide tax, legal or accounting advice. The following tax assumptions and forecasts were prepared for informational purposes only of the RFI analysis of potential incremental tax revenues for the RFI portfolio in aggregate.

Table 19: RFI portfolio Production and Applicable Tax Rates

Project State	RFI Production by Generation Type (Annual)			Tax Rates		
	Solar (MWh)	Wind (MW)	Wind (MWh)	Solar ($/kWh)	Wind Production ($/kWh)	Wind Capacity ($/kW)
Minnesota	5,137,740	4,214	15,356,490	$ 0.00120	$ 0.00120	N/A
Wisconsin	4,445,262	0	0	N/A	N/A	N/A
North Dakota	0	252	918,328	N/A	$ 0.00050	$ 2.50

[53] USDA-NASS August 31st, 2022. Prices Paid and Received: All Farm Index by Month, US. https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/allprpd.php

Table 20: Potential RFI Portfolio Annual Tax Revenues

Total Potential Tax Revenues (Annual, All States)		
State	**Solar**	**Wind**
Minnesota	$ 6,165,288	$ 18,427,788
Wisconsin	N/A	N/A
North Dakota	$ -	$ 1,089,164

4. Additional RFI Portfolio Analysis

4.1 RFI Project Portfolio Compared to MISO Queue

Reviewing the existing MISO queue provides insights into projects looking to develop in the RFI Gen-Tie Regions. Searching the active MISO queue for solar, wind, storage, and solar + storage resources sited in Minnesota, Wisconsin, North Dakota, and South Dakota allows reasonable comparison to the resources that responded to Xcel's RFI. Table 21 reiterates the MW responses to the RFI for 2026-2030. Table 22 shows the MW in the active MISO queue. Resources in the queue are likely in later stages of planning and development, so do not stretch out to 2030. Looking at the MW values, far more solar relative to other resources is in the queue relative to the resources that responded to the RFI.

Table 21. RFI Cumulative Total MW Delivered to POI

Cumulative Total MW Delivered to POI	Resource Type	2026	2027	2028	2029	2030	Total
Sherco-Lyon County POI	Solar (MW)	800	700	-	300	500	2,300
	Storage (MW)	600	600	-	300	500	2,000
	Wind (MW)	814	1700	1100	600	-	4,214
King Gen-Tie Area	Solar (MW)	490	1050	-	-	-	1,540
	Storage (MW)	176	465	-	-	-	641
Other POI	Solar (MW)	150	300	-	-	-	450
	Wind (MW)	252	-	-	-	-	252

Table 22. Summer MW in MISO Active Queue for MN, WI, ND, SD (September 2022)

Total Summer MW Active in MISO queue	Resource Type	2021	2022	2023	2024	2025	2026	Total
MN, WI, ND, SD	Solar (MW)	414	1,888	2,972	4,598	2,068	640	12,582
	Storage (MW)		300	150	2,090	255	325	3,120
	Wind (MW)	190	250	298	2,417	1,061	190	4,407
	Hybrid (MW)			150	700	148		998

With a baseline level of potential new capacity found in the MISO queue, it is important to examine what percentage of resources in the queue could potentially reach commercial operations within the Company's RFI Gen-Tie Areas. The Lyon County/Sherco Gen-Tie Region, was identified based on the clustered area of RFI responses received that were sited around the Lyon County substation. Table 23 shows that out of all projects in the MISO queue, only 25% made it through in the target area. Table 24 shows that 31.3% of projects make it through for the entirety of Minnesota. It is clear that projects in Lyon County/Sherco Gen-Tie Region have greater difficulty reaching commercial operations through the MISO interconnection study process.

Table 23. Queue Progress for Lyon County/Sherco Gen-Tie Region

Queue Progress for Minnesota Target Area	Resource Type	All 2004-2021	Done 2004-2021	% Completed 2004-2021
Lyon, Murray, Cottonwood, Redwood, Renville, Lincoln, McLeod, Wantonwan, Pipestone, and Yellow Medicine Counties	Solar (MW)	1,182.35	245	20.7%
	Storage (MW)	35	20	57.1%
	Wind (MW)	5,626.78	1,445.94[54]	25.7%
	Hybrid (MW)	0	0	-
	Total (MW)	6,844.13	1,710.94	25.0%

Table 24. Queue Progress for All Minnesota

Queue Progress for All Minnesota	Resource Type	All 2004-2021	Done 2004-2021	% Completed 2004-2021
All Counties	Solar (MW)	4,360.83	775.98	17.8%
	Storage (MW)	155	20	12.9%
	Wind (MW)	1,3305.2	4,782.42	35.9%
	Hybrid (MW)	0	0	-
	Total (MW)	1,7821.03	5,578.4	31.3%

The King Gen-Tie Region was also identified based on the clustered area of RFI responses received. Table 25 shows that out of all projects in the MISO queue, 50.3% made it through in the target area, and 42.1% made it through in the entirety of Wisconsin as shown in Table 26. These values show that it is relatively easier for projects to complete the interconnection

[54] Almost all of the wind capacity shown has been brought online in the last 10 years; since 2010 1,231.94 MW of wind projects were completed. Since 2010, 3,830.42 MW of wind projects were added to the MISO queue. This indicates a wind project completion rate of 32.16% since 2010.

process in the King Gen-Tie Region. However, the lack of projects in the target area that had submitted to the MISO queue makes these values and the conclusions drawn from them unreliable.

Table 25. Queue Progress for Wisconsin Target Area

Queue Progress for Wisconsin Target Area	Resource Type	All 2020-2021	Done 2020-2021	% Completed 2020-2021
St. Croix, Dunn, Trempealeau, and Clark Counties	Solar (MW)	101.28	101.28	100%
	Storage (MW)	0	0	-
	Wind (MW)	99.9	0	0%
	Hybrid (MW)	0	0	-
	Total (MW)	201.18	101.28	50.3%

Table 26. Queue Progress for all Wisconsin

Queue Progress for All Wisconsin	Resource Type	All 2020-2021	Done 2020-2021	% Completed 2020-2021
All Counties	Solar (MW)	3878.05	2098.92	54.1%
	Storage (MW)	197.5	20	10.1%
	Wind (MW)	1186	95	8.0%
	Hybrid (MW)	0	0	-
	Total (MW)	5261.55	2213	42.1%

4.2 Potential Impact of Future Transmission Expansion Projects

4.2.1 MISO Interconnection Queue

MISO Definitive Planning Phase (DPP) interconnection study results for projects seeking network resource interconnection service (NRIS) provide a sense of existing or excess transmission transfer capacity for a particular region of the MISO transmission system. In order to determine proxy costs for RFI projects to obtain access to the MISO market outside of existing Company POIs, Guidehouse reviewed past DPP study results for solar and wind projects seeking interconnection to substations in the vicinity of the RFI Gen-Tie Regions. Prior DPP study results indicate that projects RFI projects in the Lyon County/Sherco Gen-Tie Region likely face considerable interconnection costs and longer processing time (including load flow study, generator interconnection agreement negotiation, design and construction of

interconnection facilities) time to achieve commercial operations. Projects seeking NRIS in the King Gen-Tie Region were exposed to a range of costs, however the higher end of the cost range for King was similar to the lowest recent cost observed for the Lyon County/Sherco Gen-Tie Region. Based on these macro observations, the approach of collecting and delivering capacity from the Lyon County/Sherco Gen-Tie Region projects to the Sherco POI has a higher likelihood of delivering economic efficiencies, while a similar approach for the King area RFI projects would require detailed economic assessments to understand the potential cost-benefit tradeoffs of such a project.

Table 27: Interconnection Costs for Comparable Projects in RFI Gen-Tie Regions

MISO Project Number	Proposed POI	Resource Type/MWs	Interconnection Cost Share (Self-Funding)[55]	MISO Study Cycle
Sherco/Lyon County Gen-Tie Region				
J1106[56]	Lyon County - Cedar Mountain 345 kV Circuit 2 Line	Wind, 414MW	$145,123,579	DPP-2019-Cycle
J1315[57]	Lyon County - Cedar Mountain 345 kV Line Tap	Wind, 600MW	$12,545,869	DPP-2019-Cycle
J901[58]	Lyon County - Cedar Mountain Line	Wind, 200MW	$116,752,575	DPP-2017-AUG
J1149[59]	Hazel Creek 230 kV Substation	Solar, 200MW	$9,242,456	DPP-2018-APR
King Gen-Tie Region				
J1474[60]	Pine Lake - Eagle Point 115kV Line	Solar, 200MW	$3,183,312	DPP-2019-Cycle
J1314[60]	Apple River 161 kV Substation	Solar, 100MW	$3,412,665	DPP-2019-Cycle
J1092[56]	Three Lakes 115 kV Substation	Solar, 100MW	$10,962,721	DPP-2018-APR

[55] All Interconnection cost shares reflect current estimated cost as of the study date referenced for each project. These costs are subject to future revision based due to the iterative nature of the MISO interconnection study process.

[56] Siemens PTI, 02/16/2021. MISO DPP 2018 April West Area Phase 2 Study. https://cdn.misoenergy.org/GI-DPP-2018-APR-West-Phase2_System_Impact_Report_Public523356.pdf

[57] https://cdn.misoenergy.org/GI-DPP-2019-West-Phase1_System_Impact_Report_PUBLIC528746.pdf

[58] Siemens PTI 01/11/2021. MISO DPP 2017 August West Area Study Phase 2 Final Report. https://cdn.misoenergy.org/GI-DPP-2017-AUG-West-Phase2_System_Impact_Report_PUBLIC511211.pdf

[59] Siemens PTI 03/18/2020. MISO DPP 2018 April West Area Phase 1 Study. https://cdn.misoenergy.org/GI-DPP-2018-APR-West_Phase1_System_Impact_Report_Public_Rev437652.pdf

[60] Siemens PTI, 03/02/2021. MISO DPP 2019 West Area Phase 1 Study. https://cdn.misoenergy.org/GI-DPP-2019-West-Phase1_System_Impact_Report_PUBLIC528746.pdf

J926[58]	Pine Lake - Apple River 161 kV Line	Solar, 101.28MW	$13,315,742	DPP-2017-AUG

4.2.2 MISO Long Range Transmission Planning (LRTP)

MISO's LRTP is the RTO's regional transmission planning effort aimed towards expanding the transmission system in order to address reliability, economic, and public policy needs. In July 2022, MISO approved the first of four tranches of planned transmission facilities in MISO. MISO states that the LRTP portfolio are needed "to integrate new generation resources outlined in MISO member and states…"[61] The approved 18 projects in the portfolio are expected to enable 53[62] GW of new generation capacity to interconnect to the grid. MISO staff assumes that all the projects will be built by the year 2030. Assuming that the projects are built by the anticipated timeline, the Tranche 1 portfolio may provide benefits to the set of projects for the RFI portfolio projects seeking interconnection during the same timeframe. LRTP projects within Western and Eastern Dakotas[63], northern Minnesota[64] and Minnesota - Wisconsin[65] lie within the general areas of the RFI portfolio.

[61] MISO, MISO Board Approves $10.3B in Transmission Projects, https://www.misoenergy.org/about/media-center/miso-board-approves-$10.3-in-transmission-projects/,

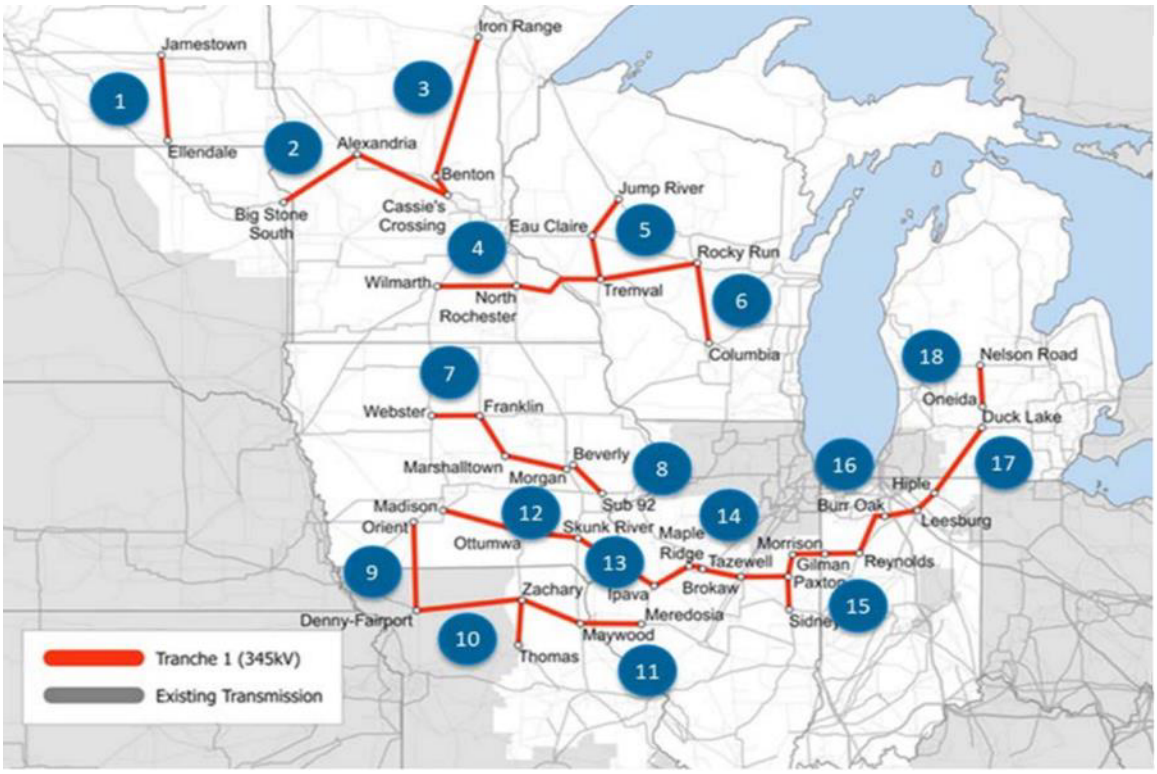
[62] Clean Grid Alliance, https://cleangridalliance.org/_uploads/_media_uploads/_source/RE_and_Jobs_impacts_-_MISO_Tranche_1-converted.pdf, https://cleangridalliance.org/_uploads/_media_uploads/_source/RE_and_Jobs_impacts_-_MISO_Tranche_1-converted.pdf

[63] Includes LRTP Project #2: Big Stone -- Alexandria -- Cassie's Crossing 345 kV

[64] Includes LRTP Project #3: Iron Rnage - Benton - Cassie's Crossing

[65] Includes LRTP Project #4: Wilmarth - North Rochester – Tremval, #5: Tremval - Eau Claire - Jump River 345 kV, #6: Tremval - Rocky Run - Columbia

Figure 5: MISO Long Range Transmission Planning Map[66]



The LRTP projects are expected to address public policy and economic needs and improve reliability. From the LRTP study process MISO anticipates that these projects will improve the system by addressing thermal and voltage issues, relieve N-1 contingencies/outages, and relieve constraints from high renewable flow. With the in-service dates for these projects being between 2028 - 2030, the upgrade and expansion of the transmission facilities may help in reliving congestion and allow for a higher penetration of renewables on the grid.

It is important to contrast the goals of the LRTP Tranche 1 portfolio which seeks to support the integration of 53GW of new generation capacity with emerging data points regarding new interconnection requests. As of the September 15th 2022 MISO DPP-2022-Cycle deadline 170.80GW of incremental generation has requested to be studied for interconnection to the MISO system[67]. Assuming a success rate of 30% for DPP-2022-Cyle projects, approximately 51GW of new capacity for the 2022 cycle year alone could potentially consume nearly all of the 53GW of renewable integration capability indicated by MISO for the LRTP Tranche 1 projects[68]. This high level analysis seems to indicate that the Tranche 1 LRTP process alone is not sufficient to integrate the planned level of renewables seeking interconnection to the MISO system and that alternative methods to interconnection new projects warrant further study.

[66] MISO, MTEP21 Report Addendum: Long Range Transmission Planning Tranche 1 Executive Summary, https://cdn.misoenergy.org/MTEP21%20Addendum-LRTP%20Tranche%201%20Report%20with%20Executive%20Summary625790.pdf

[67] 2022 Cycle is the first study cycle to incorporate LRTP Tranche 1.

[68] Including 3.4 GW of renewables in SW MN for MTEP Future 1

Glossary of Acronyms

Term	Definition
ATB	Annual Technology Baseline
COD	Commercial Operation Date
COD	Commercial Operation Date
DCSR	Debt Service Coverage Ratio
DOE	Department of Energy
DPP	Definitive Planning Phase
EV	Electric Vehicle
IE	Independent Expert
IRA	Inflation Reduction Act of 2022
IRP	Integrated Resource Plan
ITC	Investment Tax Credit
kW or kWh	Kilowatt or Kilowatt hour
LCOE	Levelized Cost of Electricity
LD	Light Duty
LRTP	Long Range Transmission Plan
MACRS	Modified Accelerated Cost Recovery System
MISO	Midcontinent Independent System Operator
MW or MWh	Megawatt or Megawatt hour
NDPSC	North Dakota Public Service Commission
NRIS	Network Resource Interconnection Service
OEM	Original Equipment Manufacturer
PEV	Plug-In Electric Vehicle
POI	Point of Interconnection
PPA	Power Purchase Agreement

PTC	Production Tax Credit
PUC	Minnesota Public Utilities Commission
R&D	Research and Development
RFI	Request for Information
ROW	Right of Way
UFLPA	Uyghur Force Labor Prevention Act
WMA	Wildlife Management Area
WPA	Waterfowl Production Area
YoY	Year over Year

Appendix D

Commission Order on Exemption Request and Notice Plan Petition

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

Lisa M. Agrimonti
Haley L. Waller Pitts
Fredrikson & Byron, P.A.
200 South Sixth Street, Suite 4000
Minneapolis, MN 55402

SERVICE DATE: June 28, 2022

DOCKET NO. E-002/CN-22-131

In the Matter of the Application of Xcel Energy for a Certificate of Need for Two Gen-Tie Lines from Sherburne County to Lyon County, Minnesota

The above entitled matter has been considered by the Commission and the following disposition made:

1. **Approved the proposed Notice Plan conditioned on Xcel Energy using Andrew Levi, Environmental Review Manager as the EERA contact in the notices.**

2. **Approved the following exemptions from the certificate of need application data requirements conditioned on Xcel Energy providing alternative data:**

   a. **7849.0260, subp. A (3) and C (6)—granted the requested exemption with the provision of the proposed alternative data;**

   b. **7849.0260, subp. B (4) and B (8)—granted the requested exemption;**

   c. **7849.0270—granted the requested exemption with the provision of the proposed alternative data and require Xcel to provide updated demand and energy forecasting data;**

   d. **7849.0280, subp. B through I—granted the requested exemption with the provision of the proposed alternative data and required Xcel to state any updates to the quantity of new generation needed based upon the updated demand and energy forecasting provided under Minnesota Rules 7849.0270;**

   e. **7849.0290, subp. F—granted the proposed exemption and required Xcel to present a summary of the conservation information in the IRP and CIP filings rather than replicate the data in the instant docket;**

f. 7849.0300 and 7849.0340—granted the requested exemption with the provision of the proposed alternative data; and

g. 7849.0330, subp. G—granted the requested exemption with the provision of the proposed alternative data.

This decision is issued by the Commission's consent calendar subcommittee, under a delegation of authority granted under Minn. Stat. § 216A.03, subd. 8 (a). Unless a party, a participant, or a Commissioner files an objection to this decision within ten days of receiving it, it will become the Order of the full Commission under Minn. Stat. § 216A.03, subd. 8 (b).

The Commission agrees with and adopts the recommendations of the Department of Commerce, which are attached and hereby incorporated into the Order. This Order shall become effective immediately.

BY ORDER OF THE COMMISSION

JDeBleeckere for

Will Seuffert
Executive Secretary

To request this document in another format such as large print or audio, call 651.296.0406 (voice). Persons with a hearing or speech impairment may call using their preferred Telecommunications Relay Service or email consumer.puc@state.mn.us for assistance.

COMMERCE DEPARTMENT

May 19, 2022

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101-2147

RE: **Comments of the Minnesota Department of Commerce, Division of Energy Resources**
Docket No. E002/CN-22-131

Dear Mr. Seuffert:

Attached are the comments of the Minnesota Department of Commerce, Division of Energy Resources (Department) in the following matter:

> Application of Xcel Energy for a Certificate of Need for Two Gen-Tie Lines from Sherburne County to Lyon County, Minnesota: Notice Plan Petition.

The Petition was filed on May 2, 2022 by:

Lisa M. Agrimonti
Fredrikson & Byron, P.A.
200 South Sixth Street, Suite 4000
Minneapolis, MN 55402

Haley L. Waller Pitts
Fredrikson & Byron, P.A.
200 South Sixth Street, Suite 4000
Minneapolis, MN 55402

The Department recommends **approval with conditions** and is available to answer any questions the Minnesota Public Utilities Commission may have.

Sincerely,

/s/ STEVE RAKOW
Analyst Coordinator

SR/ja
Attachment

Before the Minnesota Public Utilities Commission

Comments of the Minnesota Department of Commerce
Division of Energy Resources

Docket No. E002/CN-22-131

I. INTRODUCTION

On May 2, 2022, Northern States Power Company, doing business as Xcel Energy (Xcel or the Company) filed the Company's *Notice Plan Petition* (Notice Petition). The Notice Petition requests that the Minnesota Public Utilities Commission (Commission) approve Xcel's proposed notice plan to communicate the Company's intent to construct two 345 kV generation-tie lines from Sherburne County to Lyon County, Minnesota (Project). Depending on final route, the generation-tie lines would be approximately 120 to 140 miles long. The Notice Petition includes a draft notice for landowners, residents, and governmental jurisdictions, along with a draft newspaper notice.

Also on May 2, 2022, Xcel filed the Company's *Request for Exemption from Certain Certificate of Need Application Content Requirements* (Exemption Petition). The Exemption Petition provided Xcel's proposed exemptions to certain certificate of need (CN) filing requirements. The Minnesota Department of Commerce, Division of Energy Resources (Department) will file separate comments on the Exemption Petition.

Below are the comments of the Department regarding the Notice Petition.

II. DEPARTMENT ANALYSIS

A. GOVERNING STATUTES AND RULES

Minnesota Statutes § 216B.2421, Subd. 2 defines a large energy facility (LEF) as:

> (1) any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system;
>
> (2) any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length;

In turn, Minnesota Statutes § 216B.243, Subd. 2 requires that "No large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the Commission." Since the generation project(s) the proposed Project would interconnect remain unknown the Department concludes that a CN is required for the proposed Project under Minnesota Statutes § 216B.2421, Subd. 2 (2).

The Company filed the Notice Petition pursuant to Minnesota Rules, part 7829.2550, Subp. 1 which states, in part:

> Three months before filing a certificate of need application for a high-voltage transmission line as defined by Minnesota Statutes, section 216B.2421, the applicant shall file a proposed plan for providing notice to all persons reasonably likely to be affected by the proposed line.

In the Notice Petition the Xcel requests Commission approval of a plan to communicate to the public the Company's intent to construct the proposed Project.

B. TYPES OF NOTICE

Minnesota Rules 7829.2550, Subp. 3, requires types of notice as follows:

- direct mail notice, based on county tax assessment rolls, to landowners reasonably likely to be affected by the proposed transmission line;
- direct mail notice to all mailing addresses within the area reasonably likely to be affected by the proposed transmission line;
- direct mail notice to tribal governments and to the governments of towns, statutory cities, home rule charter cities, and counties whose jurisdictions are reasonably likely to be affected by the proposed transmission line; and
- newspaper notice to members of the public in areas reasonably likely to be affected by the proposed transmission line.

Regarding landowner and resident notice, the Company proposed to provide notice to landowners in the notice area shown in Figure 1 of the Notice Petition. Note that the potential routes within the notice area are not identified at this time. The Company will compile landowner names and addresses within the notice area using tax records and will obtain a list of mailing addresses in the notice area from a bulk mailing company and remove addresses common to the landowner list. The Department concludes that Xcel's proposal complies with the requirements of the rule.

Regarding tribal governments, the Company proposed to provide notice to tribal governments and tribal government officials in the notice area. Xcel's list is included in Attachment B of the Notice Petition. The Department concludes that Xcel's proposal complies with the requirements of the rule.

Regarding governmental notice, the Company proposed to provide notice to lead administration personnel in the towns, cities, home rule charter cities and counties within the Notice Area. The notice will also be provided to those State Senators and State Representatives whose districts are within the Notice Area. Xcel's list is also included in Attachment B of the Notice Petition. The Department concludes that Xcel's proposal complies with the requirements of the rule.

Regarding newspaper notice, the Company proposed to place notice advertisements in the newspapers identified in Attachment C of the Notice Petition. Xcel's plan is to place newspaper advertisements, including the Star Tribune, shortly *before* the CN application is filed. Regarding newspaper notice Minnesota Rules 7829.2500, Subp. 5 states "The applicant shall publish notice of the filing in newspapers of general circulation throughout the state." Xcel interprets this as requiring an applicant publish newspaper notice of the filing in a newspaper of general circulation throughout the state *after* the CN application is filed. Thus, Xcel requests a variance pursuant to Minnesota Rules 7829.3200.

Minnesota Rules 7829.3200 states that Commission shall grant a variance to its rules when it determines that the following requirements are met:

A. enforcement of the rule would impose an excessive burden upon the applicant or others affected by the rule;
B. granting the variance would not adversely affect the public interest; and
C. granting the variance would not conflict with standards imposed by law.

Xcel states that the three factors are met because:

A. the rule would be an excessive burden because it requires duplicate notice and associated expense without a corresponding benefit;
B. the public will be notified by notices in other newspapers and therefore the public interest would not be adversely affected; and
C. granting the variance would not conflict with any legal standards. Accordingly, a variance is warranted.

Minnesota Rules 7829.2500, Subp. 5 is generally understood to require newspaper notice at the time of the CN application. The Department recommends the Commission approve Xcel's proposed variance so that the notice via newspapers of general circulation can be made prior to the CN filing.

C. CONTENT OF NOTICE

Minnesota Rules 7829.2550, Subp. 4 requires the notices to provide the following information:

- a map showing the end points of the line and existing transmission facilities in the area;
- a description of general right-of-way requirements for a line of the size and voltage proposed and a statement that the applicant intends to acquire property rights for the right-of-way that the proposed line will require;
- a notice that the line cannot be constructed unless the Commission certifies that it is needed;
- the Commission's mailing address, telephone number, and website;
- if the applicant is a utility subject to chapter 7848, the address of the website on which the utility applicant will post or has posted its biennial transmission projects report required under that chapter;

- a statement that the Environmental Quality Board[1] will be preparing an environmental report on each high-voltage transmission line for which certification is requested;
- a brief explanation of how to get on the mailing list for the Environmental Quality Board's proceeding; and
- a statement that requests for certification of high-voltage transmission lines are governed by Minnesota law, including specifically chapters 4410 and 7849, and Minnesota Statutes, section 216B.243.

The Department reviewed the attached notices, letters and maps provided by the Companies and concludes that, as long as the notice includes the map provided in the Notice Petition's Figure 1, the proposal for the resident/landowner notice, governmental notice, and newspaper notice generally contains the required information. That appears to be Xcel's intent since the notice text refers to "the attached "Notice Area" map."

The only error noted by the Department is that Stephen Rakow is listed as the contact for the Department's Energy Environmental Review and Analysis (EERA) unit. The Department recommends the Commission require Xcel to use Andrew Levi, Environmental Review Manager as the EERA contact in the notices.

D. NOTICE TIMING

Minnesota Rules 7829.2550, Subp. 6, requires Xcel to implement the notice plan within 30 days of its approval by the Commission. The Department notes that, unlike most previous notice plan filings, Xcel did not request a variance from this rule so as to allow implementation of the notice plan within a certain time frame prior to the filing of the CN petition. Therefore, the Department understands that Xcel will implement the notice plan within 30 days of its approval by the Commission.

III. DEPARTMENT RECOMMENDATION

The Department recommends that the Commission approve Xcel's Notice Petition conditioned upon Xcel using Andrew Levi, Environmental Review Manager as the EERA contact in the notices.

[1] The Department notes that while the statutes have changed regarding routing authority and location of the staff preparing the environmental report, Minnesota Rules have not been updated to reflect these changes.

COMMERCE DEPARTMENT

May 23, 2022

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101-2147

RE: **Comments of the Minnesota Department of Commerce, Division of Energy Resources**
Docket No. E002/CN-22-131

Dear Mr. Seuffert:

Attached are the comments of the Minnesota Department of Commerce, Division of Energy Resources (Department) in the following matter:

Application of Xcel Energy for a Certificate of Need for Two Gen-Tie Lines from Sherburne County to Lyon County, Minnesota: Request for Exemption from Certain Certificate of Need Application Content Requirements.

The Petition was filed on May 2, 2022 by:

Lisa M. Agrimonti
Fredrikson & Byron, P.A.
200 South Sixth Street, Suite 4000
Minneapolis, MN 55402

Haley L. Waller Pitts
Fredrikson & Byron, P.A.
200 South Sixth Street, Suite 4000
Minneapolis, MN 55402

The Department recommends **approval with conditions** and is available to answer any questions the Minnesota Public Utilities Commission may have.

Sincerely,

/s/ STEVE RAKOW
Analyst Coordinator

SR/ja
Attachment

Before the Minnesota Public Utilities Commission

Comments of the Minnesota Department of Commerce
Division of Energy Resources

Docket No. E002/CN-22-131

I. INTRODUCTION

On May 2, 2022 Northern States Power Company, doing business as Xcel Energy (Xcel or the Company) filed the Company's *Request for Exemption from Certain Certificate of Need Application Content Requirements* (Exemption Petition). The Exemption Petition requests the Minnesota Public Utilities Commission (Commission) approve the Company's proposed exemptions to certain filing requirements for a certificate of need (CN) petition for two 345 kV generation-tie lines from Sherburne County to Lyon County, Minnesota (Project). Depending on final route, the generation-tie lines would be approximately 120 to 140 miles long.

Also on May 2, 2022 Xcel filed the Company's *Notice Plan Petition* (Notice Petition). The Notice Petition provided the Company's proposed notice plan to communicate its intent to construct the proposed Project. The Minnesota Department of Commerce, Division of Energy Resources (Department) will file separate comments on the Notice Petition.

On May 9, 2022 the Commission issued its *Notice of Comment Period on Request for Exemption from Certain Certificate of Need Application Content Requirements.* The topic open for comment is "[s]hould the Commission grant the exemptions to the certificate of need application content requirements requested by Xcel Energy in its May 3, 2022, filing."

Below are the comments of the Department regarding the Exemption Petition.

II. DEPARTMENT ANALYSIS

A. GOVERNING STATUTES AND RULES

Minnesota Statutes § 216B.2421, subd. 2 defines a large energy facility as:

> (1) any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system;
>
> (2) any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length;

In turn, Minnesota Statutes § 216B.243, subd. 2 requires that "No large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the Commission." Since the generation project(s) the proposed Project would interconnect with remain unknown the Department concludes that a CN is required for the proposed Project under Minnesota Statutes § 216B.2421, subd. 2 (2).

The Company filed the Exemption Petition pursuant to Minnesota Rules, part 7849.0200, subpart 6 which states, in part:

> Before submitting an application, a person is exempted from any data requirement of parts 7849.0010 to 7849.0400 if the person (1) requests an exemption from specified rules, in writing to the commission, and (2) shows that the data requirement is unnecessary to determine the need for the proposed facility or may be satisfied by submitting another document. A request for exemption must be filed at least 45 days before submitting an application.

In the Exemption Petition the Company requests the Commission approve exemptions from certain data requirements of parts 7849.0010 to 7849.0400.

B. REQUESTED EXEMPTIONS

The Exemption Petition requests exemptions from the following requirements:

- 7849.0260, subp. A (3) and C (6)—proposed transmission line and alternatives;
- 7849.0260, subp. B (4) and B (8)—transmission lines with different terminals or substations;
- 7849.0270—peak demand and energy forecast;
- 7849.0280, subp. B through I—system capacity;
- 7849.0290, subp. F—conservation programs;
- 7849.0300—consequences of delay;
- 7849.0340—no facility alternative; and
- 7849.0330, subp. G—description of major features between endpoints.

The Department examines each specific exemption request separately. The required criterion is whether the Company has shown that "the data requirement is unnecessary to determine the need for the proposed facility or may be satisfied by submitting another document" as discussed above.

C. ANALYSIS OF EXEMPTION REQUESTS

1. Minnesota Rules 7849.0260, subp. A (3) and C (6)

Minnesota Rules 7849.0260, subp. A (3) and C (6) requires an applicant to provide estimated "losses under projected maximum loading and under projected average loading in the length of the transmission line and at the terminals or substations." Instead, Xcel proposes to provide system losses.

The Department agrees with Xcel that the Company's proposal is consistent with the approach approved by the Commission in other CN dockets and provides more relevant information. Therefore, the Department recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0260, subp. A (3) and C (6) with the provision of the proposed alternative data.

2. Minnesota Rules 7849.0260, subp. B (4) and B (8)

Minnesota Rules 7849.0260, subp. B (4) requires an applicant discuss "transmission lines with different terminals or substations." Minnesota Rules 7849.0260, subp. B (8) requires a discussion of "any reasonable combination of the alternatives" listed in, among others, section (B)(4). Xcel states that one of the proposed Project's needs is that it interconnect at the site of the existing Sherco Substation as a condition of Xcel's ability to re-use existing interconnection rights.

The Department agrees with Xcel that the proposed need requires interconnection at the existing Sherco Substation. If the Company fails to demonstrate the claimed need (to re-use the existing interconnection), then the proposed Project could not be approved and an alternative end point is not relevant. If the Company does demonstrate the claimed need, then consideration of an alternative end point (to the Sherco Substation) again is not relevant. Therefore, the Department agrees that an exemption from discussing alternatives which do not begin at the existing Sherco Substation is reasonable and recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0260, subp. B (4) and B (8).

3. Minnesota Rules 7849.0270

Minnesota Rules 7849.0270 requires an applicant provide data concerning peak demand and annual electrical consumption within the applicant's service area and system. Instead, Xcel proposes to substitute information which describes the power demand and energy forecasting used to develop the proposed Project, and the type of information used in the recent resource plan (IRP) proceeding (Docket No. E002/RP-19-368). The Petition further states that "the methodology and specific findings from the recent IRP docket will not be re-litigated in this case." In the end, Xcel requests a full exemption from Minnesota Rules 7849.0270 and proposes to instead provide the IRP forecast and methodology, updated as appropriate.

Regarding Xcel's claim that the Commission's specific findings from the recent IRP docket will not be re-litigated in this case, the Department notes that Minnesota Rules 7843.0600, subp. 2 states:

> The findings of fact and conclusions from the commission's decision in a resource plan proceeding may be officially noticed or introduced into evidence in related commission proceedings … In those proceedings, the commission's resource plan decision constitutes prima facie evidence of the facts stated in the decision. This subpart does not prevent an interested person from submitting substantial evidence to rebut the findings and conclusions in another proceeding.

Therefore, the Department concludes that Xcel's claim that the Commission's findings cannot be re-litigated is clearly in error because Minnesota Rules specifically allow an interested person to submit evidence to rebut the findings and conclusions in an IRP order in another proceeding, such as this CN.

Regarding Xcel's proposed exemption and alternative data, given the novelty of the need claimed—to re-use existing interconnection—and Xcel's description of the alternative data—the demand and energy forecasting used in the most recent IRP—the Department recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0270 with the provision of the proposed alternative data.

Finally, given the age of the demand and energy forecasting used in Xcel's IRP, the Department recommends the Commission require Xcel to provide updated demand and energy forecasting similar to the forecasting used in the IRP.

4. Minnesota Rules 7849.0280, subp. B through I

Minnesota Rules 7849.0280, subp. B through I requires an applicant provide information that describes the ability of an existing system to meet forecasted demand; in essence, load and capability (L&C) information. Xcel requests an exemption from Minnesota Rules 7849.0280, subp. B through I and proposes instead to provide a discussion of the capacity data from the IRP that drives the need for new transmission. The Department notes that the Petition claims:

> Items (B) through (I) examine more generally generation adequacy rather than transmission planning considerations. Here, the Commission determined the energy and capacity Xcel Energy needs to re-utilize the Sherco interconnection rights and meet customer demands. The issue in this docket is what is the best alternative to deliver the new renewable generation.

Again, the Company's claim that the Commission's IRP order, in effect, already the need and the only remaining issue regards alternatives is in error. First, Minnesota Rules 7849.0120 A requires Xcel to make a demonstration regarding the need for the proposed Project. Second, while the Company is free to rely on the Commission's IRP order to the extent it desires, as stated above, Minnesota Rules allow parties to provide evidence rebutting the Commission's IRP order. To balance the Company's desire to make a case different than that presumed by the information requirements of Minnesota Rules with the need for other parties to have a starting point for questioning the Company's case, the Department recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0280, subp. B through I with the provision of Xcel's proposed alternative data. In addition, given the age of the demand and energy forecasting used in Xcel's IRP, the Department recommends the Commission require Xcel to state any updates to the quantity of new generation needed based upon the updated demand and energy forecasting provided under Minnesota Rules 7849.0270.

5. Minnesota Rules 7849.0290, subp. F

Minnesota Rules 7849.0290, subp. F requires an applicant provide "a quantification of the manner by which these programs affect or help determine the forecast provided in response to part 7849.0270." Xcel requests a full exemption because the proposed Project:

> is needed to interconnect generation resources that will replace the capacity and energy of Sherco Units 1 and 3 and are required to both utilize existing interconnection rights and maximize the Sherco interconnection. Conservation cannot meet this need.

In response the Department observes that the greater the amount of conservation the less the need for new generation overall, including the need to replace existing generation. In addition, Xcel's conservation efficiency information is examined in detail in the resource planning and Conservation Improvement Program (CIP) processes.[1] The necessary information will be available in those proceedings. Therefore, the Department recommends the Commission grant the proposed exemption and require Xcel to present a summary of the conservation information in the IRP and CIP filings rather than replicate the data in the instant docket.

6. Minnesota Rules 7849.0300 and 7849.0340

Minnesota Rules 7849.0300 requires detailed information regarding the consequences of delay on three specific statistically based levels of demand and energy consumption. Minnesota Rules 7849.0340 requires a discussion of what the impact would be on existing generation and transmission facilities at the three levels of demand specified in Minnesota Rules 7849.0300 for the no-build

[1] Docket Nos. E002/RP-19-368 and G002,E002/CIP-20-473.

alternative. Xcel requests an exemption from the portions of these rules that require the examination of delay to incorporate the three specific levels of demand required by Minnesota Rules 7849.0300. Instead, Xcel will provide a general evaluation of the consequences of delay and a no-build alternative. The Petition notes that similar requests for exemptions were approved by the Commission in other transmission line CN dockets.

Given the recommendation above regarding forecasting data to be provided under Minnesota Rules 7849.0270, the Department agrees that an exemption regarding the three specific levels of demand is reasonable. The Department recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0300 and 7849.0340 with the provision of the proposed alternative data.

7. Minnesota Rules 7849.0330, subp. G

Minnesota Rules 7849.0330, subp. G requires an applicant provide:

> a narrative description of the major features of the region between the endpoints of the transmission facility. The region shall encompass the likely area for routes between the endpoints. The description should emphasize the area within three miles of the endpoints.

At this point the Petition states that Xcel knows that the western end of the proposed Project will be located in Lyon County; specifically, Xcel states "The precise location of the western endpoint will be informed by forthcoming requests for information and proposals and then specifically identified through the Commission's routing process." Instead of using three miles of the endpoint, Xcel proposes to provide information concerning "major features of the region" within Lyon County.

As long as Xcel's proposed alternative data addresses the hydrologic, natural vegetation and wildlife, physiographic, and land-use features otherwise required the Department concludes that Xcel's proposal is reasonable. The Department recommends that the Commission grant the requested exemption to Minnesota Rules 7849.0330, subp. G with the provision of the proposed alternative data.

III. DEPARTMENT RECOMMENDATION

The Department recommends that the Commission approve the Xcel's requests for exemption from the required data as follows:

- 7849.0260, subp. A (3) and C (6)—grant the requested exemption with the provision of the proposed alternative data;
- 7849.0260, subp. B (4) and B (8)—grant the requested exemption;
- 7849.0270—grant the requested exemption with the provision of the proposed alternative data and require Xcel to provide updated demand and energy forecasting data;

- 7849.0280, subp. B through I—grant the requested exemption with the provision of the proposed alternative data and require Xcel to state any updates to the quantity of new generation needed based upon the updated demand and energy forecasting provided under Minnesota Rules 7849.0270;
- 7849.0290, subp. F—grant the proposed exemption and require Xcel to present a summary of the conservation information in the IRP and CIP filings rather than replicate the data in the instant docket;
- 7849.0300 and 7849.0340—grant the requested exemption with the provision of the proposed alternative data; and
- 7849.0330, subp. G—grant the requested exemption with the provision of the proposed alternative data.

COMMERCE DEPARTMENT

June 2, 2022

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101-2147

RE: **Supplemental Comments of the Minnesota Department of Commerce, Division of Energy Resources**
Docket No. E002/CN-22-131

Dear Mr. Seuffert:

On May 2, 2022 Northern States Power Company, doing business as Xcel Energy (Xcel or the Company) filed the Company's *Request for Exemption from Certain Certificate of Need Application Content Requirements* (Petition). The May 23, 2022 comments of the Minnesota Department of Commerce (Department) recommended approval with conditions. The May 31, 2022 reply comments of Xcel agreed with the Department's conditions and clarified how the Company intends to present the requested data. The Department agrees that the data Xcel described in the Company's reply comments will be sufficient for a complete petition and to begin the proceeding.

In summary, the Department recommends that the Commission approve the Xcel's requests for exemption from the required data as follows:

- 7849.0260, subp. A (3) and C (6)—grant the requested exemption with the provision of the proposed alternative data;
- 7849.0260, subp. B (4) and B (8)—grant the requested exemption;
- 7849.0270—grant the requested exemption with the provision of the proposed alternative data and require Xcel to provide updated demand and energy forecasting data;
- 7849.0280, subp. B through I—grant the requested exemption with the provision of the proposed alternative data and require Xcel to state any updates to the quantity of new generation needed based upon the updated demand and energy forecasting provided under Minnesota Rules 7849.0270;
- 7849.0290, subp. F—grant the proposed exemption and require Xcel to present a summary of the conservation information in the IRP and CIP filings rather than replicate the data in the instant docket;
- 7849.0300 and 7849.0340—grant the requested exemption with the provision of the proposed alternative data; and

- 7849.0330, subp. G—grant the requested exemption with the provision of the proposed alternative data.

The Department recommends approval with the above conditions and is available to answer any questions the Minnesota Public Utilities Commission may have.

Sincerely,

/s/ STEVE RAKOW
Analyst Coordinator

SR/ja

Appendix E

Load Forecast - Revised

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

Revised Appendix E: Load Forecast and Conservation Programs

This Appendix discusses the methodology Xcel Energy used to develop the energy and demand side resource forecasting discussed in Chapter 4 of this Application. It also provides information regarding Xcel Energy's conservation programs.

A. Load Forecast

At a high level, the Company relies on econometric models and other statistical techniques to develop the sales forecast. The econometric models relate our historical electric sales to demographic, economic, and weather variable data. Xcel Energy uses projections of economic activity for our various service areas that are provided by IHS Markit Inc. (formerly IHS Global Insight, Inc.). Based on this and other inputs, we develop sales forecasts for each major customer class, in each state of our service area. The individual class forecasts for each state are summed to derive a total system sales forecast. We then convert the sales forecast into energy requirements at the generator level by adding energy losses. The forecasted losses are developed using actual historical loss factors and are held constant over the forecast period. We develop the peak demand forecast using a regression model that relates historical monthly base peak demand to energy requirements and weather. The median energy requirements forecast and normal peak-producing weather are used in the model to create the median base peak demand forecast.

The impacts of the COVID-19 pandemic are accounted for in the modeling process. The econometric models developed for the Spring Forecast include 22 months (March 2020 – December 2021) of historical data that reflect the impact of the pandemic on company sales and peak demands. The sales regression models include a variable to account for the pandemic. The variable is developed from Google Mobility data that measure the duration of time of mobile phones located at residential, workplaces, and retail establishments relative the pre-pandemic levels at the same locations. Forecast of the Google Mobility variables are based on the historical data trends and long-term expectations of COVID-19 impacts on customer behavior. These variables fit well in the residential and small commercial and industrial sales models.

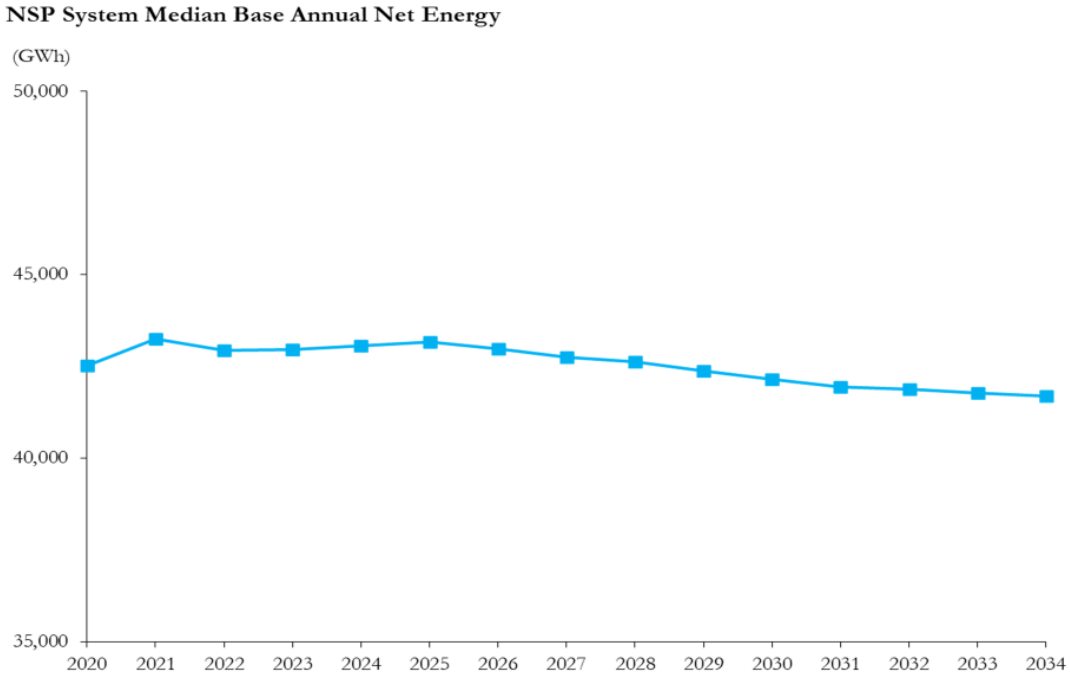
1. Base Forecast Methodology

The Spring 2022 updated base energy forecast decreases at an average annual growth rate of 0.2 percent over the 2022–2034 planning period, net of energy efficiency (EE) savings, distributed solar energy production, and electric vehicle charging consumption.

Taking these adjustments into account, the base forecasted electric energy requirements are expected to decrease at an annual average of 103 gigawatt-hours

(GWh), declining from approximately 42,900 GWh in 2022 to 41,700 GWh in 2034. See Figure II-2 below.

Figure II-2: NSP System Total Median Net Energy



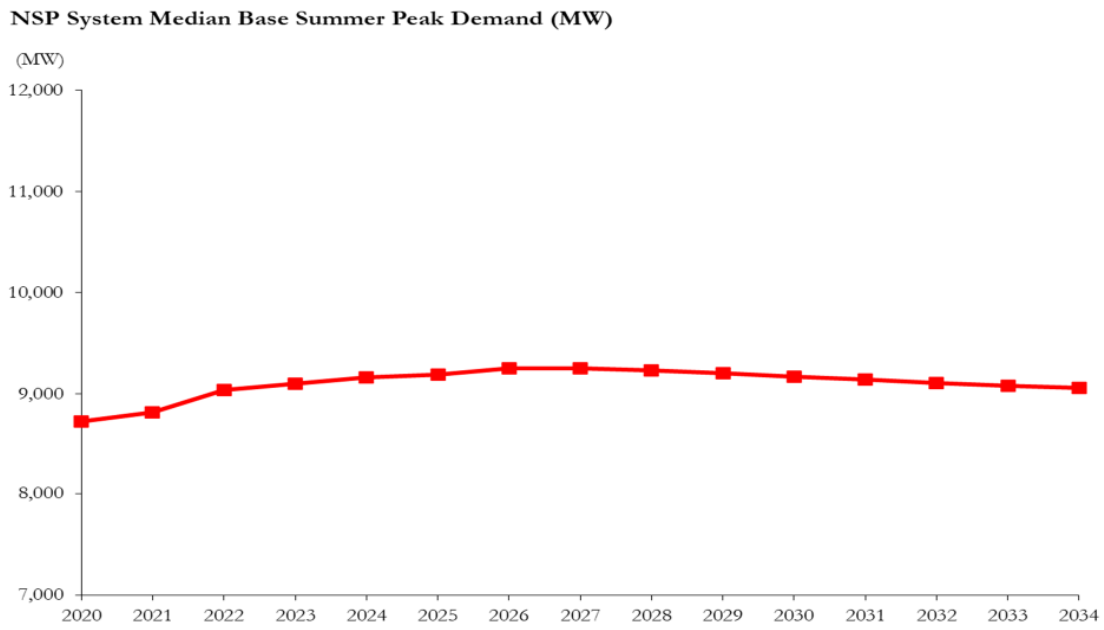
We note that the projected 0.2 percent average annual decline in electric energy requirements is similar to the actual growth seen over the past few years. After adjusting for unusual weather, electric energy requirements *decreased* at an average annual rate of 0.4 percent from 2018 to 2021.

B. System Peak Demand Forecast

1. Base Forecast

During the 2022-2034 planning period, the median base peak demand corporate forecast is essentially flat with an average annual growth rate of 0.02 percent, when including effects of already assumed EE. As demonstrated in Figure II-4 below, annual peak demand increases at an average of 2 MW each year, starting with 9,039 MW in 2022 to 9,059 MW in 2034.

Figure II-4: NSP System Median Base Summer Peak Demand



C. Key Demand and Energy Forecast Variables

The balance of this section discusses the energy and peak load forecasting methods, assumptions, analytics, adjustments, etc. to derive the Corporate System Energy Forecast presented above. In general, our approach to modeling energy and capacity demand forecasts remains consistent, even as some inputs and assumptions have been updated.

1. Demographics

Demographic projections are essential to the development of the long-range forecasts. The consumption of electricity is closely correlated with demographic statistics. The number of residential customers, weather data and economic indicators are key variables in the residential energy sales forecast. Over 99 percent of the variability in historical electric residential customer counts in our service territory can be explained through an econometric model that contains either population or households as key drivers. The forecasts for population and households are provided by IHS Markit Inc. We forecast an average annual growth rate for total residential customers on our system of 0.7 percent, with the addition of 11,740 residential customers on average per year from 2022 through 2034.

2. Economic Indicators

Xcel Energy uses estimates of key economic indicators to develop electric sales forecasts. These variables include gross state product, employment, and real personal income. The variables used are specific to the jurisdiction and are statistically significant in the sales models for the residential and commercial and industrial customer classes. Growth in electric energy consumption in the residential and commercial and industrial sectors closely follows trends in economic activity. IHS Markit Inc. provided the economic forecasts used in our regression models.

For the planning period, the economy is expected to continue to grow, resulting in growth in electric energy consumption.

3. Weather

The peak demand for electric power is heavily influenced by hot and humid weather. As the temperature and humidity rise, the demand for cooling rises steeply. Our approach to forecasting peak demand includes using a weather variable that consists of the mean of an index of heat and humidity referred to as the temperature humidity index (THI). Simply stated, the THI is an accurate measure of how hot it really feels when the effects of humidity are added to the high temperature.

We have tracked the THI at the time of the system peak demand over the past 20 years. Because of the 20 years of smoothing, the weather variable does not drastically affect our median forecasts; however, it becomes a key factor in assessing the potential peak demand if and when hot and humid weather extremes are encountered. Since Xcel Energy must have adequate generating resources available during hotter than normal circumstances, planning for the extreme is important.

D. Forecast Methodology

Xcel Energy serves customers in five jurisdictions in the upper Midwest: Minnesota, North Dakota, South Dakota, Wisconsin, and Michigan. We develop a forecast for each major customer class and jurisdiction using a variety of statistical techniques.

We first develop our system sales forecasts by using a set of econometric models at the jurisdictional level for the Residential and Small Commercial and Industrial sectors for all jurisdictions, the Large Commercial and Industrial sector for Minnesota, and the Minnesota Public Street and Highway Lighting and Public Authority sectors. These models relate our historical electric sales to demographic, economic and weather variables as detailed in the prior section of this document.

For the remaining customer classes, Large Commercial and Industrial, Public Street and Highway Lighting, and Public Authority in all states but Minnesota, and Interdepartmental, we use trend analysis and customer specific data. We compile our system sales by summing the individual forecasts for each sector in each jurisdiction.

Since some energy is lost, mostly in the form of heat created in transmission and distribution conductors, we use loss factors to convert the sales forecasts into energy production requirements at the generator. The forecasted loss factors are developed using actual historical loss factors and are held constant over the forecast period.

We have developed a regression model to relate Xcel Energy's historical uninterrupted monthly peak demand to energy requirements and weather at the time of the peak in the winter and summer seasons. The median energy requirements forecast (50/50 forecast) and normal peak-producing weather are used in the model to create the peak demand forecast.

Once the NSP System peak demand forecast is complete, a forecast is developed for the NSP System demand coincident with the MISO system peak demand. The coincident demand forecast is developed using a regression modeling approach that determines the relationship between the NSP System demand coincident with the MISO peak demand and the NSP System peak demand (not coincident with the MISO peak demand). Previously MISO only required an annual coincident demand forecast for the next planning year. The current resource plan forecast uses the NSP System demand coincident to the MISO annual peak demand during the 2022-23 planning year (June 2022 – May 2023). Beginning with the 2023-2024 planning year, MISO has requested individual seasonal peak forecasts for the Winter, Spring, Summer, and Fall seasons.

E. Corporate Forecast Adjustments

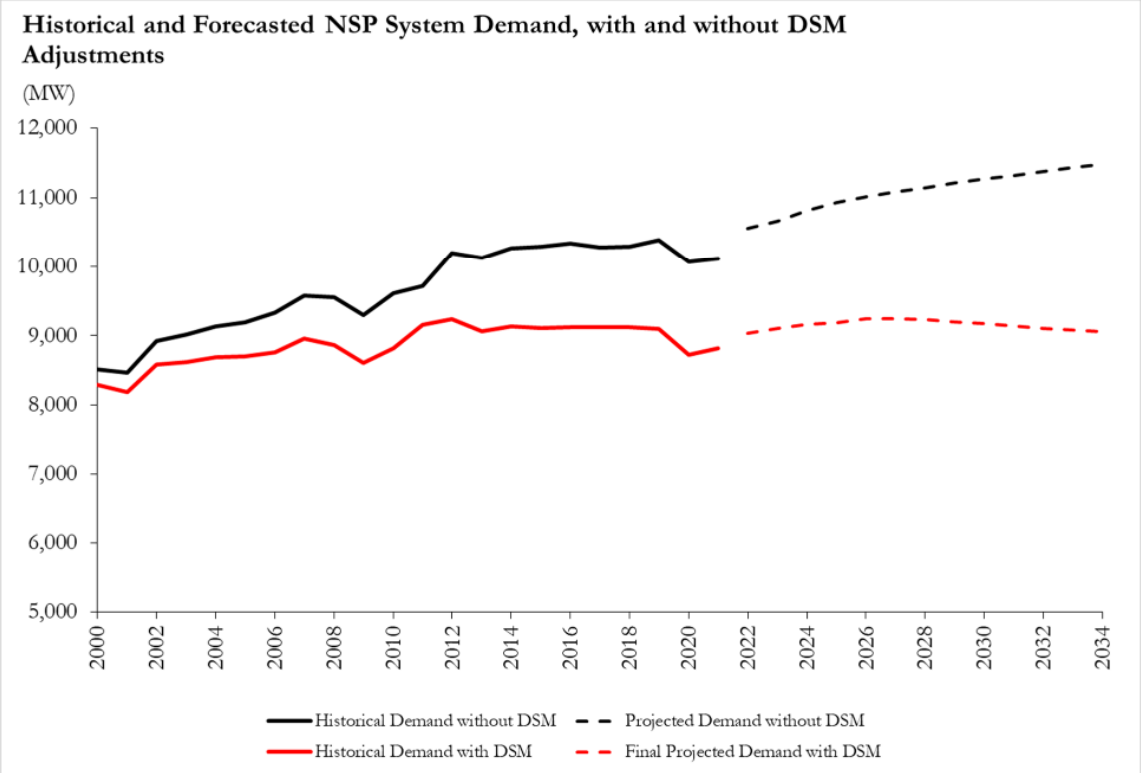
Our demand and energy forecasts are developed using a number of key forecast variables as described in this section. One important adjustment to the forecasts is to take into account our conservation programs (which are discussed in Section H below).

The EE methodology includes three distinct steps to this process:

- Collect and calculate historical and current effects of EE on observed sales;
- Project the forecast using observed data with the impact of EE removed (i.e., increase historical sales to show hypothetical case without EE); and

- Adjust the forecast to show the impact of all planned EE in future years.

Figure II-6: Illustration of EE Adjustment – NSP System Demand



For the State of South Dakota, the impacts from all conservation program installations prior to 2022 are assumed embedded in the historical demand and energy data at a rate equal to the annual program installations from 2017 through 2021. To accurately predict future supply needs, the energy and demand forecasts must be reduced by an estimate of the incremental future conservation savings. For the base forecast, we adjust the demand and energy forecast by assuming all future annual conservation achievement equal to achievement of our 2022 goal as approved in the 2020 South Dakota DSM Status Report and 2022 DSM Plan filing (Docket No. EL21-014).

In response to the establishment of a Solar Energy Standard (SES) by the Minnesota Legislature, an increased emphasis has been placed on distributed solar generation. We developed a forecast of the expected impact on demand and energy based on new programs designed to meet goals established for the SES. We adjusted the Minnesota class-level sales forecasts and the system peak demand forecast to

account for the impacts of customer-sited behind-the-meter solar installations on the NSP System. We discuss the distributed solar forecast methodology below.

After determining the base forecast, we develop net forecasts that include all adjustments, including future EE, distributed solar generation, electric vehicle charging, and the effects of our EE programs over time.

F. Additional Forecast Adjustments

We made additional adjustments to the energy and demand forecasts to account for expected changes in specific large customers' electricity usage. These additional adjustments include:

- Customers adding self-generation combined heat and power capabilities, which reduce energy consumption and peak demand; and

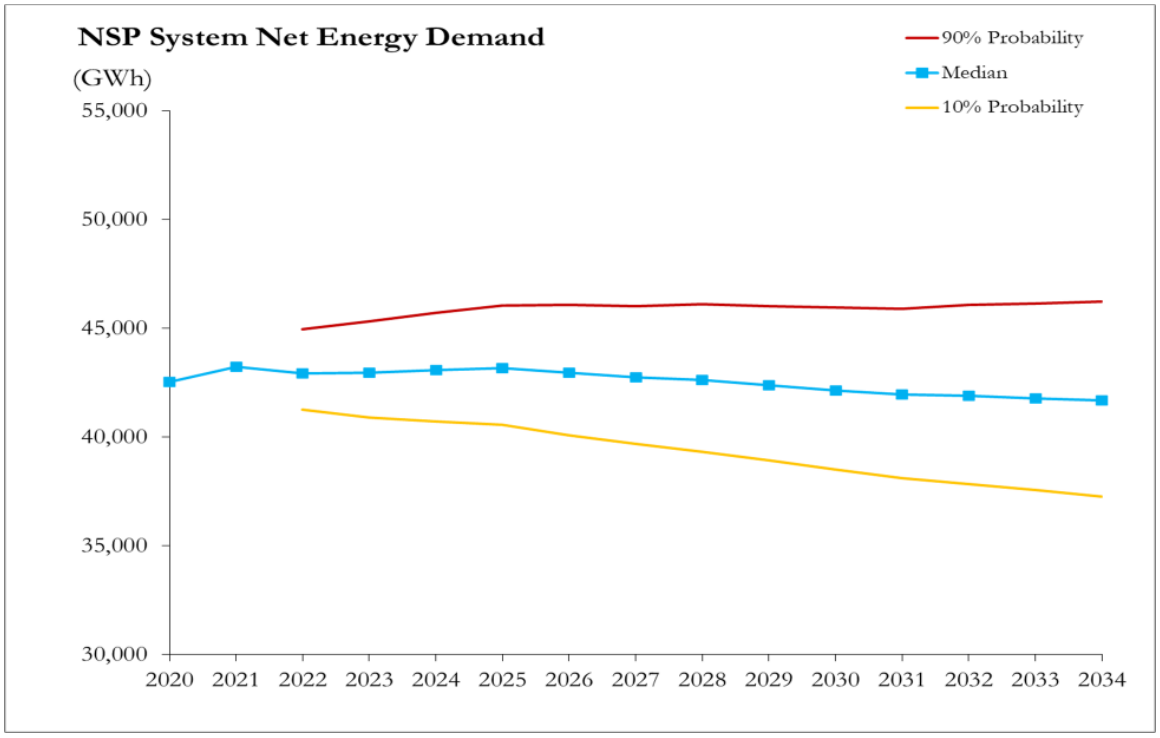
- Increases or reductions in usage due to new customers in our service territory, or planned expansions or reductions of load by existing customers, and increasing use of plug-in electric vehicle charging.

G. Forecast Variability

Given that there is uncertainty in any long-term forecast, we supplement the median forecasts with forecasts developed using statistical techniques to reflect the potential variability in energy requirements and peak demand. These probability distributions were developed using a Monte Carlo stochastic simulation of peak demand (MW) and energy (MWh). For example, the peak demand simulation involved taking 10,000 random draws from the weather probability distributions as well as 10,000 random draws from the 12-month sum of the energy probability distribution. The random draws produce 10,000 forecasts of peak demand and thus generate a probability distribution around the mean peak demand.

The probability distributions developed for this forecast yielded a 90 percent probability that the net energy will be less than 46,208,341 MWh in 2034 – or alternatively, there is a 10 percent probability that the net energy will be less than 37,267,320 MWh. See Figure II-7 below.

Figure II-7: NSP System Total Net Energy



Figures II-8 and II-9 below show the higher and lower variations of the 2020 to 2034 long-range forecasts of base and net summer peak demand.[1]

Figure II-8: NSP System Total Base Summer Peak Demand

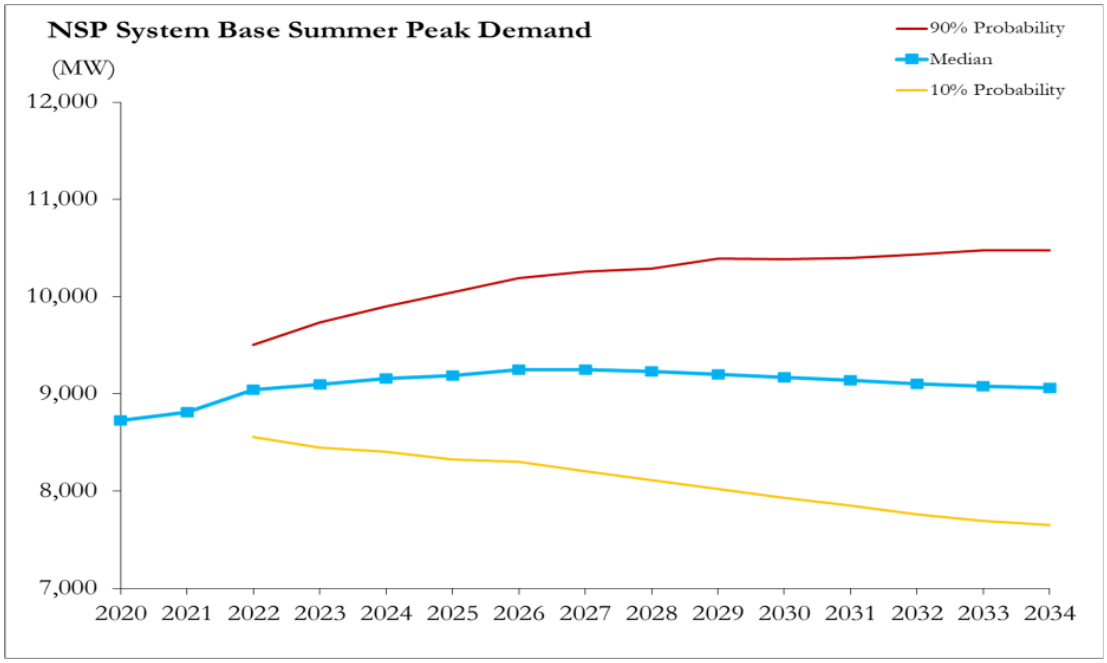
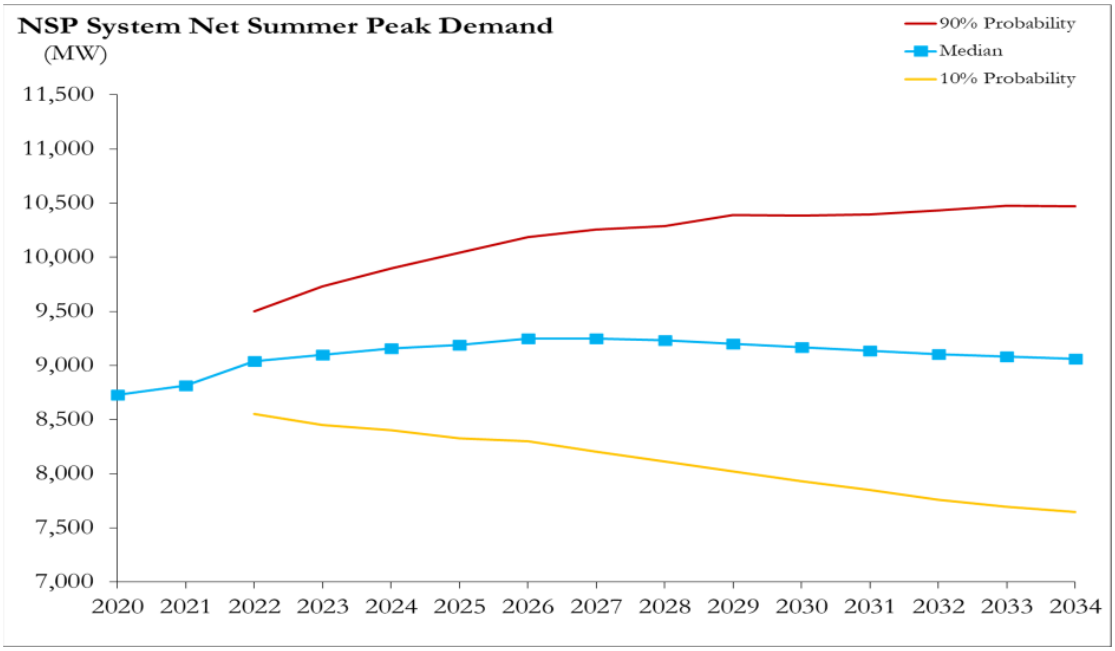


Figure II-9: NSP System Total Net Summer Peak Demand



Revised Appendix E: Load Forecast and Conservation Programs

Tables II-1, II-2, and II-3 below provide the data underlying Figures II-7, II-8, and II-9, respectively.

Table II-1: Annual Net Energy (MWh)

Year	90% Probability	Median	10% Probability
2022	44,939,761	42,919,537	41,240,583
2023	45,304,351	42,955,891	40,897,740
2024	45,693,920	43,059,425	40,699,428
2025	46,044,254	43,165,771	40,549,776
2026	46,059,074	42,964,345	40,081,692
2027	46,008,923	42,743,686	39,665,452
2028	46,096,820	42,617,702	39,323,931
2029	46,011,799	42,361,329	38,913,421
2030	45,936,396	42,129,463	38,483,976
2031	45,889,569	41,941,706	38,097,066
2032	46,059,881	41,878,121	37,826,308
2033	46,136,863	41,765,756	37,546,514
2034	46,208,341	41,683,472	37,267,320
Average Annual Growth 2022 - 2034	**0.2%**	**-0.2%**	**-0.8%**

Table II-2: Annual Base Summer Peak Demand (MW)

Year	90% Probability	Median	10% Probability
2022	9,503	9,039	8,553
2023	9,732	9,099	8,448
2024	9,900	9,158	8,402
2025	10,041	9,189	8,325
2026	10,187	9,250	8,300
2027	10,257	9,250	8,205
2028	10,290	9,232	8,115
2029	10,392	9,200	8,022
2030	10,383	9,170	7,929
2031	10,397	9,138	7,853
2032	10,431	9,103	7,760
2033	10,475	9,081	7,694
2034	10,473	9,059	7,649
Average Annual Growth 2022 - 2034	**0.8%**	**0.02%**	**-0.9%**

[1] Where net summer peak demand includes adjustments form the base forecast to account for interruptible load.

Table II-3: Annual Net Peak Demand (MW)

Year	90% Probability	Median	10% Probability
2022	9,503	9,039	8,553
2023	9,732	9,099	8,448
2024	9,900	9,158	8,402
2025	10,041	9,189	8,325
2026	10,187	9,250	8,300
2027	10,257	9,250	8,205
2028	10,290	9,232	8,115
2029	10,392	9,200	8,022
2030	10,383	9,170	7,929
2031	10,397	9,138	7,853
2032	10,431	9,103	7,760
2033	10,475	9,081	7,694
2034	10,473	9,059	7,649
Average Annual Growth 2022 - 2034	**0.8%**	**0.02%**	**-0.9%**

H. Conservation Programs

Minnesota Rule 7849.0290 requires a Certificate of Need application to provide information related to an applicant's energy conservation and efficiency programs and a quantification of the impact of these programs on the forecast information required by Minn. R. 7849.0270. Within Xcel Energy, the Demand Side Management Policy and Strategy team is responsible for filing our conservation and efficiency programs at Xcel Energy. Nick Mark and Jessica Peterson are the individuals who submit these details to the DOC-DER for approval.

Xcel Energy requested an exemption from this content requirement, explaining that conservation cannot meet the need for the Project to interconnect generation resources that will replace the capacity and energy of Sherco Units 1 and 3.[2] In response, DOC-DER noted that Xcel Energy's conservation efficiency information has been examined in detail in prior ongoing dockets and recommended that the Commission grant the proposed exemption and require Xcel Energy "to present a summary of the conservation information in the IRP and [Conservation Improvement Program (CIP)] filings rather than replicate the data in the instant docket."[3] The Commission approved

[2] *See* Docket No. E002/CN-22-131. In the Matter of the Application of Xcel Energy for a Certificate of Need for Two Gen-Tie Lines from Sherburne County to Lyon County, Minnesota, *Exemption Request* (May 3, 2022).

[3] *See* Docket No. E002/CN-22-131. Supplemental Comments of the Minnesota Department of Commerce, Division of Energy Resources (June 2, 2022) at 1.

Xcel Energy's requested exemption with the provision of the information recommended by DOC-DER.[4] Accordingly, Xcel Energy provides the summary below of the conservation information in the IRP and CIP filings.[5]

Xcel Energy's long-standing commitment in running cost-effective conservation and load management programs places the Company among the nation's top utilities in terms of energy and demand saved and most innovative programs.[6] Indeed, between 1994 and 2022, the Company invested over $2.2 billion (nominal) resulting in 11,810 GWh of electric energy savings, 3,730 MW of electric demand savings and an estimated 19.9 million Dth of natural gas savings. Xcel Energy's electric CIP portfolio has surpassed the statewide target of 1.5 percent every year since 2011, with a peak of electricity savings of 2.3 percent in 2022.[7]

Xcel Energy's 2021-2023 CIP Triennial Plan provides a description of specific energy conservation and efficiency programs the applicant has considered, including both those the applicant adopted and those that the applicant declined to adopt and why.[8] A list of specific energy conservation and efficiency programs implemented can be found in the Executive Summary of our CIP Status Reports. The Company provides these in detail on our Xcel Energy website.[9] A review of ongoing new measures is conducted as new technologies are identified and reviewed compared to the cost-effective analysis required by the Department of Commerce. All additional programs reviewed and their approvals can be found in Docket No. E,G002/CIP-20-473 as required by the Department of Commerce through a "Modification Approval." Xcel Energy continued to strive to provide customers with a wide variety of options for saving energy.[10] The Triennial Plan proposed ambitious goals of saving 2,132 GWh, 612 MW, and 3,316,234 Dth over the three-year period and at a cost of $442 million.

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[4] *See* Docket No. E002/CN-22-131. In the Matter of the Application of Xcel Energy for a Certificate of Need for Two Gen-Tie Lines from Sherburne County to Lyon County, Minnesota, *Order Approving Notice Plan and Granting Exemptions* (June 28, 2022).

[5] Minn. Statute. §216B.241 was adjusted in 2021 to enact changes to the Conservation Improvement Plan to modernize its scope to include additional load management technologies and beneficial electrification. This change is under the Energy Conservation and Optimization Act (ECO).

[6] *See* Docket No. E,G002/CIP-20-473. 2021-2023 Xcel Energy CIP Triennial Plan (May 21, 2022). ("Triennial Plan") at 3.

[7] *See* Docket No. E,G002/20-473. 2022 CIP Status Report (March 30, 2023).

[8] *See* Docket No. E,G002/CIP-20-473. 2021-2023 Xcel Energy CIP Triennial Plan (May 21, 2022). ("Triennial Plan") at 16-126.

[9] https://www.xcelenergy.com/company/rates_and_regulations/filings/minnesota_demand-side_management.

[10] Xcel Energy's next Triennial Plan will be submitted on June 1, 2023.

The proposed electric savings goals also aligned with Company's DSM commitments in the IRP. In reviewing the Triennial Plan, the Department concluded:

- "[B]usiness, residential, and low-income customers all appear to have opportunity to participate in the Company's CIP. . . . [T]he Company proposes a variety of program delivery approaches and measures that should provide participation opportunities across market segments."[11]

- "Xcel's 2021-2023 overall energy savings goals are generally aligned with the overall results from the 'Minnesota Energy Efficiency Potential Study.'"[12]

- "Staff recognize the positive efforts the Company has put forth to update its programs."[13]

In its 2022 CIP Status Report, Xcel Energy stated that, for the eleventh year in a row, it had exceeded the State of Minnesota's energy targets. Specifically, in 2022, the electric portfolio met and surpassed the state's new energy savings target of 1.75 percent,[14] achieving nearly 648 GWh of electric savings, or 2.3 percent of sales.[15] Xcel Energy spent a total of $124 million to achieve its savings results, including $104 million on electric programs and $20 million on natural gas programs.[16]

Likewise, Xcel Energy's initial IRP filing included energy efficiency (EE) and demand response (DR) investments, and the Supplemental Plan[17] and the Alternate

[11] *See* Docket Nos. E,G002/CIP-20-473, G7034,E7032/CIP-20-483, G7036,E7035/CIP-20-480, E7030/CIP-20-485, G7033,E7031/CIP-20-481. Decision (Nov. 25, 2020). ("CIP Decision") at 32.

[12] CIP Decision at 35.

[13] CIP Decision at 57.

[14] The ECO Act of 2021 updated the electric savings goal to 1.75 percent and the natural gas savings goal to 1.0 percent of annual retail energy sales; Xcel Energy will file its first Triennial under that requirement in 2023.

[15] *See* Docket No. E,G002/CIP-20-473 2021. CIP Status Report (April 1, 2022) ("CIP 2021 Status Report") at 1.

[16] CIP 2021 Status Report at 2.

[17] *See* Docket No. E002/RP-19-368. 2020-2034 UPPER MIDWEST INTEGRATED RESOURCE PLAN (June 30, 2020). ("IRP Supplement Preferred Plan").

Plan[18] continued to reflect those investments. Xcel Energy proposed to seek to achieve EE savings levels ranging from 2 to 2.5 percent annually, achieving average savings of over 780 GWh of energy in each of 2020-2034, and more than 800 MW of additional demand savings by 2034[19] when compared to the 1.5 percent level approved in the Company's prior IRP.[20] In addition, Xcel Energy proposed an incremental 400 MW of DR by 2023. [21]

[18] *See* Docket No. E002/RP-19-368. 2020-2034 UPPER MIDWEST INTEGRATED RESOURCE PLAN (June 25, 2021). ("Alternate Plan"); Docket No. E002/RP-19-368. ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS (April 15, 2022). ("Order") at 10.

[19] Alternate Plan at 10.

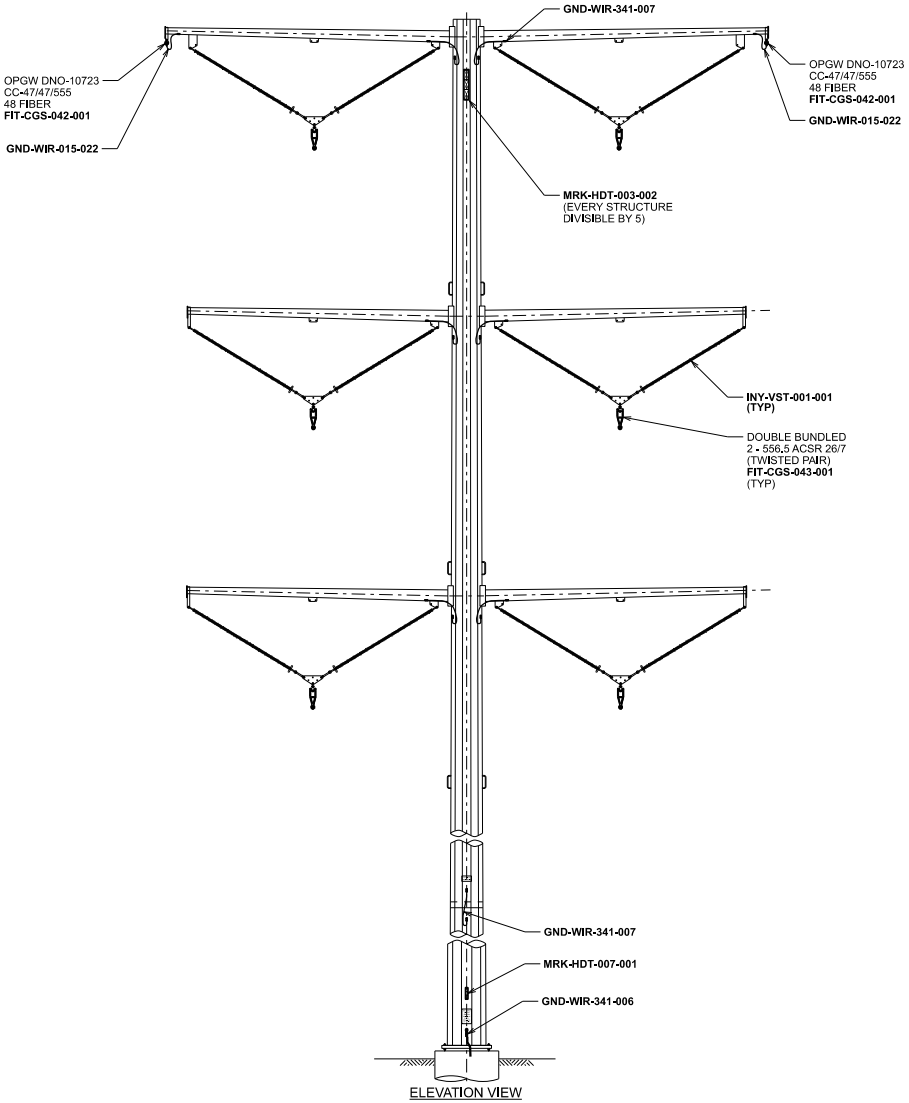
[20] *See* Docket No. E002/RP-15-21, 2016-2030 Upper Midwest Resource Plan (Jan. 2, 2015); Docket No. E002/RP-15-21, ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE RESOURCE PLAN FILINGS (Jan. 11, 2017).

[21] Alternate Plan at 10.

Appendix F

Technical Diagrams of Typical 345 kV Structures

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023



ELEVATION VIEW

NOTE:
SUB-ASSEMBLY FOR JOINT BONDS WILL BE ADDED TO EACH PLS POLE MODEL.

INSTALL BONDING GND-WIR-341-007 ACROSS ALL STEEL SHAFT SLIP JOINTS		
STRUCTURE XP#	POLE HEIGHT	TOTAL NUMBER OF SLIP JOINT BONDING REQUIRED
PST17159	125'-0"	2
PST17160	130'-0"	2
PST17161	135'-0"	2
PST17162	140'-0"	2
PST17163	145'-0"	2
PST17164	150'-0"	2
PST17165	155'-0"	3
PST17166	160'-0"	3
PST17167	165'-0"	3

CONSTRUCTION NOTE:

WHEN INSTALLING ARMS TO SHAFT BONDS DO NOT CONTACT ANY PART OF THE POLYMER INSULATOR.

CONSTRUCTION NOTE:

IF CABLES ARE USED TO TIE DOWN ARMS PRIOR TO WIRE INSTALLATION, DO NOT ALLOW TIE DOWN CABLES TO CONTACT ANY PART OF THE POLYMER INSULATOR.

ASSEMBLY
STR ND-279464-1
FOR STEEL POLES
STL ND-279454-PST17159
STL ND-279454-PST17160
STL ND-279454-PST17161
STL ND-279454-PST17162
STL ND-279454-PST17163
STL ND-279454-PST17164
STL ND-279454-PST17165
STL ND-279454-PST17166
STL ND-279454-PST17167
LD ND-279418

QTY	SUBASSEMBLIES
2	FIT-CGS-042-001
3	FIT-CGS-043-001
2	GND-WIR-015-022
1	GND-WIR-341-006
6	GND-WIR-341-007
3	INY-VST-001-001
1	MRK-HDT-007-001

ASSEMBLY
STR ND-279464-2
FOR STEEL POLES
FOR SECOND CIRCUIT

QTY	SUBASSEMBLIES
3	FIT-CGS-043-001
3	INY-VST-001-001

DRAWING REFERENCE

PLAN & PROFILE _____ ND-279505
SUBASSEMBLY INDEX _____ NL-279504

THIS PE SEAL IS ONLY APPLICABLE TO THE CURRENT CONSTRUCTION REVISION

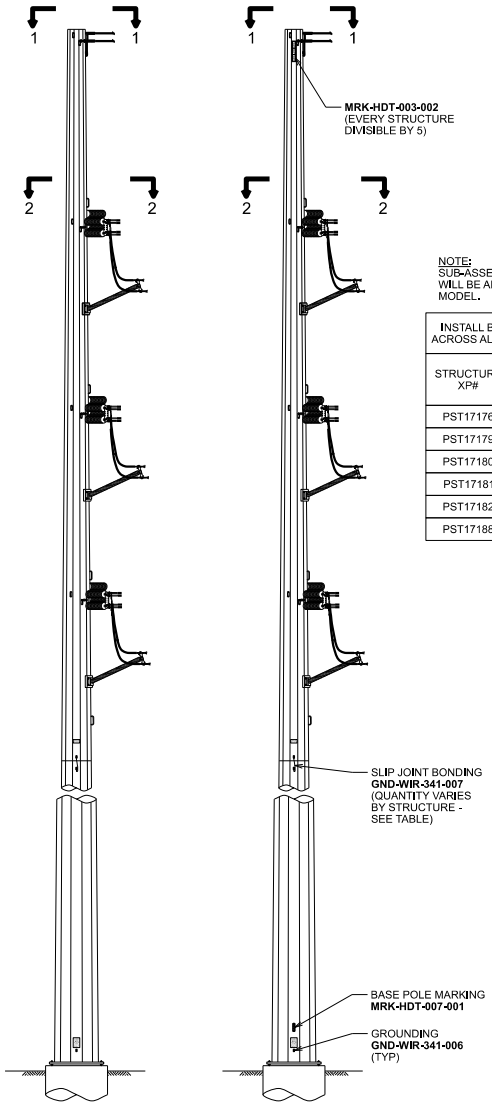
ISSUED BY ENGINEERING DEPT FOR: CONSTRUCTION

LINE 0967 345 kV
STRUCTURE DRAWING - TANGENT - STEEL - D.C. - SINGLE POLE
TAN TO 2 DEGREE, DAVIT ARM, V-STRING

Xcel Energy® | ND-279464-1 | SCALE AS NOTED | REV 0

REV	DATE	WBS 4	REVISION DESCRIPTION
0	09/25/2019	B.0000004.021.001.001	IFC - WILMARTH-HUNTLEY - NEW CONSRTUCTION

ND-279464-1.DGN
4/27/2020 8:03:50 AM



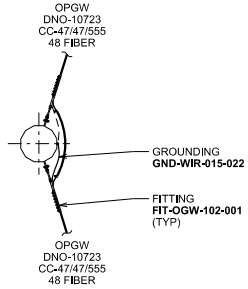
ELEVATION VIEW

STRUCTURE SHOWN IS RIGHT ANGLE CONFIGURATION - ROTATE 180° FOR LEFT ANGLE CONFIGURATION

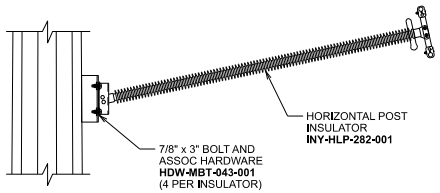
LINE ANGLE VARIES BY STRUCTURE

NOTE:
SUB-ASSEMBLY FOR JOINT BONDS WILL BE ADDED TO EACH PLS POLE MODEL.

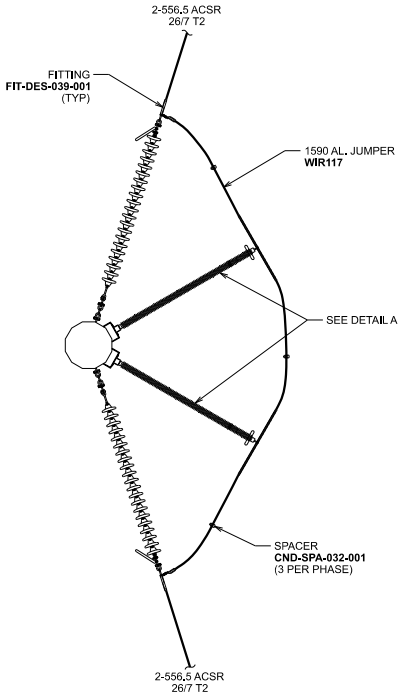
INSTALL BONDING **GND-WIR-341-007** ACROSS ALL STEEL SHAFT SLIP JOINTS		
STRUCTURE XP#	POLE HEIGHT	TOTAL NUMBER OF SLIP JOINT BONDING REQUIRED
PST17176	130'-0"	2
PST17179	155'-0"	3
PST17180	160'-0"	3
PST17181	165'-0"	3
PST17182	155'-0"	3
PST17188	145'-0"	3



SECTION 1-1
SHIELD WIRE
SCALE: NONE



DETAIL A
HORIZONTAL POST INSULATOR
SCALE: NONE



SECTION 2-2
PHASE
SCALE: NONE

ASSEMBLY
STR ND-279471-1
FOR STEEL POLES
LINE 0967

STL ND-279455-PST17176
STL ND-279455-PST17179
STL ND-279455-PST17180
STL ND-279455-PST17181
LD ND-279425

STL ND-279455-PST17182
LD ND-279426

STL ND-279455-PST17188
LD ND-279431

QTY	SUBASSEMBLIES
9	CND-SPA-032-001
2	FIB-OGW-102-001
6	FIT-DES-039-001
2	GND-WIR-015-022
2	GND-WIR-341-006
48	HDW-MBT-043-001
12	INY-HLP-282-001
1	MRK-HDT-007-001
330	WIR117 - 1590 AL

ASSEMBLY
STR ND-279471-2
FOR STEEL POLES
LINE 0982

QTY	SUBASSEMBLIES
9	CND-SPA-032-001
6	FIT-DES-039-001
330	WIR117 - 1590 AL.

DRAWING REFERENCE
PLAN & PROFILE _____ ND-279505
SUBASSEMBLY INDEX _____ NL-279504

THIS PE SEAL IS ONLY APPLICABLE TO THE CURRENT CONSTRUCTION REVISION

ISSUED BY ENGINEERING DEPT FOR: CONSTRUCTION

LINE 0967 345 kV
STRUCTURE DRAWING - DEADEND - TERMINAL - STEEL - ANGLE
0 TO 95 DEGREE - DOUBLE CIRCUIT - 2-POLE, NO OPGW SPLICE

Xcel Energy® | ND-279471-1 | SCALE 1/16"=1'-0" | REV 0

REV	DATE	WBS 4	REVISION DESCRIPTION
0	01/13/2020	B.0000004.021.001.001	IFC - WILMARTH-HUNTLEY - NEW CONSRTUCTION

ND-279471-1.DGN
7/20/2020 11:25:20 AM

Appendix G

Need Analysis Addendum

Northern States Power Company
MN Energy Connection Project
Docket No. E002/CN-22-131
May 2023

1.1 Need Analysis Addendum: Detailed Modeling Assumptions

1.1.1 Dynamics

The dynamic models for each of the new renewable machines were prepared according to the methods and data shown in Tables TA-43 through TA-48 of the MISO Renewable Integration Impact Assessment (RIIA) Summary Report published in February 2021.[1] The only changes to these data for this study were as follows:

- As recommended in Table OR-DS-2 of the MISO RIIA Summary Report, the following gains were reduced and incorporated randomization within a reasonable range, in order to improve performance with low short circuit ratio.
    - In model REEC: voltage regulator integral gain Kvi.
    - In model REPC: reactive power proportional & integral gains Kp & Ki and power control proportional & integral gains Kpg & Kig.
- As recommended by Powertech Labs Inc. (the developer of TSAT software), the V-I table in model REEC was adjusted to prevent injecting reactive current with generator terminal voltage below 0.3pu during a fault. This was necessary in order to address a numerical instability issue for certain faults.

The dynamic models for the new assumed synchronous condensers at Sherco Units 1 and 2 used data from the Xcel Energy Tolk Unit 1 synchronous condenser conversion located at a coal unit in the Southwestern Public Service Company system, as provided by Xcel Energy Transmission Planning South without modification.

The dynamic models for the new synchronous condensers in Options 3, 5, 8, 9, and 10 used data from Black Dog Unit 6 for each machine. The only change to these data was to reduce the inertia constant H to 0.75 as a conservative assumption for the reduced rotating mass with the turbine decoupled for synchronous condenser operation.

1.1.2 Steady State

The following representative transformer impedances were used, as recommended in Figure TA-22 of the MISO RIIA Summary Report:

[1] The report is available at https://www.misoenergy.org/planning/policy-studies/Renewable-integration-impact-assessment/#nt=%2Friiatype%3AReport&t=10&p=0&s=Updated&sd=desc

- to 34.5 kV step up transformers at each equivalent machine: 6% impedance with an X/R ratio of 8.

- to 345 kV main power transformers at each substation: 8% impedance with an X/R ratio of 40.

The main power 345/34.5 kV transformers modeled had an assumed top rating of 200 MVA (base of 120 MVA for impedances) or 125 MVA (base of 75 MVA for impedances) with enough units modeled in parallel to accommodate the total generation for each facility without exceeding the top rating.

An equivalent 34.5 kV collector system impedance of R = 0.019103 pu, X = 0.025036 pu, and B = 0.04728 pu (on 100 MVA system base) was assumed for each 100 MW equivalent wind machine (Type 4). This was based on data from MISO queue.

1.1.3 Analysis Techniques

Steady state power flow cases were built for each of the ten options listed above using PSSE v34.7.0 software. These cases were converted and prepared for dynamic simulation in TSAT v21 software. Ten faults were selected from the MISO MTEP20 list of disturbances as the most critical regional faults and simulated for the base case as well as each of the options. For each option, two additional faults were simulated to assess the stability impact of loss of the radial generation on each new 345 kV line. For Option 9, a total of 13 faults were included in the analysis, including the 10 critical regional faults, fault of Line 1, fault of Line 2, and a fault on the common structure taking out Line 1 and Line 2. Generators and buses in the vicinity and surrounding areas were monitored, and Transmission Owner Planning Criteria from the MISO Stability Package were applied. See **Table 1.1** below for the list of faults.

Table 1.1: Faults

Fault Information			
ID	**Ctrl area**	**NE RC type**	**Disturbance Description**
682	GRE	P72	Permanent bipole fault on the CU DC line; both Coal Creek units tripped at 0.28 sec
689	GRE	P43	SLG bus fault at Coal Creek 230kv; clear CU HVDC 1 & Coal Creek Unit 2
798	MP	P11	3 phase fault at bus Boswell Unit 4 22.8kv with normal clearing
800	MP	P12	5 cycle 3 phase fault at Square Butte 230kv on Stanton line; clear Square Butte end at 4 cycles & Stanton end at 5 cycles
840	XEL	P11	3 phase fault at bus Monticello Unit 1 22.0kv with normal clearing
889	XEL	P12	SLG bus fault at Forbes 500kv; clear Forbes - Dorsey 500kv line & Forbes-Chisago Co 500 kV line

891	XEL	P21	Clear King - Eau Claire and Eau Claire - Arpin 345kv lines
893	XEL	P21	Clear Prairie Island - N Rochester 345kv line
919	XEL	P43	SLG fault at King-Eau Claire 345kv line with a breaker failure at King; clear King-Eau Claire and King-Chisago Co 345kv lines
2241	XEL	P12	3 phase fault at Forbes 500kv post second 500 kV line
Line 1	XEL	P12	3 phase fault at Intermediate Sub 345kv bus; clear Sherco-Intermediate Subs 345kv Line #1
Line 2	XEL	P12	3 phase fault at Intermediate Sub 345kv bus; clear Sherco-Intermediate Subs 345kv Line #2
Common Structures	XEL	P7	Common structure outage of both Sherco-Intermediate Sub 345kV lines, if installed double circuit on common structures

1.1.4 Base Case

The base case for this study was the 2025 Summer Shoulder (90% wind) case from the MISO MTEP21 Stability Package. This high wind scenario was selected because the proposed radial line(s) would interconnect a large amount of new inverter-based generation and this study is intended to study the stability for a scenario with limited synchronous generation online (i.e. low rotating mass inertia) and transfer paths stressed by high-wind conditions.

1.1.5 Turbine Models

All results are based on use of 2nd generation WECC generic stability models with assumed parameters for the new generation. These models were selected for this analysis because of their capabilities for interconnection to low rotating mass inertia conditions. The capabilities of these models represent a conservative approach compared to other models which could have been selected, because exact wind turbines (and their capabilities) interconnecting to these lines is not known at this time.

Once wind turbines are installed and actual parameters are known, additional modeling will be required to verify system performance. It is possible that use of more detailed models with tuned parameters could improve the stability performance for larger amounts of generation.

1.1.6 Option Designs

All options were a variation on a radial line(s) out of Sherco to renewable generation in Lyon County.

1.1.7 Option Evaluation

An iterative approach was used to develop study options. For each configuration a range of cases with varying total generation (in 100 MW increments) were created and simulated with

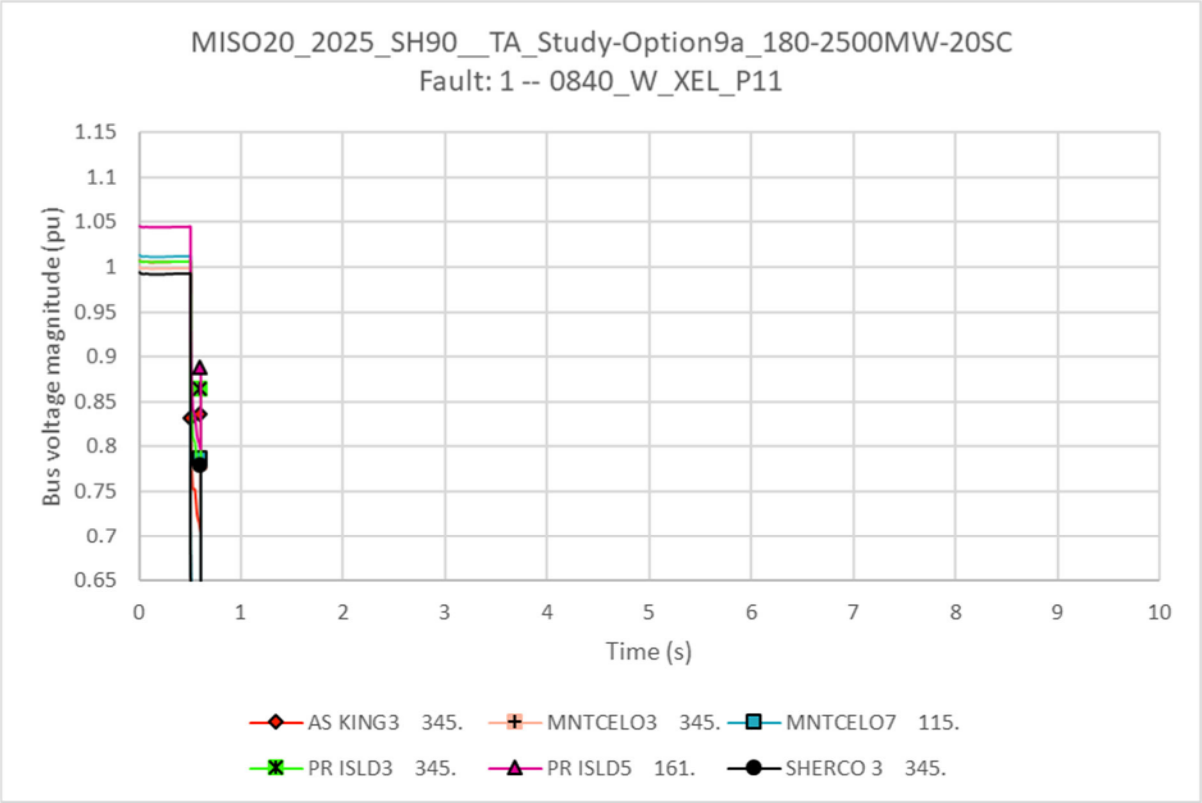
no disturbance and with a single fault. The case was considered acceptable if after the fault clearing, the voltage must not exceed 2 seconds below .8 p.u., and shall recover to 0.90. p.u. within 10 seconds. The cases with acceptable response and the highest generation interconnection level were selected for each option in this analysis.

1.2 RESULTS

All faults were stable and secure for all options due to the initial screening fault (Fault 0840) being the most limiting fault and determining stable generation levels during the screening process.

An example of an unstable result, Option 9a at 2,500 MW of installed generation (100 MW above the stable limit), is shown in Figure A2 below. Figure A2 shows the system voltages during the fault at 0.5 seconds fail to reach voltage tolerances within 50 iterations. The system is effectively unstable 0.1 seconds after the fault occurs.

Figure A2: Option 9a – Unstable at 2500 MW Installed Generation



Example stable stability plots are shown in Figures A3 through A14 below for Fault 0840 for each option. Fault 0840 was the most limiting fault which resulted in the lowest megawatts of capacity.

Figure A3: Option 1 – Voltages

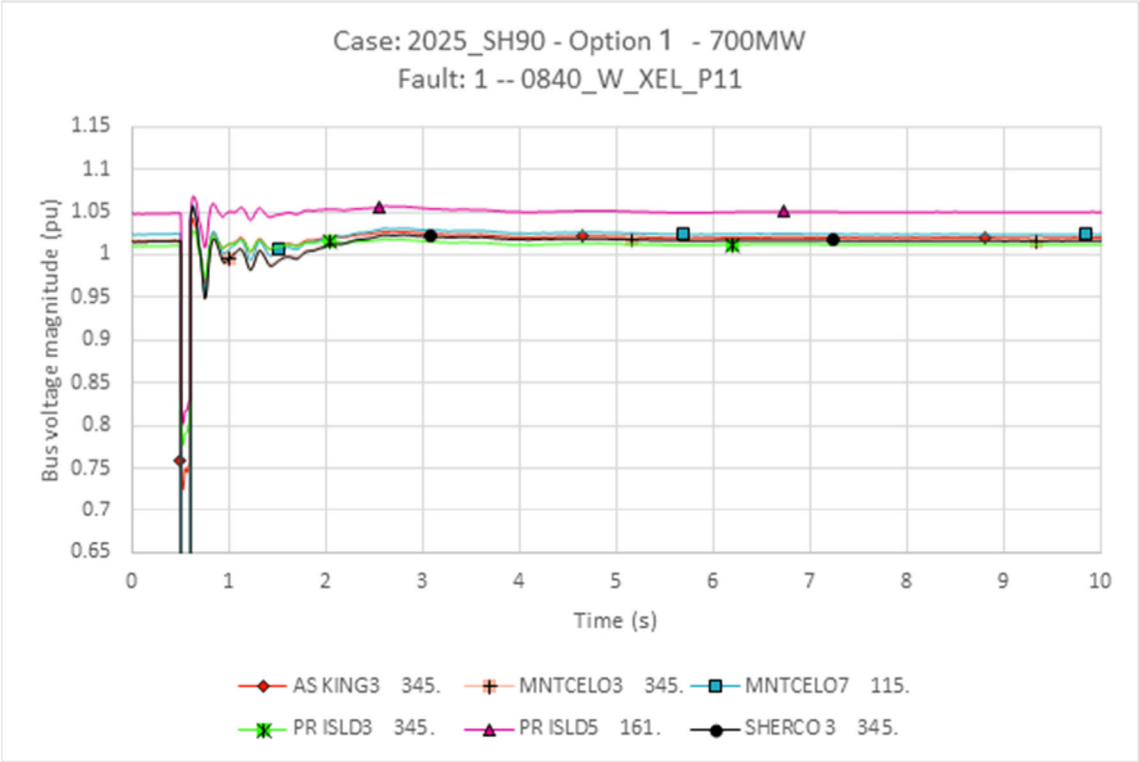


Figure A4: Option 2 – Voltages

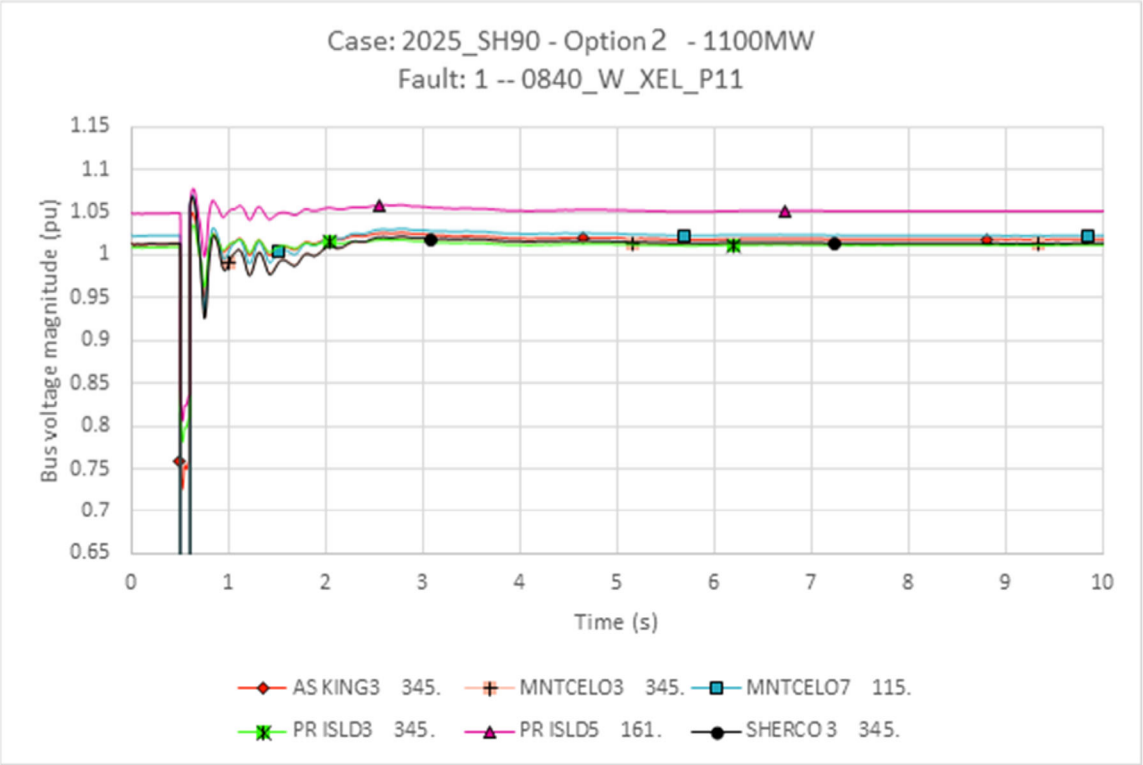


Figure A5: Option 3 – Voltages

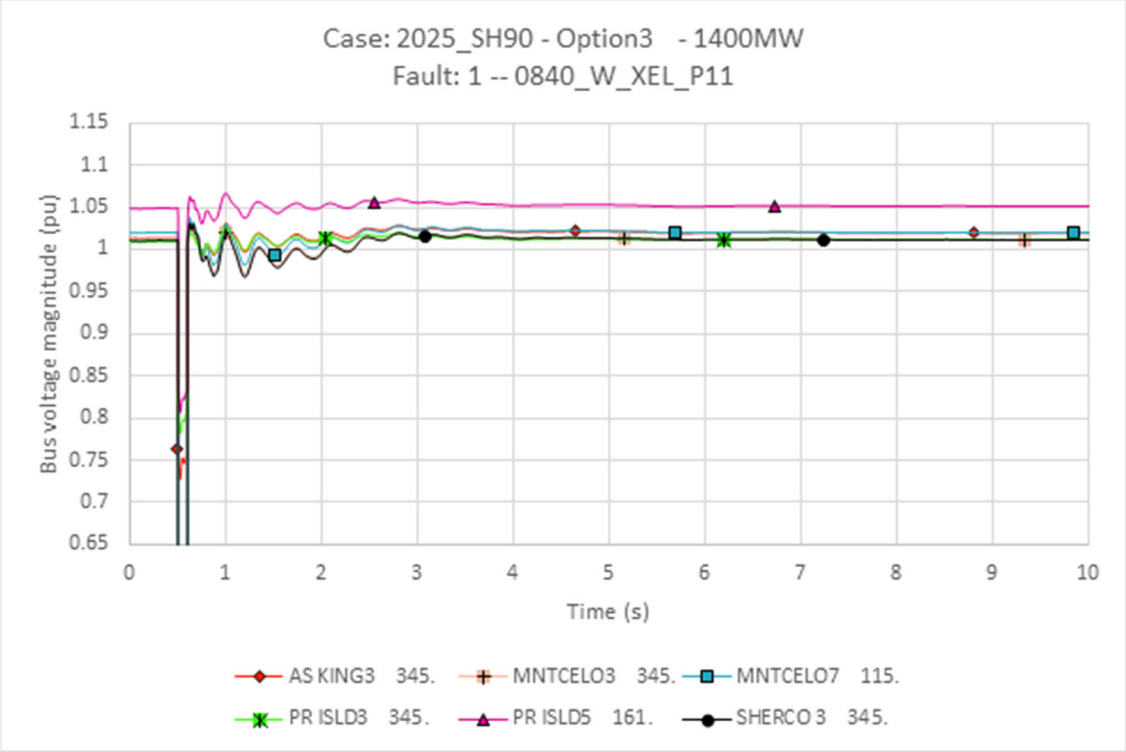


Figure A6: Option 4 – Voltages

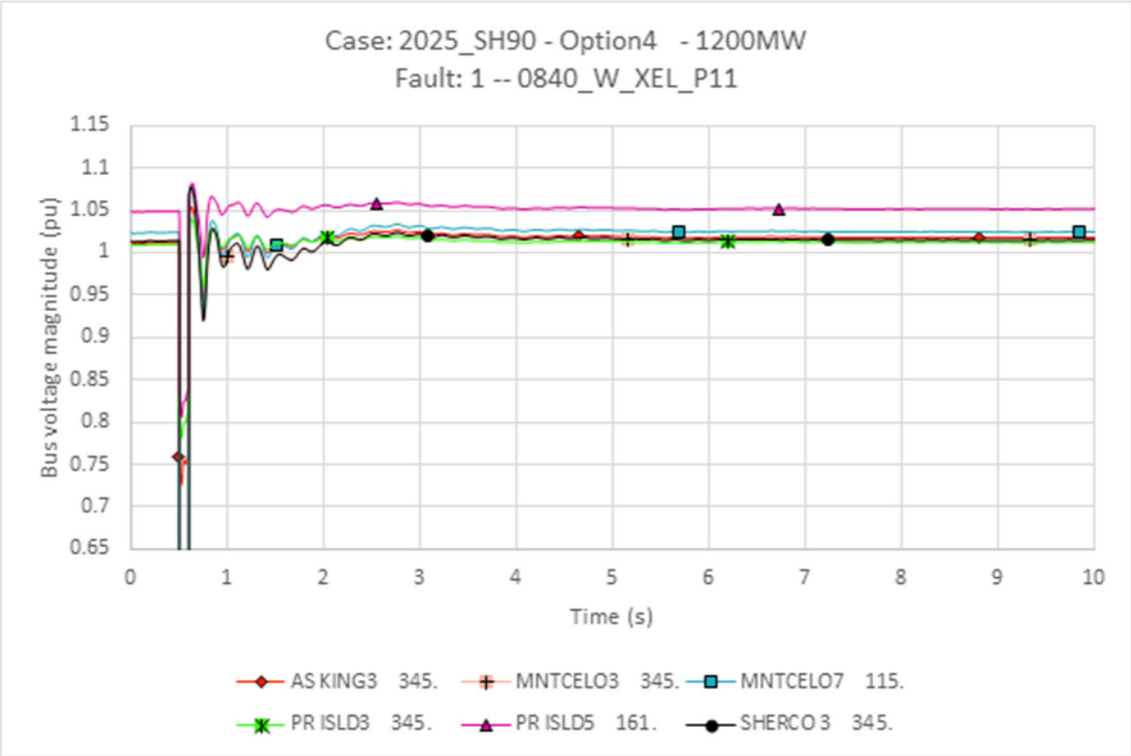


Figure A7: Option 5 – Voltages

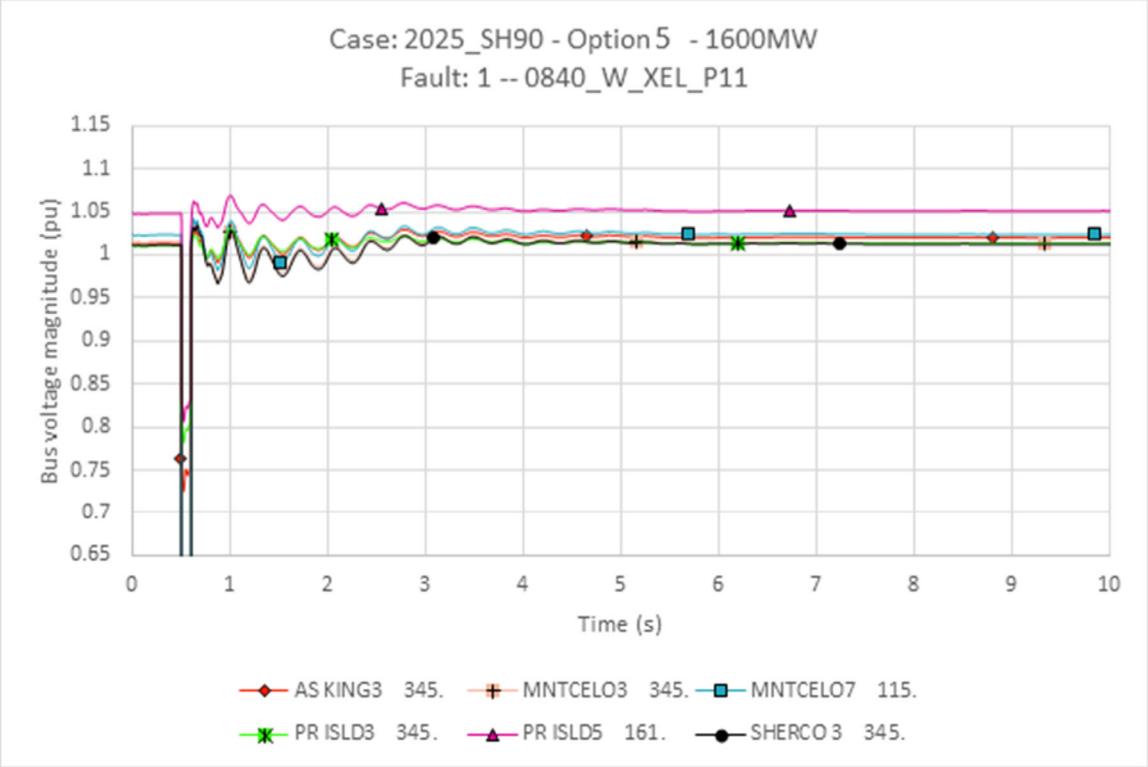


Figure A8: Option 6 – Voltages

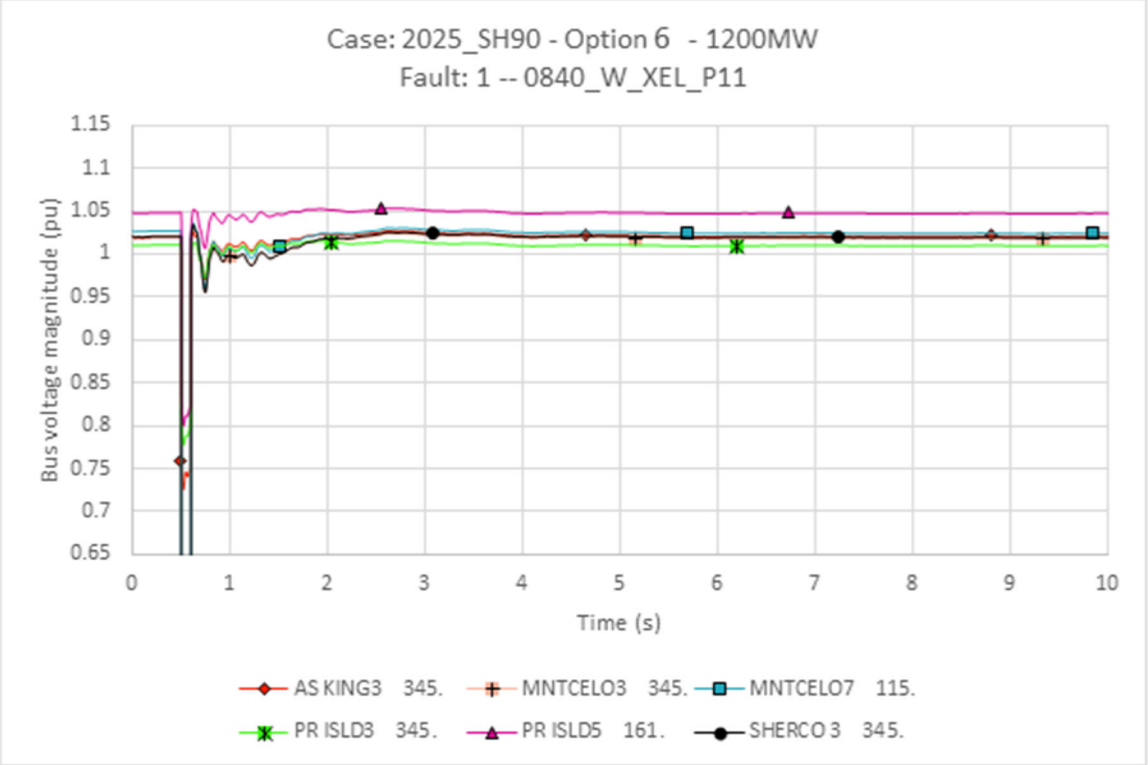


Figure A9: Option 7 – Voltages

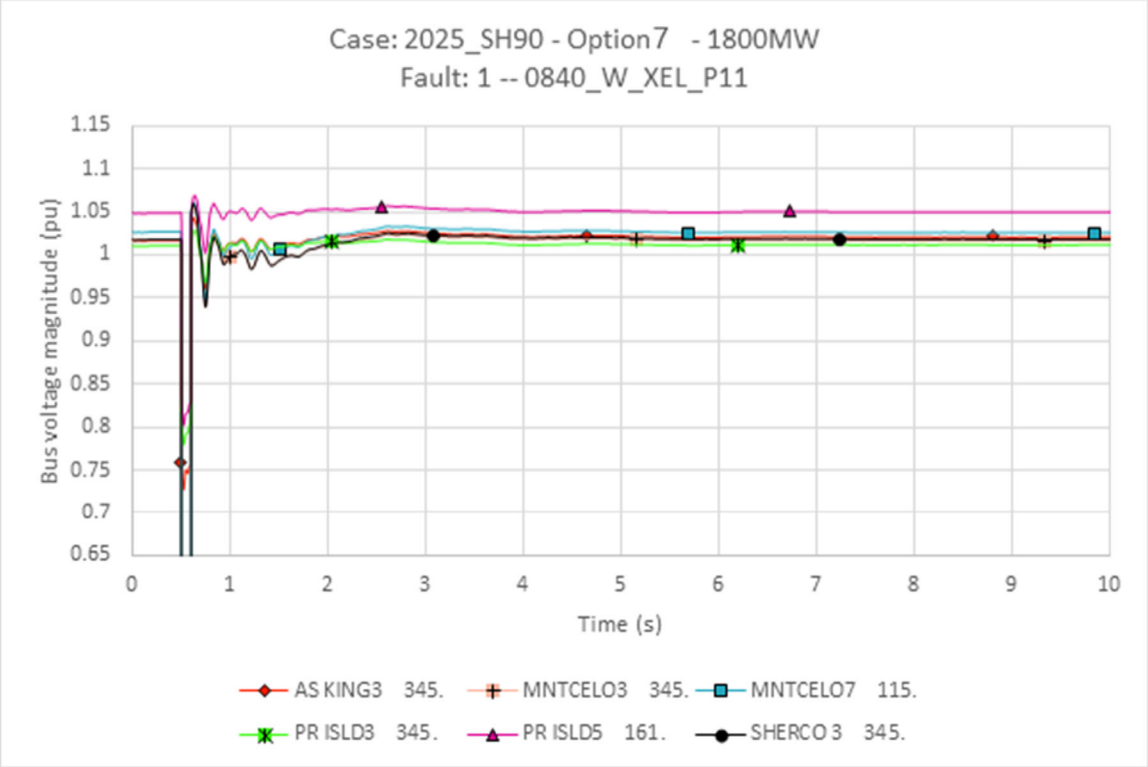


Figure A10: Option 8 – Voltages

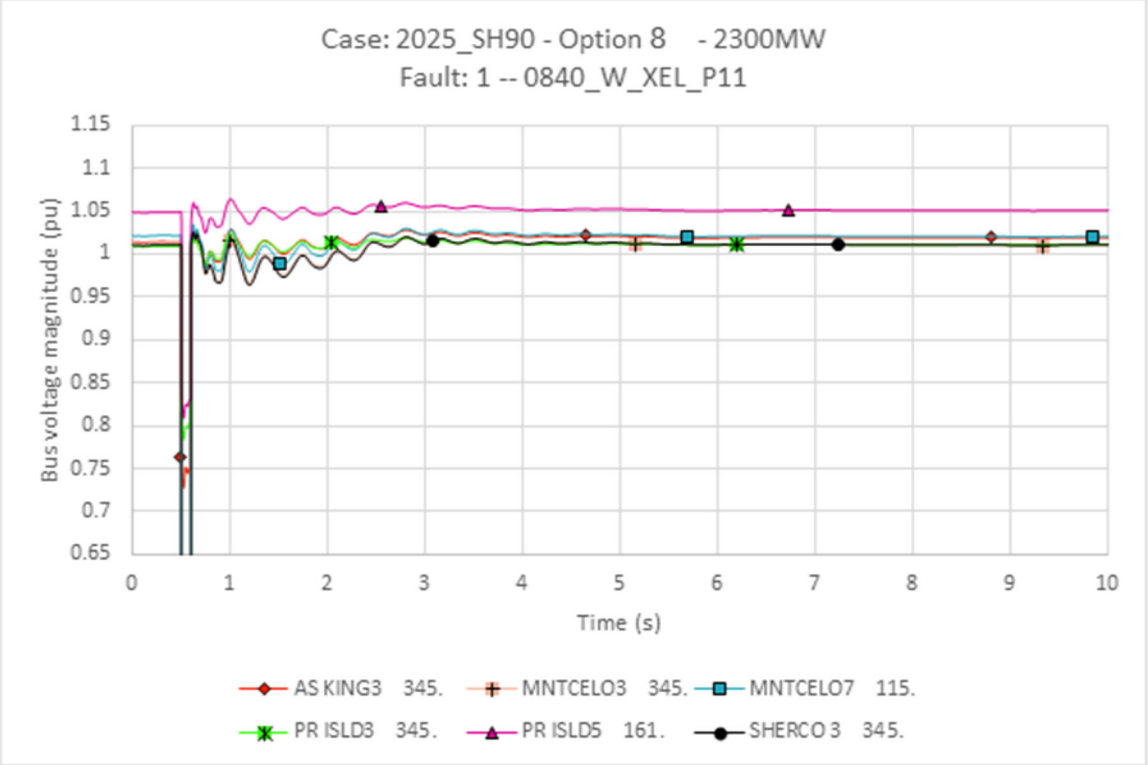


Figure A11: Option 9 – Voltages

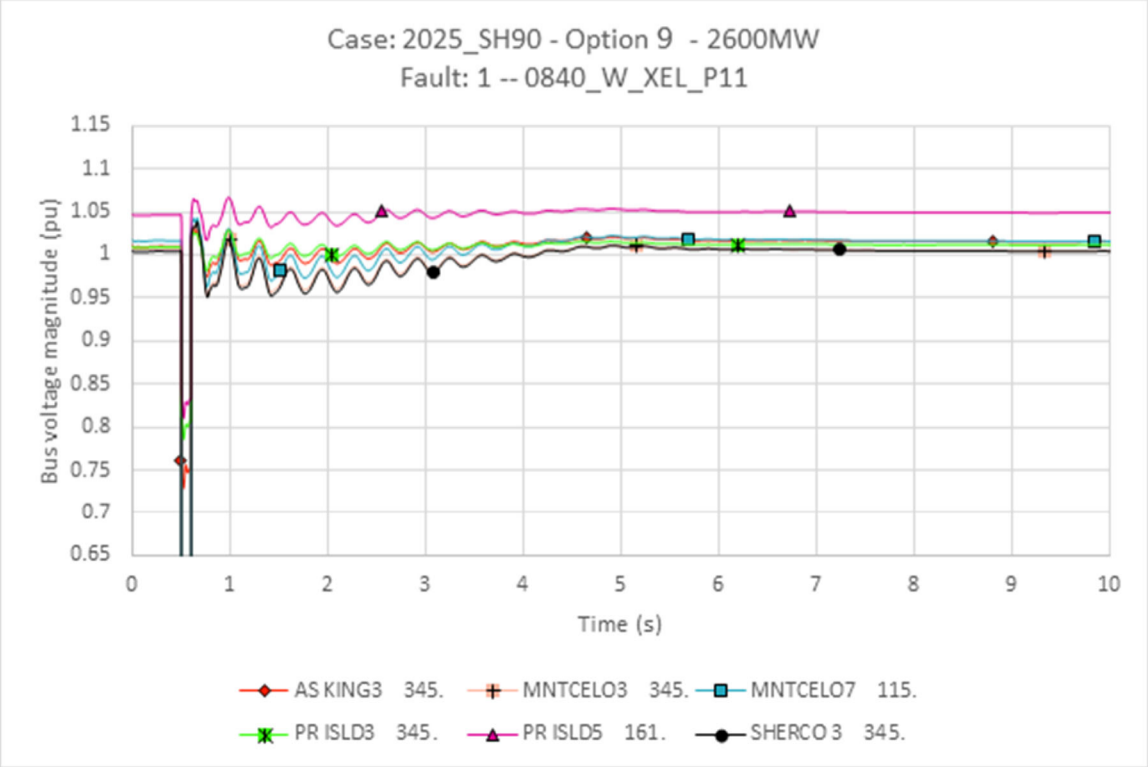


Figure A12: Option 9a – Voltages

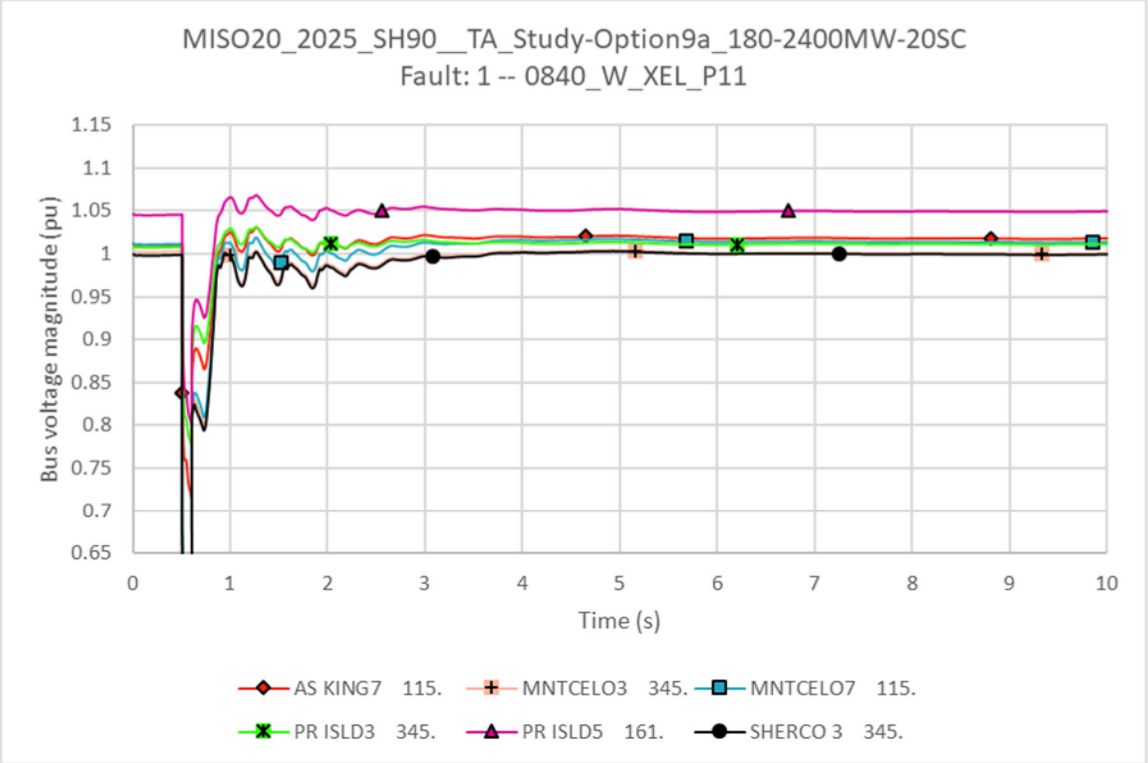


Figure A13: Option 9b – Voltages

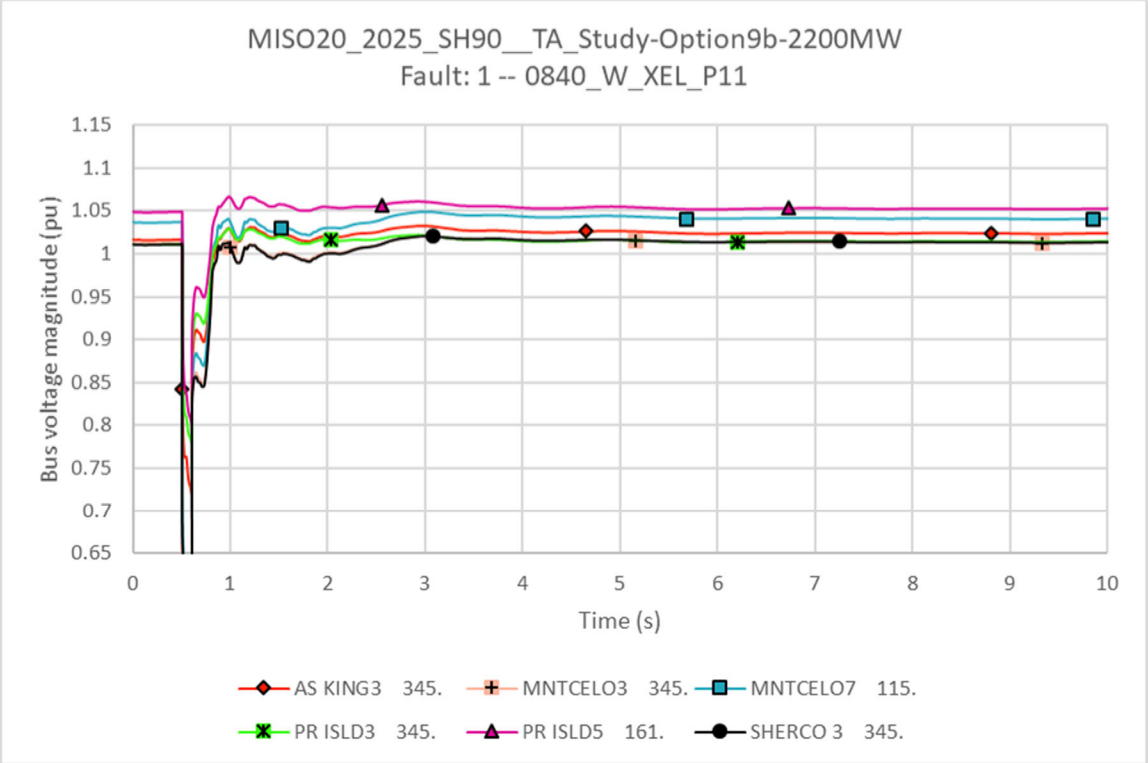


Figure A14: Option 10 – Voltages