414 Nicollet Mall
Minneapolis, MN 55401

November 1, 2023

—Via Electronic Filing—

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

RE: PROPOSAL
IN THE MATTER OF UPDATING THE GENERIC STANDARDS FOR THE INTERCONNECTION AND OPERATION OF DISTRIBUTED GENERATION FACILITIES ESTABLISHED UNDER MINN. STAT. §216B.1611
DOCKET NO. E999/CI-16-521

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, submits the enclosed Proposal consistent with the Notice of Comment Period provided by the Commission on September 1, 2023.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served to the parties on the attached service list. Please contact Jessica Peterson at jessica.k.peterson@xcelenergy.com or me at amber.r.hedlund@xcelenergy.com if you have any questions regarding this filing.

Sincerely,

/s/

AMBER HEDLUND
MANAGER, REGULATORY PROJECT MANAGEMENT

Enclosure
cc: Service List

STATE OF MINNESOTA
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 UPDATING THE GENERIC STANDARDS FOR INTERCONNECTION AND OPERATION OF DISTRIBUTED GENERATION FACILITIES ESTABLISHED UNDER MINN. STAT. §216B.1611	DOCKET NO. E999/CI-16-521 **PROPOSAL**

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, submits this Proposal in response to the Notice of Comment Period issued by the Commission on September 1, 2023. The Notice requested proposals on how to modify the current interconnection process so that small customer-sited projects have queue priority, to achieve the purpose of the new legislation (Minnesota Law 2023, Ch. 60, Art. 12, Sec. 75 (HF 2310)).

The transition to clean energy and an increasingly decentralized and more flexible electric distribution system has required an ongoing evolution in our approach to distribution system planning and operations. We are facing a monumental challenge of expanding the distribution system to support the increased demand to enable decarbonization of the electric grid and electrification of homes, buildings, and transportation. Simultaneously, this challenge opens the door to enhance how we meet the needs of our customers and create a safer, more reliable, resilient, and cost-effective system. The Company goes into significant detail regarding these challenges and our plans in our November 1, 2023 Integrated Distribution Plan (November 2023 IDP).[1]

[1] See, Docket No. E002/M-23-452.

One of the challenges addressed within the November 2023 IDP is how to serve our customers interested in installing onsite solar. The amount of Distributed Energy Resources (DER) continues to increase on the Company's distribution system. We are sympathetic with the challenges to residential and other customers caused by a capacity constrained distribution system which limits the amount of available generation capacity that can be accommodated on the distribution grid and increases the cost of interconnection. Indeed, more than two years ago in our August 25, 2021 Comments in this docket, we expressed ongoing concern with constraints resulting from large DER projects on particular feeders or substations across our jurisdiction. The Company appreciates the policy objective of the Minnesota Legislation to address interconnection for small DER projects and the need for reform in the current queue process.

The Company predicts a significant increase in DER over the next several years.[2] In anticipation of this increase, we believe that it will be imperative to prioritize Small DER projects that have been pushed out due to the rapid expansion of larger DER projects on our distribution system in the past ten years.

The Company proposes to adjust the Minnesota Distributed Energy Resource Interconnection Process (MN DIP) to allow for the prioritization of small customer-sited DER projects of up to 40 kW AC. We believe this can be achieved by altering the MN DIP in the following way:

- Allow two separate interconnection queues: One queue would be for customer-sited Interconnection Applications of up to 40 kW AC (the Priority Queue) and the other for all other Interconnection Applications (the General Queue).
- Allow the Area EPS Operator to reserve available levels of DER capacity in the Priority Queue that differs from the General Queue.

With these changes, the Commission can prioritize Small DER as required by legislation, but also allow Area EPS Operators the ability to determine the level of reserved capacity appropriate for their specific technical planning standards.

The forecasted growth of DER is significant as the Company aims towards a carbon free system. In the November 2023 IDP we reviewed system upgrade details and found that adjusting the planning standards for Small DER allows for increased available hosting capacity for these customers but is also the more cost-effective option for all customers compared to our current standards.[3] The MN DIP modifications proposed here would align with that distribution planning forecast,

[2] November 2023 IDP, Docket No. E002/M-23-452, Appendix A1.
[3] Id. Appendix I

allow future adjustments to accommodate the increased DER, and provide queue priority for Small DER. If the Commission approves our proposed changes to the MN DIP, the Company will implement our capacity reserve levels by changing our Technical Planning Standard (TPS) for each of the queues above as follows:

- General Queue: Projects are allowed capacity up to 50 percent of the system (feeder/substation) equipment rating.
- Priority Queue: Projects are allowed capacity up to 100 percent of the system (feeder/substation) equipment rating.

In the remainder of this Proposal, the Company describes our proposed MN DIP changes, provides additional background information and context unique to the Company, and discusses how we would implement our proposal for establishing two separate queues with different DER capacity levels to meet the legislative goal and our system needs.

PROPOSAL

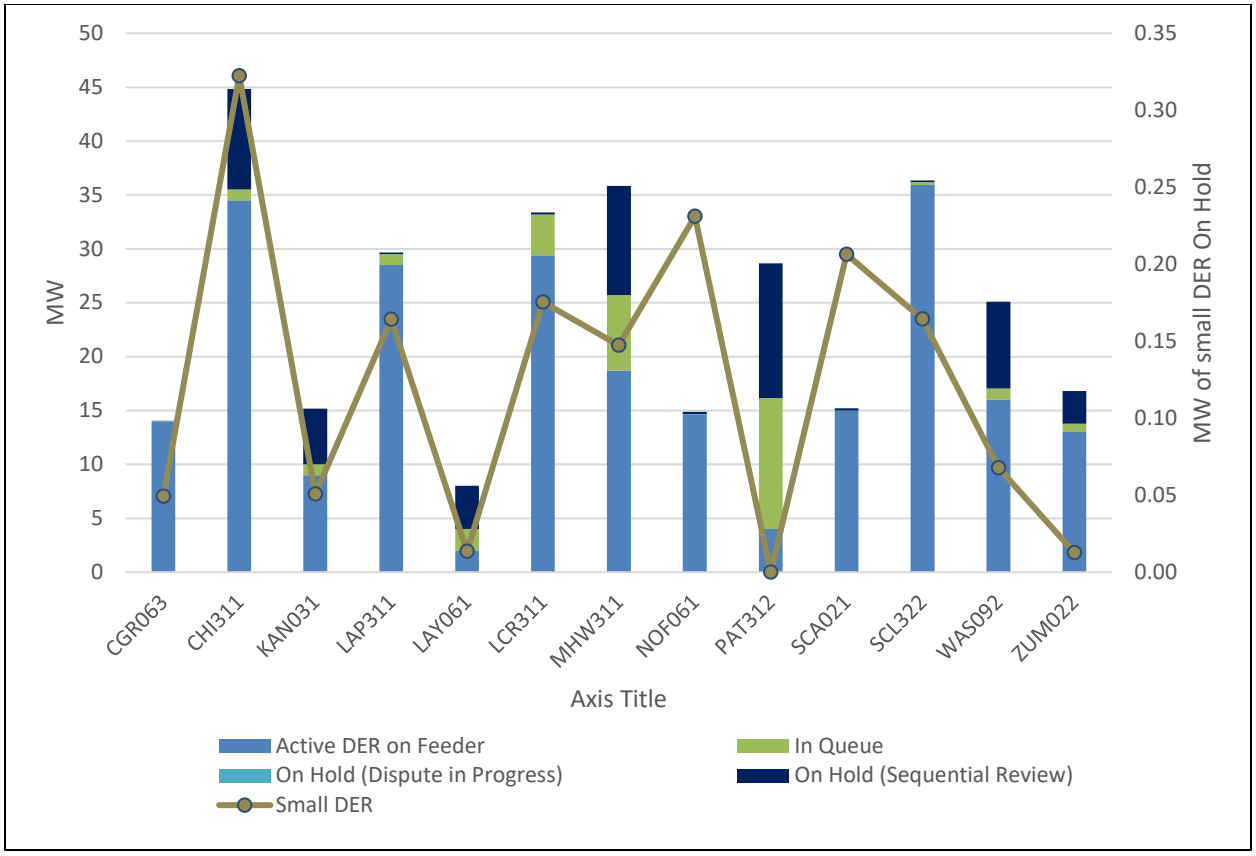
I. BACKGROUND

A. Capacity Constrained Systems

The Company has experienced lengthy interconnection queues in highly congested areas for the last several years. This congestion has led to several projects being on hold, due to the time required for projects to be reviewed sequentially (as required by MN DIP) and because there is no current capacity and significant upgrades are necessary to interconnect. Specifically, capacity constraints have an amplified consequence to Small DER (customer-sited projects up to 40 kW AC), for which the additional analysis and costs make it uneconomical for customers to accept. Our October 2023 Public DER Queue[4] shows that there are several constrained feeders with more than five projects currently on hold.

[4] https://mn.my.xcelenergy.com/s/renewable/developers/interconnection

Figure 1: Capacity Constrained Feeders (over 5 projects on hold)



We believe this congestion is due, in part, to the Community Solar Garden (CSG) program design, which has contributed to the large number of operational CSGs (over 850 MW). There are physical limits on how much DER can be accommodated at any given point on the distribution grid with the current standard equipment in place. Even in situations where it is physically possible to expand the system to allow more DER, doing so often requires more complex engineering analysis for applications and a greater investment by the customer. Such investments can include building new feeders, new substation bays, or entire new substations. Each DER project in each substation/feeder queue will have a unique impact on the system and must be studied based on the system conditions that exist at the time of study, assuming that all ahead in queue projects are moving forward with the necessary upgrades identified for them.

As a result of high levels of DER interconnection, distribution grid congestion, and longer interconnection queues, interconnecting DER – even smaller rooftop systems – becomes increasingly complex.

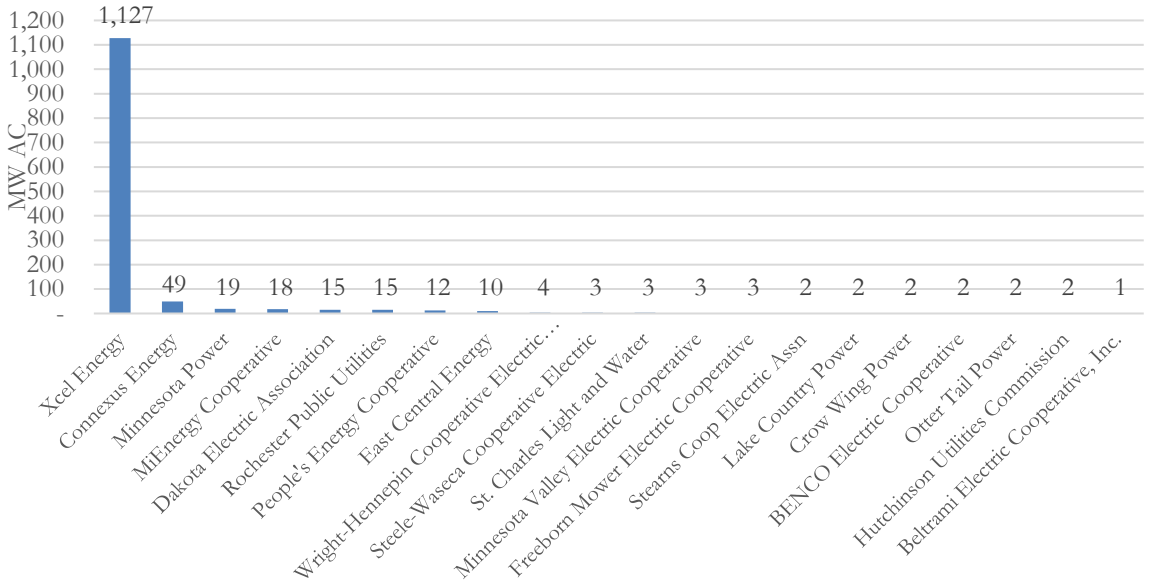
Further, as the Company plans for a system-wide carbon-free grid by 2050, the reliability of the renewable energy generation from DER will be of increased importance. If the Company is unable to confirm that a large, distributed generator can safely generate in an alternate configuration during a contingency scenario,[5] it will disconnect the generator until safe operation is confirmed or normal configuration is restored. Considering the long-term operability of the distribution and transmission systems, disconnection or curtailment of DER output for long or short lengths of time could have significant impacts to the transmission system and the wholesale market. Long-term disconnection or curtailment could also impact system viability.

But this high DER concentration is also a consequence of the Company making great efforts to interconnect a substantial amount of DER. It is our understanding that the Company manages a little less than half of all electrical accounts in the state. However, as shown in Figure 2 below,[6] the Company had in 2022 approximately 28 times more interconnected distributed solar capacity than the next utility (Connexus Energy). The Company had over 850 MW of CSGs, and approximately 100 MW of commercial DER, 50 MW of residential solar, and 100 MW of utility solar.

[5] A scenario where one or more circuits, devices, line segments, or resources are unavailable, usually during or following a planned outage for maintenance or a forced outage from faulted equipment where circuits require reconfiguration to keep customers energized.

[6] Data from Annual Distributed Energy Resources Reports filed by utilities, Minnesota Public Utilities Commission (7/26/2023), available at https://mn.gov/puc/activities/utility-reporting/annual-der-reports/. The data is for systems less than 10 MW in size and also includes utility solar. For example, the Company had in 2022 approximately 100 MW of utility solar, approximately 10 percent of the total solar capacity. For some other utilities the proportion of utility solar was much larger, for example, about 40 percent of the total solar capacity for Connexus Energy, about 40 percent for Dakota Electric Association, and about 35 percent for Minnesota Power.

Figure 2: Total Capacity of Interconnected Solar, 2022
(Top 20 Utilities in Minnesota, based on MW)



When considering new approaches to DER interconnection, such as queue priority for Small DER, it is these factors that differentiate Xcel Energy from other utilities in Minnesota. And because of these factors, we believe it is important to share our experiences and perspectives in this Proposal.

B. Minnesota Legislation

The 2023 Minnesota legislation established significant changes and new programs that fundamentally impact the Company's solar programs and DER interconnection. Many of these legislative changes are interrelated and generally aim to increase solar energy resources, but with a specific goal of doing so equitably. We provide these details as background and to acknowledge the importance of taking all these factors into account together holistically, as modifications are made to the DER interconnection process and programs.

Table 1: 2023 Legislative Action Summary

Statute	Description & Relevant Dockets	Overview
216B.1641	Community Solar Garden (CSG) program modifications Docket No. E002/M-23-335	The 2023 legislation created a Non-Legacy program that is administered by the Department of Commerce (Department), beginning January 2024. The Commission has opened a new docket and comment period to address transition issues. In our filings there, the Company highlighted a "public interest" consideration for the Commission and Department to address when determining whether to approve a new Non-Legacy CSG application. We suggested that the public interest consideration should also include the need to maximize DER hosting capacity for smaller systems up to 40 kW, consistent with the public policy goal of Minn. Stat. §216C.378. Approving a specific CSG could take away DER hosting capacity for these smaller sized systems.
216C.378	Distributed Energy Resources System Upgrade Program Docket No. E002/M-23-458	The 2023 legislation created a DER System Upgrade Program under Minn. Stat. § 216C.378, allocated $10 million for such system upgrades, and directed the Company to file with the Department by November 1, 2023 a plan how to use the allocated funds for infrastructure investments. By law, the funded system upgrades must maximize the number and capacity of DER projects up to 40 kW. Notably, the new legislation under Minn. Stat. § 216C.378 recognizes technical planning standards, which is defined in Subd. 1(c) as "an engineering practice that limits the total aggregate distributed energy resource capacity that may interconnect to a particular location on the utility's distribution system."[7]
H.F. 2310 Article 12, Section 75	Queue priority for DER up to 40 kW Docket No. E999/CI-16-521	The new legislation directed the Commission to open a proceeding to establish interconnection procedures that allow customer-sited distributed generation projects up to 40 kW priority over larger projects that may enjoy superior positions in the processing queue (Minn. Law 2023, Ch. 60, Art. 12, Sec. 75, HF 2310). This is the subject of the Company's Proposal in this filing.
216B.1691 Subd. 2h	Distributed Solar Energy Standard (DSES) Docket o. E002/M-23-403	The 2023 legislation created the new DSES under Minn. Stat. §26B.1691, Subd. 2h, which means that by the end of 2030, at least 3 percent of the Company's total Minnesota retail electric sales must be generated from distributed solar energy generating systems less than 10 MW. The Commission has opened a new docket on the DSES with several topics open for comment.[8]

[7] Also, Subd. 6 states that: "The utility subject to section 116C.779 must reserve any increase in the *DER Technical Planning Standard* made available by upgrades paid for under this section for net metered facilities and distributed energy resources with a nameplate capacity of up to 40 kilowatts alternating current. The commissioner may modify the requirements of this subdivision when the commissioner finds doing so is in the public interest." (*Emphasis added.*)

[8] Docket No. E002, E015, E017/CI-23-403, *In the Matter of the Implementation of the New Distributed Solar Energy Standard Pursuant to 2023 Amendments to Minnesota Statutes, Section 216B.1691*, Notice of Comment Period issued September 18, 2023, as modified by October 11, 2023 notice: Utility response due November 13, 2023, initial comment period closes January 8, 2024, reply comment period closes January 23, 2024.

II. PROPOSAL

The Company proposes modifications to the MN DIP to allow for the prioritization of the customer-sited small DER projects of up to 40 kW AC in the interconnection queue.

A. MN DIP Changes

The Company's proposal includes the following redlined changes to the MN DIP:

1.8.1 Queue Position is assigned by the Area EPS Operator based on when the Interconnection Application is deemed complete as described in section 1.5.2, but Queue Position is also subject to the provisions of section 1.8.3 and 1.8.5. The Queue Position of each Interconnection Application will be used to determine the cost responsibility for the Upgrades necessary to accommodate the interconnection. The Queue Position also establishes conditional interconnection capacity for an Interconnection Customer, contingent upon all requirements of the MN DIP and MN Technical Requirements being met.
…

1.8.3 The Area EPS Operator shall maintain two ~~a single,~~ administrative queues and may manage the queues by geographical region (i.e. feeder, substation, etc.) One queue is for "customer-sited" Interconnection Applications up to 40 kWac (the "Priority Queue"), and the other queue is for all other Interconnection Applications (the "General Queue"). A "customer-sited" Interconnection Application is one that complies with the 120 percent rule whereby the total generation system annual energy production kilowatt hours alternating current is limited to 120 percent of the customer's on-site annual electric energy consumption. For existing customers, the application of the 120 percent rule must be based on standard 15-minute intervals, measured during the previous 12 calendar months. If a facility subject has either less than 12 calendar months of actual electric usage or has no demand metering available, then the means of estimating annual demand or usage for purposes of applying these limits will be based on looking at information for similarly situated customers. These~~is~~ administrative queues shall be used to address Interconnection Customer inquiries about the queue process. If the Area EPS Operator and the Interconnection Customer(s) agree, Interconnection Applications may be studied in clusters for the purpose of the system impact study; otherwise, they will be studied serially.

…

1.8.5 Applications in the Priority Queue have priority over applications in the General Queue unless a specific application in the General Queue has already begun a System Impact Study or been issued an Interconnection Agreement.

1.8.6 The Area EPS Operator may reserve levels of available DER capacity in the Priority Queue that differs from the General Queue

The above language would allow the prioritization of Small DER projects by creating two queues and allowing utilities to reserve levels of DER appropriate for their systems. We further explain how the Company would implement these changes below.

We also note that the language defining the term "customer-sited" above is largely taken from Minn. Stat. § 216B.164, Subd. 4c, addressing individual system capacity limits. The intent here is to differentiate those systems whose primary purpose is to off-set on-site load, compared to oversized systems whose purpose is to go beyond serving the customer load on the site. We believe this distinction aligns with the intent of the legislation and this proceeding.

B. Establishing a Priority Queue and a General Queue

The Company processes interconnection applications on a case-by-case basis, following the rules established in the MN DIP.[9] Each DER application moves through a study review process to determine requirements for safe and reliable interconnection to the grid and to identify the necessary costs for interconnection. Our engineering review is based on fundamental engineering principles and considers other DER interconnected on the applicable feeder, or in queue on the feeder.

We started to use our current Technical Planning Standard (TPS) in DER engineering study review on March 1, 2022.[10] The current TPS calculation is based on the DML plus 80 percent of the equipment rating of either the substation transformer or feeder.

[9] The Company also applies the technical requirements established in the State of Minnesota Technical Interconnection and Interoperability Requirements (TIIR) and the Company's Technical Specifications Manual (TSM). All these documents apply to interconnection applications. The MN DIP and TIIR apply to all Minnesota public utilities and the Company cannot unilaterally change the principles, processes, or standards contained in them. Also, any changes to the Company's TSM must be filed with the Commission.
[10] Prior to the TPS implementation, there was a robust Commission proceeding in Docket No. E999/CI-16-521 and we also held several informational meetings for stakeholders.

This means that aggregate nameplate capacity of all DER installed (including those ahead in queue plus the project being studied) may not exceed the DER TPS.[11] Additionally, and most importantly, with the TPS the system will be less vulnerable to impacts from sudden changes in load, such as those that we have seen in some areas during the COVID-19 health pandemic or due to weather. Many DER systems can be expected to be in service for 25 years or more, our studies must have the margin provided by the TPS to consider load changes over this time so that we can reduce reliability risks.

As the Company began to review how best to implement two queues to prioritize Small DER project, it was apparent that we needed to focus not on current residential adoption to determine the fair balance of generating capacity but to focus our projections about future residential adoption rates through the life of many of the existing larger generating sites of 25-years.

To better allow future customer-sited DER projects up to 40 kW to interconnect, we project the need to reserve 50 percent of the DER capacity per feeder/substation for these projects. The Company's distribution system in Minnesota consists of 1,082 distribution feeders. Across the entire distribution system in Minnesota, the average number of residential customers is 1,115 per feeder. The average existing system size across the entire system for less than 40 kW applications is 9.2 kW. So, if we consider that half of the total number of residential customers on any given feeder would install a 10kW system, then this would equate to 5,575 kW average DER capacity expected per feeder. This is around half of a total feeder rating for most distribution feeders on the distribution system.

The projection that 50 percent of all residential customers might install PV sometime in the future is based on a general assumption that at least half of all homes are suitable for rooftop PV systems in this region[12]. This assumption can be used to estimate the timeline it will take for residential DER to reach its maximum penetration. Currently, the total number of <40 kW residential PV systems on the distribution grid is about 14,500. This is out of a total number of residential customers on the system, which is about 1,200,000. If we base our forecast on the national market analysis, according to Wood Mackenzie and SEIA[13], the current projected

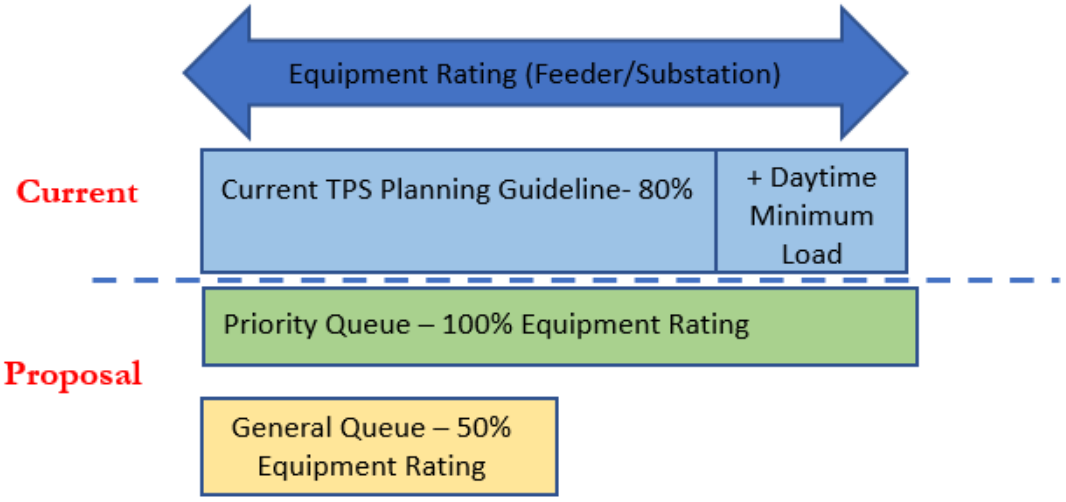
[11] Prior to this, our engineers used only the equipment rating for the transformer or feeder as the threshold. This change allows study timelines to be more predictable, as there will be more room for operational variability without extreme system impacts such as equipment damage or voltage issues for other customers.
[12] IDP, Appendix A1 Section II B.2
[13] https://www.seia.org/research-resources/solar-market-insight-report-2023-q3

growth rate for residential PV is 9 percent average year over year, although this has been as high as 30 percent in recent years. And the average growth rate specifically for Minnesota in the past 10 years is 42 percent for residential PV. To put into context, at a 9 percent growth rate we would expect that around half of all residential customers would have a rooftop PV system within the next 45 years. At a 30 percent growth rate, we would expect the same to happen in the next 14 years. And at a 42 percent growth rate, we would expect half of all residential customers to have a PV system within the next 10 years. Obviously, these are projections and may be drastically affected by unforeseen macroeconomic factors, but it illustrates that at least 50 percent of any given feeder's capacity should be reserved for <40 kW systems if we want to ensure that there is available capacity over the next 10 to 45 years.

The Commission approval of the MN DIP changes proposed above would allow two separate queues with different DER capacity reservations. To prioritize Small DER applications, the Company would require upgrades for new DER interconnections in the General Queue to prevent the aggregate nameplate of General Queue interconnections from exceeding 50 percent of the limiting equipment rating. Upgrades would be required for any DER interconnection that would cause the aggregate nameplate of all DER interconnections to exceed 100 percent of the limiting equipment rating. This approach would in effect reserve hosting capacity of 50 percent of equipment rating to allow future customer-sited Small DER to interconnect. The Company provides additional details to support this approach in Attachment A.

Figure 3 demonstrates the approach for the Priority Queue and the General Queue compared to the Company's current TPS.

Figure 3: Two Queue Interconnection Procedure



III. COMMISSION NOTICE

Additionally, we address shortly below each topic/question specified in the Commission Notice.

A. Proposals for interconnection procedures that allow customer-sited distributed generation projects up to 40 kWac in capacity to be processed according to schedules specified in the MN DIP, giving such projects priority over larger projects that may enjoy superior positions in the processing queue.

The Company proposes to establish a separate interconnection queue for customer-sited applications up to 40 kW AC (Priority Queue) and to reserve DER capacity specifically for these applications, as described in more detail above.

B. Whether the prioritization of these projects include areas where the distribution system is capacity constrained as well as in areas that are not similarly constrained.

The Company believes an overall change and Small DER capacity reservation is necessary across the distribution system, not just in constrained areas. History has shown that without prioritization created across the distribution system, there is a high likelihood that the DER hosting capacity of additional feeders and substations will quicky become constrained. Adopting our Proposal now will allow customers to

continue to install Small DER in these unconstrained areas under current system conditions, rather than experiencing unfeasibly expensive solutions in the future when additional areas become constrained.

C. Whether there are changes to the MN DIP that would be de minimis in nature regarding policy but would update the document to accurately reflect recent changes and references; and

The Company proposes adjustments to the MN DIP as described above to allow two separate interconnection queues with different DER capacity reservation levels.

D. Are there other issues or concerns related to this matter.

As addressed in the Background section, the Company believes that any changes to the MN DIP process should be taken into consideration together with all other new programs, changes and requirements outlined in the landmark 2023 legislation, as discussed above. We believe action on queue priority will set the stage and allow for public policy supportive of Small DER interconnection in the state of Minnesota. We acknowledge there is potential that each day additional Small DER is not being able to interconnect on specific Company feeders or substations. Delay in implementing proposed changes could also impact the 3 percent Distributed Solar Energy Standard, for example, by postponing the Company's future RFPs. Additionally, the Company continues to have concern regarding how quickly distribution feeders will become constrained in new areas with the implementation of the Non-Legacy CSG program.

MN DIP changes will also require updates to the Company's electric tariff book beginning at tariff sheets 10-180 to 10-181. The Company requests as part of this Proposal that for any changes to the MN DIP ordered by the Commission that the Company be authorized in this docket to make corresponding tariff changes to the tariffed version of the MN DIP at the tariff sheets referenced above.

CONCLUSION

The Company requests the Commission approve our Proposal to modify the MN DIP to:

- Allow two interconnection queues: One queue would be for customer-sited Interconnection Applications of up to 40 kW AC (the Priority Queue) and the other for all other Interconnection Applications (the General Queue).

- Allow the Area EPS Operator to reserve levels DER available capacity in the Priority Queue that differs from the General Queue.

These changes would allow the Company to alter our technical planning standards to reserve differing levels of DER for the Priority Queue and the General Queue, effectively reserving capacity for and prioritizing customer-sited Small DER.

The Company further requests as part of this Proposal that for any changes to the MN DIP ordered by the Commission in this matter that the Company be authorized in this docket to make corresponding tariff changes to the tariffed version of the MN DIP at tariff sheets 10-180 to 10-181.

Dated: November 1, 2023

Northern States Power Company

TECHNICAL PLANNING STANDARD ADJUSTMENT ANALYSIS

1. Why do we need a Technical Planning Standard

The Technical Planning Standard (TPS) is necessary for operating a safe and reliable grid and provides an appropriate balancing of interests, as interconnection applications in heavily distributed energy resource (DER) congested areas continue to be submitted and queue congestion continues to expand to additional feeders.

Our engineering judgement to plan, design and operate the distribution network goes to the core of what we do. We need to use this judgement to fulfill our statutory obligations to "…furnish safe, adequate, efficient, and reasonable service" (Minn. Stat. §216B.04). In doing so, we need to also "…comply with all applicable governmental and industrial standards required for the safety, design, construction and operation of electric distribution facilities…" (Minn. Stat. §216B.029, subd. 1(d)). Our tariff further reflects the requirement that we use "good utility practices" (tariff sheet 6-27.1), and MN DIP further requires use of Good Utility Practices. Good Utility Practice requires the use of standard operating procedures, which help us to fulfill our statutory duties – to assure reliability of our network and safety for our employees and customers. The Company is the expert at running our system safely and reliably, and we must be able to use this expertise and engineering judgement on how we operate our system as well as for developing generic standards, such as the TPS.

The benefits of standard operating procedures include the following:

- **Safety:** consistency in technology, equipment, operations, and training helps us to provide a safer distribution network and safer working conditions for our crews;
- **Reliability:** consistency in technology and equipment helps us to provide more reliable service;
- **Cost-effectiveness**: similar technology built consistently across our service territory allows for similar equipment, design and installation, keeping costs low as we are not reinventing the wheel for each different location;
- **Consistency**: consistency in operations provides an additional layer of worker safety for both our internal and external union field workers. Further, equipment maintenance can be conducted the same way regardless of location. Also, as a practical matter, we can only reliably train crews on a limited number of practices and types of equipment used;

- **Shared Resources**: we can use shared resources with respect to performing maintenance and/or operation without the need for specified crews and additional training; and
- **Troubleshooting and Training**: consistency in technology and operations provides a straightforward trouble shooting process and allows for a simpler, more uniform training process.
- **Avoids unreasonable discrimination:** this approach aligns with the statutory requirements under Minn. Stat. §§ 216B.03, .17, and .23.

The Company must consider not just the current state of the distribution system, but also look at the long-term adequacy of the distribution system to serve all our customers – including both load and generation – over the entire life of any DER project. In the early stages of the CSG program, it was not foreseen that a number of the Company's feeders would be pushed to their limits in just a few years. Even though this accounts for a small percentage of our feeders, they face real risks we must mitigate. One of the risks is the impact of large customer load changes in the foreseeable future, and this potential needs to be part of our planning considerations. For example, of those feeders that have been listed as constrained in our Public DER Queue[1], approximately 11 percent have one large customer that accounts for at least 10 percent of the load on the feeder. In today's environment of mergers, acquisitions, online purchases, rising inflation and other considerations, losing large customer loads is a real possibility. This would decrease the DML on a feeder and cause a situation where DER generation could be running at equipment limits, requiring curtailment of the DER until a longer-term solution is in place.

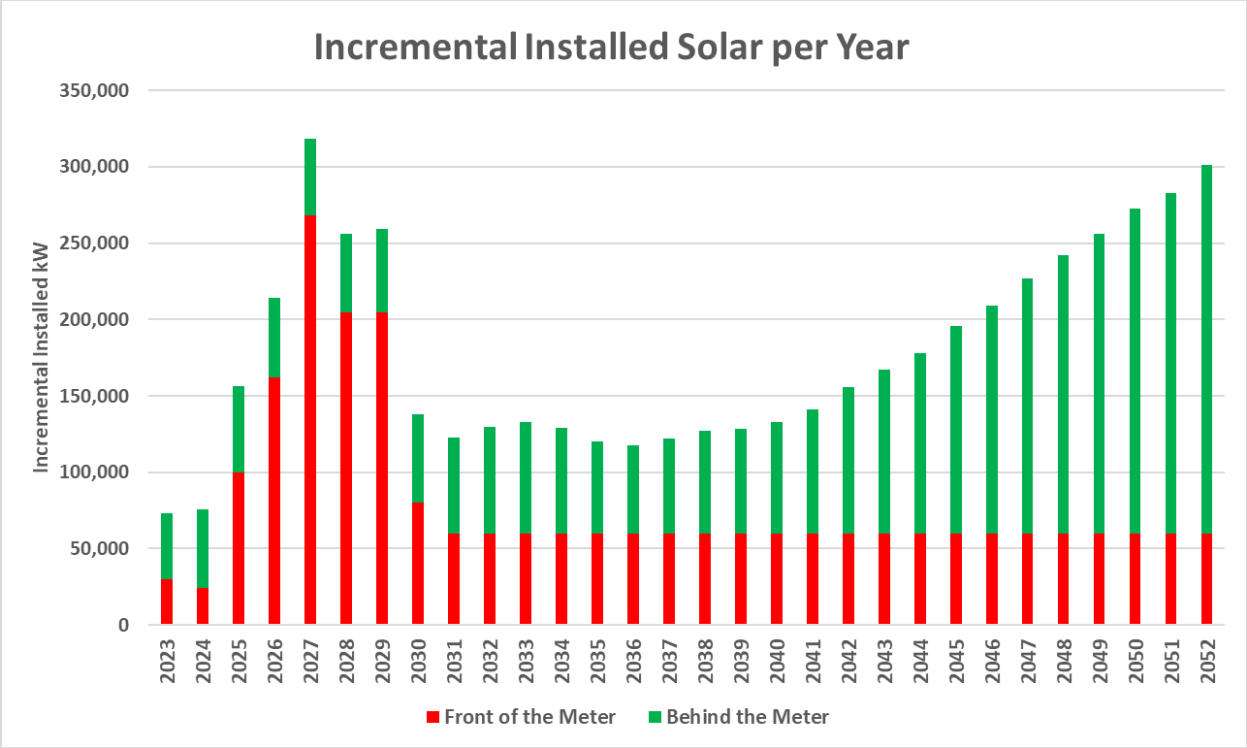
2. Why does the TPS need to change to prioritize Small DER

The majority of DER on the capacity constrained feeders and transformers are large, dedicated power producing facilities (dedicated power facilities), which are not necessarily located near load and are not evenly distributed across the feeders the way net metering DER interconnection are. As filed in the IDP, the Company's forecast of DER includes 500 MW of solar for the Distributed Solar Energy Standard allocated in the years 2026-2029, as well as the assumption that we will reach the annual cap of the CSG program of 100 MW in the first year, 80 MW in the second year, and then 60 MW per year after that. This results in around 900 MW of dedicated

[1] https://mn.my.xcelenergy.com/s/renewable/developers/interconnection

power producing solar DER interconnected between 2025-2029[2]. The Company also forecasts the annual rate of net metering DER interconnections to increase by 400% from 2036-2052. This growth forecast is shown in Figure 1 below, which shows the dedicated power producing facilities will interconnect sooner than many net metering DER and will likely consume the available capacity, leaving the net metering customers with more cost prohibitive system upgrades in the future if they are economically able to interconnect at all.[3]

Figure I - 1: Forecasted Solar Allocated to the Distribution System

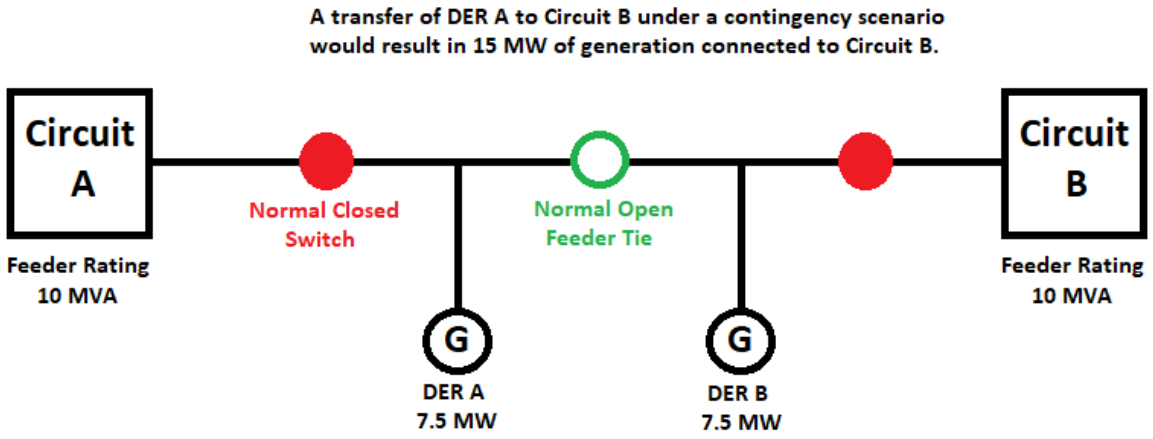


The Company has explained in its Proposal why reserving 50 percent of DER capacity for customer-sited projects up to 40 kW is appropriate given projections of future interconnections for these types of projects. Consistent with this, all of the data in Figure I-1 above cannot be true at the same time. For example, if dedicated power facilities consume the available DER hosting capacity in the next several years on feeders or substations, then the otherwise projected growth of behind-the-meter projects (such as projects up to 40 kW or other net metered on-site projects) will be unable to interconnect.

[2] IDP Attachment M – Appendix A1 Forecast Tabular Data, DER – FTM PV, High Adoption Scenario.
[3] Integrated Distribution Plan, Docket No. E002/M-23-452, Appendix A1.

The Company's planning philosophy is to load its feeders to 75 percent of its continuous rating and to have feeder ties to be able to transfer load to three other feeders. Ideally, there is an even distribution of load such that equal amounts of load are transferred to the alternate feeders. These limits are extremely important due to the standardized system design and allows for safe and reliable operation of the distribution system, which provides capacity for operational flexibility. As DER penetration levels grow, it becomes necessary to plan the system to have the same operational flexibility as well as add a margin for safety if system changes, such as an unexpected reduction or loss of load that increases the net power flow. Minnesota legislation has increased the limit for DERs participating in a Non-Legacy CSG from 1 MW to 5 MW (which would no longer be subject to the "adjacent county" rule) and created RFP bids for the Distribution Solar Energy Standard up to 10 MW, which will increase the centralization of dedicated power facilities on distribution feeders. This means even with a 75 percent planning philosophy that we use for load, that dedicated power facilities DER is not able to transfer evenly to three other feeders, and likely require disconnection or curtailment with a load transfer as demonstrated in Figure 2.[4]

Figure 2: Risk of application of 75% planning philosophy to large, centralized DER.



To apply the same feeder tie transfer capability, dedicated power facilities generation

[4] Other impacts, such as feeder tie capacity and overvoltage, may result from the transfer in addition to the rating loading of the circuit. Any transfer of DER to another substation or transformer could result in infringement on transmission capacity rights of transmission interconnected generators, therefore generators to be transferred to other substation transformers should be non-exporting.

should be planned on each feeder to 50 percent of its rating to limit the potential for rating overloads after the transfer. Otherwise, disconnection or curtailment of the generation should be reasonably expected in such a situation. The loss of that renewable generation could have impacts to resource planning, but the severity of those impacts is uncertain and back-up resources should be available on the transmission system. This transfer capability is less of a concern for net metering DER, since they are always near load and the load would be transferred with the generation, their eligible project size is limited by their annual consumption[5], and for residential applications the available space to install DER is usually further limiting to the project size. However, the instantaneous power (kW) production of the net metered DER can still exceed the customer's power draw at a given time and cause system impacts.

The Company followed industry stakeholder feedback from the DGWG to include load in the TPS calculation with the expectation that electrification would increase load and capacity for DER. Electrification does increase load and was a logical approach, but for the purposes of hosting capacity the usage of those new electric devices, such as EV charging, electric heaters, and electric stoves, must be coincident with the minimum load periods. Electrification can potentially be nullified by load reductions caused by energy efficiency improvements, closing of businesses, or responses to wholesale market service signals. In other words, the addition of that new load is not a one-to-one addition to the minimum load and in most cases are a gradual growth over many years. The Company has observed the minimum load to fluctuate from year-to-year, likely due to natural load changes or due to differing weather trends, which means the system impacts from the DER could be different from year-to-year. The Company has also observed the growth rate of DER to far exceed the growth of load in most of the capacity constrained areas in the more rural parts of the state. In fact, as we mentioned in our August 2023 quarterly DER report, on average the minimum load of capacity constrained feeders has been trending down over the last five years.[6]

[5] Net metered DER sized significantly larger than the onsite load would have similar risks to DPPFs in load transfer scenarios.
[6] Xcel Energy DER Quarterly Report, August 15, 2023, Docket E999/CI-16-521, at pages 23-24.

CERTIFICATE OF SERVICE

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

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

xx electronic filing

DOCKET NO. E999/CI-16-521

Dated this 1st day of November 2023

/s/

_____

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Samantha	Norris	samanthanorris@alliantenergy.com	Interstate Power and Light Company	200 1st Street SE PO Box 351 Cedar Rapids, IA 524060351	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Logan	O'Grady	lograd y@mnseia.org	Minnesota Solar Energy Industries Association	2288 University Ave W St. Paul, MN 55114	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Timothy	O'Leary	toleary@llec.coop	Lyon-Lincoln Electric Cooperative, Inc	P.O. Box 639 Tyler, MN 561780639	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Jeff	O'Neill	jeff.oneill@ci.monticello.mn.us	City of Monticello	505 Walnut Street Suite 1 Monticelllo, MN 55362	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Wendi	Olson	wolson@otpco.com	Otter Tail Power Company	215 South Cascade Fergus Falls, MN 56537	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Russell	Olson	rolson@hcpd.com	Heartland Consumers Power District	PO Box 248 Madison, SD 570420248	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Bethany	Owen	bowen@mnpower.com	Minnesota Power	30 West Superior Street Duluth, MN 55802	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Cezar	Panait	Cezar.Panait@state.mn.us	Public Utilities Commission	121 7th Place East Suite 350 St. Paul, MN 55101	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Dan	Patry	dpatry@sunedison.com	SunEdison	600 Clipper Drive Belmont, CA 94002	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Jeffrey C	Paulson	jeff.jcplaw@comcast.net	Paulson Law Office, Ltd.	4445 W 77th Street Suite 224 Edina, MN 55435	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Dean	Pawlowski	dpawlowski@otpco.com	Otter Tail Power Company	PO Box 496 215 S. Cascade St. Fergus Falls, MN 565370496	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Susan	Peirce	Susan.Peirce@state.mn.us	Department of Commerce	85 Seventh Place East St. Paul, MN 55101	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Wess	Pfaff	wes.pfaff@mrenergy.com		N/A	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Donna	Pickard	dpickardgsss@gmail.com	Genie Solar Support Services	1215 Lilac Lane Excelsior, MN 55331	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Crystal	Pomerleau	crystal.r.pomerleau@xcelenergy.com	Xcel	N/A	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
David G.	Prazak	dprazak@otpco.com	Otter Tail Power Company	P.O. Box 496 215 South Cascade Street Fergus Falls, MN 565380496	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Elizabeth	Psihos	elizabeth.psihos@idealenergies.com		N/A	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Mark	Rathbun	mrathbun@grenergy.com	Great River Energy	12300 Elm Creek Blvd Maple Grove, MN 55369	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Michael	Reinertson	michael.reinertson@avantenergy.com	Avant Energy	220 S. Sixth St. Ste 1300 Minneapolis, MN 55402	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
John C.	Reinhardt	N/A	Laura A. Reinhardt	3552 26th Ave S Minneapolis, MN 55406	Paper Service	No	OFF_SL_16-521_Official Service List PUC
Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_16-521_Official Service List PUC
Kevin	Reuther	kreuther@mncenter.org	MN Center for Environmental Advocacy	26 E Exchange St, Ste 206 St. Paul, MN 551011667	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Isabel	Ricker	ricker@fresh-energy.org	Fresh Energy	408 Saint Peter Street Suite 220 Saint Paul, MN 55102	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

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Kristi	Robinson	krobinson@star-energy.com	STAR Energy Services, LLC	1401 South Broadway Pelican Rapids, MN 56572	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Daniel	Rogers	dan@nokomispartners.com	Nokomis	2639 Nicollet Ave Ste 200 Minneapolis, MN 55408	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Michael	Ruiz	michael.ruiz@xcelenergy.com	Xcel Energy	N/A	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Darla	Ruschen	d.ruschen@bcrea.coop	Brown County Rural Electric Assn.	PO Box 529 24386 State Highway 4 Sleepy Eye, MN 56085	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Robert K.	Sahr	bsahr@eastriver.coop	East River Electric Power Cooperative	P.O. Box 227 Madison, SD 57042	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Kenric	Scheevel	Kenric.scheevel@dairylandpower.com	Dairyland Power Cooperative	3200 East Ave S PO Box 817 La Crosse, WI 54602	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
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Kay	Schraeder	kschraeder@minnkota.com	Minnkota Power	5301 32nd Ave S Grand Forks, ND 58201	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Matthew	Schuerger	matthew.schuerger@state.mn.us	Public Utilities Commission	121 7th Place East Suite 350 St. Paul, MN 55101	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Ronald J.	Schwartau	rschwartau@noblesce.com	Nobles Cooperative Electric	22636 U.S. Hwy. 59 Worthington, MN 56187	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Christine	Schwartz	Regulatory.records@xcelenergy.com	Xcel Energy	414 Nicollet Mall FL 7 Minneapolis, MN 554011993	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Rob	Scott Hovland	rob.scott-hovland@mrenergy.com	Missouri River Energy Services	3724 W Avera Dr PO Box 88920 Sioux Falls, SD 571098920	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Dean	Sedgwick	Sedgwick@Itascapower.com	Itasca Power Company	PO Box 455 Spring Lake, MN 56680	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Will	Seuffert	Will.Seuffert@state.mn.us	Public Utilities Commission	121 7th Pl E Ste 350 Saint Paul, MN 55101	Electronic Service	Yes	OFF_SL_16-521_Official Service List PUC
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Trevor	Smith	trevor.smith@avantenergy.com	Avant Energy, Inc.	220 South Sixth Street Suite 1300 Minneapolis, MN 55402	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Rafi	Sohail	rafi.sohail@centerpointenergy.com	CenterPoint Energy	800 LaSalle Avenue P.O. Box 59038 Minneapolis, MN 554590038	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Beth H.	Soholt	bsoholt@windonthewires.org	Wind on the Wires	570 Asbury Street Suite 201 St. Paul, MN 55104	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Marcia	Solie	m.solie@bcrea.coop	Brown County Rural Electrical Assn.	24386 State Hwy. 4, PO Box 529 Sleepy Eye, MN 56085	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

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Braden	Solum	braden.solum@idealenergies.com	iDEAL Energies	5810 Nicollet Ave Minneapolis, MN 55419	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Robyn	Sonstegard	robyn.s@northstarelectric.coop	North Star Electric Cooperative, Inc.	PO BOX 719 Baudette, MN 56623	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Brandon	Stamp	brandon.j.stamp@xcelenergy.com	Xcel Energy	401 Nicollet Mall Minneapolis, MN 55401	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
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Sherry	Swanson	sswanson@noblesce.com	Nobles Cooperative Electric	22636 US Highway 59 PO Box 788 Worthington, MN 56187	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
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Pat	Treseler	pat.jcplaw@comcast.net	Paulson Law Office LTD	4445 W 77th Street Suite 224 Edina, MN 55435	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Jeff	Triplett	triplettj@powersystem.org	MREA	10710 Town Square Dr NW St 201 Minneapolis, MN 55449	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

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Craig	Turner	cturner@dakotaelectric.com	Dakota Electric Association	4300 - 220th Street West Farmington, MN 550249583	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
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Robert	Walsh	bwalsh@mnvalleyrec.com	Minnesota Valley Coop Light and Power	PO Box 248 501 S 1st St Montevideo, MN 56265	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Roger	Warehime	roger.warehime@owatonnautilities.com	Owatonna Municipal Public Utilities	208 S Walnut Ave PO BOX 800 Owatonna, MN 55060	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Elizabeth	Wefel	eawefel@flaherty-hood.com	Flaherty & Hood, P.A.	525 Park St Ste 470 Saint Paul, MN 55103	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
John	Williamson	John.Williamson@state.mn.us	Minnesota Department of Labor and Industry	443 Lafayette Rd N St. Paul, MN 55155-4341	Electronic Service	No	OFF_SL_16-521_Official Service List PUC

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Terry	Wolf	terry.wolf@mrenergy.com	Missouri River Energy Services	3724 W Avera Dr PO Box Sioux Falls, SD 571098920	Electronic Service	No	OFF_SL_16-521_Official Service List PUC
Brian	Zavesky	brianz@mrenergy.com	Missouri River Energy Services	3724 West Avera Drive P.O. Box 88920 Sioux Falls, SD 57108-8920	Electronic Service	No	OFF_SL_16-521_Official Service List PUC