

**STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION**

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In the Matter of the Petition for approval of Northern States Power Company, dba Xcel Energy, for approval of its Community Solar Garden Program

MINNESOTA SOLAR ENERGY INDUSTRIES ASSOCIATION'S (MnSEIA) COMMENTS

December 17, 2020

Docket No. E-002/M-13-867

MnSEIA's COMMENTS

The Minnesota Solar Energy Industries Association (MnSEIA) is a 501(c)(6) nonprofit trade association that represents our state's solar businesses, with over 110 member companies, which employ over 4,200 Minnesotans.

BACKGROUND

On October 13, 2020, the Minnesota Public Utilities Commission (Commission) issued an Order¹ that, among other things, stated:

¹ See ORDER ACCEPTING NOTIFICATION PROPOSAL, In the Matter of the Petition of Northern States Power Company, d/b/a Xcel Energy, for Approval of Its Proposed Community Solar Garden Program, Doc. Id. 202010-167243-01 (October 13, 2020).

Xcel shall continue CSG stakeholder workgroup discussions of potential options to reduce and mitigate planned outages for CSGs, including possible utility protocols. The CSG stakeholder workgroup should also explore refining the earlier notice of the window of planned outages so developers can plan for outages. Xcel shall file an update and detailed summary of these discussions and potential mitigation strategies by November 1, 2020.

On November 2, 2020, Northern States Power Company, d/b/a Xcel Energy (Xcel or the Company) filed its Compliance Report—Planned Outages² (Xcel Filing or Compliance Report).

COMMENTS

I. Appreciation of the Workgroup Process

At the outset, MnSEIA would like to acknowledge both the work that has been done so far on this issue, and also the willingness of Xcel and its engineering team to come to the table to work on solutions that will mitigate planned outages in the future. While our Comments today will highlight the challenges that may need to be overcome, we do appreciate the work so far and the collaborative nature of the discussion, now that this issue has taken center stage.

We intend by our Comments today 1) to illustrate the industry's perspective of the problem, and 2) to provide solutions that might be necessary, should the work group either fail to come to agreement or take too long to do so.

II. The Disagreements Surrounding Open-Phase testing, Inverter IEEE 1547 Behavior and Arc Flash Testing Must Be Resolved

We have asked developers to provide us with the impact that these outages have had on their business. One community solar garden (CSG) developer in particular provided us with full 2020 data. Their data suggests they have lost \$377,927 this year alone due to 109 individual site events with 153 days of outages, and 1,659.5 MWhs of lost energy, which results in \$312,327 in lost generation revenue to them. The additional \$65,600 in lost revenue is really an added cost: with every outage the owner/operator needs to do a truck roll, which averages 4 hours of work and costs \$80/hr for the average technician. So, there are costs associated with these outages beyond the lost revenue.

Fortunately, we no longer need to rely on individual developer reports to illustrate the sweeping impact of these outages. Xcel has started filing their own reports, although they could only provide a little less than a month's worth of data in their initial compliance filing. This initial

² See Northern States Power, d/b/a Xcel Energy, COMPLIANCE REPORT – PLANNED OUTAGES COMMUNITY SOLAR GARDENS PROGRAM DOCKET NO. E002/M-13-867, Doc. Id. 202011-167953-01 (November 2, 2020). *Hereinafter* "Xcel filing."

report spanned September 18, 2020 through October 16, 2020, or a little under a month. In that time period, Xcel reported 40 discrete planned outage events, which when calculated on a per/day impact, resulted in 686 days of CSG outages.³ While just 28 days of data may be unrepresentative, if this same monthly pace of planned outages kept up for 12 months, then we would see over 480 planned outage events and 8,256 CSG outage-days per year.

What is of particular concern to the industry is the cause of the planned outages. According to Xcel's report:

- 464 outage days over 26 planned outage events were due to **Xcel Energy System Maintenance**;
- 212 outage days over 13 events were to accommodate upgrades for additional DER;
- And, 12 outage days from 1 outage event were for city and county work.⁴

Prior to this report, the industry had been under the impression that the bulk of the outages was due to city or county work, which is outside the control of the development community or Xcel, and the addition of more CSGs. The report, by contrast, reveals that *Xcel itself is the primary cause of the outages*, as “Energy System Maintenance” far exceeds the other categories of outages.

The challenge with Xcel being the primary cause of the outages is that this particular bucket of outage activity is the most constant of the types. Upgrades to “Accommodate Additional DER” should slow as the CSG interconnection queue fills up individual substations or feeders. “City and county” development work should slow, unless there is rapid population growth or urban sprawl. Both should be more foreseeable outage factors at the time of development. If these were the primary causes of the outages, then this challenge would lessen with time. But Energy System Maintenance is an ongoing need for the utility, and will presumably mean that major outages will continue for the duration of the 25-year contract periods that many of these gardens have.

So, the proximate cause of the outages appears to largely be Xcel, but also the reason that outages are even necessary to begin with seems to be Xcel. The Company has raised two issues regarding worker safety that have led it to turn gardens off: namely, loss of phase considerations and arc flash concerns. Let us be clear—worker safety is critically important. Worker safety, however, is not necessarily as at odds with continued CSG operation. We believe there is a perception of a system-wide worker safety issue, when there is perhaps only a minor project-by-project issue of worker safety.

³ See Northern States Power, d/b/a Xcel Energy, QUARTERLY COMPLIANCE FILING COMMUNITY SOLAR GARDENS DOCKET NO. E002/M-13-867, Doc. ID. 202010-167627-01 (October 23, 2020) at Attachment E, 20-25.

⁴ *Ibid.*

A. Loss of Phase Considerations

The perception of a worker safety issue truly arises from **Xcel’s initial program requirements that developers install a grounding transformer**. Grounding transformers are typically necessary for rotating generators, but are not necessary for solar installations that have inverters. The solar industry, however, did not initially fight the imposition of the grounding transformer, because adding that as a DER requirement is within the utility’s purview. However once the grounding transformers were installed, a peculiar phenomenon occurred. When Xcel had loss of phase issues, **the grounding transformer regenerated the phase for the inverters**—and so the inverters never shut off, giving the impression of a hazardous situation. This impression led Xcel to determine that an “Open Phase Test” was necessary for all existing gardens, and developers were—at their own expense—left to solve the loss of phase situation.

Yet, Xcel has characterized the problem as one of inverter settings, while ignoring the grounding transformer requirement:

In 2018 we began requiring open-phase testing for all interconnected CSGs. Through this testing, it was discovered that DER had the capability to continue operating during an open phase condition. This was unexpected as it is non-compliant with IEEE 1547. Although DER sites had to pass the open-phase test prior to receiving Permission to Operate (PTO), it was also observed that firmware changes to the inverter contributed to unexpected open-phase conditions. Due to the frequency of firmware updates, it is possible sites that are compliant at the time of PTO may not be compliant after firmware updates post-PTO. For these reasons, we modified our work practices to remove DER during hotline work.⁵

Nokomis Energy contradicts this characterization of non-compliance with IEEE 1547 requirements:

⁵ See Xcel filing at 3.

This statement is conflating multiple separate issues, and seems to claim (falsely) that inverters are not in compliance with IEEE I547. This is incorrect. Nokomis is not aware of any evidence suggesting inverters are noncompliant with IEEE 1547 (and by extension UL 1741), nor has Xcel presented any. We want to make sure the Commission appreciates that Nokomis is not aware of any issues with inverter operation, either before or after firmware upgrades.

The issue Xcel is describing is system noncompliance during Xcel's loss of phase testing, which involves, among other things, a grounding transformer between the inverters and the point of interconnection. Xcel's loss of phase testing only analyzes system compliance, not inverter compliance. We look forward to discussing the best resolution to the system noncompliance Xcel is detecting within the workgroup.⁶

Because Xcel never gave a firm, preferred solution to the loss of phase issue, developers have implemented a slew of solutions currently in the field. Many of those solutions are not impacted by any firmware updates. Yet, the Company unilaterally changed its operating procedures to shut off all gardens, even though only a handful might face this particular challenge as part of their solution to the problem that Xcel created with its unnecessary grounding transformer requirement.

Xcel's requirement of a grounding transformer appears to be the root cause of the open phase issue that Xcel itself describes, but it is the industry that has been forced to continually grapple with the expense of that choice. It is the industry's position that Xcel's unnecessary requirement for a grounding transformer has not only cost developers upfront dollars to purchase this equipment, but also *created* the need to turn existing gardens off during hotline work.

B. Arc Flash Concerns

A very similar issue has arisen now under the pretext of "arc flash" concerns. Arc flash testing itself is a relatively new issue for Xcel that seems to have arisen this year as further justification to shut off gardens.

Preliminary results from the Company's arc flash study presented to the technical stakeholder group on December 7th illustrate that *none* of the currently interconnected CSGs—individually or in aggregate—create enough incident energy to surpass the 8 cal/cm² threshold level of incident energy, where hotline solutions are no longer viable without significantly raising the level of personal protective equipment to do so. The technical workgroup meeting suggested that more than 75% penetration by CSGs would be required to create that level of incident energy. Yet, despite having no evidence thus far to justify its safety concerns, the utility has no plans to

⁶ See Nokomis letter at 1.

alter its practices to allow gardens to continue to operate until the full study is completed in about twelve months.

One also has to wonder why arc flash testing was not done prior to the addition of DERs, if it is so integral to Xcel worker safety. If the concern is so great that we need to keep shutting gardens off for another year, a study like this one should have been done before the addition of 700+ MW of CSGs.

Perhaps that contradiction is why Nokomis has claimed for months that Xcel mischaracterizes the arc flash problem. In their May 19th letter, Nokomis stated the following:

The Compliance Report also characterized Nokomis' presentation to the workgroup, stating that Nokomis 'identified the problem as being arc flash contributions at the feeder level as a result of interconnected DERs.' (p. 8) This is not accurate. Nokomis has not yet seen any evidence that arc flash is a problem for feeder-connected DER.⁷

The slide presented by Nokomis at that stakeholder workgroup meeting shows the text, "Xcel has **theoretical** concerns about arc flash contributions of feeder interconnected DERs."⁸ The difference, Nokomis contends in its slides, lies in effective grounding requirements. Xcel standards, according to Nokomis, "appear to be based on inaccurate and outdated methodologies, [...] which considers Inverters to be treated as Rotating Generators."⁹ Nokomis's presentation stated that the physical characteristics of inverters are such that, "the magnitude and phase angle of the synthesized voltage is controlled very rapidly such that the output current deviates little from the desired value,"¹⁰ leading to the conclusion that, "in most situations, no supplemental ground source is needed to achieve effective grounding," and furthermore, that a supplemental ground source can create an "increased arc flash hazard, due to increased current but primarily due to slowed fault clearing."¹¹ This dive into electrical engineering suggests that **arc flash is an issue with Xcel's grounding requirements, and not inverters at CSG facilities.**

The arc flash study is indicative of the general problem. While Xcel states there are "worker safety concerns," there is little evidence that keeping gardens online will create harmful situations.

C. Why an Immediate Solution Is Required

To summarize the situation: Xcel has 1) required grounding transformers when most other utilities do not; 2) which caused garden inverters to stay active when loss of phase events occur; 3) which caused Xcel to implement a requirement that each existing garden pass an "Open Phase

⁷ See Nokomis letter at 2, quoting Stakeholder Workgroup – Solar*Rewards Community, 5.19.2020 at 8

⁸ See Xcel filing, Attachment B at 132 (emphasis added).

⁹ *Id* at 134.

¹⁰ *Ibid.*

¹¹ *Id* at 140.

Test” at the developer’s expense, and that was customized by the developer; 4) which resulted in some developers picking solutions that may have challenges with firmware updates; 5) which made Xcel regard hotline work to be unsafe on *all gardens*—regardless of whether that solution would be impacted by firmware changes—and created the self-imposed need for an arc flash study); 6) which made Xcel determine that in instances of hotline work it needed to turn the gardens off until all developers prove firmware updates will not impact their inverters and the arc flash study is completed; 7) which means whenever Xcel decides to do system maintenance around gardens it will turn the gardens off, regardless of any open phase testing solution; 8) which means that Xcel is both the general cause of all outages for gardens with optimal open phase testing solutions, and is the specific cause of the majority of the planned outages.

Developers that implemented solutions to the open-phase testing requirements that will not backfeed onto the grid when a phase is lost are losing hundreds of thousands of dollars because of Xcel choices, which were only implemented because of a series of unfounded assumptions that begin with a misapprehension of inverter characteristics, and lead to the as-of-yet unsubstantiated conclusion that live CSGs materially increase the risk of arc flashes during hotline work. It is a series of utility choices that has led to significant costs, which so far the industry has borne largely by itself. The current plan, however, is for the utility to continue studying arc flash concerns and for developers to continue to lose additional revenue in the interim. A mitigation strategy is needed now.

III. Mitigation Strategies

Because developers, owners and operators have had to bear the costs of Xcel’s choices, any solution must put the onus on the utility. This is the only way to shift the weight of these choices into a more equitable position.

A. Technical Solutions

There are a number of potentially viable technical solutions available to ensure that gardens can remain online in the future when Xcel’s current practice during such an event would take them offline. Xcel and other stakeholders proposed a number of technical mitigation options prior to the July 14, 2020 meeting, including but not limited to: 1) Install Electronic Recloser at the point of common coupling (PCC); 2) Cap “maxed out” feeders; and 3) Study arc flash conditions to see if taking CSGs offline is necessary;

Some of these ideas have already been nixed due to infeasibility. But some progress has been made. We will discuss each in turn.

First, Electronic reclosers at the PCC became required as of April 2020, for all new CSGs. Adding reclosers at the PCC and/or proof of phase loss test and arc flash compliance should alleviate the Company’s concerns. But the problem may remain for existing CSGs where

retrofitting them is unduly burdensome. The cost of retrofitting them—estimated at \$60,000-\$70,000 per CSG— falls to the owner/operator of the CSG, which is a tremendous amount to ask from gardens that have already been directly impacted by revenue-reducing outages. Because a substantial portion of the challenge has arisen from Xcel’s choices, a substantial portion of the cost for electronic reclosers at the PCC, which is a viable solution for the utility, should fall on Xcel.

Second, the concept of “maxed out feeders,” which would limit the amount of distributed energy resources (DER), including or even especially CSGs, before triggering the need to reductor any feeder lines is another Xcel-proffered solution. In addition, the portion of the capacity set aside for DER would be further divided, with a reserve kept for small, behind-the-meter DER, and a larger portion available for standalone DER like CSGs. We should note that Xcel has proposed this idea in a different venue—the Hosting Capacity Report workgroups—where a reserve minimum daytime load would be set aside. This idea effectively limits the amount of DER added to any given feeder. So it is being discussed. MnSEIA has put forward verbal requests for additional information before articulating a position on the proposal. Thus, we take no position on this solution at this time.

Third, the arc flash study has produced some promising early results, as referenced above. The industry would prefer to continue down this path as quickly as is reasonable. We are optimistic that the final results of the arc flash study will illustrate that there are no real arc flash concerns. Our hope is that Xcel works as quickly and efficiently as possible. We have seen Xcel make progress with the arc flash study even since submitting the filing in question here. To that end, we respectfully request that the Company present its progress to the Commission at the hearing on this issue. We also would like to schedule a series of updates in the upcoming months to ensure the study is completed as quickly as possible.

In general MnSEIA remains supportive of a technical solution, and we will continue to work with the utility in good faith on any of the above solutions. But our concern is that the study process is taking substantial time. Each month that goes by without a technical solution to reduce the number of planned outage events ensures more and more lost revenue for existing gardens and their subscribers. We should stress that *these events undermine the financeability of the entire program.*

We believe an end-date should be implemented for a technical solution. We respectfully request a second hearing to be scheduled for fall or winter 2021 at the latest to ensure that a technical solution, should one exist, be implemented before any further outages transpire in 2022.

Having check-ins, due dates, and hearings will help to ensure that if a technical solution exists—and we believe it does—that it is implemented expediently. And, that if no technical solution is viable, then some alternative remedy is put into place by year’s end.

B. Non-technical Solutions: The Volume of Planned Outages Requires Compensation

Some solutions beyond technical approaches require utility compensation. Of those there are two: 1) the utility pays gardens (and/or subscribers) directly for the lost revenue of the offline CSGs; and 2) the utility offers a day for day extension on the 25-year term for gardens that are offline. These concepts are not mutually exclusive with a technical solution, and MnSEIA recommends that the Commission adopt one of them even if a technical solution is eventually agreed to. We will outline each in turn.

The first concept is simple. Since we've established that the gardens should never have been turned off to begin with due to the unnecessary requirement of a grounding transformer and yet all of the burden has fallen on the development community, Xcel has caused substantial damages to subscribers, developers, owners and operators. The utility should pay for the unnecessary harm that it has caused at a rate that is commensurate with the harm caused. Minn. Stat. § 216B.1641(d) requires that "the public utility must purchase from the community solar garden all energy generated by the solar garden," and section (e) requires that the program "reasonably allow for the creation, financing, and accessibility of community solar gardens." Xcel's practice has run afoul of both prongs of the statute. They have unilaterally turned gardens off, thus depriving the garden owner from generating energy. The impacts of these outage decisions is chilling the market, making gardens less financeable and accessible. It is harder to sell a project when it is unclear how much production will be possible.

Xcel's conduct is also violative of the program rules and the interconnection agreement. By failing to procure power for what appears to be unnecessary technical reasons, the utility is violating the 25-year term of the agreement. Some gardens are losing close to 10% of their production in a given year due to this issue, which if perpetuated is equivalent to losing 2.5 years off the contract period.¹² If it turns out there really was no basis for these shutoffs, the utility should be required to compensate the developers for the 2.5 years (or whatever the specific garden lost) worth of lost revenue.

Secondarily, we posit the concept of a day-for-day extension at an extension of the gardens' corresponding VOS or ARR rate. Direct compensation is our primary request for a non-technical solution.

The concept of a day-for-day extension may also work. With this solution, the utility is effectively required to fulfill the full 25-year term of its contract. The contract period is extended by the amount that the garden has been turned off. The utility gets energy, capacity and other

¹² See Novel Energy Solutions, REPLY COMMENTS, DOCKET NO. E002/M-13-867, Doc. ID. 20198-155559-01 (August 29, 2019) (referencing garden SRC number 038294 that was out 36 days by August of 2019, and 36 days divided by 365 days in the year would be a 10% outage rate assuming no further outages are recorded. Other gardens listed were on a similar pace for outages).

benefits, and the garden and subscribers get paid for the production. Presumably the Commission could set this contract extension within the CSG program rules, just as it set the initial 25-year term requirement.

Part and parcel with this solution is that it also starts a conversation around what happens when a garden reaches the end of its 25-year term. If the garden can and still produces, what does the utility pay the garden for the production? Assuming Minn. Stat. § 216B.164 and PURPA remain in place, the garden would presumably be a subscriberless powerproducer that is compensated at the utility's avoided cost rate. Minnesota law allows for avoided costs to be 1) set by the Commission; 2) the result of a least cost bid; or 3) the product of a negotiation.¹³ In this instance, we are requesting that the Commission set a pre-negotiated rate of the vintage year VOS with a term-length (and continuing VOS escalation) that is commensurate with the duration of the outages.

Here, the Commission could pre-set a rate for all gardens that have been impacted by planned outages. The Commission set rate could be the garden's VOS or ARR rate continued for an additional day-for-day allowance until the garden operator is made whole for the lost production associated with the outages the garden had, assuming the garden remains subscribed. Thereafter, the garden would receive a more traditional avoided cost rate for further energy production, but the subscription requirement would be lifted. Any garden that did not see outages would be eligible for traditional avoided cost pricing alone.

This approach negatively impacts gardens more than the initial approach, because while the gardens and subscribers are ultimately made whole in principle, in actuality the contract extension will provide money well after when it should have initially been received. Additionally, modules likely will be degraded substantially by the time the extension occurs.

However, MnSEIA believes that either of the above options will help mitigate the damages done by the current outage scenario, and as such, we believe that one should be adopted in conjunction with a technological fix—or if no technological fix can be implemented, then as a stand-in. We believe strongly that some sort of compensation is warranted to the subscriber and owner-operator communities, because the utility's choices have led to substantial, unplanned, and potentially unnecessary revenue losses for them. Xcel's overabundance of caution has resulted in huge expenses, and we believe that compensation of some form is required for the previous outages and the outages that are likely to occur while a technical solution is approved and implemented.

¹³ See Minn. Stat. §216B.164, subd. 4.

Conclusion

The planned outages at issue in this Notice and Comment Period have cost garden subscribers and owner-operators enormous sums, and further impact the financeability of future CSG development, contrary to the enabling statute. The fault does not lie at the feet of the subscribers or the developers. Rather, a misinterpretation or misapplication of an IEEE standard, which had not been recommended for compliance purposes, has led to a cascading series of decisions that ultimately took gardens offline. While those decisions were made with worker safety at the top of mind, the original misapprehension of inverter mechanics and subsequent grounding transformer requirement created the very conditions that undermine worker safety.

While we remain hopeful that engineering solutions can staunch the bleeding and prevent further outages, we nonetheless urge that non-technical means may make subscribers whole for the damage incurred. Furthermore, those financial mechanisms may disincentivize the Company from further planned outages.

Regardless of what solutions the Commission decides to adopt, speed is of the essence. Frequent, near-term reports from Xcel's ongoing arc flash studies should sufficiently inform the Commission, stakeholders, and the Company's own engineers of the non-threatening nature CSGs pose to worker safety.

We are confident that this contentious and technically challenging issue can be resolved to the satisfaction of the stakeholders involved, and that Xcel's otherwise successful CSG program can continue fruitful development.

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