STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION

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Valerie Means	Commissioner
Matt Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John Tuma	Commissioner

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) REPLY COMMENTS**
December 9, 2020	**Docket No. E-002/M-13-867**

MnSEIA's REPLY 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

The Minnesota Public Utilities Commission (Commission) adopted the Value of Solar (VOS) methodology in its April 1, 2014 Order in Docket No. E999/M-14-65, and approved its use for Northern States Power Company, d/b/a Xcel Energy's (Xcel or the Company) Solar*Rewards Community (CSG) Program through the Commission's September 6, 2016 Order in this docket.

On September 1, 2020, Xcel submitted its VOS calculation for the vintage year 2021.[1]

[1] *See* Northern States Power Company, d/b/a Xcel Energy, COMPLIANCE FILING 2021 VOS CALCULATION COMMUNITY SOLAR GARDENS PROGRAM, DOCKET NO. E002/M-13-867, Doc. Id. 20209-166369-01 (Sept. 1, 2020). *Hereinafter* "Xcel Calculation" or "Xcel Filing."

On September 4, 2020, the Commission issued a Notice of Comment Period seeking comment on Xcel's calculation of the VOS rate for 2021.[2] Among the topics open for comment were: "Did Xcel correctly implement the approved VOS methodology in determining the updated system-wide VOS rate for vintage year 2021?"; "Are the input values and updates, and subsequently calculated system-wide results, correct?"; and, "Did the Company meet all requirements of past Commission Orders, including Orders issued March 4, 2020 and December 3, 2019, in the above-cited docket?"

On September 30, 2020, the Minnesota Department of Commerce, Division of Energy Resources, (Commerce, or the Department) submitted Comments.[3] The Department noted that the VOS had declined by .48 cents per kWh levelized when compared to the 2020 vintage, and agreed with the Company[4] that the primary driver of the decrease in the rate was "a decrease in avoided fuel costs." The Department also noted that "slight increases in avoided operations and maintenance costs, avoided generation capacity cost, and avoided distribution capacity cost"[5] partially mitigated the drop in the VOS rate. Commerce recommended that the Commission approve Xcel's proposed 2021 vintage VOS.

On October 14, 2020, MnSEIA requested a 30-day extension of the Comment period on the grounds that Xcel had provided contradictory data in its initial VOS filing.[6] MnSEIA also made Information Requests to the Company in order to clarify these contradictions. On October 15, 2020, the Commission issued a Notice of Extension.[7] On October 28, 2020, the Company filed a Corrected Attachment O in response to MnSEIA Information Requests.[8]

On November 18, 2020, MnSEIA filed initial Comments.[9] MnSEIA took issue with the Company's decision to average PV Fleet Data for the Capacity Factor as three separate data

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[2] *See* NOTICE OF COMMENT PERIODS, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 20209-166427-01 (September 4, 2020).

[3] *See* Minnesota Department of Commerce, Division of Energy Resources, Comments of the Minnesota Department of Commerce, Division of Energy Resources, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 20209-166951-01 (September 30, 2020). *Hereinafter* "Commerce Comments."

[4] *See* Xcel Filing at 1.

[5] *See* Commerce Comments at 2.

[6] *See* Minnesota Solar Energy Industries Association, Extension Request, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202010-167314-01 (October 14, 2020).

[7] *See* NOTICE OF EXTENDED COMMENT PERIOD, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202010-167340-01 (October 15, 2020)

[8] *See* Northern States Power Company, d/b/a Xcel Energy, CORRECTED ATTACHMENT O, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202010-167732-02 (October 28, 2020).

[9] *See* Minnesota Solar Energy Industries Association, COMMENTS, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202011-168426-02 (November 18, 2020). *Hereinafter* "MnSEIA Comments."

points, and suggested that the Company should be required to use a weighted average instead. MnSEIA also criticized the Company's decision to use the NYMEX natural gas futures, on the grounds that that index highlights short-term speculation, rather than a rational forecast for avoided costs of gas years in the future; MnSEIA offered several alternatives, including the methodology used in the Company's Conservation Improvement Plan (CIP) filings. MnSEIA also suggested that, for reasons of public policy, the Commission should not let the drop-off between the 2020 and 2021 vintage VOS rates serve as a perverse incentive for the Company to delay interconnections. Finally, MnSEIA urged the Commission to consider an extension of the Residential Adder, so as to steer the program toward residential participation.

Cooperative Energy Futures (CEF) also submitted Comments[10] on November 18, 2020. CEF voiced concerns that the PV Fleet Shape was not appropriately applied, as required by the VOS methodology, to the calculation of the Effective Load Carrying Capacity, Peak Load Reduction, Loss Savings, and Solar Weighted Heat Rate. CEF also voiced concern—like MnSEIA—that Xcel's use of an unweighted 3-year average to calculate the Capacity Factor was an inaccurate representation of the actual capacity factor, and a misinterpretation of the Commission's intent. CEF reiterated Prof. Gabriel Chan's point during discussion of the 2019 vintage VOS that a NYMEX-based projection is a poor predictor of natural gas prices very far into the future, and noted its inconsistency with the Company's CIP filings. CEF also recommended that the residential adder be extended an additional 2 years.

On November 24, 2020, Assistant Professor Gabriel Chan, of the Hubert H. Humphrey School of Public Affairs, filed Revised Comments.[11] Chan's Comments highlighted 3 concerns with Xcel's proposal. First, like MnSEIA and CEF (which both refer to Chan's critique of the NYMEX in regards to the 2019 vintage VOS), Chan reiterated his point that NYMEX futures are a poor representation of what they are supposed to stand in for in the VOS methodology—that is, actual avoided fuel costs decades in the future. Second, Chan discussed how the Solar-Weighted Heat Rate fails to distinguish between intensive marginal resources and extensive marginal resources, which is to say gas burned and gas plants built. Third, Chan argues that coal, not gas, may be the marginal fuel for a good portion of the generation displaced by solar, and therefore marginal emissions factors used in the methodology may actually *undercount* emissions displaced by solar generation.

COMMENTS

[10] *See* Cooperative Energy Futures, COMMENTS, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202011-168424-01 (November 18, 2020). *Hereinafter* "CEF Comments."
[11] *See* Gabriel Chan, REVISED COMMENTS, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 202011-168552-01 (November 24, 2020). *Hereinafter* "Chan Comments."

I. The Commission Should Require Xcel to Use a Weighted Average to Calculate the PV Fleet Shape and Should Require Xcel to Apply the PV Fleet Shape Data to All VOS Components that Use It.

As we stated in our initial Comments,[12] Xcel's introduction of a straight-line average of the years 2017, 2018, and 2019 to calculate the PV Fleet Shape misrepresents the Commission's intent, and is not adequately substantiated. The calculations **overweight unrepresentative PV Fleet Data from 2017** by weighting the years 2017, 2018, and 2019 the same, despite a vast disparity in data quantity and quality between the years. Xcel proposes to treat data gathered from 27 MW of CSGs in 2017 the same as data gathered from 600 MW of all kinds of distributed generation (DG) solar in 2019. We proposed that the Commission order Xcel **to use a weighted average of the three years of PV Fleet data to calculate the PV Fleet Shape**, and in the alternative, revert to the previous methodology by using the 2019 data as a stand-alone year.

In its response to MnSEIA Information Request 40, Xcel provides a calculation of what this PV Fleet Shape would look like.[13] The weighted MWh/MW calculation "presumes hourly solar production of each MW installed is a function of the total operational MW in any single hour."[14] The relative weights of each of the three production years are as follows: 3.5% for the 27 MW in 2017; 32.6% for the 253 MW in 2018; and 63.9% for the 495 MW in 2019.[15] The use of a weighted average for the PV Fleet Shape changes the Actual First Year Annual Energy Production from 1550 kWh/kW to 1520 kWh/kW.[16] The corresponding VOS rate is $.1113/kWh levelized.[17]

The only other party to issue Comments on this issue, CEF, agrees.[18] CEF "recommends that the PUC direct Xcel to calculate Annual Avoided Energy based on a weighted average of the Annual Avoided Energy calculated in each year to account for the differential volume of systems in which data was available in each year."[19] CEF further maintains that the Effective Load Carrying Capacity (ELCC), Peak Load Reduction (PLR), and Loss Savings in the 2021 vintage VOS calculations proposed by Xcel were not calculated from the PV Fleet Shape, as required by the Commission:

[12] *See* MnSEIA Comments at 2.
[13] *See* Xcel Response to MnSEIA Information Request 40.
[14] *Id*. at 1.
[15] *Ibid*.
[16] *Id*.at 2.
[17] *Ibid*.
[18] *See* CEF Comments at 5.
[19] *Ibid*.

> In its calculation tables for ELCC, Loss Savings, and PLR (Attachments E-G), the PV Fleet Shape is not referenced and a Load Analysis Period of January 1, 2010 through January 1, 2011 is used instead. Additionally, in all three tables, a modelled assumption of 50MW of solar is listed, suggesting that Xcel Energy has used some other modelling approach to calculate ELCC, Loss Savings, and PLR, likely using a load model with predetermined solar load assumptions. The Commission should reject this approach, as it clearly diverges from the approved Value of Solar Methodology in multiple ways:
>
> 1. The ELCC methodology states that "ELCC will be calculated from the PV Fleet Shape for hours ending 2pm, 3pm, and 4pm Central Standard Time during June, July, and August over the most recent three years." (emphasis added).
>
> 2. The PLR methodology states that "The PLR is defined as the maximum distribution load over the Load Analysis Period (without the Marginal PV Resource) minus the maximum distribution load over the Load Analysis Period (with the Marginal PV Resource). ... All hours over the Load Analysis Period must be included in the calculation. This is because the reduced peak load may not occur in the same hour as the original peak load." (emphasis added).
>
> 3. The Loss Savings methodology states that "When calculating avoided marginal losses ... Avoided losses are to be calculated on an hourly basis over the Load Analysis Period... The avoided losses are to be calculated based on the generation (and import) power during the hour and the expected output of the Marginal PV Resource during the hour. ..." (emphasis removed)[20]

MnSEIA Information Requests 41-44 sought to clarify CEF's concerns with Xcel's methodology in the 2021 vintage VOS. Xcel's answers confirm that the methodology uses a proxy, "based on a solar production profile grossed up to 50 MW."[21] Furthermore, that proxy "has been used in this analysis since inception."[22]

The Company's reliance on the use of that proxy in past years may have comported with the other modeled values in past vintage calculations, but it does not comport with the Commission's intent for the 2021 vintage. In the Order approving the 2020 VOS, the Commission specifically required the Company "to conform to the approved VOS Methodology when filing future VOS

[20] *Id.* at 5-6.
[21] *See* Xcel's answer to MnSEIA Information Request 41.
[22] *Ibid*.

rate calculations based on actual PV production data."[23] The Xcel filing falls short of the Commission's intent in regards to the ELCC, PLR, and Loss Savings.

To that end, MnSEIA Information Request 45 asked the Company to provide a calculation of the 2021 vintage VOS with the ELCC, PLR, and Loss Savings using the PV Fleet Shape derived from the Corrected Attachment O data. The Company notes in its response that the solar capacity credit value with "this approach provides a significantly different capacity credit value of 66%."[24]

This approach also yields a significantly different 2021 vintage VOS of $.1269/kWh levelized.[25]

The above calculation, while it conforms more closely to the Commission's intent to use actual PV production data, *still overweights unrepresentative data from 2017*, because the Corrected Attachment O considers 2017, 2018, and 2019 production as single data points with equal weight. MnSEIA Information Request 46 asked the Company to provide a VOS calculation with ELCC, PLR, and Loss Savings with a PV Fleet Shape derived from a weighted average PV Fleet Shape, as with MnSEIA Information Request 40.

That approach yields a 2021 vintage VOS of $.1308/kWh levelized.[26]

While we did not request information on a recalculation of Xcel's solar weighted heat rate using the actual PV Fleet Shape production data, we assume that including that value as well would similarly be in the Commission's interest. Now that the Commission has Ordered the adoption of real-world fleet production data, it would follow to apply it to all values that could use the PV Fleet Shape.

In short, after seeing the rate suppression impacts of Xcel's partial application of the PV Fleet Shape, we support CEF's comments in full. Xcel appears to have largely chosen to apply real world fleet production data only to the VOS components that result in a lower rate. We ask that the Commission direct Xcel to conform to the approved VOS Methodology by applying actual PV production data—instead of legacy modeled data—to the ELCC, PLR, Loss Savings, and Solar Weighted Heat Rate. For the reasons we and others elucidated in our initial Comments, we ask that the applied PV production data use a weighted average that effectively treats each MW of capacity the same, consistent with Information Request 46.

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[23] *See* ORDER APPROVING XCEL'S UPDATE TO THE 2020 VALUE-OF- SOLAR RATE, 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, DOCKET NO. E-002/M-13-867, Doc. Id. 20203-160958-01 (March 4, 2020) at 7.
[24] *See* Xcel response to MnSEIA Information Request 45.
[25] See Xcel response to MnSEIA Information Request 45 Attachment B, at Fig. ES-1, cell G16.
[26] See Xcel response to MnSEIA Information Request 46 Attachment B, at Fig. ES-1, cell G16.

II. Assumptions about Displaced Natural Gas Need a Reexamination

The Comments offered on the 2021 vintage VOS highlight the need for the Commission to reevaluate the assumptions made about natural gas avoided costs. All three parties offering material Comments on the 2021 vintage VOS calculation offered commentary on the Company's use of the NYMEX in its calculations, and none were favorable toward that *choice*. (The Department offered no material commentary on the Company's choice to use NYMEX futures, but did note that the drop in avoided fuel costs were a primary driver in the reduction of the rate.)

Chan's Comments reiterated 2 points that he had made in 2018[27] in regards to the tenuous relationship between NYMEX futures and actual avoided fuel costs: "(1) Natural gas futures more than a few years out have low or zero trading volume; and (2) Natural gas price futures do not only reflect expectations of future spot prices."[28] Chan observes that, "Both concerns still hold true and are serious detriments to the validity of the estimated avoided fuel costs. There is minimal or no trading for natural gas futures contracts expiring after January 2023, as of November 2020, suggesting that there is virtually no actual market activity driving natural gas futures more than a few years out."[29]

Chan emphasizes his first point—that gas futures are time-limited in trade volume—by noting that because there is virtually no current trading in gas futures beyond January, 2023, that the "VOS methodology utilizes futures contract prices over 12 years but there is essentially zero informational content in the prices in as many as nine of those 12 years of 'data.'"[30]

Chan also highlights the volatility of the NYMEX index over the course of 2020, noting that the average price of natural gas at the Henry Hub (the NYMEX reference) would be 10-15% higher if the Company's snapshot were from mid-July to mid-November instead of March 2 to June 30, 2020.[31] This volatility, Chan argues, has the perverse effect of forcing solar developers to hedge developments according to gas futures—when, instead, the VOS should act as a hedge against gas volatility as experienced by ratepayers.

Chan recommends that the Commission explore "alternative methodologies for including natural gas price forecasts in the Value of Solar."[32] The use of one of those, the BENCOST model used in the Company's Conservation Improvement Plan (CIP), would align the utility's forecasting

[27] *See* Gabriel Chan, Comments on Xcel Energy's 2019 VOS Calculation and Proposed 2019 Vintage Year Bill Credit Tariff Sheets, Docket No. M-13-867, 201811-148058-01 (November 27, 2018) at 7-8. *See also* Ibid, at 7-13 for further discussion. *Hereinafter* "Chan 2018 Comments."
[28] *See* Chan Comments at 2.
[29] Ibid.
[30] *See* Chan Comments at 3.
[31] Ibid.
[32] *See* Chan Comments at 5.

methodologies for future avoided costs. Chan also notes that this alignment would have the effect of increasing the 2021 vintage VOS to 14.94¢/kWh levelized.[33]

CEF also took issue with the Company's choice to use the NYMEX futures as a predictor of future natural gas costs.[34] CEF cites Chan's 2018 Comments, and reiterates many of the same points. Notably, CEF also points out the disparity between methodologies the Company uses for the VOS and those used for the CIP. CEF makes more specific recommendations than Chan, in that CEF urges the Commission to direct the Company to use the same data as used in the CIP, and in the alternative, as an interim step, recalculate fuel costs using NYMEX values from August to November, 2020.[35]

MnSEIA was in alignment with the above Commenters regarding the NYMEX, and remains so. However, one singular point that we made in our initial Comments, and would like to reiterate here, is that Xcel *chose* to use the NYMEX among three approved methods within the VOS Methodology.[36] We would like to emphasize the point that Xcel has chosen the option that is the most volatile and most short-term. By contrast, the other two options—**Long Term Price Quotation and Utility-guaranteed Price**—require, respectively, either a natural gas supplier or the utility itself to assess market risks over the full 25-year period of the 2021 vintage VOS. Xcel does not address this choice to use the NYMEX, and **we continue to urge Xcel to substantiate before the Commission its choice to use the most short-term-focused option**.

We also agree with CEF that the **BENCOST model**, using Energy Information Agency data, that the Company used for its CIP filing, would be a fairer representation of real-world avoided costs, and **should be substituted**. And, like CEF, we recommend that, **in the alternative, a recalculation of the NYMEX from more recent months** would at least misrepresent natural gas futures to a lesser extent.

III. The Commission Should Consider Extending the Residential Adder

Both MnSEIA[37] and CEF[38] recommended that the Commission approve a residential adder for the 2021 VOS, and CEF recommended the adder be extended through the 2022 vintage year. MnSEIA **agrees with CEF that the Residential Adder be extended through 2022.** The implementation of a Residential Adder of $0.015/kWh for 2019 and 2020 ordered by the Commission in November 2018[39] is the only mechanism the Commission has to steer the development community towards a residential market under the framework of Minn. Stat.

[33] Ibid.
[34] *See* CEF Comments at 8.
[35] *Id.* at 9-10.
[36] *See* MnSEIA Comments at 6 and at 9.
[37] *Id.* at 12-13.
[38] *See* CEF Comments at 10-11.
[39] *See* ORDER ADOPTING ADDER AND SETTING REPORTING REQUIREMENTS, MN PUC, Docket No. E-002/M-13-867, Doc. Id. 201811-147853-01 at 9 (Nov. 16, 2018).

216B.1641. We continue to believe that the Residential Adder is necessary to ensure that CSGs are accessible to all Xcel Energy ratepayers.[40] Without the adder, the single flat rate of the VOS steers developers towards subscriber models with fewer, larger subscribers that cost less to acquire and manage.

Conclusion

We respectfully ask that the Commission require Xcel to revisit two broad categories in the 2021 vintage VOS calculations. First, we ask that data from a real-world PV Fleet Shape—using an average weighted by MW—be applied to all factors that the Methodology requires, including ELCC, PLR, Loss Savings, and Solar Weighted Heat Rate. Second, we urge a reconsideration of the use of the most volatile measurement of natural gas avoided costs, the NYMEX. In its stead, we recommend the use of the BENCOST model, which aligns with the avoided cost calculations in the Conservation Improvement Program. In the alternative, either the Long Term Price Quotation and Utility-guaranteed Price options from the VOS Methodology would be more representative of actual long-term avoided fuel costs, as would simply measuring the NYMEX from a less distorted period than Spring 2020. Lastly, we respectfully urge the Commission to consider a two-year extension of the Residential Adder.

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[40] *See* Minn. Stat. 216B.1641(e) (1)(requiring "the creation, financing, and accessibility of community solar gardens").

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Xcel Energy		Information Request No.	31
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Please explain why the chart on page 6 of the 2021 Value of Solar Compliance filing states that the Capacity Factor for 2017 is 18.35%, for 2018 it is 17.80%, for 2019 it is 16.92% and that the respective MWh/MW values are 1608, 1559 and 1482 when Attachment O says that the Capacity Factor for 2017 is 18.2%, for 2018 it is 17.7%, for 2019 it is 16.9% and the respective kWh/MW values are 1596 MWh/MW, 1547 MWh/MW and 1484 MWh/MW.

Response:
The Company filed the wrong version of Attachment O with our September 1, 2020 VOS filing. In addition, the Company has corrected the sum range for cells F3, J3, N3 to incorporate the final day of each year. Prior to this correction, the result of the analysis was 1550 MWh/MW. With this correction, the result is 1551 MWh/MW. The Company notes that this change does not change the 2021 VOS vintage rates as proposed in our September 1, 2020 filing. The correct version of Attachment O is provided as an attachment to this response, and the Company will file this revised version in the instant docket. The Company apologizes for any confusion this has caused.

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Title:	Resource Planning Analyst
Department:	Resource Planning
Telephone:	612.330.5862
Date:	October 26, 2020

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Xcel Energy		Information Request No.	32
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Please explain why the chart on page 6 of the 2021 Value of Solar Compliance filing includes MWh/MW and attachment O has similar values in kWh/MW. Should these be the same units?

Response:
Yes, these labels should both read MWh/MW. The Company apologizes for any confusion.

Preparer:	Mary Morrison
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Xcel Energy		Information Request No.	33
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Please explain what the sentence "This analysis utilizes available data from PV Systems 1 MW and smaller, including Community Solar Gardens, Solar*Rewards, and customer sited solar with production meters for the period of 2017 through 2019" means. Did Xcel Energy retroactively apply Solar*Rewards and customer-sited solar with production meters to the 2017 and 2018 capacity factor calculations, or were the 2017 and 2018 projects used to calculate the 2019 capacity factor alone?

Response:

The parameters of what type of data we were required to use were described by Commissioner Schuerger during the Commission meeting in this matter on January 23, 2020. At the link for the archive video from this session, beginning at about 1:53:30, he restated his modification to Decision Option 2.c., which was later unanimously adopted by the Commission, and stated as follows:

> A modification of decision option 2.c. Clarifies the requirements for use of the "Utility Fleet, Metered Production" method for determining Hourly Fleet Production include all PV systems in the utility service territory that are 1 MW and under ... for next year and years after. Include all systems in the same load analysis period as outlined in the methodology. And I would just have the order writer link in the language from the methodology on page 12 which has multiple years included as long as they are contiguous, complete one-year periods. And they need to be time synchronized and time stamped hourly values. And I am not inclined to put a time-period on here. ... My understanding is that they would use for the period that the VOS is in place, but that they would use available and correct data, and would remove data that is not. And, I think that if you have net metered systems that are not hourly then they are not hourly - you cannot use them. You use what you have. So, it may actually be a very small amount of data that is different than the CSG. I guess we will see. But, it is in compliance with this. And it needs to be multiple years.

The data used for this analysis met this criteria. We did not include data that did not meet this criteria. We have not calculated results outside of the data meeting the criteria.

The Company incorporated available hourly production data for resources 1 MW and smaller, as these were added to the system. As resources were operational, these were included in the subsequent month's data set. Actual production data from 2017, 2018, and 2019 was utilized. The evaluation commences with 27 MW of resources at the beginning of 2017 and concludes with more than 600 MW of resources at the end of 2019.

Prior to 2017 there were very few systems meeting these requirements, including the requirement for "contiguous complete one-year periods." Community Solar Garden systems started being installed in late 2016, which means that 2017 was the earliest time-frame when data from Community Solar Gardens began to meet these requirements. Data available for the complete one-year period of 2016 included one solar garden installation, as well as S*R, and other customer sited solar. The Company observed inconsistencies in the 2016 data. Using a method consistent with 2017, 2018, and 2019, the annual capacity factor approximated 22% for the 2016 resources. This result did not appear reasonable for systems primarily smaller than 40kW, and therefore we removed the 2016 data from the analysis.

The typical (or tradition) production meters and bidirectional meters installed for Solar*Rewards systems generally were not installed or programmed in such a way to gather the hourly, time-stamped data required for this analysis. Instead, these were installed and programmed to meet the net metering and Solar*Rewards program requirements. As the Company has stated, some S*R projects have production meters installed that are programmed to collect load research data, and these systems are included in our analysis. Meters that do not provide the required data do not meet the required criteria, and therefore would not be appropriate to use data from these resources for the purpose of the VOS analysis.

Preparer:	Mary Morrison
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Date:	October 26, 2020

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Xcel Energy		Information Request No.	34
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Xcel Energy states that only Solar*Rewards (S*R) projects that have load research installed production meters were included in their Hourly PV Fleet Production Data analysis. Why are there only 180 projects that qualify when there are nearly 1,000 solar rewards projects installed annually?

Response:

See our response to MnSEIA IR No. 33.

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Date:	October 26, 2020

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Xcel Energy		Information Request No.	35
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Xcel Energy states that they have drawn data from 683 Community Solar Gardens, 180 Solar*Rewards projects and 88 Customer Sited Solar with Production Meters. Were these projects used for all three years or just 2019's PV Fleet production data?

Response:

See our response to MnSEIA IR No. 33.

Preparer:	Mary Morrison
Title:	Resource Planning Analyst
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Date:	October 26, 2020

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Xcel Energy		Information Request No.	36
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
What criteria did Xcel use to conclude that the "full year hourly production data for solar systems prior to 2017 is less complete" and what makes 2017 the year to begin this analysis?

Response:

See our response to MnSEIA IR No. 33.

Preparer:	Mary Morrison
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Date:	October 26, 2020

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Xcel Energy		Information Request No.	37
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Presumably Xcel believes they cannot capture the data for Solar*Rewards projects unless they have a certain type of meter, but if Xcel took the production from the 180 S*R projects and extrapolated that production number across all of the projects in the Solar*Rewards program (presumably several thousand) what would happen to capacity numbers for 2017, 2018 and 2019? Would they go up, down or stay the same? What would they be exactly?

Response:

See our response to MnSEIA IR No. 33.

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Xcel Energy		Information Request No.	38
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Why are Solar Rewards projects with "load research installed production meters" the only Solar Rewards projects that Xcel is considering in their PV Fleet Analysis? Why are projects with traditional production meters, bidirectional meters or separate meters not measured in the chart on page 5 of the 2021 VOS compliance filing?

Response:

See our response to MnSEIA IR No. 33.

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Xcel Energy		Information Request No.	39
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	David Schaffer		
Date Received:	October 14, 2020		

Question:
Please explain how Xcel's PLEXOS modelling, used to calculate the Solar Weighted heat rate, does or does not utilize the PV Fleet Shape over the 3-year Load Analysis period Xcel provided in its filing. In your response, please indicate how PLEXOS identifies the plant on the margin for each hour of the load analysis period and selects the heat rate of that plant on the margin in each hour of the Load analysis period to multiply by the PV Fleet Shape generated for each hour in the calculation of solar-weighted heat rate, and articulate how this calculation for the 2021 VOS proposal differs from previous year's calculations when an hourly PV FLeet Shape based on a consistent Load Analysis period was not used.

Response:

The Plexos model, used for the modeling of the Solar Weighted Heat Rate (SWHR), makes use of different hourly shapes, reflective of rooftop, CSG, large scale resources, fixed and single axis installations. The Plexos modeling does not utilize the PV study data provided in this filing.

Plexos does not identify a specific resource "on the margin" for each hour, rather the evaluation considers the addition of 100 MW of solar resource to the existing resources of a base case. The base case reflects the forecasted resources and operation for the next year (i.e. 2021 for the 2021 VOS). The resulting change of annual production of the existing units and the change case average heat rate of the CT's and CC's is compared to that of the base case.

For the SWHR, the methodology has not changed from the prior fling. As discussed at the Stakeholder meeting, changes in the SWHR are a function of renewable additions and the resulting changes in thermal resource operations.

The 3-year PV study data is not incorporated into corporate modeling data for planning and forecasting purposes.

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Xcel Energy		Information Request No.	40
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:
Please provide 2021 vintage Value of Solar (VOS) calculations where the PV Fleet Shape is calculated using a weighted average by MW. For example, if the size of the PV fleet in 2017(Column F in the Corrected Schedule O) is 10% the size of the PV fleet in 2019 (Column N), then it should have 1/10th the weight of the 2019 fleet.

Response:
See Attachment A to this response for the weighted MWh/MW calculation described above. Rather than equally valuing each year at 1/3 of the weighted value, the requested calculation weights 2019 as 55% of the total. The calculation presumes hourly solar production of each MW installed is a function of the total operational MW in any single hour. An example of the weighting for Hour 1 has been provided below.

Table (MnSEIA-40) 1

	2017	2018	2019
1/1 1:00 AM	27	253	495
As Requested	27/495 = 5.5%	253/495 = 51.1%	495/495 = 100%
As Requested Basis of 100%	5.5%/ (5.5%+51.1%+100%) = 3.5%	51.1%/ (5.5%+51.1%+100%) = 32.6%	100%/ (5.5%+51.1%+100%) = 63.9%
Calculation in Attachment A	27/ (27+253+495) = 3.5%	253/ (27+253+495) =32.6%	495/ (27+253+495) =63.9%

See Attachment B to this response for the revised 2021 VOS Model with the requested updated to the Actual First Year Annual Energy Production and resulting rate impact. The table below provides the updated values.

Table (MnSEIA-40) 2

	Description	Actual First Year Annual Energy Production (kWh per kW-AC)	2021 VOS Model Figure ES-1 (cell G16) ($/kWh)
As Filed	Equal Weighting to each year of solar production	1550	$0.1104
MnSEIA IR 40	Solar Production Weighted Hourly by Total MW Operational	1520	$0.1113

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Xcel Energy		Information Request No.	41
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:
Please, clarify what assumptions underlie the labels "50MW PV Without Losses" and "50MW PV **With** Losses" in columns D and I, respectively, in Attachment E (Doc. Id. 20209-166369-08). Is this "50MW PV" a model, or is it based on real world data?

Response:
A proxy of 50 MW PV is based on a solar production profile grossed up to 50 MW. The data "Without Losses" reflects the solar production profile, the data "With Losses" reflects the solar profile with the PV Line Loss Savings from Attachment F, Energy Loss Savings, Column T.

A proxy of 50 MW has been used in this analysis since inception. The solar production profile was described in Part 4 of our response to DOC IR No. 19, submitted on May 16, 2014.

> *The Company compiled a list of 858 existing Solar*Rewards customers with fixed panel installations. For each installation the size, tilt, and azimuth was recorded. Next, after inspection of the various orientations, the Company developed 15 representative combinations of tilt and azimuth as presented in Table 6 of the Company's May 1, 2014 filing. The weighted average orientation was 34.3 degree tilt and 180.1 degree azimuth.*
>
> *Development of the hourly PV generation pattern was performed using the National Solar Radiation Database (NSRD) 1991-2010 Update, developed and published by the National Renewable Energy Laboratory (NREL) and their System Advisor Model. The NSRD database includes hourly measurements of solar insolation as well as other atmospheric data (temperature, humidity, etc.).*
>
> *The Company selected data based on 2010 measurements at the Minneapolis–St. Paul International airport. That data is provided in DOC-19 Attachment J. Next the solar radiation data was used as an input to the System Advisor Model (SAM). The SAM*

model converts solar radiation data and PV system inputs into a projection of hourly AC output.

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Xcel Energy		Information Request No.	42
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:

Please, clarify what assumptions underlie the label "50MW PV" in cell L11 in Attachment F (Doc. Id. 20209-166369-09). Is this "50MW PV" a model, or is it based on real world data?

Response:
See our response to MnSEIA IR No. 41.

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Xcel Energy		Information Request No.	43
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:

Please, clarify what assumptions underlie the labels "50MW PV" and "50MW PV With Losses" in columns D and G, respectively, in Attachment G (Doc. Id. 20209-166370-01). Is this "50MW PV" a model, or is it based on real world data?

Response:
See our response to MnSEIA IR No. 41.

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Xcel Energy		Information Request No.	44
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:
Please, clarify the choice to use the year 2010 in Attachments E, F, and G (Doc. Ids. above). Is this year a theoretical year, or is it actual data from 2010?

Response:
Attachments E, F, and G use the 50 MW PV solar production profile, as described in response to MnSEIA IR 41. The label of 2010 relates to the data used in the development of the production profile.

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Xcel Energy		Information Request No.	45
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:

Per the Initial Comments of Cooperative Energy Futures in the Value of Solar Notice and Comment period (Docket No. E-002/M-13-867, Doc. Id. 202011-168424-01), please provide a calculation of the 2021 VOS with the following parameters:

1) the Effective Load Carrying Capacity calculated using the PV Fleet Shape (as provided in the corrected Attachment O, Doc. Id. 202010-167732-02) for hours ending 2pm, 3pm, and 4pm Central Standard Time during June, July, and August over the most recent three years;
2) the Peak Load Reduction calculated using the PV Fleet Shape (as provided in the corrected Attachment O, Doc. Id. 202010-167732-02); and,
3) the Loss Savings calculated using the PV Fleet Shape (as provided in Attachment O, Doc. Id. 202010-167732-02).

Response:
The requests of Part 1, 2, and 3 are provided in Attachment A to this response, with tabs identified as Attachments E (Peak Load Reduction Loss Savings), F (Energy Loss Savings), and G (Effective Load Carrying Capability).

Attachment B to this response provides a revised 2021 VOS Model with the requested updates to Attachments E, F, and G and resulting rate impact.

The solar production profile that the Company uses in Attachments E, F, and G of our September 1, 2020 VOS calculation is described in our response to MNSEIA IR 41. This profile was established through analyses using National Renewable Energy Laboratory's (NREL) National Solar Radiation Database and System Advisor Model, was previously approved in this docket, and provides a solar capacity credit value of 48.7%. The data in corrected Attachment O, used for the response to this request, is reflective of 3-years of solar operation, with less than two complete years of

production data from most resources. This approach provides a significantly different capacity credit value of 66%. Additionally, the Company notes that this value also differs from the results of our 2018 Effective Load Carrying Capability study, filed in Docket No. E999/CI-15-115 (August 17, 2018), which provided a range of 45 to 55% for solar capacity credit. The study followed the 2012 NREL "Preferred Methodology" publication.

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Xcel Energy		Information Request No.	46
Docket No.:	E002/M-13-867		
Response To:	Minnesota Solar Energy Industries Association		
Requestor:	Peter Teigland		
Date Received:	November 24, 2020		

Question:
Comment period (Docket No. E-002/M-13-867, Doc. Id. 202011-168424-01, at 6), please provide a calculation of the 2021 VOS with the following parameters:

> 4) the Effective Load Carrying Capacity calculated using the PV Fleet Shape (as provided in the **weighted average PV Fleet Shape as described in MnSEIA Information Request40,** above) for hours ending 2pm, 3pm, and 4pm Central Standard Time during June, July, and August over the most recent three years;
> 5) the Peak Load Reduction calculated using the PV Fleet Shape (as provided in the **weighted average PV Fleet Shape as described in MnSEIA Information Request 40,** above); and,
> 6) the Loss Savings calculated using the PV Fleet Shape (as provided in the **weighted average PV Fleet Shape as described in MnSEIA Information Request 40,** above).

Response:
The requests of Part 4, 5, and 6 are provided in Attachment A to this response, with tabs identified as Attachments E (Peak Load Reduction Loss Savings), F (Energy Loss Savings), and G (Effective Load Carrying Capability).

Attachment B to this response provides a revised 2021 VOS Model with the requested updates to Attachments E, F, and G and resulting rate impact.

The solar production profile that the Company uses in Attachments E, F, and G of our September 1, 2020 VOS calculation is described in our response to MNSEIA IR 41. This profile was established through analyses using National Renewable Energy Laboratory's (NREL) National Solar Radiation Database and System Advisor Model, was previously approved in this docket, and provides a solar capacity credit value of 48.7%. The data in corrected Attachment O, with a weighted MWh/MW calculation described in our response to MnSEIA IR No. 40 and used for the response to this

request, is reflective of 3-years of solar operation, with less than two complete years of production data from most resources. This approach provides a significantly different capacity credit value of 70%. Additionally, the Company notes that this value also differs from the results of our 2018 Effective Load Carrying Capability study, filed in Docket No. E999/CI-15-115 (August 17, 2018), which provided a range of 45 to 55% for solar capacity credit. The study followed the 2012 NREL "Preferred Methodology" publication.

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