STATE OF MINNESOTA
BEFORE THE
PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Dan Lipschultz	Commissioner
Matthew Schuerger	Commissioner
Valerie Means	Commissioner
John Tuma	Commissioner

In the Matter of Xcel Energy's 2019 Distribution System Hosting Capacity Study	Docket No. E002/M-19-685

COMMENTS OF THE INTERSTATE RENEWABLE ENERGY COUNCIL, INC. ON XCEL ENERGY'S 2019 HOSTING CAPACITY ANALYSIS

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I. Introduction

In response to the Commission's November 15, 2019 Notice of Comment Period on Xcel Energy's 2019 Distribution System Hosting Analysis Report, and the subsequent December 12, 2019 notice extending the comment deadline, the Interstate Renewable Energy Council, Inc. (IREC) hereby submits these comments. IREC thanks the Commission for setting a comment period that provides for prompt review of Xcel's Hosting Capacity Analysis (HCA). We hope this will enable the Commission to issue an order in early 2020, providing Xcel time to fully incorporate any changes required by the order.

IREC has participated in the development of hosting capacity analyses in Minnesota and other jurisdictions, authored a report on the topic,[1] and provided comments and suggestions for improvements regarding Xcel's 2016, 2017, and 2018 HCA Reports.[2] IREC reviewed Xcel's 2019 HCA Report (Xcel's 2019 HCA)[3] and also issued information requests regarding Xcel's 2019 HCA in order to better inform these comments.[4]

Xcel's 2019 HCA represents a substantial leap forward from its earlier HCAs. The 2019 HCA provides significantly more distribution system data and the associated online map now has

[1] Sky Stanfield & Stephanie Safdi, *Optimizing the Grid: A Regulator's Guide to Hosting Capacity Analyses for Distributed Energy* Resources, Interstate Renewable Energy Council, Inc. (Dec. 2017), available at https://irecusa.org/2017/12/tools-to-build-the-modern-grid ("*Optimizing the Grid*").

[2] Dkt. E002/M-15-962, Comments of Interstate Renewable Energy Council, Inc. Regarding Xcel Energy's Hosting Capacity Analysis and Supplemental Comments (April 20, 2017); Dkt. No. E002/M-17-777, IREC's Opening Comments on Xcel's 2017 Hosting Capacity Report (Feb. 2, 2018); Dkt. E002/M-18-684, Reply Comments of the Interstate Renewable Energy Council, Inc. on Xcel Energy's 2018 Hosting Capacity Study (March 28, 2019).

[3] Xcel Energy, Dkt. E002/M-19-685, Distribution System – Hosting Capacity Analysis Report (Nov. 1, 2019).

[4] Xcel's responses to IREC's information requests are provided as Attachment A to these comments: Xcel Energy's Response to IREC Information Requests Nos. 1-6 (Dec. 17, 2019); Xcel Energy's Response to IREC Information Request No. 7 (Dec. 23, 2019); Xcel Energy's Response to IREC Information Requests Nos. 8-26 (Dec. 17, 2019).

improved functionality. This improvement is a direct consequence of the clear and quantifiable requirements included in the Commission's most recent order on HCA.[5] Indeed, pursuant to the order's requirements, Xcel solicited the feedback of stakeholders, and based on that feedback, included basic distribution system data in its online map for the first time. IREC thanks the Commission and Xcel for facilitating these improvements, they make the tool considerably more useful for customers seeking to interconnect distributed energy resources (DER).

While the 2019 HCA reflects substantial improvements over prior iterations, Xcel's HCA continues to lack basic features that prevent it from being the truly meaningful and vital interconnection tool that it should be. In these comments IREC recommends two fundamental and crucial improvements that will go a long way towards making the HCA more accurate, useful, and actionable: performing monthly updates so that customers always see fresh results, and providing results on more granular level so that customers know more precisely what project sizes are likely to trigger the technical criteria violations. Making these two improvements will go a long way towards helping customers achieve Minnesota's goals for increased DER deployment.

After discussing these improvements, IREC responds to Xcel's unsupported data redaction claims. IREC takes customer privacy and grid security concerns seriously and would not support the publication of information that could identify a specific customer's energy use or increase risk to public safety. Yet Xcel proposes to withhold much more information than is necessary to protect customer privacy, and fails to meet the Commission's requirement to specifically identify how publishing HCA data increases risk to public safety. The Commission

[5] Order Accepting Study and Setting Further Requirements, Dkt. E-002/M-18-684 (Aug. 15, 2019) (2018 HCA Order).

should carefully scrutinize Xcel's justifications and reject the withholding of any HCA data that is not supported by the record and Commission policy in this case.

After updating its HCA more frequently and providing more granular results, there are additional ways that Xcel could improve its HCA. IREC continues to recommend that the HCA quantify the distribution system's ability to host all types of DERs, not just distributed generation, *i.e.*, solar. The HCA should identify how much new load from DERs, such as electric vehicle chargers or energy storage, each feeder and line section can accommodate without the need for additional study or costly upgrades.

Finally, IREC recommends that the Commission supervise a discussion and then issue a decision regarding the technical assumptions, limiting criteria, and thresholds used in Xcel's analysis, and order Xcel to publish basic distribution system data unless Xcel can articulate a rational for not publishing the data.

II. Infrequent updates to hosting capacity results leave customers with stale hosting capacity data; monthly updates would provide fresh data to customers when they can use it.

Xcel should update its HCA monthly to provide customers with a reliable estimate of the available level of hosting capacity throughout the year. The benefits provided by an HCA—including preventing interconnection queue backlogs and unlocking the potential for new DERs by informing their siting and design—only materialize when a utility publishes up-to-date results. Customers will not make decisions based on HCA results they know to be outdated.

A. Xcel's HCA results are unreliable because they are months old when published, and then sit on the shelf without any updates for a year.

Xcel's HCA is unreliable because it is updated only once a year, and even then, the results are already months old by the time they are released in November. Xcel currently

performs its HCA from June to October.[6] The results of the HCA are available to Xcel as it performs the analysis, yet customers cannot access the results until Xcel publishes its report in November.[7] By November, the results for some feeders are likely to already be wrong because the feeder model was built to represent the configuration of the feeders when the analysis was performed and the DER penetration or configuration of those feeders is likely to have changed between June and November.[8] This problem is exacerbated in later months, as more feeders change configuration in ways that impact hosting capacity, leaving Xcel's map outdated.

To solve this problem, on a monthly basis Xcel should identify feeders where significant changes in load, configuration, or generation occurred and rebuild or update its model of those feeders in the month that the change occurs.[9] After updating its model of those feeders, Xcel should perform and publish updated HCA results for those feeders. Xcel should provide a time stamp that reflects when the analysis was performed, which should be close in time to when results are published.[10] If Xcel followed this process, its results would be accurate and usable by customers more often.

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[6] Xcel Energy's Response to IREC Information Request No. 12; Xcel's 2019 HCA, at 6 ("The results are a snapshot in time as of August 2019, based on the characteristics and topology of the Company's distribution system at that time.").

[7] Xcel Energy's Response to IREC Information Request No. 12.

[8] *See* Xcel's 2019 HCA, Attachment A, at 25 (all citations to Attachment A use the numbering in the upper right corner of the page).

[9] Xcel developed thresholds for what constitutes a significant change in configuration, load, or generation to warrant rebuilding a feeder model. Xcel's 2019 HCA, Attachment A, at 5. These same thresholds could be used as triggers for monthly feeder rebuilds. In section VI, IREC proposes that the Commission supervise a discussion and issue a decision regarding the thresholds that trigger rebuilding a feeder model.

[10] Xcel's online map appears to provide a "Date Hosting Capacity Updated" of 10/30/19 for all results, which does not match Xcel's description of when it performed the HCA. Xcel Energy's Response to IREC Information Request No. 12.

If the Commission requires Xcel to perform monthly updates, it would eliminate the time lag between the model runs and publication of results. It is not justifiable to delay the release of hosting capacity results until the lengthy HCA report is filed in November.[11] By eliminating the lag between the model runs and publication of the results, the results that customers have access to will be less likely to be outdated and more reliable.

B. More frequent updates may not result in significantly increased costs.

Performing monthly updates to the HCA may not result in significantly increased costs. A monthly update schedule does not entail performing twelve times the amount of work as annual updates. Instead, as described above, regular updates mean identifying feeders where significant changes in load, configuration, or generation occurred. The utility would only update its model and perform the HCA on feeders where significant changes occurred.

Right now all feeder model updates—the most time-intensive aspect of this analysis—are performed in the summer.[12] There is no seasonal pattern in changes to Xcel's system to justify performing all of the updates at the same time of the year.[13] By updating feeder models and performing the HCA on those feeders as changes occur, Xcel's work will be spread out over the course of the year rather than concentrated in a specific month or season. This has many

[11] Xcel agrees that "no technological limitations exist that would prevent incremental tabular updates within a week of completing the analysis." Xcel Energy's Response to IREC Information Request No. 12.B.

[12] Xcel's 2019 HCA, Attachment A at 5 ("Building the feeder models is one of the most resource-intensive parts of the HCA"); Xcel's 2019 HCA at 6 ("The results are a snapshot in time as of August 2019, based on the characteristics and topology of the Company's distribution system at that time.").

[13] Xcel is "unaware of a pattern that a certain month or week of a year would have a higher rate of changes in load configuration, load, or generation" Xcel Energy's Response to IREC Information Request No. 5.D.

potential benefits, including spreading the workload out and ensuring that Xcel's distribution system models are always current.

Moreover, most feeders do not see significant changes every year and therefore will not need to be rebuilt at all. For example, using the thresholds that Xcel selected, it identified that one-third of its feeders underwent a significant change between the 2017 and 2018 HCA.[14] It is unlikely that most feeders will have significant changes every month, it is more likely that most feeders will not need to be updated more than once a year. There may be a small number of feeders that see multiple significant changes over the course of the year, and a monthly update cadence could mean performing an analysis on those feeders more than once a year. Overall, this means that a monthly update cadence is not likely to require much more work than an annual update. The primary difference is that the work will occur over the course of year rather than all at once.

IREC's proposed format of regular updates is the best practice for HCA. For example, the California Commission selected a monthly update cadence for its utilities' HCA. The Nevada Commission has even set a goal of working towards real time HCA updates, and NV Energy is currently performing monthly updates.[15] Customers and developers are deciding how design and where to build new DERs throughout the year. If Xcel cannot provide reliable results when customers need them, then what is the value of performing the analysis? The Commission should order Xcel to perform monthly updates.

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[14] Xcel's 2019 HCA, Attachment A at 5 ("We rebuilt (i.e., extracted GIS asset data for) approximately one-third of the feeders in the analysis, focusing on those feeders that had experienced large configuration, load, or generation changes.").

[15] NV Pub. Util. Comm., Dkt. R.19-04003, Order Approving Distribution Resource Plan Stipulation, Attachment 1, at 7 (Aug. 1, 2019) ("HCA shall include updates in a period of time shorter than monthly.").

C. Xcel's workpapers do not support its claims regarding the cost of more frequent updates or its annual costs.

Xcel claims that more frequent HCA updates would cost "slightly less than" $300,000,[16] but its workpapers do not at all support this claim. In response to IREC's request for Xcel to quantify the $300,000 number provided in its report, Xcel provided an accounting that does not add up to $300,000. Table 1 shows the costs detailed in Xcel's response.

Table 1: Xcel's HCA Costs[17]

Line	Cost	Description
1	$160,000	1,600 hours of distribution engineering labor
2	$50,000	EPRI analysis of feeders with zero hosting capacity
3	$62,500	One-fourth of one-time $250,000 acquisition cost for the DRIVE tool
4	$10,000	One-third of triennial $30,000 DRIVE user group fee
5	$282,500	Total calculated cost

Of the $282,500 in costs Xcel identified, none represent the additional cost to perform monthly updates proposed by IREC. Further, $282,500 is not an appropriate annual estimate for future HCA costs.

First, as explained above, more frequent updates may not result in significantly increased engineering labor time or costs to perform an HCA. Therefore, it is unreasonable to estimate that monthly updates will result in an additional 1,600 hours of distribution engineering labor each month as shown in line 1.

Line 2 shows the $50,000 that Xcel paid EPRI to perform an analysis of feeders with zero hosting capacity. This analysis was performed outside of the DRIVE software, and IREC

[16] Xcel's 2019 HCA, Attachment A at 46.

[17] Xcel Energy's Response to IREC Information Request No. 7.B-D.

does not propose to require such an analysis in the monthly updates.[18] If the Commission requires Xcel to perform this analysis again in its 2019 HCA, Xcel should perform an update once for the annual report at less cost than the initial study.[19] In any case, this separate analysis will not result in any additional costs related to the monthly updates proposed by IREC.

Line 3 represents the cost that Xcel paid to acquire the DRIVE software. Xcel paid a one-time cost of $250,000 to acquire DRIVE, used DRIVE in four annual HCAs since,[20] and plans to use DRIVE in the future.[21] Using one-fourth of a one-time acquisition cost is not the correct way to estimate the annual cost of software Xcel expects to continue using in the future. Any annual cost estimate should include only the software's annual depreciation cost based on its total expected life (which is more than four years). So, for example, if the useful life of the software is assumed to be ten years, the annual cost should be spread over those years. Furthermore, because the $250,000 represents a one-time cost, performing the monthly updates proposed by IREC will not result in any additional DRIVE acquisition costs.

Line 4 includes one-third of the triennial DRIVE user group fee. Participating in the user group provides Xcel access to annual software updates,[22] therefore including one-third of the fee in an annual cost estimate appears reasonable.[23] However, performing the monthly updates as proposed by IREC will, again, not result in any additional user group fees.

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[18] IREC's regulatory team has not completed its review of this study and may provide additional comments on it in the future.

[19] *See* Xcel Energy's Response to IREC Information Request No. 7.C.iii.

[20] Xcel Energy's Response to IREC Information Request No. 7.D.ii.

[21] Xcel's 2019 HCA, Attachment A at 6-7 (discussing the use of DRIVE's features in Xcel's 2020 HCA).

[22] Xcel Energy's Response to IREC Information Request No. 7.D.iii-iv.

[23] IREC notes that if Xcel used the Synergi tool to perform its HCA, it would have zero annual incremental costs. *Id*. at 7.D.i.

Finally, Xcel does not estimate the costs of its regulatory and legal employees' time working on the HCA.[24] It is not clear why Xcel decided to leave the Commission guessing on these amounts, however, while a quantification of these labor costs may be appropriate to include in an annual cost estimate, once again, performing the monthly updates proposed by IREC will not result in additional work for these teams.

In sum, none of costs Xcel identified represent the additional cost to perform monthly updates, nor is $282,500 an appropriate annual estimate for future HCA costs. Rather, as explained above, requiring monthly updates is not likely to be dramatically more expensive, and any modest increased cost is well worth it if the Commission wants an HCA that is actually useful to customers in Minnesota.

III. Granular hosting capacity results would provide more meaningful and actionable information to customers.

A. Publishing all of the criteria violation values rather than only a minimum and maximum hosting capacity provides customers more precise and actionable information.

Xcel should increase the precision and usefulness of its HCA by providing customers more data from its HCA. Every time an HCA is performed, the DRIVE software evaluates several criteria to determine if specific thresholds are violated when a certain quantity of DERs is added at a location.[25] The result of the analysis is the quantity of DERs that can be added to a line segment without violating each criterion's threshold. In other words, the HCA is not really just one value, but a set of values that represent the various different technical criteria that need to be taken into account in determining whether DERs may impact the grid or require upgrades.

[24] Xcel's 2019 HCA, Attachment A, at 46.

[25] The criteria Xcel uses are listed in table 2 on the next page, and Xcel lists the thresholds it uses in its report. Xcel's 2019 HCA, Attachment A, at 19 (Table 3).

If Minnesota wants to enable interconnection customers and developers to design projects well suited to their location and to take advantage of the flexibility and capabilities of DER technologies, then Xcel should be required to publish values for each of the HCA criteria. Allowing customers to see the quantity of DERs that can be supported without violating each criteria allows them to understand whether the violation can be addressed through DER system design, or to better understand the type of distribution system upgrade that may be required in order to interconnect. To illustrate this point, IREC provides an example using Table 2. Assume that a prospective interconnection customer was provided the following hosting capacity results:

Table 2: Example of Technical Hosting Capacity Results for a Line Segment

Criteria	Hosting Capacity
Primary Over-Voltage	500 kW
Primary Voltage Deviation	950 kW
Regulator Voltage Deviation	800 kW
Thermal for Discharging DER	750 kW
Additional Element Fault Current	5 MW
Breaker Relay Reduction of Reach	10 MW
Reverse Power Flow	3.5 MW
Unintentional Islanding	1 MW

A customer can glean a lot of actionable information from these detailed results that is not provided with just the lowest value of the bunch. First, the maximum size of DER that can be interconnected without any upgrades or mitigations is 500 kW. If a customer wishes to interconnect a system larger than 500 kW but under 750 kW, it must plan to address voltage deviations. This is important information, because some voltage issues can be addressed inexpensively by designing the DER to use a smart inverter with reactive power voltage regulation. This means that although the minimum hosting capacity is only 500 kW, a system as large as 750 kW may be interconnected without expensive upgrades. On the other hand, thermal violations normally require expensive upgrades to the distribution system, which again would

help a customer understand that they are unlikely to be able to build a system above 750 kW without significant upgrade costs.

As demonstrated above, providing all the criteria violation values gives customers a lot of information that allows them to design systems that avoid more time-consuming interconnection studies and costly system upgrades. For the first time this year, Xcel's HCA publishes the primary limiting factor. Xcel's publication of this information is welcome, but it is not as useful as providing the detailed results described above. If this example was the smallest hosting capacity value on the feeder, it would have resulted in a published minimum range of 500 kW and a limiting factor of "PrimaryOverVoltage." Xcel's 2019 HCA results do not allow customers to see limiting factors beyond the minimum, or to understand the available hosting capacity before reaching the next limiting factor. In this illustrative example, Xcel's 2019 HCA would not provide the customer the 750 kW thermal limit that is essential for understanding what size DER the system can accommodate without construction, even though the DRIVE model's output included that information.

Publishing more granular hosting capacity results, including all the criteria violation values for each line segment, would provide customers with more meaningful and actionable information about the electric system. This is information that Xcel currently has available and it should not increase costs to publish this information, although it would substantially increase the overall value of the HCA to customers.

B. Xcel's analysis should include monthly results.

Xcel's HCA should provide monthly results to allow a developer to design a DERs that benefit the grid and avoid seasonal constraints. Xcel currently performs its HCA only using annual daytime minimum load.[26]

In order to provide more useful data for customers seeking to design a photovoltaic (PV) systems that avoid seasonal constraints on Xcel's system, Xcel should publish HCA results using daytime minimum load in each month of the year. For example, if a line section could support a 2 MW PV system for 11 months of the year, but only a 1 MW system in the remaining month, a customer could build a 2 MW system and agree to limit its output to 1 MW during the one month which the constraint exists. In this way, the customer can build the system at the size she desires while avoiding the need for upgrades to Xcel's distribution system with a seasonal output limit.

Next, in order to provide more useful data for customers seeking to design systems based on other generation types, Xcel should publish HCA results using absolute minimum load in each month of the year. In the same way that a customer can design a PV-only system to avoid seasonal constraints using results with daytime minimum load, a customer can design a system using other generation types (such as solar+storage) to avoid seasonal constraints using results with absolute minimum load.

As a long-term goal, Xcel should move towards providing hourly HCA results using the 24 hour load profile of each month's peak day and minimum day. For the next HCA cycle, IREC recommends that the Commission order Xcel to provide monthly results using daytime minimum load for the benefit of customer designing PV-only systems and absolute minimum load for the benefit of customers designing other systems. Correspondingly, as discussed further below, we

[26] Xcel's 2019 HCA, Attachment A, at 4.

think the HCA should provide both generation and load values, and therefore should be looking at both peak and minimum load on a monthly basis.

C. Publishing hosting capacity results on a line segment level provides customers more precise and actionable information.

The hosting capacity results that Xcel provides lack precision. Xcel's HCA produced results on a line segment level, which is an valuable improvement over providing the results on a whole feeder basis.[27] Yet Xcel's tabular spreadsheet only provides a range of the hosting capacity of an entire feeder, and a customer is unable use Xcel's map to identify the specific location of the line segment for which results are provided.

That range shown in the spreadsheet, calculated as the difference between the maximum hosting capacity value and minimum hosting capacity value on a feeder, is so large that it renders the results nearly useless much of the time. Over 25 percent of Xcel's feeders include a range of 1 MW or larger. For example, feeder HSN312 includes a hosting capacity range of 0 MW to 3.25 MW.[28] These results indicate that the feeder could potentially host a large 3 MW system, or could fail to host a small net metering system of 10 kW. This range is so wide that it dilutes—if not renders useless—the value of HCA results on that feeder. Further, as shown below in section IV, Xcel's security and customer privacy concerns regarding the publication of line segment data[29] in its tabular spreadsheet are unsupported.

While Xcel provides line segment results on its map, the map cannot be used to specifically identify the location of the line segment for which results are provided. In addition, a

[27] Xcel Energy's Response to IREC Information Request No. 3.A (Dec. 17, 2019). A line segment is the sub-feeder level unit that Xcel displays its results. Multiple line segments comprise one feeder.

[28] Xcel's 2019 HCA, Attachment B.

[29] Xcel Energy's Response to IREC Information Request No. 3.B.

customer cannot identify which line segment the HCA data corresponds to because the pop-up box does not identify the line section with a unique name or number. Xcel should include in its pop-up box a unique name or number for each line segment, and publish the location of its lines on its map, as discussed in section IV.E below, so that customers can identify the location on Xcel's grid that that HCA data corresponds to.

IV. Xcel's data redaction practices are unsupported by the record.

The Commission's 2018 HCA Order requires Xcel to "provide hosting capacity data by substation and feeder" including "peak load, daytime minimum load, installed generation capacity, and queued generation capacity."[30] The 2018 HCA Order further requires:

> Xcel shall provide the same information in its public-facing hosting capacity map, except to the extent that publicly disclosing this data would violate *specific* data privacy requirements or pose a *significant* security risk to Xcel's system or its customers. If Xcel withholds any information on this basis, Xcel shall provide the Commission with a full description and *specific basis for withholding the information*, including any Trade Secret claims.[31]

Xcel withholds much more data from publication than is allowed by the Commission or supported by Xcel's filing. In this section, IREC demonstrates that Xcel withholds more data than is necessary in the name of protecting customer privacy, fails to provide *any* peak feeder or substation load for unfounded reasons, and raises generalized and undefined security concerns that do not meet the Commission's requirement of a "specific basis for withholding the information."[32]

[30] 2018 HCA Order at 14 (Ordering Paragraph 2.B).

[31] 2018 HCA Order at 14 (Ordering Paragraph 2.C) (emphasis added).

[32] 2018 HCA Order at 14 (Ordering Paragraph 2.C).

A. Xcel withholds more data than is necessary to protect customer privacy.

This Commission requires utilities to establish defined practices to protect the anonymity of customer energy use data (CEUD) before releasing such data to third parties.[33] Xcel Energy selected the 15/15 standard to determine if CEUD is sufficiently aggregated to be released.[34] The 15/15 standard provides that aggregated CEUD should not be released if the data come from a pool of less than 15 customers, or if a single customer's load makes up more than 15 percent of the pool.

Use of 15/15 standard is mandated in other jurisdictions, including Colorado and California, to protect CEUD.[35] For example, the California Commission adopted the 15/15 standard to require the redaction of data "in order to ensure that the released data is sufficiently aggregated to prevent the identification of [CEUD] on individuals."[36] IREC believes the 15/15 standard is a reasonable and important way to protect customer privacy and has long supported its use.

However, Xcel applies the 15/15 standard incorrectly by using the standard as its rational to redact data that is not related a customer's energy use. This Commission defines CEUD as "data collected from the utility customer meters that reflects the quantity, quality, or timing of customers' natural gas or electric usage or electricity production."[37] Xcel applies the 15/15

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[33] Order Governing Disclosure of Customer Energy Use Data to Third Parties, Requiring Filing of Privacy Policies and Cost Data, and Soliciting Comment, Dkt. E,G-999/CI-12-1344, at 7-8 (Jan. 19, 2017) ("CEUD Privacy Order").

[34] Xcel Energy, Compliance Filing—CEUD Aggregation and Release Policies, Privacy Policies of Rate-Regulated Energy Utilities, Dkt. E,G-999/CI-12-1344, at 4-6 (Feb. 10, 2017); *id*. at 11.

[35] *Id*. at 6; CPUC D. 14-05-016 at pp. 26-27 (May 5, 2014).

[36] CPUC D. 14-05-016 at pp. 26-27 (May 5, 2014).

[37] CEUD Privacy Order, at 6.

standard to withhold *all HCA data* from feeders that violate the 15/15 standard "with the rationale that publicly disclosing these feeders could compromise customer privacy."[38] Using the 15/15 standard to redact data that is not in any way related a customer's energy use is an incorrect application of the standard. Protecting customer privacy is not a valid rationale for withholding data that has nothing to do with customer energy use. The following table shows the data that Xcel provides in its HCA, indicates if it that data is related to customer energy use, and if so, the rationale for redacting that data.

Table 3: Data Withheld by Xcel When a Feeder Violates the 15/15 Standard

Data	**Meets the definition of CEUD?**	**Rationale for redaction if data violates the 15/15 standard**
Feeder name	No	None
Substation name	No	None
Peak feeder load	Yes	If the feeder violates the 15/15 standard, a user may be able to identify the customer's peak load. If a substation violates the 15/15 standard, but the feeder does not (*i.e.*, if there is a large customer on only one feeder leading to a substation), Xcel should publish the feeder's peak load because the feeder data is sufficiently aggregated to protect customer privacy.
Peak substation load	Yes	If the substation violates the 15/15 standard, a user may be able to identify the customer's peak load. If a feeder violates the 15/15 standard, but the substation does not, Xcel should publish the substation's peak load because the substation data is sufficiently aggregated to protect customer privacy.
Daytime minimum feeder load	Yes	If the feeder violates the 15/15 standard, a user may be able to identify the customer's daytime minimum load. If a substation violates the 15/15 standard, but the feeder does not, Xcel should publish the feeder's daytime minimum load because the feeder data is sufficiently aggregated to protect customer privacy.

[38] Xcel's 2019 HCA, Attachment A, at 31-32.

Daytime minimum substation load	Yes	If the substation violates the 15/15 standard, a user may be able to identify the customer's daytime minimum load. If a feeder violates the 15/15 rule, but the substation does not, Xcel should publish the substation's daytime minimum load because that data is sufficiently aggregated to protect customer privacy.
Existing DER on substation	No	None
Existing DER on feeder	No	None
Queued DER on substation	No	None
Queued DER on feeder	No	None
Available hosting capacity	No	None
Limiting threshold	No	None
Feeder voltage level	No	None
Line phasing (single/three)	No	None
Line type (overhead/underground)	No	None
Field voltage regulator location	No	None
Substation location	No	None

California utilities similarly applied the 15/15 standard when establishing the scope of data to withhold from their HCA maps. For example, Southern California Edison withholds from publication the load profile, a data set that includes peak load and daytime minimum load, when a circuit violates the 15/15 standard.[39] All of the other data provided in Xcel's HCA—including the existence of the feeder on the map—are published by California utilities when a feeder violates the 15/15 standard.[40]

[39] Southern California Edison, Integration Capacity Analysis User Guide, at 12 (accessed Dec. 8, 2019), available at https://ltmdrpep.sce.com/drpep/downloads/ICAUserGuide.pdf.

[40] Certain other data regarding operational flexibility are withheld from publication by the California utilities when a circuit violates the 15/15 rule. *Id*. These other data are not provided in Xcel's HCA for two reasons. First, Xcel does not publish the criteria violation results, which is the data that Southern California Edison withholds. See section III.A, above. Second, even if it did publish the criteria violation results, the only results that can be traced directly back to load are the operational flexibility results, and Xcel does not use the operational flexibility criterion in its HCA. Xcel's 2019 HCA, Attachment A, at 19.

When a feeder violates the 15/15 standard, Xcel removes the feeder from its map such that the map appears blank where the feeder should appear, and no HCA data is published on the map. This practice results in the redaction of more information than is necessary to protect customer privacy and is different from California's application of the 15/15 standard to its HCA maps. For example, in California if a feeder violates the 15/15 standard, the exact location of the feeder lines are published on the map and all non-CEUD is published.[41] In place of CEUD, the pop-up box displays a note that says CEUD is not provided. Xcel claims that marking peak load data as redacted "would identify the feeders that fall under the 15/15 standard, disclosing that these feeders contain sensitive private information and defeating the purpose of protecting that information."[42]

Xcel incorrectly claims that the purpose of protecting customer energy use data is to prevent the identification of the feeder that the customer connects to. As defined by this Commission, the purpose of protecting CEUD is prevent third parties from accessing the energy use patterns of a specific customers and data that reveals commercially sensitive information.[43] Xcel's catch-22 dilemma is based on a the false premise that the purpose of withholding data is to prevent the identification of the feeder the customer connects to, and should be rejected by the Commission. Knowing that a feeder has fewer than 15 customers or one customer with more than 15% of the load does not reveal the customer's data. Furthermore, removing a feeder from

[41] *See* Southern California Edison, Integration Capacity Analysis User Guide, at 12.

[42] Xcel's 2019 HCA, at 19.

[43] CEUD Privacy Order, at 7 ("The data might disclose facts about a customer's household routine (when the customer sleeps and when the customer is active at home), whether the household has an alarm system, the types of appliances installed, the presence of certain medical equipment, and so on. Data from industrial customers might reveal competitively sensitive information.").

the map actually makes it more obvious that there might be confidential information, not less obvious.

In conclusion, when the 15/15 standard calls for the redaction of CEUD to protect customer privacy, the Commission should allow Xcel to redact only peak load and daytime minimum load and require Xcel to publish on its map, and in its downloadable spreadsheet, all other HCA data. This section responded to Xcel's arguments regarding customer privacy, the next section responds to Xcel's other arguments for failing to publish peak load data.

B. Peak load data is useful for customers seeking to interconnect DERs, but Xcel fails to publish it in violation of the Commission's 2018 HCA Order.

The Commission's 2018 HCA Order required Xcel to "provide hosting capacity data by substation and feeder" including, among other data, "peak load."[44] Xcel fails to comply with the Commission's requirement to publish any of its peak load data. To support its failure to publish any peak load data Xcel makes three claims: 1) peak load is exempt from publication for customer privacy reasons, 2) developers do not think peak load is necessary useful information, and 3) publishing peak load is a security concern.[45] IREC has already addressed the first claim regarding customer privacy in section IV.A above and will address the third claim in section IV.C below. Here we address the basic question of whether this data has value.

Xcel claims that developers do not think peak load is necessary or useful information.[46] First and foremost, this argument fails to meet the Commission's standard for withholding

[44] 2018 HCA Order at 14 (Ordering Paragraph 2.B).

[45] Xcel's 2019 HCA, at 18.

[46] Xcel's 2019 HCA, at 18.

information that is explicitly ordered to be published.[47] Furthermore, Xcel is simply wrong that the information is not useful; Xcel failed to consult a diversity of developers in reaching its conclusion. Customers and developers need peak load data to strategically locate DERs that are load sources, such as electric vehicles and energy storage, and a load profile could be used by customers with DERs looking to provide the valuable service of reducing peak load hours.

For example, a customer seeking to site an electric vehicle charging station would find it very useful to know the peak load on a feeder if it was seeking to understand whether their station could be accommodated without upgrades. In addition, a customer seeking to site a new solar project could use a load profile (both peak and minimum data) to design a system that accommodates seasonal variations without expensive distribution system upgrades.

It certainly could be that, as Xcel found in its surveys, that accessing a single annual value for peak load is not a high priority for certain developers. We suspect that this is because Xcel was only surveying solar developers, and not those looking to use the HCA data for other DER types, and because Xcel's current HCA only offers a single data point. Thus, rather than withholding load data that the Commission ordered it publish, Xcel should provide load data that allows customers to design new DERs that avoid negative distribution system impacts and actually benefit the grid. Xcel should publish monthly peak load, monthly absolute and daytime minimum load for all of its feeders and substations.

[47] As discussed above, the Commission standard is that "publicly disclosing this data would violate specific data privacy requirements or pose a significant security risk." 2018 HCA Order at 14 (Ordering Paragraph 2.C).

C. Xcel fails to adequately support it's claim that "security risks" will arise from the sharing of HCA data.

Xcel claims that various classes and types of HCA data pose undefined "security risks" to the company's system or customers.[48] IREC acknowledges that this is a serious issue and one that warrants careful consideration by the Commission. There is a growing awareness about the need to protect the physical and cyber security of the grid from attack and IREC urges Commissions to proactively, and not reactively, consider how best to mitigate these threats. However, we believe that a nuanced consideration does not necessarily lead to the conclusion that redacting vast swaths of information is actually the best way to protect the grid and its customers.

To start, it must be clear that the standard cannot be whether there is *any* risk associated with publishing HCA data, but rather, as stated by the Commission, whether sharing of that data creates a *significant* risk.[49] In other words, it is necessary to demonstrate that the risk is substantial enough that it would outweigh the well documented benefits of providing this transparency to facilitate optimal siting of DERs in accordance with the state's clean energy goals. To help with this, it is instructive and relevant to look to how the Federal Energy Regulatory Commission (FERC) has chosen to address these risks in its regulations on the designation of Critical Energy Infrastructure Information (CEII).

FERC does not allow the utilities to simply determine themselves what constitutes CEII. Rather, FERC itself must make that determination after a proactive showing by the utility that

[48] Xcel's 2019 HCA, at 17-22.

[49] 2018 HCA Order at 14 (Ordering Paragraph 2.C).

the specific infrastructure meets specified standards.[50] FERC's own guidance on this issue starts with the firm statement that the purpose of CEII is not to enable companies to prevent the public from gaining access to information that does not pose a risk of attack.[51] To avoid this misuse, FERC requires not a generalized statement that there is a risk, as Xcel has provided here, but rather it requires specific pieces of infrastructure be identified and the risks documented before it will grant such designation.[52] It is also important to note that FERC rarely prevents publication of the location of equipment alone.[53] While this standard is not necessarily binding on this Commission, it does expose the inadequacy of Xcel's showing.

Xcel's filing does not clearly state whether it has sought CEII protection for any of the information that it now seeks to withhold from the public here. Instead, Xcel identified feeders that would fall into four categories:

- Critical Energy Infrastructure on distribution feeder,[54]
- Critical Hospital – Level 1 or 2 Trauma Center on distribution feeder,
- Critical Data Center on distribution feeder, and
- Critical Public Gathering Center on distribution feeder.[55]

[50] 18 CFR Parts 375 and 388, Regulations Implementing FAST Act Section 61003 -- Critical Electric Infrastructure Security and Amending Critical Energy Infrastructure Information, 157 F.E.R.C. ¶ 61,123 (November 17, 2016).

[51] FERC Guidelines for Filing Critical energy Infrastructure Information, https://www.ferc.gov/resources/guides/filing-guide/file-ceii/ceii-guidelines/guidelines.pdf

[52] 18 C.F.R. Section 388.113(c)(2) (emphasis added).

[53] 18 C.F.R. Section 388.113(c)(2).

[54] Again, it is not clear if this term is being used in the context of infrastructure that FERC has determined is CEII or if it is being used in a more generalized manner.

[55] Xcel's 2019 HCA, Attachment A, at 28.

Xcel indicates that this information "aligns with protecting Critical Infrastructure Sectors (CIS) as identified by the US Department of Homeland Security (DHS)"[56] but provides no citation to support that DHS intended this information not to be disclosed from the public simply because it falls within one of those categories. IREC theoretically agrees that certain information about those sectors could be the sort of information that should be protected from publication, but it is vastly overbroad to state that simply because a facility might belong to one of the CIS sectors that any information about it should be suppressed.[57]

The simple fact that a facility is critical does not mean that the best way to protect it is to hide all information about it. Not all information is going to increase the vulnerability of the facility and some information (such as the location) is likely already available via other public means. Some security experts have noted that there are better methods to protect the electric power system from attack.[58] Xcel has failed to make a specific showing with respect to the sites or the types of information it seeks to protect, nor has it explained whether it considered other means, such as requiring a password to access the maps or other simple, but not burdensome, techniques. IREC does not take the position that there is no case where information the HCA maps might warrant protection, but broad and generalized claims of security risk are inadequate in light of the real value that distribution system transparency can have to the DER market.

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[56] Xcel's 2019 HCA, at 18.

[57] There are 16 different Critical Infrastructure Sectors covering vast portions of the economy, https://www.dhs.gov/cisa/critical-infrastructure-sectors, it is not clear why Xcel picked those that it did.

[58] National Research Council, Terrorism and the Electric Power Delivery System, 2012, Washington, DC, The National Academies Press, at 33-36, https://doi.org/10.17226/12050 (prepared by the Committee on Enhancing the Robustness and Resilience of Future Electrical Transmission and Distribution in the United States to Terrorist Attack) (Concluding that due to the fact that electric facilities can be easily located on the ground and online, it is ineffective to try to control access to their locations, and rather better to focus on other types of security techniques).

D. The California Public Utilities Commission has repeatedly rejected the IOUs' attempts to allow any data redaction beyond the 15/15 standard.

IREC is glad that Xcel has pointed this Commission to the recent conversations on this topic in California.[59] However, it is slightly puzzling that Xcel points the Commission to the California utilities' Petition for Modification without noting what led to the petition and what has (or has not) happened since it was filed. The petition that Xcel cites, was filed by the three large utilities in California after a lengthy process, wherein the Commission has repeatedly, since 2010, ordered the publication of data to support the hosting capacity map[60] (and earlier iterations of it). After repeated unsuccessful attempts to shield this information,[61] the California utilities filed yet another Petition for Modification at the end of 2018. However, while the rules in California allow parties to petition the Commission—they do not require the Commission to rule on the petitions they do not find to be meritorious. At this point, it has been over a year since the petition was filed. While the Commission may yet rule on the petition, it is more likely that the Commission has effectively rejected, yet again, the utilities attempt to prevent the public from accessing valuable information that facilitates the siting of DERs in the state. The Commission's orders are the law in California and they require that all information in the hosting capacity maps that is not confidential customer data under the 15/15 standard (see discussion above) be

[59] Xcel's 2019 HCA, at 19 (footnote 7).

[60] The maps in California are referred to as Integration Capacity Analysis (ICA) maps, but for simplicity we will refer to them here as HCA maps.

[61] Rather than providing this extensive history here, we have attached the joint response of IREC and multiple other parties to the utilities' petition. The Joint Parties response, provided as Attachment B, documents this history in detail at pages 2-8. Attachment C to these comments is the response of California's consumer advocate, the Public Advocate's Office, to the utilities' petition.

published, unless and until the utilities make an adequate showing that the information is CEII or otherwise warrants protection.[62] To date, the utilities have declined to make this showing.

The California hosting capacity maps are live, publicly available, updated monthly and full of considerably more detailed and useful information than Xcel is sharing in Minnesota.[63] While there is a lot of interesting history and arguments in the California case, the ultimate point is that it is insufficient to simply state that there is a risk. There must be a showing that the information is not otherwise available and poses a substantial risk that outweighs the merits of increased transparency and conformance with Commission direction to provide more information. Like FERC and the California Commission have done, we ask this Commission to hold Xcel to a reasonable standard of proof and not simply accept blanket assertions of security risks. The Commission should also clearly distinguish between what data is being protected for security concerns and what data is to be protected for customer conditionality concerns.

E. Publishing the location of distribution system lines will allow customers to identify which line segment they interconnect to.

In addition to requiring Xcel to publish all HCA data until Xcel has met a reasonable standard of proof for its broad claims of confidentiality for security or customer privacy concerns, the Commission should immediately require Xcel to publish the actual locations of the distribution system lines in its map. At this time Xcel is using an unusual method of essentially

[62] California Public Utilities Commission, Administrative Law Judge's Ruling Resolving Confidentiality Claims Raised by Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company as to Distribution System Planning Data Ordered by Decisions 17-09-026 and 18-02-004, R. 14-08-013 (December 17, 2018).

[63] For example, the maps in California include the exact location of the three-phase and single-phase lines, detailed load profiles for each circuit, the customer-type breakdown for each feeder, and downloadable data with considerably more granularity. *See, e.g.* https://ltmdrpep.sce.com/drpep/ (Southern California Edison's map, zoom in to get circuit specific information).

showing broad blocks of color instead of publishing the actual locations of the distribution system lines. This impairs developers ability to use the map effectively to determine precise locations and the relevant information for them. It also is simply unnecessary, the other major utility HCA maps in the country provide the actual locations of the lines,[64] and Xcel has made no specific showing that this information is confidential for its entire system. In many cases one can easily identify the location of distribution system lines, transformers and other equipment by either driving down a street or using readily available free online mapping tools.[65] Xcel's attempt to obscure this information does little other than impair the attempts of customers to access information that would enable them to design DER facilities well-suited and optimized for their specific grid location.

V. Xcel's HCA should identify how much new DER load a feeder, or sections of a feeder, can accommodate without additional study or cost.

IREC continues to urge the Commission to require Xcel to provide an HCA that is useful for identifying how much new DER load a feeder, or sections of a feeder, can feasibly accommodate without additional study, upgrades, or cost. Xcel's HCA only provides results for PV generation and fails to provide analysis for DER load. The transition to a low-carbon economy is going to require massive electrification of vehicles and buildings, hosting capacity maps are an important tool that can provide an understanding of where the best opportunities for

[64] *See, e.g.* Southern California Edison's map at https://ltmdrpep.sce.com/drpep/; NYSEG and RG&E map at http://iusamsda.maps.arcgis.com/apps/webappviewer/index.html?id=2f29c88b9ab34a1ea25e07ac59b6ec56; National Grid's Massachusetts map at https://ngrid.apps.esri.com/NGSysDataPortal/MA/index.html; and PEPCO's map of their entire service territory at http://pepco.maps.arcgis.com/apps/webappviewer/index.html?id=5c02592c8e0541b188eef9cbd8a2c9c0.

[65] *See* California Public Utilities Commission, R. 14-08-013, Administrative Law Judge's Ruling Resolving Confidentiality Claims Raised by Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company as to Distribution System Planning Data Ordered by Decisions 17-09-026 and 18-02-004, at 13-14 (December 17, 2018) (noting the ease with which distribution system equipment locations can be accessed online).

placing new DER load may exist, just as they can for new DER generation. There is untapped potential for growth in distributed energy storage (as a standalone project or paired with distributed generation), especially as costs continue to decline and customer demand for resiliency increases. HCA load analysis can also provide important insight for the Commission and other stakeholders as they review and approve long-term integrated distribution plans and investments, with the aim to integrate these resources in the lowest cost manner for the benefit of all ratepayers. Both software tools that Xcel has used for its HCA, DRIVE and Synergi, can perform this load analysis.[66]

The Commission agreed that such an analysis would be useful,[67] however Xcel performed an analysis that does not meet the goals outlined by IREC and Fresh Energy and endorsed by the Commission.[68] Xcel's analysis appears to model an increase in load on a feeder, then adds additional DER generation.[69] As outlined above, and in IREC's comments on Xcel's earlier HCAs, what customers need is an analysis that identifies how much new DER load, *e.g.*, electric vehicle chargers or energy storage, a feeder or sections of a feeder can accommodate without additional study or cost. Xcel's analysis turns this on its head and plainly does not achieve the goal of identifying optimal EV charging or energy storage sites.

VI. The Commission should supervise a discussion and then issue a decision fixing the technical assumptions, limiting criteria, and thresholds used in Xcel's HCA.

Xcel's 2019 HCA listed a variety of technical assumptions, limiting criteria, and thresholds used in its analysis. IREC's regulatory team, including engineering staff, completed

[66] Xcel Energy's Response to IREC Information Request No. 11 (Dec. 17, 2019). Further, this analysis should be performed using monthly peak load data.

[67] 2018 HCA Order, at 12.

[68] Xcel Energy's Response to IREC Information Request No. 11.A.

[69] Xcel's 2019 HCA, Attachment A, at 43-45.

an initial review of Xcel's description of this information. We identified a variety of ways that the technical assumptions, limiting criteria, and thresholds used in the HCA could be applied to show results that do not accurately reflect the hosting capacity of a line segment. In order to ensure that stakeholders have a firm understanding of the way that Xcel performs the analysis and the opportunity to suggest modifications that reflect appropriate thresholds used to perform interconnection studies, the Commission should supervise a discussion and then issue a decision regarding the assumptions, limiting criteria, and thresholds used in Xcel's HCA.

Xcel developed thresholds for what constitutes a significant change in configuration, load, or generation to warrant rebuilding a feeder model.[70] First, Xcel uses a 500 kW threshold for changes in load.[71] 500 kW is a high threshold for a single feeder because smaller changes in load are likely to impact reverse power flows. Second, Xcel considers the placement of a new solar garden as the threshold for new generation.[72] Most solar garden projects have a capacity around 1 MW, which is a high threshold for a single feeder. For both of these thresholds, IREC proposes that Xcel instead use the smallest increment that is feasible; 100 kW is a reasonable threshold to start with in the next update to produce more accurate results.

Next, it appears that Xcel's analysis of feeder voltage unnecessarily restricts its hosting capacity results. Xcel explains:

> When the Maximum Tap Regulators in Over/Under-Voltage Analysis setting is selected, voltage at a regulated bus is adjusted to the edge of the regulated nodes bandwidth. All voltages downstream until another regulation device or the edge of the feeder are adjusted accordingly. This is a valid voltage condition as the regulation device would not operate as long as the regulated bus is still within its

[70] Xcel's 2019 HCA, Attachment A, at 5.

[71] Xcel Energy's Response to IREC Information Request No. 5.

[72] *Id.*

> bandwidth. For overvoltage, voltages are moved to the top of the bandwidth, which is where this setting has impact.[73]

While this is a potential condition in the real world, utilizing this assumption in combination with maximum voltage in Range A of American National Standards Institute (ANSI) C84.1 (105%) likely limits hosting capacity unnecessarily. According to ANSI, voltages outside Range A and within Range B may occur infrequently and for a short duration. It appears Xcel configured its analysis so that voltages outside Range A should never occur, which is more strict than the ANSI standard. IREC requests that the Commission supervise a discussion and then issue a decision regarding this and the other voltage assumptions used in Xcel's HCA.

IREC also has a concern that operating distribution equipment at the high end of voltage ranges (*e.g.* near 105% of nominal, ANSI C84.1 Range A) and allowing for zero tap changes leaves little headroom for DER to reduce load or reverse power flow on a feeder without causing overvoltage violations. Similarly, not using line drop compensation techniques to adjust voltage regulation based on actual load could cause DER to produce voltage violations. Inasmuch as the HCA could be used as a tool to understand how operations might be altered to accommodate higher levels of DER, the Commission should supervise a discussion of the actual voltage regulation techniques Xcel uses in the field and if these techniques are effectively modeled for the HCA.

IREC understands the Primary Voltage Deviation analysis assumes that all DER on circuit ceases generation simultaneously. Xcel's white paper regarding IEEE 1453 states:

> All PV on a feeder or all feeders on a substation can trip at the same time for various disturbances, which results in substantial impacts to service quality. The step-voltage limit of 5% voltage change is proposed for this highly coincident

[73] Xcel Energy's Response to IREC Information Request No. 20.A.

situation. The step voltage limit of 3% for a single large PV tripping is proposed.[74]

Since Xcel published this white paper, IEEE released its Standard 1547-2018[75] that addresses similar step voltage changes for DER. Accordingly, the Commission and stakeholders should further review and consider how conservative this assumption should be in order to maintain power quality limits during normal operation. IEEE Standard 1547-2018 states that rapid voltage change (RVC) limits "shall not apply to infrequent events such as switching, unplanned tripping, or transformer energization related to commissioning, fault restoration, or maintenance." IEEE Standard 1547-2018 does not address aggregate effects for DER RVC, and only places a 3% limit for a single installation at the medium voltage level. IREC would like to understand whether or not the 5% or 3% limits are being applied for the case of "unplanned tripping" and why this assumption is appropriate for aggregate or single systems. Unplanned tripping of DER, especially in aggregate, would generally be due only to voltage or frequency protection limits being exceeded, *i.e.*, in response to poor power quality. IREC requests that the Commission direct further discussion on the basis of this assumption and how it translates to HCA limitations, and then consider issuing a decision addressing the appropriate method if necessary.

Additionally, the Unintentional Islanding criterion appears to limit reverse power flow through any "large three phase protective device",[76] which may further limit the HCA values. Unintentional Islanding appears to be the limiting factor hosting capacity on about 12% of Xcel's

[74] Xcel Energy, Dkt. E002/M-13-867, Applying IEEE 1453-2015 for Determining the Voltage Deviation Limits for Medium Voltage Distribution Connected Photovoltaics for Step-Changes in Voltage and Ongoing Voltage Deviations Due to the Passage of Clouds, at 1 (April 26, 2017).

[75] IEEE Standard 1547™-2018 for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces.

[76] Xcel's 2019 HCA, Attachment A, at 19.

feeders listed in Attachment B. IREC believes further review and consideration of the applicability of this criterion to inverter-based systems with anti-islanding protection is warranted. Islanding is unlikely to occur even if load and generation are able to be matched 100%, given the fluctuations of output power from DER and load, as well as the anti-islanding protection present in inverter-based DER. Inverters with anti-islanding protection will prevent unintentional islanding in almost all circuit configurations. A recent Sandia National Laboratory Study suggests that unintentional islanding criterion should limit the hosting capacity for inverter-based systems only when a single circuit includes inverters with multiple types of anti-islanding protection or a rotating generator.[77] In other circumstances, direct transfer trip or reclose blocking is likely not required. IREC requests that the Commission facilitate a discussion on this topic and then issue a decision regarding this and other assumptions used in Xcel's HCA, preferably before work on the next HCA commences.

VII. Xcel's map should include all pre-application report data unless Xcel can articulate a rational for not publishing the data.

Stakeholders requested that Xcel publish basic distribution system data provided in its pre-application report.[78] In response to this request, Xcel provided significantly more distribution system data in its online map. This data makes the map considerably more useful for customers seeking to interconnect DER, and yet Xcel can reasonably publish more basic distribution system data. For example, Xcel withholds the following data while at the same time indicating that there is "No Limitation" preventing it from publishing this data on its map and in its tabular spreadsheet:

- Transformer Name,

[77] Michael E. Ropp et al, *Unintentional Islanding Detection Performance with Mixed DER Types*, Sandia National Laboratories (July 2018) (Report No. SAND2018-8431).

[78] Xcel's 2019 HCA, Attachment A, at 46-47.

- Transformer Absolute Min,
- Load Tap Changer (LTC) or Regulator,
- Feeder Absolute Min, and
- Network or Radial.[79]

The Commission should order Xcel to publish this basic system data on its map and in its tabular spreadsheet because Xcel cannot identify a reason for withholding this information from customers and developers.

VIII. The 2019 HCA's accuracy check is a good start, but additional data validation efforts are needed once frequency and granularity issues are addressed.

The accuracy analysis required by the 2018 HCA Order represents a first step in assessing the validity of HCA results. The comparison with the results from Synergi were promising, and yet, when comparing the HCA results to actual interconnection studies, less than half of the feeders in Xcel's 2018 HCA accuracy check had valid results![80] Considering the time and resources spent developing the HCA, it is quite concerning that Xcel somehow concludes that the fact that the HCA results are inaccurate more than half the time is a "positive correlation."[81]

Putting aside this questionable metric for success, although we will not know until a full scale validation effort is undertaken, it appears that the inaccuracies identified by Xcel in comparing the results of interconnection studies may have less to do with the accuracy of the model itself, and more to do with how infrequently the model is update and the lack of granularity its results. In section II.A of these comments, IREC describes how monthly updates

[79] Xcel Energy's Response to IREC Information Request No. 6.

[80] Xcel's 2019 HCA, Attachment A, at 25 ("Overall, seven of the 15 feeders had interconnection study results that were either between the minimum and maximum DRIVE hosting capacities or were within 100kW, which we consider to be a positive correlation."). IREC has not evaluated or provided an opinion of Xcel's metric for a positive correlation between HCA results and interconnection studies.

[81] *Id.*

can ensure that results are accurate more often without significantly increased costs, and in Section III, IREC describes how publishing HCA results on a more granular level provides customers more precise and actionable information. Based on IREC's experience with the development of HCAs across the country, and the results of Xcel's comparison with the interconnection studies, we believe that the best way to increase the accuracy of Xcel's HCA is to perform monthly updates and provide more granular results. Accordingly, we recommend implementing these two recommendations and then engaging in a more through data validation effort.

IREC recommends that Xcel develop a written data validation plan, accept written feedback from stakeholders on the written plan, and then implement a plan that incorporates stakeholders' feedback. A national best practice for validating HCA results has yet to be developed, but multiple states are evaluating possible approaches, and we look forward to working with Xcel and the Commission to ensure that HCA results are accurate. Based on our experience to date, we would expect a data validation plan to use automated flags to identify results that may be inaccurate (*e.g.*, large discrepancies between previous HCA results and current results; mismatches on number of line sections; default equipment; loading violations; voltage violations), include a certain number of random manual checks to ensure accuracy before publication, and a system to check that hosting capacity results of zero are accurate.[82] For example, IREC suspects that a feeder that includes no existing DER and a daytime minimum

[82] *See* CA Pub. Util. Comm., Dkt. R.14-08-013, Reply Comments of the Interstate Renewable Energy Council, Inc. on Refinements to the Integration Capacity Analysis, Attachments 2-4 (Sept. 9, 2019 presentations on HCA data validation efforts of California utilities) (Sept. 30, 2019), available at http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M321/K320/321320934.PDF.

load 5 MVA should not have a hosting capacity value of zero, circumstances like this should be examined.

Finally, Xcel noted, and IREC agrees, that comparing interconnection studies to HCA results has limited value. In its 2017 HCA Report, Xcel noted that comparing HCA results to interconnection study results poses problems; in particular, most past interconnection studies did not necessarily calculate hosting capacity, but rather showed where violations occurred and upgrades might be needed to interconnect a particular sized project.[83] For example, the largest project evaluated in the interconnection study was 1 MW, so this comparison does not evaluate if a feeder could host a project larger than 1 MW.[84] While we were able to see that the frequency of updates and granularity are problematic from this assessment, it does not tell the Commission whether the HCA model is getting the actual hosting capacity correct. Thus, the Commission should work with stakeholders and Xcel to ensure a more robust, representative, and thorough accuracy assessment.

For the reasons articulated herein, IREC recommends performing monthly updates and providing more granular results to ensure the HCA is a useful and informative tool to help support Minnesota's DER policy goals.

IX. Conclusion

Xcel's 2019 HCA represents a substantial improvement from its earlier HCAs. These improvements are directly attributable to the Commission's order that directed Xcel to use and publish specific data, and to work with stakeholders to improve the map's functionality. The Commission should continue to direct specific enhancements to Xcel's analysis and require Xcel

[83] Xcel Energy, Docket No. E002-M-17-777, Distribution System/Hosting Capacity Study, at pp. 17-18 (Nov. 1, 2017).

[84] Xcel Energy's Response to IREC Information Request No. 9.

engage in discussions with stakeholders this year regarding the technical assumptions, limiting criteria, and thresholds used in the HCA.

Xcel's HCA continues to lack basic features that prevent it from being a useful and valuable interconnection tool for customers. The best way to increase the value of Xcel's HCA for customers is to switch to monthly updates and provide more granular results, including all the criteria violation values for each line segment. Making these two improvements will go a long way towards helping customers achieve Minnesota's goals for increased DER deployment.

Finally, the Commission should carefully scrutinize Xcel's justifications and reject the withholding of any data that is not supported by the record and Commission policy in this case.

DATED: December 30, 2019 Respectfully submitted,

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