

Staff Briefing Papers

Meeting Date	September 1, 2022	Agenda Item *7
Company	Xcel Energy E002/M-21-767	
Docket No.	In the Matter of Xcel Energy 2021 Hosting Capacity Report Under Minn. Stat. 216B.2425, Subd. 8	
Issues	1. Should the Commission accept or reject Xcel Energy's 2021 Hosting Capacity Analysis Report?	
Staff	Hanna Terwilliger hanna.terwilliger@state.mn.us	651-201-2243

Relevant Documents	Date
Xcel Energy – 2021 Hosting Capacity Analysis Report (Initial and Trade Secret)	November 1, 2020
Institute for Local Self Reliance – Initial Comments	April 4, 2022
Department of Commerce – Initial Comments	May 25, 2022
Xcel Energy – Reply Comments	June 6, 2022
Department of Commerce – Letter	June 23, 2022

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The attached materials are work papers of the Commission Staff. They are intended for use by the Public Utilities Commission and are based upon information already in the record unless noted otherwise.

Statement of the Issues

1. Should the Commission accept or reject Xcel Energy's 2021 Hosting Capacity Analysis (HCA)?

Acronyms

ADMS	Advanced Distribution Management System
BCA	Benefit-Cost Analysis
CIM	Common Information Model
CRS	Customer Resource System
DER	Distributed Energy Resource
DRIVE	Distribution Resource Integration and Value Estimation
EV	Electric Vehicle
FTSRS	Fast Track Supplemental Review Screen
GIS	Geographic Information System
HCA	Hosting Capacity Analysis
MN DIP	Minnesota DER Interconnection Process
VSR	Voltage Supervisory Reclosing

Background

Minn. Stat. §216B.2425, subd. 8, directs a public utility that is subject to the statute and operating under a multi-year rate plan to "... conduct a distribution study to identify interconnection points on its distribution system for small-scale distributed generation resources and shall identify necessary distribution upgrades to support the continued development of distributed generation resources... ."

Under the statute, the study must be conducted biennially (odd-numbered years) and included in the utility's biennial transmission projects report. Xcel has agreed to conduct and file the study annually. Xcel files the Hosting Capacity Analysis (HCA) Report on the same due date as the biennial report (November 1) however, it is filed as a stand-alone report from the biennial transmission projects report, as authorized by the Commission in the 2018 HCA Order.¹

¹ See Order Point 8, July 19, 2018, Order Accepting Study and Setting Further Filing Requirements

Report Year (Filing Year)	Docket No.	Initial Filing (Filing Link)	PUC Order Date (Order Link)
2021	E002/M-21-767	2021 HCA Report	
2020	E002/M-20-812	2020 HCA Report	2021 HCA Order – November 9, 2021
2019	E002/M-19-685	2019 HCA Report	2020 HCA Order – July 31, 2020
2018	E002/M-18-684	2018 HCA Report	2019 HCA Order – August 1, 2019
2017	E002/M-17-777	2017 HCA Report	2018 HCA Order – July 19, 2018
2015	E002/M-15-962	2016 HCA Report	2017 HCA Order – August 1, 2017

On November 9, 2021, the Commission issued its Order Accepting Report, Requiring Stakeholder Workshops, and Setting Additional Requirements in Docket No. E002/M-20-812.

On November 1, 2021, Xcel filed its 2021 Hosting Capacity Report, including the following four attachments:

- Attachment A: November 2021 HCA Report
- Attachment B: Feeder Tabular Results for the November 2021 HCA (by feeder).
- Attachment C: Sub-Feeder Tabular Results for the November 2021 HCA (by feeder segment).
- Attachment D: Compliance Matrix.

On February 1, 2022, Xcel filed its quarterly update of the HCA Report.

On February 7, 2022, the Commission issued a Notice of Comment Period.

On April 4, 2022, the Institute for Local Self Reliance (ILSR) filed initial comments and the Commission extended the comment period at the request of the Minnesota Department of Commerce.

On April 8, 2022, Xcel filed a letter outlining its 2022 Stakeholder Workshop Plan for the HCA report.

On May 2, 2022, Xcel filed its quarterly update of the HCA Report.

On May 3, 2022, the Commission extended the comment period at the request of the Department of Commerce.

On May 12, 2022, Xcel filed a letter with the slides from its first stakeholder meeting.

On May 25, 2022, the Department filed initial comments.

On June 6, 2022, Xcel filed reply comments

On June 23, 2022, the Department filed a letter responding to Xcel's reply comments

Commission action on Xcel Energy's HCA Report is not required by law. Given stakeholder interest and the iterative nature of the HCA to-date, the Commission historically has accepted the HCA Report filings upon review and provided additional guidance as warranted. Typically, whether the Commission accepts a given HCA report and/or provides guidance for future filings stems from the analysis of whether: Xcel complied with law (statutory requirements), Xcel complied with previous Commission orders, and the record indicates that additional or new

guidance should be provided to Xcel to ensure future reports are useful and progressively improving.

2021 HCA Report

As in prior reports, Xcel continues to use the EPRI DRIVE (Distribution Resource Integration and Value Estimation) tool to perform its hosting capacity analysis, using the Centralized methodology which assess distributed energy resources (DER) at specific locations along each feeder.² Xcel indicated that unless otherwise noted, the 2021 HCA uses the same methodology, assumptions, limiting criteria, and thresholds as its November 2, 2020 HCA and August 2021 quarterly update, which is also consistent with the Commission's November 9, 2021 Order.³ A description of how the HCA is conducted can be found on pages six through nine of Xcel's filing.

Xcel instituted a quarterly update of its HCA in 2021, aiming to publish quarterly results on February 1, May 1, August 1, and November 1 annually. The cutoff date for updated data will be three months prior to the date of publishing.⁴ Each update applies to approximately one quarter of the Company's system, focusing on any feeders that had infrastructure upgrades and significant changes in load or install DERs. Every feeder is updated at least once per year.⁵

Xcel outlined several improvements to the 2021 HCA:

- Use of Unintentional Islanding Threshold: Returned to use after absence in 2020 Annual HCA due to a change in DRIVE 2.1.1, which was restored in the current 3.0 version of drive. Xcel used an 80 percent generation to load threshold, which aligns with current interconnection studies.⁶
- Feeders with Installed Voltage Supervisory Reclosing (VSR): Since VSR negates the Unintentional Islanding limit, Xcel incorporated this information into the HCA results – replacing all instances where Unintentional Islanding was the limiting factor with the next applicable limit. Currently, 115 feeders have confirmed VSR installed.⁷
- Criteria for Updating the Feeder Models – Change in Aggregate DER Generation 100 kW or Greater: For the November 2021 HCA, lowered the DER generation threshold that triggers a feeder model update from 500 kW to 100 kW. Feeders are updated if new DER installations amount to 100 kW or greater on a feeder and are in service at the time of the analysis.⁸
- Power Factor: Determined it was reasonable to change the power factor for DER sites from 98 percent to 95 percent, as value is commonly used in interconnection studies.⁹
- Additional Information with the Results: The hosting capacity map pop-up and Feeder Tabular Results include for each feeder the most recent date when data was updated

² Xcel, Petition, p. 5

³ Xcel, Petition, p. 2

⁴ Xcel, Petition, p. 6

⁵ Xcel, Petition, p. 2

⁶ Xcel, Petition, pp. 7-8

⁷ Xcel, Petition, p. 8

⁸ Xcel, Petition, p. 8

⁹ Xcel, Petition, p. 8

(data cutoff date). They also indicate what was the most recent quarterly report where that data was updated.¹⁰

Xcel explained that the November 1, 2021, HCA results indicated 91 feeders with zero maximum hosting capacity, down from 95 feeders in the August 2021 HCA and 122 feeders in the November 2020 HCA.¹¹

Cost Estimate and Timeline for a Monthly Updated HCA

In its November 9, 2021, Order in Docket 20-812 (Xcel's 2020 HCA), the Commission required Xcel to provide "options for monthly HCA updates, including cost estimates."¹²

In its filing, Xcel provided an initial estimate for a monthly HCA update. Xcel noted due to the short time between the Commission's verbal decision (September 30) and filing date (November 1) it would need to refine its estimates with a more detailed analysis, including further engagement with stakeholders over the coming months. Xcel indicated it could file a monthly HCA within 15-18 months after it initiates the project, at a total cost of \$1.7 - \$3.5 million. There would also be an annual incremental engineering cost of \$375,000 to \$500,000.¹³

Xcel explained that it would need to automate the feeder model building process to offer a monthly HCA. It outlined several steps necessary to produce a monthly HCA:

- CIM Extract for Synergi: Import Common Information Model (CIM) to Synergi in parallel with Advanced Distribution Management System (ADMS) data, which will expedite the ability to build and analyze feeder models.
- Feeder Model Database: need to create a database to store the feeder models created with the CIM extract, which will assist with the integration of the HCA with MN DER interconnection process (MN DIP) processes. The database will also allow the company to use the feeder models for other applications and use cases, such as the study of EV penetrations.
- Synergi/CRS Integration and Cleanup: reconfigure the link between the Customer Resource System (CRS) and Synergi to assure data quality and improvements.
- Salesforce Integration: integrate Salesforce (currently access point for DER developers to interact with MN DIP) to increase automation and communication between Xcel engineers, program office, and external DER developers.¹⁴

Xcel indicated it would also need to add several new positions to support the monthly HCA cadence, including two HCA Engineers, two Modeling Engineers, and one to two GIS Specialists.¹⁵

Security and Confidentiality Considerations

¹⁰ Xcel, Petition, p. 8

¹¹ Xcel, Petition, p. 11

¹² Docket 20-812, November 9, 2021 ORDER ACCEPTING REPORT, REQUIRING STAKEHOLDER WORKSHOPS, AND SETTING ADDITIONAL REQUIREMENTS, Order Point 13.

¹³ Xcel, Petition, p. 13

¹⁴ Xcel, Petition, pp. 14-15

¹⁵ Xcel, Petition, pp. 15-16

In Attachment E to its petition, Xcel included a justification for data security and privacy concerns associated with the HCA. No changes were made since the November 2021 HCA.

In Docket 20-800, the Commission’s Investigation on Grid and Customer Security Issues Related to Public Display or Access to Electric Distribution Grid Data, contained recommendations relating to Xcel’s HCA, including data classification and access, new data for the HCA, and the frequency of updates for the HCA. In briefing papers in that docket, Staff included decision options relating to HCA data access and classification, but did not raise the other HCA issues as they were considered out of scope. Staff notes parties did not raise the out-of-scope issues in the instant docket during the comment period. In its August 3, 2022, [Order](#) in Docket 20-800 the Commission authorized the Executive Secretary to take further comment on issues related to grid security, which includes how grid data will be handled for the HCA.

Comments

Department of Commerce

In initial comments, the Department provided the following table summarizing whether Xcel complied with the HCA statute and prior HCA Orders. The Department found 1 area of non-compliance, as discussed below, and two order points that were not applicable, otherwise the Department found the HCA to be in compliance with Minnesota statute and prior Commission orders. For the two “n/a” categories, the Department noted they were for future looking order points.

Authority	Description	Location	Complied?
<i>Minn. Stat. § 216B.2425, subd. 8</i>			
Substantive Requirement	Xcel shall conduct a distribution study to identify interconnection points on its distribution system for small-scale distributed generation resources and shall identify necessary distribution upgrades to support the continued development of distributed generation resources.	Report, Sec. I.B, at 6	Yes ⁹
Procedural Requirement	Xcel shall include the study in its report required under subdivision 2.	n/a	Yes ¹⁰
<i>2020 HCA Order</i>			
Order Point 4	Collaborate with stakeholders in evaluating costs and benefits associated with hosting capacity analysis able to achieve the following objectives: <ul style="list-style-type: none"> a. Remaining an early indicator of possible locations for interconnection; b. Replacing or augmenting initial review screens and/or supplemental review in the interconnection process; c. and/or Automating interconnection studies. 	See footnote 11	Yes ¹¹
Order Point 5	Xcel is directed to continue working with stakeholders to identify opportunities to integrate the HCA and the MN DIP pre- application and screening processes in future iterations of the HCA.	See footnote 11	Yes

Order Point 8	Xcel's future HCA reports must be detailed enough to provide developers with a reliable estimate of the available level of hosting capacity at the feeder and sub-feeder levels at the time of submittal of the report to the extent practicable. The information should be sufficient to provide developers with a starting point for interconnection applications.	Atts. A, B, and C	Yes
Order Point 9	The Commission adopts a long-term goal to use the hosting capacity analysis in the interconnection process's fast track screens. Xcel should work with stakeholders to refine the hosting capacity analysis. Xcel may seek cost and timing clarification from the Commission.	See footnote 11	Yes
Order Point 11	In its 2020 HCA Report, Xcel must, to the extent practicable, include a unique name or number for each line segment in the maps' pop-up boxes.	Att. C	Yes
Order Point 15	In its 2020 HCA tabular report, Xcel must publish the criteria violation and corresponding hosting capacity values for each HCA model run and location, and map with appropriate caveats.	Att. C, February 2022 Update, and HCA Map ¹²	Yes
Order Point 17	Following a Commission determination of the Use Case for future HCA reports, Xcel must develop a corresponding data validation plan for HCA results, solicit written feedback from stakeholders on the draft plan, and then include the final plan in the next HCA report.	Att. A, at 19	Yes
2021 HCA Order			
Order Point 2	See 2020 HCA Order, Order Point 8	Atts. A, B, and C	Yes
Order Point 3	Xcel must fully comply with the requirements of Order Point 15 of the 2020 HCA Order and publish all criteria violation on the map by May 2022.	HCA Map	Yes
Order Point 4	Xcel must perform an HCA for load and file the analysis by November 2022.	Att. A, at 8 – 9.	n/a
Order Point 5	The Commission directs that stakeholder workshops be held that provide for proposals put forward by stakeholders to incorporate the HCA into the interconnection process; the workshops will be convened by the Distributed Generation Work Group and facilitated by Commission staff. The Commission delegates administrative authority to the Executive Secretary to set schedules and timelines. Xcel shall, in collaboration with stakeholders, identify which priorities should be addressed first. For the priorities, stakeholders shall discuss the costs and benefits. Once complete, Xcel shall use the resulting information to develop a cost-benefit analysis and timelines for the priorities. The Company shall provide this information within 120 days after	See footnote 11	Yes

	the workshops conclude, or in the alternative, a status update and revised timeline for providing this timeline.		
Order Point 6	Xcel must conduct a benefit-cost analysis of the Company's proposed Path 1 and Path 2 improvements of its hosting capacity analysis in any future cost recovery filing. This analysis should clearly indicate which improvements are incremental to any existing and planned grid modernization proposals, such as Xcel's ongoing Advanced Distribution System Management project. Additionally, this analysis should include a discussion of revenue generation from beneficiaries of any improvements.	n/a	n/a
Order Point 7	Xcel must exclude its hosting capacity analysis costs from its next rate case if the Company requests recovery of its HCA costs through its next Transmission Cost Recovery Rider Petition.	n/a	Yes ¹³
Order Point 8	Xcel must separately develop a proposal to implement the Fast Track Supplemental Review Screen (FTSRS) Use Case in the next hosting capacity analysis report consistent with the Commission's long-term goal of the hosting capacity analysis and must conduct a benefit-cost analysis of the FTSRS Use Case.		No
Order Point 9	See 2020 HCA Order, Order Point 17	Att. A, at 19	Yes
Order Point 10	See 2020 HCA Order, Order Point 4	See footnote 11	Yes
Order Point 11	See 2020 HCA Order, Order Point 5	See footnote 11	Yes
Order Point 12	See 2020 HCA Order, Order Point 9	See footnote 11	Yes
Order Point 13	Xcel must provide, in its 2021 HCA Report, options for monthly HCA updates, including cost estimates.	Report, Sec. II, at 14 – 16.	Yes

⁹ Xcel identified and included 1,053 feeders in the 2021 Report, while excluding 115 feeders from the public "heat map" based on confidentiality and security concerns. The Department notes that Xcel identified and included 1,050 feeders in the 2019 and 2020 Reports.

¹⁰ The statute refers to the Biennial Transmission Project Report. The Commission has previously determined that Xcel's HCA Report can be filed separate from the Biennial Transmission Project Report. IN THE MATTER OF XCEL'S 2017 HOSTING CAPACITY STUDY. *Order Accepting Study and Setting Further Requirements*. Docket No. E002/M-17-777. July 19, 2018. Order Point No. 8.

¹¹ See Xcel Letter – 2022 Workshop Plan. Docket Nos. E002/M-21-767, E002/M-20-812, and E999/CI-16-521.

¹² Xcel HCA Map accessed at:

<https://xeago.maps.arcgis.com/apps/webappviewer/index.html?id=a04c42c922664381a2d35ba12305eb2e>.

¹³ The Department reviewed Xcel's 2021-2022 Transmission Cost Recovery Rider petition in Docket No. E002/M-21-814. HCA costs are not included in the petition.

Based on its review of Xcel's HCA, the Department found the report generally complied with state statute and the 2020 and 2021 HCA Orders, with the exception of Order Point 8 of the 2021 HCA Order.¹⁶ Order point 8 requires Xcel to "separately develop a proposal to implement the Fast Track Supplemental Review Screen (FTSRS) Use Case in the next hosting capacity

¹⁶ Department, Initial, p. 9

analysis report consistent with the Commission’s long-term goal of the hosting capacity analysis and must conduct a benefit-cost analysis [BCA] of the FTSRS Use Case.”

The Department noted it suspected due to the short window of time between the Commission’s oral decision at its September 30, 2021, agenda meeting and the due date of the report (November 1, 2021), Xcel did not have time to carry out order point 8. However, in the Department’s opinion, that did not justify complete omission of a discussion of Order Point 8, even if just to lay out a path forward. The Department pointed out that Xcel discussed several other verbal decisions from the September 30 meeting in its HCA report. Therefore, the Department requested “that Xcel develop a proposal to implement the FTSRS Use Case and conduct a BCA in Reply Comments. If not practical, the Department requests that Xcel provide a timeline to supplement its 2021 HCA Report with the information required by Ordering Paragraph 8 of the 2021 HCA Order in Reply Comments.”¹⁷

The Department also recommended that “the Commission find that Xcel Energy’s 2021 Hosting Capacity Analysis Report does not achieve the requirements outlined in the Commission’s July 31, 2020 Order, the Commission’s November 9, 2021 Order, and Minn. Stat. § 216B.2425, subd. 8 until Xcel complies with Ordering Paragraph 8 of the Commission’s November 9, 2021 Order.”¹⁸

Institute for Local Self Reliance (ILSR)

ILSR recommended acceptance of Xcel’s 2021 HCA report. ILSR noted the addition of criteria threshold violations to the map pop-ups as particularly useful. However, ILSR noted additional improvements are needed before the HCA can be integrated with the interconnection process, in particular aligning how the HCA treats in queue projects with how interconnection treats in queue projects. ILSR explained that if the HCA is meant to be used as a first step in the interconnection process, it must include projects that are in the interconnection queue as operational for the HCA, which would be consistent with how other utilities treat queued projects in their HCA. ILSR noted Xcel was concerned that including queued projects would create too much variability in the HCA due to those applications entering and exiting the interconnection process. However, ILSR explained this could be mitigated by conducting the HCA on a monthly basis.¹⁹

In addition, ILSR pointed out Xcel’s cost estimates to provide a monthly HCA should be scrutinized, noting comments from IREC in prior HCA reports that cast doubt to the reasonableness of cost projections. ILSR also requested that the Commission “hold stakeholder workshops with Xcel Energy and industry experts to develop the load hosting capacity analysis methodology” as ordered in its November 9, 2021, Order in Xcel’s 2020 HCA report.²⁰

Xcel Reply Comments

In reply comments, Xcel disagreed with the Department’s assertion that it had not met the requirements of Order Point 8 from the Commission’s November 9, 2021 Order. Xcel asserted

¹⁷ Department, Initial, p. 9

¹⁸ Department, Initial, p. 10

¹⁹ ILSR, Initial, p. 2

²⁰ ILSR, Initial, p. 3

that the Commission speaks through its written orders, and as the order was not issued until November 9, 2021, the language requiring Xcel to file a proposal for FTSRS Use Case is not applicable until Xcel files its 2022 HCA on November 1.²¹

Xcel explained:

... the Company is working to separately develop a proposal for implementation of the FTSRS Use Case in isolation. This work, however, requires the same stakeholder cost and benefit information associated with Order Point 5 discussed above, to conduct the required cost-benefit analysis. As we noted previously, even if the Commission's verbal decisions were binding, it would have impracticable for the Company to be able to provide any meaningful further analysis of an FTSRS use case with only 30 days between the Commission's verbal decisions and our 2021 HCA Report. In contrast, the process we believe the Commission contemplated – and that we currently have underway to comply with the November 9 Order, which includes further engagement with stakeholders directly and through the DGWG [Distributed Generation Workgroup] – will indeed provide meaningful information to inform the Commission's actions with respect to the future of our HCA.²²

Also in reply comments, Xcel outlined its ongoing initiatives and stakeholder processes ahead of the filings of its November 2022 HCA report. Xcel is in the process of hosting five workshops around its existing HCA and the Load HCA:

SERIES 1 – POTENTIAL HCA FUTURES

- April 26, 2022
 - HCA Overview
 - Current HCA Futures Roadmap
 - HCA and Interconnection Study Attributes
 - Explore HCA/Interconnection Integrations
- May 24, 2022
 - Continue exploration of HCA/Interconnection Integration scenarios
 - Discuss Priorities and Benefits²³

SERIES 2 – LOAD HCA

- June 22, 2022
 - What is a Load HCA
 - Proposed Approach
 - Explore Use Cases
 - Priorities and Benefits
- July 26, 2022
 - Overview of Final/Planned Approach
- Post-November 2022 Filing – Date TBD
 - Feedback on first full Load HCA²⁴

²¹ Xcel, Reply, pp. 2-4

²² Xcel, Reply, pp. 5-6

²³ Xcel, Reply, p. 5

²⁴ Xcel, Reply, p. 6

In response to ILSR, Xcel noted many of the topics raised in their comments are the subject of its stakeholder series outlined above. Xcel also explained it has taken other actions to align the HCA and the interconnection process, specifically that it “aligned Hosting Capacity criteria with the interconnection screen and study requirements, utilized hosting capacity models for the interconnection screens and studies when able, and increased the cadence of the hosting capacity analysis to better align HCA results with existing DERs in the field.”²⁵

Department Reply Letter

In a June 23, 2022 letter, the Department responded to Xcel’s reply comments. In the letter, the Department acknowledged the ongoing stakeholder process Xcel is conducting around future use cases and incorporating the HCA into the interconnection could better inform the Company’s proposal for the FTSRS Use Case. Therefore, the Department recommended the Commission “find that Xcel Energy’s 2021 Hosting Capacity Analysis Report achieves the requirements outlined in the Commission’s July 31, 2020 Order in Docket No. E002/M-19-685, the Commission’s November 9, 2021 Order, and Minn. Stat. §216B.2425, subd. 8 with the understanding that Xcel will comply with Ordering Paragraph 8 of the Commission’s November 9, 2021 Order in the 2022 HCA Report expected on or before November 1, 2022.”²⁶

Staff Analysis

Staff notes the disagreement between the Department and Xcel is mainly over whether the Commission intended for the Company to file its FTSRS with the 2021 HCA or with the 2022 HCA. Given that the next HCA report is due within the next 3 months, Staff believes that receiving Xcel’s FTSRS with the November 1, 2022 report is reasonable, and the Commission does not need to make a determination on whether Xcel has complied with Order Point 8. In future decisions if the agenda meeting takes place close to the due date of the next report, the Commission could give additional direction to Xcel about updates to pending order points at the agenda meeting.

Decision Options

1. Accept Xcel Energy’s 2021 Hosting Capacity Analysis Report and Hosting Capacity Analysis. (Xcel, ILSR)
2. Find that Xcel Energy’s 2021 Hosting Capacity Analysis Report achieves the requirements outlined in the Commission’s July 31, 2020 Order in Docket No. E002/M-19-685, the Commission’s November 9, 2021 Order, and Minn. Stat. §216B.2425, subd. 8 with the understanding that Xcel will comply with Ordering Paragraph 8 of the Commission’s November 9, 2021 Order in the 2022 HCA Report expected on or before November 1, 2022. (Department)
3. Reject Xcel Energy’s 2021 Hosting Capacity Report and Hosting Capacity Analysis.

²⁵ Xcel, Reply, p. 8

²⁶ Department, Letter, June 23, 2022, p. 1