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Xcel Energy		Information Request No.	1
Docket No.:	E002/M-23-452		
Response To:	Minnesota Public Utilities Commission		
Requestor:	Austin Northagen		
Date Received:	April 30, 2024		

Question:
How is the utility considering equipment design standards regarding modernizing infrastructure to withstand increasing extreme weather events, including but not limited to higher and longer duration heat waves, heavy rainfall events, higher winds, and increased ice storms? For example, how is the utility considering how increased and longer duration heat waves might impact increased stress on the distribution system from both higher temperatures and higher electricity use?

Response:
Utility distribution systems are complex and dynamic, in that they involve thousands of pieces of equipment, must be resilient from outside forces over vast areas of geography, and must be able to respond to changes in customer loads and operational realities. The Company is continually performing research and implementing standards to improve resiliency and reliability. Our standards consider extreme weather events and continue to advance with the latest research. Revision to the Distribution Design and Construction Standards typically occurs every two years. Some research is performed in-house, but historically most of this research has been conducted in conjunction with the Electric Power Research Institute (EPRI) and other utilities. Below is a list of the upgrades that the Company has implemented because of these research projects:

- Fiberglass crossarms (2012, 2014)
- Transition to NESC Grade B construction (2014)
- Wildfire construction standards (2020-present)

The Company is currently evaluating the potential impacts of cable and transformer loading related to Electric Vehicle adoption, electrification of the gas system (e.g., heat pumps), and distributed energy resources. Additionally, we are participating in IEEE standard groups to create and/or revise distribution equipment standard requirements that reflect the changing needs of the world. (e.g., IEEE Insulated Conductor Committee, IEEE C37 Switchgear Committee).

Higher ambient temperatures affect both the capacity rating of distribution equipment and the electricity usage of customers. In general, the capacity of conductors decreases as the ambient temperature increases. The conductor capacities used for distribution planning are calculated assuming an ambient temperature of 40 degrees Celsius (104 degrees Fahrenheit). Increased customer electricity usage during extreme heat waves is addressed in the load forecasting process. The Company's load forecasting software, LoadSEER, uses a weather normalization and simulation tool called SCADAScrubber to correlate historical SCADA data for feeders and banks with historical weather data. SCADAScrubber then uses this load-weather correlation to simulate system loading under a user-specified percentile of extreme weather based on 30 years of historical weather data. This allows distribution planning engineers to understand the demands on the distribution system, should the most extreme weather events of the past 30 years occur more frequently.

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