



414 Nicollet Mall
Minneapolis, Minnesota 55401

April 16, 2019

—VIA ELECTRONIC FILING—

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101

RE: ERRATA – COMMENTS
IMPACT OF SEVERE WEATHER
DOCKET NO. E,G999/CI-19-0160

Dear Mr. Wolf:

Northern States Power Company, doing business as Xcel Energy, submits a corrected version of its April 12, 2019 Comments in response to the Minnesota Public Utilities Commission's March 18, 2019 Notice of Comment Period in this docket. We summarize the revisions to pages 5 and 10 below, and note that we identify the corrections to our attached Comments in **bold redline**.

Revision to Page 5:

We note that after analyzing the event, we hit a new natural gas throughput peak on January 29, at 799,550 Dekatherms (Dth), which is ~~nine~~ **three** percent above our prior firm **and interruptible throughput** peak ~~load~~.

Revision to Page 10:

We have approximately 361 non-firm natural gas customers on our Upper Midwest system. We began curtailing a limited number (15) of interruptible customers the evening of January ~~28~~ **9**, and the remaining customers beginning at 9:00 a.m. January ~~29~~ **30**.

Pursuant to Minn. Stat. § 216.17, subd. 3, we have electronically filed this document, and served copies of the summary on the parties on the attached service lists. If you have any

questions regarding this filing please contact Pamela Gibbs at (612) 330-2889 or pamela.k.gibbs@xcelenergy.com or me at (612) 330-6935 or gail.baranko@xcelenergy.com.

Sincerely,

/s/

GAIL BARANKO
MANAGER, REGULATORY PROJECT MANAGEMENT

Enclosures
c: Service List

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Dan Lipschultz
Matthew Schuerger
Katie J. Sieben
John A. Tuma

Vice Chair
Commissioner
Commissioner
Commissioner

IN THE MATTER OF A COMMISSION
INQUIRY INTO THE IMPACT OF SEVERE
WEATHER IN JANUARY AND
FEBRUARY 2019 ON UTILITY OPERATIONS
AND SERVICE

DOCKET No. E,G999/CI-19-160

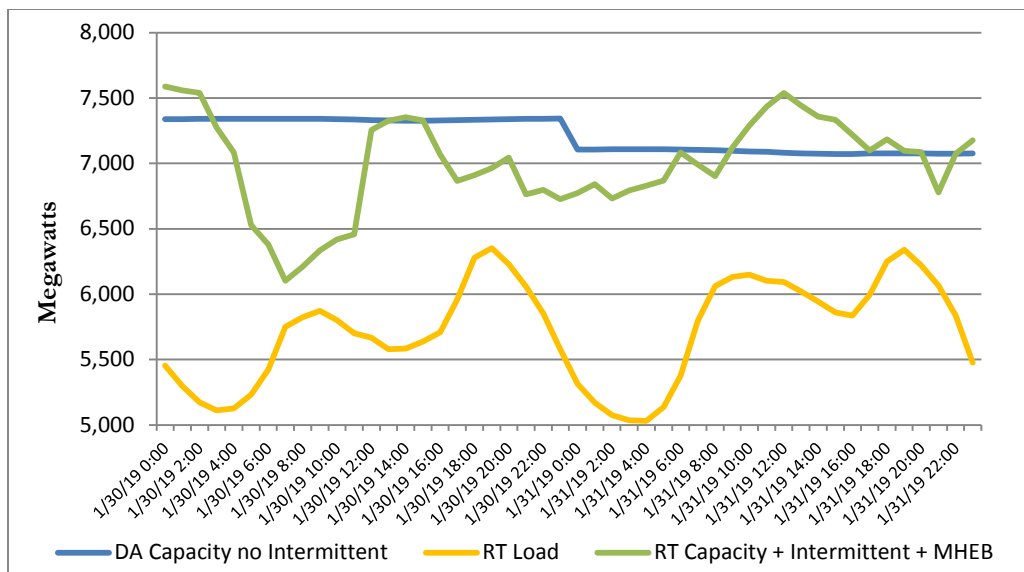
COMMENTS

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, submits to the Minnesota Public Utilities Commission these Comments in response to the March 18, 2019 NOTICE OF COMMENT PERIOD – INFORMATION FROM UTILITIES. The Notice seeks information about the impacts the cold weather in January and February 2019 had on utility operations and service; and, whether the utilities had lessons-learned from the January 28 through February 1, 2019 severe weather event that can be used to keep utility systems operating reliably and safely under extreme, challenging circumstances in the future.

During this period, we experienced historically low temperatures over a four-day period that stressed the electric and natural gas systems. Overall, our natural gas and electric systems performed well in the sustained extreme conditions. While we experienced multiple electric generating resource challenges, including cold weather-related outages at some generating units, we comfortably met our load requirement as illustrated by Figure 1 below.

**Figure 1: NSP System Generation Capacity vs. Load¹
January 30-31, 2019**



Notable electric system occurrences during the Event included wind turbine temperature cutouts that severely curtailed wind production. Wind generation averaged 1,500 MWh the day before the Event and on January 30, it dropped to an average of 150 MWh – picking back up to an average of 580 MWh on January 31. The cold weather also affected our ability to start units, and in some cases, deliver fuel to plants (several peaking units had difficulty at start-up due a variety of reasons such as frozen fuel valves). Northern Natural Gas (NNG) also experienced a gas compressor station failure on the morning of January 30 at which time, the Company ramped its combined-cycle units and Black Dog Unit 6 to minimum load for a two- to three-hour period to preserve adequate pressure for the LDC and electric systems.² The Midcontinent Independent System Operator (MISO) declared conservative operations and issued a Maximum Generation Event for the North and Central Regions on January 30.³ MISO also activated load management resources for the NSP region the morning of January 30, which was something we did not see the previous winter.

In terms of natural gas, we maintained adequate supplies throughout the event. We reached a new throughput peak load on January 29, but did not reach our Design Day

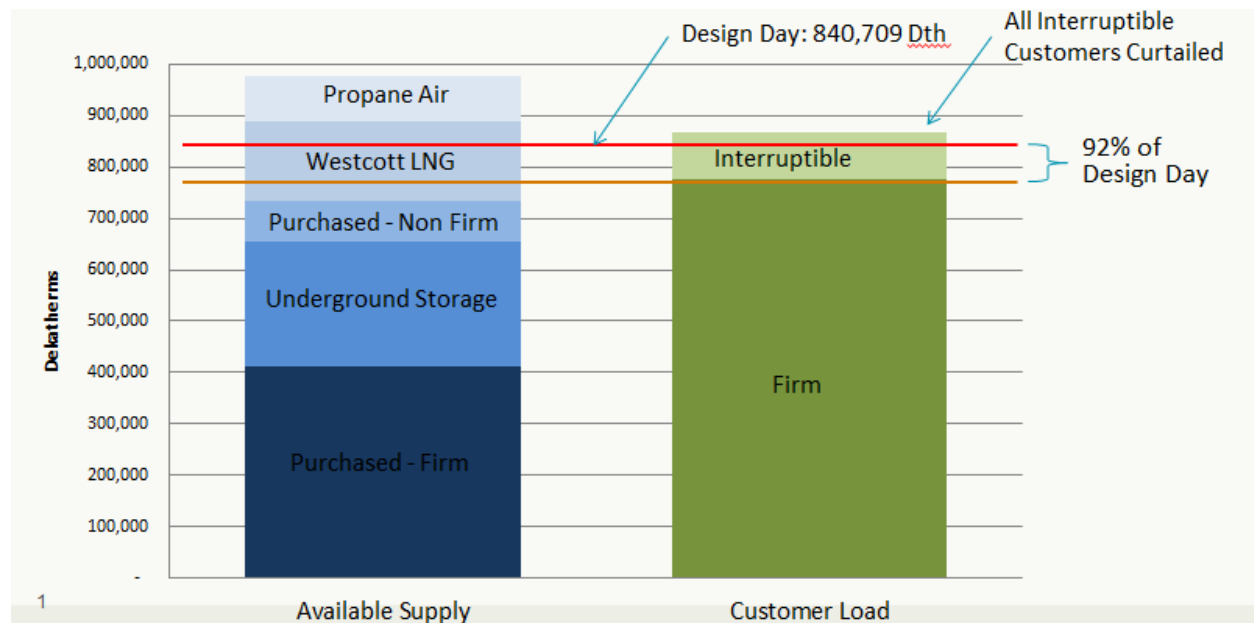
¹ The NSP System includes the Xcel Energy Operating Companies Northern States Power Company-Minnesota and Northern States Power Company-Wisconsin and the states of Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin.

² NNG lost its Farmington, Minnesota gas compressor station for several hours until it could be repaired.

³ MISO declared a Max Gen Event Step 2 a-b and NERC EEA 2.

supply parameters (see Figure 2).⁴ We ran the Westcott Liquefied Natural Gas (LNG) plants throughout the event, as necessary to meet peak customer demand above the Company's firm transportation and storage entitlements on upstream pipelines. As discussed in this response, we also deployed portable Compressed Natural Gas (CNG) bottle trucks to maintain adequate tail-end pressures at certain locations on the distribution system. The most notable event was the NNG Compressor Station issue that required system wide electric generation and gas delivery adjustments.

Figure 2: NSP Natural Gas System Supply vs. Load⁵
January 29, 2019



Also during the event, we curtailed our electric interruptible business customers and natural gas interruptible customers. We experienced typical levels of electric distribution customer outages/impacts and some localized natural gas customer outages/impacts. We appealed to customers in areas experiencing low system pressures to lower their thermostats, and – while we were not seeing broad pressure issues in the system – later issued a general appeal for all customers to lower their thermostats as a conservative measure to ensure adequate natural gas for our customers and electric energy production due to the sustained nature of the low

⁴ We also did not reach our Design Day parameters on January 30. Temperatures were colder, but throughput was lower and reflected the customer curtailments that began the evening of January 29.

⁵ The NSP Natural Gas System includes the Northern States Power Company-Minnesota states of Minnesota and North Dakota.

temperatures.

Specific customer impacts include natural gas service outages to approximately 180 customers in the communities of Princeton (152 customers) and Hugo (29 customers), due to localized low system pressures in those areas. We worked with local government and emergency management officials, and took steps to secure alternative lodging accommodations for impacted Princeton-area customers and provide winterization resources including space heaters and professional plumbers to help customers prevent their pipes from freezing. The outage in Hugo was a shorter duration and did not require alternative lodging or other extraordinary measures, as we were able to complete a temporary reinforcement project that restored service to impacted customers later the same day. Excess Flow Valves operated as expected, and did not result in any customer outages.

In the balance of this response, we provide a narrative of the event as it unfolded in Part I and answers to the Notice questions in Part II.

RESPONSE TO NOTICE

I. EVENT TIMELINE

1. January 28-29, 2019

We had been monitoring and preparing for an extreme weather event, in an effort to ensure reliable service to our customers. In anticipation of a prolonged event and stress on the natural gas system, we started curtailing a portion of our non-firm gas customers at 9:00 p.m. on Monday, January 28, and all non-firm customers at 9:00 a.m. on Tuesday, January 29. We told all customers to expect the curtailment to last through Thursday, January 31. At this point, we were poised to call on our peaking plants when needed – and we staged several portable CNG trailers around our service area, in an effort to more readily support low system pressures if needed.

We began running our natural gas system peaking facilities the evening of January 29, and deployed staff to our Sibley LPG (propane) facility to be prepared to start and run as needed. In terms of natural gas operational staffing, we put our metro area crews on 12-hour shifts and non-metro crews on-call – and sent them home with their Xcel Energy trucks to expedite any needed response. We also began to proactively staff electric first responders heavily beginning the evening of January 29, in recognition of the impact any power outages would have on our customers during the harsh conditions.

On a local level, at approximately 10:30 p.m. on January 29, we interrupted natural gas service to a neighborhood of 152 customers in the Princeton, Minnesota area after our monitoring identified that the area was experiencing very low system pressures. We began outbound calls to impacted customers immediately, began work to secure hotel rooms for affected Princeton-area customers to ensure everyone's safety, and started the process of securing electric space heaters and plumbers to help customers temporarily winterize their homes during the outage. While we were working as quickly and safely as we could to restore service, given the weather, we expected the interruption to last into Thursday, January 31 – which it did.

In addition to making customers aware of the outage and its expected duration, our outbound communications informed them of available lodging arrangements, once known, and other tips – such as leaving faucets dripping before they leave their homes to prevent pipes from freezing. Crews in the area that were shutting off the services at each impacted home also attempted personal contact with each customer in case they hadn't gotten other Company communications regarding the situation and emergency accommodations.

In conjunction with the Princeton outage, we initiated a request to customers in surrounding communities in Becker, Big Lake, Chisago City, Isanti, Lindstrom, and Princeton to reduce their use of natural gas – asking them to turn down their thermostats and avoid the use of other natural gas appliances, including hot water, until further notice.

We note that after analyzing the event, we hit a new natural gas throughput peak on January 29, at 799,550 Dekatherms (Dth), which is ~~nine~~ three percent above our prior firm and interruptible throughput peak ~~load~~.

2. *January 30, 2019*

By approximately 1:00 a.m. January 30, we had secured hotel rooms for Princeton-area customers impacted by the natural gas outage. At approximately 5:00 a.m., we had established an incident command center at the AmericInn in Princeton (one of the hotels where we secured rooms for impacted customers). Onsite Company staff were available 24/7 to hand out space heaters, connect customers with the plumbing/winterization arrangements, and also were able to share the most up-to-date details and updates on our restoration progress. A significant proportion of impacted customers took our offer for space heaters to maintain the temperature in their homes through the day yesterday and overnight last night.

We had also been coordinating with local Princeton-area officials to aid our outreach

in the impacted area to ensure resident safety. For example, County emergency management personnel went door-to-door to do welfare checks and ensure any residents still in their homes were aware of the available lodging accommodations and temporary winterization resources we had arranged.⁶ For homes where we were unable to make contact with customers through calls and door-to-door visits, we worked with locksmiths to gain access and set heaters to prevent their pipes from freezing. As a further measure for resident safety, our Personal Account Representative team in Customer Care made personal/individual calls to any Medical status accounts. We also initiated proactive contacts with any third parties listed on impacted customer accounts.

By the morning of January 30, the extreme weather conditions were putting a significant strain on the natural gas system. That morning, we experienced localized low pressures in the Hugo, Minnesota area, which resulted in an outage to approximately 29 customers for a portion of the day. We were able to complete a temporary system reinforcement project that day to get the impacted Hugo customers back in service, which we completed at approximately 7:00 p.m. Before putting the reinforcement project into service, we had to visit each home in the affected area as a safety precaution. Our crews therefore went door-to-door. If the customer was home, we checked the service and relit any appliances that may have been affected by the low pressures. If the customer was not home, we turned off their service at the meter, and left instructions for them to call us when they got home; we then returned to assess and return the customer to service, as appropriate. Once the reinforcement project was complete, we revisited each of the 29 homes impacted by the outage to perform the necessary safety checks, relight any pilot lights, and return them to service. All Hugo customers were returned to service by approximately midnight.

Later in the day, we issued a general appeal to all customers, asking them to please help conserve gas during the record-setting cold. Along with this general appeal, we again asked customers in the Becker, Big Lake, Chisago City, Lindstrom, Princeton, and Isanti areas to temporarily lower their thermostats and avoid the use of other natural gas appliances, including hot water and gas fireplaces due to the extra strain on the system in these areas. In terms of overall communications, we were employing all available channels, including outbound calls, email, News Releases, social media, and our website.

On the electric system, MISO declared a Maximum Generation Event Step 1a for the MISO North and Central Regions at 4:00 a.m. on January 30 until 11:00 a.m. January

⁶ Reports from our crews and Police and Fire who entered impacted homes during the outage were that 55 degrees Fahrenheit was the lowest temperature they recorded.

31. MISO then moved into a Maximum Generation Event Step 2a/b at 8:00 a.m. on January 30 and called for curtailment of Xcel Energy's NSP Load Modifying Resources (LMRs). The Company thus called a Peak Control and Energy Control event for business customers on the electric distribution system from 8:00 a.m. until 11:00 a.m., and requested other large customers to voluntarily curtail their loads if possible. We also reduced lighting levels and all other non-critical building loads at all Xcel Energy office and service facilities to minimize our energy use. MISO then extended the scheduling instructions for the LMR event until 7:00 p.m. on January 30, but subsequently ended the event at noon, although the Maximum Generation Event Step 2a/b continued until 9:00 p.m. We did however, request business customers to voluntarily continue to curtail their loads to the extent possible.

During this time, we were running all of our generating units as directed by MISO – utilizing alternative fuels to preserve natural gas supplies for retail customer use. However, the morning of January 30, we backed our Black Dog, High Bridge and Riverside plants down to their economic minimums in response to Northern Natural Gas (NNG) losing their Farmington compressor station until repairs were complete. We did this out of an abundance of caution for both plant operational considerations, and concern for maintaining natural gas system pressures into the metro area for retail customers, in light of the significant draw on the system that a large generating unit. The compressor station ended-up being out of service for approximately three hours.

NNG had deployed CNG bottle trucks to the Farmington area to maintain system pressures while they completed the compressor station repairs, in case additional system pressure support was needed before repairs were complete. Once the NNG compressor station was repaired, we were able to work with NNG to redeploy those CNG bottle trucks to the Princeton, Minnesota to aid the system pressure issues we were experiencing in that area. The combination of the CNG bottle trucks' support of the system pressures in the Princeton area along with the expected moderation of the temperatures gave us confidence that we would be able to return impacted customers to service the following day.

Therefore that evening, we began making outbound calls to Princeton-area impacted customers, telling them that based on current conditions, we were expecting to begin restoring their service late morning or early afternoon January 31. We also told them to expect another call the next morning to confirm plans for restoring their service later that day.

3. January 31, 2019

The extreme cold temperatures continued through the night. We continued to

monitor the system, and expected temperatures to continue to improve/rise throughout the day and, in particular, during the weekend. We continued to run the Westcott plant, and expected to utilize both the Westcott and Sibley plants as needed as we began to release the non-firm customers from curtailment. We began returning Princeton-area customers to service around noon – and all were restored by 6:00 p.m., except for one customer who requested a later restoration time.

On the electric system, the MISO Maximum Generation Event Step 1b-c was allowed to expire at 11:00 a.m. The Conservative Operations declaration remained through 5:00 p.m. Outages at the electric distribution level remained scattered, limited in scope, and consistent with historic levels for the period. We continued to maintain heavier levels of available staff ready to respond, should they be needed.

4. *February 1, 2019*

We notified non-firm natural gas customers that the curtailment would be lifted at 9:00 a.m. Natural gas and Electric operations returned to normal operations.

II. RESPONSE TO NOTICE QUESTIONS

A. Natural Gas Reinforcement Projects

Q1. Xcel Energy shall provide a written account of the natural gas reinforcement projects it has planned for this summer in areas that experienced low pressure and/or service outages.

First, we have modified our distribution system modeling with more severe temperature constraints to account for greater gas loads under the extreme cold conditions experienced in late January 2019. Additionally, after analyzing our system using the updated model, we have so far identified nine projects to reinforce delivery pressures in seven communities:⁷ Princeton, Becker, Big Lake, Blaine, Hugo, Roseville, and Chisago Lakes. In total, these projects involve installing 13.6 miles of new main in various sizes from 2 inch through 8 inch, adding one new regulating station, and upgrading a second regulator station.

We discuss the planned 2019 reinforcement projects for each community below:

Becker. We will install approximately 4,000 feet of 2-inch polyethylene (PE) pipe in the vicinity of 97th Street and 173rd Avenue SE, as well as approximately 2,000 feet of

⁷ We note that we are continuing to review our system and may identify additional projects.

6-inch PE pipe in the vicinity of Highway 10 and Industrial Boulevard.

Big Lake. We will install approximately 4,000 feet of 6-inch PE pipe in the vicinity of Jefferson Boulevard and Lake Street South, as well as a new regulator station.

Blaine. We will install approximately 15,000 feet of 8-inch PE pipe in the vicinity of Bunker Lake Boulevard and Radisson Road NE.

Chisago Lakes. We will install approximately 12,500 feet of 4-inch PE pipe in the vicinity of 280th Street and Olinda Trail North in Lindstrom.

Hugo. As discussed in this response, 29 customers in Hugo, Minnesota experienced a natural gas outage. During the event, we completed a temporary reinforcement of 400 feet of 2-inch PE pipe to improve local pressures and restore service to customers. Since that time, we have buried the temporary installation to make it permanent. Our additional reinforcement plans for 2019 include installing approximately 24,000 feet of 8-inch PE pipe in the vicinity of Forest Boulevard and 130th Street North.

Princeton. As discussed in this response, 152 customers in the Princeton, Minnesota area experienced a natural gas outage due to low pressures in the area. The project we have planned for the Princeton area in 2019 involves installing approximately 7,800 feet of 4-inch PE pipe in the vicinity of 144th Street NW and 293rd Avenue NW.

Roseville. We will install approximately 2,600 feet of 6-inch PE pipe and 1,200 feet of 2-inch PE pipe in the vicinity of Western Avenue and County Road C. In addition, we will rebuild/upgrade Regulator Station R141 at Rice Street and County Road C.

We will submit an informational filing in this docket upon completion of these projects, which will be before the 2019-2020 heating season.

B. Natural Gas Customer Curtailments

Q3. Each natural gas utility shall report on curtailment activity during this period: What percentage of customers curtailed as requested? What percentage of customers failed to curtail as requested? Were these customers charged failure to curtail or other penalties, and, if so, how much penalty revenue was collected in this time period? What percentage of its curtailable customers is each utility able to effectively monitor remotely in as close to real time as possible?

1. Interruptible Rates Program Overview

Xcel Energy offers natural gas service on an interruptible basis to Commercial and Industrial sales and Transportation customers. Customers on interruptible rate services agree to curtail their gas usage within one hour of notification and in return, they pay significantly less per therm on their gas distribution rates year-round. In order to qualify for this program, customers must provide and maintain suitable and adequate alternate fuel-capable standby facilities, and have access to sufficient standby alternate fuel for curtailment periods.

Customers on an interruptible rate service also have an option to reserve up to 15 days of firm gas supply for use during curtailment days through our Limited Firm program. Customers enrolled in this program pay an up-front Availability Charge for the ability to supplement their interruptible service with firm gas supply. Customers on this program understand that limited firm natural gas supply is not always available. In the case of this event, we did not allow Limited Firm customers to use firm gas supplies – they were also required to curtail.

2. Curtailment Activity

We have approximately 361 non-firm natural gas customers on our Upper Midwest system. We began curtailing a limited number (15) of interruptible customers the evening of January 28~~9~~, and the remaining customers beginning at 9:00 a.m. January 29~~30~~.

We electronically collect hourly meter data for our non-firm customers on a daily basis. We do not have the capability to remotely monitor in near real-time whether they have curtailed their usage as called, or not. We collect the usage data after the event concludes, and as a back-up method, also require customers to submit meter readings from just prior to their curtailment and immediately following the end of the curtailment.

3. Curtailment Failures

When gas interruptions are called, we count on customers to curtail system gas use and switch to their alternate fuel source. If unauthorized use of gas occurs during a control period, we are required by tariff to take back some of those savings in the form of penalties. In Minnesota, penalties equal the higher of \$5.00 per therm, or an amount equal to any incremental cost incurred by Xcel Energy resulting from a failure to curtail or interrupt.

Other possible additional penalties involve pipeline charges, as follows:

- Customers taking service from Northern Natural Gas may incur additional charges of \$11.30 per therm or higher.
- Customers taking service from Viking Gas Transmission may incur additional charges of \$1.50 per therm or higher.

A total of 222 customers, or 61 percent, fully curtailed their usage to specified levels during the interruption. The remaining 39 percent were invoiced for penalties, as follows:

Interruptible Penalties \$884,446.65

We summarize the curtailment penalties by customer category below:

Rate	Customer Count	Penalty Amount	Penalty Therms
Medium Int. Transport	9	\$2,650.00	530
Small Int. Transport	1	\$0.00	0
Commercial Small Int.	251	\$179,732.25	35,946.45
Commercial Medium Int.	92	\$263,009.10	52,601.82
Commercial Large Int.	8	\$439,055.30	87,811.06
Total	361	\$884,446.65	176,889.33

We note that we intended to curtail our interruptible Transportation customers, but our communication about the curtailment was not as clear as it should have been. As a result, only about two-thirds curtailed their usage during the interruption period; we did not apply penalties to the customers that received the unclear communication. To ensure a similar miscommunication does not occur going forward, we have revised the scripts in our automated customer curtailment communications system and added a confirmation step to ensure we communicate the proper messaging. No pipeline penalties were assessed to any of our customers.

Q4. Natural gas utilities shall report on the root causes for customers failing to curtail for those customers who failed to curtail as requested.

While we do not track the reasons customers do not control, in our experience the reasons generally fall into three categories, as follows:

Customer Equipment Failures. Equipment failures that impede a customer's ability to fully curtail include boiler failures, such as tube leaks, burner failures, customer gas line obstructions, customer regulator failures and/or the boiler controls fail. Other failures include heater failures (furnace-type equipment), pump failures, other

mechanical or electrical failures, and human error.

Back-Up Fuel Issues. These include a lack of sufficient propane or oil inventory, oil gelling and prohibiting the flow, oil contamination that may be due to a tank issue or the age of the oil, and/or the oil can break down over time.

Customer Internal Communications. Sometimes customers experience internal communication issues where the Xcel Energy curtailment announcement does not get fully disseminated within the customer's company, or the individual(s) responsible to implement the curtailment are not onsite for the event. Another reason can be that the start time of the curtailment event is an issue for the customer in relation to their operational needs.

C. Electric Generating Resources

Q5. Electric utilities shall provide status of all their generation units, Demand Resources and purchased power agreements from January 28, 2019 to January 31, 2019. The status includes hourly MISO offer price, Economic Maximum MW, Emergency Maximum MW, offered MW, deployed MW, commitment status (FRAC, IRAC, Day Ahead or Real Time), and dispatch status. Also, the status includes unit level fuel availability of primary and secondary source, fuel contract status (firm, non-firm, or on site) of primary and secondary source, and Generating Availability Data System report data.

We provide the requested data regarding the status of our generation resources in a series of Attachments labeled Attachment 1.1 through Attachment 1.7 which we explain further below. Several of these attachments contain information that is Not Public because it is commercially-sensitive, proprietary, and/or trade secret.

Attachments 1.1 through 1.4 provide information concerning Xcel Energy's offer prices, generating unit capabilities and operating levels during the Event. Specifically, Attachment 1.1 provides the generating level by hour for all Xcel Energy generating resources during the Event. This data meets the request for "deployed MW." Please note that Xcel Energy does not typically offer a specific MW level into MISO, so, we do not have information on "offered MW." Rather, we offer a dispatch range and allow MISO to choose an optimal level of generation for each unit.

Not Public Attachment 1.2 provides the generating unit capabilities offered to MISO including the following information requested: Economic Maximum MW, Emergency Maximum MW, and commitment status.

Not Public Attachment 1.3 provides the generating unit hourly MISO offer price curve.

Not Public Attachment 1.4 lists the outages for all Xcel Energy generating resources, including purchased power resources. Please note that the information we provide in Not Public Attachment 1.4 is more expansive than the outages listed in Not Public Attachment 1.6, which is data from our Generation Availability Data System, because it contains information on the purchased power generating resources in addition to the utility-owned generating resources.

Not Public Attachment 1.5 provides the requested unit level fuel availability of primary and secondary source, fuel contract status (firm, non-firm, or on site) of primary and secondary source data.

Not Public Attachment 1.6 provides Company-owned generating resource unit availability data from our Generation Availability Data System.

Not Public Attachment 1.7 provides the dispatch status of the Company's generating resources.

D. Day-Ahead Wind and Solar Forecasts

Q6. Electric utilities shall provide hourly day ahead Wind and Solar energy production forecast and forecast parameters used to produce the forecast.

We provide our wind and solar forecasts in relation to the temperatures as Attachment 6 to this response.

Xcel Energy purchases a Global Weather Corporation forecast that we modify as necessary, based on expectations of wind farm icing, over-speed, and/or extreme temperatures that would reduce wind farm output. Please note that on January 29, we produced an emergency forecast update at 8:00 a.m. MST (market submittals are due at 8:30 MST) to further lower some of the day-ahead wind forecast for January 30, primarily for the 2 a.m. to 8 a.m. timeframe on January 30, when we expected the strongest cold to occur. We then increased the wind forecast a bit in our 8 a.m. update compared to our 6 a.m. original forecast for the 9 a.m. to 5 p.m. timeframe, expecting that sunshine would bring back some of the wind farms that had either iced-up or that experienced cold-weather cut-out; we then we again reduced output from 6 p.m. onward on January 30 due to the threat of more cold-weather cut-outs.

E. Wind and Solar Temperature Cutoff Thresholds

Q7. Electric utilities shall provide wind and solar temperature cutoff thresholds for each MISO EP Node.

Please see Attachment 7 for the wind turbine temperature cut-off thresholds for each Xcel Energy wind farm by MISO EP Node.⁸ We do not possess wind turbine temperature cut-off thresholds for the smaller wind farms with which we have Purchased Power Agreements.

With regard to solar generation, performance is affected by temperature, but does not involve cold weather cut-offs. Rather, solar panel efficiency drops off steadily once panel temperatures exceed approximately 42 degrees Celsius (107 Farenheit). Panel temperatures are typically approximately 20 degrees Celsius higher than the ambient air temperatures, thus solar production efficiency starts to decline when the ambient air temperature is in the range of 87-91 degrees Farenheit. PV Solar panel production works most efficiently during cold temperatures, with the obvious caveat that cloud cover and/or snow on the panels will reduce solar generation.

F. Lessons-Learned

Q8. Utilities shall provide an account of lessons learned and steps to be taken to help prepare for the next severe weather event. Example: Was there anything learned about the functioning of Excess Flow Valves and Regulators that can be used to prevent natural gas outages in the future?

In addition to specific business area learnings, we had some overall takeaways from this polar vortex severe weather event that center around communications and partnership. Internally, our coordinated electric-natural gas operational planning leading up to and throughout the event was very valuable and resulted in positive outcomes for our customers. For example, as we recognized the localized gas pressure issues were occurring, electric operations seamlessly secured lodging, space heating, and other resources for impacted customers – and staffed the Princeton area command center – to serve our customers with the high quality service they expect. This also allowed natural gas operations to maintain their focus on the gas system. From an external perspective, for both the Princeton area and Hugo communities, we proactively communicated and coordinated efforts with local officials, first responders and emergency management personnel throughout the severe weather event. From a

⁸ The provided data is performance data specific to the turbines at the associated Xcel Energy wind farms.

lessons learned standpoint, we are meeting with these officials to review the severe weather event and resulting outages, answer any questions, inform them of our 2019 reinforcement plans in their communities, and identify opportunities to improve from a communication and coordination standpoint.

Specific to natural gas distribution, we proactively increased staffing going into the event, which we believe allowed us to more effectively respond to the challenges that the weather put on our system. Our most significant takeaway from this event has been to update our distribution models to model our system under more severe temperature constraints. As outlined in this response, as a result of this updated modeling, we have also identified nine system reinforcement projects in seven communities. We may identify additional projects for 2019 as we continue to re-model our system. Additionally, as discussed above, we have taken steps to clarify the communications generated by our automated customer curtailment communications system, so that interruptible Transportation customers receive clearer instructions during curtailment events.

On the electric system, while our outage levels were consistent with historic levels for that time of year, we staffed distribution operations heavily in acknowledgement of the significant impact any outage might have on customers in the extreme temperatures. Other lessons-learned on the electric system include:

- We have reviewed and refined the gas nomination process to better optimize gas supply contracts based on this cold weather event.
- We are compiling a cold weather survey of plants to better understand their operating limitations as temperatures get colder, and as the duration of cold is extended. Since this is a rare event, we are taking the opportunity to record and capture, by way of a survey, the unique plant constraints during extreme cold weather events.
- This weather event provides a great example of a circumstance where there may be benefits of self-committing units rather than responding only to MISO instructions. Based on information gleaned from the survey and other operating experience, we may take early action to commit units ahead of the extreme cold to mitigate start-up failure risks.

We appreciate the Commission's support as we worked through the strain and challenges this event put on our and all utilities' systems. We are committed to continue to keep the Commission updated during severe events, as we have in the past. In this case, we believe our general appeal had an impact on natural gas usage. To the extent the Commission may want to consider something similar in the future, we are open to providing any information that may be helpful to that end.

CONCLUSION

We appreciate the opportunity to provide this information to the Commission. We will submit an informational filing in this docket upon completion of our planned natural gas reinforcement projects, which will be before the 2019-2020 heating season.

Dated: April 12, 2019

Northern States Power Company

CERTIFICATE OF SERVICE

I, Jim Erickson, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

Docket No. E,G-999/CI-19-160

Dated this 16th day of April 2019

/s/

Jim Erickson
Regulatory Administrator

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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