2021 WIND CURTAILMENT REPORT

I. INTRODUCTION

The Commission's April 4, 2006 Order regarding curtailment payments to wind developers (Docket No. E999/AA-04-1279) requires the Company to provide in future AAA reports a projection of wind generation curtailment costs given existing and planned wind-generated energy purchases and transmission system needs. The Commission's June 12, 2019 Order in Docket No. E999/CI-03-802 approved the disposition of AAA reporting requirements as agreed to by the Company and the Department. The Company and the Department agreed that curtailment reporting could be reformatted to provide support for increased curtailment, in addition to providing detailed curtailment data by unit and by curtailment code.

Below we summarize the Company's experience regarding wind curtailment payments and provide a discussion of the drivers for increased wind curtailment payments during the 2021 reporting year as compared to the 2021 forecast. Part C, Attachment 2 shows detailed curtailment payments by unit and by curtailment code, in compliance with the Commission's February 6, 2008 Order in Docket Nos. E,G999/AA-06-1208 and E002/M-04-1970 *et al.*

We most recently discussed and provided an estimate of potential curtailment payments and the assumptions used to develop our 2022 curtailment forecast in our April 30, 2021 Petition and July 30, 2021 Reply Comments in Docket No. E002/AA-21-295. We will provide an estimate of 2023 curtailment payments, including forecast assumptions, in our 2023 fuel forecast Petition to be filed by May 2, 2022.

II. CURTAILMENT OVERVIEW

The Company expects that some level of wind curtailment from Power Purchase Agreement (PPA) facilities will occur in the foreseeable future. The reasons driving the curtailment have shifted from primarily local transmission constraints on NSP's transmission system in southwest Minnesota to regional transmission system congestion on the MISO system. The regional congestion, which results in negative LMP, was the largest driver of curtailment during this reporting period. Additionally, the nature of transmission congestion is accentuated by the large concentration and increased level of wind facility operations in Minnesota, North Dakota, South Dakota, and Iowa.

Significant transmission improvements in southwestern Minnesota and the region, such as the CapX2020 transmission projects (CapX2020), the Huntley – Wilmarth 345

kV line, and all but one of the MISO Multi-Value Projects (MVPs) are now in-service and will positively impact curtailment by reducing local congestion. However, the Company believes future curtailment in this area will continue to occur because of more regional congestion and the resulting negative LMP in the MISO energy market, along with transmission outages required for construction, maintenance or repair activities and wind generation projects going into service before all required transmission facilities are completed and likely generation oversubscription of the transmission system.

To better manage regional congestion, MISO and the industry utilize Dispatchable Intermittent Resources (DIRs), which provides better management of the wind resources. Under this system, a number of existing PPA wind facilities that are capable of operating as DIR, along with all new wind facilities, are registered with MISO as DIR. DIR facilities are given set point instructions every five minutes and rely on Automated Generation Control (AGC) technology, which automatically controls wind project output. DIR allows wind generators to be operated more like traditional generating facilities and, as a result, MISO is able to more quickly and accurately respond to system conditions.

Table 1 shows the current PPA wind facilities associated with this report that are registered and operate as DIR.

Table 1: DIR PPA Facilities

Wind Project	MW
Big Blue	36
Cisco	8
Crowned Ridge 1	200
Dakota Range 3	150
Fenton	200
Glen Ullin Wind	106
MinnDakota	150
Moraine II	50
Odell	200
Prairie Rose	200
Valley View	10
Zephyr	30
Total	1340

The federal Production Tax Credit (PTC), which provides tax benefits to wind generating plants, is scheduled to be phased out over the next few years. As in the past, the uncertainty of PTC expiration is closely connected with increases in wind curtailment, since wind projects are often put into service to meet PTC eligibility requirements even though the necessary transmission upgrades were not completed. The Company is aware of 6,287 MW of new wind generation in Minnesota, North Dakota, South Dakota, and Iowa that has recently gone into service, or is expected to go into service in 2022. This includes 2,100 MW of Company-owned and PPA wind. Table 2 shows planned wind developments by NSP and other regional companies. All of these wind developments will be registered and operated as DIRs.

Table 2
Wind Generation Additions[1]

Company	MW	Location	In-Service Dates
Alliant Energy	1,150	IA	2019-2021
Great River Energy[2]	679	ND	2020-2023
MidAmerican	2,216	IA	2019-2021
Minnesota Municipal Power Agency	111	MN	2021
Minnesota Power	250	MN	2020
Northern States Power	2,100	ND, SD, MN	2019-2022
Otter Tail Power	150	ND	2020
Total	6,657		

The required transmission upgrades for these wind projects will not all be in-service at the time the projects begin producing energy. A number of transmission facilities that were identified in the interconnection studies as overloaded, along with MTEP related transmission facilities were, or will be, taken out of service and rebuilt. This has and will continue to have a negative effect on LMP pricing in the MISO energy market and will continue to impact real-time wind generation on the NSP System.

III. TRANSMISSION SYSTEM IMPROVEMENTS

Since 1994, wind energy resources have been the dominant factor in determining the need for transmission infrastructure improvements in southwestern Minnesota. To meet this need, the Company, often in cooperation with other utilities, has planned,

[1] The wind repowering projects being developed by NSP are not included in this list.
[2] Great River Energy has announced plans to install an additional 430 MW of wind generation in 2023.

engineered, and constructed a number of projects designed to increase the transmission capacity in that area. Table 3 shows historic southwest Minnesota projects that increased the available transmission outlet in that area.

Table 3
Southwest Minnesota Wind Limits

Transmission Project	Transmission Owner	In-Service Date
425 MW Wind Transmission Expansion Project	Xcel Energy	December 2006
825 MW Wind Transmission Expansion Project	Xcel Energy	June 2008
Buffalo Ridge Incremental Generation Outlet (BRIGO)	Xcel Energy	December 2009

The Company also participated in the development of three CapX2020 transmission projects, all of which have gone into service and are helping reduce wind curtailment on the NSP system. Table 4 lists the CapX2020 transmission projects.

Table 4
CapX2020 Transmission Projects

Transmission Project	Transmission Owner	Actual/Planned In-Service Date
Brookings County - Southeast Twin Cities 345 kV Line	Xcel Energy, Great River Energy	March 26, 2015
Fargo North Dakota - Northwest Twin Cities 345 kV Line	Xcel Energy, Great River Energy	April 2, 2015
Southeast Twin Cities - LaCrosse, Wisconsin 345 kV Line	Xcel Energy, SMMPA and non-MISO	September 16, 2016

In addition to the transmission projects discussed above, a number of other new transmission infrastructure projects have been placed in service, including the Huntley – Wilmarth 345 kV line, and all but one of the Multi-Value Projects (MVP). The Cardinal - Spring Green - Dubuque area 345 kV Line will be the last MVP to go into service, though the expected in-service date is not known at this time. The Huntley – Wilmarth line, which went into service on December 1, 2021, was classified as an Economic Project under the MTEP process and was installed to improve congestion, The MVPs were designed to expand and enhance the region's transmission system, reduce congestion, provide access to affordable energy sources, and meet public policy requirements including renewable energy mandates. The completion of the MVP projects, particularly the ones listed in Table 5, have had, or will have, a positive impact on Company-owned and PPA wind facilities.

Table 5
MVP Projects

Transmission Project	Transmission Owner	Planned/Actual In-Service Date
Big Stone South to Brookings County 345 kV Line	Otter Tail Power Company, Xcel Energy	September 8, 2017
Lakefield Jct. - Winnebago - Winco - Kossuth County & Obrien County - Kossuth County - Webster 345 kV Line	MidAmerica Energy, ITC Midwest	September 27, 2018
North LaCrosse - North Madison	American Transmission Company, Xcel Energy	December 12, 2018
Winco to Hazleton 345 kV Line	MidAmerica Energy, ITC Midwest	July 18, 2019
Ellendale to Big Stone South 345 kV Line	Otter Tail Power Company, Montana Dakota Utilities	February 5, 2019
Cardinal - Spring Green - Dubuque area 345 kV Line	American Transmission Company, ITC Midwest	Unknown

One of the design goals for the North LaCrosse - North Madison and Cardinal - Spring Green - Dubuque area 345 kV Lines was to increase the transmission export capacity from Iowa and Minnesota into the 345 kV system in Wisconsin that connects to the Milwaukee and Illinois load centers.

IV. WIND GENERATION AND CURTAILMENT

Chart 1 shows planned and installed Company-owned and PPA wind generation facilities throughout the NSP service territory on an incremental and cumulative basis.

Chart 1

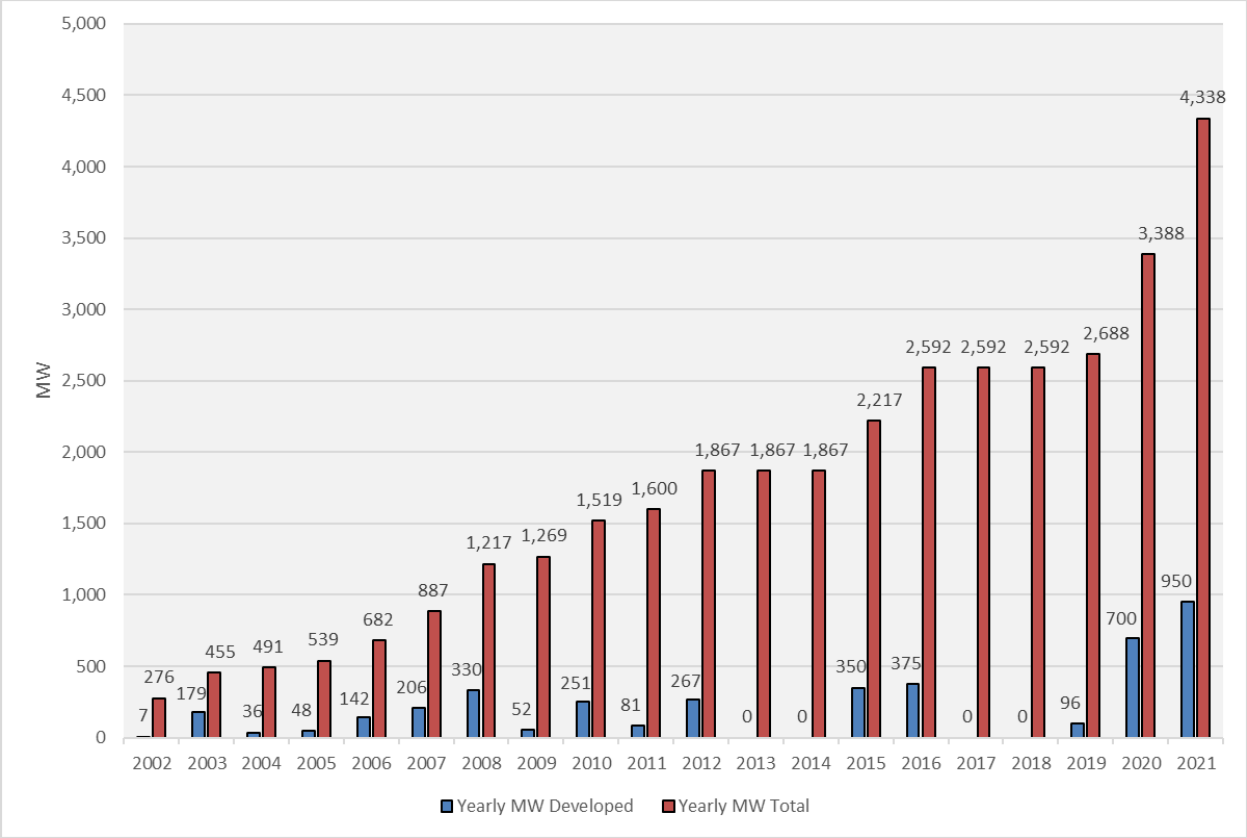
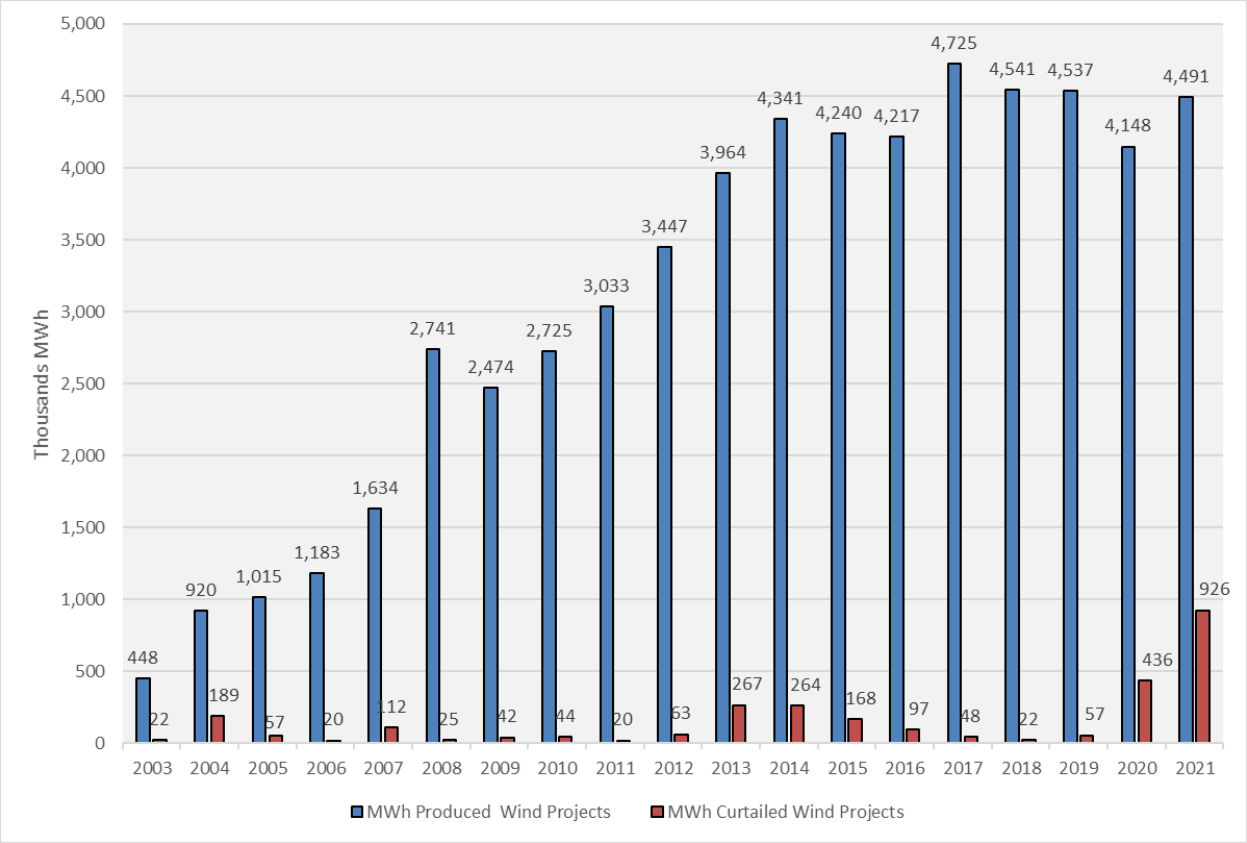


Chart 2 shows the comparison between total wind energy produced and the wind energy curtailed from the projects through December 2021.[3] Despite the lead/lag time associated with generation and transmission development, Chart 2 shows that wind curtailment is small compared to the total wind generation delivered.

Wind curtailment, as a tool to manage wind generation volumes when necessary, has had the positive benefit of facilitating a large amount of wind resources to be added to the system, which would not otherwise have been possible.

[3] Part C, Attachment 2.

Chart 2



The 2021 Curtailment in summarized in Table 6.

Table 6
2021 Wind Curtailment MWh and Costs

	MWh	Costs
Curtailment	926,013	$42,062,446

It is important to note that of the $42,062,446 in total curtailment costs, the vast majority of these costs are associated with the contractual energy price of the PPAs. These are contractually obligated sunk costs which are not economically relevant to the decision to curtail the generation from a wind farm.[4]

The Company typically has broken up curtailment into two categories to better explain the reasons for the curtailment and its cause. The two categories were Transmission Curtailment and DIR Curtailment. Transmission Curtailment was specifically related to situations where local transmission-related outages impacted

[4] The PPA contract language can generally be described as "take or pay" in which NSP must pay for the wind energy that could be produced, regardless of whether it actually is produced or if it is curtailed.

wind projects. DIR Curtailment was considered curtailment that was not caused by local transmission outages, or where transmission outages did not impact a specific wind farm. This breakdown was informative when the curtailment was primarily related to local transmission constraints on NSP's transmission system in southwest Minnesota. However, since curtailment is almost entirely related to regional transmission congestion on the MISO system, the Company will no longer provide a breakout for Transmission Curtailment. The Company will refer to curtailment as "Economic Curtailment" or simply "Curtailment."

The Company believes that it will be more informative to provide details on the drivers of regional congestion as measured by the Real Time Binding Constraints which are used to manage congestion in the MISO Real Time Market along with a discussion on transmission outages that occurred during the year.

> *Per the MISO website, the Real-Time Market is a continuous process for balancing supply and demand at least-cost while recognizing current operating conditions. This includes any deviations from the day-ahead plan as a result of unanticipated and unhedged congestion due to unexpected changes. The Real Time Market dispatches the least-cost generation resources to satisfy system demand without overloading the transmission network.*
>
> *MISO uses the Security Constrained Economic Dispatch (SCED) algorithm to provide co-optimized clearing solutions in the Real-Time Market. The objective of the Security Constrained Economic Dispatch (SCED) algorithm is to minimize cost while meeting forecasted demand, scheduled interchange, and operating reserves requirements, which are subject to transmission congestion and other system limitations. SCED produces Balanced injections and withdrawals, congestion management solutions and LMP and MCP. The SCED runs every five minutes during the Operating Hour to establish the dispatch instruction for generation resources. SCED produces Resource Energy Dispatch Targets, Dispatch target information vis setpoint instructions, RT LMP and RT MCP. MISO sends out a five-minute dispatch target to each resource and repeats throughout the Operating Day.*

1. Curtailment Procedures

MISO performs a 10-minute forecast every five minutes which is used as the maximum limit for the wind farm in the Unit Dispatch System. MISO sends five-minute dispatch instructions to DIR wind farms. When LMP drops below the offer price of the DIR unit, the farm is automatically dispatched down. The setpoint is sent to the DIR wind farm, and the facility is automatically curtailed. Both PTC and non-PTC DIR wind farms are managed by MISO through automatic control, and these

facilities are required to comply with the MISO cost signals. Failure to comply would expose the Company to Revenue Sufficiency Guarantee charges. More curtailment occurs at non-PTC wind farms.

2. Real Time Binding Constraints

Real time binding constraints are the transmission facilities that are identified in the SCED that would overload in anticipation of the next contingency. The SCED would send setpoint instruction to redispatch generation to eliminate the constraint. The most frequent real time binding constraints in the NSP area[5] are listed in Table 7.

Table 7
2021 Real Time Binding Constraints

Constraint Name	Contingency Description	State	Hours Binding (year)	Average Shadow Price
Forman_230_115_TR1_flo_Hankinson_Wahpeton_230kV	HANKINSON-WAHPETON 230+WAHPETN TR2	ND	1,915.8	($271.0)
NSP34102_ROCHSTR_ROCHSWABAC16_1_1 (Rochester – Wabaco)	BRIGGS ROAD - NORTH ROCHESTER 345	MN	1,874.6	($222.8)
ALW34X17_FOX_LK_FOX_LRUTLA16_1_1	HUNTLEY 345/161 TR1	MN	669.8	($171.0)
NSP34107_SOUTHBND_TR6_TR6	LYON CO - HAWKS NEST LAKE 345	MN	602.8	($278.5)
DPCGEN01_ROCHSTR_ROCHSWABAC16_1_1 (Rochester – Wabaco)	ALMA UNIT6 (399MW)	MN	590.5	($810.1)
OTP23100_JOHNJCT_JOHNJGRACE11_1_1	HANKINSON-WAHPETON 230+WAHPETN TR2	MN	442.0	($1,225.2)
Temporary_577__S3GRANHAWLYN	LYON CO - HAWKS NEST LAKE 345	MN	437.3	($254.4)
OTP23016_HOOT_LK_HOOT_FERGS11_1_1	FERGUS FALLS - SILVER LAKE 230	MN	423.1	($676.7)
Blair_Granite_Falls_230_KV_FLO_Hawksnest_Ln_Lyon	LYON CO - HAWKS NEST LAKE 345	MN	409.0	($203.1)
Fargo_Sheyenne230_FLO_BUFFALO_JAMESTOWN345	BUFFALO - JAMESTOWN 345	SD	398.7	($321.3)
NSP34107_ERIE_RD_ERIE_S311_1_1	LYON CO - HAWKS NEST LAKE 345	MN	353.3	($214.8)
MDU23007_MERRICRT_MERRITATAN23_1_1	MERRICOURT - ELLENDALE 230	ND	333.2	($28.6)
Ellendal_AberdeenJct_115kV_flo_Ellendale2_BigSto	TWIN BROOKS - BIG STONE SOUTH 345	ND	262.1	($122.8)

[5] Area includes Minnesota, North Dakota, South Dakota and Wisconsin.

Constraint Name	Contingency Description	State	Hours Binding (year)	Average Shadow Price
Bigstone_BrownsVally_230kV_flo_Oaks_Ellenda_230k	ELLENDALE-OAKES 230	ND	248.2	($219.8)
White_Split_Rock_345_kV_FTLO_Hawks_Nest_Lyon_Cou	LYON CO - HAWKS NEST LAKE 345	SD	246.9	($77.8)
NSP3403_SOUTHBND_TR6_TR6	CRANDALL - WILMARTH 345	MN	242.2	($417.5)
ChubLake_345_115_TR1_flo_ChubLake_Hampton_345kV	CHUB LAKE-HAMPTON 345 (0961)	MN	182.5	($180.1)
FORMAN_FORMAN_115kV_TIE_FLO_HANKSON_WAHPETON_230	HANKINSON-WAHPETON 230+WAHPETN TR2	ND	167.9	($400.2)
Adams_BeaverCreek_161kV_flo_BriggsRd_NorthRoches	BRIGGS ROAD - NORTH ROCHESTER 345	MN	131.5	($278.0)
BASE_SOUTHBND_TR6_TR6		MN	123.5	($342.0)
Canby_GraniteFalls_115kV_flo_Brookings Co_Astoria	BROOKINGS COUNTY - ASTORIA 345	MN	118.3	($325.3)
NSPOTP13_CANBY_CANBYGRANI11_1_1	BROOKINGS COUNTY - ASTORIA 345	MN	107.2	($297.3)

The real time binding constraints occurred for a number of reasons, including wind generation projects going into service before all required transmission facilities are completed, transmission outages required for construction, maintenance or repair activities and likely generation oversubscription of the transmission system.

Table 8 lists the transmission outages that the Company has identified as having the most impact on the binding constraints listed above and the resulting curtailment. The outages were required for a number of reasons including construction required for regional transmission upgrades and generator interconnection required upgrades along with regular maintenance or repair activities.

Table 8
2021 Significant Transmission Outages

Outage Request ID	Company	KV	From Station	To Station	IDC Equipment Name	State	Start Date	End Date (Actual or Planned)	Duration (Days)
1-25554035	GRE, MPCN,	230	SQBUTTEW	STANTON2	GRE-STANTON4230.00 SQBUTTE4 230.00 1	ND	2/1/2020	7/22/2021	538
1-25904955, 1-26191016, 1-26384463, 1-26458059	MDU	230	MANDAN	NAPOLNSW	MANDAN 4 230.00 NAPOLEON SW4230.00 1	ND	3/1/2020	2/18/2022	720
1-26308112	OTP	345	DKR_I_II	TWINBRKS	DAKOTARNG 3 345.00 TWINBRKS3 345.00 1	MN	5/31/2020	7/30/2021	426
1-24342017	NSP	345	CRANDAL	FIELDON	FIELD_S3 345.00 - CRANDAL 3 345.00 1	MN	9/8/2020	5/21/2021	255
1-24342017	GRE, NSP	345	FIELDON	WILMART	WILMART3 345.00 - FIELD_N3 345.00 1	MN	9/8/2020	5/21/2021	255
1-25872873	MDU, OTP	230	ELLENDL	OAKES	OAKES 4 230.00 ELLENDL4 230.00 1	ND	10/28/2020	1/22/2021	87
1-25868843	GRE, OTP	115	JOHNJCT	ORTONVL	GRE-JOHNJCT7115.00 ORTONVL7 115.00 1	MN	11/2/2020	9/22/2021	325
1-26233135	MPCN, NSP,	345	MAPLE_R TR1		MAPLE R3 345.00 MAPLE R4 230.00	ND	2/28/2021	1/31/2022	338
1-26120687	GRE, NSP	345	HELENAMN	SCOTTCO	HELENA 3 345.00 SCOTTCO3 345.00 1	MN	4/5/2021	11/4/2021	214
1-26272777	OTP	230	BROWNSV	HANKSON	BROWNSV4 230.00 HANKSON4 230.00 1	ND/ SD	4/15/2021	5/31/2021	47

Outage Request ID	Company	KV	From Station	To Station	IDC Equipment Name	State	Start Date	End Date (Actual or Planned)	Duration (Days)
1-26308777	GRE, NSP	345	LYON_CO TR9		LYON CO 3 345.00 LYON CO7 115.00	MN	5/28/2021	3/18/2022	295
1-26299934	GRE, OTP	115	JOHNJCT	GRACEV	GRE-JOHNJCT7115.00 GRE-GRACEV 7115.00 1	MN	7/19/2021	8/13/2021	26
1-26299934	GRE, OTP	115	JOHNJCT	MORRISOT	GRE-JOHNJCT7115.00 MORRIS 7 115.00 1	MN	7/19/2021	8/13/2021	26
1-26142419	NSP, WAUE	345	SPLT_RT	NOBLES	SPLT RK3 345.00 NOBLES 3 345.00	SD/ MN	8/9/2021	8/26/2021	18
1-24342018, 1-26307776	NSP	345	CRANDAL	FIELDON	FIELD_S3 345.00 CRANDAL 3 345.00 1	MN	8/16/2021	10/29/2021	75
1-24342018, 1-26307776	GRE, NSP	345	FIELDON	WILMART	WILMART3 345.00 FIELD_N3 345.00 1	MN	8/16/2021	10/29/2021	75
1-26370092	OTP	115	HOOT_LK	FERGSFL	HOOT LK7 115.00 FERGSFL7 115.00 1	MN	9/2/2021	10/6/2021	35
1-25868944	GRE, OTP	115	JOHNJCT	MORRISOT	GRE-JOHNJCT7115.00 MORRIS 7 115.00 1	MN	9/13/2021	2/1/2022	142
1-25985981	GRE, NSP	345	SHEASLK	WILMART	WILMART3 345.00 SHEAS LK3 345.00 1	MN	9/14/2021	9/30/2021	17
1-26335310	ITC_MW, NS	345	LAKEFLD	NOBLES	NOBLES 3 345.00 LAKEFLD3 345.00 1	MN	10/5/2021	10/8/2021	4
1-26214633	NSP	345	EAU_CLA TR9		EAU CL 3 345.00 EAU CL 5 161.00	WI	10/11/2021	10/21/2021	11
1-26214129	DPC	161	ROCHSTR	WABACO	WABACO 5 161.00 ROCHSTR5 161.00 1	MN	11/11/2021	5/31/2022	202

The Company believes that a majority of the binding constraints listed in Table 7 were either caused or made worse by the transmission outage identified in Table 8. An exception would be the Rochester – Wabaco binding constraint.

The Rochester – Wabaco 161 kV (for loss of North Rochester 345 kV line and loss of Alma Unit#6 Generating Plant) was the most common binding constraint in 2021. Rochester Wabaco bound throughout 2021 and was likely responsible for a significant amount of curtailment that occurred throughout the region. Rochester – Wabaco was identified as a MTEP transmission upgrade but was not scheduled for upgrade until 2022. Rochester – Wabaco was considered as "in-service" in the generator interconnection studies since it was an approved MTEP project, and a significant amount of generation went into service before the upgrade could be completed. Rochester – Wabaco is scheduled to be upgraded and back in service on May 31, 2022.

The Forman Transformer binding constraint was the second most common binding constraint in 2021. The Forman Transformer binding constraint was made worse by a number of different transmission outages that took place in 2021 including the Napoleon – Mandan outage which was out of service for the full year. The Napoleon – Mandan line is out of service for rebuilding as required by the generator interconnection process. The Napoleon – Mandan outage also likely contributed to the Ellendale – Aberdeen Jct, Hoot Lake – Fergus Falls, Big Stone – Browns Valley and Merricourt – Tatanka binding constraints. The Company believes that there is a risk that the Forman Transformer could continue to bind even after the transmission outages are complete.

The remaining binding constraints were likely related to the various transmission outages that occurred throughout 2021.

3. Curtailment Mitigation Efforts

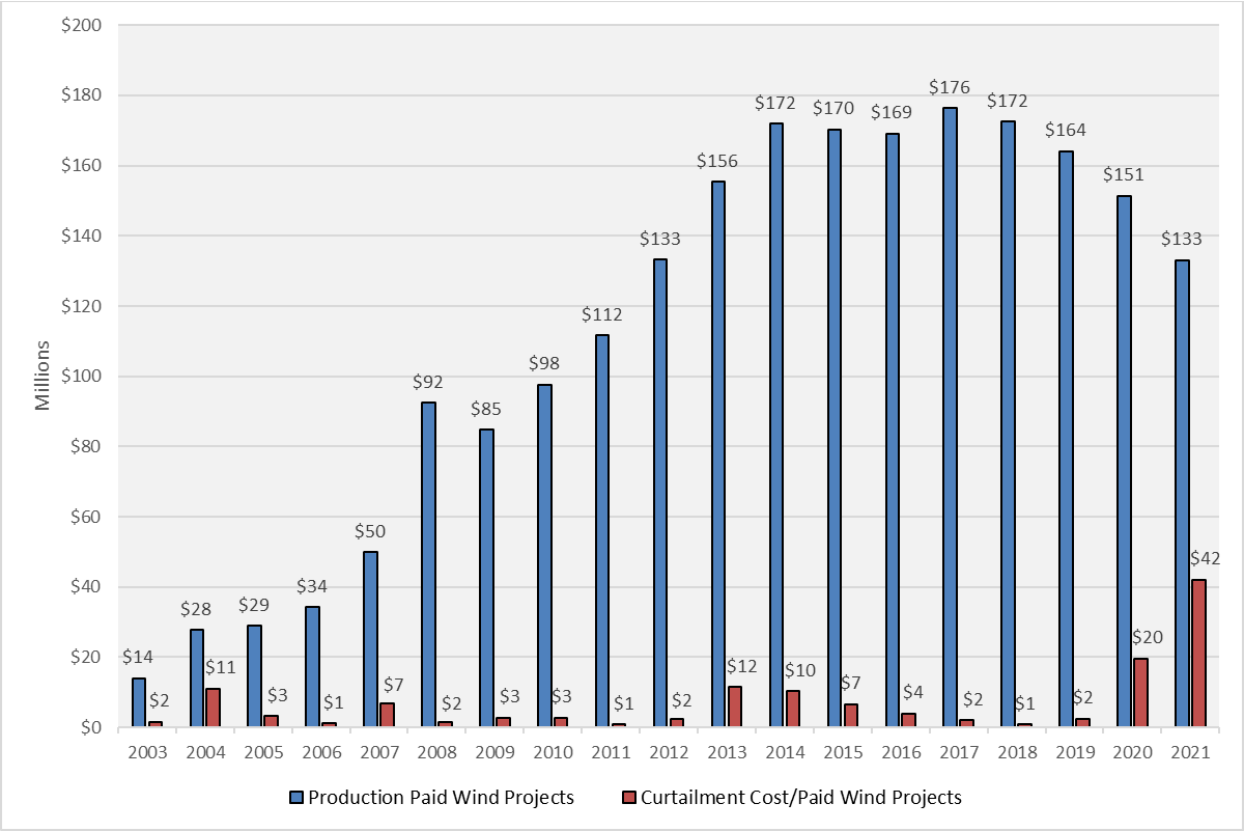
The Company has been working to schedule transmission outages to minimize curtailment for a number of years –performing multiple outages at the same time and scheduling these activities during times when wind is normally at its lowest levels – typically the summer months in the NSP service territory. While Xcel Energy attempts to plan outage work with this principle in mind, this is not always possible. Summer months are also high load months and transmission outages may not be possible due to load serving needs.

The Company is also working to identify binding constraints that are likely to occur going forward and are developing plans to mitigate these constraints. The mitigation plans will be designed to cost effectively reduce both curtailment and congestion. The plans include breaker reconfiguration and transmission facility upgrades.

V. WIND PRODUCTION AND CURTAILMENT PAYMENTS

Chart 3 shows the corresponding production and curtailment costs for 2003 through 2021.[6] As with wind generation produced and curtailed, paid curtailment is a very small portion of total cost of wind generation on the system.

Chart 3



The Company has typically provided estimates of future potential curtailment payment estimates in the AAA Report. However, going forward these estimates will be provided in our fuel forecast Petition, including the one that will be filed by May 2, 2022. The Company is projecting future curtailment will occur because of regional congestion and the resulting negative LMP in the MISO energy market, along with transmission outages required for construction, maintenance or repair activities and

[6] The data for 2019-2021 is shown in Part C, Attachment 2.

wind generation projects going into service before all required transmission facilities are completed.

Significant transmission improvements in southwestern Minnesota and the region such as the CapX2020 transmission projects (CapX2020), the Huntley – Wilmarth and all but one of the MISO Multi-Value Projects (MVPs)[7] are now in-service and will positively impact curtailment by reducing local congestion. However, the Company anticipates that wind generation curtailment and associated payment to vendors will continue to occur over the coming years because of regional congestion and the resulting negative LMP in the MISO energy market, along with transmission outages required for construction, maintenance, or repair activities and wind generation projects going into service before all required transmission facilities are completed and likely generation oversubscription of the transmission system. System conditions and wind project development are very dynamic and actual curtailment may vary from that projected in this report. The Company will continue to participate in discussions regarding transmission planning and operations to identify needs and work to manage future costs. We will continue to refine and gather information for use in future updates to be submitted with subsequent true-up and AAA reports.

The Company continues to utilize initiatives to reduce curtailment. Examples include, where possible, scheduling transmission activities which can impact curtailment during low wind months. The Company is also working to identify binding constraints that are likely to occur going forward and are developing plans to mitigate these constraints.

[7] The Cardinal - Hickory Creek 345 kV MVP line is scheduled to go into service in late 2023.

Northern States Power Company
Electric Utility - State of Minnesota
Wind Curtailment Summary Report - Total

Production Month	Date Paid		Wind Production Delivered		Lost Production		Total Xcel Energy Paid
	Delivered MWh	Lost MWh	MWh Delivered	Amount Xcel Energy Paid	Lost MWh	Amount Xcel Energy Paid	
Jan-19			409,935.57	15,794,417.19	2,691.44	138,614.09	$ 15,933,031.28
Feb-19			316,550.82	12,067,583.35	1,755.04	84,703.94	$ 12,152,287.29
Mar-19			411,474.86	15,202,176.47	1,869.04	93,395.08	$ 15,295,571.55
Apr-19			320,446.94	11,945,738.10	15,514.36	714,235.19	$ 12,659,973.29
May-19			419,819.81	14,792,059.29	8,719.31	367,154.52	$ 15,159,213.81
Jun-19			307,889.93	10,765,318.39	2,914.02	116,848.22	$ 10,882,166.61
Jul-19			261,647.61	9,175,408.30	5,882.20	225,357.99	$ 9,400,766.29
Aug-19			238,064.67	8,453,872.37	1,705.60	68,807.54	$ 8,522,679.91
Sep-19			422,465.39	15,040,484.98	1,016.19	47,264.76	$ 15,087,749.74
Oct-19			527,632.25	18,941,335.79	11,579.78	477,171.98	$ 19,418,507.77
Nov-19			484,992.26	17,217,454.47	1,823.17	77,334.60	$ 17,294,789.07
Dec-19			416,115.75	14,719,570.78	1,533.90	70,503.00	$ 14,790,073.78
Total-19			4,537,035.83	$ 164,115,419.48	57,004.05	$ 2,481,390.91	$ 166,596,810.39
Jan-20			399,651.01	14,281,994.44	1,583.27	65,900.77	$ 14,347,895.21
Feb-20			503,731.90	17,936,163.91	5,269.02	229,785.49	$ 18,165,949.40
Mar-20			491,554.55	17,679,218.49	19,126.61	849,968.99	$ 18,529,187.48
Apr-20			426,745.32	15,159,859.92	19,377.19	842,513.17	$ 16,002,373.09
May-20			295,839.59	11,005,702.99	38,161.09	1,789,868.33	$ 12,795,571.32
Jun-20			303,865.09	11,215,457.53	68,698.92	3,054,847.02	$ 14,270,304.55
Jul-20			203,130.29	7,708,535.67	11,701.62	508,971.38	$ 8,217,507.05
Aug-20			267,227.71	10,037,747.80	13,175.80	604,055.79	$ 10,641,803.59
Sep-20			284,608.69	10,541,870.58	55,057.72	2,436,060.69	$ 12,977,931.27
Oct-20			293,763.86	10,900,396.21	73,618.56	3,273,477.66	$ 14,173,873.87
Nov-20			350,138.46	12,659,381.03	87,314.17	3,902,384.06	$ 16,561,765.09
Dec-20			327,718.91	12,277,242.13	43,189.37	2,055,139.30	$ 14,332,381.43
Total-20			4,147,975.37	$ 151,403,570.70	436,273.34	$ 19,612,972.65	$ 171,016,543.35
Jan-21			415,276.96	12,790,075.17	55,813.10	2,807,900.43	$ 15,597,975.60
Feb-21			299,731.39	9,077,653.32	33,081.74	1,494,249.98	$ 10,571,903.30
Mar-21			454,702.83	13,823,194.08	102,918.72	4,570,158.12	$ 18,393,352.20
Apr-21			452,040.18	13,764,354.19	95,559.76	4,295,598.08	$ 18,059,952.27
May-21			378,818.38	11,076,185.38	83,722.64	3,810,012.94	$ 14,886,198.32
Jun-21			279,425.87	8,220,002.13	53,729.94	2,451,113.61	$ 10,671,115.74
Jul-21			254,534.12	6,964,756.60	19,170.23	842,853.61	$ 7,807,610.21
Aug-21			334,103.43	9,296,401.87	45,423.20	2,027,854.35	$ 11,324,256.22
Sep-21			365,006.51	10,674,869.41	90,261.00	4,036,330.17	$ 14,711,199.58
Oct-21			374,769.54	10,876,269.01	127,250.80	5,717,621.97	$ 16,593,890.98
Nov-21			475,572.96	14,208,437.64	117,907.39	5,371,503.97	$ 19,579,941.61
Dec-21			407,418.06	12,310,147.31	101,174.26	4,637,248.47	$ 16,947,395.78
Total-21			4,491,400.22	$ 133,082,346.11	926,012.80	$ 42,062,445.70	$ 175,144,791.81

Northern States Power Company
Electric Utility - State of Minnesota
Wind Curtailment Summary Report - Curtailment Reason Code 1 (ATC)

Production Month	Date Paid		Wind Production Delivered		Lost Production		Total Xcel Energy Paid
	Delivered MWh	Lost MWh	MWh Delivered	Amount Xcel Energy Paid	Lost MWh	Amount Xcel Energy Paid	
Jan-19							
Feb-19							
Mar-19							
Apr-19							
May-19							
Jun-19							
Jul-19							
Aug-19							
Sep-19							
Oct-19							
Nov-19							
Dec-19							
Total-19							
Jan-20							
Feb-20							
Mar-20							
Apr-20							
May-20							
Jun-20							
Jul-20							
Aug-20							
Sep-20							
Oct-20							
Nov-20							
Dec-20							
Total-20							
Jan-21							
Feb-21							
Mar-21							
Apr-21							
May-21							
Jun-21							
Jul-21							
Aug-21							
Sep-21							
Oct-21							
Nov-21							
Dec-21							
Total-21							

Northern States Power Company
Electric Utility - State of Minnesota
Wind Curtailment Summary Report - Curtailment Reason Code 2 (Low Load)

Production Month	Date Paid		Wind Production Delivered		Lost Production		Total Xcel Energy Paid
	Delivered MWh	Lost MWh	MWh Delivered	Amount Xcel Energy Paid	Lost MWh	Amount Xcel Energy Paid	
Jan-19							
Feb-19							
Mar-19							
Apr-19							
May-19							
Jun-19							
Jul-19							
Aug-19							
Sep-19							
Oct-19							
Nov-19							
Dec-19							
Total-19							
Jan-20							
Feb-20							
Mar-20							
Apr-20							
May-20							
Jun-20							
Jul-20							
Aug-20							
Sep-20							
Oct-20							
Nov-20							
Dec-20							
Total-20							
Jan-21							
Feb-21							
Mar-21							
Apr-21							
May-21							
Jun-21							
Jul-21							
Aug-21							
Sep-21							
Oct-21							
Nov-21							
Dec-21							
Total-21							

Northern States Power Company
Electric Utility - State of Minnesota
Wind Curtailment Summary Report - Curtailment Reason Code 3 (MISO)

Production Month	Date Paid: Delivered MWh	Date Paid: Lost MWh	Wind Production Delivered: MWh Delivered	Wind Production Delivered: Amount Xcel Energy Paid	Lost Production: Lost MWh	Lost Production: Amount Xcel Energy Paid	Total Xcel Energy Paid
Jan-19			34,790.48	$ 1,584,575.48	2,691.44	$ 138,614.09	$ 1,723,189.57
Feb-19			46,095.81	$ 1,975,647.30	1,755.04	$ 84,703.94	$ 2,060,351.24
Mar-19			133,223.00	$ 5,104,484.91	1,869.04	$ 93,395.08	$ 5,197,879.99
Apr-19			132,374.40	$ 5,618,629.76	15,514.36	$ 714,235.19	$ 6,332,864.95
May-19			143,861.13	$ 6,224,849.74	8,719.31	$ 367,154.52	$ 6,592,004.26
Jun-19			103,936.66	$ 4,463,954.31	2,914.02	$ 116,848.22	$ 4,580,802.53
Jul-19			64,936.43	$ 2,490,433.42	5,882.20	$ 225,357.99	$ 2,715,791.41
Aug-19			65,097.85	$ 2,490,144.14	1,705.60	$ 68,807.54	$ 2,543,812.57
Sep-19			152,102.41	$ 6,518,938.81	1,016.19	$ 47,264.76	$ 6,566,203.57
Oct-19			192,968.52	$ 8,558,704.45	11,579.78	$ 477,171.98	$ 9,035,876.43
Nov-19			85,834.03	$ 3,248,563.99	1,823.17	$ 77,334.60	$ 3,325,898.59
Dec-19			143,811.28	$ 6,362,151.94	1,533.90	$ 70,503.00	$ 6,432,654.94
Total-19			1,299,031.99	$ 54,641,078.25	57,004.06	$ 2,481,390.91	$ 57,107,330.05
Jan-20			152,447.62	$ 6,394,615.97	1,583.27	$ 65,900.77	$ 6,460,516.74
Feb-20			199,042.07	$ 8,284,249.02	5,269.02	$ 229,785.49	$ 8,514,034.51
Mar-20			190,537.12	$ 7,939,476.63	19,126.61	$ 849,968.99	$ 8,789,445.62
Apr-20			158,348.00	$ 6,624,111.36	19,377.19	$ 842,513.17	$ 7,466,624.53
May-20			145,484.94	$ 6,215,334.19	38,161.09	$ 1,789,868.33	$ 8,005,202.52
Jun-20			226,908.24	$ 8,515,332.08	68,698.92	$ 3,054,847.02	$ 11,570,179.10
Jul-20			116,826.05	$ 4,996,335.18	11,701.62	$ 508,971.38	$ 5,505,306.56
Aug-20			168,459.46	$ 6,230,107.58	13,175.80	$ 604,055.79	$ 6,834,163.37
Sep-20			210,090.70	$ 7,707,155.08	55,057.72	$ 2,436,060.69	$ 10,143,215.77
Oct-20			211,822.27	$ 7,810,296.30	73,618.56	$ 3,273,477.66	$ 11,083,773.96
Nov-20			290,736.26	$ 10,515,693.78	87,314.17	$ 3,902,384.06	$ 14,418,077.84
Dec-20			268,369.30	$ 9,992,099.21	43,189.37	$ 2,055,139.30	$ 12,047,238.51
Total-20			2,339,072.03	$ 91,224,806.38	436,273.34	$ 19,612,972.65	$ 110,837,779.03
Jan-21			286,239.78	$ 8,608,971.51	55,813.10	$ 2,807,900.43	$ 11,416,871.94
Feb-21			207,036.82	$ 5,238,392.38	33,081.74	$ 1,494,249.98	$ 6,732,642.36
Mar-21			313,731.84	$ 7,958,889.42	102,918.72	$ 4,570,158.12	$ 12,529,047.54
Apr-21			359,879.41	$ 10,295,738.72	95,559.76	$ 4,295,598.08	$ 14,591,336.80
May-21			335,682.76	$ 9,476,493.54	83,722.64	$ 3,810,012.94	$ 13,286,506.48
Jun-21			244,634.08	$ 6,801,152.64	53,729.94	$ 2,451,113.61	$ 9,252,266.25
Jul-21			188,634.61	$ 4,407,043.28	19,170.23	$ 842,853.61	$ 5,249,896.89
Aug-21			279,344.49	$ 7,183,597.10	45,423.20	$ 2,027,854.35	$ 9,211,451.45
Sep-21			317,149.99	$ 8,632,740.85	90,261.00	$ 4,036,330.17	$ 12,669,071.02
Oct-21			322,379.24	$ 8,637,684.25	127,250.80	$ 5,717,621.97	$ 14,355,306.22
Nov-21			409,323.89	$ 11,381,625.18	117,907.39	$ 5,371,503.97	$ 16,753,129.15
Dec-21			343,706.19	$ 9,649,758.76	101,174.26	$ 4,637,248.47	$ 14,287,007.23
Total-21			3,607,743.08	$ 98,272,087.63	926,012.80	$ 42,062,445.70	$ 140,334,533.33

Northern States Power Company
Electric Utility - State of Minnesota
Wind Curtailment Summary Report - Curtailment Reason Code 4 (Other-Paid)

Production Month	Date Paid		Wind Production Delivered		Lost Production		Total Xcel Energy Paid
	Delivered MWh	Lost MWh	MWh Delivered	Amount Xcel Energy Paid	Lost MWh	Amount Xcel Energy Paid	
Jan-19							
Feb-19							
Mar-19							
Apr-19							
May-19							
Jun-19							
Jul-19							
Aug-19							
Sep-19							
Oct-19							
Nov-19							
Dec-19							
Total-19							
Jan-20							
Feb-20							
Mar-20							
Apr-20							
May-20							
Jun-20							
Jul-20							
Aug-20							
Sep-20							
Oct-20							
Nov-20							
Dec-20							
Total-20							
Jan-21							
Feb-21							
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Apr-21							
May-21							
Jun-21							
Jul-21							
Aug-21							
Sep-21							
Oct-21							
Nov-21							
Dec-21							
Total-21							