



Curtailment Increasing in Minnesota



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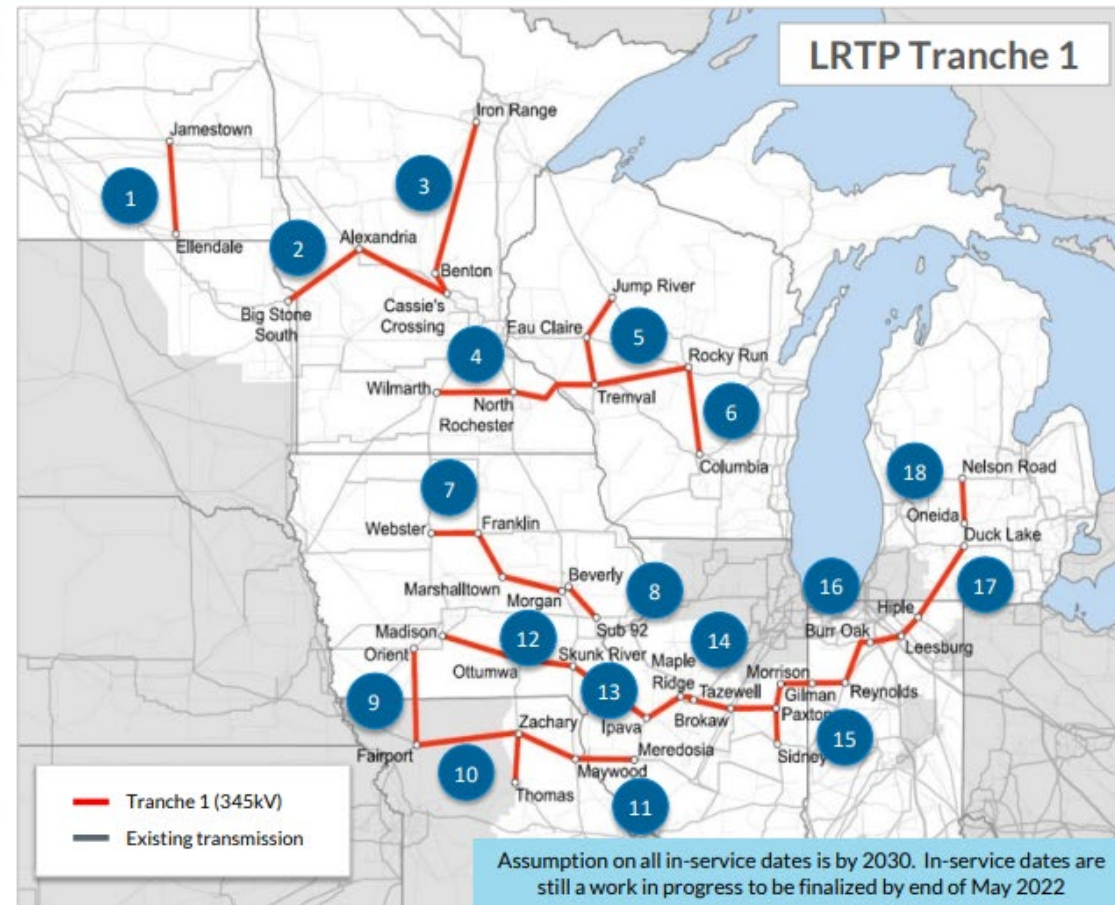
Curtailment Increasing and Expanding 2023

Project	Year	Curtailment
F	2023	55.37%
	2022	41.65%
	2021	43.40%
RP	2023	31.46%
	2022	15.39%
	2021	6.90%
Sy	2023	17.88%
	2022	1.83%
	2021	8.16%
Wapsi	2023	29.60%
	2022	4.04%
	2021	5.45%

Transmission - MISO LRTP Approved

Current project cost estimates for LRTP Tranche 1 are \$10.4 B for projects located across the MISO Midwest subregion

ID	Project Description	Est. Cost (\$M, 2022)
1	Jamestown - Ellendale	\$420M
2	Big Stone South - Alexandria - Cassie's Crossing	\$595M
3	Iron Range - Benton County - Cassie's Crossing	\$853M
4	Wilmarth - North Rochester - Tremval	\$718M
5	Tremval - Eau Claire - Jump River	\$575M
6	Tremval - Rocky Run - Columbia	\$673M
7	Webster - Franklin - Marshalltown - Morgan Valley	\$716M
8	Beverly - Sub 92	\$178M
9	Orient - Denny - Fairport	\$561M
10	Denny - Zachary - Thomas Hill - Maywood	\$1,115M
11	Maywood - Meredosia	\$356M
12	Madison - Ottumwa - Skunk River	\$683M
13	Skunk River - Ipava	\$600M
14	Ipava - Maple Ridge - Tazewell - Brokaw - Paxton East	\$640M
15	Sidney - Paxson East - Gilman South - Morrison Ditch	\$533M
16	Morrison Ditch - Reynolds - Burr Oak - Leesburg - Hiple	\$374M
17	Hiple - Duck Lake	\$488M
18	Oneida - Nelson Rd.	\$302M
Total Project Portfolio Cost		\$10,380



List of projects impacted by FENOCH interface:

Project	COD	Owner	Size	PPA Offtaker
Nobles Wind Project	Dec-10	NSP	200	
Nobles 2 Power Partners Wind Farm	Dec-20	ALLETE, Tenaska, Bright Canyon	250	Minnesota Power Enterprises
Fenton Wind	Sep-07	EDF Renewables	205.5	NSP
Stoneray Wind	Dec-18	EDF Renewables	100	SMMPA
Northern Wind Energy Project	Jan-23	NSP	100	Xcel
Moraine Wind II	Feb-09	Avangrid	49.5	NSP
Ridgewind Power Plant	Jan-11	Greenbacker Renewable Enery	25.3	NSP
Moraine Wind	Dec-03	Avangrid	51	NSP
Rock Aetna	Dec-22	NSP	22.3	NSP
Valley View Wind Project	Jul-11	Con Edison	10	NSP
Community Wind South Wind Farm	Dec-12	Greenbacker Renewable Energy, Juwi Wind, Larkin-Summit Wind	30	NSP
Westridge Windfarm	Nov-03	TotalEnergies, Global Infrastructure	17.1	NSP
Eastridge Wind Project	Apr-06	Bendwind	10.4	NSP

This is the outage planned through the end of the year.

MISO	NOBLES		NOBLES TR9 9	XFMR	345	06/23/2023 08:00:00	01/01/2024 00:59:00
MISO	NOBLES		NOBLES TR9_2 9	XFMR	118	06/23/2023 08:00:00	01/01/2024 00:59:00

TR9 with TR9_2 being out of service means it is one of the 345/115kv transformers out. The other 345/115kv transformer is TR10 with TR10_2 and that is still in service during this time. But having one out results in congestion on the interface.

The 345kv sides are TR9 and TR10, the 115kv sides are TR9_2 and TR10_2, and the low 34.5kv sides are TR9_3 and TR10_3. The TR1 and TR2 ones are ties to generators (I think Nobles Wind).

Name	From Bus ID	From Bus Name	From KV	From ISO	From Area	From Zone	To Bus ID	To Bus Name	To KV
NOBLES TR1	600251	NOBLES	115.0	MISO	NSP	NSP NSP	600113	G287 NOB3G W	34.5
NOBLES TR10	601034	NOBLES 3	345.0	MISO	NSP	NSP NSP	600256	NOBLES	1.0
NOBLES TR10_2	600251	NOBLES	115.0	MISO	NSP	NSP NSP	600256	NOBLES	1.0
NOBLES TR10_3	600255	NOBLES	34.5	MISO	NSP	NSP NSP	600256	NOBLES	1.0
NOBLES TR2	600251	NOBLES	115.0	MISO	NSP	NSP NSP	600113	G287 NOB3G W	34.5
NOBLES TR9	601034	NOBLES 3	345.0	MISO	NSP	NSP NSP	600257	NOBLES	1.0
NOBLES TR9_2	600251	NOBLES	115.0	MISO	NSP	NSP NSP	600257	NOBLES	1.0
NOBLES TR9_3	605664	NOBLES 9004	34.5	MISO	NSP	NSP NSP	600257	NOBLES	1.0



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