GRID UNITED

The Need for HVDC Intertie Accreditation

MISO HVDC Workshop

2025-04-29

Key Takeaways:

- The MISO region is facing capacity shortages and new methods are needed to recognize and quantify capacity wherever it exists
- An interregional HVDC line importing power at times of high risk provides resource adequacy and attribute benefits similar to a peaking plant or battery
- Without a framework for accreditation, members interested in sponsoring interregional projects are unable to count on a major source of value

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Straw Proposal:

- MISO currently credits the benefit of external connections in its Loss of Load Expectation (LOLE) studies by reducing the regionwide Planning Reserve Margin (PRM) and has developed an RA benefit metric for the purpose of Long-Range Transmission Planning (LRTP)
- Both methods acknowledge the capacity value of transmission during high-risk hours and could be extended to accredit and incent new interregional tie lines

Grid United Mission & Projects

Mission: To develop America's next-generation energy infrastructure to power our future

Our projects:

- Connect key areas of the electric grid
- Create a more resilient and efficient electric system
- Utilize the nation's abundant and geographically diverse resources
- Benefit all consumers

HVDC integration is advancing across multiple MISO areas - establishing a methodology for accreditation is the most urgent

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Interconnection

Modernize the process for efficiency and flexibility

Accreditation

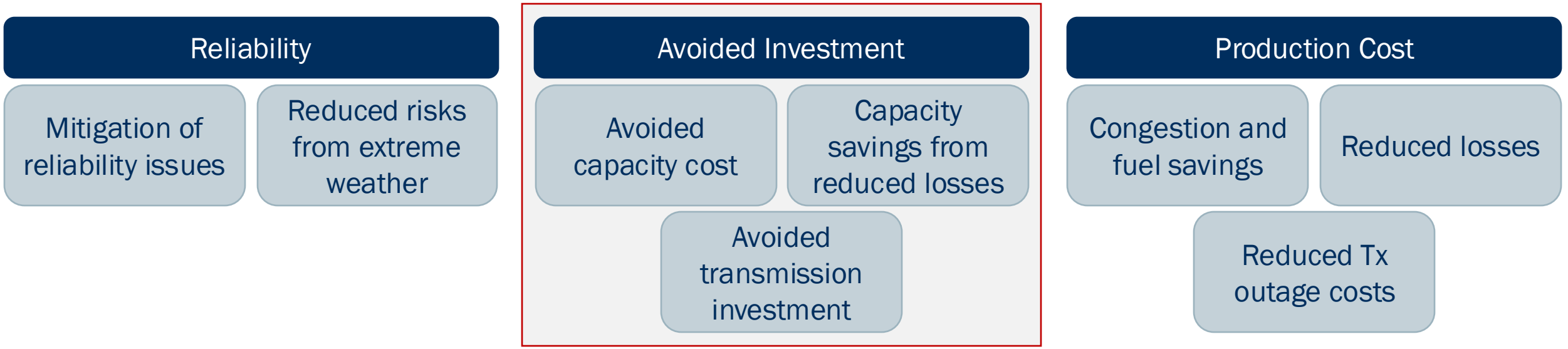
Value the Resource Adequacy contribution of interregional ties

Market Participation

Optimize HVDC in energy and ancillary services markets

Today's focus

HVDC provides unique benefits across MISO's LRTP metrics, but there is a gap in the Avoided Investment category for interregional projects

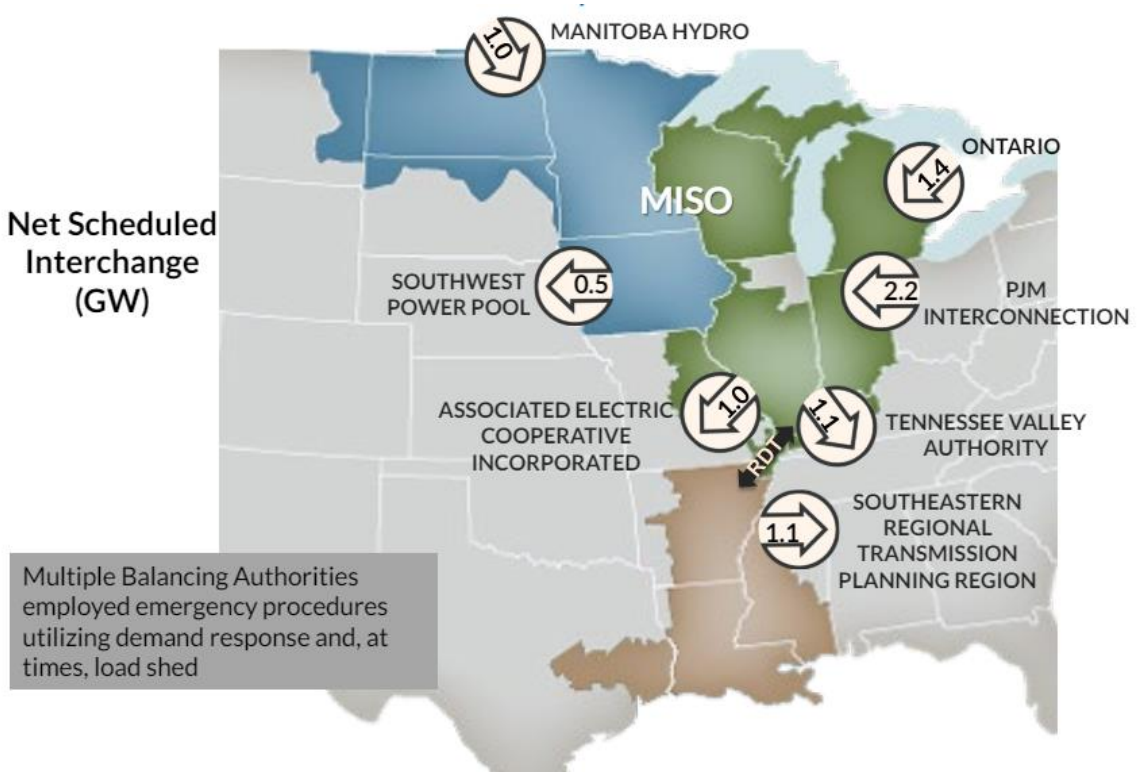


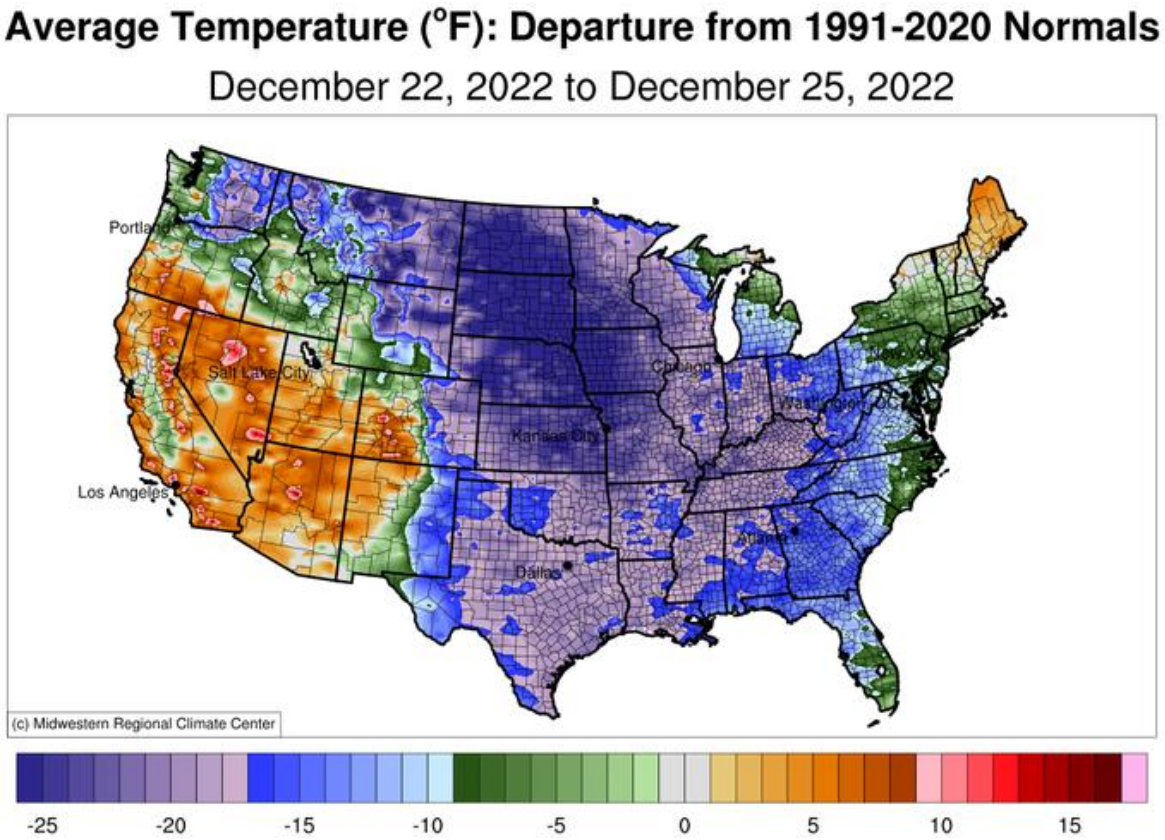
Regional transmission is evaluated for all of the above metrics. However, participant-funded, interregional projects do not have a path for MISO members to evaluate them based on the resource adequacy benefits they provide, despite recognition of that value in operations.

MISO should define a capacity accreditation framework for new HVDC interties to ensure fair treatment for their attributes and incent investment in the region.

From *MISO MTEP24 Chapter 2 – Figure 2.137: Tranche 2.1 Benefits*

Historical experience demonstrates the value of interregional transmission and having a grid bigger than the weather

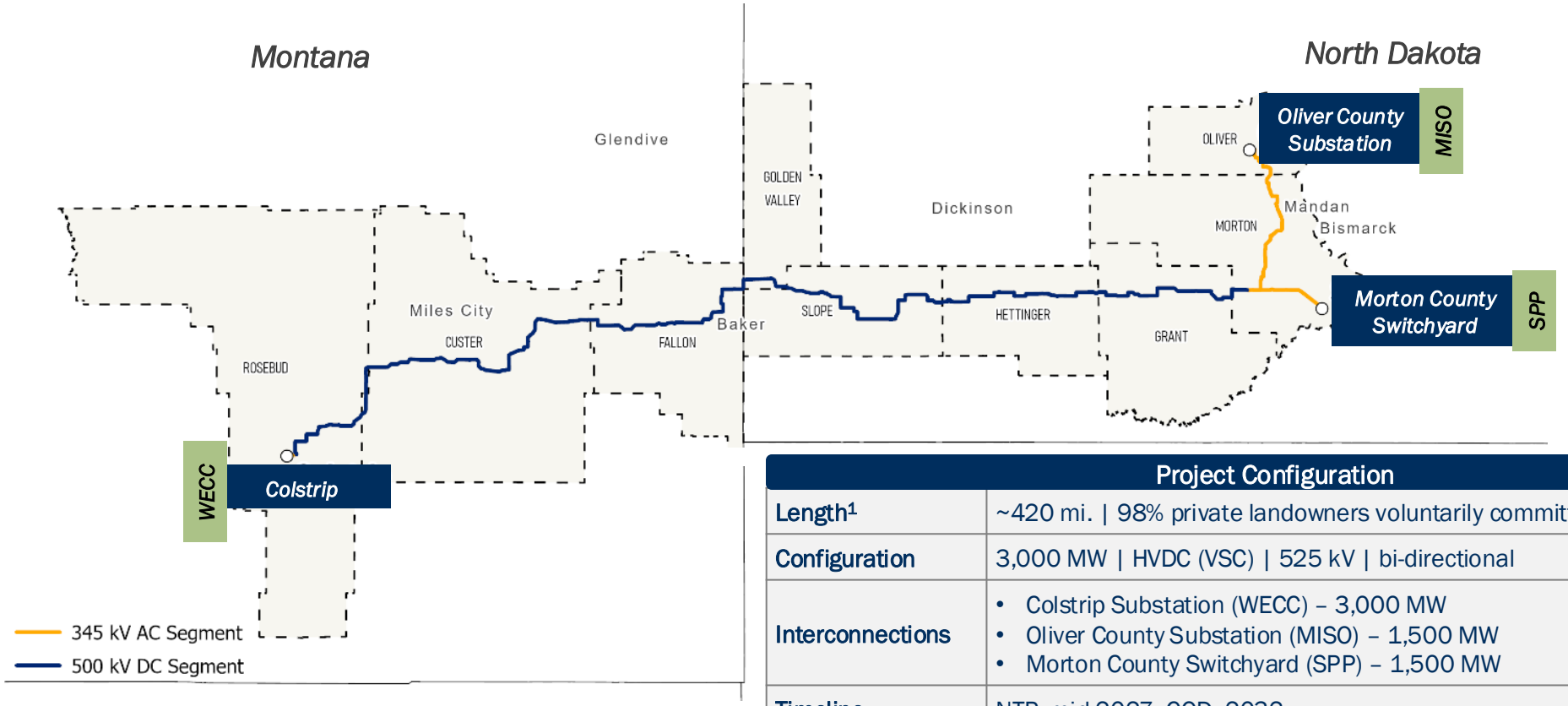




Existing interregional connections are integral to MISO's ability to support and be supported by its neighbors during wide-ranging weather events like Winter Storm Elliott in December, 2022 which affected much of the eastern half of the country.

Source: MISO Winter Storm Elliott Report; Midwest Regional Climate Cener

North Plains Connector – Project Overview



Project Configuration	
Length[1]	~420 mi. | 98% private landowners voluntarily committed
Configuration	3,000 MW | HVDC (VSC) | 525 kV | bi-directional
Interconnections	• Colstrip Substation (WECC) – 3,000 MW • Oliver County Substation (MISO) – 1,500 MW • Morton County Switchyard (SPP) – 1,500 MW
Timeline	NTP: mid 2027, COD: 2032

[1] Project route is under active development and is subject to change.

Connecting diverse regions contributes to resource adequacy by enabling access to diverse pools of load and resources

- High net loads in the Pacific Northwest and MISO are typically non-coincident – very low correlation between peak loads, renewable production, and thermal plant outages across the east vs west interconnections
- In the top 3% net load hours in both regions, 86% of hours are non-coincident, i.e. only one market is experiencing a high net load hour, not both
- During the coincident 39 hours, there are sufficient operating reserves available to offer energy in both markets

MISO top 3% of hourly net loads in 2024

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	1	0	0	0	0
11	0	0	0	0	0	0	3	5	0	0	0	0
12	0	0	0	0	0	3	7	6	0	0	0	0
13	0	0	0	0	0	4	11	8	0	0	0	0
14	0	0	0	0	0	4	12	10	1	0	0	0
15	0	0	0	0	0	4	15	11	1	0	0	0
16	0	0	0	0	0	6	14	14	1	0	0	0
17	0	0	0	0	0	7	15	15	2	0	0	0
18	0	0	0	0	0	7	16	16	2	0	0	0
19	0	0	0	0	0	6	12	14	0	0	0	0
20	0	0	0	0	0	2	11	7	0	0	0	0
21	0	0	0	0	0	0	5	4	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0

Pacific Northwest top 3% of hourly net loads in 2024

	1	2	3	4	5	6	7	8	9	10	11	12
1	4	0	0	0	0	0	0	0	0	0	0	0
2	4	0	0	0	0	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0	0	0	0	0
4	4	0	0	0	0	0	0	0	0	0	0	0
5	4	0	0	0	0	0	0	0	0	0	0	0
6	4	0	0	0	0	0	0	0	0	0	0	0
7	5	0	0	0	0	0	0	0	0	0	0	0
8	7	0	4	0	0	0	0	0	0	0	0	3
9	8	1	3	0	0	0	0	0	0	0	0	8
10	8	1	2	0	0	0	0	0	0	0	0	8
11	8	0	0	0	0	0	0	0	0	0	0	6
12	8	0	0	0	0	0	0	0	0	0	0	2
13	8	0	0	0	0	0	2	0	0	0	0	0
14	8	0	0	0	0	0	2	1	0	0	0	0
15	8	0	0	0	0	0	3	2	0	0	0	0
16	7	0	0	0	0	0	3	2	0	0	0	0
17	7	0	0	0	0	0	3	3	1	0	0	0
18	8	0	0	0	0	0	7	3	2	0	0	4
19	8	0	0	0	0	0	6	3	1	0	0	8
20	8	0	0	0	0	0	7	2	1	0	0	8
21	7	0	0	0	0	0	4	1	0	0	0	5
22	7	0	0	0	0	0	2	1	0	0	0	3
23	5	0	0	0	0	0	0	0	0	0	0	0
24	5	0	0	0	0	0	0	0	0	0	0	0

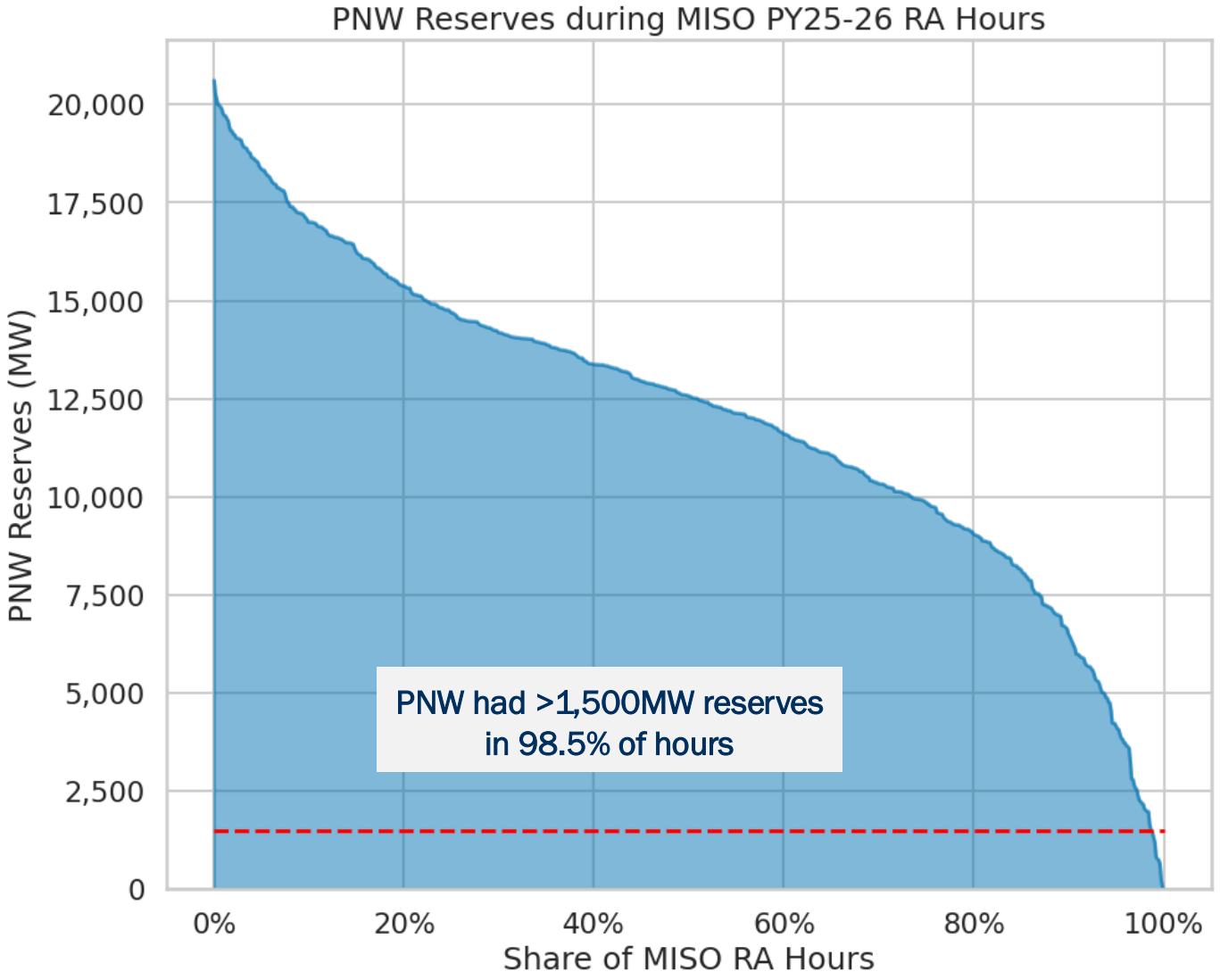
Overlap of Pacific Northwest & MISO top 3% of hourly net loads

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	2	0	0	0	0	0
14	0	0	0	0	0	0	2	1	0	0	0	0
15	0	0	0	0	0	0	3	2	0	0	0	0
16	0	0	0	0	0	0	3	2	0	0	0	0
17	0	0	0	0	0	0	3	2	0	0	0	0
18	0	0	0	0	0	0	6	2	0	0	0	0
19	0	0	0	0	0	0	3	2	0	0	0	0
20	0	0	0	0	0	0	4	1	0	0	0	0
21	0	0	0	0	0	0	0	1	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0

86% of hours are non-coincident

= MISO non-coincident top 3% net load hours
= MISO coincident top 3% net load hours

Focusing on MISO's RA hours shows the depth of resources that an HVDC intertie can access



Crossing MISO's published North/Central seasonal resource adequacy hours with net load data in the PNW shows the lack of correlation between peaks in the two regions.

- Use Annual Peak Net Load – Hourly Net Load as a proxy for reserves in the PNW
- September 2021 – August 2024 data

Challenge: MISO's existing resource adequacy framework places value on existing interties, but does not extend to incentivize new ties

Current Methodology (MISO)

- Non-firm net scheduled interchange during emergency pricing hours credited towards MISO as a whole, reducing the system-wide planning reserve margin
- Recognizes that existing external connections have resource adequacy value

	Summer	Fall	Winter	Spring
p5	1,138	525	9	1,384
p10	1,440	903	288	1,626
p25	2,959	1,749	1,223	2,283
p50	4,260	2,601	3,292	3,717
p75	5,198	3,632	5,785	4,987
p90	5,921	4,935	8,097	6,221
p95	6,520	5,748	9,197	6,497

Table 3-5: Non-Firm External Import Distribution During Emergency Pricing Hours (MW)

Limitations for New, Participant-Funded Ties

- Does not accredit the resource adequacy contributions of a new tie to its owners, hindering MISO members ability to participant-fund new interregional projects
- Existing structures for accrediting external resources require capacity to be counted in one region at a time: ignores the intrinsic diversity value of connecting to a remote region

Straw Proposal: Expand MISO's existing methodology to determine a forward-looking, asset-specific accredited value for interregional HVDC ties

Dispatchability makes HVDC unique as an intertie technology, appearing as a generator or load as needed.

This function simplifies metering and accreditation, allowing its performance and attributes to be evaluated like any other resource.

Accreditation methodology:

- Accredit historical intertie flows during critical hours (consistent with current tie methodology)

OR

- Use a loss of load model including external regions and apply the same methodology used in other MISO accreditation processes

Application:

- Owners (funders) of the HVDC tie count accredited capacity towards their PRMR

Grid United urges MISO to urgently address the HVDC accreditation gap

- To meet the challenges of load growth, a changing generation fleet and extreme weather, MISO must provide the tools TOs need to unlock resource adequacy wherever it exists
- Interregional HVDC ties can provide the capacity and reliability attributes that MISO needs
- MISO's existing methods acknowledge the capacity value of transmission during high-risk hours and could be extended to accredit and incent new interregional tie lines
- There are useful parallels in other regions (e.g., ISO-NE) and countries, and industry organizations like ESIG are working to codify best practices

Thank you for the opportunity to present. Questions?

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Appendix: Resources

ISO-NE Tie Benefits Methodology

- Overview of ISO-NE's calculation of tie benefits and review of practices in other ISO/RTOs

ESIG *Interregional Transmission for Resilience*

- Report including a methodology for calculating where interregional transmission can provide the highest resilience value
- Part of a series of task forces on interregional transmission, resilience, and reliability

Telos Energy: *Transmission as a Capacity Resource*

- Blog post - a case for allowing interregional transmission to offer into capacity markets and all-source procurements