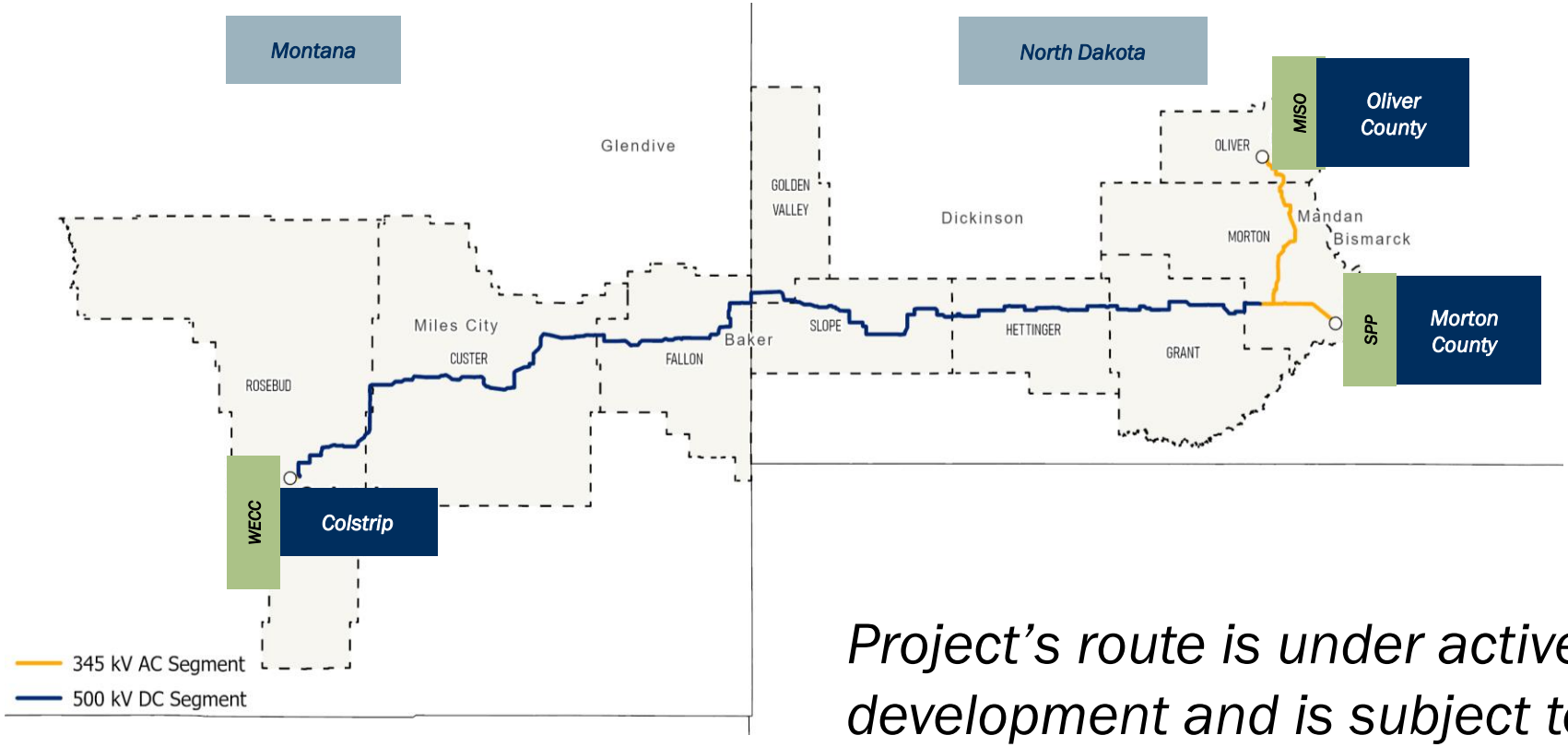
GRID UNITED

North Plains Connector

Interregional Capacity Value

2024-10-23

North Plains Connector – Project Overview



Project's route is under active development and is subject to change.

Length	**>400 miles**
Configuration	3GW HVDC (VSC) between WECC, SPP, and MISO
Timeline	Early 2030s

Interregional Value

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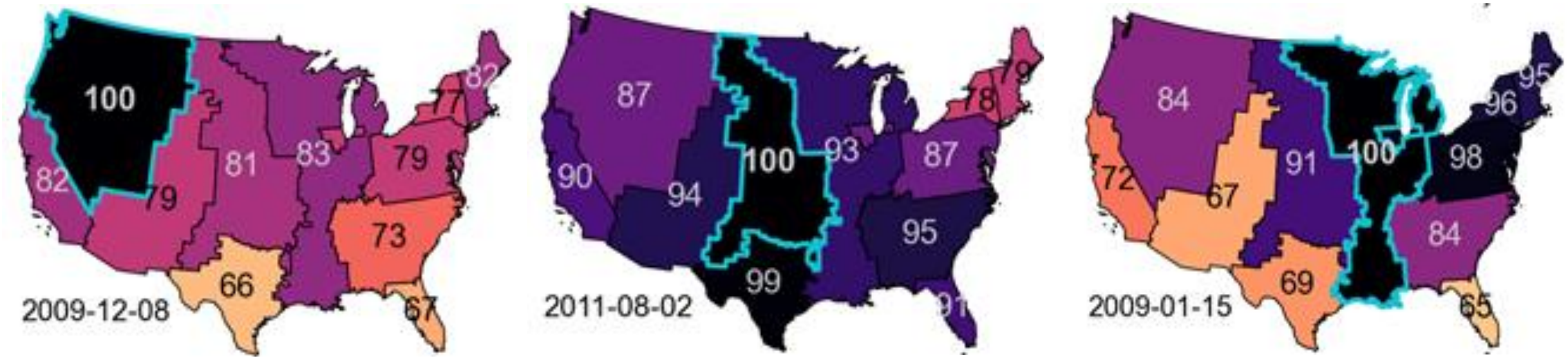
Reliability & Resilience			Economics	
Reduced Loss of Load Probability	Improved Grid Operations	Reduced Reserve Margin	Reduced Ancillary Service Costs	Insurance-like Value for Low Probability Events
		Reduced Impact of Load & Renewables Forecast Error		
Access to Geographically & Technologically Diverse Resources		Reduced Cost & Impact of Extreme Weather	Mitigated Impact of Complying with Future Policy, Market Changes	
		Bidirectional Transfer of Power		

Regions don’t peak at the same time



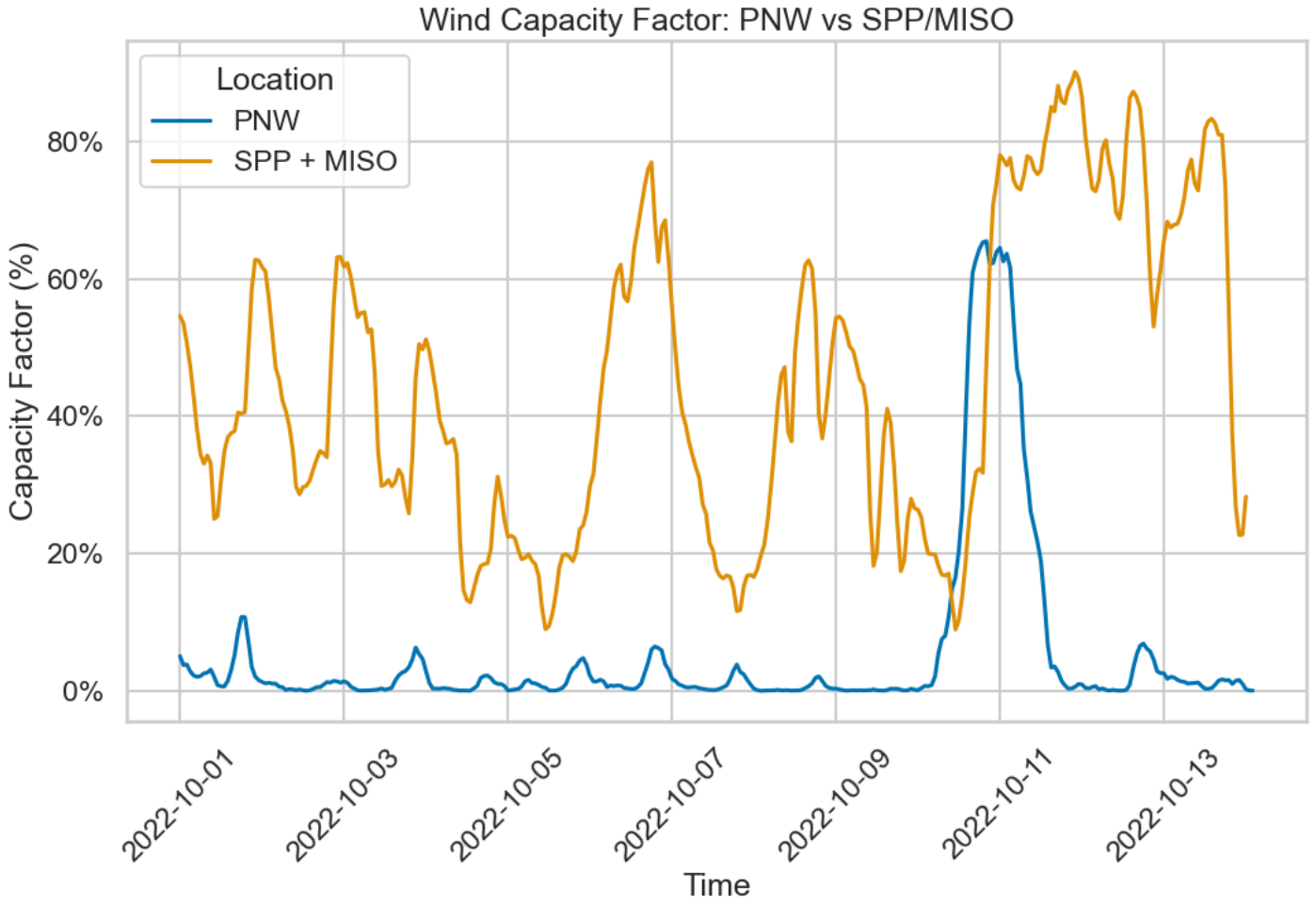
Using 2007-2013 data, the DOE National Transmission Planning Study recently found significant differences in load across regions during peak periods

Source: DOE, National Transmission Planning Study Chapter 2, Figure 40. October 2024

Generation can differ greatly between regions

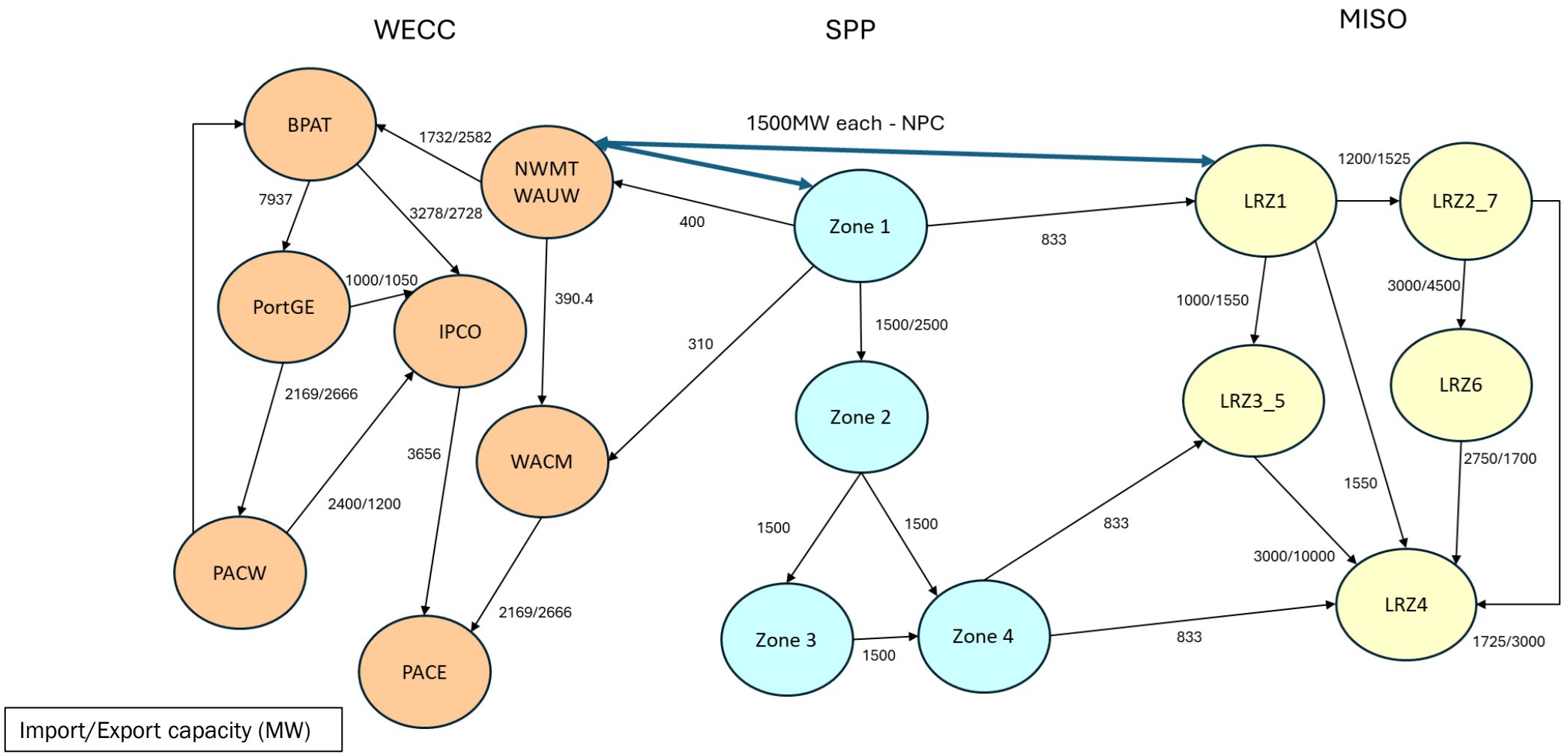
During the first two weeks of October, 2022 the PNW saw little to no wind generation at all

MISO and SPP performed normally in this period



Source: EIA Hourly Grid Monitor

GU worked with Astrape Consulting to quantify interregional capacity benefits



MISO sees the most risk in summer afternoons

MISO		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Hour of Day	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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%	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%	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%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	5	0.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%
	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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%	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%	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%	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%	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%	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%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%
	13	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	1.0%	0.0%	0.0%	0.0%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	1.3%	0.0%	0.0%	0.0%	0.0%
	17	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.5%	6.9%	0.0%	0.0%	0.0%	0.0%
	18	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	7.9%	0.0%	0.0%	0.0%	0.0%
	19	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	6.4%	4.2%	0.0%	0.0%	0.0%	0.0%
	20	0.1%	0.9%	0.2%	0.0%	0.0%	0.0%	3.0%	4.4%	0.0%	0.0%	0.0%	0.0%
	21	0.1%	0.8%	0.9%	0.0%	0.0%	0.0%	5.0%	14.6%	0.0%	0.0%	0.0%	0.0%
	22	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	2.2%	3.5%	0.0%	0.0%	0.0%	0.0%
	23	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	1.4%	2.7%	0.0%	0.0%	0.0%	0.0%
	24	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	1.6%	1.9%	0.0%	0.0%	0.0%	0.0%

Table shows the percentage of total curtailed load occurring in each hour of each month across all model runs

** values rounded for ease of interpretation*

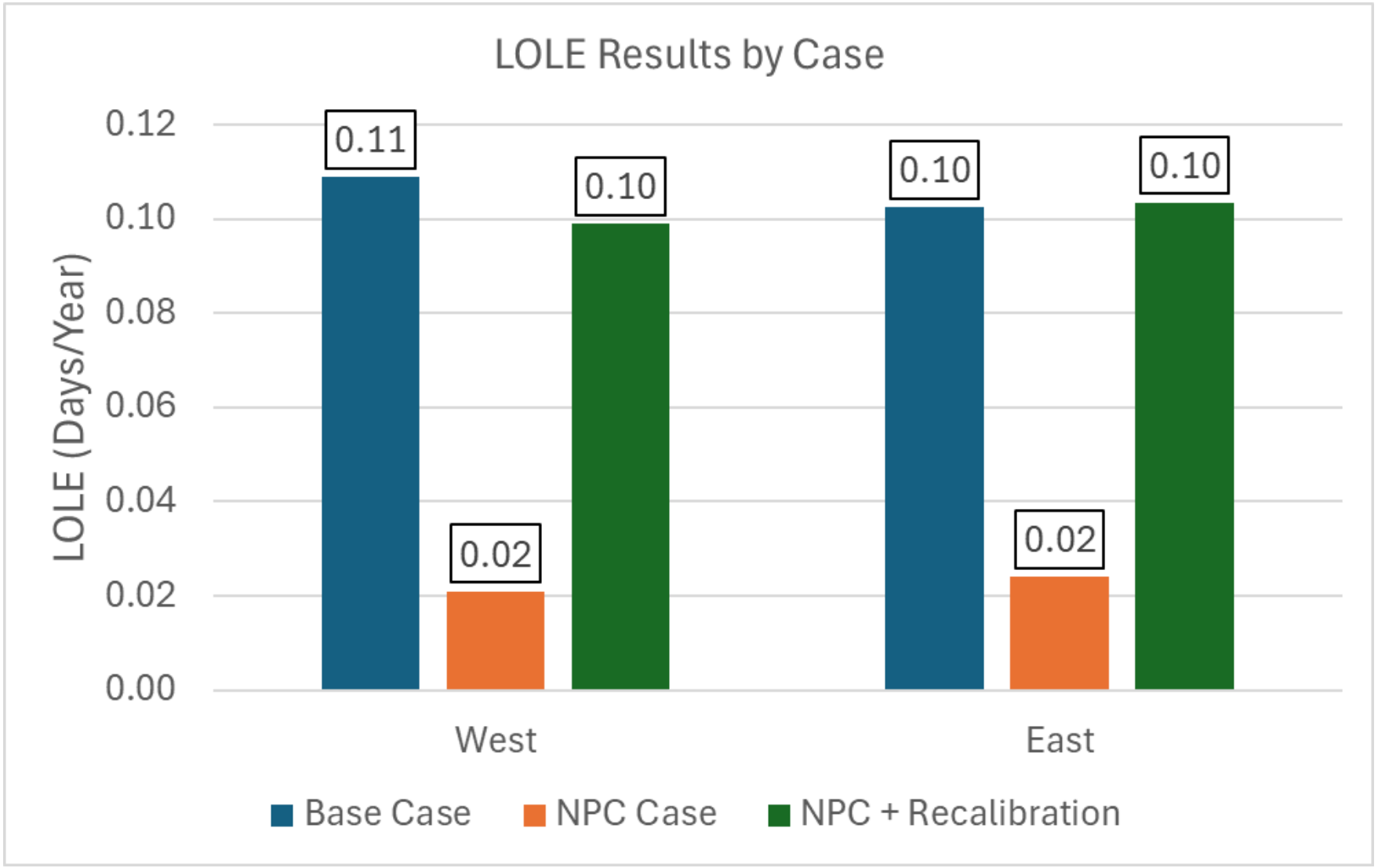
The PNW sees the most risk in the winter

WECC		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Hour of Day	1	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%
	2	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
	3	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%
	4	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%
	5	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	3.7%
	6	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	5.5%
	7	0.5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.1%	8.2%
	8	1.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	10.9%
	9	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.4%
	10	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
	11	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	13	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	16	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	17	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	2.0%
	18	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	5.1%
	19	1.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%
	20	1.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%
	21	1.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%
	22	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.5%
	23	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	5.1%
	24	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.0%

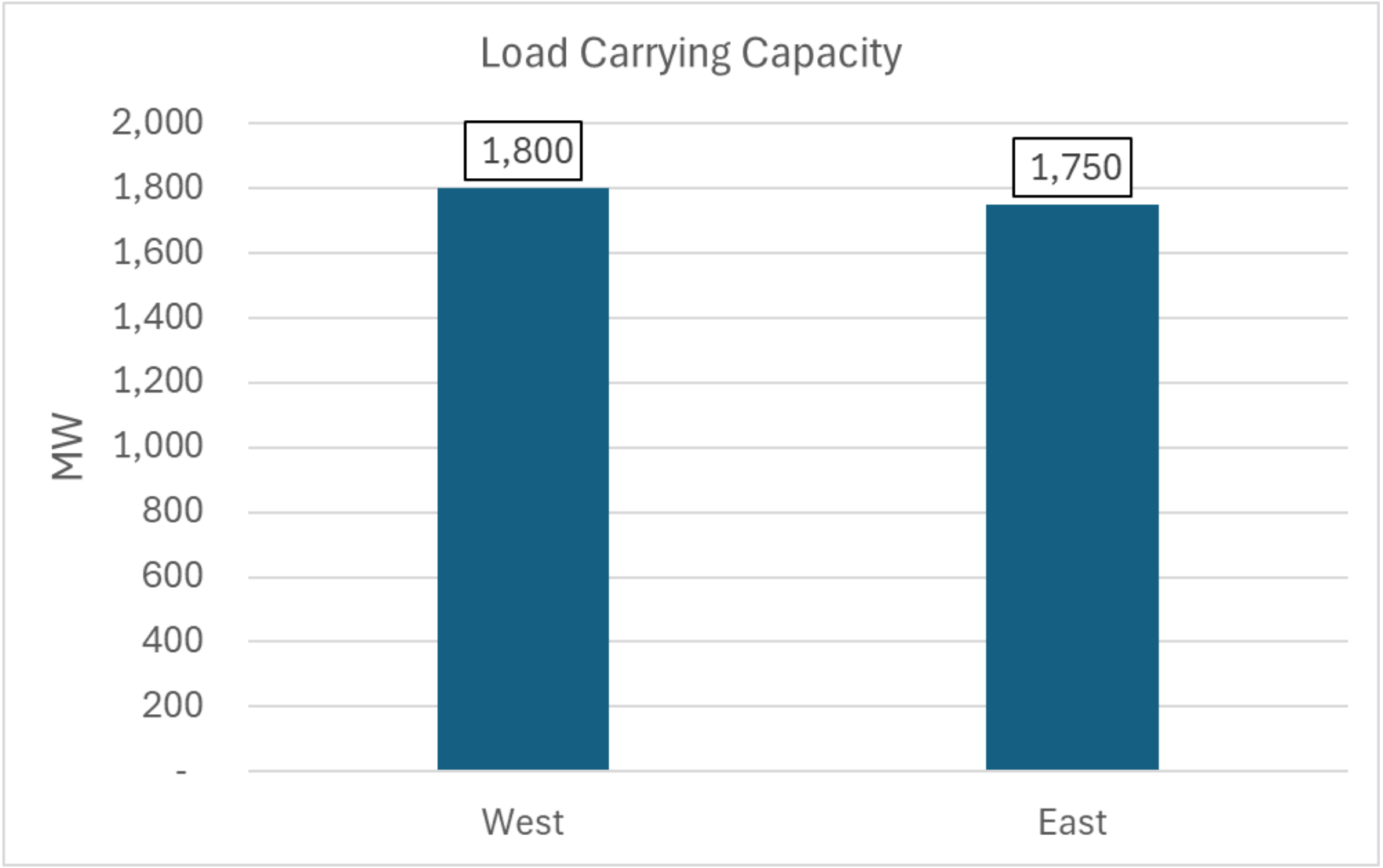
Table shows the percentage of total curtailed load occurring in each hour of each month across all model runs

** values rounded for ease of interpretation*

Access to interregional capacity has large LOLE impacts

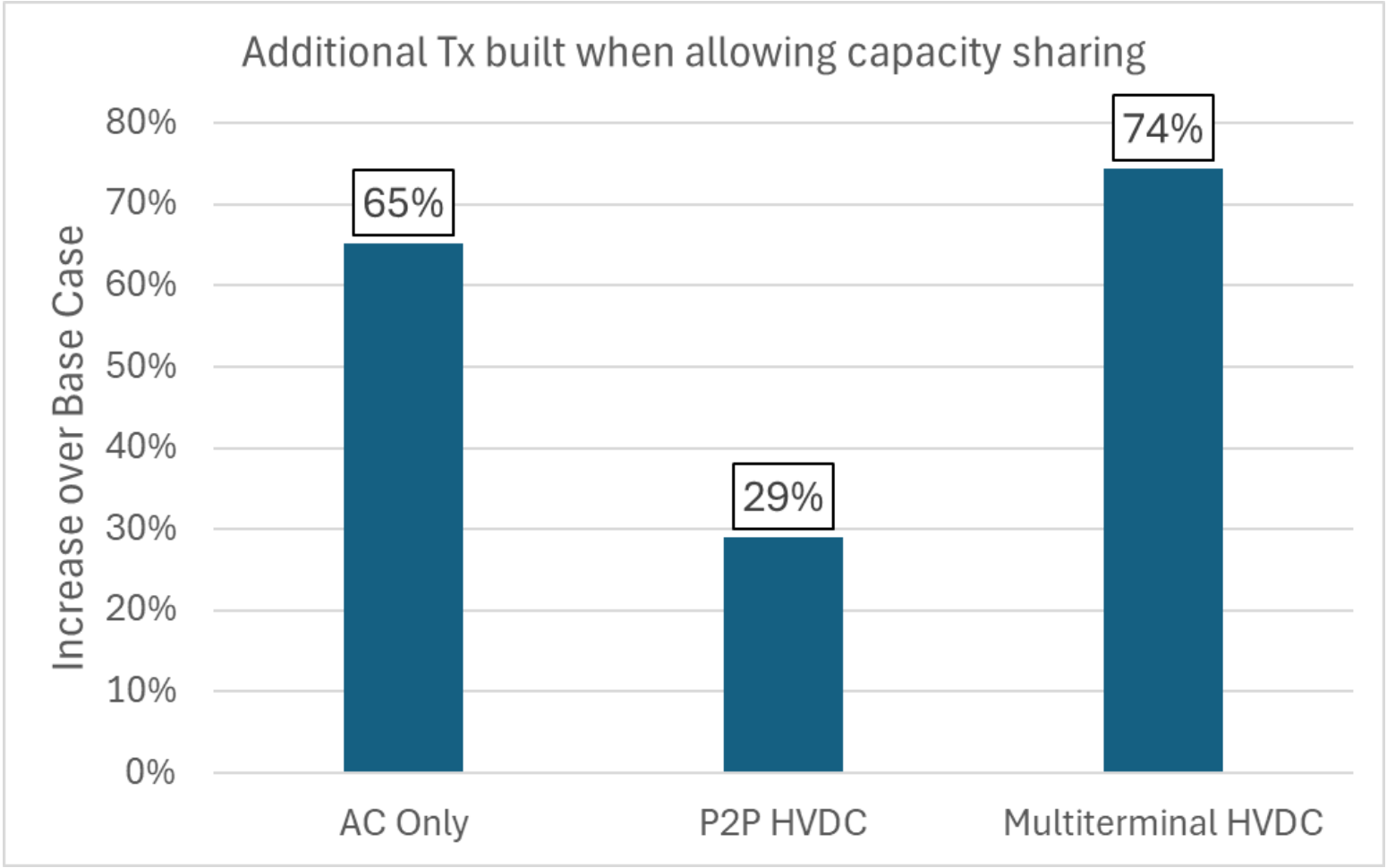


Translating to >3GW of carrying capacity



RA is a massive driver of transmission value

DOE's National Transmission Planning study found that much more transmission was economic to build in all scenarios when interregional capacity was given value



Source: DOE, National Transmission Planning Study Chapter 2, Figure 40. October 2024

Today's capacity regimes only count historical performance of interregional ties, if at all

For example: MISO draws from distributions of historical non-firm imports for its LOLE studies.

This puts value on external connections, but does not credit the contributions of individual new ties.

	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)

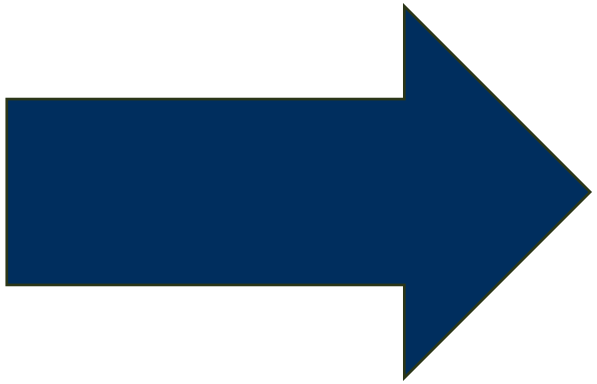
Source: MISO, Planning Year 2024-2025 Loss of Load Expectation Report, Table 3-5.

Forward-looking accreditation for new transmission will incentivize its development

Status Quo

RA attributes of existing external transmission sometimes credited to the system as a whole

Does not incentivize new projects



Proactive Accreditation

Probabilistic ELCC approach similar to other resources to provide accreditation for new interregional connections.

Allows LSEs to count new transmission towards their PRM, **incentivizes new projects**

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gridunited.com

linkedin.com/company/grid-united

info@gridunited.com