Billions in Benefits: A Path for Expanding Transmission Between MISO and PJM

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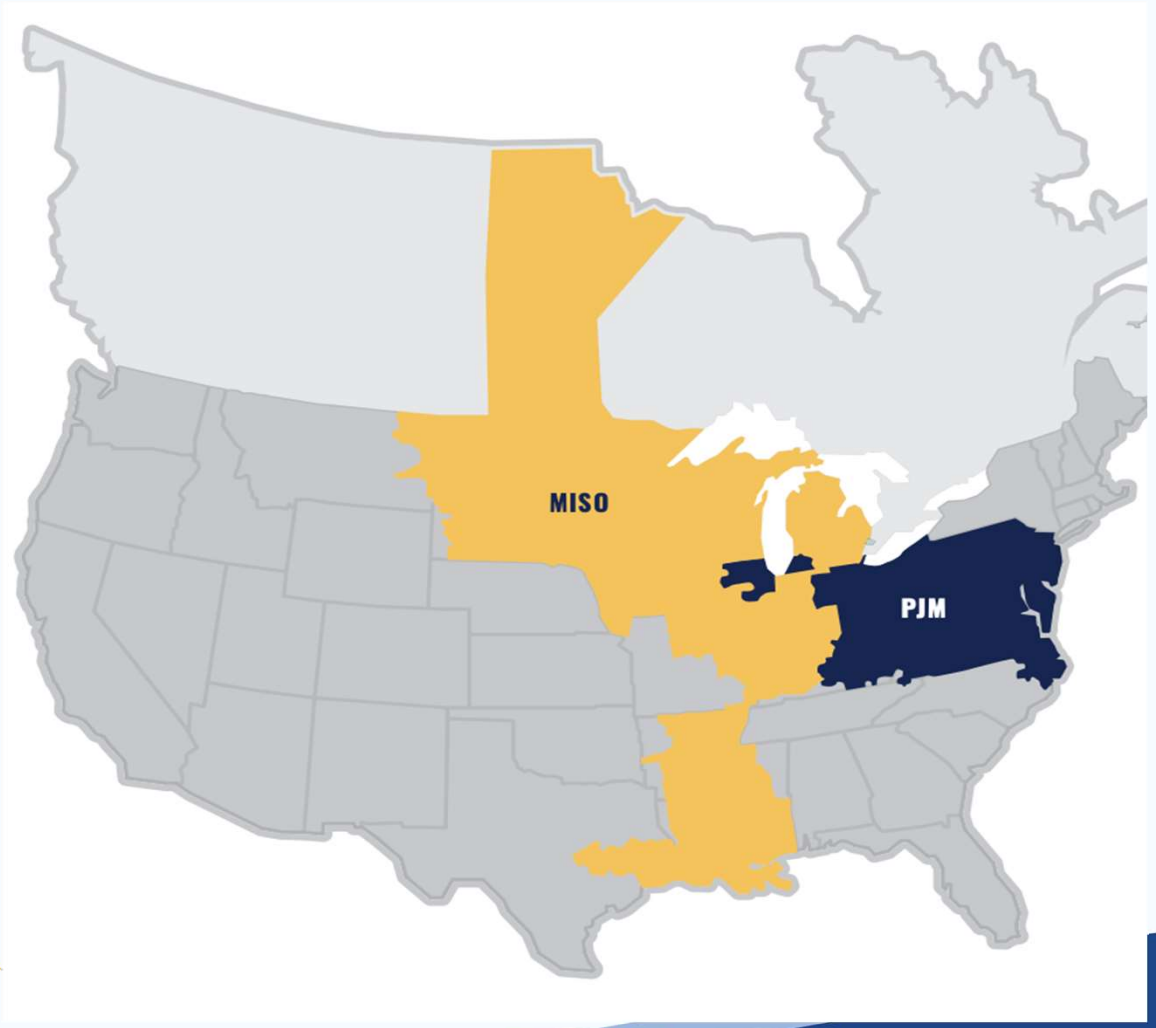
MISO and PJM



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Energy Market Congestion Between MISO and PJM

-Large energy market congestion between MISO and PJM.

-Congestion and its distribution to MISO vs PJM varies year to year, making transmission like an insurance policy.

-However, there are many additional benefits of interregional transmission that are not typically accounted for in transmission planning and cost allocation.

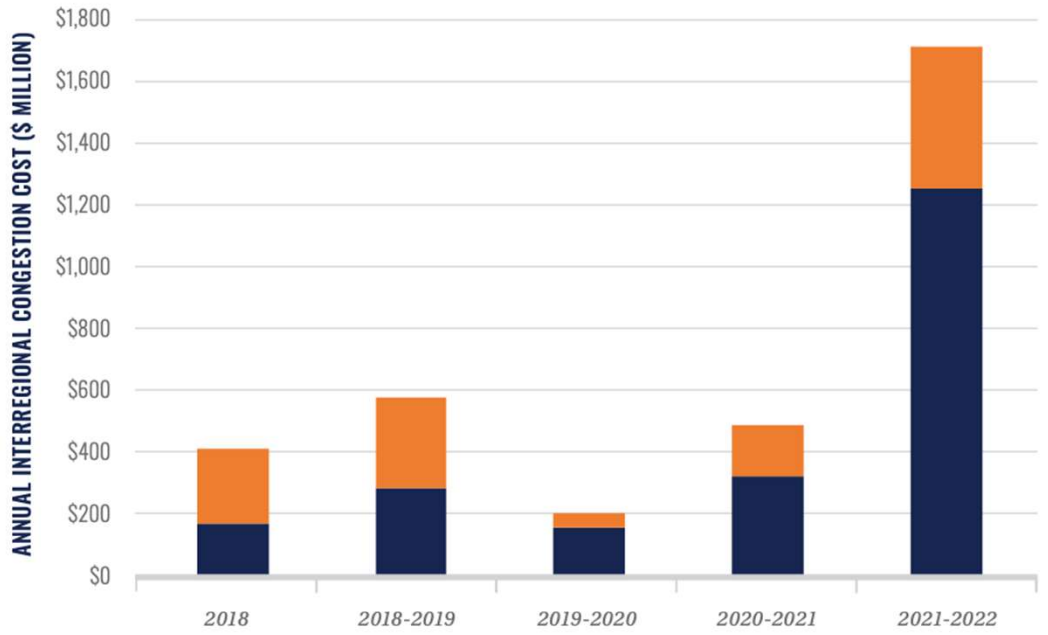

FIGURE 2.
Congestion Between MISO and PJM, 2018-2022

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Capacity benefit: Interregional transmission accesses geographic diversity

Interregional transmission reduces the generating capacity needed to maintain the same level of reliability by accessing timing diversity for:

- Electricity demand
- Renewable output
- Conventional generator forced outages

In Grid Strategies' May 2023 report, renewables drove a small share of the total diversity benefit over 9 historical years across the Eastern Interconnect plus ERCOT, but that increases significantly at higher renewable penetrations.

Reduced capacity need from geographic diversity as a share of peak load, under different assumptions

	With Renewables	Without Renewables
With ERCOT	20.99%	18.35%
Without ERCOT	18.25%	14.42%

https://gridstrategiesllc.com/wp-content/uploads/2023/05/GS_Interregional-Transfer-Requirement-Analysis-final54.pdf

Capacity benefit: Regions have peak need at different times

May 2023 report: Each region's share of its maximum need observed across 9 years of data, where need = demand – renewables + gen outages

	ERCOT	SPP	MISO S	TVA	MISO N	PJM	NYISO	ISO-NE	Carolinas	SOCO	Florida
1/ 7/2014 7 AM ET	58%	60%	74%	86%	75%	100%	68%	64%	88%	87%	60%
1/17/2018 10 AM ET	60%	67%	100%	81%	61%	70%	61%	63%	56%	85%	61%
1/18/2018 6 AM ET	58%	50%	65%	76%	55%	66%	51%	55%	63%	100%	79%
2/15/2021 10 AM ET	100%	99%	83%	61%	69%	63%	56%	59%	58%	68%	55%
12/23/2022 6 PM ET	68%	87%	88%	99%	86%	85%	60%	56%	88%	91%	65%
12/24/2022 6 AM ET	63%	87%	87%	91%	77%	85%	49%	50%	100%	95%	66%

Capacity Benefit: Diversity benefit between MISO and PJM increases with more renewables

-Value of the capacity benefit between MISO and PJM grows from $6.3 billion in 2022 to $15.1 billion in 2035 high renewable case

-Increased dependence on gas and heating electrification may further increase value of interregional transmission by making winter peak need more weather-dependent

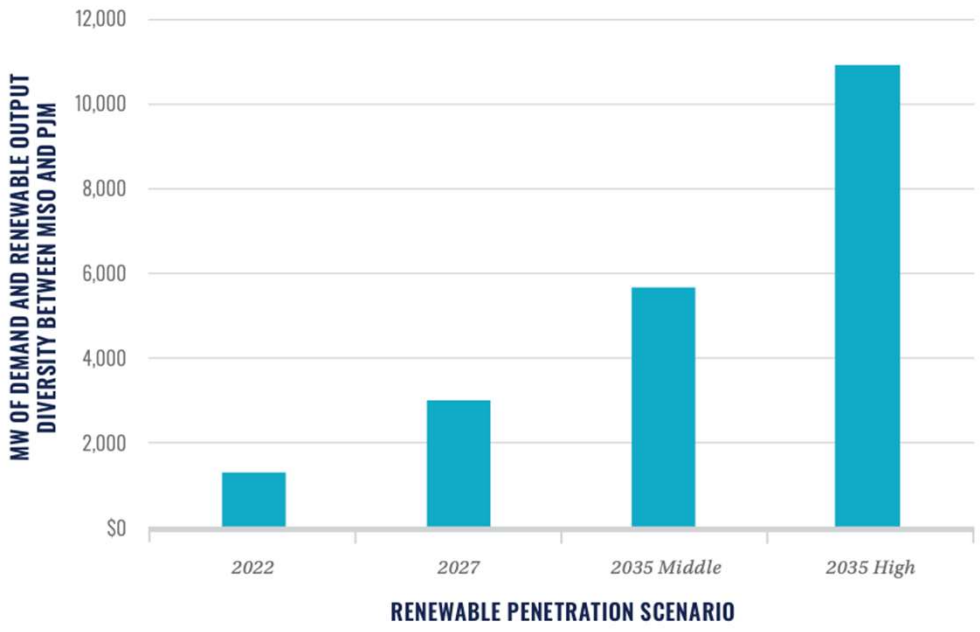
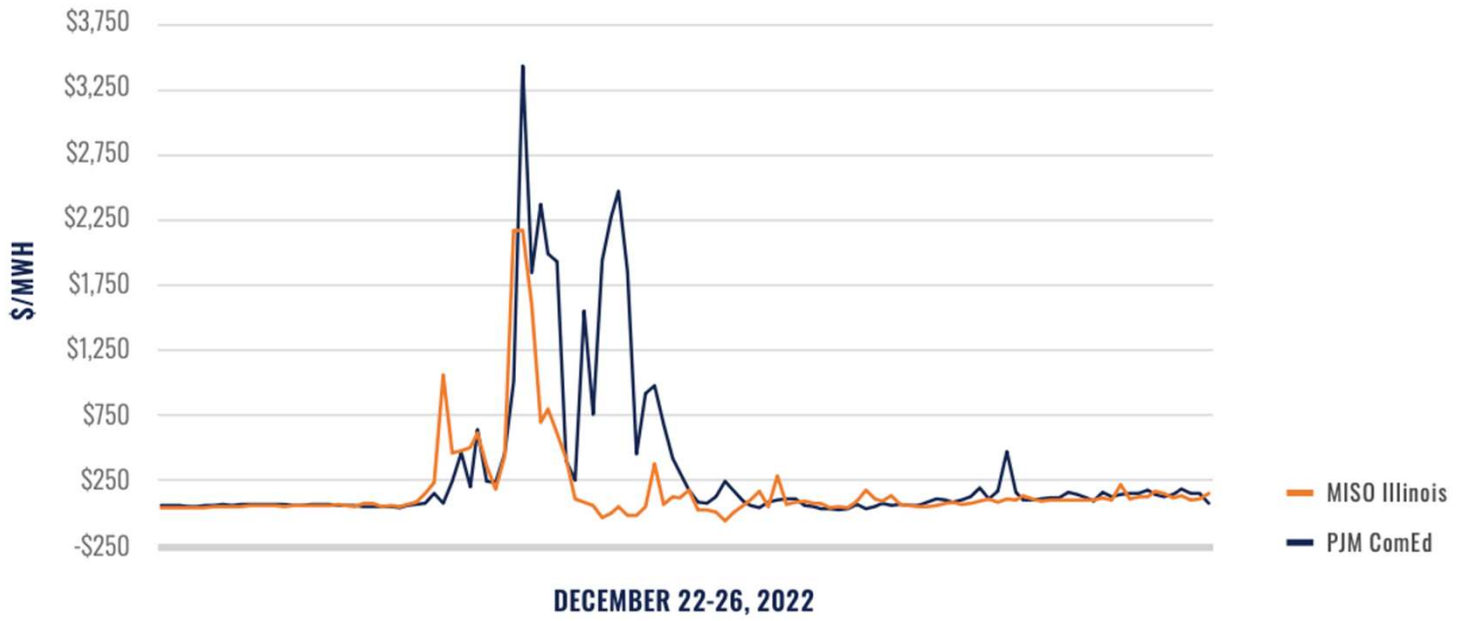


FIGURE 4. *MW of Demand and Renewable Diversity on Peak Between PJM and MISO's Midwest Subregion Under Various RTO Scenarios for Renewable Deployment*

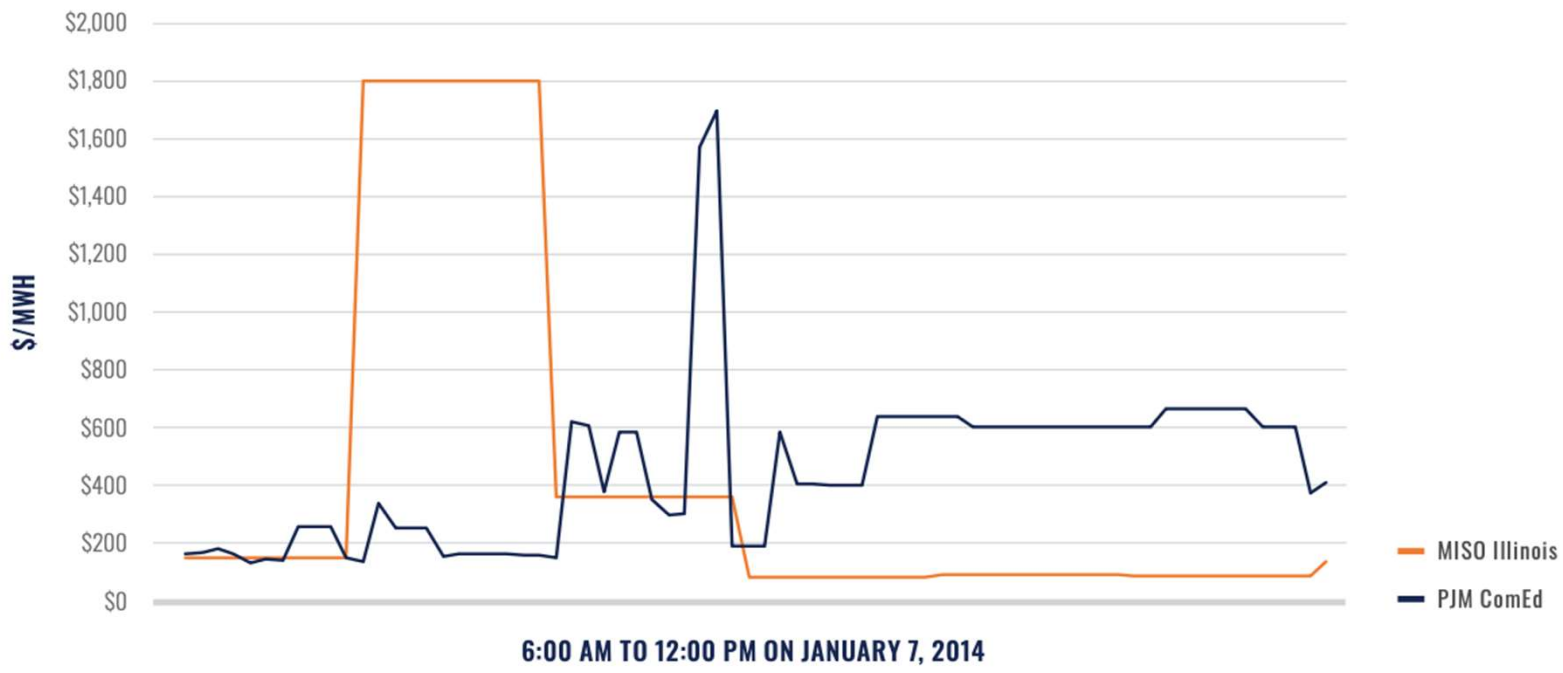
Resilience to Extreme Events: Winter Storm Elliott

FIGURE 6. *$/MWh Power Prices at MISO and PJM trading hubs in Illinois during Winter Storm Elliott*



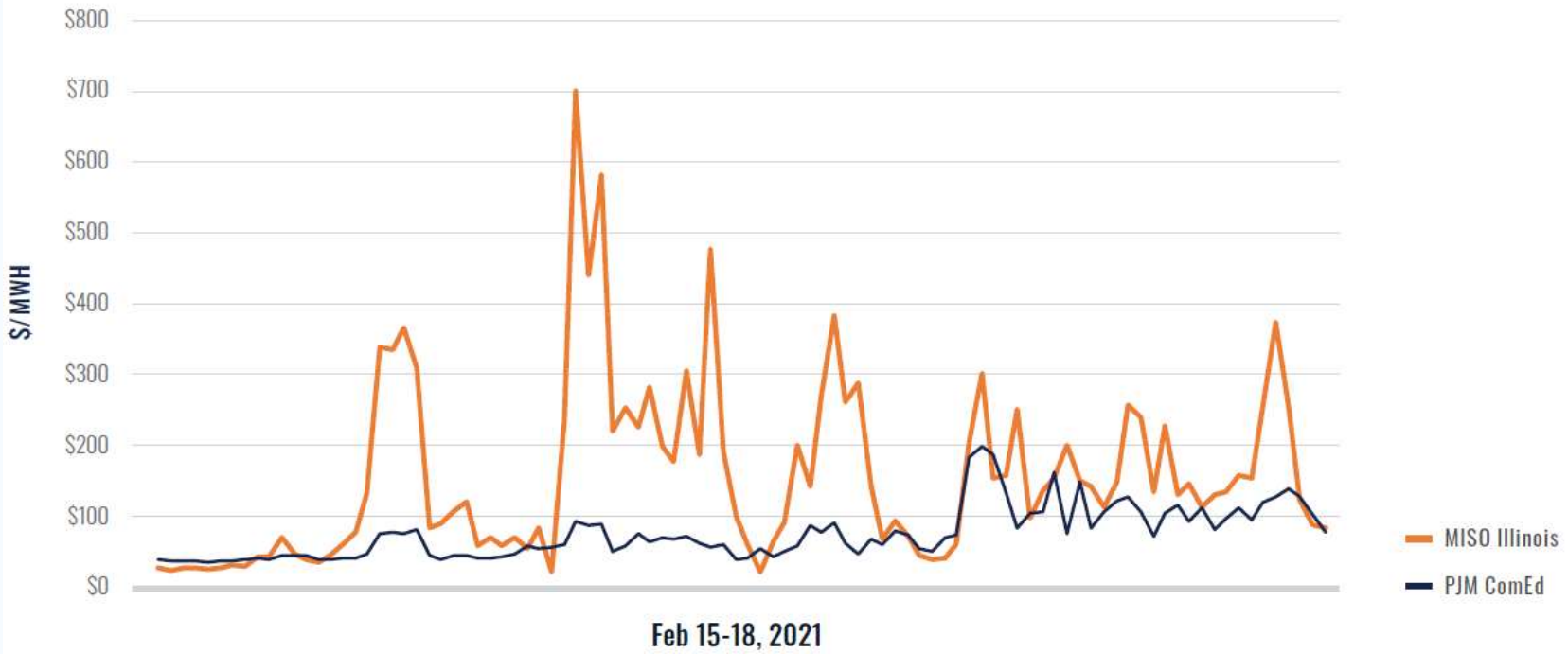
Resilience to Extreme Events: 2014 Polar Vortex

FIGURE 8. *$/MWh Power Prices at MISO and PJM trading hubs in Illinois during Polar Vortex, zoomed in on morning of January 7, 2014*

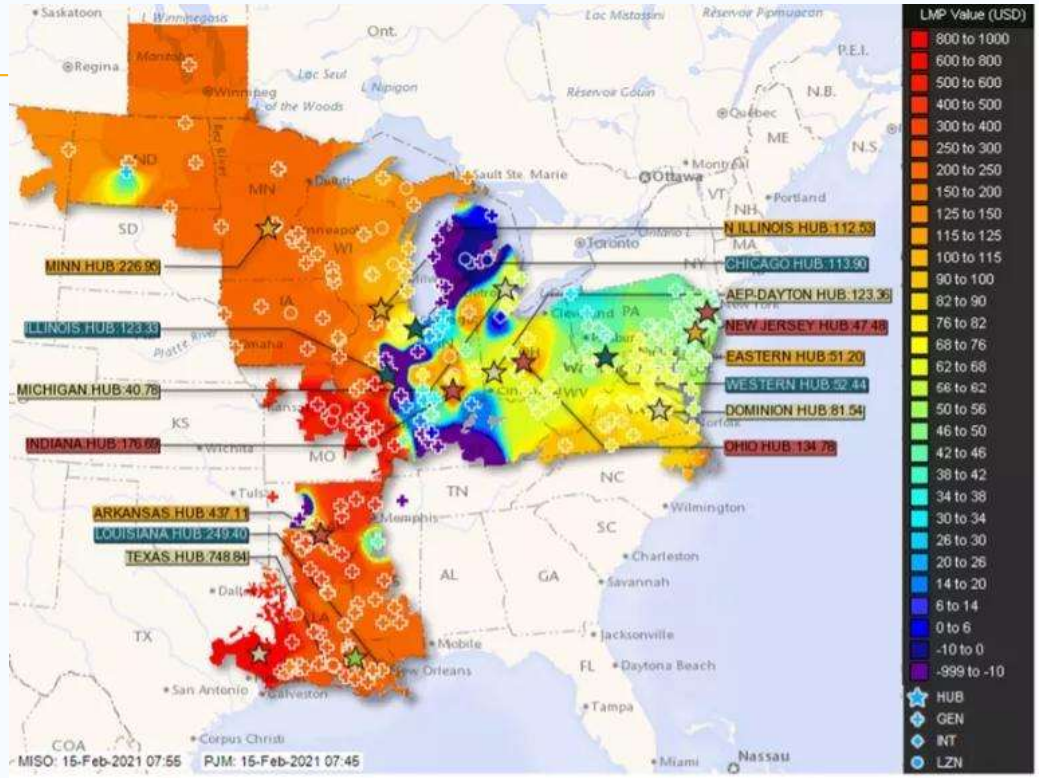


Resilience to Extreme Events: Winter Storm Uri

FIGURE 10. *$/MWh Power Prices at MISO and PJM trading hubs in Illinois during Winter Storm Uri*



Resilience to Extreme Events: Winter Storm Uri



US failing to build interregional transmission: DOE Transmission Needs Study

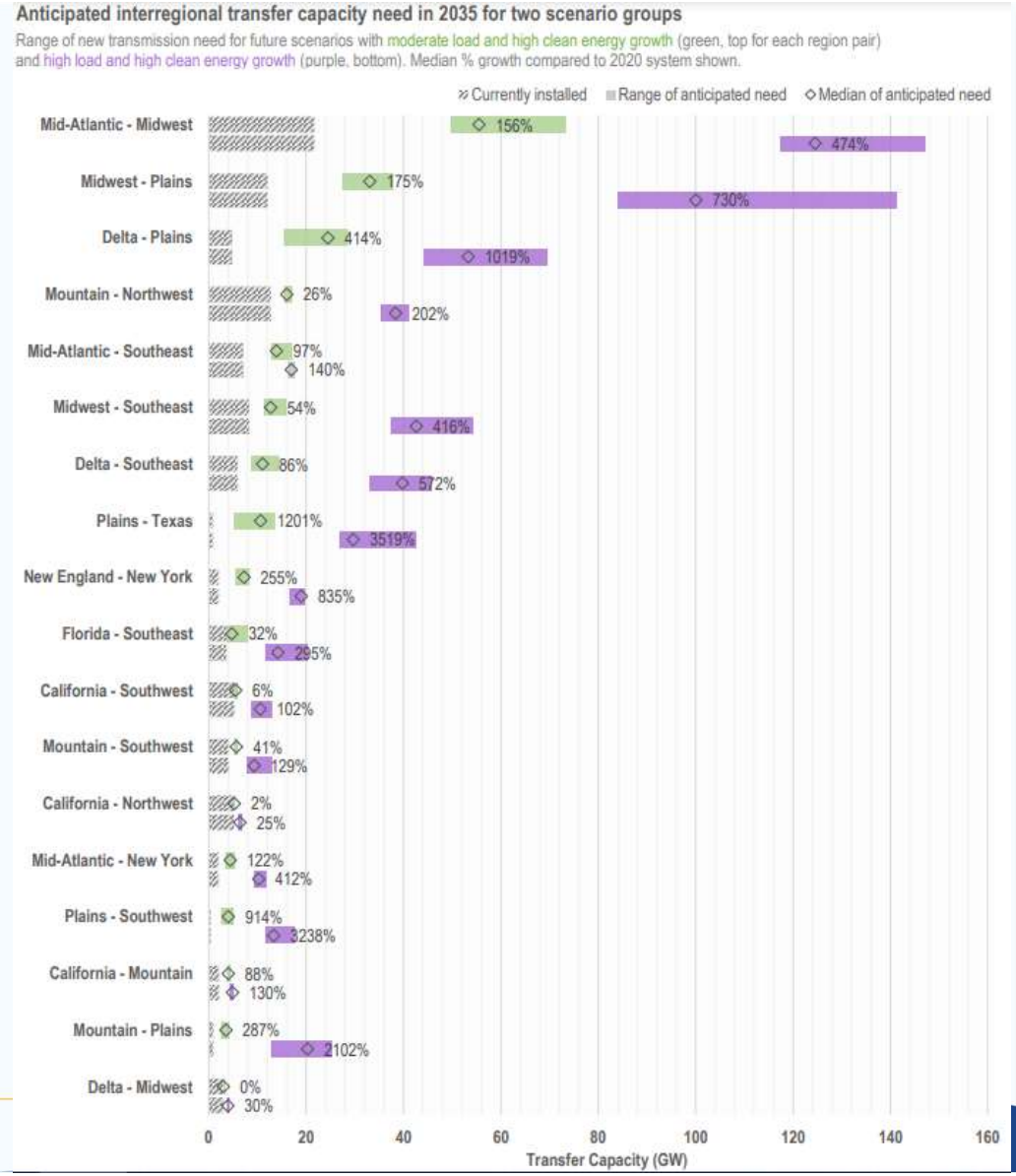
Historical build 2011-2020, annual average

Regional transmission : 3,300 miles

Interregional transmission: 70 miles

DOE: “Significant Future Transmission Investments are Necessary to Address Anticipated Needs Under a Wide Variety of Future Scenarios”

DOE: MISO-PJM largest need for interregional transmission in US



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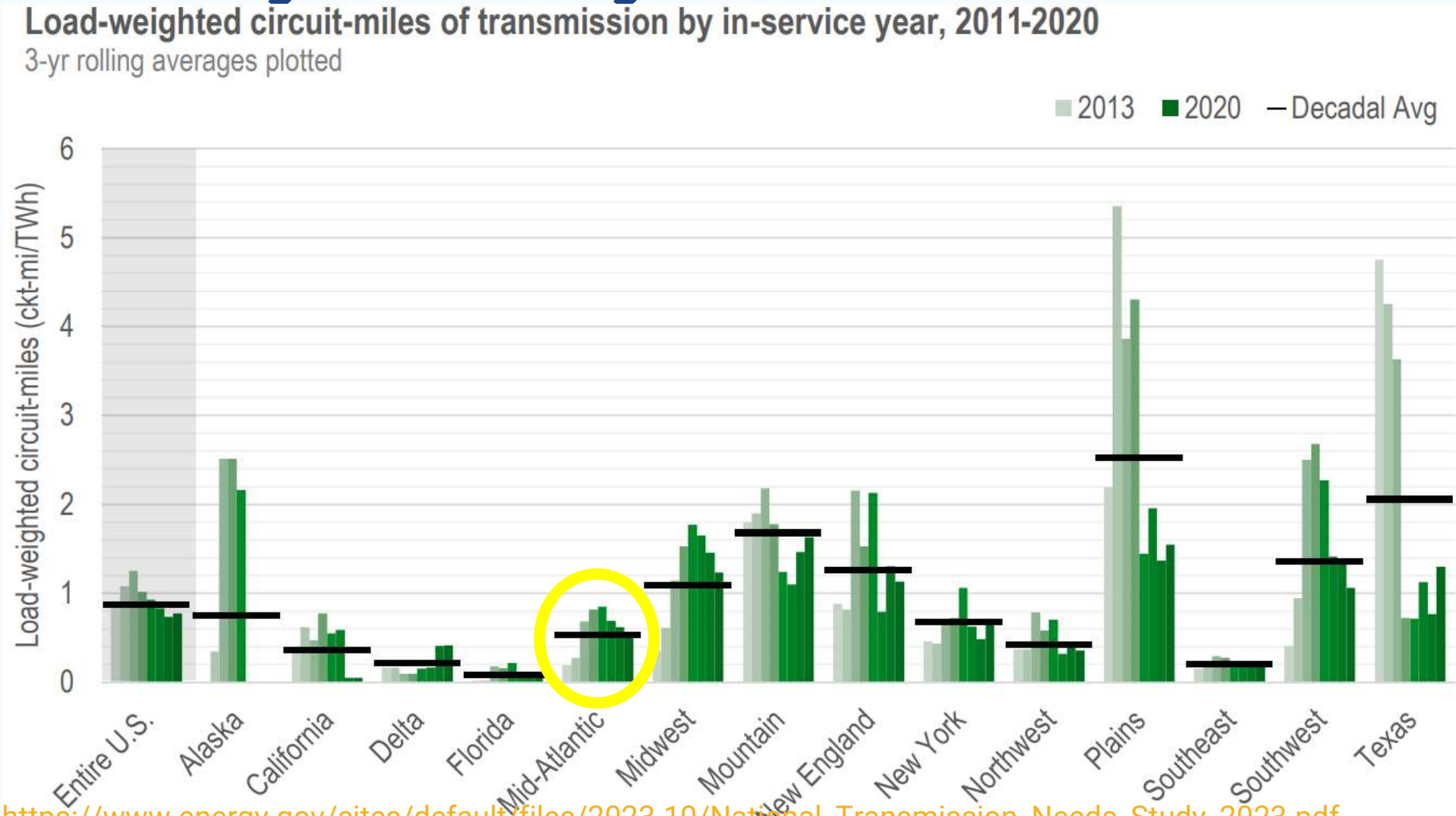
PJM falling behind on regional transmission: DOE data



https://www.energy.gov/sites/default/files/2023-10/National_Transmission_Needs_Study_2023.pdf

Policy Solutions

Ideal solution: Proactive multi-value planning of regional and interregional transmission

Modeled on regional success in MISO, Texas, SPP; FERC proposed rule on regional transmission

Applied within region and interregionally

Second-best solutions: Improved coordination between MISO and PJM

-Coordinated top-down planning by synching MISO and PJM regional planning, looking for more effective interregional solutions to regional needs

-Coordinated bottom-up planning like MISO-SPP Joint Targeted Interconnection Queue

Necessary Reforms Under Any Solution

-Allow merchant transmission developers to propose interregional solutions and be fully compensated for the value their projects provide

-Operational seams solutions for market transactions between RTOs

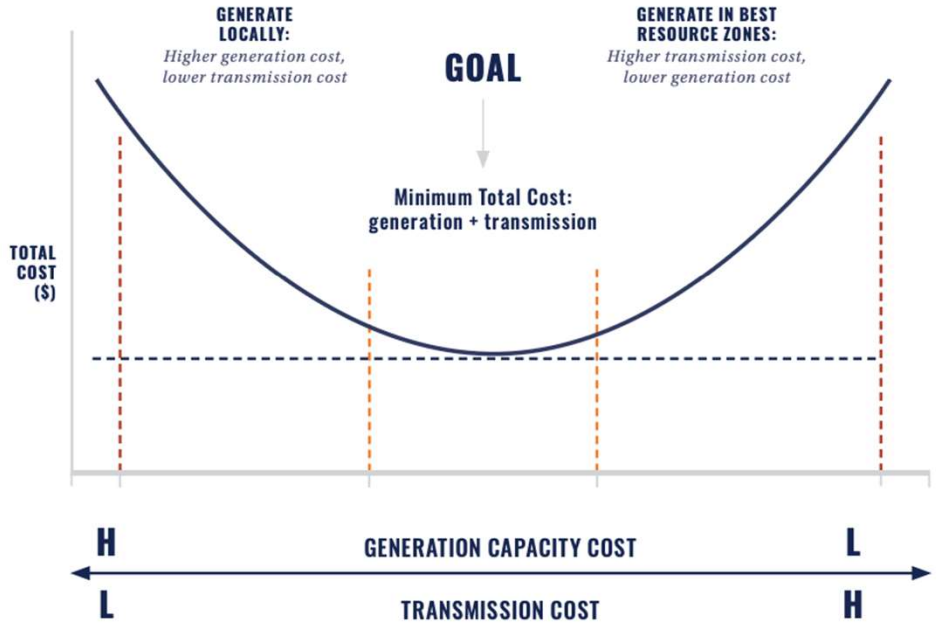
Proactive multi-value transmission planning to minimize costs and maximize benefits

-Proactive transmission planning to access generation, instead of reactive to interconnection queue applications

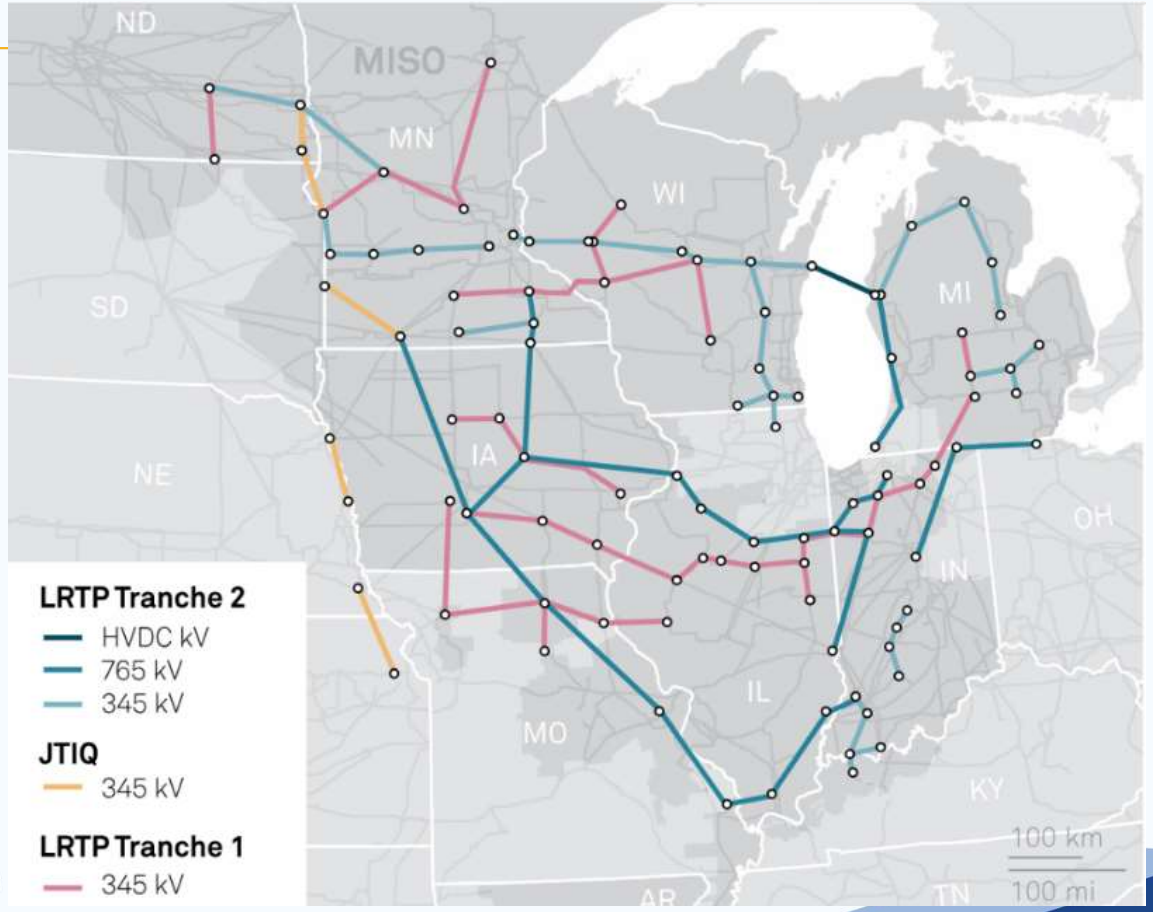
- Achieves economies of scale
- Accesses lowest-cost generation

-Multi-value transmission planning and cost allocation optimizes across all benefits simultaneously, instead of siloed categories of projects and benefits

	Voltage (kV)	69	115	138	161	230	345	500	765
Single Circuit	$M/mile	1.6	1.7	1.8	1.9	2	3.2	4	5
	MW	140	329	394	460	657	1792	2598	6625
	$/MW-mile	**$11,429**	**$5,167**	**$4,569**	**$4,130**	**$3,044**	**$1,786**	**$1,540**	**$755**
Double Circuit	$M/mile	2.3	2.5	2.7	2.7	3.2	5.3		
	MW	280	658	788	920	1314	3584		
	$/MW-mile	**$8,214**	**$3,799**	**$3,426**	**$2,935**	**$2,435**	**$1,479**		



MISO's Long Range Transmission Plans



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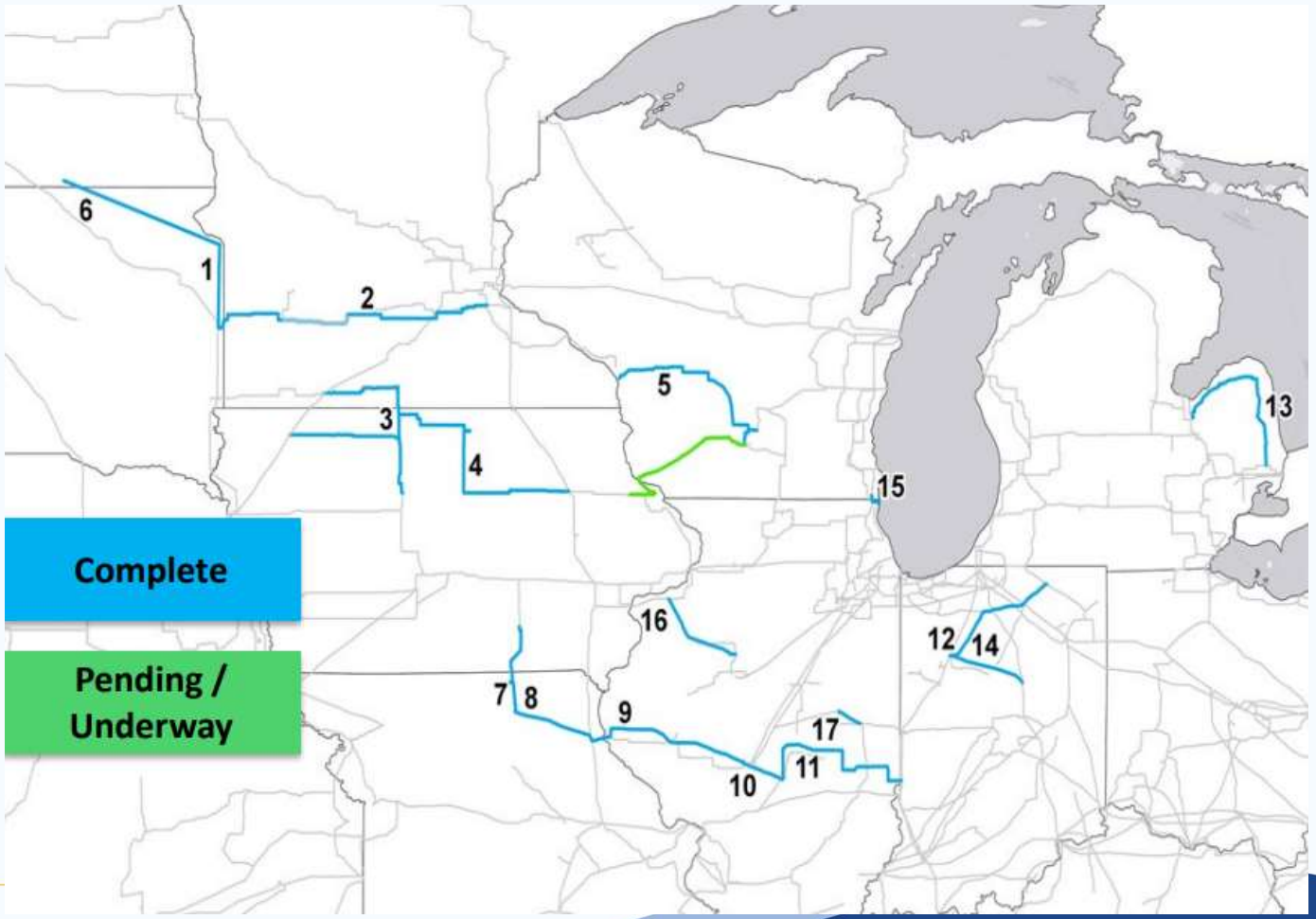
MISO Multi Value Projects



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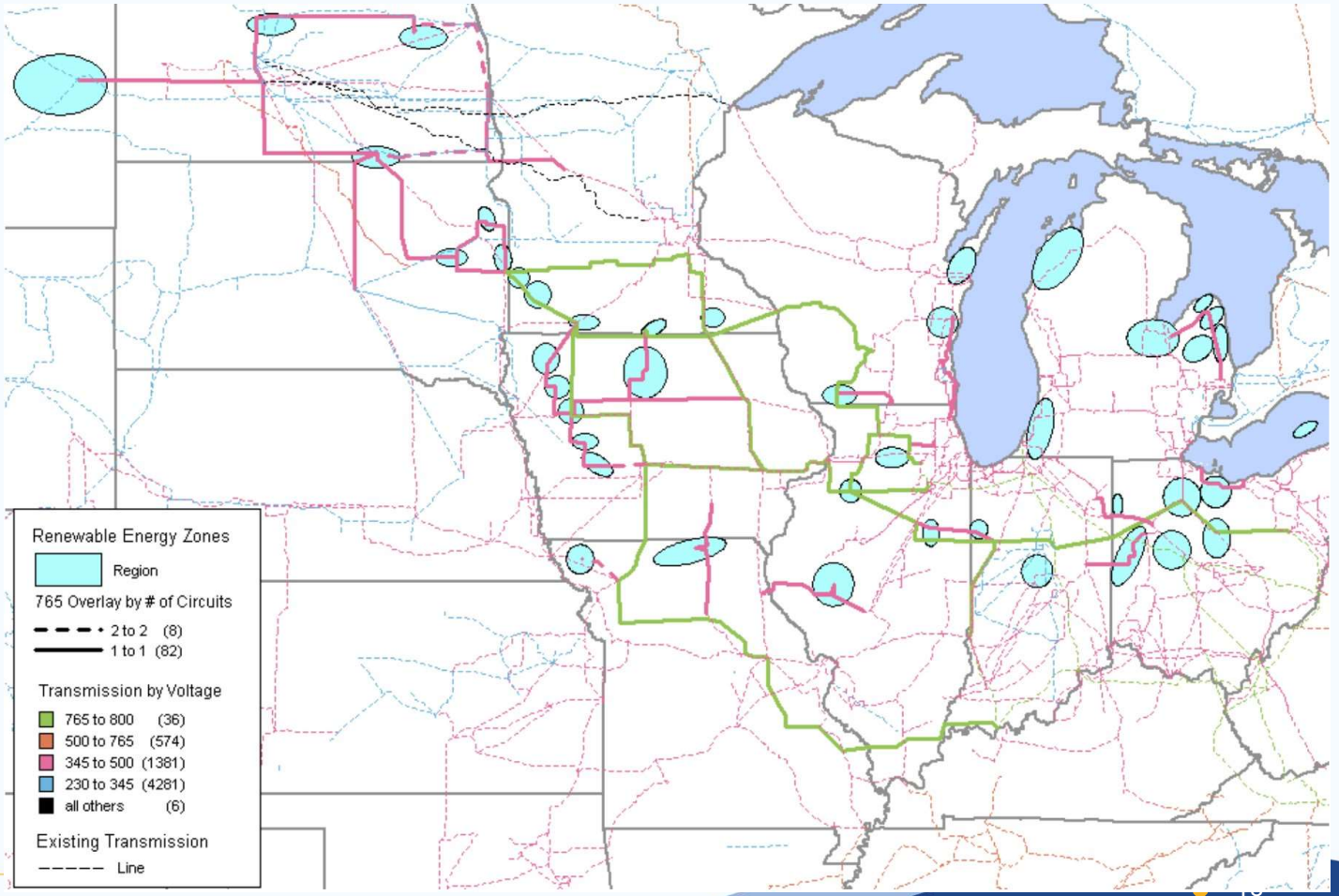
MISO Regional Generation Outlet Study

MISO RGOS included PJM parts of Ohio and Northern Illinois, and as a result built high-voltage transmission across the seam



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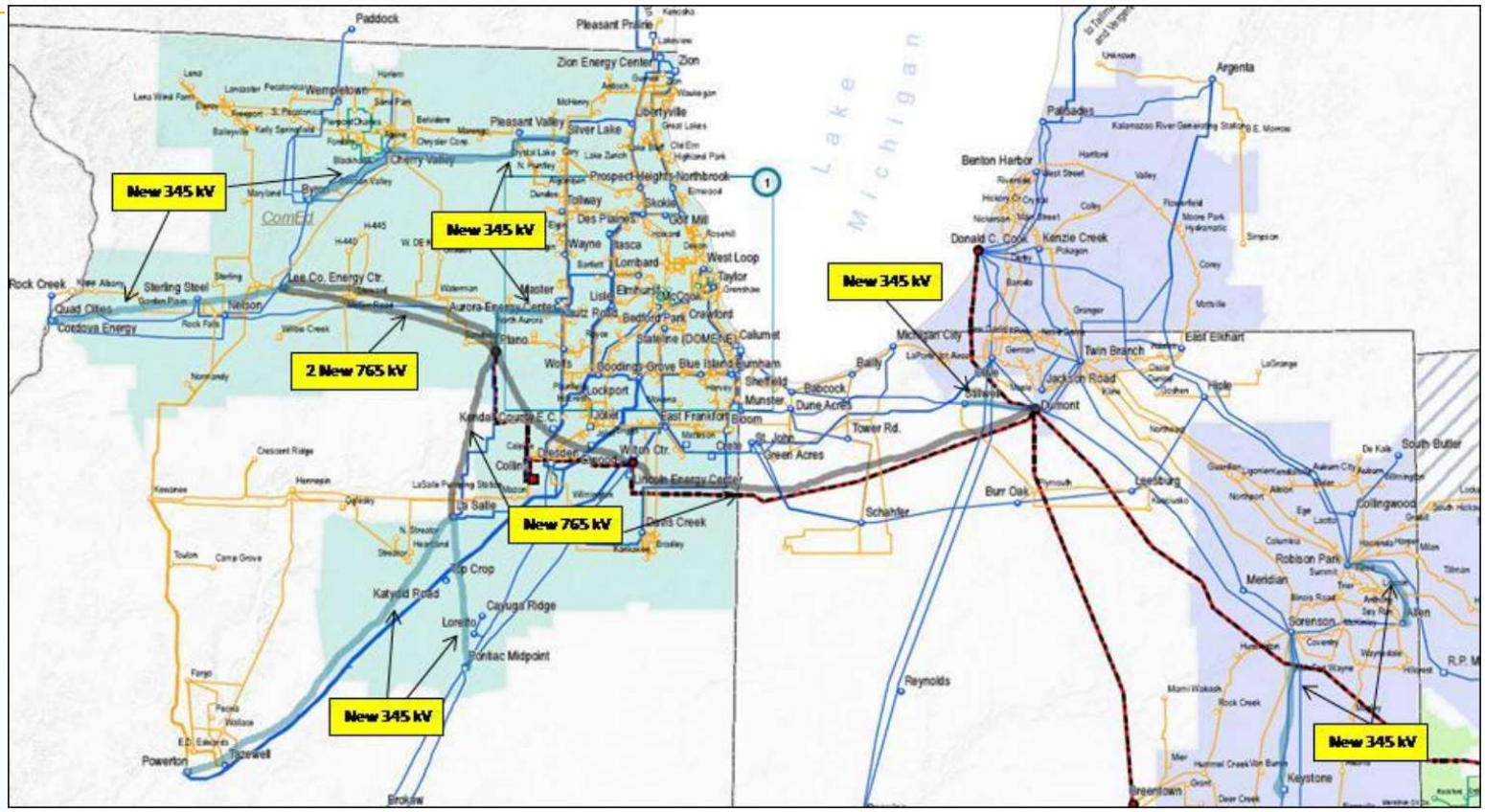
PJM Renewable Integration Study

2014 PJM Renewable Integration Study also built high-voltage transmission across northern Indiana and Illinois, and to MISO seam at Iowa border



Second-best solutions: Improved coordination between MISO and PJM

Coordinated top-down planning

- Need consistent planning assumptions and methods between MISO and PJM
- Look for more effective interregional solutions to regional needs

Coordinated bottom-up planning

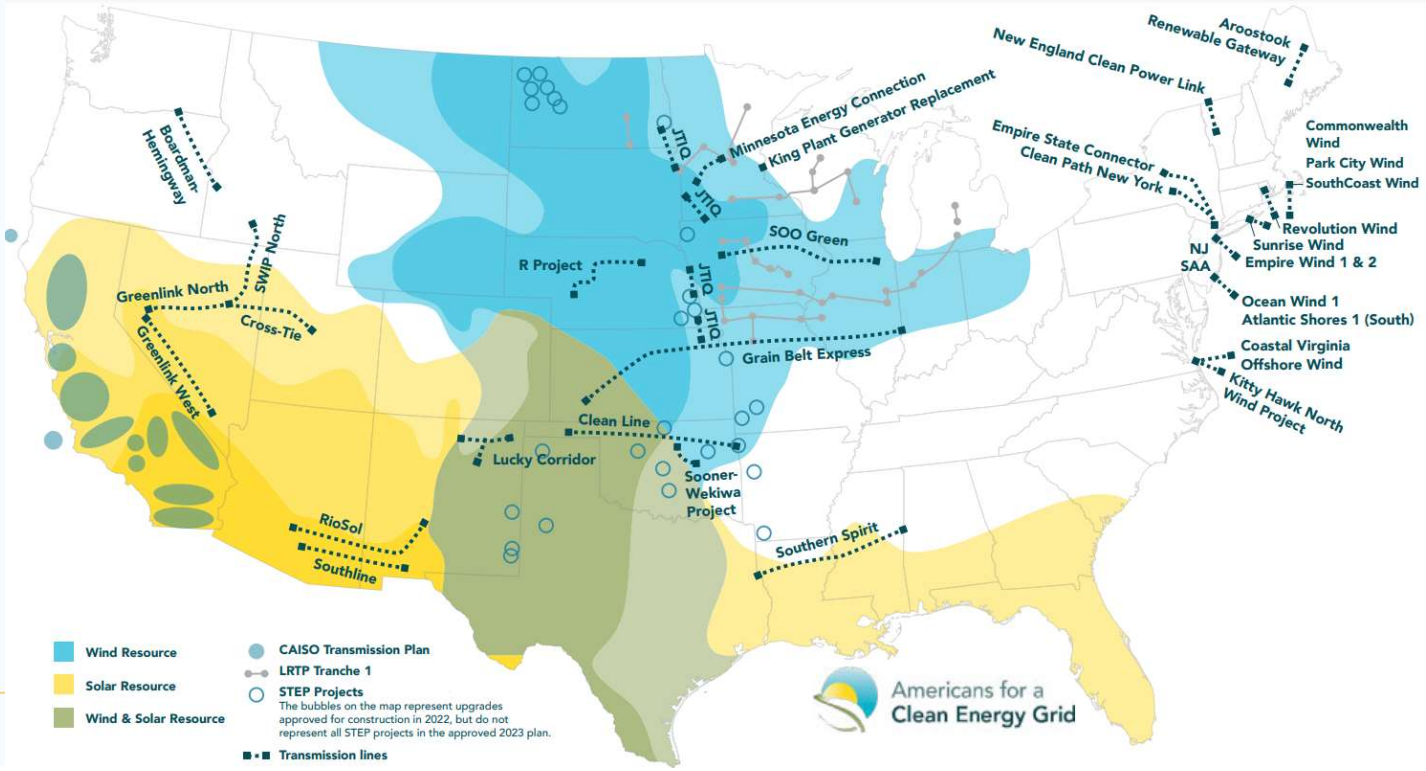
- Modeled on MISO-SPP Joint Targeted Interconnection Queue
- Build upgrades along seam regularly identified in queue affected system studies

Necessary reform: Allow merchant transmission developers to propose solutions, and be fully compensated for their value

-Merchant transmission developers have proposed solutions, but these typically go through interconnection queue and are not included in RTO planning process.

-Merchant transmission can receive energy arbitrage value, but not other value streams including capacity benefit from geographic diversity.

-SOO Green and Grain Belt Express FERC complaints about MISO and PJM



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Necessary reform: Intertie optimization for efficient market transactions at seams

-PJM Market Monitor: In 2022, 49% of the time power flowed from high price to low price region across the MISO-PJM seam, the opposite of efficient flows.

-Ideal solutions include optimized dispatch across RTOs, or creating a market for transactions at RTO seams like Western Energy Imbalance Market.

-Incremental solutions include use of more current information in seam transaction scheduling, removing transmission charges and external congestion costs from prices.

-These reforms can be implemented in parallel with transmission policy reform and transmission development.

-For more detail, see ACORE's recent report on this topic:

https://acore.org/wp-content/uploads/2023/10/The-Need-for-Intertie-Optimization.pdf

Thank You!

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