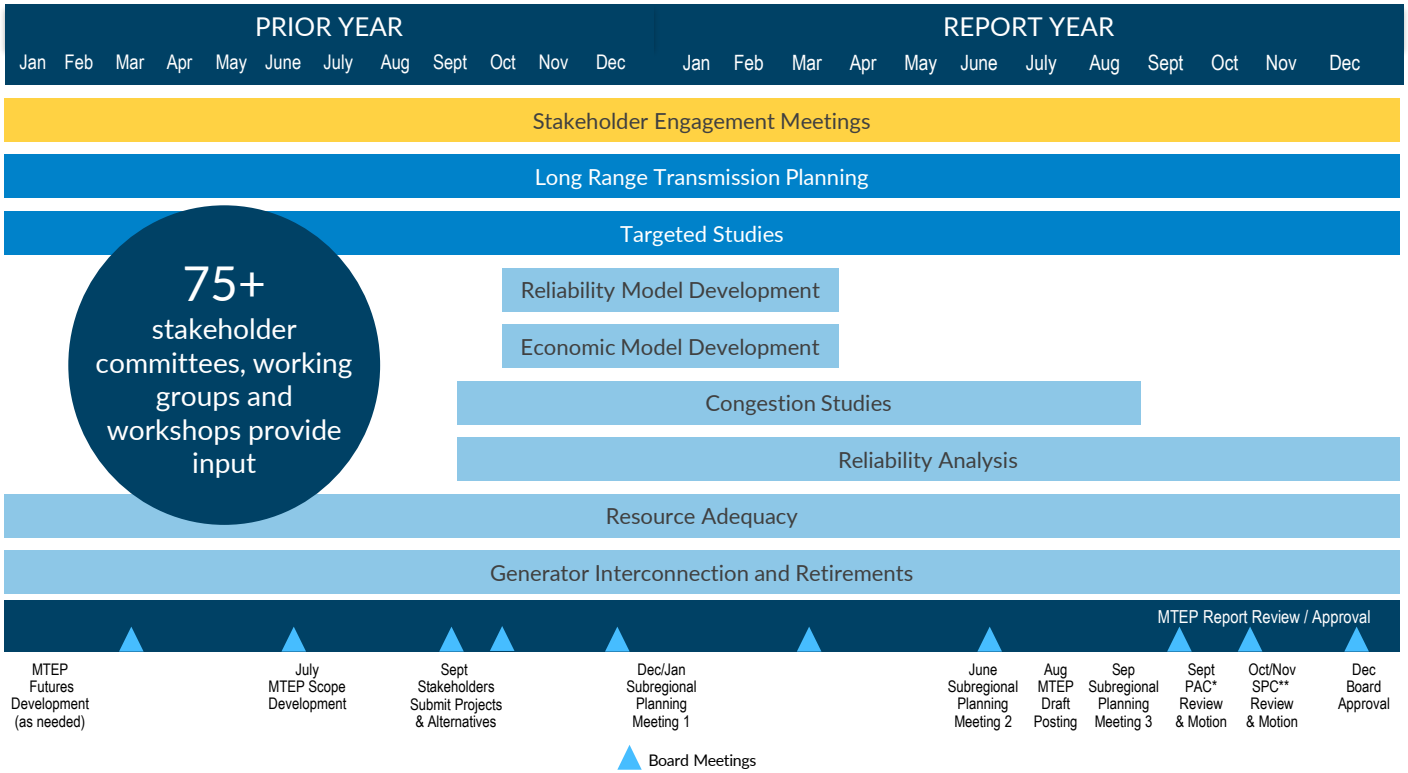
RTO Public Meeting

Missouri PSC

November 6, 2024

The MISO Transmission Expansion Plan (MTEP) is developed annually through a comprehensive planning process

Typical MTEP Cycle



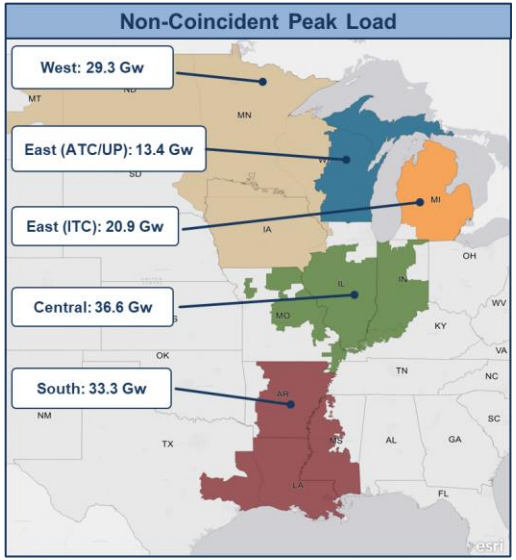
*PAC - Planning Advisory Committee; **SPC - System Planning Committee

Generator Interconnection

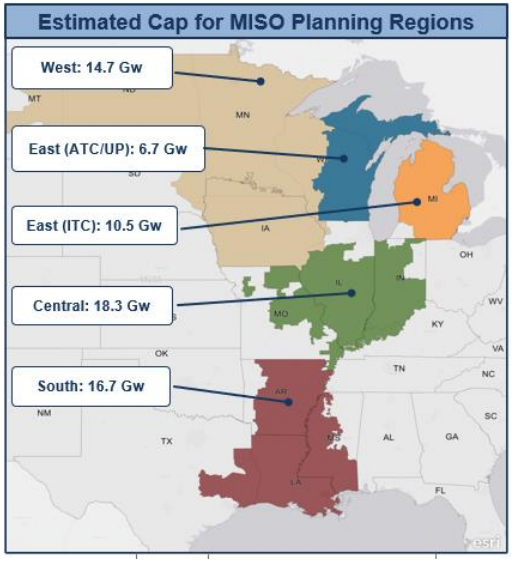
MISO continues to make improvements to its generator interconnection queue process to enable the energy transition

- Queue cycles are taking 3 years or longer to complete due to large volume of projects in each cycle
  - Reforms developed in 2023, and approved by FERC in 2024 (e.g. increased financial obligations and site control requirements) did reduce the size of the latest cycle but not enough
- MISO plans to file with FERC this month the ability to cap future queue cycles to 50% of peak load.
  - Cap will reduce the congestion in studies, resulting in less overloads, less network upgrades, cheaper interconnection costs, and therefore faster processing and less dropouts
- Cap filing will not include a RERRA exemption.
  - MISO introducing new Expedited Resource Adequacy Study (ERAs) at 11/13 PAC and 11/18 ERAs Workshop that will allow MISO to study units needed for resource adequacy separate from existing queue cycles
- MISO expects an answer from FERC on the MISO-SPP Joint Targeted Interconnection Queue (JTIQ) Study framework by 11/14

MISO's Cap will be 50% of each Planning Region's Non-Coincident Peak; improving the quality of initial studies and potentially reducing network upgrade costs.



2023 Non-Coincident Peak Load ~134 GWs

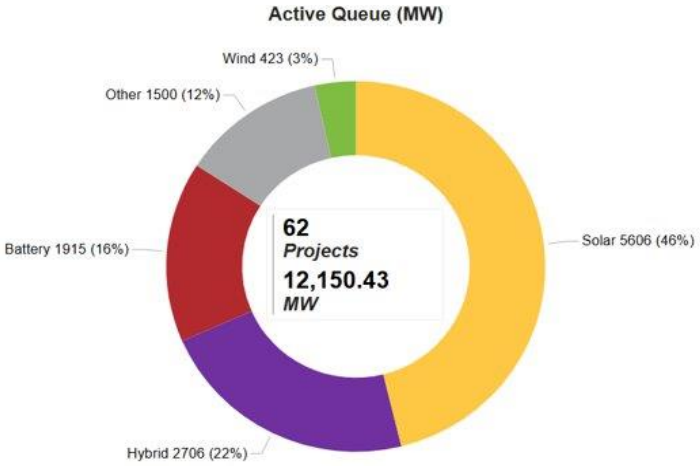


The planned 2024 cycle will be ~68 GWs

- Projects over Cap will be first in line per submission timestamp
  - Projects over Study Region Cap will not be used to fill Study Region Cap that aren't filled
- Approved exemptions will reduce the Cap number
  - Change from IPWG Sept 30th proposal
- 3-year review of effectiveness of the queue Cap

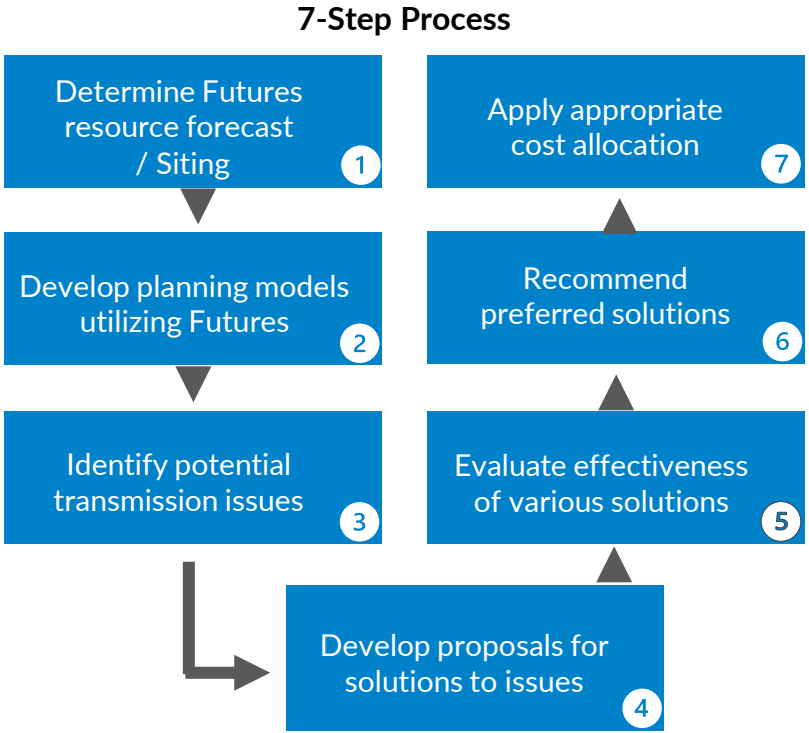
** Once the Cap is met additional applications would begin accumulating for the next cycle. The RERRA exemptions, if needed would be added to current cycle.*

There is over 311GW of projects in MISO queue, and over 57 GW of projects with a GIA and not yet online. There is 12GW of active projects and 3.6 GW with a GIA in Missouri



Long Range Transmission Planning

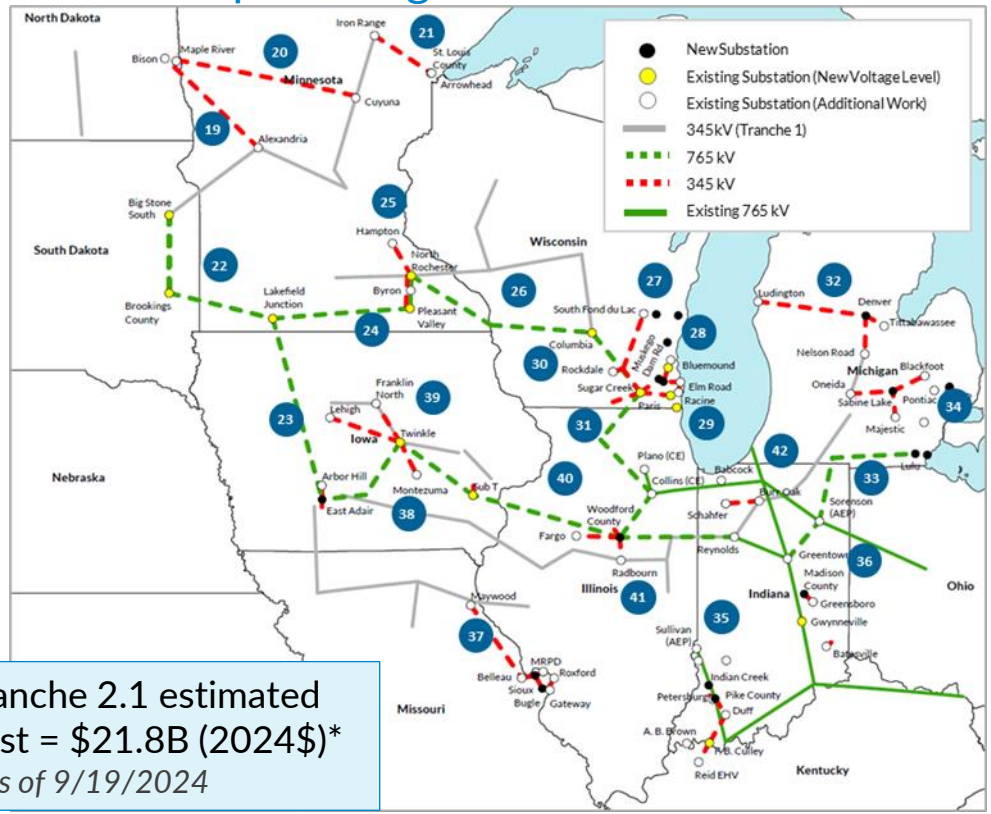
Developed through a comprehensive planning process, Tranche 2.1 is a robust, least-regrets, regional solution that reliably and efficiently enable the goals and objectives of its members and states



- Recognize member and state goals across the entire footprint
- Identify a least-regrets transmission buildout that hedges uncertainty
- Focus on regional transmission solutions, rather than localized issues

The Tranche 2.1 portfolio enables the resources required to maintain reliability and serve energy needs for the MISO system while providing benefits in excess of its cost

- Selected projects represent least-regrets solutions to ensure reliable and efficient energy delivery to MISO Midwest customers

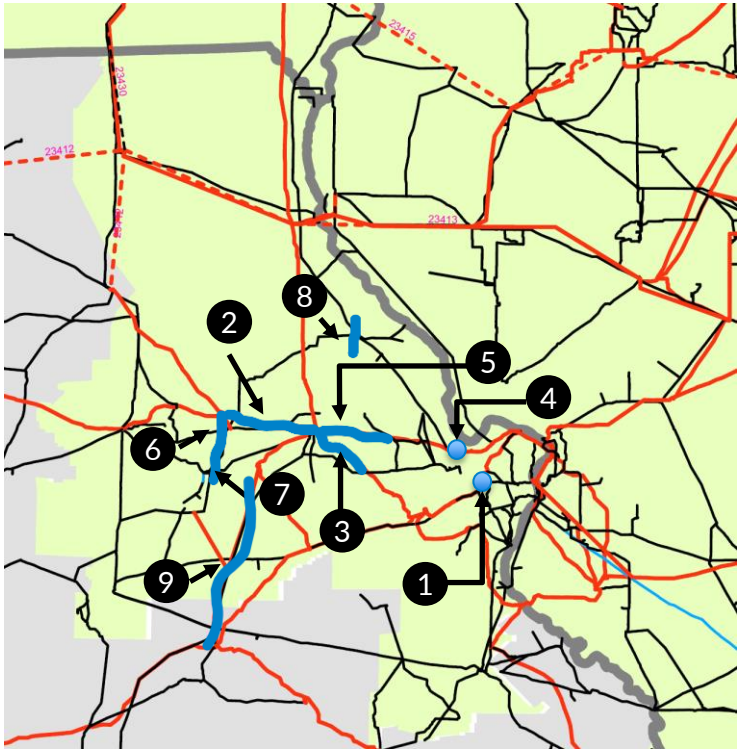


LRTP Tranche 2.1 estimated project cost = $21.8B (2024$)*

**as of 9/19/2024*

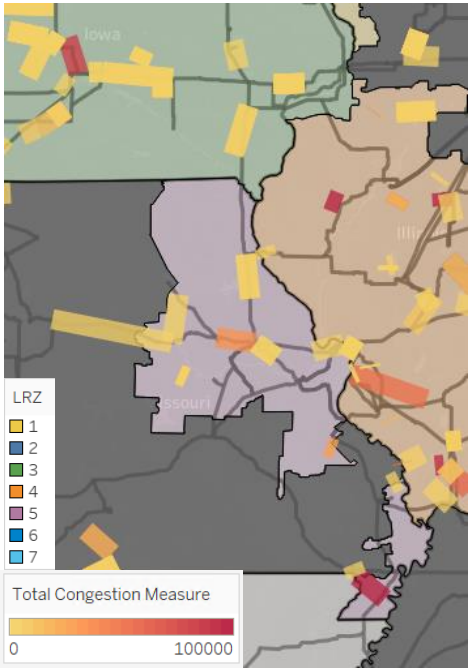
Loading on transmission elements in Missouri is relieved by the LRTP T2.1 portfolio

#	Limiting Element	Initial Worst Loading %	Final portfolio Worst Loading %
1	[AMMO] Mason 345/138 kV Transformer	114	92
2	[AECI] McCredie-[AMMO] Montgomery 345 kV	108	65
3	[AMMO] Scarlett-[AMMO] Montgomery 345 kV	103	76
4	[AMMO] Belleau 345/138 kV Transformer	108	49
5	[AMMO] Enon-[AMMO] Montgomery 345 kV	105	71
6	[AMMO] Loy Martin-[AMMO] McBain 161 kV	124	70
7	[AMMO] Apache-[AMMO] California 161 kV	124	71
8	[AECI] Cyrene-[AMMO] Pike 161 kV	128	66
9	[AMMO] Franklin-[AECI] Clover Bottom-[AMMO] Tegeler-[AMMO] Bland 138 KV	110	73

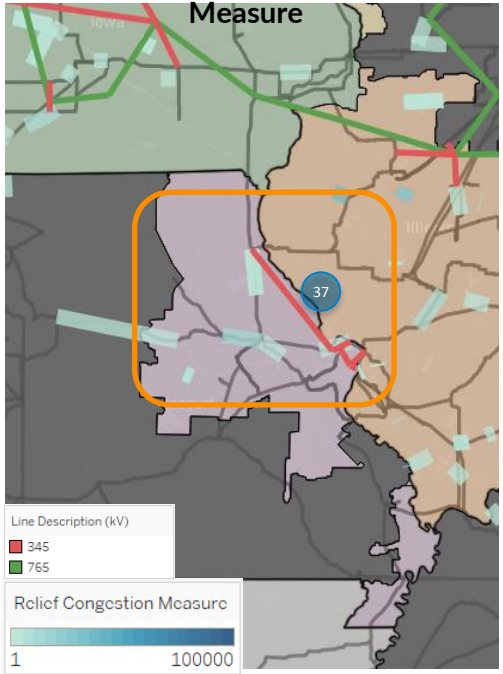


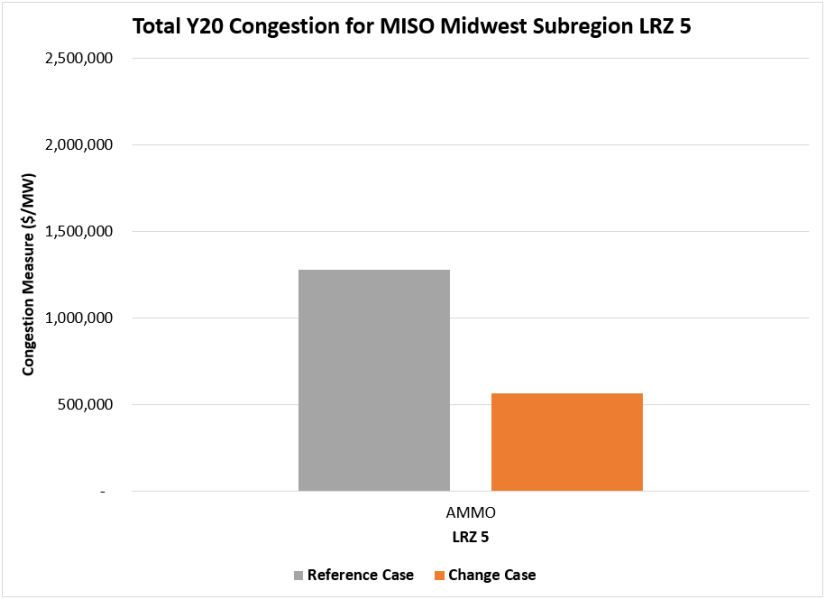
Tranche 2.1 portfolio reduces economic congestion throughout Missouri by providing a 345kV regional pathway

Reference Case: Congestion Measure



Change Case: Reduction in Congestion Measure

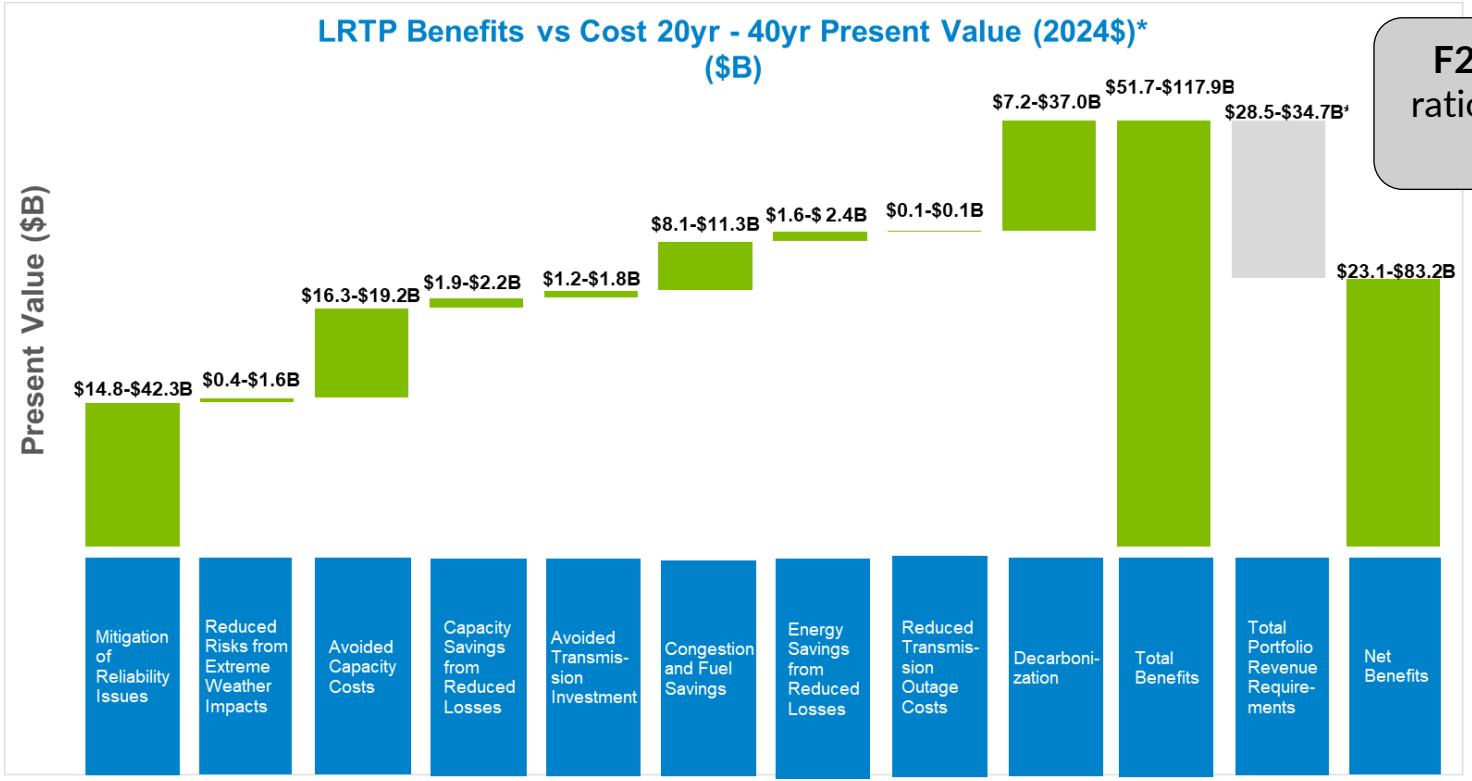




- Final portfolio reduces congestion in LRZ 5 by 55.9% (714 k$/MW)
- Congestion decreased by adding another path directly north of congested facilities

*Economic Congestion is defined as "Congestion Measure" ($/MW) and is calculated by multiplying annual Average Shadow Price ($/MWh) by Binding Hours (h).

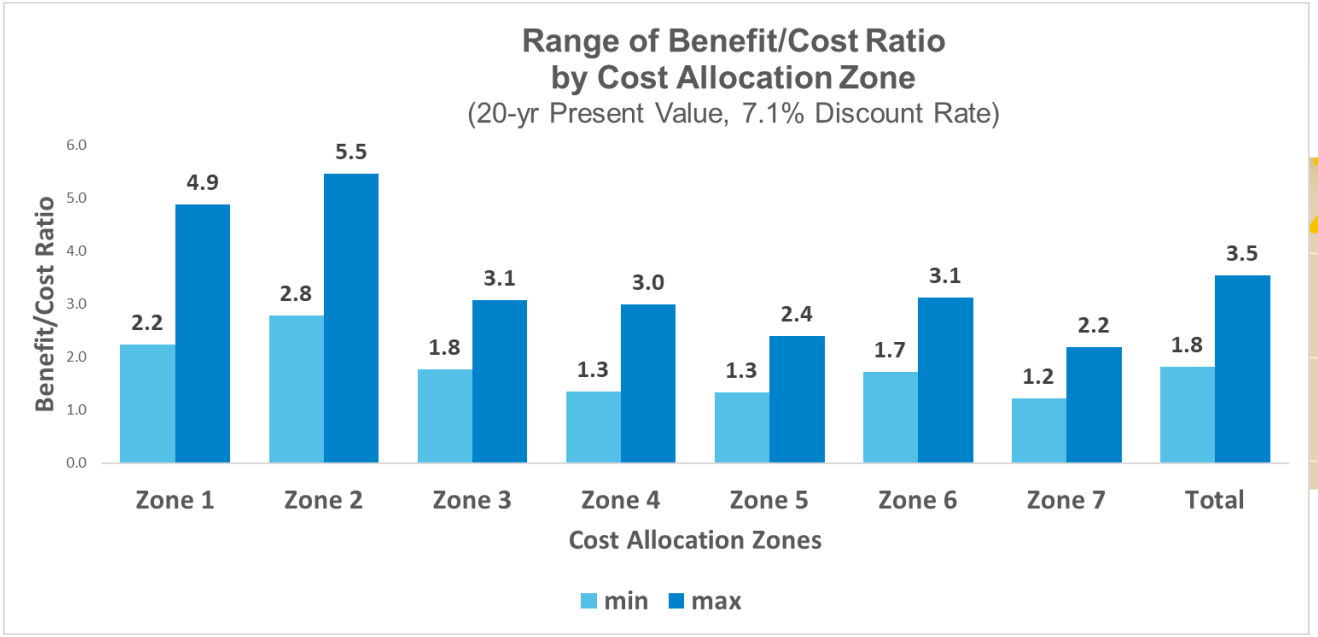
Tranche 2.1 portfolio under Future 2A provides a regional benefit-to-cost ratio of at least 1.8 capturing multiple types of reliability, economic and policy value



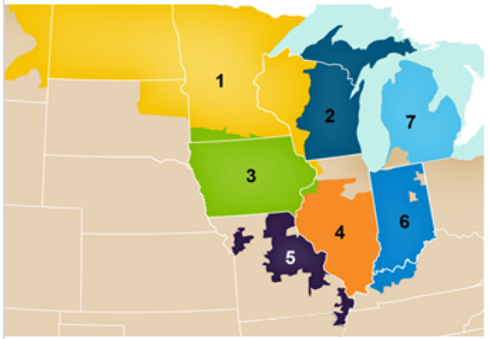
F2A Total B/C ratio ranges from **1.8 to 3.5**

*Estimated costs as of 9/19/2024. Assumes 7.1% discount rate. *Link to LRTP Tranche 2.1 metrics whitepaper.*

Tranche 2.1 portfolio benefits exceed costs and are broadly distributed across the Midwest Subregion with each zone showing a B/C ratio > 1.0* under Future 2A



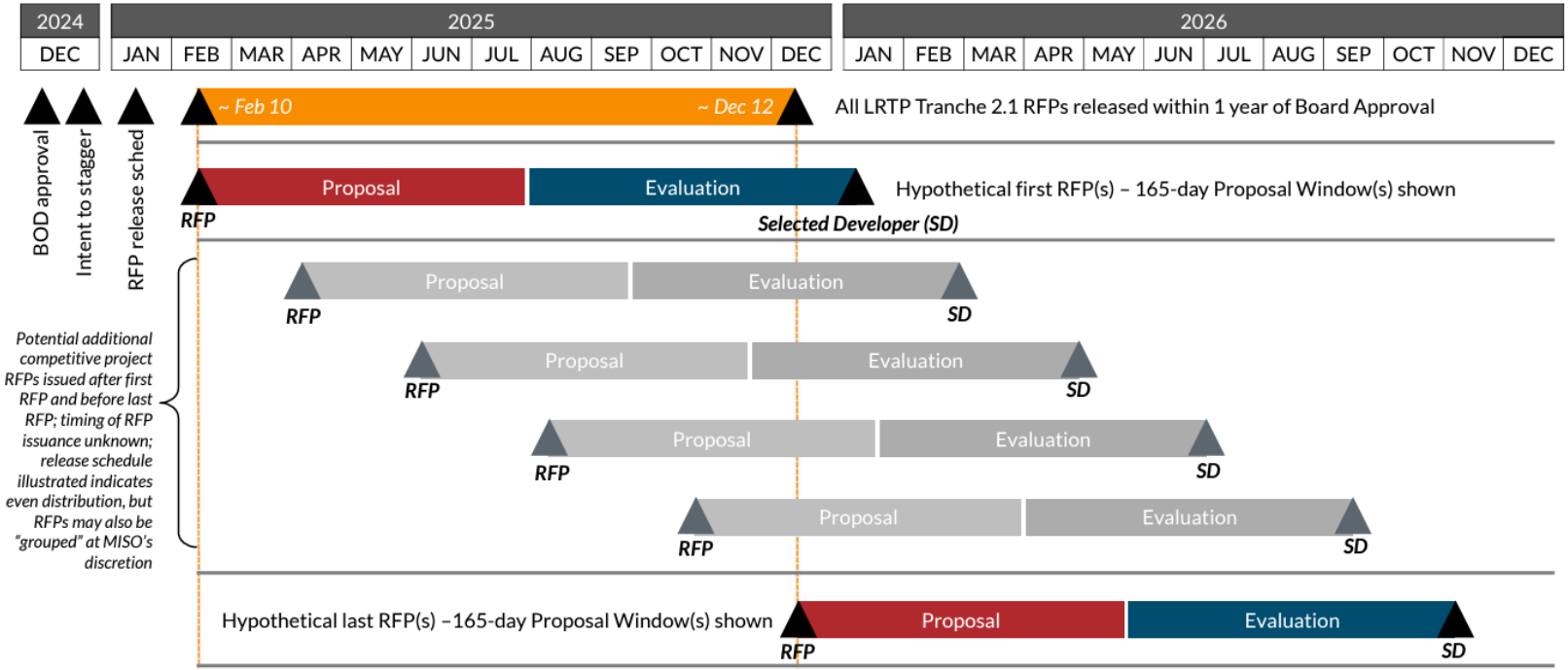
Map of Midwest Cost Allocation Zone Boundaries*



*MISO Tariff, Attachment WW

** See appendix pg. 34-37 for more detailed information on cost allocation zone benefits. Link to LRTP Tranche 2.1 metrics whitepaper.*

The Competitive Transmission Developer selection process for Tranche 2.1 begins with MISO Board of Director approval and will continue into 2026



Appendix

MISO benefit cost analysis detailed results are provided for MISO Midwest Cost Allocation Zones: **20-years Lower Range**

Footprint Benefits (minimum)- 20 Year NPV, 7.1%, 2024$		($M)							
Benefit Metric	CAZ Allocation Method	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Total
Avoided Capacity Costs	Based on load ratio share	$3,409	$2,179	$1,802	$1,546	$1,243	$2,894	$3,199	$16,271
Capacity Savings from Reduced Losses	Based on load ratio share	$389	$249	$206	$176	$142	$330	$365	$1,857
Congestion and Fuel Savings	Derived directly from PROMOD results	$1,366	$2,546	$1,689	-$341	$232	$1,847	$808	$8,148
Energy Savings from Reduced Losses	Derived directly from PROMOD results	$246	$273	$54	$92	$129	$428	$411	$1,632
Reduced Transmission Outage Costs	Derived directly from PROMOD results	$31	$14	-$34	-$3	$69	$22	-$22	$76
Reduced Risks from Extreme Weather Impacts*	Based on load ratio share	$82	$53	$44	$37	$30	$70	$77	$394
Avoided Transmission Investment	Based on the zonal location of upgrade	$292	$435	$85	$154	$161	$59	$42	$1,228
Mitigation of Reliability Issues*	Based on location of issues	$6,021	$3,917	$922	$1,286	$353	$1,746	$575	$14,821
Decarbonization**	Based on load ratio share	$1,515	$968	$801	$687	$552	$1,286	$1,421	$7,230
Total Benefits		$13,352	$10,633	$5,569	$3,635	$2,910	$8,681	$6,876	$51,657
Total Costs		$5,977	$3,821	$3,159	$2,709	$2,179	$5,073	$5,608	$28,525
B/C		2.2	2.8	1.8	1.3	1.3	1.7	1.2	1.8

* VOLL: min=$3,500

**Carbon Price: min=$85

Tranche 2.1 transmission investments are estimated to power between 22,000 and 65,000 direct jobs and between $4 and $24 billion in total economic output

	Tranche 2.1 Investment ($Mns)	Direct Local Jobs		Total Local Jobs		Local Investment/Total Economic Output ($Mns)	
Central		*Low Estimate*	*High Estimate*	*Low Estimate*	*High Estimate*	*Low Estimate*	*High Estimate*
MO	$872	872	2,616	1,744	5,231	$ 174	$ 959
IL	$2,886	2,886	8,659	5,772	17,317	$ 577	$ 3,175
IN	$2,378	2,378	7,135	4,757	14,270	$ 476	$ 2,616
KY	$77	77	230	153	459	$ 15	$ 84
East							
MI	$2,672	2,672	8,015	5,344	16,031	$ 534	$ 2,939
West							
IA	$3,606	3,606	10,817	7,212	21,635	$ 721	$ 3,966
MN	$4,342	4,342	13,026	8,684	26,051	$ 868	$ 4,776
ND	$188	188	564	376	1,129	$ 38	$ 207
SD	$724	724	2,171	1,447	4,341	$ 145	$ 796
WI	$4,086	4,086	12,257	8,171	24,514	$ 817	$ 4,494
Total	$21,830	21,830	65,489	43,659	130,978	$ 4,366	$ 24,013