



Planning Advisory Committee

Summary of Review and Advice to Advisory Committee and Board of Directors

MISO Transmission Expansion Plan (MTEP24) Appendix F

November 1, 2024

The Planning Advisory Committee, through its sector representatives, has reviewed the draft MTEP24 report and invited MISO stakeholders to provide input. The following is a summary of key input from stakeholders to the Advisory Committee and the MISO Board of Directors as well as brief MISO responses. This document includes substantive comments received through the formal MTEP feedback process from the following stakeholders:

- Eligible End Use Customers Sector
- Environmental Sector
- Municipals / Cooperatives / Transmission Dependent Utilities (TDU) Sector
- ITC Companies
- Invenergy
- NextEra Energy Resources
- North Dakota Public Service Commission
- Otter Tail Power Company
- Prairie Power
- WPPI Energy

Summary of Formal Feedback Received

MISO greatly appreciates the stakeholder feedback received throughout the MTEP24 study effort and most recently as part of the formal substantive feedback request, included below in detail with MISO's responses. MISO has long committed to robust and transparent transmission planning processes and has and will continue to take this valuable feedback to help inform the relevant processes. The substantive feedback received focused on the following topics:

- **General Portfolio Comments:** General comments on the MTEP24 portfolio or certain aspects of the portfolio and planning process
- **LRTP Business Case:** Methodology for calculating benefits and/or resulting metrics – overstated or understated
- **LRTP Portfolio Sufficiency:** Scope of analysis, robustness testing, sensitivities in planning
- **Cost Containment and Affordability:** How portfolio costs will be contained and/or affordability for end use customers will be achieved
- **Technology Consideration and Interregional Coordination:** Grid Enhancing Technologies and 765 kV; interregional coordination
- **Merchant Transmission Modeling:** Inclusion in base case
- **Other Comments:** Miscellaneous comments on JTIQ, projects or other topics; questions for clarification

As shown in the list of topics above, the majority of the feedback focused on Tranche 2.1. Most stakeholders – through the substantive feedback process, workshops, meetings, or other means – have expressed support for Tranche 2.1 and Long Range Transmission Planning (LRTP) as a key part of MISO's overall Reliability Imperative effort. Areas of feedback were generally consistent with comments shared in LRTP workshops and in public comments at recent System Planning Committee meetings, focusing on the calculation of specific business case metrics. MISO is confident it has developed a robust, least regrets portfolio that delivers benefits in excess of costs based on appropriate methodologies that are consistent with the policy and direction of FERC Order 1920. As MISO's numerous stakeholders have diverse needs and interests in the



L RTP process, there are also varied opinions on how best to approach the L RTP initiative. MISO has considered and discussed this feedback with stakeholders and adjusted processes as needed. MISO will continue to take this valuable feedback to help inform future L RTP study efforts.

Verbatim Stakeholder Substantive Comments and MISO Responses

Eligible End Use Customers Sector¹ Verbatim Comments:

A. Executive Summary

The End Use Customer Sector appreciates the opportunity to respond to MISO's request for feedback regarding MISO's 2024 MTEP Draft Report which was posted on September 30, 2024. At the October 1st Planning Advisory Committee (PAC) meeting, MISO Staff requested substantive and editorial feedback regarding the 2024 MTEP draft report by October 14, 2024. The substantive feedback from stakeholders and sectors will be circulated to the MISO Board of Directors for their review and consideration.

The draft MTEP 2024 report includes the largest MTEP investment in MISO's history at approximately \$30 billion of investment: The plan proposes the following:

- Traditional MTEP investment: 459 projects totaling \$6.7B;²
- Regional (L RTP Tranche 2.1): 24 projects totaling \$21.8B; and
- Interregional/Joint Targeted Interconnection Queue (JTIQ): 5 projects totaling \$1.65B

Our substantive feedback is focused on L RTP Tranche 2.1 related matters discussed in Chapter 2 of the MTEP 2024 Draft report (Step 5 – Business Case Analysis). The facilities included in L RTP Tranche 2.1 are located in the MISO North/Central Subregion and will be exclusively recovered from transmission customers in that subregion on a postage-stamp energy withdrawal basis. Our major concerns are regarding certain benefit metrics utilized to demonstrate the business case for MISO's proposed L RTP Tranche 2.1 portfolio. While the issue of cost variance is not addressed in the draft report, we are also concerned regarding the lack of cost containment measures for transmission projects that will not be competitively solicited or otherwise subjected to binding cost caps or other cost commitments.

The members of the End Use Customer Sector include several MISO Members and MISO stakeholders who represent manufacturers and large industrial and institutional users of electricity who operate facilities within the MISO North/Central Subregion. These large retail customers ultimately will be required to pay for a proportionately large amount of the estimated \$21.8 billion in transmission investment being contemplated for the Tranche 2.1 portfolio of projects. The justness and reasonableness of this planned transmission spend is therefore critical to the large retail customers within the MISO North/Central Subregion that many of our members represent. Accordingly, the total dollar magnitude of these potential investments requires careful consideration and thorough vetting to ensure end-use customers are asked to pay only for transmission investment that is cost-effective and is ultimately used and useful.

As currently proposed, MISO has not been able to reasonably demonstrate that the L RTP Tranche 2.1 portfolio of projects is cost effective and would ultimately be used and useful. As detailed later in these comments, this is because two of the metrics that are among those projected to be the largest source of benefits provided from L RTP Tranche 2.1 are seriously flawed and, if excluded, would result in the projected benefit to cost ratio for L RTP Tranche 2.1 to fall below 1.0. In addition, we are concerned not enough is being done to ensure that the very high costs of L RTP Tranche 2.1 will be contained as much as it could be. Given these concerns we oppose L RTP Tranche 2.1 as currently proposed. To be clear, we are not opposed to approval of a cost effective version of L RTP Tranche 2.1 as we fully recognize the need for a timely buildout of

¹ The members of the End-Use Customer Sector that are participating in these comments include MISO Members: Association of Businesses Advocating Tariff Equity (ABATE), Coalition of MISO Transmission Customers (CMTC), Illinois Industrial Energy Consumers (IIEC), Louisiana Energy Users Group (LEUG), Midwest Industrial Customers (MIC), Minnesota Large Energy Consumers (MLEC) and Texas Industrial Energy Consumers (TIEC). In addition, MISO stakeholder NIPSCO Large Customer Group (LCG) is participating in these comments.

² The End Use Customer Sector typically abstains from taking positions regarding the "traditional" projects included in annual MTEP.



additional backbone transmission infrastructure in the MISO North/Central Subregion.³ However, it is also important to ensure a strong business case where the present value of the benefits exceed the present value of the costs, and the investment is one of least regrets.

The End Use Customer Sector submits two substantive recommendations for the MISO Board's consideration that would address our concerns: (1) direct MISO to revise its metrics for projecting certain benefits prior to finalizing Tranche 2.1 portfolio and related business case and (2) investigate expanding application of cost containment to incumbent transmission owning entities that are not bound to any binding cost containment measures, such as the binding commitments reflected in Selected Developer Agreements.

1. Revise benefit methodologies of certain metrics prior to formal submittal for MISO Board approval.

The End Use Customer Sector supports building regional transmission provided the business case associated with the investment demonstrates that the benefits exceed the costs. MISO's methodologies to calculate the Avoided Capacity Cost and Mitigation of Reliability Issues metrics are flawed and result in grossly overestimating the benefits. According to MISO's estimates, these two benefit metrics account for 60% of the present value of the total benefits. As discussed further below, the End Use Sector shares the Independent Market Monitor's view that, as currently configured, the estimated savings associated with these two metrics should be disregarded due to unrealistic and invalid assumptions used. As detailed later in these comments, without the projected benefits associated with the Avoided Capacity Cost and Mitigation of Reliability Issues metrics, MISO's economic analysis only forecasts a 20-year present value benefit-to-cost ratio for LRTP Tranche 2.1 of 0.72 under MISO Future 2A and 0.37 under MISO Future 1A. Therefore, as currently proposed, MISO has not reasonably demonstrated that the proposed Tranche 2.1 portfolio is economic or one of least regret.

Given an estimated price tag of LRTP Tranche 2.1 of \$21.8 billion, it is vitally important to ensure that the Tranche 2.1 portfolio is cost effective by having forecasted benefits that exceed forecasted costs demonstrated through credible benefit methodologies which instill confidence in the results. The End Use Customer Sector represents large energy users who operate in a competitive environment and will ultimately be asked to pay their share of this unprecedented level of transmission investment. Neither these customers, nor any other customers, should have to pay for uneconomic transmission. Proactively addressing the flaws in the benefits metrics now would serve both transmission owners and transmission customers, as it would minimize the likelihood of any future prudence challenges. Neither transmission owners nor transmission customers want to be involved in protracted litigation in the future concerning substantial transmission project investments.

If MISO wants to incorporate its proposed Avoided Capacity Costs and Mitigation of Reliability Issues metrics in its economic analysis for LRTP Tranche 2.1, the methodologies for these two metrics need to be revised to incorporate realistic and valid assumptions. Failure to address the current flaws in these two metrics at this time would increase the likelihood of creating problems and delays at the state regulatory approval level which is counterproductive to the advancement of regional transmission infrastructure. It is more effective to address the flaws in the benefit metrics now. The projects must be necessary and costs must be demonstrated to be prudently incurred in order for transmission owning entities to receive the authorization at the state regulatory level to construct the projects.

We therefore recommend to the MISO Board of Directors that it require MISO to correct the methodologies associated with the Avoided Capacity Cost and Mitigation of Reliability Issues metrics and then resubmit the business case with the corrected metrics. At the October 10th Market Sub Committee, the IMM expressed similar concerns and indicated his intent to recommend delay of the Tranche 2.1 portfolio approval until these same two issues were addressed.

We recognize that this will delay the approval process for LRTP Tranche 2.1 currently slated for December by

³ Some members of the End Use Sector believe that Tranche 2.1 will benefit the region by increasing transmission system capacity to meet expected future load growth. However, the End Use Sector at large emphasizes the importance of economic transmission and cost containment as described herein.



some amount. However, delay of the Board approval is necessary and justified in order to verify that the proposed portfolio is indeed economic and results in least regrets. Furthermore, any such delay should not extend beyond two or three months and would likely be dwarfed by any delay that could come later from stalled approval at the state level due to MISO failing to address these two flawed metrics at this time. We specifically recommend that the Board not approve LRTP Tranche 2.1 as part of its December approval of MTEP24. Instead, we recommend that the Board direct MISO address the concerns we have raised with the Avoided Capacity Cost and Mitigation of Reliability Issues metrics.

Then, with the flaws associated with the two metrics reasonably addressed, MISO could return to the Board with a version of LRTP Tranche 2.1 that has a projected net benefit for both MISO Future 1A and Future 2A. This version of LRTP Tranche 2.1 could then be approved by the Board as an amendment to the MTEP24 Report at the March 2025 quarterly Board meeting

2. Binding cost containment commitments, such as those found in selected developer agreements, need to be applied to all LRTP projects in Tranche 2.1 and beyond.

Under the current MISO Tariff (Attachment FF) provisions, the transmission owning entities that acquire LRTP related projects due to waivers from acquiring the projects competitively, are not subject to binding cost containment requirements as the transmission developer entities that win competitively sourced projects. The vast majority of projects approved for Tranche 1 were designated as non-competitive. If this trend continues for Tranche 2.1, there is a high level of investment not subject to cost containment, which creates more uncertainty about the cost effectiveness of the transmission investment. Enforcement of cost containment measures should be applicable to all LRTP projects and not just those subject to competitive solicitation.

We are highly concerned regarding the lack of consistency in cost containment discipline and recently submitted this as an issue to be pursued and vetted through the MISO stakeholder process. We want MISO and the Board to be aware of this pursuit.

B. Detailed Comments

1. Financial Assumptions

While MISO provided a range of estimates based on differing assumptions, Attachment FF of the MISO Tariff requires the benefit to cost ratio to be calculated on a 20-year net present value basis using a discount rate based on the Weighted Average Cost of Capital (“WACC”) for transmission owners. As such, the relevant estimates to consider and discussed below are based on the economic analysis MISO has performed using a 20-year net present value of the revenue requirement with a discount rate of 7.1%.

MISO is utilizing Future 2A assumptions to develop the proposed Tranche 2.1 portfolio and estimate the 20-year net present value of costs and benefits. MISO uses Future 1A as a low bookend to demonstrate if the proposed portfolio is one of least regret. We support the use of Future 1A as a low end bookend.

2. Flawed Benefits Metrics

a. Mitigation of Reliability Issues Benefit Metric

MISO has indicated that transmission capacity is essential to addressing reliability risks from future fleet evolution. MISO prescribes a value to transmission to compensate for declining dispatchable resources traditionally used to manage reliability risk. In this regard, MISO has proposed a two-step process to perform reliability redispatch to mitigate issues and identify residual overloading that would require load shedding. The load shedding amount is translated into unserved energy (MWh) which is then multiplied by the Value of Lost Load (VOLL) to monetize the benefit. MISO used \$3,500 and \$10,000 for VOLL values to estimate a net present value range of \$14.2 billion to \$42.3 billion for this benefit metric using Future 2A and \$8.5 billion to \$24.3 billion using the low bookend Future 1A, respectively. The results associated with this methodology should be disregarded because this methodology uses invalid and unrealistic assumptions which result in



grossly overstating benefits.

As a practical matter and as it relates to the pace of the fleet evolution, while certain states and utilities might make decarbonization goals a priority, no state or utility would insist on meeting these goals without ensuring reliability. Consequently, it is not realistic to assume that without the Tranche 2.1 portfolio, there would be a higher risk of load shedding due to local reliability issues. The End Use Sector shares the Independent Market Monitor's (IMM) view that in the absence of the Tranche 2.1 portfolio, these local reliability issues would instead be addressed in other practical ways through out-of-market commitments, modeling, thermal proxy transmission constraints, transmission reconfigurations, or by investments in other network equipment. Neither MISO nor the transmission owning entities would contemplate relying on load shedding as a routine strategy for addressing these local reliability issues.

MISO's VOLL-based metric for this benefit is therefore flawed and substantially overstates the benefits associated with this benefit. Instead, the impact of the Tranche 2.1 portfolio needs to be estimated by utilizing modeling assumptions that are reflective of the actions MISO and the transmission owning entities would undertake to address these local reliability issues without the proposed portfolio.

b. Avoided Capacity Cost Benefit Metric

MISO's proposed Avoided Capacity Cost benefit metric calculation consists of using Loss of Load Expectation (LOLE) modeling and a simplified representation of transmission constraints at the zonal level to calculate changes in the planning reserve margin (PRM) with and without the Tranche 2 portfolio. The EGEAS resource expansion model that MISO uses is rerun for Futures 1A and 2A to identify the additional generation resources required for the incremental increase in PRM without the Tranche 2 portfolio of projects. All other assumptions in the Future 1A and Future 2A base model, including generation siting assumptions, are not changed. MISO estimated that the net present value of the Avoided Capacity Cost benefit metric is approximately \$15.3 billion and \$16.3 billion using Future 1A and Future 2A respectively.

MISO's proposed methodology is based on the major premise that the generation supply mix and generation siting will be the same with or without the Tranche 2 portfolio. We disagree. Without the Tranche 2 portfolio, and especially as it relates to resource adequacy, generation siting will change to deliverable locations in order to be cost effective. Furthermore, to the extent that utilities need to fulfill their renewable energy and decarbonization goals, they would utilize technologies that are locally suited such as storage and solar or related hybrid combinations as opposed to other renewable generation that requires expensive upgrades to be deliverable. In short, the generation mix and siting for each utility will be specific and maximized to each utility's situation within a local resource zone as opposed to assuming that MISO's siting and generation mix associated with Future 1A and Future 2A are representative of what the utilities would plan for, in the absence of the Tranche 2.1 portfolio.

MISO has repeatedly indicated in workshops that it is not a resource planner. At the same time, however, MISO necessarily undertook the role of resource planning by assuming the same generation siting without the Tranche 2.1 portfolio added. MISO indicated that the generation siting was based on feedback from member utilities regarding decarbonization goals. However, MISO did not seek feedback on actions utilities would take without the Tranche 2.1 portfolio.

The IMM has consistently shared similar concerns.⁴ We support the IMM's assessment that there is no basis to believe that transmission investment will change the PRM, which invalidates this class of benefits. In summary, as currently proposed, the projected benefits associated with this metric are invalid. The methodology associated with this metric needs to be corrected to address the limitations discussed above in order to be considered.

3. Business Case Results without Mitigation of Reliability Issues and Avoided Capacity Cost Metrics

⁴ See IMM's Memorandum which was discussed at the LRTP Workshop on September 13, 2024: <https://cdn.misoenergy.org/IMM%20Memo%20re%20Tranche2%20Benefits%20Methodologies646681.pdf>



The table below shows that the overall 20-year present value benefit to cost ratio for LRTP Tranche 2.1 portfolio without the two flawed metrics is 0.72 and 0.37 using Future 2A and 1A respectively. Consequently, as currently proposed, the Tranche 2.1 portfolio has not been demonstrated to be economic or one of least regret.

Table 1: Overall NPV of forecasted benefits and costs

Benefits and Costs= 20 Year NPV, 7.1% discount rate, 2024\$	Future 2A	Future 1A
Avoided Capacity Costs		
Capacity Savings from Reduced Losses	\$1,857	\$875
Congestion and Fuel Savings	\$8,148	\$2,901
Energy Savings from Reduced Losses	\$1,632	\$1,151
Reduced Transmission Outage Costs	\$76	\$172
Reduced Risks from Extreme Weather Impacts*	\$394	\$260
Avoided Transmission Investment	\$1,228	\$1,228
Mitigation of Reliability Issues		
Decarbonization (Carbon price:\$85)	\$7,230	\$3,890
		\$0
Total Benefits	\$20,565	\$10,477
Total Costs	\$28,525	\$28,525
B/C	0.72	0.37

From a local resource zone (LRZ) perspective, the resulting 20-year net present value benefit to cost ratio is as low as 0.3 (LRZ 4) under the Future 2A scenario (See Table 2 (a)). Under the Future 1A scenario, no LRZ's forecasted benefit to cost ratio exceeds 0.5 (See Table 2(b)).

Table 2 (a): NPV of forecasted Tranche 2.1 benefits and costs by LRZ using Future 2A

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Total
Avoided Capacity Costs								
Capacity Savings from Reduced Losses	\$389	\$249	\$206	\$176	\$142	\$330	\$365	\$1,857
Congestion and Fuel Savings	\$1,366	\$2,546	\$1,689	(\$341)	\$232	\$1,847	\$808	\$8,148
Energy Savings from Reduced Losses	\$246	\$273	\$54	\$92	\$129	\$428	\$411	\$1,632
Reduced Transmission Outage Costs	\$31	\$14	(\$34)	(\$3)	\$69	\$22	(\$22)	\$76
Reduced Risks from Extreme Weather Impacts*	\$82	\$53	\$44	\$37	\$30	\$70	\$77	\$394
Avoided Transmission Investment	\$292	\$435	\$85	\$154	\$161	\$59	\$42	\$1,228
Mitigation of Reliability Issues								
Decarbonization (Carbon price:\$85)	\$1,515	\$968	\$801	\$687	\$552	\$1,286	\$1,421	\$7,230
								\$0
Total Benefits	\$3,922	\$4,537	\$2,844	\$803	\$1,314	\$4,041	\$3,103	\$20,565
Total Costs	\$5,977	\$3,821	\$3,159	\$2,709	\$2,179	\$5,073	\$5,608	\$28,525
B/C	0.66	1.19	0.90	0.30	0.60	0.80	0.55	0.72

Table 2 (b): NPV of forecasted Tranche 2.1 benefits and costs by LRZ using Future 1A

20-Year NPV, 7.1%, 2024\$	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Total
Avoided Capacity Costs								
Capacity Savings from Reduced Losses	\$183	\$117	\$97	\$83	\$67	\$156	\$172	\$875
Congestion and Fuel Savings	\$501	\$493	\$554	-\$37	\$247	\$981	\$162	\$2,901
Energy Savings from Reduced Losses	\$166	\$212	\$82	\$92	\$87	\$312	\$201	\$1,151
Reduced Transmission Outage Costs	\$32	\$34	-\$7	-\$14	\$44	\$70	\$13	\$172
Reduced Risks from Extreme Weather Impact	\$55	\$35	\$29	\$25	\$20	\$46	\$51	\$260
Avoided Transmission Investment	\$292	\$435	\$85	\$154	\$161	\$59	\$42	\$1,228
Mitigation of Reliability Issues*								
Decarbonization**	\$815	\$521	\$431	\$369	\$297	\$692	\$765	\$3,890
								\$0
Total Benefits	\$2,044	\$1,847	\$1,270	\$673	\$923	\$2,315	\$1,406	\$10,477
Total Costs	\$5,977	\$3,821	\$3,159	\$2,709	\$2,179	\$5,073	\$5,608	\$28,525
B/C	0.34	0.48	0.40	0.25	0.42	0.46	0.25	0.37



4. Business Case: Tranche 1 v. Tranche 2.1

In Tranche 1, the transmission investment was estimated at \$10.38 billion with a net present value of benefit to cost ratio of 2.6.⁵ MISO quantified the benefits associated with six metrics. The End Use Customer Sector's position regarding Tranche 1 was that correcting for some flaws in select benefit metrics would likely have not resulted in the benefit to cost ratio to be lower than 1.0.

With regards to the proposed Tranche 2.1 portfolio of investment, however, we are highly concerned that this portfolio may not be economic after the erroneous methodologies are corrected. It is also worth noting unlike the Tranche 1 portfolio, the projected congestion and fuel cost savings for the Tranche 2.1 portfolio are significantly less than the estimated cost of the portfolio, which heightens the concern regarding the proposed Tranche 2.1 portfolio as shown in the table 3 below. The table below shows that with the Tranche 1 portfolio, the 20 year NPV of the congestion and fuel cost savings metric was substantially close to the 20 year NPV of the costs (\$13.125 billion v. \$14.183 billion or a ratio of 0.93). In sharp contrast, the 20 year NPV of the congestion and fuel costs savings metric for Tranche 2.1 is substantially lower under Future 2A (\$8.148 billion v. \$28.5 billion or a ratio of 0.29) and dismally lower under Future 1A (\$1.15 billion v. \$28.5 billion or a ratio of 0.04).

Table 3: 20 Year NPV of Congestion and Fuel Cost Savings v. 20 Year NPV of Costs

Tranche	20 Year NPV of Congestion and Fuel Cost Savings	20 Year NPV of Costs
Tranche 1	\$13.125 Billion	\$14.183 Billion
Tranche 1, Future 2A	\$8.148 Billion	\$28.5 Billion
Tranche 1, Future 1A	\$1.15 Billion	\$28.5 Billion

5. Binding Cost Containment Commitments, Such as Those Found In Selected Developer Agreements, need to be investigated for application to All LRTP Projects in Tranche 2.1 and Beyond.

Binding cost containment commitments, such as those found in selected developer agreements must be applied to all LRTP projects in Tranche 2.1 and beyond. As a general rule, regional transmission projects, such as LRTP Tranche 2.1, are subject to the Competitive Transmission Process, which facilitates competitive bidding and aggressive cost containment proposals. The winner of a competitive solicitation must execute the *pro forma* Selected Developer Agreement or submit an unexecuted Selected Developer Agreement with FERC.⁶ MISO and the Selected Developer agree to various schedules and milestones in the Selected Developer Agreement.⁷ The Project Costs as well as the Selected Developer's cost containment and rate commitments are detailed in Appendix A to the *pro forma* Selected Developer Agreement. In contrast, an incumbent transmission owner that automatically receives assignment of a regional project, including an LRTP project, due to an exception from the Competitive Transmission Process, including a State Right of First Refusal (ROFR) law exemption or an Upgrade exemption,⁸ is not bound to such cost containment commitments. Notably, in Tranche 1, approximately \$9 billion out of the \$10 billion in projects were protected by either ROFR Law or Upgrade exemptions, and therefore were not subject to any meaningful cost containment commitments or cost discipline that only occurs during a competitive process resulting in a Selected Developer Agreement.

We are very concerned about the lack of cost containment measures and have recently submitted an issue submission asking to investigate the application of sufficient cost containments for all LRTP Projects. In the absence of binding cost containment commitments, consumers will likely be responsible for billions of dollars in excess costs. Incumbent transmission owners, such as Ameren Transmission Company of Illinois, have

⁵ <https://cdn.misoenergy.org/LRTP%20Tranche%201%20Detailed%20Business%20Case625789.pdf>

⁶ MISO Tariff, Attachment FF, Section VIII.F.

⁷ See *id.* at Attachment FF, Appendix 1 (pro forma Selected Developer Agreement).

⁸ See Attachment FF, Sections VIII.A.1 and VIII.A.2.



demonstrated their willingness and ability to commit to cost caps and creative cost-savings solutions. For example, for the Fairport to Denny to IA/MO State Border 345 kV Competitive Transmission Project, Ameren partnered with Missouri Joint Municipal Electric Utility Commission (MJMUEC) to propose an estimated project cost of \$84 million, which was “a substantially lower cost than that of the next closest proposal which was 36% higher based on the annual costs to customers over 40 years.”⁹ Ameren also proposed a project implementation cap whereas other developers did not.¹⁰

Even if fewer Tranche 2.1 LRTP projects are protected by ROFR Law or Upgrade exemptions, a substantial portion of project costs will still not be subjected to any binding cost containment commitments under current tariff provisions. We are hopeful that our issue submission will result in full vetting of the issue and addressed through new tariff provisions.

Thank you for giving us the opportunity to provide feedback. If you have any questions, please do not hesitate to contact any one of us.

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MISO Response:

LRTP Business Case

MISO is confident that its comprehensive regional planning process has appropriately managed the uncertainty inherent in developing solutions that address a resource mix and issues 20 years into the future and in estimating the value of those solutions to MISO's members. No edits to the benefit methodologies are required.

The Tranche 2.1 business case was developed using the Tranche 1 business case process as a starting point, with discussions on process revisions for Tranche 2.1 business case metrics beginning in January 2023. Over the next 18 months MISO engaged stakeholders on the methodology development for each benefit metric, including the

⁹ See “Ameren Transmission Company of Illinois to lead the development of Missouri transmission project,” MISO, Oct. 27, 2023, available at <https://www.misoenergy.org/meet-miso/media-center/2023/second-lrtp-competitive-transmission-developer-selected/> :-:text=CARMEL,%20Ind.%20E2%80%94%20MISO%20announced%20today%20that%20Ameren (last visited Oct. 6, 2024).

¹⁰ See Selection Report: Fairport to Denny to IA/MO State Border 345 kV Competitive Transmission Project, at p .18, available at Fairport to Denny to IA/MO State Border 345 kV Competitive Transmission Project (last visited Oct. 6, 2024).



development of a detailed business case benefit metrics methodology whitepaper. In summary MISO disagrees with the need to eliminate or modify the avoided capacity cost or mitigation of reliability issues metric with a more detailed explanation to that position included below.

L RTP Business Case - Avoided Capacity Cost Metric

The Avoided Capacity Cost metric reflects the incremental resource capital cost savings from the increase in transmission capability provided by L RTP Tranche 2.1. This increased transfer capability enables access to resources over the Midwest Subregion and captures the resource and load diversity and operational flexibility benefits provided over larger geographic areas.

The methodology used to calculate this metric matches the objective function of L RTP - to understand the value of transmission given the collective member resource plans, as represented in the different Future scenarios. This approach is consistent with how MISO and others have performed benefit analysis for regional transmission for over a decade. The objective is not to take the role of a central resource planner by proposing resource plans, or to force the evaluation of different member plans that might occur if the transmission does not exist by shifting resources.

Specifically, a key part of the Future creation process is stakeholder review of the location of these resources. Resource locations are initially sited by MISO planning staff, considering the physical characteristics of the transmission system, local resource requirements (e.g., Local Clearing Requirements) and Generator Interconnection Queue information. Stakeholders then have the opportunity to review and provide feedback on the resource sites, submitting over 500 recommended changes on Futures used for Tranche 2.1, which was used to inform the final resource siting.

L RTP Business Case - Mitigation of Reliability Issues Metric

This metric is intended to capture the monetary value of addressing reliability issues. More specifically, it focuses on a subset of commonly occurring issues that meet three criteria, and it applies them for only a subset of hours where a scenario could have load risk.

1. They must occur under single element or common structure contingencies in normal operations
2. They cannot be resolved through redispatch, and
3. They must be resolved by the inclusion of the L RTP Tranche 2.1 portfolio

It is appropriate to use Value of Lost Load (VOLL) in this instance, rather than a thermal proxy, as this represents the residual risk which MISO is attempting to mitigate – that is a simple constraint which cannot be redispatched around, which only occurs in a specific set of hours. This valuation is further supported using redispatch, and the focus on single element outages. This metric appropriately captures the avoided risk, not the cost of inefficient operations.

Monetizing the reliability value of transmission has been a long-standing industry challenge that can result in significantly undervaluing the economic value of transmission if left unaccounted for. MISO's approach to this risk is conservative, with a focus on key criteria and select hours, as shown in the benefit metrics whitepaper.

Cost Containment & Affordability

MISO's Tariff contains adequate processes to understand variances in costs. The Variance Analysis process described in Attachment FF Section IX of MISO's Tariff applies to all Cost Shared Projects. This process enables MISO to monitor project schedules, costs and other factors; and take action as needed if costs or other material changes occur after Board approval (i.e., 25% or greater).



Environmental Sector Verbatim Comments:

Once again, MISO has established its national leadership in regional transmission planning. The Environmental Sector (“Sector”) applauds the finalization of Tranche 2.1, which is yet another step in both recognizing and enabling the ongoing transformation of the electricity industry. MISO rightfully points out “The job of the LRTP is to enable a reliable generation fleet as planned by MISO Members and states.” It is not MISO’s job to be a resource planner, and we applaud MISO’s focus on enabling the plans of its member states and load serving entities.

While the Sector fully supports Tranche 2.1, we do have some specific comments and substantive recommendations for the Report.

Recurring Themes:

1. Point the Other Way: When planning 20 years out, MISO must “take” the resources its members and states have in their future plans to prepare the grid to reliably accommodate those resources. However, the draft Report (as well as MISO’s comments at the most recent board meeting and MISO’s 9/13/24 amicus brief to the U.S. Court of Appeals for the DC Circuit objecting to EPA regulations) can be read to blame MISO members, states, and EPA for MISO’s current tight resource adequacy conditions and reliability challenges. But MISO fails to look in the mirror to identify how its actions and omissions have led to the conditions and challenges it is facing.

Under the Transmission Evolution Section in Chapter 1, MISO could call out any of the following as contributing to the current debacle - and these are just a few of the examples:

- Waiting six years after the first Multi-Value Project portfolio to conduct another long-term planning process and then canceling the Regional Transmission Outlet Study (RTOS) in 2017 and not starting LRTP until 2019;
- Inability to get new generation interconnected to the regional grid;
- Slow/stopped generation interconnection queue processes (though MISO blames the lack of new generation entirely on supply chain and permitting issues);
- Numerous barriers to entry for electricity storage development and operations in MISO; and
- Having insufficient staff to complete regional, interregional, and interconnection planning more quickly.

It would save consumers money and increase reliability if MISO were to solve these problems in a timely manner.

2. MISO Places its Finger on the Scales to Support Fossil-Fuel Generation:

Time and again, MISO states that the region’s resource adequacy and reliability challenges are due to fossil fuel retirements and growing renewables. (For example: see Retirement of Traditional Resources Ch. 1 p. 4 and Fuel Assurance on p. 5.) Indeed, at the last board meeting, MISO asked members and states to consider “relaxed renewable/clean energy goals” and to delay retirements of fossil generators. Rather than asking others to slow down, MISO should speed up what is within MISO’s control to get the following capacity on-line as quickly as possible, including:

- New electric storage¹
- New generation through the interconnection queue, and
- New transmission lines through Tranches 2.2, 3, and 4.

¹ Among other things, MISO Market Redefinition (Ch. 1, p. 5) has been very slow to evolve to accommodate storage resources which has contributed to slowing the integration of new storage onto the grid and exacerbating the resource adequacy and reliability challenges.



3. Identify Opportunities, not just Obstacles: the draft MTEP24 Report focuses on what has stopped progress in the past, but fails to identify the opportunities for the future, such as the following:
 - MISO's footprint has some of the best wind resources in the world meaning that MISO's members have the opportunity to access some of the least expensive wind generation in the world to help drive down consumers' bills;
 - Technologies can increase the capacity of the grid such as installing advanced conductors and wind speed adjusted dynamic line rating; and
 - Improvements in storage technology including pilot projects within the MISO footprint of very long duration (150-hour) storage.

We encourage MISO to rewrite portions of the MTEP24 Report to address the issues we have raised in the themes above.

Section-Specific Substantive Comments:

2.2 The Planning Process

The Futures: In Tranche 2.1, MISO only used Futures 1A and 2A; but, in Ch. 2 p. 9 MISO touts the futures' ability to "appropriately bookend future uncertainty." MISO failed to adequately bookend the future because it failed to build the models for F3A. Indeed, according to some stakeholders, F3A is even too conservative in some respects. In all of MISO's long-range planning efforts, the Futures have been too conservative by the time the planning process has been completed. For Tranche 2.2, MISO must include a truly aggressive bookend to ensure the grid can accommodate the generation, load, and weather changes that are coming.

The Benefit Metrics: MISO underestimates the savings brought by the LRTP lines (presumably to minimize the debate over those calculations). However, we believe underestimating the savings is a disservice to the public as it misrepresents the full value stream that regional backbone lines bring to MISO's consumers. For example, the asset life of a transmission line is 60 years or more; however, MISO relies primarily on the savings received in the first 20 years of a line.

The following provide examples of underestimated savings within specific metric calculations:

1. Mitigation of Reliability Issues - this metric uses the value of lost load (VOLL) to quantify the benefits of avoided load shedding, which is appropriate. The focus of this metric is on the impact on consumers, and VOLL is our best representation of that value.

We agree that MISO should include both the \$3,500 and the \$10,000 values for VOLL. While \$3,500/MWh is the approved VOLL and MISO must, therefore, use it, MISO is filing its new VOLL (\$10,000/MWh) to FERC in Q4 this year. Including the \$10,000 VOLL provides context to the board and the public of how this calculation will affect Tranche 2.2. The Board should note that a VOLL of \$10,000/MWh is a more realistic number based on present-day accounting, while the "now-outdated"² \$3,500 VOLL is based on such accounting conducted in 2007. Reliance on the \$3,500 VOLL—while legally appropriate—leads to a grossly conservative result in this part of the analysis. Finally, although the upcoming FERC filing uses a VOLL of \$10,000/MWh, the Board should also note that this is MISO's "Pricing VOLL," whereas the "System VOLL" that is fundamental to MISO's scarcity pricing reforms is based on a VOLL of \$35,000/MWh.³

² MISO, "Continued Reforms to Improve Scarcity Pricing and Price Formation," slide 7, presented on October 10, 2024, available at [https://cdn.misoenergy.org/20241010%20MSC%20Item%2010%20Continued%20Reforms%20to%20Improve%20Scarcity%20Pricing%20and%20Price%20Formation%20\(MSC-2019-1\)652052.pdf](https://cdn.misoenergy.org/20241010%20MSC%20Item%2010%20Continued%20Reforms%20to%20Improve%20Scarcity%20Pricing%20and%20Price%20Formation%20(MSC-2019-1)652052.pdf).

³ See id., at slide 8 (summarizing key comments made by the IMM in its 2023 IMM State of the Market Report).



2. Reduced Risks from Extreme Weather Impacts - We appreciate MISO's recognition of the benefits received by mitigating the impacts of extreme weather, which differ from the benefits of mitigating the reliability failures caused by common contingencies, as captured in the "Mitigation of Reliability Issues" metric.

However, MISO's calculation of these benefits severely under values the reduction in risk provided by the regional backbone grid during extreme weather events:

- a. This metric uses "14 weather years [2007-21] of load and renewable generation profiles". However, we know that the incidents of extreme weather are increasing⁴ and the current metric undoubtedly undercounts this benefit. For Tranche 2.2, the increasing trend of extreme weather must be captured.⁵
 - b. MISO is assuming events in years 5, 10, 15, and 20. This is likely unreasonably conservative given the increase in frequency of high-impact events over the past decade. Also, given the use of the 7.1 discount rate, staff should provide the same calculations assuming events in year 1, 6, 11, and 16 to better reflect the uncertainty and range of likely benefits to ratepayers.
 - c. Similar to what is stated above under "Mitigation of Reliability Issues," this metric uses the current VOLL of \$3,500/MWh alongside the VOLL of \$10,000/MWh that MISO will be filing at FERC later this year. Since MISO uses its most conservative numbers when publishing its final benefit/cost ratios, we merely mention this to remind the Board that the b/c ratio in this metric and in the Mitigation of Reliability Issues is therefore grossly conservative in that it uses an outdated VOLL based on accounting completed in 2007, not 2024.
3. Avoided Capacity Cost - this metric also uses the same historic 14 weather years and MISO runs hourly simulations "to reflect the probabilities of forced outages, including temperature-dependent correlated outages." As noted above, this historic weather data does not reflect current extreme weather trends and will underestimate the number of forced outages and temperature-dependent correlated outages. In other words, it will underestimate the savings created by the increased transfer capabilities from Tranche 2.1
 4. Decarbonization -
 - a. MISO's use of \$85/ton as the low-end value of decarbonization benefits is inappropriate. The federal social cost of carbon is currently set to \$190/ton assuming a 2.0% discount rate.⁶ The use of \$85/ton significantly undervalues the assumed benefits of decarbonization across the MISO footprint.
 - b. MISO also fails to monetize the other health benefits of reducing air pollution. There is a robust body of scientific research and analysis to justify including avoided public health impacts, yet MISO refuses to do so. MISO's refusal does not obviate these impacts, and we continue to call on MISO to include public health benefits of avoided pollutants as a benefit metric. Because MISO does not monetize these other public health benefits derived from reduced air emissions, MISO should use the Minnesota PUC's carbon cost of \$248.67 2024\$/metric ton.

Base Case for Calculating Benefits: During the stakeholder process, there was considerable debate on how the benefits should be measured when comparing the base case to the change case. We strongly agree with

⁴ UCS: <https://www.ucsusa.org/climate/impacts>; IPCC: <https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-11/>; NCA: <https://nca2014.globalchange.gov/highlights/report-findings/extreme-weather#:~:text=Changes%20in%20extreme%20weather%20and%20climate%20events,%20such%20as%20heat>

⁵ Going forward, MISO must do more to understand how risks are growing and/or shifting due to climate change that will impact the MISO system. Using climate informed modeling of future weather conditions, such as EPRI is doing through its Climate READi initiative and currently being done at ISO-NE with its Probabilistic Energy Adequacy Tool (PEAT) study, represents a more realistic assessment of future risks and would likely identify additional periods with significant Expected Unserved Energy.

⁶ U.S. EPA, "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances," (2023), https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf



MISO that the appropriate base case in the economic analysis is the same resource portfolio as in the change case but without the LRTP projects under evaluation. The Future 2A resource expansion was built upon information from the states and LSE's that are the resource planners in the MISO region and the developers looking to build new resources (e.g. the generator interconnection queue). Developing a new, purely hypothetical counterfactual provides limited, if any, value compared with these robust inputs and should be used only to fill gaps in our existing knowledge. Developing a purely hypothetical counterfactual would marginalize what we do know, ignore long-term planning decisions in IRPs and state laws, and would make the benefit calculations less accurate, not more.

Conclusion: Again, we appreciate MISO's work on the MTEP24 report, including the huge effort to plan the Tranche 2.1 portfolio. We offer these comments to highlight that, while Tranche 2.1 does meet the MVP benefit to cost ratio, the real benefits likely to come from this portfolio will be much higher. We urge MISO to continue to improve its benefit metrics and futures assumptions. And we reiterate our request for MISO to be more proactive to integrate storage and advanced transmission technologies into its work on transmission planning and markets.

Respectfully submitted on behalf of the Environmental Sector.

Natalie McIntire

Senior Advocate, Sustainable FERC Project

MISO Response:

MISO's Actions and the Reliability Imperative

In the MISO region, the responsibility for grid reliability is shared among MISO-member electricity providers, states, and MISO. MISO calls this shared responsibility the "Reliability Imperative." In light of the urgent and complex reliability risks we face, MISO calls on its members and states to work together to:

- *Refine generation resource plans across MISO by accelerating the addition of reliability attributes and moderating retirements to avoid undue reliability risk*
- *Maintain transition resources as reliability "insurance" until promising new technologies become viable at grid scale*
- *Identify areas of risk in which electricity providers, states, and MISO must coordinate*

The acknowledgement that maintaining reliability is a shared responsibility is not an attempt to blame others for the urgency or complexity of the reliability risks that we share. As noted in comments, MISO is a national leader in transmission planning, but that does not negate the need to continue to improve our processes.

MISO is fuel agnostic, with a focus instead on the key attributes required from transmission and generation assets. The need for key attributes from the resources our members have identified to meet their resource adequacy requirements remains critical. As noted in the report, the combination of declining resources, supply chain and permitting issues, increasing load growth, and more frequent weather events are all creating risks for the transmission system. MISO believes it is critical to consider all options in meeting these risks, including both delaying retirements and accelerating new capacity.

MISO and its stakeholders have made important progress under the Reliability Imperative in recent years. But despite this progress, fleet change and other risks are accelerating more than we anticipated, so we must act and execute with urgency and resolve. This work proceeds through MISO's stakeholder entities and workshops; future opportunities are best discussed in those forums and are largely out of scope for the MTEP24 report.

LRTP Business Case - Futures, Expansion & Modeling

MISO creates future scenarios (Futures) which bookend possible scenarios; these Futures are created based on an assessment of industry trends and member needs. The Future scenarios and models used for a particular evaluation,



such as Tranche 2.1, are selected based on the needs of the evaluation and to balance the scope of the study with its timeline. MISO may choose to evaluate fewer models to complete studies more quickly if the reduction in study models leads to the same outcome.

Tranche 2.1 focused on Future 2A as a logical next step to build upon the successes of Tranche 1, which focused on the lower load levels represented in Future 1. Additionally, as analysis continued, MISO recognized that the right next step was a portfolio that addressed some, but not all, of the regional issues in Future 2A. As a result, MISO did not see sufficient value to extend the Tranche 2.1 study timeline to include a Future 3A evaluation, which would represent a more stressed system than the Future 2A and Future 1A models used in analysis.

MISO agrees that the objective function of LRTP is to understand the value of transmission given the collective member resource plans as represented in the different Future scenarios. This approach is consistent with MISO's role, and with how MISO and others have performed benefit analysis for regional transmission for over a decade. The objective is not to evaluate different member plans that might occur if the transmission doesn't exist.

LRTP Business Case Metrics

MISO appreciates the support of the Environmental sector on the LRTP portfolio. We believe that we appropriately capture the portfolio's benefits.

MISO notes the prevalence of extreme weather could increase the value of transmission, especially as captured in the 'Reduced Risks from Extreme Weather Impacts' and 'Avoided Capacity Costs' benefit metrics. We also note the differences in stakeholder opinion on the valuation of reliability captured by the Value of Lost Load in the 'Mitigation of Reliability Issues' metric and the cost of carbon used for the 'Decarbonization' metric. We are confident that our stakeholder reviewed business case processes appropriately balance these viewpoints to capture a conservative estimate of the value of the Tranche 2.1 portfolio.

The Tranche 2.1 business case was developed using the Tranche 1 business case process as a starting point, with discussions on process revisions for Tranche 2.1 business case metrics beginning in January 2023. Over the next 18 months, MISO engaged stakeholders on the methodology development for each benefit metric. The resulting calculations attempted to balance capturing the value of transmission with a conservative approach to calculations, recognizing the varying stakeholder input from across the MISO region.



Municipals / Cooperatives/ Transmission Dependent Utilities Sector Verbatim Comments:

1. The TDU Sector recognizes the need for substantial improvements to the MISO transmission system to accommodate the very significant changes in the resource mix that MISO is experiencing now, and that we expect to continue. It is important that MISO and stakeholders plan upgrades to cost-effectively address this need, and we support the LRTP effort to achieve this.
2. The TDU Sector submitted MTEP Report comments on the Tranche 1 study in 2022 emphasizing that consideration of both grid-enhancing technologies and coordination with neighboring regions on potential upgrades to non-MISO facilities and rights-of-way will be important in identifying the most cost-effective upgrades. Neither of these appears to have played a large role in the Tranche 2.1 study process. We urge MISO to incorporate these elements into future LRTP study phases.
3. While considerable planning has occurred with LRTP Tranches 1 and 2.1, the TDU Sector sees a need for additional planning and analysis to more fully understand the impacts of the proposed 765 kV overlay and what additional transmission is required to support its reliable integration. The Sector would have preferred a more complete portfolio was created for Tranche 2.1 and believes that additional transmission developed in a Tranche 2.2 effort is likely required to integrate MISO's proposed 765 kV overlay as well as address other system needs. The Sector does not believe it is appropriate or would be effective to utilize the normal MTEP process to address reliability and other system issues driven by MISO's regional planning.
4. The TDU Sector submitted comments on the Tranche 1 study in 2022 noting the unreliability of MISO's LRTP overall benefit calculation, given the failure to use a consistent reference case across benefit types. This problem continues to be present in the Tranche 2.1 benefit work. Accordingly, MISO's benefit estimates again appear unreliable. For example, MISO finds that more than 20 GW of additional capacity resources would be required in the subregion if the Tranche 2.1 projects were not constructed, yielding Avoided Capacity Cost benefits, but it effectively assumes these resources would never be dispatched for the purpose of reducing production costs, reducing losses, reducing CO2 emissions or addressing reliability issues.
5. In addition, the sector agrees with the Potomac Economics memo of July 15, 2024 (posted to the September 13 LRTP Workshop page) that valuing mitigation of reliability issues based on the value of lost load associated with constraint management by pre-contingency load shedding will tend to significantly overstate this benefit. Accordingly, we find MISO's Mitigation of Reliability Issues benefit estimate particularly unreliable.
6. Transmission affordability is of critical importance to the TDU Sector. While regional transmission buildout is necessary, MISO should be clear about and mindful of the cost impacts to customers. Information MISO has provided on indicative Schedule 26A rates is helpful and shows the Schedule 26A rate could grow from \$1.77/MWh in 2025 to over \$6.00/MWh in 2035 depending on both the final costs to construct projects and actual future load levels. This is a significant cost increase that end-use customers will bear. MISO should consider working with its stakeholders to communicate this cost impact in other terms which can be more easily understood by a broader audience (e.g., average impact to a customer bill). As noted above, the Sector supports MISO continuing with regional transmission planning but sees a need for MISO to focus more on system optimization and for planning to overall become more dynamic and able to respond to material changes to the system. In addition, given the large amount of transmission being identified and improved, it is also important that transmission projects which are most needed are prioritized and accelerated. Managing congestion, addressing other system issues and continuing to plan for the future are all essential, and the sector looks forward to working with MISO on the best ways to meet these needs, which sector believes will be a combination of transmission, generation and other solutions.

MISO Response:

General Portfolio Comments

MISO appreciates the support for the LRTP effort.



Technology Consideration & Interregional Coordination

MISO supports the use of grid-enhancing technology (GET), although in practice, we believe that many of these technologies are better suited to smaller and more localized issues rather than as alternatives to 765 kV lines. As such, MISO investigated GETs and incorporated some, where needed and appropriate, into the Tranche 2.1 portfolio. Additionally, the portfolio will enable the use of GETs, and Transmission Owners may include some as they construct the portfolio. For example, they could consider newer conductor technology that provides higher thermal ratings than conventional conductors in any of the reconductor projects included in the portfolio.

MISO has engaged with PJM to coordinate impacts of upgrades its system, which has included discussions on routing. PJM will perform a “no harm test” to determine if the Tranche 2.1 portfolio impacts reliability on its system.

LRTP Portfolio Sufficiency

Tranche 2.1 includes appropriate transmission to support the proposed 765 kV overlay.

As part of the Tranche 2.1 planning process, MISO performed substantial analysis of study results to analyze the impact of the 765 kV portfolio on underlying facilities. In many cases this resulted in development of “underbuild” projects to further reinforce the underlying system, particularly when loading was aggravated by proposed facilities. MISO believes that the normal MTEP or Generator Interconnection Process is applicable when facilities were loaded specific to load or generation siting.

LRTP Business Case - Futures, Expansion, and Modeling

MISO agrees that the objective function of LRTP is to understand the value of transmission given the collective member resource plans as represented in the different Future scenarios. This approach is consistent with MISO’s role, and with how MISO and others have performed benefit analysis for regional transmission for over a decade. The objective is not to evaluate different member plans that might occur if the transmission doesn’t exist.

Monetizing the reliability value of transmission has been a long-standing industry challenge that can result in significantly undervaluing the economic value of transmission if left unaccounted for. MISO’s approach to this risk is conservative, with a focus on key criteria and select hours, as shown in the benefit metrics whitepaper.

LRTP Business Case - Mitigation of Reliability Issues Metric

This metric is intended to capture the monetary value of addressing reliability issues. More specifically, it focuses on a subset of commonly occurring issues that meet three criteria, and it applies them for only a subset of hours where a scenario could have load risk.

1. They must occur under single element or common structure contingencies in normal operations
2. They cannot be resolved through redispatch, and
3. They must be resolved by the inclusion of the LRTP Tranche 2.1 portfolio

It is appropriate to use Value of Lost Load (VOLL) in this instance, rather than a thermal proxy, as this represents the residual risk which MISO is attempting to mitigate – that is a simple constraint which cannot be redispatched around, which only occurs in a specific set of hours. This valuation is further supported using redispatch, and the focus on single element outages. This metric appropriately captures the avoided risk, not the cost of inefficient operations.

Monetizing the reliability value of transmission has been a long-standing industry challenge that can result in significantly undervaluing the economic value of transmission if left unaccounted for. MISO’s approach to this risk is conservative, with a focus on key criteria and select hours, as shown in the benefit metrics whitepaper.

Cost Containment and Affordability

MISO takes ensuring reliability and value to customers very seriously, and we carefully weigh costs and benefits in our transmission recommendations. MISO agrees that being mindful of affordability is important when performing regional transmission planning. The information provided in the MTEP24 report seeks to demonstrate the significant value in excess of costs provided by the Tranche 2.1 portfolio. Tranche 2.1 is estimated to cost MISO members about \$5 per 1,000 kWh of energy used while providing \$10 to \$18 of value over the same amount of usage, based on F2A analysis.



ITC Holdings Verbatim Comments:

ITC Holdings (ITC) thanks MISO for the opportunity to provide feedback on the Draft MTEP24 Report, which was recently discussed during an October 1, 2024, special meeting of the Planning Advisory Committee. ITC Holdings provides the following comments for MISO's consideration:

I. Draft MTEP Chapter 1 – Transmission Planning Overview

ITC supports MISO's Draft MTEP24 Transmission Portfolio and accompanying report. MISO's Order No. 890- and 1000- compliant MTEP planning process is an open, transparent, and time-tested process. ITC recognizes the importance of the MTEP planning process in addressing transmission issues, and as a participant, views the MTEP planning process as a critical component of MISO's Transmission Evolution initiative, which is one of the four prongs of MISO's Reliability Imperative.

II. Draft MTEP Chapter 2 – Regional Long Range Transmission Planning

ITC supports MISO's Long Range Transmission Planning work as another critical component of MISO's Transmission Evolution initiative and, in turn, a material contribution to solving MISO's Reliability Imperative. In particular, ITC supports the final \$21.8B LRTP Tranche 2.1 portfolio of projects included within Draft MTEP24 and Appendix A. MISO has extensively collaborated with stakeholders for approximately two years to finalize this portfolio and demonstrate its benefits. Specifically:

- ITC supports MISO's Futures-based planning approach, including MISO's approach for resource expansion and resource siting.
- ITC supports the final Tranche 2.1 portfolio developed through application of MISO's planning process and in collaboration with stakeholders. LRTP Tranche 2.1 is a visionary and necessary approach to solving MISO's Reliability Imperative.
- MISO collaboratively developed and socialized nine benefit metrics with its stakeholders over an approximate one-year period.
- MISO utilized nine-benefit metrics to develop a business case that is conservative and demonstrates that benefits of the LRTP Tranche 2.1 portfolio are likely to be realized and are broadly and equitably distributed throughout the MISO Midwest subregion (with an aggregate, conservative benefit-cost ratio of 1.8).¹
 - ITC supports MISO's approach to developing a reference case/change case to measure benefits for LRTP Tranche 2.1, as referenced throughout Chapter 2.
 - MISO's methodology to compute benefits for the Mitigation of Reliability Issues and Reduce Risks from Extreme Weather Impacts are appropriate, but quite conservative. The industry has learned from past experiences that significant load shedding can occur resulting in loss of life from even a single major event. There is no doubt that weather events are only becoming more severe and frequent, significantly increasing the likelihood and impact of major load shedding events.²
- LRTP Tranche 2.1 marks a significant step forward in addressing the Reliability Imperative. However, LRTP Tranche 2.1 does not resolve all the issues presented by Future 2A. ITC supports MISO moving forward with LRTP Tranche 2.2 soon after LRTP Tranche 2.1 is approved by MISO's Board of Directors.

III. Draft MTEP24 Chapter 3 – Interregional Planning

ITC supports the MISO/SPP Joint Targeted Interconnection Queue (JTIQ) Study and the portfolio of JTIQ projects included in MTEP24 Appendix A. JTIQ is a proactive, innovative, and collaborative solution to the pressing need for new generation interconnection capacity, especially for renewable resources along that

¹ See Draft MTEP24 Report, Chapter 2, at pp. 146-7.

² See id. at 4.



seam. JTIQ offers a more streamlined and efficient alternative to the traditional Affected System Study process, delivering cost and timing benefits to interconnection customers and supporting the development of a cleaner and more reliable electric grid. The United States Department of Energy (DOE) similarly recognized these visionary aspects of JTIQ, and announced approval of \$464 million of Grid Resilience and Innovation Partnerships (GRIP) funds to help defray the costs of the inaugural JTIQ portfolio.

ITC also supports the MISO-PJM Interregional Transfer Capability Study and the MISO-SPP Interregional Study, both of which were announced by MISO in 2024 but are not expected to yield any results until 2025. ITC supports MISO's solutions-oriented planning approach, and its acknowledgement that existing interregional planning processes have been ineffective. ITC looks forward to collaborating with MISO as these innovative interregional planning efforts progress.

IV. Draft MTEP Chapter 4 – Local Reliability Planning

ITC supports MISO Board approval of MTEP24's Local Reliability Projects, which includes 459 new projects in Appendix A representing over \$6.7 billion in transmission infrastructure investment.³ MISO's high-profile and portfolio-based and/or interregional-focused planning efforts may sometimes overshadow the day-to-day efforts to maintain the safe, reliable, and cost-effective operation of MISO's regional grid. However, MTEP Local Reliability Planning is the "bread and butter" of the annual MTEP, and this annual "bottom-up/top-down" open, transparent, and collaborative planning process is at least of equal importance to MISO's regional and interregional planning efforts.

V. Conclusion

ITC supports Draft MTEP24 and recommends that the Board approve MTEP24 as presented. ITC appreciates the opportunity to provide these comments to MISO and its stakeholder community.

MISO Response:

MISO appreciates the support.

³ See *id.* at Chapter 4, p. 4, Figure 4.1.-1.



Invenergy Transmission LLC Verbatim Comments:

Invenergy Transmission LLC (“Invenergy”) appreciates the opportunity to submit these comments regarding MISO’s proposal to include the Long Range Transmission Planning (LRTP) Tranche 2.1 Portfolio of transmission projects to the MISO Transmission Expansion Plan (“MTEP”) 24. Consistent with encouragement from MISO to take full advantage of the stakeholder process¹, these comments are largely focused on the “no-harm” analysis memorialized in Chapter 2 of the Draft MTEP24 report under the Refining Solutions and Robustness Testing section. In addition, these comments also build upon previous comments that Invenergy submitted on May 13, 2022, March 30, 2023, April 3, 2023, May 23, 2023, April 1, 2024, and May 13, 2024, as well as our vocal engagement in all the numerous Planning Advisory Committee meetings and LRTP workshops MISO hosted.

The decision to overlook advanced-stage merchant transmission in the base models have pushed the LRTP portfolio away from the Federal Energy Regulatory Commission (“FERC”) guidance that transmission planning should focus on the most efficient and cost-effective transmission solutions. In addition, this decision is counter to the Department of Energy (“DOE”) policy encouraging the development and construction of high-voltage lines connecting areas with significant renewable energy resources to load centers.

Invenergy believes there are opportunities for improvement for MTEP to better harmonize LRTP with merchant transmission based on experience from the LRTP Tranche 2.1 process, and Invenergy looks forward to continuing working with MISO to ensure the optimized, cost-efficient transmission that the grid needs and ratepayers can support.

Feedback on GBX Robustness Testing (i.e. “No-Harm” Analysis)

MISO asserts there is no need to include GBX in the Tranche 2.1 Base Case because MISO will undertake an after-the-fact sensitivity on Tranche 2.1 that includes GBX. This plan is deficient and short of what is needed to protect ratepayers.

The scope of what MISO studied as a sensitivity for Tranche 2.1 is inadequate. MISO will assess only whether GBX or other “key projects” will drive reliability issues on the system when their energy flows are added on top of Tranche 2.1.² This will not result in an optimized, lowest cost transmission portfolio. MISO must instead analyze each project in the Tranche 2.1 Portfolio starting with GBX in the Tranche 2.1 Base Case. GBX will inject 6.3 TWh annually, years before the Tranche 2.1 Portfolio comes online. The Tranche 1 Portfolio, which is included in the Tranche 2.1 Base Case, will come online contemporaneously with or after GBX, and GBX will be operational at least three-to-five years before the projects in the Tranche 2 Portfolio.

The scope must be a re-study or more appropriately an initial study that includes GBX in the Tranche 2.1 Base Case. MISO has, in effect, undertaken a restudy with its Tranche 2.1 business case assessment, for example, revising Futures 2A, GW shifted to other Zones, and using new metrics to select the Tranche 2.1 Portfolio. MISO should have included the 6.3 TWh of energy and hundreds of millions of dollars worth of GBX related network upgrades Invenergy has agreed to fund as part of that restudy not only because of the mature state of GBX but because MISO has already acknowledged that it will be putting GBX in its MTEP 25 Base Case. Without this requirement, a no-harm analysis will only assess the reliability impact on Tranche 2.1, not whether specific projects in Tranche 2.1 should be built in the first place.

Additionally, it is telling that MISO proposes to include the forthcoming JTIQ in the Tranche 2.1 no-harm

¹ See Members Call for More Tx Expansion Following MISO’s \$20B LRTP, RTO Insider (Mar. 21, 2024) (available at <https://www.rtoinsider.com/74431-members-call-more-tx-expansion-miso-lrtp-blueprint/>) (explaining that “MISO does its very best to ensure that it has a very open and transparent process . . . encouraging stakeholders to participate in MISO’s public planning meetings and voice concerns”) (internal quotations omitted).

² LRTP Tranche 2 FAQs at 14-15 (available at <https://cdn.misoenergy.org/MISO%20Long-Range%20Transmission%20Planning%20LRTP%20Tranche%202%20FAQs631005.pdf>).



analysis. Inverenergy agrees the proposed JTIQ projects should be in a no-harm analysis because JTIQ is merely at the proposal stage. In contrast, GBX has permits in all four states; acquired over 96% of the necessary HVDC main line right-of-way in Kansas and Missouri; and obtained all required long-term interconnection agreements with MISO (TCA), SPP and AECI among other development milestones.

Inverenergy thanks MISO staff and the leadership for their time and consideration and we look forward to working cooperatively in future LRTP planning.

MISO Response:

Merchant Transmission Modeling

The LRTP process focused on developing a robust, least regrets solution to the future needs of the system. The planning process did appropriately include late-stage transmission through robustness testing.

MISO appropriately included the Grain Belt Express (GBX) project into our LRTP robustness testing. The transmission system is ever evolving, and MISO cannot halt all study processes after each system change to reissue models. Instead, we rely on robustness testing to validate that key changes do not invalidate or require changes to projects as proposed.

MISO only includes merchant transmission into models when a Transmission Construction Agreement (TCA) is signed to enable the joint modeling of both the merchant transmission and any required transmission upgrades to the larger system. This approach ensures that the costs of such upgrades are appropriately assigned to the merchant transmission developer, and not captured in another study and allocated to MISO load. For example, the GBX TCA identified approximately \$430 million in related upgrades to connect the GBX Line to the MISO Transmission System to maintain the system's reliability.

In addition, MISO includes merchant transmission projects in some forward-looking models, such as those used in LRTP, if such projects are included in an integrated resource plan ("IRP"), or a preferred plan if no IRP is used, by a MISO Load Serving Entity ("LSE") or a MISO State.

The TCA for Grain Belt Express was executed in February 2024, after the submission dates to inform Futures (May 2023) and model building (October 2023), and after the initial issues identification was completed (December 2023). As such, MISO was unable to include it in base models per our processes and instead included it in robustness testing.

Robustness testing process scope was initially introduced in December 2023 and described more thoroughly in April 2024 in advance of testing being performed. This testing included key MTEP23 projects approved after the models were constructed and key MTEP24 projects, including but not limited to JTIQ, that could impact the LRTP portfolio. The detailed results and conclusions were shared in June 2024 with stakeholders via LRTP workshops and MISO's Sharefile site.

MISO found that none of the projects that underwent robustness testing for Tranche 2.1 impacted the needs defined for the Tranche 2.1 portfolio, affirming the value of the portfolio.

MISO disagrees that a project-by-project analysis or a restudy was required to ensure that there was no overlap between these projects and the LRTP portfolio. Each key project identified for robustness testing was analyzed in detail by looking at the relevant system conditions and contingencies.



NextEra Energy Resources Verbatim Comments:

NextEra Energy Resources (NextEra), on behalf of its affiliate, NextEra Energy Transmission (NEET) appreciates the opportunity to provide comments on MISO's September 20, 2024 Draft MTEP24 Report. NextEra's feedback is focused on two key areas of the Draft Midcontinent Transmission Expansion Plan (MTEP) 2024 Report (MTEP24) that are part of the Long Range Transmission Plan (LRTP): (1) the benefit metrics supporting the LRTP portfolio included in MTEP24, and (2) the direct assignment of the approximately 100-mile Illinois portion of LRTP Project 31: Sugar Creek – Collins 765 kV line to a transmission owner in the PJM Interconnection, LLC footprint. While NextEra commends MISO's efforts to develop its forward-thinking benefits metrics for this landmark transmission portfolio and broadly supports its approval by the MISO Board of Directors, NextEra expresses concerns over the assignment of a significant portion of LRTP Project 31 to a PJM Transmission Owner and urges MISO Staff and the MISO Board of Directors to reconsider the direct assignment of that project to a non-MISO member when costs for the project will be borne by ratepayers in MISO's footprint.

MISO's MTEP24 Benefit Metrics Appropriately Capture the Portfolio's Projected Benefits

NextEra recognizes the critical importance of MISO's annual Transmission Expansion Plan processes and this year's plan, which includes projects resulting from LRTP Tranche 2.1 work, is even more critical. MISO's development and application of key benefit metrics for LRTP Tranche 2.1 is forward-thinking and leans into the foundation MISO has built over the last 20 years, as well as FERC's recent Order 1920 directives.¹ These benefit metrics appropriately identify that the value LRTP Tranche 2.1 projects will deliver far exceeds the cost of the investment, with a benefit to cost ratio range between 1.8 to 3.5. NextEra supports the full range of benefit metrics developed and applied in MTEP24 and provides specific support for the use of reliability metrics and the avoided investment metrics.

Reliability Metrics Appropriately Capture Risks and Mitigation of Investments

MISO uses two metrics to appropriately capture the reliability benefits brought by the MTEP24 portfolio: Mitigation of Reliability Issues and Reduced Risks from Extreme Weather Impacts. Combined, these two metrics project benefits in the range of \$15 to \$44 billion.² The mitigation of reliability issues benefit metric identifies the value that results from avoiding potential unserved load due to thermal/voltage/stability issues on the system. MISO has developed a methodology for quantifying the remediation provided by LRTP Tranche 2.1 projects, largely based on deterministic analysis to assess the need for transmission reinforcements and evaluation of optimal regional transmission solutions. Ultimately, this approach identifies the difference in load curtailment determined with and without the LRTP Tranche 2.1 projects, and that delta is the resulting reliability benefit provided by the projects. MISO has thoroughly explained its key inputs, each step of its analysis, and model assumptions, including generation and load redispatch rules or limits.³

NextEra strongly supports the inclusion of Reliability metrics and the methodology developed by MISO to calculate these metrics. These metrics are essential for accurately capturing the critical reliability benefits provided by transmission, especially given the increasing strain on the electric grid from extreme weather events.

Avoided Investment Metrics

¹ Building for the Future Through Electric Regional Transmission Planning and Cost Allocation, Order No. 1920, 187 FERC ¶ 61,068 (2024) ("Order No. 1920").

² See MTEP24 Report Preview, Planning Advisory Committee, Oct. 1, 2024, <https://cdn.misoenergy.org/20241001%20PAC%20Item%2002%20MTEP24%20Report%20Preview650567.pdf>.

³ See LRTP Tranche 2 Business Case Metrics Methodology Whitepaper, Oct. 1, 2024, <https://cdn.misoenergy.org/LRTP%20Tranche%202%20Business%20Case%20Metrics%20Methodology%20Whitepaper633738.pdf>.



MISO has identified three metrics that it categorizes as “Avoided Investment”: Avoided Capacity Cost (ACC), Capacity Savings from Reduced Losses, and Avoided Transmission Investment. Of these, the most impactful metric is the ACC, with a calculated benefit of \$16.3 billion. This metric reflects the capital cost savings from the increase in transmission capability provided by the LRTP Tranche 2.1 projects, enabling access to resources across the broader MISO footprint. This benefit measures the change in loss of load expectation (LOLE) to determine the adjustment needed to the MISO-wide planning reserve requirement to meet the LOLE target with and without the LRTP Tranche 2.1 projects.

NextEra supports MISO’s use and application of the ACC in the assessment of benefits of LRTP Tranche 2.1. NextEra acknowledges that certain commenters, including MISO’s Independent Market Monitor (IMM) have challenged the use of ACC in development of the LRTP Tranche 2.1 Business Case. While the IMM has recommended MISO eliminate ACC benefits from the analysis, MISO has acknowledged that LRTP Tranche 2.1 can send market price signals that influence resource entry and siting. Additionally, MISO has appropriately included the ACC metric because transmission provides necessary optionality relative to the location of load. As MISO has accurately commented, due to load peaks at different locations and times across the footprint, the market sends more accurate signals to new resources with transmission modeled than without.⁴ Accordingly, NextEra supports continued inclusion of the ACC metric in the LRTP Tranche 1 Business Case.

MISO Should Follow Existing Tariff Provisions for Assignment of LRTP Project 31

MISO’s draft MTEP24 Appendix A includes LRTP Project 31: Sugar Creek – Collins 765 kV line, which is subdivided into three facilities in the “Facilities” worksheet. The Sugar Creek – Collins 765 kV line is an approximately 125-mile new, greenfield transmission line project between Wisconsin and Illinois that initiates in the MISO footprint at Sugar Creek, crosses the border between Illinois and Wisconsin after approximately 25 miles, and continues for another 100 miles to the Collins substation in the PJM footprint. MISO’s draft Appendix A separately identifies the transmission line project and the substation project at the Collins substation. The Facility Description field of Appendix A for the project states, “[t]his transmission line will be assigned to a PJM Transmission Owner.”⁵ No further explanation, tariff, or Business Practices Manual citation is provided for this apparent direct assignment of this line to a “PJM Transmission Owner.”

The tariff provisions in effect at the time a project is approved for inclusion in Appendix A control the selection of the developer for the project. Upgrades to existing PJM facilities, like that of the Collins substation, are directly assigned to a PJM Transmission Owner. However, for the identified greenfield transmission line, such an assignment is inappropriate under MISO’s tariff. It appears MISO is not following its tariff by introducing geographic boundaries into its analysis and no basis exists in the tariff for MISO to make such an assignment to a PJM Transmission Owner. Accordingly, MISO should follow existing tariff provisions to govern the assignment of LRTP Project 31 and MISO should not include the project in the draft MTEP24 Appendix A with the notation that it would “be assigned to a PJM transmission owner” for presentation to the MISO Board of Directors. Further, MISO should engage with stakeholders about how best to equitably assign such projects because based on MISO’s current approach, ratepayers in MISO’s footprint would bear the costs of a \$521.6 million project wholly recovered by a PJM Transmission Owner. In the absence of this project being awarded through MISO’s Competitive Transmission Process, MISO customers lack protection against potential cost overruns and/or schedule delays. MISO should engage with stakeholders to explain how it will protect MISO customers if it transfers oversight and control over the development and construction of a major 765 kV greenfield transmission project to a non-MISO member who is not accountable under the MISO tariff.

As recently as LRTP Tranche 1, MISO identified a project that was split by RTO boundary lines. In that situation, MISO included the transmission line in a competitive request for proposals and assigned substation

⁴ See MISO Response to IMM Memo, Sept. 11, 2024, <https://cdn.misoenergy.org/MISO%20Response%20to%20IMM%20Memo646682.pdf>.

⁵ See MTEP24 Appendix A – LRTP TR2.1 projects recommended for approval, <https://www.misoenergy.org/planning/transmission-planning/mtep/#t=10&p=0&s=&sd=>.



upgrades to the respective incumbent transmission owners. A similar set of facts exists here with LRTP Project 31, yet MISO has stated that in addition to the substation upgrades, the Illinois portion of the transmission line itself will be assigned to the non-MISO transmission owner, while costs will be borne by ratepayers within MISO's footprint. The facts underlying LRTP Project 31 strongly suggest that the entire 765 kV line from Sugar Creek substation in Wisconsin and Collins substation in Illinois should be included in a single competitive Request for Proposals.

Conclusion

NextEra appreciates the opportunity to provide these comments and commends the effort and work product of MISO to develop this landmark MTEP24. While NextEra fully supports MISO's MTEP24 benefit metrics, as they reflect a robust and valuable business case for the LRTP portfolio, NextEra urges MISO to reconsider its direct assignment of the Illinois portion of LRTP Project 31 to a PJM Transmission Owner and subject that MISO-funded facility to Request for Proposals under MISO's Competitive Transmission Process.

MISO Response:

General Portfolio Comments and LRTP Business Case

MISO appreciates the support.

Assignment of LRTP Project 31 (Sugar Creek to Collins 765 kV project)

In short, MISO's Tariff enables the funding of projects within the Multi-Value Projects (MVP) portfolio both within and outside of the MISO Transmission System. The direct assignment also is in line with the MISO Tariff and FERC Order 1000.

Foundationally, in Order No. 1000, FERC recognized that regional transmission planning processes may identify upgrades that may be required in another region. This enables MISO staff to work with PJM to define cost allocation and ownership responsibility for the LRTP upgrades within PJM's service territory.

- FERC accepted MISO's proposed approach, on a case-by-case basis, to work with the constructing neighboring-region transmission owner in these instances.*
- MISO's Tariff includes language that provides that network upgrades needed as a direct result of the development of MVPs may be cost shared.*
- MISO is also aware of several FERC-accepted funding agreements where a transmission provider or owner funds necessary upgrades located in another transmission provider or owner's footprint.*

Because the PJM-located upgrades will be under PJM's functional control, and will be included in the PJM Transmission System, PJM's rules will determine whether such upgrades may be eligible for competition.

- PJM would classify these projects as supplemental.*
- Supplemental Projects refers to transmission expansion or enhancements not needed to comply with PJM reliability, operational performance, FERC Form No. 715, economic criteria or State Agreement Approach projects.*



North Dakota Public Service Commission Verbatim Comments:

The North Dakota Public Service Commission (NDPSC) has reviewed MISO's Tranche 2.1 business case metrics, and although we agree that transmission is vital to ensuring reliable power at affordable rates, the NDPSC concludes that MISO's methodology is deeply flawed. Without the makeweight benefits and erroneous calculations and assumptions presented in the LRTP Tranche 2.1 business case, the substantial costs imposed on customers would be unjustified.

The NDPSC urges MISO to reconsider its Tranche 2.1 business case and disagrees with the inclusion and calculation of the mitigation of reliability issues, avoided capacity cost, and decarbonization values, and has concerns with the projected lack of congestion and fuel savings. Furthermore, the NDPSC has reviewed the IMM's critique and assessment of the LRTP Tranche 2.1 planning and urges MISO to model and show benefit-cost metrics as proposed by the IMM.

CONCERNS

Due to constraints, the NDPSC cannot fully present all its concerns, but the following are some critical issues with the current Tranche 2.1 business case:

The methodology significantly exaggerates benefits. The benefits of the transmission portfolio are neither realistic nor quantifiable in what they measure. The Mitigation of Reliability Issues benefit is grossly inflated. MISO assumes that grid operators would prevent load shed, not by investing in or identifying local reliability MTEP, voltage support, or other transmission projects, but by avoiding \$3500/MWh Value of Lost Load emergencies, with plans to increase this figure to \$10,000/MWh with both values based upon survey. This approach inflates costs by assuming extreme scenarios that are unlikely under typical grid planning. A more reasonable strategy would focus on preventative investments in local reliability projects and other transmission investments.

The avoided capacity cost benefit is flawed. The Avoided Capacity Cost benefit is similarly overstated and invalid. MISO assumes that resource siting remains static with or without Tranche 2.1. In reality, without the proposed buildout, utilities may be more apt to site resources closer to demand, thereby avoiding unnecessary generation MISO has placed in its models. MISO has not accounted for these adaptive measures in its model, resulting in an inaccurate cost-benefit analysis. MISO argues it is not a resource planner, yet the models select resources not existing within member plans and resources that rely upon IRP placeholders subject to significant uncertainty. A more realistic reference case should be developed, reflecting how utilities would respond without Tranche 2.1.

Congestion and fuel show diminishing economic benefits. Tranche 2.1 provides limited economic benefits in terms of congestion and fuel savings, particularly compared to Tranche 1. These savings, which are the most realistic and quantifiable benefit metric to justify the high costs of the portfolio, are diminished, raising concerns about the overall value of the portfolio. MISO must provide more robust evidence of how Tranche 2.1 will deliver long-term economic value to customers.

The model provides inconsistent carbon value assumptions. MISO has adopted a carbon value that is not the result of law and does not reflect the varied carbon policies of its member states. For North Dakota, this is especially concerning, as MISO's model imposes decarbonization benefits that conflict with state law. A more tailored approach is needed to show how each state will benefit from the portfolio based on its specific goals and regulations.

The modeling assumptions are outdated. Along with correcting the benefits, MISO should test Tranche 2.1 against an additional sensitivity that includes more dispatchable, storage, and hybrid resources as proposed by the IMM. Current models rely on outdated resource accreditation, which skews the results. For example, under the recently filed DLOL accreditation, wind and solar would receive far less credit. MISO should show the full range of benefits for such a sensitivity to ensure it is planning a least-regret and prudent portfolio



robust to different system configurations.

CONCLUSION

The NDPSC is seriously concerned about the financial burden Tranche 2.1 would place on customers, particularly in North Dakota. Taking into consideration the error in methodology and the critiques presented by the IMM, the benefit-cost ratio falls significantly below the required levels. The resulting increased rates, without corresponding benefits, are unacceptable.

While the NDPSC supports transmission infrastructure, we find the current benefit calculations for Tranche 2.1 arbitrary and adverse to the interests of North Dakota customers. We strongly urge MISO to reevaluate its benefit metrics, develop an alternative reference case that accurately reflects decisions that utilities would make in the absence of Tranche 2.1, and run a sensitivity on a case as proposed by the IMM. This will allow for a more prudent investment that balances affordability with the long-term needs of the grid.

MISO Response:

L RTP Business Case

MISO is confident that its comprehensive regional planning process has appropriately managed the uncertainty inherent in developing solutions that address a resource mix and issues 20 years into the future and in estimating the value of those solutions to MISO's members. No edits to the benefit methodologies are required.

The Tranche 2.1 business case was developed using the Tranche 1 business case process as a starting point, with discussions on process revisions for Tranche 2.1 business case metrics beginning in January 2023. Over the next 18 months, MISO engaged stakeholders on the methodology development for each benefit metric, including the development of a detailed business case benefit metrics methodology whitepaper. In summary MISO disagrees with the need to eliminate or modify the avoided capacity cost or mitigation of reliability issues metric with a more detailed explanation to that position included below.

L RTP Business Case - Avoided Capacity Cost Metric

The Avoided Capacity Cost metric reflects the incremental resource capital cost savings from the increase in transmission capability provided by L RTP Tranche 2.1. This increased transfer capability enables access to resources over the Midwest Subregion and captures the resource and load diversity and operational flexibility benefits provided over larger geographic areas.

The methodology used to calculate this metric matches the objective function of L RTP - to understand the value of transmission given the collective member resource plans, as represented in the different Future scenarios. This approach is consistent with how MISO and others have performed benefit analysis for regional transmission for over a decade. The objective is not to take the role of a central resource planner by proposing resource plans, or to force the evaluation of different member plans that might occur if the transmission does not exist by shifting resources.

Specifically, a key part of the Future creation process is stakeholder review of the location of these resources. Resource locations are initially sited by MISO planning staff, considering the physical characteristics of the transmission system, local resource requirements (e.g., Local Clearing Requirements) and Generator Interconnection Queue information. Stakeholders then have the opportunity to review and provide feedback on the resource sites, submitting over 500 recommended changes on Futures used for Tranche 2.1, which was used to inform the final resource siting.

L RTP Business Case - Mitigation of Reliability Issues Metric

This metric is intended to capture the monetary value of addressing reliability issues. More specifically, it focuses on a subset of commonly occurring issues that meet three criteria, and it applies them for only a subset of hours where a scenario could have load risk.



1. They must occur under single element or common structure contingencies in normal operations
2. They cannot be resolved through redispatch, and
3. They must be resolved by the inclusion of the LRTP Tranche 2.1 portfolio

It is appropriate to use Value of Lost Load (VOLL) in this instance, rather than a thermal proxy, as this represents the residual risk which MISO is attempting to mitigate – that is a simple constraint which cannot be redispatched around, which only occurs in a specific set of hours. This valuation is further supported using redispatch, and the focus on single element outages. This metric appropriately captures the avoided risk, not the cost of inefficient operations. Monetizing the reliability value of transmission has been a long-standing industry challenge that can result in significantly undervaluing the economic value of transmission if left unaccounted for. MISO's approach to this risk is conservative, with a focus on key criteria and select hours, as shown in the benefit metrics whitepaper.

LRTP Business Case - Congestion and Fuel Savings

LRTP Tranche 2.1 is primarily a reliability-based portfolio, although it also provides a broad range of value as demonstrated in the business case.

The change in the resource mix and the expectations that the MISO system will be operating at its reserve margin in the future create a paradigm where transmission is required to deliver output from scarce generation resources to load. The value of the transmission lines was demonstrated through the 'deep dive' analysis shared with stakeholders at the September 23rd LRTP workshop and captured in the MTEP24 report. It wasn't unexpected to see the Congestion and Fuel Savings metric providing a reduced share of the overall portfolio value, given the change in the resource mix to higher-levels of resources (i.e., solar and wind) with near-zero fuel and variable operating costs. The Congestion and Fuel Savings metric is inherently conservative because economic planning models use an intact transmission system with no transmission outages, unlike what happens daily in real-time operations with dozens of transmission outages. However, as noted in FERC Order 1000, alleviating congestion is just one of the many potential benefits that transmission infrastructure provides.

LRTP Business Case - Decarbonization

MISO disagrees that it is improper to capture the value of decarbonization for the MISO Midwest footprint, although we agree that individual states or stakeholders may not recognize the benefit.

To accommodate this viewpoint, MISO provides the decarbonization benefit as a separate benefit to clearly show the estimated monetary value attributed to this benefit metric. This enables MISO stakeholders to understand the contribution to the portfolio and the distribution of this benefit across the Midwest Subregion.

LRTP Business Case - Futures, Expansion, and Modeling

The objective function of LRTP is to understand the value of transmission given the collective member resource plans as represented in the different Future scenarios. MISO is confident that Future 2A and Future 1A provide a sufficient bookend to demonstrate a conservative estimation of the value from the Tranche 2.1 portfolio.

MISO is not a resource planner; creating scenarios with a preference towards a specific resource type outside of these plans would run afoul of MISO's fuel agnostic approach and create a scenario that diverges from member resource plans and inputs gathered through the stakeholder process.

To ensure that the Futures used in the Tranche 2.1 portfolio analysis were sufficiently robust given changing system conditions, MISO conducted multiple screenings assessing the impact of different changes on the resource mix, including "low accreditation" and "high gas and battery". These results, which were discussed at the October 2, 2023, LRTP workshop, demonstrated that Future 1A and Future 2A represent reasonable bookends which either encompassed or were anticipated to require less transmission than other tested scenarios.

Additionally, both Future 2A and Future 1A were screened to ensure the resource expansion contained sufficient dispatchable resources. Additional resources were added to the Future 2A expansion to ensure energy adequacy; no additional resources were required for Future 1A.



Otter Tail Power Company Verbatim Comments:

Otter Tail Power Company (Otter Tail) appreciates the opportunity to provide comments on MISO's Draft MTEP24 report. While we are generally supportive of the entire draft MTEP24 report, our comments focus specifically on the Long Range Transmission Planning (LRTP) Tranche 2.1 and Joint Targeted Interconnection Queue (JTIQ) Projects.

For nearly 15 years, MISO has performed long range transmission planning and was the first Regional Transmission Organization to recognize the need for this longer-term planning process. MISO developed a process that is held up as a model for the entire nation under Order 1920, and MISO continues to fulfill its duty to provide a reliable transmission system to meet the future needs of its members with robust portfolios under the LRTP planning process. Planning for 20 years of transmission needs involves forecasting a number of inputs and working amid uncertainty. MISO uses future scenarios, which are developed with the opportunity for active engagement by stakeholders. Otter Tail believes these are reasonable bookend scenarios that produce a least-regrets portfolio of projects to account for those uncertainties. Otter Tail believes the nine benefit metrics are appropriate, well-defined, and develop a business case that is conservative for Tranche 2.1. We know the LRTP Tranche 2.1 projects will bring additional benefits not quantified by MISO within the metrics analysis and the facilities will continue to bring benefits to the region well beyond the 40-year period quantified by MISO. We are seeing increasing costs of transmission to meet the future needs of the region, but doing nothing is simply not an option. MISO's comprehensive and collaborative LRTP process produces a regional solution that Otter Tail believes is the most cost-effective approach to maintaining a reliable grid and meeting future needs. Otter Tail fully supports MISO's LRTP planning process.

As a stakeholder, Otter Tail provided feedback to MISO numerous times in the futures and portfolio development. We made suggestions on the alternative siting of future generation as well as on the project alternatives. The initial Draft Tranche 2.1 portfolio fell short of addressing the needs in the North Dakota, South Dakota, and western Minnesota areas. As part of the alternative's submission process, Otter Tail submitted projects to address additional needs, along with our analysis to support these projects. Ultimately, MISO agreed with our identification of additional voltage and thermal constraints that needed to be resolved as part of Tranche 2.1, and they accepted some of our proposals while providing alternate solutions to others. Otter Tail believes the final MISO Tranche 2.1 portfolio addresses most areas of concern that we had with the initial draft portfolio. Notably though, MISO Tranche 2.1 does not address all the needs in the Midwest Subregion. Therefore, Otter Tail supports MISO moving forward on LRTP Tranche 2.2 soon after LRTP Tranche 2.1 is approved.

Regarding the JTIQ projects, Otter Tail supports the portfolio that resulted from this novel approach to affected systems studies. The JTIQ planning process provides efficient solutions to address the delays in the current process and targets the constraints that create significant barriers to interconnection of new generation along the seam.

MISO Response:

MISO appreciates the support.



Prairie Power, Inc. Verbatim Comments:

- Page 1-7: May want to highlight other interregional planning efforts other than JTIQ.
- Page 1-13: Include other interconnected areas such as TVA and Ontario.
- Page 2-10: Explain how MISO incorporated chronological-based models and transmission into Tranche 2.1 planning.
- Page 2-10: Explain how MISO incorporated chronological-based models and transmission into Tranche 2.1 planning.
- Page 2-38: Further explain “100% renewable penetration”. Is this at low load with high renewable output?
- Page 2-137: Explain why Region 4 benefits are negative.

MISO Response:

Interregional Coordination

Chapter 3 describes interregional planning efforts with SPP and PJM.

While MISO coordinates planning activities with both Southeastern Regional Transmission Planning (SERTP), which includes TVA, and Ontario (Independent Electricity System Operator - IESO), there were no study activities in the 2024 cycle to report on in this report.

LRTP Business Case - Futures, Expansion, and Models

The third paragraph in Section 2.2 was updated to include a footnote to provide clarity that the economic analysis utilizes chronological-based models, as well as including a link to the MISO Economic Study Whitepaper, which discusses this topic in more detail.

The 2042 LRTP Average Load Case represents typical system conditions within 70-80% on the load duration curve. However, with the resource evolution captured in LRTP models, this scenario is the most stressed case. It includes 100% renewable penetration, meaning that all MISO load is being served by renewables, and is the most severe case due to the required transfers of generation across large distance to load. The report has been updated to clarify.

LRTP Business Case

The total benefits for Illinois (Local Resource Zone 4, or LRZ 4) are in excess of their costs. The nine distinct benefit metrics in the Tranche 2.1 Business Case provide \$3.6B to \$8.0B in total benefits for LRZ 4.

Prairie Power’s comments likely refer to the negative results for LRZ 4 captured in Congestion and Fuel Savings. These negative benefits are mainly driven by revenue losses from nuclear power (assumed as a must-run unit in all LRTP cases) and a decline in net exports. The addition of the Tranche 2.1 portfolio further reduces generator Locational Marginal Prices (LMPs), increasing renewable resource curtailments in LRZ 4 and a reduction in net exports.



WPPI Energy Verbatim Comments:

Introduction

1. WPPI is a member of the Municipal/Cooperative/Transmission Dependent Utility (TDU) Sector, and joins in the comments submitted by that sector. We add further comments below.

Chapter 1

2. At p. 6/21 of Chapter 1, MISO describes the goal of transmission planning as identifying “the optimal locations for generation to minimize the total cost between generation and transmission investment.” Ideally this would involve a careful effort to find the low point in the combined generation and transmission cost curve (i.e., the “bathtub curve”). MISO’s LRTP Tranche 2.1 study effort fell short of this ideal by assuming generator locations at the outset and performing limited evaluation of a single alternative resource expansion for each Future considered.

Chapter 2

3. At p. 22/155 of Chapter 2, MISO says that, in the Tranche 2.1 study, it “conducted transient stability analysis ensuring the system meets necessary performance requirements in the Midwest subregion.” Our review of the posted reliability results indicates that not all transient stability issues were fully resolved with the Tranche 2.1 projects. This is not to deny that those projects provide very significantly improved stability performance, or to suggest that the remaining issues are necessarily difficult to address or that they would pose significant system limitations. We simply suggest that MISO clarify in the report that its Tranche 2.1 cases continue to show inadequate transient stability performance for some events, and thus do not fully satisfy performance requirements for the dispatch scenarios in those cases.
4. We agree with MISO that 765 kV transmission makes sense in the scenarios considered in Tranche 2.1, as it is liable to provide the most transfer capability for a given unit of cost or land area. This is particularly true given the opportunity to connect to and expand upon the existing 765 kV network in Indiana and states to the east. However, new 765 kV transmission will generally make sense only where it is extended as a network, with at least two paths connecting to the existing 765 kV network, rather than as radial 765 kV.
5. We note also that MISO’s description of voltage-related transfer-capability differences, as illustrated in Figure 2.27, presents an incomplete picture. Where new 345 kV transmission is built using a high-capacity low-impedance design (which we should strongly consider for long-distance 345 kV transmission going forward), one 765 kV circuit is more comparable to four 345 kV circuits than six. And once operating rules that require planning for the worst transmission contingency are considered, six such 345 kV circuits are likely more comparable to two 765 kV circuits rather than one.
6. At p. 65 of Chapter 2, MISO says “MISO intentionally planned the system to increase the SIL of regional lines when practical (e.g., use of 765 kV options and high-SIL 345 kV options for very long 345 kV lines).” We agree that high-SIL 345 kV designs merit consideration in LRTP along with higher voltages. However, our review of the August 6 cases—apparently the most recent cases posted—shows fairly ordinary SIL characteristics for several of the longer 345 kV lines in the portfolio, including Maple River-Cuyuna, Denver-Ludington, Maywood-Belleau, Lehigh-Twinkle, Franklin North-Twinkle, S. Fond du Lac-Jefferson and Iron Range-St. Louis Co. We would ask MISO to clarify where it incorporated high-SIL 345 kV designs in its Tranche 2.1 planning and where this is reflected in the models.
7. At pp. 65-66 of Chapter 2, MISO suggests that, because the proposed 765 kV lines provide substantial reactive power during moderate-loading conditions, there is no need to look at other voltage support in the LRTP process. This conclusion is not supported, however, and MISO’s own models show significant voltage issues associated with regional transfer, particularly on long 345 kV paths for contingency outage of proposed new 765 kV facilities (which would also represent future conditions



with Tranche 1 facilities in place but not the 765 kV additions, which could potentially be an extended period). Furthermore, it is far from clear that these issues can reasonably be, as MISO suggests, addressed via non-LRTP MTEP processes, given the different inputs used in those study processes. WPPI raised this issue in its MTEP21 Addendum comments on the Tranche 1 portfolio, and MISO's response indicated they would consider this in the next phase. Having not focused on this in Tranche 2.1, it is increasingly important that MISO do so in the proposed Tranche 2.2 study.

8. Our view is that MISO's proper role in long-range planning is to try to plan around projects like the merchant HVDC projects that have been proceeding through study queues for several years, rather than planning lines that would yield similar transfer capability between similar endpoints. We appreciate MISO's willingness to make adjustments to its Tranche 2.1 plans in Illinois and Missouri to provide improved transfer within MISO while avoiding potential duplication with such merchant projects.
9. MISO's description of the Near-term Congestion Analysis work appears to end before any reporting of results or lessons learned in the effort. We are aware that MISO posted a results spreadsheet to the Sharefile site on October 14, which is the due date for this feedback. We would ask MISO to incorporate these and any other available results into the final version of the MTEP24 report, and to extend this reporting to MTEP25 to the extent further results are available after the deadline for inclusion in the MTEP24 report.

Chapter 3

10. We encourage MISO—along with involved Transmission Owners and regulators—to ensure that the Lyon County-Lakefield JTIQ project is designed with the capability to hold a second 345 kV circuit, as this would appear to make the best use of right-of-way, and we expect this capability will be particularly important to get the most out of the 765 kV Big Stone South-Lakefield 765 kV Tranche 2.1 project.
11. We understand that the several JTIQ projects would have construction responsibility split between MISO and SPP (and between their respective Transmission Owners), and that only the MISO-responsibility projects are included in MTEP24 appendix A. Given that approval of all the JTIQ projects would be necessary to achieve the objective of the JTIQ effort, we presume that any MISO Board approval of MISO's share of the JTIQ portfolio would be contingent upon SPP granting whatever approval is necessary for its share of the JTIQ portfolio. We ask MISO to clarify whether this is correct.

MISO Response:

LRTP Futures, Expansion, and Models

The objective function of LRTP is to understand the value of transmission given the collective member resource plans as represented in the different Future scenarios. MISO is confident that Future 2A and Future 1A provide a sufficient bookend to demonstrate a conservative estimation of the value from the Tranche 2.1 portfolio.

MISO is not a resource planner; creating scenarios with a preference towards a specific resource type outside of these plans would run afoul of MISO's fuel agnostic approach and create a scenario that diverges from member resource plans and inputs gathered through the stakeholder process.

To ensure that the Futures used in the Tranche 2.1 portfolio analysis were sufficiently robust given changing system conditions, MISO conducted multiple screenings assessing the impact of different changes on the resource mix, including "low accreditation" and "high gas and battery". These results, which were discussed at the October 2, 2023, LRTP workshop, demonstrated that Future 1A and Future 2A represent reasonable bookends which either encompassed or were anticipated to require less transmission than other tested scenarios.

Additionally, both Future 2A and Future 1A were screened to ensure the resource expansion contained sufficient



dispatchable resources. Additional resources were added to the Future 2A expansion to ensure energy adequacy; no additional resources were required for Future 1A.

L RTP Portfolio Sufficiency and Technology Consideration

MISO has clarified language to describe how transient stability analysis is considered to determine the degree to which the proposed portfolio improves system performance specific to angular stability.

The additional 765 kV included in the L RTP Tranche 2.1 portfolio was generally added as a network with two paths originating in Southwestern Minnesota and extending to Central Illinois (one through Iowa and one through Wisconsin). For 765 kV elements that were not fully networked at the 765 kV level, they were integrated with existing or proposed 345 kV transmission, both to support current needs and the potential for future expansion. In all scenarios, MISO performed contingency analysis to ensure that the L RTP Tranche 2.1 portfolio was sufficiently robust.

MISO agrees that one 765 kV circuit (typical Surge Impedance Loading (SIL) above 2400 MW for 6-conductor bundle) would be comparable to four 345 kV high-capacity circuits, while noting that these high capacity 345 kV lines are not yet in widespread use. MISO is supportive of high capacity 345 kV lines, particularly for longer lines where post contingent loading could exceed the safe loading limit of the line, and has specified one of the proposed 345 kV circuits in the L RTP Tranche 2.1 portfolio (the Maple River – Cuyuna 345 kV line) to have a minimum SIL of 550 MW.

MISO did not intend to suggest that establishment of a 765 kV backbone would address all voltage issues. In fact, MISO does not believe it would be prudent planning to commit to solutions to all potential voltage issues at this time, and we believe that our planning processes in aggregate, inclusive of MTEP and Generator Interconnection, will appropriately address any future needs.

Voltage support solutions tend to be shorter lead time than constructing long distance transmission, so a final commitment to a specific voltages support solution for an issue uncovered in 2042 is not needed at this time. Additionally, other methods of addressing voltage issues could arise in the intervening years, providing a more cost-effective solution.

Near-Term Congestion Study

Near-Term Congestion Study (NTCS) results, recommendations, and lessons learned will be included in the final MTEP24 Report and shared at the October 30th Planning Subcommittee (PSC). Input on Grid-Enhancing Technologies (GETs) based on the published NTCS flowgate report can continue to be sent to the ep@misoenergy.org email. GETs suggestions not received by the posting of the MTEP24 Report will be shared at the November 13th PAC.

JTIQ

The Lyon County – Lakefield project is correctly scoped as a single circuit 345 kV based on the JTIQ analysis. However, MISO is not precluding future enhancements.

SPP's Board of Directors has approved the JTIQ projects that they are responsible for.



Memorandum

TO: Midcontinent ISO

FROM: David Patton

DATE: July 15, 2024

RE: Concerns and Recommendations for the Tranche 2 Benefit Methodologies

Transmission investment will be a critical component of MISO's evolution over the next 20 years. It is, therefore, vitally important that this investment be economic. Uneconomic investment will raise costs and undermine efficient and economic investment in resources, storage, and other alternatives to transmission.

We have previously expressed concerns about that the Future 2A resource assumptions are extremely unrealistic. We have reviewed and evaluated the various benefit methodologies MISO has proposed to utilize for Tranche 2. This includes 9 classes of benefits MISO intends to estimate. As we describe in this memo, we find that the proposed methodologies are likely to lead to substantially over-estimated benefits. We describe the changes we recommend to ensure that the benefits are an accurate basis for making determinations on the Tranche 2 projects. These recommendations are summarized at the end of this memo, including a description of MISO's initial responses to the recommendations, if any.

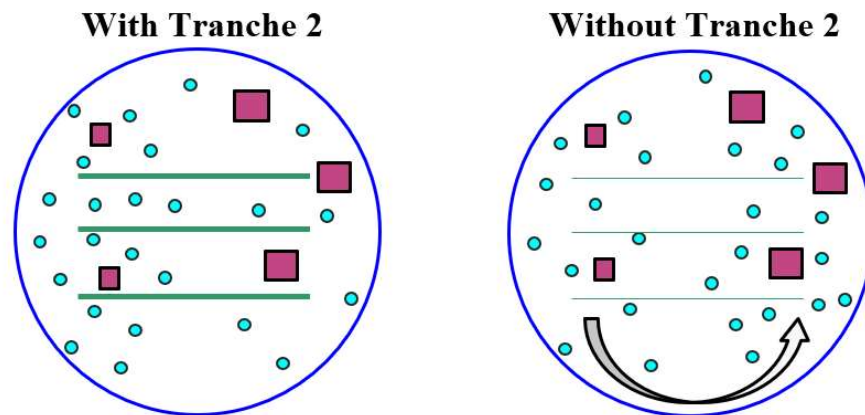
A. Fundamental Issue Affecting Multiple Classes of Benefits

One of our primary concerns is that the effects of MISO's markets are not properly recognized in the benefit cases. Specifically, MISO does not recognize that the transmission investments in Tranche 2 will affect the resources that enter in the Midwest and where they are located. MISO has developed a single Reference Case, including siting assumptions that are based on an exogenous methodology (existing sites and sites identified by stakeholders). In reality, resource entry and siting decisions will be substantially affected by the transmission investments because it will affect congestion pricing and local capacity requirements in the PRA.

To ignore these effects is a key oversight given that *one of MISO's fundamental roles is to operate markets designed to facilitate resource investments* by regulated and unregulated utilities alike. Therefore, it is essential for MISO to have two generation siting cases:

- A case *with* the Tranche 2 investments; and
- A case *without* the Tranche 2 investments.

The differences in resource entry and siting in these two cases must be estimated because they will affect the transmission needs and congestion patterns. Therefore, the benefit estimates will not be accurate if MISO does not estimate the effects of the transmission investments on participants' resource investment and siting decisions. This is illustrated in the figure below where the blue circles represent resources and the maroon squares represent load centers.



This illustration shows why the benefit analyses must recognize that new transmission will change energy and capacity market signals – because less transmission will shift resources closer to load. The left illustration shows a larger share of resources located farther from load and utilizing the reinforced transmission network to deliver its energy output to the larger load centers. The right illustration shows that the location of resources will shift if less transmission is built, generally toward the load. This will occur because both investment and retirement decisions will be affected by the change in market signals and capacity requirements. Importantly, this shift in resources will reduce or eliminate many of the benefits MISO plans to estimate (e.g., avoided capacity costs and the benefits of reduced losses).

Recommendation 1: To address this fundamental concern, we recommend MISO develop a reference case with modified siting assumptions that reflect the effects of not building the Tranche 2 transmission projects.

MISO has proposed 9 classes of transmission benefits. We believe the *Congestion and fuel costs savings* and the *Reduced transmission outage costs* are likely to be the most valid and reasonable, depending upon the details of the implementation. However, as we discuss in this memo, we have fundamental concerns and recommend MISO delete these classes of benefits or substantially modify them.

- *Avoided capacity costs* – where benefits are driven by the siting assumptions.
- *Decarbonization* – should be based solely on the PTC values, which will be double counted if not removed from the congestion and fuel savings.
- *Mitigation of reliability issues* – better addressed with specific remedies.

We also have concerns that some of the remaining categories may be overestimated given the methodologies proposed by MISO. However, we discuss these concerns and recommendations

to address them below in this memo. Each section below discusses one class of benefits, beginning with the two most valid classes of benefits, followed by the three classes of benefits that raise the greatest concerns and the remaining classes of benefits.

Before discussing the individual classes of benefits, the first subsection discusses key recommendations regarding MISO's overall approach for quantifying the benefits of the Tranche 2 projects to ensure that it is able to find a "no regrets" portfolio of projects as it intends.

B. Project Aggregation and Sensitivities in the Benefit Cost Analysis

One of the dangers of evaluating the benefits of many projects together is that some of them in the portfolio could have very large benefits contribute to the portfolio having a benefit cost ratio substantially above 1 even if a number of the projects produce little or no benefits. Adopting such an approach will make it impossible to truly develop a "no regrets" portfolio of projects.

Recommendation 2: Divide the portfolio into groupings of projects that address separate issues to validate that each grouping passes a benefit-cost test.

MISO has also proposed to adopt a sensitivity case based on Future 1A. Although this is better than doing no sensitivity cases, Future 1A has substantially less intermittent renewables, it also understates the likely quantity of dispatchable resources that are key for managing congestion.

Recommendation 3: Adopt a sensitivity case similar to IMM-2A, which has more dispatchable/storage/hybrid resources than MISO's Future 1A.

C. Congestion and Fuel Costs Savings

This class of savings appears to assume the same resources in the same locations in both the Reference Case and the Change Case that includes the Tranche 2 projects. The MISO simulates the dispatch of the system in the two cases and quantifies the difference in production costs in the two cases – i.e., the adjusted production costs (APC) savings.

Although we believe this is the most valid metric, it will be substantially affected by the inputs and assumptions. The most important methodological concern is the siting issue discussed in the prior section that would be addressed by:

Recommendation 1 (same as above): Develop an alternative reference case, without the transmission investments, to use to calculate this class of benefit. This is necessary for the resulting benefits to accurately account for resource siting decisions.

Finally, realistic modeling of transmission facilities and resources is key because this can alter the magnitude of the congestion savings. To that end, we recommend that MISO:

Recommendation 4: Fully include the impacts of: a) required ambient-adjusted and emergency ratings for all transmission facilities, and b) storage resources that are well-suited to mitigate the peak transmission flows caused by peaks in intermittent output.

D. Reduced Transmission Outage Costs

This metric is intended to capture the impact of the Tranche 2 portfolio during simultaneous outages (beyond N-1 from system intact). This is a valid class of benefits since the base production costs savings would not tend to include transmission outages that are experienced regularly. However, the magnitude of this estimated benefit is highly uncertain. Therefore, MISO should adopt a conservative approach to estimating this benefit that reflects the historical effects of outages.

E. Comments on Avoided Capacity Costs

The avoided capacity cost benefit is based on an assertion that increasing levels of congestion will increase the required planning reserve margin (PRM) of the system. MISO's methodology is to establish a base case under the assumed Future 2A load and resources with no transmission modeled (i.e., a copper sheet) adjusted to a 1-in-10 LOLE level. It then proposes to model the transmission network with and without the Tranche 2 projects, which will change the capacity import and export limits for MISO capacity zones (CIL and CEL) and measure the required increase in capacity to maintain the one-in-10 LOLE reliability standard. The cost savings are calculated as the cost of the additional capacity deemed necessary in the no transmission case.

This methodology is *not* valid because it implicitly assumes that the base generation siting will be unaffected by the Tranche 2 transmission investments (as discussed in Section A). If one recognizes the effects of the market incentives and requirements on resource investment and siting decisions, then the basis for believing that the PRM will increase evaporates. The only reason to believe that the PRM will increase without transmission is that the some of the assumed generating resources are not deliverable.

However, the zonal capacity requirements and incentives will predictably shift resource investments to more deliverable locations and slow retirements in such locations. There is little uncertainty that such changes will occur because they will be necessary for MISO's LSEs to meet their capacity requirements under Module E of the MISO Tariff. Importantly, these resource investment and retirement changes will ensure that its resources that satisfy MISO capacity needs remain deliverable and will prevent the PRM from rising as MISO assumes. While some renewable resources would be less deliverable without the transmission investments, these resources over time will supply a very small portion of MISO's capacity given that their capacity accreditation will be extremely low. *Hence, we find no basis to believe that transmission investment will change the PRM, which invalidates this class of benefits.*

Recommendation 5: We recommend that MISO eliminate the Avoided Capacity Cost benefits to address the invalid assumptions underlying this metric.

F. Decarbonization Comments

MISO plans to calculate decarbonization benefits based on a range of assumed carbon values. However, we find that this class of benefits is not valid as a separate class of benefits if it is already fully captured in MISO's congestion and fuel savings analysis. Since MISO initially

included the production tax credits (PTC) in the assumed marginal production costs for intermittent renewable resources, its congestion and fuel savings metric would have included the value of the PTC associated with every MW of avoided curtailment produced by the Tranche 2 investments.

This is key to understand because the PTC is the most reasonable measure of the value of carbon. It represents the amount that federal law mandates be paid to clean energy resources. We have estimated that the PTC corresponds to a carbon value of roughly \$50 per ton of carbon. The Biden administration's current social cost of carbon (SCC) is \$51 per ton, which is under the purview of an interagency working group (IWG). Some states are attempting to litigate the use of this value in regulatory decisions. Nonetheless, since this value is embedded in federal law through the PTCs, it is reasonable to include the PTCs in the benefits, which MISO will be doing in its congestion and fuel savings. However, separately estimating decarbonization as an independent class of benefits is double counting unless the PTC values are removed from the congestion and fuel savings metric.

MISO has indicated that it intends to calculate the portion of the congestion and fuel savings benefits that produced by the PTCs so the decarbonization benefits can be separately quantified. However, MISO has also proposed to use the EPA's recently proposed SCC value of \$190 per ton of carbon, which represents almost a 4-fold increase in the cost of carbon that is embedded in legislation. This is not valid because:

- This value has not been adopted, either in legislation or by the IWG on behalf of the Biden administration. For context, the Obama Administration's SCC was \$43 per ton and the Trump Administration's was \$3-\$5 per ton.
- Most of the increase proposed by EPA was associated with lowering the discount rate from 3% to 2% percent, intended to reflect the risk-free interest rate, which has been falling up to 2021. However, the risk-free interest rate has rebounded since then and is now likely approaching 4%.

There is no reasonable basis to use a SCC higher than the value embedded in the PTC, which is the current state of the law. In reality, some states may believe the SCC is higher than the \$50 per ton implied by the PTC and they are free to adopt state policies that reflect that belief. Others may believe the SCC is lower than the \$50 per ton. In absence of a consensus that the PTC undervalues carbon, MISO has no authority impose its view of the SCC to justify costly new transmission investment that must be borne by MISO's customers that do not share MISO's view. Therefore, we recommend that MISO:

Recommendation 6: Quantify the decarbonization benefit based solely on the PTC and remove this value from the congestion and fuel savings.

G. Mitigation of reliability issues

MISO asserts that building the Tranche 2 transmission projects will address or mitigate local reliability issues. While this may be true, MISO proposes to quantify this benefit by assuming that these issues would result in load shedding absent the Tranche 2 projects and then estimating

the costs of the load shedding. Because the value of lost load is very high, this methodology will massively overvalue these issues.

In reality, all RTO's manage these types of voltage and local reliability issues do not result in load shedding. They are managed operationally through out-of-market commitments, modeling thermal proxy transmission constraints, transmission reconfigurations, or by investments in other network equipment. All of these solutions are much less expensive than load shedding.

Recommendation 7: Eliminate Mitigation of Reliability Issues as a separate class of benefits or quantify it based on the congestion from modeling a thermal proxy or the costs of voltage support equipment.

H. Capacity and energy savings from reduced losses

In this section, we address the two classes of benefits related to transmission losses – energy savings and capacity savings. Expanding transmission capability will reduce transmission losses, all else equal. These lower losses can produce energy savings and reduce the capacity needed to replace the losses.

However, the problem described in Section A will render these estimates inaccurate. Absent the Tranche 2 investments, generation resources will shift location over time to more congested locations closer to load. This shift in resources will reduce transmission losses on offset the benefits MISO will otherwise estimate. To address this concern, MISO should implement:

Recommendation 1: Develop a reference case with modified siting assumptions that reflects the effects of not building the Tranche 2 transmission projects.

I. Avoided transmission investment

Some avoided transmission investment could be a valid class of benefit. In particular, transmission costs that can be avoided by the Tranche 2 projects that are related to replacing and maintaining aging transmission facilities are valid benefits of Tranche 2.

However, it would not be appropriate to include avoided transmission investments related to relieving congestion, which were a class of investments included in the Tranche 1 analysis. These cannot legitimately be estimated unless the forgone benefits of these investments are calculated. These foregone benefits would have to be included as a cost of the Tranche 2 projects. However, given the difficulty and speculative nature of this type of analysis, we recommend not including this class of avoided transmission investment. Hence, we recommend:

Recommendation 8: Include only avoided age and condition related investments in the Avoided Transmission Investments.

J. Reduced risks from extreme weather impacts

This is one of the most uncertain and speculative benefits. Each of the extreme weather events have resulted in extremely different patterns of flows so it is difficult to predict how transmission would help. In any case, the benefits should be small because the probability of extreme weather events is low.

MISO should ensure that it does not implicitly increase the probability of extreme weather events in calculating the benefits. In other words, the benefits should be based on the following:

- Benefit = Potential Savings during Event * Probability of Event

We look forward to continuing to discuss the benefit methodologies with MISO and its stakeholders. We believe this work is essential in ensuring that MISO is able to develop a portfolio of transmission investments in Tranche 2 that would be economically efficient, support reliability, and not undermine the performance of its electricity markets.

DBP

IMM Recommendations for Benefit Metrics

Rec. #	Description	Status of MISO Response
1	MISO should develop a reference case with modified siting assumptions that reflect the effects of not building the Tranche 2 transmission projects.	To be determined.
2	Divide the portfolio into groupings of projects that address separate issues to validate that each grouping passes a benefit-cost test.	MISO has indicated this is not practical.
3	Adopt a sensitivity case similar to IMM-2A, which has more dispatchable/storage/hybrid resources than MISO's Future 1A.	No current plans to modify sensitivities beyond Future 1A.
4	Fully include the impacts of: a) required ambient-adjusted and emergency ratings for all transmission facilities, and b) storage resources that are well-suited to mitigate the peak transmission flows caused by peaks in intermittent output.	To be determined. Currently, MISO has not included enhanced ratings and assumes fixed charge/discharge schedules for storage resources.
5	We recommend that MISO eliminate the Avoided Capacity Cost benefits to address invalid assumptions underlying this metric.	To be determined.
6	Quantify the decarbonization benefit based solely on the PTC and remove this value from the congestion and fuel savings.	MISO has revised the APC calculation in PROMOD with the intention of removing double counting of the PTC benefits. Removing benefits beyond PTC is to be determined.
7	Eliminate Mitigation of Reliability Issues as a separate class of benefits or quantify it based on the congestion from modeling a thermal proxy or the costs of voltage support equipment.	To be determined
8	Include only avoided age and condition related investments in the Avoided Transmission Investments.	MISO has indicated general agreement with this recommendation.

Executive Summary

The Long-Range Transmission Planning (LRTP) effort is a key piece of MISO’s Reliability Imperative, which is the shared responsibility between MISO, our members, and states to maintain reliability throughout the resource transition. The ongoing shift in the resource fleet and the substantial projected increase in load pose significant challenges to the design of the transmission system in the MISO region. LRTP is designed to reliably and efficiently enable the resource plans of MISO members, by creating a “least-regrets” regional transmission backbone.

One key piece of the LRTP process is the development of a business case which quantifies benefits accruing from the portfolio. The Tranche 2.1 business case was developed using the Tranche 1 business case process as a starting point, with discussions on process revisions for Tranche 2.1 business case metrics beginning in January 2023. Over the next 18 months MISO engaged stakeholders on the methodology development for each benefit metric.¹

On July 15th the Independent Market Monitor (IMM) provided feedback on the LRTP methodologies outlined into 8 recommendations, which aligned with previous IMM recommendations such as the 2023 State of the Market report.

MISO appreciates this input and summarizes our responses to each of the IMM’s 8 recommendations below.

	IMM Description	MISO Assessment	LRTP Process Resolution	Remaining Difference
1	MISO should develop a reference case with modified siting assumptions that reflect the effects of not building the Tranche 2 transmission projects	MISO agrees that Tranche 2.1 can send market price signals that influence resource entry and siting decisions. MISO disagrees with developing a reference case which diverges from Future 1A and 2A. MISO is not a resource planner, and this approach would create a scenario that diverges from member resource plans and inputs gathered through the stakeholder process.	MISO Future scenarios were defined with member input, including both the inclusion of planned resources from resource planners and MISO member review of tool generated resources and siting selections.	Creation of a ‘but for’ case to reflect a different resource mix if the LRTP transmission is not built.

¹ Link to LRTP Workshop meeting materials: [Long Range Transmission Planning \(LRTP\) Workshop \(misoenergy.org\)](https://www.misoenergy.org/Long-Range-Transmission-Planning-LRTP-Workshop)

	IMM Description	MISO Assessment	L RTP Process Resolution	Remaining Difference
2	Divide the portfolio into groupings of projects that address separate issues to validate that each grouping passes a benefit-cost test.	<p>MISO agrees that the LRTP analysis must ensure that all projects in the portfolio have value.</p> <p>MISO disagrees that a sub portfolio-specific benefit cost ratio would capture the true benefits of that project. Economic analysis of a subset of projects does not reflect their value in a portfolio, nor does it fully capture other benefits such as reliability value. Additionally, sub portfolio-specific benefit cost ratios do not fully capture the additive benefits of the portfolio.</p>	LRTP analyses include project specific analysis and the evaluation of alternatives, with a focus on reliability, generation enabled, and congestion relieved.	Inclusion of a benefit-cost ratio in sub portfolio analysis
3	Adopt a sensitivity case similar to IMM-2A, which has more dispatchable/storage/hybrid resources than MISO's Future 1A.	<p>MISO agrees that resource attributes such as dispatchability are critical to maintaining system reliability.</p> <p>MISO disagrees that Future 1A and Future 2A have insufficient dispatchable resources. Additionally, MISO is not a resource planner, and the creation of a new sensitivity case would create a scenario that diverges from member resource plans and inputs gathered through the stakeholder process.</p> <p>MISO Future scenarios were defined with member input, including both the inclusion of planned resources from resource planners and MISO member review of tool generated resources and siting selections.</p>	<p>MISO conducted multiple resource expansions, varying key assumptions between each of those based on questions received from stakeholders. Future 1A and Future 2A were shown to best bookend the potential resource mix. The prevalence of storage or hybrid resources did not increase substantially in any of those expansions.</p> <p>Additionally, MISO conducted analysis on both Future 1A and Future 2A to ensure sufficient dispatchable resources are available to serve energy needs throughout the year. As a result of this analysis, MISO added additional dispatchable resources to the Future 2A models. No additional dispatchable resources were required for Future 1A.</p>	Whether to conduct business case analysis on a sensitivity case that includes more storage, hybrid renewable, and dispatchable resources.

	IMM Description	MISO Assessment	L RTP Process Resolution	Remaining Difference
4	Fully include the impacts of: a) required ambient adjusted and emergency ratings for all transmission facilities, and b) storage resources that are well-suited to mitigate the peak transmission flows caused by peaks in intermittent output.	<p>MISO agrees that storage and ambient adjusted ratings can serve as viable non-transmission alternatives in some situations (e.g. near term or localized constraints). MISO also agrees with the use of emergency ratings under contingent conditions.</p> <p>MISO disagrees that storage resources and ambient adjusted ratings are viable solutions to forward-looking, large-scale, and regional projects, or that such projects could materially reduce the congestion and fuel savings.</p>	<p>MISO’s models include storage and hybrid resources, which are optimized to utilize excess energy for charging and meet daily energy needs.</p> <p>MISO utilizes emergency ratings to mitigate constraints under contingent conditions in planning models.</p> <p>Historically, production cost simulations have understated congestion savings, as planning models cannot include all contingencies which occur in real time operations. While this is partially captured in the Reduced Transmission Outage cost, we anticipate that real time congestion will continue to benchmark higher than planning projections.</p>	<p>Use of ambient adjusted ratings in LRTP analysis</p> <p>Re-siting and dispatching storage to mitigate transmission build</p>

	IMM Description	MISO Assessment	L RTP Process Resolution	Remaining Difference
5	We recommend that MISO eliminate the Avoided Capacity Cost benefits or to modify the benefit calculation to focus on the costs of the likely shifts in resource siting that would occur without Tranche 2.	<p>MISO agrees that Tranche 2 can send market price signals that influence resource entry and siting decisions.</p> <p>MISO disagrees with eliminating the metric. Transmission provides optionality relative to the location of load. As long as loads in different locations peak at different times (which is always the case in practice), less generation will be required with transmission than without.</p> <p>MISO also disagrees with adapting this metric based on the cost of moving resources. This diverges from the resource plan of our members, who provided insight on what resources and where they should be located.</p>	The Avoided Capacity Cost metric assesses the change in Loss of Load Expectation (LOLE) given the L RTP portfolio.	<p>Consideration of transmission limitations in resource adequacy:</p> <ul style="list-style-type: none"> - IMM: Generation would shift to meet changing resource needs; Impacts would only be local not regional - MISO: Increased transfer capacity enables a lower PRM by enabling load diversity and minimizing binding
6	Quantify the decarbonization benefit based solely on the PTC and remove this value from the congestion and fuel savings.	<p>MISO agrees on ensuring no overlap exists with the decarbonization metric and congestion and fuel savings.</p> <p>MISO disagrees on focusing on a single value to represent the cost of carbon.</p>	<p>MISO’s process ensures that the Production Tax Credit (PTC) value is removed from the final congestion and fuel savings.</p> <p>The values assigned to decarbonization were informed by discussions in the MISO stakeholder process; the range of values in the business case are reflective of input received.</p>	<p>Valuation of decarbonization</p> <ul style="list-style-type: none"> - IMM: PTC value is the most valid assumption for decision-making purposes. - MISO: Utilize federal and MN PUC values to calculate range of decarbonization benefits.

	IMM Description	MISO Assessment	LRTP Process Resolution	Remaining Difference
7	Eliminate Mitigation of Reliability Issues as a separate class of benefits or quantify it based on the congestion from modeling a thermal proxy or the costs of voltage support equipment.	<p>MISO agrees that this metric should apply in circumstances where routine operational procedures are insufficient (e.g. planning for the next contingency and applying redispatch).</p> <p>MISO disagrees with eliminating the metric as it appropriately captures the avoided reliability risk accruing from the LRTP portfolio.</p>	<p>This business case metric captures the monetary value of reduced load shed risk on a subset of identified constraints that are resolved by Tranche 2.1 projects and are not mitigated by other routine methods. This method was defined and reviewed by stakeholders at LRTP workshops.</p>	<p>Application of VOLL versus remediation cost to calculate the benefits of mitigating the reliability issues</p>
8	Include only avoided age and condition related investments in the Avoided Transmission Investments.	MISO agrees.	<p>This business case metric will only consider age and condition investments.</p>	None

MISO’s Response to IMM’s Concerns and Recommendations for the Tranche 2.1 Benefit Methodologies

The Long-Range Transmission Planning (L RTP) effort is a key piece of MISO’s Reliability Imperative, which is the shared responsibility between MISO, our members, and states to maintain reliability throughout the resource transition. The ongoing shift in the resource fleet and the substantial projected increase in load pose significant challenges to the transmission system in the MISO region. L RTP is designed to reliably and efficiently enable the resource plans of MISO members, by creating a “least-regrets” regional transmission backbone.

L RTP’s goal is to identify key transmission projects which require near-term approval due to their lead time, while not recommending transmission which is wholly dependent on specific load and generation locations. To manage the inherent uncertainty in planning for needs 20+ years in the future, MISO’s comprehensive planning processes includes:

- Evaluating multiple resource scenarios to demonstrate that Future 1A and Future 2A adequately bounds the resource expansion under different policies, accreditation, and load growth.
- Creating a framework and fostering stakeholder discussions to consider multiple approaches to building regional transmission, including 345 kV, 765 kV, and HVDC.
- Using multiple models and transfer scenarios to determine regional issues caused by the changing resource mix, and to rule out issues which only apply in a single dispatch pattern or due to specific generator or load.
- Evaluating MISO proposed and stakeholder developed transmission solutions as alternatives against these needs.
- Performing robustness testing to ensure solutions are not redundant with other transmission projects under development.
- Developing a range of benefits as part of the business case analysis to show the risk-adjusted value of potential transmission projects over the 20 years.

Tranche 2.1 Business Case Process Development and Stakeholder Review

The Tranche 2.1 business case was developed using the Tranche 1 business case process as a starting point, with discussions on process revisions for Tranche 2.1 business case metrics beginning in January 2023. Over the next 18 months, MISO engaged stakeholders on the methodology development for each benefit metric.²

MISO adjusted the benefit metric methodology based on stakeholder feedback, including the comments captured in the IMM 2022 State of the Market Report. Stakeholder comments requested additional resource scenarios, sought to focus the business case on only transmission instead of varying generation in the reference case, noted the potential for overlap or the overstatements metrics, and recommended methods to capture additional value. Adjustments based on these comments include:

- 1) Using an additional Future scenario (Future 1A), which reflects a 20-year resource expansion that is 93% aligned with resources identified in MISO member plans.
- 2) Utilizing equivalent resources in the reference and changes cases used for congestion and fuel savings metric.

² Link to L RTP Workshop meeting materials: [Long Range Transmission Planning \(L RTP\) Workshop \(misoenergy.org\)](https://www.misoenergy.org/Long-Range-Transmission-Planning-LRTP-Workshop)

- 3) Eliminating the resource adequacy metric to avoid metric overlap.
- 4) Enhancing the reduced risks from extreme weather impacts metric to include probabilistic analysis of events.
- 5) Incorporating additional benefits such as reduced transmission outage costs, energy savings from reduced losses, capacity savings from reduced losses, and mitigation of reliability issues.

The final nine benefit metrics for the Tranche 2.1 business case analysis are shown below.

Benefit Metric	Description
1) Congestion and fuel savings	Enhances market efficiency and provides access to low-cost generation
2) Reduced transmission outage costs ¹	Reduced transmission congestion during forced and planned transmission outages
3) Energy Savings from Reduced Losses ¹	Lower production costs to serve load with transmission facilities that reduce system losses
4) Decarbonization ²	Enables the economical dispatch of renewable resources to help reduce the carbon footprint
5) Avoided capacity costs	Avoids capital costs for local resource builds versus regional expansions defined in Futures
6) Capacity Savings from Reduced Losses ¹	Value of reducing transmission losses during peak capacity periods
7) Avoided transmission investments	Avoids the need for facility replacement due to age and condition
8) Reduced risks from extreme weather events	Increases grid resilience and decreases the probability of major service interruptions
9) Mitigation of reliability issues ^{1,2}	Value of alleviating reliability issues that unresolved introduce a risk of unserved load

1 - benefit metric not calculated for Tranche 1

2 - benefit metric not one of the 7 included in FERC's Order 1920

IMM's Recommendations:

On July 15th, the Independent Market Monitor (IMM) provided feedback on the LRTP process outlined into 8 recommendations, which aligned with previous IMM recommendations such as the 2023 State of the Market report. MISO's responses to these recommendations are summarized in the chart at the start of this memo, with additional detail as follows.

Recommendations related to generation siting:

IMM Recommendation 1: To address that members will shift resources without a regional transmission plan, we recommend MISO develop a reference case with modified siting assumptions that reflect the effects of not building the Tranche 2 transmission projects.

IMM Recommendation 3: Adopt a sensitivity case like IMM-2A, which has more dispatchable, storage, and hybrid resources than MISO's Future 1A.

IMM Recommendation 5: We recommend that MISO eliminate the Avoided Capacity Cost benefits to address the invalid assumptions underlying this metric.

MISO's Response to Recommendations 1, 3, and 5:

MISO agrees that cases without the Tranche 2.1 investments can send market price signals that on the margin can influence resource entry and siting decisions. This is especially true when and if Cost of New Entry (CONE) values are reached in the system or a Local Resource Zone because of resource deficiency. These market signals are then incorporated into the resource plans of MISO members.

Specifically, the MISO footprint is primarily made up of Vertically Integrated Utilities, and these utilities have the fiduciary and regulatory responsibility to serve their load obligations. MISO respects the rights of state and load serving entities, including MISO utilities, towards resource adequacy and recognizes their role as the resource planner for their respective areas. In essence, MISO plans transmission given the generation fleet defined by MISO utilities / resource planners.

As such, MISO disagrees with actions that would require modifying member resource plans or the resource expansion which was developed in the MISO stakeholder process with the opportunity for MISO resource planner and member input. This position extends to the original Future 1A and Future 2A resource plans, the siting of resources within those Futures, and the base and change cases of business case metrics. MISO disagrees with creating a new reference case, adopting a sensitivity case, or eliminating the Avoided Capacity Cost metric due to the same rationale.

MISO Future Scenarios Overview

As stated above, MISO is not a resource planner and does not have authority over generation planning decisions or resource procurement. Member and state plans are used as the foundation for MISO transmission planning, but they may not define resource plans in all conditions across the 20+ year planning horizon, especially under scenarios with increasing load growth. MISO supplements these plans through resource expansion analysis, including intensive stakeholder review, to create forward-looking models.

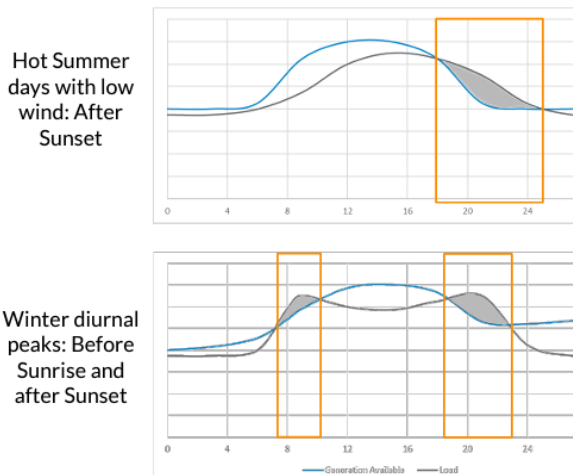
This resource expansion analysis creates planning scenarios called the MISO Futures, which seek to find resource buildouts that minimize the overall system resource cost while meeting reliability and policy requirements. Key inputs that drive the composition of these Futures include:

- Retirement and repowering assumptions
- Load growth assumptions, including electrification
- Public policies goal, including emission, decarbonization, and Renewable Portfolio Standard
- Resource capital and implementation costs, including impacts from the Inflation Reduction Act

Energy Adequacy Analysis

While developing these Futures for Tranche 2.1, MISO performed an energy validation of the resource expansion results. PROMOD, a production cost modeling tool, provided hourly chronological security-constrained unit commitment and economic dispatch, to identify any energy adequacy shortfall needs that may not have been captured in the expansion results. Generation shortfalls were identified for 3-4 hours per day during twilight hours (before sunrise or at sunset) in up to 26 days of the modeled year for Future 2A, with a maximum shortfall of 29 GW in a single hour. Resources were added to the model to mitigate these shortfalls and ensure sufficient dispatchable capacity for those hours.

Supplemental capacity additions are needed to ensure no energy shortfall in Future 2A, especially for twilight hours with low wind output



- PROMOD chronological simulations identified off-peak hours requiring additional capacity
- 26 – 29 GW in Future 2A 2042 in MISO
 - 13-26 Unserved Energy days per year
 - 3-4 hours per Unserved Energy day
 - Battery charging behavior may shift risks
- Flexible Attribute Units were added to the Futures to ensure adequacy during these hours

Resource Siting

A key part of the Future creation process is stakeholder review of the resource expansions and the location of these resources. These resource locations are initially sited by MISO staff, considering the physical characteristics of the transmission system, local resource requirements (e.g. Local Clearing Requirements) and Generation Interconnection Queue information. Stakeholders then had the opportunity to review and provide feedback on the resource sites, submitting over 500 recommended changes. MISO reviewed this feedback and created a final siting for the Futures. The resulting generation sites spanned the entire MISO footprint, as shown below.

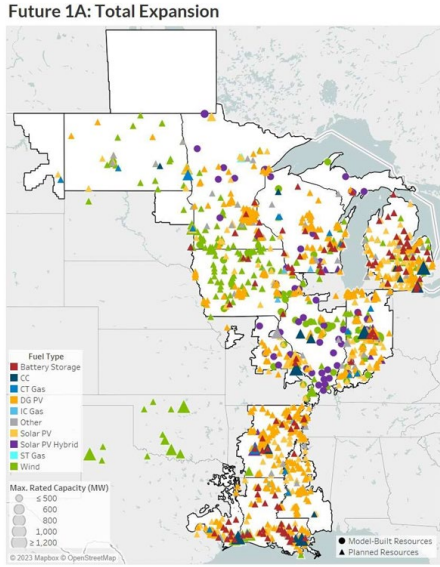


Figure 67: MISO Future 1A Non-EGEAS and EGEAS Expansion Siting

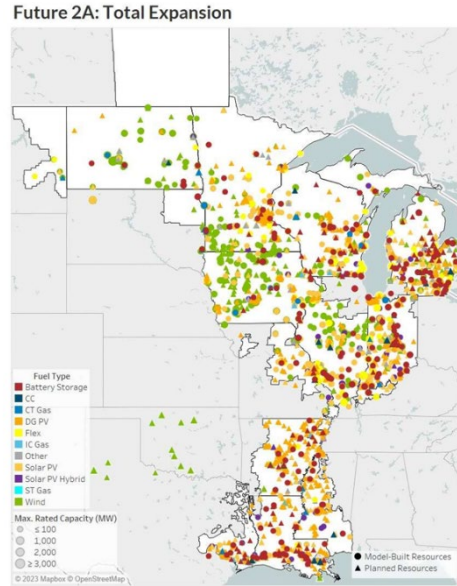
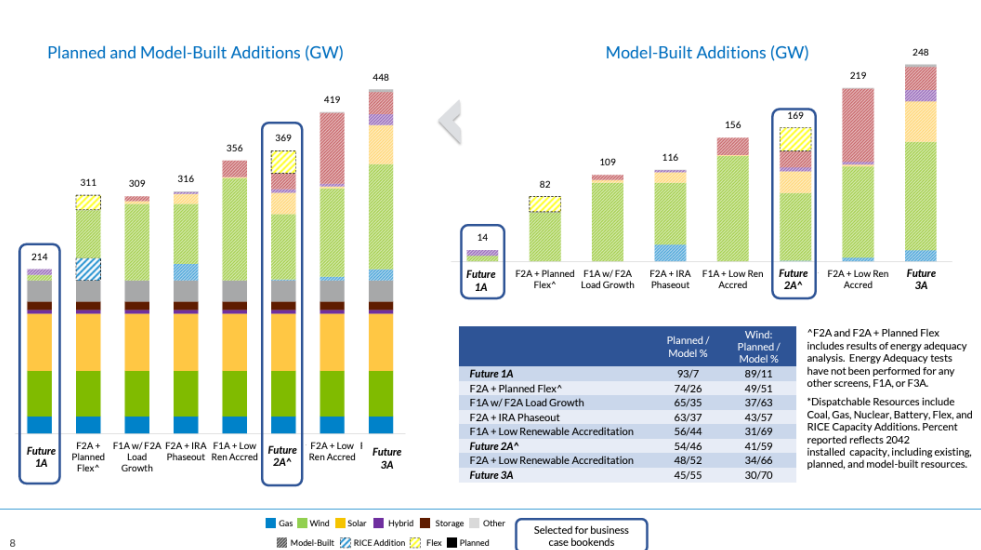


Figure 83: MISO Future 2A Non-EGEAS and EGEAS Expansion Siting

Robustness of MISO's Future Scenarios

As part of the LRTP process, MISO conducted analyses to determine the robustness of these resource expansions by varying input assumptions. The goal of this analysis was to ensure that the LRTP Tranche 2.1 transmission plans would be sufficiently robust – that the transmission was being tested against resource mixes which truly bound potential future resource mixes, while still being based in the same foundational analysis which creates all MISO Futures. Ultimately, Future 1A and Future 2A were selected to represent ‘bookends’ of potential resource plans; other scenarios fell within the range of those two generation scenarios.



Of note, 93% of the resource needs in Future 1A were met by resources in member plans. Future 2A built upon this resource set to meet additional load growth, with 54% of the resources being sourced directly from member plans and the additional resource expansion resulting from the MISO Futures analytical framework and undergoing stakeholder review prior to being included in modeling.

Inclusion of dispatchable resources

It is important to note that, as mentioned in the IMM comments, dispatchable resources are important. In particular, and as mentioned above, the initial Future 2A resource expansions did not have sufficient dispatchable resources to meet energy needs in low-wind, twilight hours, and additional dispatchable resources were added to the model to meet system needs. Additionally, the Future 2A expansion included storage and hybrid, and the total dispatchable resources in Future 2A exceeded 100 GW, with such resources distributed across the footprint.

Type	Future 2A Expansion (GW)
Gas/Flex	67.1
Solar	112
Wind	161.7
Hybrid	9.8
Battery	31.2
Total	471

Calculation of the Avoided Capacity Cost Benefit

The Futures are created with consideration of both regional (Planning Reserve Margin, or PRMR) and local (Local Clearing Requirements, or LCR) resource requirements. These requirements include calculation based on the relative resource risk, and the metric captures how transmission can reduce the total resource requirement. MISO disagrees with the IMM that transmission would be unable to reduce the system-wide capacity needs, as shown in the simplified example below.

Below is a simple example with two zones and two hours, ignoring resource risk (e.g. generator outages). If there's no transmission, 250 MW of capacity in Zone A and 300 MW of capacity in Zone B would need to be built, for a total of 550 MW of capacity. If 100 MW of transmission is constructed, only 500 MW of capacity must be built, as capacity in Zone A can be used to serve Zone B's peak load (and vice versa).

Hour	Zone A Load (MW)	Zone B Load (MW)
1	200	300
2	250	200

Variations between MISO and IMM expansions

The IMM recommended an alternative resource expansion, as an alternative to MISO’s Future 1A and Future 2A. This expansion focused on additional dispatchable resources, namely storage and hybrid, and it was developed with a different interpretation of renewable energy requirements. These differences are expanded upon below.

One important assumption in the creation of forward-looking resource expansion is the treatment of renewable energy goals by the states and members within MISO. These goals are summarized in the table below:

State Clean Energy Goals & RPS ^{5F11} (source linked)	State	Utility	Utility Decarbonization Goals (2005 Baseline) ⁶	Utility Renewable Energy Goals
RPS: 15% RE by 2021 (IOUs)	Missouri	Ameren Missouri	60% by 2030, 85% by 2040, Net Zero by 2045	15% by 2021
		Columbia Missouri Water and Light Department	-	30% by 2029
		Missouri River Energy Services	-	22% by 2027
100% Clean Energy by 2050 RPS: 25% by 2025, 50% by 2042, 100% by 2050	Illinois	Ameren Illinois	Carbon Free by 2050 ¹²	100% by 2050 ¹²
		Springfield Illinois – City Water Light & Power	Carbon Free by 2050 ¹²	100% by 2050 ¹²
		Southern Illinois Power Co-operative	Carbon Free by 2050 ¹²	100% by 2050 ¹²
RPS: 105 MW (completed 2007)	Iowa	MidAmerican Energy	7% of MEC’s load subject to Illinois state bill SB 2408 which requires 100% clean energy by 2050. ¹²	97% by 2025
		Cedar Falls Utilities	45% by 2030 (2010 Baseline). Net Zero by 2050	-
		Alliant Energy	50% by 2030. Carbon Free by 2050	30% by 2030
Carbon Free by 2050 (Governor) RPS: 10% by 2020	Wisconsin	Dairyland Power	50% by 2030	12% by 2026
		WEC Energy Group	Carbon Neutral by 2050	10% by 2020
		Madison Gas & Electric	80% by 2030. Net Zero by 2050	30% by 2030. 40% by 2050
Carbon Neutral by 2050 (Executive Goal) RPS: 15% by 2021 (standard), 35% by 2025 (goal, including EE & DR), 50% by 2030 (MI Healthy Climate Plan)	Michigan	Consumers Energy	Net Zero by 2040	15% by 2021
		DTE Energy	80% by 2040	15% by 2021
		Michigan Upper Peninsula	Carbon Neutral by 2050	15% by 2021. 35% by 2025
		Upper Peninsula Power	Net Zero by 2050	50% by 2025
Voluntary clean energy RPS, 10% RE by 2025	Indiana	Duke Energy	50% by 2030. Net Zero by 2050	-
		Hoosier Energy	-	10% by 2025
		Southern Indiana Gas & Electric	Net Zero by 2035	-
		Wabash Valley Power Association	50% by 2031. 70% by 2040. Net Zero by 2050	-
		NIPSCO	90% by 2030	-
Carbon Free by 2040 ¹³ RPS: 25% by 2025, 55% by 2035	Minnesota	Xcel Energy	80% Reduction by 2030. Carbon Free by 2050	60% by 2030
		SMMPA	90% by 2030	75% by 2030
		Minnesota Power	Carbon Free by 2050	70% by 2030
		Otter Tail Power Company	80% by 2042	35% by 2023
		Great River Energy	80% by 2050	50% by 2030
	Montana	Montana Dakota Utilities Co.	45% by 2030	-
Net Zero GHG by 2050 (Governor) RPS: 80% by 2050 (Executive Order)	Louisiana	CLECO	37.8% by 2030. Net Zero by 2050. (2011 Baseline)	-
		Entergy	50% by 2030. Net Zero by 2050. (2000 baseline)	-
City Clean Energy Goals & RPS ^{5F} (source linked)	City			
RPS: 70% by 2025, 100% by 2040	New Orleans			

Table 1: Modeled State & Utility Goals - Service Area Overlay

Both the MISO and IMM scenarios tracked these goals and removed overlap between state and utility goals. However, the IMM scenarios treated the Renewable Energy Credits (RECs) for utilities without a state goal as fungible; MISO assumed that those goals were additive to other state goals.

For example, Montana does not have state clean energy goals, however Montana Dakota Utility (MDU) does. The IMM expansion assumed that MDU would sell their renewable energy credits to a utility in a state with a renewable goal; MISO assumed that MDU's renewable energy would not be designated for another utility. In general, this leads to a larger renewable expansion in MISO's Future 2A than in the IMM expansion.

The other key difference between the IMM and MISO expansion is on the inclusion of storage and hybrid resources. The IMM's expansion included a greater percentage of storage and hybrid resources, as compared to MISO's expansion. This increased inclusion of storage reflects the energy and ancillary service value of storage, gas, hybrid, and batteries. MISO's resource expansions, including Future 1A, Future 2A, and all additional scenarios, did include storage, gas, hybrids, and batteries, but such resources did not dominate any scenario. In short, MISO's expansions found that, due to the impact of the Investment and Production Tax Credits in the Inflation Reduction Act, wind and solar resources were more economically viable.

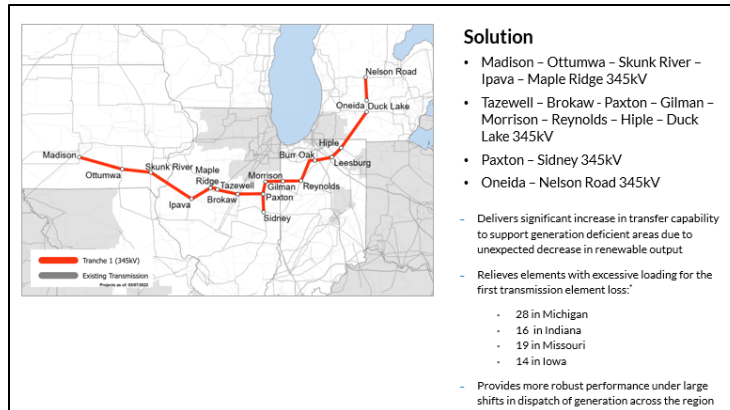
IMM Recommendation 2:

Divide the portfolio into groupings of projects that address separate issues to validate that each grouping passes a benefit-cost test.

MISO's Response to Recommendation 2:

MISO agrees that it is critical to ensure that each project within the portfolio provides value. This is foundational to our LRTP analysis and the foundation of our alternatives assessment. Our processes reinforce this through the review of project specific performance, with a focus on issues identified through multiple models. Additionally, MISO's review removes identified transmission if it is only addressing an issue identified to support a specific resource location or load growth site. This project specific performance becomes a key piece of support for state regulatory proceedings.

An example of a project-specific justification from Tranche 1 is shown below for reference.



However, such project-specific performance does not and should not include project-specific benefit cost ratio, as such ratios for individual projects would be misleading. Like trying to evaluate the value of a highway by looking solely at a stretch of road between two towns, valuing the portfolio on a piece-by-piece basis would drastically undervalue the network benefits of a regional transmission portfolio.

IMM Recommendation 4:

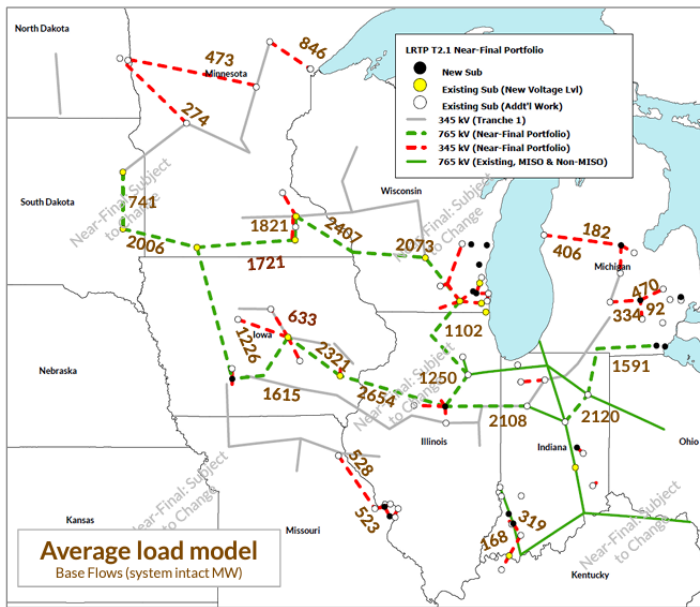
Fully include the impacts of: a) required ambient-adjusted and emergency ratings for all transmission facilities, and b) storage resources that are well-suited to mitigate the peak transmission flows caused by peaks in intermittent output.

MISO’s Response to Recommendation 4: MISO agrees that storage and ambient-adjusted transmission ratings can be economic alternatives to some types of transmission. As noted above, MISO’s Future resource plans do include storage and hybrid resources. Our economic and reliability models optimize the use of these resources to efficiently use surplus energy. Emergency ratings are applied in our LRTP models under contingent conditions.

MISO’s experience is that storage is better suited to address local term issues, and ambient adjusted ratings are ideally suited to use in the operational time horizon. The identification of a robust regional transmission system serves as a compliment to such near term and local transmission solutions.

For example, MISO believes that storage works as a transmission alternative when the transmission issue has a localized impact and the areas also has predictable load profiles / lower load factors. Storage may be implemented as a Transmission Only Asset (SATO) to identified transmission planning issues. MISO also notes that the implementation of Order 881 will bring the utilization of ambient-adjusted ratings into the operational horizon, better enabling its use in the transmission planning horizon as its real-time application is tracked.

However, for Tranche 2.1, the power transfers in Future 2A are extremely high, and utilizing storage or ambient adjusted ratings to mitigate those transfers would be infeasible. Transfer results under a system-intact, average load model from July analysis are shown below. These transfers would increase under contingency and in different scenarios.



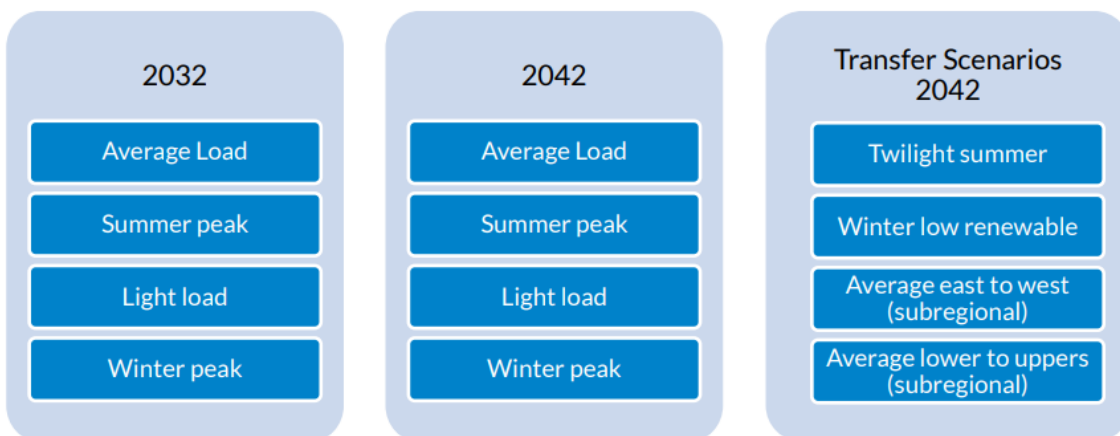
The near-final Tranche 2.1 portfolio shows strong base case flows on 765 kV and 345 kV facilities

Near-Final Tranche 2.1
Portfolio as 7/12/2024

Base flows show strong utilization of superhighway across the Midwest Subregion; impact is greater after considering contingencies (outages), enabling efficient regional transfer of power

Additionally, the lines which comprise the LRTP portfolio are evaluated and selected due to project-specific benefits under multiple scenarios, as shown below. The ability of storage or ambient ratings to mitigate all the scenarios is unlikely.

The reliability scope included multiple core models and transfer scenario models for the 2032 and 2042 timeframes



Contingencies included to date*: P0, P1, P2, P4, P5 and P7 – generally system intact, single element and single right of way outages

IMM Recommendation 6:

Quantify the decarbonization benefit based solely on the PTC and remove this value from the congestion and fuel savings.

MISO's Response to Recommendation 6:

MISO agrees that there should be no overlap with the application of the decarbonization benefit in the congestion and fuel savings and the stand-alone business case metric. Our congestion and fuel savings only include the Production Tax Credits to optimize the dispatch; the PTC value is removed from the final congestion and fuel savings benefit value.

MISO acknowledges that there are varying opinions on how to value decarbonization; this drives MISO to disagree with the use of a single value. MISO developed our process to value decarbonization in Tranche 1; this process was then duplicated with more recent information for Tranche 2 and reviewed with stakeholders in LRTP workshops. MISO believes that we should include this range of potential decarbonization value, based both on federal support values and state values, as reviewed with stakeholders. MISO is continuing to evaluate the appropriate value to use for the low end of this range.

IMM Recommendation 7:

Eliminate Mitigation of Reliability Issues as a separate class of benefits or quantify it based on the congestion from modeling a thermal proxy or the costs of voltage support equipment.

MISO's Response to Recommendation 7:

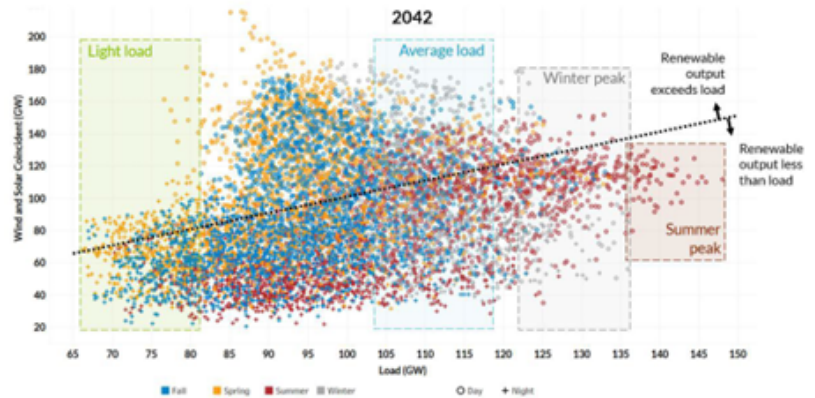
MISO disagrees. This metric is intended to capture the monetary value of addressing reliability issues. More specifically, it focuses on a subset of commonly occurring issues that meet three criteria, and it applies them for only a subset of hours where a scenario could have load risk.

1. They must occur under single element or common structure contingencies in normal operations
2. They cannot be resolved through redispatch, and
3. They must be resolved by the inclusion of the LRTP Tranche 2.1 portfolio

Monetizing the reliability value of transmission has been a long-standing industry challenge that can result in significantly undervaluing the economic value of transmission if left unaccounted for. MISO's approach to this risk is conservative, with a focus on key criteria and select hours, as shown in the illustrative graphic below.

Hours of unserved load are determined by examining the dispatch and load distribution associated with each model scenario

- Model scenarios represent a subset of annual conditions
- Load shedding risk hours correspond to hours represented by the study scenario in the annual load distribution



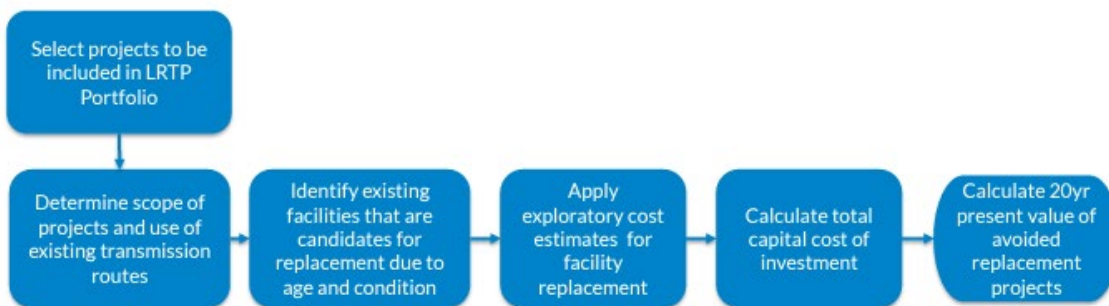
It is appropriate to use Value of Lost Load (VOLL) in this instance, rather than a thermal proxy, as this represents the residual risk which MISO is attempting to mitigate – that is a simple constraint which cannot be redispatched around, which only occurs in a specific set of hours. This valuation is further supported using redispatch, and the focus on single element outages. This metric appropriately captures the avoided risk, not the cost of inefficient operations.

IMM Recommendation #8:

Include only avoided age and condition related investments in the Avoided Transmission Investments.

MISO’s Response to Recommendation 8:

MISO agrees. This metric focuses on age and condition, as shown below.



Other IMM Comments on Specific Metrics:

IMM Comment on Reduced Transmission Outage Costs:

MISO should adopt a conservative approach to estimating this benefit that reflects the historical effects of outages.

MISO Comment:

MISO agrees. The metric is applied based on the historical rates shown below.

			MISO North	MISO Central	MISO East	MISO South
Forced	Lines	EHV	0.0019	0.0033	0.0012	0.0029
		230kV	0.0036	0.0035	0.0033	0.0018
	Xfs	EHV	0.0028	0.0021	0.0008	0.0034
		230kV	0.0010	0.0139	0.0020	0.0060
Planned	Lines	EHV	0.0051	0.0141	0.0142	0.0072
		230kV	0.0087	0.0100	0.0189	0.0068
	Xfs	EHV	0.0043	0.0061	0.0056	0.0046
		230kV	0.0051	0.0106	0.0330	0.0041

IMM Comment on Reduced Risks from Extreme Weather Events:

MISO should ensure that it does not implicitly increase the probability of extreme weather events in calculating the benefits.

MISO Comments:

MISO agrees. This metric is focused on the worst 10% of events in a Loss of Load Expectation model.