MISO IMM Comments on LRTP Tranche 2 Benefit Analysis

MISO Independent Market Monitor

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Introduction and Background

- Efficient transmission investment is essential to support MISO's competitive markets and reliability as its fleet evolves
- However, inefficient investment can be costly because:
  - ✓ It undermines market signals to participants that can address comparable system needs through resource investment
  - ✓ Transmission is costly – Tranche 2.1 represents a present value of $2,600 per family in the Midwest
- Hence, it is critical that the analysis be objective, accurate, and unbiased
- As the IMM for MISO, we have been providing comments in the Tranche 2 process since Future 2A was published
- This presentation discusses the business case for Tranche 2, providing:
  - ✓ An overview of the IMM's concerns with Future 2A; and
  - ✓ The benefit analyses supporting the future approval of Tranche 2.1.

Conclusions and Recommendations

- Although we have been consistently raising these concerns over the past 2 years, MISO has not addressed them
- As described in these comments:
  - ✓ The results for the two most flawed categories of benefits constitute 60 to 70 percent of the Tranche 2.1 benefits
  - ✓ Correcting the most significant flaws in MISO's benefit analysis reveals benefit-cost ratios ranging from 0.4 to 0.7
- Based on the findings described in this presentation, we recommend the Board postpone approval of Tranche 2.1 to allow MISO to:
  - ✓ Reform the portfolio of projects; and
  - ✓ Correct the benefits analyses to ensure that any approved Tranche 2 portfolio will produce net benefits for MISO's customers

Recap of Future 2A Concerns

- It is important to recall the concerns with Future 2A because it is the basis for both the Tranche 2.1 portfolio and the benefit analyses
- We find Future 2A to be unrealistic because:
  - ✓ *It does not represent member plans* – almost half of the new resources are from the capacity expansion model or "Flex" resources added by MISO
    - The capacity expansion model ignores market revenues and assigns unrealistic accreditation to intermittent resources, which causes the model to almost exclusively select intermittent renewables
    - The model understates the value and technological potential of battery storage and hybrid renewable resource configurations
    - This results in a Future 2A that is $88 Billion more costly with 113 GW more intermittent renewables than an alternative case we produced that meets all energy adequacy and carbon objectives
  - ✓ Resource siting is not optimal – although comments were solicited on siting assumptions, it is not optimized consistent with market signals (locations that minimize congestion and maximize capacity deliverability)

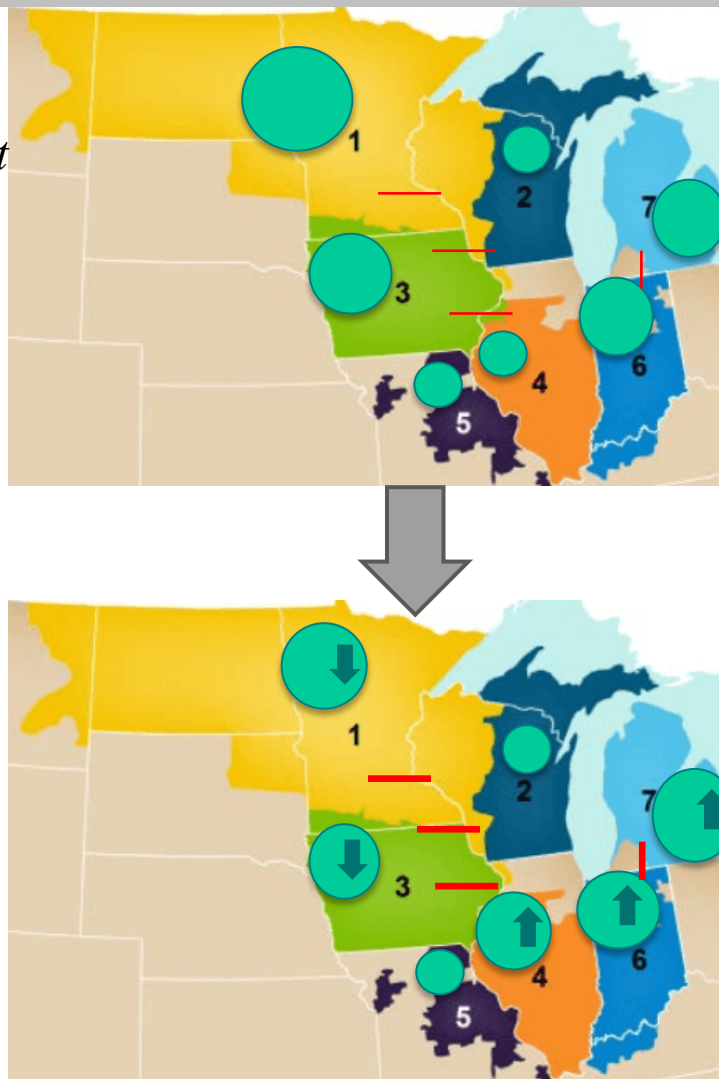
Siting is Critical to Accurately Calculate Benefits: Fundamental Flaw in MISO's Analysis

With Tranche 2.1

- Any accurate benefit-cost analysis must compare expected outcomes *with* & *without* the factor studied (i.e., Tranche 2 projects)
- MISO assumes large quantities of resource development in areas that would utilize the Tranche 2.1 facilities

Without Tranche 2.1

- Without Tranche 2.1, changes in energy and capacity market signals/requirements would shift resources closer to load
- MISO ignores this – assuming Tranche 2.1 will have no effect on resource investment
- This is a major flaw because these siting changes would shift, reduce or eliminate many of the categories of benefits



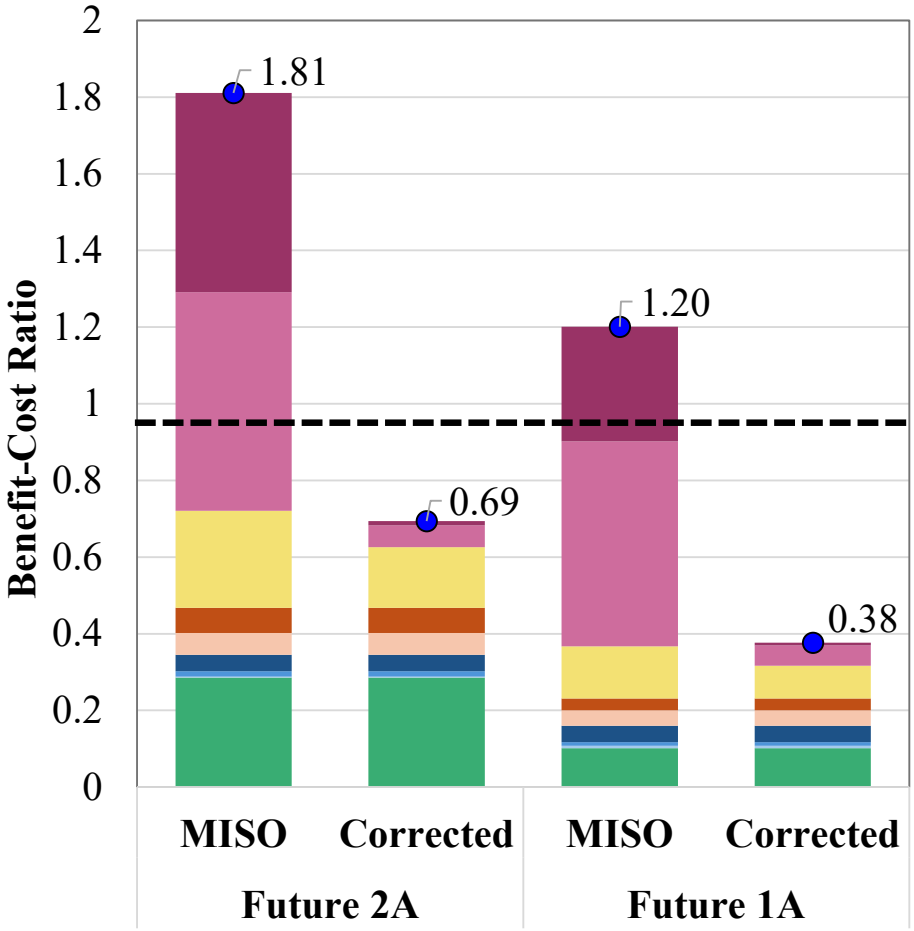
Categories of Benefits Estimated by MISO

Categories of Benefits	Summary of Comments
• Congestion and Fuel Savings (i.e., production cost savings)	• The primary source of economic benefits - overstated by siting flaw
• Reduced Losses – Capacity Savings – Energy Savings	• Overstated by siting flaw – shifting resources closer to load will lower losses, reducing these benefits
• Decarbonization	• Overstated by not assuming a reasonable range of carbon values
• Reduced Tx. Outage Costs	• Valid category of benefits – not captured by most models
• Reduced Extreme Weather Risks	• Valid category of benefits
• Avoided Tx. Investment	• Valid category of benefits
• Avoided Capacity Costs	• Overstated by siting flaw
• Mitigation of Reliability Issues	• Invalid methodology

Overview of Benefit-Cost Results

- MISO has announced that the Tranche 2.1 will produce benefit-cost ratios significantly greater than 1.0 (1.2 to 1.8 in the case shown below)
- The next figure shows the 20-year benefit case, comparing MISO's reported results to correct results that address some of our concerns:
  - ✓ Although the siting flaw described above inflates every category of benefits, our corrections only address the two largest categories
  - ✓ The economic benefits of reducing congestion costs, including the costs of outages and extreme weather, produce benefit-cost ratios ranging from 0.11 in Future 1A and 0.3 in Future 2A
  - ✓ Adding the benefits associated with reduced losses, which are overstated because of the siting flaw, as well as the decarbonization benefits valued at the level of the renewable subsidies, raises the ratios to 0.27-0.58
  - ✓ Finally, when the two largest categories are corrected, the final benefit-cost ratios range from 0.38 in Future 1A to 0.69 in Future 2A
- The 40-year, low discount rate case yields similar results with corrected benefit cost ratios ranging from 0.42 in Future 1A to 0.83 in Future 2A

Summary of Benefit-Cost Results: 20-Year, 7% Discount Rate Case



- Congestion and Fuel Savings
- Reduced Transmission Outage Costs
- Reduced Extreme Weather Risks
- Avoided Transmission Investment
- Energy Svgs from Reduced Losses
- Capacity Svgs from Reduced Losses
- Decarbonization
- Avoided Capacity Costs
- Mitigation of Reliability Issues

	MISO	Corrected
20 Year, 7% Case		
Future 2A	1.81	0.69
Future 1A	1.20	0.38
40 Year, 3% Case		
Future 2A	1.68	0.80
Future 1A	1.13	0.39

* MISO cases show the minimum value, affecting only 2 benefits by excluding the high-end carbon value and VOLL.

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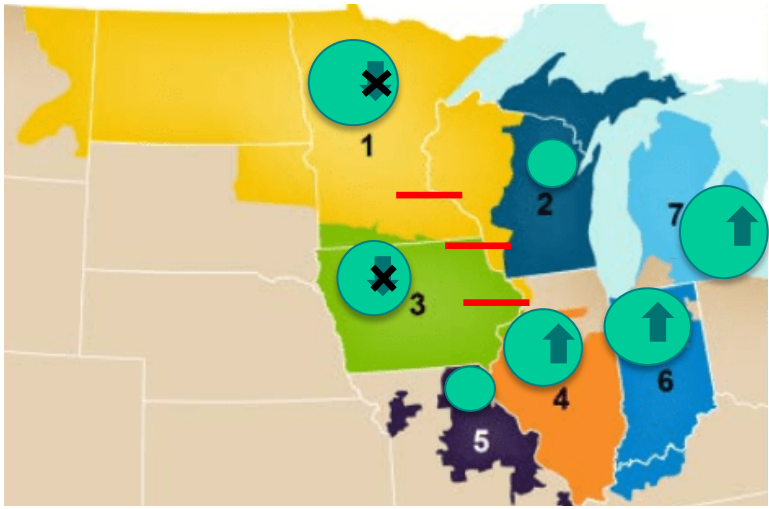
Avoided Capacity Cost

- MISO claims more than $32 billion in avoided costs by estimating that if Tranche 2.1 is not built, MISO will need almost *23* GW of new resources
- MISO's methodology estimates the changes in the Import and Export limits into and out of each capacity zone, then estimates how much new capacity would be needed achieve its reliability requirements
  - ✓ This shows that large amounts of Future 2A resources are not deliverable without Tranche 2 so new resources must be added in deliverable locations
- MISO does not recognize that participants will also rationally reduce investment in undeliverable locations
  - ✓ A proper analysis would assume new resources would *move* from undeliverable areas to deliverable areas (this is <u>much</u> less costly)
  - ✓ We estimate the costs of moving the resources and find that it lowers these benefits by *90 percent*



Avoided Capacity Cost

The second problem: MISO uses the same capacity expansion model (EGEAS) as it used to create Future 2A

- The EGEAS model strongly prefers intermittent renewables because it does not accurately perceive the relative market and reliability value of renewables vs. other technologies
- After MISO estimates the additional MWs needed for reliability, its model chooses to meet **75%** of this need with intermittent renewables (16.8 GW)
  - ✓ This is problematic because these resources are meeting a reliability need but will provide almost no marginal reliability in the out years
  - ✓ MISO's new capacity accreditation framework will recognize this, but this analysis uses old and inaccurate accreditation assumptions
- The same reliability value can be provided by a combination of battery storage, hybrid renewables, and dispatchable resources *totaling 5 to 6 GW and costing $13 billion less* than MISO's 23 GW of new resources

Mitigation of Reliability Issues

MISO's intent was to quantify the value of the load-shedding risks that Tranche 2.1 may mitigate.

There are two serious concerns with this:

1. This is not a logically valid means to calculate this benefit
2. MISO's methodology vastly overstates the potential load shedding

Benefit validity: any valid benefit analysis must compare expected outcomes with and without the factor being studied

- MISO's approach would only be valid if it actually sheds load to address these issues, which is not true
- These issues are managed operationally by:
  - ✓All available resource redispatch & commitments
  - ✓Transmission line-loading relief procedures
  - ✓Network reconfiguration or operating guides
- Issues not manageable operationally would result in incremental upgrades via MTEP or other processes

Mitigation of Reliability Issues

Overestimated Load Shedding: Even if quantifying load shedding were valid, MISO's methodology overestimates it

- MISO severely restricts redispatch of non-renewables for the constraints that generate the load shedding:
  - ✓ Thermal units, battery storage, and hydro resources are assumed to be fixed unless needed to balance demand
  - ✓ MISO only allows relatively low-cost redispatch by using a low constraint penalty (much lower than MISO uses in operations)
- Any identified load shedding is assumed to occur in all similar hours, which increases the estimated magnitude of potential load shedding

A valid method for calculating this benefit would quantify the following

- Cost of mitigating the issues (redispatch, resource commitments, operating guides, etc.)
- Upgrade costs if they cannot be managed operationally
- *Not the value of lost load* since load shedding will not actually occur – we estimate mitigation costs of $320 million (rather than $14.8 billion)

Conclusions and Recommendations

- As described above, we find MISO's benefit analysis to be flawed, resulting in substantially overstated benefit-cost ratios
  - ✓ Correcting the flaws for the two largest categories of benefits reduces the range of benefit-cost ratios to from **0.4 to 0.8**
  - ✓ Correcting the effects of the siting flaw described above on the other 7 categories of benefits would further reduce the benefit-cost ratios
- Hence, we find that MISO's analysis provides no reasonable basis for the MISO Board to approve Tranche 2.1

- **We recommend the Board postpone approval of Tranche 2 pending MISO:**
  - ✓ Reforming the portfolio of projects; and
  - ✓ Correcting the benefit analyses to ensure that any approved Tranche 2 portfolio will produce net benefits MISO's customers