

CHAPTER 3: POLICY AND ECONOMIC STUDIES

3.1 Targeted and Interregional Analyses

MISO is addressing challenges driven by the pace at which the grid is evolving from all directions, including increased renewable integration, retirements, and new technologies. The value of MISO-wide diversity and interconnectedness are key to understanding the best outcome and driving traditional planning processes to change to accommodate this rapidly evolving grid. Many stakeholders share the position that now is the time for MISO to take action to ensure that the grid is positioned to reliably and cost-effectively enable the transitions that are occurring.

For MTEP20, updated MTEP19 Futures were used and instead of performing a Market Congestion Planning Study, four targeted sub-regional issues and areas were evaluated and analyzed, including the completion of the North-South study and an interregional evaluation through a Coordinated System Plan (CSP) with Southwest Power Pool (SPP). These studies help set the stage for further investigation of the long-range transmission needs.

These evaluations highlighted the values of and need for further identification of sub-regional concerns that should be addressed as part of the regional and interregional transmission plan. While there are no proposed Appendix A projects in MTEP20 resulting from these investigations, they provide a significant informational base going into the next planning cycle.



Figure 3.1-1: Focus areas of MTEP20 targeted and interregional analyses

3.2 Analyses Addressing Sub-Regional Needs

North-South Interface

Business Need/Study Scope

In early 2019, MISO submitted updates to the current MEP cost allocation methodology to include the avoided cost of future MISO-SPP Settlement Agreement payments as a benefit metric. Shortly after, MISO received requests from various Stakeholders to examine transmission line alternatives to the MISO-SPP Settlement Agreement. MISO began studying the economic benefit potential of various transmission lines against the cost of future settlement payments. The objective of this analysis was to determine if a transmission project would offer a better value to MISO’s membership than the current MISO-SPP Settlement Agreement and if a higher transfer capability between the MISO sub-regions would result in increased economic benefits.

The MISO-SPP Settlement Agreement is an agreement in which MISO financially compensates SPP and The Joint Parties (AECI/TVA/LGE/KU) for real-time energy transfers above 1000 MW (up to 3000 MW North-South and 2500 MW South-North limits) between MISO’s North and South sub-regions.

Approach/Methodology

The study began in the middle of the MTEP19 Market Congestion Planning Study (MCPS) with an informational session led by the Economic Studies group which communicated the future value, cost and importance of energy transfers between the North and South sub-regions in MISO. These three concepts were investigated in detail throughout the session to develop a specific framework to identify issues and respective solutions.

MISO collaborated with Stakeholders on various transmission project ideas. These solutions were intended to add additional contract path capacity between MISO’s sub-regions, which required that the transmission project possessed termination points in both MISO North and MISO South. In total, 35 transmission solutions passed the screening criteria for adding new contract paths as tested using MISO’s MCPS study framework.

The Economic Studies team performed all steps provided in the MCPS process and discovered three projects that maintained a B/C Ratio above 1.0 throughout the analysis. These projects maintained this status due to their low cost and large contract path increase which allowed for sub-regional transfer capability greater than or equal to the limits provided by the MISO-SPP Settlement Agreement.

ID	Transmission Solution	Cost Estimate (2019-\$M)	20-yr B/C Ratio					Assumed Contract Path Increase (MVA)
			AFC	CFC	DET	LFC	Aggregate	
PC-1	New 345kV, 2574MVA line from Jim Hill-Berntie Rebuild 161kV line from Berntie-Stoddard	152	2.33	2.18	1.90	1.75	2.04	2574
PC-2	New 345kV, 2574MVA line from Jim Hill-Lutesville	249	1.43	1.13	1.01	1.08	1.16	2574
PC-3	New 345kV, 1793MVA line from Jim Hill-Kelso. New 161kV, 509MVA lines from Jim Hill-Berntie. Upgrade existing Stoddard-Berntie, Stoddard-Morley, Oran-Morley and Oran-Kelso lines to 509MVA.	262	1.19	1.14	1.04	1.02	1.10	2302

Table 3.2-1: North-South Interface projects meeting MCPS thresholds

Outlook/Next Steps

Although MISO concluded the [North-South Interface Study](#) in the spring of 2020 with the MTEP19 project scope, MISO anticipates further analysis in MTEP21. The three main reasons for concluding the current study are (1) MISO has continuously collaborated with SPP and The Joint Parties and plans to continue that communication into the MTEP21 time period (2) Stakeholders would like MISO to consider benefit metrics beyond APC savings and avoided settlement costs to capture all of the benefits a transmission solution would provide (3) At the time of conclusion, the Tariff updates which included settlement agreement cost avoidance as a benefit metric were still pending FERC approval.

North Region Targeted Study

Business Need/Study Scope

As the MISO fleet continues to shift away from large thermal units to geographically dispersed inverter-based renewables, it is expected that addressing non-thermal system limitations will begin playing a larger role in ensuring reliable operation of the system. MISO's economic planning process has historically focused on thermal limits for its market constraint modeling, with non-thermal limits simply being modeled at their currently defined ratings. To accurately reflect the future MISO energy market, reliability assessments must be performed to determine if any updated or new non-thermal limits should be incorporated into the economic models.

The North Region Targeted Study is an informational study in which MISO evaluates system limitations caused by non-thermal constraints between the high renewable penetration northwestern areas of MISO and load centers in eastern areas of MISO. Findings from this study will be used to inform future transmission planning initiatives and improve existing economic evaluation processes such as the Market Congestion Planning Study (MCPS).

Three scenarios representing varying levels of renewable penetration and different siting methods were developed for this study. These scenarios were then simulated in the production cost modeling software PROMOD with the outputs from these simulations converted to powerflow model inputs for reliability analysis in PSS/E and VSAT. Once non-thermal limits were determined, they were brought back to the PROMOD models where they were included as market constraints. Any non-thermal constraints that resulted in substantial levels of congestion were identified as economic issues, and potential transmission upgrades were tested to resolve them.

MISO targets to use findings from this study effort to scope studies in the upcoming MTEP21 cycle, where it will provide a more holistic view of how the future grid will operate and what transmission upgrades are necessary to continue to reliably and efficiently deliver energy across the MISO footprint.

Approach/Methodology

The current MCPS process emphasizes analysis of congestion related to thermal system limitations on the MISO system. While some non-thermal constraints are included in MCPS economic models (e.g. MWEX), they are modeled using system-intact limits that are currently used in the MISO market. One of the main objectives of the North Region Targeted Study (NRTS) is to develop a process to identify and incorporate non-thermal system limitations as they would exist in the futures developed for the MCPS process.

The following steps were performed to create a standardized process in determining non-thermal system limitations in economic study models:

1. Created three scenarios with varying levels of renewable penetration and different siting methodologies
2. Simulated the three scenarios using production cost models
3. Created powerflow models for each scenario based on the Security Constrained Economic Dispatch (SCED) performed in the production cost models
4. Performed transfer analyses on each powerflow model to identify voltage stability issues and their associated limits
5. Included newly evaluated non-thermal interfaces and limits in production cost models to determine if they resulted in economic congestion issues
6. Evaluated congestion mitigation and economic benefit of project ideas, considering both thermal and non-thermal issues

Evaluating non-thermal issues in economic modeling will allow future economic studies to better capture how the market would operate in any potential future system scenario. As MISO's generation fleet converts from traditional large thermal units to inverter-based intermittent and distributed renewables, this process will become increasingly important in maintaining the most efficient and reliable bulk electric system.

Outlook/Next Steps

The MISO generator fleet is projected to change significantly in the coming years, moving away from large thermal units with high inertia to inverter-based technologies. The [North Region Targeted Study](#) was a first step in re-evaluating MISO's standard economic planning processes to ensure that all issues that will be encountered in the future are considered. An iterative process between reliability and economic analyses is required to address system needs due to changing generation fleet.

The process and findings from this study will be used to further investigate non-thermal issues in the MISO North region as a part of the Long-Range Transmission Planning effort in MTEP21.

In upcoming studies, additional analysis will be conducted to identify solutions that improve voltage stability in the MISO North region. MISO will conduct both voltage and transient stability analysis to reveal weak grid areas that have high penetration of inverter-based resources. Concurrently, options to quantify reliability benefits provided by any projects that mitigate these non-thermal issues will be explored.

Michigan Capacity Import Export Limit Expansion Study

Business Need/Study Scope

When comparing the Local Clearing Requirements (LCR) to regional requirements, Local Resource Zone 7 must source nearly their entire resource adequacy requirement from within Local Resource Zone 7. As Michigan is experiencing a significant number of planned and future power plant retirements, additional import capacity may help Michigan access diverse and economical supplies of power, assist with reliability and resiliency during emergency conditions, and enhance MISO's annual resource adequacy needs, particularly with respect to LRZ 7's ability to meet the MISO Local Clearing Requirement.

In the Michigan State Energy Assessment report issued on September 11, 2019, the Michigan Public Service Commission (MPSC) recommended that the value of resiliency should be incorporated in future electric infrastructure planning and investment decisions. On November 7, 2019, the Governor of Michigan and the MPSC, respectively, requested MISO to conduct analysis on the impacts of increasing Capacity Import Limits (CIL) and Capacity Export Limits (CEL) for MISO's Local Resource Zone 7 (LRZ 7). LRZ 7 geographically covers the majority of Michigan's Lower Peninsula (LP).

Specifically, the MPSC seeks to better understand transmission and non-transmission solution options available to increase the limits into and out of LRZ 7 in the near and long term (e.g., the possibility of considering additional high voltage infrastructure coming into LRZ7), as well as an estimate of the corresponding costs and benefits.

The MPSC requested from MISO to first analyze increasing the CIL in the near term at increments such as 500 MW and 1,500 MW. The goal is to determine the infrastructure needed to accommodate cost-effective increases in the near term, with corresponding costs and benefits to LRZ 7 and other LRZs as applicable.

The MPSC's second request from MISO is to determine what types of projects could facilitate an increase in the CIL in LRZ 7 by larger increments over the next decade to accommodate additional renewable energy and other changes in the generation mix.

Approach/Methodology

The Michigan Capacity Import/Export Limit Expansion Study is an informational study to determine transmission expansion and non-transmission options to increase the capacity import and export limits for MISO's Local Resource Zone 7 (Lower Michigan). As this is an informational study, MTEP Appendix A project recommendations will not be made as a direct result of this study – any further action would be that of the MPSC or MISO stakeholders.

To determine an LRZ's capacity import or export limit, a transfer is modeled by ramping generation up in a source subsystem and ramping generation down in a sink subsystem. The LRZ studied for import limits is the sink subsystem and the adjacent MISO areas are the source subsystem. The LRZ studied for export limits is the source subsystem and the rest of MISO is the sink subsystem. Limited redispatch is applied after performing transfer analyses to mitigate constraints. Redispatch ensures constraints are not caused by the base dispatch and aligns with potential actions that can be implemented for the constraint in MISO operations.

Transfer capability measures the ability of interconnected power systems to reliably transfer power from one area to another under specified system conditions. The incremental amount of power that can be

transferred is determined through First Contingency Total Transfer Capability (FCTTC) analysis, which identifies the total amount of transferrable power before a reliability constraint is identified. Reliability constraints consider steady-state thermal and voltage issues based on the NERC Transmission Planning Reliability Standards.

As initially scoped, the Michigan Capacity Import/Export Limit Expansion study will focus on identifying multiple potential transmission expansion scenarios:

- **Local Smaller-Scope:** Approximately 500 MW incremental increase in capacity import limit
- **Local Larger-Scope:** Approximately 1,500 MW incremental increase in capacity import limit
- **Regional:** 3,000 MW+ incremental increase in capacity import limit

Transmission expansions will be optimized to provide the highest capacity import limit increase to capital cost of the project ratio, while considering the targeted scope ranges. Capacity export limits will be calculated on final transmission expansion options. Additionally, final transmission expansions will be qualitatively evaluated in the context of broader regional needs (i.e. determination of how options fit with additional topology changes being considered through concurrent MTEP20 studies).

As the current Michigan Capacity Import/Export Limit Expansion Study is focused on increasing the capacity import limit (decreasing the Local Clearing Requirement) which is MISO intra-zonal, transmission options will be primarily focused inside the MISO footprint or those which increase the LRZ7 CIL. As MISO continues evaluation of the Long Range Transmission Plan, MISO will consider further opportunities to enhance access and delivery to the broader MISO market for LRZ7.

Outlook/Next Steps

A Capacity Import Limit achieving the targeted near-term megawatt increase was identified for Scenario 1. MISO is asking stakeholders to identify alternative projects to increase the Michigan Capacity Import Limit for Scenario 2. A report will be released by the end of the calendar year.

3.3 Analyses Addressing Interregional Needs

MISO-SPP Coordinated System Planning

In March of 2020, MISO and SPP formally initiated a CSP study based on the recommendation of the MISO-SPP IPSAC. The study scope focused on economic evaluation of top congested seams flowgates identified in each RTO's respective regional planning process (Figure 3.3-1). The complete results of the study will be published in a standalone 2020 CSP study report (anticipated Q4 2020), as well as presented to stakeholders at a conclusionary IPSAC meeting. Any project recommended by the 2020 CSP study will require approval by each RTO's Board of Directors for inclusion in the respective regional transmission plan.

2020 SPP-MISO CSP Study Areas of Congestion:

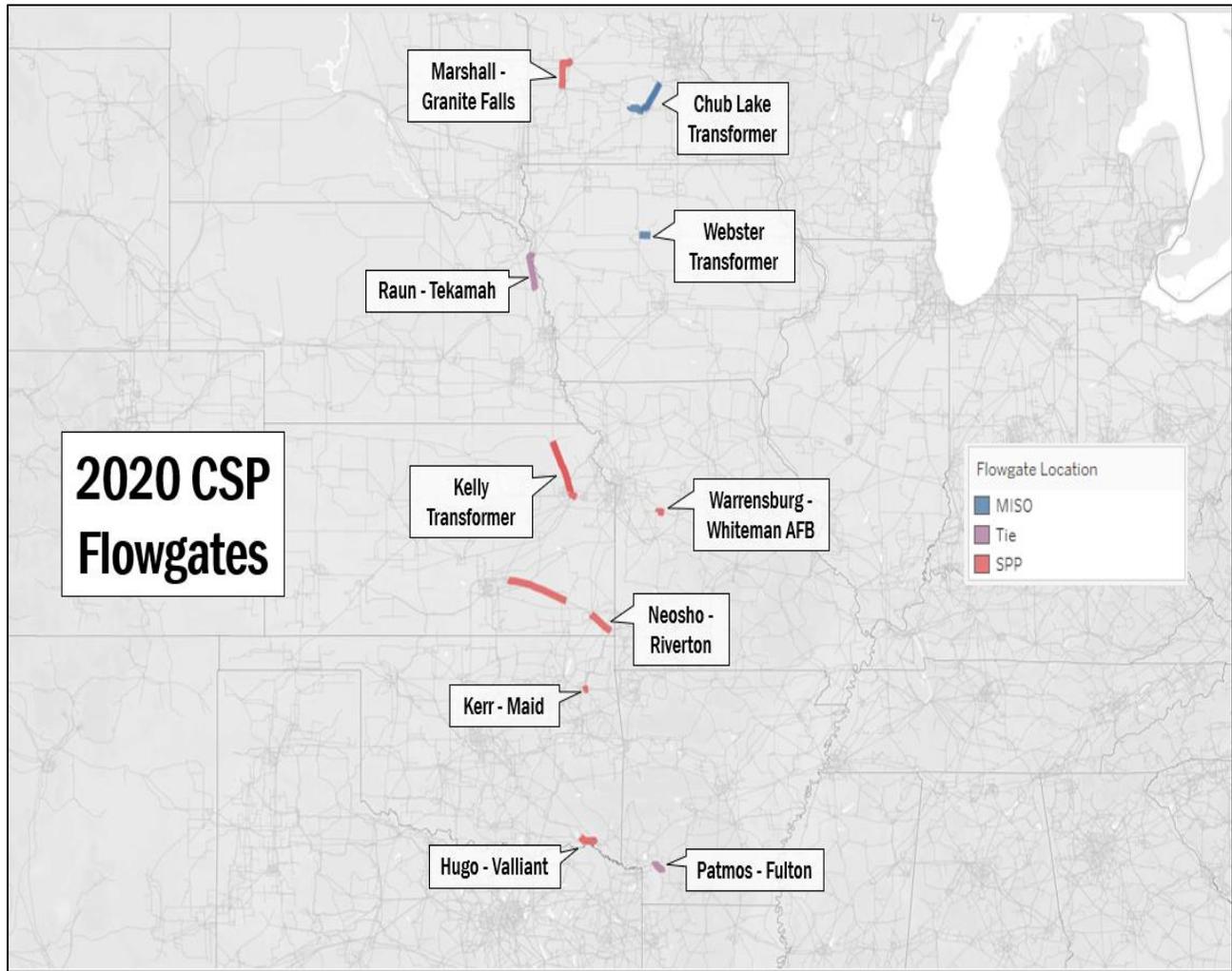


Figure 3.3-1: MISO-SPP 2020 CSP flowgates

On September 14, 2020 it was jointly [announced](#) that MISO and SPP will conduct a Joint Study Targeting Interconnection Challenges. MISO and SPP will collaborate on a year-long transmission study designed to identify transmission projects. This joint study will be a simultaneous evaluation of benefits focused on solutions that the RTOs believe will offer benefits to both their interconnection customers and end use

consumers. The study is expected to formally kick off in December 2020 and include several joint stakeholder meetings. The study will be reported on in the MTEP21 Report.

MISO-PJM Coordinated System Planning

In Q1 of 2020, MISO and PJM presented their respective regional issues at an IPSAC meeting to help determine the need for a CSP study. RTOs also reviewed the 2018-2019 historical market-to-market congestion costs for the possibility of developing a Targeted Market Efficiency Project (TMEP) study. After careful consideration, MISO and PJM mutually determined not to initiate a CSP study based on the following rationale:

- Interregional Market Efficiency Project (IMEP) study (2-year study process): Coordinated models are currently under development in each region. A study will be pursued in the near future if the regional models identify constraint(s) that could justify such a project
- Targeted Market Efficiency Project Study (TMEP): Very limited opportunities were identified; study will not be conducted in 2020
- Interregional Reliability Project: No constraints have been identified for study in 2020
- Interregional Public Policy Project Study: No drivers were identified, or studies currently planned
- Ad Hoc: No drivers were identified, and no ad hoc studies are currently planned under the CSP

The next MISO-PJM IPSAC meeting is expected to be scheduled in the fourth quarter of 2020 and will focus on the potential for a two-year cycle IMEP study. The RTOs will evaluate the need for a two-year cycle study as the economic models are completed and results are reviewed later this year.