Executive Summary

Introduction

MISO is focused on ensuring a reliable and efficient electric infrastructure to meet future needs

System Planning is working to ensure a reliable and efficient infrastructure given a changing resource mix

The Midcontinent Independent System Operator (MISO), through an inclusive and transparent stakeholder process, annually develops the MISO Transmission Expansion Plan (MTEP). MISO evaluates various types of projects through the MTEP process that, when taken together, build an electric infrastructure that is sufficiently robust to meet local and regional reliability standards; enable competition among wholesale capacity and energy suppliers in the MISO markets; and allow for competition among transmission developers in the assignment of transmission projects. **MISO's system planning process ensures the reliable operation of the transmission system; supports achievement of state and federal energy policy requirements; and enables a competitive electricity market to benefit all customers.**

The electricity industry successfully navigated a tremendous amount of change and uncertainty over the last decade and faces continued change into the foreseeable future. MISO's strategy is meant to ensure its market operations and electric infrastructure will meet tomorrow's needs**.** MISO System Planning plays a key role in the development of new planning methods, providing critical insights around impacts of change, and recommending new transmission infrastructure to support ongoing transformation of the regional landscape. MTEP16 reflects current progress in long-term planning efforts to deliver the lowest-cost energy to consumers and maintain reliable operation of the transmission system as well as set a path for future needs.

MTEP16 Overview

In MTEP16, MISO staff recommends the MISO Board of Directors approve $2.7 billion of new transmission expansion projects with expected in-service dates through 2024. MTEP16, the 13th edition of this publication, is the culmination of more than 18 months of collaboration on system planning across a diverse geographic and regulatory landscape covering 900,000 square miles. The projects in MTEP16 bring continued reliability to the electric grid and deliver the lowest-cost energy to customers.

In MTEP16, the 13th edition of this publication, MISO staff recommends $2.7 billion of new transmission expansion projects for Board of Directors' approval

As the MISO region experiences changes and growth, MTEP also looks at specific issues to ensure the region is well-positioned to meet future electricity demand and regulatory mandates. Notable work efforts performed during this planning cycle include:

- Continued efforts to evaluate transmission needs and identify solutions through Market Congestion Planning Studies[1]
- Providing transparency around the Resource Adequacy outlook in the MISO Region[2]
- Greater interregional planning collaboration along MISO's seams[3]
- Seeking improved Generation Interconnection Process outcomes through Queue Reform[4]
- MISO's Clean Power Plan analysis[5]

MTEP16 is organized into four books and a series of detailed appendices.

- **Book 1** summarizes this cycle's projects and the analyses behind them
- **Book 2** describes annual and targeted analyses for Resource Adequacy
- **Book 3** presents the policy landscape. It summarizes regional and interregional studies
- **Book 4** presents additional regional energy information

Appendices A through F provide detailed assumptions, results, project information and stakeholder feedback.

MTEP16 Highlights

- **383 new projects** for inclusion in Appendix A
- **$12.9 billion in projects** constructed in the MISO region since 2003
- **MISO forecasts the reserve margin** will drop below the Planning Reserve Margin Requirement of 15.2 percent beginning in 2018 absent additional actions by load serving entities and state commissions
- Improved **Interregional Planning** pursuant to Order 1000

[1] See MTEP16 Report, Section 5.3
[2] See Book 2
[3] See Chapter 8
[4] See Section 4.2
[5] See Section 7.1

The MISO Planning Approach

A defined set of principles, established by MISO's Board of Directors, is the foundation of the organization's planning efforts. These principles, last reconfirmed March 2016, were created to improve and guide transmission investment in the region and to give strategic direction to the MISO transmission planning process.

Guiding Principles for Expansion Plans

The system expansion plans produced through the MISO planning process must ensure the reliable operation of the transmission system; support achievement of state and federal energy policy requirements; and enable a competitive electricity market to benefit all customers. The planning process, in conjunction with an inclusive, transparent stakeholder process, must identify and support development of transmission infrastructure that is sufficiently robust to meet local and regional reliability standards as well as enable competition among wholesale capacity and energy suppliers.

In support of these goals, the MISO regional expansion planning process should meet each of the following Guiding Principles[6]:

- Make the benefits of an economically efficient electricity market available to customers by identifying transmission projects that provide access to electricity at the lowest total electric system cost
- Develop a transmission plan that meets all applicable NERC and Transmission Owner planning criteria and safeguards local and regional reliability through identification of transmission projects to meet those needs
- Support state and federal energy policy requirements by planning for access to a changing resource mix
- Provide an appropriate cost allocation mechanism that ensures the costs of transmission projects are allocated in a manner roughly commensurate with the projected benefits of those projects
- Analyze system scenarios and make the results available to state and federal energy policy makers and other stakeholders to provide context and to inform choices
- Coordinate planning processes with neighbors and work to eliminate barriers to reliable and efficient operations

The MTEP process seeks to identify projects which:

- **Ensure the reliability of the transmission system**
- **Provide economic benefits, such as increased market efficiency**
- **Facilitate public policy requirements, such as meeting Renewable Portfolio Standards**
- **Address other issues or goals identified through the stakeholder process**

A number of conditions must be met through this process before approving long-term transmission that will support future generation growth and accommodate documented energy policy mandates and laws. These conditions support the MISO guiding principles and include:

- A robust business case for the project
- Policy consensus around what issue is being addressed

[6] These Guiding Principles were initially adopted by the Board of Directors, pursuant to the recommendation of the System Planning Committee, on August 18, 2005, and reaffirmed by the System Planning Committee in February 2007, August 2009, May 2011, March 2013, and March 2016

- Clearly defined cost allocation methods that closely align who pays with who benefits, and Cost recovery mechanisms that reduce financial risk

In support of these principles, MISO implemented a planning process to reflect a view of projects inclusive of reliability, market efficiency, public policy and other value drivers across all planning horizons.

Competitive Transmission Process

In response to FERC Order 1000 reforms, MISO established a process that opens up opportunities for non-incumbent transmission developers to construct, own, operate, and maintain transmission in the MISO footprint.

In response to these significant changes, MISO's Competitive Transmission Process,[7] consisting of the Competitive Developer Qualification Process and the Competitive Developer Selection Process, was designed to supplement the established regional transmission planning process (Figure 1.1). As a result, the MTEP process continues to determine the facilities necessary to ensure delivery of lowest-cost energy to consumers and the reliable operation of the transmission system while the MISO Competitive Developer Selection Process determines the responsible entity that will construct, own, operate and maintain these facilities.

MTEP15 included a Competitive Transmission Facility that triggered the first implementation of the MISO Competitive Developer Selection Process. This process began with the issuance of a Request for Proposals (RFP) for the Duff-Coleman EHV 345 kV transmission line facility on January 8, 2016. MISO received 11 completed proposals in response to this RFP to construct, own, operate and maintain the Duff-Coleman EHV 345 kV transmission line facility. These proposals are under evaluation by MISO, which is expected to be completed on or before December 30, 2016

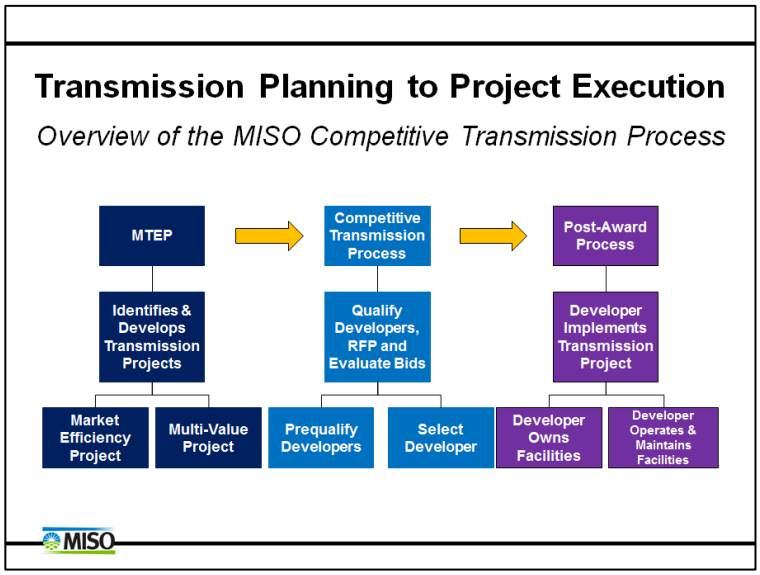

Figure 1.1: Overview of MISO Competitive Transmission Process

MTEP16 does not include any transmission facilities eligible for the MISO Competitive Developer Selection Process, however this cycle will include a Market Efficiency Project (MEP) located wholly within the state of Minnesota.[8] The MTEP16 MEP was not eligible for the MISO Competitive Developer Selection Process due to the applicability of Minnesota Statute 216B.246, which assigns the authority for selecting developers to the state.

[7] https://www.misoenergy.org/PLANNING/Pages/TransDevQualSel.aspx
[8] See Section 5.3 Market Congestion Planning Study

The System Planning Long-Term Plan

The MISO Strategic Plan includes three Strategic Objectives: Market and Grid Positioning, Serve and Grow Membership and Thought Leadership (Figure 1.2). These key objectives — in conjunction with a focus on ensuring efficient and effective processes, development of necessary employee skill sets and implementation of new technology — collectively seek to achieve MISO's vision to be the most reliable, value-creating regional transmission organization (RTO). The MISO long-term strategic plan sets the framework to address upcoming challenges in the industry with a clear, forward-looking roadmap.

MISO System Planning will undertake a number of initiatives in support of key elements of the MISO strategic plan, with a goal of ensuring an electric system that provides reliable, low-cost energy to customers.

The MISO Strategic Plan

Figure 1.2: The MISO Strategic Plan

Portfolio Evolution / Enable Infrastructure Investment

Transmission infrastructure is expected to be a key component of ensuring reliable and low-cost electricity given the changes in the resource portfolio. The MISO footprint will see a decrease in coal generation resources and an increase in other generation resources such as natural gas, wind and solar. Additionally, load patterns will likely shift due to increased energy efficiency, demand response and distributed generation. The MISO transmission overlay development process will identify transmission projects to reliably deliver least-cost energy and capacity to consumers under a range of foreseeable resource mix scenarios. This work will be accomplished by building on the three future scenarios detailed in MTEP16[9] and using them to develop long-term transmission planning roadmaps, which will guide annual transmission decisions through the MTEP process in future MTEP cycles.

Another significant aspect of portfolio evolution is the need to interconnect new generation resources in an efficient manner. Continued focus on generator interconnection queue reform will improve study processes to allow timely execution of Generation Interconnection Agreements and align with participation in MISO's resource

[9] See Section 5.2

adequacy construct. Executing this essential planning function will address generation portfolio changes and support resource adequacy throughout the MISO footprint.

Finally, MISO will continue to provide insight around resource adequacy in the region. With shrinking reserve margins, continued transparency around the supply/demand balance remains important to understand reliability risk for the MISO footprint. Additional work to refine the calculation of the required reserve margin will also occur to ensure the analysis reflects the new mix of resource types including reduced levels of baseload coal, increased intermittent resources such as wind, and the introduction of new resource types such as storage to the MISO footprint.

Regional Modeling and Analytics

New energy policies and emerging technologies such as energy storage, solar, and synchrophasors are changing the bulk electric system. MISO will help state regulators and members understand the risks and value created by changes in economic and policy conditions by providing data transparency and offering technical analysis. In the MTEP16 timeframe,[10] MISO completed analysis of the Clean Power Plan (CPP) and other environmental regulations to assess the impacts of compliance with the CPP's CO_2 reduction targets. Going forward, MISO will continue to focus its analysis on impacts of carbon regulations, including air quality rules, and emerging alternative technologies such as energy storage and distributed generation. Ultimately MISO will consider how to incorporate these complexities into MISO's planning process.

Electric-Gas Coordination

As gas-fired generation becomes an increasingly larger part of the MISO resource mix, MISO will coordinate with the natural gas industry to address issues associated with the region's increasing reliance on gas-fired power generation. From a System Planning perspective, MISO will continue to analyze impacts of long-term increases in natural gas for electricity-generating purposes. In addition, MISO will focus on the development of additional skills, tools and processes needed to understand the expected supply of natural gas so accurate transmission planning solutions are developed. Future studies included in MTEP will reflect this increased integration of gas impacts into transmission planning.

Seams Optimization

Interregional planning is critical to maximize the value of the transmission system and deliver savings for customers. Interregional studies[11], conducted jointly with MISO's neighboring planning regions, are based on a review of transmission issues conducted annually. Additionally, efforts such as the Targeted Market Efficiency Projects[12] concept, currently in development with PJM, reflect continued innovation in the process to ensure MISO and its neighbors jointly identify new or better projects than would otherwise be developed through the regional plan. MISO and PJM have identified a number of potential projects of this type and anticipate filing Joint Operating Agreement changes along with associated regional tariff revisions with FERC near the end of the fourth quarter of 2016.[13] Along the seam with SPP, MISO has committed to a joint, multi-year study, similar to MISO's own overlay development efforts, which will address future interregional system planning needs stemming from a dramatically changing future energy landscape expected to impact both RTOs. MISO will also continue to work with the Southeastern Regional Planning (SERTP) sponsors to advance and mature interregional coordination provisions that were accepted by FERC in 2016.

[10] See Section 7.1
[11] See Chapter 8 Interregional Studies
[12] See Section 8.1 PJM Interregional Study
[13] See Section 8.1 PJM Interregional study - IPSAC

Conclusion

MISO is proud of its independent, transparent and inclusive planning process that is well-positioned to study and address future regional transmission and policy-based needs. The valuable input and support from the stakeholder community allows MISO to create well-vetted, cost-effective and innovative solutions to provide reliable delivered energy at the least cost to consumers. MISO welcomes feedback and comments from stakeholders, regulators and interested parties on the evolving electricity system and implementation of MISO's strategic initiatives. For detailed information about MISO, MTEP16, renewable energy integration, cost allocation, and other planning efforts, go to www.misoenergy.org.