



Current & Emerging Transmission System Technology Overview

System Planning Committee
of the Board of Directors

June 25, 2024

Executive Summary



- Drivers of the Reliability Imperative increase planning complexity and require MISO to transform its planning processes
- While Committee technology updates typically focus on transmission systems, this year highlights how MISO is meeting challenges of the evolving grid by leveraging technology to adapt and improve processes
- An economic planning technology and modernization project is providing new and critical analytical capabilities while PLEXOS software is advancing capacity modeling

As MISO looks toward the next five years, System Planning's near-term efforts will focus on addressing the accelerating transition of the resource fleet along with the increased complexity of planning

Long Range & Interregional Transmission Planning

Standardized local, regional and interregional transmission planning, processes and buildout based on Futures reflective of resource evolution, to enable policy goals and the future grid with broadly accepted cost allocation methodologies

Resource Utilization

Dynamic retirement process, more rapid interconnections with smaller average MW, and resource reliability attributes addressed throughout the resource lifecycle

Planning Transformation

Aligned, adaptable and flexible processes to recognize emerging transmission opportunities and risks, and increased alignment with Markets and Operations

Significant change is required as spot load growth, policy direction and other Reliability Imperative drivers are increasing the complexity of planning and increasing MISO's overall workload



Increased correlated risks from intermittent resources



More complex analysis needed on additional scenarios



Significant growth in queue requests



Enhanced need for stakeholder input and data exchanges

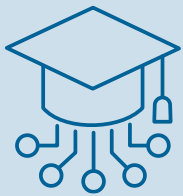


Increase in volumes of data collected and managed



Need for better internal and external coordination

A key economic planning technology and modernization project makes planning, operations and markets data accessible in a single platform for the first time, enabling essential cross-functional insights



Lays the foundation to unlock machine learning capabilities in planning processes



Moves MISO toward reducing economic model building time by as much as one-half

- Will enhance MISO's uncertainty management capabilities with improved scenario planning
- Consolidates previously siloed data of more than 140 economic planning data sets with operations and markets into a modern data platform
- Automates the storage, validation and visualization of economic data
- Frees up MISO staff to focus on higher level analysis in more complex planning

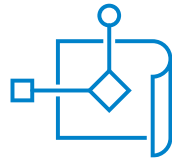
Digital Technology's work is enabling data transformation across MISO

This modernization of data and technology is enabling MISO to realize a new transformational paradigm with aligned planning and operations

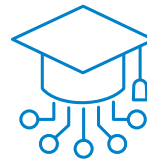
TECHNOLOGY SOLUTIONS



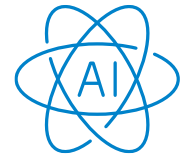
**Diagnostic
Analytics Using
*Business Intelligence***



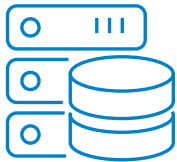
**Advanced
(Predictive)
Analytics**



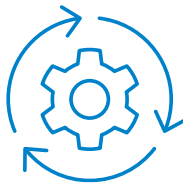
**Prescriptive
Analytics Using
*Machine Learning***



**Autonomous
Analytics Using
*Artificial Intelligence***



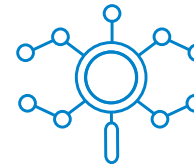
**Consolidated
& Integrated Data**



**Process
Automation**



**Standard &
Ad-Hoc Reporting**

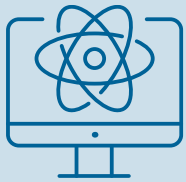


**Portals for
Self-Service**



**Stakeholder
Data Exchanges**

PLEXOS provides the features needed to address the complexities of the electric industry landscape and the quick pace of change



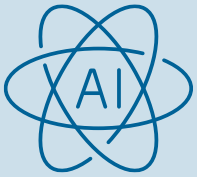
Enables flexible, comprehensive and chronological simulation models in a complex system



Accommodates all time horizons, from hourly to long-term, for system planning and operations

- Handles high penetrations of intermittent resources and storage
- Incorporates policy goals, regulation and load-following requirements in economic commitment and dispatch decisions
- Captures input data on costs, system load, plant characteristics, transmission capability, and variable generation
- Wide user base in the power industry

MISO is also pursuing technology advancements within the Generator Interconnection Queue to improve access to information through Artificial Intelligence (AI) and to speed up the process through automation



Teaching AI to answer questions about queue process, Tariff and business practices



Automating portions of the queue process will improve the timeliness of studies

- An AI driven chatbot will give customers quick access to information and reduce the MISO staff workload
- Cloud computing will improve model building and provide constraint solutions more quickly
- Automating the solution process and integrating MISO's Cost Estimation Guide will speed calculation of cost estimates

Automation improvements are resulting in processes similar to those at SPP