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**Executive Summary**

Today, several factors produce rising electricity resource adequacy and reliability concerns across the country, creating a complex policy landscape:

- Growing electric demand from continued electrification, a resurgence in manufacturing, and energy-hungry data centers to support artificial intelligence.
- The accelerated early retirement of existing electric generation.
- The growing preference for low or no carbon emission resources that often do not have the 24/7 availability, flexibility, and duration attributes of the power plants they are replacing.
- More frequent occurrences of extreme weather, particularly winter storms affecting large areas of the country, are creating challenging operating conditions.

For several years, MISO has been taking action through its ongoing Reliability Imperative initiative to help address these growing challenges. For example:

- Electric resource accreditation reforms to better identify a resource's ability to perform during hours of highest risk and updated real-time pricing signals to better incentivize availability during tight operating conditions.
- Over $30 billion in new transmission lines to substantially improve electric transfer capabilities and ensure electric reliability and associated economic growth.
- Improvements to the generator interconnection queue process to expedite the approval of new electric generation on the system.

More work remains to be done to ensure that our nation's bulk electric system remains reliable:

- Let reliability needs help inform the pace of retirement of existing electric generating resources, ensuring they aren't retired before adequate new electric generation is available.
- Continue developing new electric generation resources and transmission projects at a rapid pace; mitigate the regulatory, supply chain, and other challenges that hinder development.
- Leverage an approach that includes a mixture of present and new thermal resources as well as solar, wind, storage, emerging technologies, and transmission to achieve reliability.
- Support reforms, like MISO's Expedited Resource Adequacy Study and Demand Response and Emergency Resource reforms, that enhance the utilization of existing resources.

## Introduction

Good morning Committee Chairman Guthrie, Ranking Member Pallone, Subcommittee Chairman Latta and Ranking Member Castor, and members of the Subcommittee. I am Jennifer Curran, Senior Vice President of Planning and Operations for the Midcontinent Independent System Operator (MISO). It is a pleasure to be here today as you consider the state of regional grid reliability and its impact on our nation. I hope MISO's insights and experience will be useful to your work of shaping U.S. energy policy.

## MISO Overview

Before I share MISO's insights on some of the challenges facing our nation's bulk electric system and MISO's work to stay a step ahead of these challenges, I would like to provide a brief overview of MISO and our work.

MISO is a 501(c)(4) not-for-profit social welfare organization with an obligation to act in the public interest. MISO is responsible for ensuring the reliability of the high-voltage electric transmission system to deliver low-cost wholesale energy to consumers. The Federal Energy Regulatory Commission's (FERC) Order 2000 established Regional Transmission Organizations (RTOs), like MISO, to be independent entities that plan and operate the electric grid on a regional basis to maintain reliability and maximize efficiency. MISO was the first Independent System Operator to be recognized as an RTO, receiving FERC approval in 2001.

The wholesale electricity markets MISO manages are the largest in North America in terms of geographical scope, serving about 45 million people across all or parts of 15 states, stretching from the Canadian border to the Gulf Coast. The pricing rules in the MISO market are designed to reinforce the reliable operations of the bulk electric system. MISO's energy markets are also among the largest in the world, with more than 550 market participants and $40 billion in annual gross market charges. MISO also serves as the reliability coordinator for the Canadian province of Manitoba.

Currently, the MISO market region contains about 77,000 miles of high-voltage transmission lines and 203 gigawatts of electric generating capacity. MISO does not own any of these assets. Instead, with the consent of our 223 members and in accordance with our FERC-regulated tariff, MISO exercises functional control over the region's transmission and generation resources with the aim of utilizing them to ensure reliability in the most cost-effective manner possible. MISO has a robust and strong stakeholder process that allows asset owners, state regulators, load-serving entities, and end-use customers to provide input and guidance to MISO on a regular and ongoing basis.

The MISO region predominantly consists of vertically integrated utilities with responsibility for providing adequate electric generation to meet needed load for their area and states having jurisdiction over electric resource adequacy decisions. This is distinct from many other RTOs, which rely more heavily on competitive markets to shape electric resource adequacy needs. MISO works with the states, utilizing its regional perspectives and insights, to ensure they have an understanding of evolving system needs and conditions.

MISO puts a priority on maintaining our independence from individual market participants. We are fuel source and policy neutral, meaning we do not favor, prefer, or advocate any particular fuel or policy outcome. That doesn't mean, however, that we are disinterested observers. Our mission is to ensure the continued reliability of the bulk electric system.

MISO also creates significant value for the region, which is quantified in the MISO Value Proposition study. Our work to maintain reliability, administer wholesale markets and conduct transmission planning on a regional scale generates substantial benefits. In 2024 alone MISO created approximately $5.1 billion in savings for the region, and over $50 billion since 2007. Ultimately, this results in lower costs to consumers.

**Electric System Challenges**

Electricity plays a vital role in the lives of all Americans, and its importance is continuously growing. To ensure that our nation's bulk electric system remains reliable in our ever-changing world, it is important to recognize and stay ahead of the challenges and trends that could impact

electricity. Today, the MISO region faces resource adequacy and reliability challenges due to the changing characteristics of the electric generating fleet, inadequate transmission system infrastructure, growing pressures from extreme weather, and rapid load growth.

Driven by a combination of state and federal policies and consumer demand for carbon free energy, the MISO region is experiencing a rapid growth of wind and solar energy accompanied by the retirement of many coal and natural gas power plants. While weather-dependent resources like solar and wind are being added in large numbers and provide many benefits, including lower electricity production costs than natural gas or coal and lack of carbon emissions, they typically do not provide the 24/7 availability, flexibility, and duration attributes of the retiring power plants they are replacing. For example, MISO has experienced 11 wind droughts – extended periods of time with extremely low wind output – since 2020, including one lasting 40 consecutive hours. Similarly, solar output is dramatically reduced in overcast or cloudy weather conditions, as often occur in winter storms, and output is virtually zero in the overnight hours.

In order to understand potential impacts of a changing generation mix, MISO compiles our individual member plans and state policies. MISO then uses this information to develop a range of expected outcomes we call Future Planning Scenarios. MISO's Future Planning Scenarios estimate that while the total amount of installed electric generation will increase significantly over the next 20 years due to the rapid growth of wind and solar, the actual amount of electricity available to the system during critical hours could decline by about 32 GW due to the operational characteristics of these new resources. Emerging technologies with the needed characteristics, such as longer-duration battery storage and small modular nuclear reactors, hold great promise in the future but are likely years away from grid-scale viability.

We must also recognize that the existing electric transmission infrastructure is inadequate to meet future needs. It cannot carry the amount of energy that will be needed in future years, nor does it provide the connectivity to move energy from increasingly widespread generation fleets to population centers. It is notable too that approving and building new high-voltage transmission lines is a complex and lengthy process.

MISO's region, like most of the country, is also experiencing changing weather patterns, including more frequent occurrences of extreme weather, particularly winter storms affecting large areas of the country. These extreme weather events create challenging operating conditions, with high demand for electricity sometimes accompanied by reduced solar or wind output and, in some instances, challenges with adequate fuel supplies for natural gas and coal power plants. This highlights the need for a diverse electric generation fleet and a robust transmission system to move energy over long distances.

Finally, demand for electricity is growing at an accelerated pace. Over the last few decades, we have experienced growth in electrification through electronic devices, smart home products, and electric vehicles, but minimal growth in electric demand, largely due to increasing energy efficiency. Looking ahead, however, we expect much stronger growth from continued electrification efforts, a resurgence in manufacturing, and an unexpected demand for energy-hungry data centers to support artificial intelligence. In fact, based on the current trajectory, electric load in the MISO region is projected to grow by approximately 60% over the next 20 years, threatening to outpace new electric resource additions if urgent action isn't taken.

This combination of factors significantly increases operational challenges, uncertainty, and reliability risks to the electric grid. This, in turn, creates significant economic and security risks for our nation. If electricity production and delivery from all sources cannot keep up with growing demand, then the planned growth of manufacturing, artificial intelligence, and data centers cannot occur. A timely and coordinated approach is necessary if we are to continue meeting the nation's need for reliable and low-cost electricity.

**Opportunities and Work-in-Progress**

MISO continuously works with its members and states to gain a more accurate understanding of future electricity needs and timelines. Two of our most important tools are the Futures Planning Scenarios, which are MISO projections capturing a range of potential system conditions over a 20-year horizon, and the annual Organization of MISO States and MISO survey, a voluntary survey of generation owners to assess available resource capacity to serve the projected load over the next five years. These regularly updated studies provide the basis for long-term transmission

planning efforts and help inform the electric resource planning decisions, which are the purview of the states and utilities in the MISO region.

MISO's extensive analysis and operational experience make it clear that no single electric generating resource, transmission line, process improvement, emerging technology, or other solutions will solve all our challenges. Addressing our nation's future electricity needs requires a multi-faceted and coordinated approach that leverages all of these tools.

Improving existing market and operations processes and tools is a cost-effective and timely way to improve reliability in an efficient manner. Over the last few years MISO instituted, with FERC approval, electric resource accreditation reforms to better identify their ability to perform during hours of highest risk, and recently submitted a filing to update its shortage pricing to better incentivize electric resource availability during tight operating conditions. Looking ahead, MISO is currently working with its stakeholders to update the framework governing the usage of Demand Response and Emergency Resources to improve the ability of those existing entities to support system reliability during challenging operating conditions.

Other efforts include working to maximize electric flows on existing transmission lines, which can be enabled by utilizing certain grid-enhancing technologies, like advanced line ratings, that provide more accurate real-time data on the amount of electricity that can safely be transmitted without overheating a power line.

A substantial amount of new electric generation is also needed to help meet future electricity needs. While MISO supports the work of developers to continue accelerating the advancement of solar, wind, and emerging technologies, there is also a need to maintain existing and add new natural gas resources to provide flexibility and duration characteristics, thus serving as a reliability insurance policy for periods when electric demand is high and weather conditions aren't conducive to adequate solar and wind output. A growing reliability risk is that the rapid retirement of existing coal and gas power plants threatens to outpace the ability of new resources with the necessary operational characteristics to replace them. This can be addressed by letting local reliability requirements determine the pace of retirement of existing power plants. Having

the right mix of resources on the system means that we don't have to choose between decarbonization and reliability.

To ensure the necessary generation is there when needed, MISO is also working to improve the efficiency and timeliness of approving new electric generator interconnections. Currently, MISO's generator interconnection queue faces a significant backlog, with over 1,600 projects totaling over 296 GW of installed capacity currently under review. For comparison, MISO's region currently has less than 1,500 generating units and peak electric load in 2024 was 122 GW. While history has shown that not all projects submitted into the queue will be built, they all must be studied for potential system impact. Currently, queue cycles are taking three to four years, as a dramatic growth in the number of project requests in recent years has exponentially increased the difficulty of the detailed studies that must be conducted. MISO has instituted several reforms to speed up the queue cycles, including a cap on the number of projects that can enter the queue in a given cycle, and is working on several technology enhancements and process improvements to eventually get to a one-year queue cycle. In the interim, an Expedited Resource Addition Study process was recently submitted for FERC for consideration. If approved, this process would provide a temporary framework, sunsetting by the end of 2028, for the accelerated study of electric generation projects that are required to address urgent resource adequacy and reliability needs. A second challenge is the long timeline required for approved electric generation projects to be built and connected to the system. Currently, the MISO region has over 53 GW of projects that have been approved but are not yet operational, and project developers have indicated that more than half of those are delayed, often due to regulatory hurdles, supply chain challenges, and labor shortages.

As electric demand grows and electric generation shifts from large power plants to more dispersed solar and wind facilities, there is also a need for significant expansion of high-voltage transmission lines. To that end, over the last several years MISO has approved over $30 billion in new transmission lines through its Long-Range Transmission Planning efforts, with more expected in the coming years. These projects are projected to have a benefit-to-cost ratio of approximately 2.6 to 1 and will substantially improve electric transfer capabilities and enable the electric reliability and associated economic growth being planned across the nation.

Interregional collaboration with neighboring grid operators – including SPP, PJM, and TVA – is also a vital tool for meeting demand for electricity. MISO and our neighbors have various operating agreements and communications protocols in place to help support one another, as feasible, for both economic and reliability purposes. Additionally, MISO and SPP have collaborated on a Joint Targeted Interconnection Queue that includes five transmission projects along the shared border that is expected to enable 28 GW of new electric generation, providing reliability and economic benefits to both regions.

**Looking Ahead**

The operational challenges and reliability risks of the MISO region are largely mirrored across the country. To address them, we need to take several important steps to turn around the decline in available energy and to expedite the construction of new electric generation and the transmission lines necessary to move necessary energy from where it is produced to where it is needed. Specifically:

- A strong, working Federal Energy Regulatory Commission is vital to furthering policies and supporting reforms necessary to ensure a stable and reliable electric system.

- Ensure that states and utilities have the information they need to make prudent electric resource decisions to support resource adequacy.

- Let reliability needs help inform the pace of retirement of existing electric generating resources, ensuring they aren't retired before adequate new electric generation is available.

- Continue developing new resources at a rapid pace. Streamline the approval of new electric generation and transmission projects, and work to mitigate the regulatory, supply chain, and workforce challenges that can hinder development of these projects.

- Leverage an "all of the above" approach that includes a mixture of solar, wind, natural gas, storage, emerging technologies, and transmission to achieve reliability.

- Support reforms, like MISO's Expedited Resource Adequacy Study and Demand Response and Emergency Resource reforms, that enable the more effective and efficient utilization of existing resources and capabilities.

- Continue to support and encourage interregional collaboration on future transmission needs and operational protocols that maximize the use of the existing system.