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# Minnesota's Electric Transmission System

Annual Adequacy Report  
February 10, 2023

Submitted by  
The Minnesota Department of Commerce  
In consultation with the Minnesota Public Utilities Commission

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# Executive Summary

This report summarizes why electric transmission is needed in Minnesota and its status. The report includes an update on ongoing or planned transmission projects; how transmission lines are regulated at the state and federal level; provides updates for 2022; and summarizes long-term challenges and potential solutions.

In 2022, the Minnesota Public Utilities Commission (Commission) issued two route permits for three new high-voltage transmission projects. All three were single purpose transmission lines required to interconnect new generation projects into the high-voltage transmission system: (1) an 18 mile-long 161-kilovolt (kV) transmission line in Cottonwood, Martin, and Watonwan Counties, (2) an approximately 3.2 mile 345-kV line in Sherburne County, and (3) an approximately 1.7 miles long 345-kV line also in Sherburne County. A single permit was issued for the two projects in Sherburne County because they were both interconnecting the same new 460-megawatt solar project located near Xcel Energy’s Sherburne County coal-fired power plant.

Five other transmission line projects are currently undergoing permit review. Of these, three are proposed interconnection lines for specific wind or solar generation projects.<sup>1</sup> The other two are general transmission upgrade projects. One of those is part of the Duluth-Loop Project, which is intended to support the grid in Northeast Minnesota due to recent coal plant retirements along the North Shore. The other is a 3.2-mile upgrade project in Stearns County.

Since 2012, when the last CapX project was approved in Minnesota, the Commission has issued three route permits for larger, high-voltage “backbone” transmission lines (345-kV or above). In 2015, the Commission approved a 50-mile 345-kV Minnesota to Iowa line. Construction was completed on this line by ITC Midwest in 2019. In June 2020—following over eight years of planning, environmental review, permitting and construction—Minnesota Power energized a new 225-mile, 500-kV line from the Canadian province of Manitoba to Grand Rapids, Minnesota (the Great Northern Transmission Project). Finally, in 2019 the Commission approved the 50-mile Huntley-Wilmarth 345 kV transmission line in Southern Minnesota near Mankato. Xcel Energy completed construction of that project in 2021 and it was placed into service in December 2021.

The 2021 Biennial Report also indicates that Minnesota electric utilities are exceeding the renewable energy standards (RES) in Minn. Stat. § 216B.1691. Some Minnesota utilities have more aggressive renewable energy goals than required by the RES statute.<sup>2</sup> The 2021 Biennial Report indicates that meeting these corporate goals will require new high-voltage transmission lines.

The Midcontinent Independent System Operator (MISO) is responsible for planning the high-voltage transmission system in most of Minnesota and the central part of the United States. In July 2022, after two years of planning, MISO approved an initial group of regional and interregional “backbone” 345-kV long-range transmission projects (LRTP) in the Upper Midwest (Tranche 1 portfolio).<sup>3</sup> Three of Tranche 1 portfolio projects are in Minnesota. All three projects are in early planning and development.

These new LRTP projects are expected to be in service between 2028 and 2030. In the meantime, some Minnesota utilities may be able to interconnect new wind and solar projects using interconnection capacity

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<sup>1</sup> Despite recent high transmission network upgrade costs, many new wind and solar projects are currently requesting MISO approval to connect to the high voltage grid throughout the region, including in Minnesota and neighboring states MISO provides an interactive map of the current queue which can be found by going to: [https://www.misoenergy.org/planning/generator-interconnection/GI\\_Queue/](https://www.misoenergy.org/planning/generator-interconnection/GI_Queue/) and clicking on “Interactive Queue Map”

<sup>2</sup> [Clean Energy Goals](#) Chapter 9 Biennial Report.

<sup>3</sup> [July 2022 MISO Long Range Transmission Planning](#)

at their existing or retiring coal or natural-gas plants. For example, in May 2022 Xcel Energy filed a certificate of need notice plan for two 120 to 140-mile 345-kV generation tie lines between Lyon County and their Sherco power plant site. The certificate of need application for these two transmission lines is expected in 2023.

MISO has also started several other initiatives to address the challenges presented by a changing generation resource mix. For example, MISO in 2022 completed a Joint Targeted Interconnection Queue (JTIQ) Study with the Southwest Power Pool (SPP).<sup>4</sup> The JTIQ projects are intended to reduce expensive transmission upgrade costs when new generation projects in one system affect the transmission system of the other. The Commission and the Minnesota Department of Commerce (Commerce) participated in the JTIQ planning process. In addition, Commerce is actively working on an application to the United States Department of Energy (DOE) for a grant that, if approved, would pay for about half the costs of the JTIQ projects. Other initiatives aimed at using the existing high-voltage transmission system are ongoing.

Finally, in 2022 the Federal Energy Regulatory Commission (FERC) continued work on interstate transmission initiatives they started in 2021. The first is a potential federal rulemaking process to address transmission planning and generator interconnection issues. FERC issued a proposed rule in that docket in 2022.<sup>5</sup> The second FERC transmission initiative is a joint state/federal electric transmission task force.<sup>6</sup> Commerce and the Commission both actively participated in these and other FERC processes in 2022.

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<sup>4</sup> Most recently updated at: [November 2022 PAC Update](#)

<sup>5</sup> [FERC Transmission NOPR RM21-17 April 2022](#)

<sup>6</sup> [Joint Federal-State Task Force on Electric Transmission](#)

# Minnesota Department of Commerce

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## Mission

For more than 150 years, the Minnesota Department of Commerce and its predecessor agencies have served Minnesotans. Our mission is to protect and assist consumers, to ensure a strong, competitive and fair marketplace, and to engage people and communities across the state.

## Our Strategic Priorities

- Protect the public interest through consumer protection, consumer education, assistance to consumers, safety, health and financial security, and lowering inequities.
- Serve as a trusted public resource for consumers and businesses by listening and learning from the Minnesotans Commerce services, being effective stewards of public resources, advocating for Minnesota consumers and develop a policy, programmatic, and regulatory environment that meets their needs.
- Reduce economic barriers within Commerce regulatory oversee and reduce disparities within those of all races, ethnicities, religions, economic statuses, gender identities, sexual orientations, (dis)abilities, and zip codes.
- Ensure all, especially historically disadvantaged Minnesotans, are resilient to Minnesota’s climate and engaged in advancing efforts to mitigate climate change.
- Ensure a strong, competitive, and fair marketplace for Minnesotans.

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## Report to the Minnesota Legislature

Minn. Stat. § 216C.054 requires the Commissioner of Commerce, in consultation with the Minnesota Public Utilities Commission, to submit an Annual Transmission Adequacy Report to the Legislature.

Pursuant by Minn. Stat. § 3.197: This report cost approximately \$1,800.00 to prepare, including staff time.

# Why Transmission Matters: Introduction

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Electricity is generally delivered to consumers via three main steps: 1) electricity is produced at various generation facilities, 2) it is then transmitted on an integrated system of high voltage transmission lines and 3) is delivered to consumers through a distribution system of lower voltage power lines.

As the link between the production (generation) of electricity and delivery (distribution) to consumers, transmission plays a vital role in helping to ensure that consumers have low-cost, reliable energy. The transmission system can be impacted by changes in either supply or demand for energy. Further, as more, and smaller generation facilities are added to the distribution system (also known as distributed generation), the dynamic and interconnected nature of the electricity system requires transmission to adapt to resulting changes in flows of electricity.

While transmission is a critical component in providing electric service, it currently accounts for a much smaller percentage of utility costs than either generation or distribution facilities. For example, transmission typically accounts for about 15 percent of the costs of providing electric service while generation and distribution account for the other 85 percent. Utilities that move large amounts of power over long distances tend to have relatively more transmission costs as a percentage of total costs due to the length of the transmission lines and the line losses experienced in the transport of electricity.

When the original transmission facilities in Minnesota were built in the 1960s, they were designed primarily to interconnect an individual utility's generation and distribution facilities, and secondarily to interconnect neighboring utilities to each other to provide additional backup power and reliability.

Over time, the focus on transmission planning and reliability has grown to include interconnecting broader regions, even as the need to connect a utility's generation and distribution systems remains. This evolving design enables utilities to access other generation or transmission systems if something goes wrong on an individual utility's system. Interconnection with other electric systems provides a more reliable system overall than isolated systems and allows utilities to access lower cost power from other suppliers, or purchase power on a temporary basis rather than building a generation facility that may be used only occasionally.

More recently, there has been a need to adapt transmission systems to respond to changes in distribution systems. Transmission helps companies and states engage in a greater degree of specialization and thus allows the system of interconnected utilities to operate more efficiently and reliably than if each utility or state were operated on a stand-alone basis.

The nation's transmission grid is split into three sections: The Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas (ERCOT). Reliability of the transmission grid in the part of the Eastern Interconnection in which Minnesota is located is overseen by the Midwest Reliability Organization (MRO), as shown in Map 1 and as discussed below.

**Map 1: Map of North American Regional Reliability Areas**



Electricity follows the laws of physics: it follows the path of least resistance. Electricity placed onto the interconnected transmission grid can be withdrawn at any other place within the interconnection if there is no congestion on the transmission system. Moreover, the electrical system must be balanced in real time, meaning that the amount of electricity being produced at any given time must essentially equal the amount of electricity being used. Because in some cases electricity cannot yet be stored in a cost-effective manner, the transmission system helps maintain this balance at a lower cost by allowing electricity to flow through the broader electrical system where possible.<sup>7</sup>

## Minnesota's Transmission System: Planning for the Future

Determining the amount of transmission infrastructure needed to provide economic and reliable electric service in Minnesota requires balancing transmission capacity to deliver electric service from available generation resources. If more transmission capacity is built than is needed, the system will be relatively free of transmission constraints, but will be higher cost than is necessary to provide adequate service. If too little capacity is built for the delivery of electric service from existing and new generation resources, the transmission cost component of providing electricity service may be lower, but there could be a cost to Minnesotans and the Minnesota economy.

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<sup>7</sup> Technologies to store electricity for later use includes batteries, pumped hydro, compressed air, flywheels, and the transmission system itself. Storage is discussed further below.

## 2022 Transmission Projects

In 2022, the Commission issued two permits for three new high-voltage transmission projects. All three (3) were single purpose transmission lines required to interconnect new generation projects into the high-voltage transmission system: (1) the 18 mile-long 161-kilovolt (kV) Big Bend line in Cottonwood, Martin, and Watonwan Counties, (2) the two approximately 3.2-mile and 1.7-mile 345-kV Sherco East/West lines in Sherburne County. A single permit was issued for the two projects in Sherburne County because they were both interconnecting into the same new 460-megawatt solar project located near Xcel Energy's Sherburne County coal-fired power plant.

Five other transmission line projects are currently undergoing permit review. Of these, three are proposed interconnection lines for specific wind-energy or solar projects: the Dodge County Wind 161-kV line, the Byron Solar 345-kV line, and a 161-kV line for the Three Waters Wind Project. The other two transmission line permits in process are for general transmission upgrade projects. One is part of the Duluth-Loop Project, which is intended to support the grid in Northeast Minnesota due to recent coal plant retirements along the North Shore. The other is a 3.2-mile St. Joseph 115 kV upgrade project in Stearns County. The Commission docket numbers and more details on these projects and others are available in the annual Power Plant Siting Act update report.<sup>8</sup>

## MISO Long-range Transmission Planning

MISO is primarily responsible for planning high-voltage transmission system in our region. Because of the evolving generation mix, emerging transmission constraint problems, and the long lead time required for large new transmission projects, Commerce and the Commission continue to advocate for MISO to engage in long-range planning.

MISO initiated their most recent long-range planning effort in August 2020 to better assess what upgrades over the next 20 years may be needed. In July 2022, MISO approved an initial group of seventeen new regional transmission line projects to ensure the reliable and efficient operation of the transmission grid in the Upper Midwest (Tranche 1 portfolio).<sup>9</sup> Three (3) of these projects are in the state of Minnesota. Total construction costs are expected to be approximately \$10 billion for all seventeen (17) projects located across the Midwest. A map of the proposed projects is shown below in Map 2.

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<sup>8</sup> [Department of Commerce PPSA Annual Summary 2022](#)

<sup>9</sup> <https://www.misoenergy.org/planning/transmission-planning/long-range-transmission-planning/>



**Map 2. MISO 2022 Long-Range Transmission Projects**



In addition, MISO and SPP have begun a related but separate process, the Joint Targeted Interconnection Queue (JTIQ), to evaluate potential joint transmission projects that would reduce transmission upgrade costs when proposed new generation projects affect the others transmission network. Initial planning for this joint MISO/SPP effort, started in December 2020. The most recent summary of the JTIQ projects and potential cost allocation approaches were most recently summarized at a MISO Planning Advisory Committee meeting in November 2022.<sup>10</sup>

## Biennial Transmission Report

Minn. Stat. § 216B.2425 requires utilities that own or operate electric transmission facilities in the state to report by November 1 of each odd-numbered year on the status of the transmission system, including present and foreseeable inadequacies and proposed solutions. The last Biennial Transmission Report, summarized Commerce’s Annual Transmission Adequacy Report to the legislature last year, was filed on November 1, 2021. The next one is due in November 2023.

The sixteen (16) participating utilities also jointly maintain the following website that provides information about transmission planning and projects: <http://www.minnelectrans.com>.

<sup>10</sup> [November 2022 LRTP Update to PAC](#)

# Transmission, Reliability and Power Costs

Adequate transmission is essential to ensure Minnesotans have reliable electric service. When there are areas with constraints or shortages in transmission capacity, there are more frequent power outages and lower power quality (which can affect sensitive equipment). Since Minnesotans depend heavily on reliable power in their homes and businesses, it is critical to ensure that electric service is as reliable as reasonably possible to minimize the cost to Minnesotans and Minnesota’s economy.

## Roles of Entities Involved in Transmission

Numerous entities can have an impact on the design and cost of the transmission system that serves Minnesota. Clearly determining responsibility and assigning authority for different aspects of transmission planning and reliability will be critical moving forward. For example, because transmission lines located outside of the state help serve Minnesota customers, utilities that own those facilities, and the states that regulate those utilities, can affect the design and cost of the transmission grid. While transmission owning utilities are involved in these matters, so are other federal and state nonutility organizations, including the following.

1. **The Federal Energy Regulatory Commission (FERC)** regulates the wholesale rates that utilities charge for transmission service and the type of transmission services provided.
2. **MISO and SPP** do not own transmission or generation facilities, but work with utilities that voluntarily choose to be their members to operate the regional transmission system reliably and in the least-cost manner through energy and capacity markets.<sup>11</sup> MISO and SPP assist their members in developing long-term transmission plans for the region. MISO members currently operate in all or part of 15 states plus the Canadian province of Manitoba.<sup>12</sup> MISO cannot require its members to build new resources, nor is it responsible for the development of long-term plans for generation. FERC regulates the rates and practices of MISO and SPP.
3. **The North American Electric Reliability Corporation (NERC)** develops and enforces certain electric reliability standards for what is known as the “Bulk Power System” or “the grid.” There are seven NERC Reliability Regions covering the United States and Canada, as shown in Map 1. Minnesota is in the “MRO” region, as noted above. NERC’s other reliability organizations are the Western Electricity Coordinating Council, Inc. (WECC), Texas Reliability Entity (Texas RE), Northeast Power Coordinating Council, Inc. (NPPC), Reliability First (RF), SERC Reliability Council (SERC, the successor to the Southeast Electric Reliability Council), and Florida Reliability Coordinating Council, Inc. (FRCC). Because an outage in one part of the grid can affect other parts of the grid, NERC coordinates among these regions.
4. **The Midwest Reliability Organization (MRO)**, with members in eight states (Minnesota, Wisconsin, Iowa, North Dakota, South Dakota, Nebraska, Montana and Illinois) and two Canadian Provinces (Manitoba and Saskatchewan), develops and ensures compliance with regional and interregional electric standards for the transmission system and performs assessments of the grid’s ability to meet the demands for electricity.

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<sup>11</sup> [MISO SPP JTIQ Update 12.3.2021](#), December 3, 2021

<sup>12</sup> MISO and SPP are called Regional Transmission Organizations, which are responsible for moving electricity over large interstate areas. Despite this geographical definition, electric utilities can choose which Regional Transmission Organization to join and, if they meet the terms of the agreements, could switch to another Regional Transmission Organization.

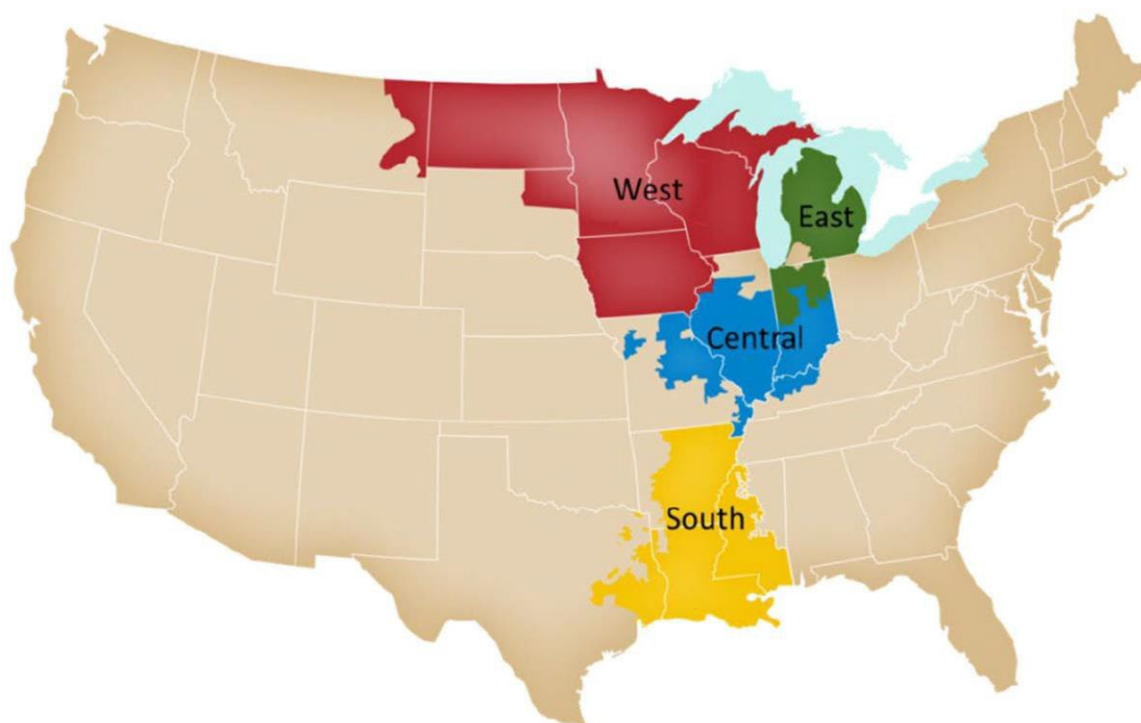
5. **The Organization of MISO States (OMS)** is a self-governing organization of representatives from the regulatory commissions of 15 states, the City of New Orleans and Manitoba. The regulatory commissions have certain authorities over transmission-owning utilities participating in MISO. The OMS examines various issues and makes recommendations to MISO, FERC and other relevant government agencies regarding matters that affect state jurisdiction and other regional transmission matters. The Commission represents Minnesota in OMS. In addition, Commerce represents Minnesota as an associate member and, along with other Public Consumer Advocates such as the Minnesota Office of Attorney General's Residential Utilities and Antitrust Division, participates in the efforts and activities of OMS and MISO.
6. **The Commission** requires Minnesota utilities to develop enough transmission to reliably serve load. The Commission also regulates the retail rates of Minnesota's investor-owned utilities, including the amount of transmission costs that can be recovered from their retail customers. In addition, while the Commission does not regulate the wholesale rates charged by Minnesota's investor-owned utilities, it does ensure that these utilities allocate transmission costs and revenues appropriately at the retail level, considering factors such as the types or classes of retail customers and their usage.
7. **Commerce's Division of Energy Resources** investigates matters pending before the Commission and makes recommendations to address proposals by utilities and others.

Because it is heavily involved in Minnesota's electric transmission system, MISO warrants further discussion. As noted above, MISO is a Regional Transmission Organization (RTO) created and regulated by FERC. MISO is involved in numerous matters that are critical to the reliable and low-cost operation of the bulk transmission system. These activities include: planning for contingencies if large generation plants are retired or transmission components fail; conducting engineering analyses of the effects of various changes to the generation fleet or transmission components of the system as a whole; planning for transmission needs in the MISO region; coordinating with other RTOs in the Eastern Interconnection System; monitoring the day-to-day (and minute-to-minute) operations of the regional transmission system; determining which generation units will operate (from lowest to highest cost) in the energy market at any given time; addressing the operational effects of congestion on the transmission system; and analyzing where the greatest congestion exists. Staff of Commerce and the Commission participate in various MISO workgroups and committees.

As noted above, the geographical area of MISO's region spans 15 states and, for reliability purposes, a Canadian province. To focus its review of the reliability of the transmission system, MISO established "four transmission planning zones."

As shown in Map 3, below, most of Minnesota is part of Transmission Planning Zone 1. The 13 MISO-member utilities in Zone 1 are: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Heartland Consumers Power District, Minnesota Municipal Power Agency, Minnesota Power, Missouri River Energy Services, Montana-Dakota Utilities, Northern States Power (Xcel Energy), Otter Tail Power, Rochester Public Utilities, the Southern Minnesota Municipal Power Agency, and Willmar Municipal Utilities.

**Map 3: MISO Transmission Planning Subregions**



## How Much Transmission Is Enough?

### Minnesota's Transmission System

When the initial transmission system was designed and built over 60 years ago, items such as home computers, video games, cable TV and cellphones were unheard of. Few customers had air conditioners, and few plug-in appliances had been invented or available. Those transmission facilities were sized and constructed to meet the electricity needs of the population and economy at the time with some assumptions for growth based on certain expectations at that time.

In response to the changing location of electric generation facilities, high-voltage transmission backbone projects were constructed in Minnesota between 2004 and 2012 and more will be needed in the future to cost effectively integrate new renewable energy technologies. Minnesota residents and industry also need acceptable power quality, meaning evenly delivered energy without power surges and other fluctuations that can affect computers and other sensitive electronic devices. A lack of capacity on the grid could lead to some locations in the state where power quality would become unacceptably poor. In some locations and times, too much electricity is trying to flow on the lines causing congestion or “grid lock,” resulting in economic and reliability problems in making sure electricity can be delivered where it is needed.

While the use of the transmission system varies with the overall demand for electricity and location of the supply, transmission planning requires a focus on the amount and timing of the highest demand and need to import or export electricity between regions. In some regions, the need is to be able to export power. However, sometimes, the need to export power is when the demand for electricity is low, and the supply of

electricity exceeds demand in an area. This imbalance typically occurs during overnight hours in the spring and fall when the demand for power is low and the generation of electricity from certain resources, such as wind, is high.

When planning for the supply of electricity, the highest demand for electricity (peak demand) during the day and the season is reviewed. While peak demand for electricity in the MISO region has typically occurred in the summer, MISO must also plan for meeting high winter loads.

Well-designed transmission systems help facilitate more efficient use of generation resources. A transmission system or “grid” that covers a broader region and multiple utilities, with access to a larger portfolio of generation resources, allows strategic use of the most efficient resources available on the grid at any given moment. Since the grid deploys least-cost generators first, having access to more generators can help reduce electricity prices. As indicated above, in its role as a regional transmission organization, MISO helps coordinate both regional transmission planning and operations. These functions help to mitigate potential inefficiencies that can result from a balkanized utility grid that is based on individual utilities planning and operating their systems solely to meet the needs of their customers in their own service territories. Being aware of the various costs of resources in its region, MISO can provide direction to its members on how to dispatch those resources more efficiently overall.

As a result, planning the transmission system means meeting not only the overall expected peak demand for power, typically in summer months, but also the demand for relatively high amounts of power during extreme weather and other circumstances. Moreover, when generation capacity is higher than the demand for electricity in a region, the need to move or export electricity increases. Transmission planning also considers changes in technologies and the economy. While excess transmission capacity could result in additional costs and environmental impacts, a shortage in transmission capacity would have negative effects on the cost and reliability of electricity.

## **Battery Storage as a Transmission Asset**

Strategically placed generation and storage facilities could also help ensure reliable electric service, particularly when such resources are relatively low cost and located in areas where such resources can address congestion on the transmission system. For example, in the past Otter Tail Power sited certain generation peaking units as a substitute for new transmission. In the future storage resources placed in strategic areas may delay or prevent the need to build new transmission.

However, these programs should not be expected to put off needed changes to transmission indefinitely. Further, conservation might increase the need for new transmission if it occurs in an area where there are limits to the amount of generation that can be exported. For example, as more renewable energy has been added in and near Minnesota, there often is a greater need to build more transmission to export the power during off-peak hours when demand is low and renewable energy generation can be higher.

# Federal and State Actions Related to Minnesota's Transmission Grid in 2022

Additions to transmission are needed not only due to factors in Minnesota, but also due to federal and regional governmental actions directly affecting the use of Minnesota's transmission grid (as well as other states' grids). Issues that developed recently with potential effects in Minnesota are described in this section of the report.

## Federal Legislation: Infrastructure Investment and Jobs Act

On November 15, 2021, President Biden signed into law the \$1.2 trillion Infrastructure Investment and Jobs Act (IIJ Act). The IIJ Act includes approximately \$27 billion in new spending over five (5) years on the nation's energy grid. Most of the funding targets updating and improving the existing grid, with some targeted towards new transmission lines. Some of its key provisions include:

- Directing the DOE to establish a \$5 billion grant program for grid hardening and weatherization to help reduce the impacts of extreme weather events on the grid.
- Authorizing \$6 billion toward grid reliability and resilience research, development, and demonstration, including \$1 billion specifically for rural areas. This new program includes innovative approaches to transmission, distribution and storage infrastructure that is implemented at the state level by publicly regulated entities on a cost-share basis.
- Authorizing \$3 billion in the Smart Grid Investment Matching Grant Program to deploy technologies that enhance grid flexibility.
- Establishing a \$2.5 billion Transmission Facilitation Fund and a Transmission Facilitation Program, positioning DOE to leverage federal funding to reduce the overall risks of transmission projects.
- Authorizing \$500 million to the State Energy Program to support state transmission and distribution planning, among other activities.
- Authorizing \$350 million to develop advanced cybersecurity technologies for the energy sector.
- In addition to these funds, the IIJ Act addresses some aspects of federal oversight of transmission siting and planning, summarized below in the federal and state jurisdiction section of this report.

Many of the details of these programs, and their specific applicability to Minnesota and the organizations with roles in the transmission system, will be determined by DOE over the coming months and years. Commerce is actively working on several potential grants with utility partners as well as MISO, including a potential application for a grant that would facilitate the joint MISO/SPP JTIQ transmission projects.

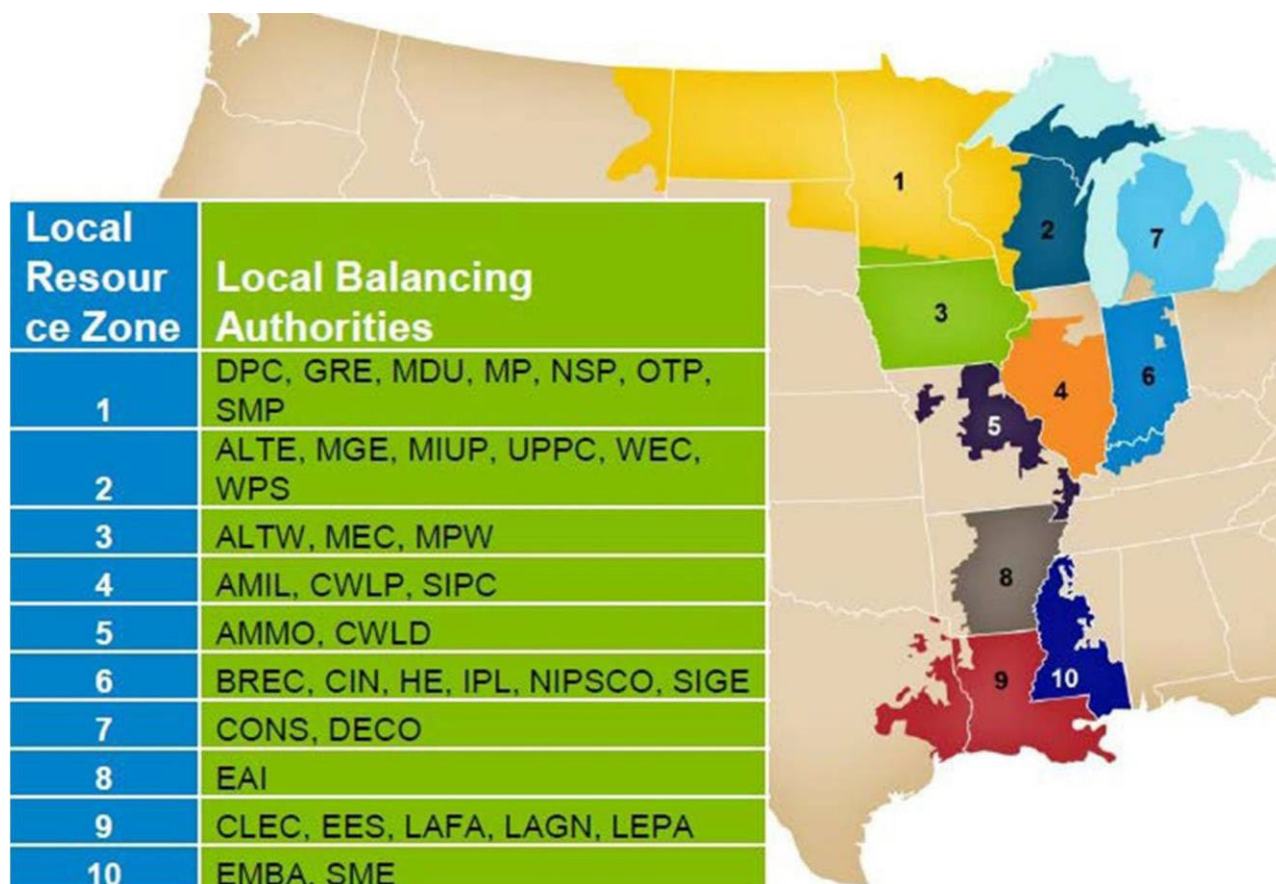
## Federal Regulatory and Planning Developments

Federal and state issues regarding the high-voltage transmission system are often addressed at MISO (and FERC) so an overview of MISO operations is provided below to help understand the underlying issues being addressed. Due to its wide swath and geographic diversity, MISO is divided into ten geographical regions ensuring that there are adequate electric generation resources to meet the needs in each zone (also known as "resource adequacy"). See Map 4.

Minnesota is part of MISO’s Planning Reserve Zone 1, along with the western half of Wisconsin, all of North Dakota and portions of Montana, South Dakota and part of Illinois. Utilities included in Zone 1 are Dairyland Power Cooperative, Great River Energy, Montana-Dakota Utilities, Minnesota Power, Northern States Power, Otter Tail Power and the Southern Minnesota Municipal Power Agency. The utility that serves Minnesota in Zone 3, in the southernmost part of Minnesota, is Interstate Power and Light<sup>28</sup>, which sold its transmission resources to ITC Midwest, a transmission-only utility. Interstate also sold its distribution system and customers to the Southern Minnesota Electric Cooperative.

**Map 4: MISO’S Resource Planning Zones**

*Source: The Midcontinent Independent System Operator*



### Constraints on Power Transfers within MISO

The amount of electricity that MISO North can export to and import from MISO South has been limited since shortly after MISO integrated the Entergy region (MISO South) in 2013. SPP filed a complaint with FERC, claiming that MISO should pay for certain transfers that exceed 1,000 MW. Under a settlement, MISO is currently paying SPP and Joint Parties more than it previously did to transfer power over 1,000 MW. The annual cost to maintain the settlement is estimated to be up to \$38 million and is dependent on the usage of the interface.

Late in 2016, MISO launched the Footprint Diversity Study, to examine the 1,000 MW limit. Of the 35 transmission projects that were studied to solve the congestion, none passed the benefit-to-cost ratio of 1.25

used within the Market Congestion Planning study process to assess which projects might be cost-effective. While there are significant potential savings in settlement costs, the minimal amount of physical congestion on the interface between MISO North/Central and MISO South within MISO’s models did not provide enough economic benefit to justify a project. MISO is generally planning to assess potential new projects for the North-South interface as part of its LRTP study in 2024 or 2025.

## **MISO’s Competitive Bid Process for Regional Transmission (Transmission Developer Qualification and Selection)**

One of FERC’s stated goals is to promote competition for the construction of transmission projects. FERC in Order 1000 eliminated a federal (but not state) right of first refusal on regionally cost shared transmission projects. Minnesota passed an incumbent utility “Right of First Refusal”—or ROFR—statute in 2012. This act provides utilities that own transmission with “the right to construct, own, and maintain an electric transmission line that has been approved for construction” by a FERC-regulated transmission planning process. The utility that owns the existing facilities that interconnect with the new line has 90 days following approval by the FERC-regulated process of the new line to notify the Commission of whether it intends to construct the line. If the utility does not intend to construct the line, the Commission may order it to do so. Otherwise, other entities may have the opportunity to construct the line. See Minn. Stat. § 216.246.

In November 2020, as part of on-going litigation, a non-utility transmission line developer petitioned the Supreme Court to review an U.S. Court of Appeals Eighth Circuit decision upholding Minnesota’s ROFR law.<sup>13</sup> The United States Supreme Court declined to hear that case in March 2021. The issue continues to be debated at the FERC. For example, in August 2022 the Industrial Energy Consumers of America filed a complaint at FERC regarding the issue. Commerce and the Commission both intervened in that FERC docket.<sup>14</sup>

Minnesota does promote transmission cost control and competition through other means. For example, existing certificate of need law requires the Commission to consider alternatives to proposed facilities. In addition, Commerce and the Commission typically approve, “soft” cost caps in CN proceedings. For example, for one project near Mankato, referred to as “Huntley-Wilmarth,” was approved by MISO in December 2016. The project establishes a transmission line to interconnect substations owned by Xcel Energy and ITC Midwest. The Commission granted the certificate of need and the route permit for the project on August 5, 2019 and included a soft cap as part of the approval.

## **MISO’s Multi-Value Transmission Project Portfolio**

In 2011, MISO approved a portfolio of 17 different transmission projects across the MISO North, Central and East footprint, the costs of which were regionally shared across the MISO footprint at the time. The projects, referred to as multi-value projects or “MVP” projects<sup>15</sup> had a wide variety of goals, including to:

- Provide benefits in excess of costs under the scenarios studied. In this case the benefit-to-cost ratio for the MVP portfolio ranged from 1.8 to 3.0.
- Maintain system reliability by resolving various reliability violations defined by federal reliability standards. The MVPs addressed violations on approximately 650 transmission elements for more than

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<sup>13</sup> [Summary of ROFR Petition to US Supreme Court](#)

<sup>14</sup> See e.g. [Commerce Motion to Intervene EL22-78](#)

<sup>15</sup> [MVP Report](#)



- 6,700 system conditions and mitigated 31 system instability conditions.
- Enable 41 million MWh of wind energy per year to meet renewable energy mandates and goals.
  - Provide an average annual value of \$1,279 million over the first 40 years of service, at an average annual revenue requirement of \$624 million.
  - Support a variety of generation policies by using a set of energy zones that support wind, natural gas and other fuel sources.

Two of the 17 MVP projects are in Minnesota: the 345 kV line between Brookings, South Dakota, and the Southeast Twin Cities and the 345 kV line from Lakefield Junction to Winnebago, Iowa. Overall, final construction costs for these projects were generally in line with cost estimates used by MISO when adjusted for inflation, with some projects under budget and some over.

As noted above, in Minnesota, Commerce and the Commission hold investor-owned utilities accountable for the costs proposed in certificate of need proceedings by not only comparing actual costs (escalated to current dollars) to estimated costs, but also preventing rate-regulated transmission owners from charging cost overruns to ratepayers without a proper vetting process. Rate-regulated utilities may charge ratepayers for cost overruns only if: 1) there was no competitive process used to select the project, 2) utilities can justify why it is reasonable to charge such cost overruns to ratepayers, and 3) the utility files a general rate case (cost overruns are not charged to ratepayers through rider rates prior to the rate case).

Planning for this MVP portfolio of transmission projects began in 2007. As of December 2021, all 17 MVP projects have been approved in state regulatory proceedings. Construction is now complete on 16 of the 17 projects. The last project to get regulatory approval, the Cardinal-Hickory Creek Project, is under construction and has an estimated in-service date of 2023 pending ongoing litigation.

## **Distributed Energy Aggregation in Interstate Markets: FERC Order 2222**

On September 17, 2020, FERC issued a new final rule intended to enable aggregators of distributed energy resource (DER) like small generators, rooftop solar, behind-the-meter batteries and electric vehicles to compete in all regional organized wholesale electric markets. The purpose is to remove what FERC sees as existing barriers to distributed generation and to increase the competitiveness of wholesale markets. MISO's compliance filing was filed in April 2022, with implementation details to be worked out over the next eight years. MISO held a series of DER Task Force meetings throughout 2022 that will continue into at least 2023 that serve as a clearing house for discussions on MISO's Order 2222 compliance filing.

## **FERC Advanced Notice of Proposed Rulemaking (ANOPR) on Regional Transmission Planning and Cost Allocation and Generator Interconnection**

On July 15, 2021, FERC issued an Advanced Notice of Proposed Rulemaking (ANOPR) that potentially sets in motion a new federal rulemaking process that may change the rules governing planning and expansion of the nation's electric transmission system.<sup>32</sup> The ANOPR expressed concern that the current rules for planning, cost allocation, and interconnection of generation, all of which were adopted a decade or more ago, are no longer resulting in economically efficient transmission expansion that reflects the need to add large amounts of renewable generation to the grid in the next two decades. The ANOPR received 376 initial comments totaling thousands of pages. Commerce filed initial comments in the docket in October 2021.<sup>16</sup> In April 2022 FERC issued its Notice of Proposed Rulemaking—its draft rule—for public comment. Commerce and the

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<sup>16</sup> [Minnesota Department ANOPR Comments 10.12.21](#)

Commission filed joint comments on the proposed rule (NOPR) on August 16, 2022.<sup>17</sup>

## **MISO Storage as a Transmission Only Asset Tariff (SATO)**

On August 10, 2020 FERC accepted MISO's proposal that allows energy storage resources to be selected as transmission-only assets as part of the grid operator's annual grid expansion plans. FERC accepted the proposal despite various objections to MISO restricting these assets only to storage owned by transmission owners.<sup>36</sup> DTE Electric Company and other parties recently appealed this FERC decision to the United States Court of Appeals for the District of Columbia. Oral argument at the D.C. Circuit was held in December 2021, but no order has been issued as of December 2022.

## **Complaint by Large Power Customers to FERC regarding MISO Transmission Owners' Return on Equity (ROE)**

As discussed in prior reports, a group of industrial end-users filed a complaint at FERC in late 2013 seeking to reduce the allowed return on equity (ROE) of MISO Transmission Owners and limit capital structure ratios and incentive equity adders. At that time, MISO transmission owners had a base ROE of 12.38 percent. The complaint sought to decrease the transmission owners' base ROE over 300 basis points below the then-current base ROE, to 9.15 percent.

In 2015, MISO's Public Consumer Group, of which Commerce is a member, provided testimony identifying the basis for decreasing the ROE to a reasonable level. FERC's Trial Staff filed briefs that were supportive of consumer advocates' positions. Transmission customers and consumer advocates argued that FERC's high ROEs imposed undue costs on consumers and distorted decision-making by encouraging utilities to build transmission rather than generation or distribution resources. While transmission resources are needed, it would not be appropriate to build only transmission to meet the electric needs of society since there must be an appropriate balance of production and delivery of electricity.

Because the Commission requires utilities under its ratemaking authority to offset high ROE transmission costs with high ROE transmission revenues, Minnesotans taking service from such utilities have been spared from paying high ROEs without the revenue offset. While these ratemaking decisions have reduced the harm of paying for high ROEs for such ratepayers in Minnesota, such benefits will be returned to Minnesota retail ratepayers only if utilities choose to provide a credit to Minnesota retail ratepayers for higher revenues or—as with utilities subject to the Commission's ratemaking—are required to do so. Even if Minnesota retail ratepayers receive the benefit of revenue offsets to reduce the high rates they pay for electric service, the distortion of utility decision-making remains an issue.

On December 22, 2015, Administrative Law Judge David H. Coffman issued an Initial Decision, determining that the allowed base ROE should be reduced by over 206 basis points (just over 2 percent), to 10.32 percent.

On September 28, 2016, FERC approved Judge Coffman's Initial Decision, requiring MISO to refund the difference between the base ROEs of 12.38 percent and 10.32 percent, a reduction of over 200 basis points.

On July 2017, MISO filed its compliance filing showing that the transmission owners provided sizable refunds to Minnesota utilities in February and June 2017 that were flowed back to Minnesota customers.

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<sup>17</sup> [Commerce and Commission joint comments on FERC Transmission NOPR August 2022](#)

More recently, following multiple rehearing requests, on November 19, 2020, FERC issued Opinion No. 569-B, in which it made minor modifications to the discussion in, but largely reaffirmed, its previously issued Opinion No. 569-A wherein FERC revised its return on equity (ROE) analysis and methodology.<sup>37</sup>

This FERC decision was recently remanded back to FERC yet again on August 9, 2022, by the Court of Appeals for the District of Columbia.<sup>18</sup>

## **Incentive ROEs for Transmission**

In another long-running issue, FERC originally granted ROE adders of 100 basis points to companies that were transmission-only companies to encourage such structures. Previously, Commerce participated with Joint Consumer Advocates to urge FERC to eliminate or reduce this ROE adder; FERC reduced the adder in half, to 50 basis points. Commerce and other consumer advocates opposed FERC giving a bonus ROE of 50 basis points for ITC since changes in that utility's corporate structure called into question its independence from generation facilities. On Oct. 18, 2018, FERC reduced ITC's independence ROE adder from 50 to 25 basis points. FERC concluded that ITC is still "independent" following its acquisition by Fortis and GIC, but less independent than it was before, which means ITC is still eligible for an independence adder, but a smaller one. In September 2019 ITC appealed this FERC decision to the DC Circuit and OMS intervened in support of FERC (19-1190), and the DC Circuit denied the ITC petition for review in February 2019.

Additionally, the Joint Consumer Advocates and the Organization of MISO States filed separate protest comments with FERC on January 5, 2018, to oppose Ameren Service's request for 100 basis point ROE incentive adder (on top of their 10.32% base ROE), for the Illinois River & Mark Twain components of the Grand Rivers Project. Ameren did not support why this ROE incentive adder was needed, particularly since Ameren already has incentives for cost mitigation. On February 13, 2018, FERC denied Ameren's request for a 100-basis point adder. On March 30, 2018, the OMS and Joint Consumer Advocates filed a joint answer to Ameren's rehearing request. On November 5, 2018, on rehearing FERC granted a 50-basis point ROE incentive adder (reduced from the 100-basis point adder requested by Ameren Service).

In a FERC Order issued on March 21, 2019 in Docket No. PL19-3, FERC issued a Notice of Inquiry (RM20-10), seeking comments on the scope and implementation of its electric transmission incentives regulations and policy. The OMS (with Commerce and the Commission supporting) filed comments with FERC recommending the evaluation of granting ROE incentive adders on a case-by-case basis. The comments recommended keeping benefits to consumers at the forefront of any analysis to determine whether to grant or eliminate ROE transmission incentives and supported non-ROE incentives first for mitigation of transmission project risks. A FERC decision on the issue is still pending.

## **U.S. Department of Energy Defense-Critical Electric System Review<sup>19</sup>**

DOE includes transmission infrastructure in an on-going evaluation of electric power system assets that may be crucial to national security. DOE's review of defense-critical electric infrastructure can result in designations of electric system assets that are identified as critical to national defense. DOE's review may also help identify and prioritize areas of the electric system that need additional investment and/or hardening against potential threats or disruptions. Transmission infrastructure in Minnesota that is deemed defense-critical may require increased security measures, additional investments and/or may be subject to emergency orders and rules issued by the Secretary of DOE in an emergency.

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<sup>18</sup> [MISO Transmission Owners v. FERC \(No. 16-1325\)](#), August 9, 2022

<sup>19</sup> 16 U.S. Code § 824o-1

# Impacts to future planning of Transmission in Minnesota

## Ongoing Transmission Constraint Issues

Transmission constraints continue to slow interconnection of large-scale wind and solar generation in Minnesota. Longer-term, new high-voltage transmission lines are needed to help reduce these constraints. Recently, in July 2022, as described above, MISO approved a group of eighteen new large high-voltage transmission lines in our region and is in the process or working on a second group.

However, it takes time—five to ten years—to plan, permit, and construct large high-voltage transmission lines. Therefore, there is increased industry interest in improving the operating capacity and efficient use of the existing high-voltage transmission system while longer range transmission capacity issues are addressed. Efforts to improve the transfer capability of the existing high-voltage system are ongoing in the MISO region, such as ambient adjusted line ratings and system reconfiguration.

Ambient adjusted rating changes are based on temperature alone. More complicated and more expensive, but potentially more valuable, Dynamic Line Ratings are based not only on forecasted ambient air temperature, but also on other weather conditions such as wind, cloud cover, solar irradiance intensity, precipitation, and/or on transmission line conditions such as tension or sag.

More specifically, on December 16, 2021, FERC issued a final rule on the use of ambient-adjusted ratings. This final rule requires all transmission providers, both inside and outside of organized markets, to use ambient-adjusted ratings as the basis for evaluating near-term transmission service to increase the accuracy of near-term line ratings. While the final rule does not mandate the adoption of dynamic line ratings, the rule does require that organized market operators establish and maintain systems and procedures necessary to allow transmission owners that would like to use dynamic line ratings the ability to do so.

## New Transmission Projects Raise Concerns about Land Use and Land Rights

In recent years, natural gas pipelines, electric utilities and crude oil pipelines, have sought approval to construct new energy projects in Minnesota. Since the siting process in Minnesota mandates public meetings and hearings and other outreach efforts to potentially impacted residents, landowners and the general public, the legal framework and other issues regarding land rights and land use are also receiving close scrutiny. In addition to wanting to know what benefit their area of the state would derive from a project, landowners and other affected citizens naturally want to know what their rights are regarding such projects impacting their land so they may be assured that their rights are not infringed upon during the process.

To date, answers to affected citizens and landowners have been provided during established regulatory processes. The answer to “what benefit does this project have for my area or my State,” is a key question that is addressed in the State’s Certificate of Need<sup>20</sup> process and land rights questions are addressed in various parts of Minnesota Statutes.

To help stakeholders understand facility permitting proceedings before the Commission that affect them and to help them have more productive input into those proceedings, the Commission created the specially designated position of Public Advisor. This position is responsible for implementing a program to better inform stakeholders and to advise them on how to have a meaningful voice in the permitting process.

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<sup>20</sup> Minn. Stat. § 216B.243

## Cost Responsibility for Mitigation

As utilities build more infrastructure, state regulators must ensure that utilities use cost discipline as they construct new resources. To encourage cost discipline and prevent ratepayers from paying more than is reasonable for new utility infrastructure, at a minimum, a utility must justify any cost recovery above the amount the utility originally indicated that the project would cost. This focus is important since decisions to approve or deny a project are based in part on cost effectiveness of the proposed facility. Consequently, it is important to minimize errors in estimation to avoid ill-informed decisions from being made that would result in higher system costs than necessary. Minnesota has built such discipline into its transmission approval process.

When utilities install infrastructure in an area, there are always mitigation measures employed to address local concerns. Thus, it is important to ensure that decisions made by a utility on behalf of local governments or citizens reasonably consider the cost implications noted above. Further, it is important that costs of any significant upgrades are equitably allocated to ratepayers, based on ratemaking principles such as cost-causation, cost minimization and administrative feasibility. Discussions about such issues have occurred and are likely to continue in the future.

## Federal versus State Jurisdiction Over Siting and Construction

The routing and permitting of interstate transmission lines been the province of the states (with limited exceptions) for virtually the entire history of the electricity industry in the United States. The grid formerly consisted of many localized transmission and distribution networks, so federal interest in siting of the transmission system was limited. In addition, state and local governments are well positioned to weigh the local factors that go into siting decisions, including environmental and scenery concerns, zoning issues, development plans and safety.

However, the electricity transmission system in the 48 contiguous states has evolved into a complex continent-spanning network consisting of three major interconnections. Although the federal government has recently increased its authority over transmission reliability and in other areas, it has, for the most part, left transmission siting decisions in the hands of the states. However, as concerns over grid congestion and its impact in reliability have grown, the federal government has carved out a small role in transmission siting as a “backstop” siting authority in designated transmission corridors.

When the United States Congress passed the Energy Policy Act of 2005 (2005 Act), one section of the 2005 Act authorized (DOE to designate “National Interest Electric Transmission Corridors” based on DOE’s findings after conducting a study of congestion. The 2005 Act then authorized FERC to permit the construction and operation of electricity transmission facilities within the boundaries of these DOE designated corridors. This authority, however, may not be exercised by FERC unless the state where the facility would be sited lacks the authority to issue the permit, the applicant does not qualify for the permit in the state, or the state has “withheld approval” of the permit for more than one year. Much debate and litigation occurred regarding whether “withheld approval” included rejecting a permit application. Partly as a result, FERC has to date never used this backstop permitting authority.

However, the Federal IJ Act of 2021 addresses this ambiguity by explicitly allowing FERC to overrule state objections whether the state “withheld approval” or denied approval within a DOE designated corridor. In addition, the 2021 IJ Act, expands the scope of DOE’s review by providing additional factors that DOE may consider when designating a National Interest Corridor. Specifically, DOE may now review whether a designation will “enhance the ability” of electric generation facilities “to connect to the electric grid,” whether the designation will decrease electricity costs for consumers, and also whether the designation will

enhance the United States’ energy security.

The DOE is expected to issue its “Transmission Needs” study in the first half of 2023. The IJ Act’s changes could affect the federal government’s future role in the siting of electricity transmission projects – a role that has historically been almost exclusively within the purview of the states. FERC also on December 15, 2022, issued a new notice of proposed rulemaking for implementing its back stop authority.<sup>21</sup> The proposed rule is now out for public comment.

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<sup>21</sup> [E-1-RM22-7-000 | Federal Energy Regulatory Commission \(ferc.gov\)](#)

## Summary of Conclusions

- The high-voltage electric transmission system in Minnesota is part of a much larger regional system that is planned and operated by the Midcontinent Independent System Operator (MISO). MISO works with its utilities and member states to plan and operate the electric transmission system in Minnesota and surrounding states to achieve reliability, regional coordination, and efficiency.
- The initial high-voltage transmission system was not designed to accommodate the ongoing shift from a limited number of large conventional power plants towards many widely dispersed wind and solar projects. While new transmission lines have been added, the existing high-voltage transmission system is increasingly constrained and has limited the amount of new renewable generation projects that can be interconnected to the system.
- Because it can take years or more to plan, permit, and construct large new transmission lines, long-range transmission planning is needed to keep up with evolving electric generation technologies. Commerce is working with other states and MISO to encourage and facilitate long-range transmission planning in the region, including how to efficiently and fairly allocate the costs and benefits of any new transmission lines.
- Based in part on state agency leadership on the issue, in July 2022 MISO approved an initial group of regional and interregional transmission line projects in the Upper Midwest (LRTP Tranche 1 portfolio). Three of these proposed projects are in Minnesota. All three are in the planning and development with permitting expected to start in 2023 or 2024. Shorter term, some utilities may be able to interconnect new wind and solar projects using interconnection capacity at their existing or retiring coal or natural-gas plants.
- MISO in 2022 also completed a Joint Targeted Interconnection Queue (JTIQ) Study with the Southwest Power Pool (SPP). The JTIQ projects are intended to reduce expensive transmission upgrade costs when new generation projects in one transmission system trigger upgrades in the other. Commerce is actively working on an application to the federal Department of Energy for a grant that, if approved, would pay for about half the costs of these JTIQ projects.
- Minnesota has been and will continue to be involved in numerous regional and national efforts to ensure that electric transmission lines are planned and constructed in a reliable, cost-effective and environmentally responsible manner for the State's economic future and the needs of its businesses and citizens and to maintain the State's jurisdiction over the provision of essential services to ensure safe, adequate, and efficient utility services at fair, reasonable rates.