

# MINNESOTA'S ELECTRIC TRANSMISSION SYSTEM: NOW AND INTO THE FUTURE

SUBMITTED BY



DIVISION OF ENERGY RESOURCES

In Consultation with

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## I. INTRODUCTION

Minnesota Statute §216C.054, the Annual Transmission Adequacy Report to the Legislature,<sup>1</sup> requires the Commissioner of Commerce, in consultation with the Minnesota Public Utilities Commission, to prepare and submit this report annually to provide a nontechnical discussion of the “state” of Minnesota’s current electric transmission system. This law also requires a report on transmission planning and other actions taken or in process to maintain electric service reliability as well as comply with the requirements of the State’s Renewable Energy Standard.

Because transmission issues tend to involve numerous considerations and entities, this report provides a general discussion of transmission as a reference guide, similar to the discussion from previous reports. This report also provides an update of current transmission projects as identified in the most recent biennial transmission report required by Minnesota transmission owners; noting that no certificates of need for transmission lines were filed in Minnesota in 2016.

## II. WHY TRANSMISSION MATTERS: OVERVIEW

Electricity is provided to consumers via three main steps: 1) electricity is generated at various power plants, 2) electricity is transmitted on an integrated system of large power lines and 3) electricity is delivered to consumers through a distribution system of smaller 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. Further, the transmission system can be impacted by changes in either supply or demand for power.

While it is a critical component in providing electric service, transmission accounts for a much smaller percent of utility costs than either generation or distribution facilities. For example, transmission may account for 10 percent of the costs of providing electric service while generation and distribution make up the other 90 percent.

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<sup>1</sup> The statute states:

The commissioner of commerce, in consultation with the Public Utilities Commission, shall annually by January 15 submit a written report to the chairs and the ranking minority members of the legislative committees with primary jurisdiction over energy policy that contains a narrative describing what electric transmission infrastructure is needed within the state over the next 15 years and what specific progress is being made to meet that need. To the extent possible, the report must contain a description of specific transmission needs and the current status of proposals to address that need. The report must identify any barriers to meeting transmission infrastructure needs and make recommendations, including any legislation, that are necessary to overcome those barriers. The report must be based on the best available information and must describe what assumptions are made as the basis for the report. If the commissioner determines that there are difficulties in accurately assessing future transmission infrastructure needs, the commissioner shall explain those difficulties as part of the report. The commissioner is not required to conduct original research to support the report. The commissioner may utilize information the commissioner, the commission, and the Office of Energy Security [now known as the Division of Energy Resources] possess and utilize in carrying out their existing statutory duties related to the state's transmission infrastructure. The report must be in easily understood, nontechnical terms.

At the time they were built the initial transmission facilities were designed primarily to interconnect a utility's generation and distribution facilities, and secondarily to interconnect neighboring utilities to each other to provide additional backup power. Over time, the focus on interconnecting utilities 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 that utility's system. This 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. 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 interconnected transmission system is vast. Electrically, the transmission grid is split into three sections: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas (ERCOT). These areas are shown in the map in Appendix A.<sup>2</sup>

Electricity follows the laws of physics: like water, it follows the path of least resistance. However, electricity has specific properties that require different delivery systems than are used for water and most other goods. For example, electricity placed onto the interconnected transmission grid could be withdrawn at any other place within the interconnection as long as 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 by consumers. Because electricity cannot be stored in a reasonable manner with current technology, the transmission system helps maintain this balance in a more cost-effective manner by allowing electricity to flow through the broader electrical system where possible.<sup>3</sup>

### III. TRANSMISSION, RELIABILITY AND POWER COSTS

Adequate transmission is one essential component to ensure that Minnesotans have reliable and reasonably priced electric service. When there are shortages in transmission capacity in certain areas, there are more frequent power outages and lower power quality (which can affect sensitive equipment such as computers). 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

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<sup>2</sup> See Appendix A, with source and electronic link: [NERC map](#)

<sup>3</sup> Development continues of technologies to store un-needed electricity for later use (including batteries, pumped hydro, compressed air, flywheels, etc.). However, few of these technologies are commercially viable or operational at a utility scale at this time. One exception is known as "Pumped Storage Hydro" which in effect stores the electricity in the potential energy of water, by using electricity at times when little power is being used for other purposes to pump large amounts of water into a reservoir. Later, when electricity is needed, this reservoir water is allowed to flow through a hydro-power turbine, generating electricity. This technology's use is restricted due to the need for both a large amount of water to make it viable and large ponds to store the water and generate the hydro-power. Currently, the largest Pumped-storage Hydro facility in the eastern U.S. is located on the eastern shore of Lake Michigan. In addition, Northern States Power d/b/a Xcel Energy is testing use of a large battery facility to store power from wind energy for later use. Such batteries are still in the testing stage in the U.S., some with assistance from the Department of Energy's Office of Electricity Delivery and Energy Reliability.

possible to minimize the cost to Minnesota's economy in lost production time and disruption and potential harm to the myriad systems that depend on electricity. For example, electricity is needed to deliver natural gas and other fuels to consumers as energy producers rely on electricity to produce and deliver their products.

Another negative effect of inadequate transmission capacity is an increase in the cost of power delivered on the system. The entire electric system starts by using the least-cost generators available and adds power from generators that are increasingly more expensive to operate. When there is not enough transmission capacity, certain paths on the system become congested, causing operators of the electric system to decrease the amount of electricity produced by the cheaper generators in congested areas and increase electricity production by more expensive generators in areas free of congestion to make up for the generation that could not be delivered from the congested areas. As a result, when transmission congestion causes adjustments to the generation facilities used to produce power, the cost of power goes up as more expensive generation replaces less expensive generation.

Both of these factors hurt Minnesota's economy. Lapses in power quality and reliability, along with higher costs, could potentially disrupt businesses, industries, hospitals, schools, public services and citizens who depend on computers and other electronics in their day-to-day lives and expect that power costs will be reasonable.

#### **IV. ROLES OF ENTITIES INVOLVED IN TRANSMISSION**

Numerous entities are involved in various aspects of the design and cost of the transmission system that serves Minnesota. For example, because transmission lines located outside of Minnesota serve Minnesota customers, the utilities that own those facilities and states that regulate those utilities affect the cost and design of the transmission grid that serves Minnesotans.<sup>4</sup> While Minnesota's electric utilities are certainly involved in these matters, so are other entities. The following is a partial list of major players.

1. The Federal Energy Regulatory Commission (FERC)<sup>5</sup> regulates the wholesale rates that utilities charge for transmission service and the type of transmission services provided.
2. The Southwest Power Pool (SPP)<sup>6</sup> and Midcontinent Independent System Operator (MISO)<sup>7</sup> do not own transmission or generation facilities, but work with their voluntary members to operate the regional transmission system reliably and in the least-cost manner through energy markets. MISO and SPP help their members develop long-term transmission plans for

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<sup>4</sup> Similarly, the transmission grid physically located in Minnesota affects the electric service provided outside of Minnesota.

<sup>5</sup> <http://www.ferc.gov/about/ferc-does.asp>

<sup>6</sup> Companies with transmission assets in Minnesota and membership in SPP include: East River Electric Power Cooperative and Missouri River Energy Services. More information can be found at: <https://www.spp.org/about-us/>

<sup>7</sup> Companies with transmission assets in Minnesota and membership in MISO include: ALLETE (Minnesota Power), Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, ITC Midwest, Missouri River Energy Services, Montana-Dakota Utilities, Northern States Power d/b/a Xcel Energy, Northwestern Wisconsin Electric Company, Otter Tail Power, and Southern Minnesota Municipal Power Agency. Missouri River Energy Services has membership in both SPP and MISO because some of its member municipalities joined SPP and others joined MISO. For more information on MISO members and to see a map of MISO's areas, see: [MISO Communications](#)

the region. For example, MISO currently covers all or part of 15 states and the Canadian provinces of Manitoba and Saskatchewan. MISO cannot require any of its members to build new resources and is not responsible for developing long-term generation plans. To focus its review of the reliability of the transmission system, MISO has resource “zones.” Minnesota is in Zone 1. FERC regulates the rates and practices of MISO and SPP.

3. The North American Electric Reliability Corporation (NERC)<sup>8</sup> works with regional electric reliability organizations or councils and others to develop and enforce certain electric reliability standards for what is known as the “Bulk Power System” or “the grid.” There are eight NERC Reliability Regions covering the United States and Canada. Minnesota is in the “MRO” region as shown in Appendix A attached to this report and discussed in item 5 below. 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),<sup>9</sup> with members in six states<sup>10</sup> 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 demands for electricity.<sup>11</sup>
5. The Organization of MISO States (OMS)<sup>12</sup> is a self-governing organization of representatives from each of the state regulatory commissions with authority over utilities or other entities participating in MISO. The OMS analyzes and makes recommendations to MISO, FERC, and other relevant government agencies regarding matters that affect regional transmission issues. The Minnesota Public Utilities Commission (Commission) represents Minnesota in OMS. In addition, the Department represents Minnesota as an associate member in OMS and, along with other Public Consumer Advocates, participates in efforts by OMS and MISO.
6. The Commission requires Minnesota utilities to develop sufficient transmission to serve load and regulates the rates that Minnesota’s investor-owned utilities charge to their retail customers to recover transmission costs. In addition, while the Minnesota Commission does not regulate the wholesale rates that Minnesota’s investor-owned utilities charge to wholesale customers,<sup>13</sup> the Commission does ensure that these utilities allocate transmission costs appropriately at the retail level, considering facts pertaining to retail customers.
7. The Division of Energy Resources of the Minnesota Department of Commerce (Commerce) investigates matters pending before the Commission and makes recommendations to address proposals by utilities and others.

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<sup>8</sup> More information is available at [About North American Electric Reliability Corporation](#)

<sup>9</sup> More information is available at [About the Midwest Reliability Organization](#)

<sup>10</sup> The MRO Region covers roughly one million square miles spanning the provinces of Saskatchewan and Manitoba, and all or parts of the states of Illinois, Iowa, Minnesota, Michigan, Montana, Nebraska, North Dakota, South Dakota and Wisconsin.

<sup>11</sup> Neither NERC nor MRO have jurisdiction over generation facilities. NERC describes its function as follows: “The North American Electric Reliability Corporation is a not-for-profit entity whose mission is to ensure the reliability of the Bulk-Power System in North America.” See: <http://www.nerc.com/Pages/default.aspx>.

<sup>12</sup> OMS’s website is: <http://misostates.org/>

<sup>13</sup> Rate regulation occurs as follows: FERC regulates wholesale rates, the Minnesota Public Utilities Commission regulates retail rates of both investor-owned utilities and cooperative utilities that elect such regulation, municipalities regulate retail rates of municipal distribution utilities and cooperative boards regulate the retail rates of cooperative distribution utilities.

Because it is so involved in the operations of Minnesota's electrical system, MISO warrants further discussion. As noted above, MISO is a Regional Transmission Organization created and regulated by FERC. It is involved in numerous matters that are critical to the reliable and low-cost operation of the bulk transmission system, including planning for contingencies if large generation plants or transmission components retire or fail, conducting engineering analyses of the effects of changes in generation or transmission components on the system as a whole, planning for the transmission needs in the MISO region, coordinating with other areas of the Eastern Interconnection System, monitoring the day-to-day (and minute-to-minute) operations of the transmission system, operating the system to call on the lowest cost generation facilities to operate, operating the system to address the effects of congestion on the transmission system, analyzing where the greatest congestion exists and so forth. The Department and Commission Staff participate in various MISO and OMS committees.

The geographical area of MISO's region spans numerous states. MISO uses "planning reserve zones" and focuses in each region on ensuring that there are adequate electric resources to meet the needs in each zone. This planning ensures that limits on a regions' ability to import or export power are considered.

As shown in Appendix B to this report, most of Minnesota is part of MISO's Planning Reserve Zone 1, along with the western half of Wisconsin, the portions of North Dakota with utilities belonging to MISO, and portions of Montana, South Dakota, and 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.

## **V. DETERMINING HOW MUCH TRANSMISSION IS ENOUGH**

### **A. MINNESOTA'S TRANSMISSION SYSTEM**

When the initial components of Minnesota's transmission system were designed and built, largely 50 to 70 years ago, items such as home computers, video games, cable TV, and cell phones were unheard of, few customers had air conditioners, and there were few plug-in appliances. Those transmission facilities were sized to meet the then-current electricity needs of the population and economy of the day plus some assumptions for growth based on what was known at that time.

While Minnesota's transmission system was previously built with more capacity than was immediately needed, Minnesota has been outgrowing its system both in terms of the quantity of electricity customers demand and where the electricity is produced. In addition the system has been aging. In response more transmission has been added recently and more is expected to be needed in the near future. The largest example of recent transmission additions in Minnesota are the CapX projects.<sup>14</sup> Moreover, Minnesota residents and industry need not only electricity, but also

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<sup>14</sup> The CapX projects in Minnesota include:

- the 70-mile Bemidji-Grand Rapids transmission line in north central Minnesota;
- the 250-mile Brookings County-Hampton transmission line from the south side of the twin cities to the South Dakota border;
- the 130-mile Hampton-Rochester-La Crosse transmission line from the south side of the twin cities to Rochester and then the Wisconsin border;

acceptable power quality, meaning evenly delivered energy without power surges and other fluctuations that can impact computers and other sensitive electronic devices. Lack of sufficient space or capacity on the grid also means that there could be some locations in the state where power quality may become unacceptable. Further, in some Minnesota locations too much electricity is trying to flow on the lines causing “grid lock,” and reliability problems in making sure the power can be delivered where it is needed. One of the more prominent examples of grid lock at this time is Minnesota’s limited ability to export electricity to regions further east in MISO. These limits, which impact Minnesota’s ability to connect new generation, are to be addressed by projects approved by MISO as “multi-value projects” or “MVP” projects, discussed on page 13 of this report.

Determining the amount of transmission infrastructure needed to provide reliable electric service in Minnesota requires balancing the risks of building too much transmission or too little. However, these risks are not symmetrical. If more transmission capacity is built than needed to provide delivery service for available generation resources, the system will be relatively free of transmission constraints, but will cost more than is necessary to provide adequate service. However, if too little capacity is built for delivery service from existing and new generation resources, the transmission cost component of providing electricity service may be lower, but the overall costs to Minnesota’s economy of the less reliable power that would result may be far greater than the cost of building transmission. As noted above, costs of a less reliable electric system may include lost productivity, damage to security systems, damage to computer systems, and increased cost of producing electricity.

While use of the transmission system varies with the overall demand for electricity and the location of the supply, transmission planning requires focus on the amount and timing of the highest needs to import electricity to a region and the highest needs to export electricity from a region. For example, in some regions the clearest need is to meet export needs. Sometimes, the greatest need to export power is when demand for electricity is low, and the supply of electricity exceeds demand in an area. This imbalance occurs during overnight hours of the spring and fall when demand for power is low and generation from “must run” resources such as wind is high.

When planning for the need to meet import needs, the highest demand for electricity (peak demand) is reviewed. While peak electric use typically occurs in the summer, MISO must also plan for meeting high winter loads. For example, temperatures in January and February of 2014 were exceedingly cold during the two “polar vortexes.” In fact, the historic winter peak electric demand of 109,307 MW on MISO’s system was set on January 6, 2014.<sup>15</sup> At the same time, there were shortages of propane and natural gas, two primary fuels used to heat homes and water in Minnesota and surrounding areas. Because this event was significant, MISO issued a report on September 23, 2014, “MISO and Stakeholder Polar Vortex Experiences with Natural Gas Availability and Enhanced RTO/Pipeline Communication,” in which MISO stated that the January 6, 2014 historic winter peak demand of 109,307 MW was 9 percent higher than the prior winter peak demand.<sup>16</sup> MISO summarized its report as follows:

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- the 30-mile Monticello-St. Cloud transmission line on the north side of the twin cities; and
  - the 210-mile Fargo-St. Cloud transmission line from St. Cloud to the South Dakota border.

<sup>15</sup> MISO’s highest peak occurs in the summer, with the historic peak to date set on July 20, 2011, at 127,125 MW.

<sup>16</sup> FERC’s Energy Primer explains measurement of electricity as follows:

Electricity is measured in terms of watts, typically in kilowatts (1,000 watts) or megawatts (1,000 kilowatts). A kilowatt (or watt or megawatt) is the amount of energy used, generated or transmitted at a point in time.

“The January 2014 polar vortex brought extreme weather conditions to the MISO Region that introduced significant challenges to the reliable operation of the power grid. The [e]ffects were far-reaching, spanning from the Canadian province of Manitoba to the Gulf Coast. While the severity of the conditions was forecasted well in advance, this was nevertheless a rare weather event for which the full impact could not be precisely anticipated. Overall, however, MISO was able to effectively manage system assets to maintain the reliability of the Bulk Power System within its region, while also supporting and assisting neighboring entities in their efforts to do the same. MISO’s market functions performed as expected during the event.”

In addition, 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, permits strategic use of the most efficient resources available on the grid at any given moment. As indicated in the citation 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 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, it is important to plan the transmission system to meet not only the expected demand for power but also the demand for relatively high amounts of power during extreme weather and other circumstances and also the need to move larger amounts of electricity out of regions when demand is low. The minimum time period that should be considered in planning for new facilities is the number of years that it takes to build new transmission lines (including assessing a need, conducting engineering analysis, working with local communities and landowners, obtaining needed permits and installing the lines).<sup>17</sup> It can take a decade for a large transmission line to move from planning through permitting and construction to be placed in-service.

Strategically placed generation facilities also have a role in ensuring reliable power, particularly when such resources are relatively low cost, are located in areas where such resources can address congestion on the transmission system.<sup>18</sup> In short, new generation is often sited where sufficient transmission already exists—large scale transmission projects are built before generation is sited, not after.

While there is not a desire to have too much transmission, since excessive facilities lead to costs being higher than necessary, the overall goal is to have a system that is sized just large enough to be ready to handle the demands to import and export power to allow for growth in the economy and expected changes in the generation fleet. For example, if the transmission system were

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The aggregation of kilowatts possible at a point in time for a power plant, for example, is its capacity. The aggregation of kilowatts used at a point of time is the demand at that point.

The number of kilowatts used in an hour (kilowatt-hour or kWh and, in larger quantities, megawatt-hour or MWh) is the amount of electricity a customer uses or a power plant generates over a period of time.

<sup>17</sup> Utilities have demand-side management tools which can help reduce demand on the system at peak times.

<sup>18</sup> Generation interconnected to utilities’ distributions systems, known as “distributed generation” may have limited effects on transmission systems; however, distributed generation is beyond the scope of this report.

planned assuming that the relatively low demand for power that occurs during a recessionary period would continue in the future, the transmission system would be unable to accommodate recovery and growth in the economy. Even if the transmission system were planned only to meet the demand for power during a reasonably healthy point in the business cycle, the transmission system could not accommodate a boom period in the economy. Moreover, if plans for transmission ignore growth in the economy and the demand for power over time, let alone for any expected new uses of electricity for applications that may not yet exist, then the transmission system may not be adequate in the future.

The Commission recognized these concepts in its May 22, 2009 Order in the certificate of need proceeding for the transmission capacity expansion project for 2020, or CapX 2020:

“The fact that demand is less than forecast reflects a variety of factors, including both the current recession and abnormally cold weather. In evaluating the demand for facilities that are expected to last decades, however, the Commission must focus not on current levels of demand – reflecting fluctuations in the economy and weather - but rather on long-term trends.”<sup>1</sup>

The Minnesota Court of Appeals affirmed the Commission’s decision on June 8, 2010. Thus, as the economy grows in the future it will be necessary to ensure that the transmission system is ready to meet the needs of the future. Prior to the Great Recession, Minnesota’s transmission grid was operating close to its limits with small amounts of unused space on the grid available in some locations to accept new power sources. Fortunately, significant transmission lines that the Minnesota Commission approved for use throughout Minnesota in the CapX 2020 proceeding noted above have been placed in-service in 2015 and 2016 in Minnesota to accommodate growth in Minnesota’s economy and expected changes in the changing resource mix. These transmission lines and other facilities (substations, etc.) will help ensure that power is delivered reliably and allow new generation facilities of significant size to connect to these areas of the transmission grid in the future.

Moreover, Minnesota largely avoided serious problems with its transmission system due to having one of the strongest energy conservation programs in the country. Minnesota’s Conservation Improvement Program has, since its inception, conserved enough energy to push back by many years the need for building multiple major electric generation plants by offering industry, business and residents various programs to save energy in their day-to-day operations. As a consequence, while power usage continued to increase the rate of growth has declined. However, these programs cannot put off additions to transmission indefinitely. Further, conservation might actually increase the need for new transmission when it occurs in a region where there are limits to the amount of generation that can be exported from the area. For example, as more renewable energy has been added in and near Minnesota, there is a greater need to build more transmission to export the power during off-peak hours when demand is low.

**B. FEDERAL AND STATE ACTIONS RELATED TO MINNESOTA’S TRANSMISSION GRID IN 2016**

Additions to transmission are needed not only due to factors in Minnesota, but also due to federal and regional governmental actions directly impacting the use of Minnesota’s transmission grid (as well as other states’ grids). The Department’s prior transmission reports listed developments that affected Minnesota in those years; the current report discusses several issues that developed in 2016 with potential effects on Minnesota. This report does not list all of these issues, but discusses a few issues briefly.

## **1. *MISO South Integration, Update***

As noted in prior reports, the Entergy Region [portions of Arkansas, Louisiana (including New Orleans), Mississippi, Texas, and Missouri] referred to as “MISO South” started their energy market with MISO on December 19, 2013. As a result of this integration of MISO South, MISO’s footprint added 16,000 miles of transmission lines (which is a 32 percent increase in transmission), 50,000 MW of generation (which is a 38 percent increase in generation), and 30,000 MW of load (which is a 31 percent increase in load). MISO South is expected to create benefits for existing MISO members by reducing MISO administrative fees since they will be shared across a larger footprint. FERC approved a five-year transition period for MISO transmission planning and MISO cost allocation for the MISO South Region; the end of this period is approaching (the end of 2018) and discussions are occurring at MISO over the next steps, with MISO introducing a conceptual proposal on cost allocation in December 2016, with the goal of developing a proposal by the end of 2017 to file with FERC in June, 2018.

Due to its wide swath and differences in certain areas, MISO divided its system into three geographical regions and ten geographical sub-regions, to focus on reliability in those sub-regions:

### MISO Central Region:

- Wisconsin and Upper Michigan sub-region
- Lower Michigan, Northern Indiana sub-region
- Central and Southern Indiana and Southern Ohio sub-region
- Missouri and Southern Illinois sub-region

### MISO North Region:

- Dakotas sub-region
- Minnesota/Western Wisconsin sub-region
- Iowa sub-region
- Manitoba, Canada sub-region

### MISO South Region:

- Arkansas, Louisiana, Mississippi and Texas sub-region

Minnesota is in the “MISO North” region of MISO.

## **2. *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 2014 when SPP filed a complaint with FERC, claiming that MISO should pay for certain transfers that exceed 1,000 MW. SPP filed this complaint shortly after Entergy moved from SPP to MISO. Under a temporary settlement, MISO is currently paying SPP more to transfer power over 1,000 MW; this arrangement distorts the choices of least-cost options and increases costs for MISO customers.

In 2015, MISO and SPP reached a full settlement of the matter, including higher costs of power transfers with SPP than before the complaint but more price convergence between MISO North and MISO South. The settlement judge approved the settlement, which was approved by FERC in early 2016. At this time MISO is in the initial phases of a process that will study this 1,000 MW limit. The process is referred to as the “Footprint Diversity Evaluation.” A recommendation on potential projects to increase the limit is not expected until late in 2017.

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

One of FERC’s goals is to promote competition for transmission projects; Minnesota and other states agree with this goal. In fact, Minnesota’s existing certificate of need law requires the Commission to consider alternatives to proposed facilities. Minnesota Statutes also require Minnesota utilities to give notice as to whether or not they will build a transmission facility that has been identified in a MISO planning process as being necessary; if the utility does not intend to build the facility, the Commission may either require the incumbent utility or another entity to build the facility. One such project near Mankato, referred to as “Huntley-Wilmarth”, was approved by MISO in December 2016. The project connects transmission lines owned by Xcel Energy and ITC Transmission.

FERC requires MISO to have a Transmission Developer Qualification and Selection System and to eliminate the federal (but not state) right of first refusal on certain types of transmission projects. MISO’s Transmission Developer Qualification and Selection system does not apply to transmission projects within the state of Minnesota, due to Minnesota’s right of first refusal for incumbent utilities either to build transmission or to give up such a right. As noted above, Minnesota’s existing statutes have long required consideration of alternatives to proposals to build large energy facilities in Minnesota. However, interfacing with MISO’s system could be an issue for a transmission project that crosses multiple states that include Minnesota.

Minnesota has noted in FERC proceedings that reaching the overall goal of using competition to build new transmission resources – obtaining the best projects at lowest costs – depends critically on holding bidders accountable to their bids; if bidders are allowed to increase costs above bids or fail to meet the specifications in their bids with little or no accountability, then the process cannot be expected to result in low-cost, reliable resources. Specifically, the Department and the Commission filed comments on August 27, 2015 raising concerns about a utility’s proposal as to rates charged for transmission projects. FERC held a technical conference and took comments on how to hold bidders accountable for cost increases.

#### 4. MISO's Multi Value Transmission Project Portfolio

In 2011, MISO approved a portfolio of 18 different transmission projects across the MISO North footprint. The projects, referred to as multi-value projects or “MVP” projects had a wide variety of goals across the entire MISO North footprint, including:

- Provide benefits in excess of costs under the scenarios studied. In this case the benefit to cost ratio ranged from 1.8 to 3.0;
- Maintain system reliability by resolving reliability violations. The MVPs addressed violations on approximately 650 transmission elements for more than 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; and
- Support a variety of generation policies by using a set of energy zones which support wind, natural gas and other fuel sources.

Two of the 18 MVP projects are located in Minnesota.<sup>20</sup> The most recent cost estimates for the 2 MVP projects in Minnesota are at or below the cost estimate used by MISO; however, the MVP portfolio as a whole has experienced cost overruns to date of about \$1 billion.<sup>21</sup> This significant cost overrun highlights the importance of starting with a reasonable estimate and building adequate cost control measures into the transmission project approval process. The Minnesota Commission and the Department are participating in proceedings with OMS and MISO to understand and address these concerns.

#### 5. *Complaint by Large Power Customers to FERC regarding MISO Transmission Owners' Return on Equity*

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. MISO transmission owners currently have a base ROE of 12.38 percent, with some stand-alone transmission owners at 12.88 percent. The complaint has sought to decrease the transmission owners' base ROE over 300 basis points below the current base ROE, to 9.15 percent.

In 2015, MISO's Public Consumer Group, of which the Department 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. Advocates argued that FERC's high ROEs have imposed undue costs on consumers and distorted decision-making by utilities toward transmission only and not generation resources. While transmission resources are needed, it would not be appropriate to build only transmission to meet the electric needs of society since

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<sup>20</sup> These are the Brookings County-Hampton transmission line, one of the CapX projects mentioned elsewhere in this report and the Lakefield Junction—Winnebago—Winco—Burt area project, being constructed by ITC Transmission.

<sup>21</sup> MISO's third quarter “MVP dashboard” shows the approved cost estimate was \$5.56 billion while the most recent cost estimate, from the 3<sup>rd</sup> quarter of 2016, is \$6.61 billion.

there must be an appropriate balance of production and delivery of electricity. Further, such premiums may encourage inefficient decisions, especially if ratepayers are not appropriately credited with higher revenues from higher returns on equity.

Fortunately, with the Department's advocacy, the Minnesota Commission has required electric utilities subject to the Commission's jurisdiction to credit the excessive ROE revenues back to retail customers, thus limiting much of the harm of the high ROEs on Minnesota ratepayers who take service from utilities under the Commission's regulatory authority. While these ratemaking decisions have reduced the harm of high ROEs in Minnesota, not all ratepayers in Minnesota have had the benefit of revenue offsets to reduce the rates they pay for electric service.

On December 22, 2015, Administrative Law Judge David H. Coffman issued his Initial Decision, determining that the allowed base ROE should be reduced by over 206 basis points (just over 2percent), 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. However, on October 21, 2016, MISO requested an extension of nine months to provide the refunds. Next, MISO, the transmission owners and others requested reconsideration of various aspects of FERC's Order, which FERC granted and will address in the future.

Related to this proceeding is another complaint filed on February 12, 2015 regarding further reason to reduce the returns on equity for transmission assets in MISO. This complaint relates to a change in analyzing returns on equity as reflected in an Order issued by FERC. The Initial Decision by the Administrative Law Judge David H. Coffman determined that the allowed base ROE should be further reduced from 10.32 percent to 9.7 percent. However, the proceeding is not over; a final FERC decision is expected in 2017.

## **6. *ITC Midwest Transmission ROE Incentive***

Certain utilities in Southern Minnesota receive transportation service from ITC Midwest, an independent transmission company. Given the excessive returns on equity identified in the analyses above, the Department of Commerce joined the Iowa Utilities Board and the Iowa Consumer Advocate at FERC to oppose the continued use of a 100 basis point adder to ITC's FERC-authorized return on equity for ITC Midwest's wholesale transmission rates. Minnesota and Iowa raised concerns about the unreasonableness of ITC Midwest's ROE under current circumstances. FERC agreed, cutting ITC Midwest's bonus return on equity (adder) by 50 basis points (half a percent) in a January 6, 2016 Order. This change reduced rates charged largely to cooperative and municipal utilities to obtain wholesale power needed to serve their members and residents.

## **7. *Clean Power Plan***

The U.S. Environmental Protection Agency (EPA) issued its final rule for regulation of carbon emissions from existing power plants, called the "Clean Power Plan." On February 9, 2016, the U.S. Supreme Court stayed implementation of the Clean Power Plan pending judicial review. On May 16, 2016, the full D.C. Circuit ordered, on its own motion, to reschedule a hearing before a three-judge panel to be heard instead by the D.C. Court *en banc* on September 27, 2016. At the time of this writing, the results are not yet known. According to the Congressional Research

Service:<sup>22</sup>

For oral argument, the court focused on five main areas: (1) statutory issues related to state authority and electricity generation shifts among affected power plants and renewable energy providers; (2) different amendments affecting [Clean Air Act] CAA Sections 111(d) and 112; (3) constitutional issues; (4) notice issues; and (5) record-based issues. The court had scheduled 3.5 hours of oral argument on these issues, but the argument on September 27, 2016, lasted about seven hours. (Footnotes omitted)

While these rule changes apply to power plants rather than transmission facilities, the changes may have significant effects on the configuration of the existing integrated electrical system. For this reason, MISO worked with its own stakeholders to study expected effects of the Clean Power Plan on the transmission system under various assumptions as to how states within the MISO region may implement the Clean Power Plan. MISO provided analyses indicating that regional approaches to compliance can reduce the overall costs compared to a state-by-state approach to compliance. Once again, broadening the area that customers can draw power from reduces the overall cost of electricity.

## **8. *MISO Regional Transmission Study***

In 2016 MISO began a multi-year process to position the transmission grid to support a changing resource mix. The process, called the Regional Transmission Overlay Study, is focused on developing long-term transmission roadmaps and regional solutions. MISO gathered information about different factors that could affect the size and configuration of the transmission system. Currently MISO is identifying long-term, regional needs and developing packages of transmission projects that might address the needs. Evaluation of candidate packages is currently scheduled for 2018, with approval of projects, if any, anticipated in late 2019. The Department and Commission Staff expect to monitor and participate in this process.

## **9. *Price Cap on Offers of Energy in the Regional Wholesale Electric Market***

Since the beginning of the MISO wholesale energy market on April 1, 2005, MISO has had a cap of \$1,000 per MWh for energy bids (offers), plus a waiver to exceed this cap during the winter during emergency conditions (“soft cap”). In 2016, largely in response to higher energy prices in East Coast states, FERC held rulemaking to consider increasing those price caps.

The closest the Midwest came to reaching the “soft cap” was during the extreme weather during the 2013-14 “Polar Vortex” and the concurrent explosion of the TransCanada pipeline, which led to a significant rise in the price of natural gas. While these factors could have caused some resources to operate at a loss if their short-run marginal costs exceeded the \$1,000/MWh soft cap, there was no such occurrence even under those extreme circumstances. Nonetheless, to ensure that a sufficient level of resources offered into the wholesale energy market, FERC granted limited waivers of the offer cap rules in some regions to ensure that resources could recover costs above the cap.

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<sup>22</sup> Clean Power Plan: Legal Background and Pending Litigation in *West Virginia v. EPA*, October 13, 2016.

10. On November 17, 2016, FERC issued in its final rulemaking, which increased the soft cap for offers into the energy market at the higher of \$1,000/MWh or that resource's verified cost-based incremental energy offer and set a hard cap on the verified cost-based incremental energy offers used to calculate energy prices at \$2,000/MWh. FERC's Independent Market Monitor must verify all energy offers above \$1,000/MWh prior to any such offer being used to calculate energy prices, to ensure that a resource's cost-based incremental energy offer reasonably reflects that resource's actual or expected costs.

### ***Prorated Accumulated Deferred Income Taxes (ADIT)***

Utility rates spread (depreciate) the costs of structures such as transmission lines over the expected life of the facility, charging those who use the structure over its life for a fair share of its costs. Since the 1970s, Congress, through the Internal Revenue Service, has allowed utilities to have accelerated depreciation for income tax purposes, which results in lower income taxes in the early years of the facility's life and correspondingly higher taxes later in the life. Thus, utility rates at the beginning of a facility's life overcharge for income taxes and a corresponding undercharge for income taxes later in the life of the facility. To balance out the difference between uniform depreciation in utility rates and accelerated depreciation for income taxes, the utility maintains an accumulated deferred income tax (ADIT) account in its rate base, over the life of the facility. This account provides a credit for prepaid income taxes at the beginning of the facility's life, which reduces the utility's rate and offsets the overcharges for income taxes. Each year, this account is adjusted to maintain the difference in imputed and actual income taxes; by the end of the facility's life, the account should net out to zero.

In 2015, the Internal Revenue Service confirmed that, when utility rates are set based on a historical test year, this ratemaking should continue. However, when utility rates are set based on a forecasted test year, the credit to ADIT should be reduced, for the portion of the year that is forecasted. That is, when utility rates are set on a forecasted, formula basis, there is not a full credit in that year for the prepaid income taxes; instead, there is a reduction (proration) for the months that are not historical at the time the rates are authorized.

FERC required Xcel to give the full credit to ADIT back in the following year, through a true-up. However, Xcel filed a new request, asking FERC to allow the Company never to provide a full credit to ADIT, thus keeping for its shareholders the reduction in the ADIT credit, so that utility rates would charge for non-existent income taxes.

The Department filed comments with Joint Consumer Advocates opposing Xcel's proposal to keep permanently for its shareholders some of the tax benefits of accelerated depreciation, as a result of not providing the full ADIT credit (by prorating) for the prepaid income taxes. This issue is currently pending before the FERC.

## **VI. MINNESOTA'S TRANSMISSION SYSTEM – PLANNING FOR THE FUTURE**

### ***A. BIENNIAL TRANSMISSION REPORT***

Minnesota Statute §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 was filed on October 30, 2015 by the utilities listed below.

- American Transmission Company, LLC
- Dairyland Power Cooperative
- East River Electric Power Cooperative
- Great River Energy
- Hutchinson Utilities Commission
- ITC Midwest LLC
- L&O Power Cooperative
- Marshall Municipal Utilities
- Minnesota Power
- Minnkota Power Cooperative
- Missouri River Energy Services
- Northern States Power Company d/b/a Xcel Energy
- Otter Tail Power Company
- Rochester Public Utilities
- Southern Minnesota Municipal Power Agency
- Willmar Municipal Utilities

These utilities also jointly maintain the following helpful website that provides information about transmission planning and projects: <http://www.minnelectrans.com>

The utilities' most recent Biennial Transmission Report, filed in 2015, stated that over 100 transmission inadequacies, 40 of which had been newly identified in that report, needed to be addressed to improve the transmission system. The 2015 Report identified projects in the Northeast Zone for which Minnesota Power and Great River Energy<sup>23</sup> have already filed or will file certificate of need applications for new transmission lines in the near future.<sup>24</sup>

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<sup>23</sup> While the Minnesota Transmission Owners' 2013 Biennial Transmission Report indicated that Otter Tail Power and Minnkota Power would build a new 230 kV transmission line between Winger and Thief River Falls, the 2015 Biennial Transmission Report states that the expected completion date of 2016 was extended to 2023. In addition, Minnesota Power is delaying pursuit of the 230 kV upgrade near Duluth, due to slower load growth.

<sup>24</sup> In addition, the 2015 Report identified two possible projects, in Woodbury and in Chaska/Chanhassen, both of which would be built by Xcel that might require certificates of need. There is not enough information about the potential projects to indicate whether a certificate of need would be required.

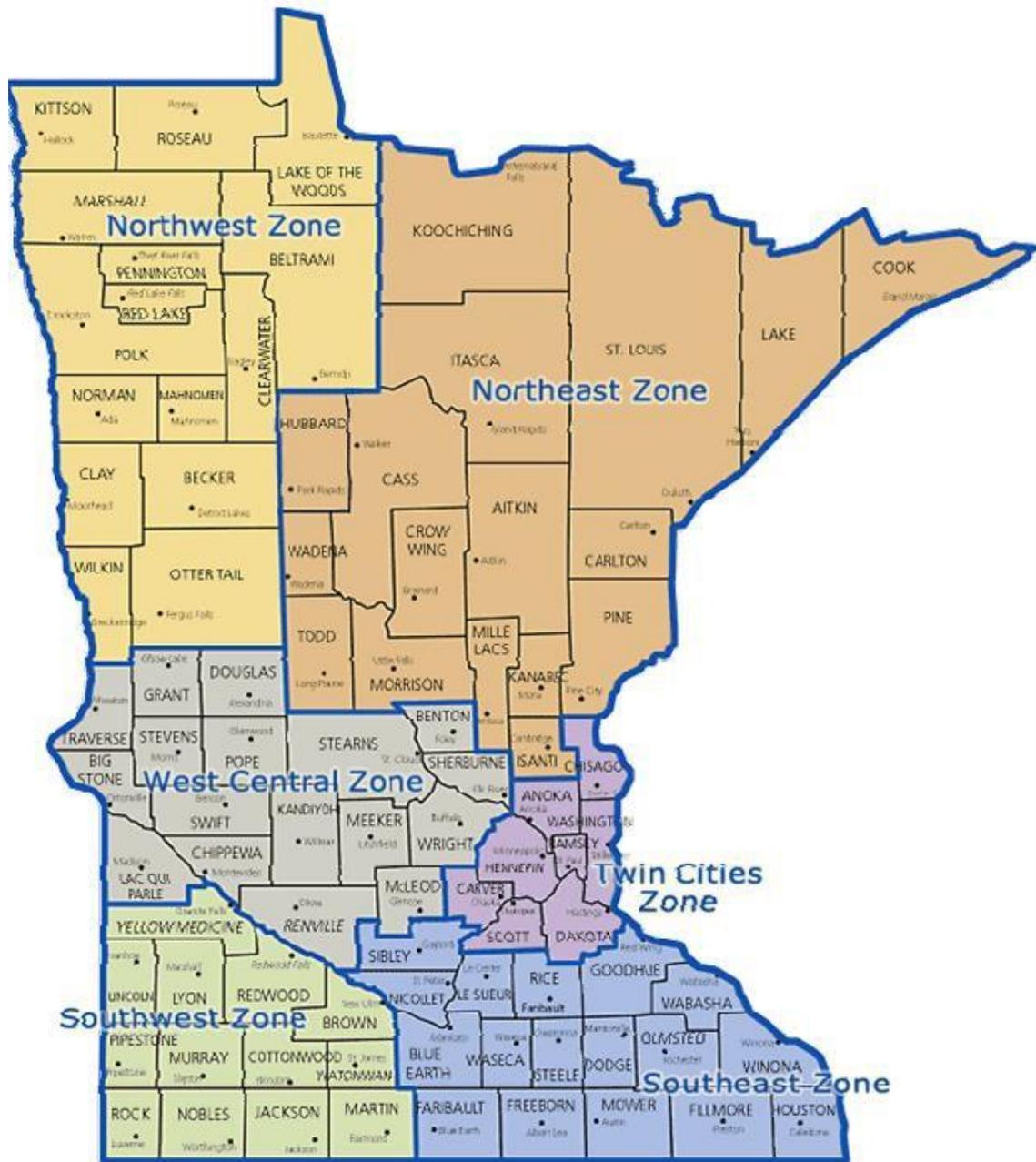
Name and Description of Proposed Transmission Project	Name of Utility
<p>Great Northern Transmission Line 500 kV line between Winnipeg in Manitoba, Canada through numerous counties in Minnesota to the Blackberry Substation (225 to 300 miles), and a 345 kV double circuit line between Blackberry and the Arrowhead Substation near Hermantown in St. Louis County, Minnesota (approximately 50 to 70 miles). Impacted counties could include Kittson, Roseau, Marshall, Pennington, Red Lake, Polk, Clearwater, Lake of the Woods, Beltrami, Koochiching, Itasca, and St. Louis. Commission granted a certificate of need in May, 2015 and approved a minor alteration in December, 2016.</p>	<p>Minnesota Power</p>
<p>Cromwell/Floodwood: Construct new Savanna 115 kV Switching Station near Floodwood, Minnesota, and rebuild approximately 37 total miles of existing 69 kV line to 115 kV specifications between Lake Country Power's existing Cedar Valley Substation, the new Savanna Switching Station, Lake Country Power's existing Gowan Substation, and Great River Energy's existing Cromwell Substation. The project also includes a capacity upgrade of approximately 10 miles of existing 115 kV line. Project is completed..</p>	<p>Minnesota Power</p>
<p>The Menahga Area 115 kV Project consists of approximately 22.5 miles of new 115 kV transmission line between Great River Energy's existing Hubbard Substation and a new Minnesota Pipeline pumping station, as well as the construction of three new substations (Minnesota Power "Straight River," Great River Energy "Blueberry," and Todd-Wadena Electric Cooperative "Red Eye"), relocation and voltage conversion of the existing Todd-Wadena Menahga Substation, and modifications to the existing Great River Energy Hubbard Substation. The Commission granted a certificate of need in March, 2016.</p>	<p>Minnesota Power/ Great River Energy</p>
<p>Construct a new, 16.5 mile, 115 kV transmission line between the existing Itasca-Mantrap Cooperative Electric Association's (IMCEA) Potato Lake Substation and the existing Great River Energy (GRE) Hubbard Substation. The Project involves adding a new 115/34.5 kV substation to the Hubbard-Potato Lake 115 kV line to be named Elisha. The proposed project includes construction of a proposed new, 8.0 mile, 34.5 kV sub-transmission line from the Elisha 115/34.5 kV Substation to the existing IMCEA Osage substation. The Commission granted a certificate of need in March, 2016.</p>	<p>Great River Energy</p>

Name and Description of Proposed Transmission Project	Name of Utility
<p>The Motley Area 115 kV Project consists of approximately 16 miles of new 115 kV transmission line between a point on Minnesota Power’s existing 115 kV Line and a new Minnesota Pipeline pumping station, as well as construction of one new substation at the pumping station site (Crow Wing Power “Fish Trap Lake”), conversion of the existing Crow Wing Power Motley Substation from 34.5 kV to 115 kV service, and expansion of the existing Minnesota Power Dog Lake Substation to a more reliable design. The Commission granted a certificate of need in March, 2016.</p>	Great River Energy
<p>Expand planned Iron Range 500 kV Substation to include two 1200 MVA 500/345 kV transformers and extend a double circuit 345 kV line from Iron Range to the existing Arrowhead 345 kV Substation. This project was formerly coupled together with the Great Northern Transmission Line (2013-NE-N13) but the two projects have since been decoupled due to the lack of sufficient transmission service requests to justify the 345 kV connection to Arrowhead. Commission granted a certificate of need in May, 2015 and approved a minor alteration in December, 2016.</p>	Minnesota Power
<p>Build a ~13 mile 115 kV transmission line from MP's 115 kV #13 line to the Enbridge Palisade Pumping Station.</p>	Great River Energy

Detailed information (including maps) on all transmission actions is broken down into six geographic zones of the state: Northeast, Northwest, West Central, Twin Cities, Southwest and Southeast. The transmission-owning utilities operating in six geographical zones put that zone’s report together. The six zones in the state are shown in the map below.

The transmission-owning utilities in each Minnesota region are:

1. Northwest Zone – Great River Energy, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power company and Xcel Energy
2. Northeast Zone – American Transmission Company, LLC, Great River Energy, Minnesota Power and Xcel Energy
3. West Central Zone – Great River Energy, Hutchinson Utilities Commission, Missouri River Energy Services, Otter Tail Power Company, Willmar Municipal Utilities and Xcel Energy
4. Twin Cities Zone – Great River Energy and Xcel Energy
5. Southwest Zone – ITC Midwest LLC, East River Electric Power Cooperative, Great River Energy, L&O Power Cooperative (headquartered in Iowa), Marshall Municipal Utilities, Missouri River Energy Services, Otter Tail Power Company and Xcel Energy
6. Southeast Zone – Dairyland Power Cooperative, Great River Energy, ITC Midwest LLC, Rochester Public Utilities, Southern Minnesota Municipal Power Agency and Xcel Energy



## **B. RENEWABLE ENERGY STANDARD TRANSMISSION STUDY**

In addition to reporting on transmission in general, utilities are required to determine any transmission upgrades needed to meet an upcoming milestone of the Minnesota Renewable Energy Standard (RES), which identifies the percentages of each electric utility's total retail electric sales to retail customers in Minnesota to be generated by eligible energy technologies. Part of that analysis requires assessing how many megawatts of renewable generating resources utilities may require beyond what is presently on their systems. Ongoing progress by utilities toward the RES is monitored in several venues, including separate biennial reports to the Legislature on this issue. The latest biennial report to the Legislature is being filed concurrently with this Report on January 17, 2017. As indicated in that report, utilities are in compliance with present RES standards through 2015 and expect to have enough renewable generation and transmission to meet increased future RES milestones into the 2020's.

## **VII. CHALLENGES TO TRANSMISSION PLANNING – POTENTIAL IMPACTS TO MINNESOTA**

### **A. NEW TRANSMISSION PROJECTS RAISE CONCERNS ABOUT LAND USE AND LAND RIGHTS**

In recent years, a number of energy entities, including 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 a number of public meetings and hearings and other outreach efforts to potentially impacted residents and landowners, the laws and 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 the project, landowners and other impacted 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 impacted citizens and landowners have been identified during the 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 process (Minn. Stat. §216B.243) and land rights questions are addressed in various parts of Minnesota’s statutes.

To help stakeholders understand facility permitting proceedings before the Minnesota Public Utilities 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 designing and implementing a program to better inform stakeholders and to advise them on how to have a meaningful voice in the permitting process.

## *B. COST RESPONSIBILITY FOR MITIGATIONS*

As utilities build more energy infrastructure, state regulators need to 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 on cost discipline 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. However, MISO has not and, as discussed above, MISO is experiencing significant cost overruns in transmission projects.

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 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.

## *C. FEDERAL VS. STATE JURISDICTION OVER TRANSMISSION SITING AND CONSTRUCTION*

The federal government “opened up” the interstate electric transmission grid in the 1990s. Certain eastern States challenged the federal government’s jurisdiction over interstate electric transmission lines.<sup>25</sup> The challenge went to the U.S. Supreme Court which upheld that FERC has legal and regulatory jurisdiction over electric lines used for interstate commerce (States retain jurisdiction over small power lines that distribute power directly to retail electric customers.) After the Supreme Court reached its decision, FERC issued a policy statement saying that it would not “preempt” state regulation of transmission lines as long as transmission service is not detrimentally impacted by state actions. When the federal approach of one-size-fits-all has not worked for Minnesota, the Department and Commission have advocated for the interests of Minnesota (with examples discussed above).

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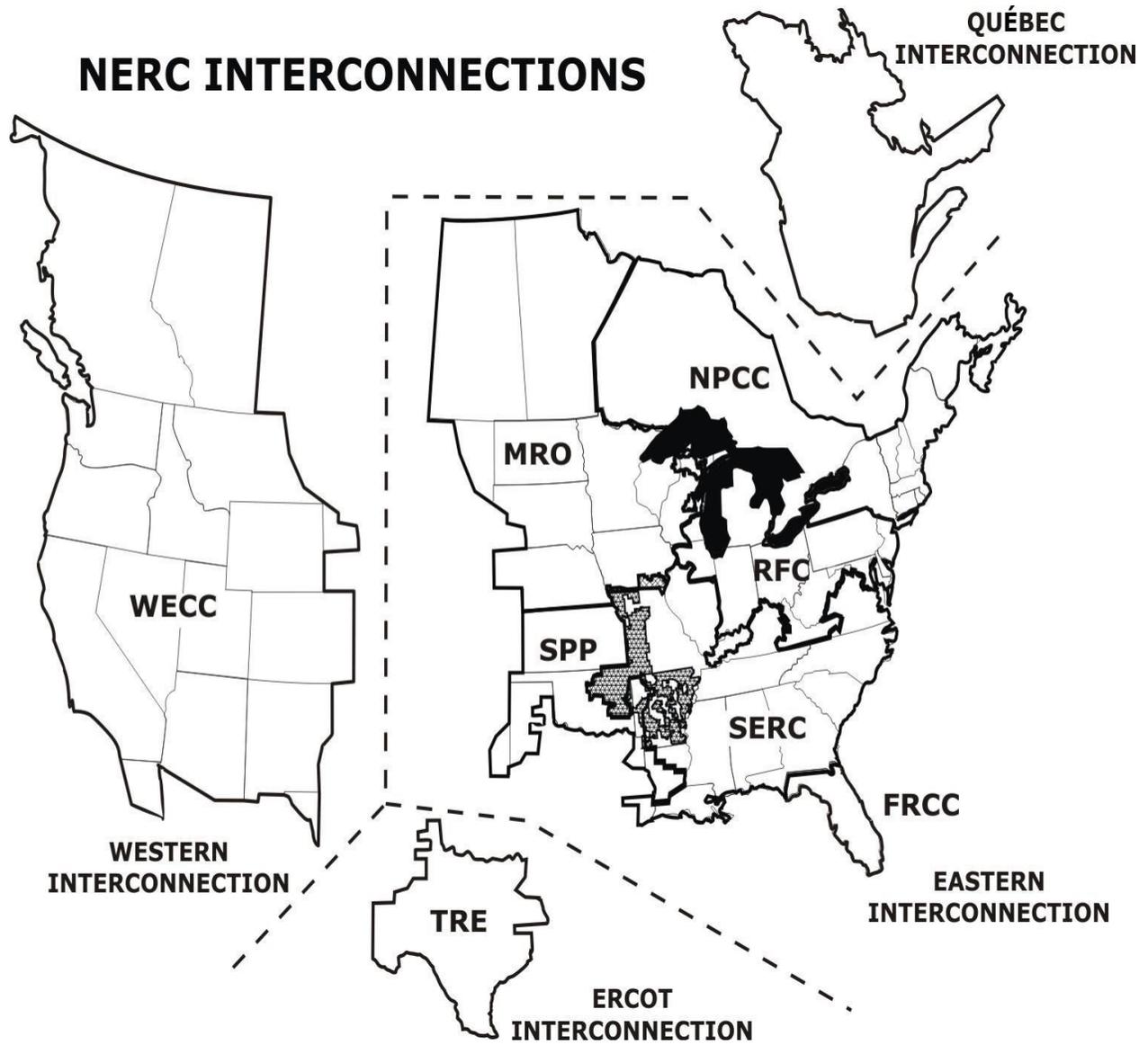
<sup>25</sup> See *New York, et al. v. FERC, et al. and Enron Power Marketing, Inc. v. FERC* for further details.

## VIII. SUMMARY AND CONCLUSIONS

In summary:

- Electricity continues to be an essential component in providing needed energy to Minnesota's homes and businesses.
- Minnesotans and the economy depend on reliable power every day.
- A Regional Transmission Organization (e.g., MISO) operates the electric transmission system in Minnesota and surrounding states to achieve regional coordination and efficiency.
- Even though we are using the transmission system in a highly efficient manner, our increased use of electricity and participation in the broader regional energy markets has strained the transmission grid, which was not designed for the purposes for which it is currently being used and expected to be used in the future.
- We have outgrown our aging transmission system and there have been and will continue to be significant changes in aging generation resources. Minnesota needs highly dependable electricity for computers and other sensitive equipment in our homes and businesses, so it is necessary to continue to upgrade and enhance our transmission infrastructure to match current needs and provide room for expansion in the future.
- The way that we build transmission is affected by state and federal policies, rules and laws facilitating the construction of certain types of generation and transmission and restricting other types of electricity and transmission in the state, region and across the United States.
- 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.

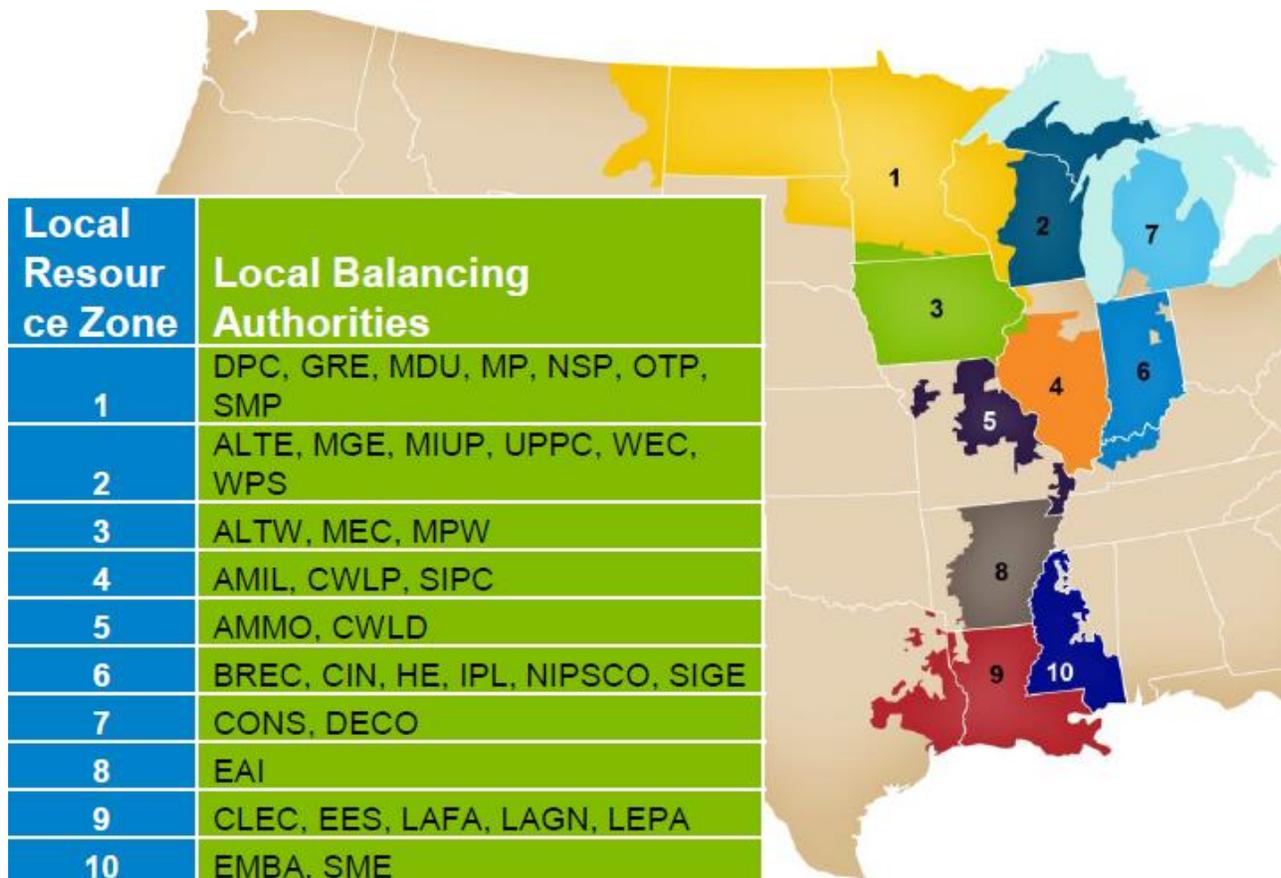
**APPENDIX A: MAP OF REGIONAL RELIABILITY AREAS**



**Source:** North American Electric Reliability Corporation

**APPENDIX B: MISO’s RESOURCE PLANNING ZONES**

The geographical area of MISO’s region spans numerous states. MISO has “planning reserve zones” to focus each region on the need to ensure that there are adequate electric resources to meet the needs in each zone. Minnesota is part of Planning Reserve Zone 1, along with the western half of Wisconsin, all of North Dakota, and portions of Montana, South Dakota, and 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, which sold its transmission resources to ITC Midwest, a transmission-only utility. Interstate also sold its distribution system to the Southern Minnesota Electric Cooperative.



**Source:** The Midcontinent Independent System Operator