Investing in Our Electricity Backbone:
The Critical Role of Transmission Infrastructure

A report by Cora Hoffer,
Center for Rural Affairs

Center *for* Rural Affairs

Table of Contents

Contents

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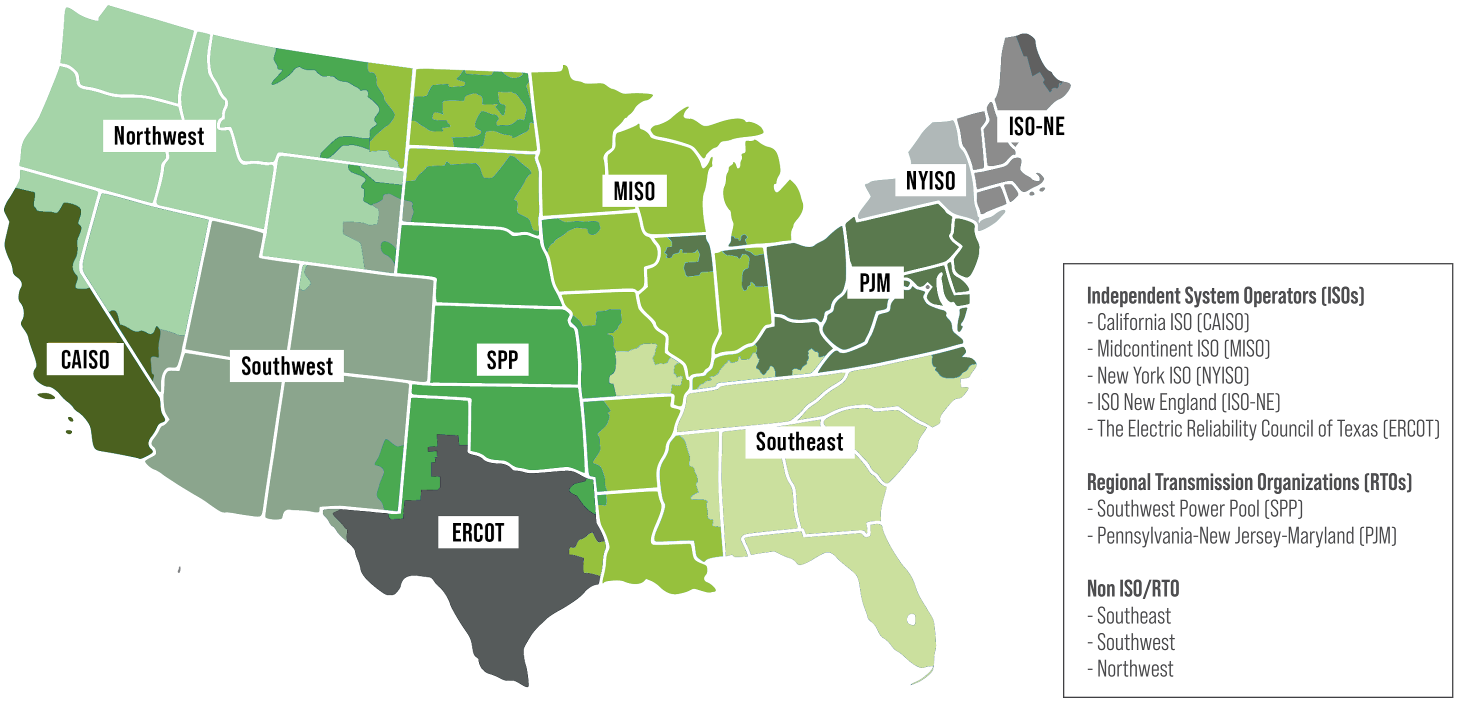
Figure 1. Ten transmission regions in the U.S.



I. Introduction

A series of towers and poles strung together with wire and connected to electricity-producing resources make up the transmission system, which is the electrical backbone of the U.S. The transmission system is a crucial component of our infrastructure that makes modern life possible, from heating and cooling homes to powering our electronic devices. It ensures a stable and reliable flow of energy from where it is produced to where it is needed.

Demand for electricity is rising. With significant growth in data centers, electrification of businesses and vehicles, the resurgence of domestic manufacturing, and more frequent extreme weather events, the electrical grid is under significant pressure to meet rising power needs, maintain reliable service, and meet consumer demand for lower-cost electricity. Additional challenges, such as permitting delays and grid congestion, create barriers to much-needed expansion of the transmission system.

Now more than ever, there is a need for a more robust and coordinated electricity grid that can adapt to the U.S.'s increasing energy needs.

II. Laying out the transmission landscape

When customers buy electricity from their utility, that provider has to either produce the electricity or purchase it from power supply resources like wind, solar, or gas within the wholesale electricity market. As shown in Figure 1, the U.S. has 10 distinct transmission regions that represent organized markets for wholesale electricity sales.[1] These markets exist to facilitate the distribution of power production and transmission.

The Southeast, Southwest, and Northwest all have traditional wholesale electricity markets where utilities are responsible for grid operations and management, as well as providing electricity to customers.[2] The remaining seven are known as Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs). These

1 "RTOs and ISOs." Federal Energy Regulatory Commission, Jan. 17, 2024, ferc.gov/power-sales-and-markets/rtos-and-isos. Accessed October 2025. Figure 1 has been modified from this source.

2 Hitchens, Kathy. "What's the Difference Between ISO and RTO?" PCI Energy Solutions, Nov. 29, 2022, pcienergysolutions.com/2022/11/29/whats-the-difference-between-iso-and-rto. Accessed September 2025.

Demand for electricity is rising. With significant growth in data centers, electrification of businesses and vehicles, the resurgence of domestic manufacturing, and more frequent extreme weather events, the electrical grid is under significant pressure to meet rising power needs, maintain reliable service, and meet consumer demand for lower-cost electricity.

entities oversee the generation, transmission, and sale of electricity, which allows power-producing organizations and companies like electric utilities to sell their power in a given region.[3]

Oversight of wholesale electricity markets are regulated at the federal level by the Federal Energy Regulatory Commission (FERC). FERC has jurisdiction over the sales of electricity between power suppliers and utilities, which are referred to as “wholesale sales.” FERC does not have authority over individual consumer electricity purchases. Those purchases, often called “retail” transactions, are overseen by state and local regulators. One exception to FERC regulation is the Electric Reliability Council of Texas (ERCOT), which is subject to state-level oversight by the Public Utility Commission of Texas and the Texas Legislature.[4]

The 2024 National Transmission Planning Study indicates that, under current policies, the U.S. transmission system will need to at least double in size by 2050 to accommodate demand.[5]

III. Planning for transmission takes coordination

Transmission planning is essential to ensure that future electricity demand can be met reliably and affordably.

Planning for transmission involves coordinated decisions at the federal, regional, state, and utility levels.[6]

3 “What are Regional Transmission Organizations and How Do They Interact with State Climate Goals?” National Caucus of Environmental Legislators, July 25, 2022, ncelenviro.org/articles/what-are-regional-transmission-organizations-and-how-do-they-interact-with-state-climate-goals. Accessed September 2025.

4 “An Introductory Guide to Electricity Markets Regulated by the Federal Energy Regulatory Commission.” Federal Energy Regulatory Commission, April 3, 2025, ferc.gov/introductory-guide-electricity-markets-regulated-federal-energy-regulatory-commission. Accessed September 2025.

5 “National Transmission Planning Study.” U.S. Department of Energy, 2024, energy.gov/gdo/national-transmission-planning-study. Accessed September 2025.

6 Robertson, Molly, and Karen Palmer. “Transmission 101: Transmission Planning.” Resources for the Future, Sept. 22, 2023, rff.org/publications/explainers/transmission-101-transmission-planning. Accessed September 2025.

- **Federal:** FERC has broad oversight over transmission planning and regulates public utility transmission providers to ensure rates are "just and reasonable" and practices, including access to transmission services, do not discriminate or give preference to certain actors. In addition, agencies like the U.S. Department of Energy (DOE) conduct analysis and research to identify long-term interregional transmission needs, but do not direct funding to projects or mandate that certain transmission lines be built.
- **Regional:** RTOs and ISOs, which operate the grid but do not own power lines or power resources, identify new transmission needs in their territories and help inform transmission planning, generally focused on reliability-based needs.
- **State:** State legislatures are responsible for designating an entity responsible for authorizing construction and issuing siting permits for transmission projects. In 32 states, Public Utilities Commissions (PUCs) are responsible for approving the siting and construction of transmission facilities.[7] In addition, some are also tasked with approving utilities' integrated resource plans, which are strategic roadmaps utilities create to outline how they will meet their customers' future energy needs over a specific period.[8]
- **Utility:** Utilities that own transmission lines may identify when a line is facing significant congestion or when limited transmission access is preventing new generation projects that could lower electricity costs—like wind and solar energy—or offer greater reliability. In regions without ISOs, utilities are the main entity responsible for planning transmission.

7 McWard, Alex. "Electric Transmission Planning: A Primer for State Legislatures." National Conference of State Legislatures, Dec. 19, 2023, ncsl.org/environment-and-natural-resources/electric-transmission-planning-a-primer-for-state-legislatures. Accessed September 2025.

8 Biewald, Bruce, et al. "Best Practices in Integrated Resource Planning: A Guide for Planners Developing the Electricity Resource Mix of the Future." Synapse Energy Economics, Lawrence Berkeley National Laboratory, November 2024, energy.gov/sites/default/files/2024-12/best_practices_irp_nov_2024_final_optimized.pdf. Accessed September 2025.

Determining the cost allocation for new transmission can create significant barriers for development, primarily by generating disputes over who pays for and who benefits from new infrastructure.

IV. Who pays for transmission?

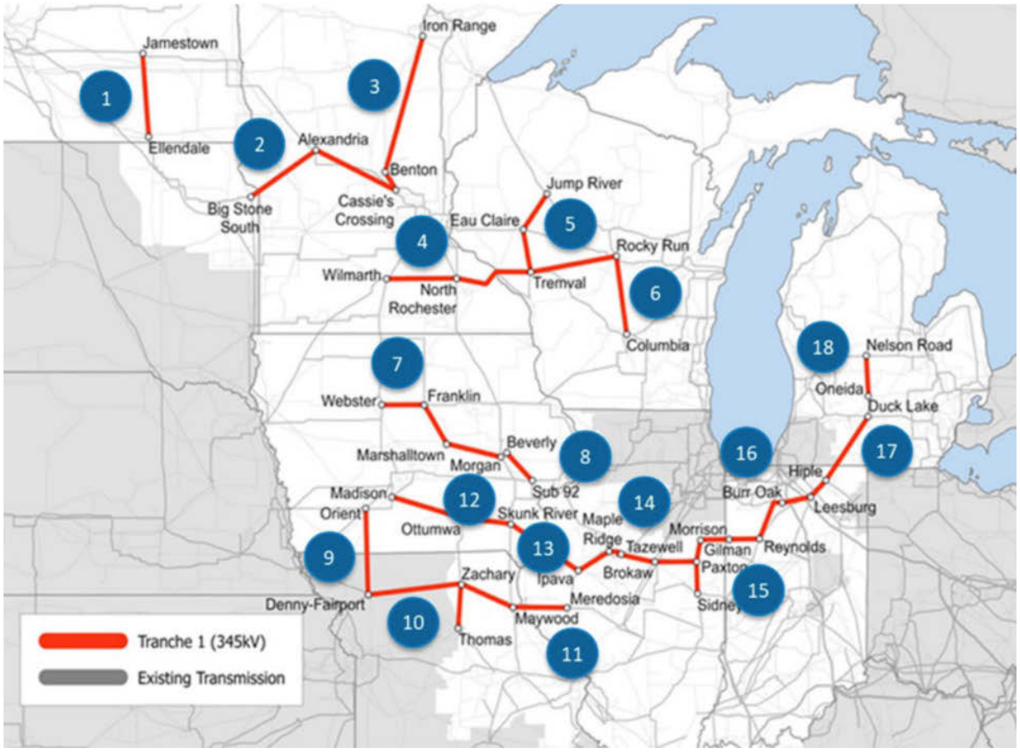
In the U.S., FERC regulates how costs for building new transmission infrastructure are allocated. This authority is exercised in close coordination with regional grid operators and state utility commissions. FERC requires that regional planning processes for transmission include cost allocation methods. Cost allocation is integral to the transmission approval process, as it determines how costs will be recovered for new transmission infrastructure.[9] Determining the cost allocation for new transmission can create significant barriers for development, primarily by generating disputes over who pays for and who benefits from new infrastructure.

Under FERC rulings, transmission providers in each region are required to file one or more cost allocation methods that apply to selected long-term regional transmission facilities. Proposed cost allocation methods must distribute costs in a manner that is at least roughly comparable to estimated benefits of the transmission project. Filing and receiving approval for the cost allocation method in advance is critical because it provides certainty about how costs will be distributed before transmission facilities are built.[10]

9 "Explainer on the Transmission Planning and Cost Allocation Final Rule." Federal Energy Regulatory Commission, May 7, 2025, cms.ferc.gov/explainer-transmission-planning-and-cost-allocation-final-rule. Accessed September 2025.

10 Ibid.

Figure 2. Long Range Transmission Planning Tranche 1 projects



Methods of cost allocation and recovery include these.[11]

- **License plate:** Each utility recovers the costs of its own transmission investments (usually located within its footprint).
- **Beneficiary pays:** Cost is assigned to individual transmission owners that benefit from a project, even if the project is not owned by the beneficiaries; then, costs are recovered from the transmission owner's customers.
- **Postage stamp:** Costs are recovered uniformly from all users in a defined area, regardless of their distance from the project.
- **Direct assignment:** Costs of transmission upgrades are assigned directly to the specific entity that requested or caused them.

A closer look:

V. The Midwest and Plains transmission planning efforts

There are several planning efforts between Midcontinent Independent System Operator (MISO) and Southwest Power Pool (SPP), which cover much of the Midwest and Plains regions of the U.S. These efforts have local, regional, and interregional components that address future reliability, energy costs, and integration of renewable energy resources.

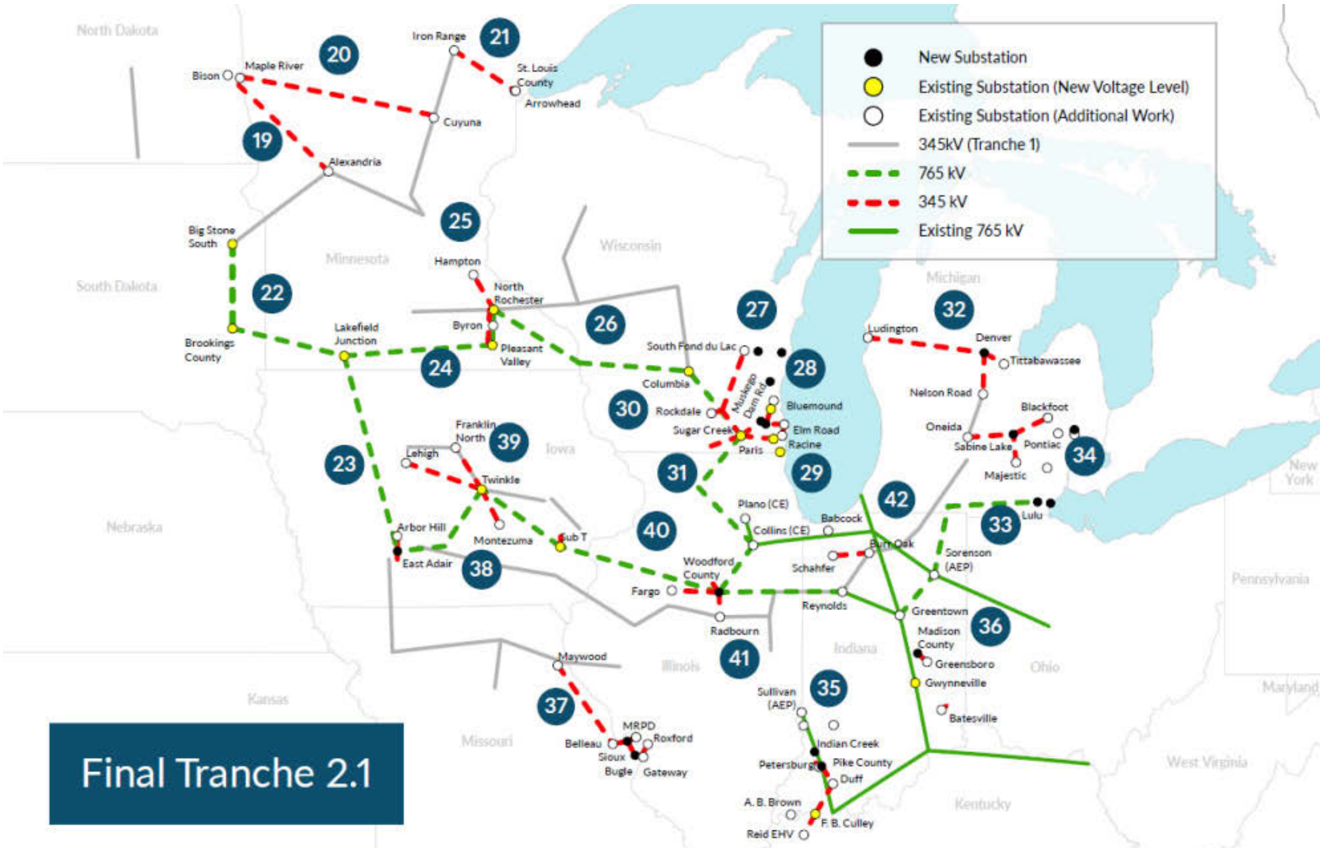
1. MISO Transmission Expansion Plan

In July 2022, MISO's 2021 Transmission Expansion Plan (MTEP21) was approved. It included a portfolio of Long Range Transmission Planning (LRTP) projects known as Tranche 1. The $10.3 billion investment consisted of 18 projects spread across the Midwest, as seen in Figure 2.[12] These projects

11 Pfeifenberger, Johannes. "Transmission Cost Allocation: Principles, Methodologies, and Recommendations." The Brattle Group, Nov. 16, 2020, brattle.com/wp-content/uploads/2021/05/20508_transmission_cost_allocation_-_principles_methodologies_and_recommendations.pdf. Accessed September 2025.

12 "MTEP21 Report Addendum: Long Range Transmission Planning Tranche 1." Midcontinent Independent System Operator, Inc., 2022, cdn.misoenergy.org/MTEP21%20Addendum-LRTP%20Tranche%201%20Report%20with%20Executive%20Summary625790.pdf. Accessed October 2025.

Figure 3. Long Range Transmission Planning Tranche 2.1 projects



were the first phase of a multi-part effort to update the grid to ensure reliability, integrate new energy generation resources, and enable access to lower-cost energy.[13] As of December 2024, many projects are well into regulatory approval processes.[14]

Building on MTEP21, MISO's Transmission Expansion Plan (MTEP24) was approved in December 2024 and included an expansion to LRTP with a portfolio of projects known as Tranche 2.1. This $21.8 billion investment consists of 24 projects, collectively developing a 3,631-mile, 765-kilovolt backbone, as seen in Figure 3.[15] These projects are designed to carry more electricity, minimize land use, and reduce energy losses.[16] With increased transmission capacity, these projects will enable more renewable energy development, like wind and solar, and improve grid reliability and resilience against extreme weather.

Both MTEPs involve locally focused drivers for planning new transmission. MTEP21 has 335 new projects, and MTEP24 has 459 new projects, with more than half of the total investments in each going toward addressing local reliability, load growth, and age and condition of infrastructure.[17,18]

13 "LRTP Tranche 1 Portfolio Detailed Business Case." Midcontinent Independent System Operator, Inc., June 25, 2022, cdn.misoenergy.org/LRTP%20Tranche%201%20Detailed%20Business%20Case625789.pdf. Accessed September 2025.

14 "Long Range Transmission Planning." Midcontinent Independent System Operator, Inc., misoenergy.org/planning/long-range-transmission-planning. Accessed September 2025.

15 Ibid.

16 "MTEP24 Chapter 1: Transmission Planning Overview." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

17 "MTEP24 Chapter 4: Local Reliability Planning." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

18 "MTEP21." Midcontinent Independent System Operator, Inc., 2021, legalectric.org/f/2022/07/MTEP21-Full-Report-including-Executive-Summary611674.pdf. Accessed September 2025.

Figure 4. MTEP21 investment summary

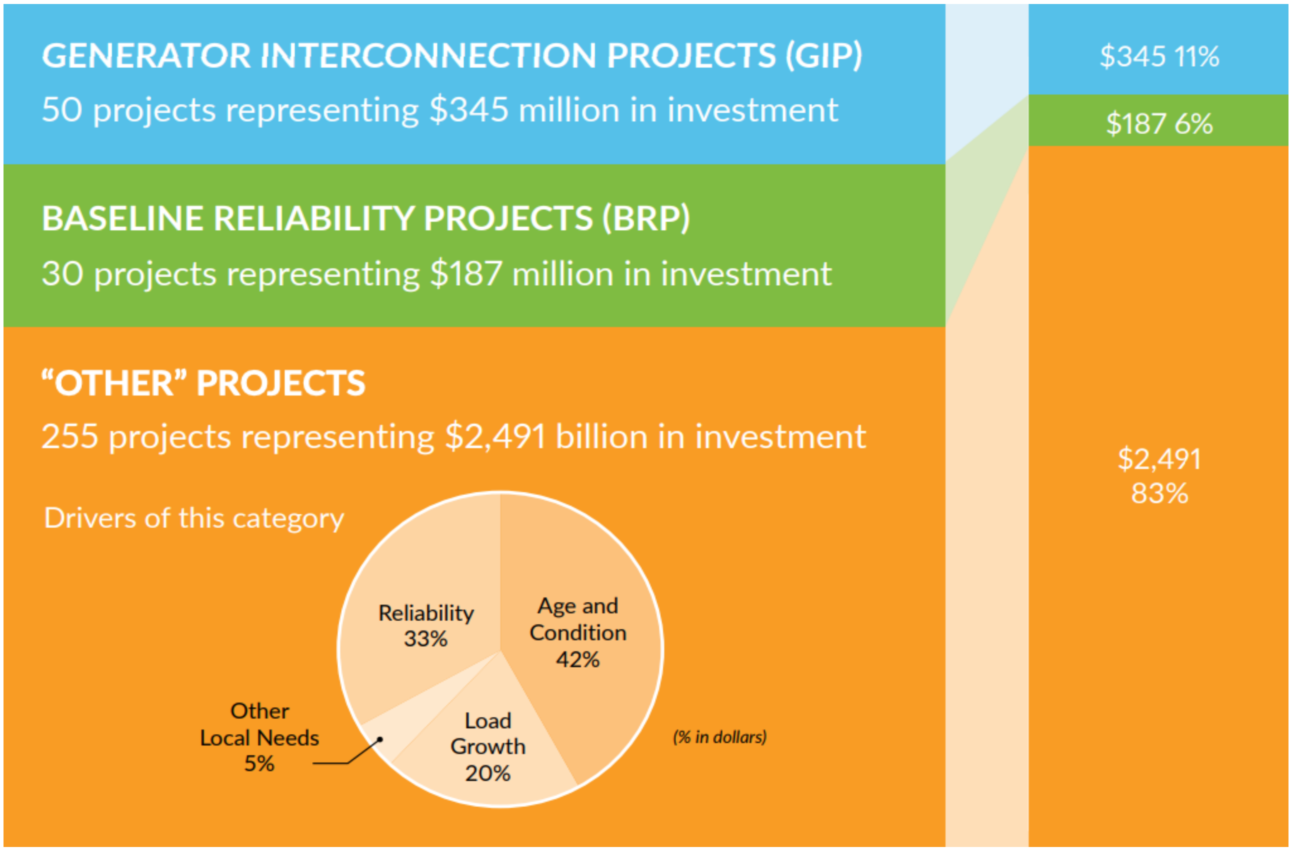


Figure 4 above and Figure 5 on page 10 depict the allocation of investment for each MTEP, including project types, cost allocations, and number of projects, as well as project drivers.[19,20]

As part of the regional efforts, long-range transmission planning develops a backbone of regional projects to ensure the transmission system is reliable, economical, and adaptive to state and utility policy and goals, projected conditions, and industry trends.[21] This type of comprehensive planning is done in collaboration with stakeholders and takes a long-term, roughly 20- to 40-year, view of the system, ultimately building a roadmap to address future issues and guiding near-term next steps.

2. MISO-SPP Joint Targeted Interconnection Queue

One way to improve interregional capabilities of the electric grid is by examining the boundaries, or seams, between transmission regions. The MISO-SPP Joint Targeted Interconnection Queue (JTIQ) study launched in late 2020 focused on building transmission network upgrades along the MISO-SPP seams to enable new generator interconnections.[22] Generator interconnection is a process used to connect a new or upgraded power-generating facility, such as a wind or solar farm, to the existing electrical grid, which involves rigorous studies to ensure grid reliability.[23]

19 Ibid.

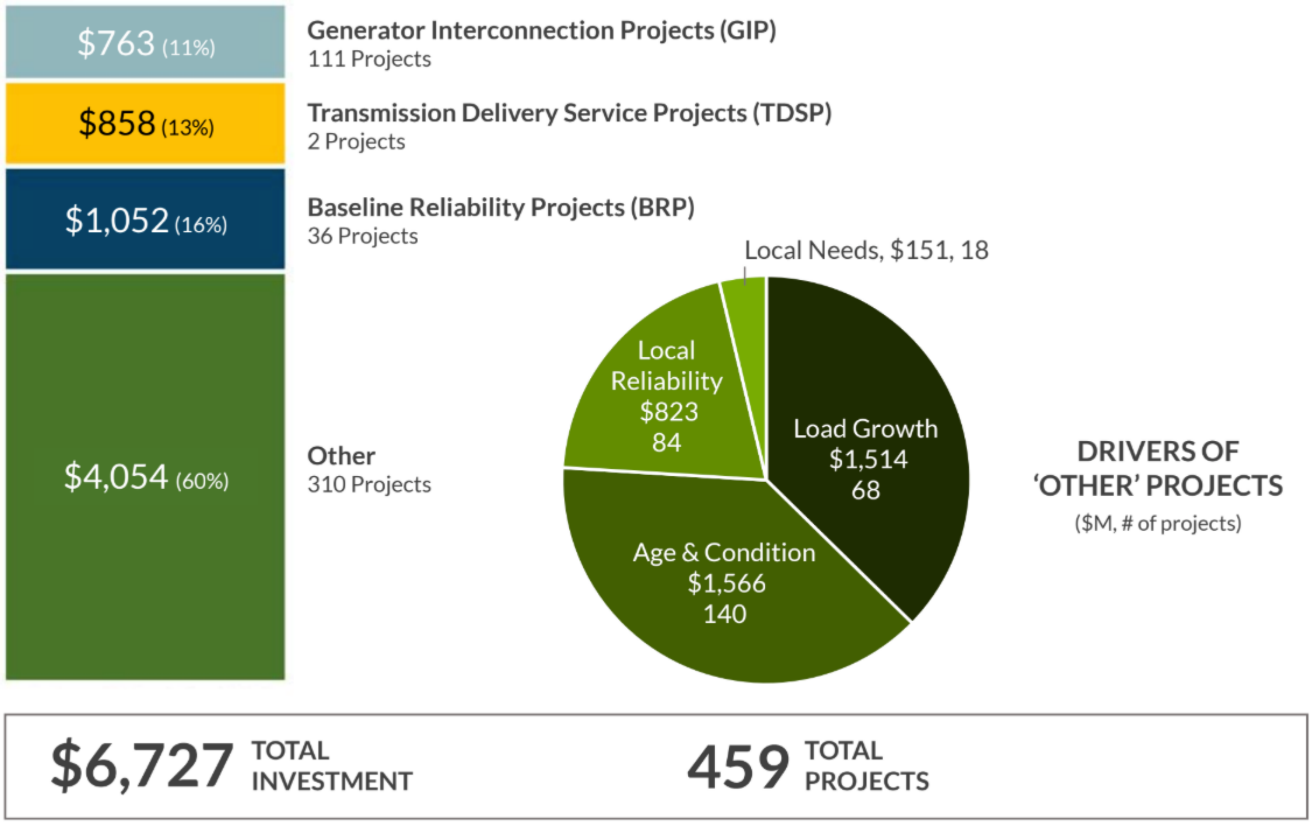
20 "MTEP24 Chapter 4: Local Reliability Planning." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

21 "MTEP24 Chapter 2: Regional Long Range Transmission Planning." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

22 "MTEP24 Chapter 3: Interregional Planning." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

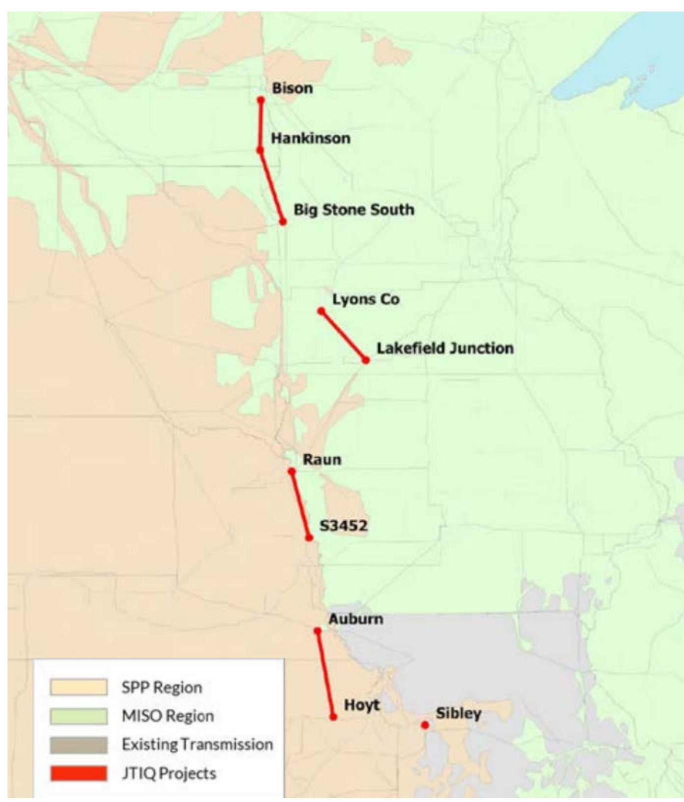
23 "Interconnection 101." American Clean Power, June 2023, cleanpower.org/wp-content/uploads/gateway/2023/06/ACP_Interconnection_FactSheet_0623.pdf. Accessed September 2025.

Figure 5. MTEP24 investment summary (in millions)



Through collaboration between MISO and SPP, the JTIQ study identified five transmission projects, shown in Figure 6, with a projected cost of approximately $1.65 billion, that are expected to fully address the set of transmission constraints evaluated as being significant barriers to the development of new generation along the MISO-SPP seam.[24] In addition, these projects will enable new interregional generation, which is the process of producing and transmitting electricity across different electrical grid regions, and streamline the interconnection of new energy projects. This will help ensure the timely buildout of projects while maintaining system reliability.

Figure 6: Joint Targeted Interconnection Queue projects



24 "MTEP24 Chapter 3: Interregional Planning." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

Programs and policies at the local, state, and federal levels support planning, permitting, and siting of transmission projects.

3. SPP Integrated Transmission Plan

SPPs 2025 Integrated Transmission Plan (ITP) is SPPs most valuable transmission plan per date, providing between $12 and $18 in benefits for every dollar invested.[25] The $8.6 billion investment, which was approved in November 2025, comprises 50 projects designed to add more than 1,000 miles of new and upgraded transmission lines to the region's grid.[26] The integrated transmission planning process is an annual planning cycle that assesses near- and long-term economic and reliability transmission needs. The 20-year assessment is performed once every five years.[27] Three major study drivers were load growth, extreme weather, and enabling a more flexible, balanced mix of energy resources.

VI. Federal, state, and local transmission policies

Transmission planning happens at the state level (for local projects) and at a multistate level (for regional projects). Transmission planning affects the kinds of projects that are built.[28] Programs and policies at the local, state, and federal levels support planning, permitting, and siting of transmission projects.

A. Federal

1. FERC orders

At the federal level, FERC has the authority to establish orders, which are formal, written decisions that establish rules, policy changes, and directives for wholesale electricity and other industries it regulates.[29] In July 2011, FERC issued Order No. 1000, which, for the first time, included a requirement that transmission providers engage in regionwide transmission planning, considering various factors like public policies and regional needs.[30] This order was a step forward in creating a more efficient and cost-effective national grid. Fast forward to May 2024, when FERC issued Order No. 1920, which added to Order No. 1000 requirements for regional planning. Order No. 1920, and subsequent Orders No. 1920-A and 1920-B, requires transmission providers in each planning region to conduct long-term regional transmission planning, using a forward-looking, comprehensive approach.[31] This rule provides a roadmap for transmission providers and states to build the future grid, but requires them to come together to get it done.

25 "Powering the Future: The 2025 Integrated Transmission Plan." Southwest Power Pool Inc., 2025, spp.org/documents/75194/2025%20itp%20fact%20sheet%20final.pdf. Accessed November 2025.

26 Ibid.

27 "Integrated Transmission Planning." Southwest Power Pool Inc., spp.org/engineering/transmission-planning/integrated-transmission-planning. Accessed September 2025.

28 Lawson, Ashley J. "Electricity Transmission Permitting Reform Proposals." Library of Congress, May 24, 2024, congress.gov/crs-product/R47627. Accessed September 2025.

29 "U.S. Energy Law: Electricity." The George Washington University, law.gwu.libguides.com/electricity/ferc. Accessed September 2025.

30 "Order No. 1000 - Transmission Planning and Cost Allocation." Federal Energy Regulatory Commission, Nov. 9, 2021, ferc.gov/electric-transmission/order-no-1000-transmission-planning-and-cost-allocation. Accessed September 2025.

31 "Explainer on the Transmission Planning and Cost Allocation Final Rule." Federal Energy Regulatory Commission, May 7, 2025, cms.ferc.gov/explainer-transmission-planning-and-cost-allocation-final-rule. Accessed September 2025.

2. Permitting reform

On average, federal permitting for a new electric transmission line takes approximately four years.[32] In May 2024, the Coordinated Interagency Transmission Authorizations and Permits Program, led by the DOE, was established. It aims to enable more rapid deployment of electric transmission to cut in half the time it takes to issue federal permits for major new transmission lines. This program is designed to increase access to a diversity of generation sources, reduce transmission congestion, and deliver reliable, affordable power that future consumers will need, when and where they need it.[33] As a coordinating entity between federal agencies and relevant state and local actors responsible for permitting decisions necessary to site transmission lines, DOE will accelerate federal environmental reviews and permitting processes for qualifying projects.[34] Under this program, there is a two-year deadline for DOE to issue permits and authorizations.

B. State

Although the federal government, through FERC, has jurisdiction over interstate electricity transmission, states can act proactively to ensure transmission planning and development are comprehensive and cost-effective. Most electricity transmission siting authority, or the authority to approve the route and authorize construction, resides with the states.[35]

32 "Coordinated Interagency Transmission Authorizations and Permits Program." U.S. Department of Energy, energy.gov/gdo/coordinated-interagency-transmission-authorizations-and-permits-program. Accessed September 2025.

33 "Coordination of Federal Authorizations for Electric Transmission Facilities Final Rule." Grid Deployment Office, U.S. Department of Energy, 2024, energy.gov/sites/default/files/2024-04/CITAPFinalRuleDOE.pdf. Accessed September 2025.

34 "Coordinated Interagency Transmission Authorizations and Permits Program." U.S. Department of Energy, energy.gov/gdo/coordinated-interagency-transmission-authorizations-and-permits-program. Accessed September 2025.

35 Lawson, Ashely J. "Electricity Transmission Permitting Reform Proposals." Library of Congress, May 24, 2024, congress.gov/crs-product/R47627. Accessed September 2025.

1. Decarbonization policies and renewable energy goals

Within MISO's region, a significant number of utilities and states have implemented decarbonization policies and set ambitious clean energy targets. As of 2024, approximately 75% of MISO's total load is served by utilities committed to decarbonization or renewable energy goals. Since 2014, carbon emissions in the region have decreased by more than 32%, and far greater reductions are expected in the future.[36] These ambitious policies and goals help make the case for expanding and modernizing the region's electrical grid to connect to renewable energy sources like wind and solar, which support decarbonization goals.

2. Permitting reform

Delays of permitting new transmission facilities create a barrier to connect renewable energy to the electrical grid. Several states have attempted to address permitting bottlenecks to enable better coordination among stakeholders and speed up the process of developing energy infrastructure. For example, Minnesota passed the Energy Infrastructure Permitting Act in 2024, which is a legislative framework designed to streamline and enhance the permitting process for energy infrastructure projects.[37] Under the law, smaller projects will undergo Standard Review, which is a 6-month process, while larger, more complex projects will undergo Major Review, a 12-month process. Prior to the law passage, the permitting process for large transmission lines averaged 673 days.[38]

36 "MTEP24 Chapter 1: Transmission Planning Overview." Midcontinent Independent System Operator, Inc., 2024, misoenergy.org/planning/transmission-planning/mtep/#nt=%2Fmtepstudytypenew%3AMTEP%20Reports&t=10&p=0&s=FileName&sd=desc. Accessed September 2025.

37 "Energy Infrastructure Permitting." Minnesota Public Utilities Commission, 2025, puc.eip.mn.gov. Accessed September 2025.

38 Rosenthal, Aaron. "Powering Progress: Transforming Clean Energy Permitting for a Greener Minnesota." NorthStar Policy Action, media.websitecdn.net/sites/949/2024/03/Powering-Progress.pdf. Accessed October 2025.

3. Grid-enhancing technologies

According to a report by Grid Strategies, nationwide electricity demand is projected to increase by 15.8% by 2029.[39] While transmission takes several years to build, grid-enhancing technologies (GETs) offer a short-term, lower cost way to address more immediate system needs. Some states have passed laws that require utilities to consider these innovative technologies to increase the capacity and efficiency of the existing grid. In 2024, Minnesota passed a bill that added to the state's transmission planning process and requires utilities owning more than 750 miles of transmission lines to evaluate GETs on highly congested lines.[40] Implementation of GETs can get more renewables onto the grid in a shorter timeframe by increasing capacity on existing transmission lines with lower-cost investments.

GETs are hardware or software that increase the capacity, efficiency, reliability, or safety of existing transmission lines by optimizing the capabilities of the infrastructure. This allows for more flexibility to move energy on the existing electrical grid at a lower cost than traditional grid buildout. One example of grid-enhancing technology, known as Advanced Power Flow Control devices, pushes and pulls power along the path of least resistance. They essentially act like a traffic director, changing traffic flows by rerouting drivers away from congested areas to roads (or lines) with extra capacity for vehicles (or electrons).[41]

39 Wilson, John D., et al. "Strategic Industries Surging: Driving U.S. Power Demand." Grid Strategies, December 2024, gridstrategiesllc.com/wp-content/uploads/National-Load-Growth-Report-2024.pdf. Accessed September 2025.

40 "HF No. 5247, Conference Committee Report." Minnesota Legislature, Office of the Revisor of Statutes, May 19, 2024, revisor.mn.gov/bills/93/2024/0/HF/5247/versions/ccr/0/pdf. Accessed September 2025.

41 "What are Grid Enhancing Technologies?" WATT Coalition, watt-transmission.org/what-are-grid-enhancing-technologies. Accessed September 2025.

C. Local

Local governments' role in transmission siting can involve exercising land-use authority, issuing zoning and planning permits, and providing a platform for public and stakeholder engagement through meetings and feedback opportunities. While states and the federal government have primary authority over major transmission projects, local bodies ensure that decisions align with local land-use plans, community concerns, and zoning ordinances through their permitting processes.

1. Zoning and land use ordinances

Local governments can enact specific policies to either facilitate or regulate transmission projects within their jurisdictions. These regulations can significantly impact where transmission facilities are built. Provisions may include setback requirements or aesthetic and design standards. A few states—Colorado, Indiana, Louisiana, and Oklahoma—leave most siting decisions to local government entities such as county zoning boards.[42] Generally, developers must obey local, county, and state laws, and zoning ordinances. However, if a conflict exists between these ordinances and what FERC requires, FERC's requirement takes precedence.[43]

a. Use of eminent domain[44,45]

When a developer is working to obtain a right-of-way to install transmission infrastructure, they will try to negotiate a right-of-way easement, or the right to use land owned by another person for a limited purpose, and compensation for the easement with each landowner. If FERC authorizes the project and the developer cannot reach agreement with the landowner through negotiations, the developer may use eminent domain under section 216(e) of the Federal Power Act, which gives the applicant the right to acquire the right-of-way in court.

42 Smith Jr., William H., "Mini Guide on Transmission Siting: State Agency Decision Making." National Council on Electricity Policy, December 2021, pubs.naruc.org/pub/C1FA4F15-1866-DAAC-99FB-F832DD7ECFF0. Accessed September 2025.

43 "Electric Transmission Facilities Permit Process." Federal Energy Regulatory Commission, Jan. 22, 2025, ferc.gov/electric-transmission-facilities-permit-process. Accessed September 2025.

44 Ibid.

45 "Explainer on Siting Interstate Electric Transmission Facilities." Federal Energy Regulatory Commission, Feb. 13, 2025, ferc.gov/explainer-siting-interstate-electric-transmission-facilities. Accessed September 2025.

VII. Current challenges and needs

While current federal, state, and local policies offer support, further reform and engagement efforts are needed to efficiently build transmission infrastructure to meet growing electricity needs.

A. Increased pace of buildout is needed to match rising demand

The pace of buildout of high-voltage transmission lines in the U.S. is falling short of what is needed to meet the nation's increasing electricity demand. According to a report from Americans for a Clean Energy Grid and Grid Strategies, just 322 miles of high-voltage transmission lines were completed in 2024, marking the third slowest year for such construction in the past 15 years.[46] For comparison, nearly 4,000 miles were built in 2013 alone. The 2024 National Transmission Planning Study indicates at least doubling the current regional transmission capacity and quadrupling interregional transmission capacity by 2050 to meet future electricity needs.[47] This implies that a buildout of roughly 5,000 miles per year of high-capacity regional transmission is needed to support grid reliability, reduce congestion, and enable economic opportunities.

Recommendation:
Increasing the rate of transmission buildout to support rising electricity demand requires addressing significant challenges in planning, permitting, and cost allocation. To address short-term needs on the system, using technologies to enhance existing transmission infrastructure is possible. In addition, broader coordination across transmission regions is needed to plan for grid expansion.

The pace of buildout of high-voltage transmission lines in the U.S. is falling short of what is needed to meet the nation's increasing electricity demand.

B. Permitting reform must focus on decreasing the years- or decades-long permitting process

According to American Clean Power, getting the required permits to build a transmission project takes 7.5 years on average.[48] Many factors can contribute to lengthy transmission development timelines, such as complex permitting processes at the federal, state, and local levels, stakeholder opposition, determination of cost allocation between stakeholders, and difficulty securing financing.[49]

Recommendation:
Defined timelines, collaboration among agencies, prioritizing existing rights-of-way, and establishing cost allocation can aid in the accelerated buildout of a robust transmission grid.

46 Shreve, Nathan, et al. "Fewer New Miles: Strategic Industries Held Back by Slow Pace of Transmission." Americans for a Clean Energy Grid, Grid Strategies, July 2025, cleanenergygrid.org/wp-content/uploads/2025/07/ACEG_Grid-Strategies_Fewer-New-Miles-2025_Rev-1.pdf. Accessed September 2025.

47 "National Transmission Planning Study." U.S. Department of Energy, 2024, energy.gov/sites/default/files/2024-10/NationalTransmissionPlanningStudy-ExecutiveSummary.pdf. Accessed September 2025.

48 "Pass the Energy Permitting Reform Act." American Clean Power, August 2024, cleanpower.org/wp-content/uploads/gateway/2024/08/ACP_Pass-the-Energy-Permitting-Reform-Act_Fact-Sheet.pdf. Accessed September 2025.

49 Robertson, Molly, and Karen Palmer. "Transmission 102: Building New Transmission Lines." Resources for the Future, Sept. 22, 2023, rff.org/publications/explainers/transmission-102-building-new-transmission-lines. Accessed September 2025.

C. Prioritize replacement of aging infrastructure

Outdated infrastructure can have major consequences for communities, including frequent power outages, higher electricity costs, and threats to essential services. The typical life cycle of transmission infrastructure is 50 to 80 years, and, according to DOE, 70% of transmission lines are more than 25 years old.[50] Our modern electricity needs modern infrastructure to efficiently and reliably move power where it is needed.

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Recommendation:
To determine how to prioritize where to modernize or replace infrastructure, utilities may begin by pinpointing where current shortfalls are. This may include looking at areas more prone to the effects of extreme weather events that cause interruptions to electricity service, or by looking at the potential financial or operational consequences of infrastructure failure. Further, utilities should consider future needs and implement supportive policies. In addition, prioritizing buildout that increases the connectivity of energy-rich regions with areas more vulnerable to power outages can increase the ability of the system to move electricity where it's needed.[51,52]

50 "What Does it Take to Modernize the U.S. Electric Grid?" U.S. Department of Energy, Grid Deployment Office, Oct. 19, 2023, energy.gov/gdo/articles/what-does-it-take-modernize-us-electric-grid. Accessed September 2025.

51 Robertson, Molly, and Karen Palmer. "Transmission 101: Transmission Planning." Resources for the Future, Sept. 22, 2023, rff.org/publications/explainers/transmission-101-transmission-planning. Accessed September 2025.

52 Ferguson, Steve. "Grid Modernization: A Guide to Choosing the Right Priorities." Irby Utilities, Jan. 14, 2025, irby.com/iub-en/resources/grid-modernization-a-guide-to-choosing-the-right-priorities-151002. Accessed September 2025.

D. Meaningful community engagement is critical

As transmission lines are proposed, the projects may encounter local opposition due to the visible appearance of these facilities, land-use impacts, environmental concerns, or distrust and poor engagement during the planning and decision-making processes. Developers and policymakers play a significant role in overcoming opposition.

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Recommendation:
To aid in the success of projects, transmission developers should engage with landowners, Tribal governments, and local communities impacted by a project. A publication by Americans for a Clean Energy Grid concluded that developers who undertake meaningful, respectful, and consistent engagement can build trust in communities and improve their project's chance of success. Beneficial activities include early and consistent engagement, offering innovative and flexible compensation to landowners, and consulting affected communities and government entities.[53]

Outdated infrastructure can have major consequences for communities, including frequent power outages, higher electricity costs, and threats to essential services.

53 Blaug, Elisabeth, and Nils Nichols. "Recommended Siting Practices for Electric Transmission Developers." Americans for a Clean Energy Grid, February 2023, cleanenergygrid.org/wp-content/uploads/2023/04/ACEG-Report-Recommended-Siting-Practices-for-Electric-Transmission-Developers-February-2023.pdf. Accessed September 2025.

VIII. Conclusion

Transmission infrastructure is critical to support everyday services, such as keeping lights on, heating and cooling of buildings, and powering devices like phones and electric vehicles. But increasing electricity demand is putting pressure on our limited, outdated infrastructure. While there are challenges to overcome, opportunities exist to implement policy reform, increase the pace of building new lines and replacing outdated infrastructure, and boost support for transmission projects by strengthening community engagement. Creating a more robust energy grid is critical to lowering energy costs, increasing the reliability of our power grid, and ensuring we have the electricity needed for future economic growth.

About the Center for Rural Affairs

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities.