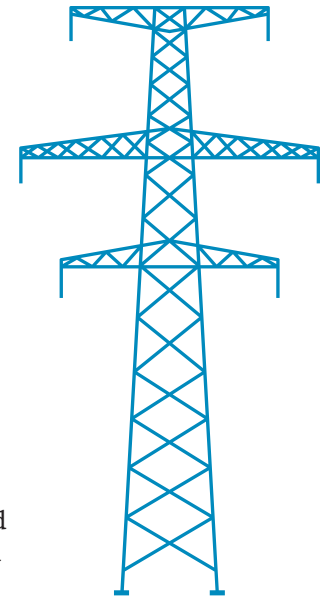


Load Growth and the Transmission System



Introduction

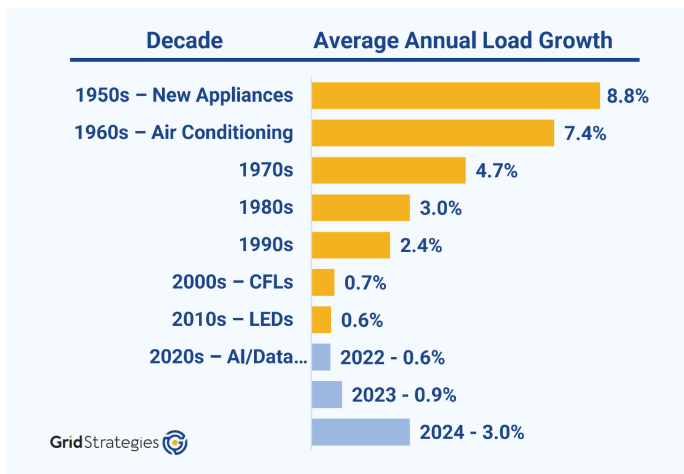
Electricity demand in the U.S. is growing rapidly and is expected to accelerate even more due to industrial activity, electrification of homes and transportation, and the rise of energy-intensive artificial intelligence and data centers. The electrical grid that carries power across the country was built for a different time and different demand and is struggling to keep up with the needs of today’s consumers. Without upgrades, more frequent outages and bottlenecks will occur, driving up costs for everyone. To keep our power affordable and dependable, a stronger, more modern transmission system is needed to ensure we can deliver reliable energy where it’s needed most.

Drivers of demand

Load growth, also known as “electricity demand growth,” is the increase in electricity consumption over time, measured by sales to commercial and residential customers.¹ According to Grid Strategies, electricity demand growth has been sluggish, averaging well under 1% annually for more than two decades. If the updated forecast for demand is accurate, annual peak demand growth, or the projected or measured annual increase in the highest point of electricity usage on a grid, will average 3% per year from 2024 to 2029. While 3% growth may seem small, it would mean six times the planning and construction of new generation and transmission capacity.² See Figure 1.³

Over the past two years (2023 and 2024), the five-year load growth forecast, or an estimate of future increases in the demand for energy, has increased by almost a factor of five.⁴ The nationwide forecast of electricity demand increased from 2.8% to 8.2% growth between 2024 to 2029, but with an additional estimated 61 gigawatts (GW) of growth, nationwide electric demand is estimated to increase by 15.8% by 2029.⁵ See Figure 2 on page 2.⁶ The main drivers of load growth are investments in data centers, growth in manufacturing, and electrification efforts such as electric vehicles and heating.

Figure 1. Annual load growth through the decades



1 Atkinson, Will, and Yuki Numata. “Three Priorities for a New Age of Electricity Load Growth.” RMI, July 31, 2025, rmi.org/three-priorities-for-a-new-age-of-electricity-load-growth. Accessed August 2025.

2 Wilson, John D., et al. “Strategic Industries Surging: Driving US Power Demand.” Grid Strategies, December 2024, gridstrategiesllc.com/wp-content/uploads/National-Load-Growth-Report-2024.pdf. Accessed August 2025.

3 Ibid.

4 Ibid.

5 Ibid.

6 Ibid.

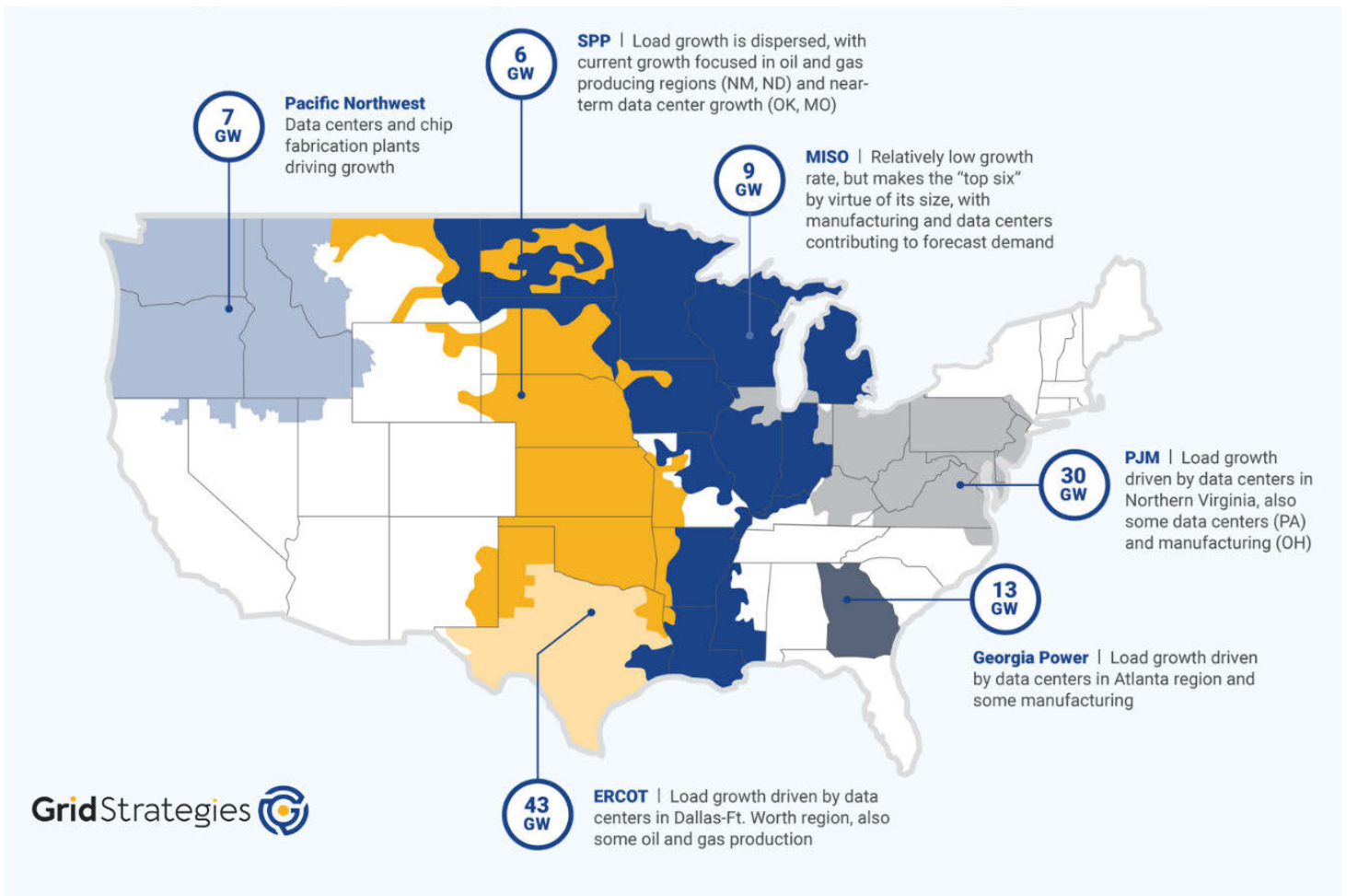
Impacts on transmission infrastructure

In 2023, 55 miles of high-capacity transmission lines were built in the U.S.⁷ This is in stark contrast to load growth projections, going from 2.8% to 15.8% over the next five years. Fortunately, planned transmission expansion investments have increased to \$15.1 billion for 2024, compared to \$9.2 billion just two years prior to 2024.⁸ These investments are necessary to maintain the efficient flow of electricity.

Lack of adequate transmission puts the grid at risk for congestion and reliability issues as the electric system experiences increased demand.

Grid congestion is when the transmission lines don't have enough space to carry electricity from where it's produced to where it is needed. This usually occurs during times of high demand or when the flow of power is constrained due to factors like aging infrastructure, physical constraints, or the siting of renewable energy sources far from where there is high demand for electricity. When the flow of power is restricted, it can increase costs for consumers, especially during peak demand periods.

Figure 2. Six regions driving load growth through 2029



7 Shreve, Nathan, et al. "Report: Fewer New Miles: The U.S. Transmission Grid in the 2020s." Americans for a Clean Energy Grid, July 2024, cleanenergygrid.org/portfolio/report-fewer-new-miles-the-u-s-transmission-grid-in-the-2020s/. Accessed July 2025.

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



Addressing load growth

Several mechanisms can be deployed to keep up with the pace of electricity demand while maintaining reliability.

- Investments in long-range transmission infrastructure are critical to modernize and expand the current system to support new load and maintain reliability.
- Proactive and coordinated transmission planning allows for timely and efficient infrastructure upgrades, integration of energy sources, and strategic deployment of resources to address load growth gaps, leading to cost savings and grid reliability.
- In the short-term, grid-enhancing technologies offer cost-effective fixes by boosting the capacity, reliability, and efficiency of our existing transmission system. This allows more power to flow where it's needed without waiting years for new construction to be completed. Examples of these grid-enhancing technologies include dynamic line ratings, advanced power flow control, and topology optimization.⁹
- Policy changes are needed to speed up the permitting process. According to a 2023 policy statement from the American Society for Civil Engineers, the nation's 640,000 miles of high-voltage lines are already at full capacity, yet approval times for new projects remain far too long.¹⁰ The average permitting time for transmission projects is 6.5 years, and often can take more than 10 years, as reported by American Clean Power.¹¹

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

10 "Policy Statement 484 - Electricity Generation and Transmission Infrastructure." American Society of Civil Engineers, July 10, 2025, asce.org/advocacy/policy-statements/ps484---electricity-generation-and-transmission-infrastructure. Accessed August 2025.

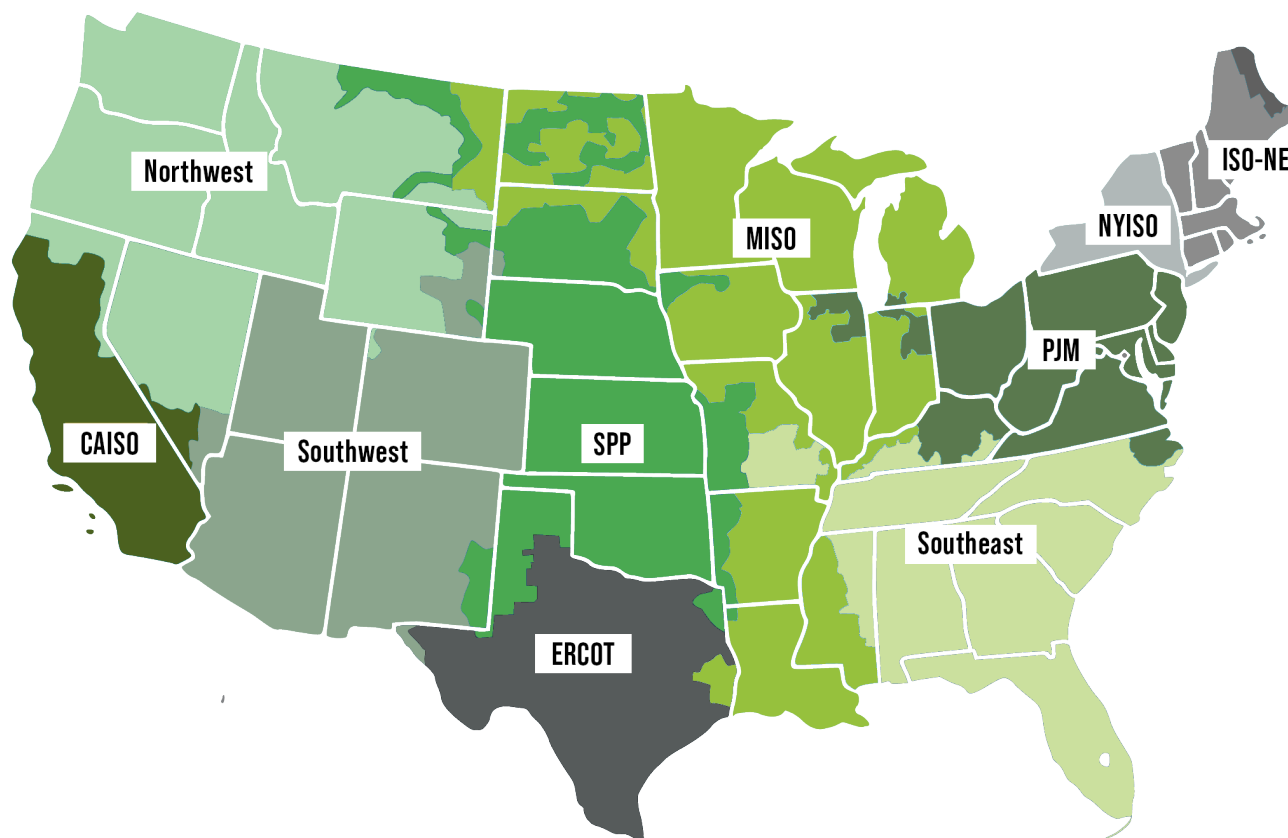
11 Deeley, Blake. "U.S. Permitting Delays Hold Back Economy, Cost Jobs." Cleanpower.org, April 2024, cleanpower.org/wp-content/uploads/gateway/2024/04/ACP-Pass-Permitting-Reform_Fact-Sheet.pdf. Accessed August 2025.

Case Study:

SPP and MISO: How the Plains and the Midwest are planning for the future

The two transmission regions in the Plains and Midwest that oversee the generation, transmission, and retail service of electricity, both have extensive plans for future growth.¹² See Figure 3.¹³

Figure 3. Ten transmission regions in the U.S.



Independent System Operators (ISOs)	Regional Transmission Organizations (RTOs)	Non ISO/RTO
- California ISO (CAISO)	- Southwest Power Pool (SPP)	- Southeast
- Midcontinent ISO (MISO)	- Pennsylvania-New Jersey-Maryland (PJM)	- Southwest
- New York ISO (NYISO)		- Northwest
- ISO New England (ISO-NE)		
- The Electric Reliability Council of Texas (ERCOT)		

12 “Electric Power Markets.” Federal Energy Regulatory Commission, March 27, 2025, [ferc.gov/electric-power-markets](https://www.ferc.gov/electric-power-markets). Accessed August 2025.

13 “RTOs and ISOs.” Federal Energy Regulatory Commission, Jan. 17, 2024, [ferc.gov/power-sales-and-markets/rto-and-iso](https://www.ferc.gov/power-sales-and-markets/rto-and-iso). Accessed October 2025. Figure 3 has been modified from this source.

Figure 4. Map of Long Range Transmission Plan Tranche 1 projects

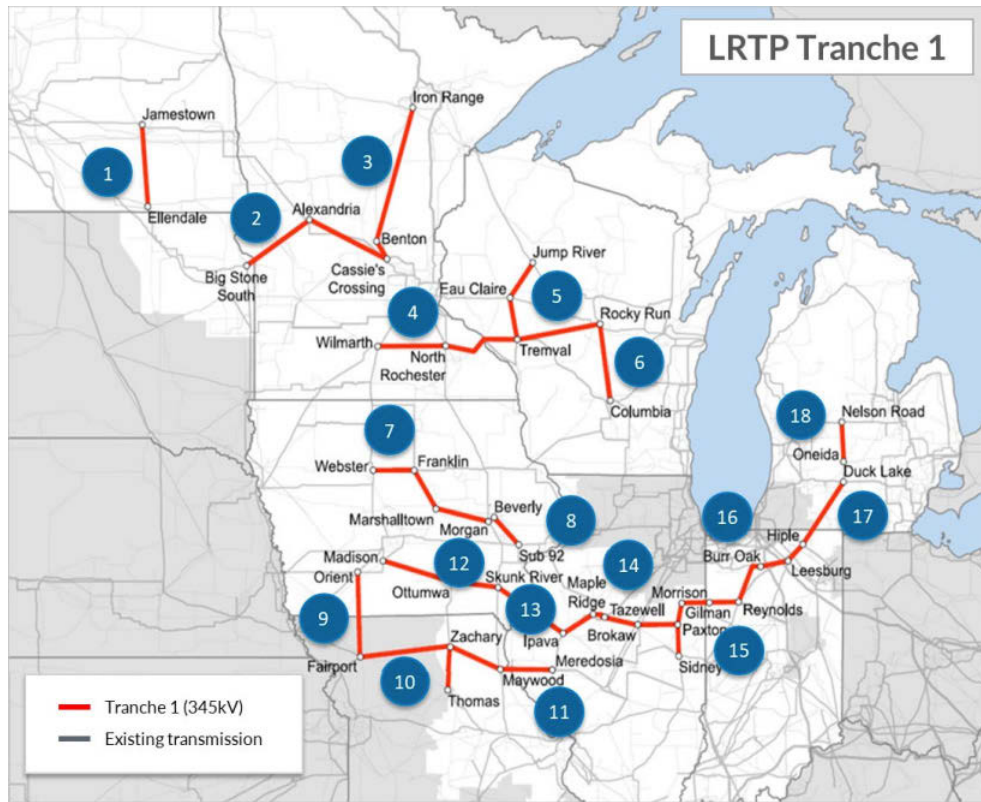
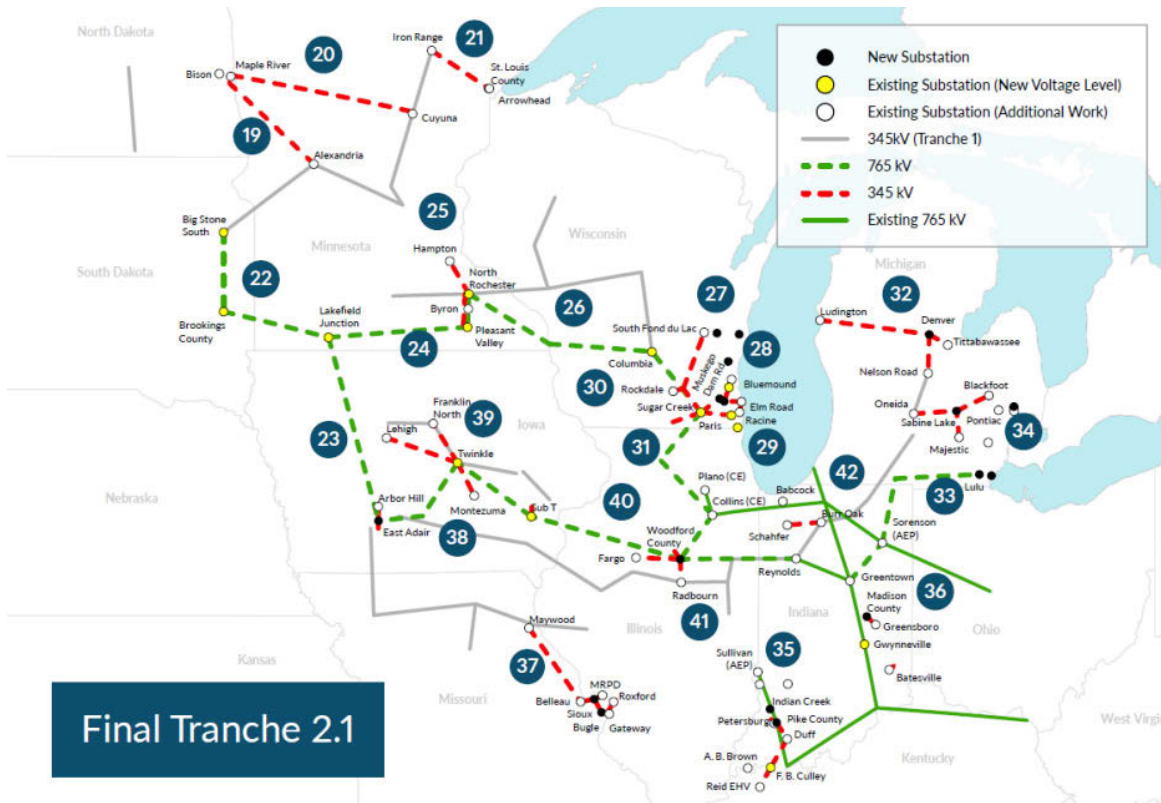


Figure 5. Map of Long Range Transmission Plan Tranche 2.1 projects



Midcontinent Independent System Operator (MISO)

MISO Long Range Transmission Planning focuses on transmission infrastructure needed to meet future electricity demand, support for the integration of renewable energy, and reliability maintained throughout MISO. The plan will be implemented in phases, called “tranches.”¹⁴

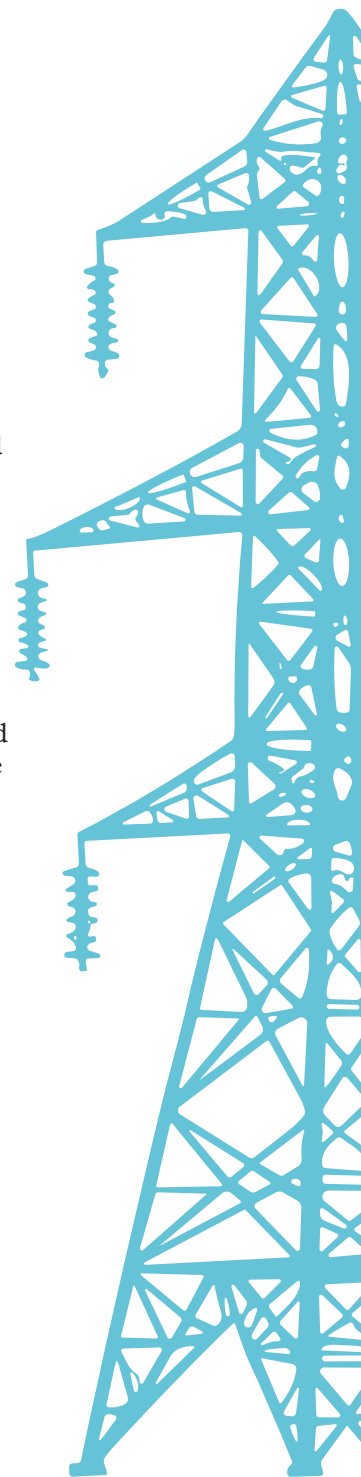
- In July 2022, MISO’s board of directors approved a \$10.3 billion investment in Tranche 1 portfolio, which focuses on addressing transmission needs across the Midwest. This portfolio consists of 18 transmission projects and will add more than 2,000 miles of new lines.
- Building on the foundation laid with Tranche 1 efforts, in December 2024 MISO approved a \$21.8 billion investment in Tranche 2.1. This portfolio includes 24 new transmission projects, totaling more than 3,631 miles of new lines, connecting the Midwest with a robust electrical backbone to ensure future reliability, address load growth, and bolster the ability of the grid to withstand extreme weather events.¹⁵ See Figures 4 and 5 on page 5.^{16,17}

Southwest Power Pool (SPP)

In 2025, the Integrated Transmission Plan (ITP) from the SPP was its largest proposed transmission enhancement to date, with an estimated cost of \$8.6 billion. It includes 50 new transmission projects, and adding over 1,000 miles of new and upgraded transmission lines across its 14-state region. This portfolio will enhance reliability and grid resilience, enable system growth, and is expected to deliver more return on investment than any plan to date.¹⁸

Conclusion

Meeting the country’s growing electricity needs will require long-term investment, careful and coordinated planning, and policy changes that make it easier to build the infrastructure of the future. Expanding and modernizing the current system, streamlining permitting, and addressing the backlog in the interconnection queue are needed to keep up with the current pace of demand. In addition to these steps, innovative grid-enhancing technologies offer practical, cost-effective solutions to boost capacity and reliability while moving those larger projects forward. These combined strategies ensure our nation’s grid can deliver reliable and affordable power to communities today and in the years to come.



14 “Long Range Transmission Planning.” Midcontinent Independent System Operator, Inc., December 2024, misoenergy.org/planning/long-range-transmission-planning. Accessed August 2025.

15 Ibid.

16 “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 August 2025.

17 “Fact Sheet: Long Range Transmission Planning (LRTP) Tranche 2.1.” Midcontinent Independent System Operator, Inc., December 2024, cdn.misoenergy.org/LRTP%20Tranche%202.1666573.pdf. Accessed August 2025.

18 “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.

