

Benefits of Transmission Expansion



Introduction

Americans rely on electricity for everything from electronic devices like cellphones and computers to heating and cooling their homes and businesses to transportation. Energy demand continues to rise, and more renewable energy resources are coming online, putting increased pressure on our electrical grid. Expanding and modernizing the U.S. transmission system is essential to efficiently move energy from where it is produced to where it is needed, and to maintain a resilient and reliable electrical grid that can deliver power consistently and safely.

What is transmission?

The system of transmission lines suspended along large towers or buried underground carries high-voltage electricity from generation facilities like power plants and renewable energy sources to where it can be accessed locally. High-voltage electricity arrives at local substations and then is distributed at lower voltages through power lines to homes and businesses. The infrastructure across rural and urban landscapes forms the U.S. power grid and allows energy to travel long distances to where it is needed. See Figure 1.

Figure 1. Transmission process

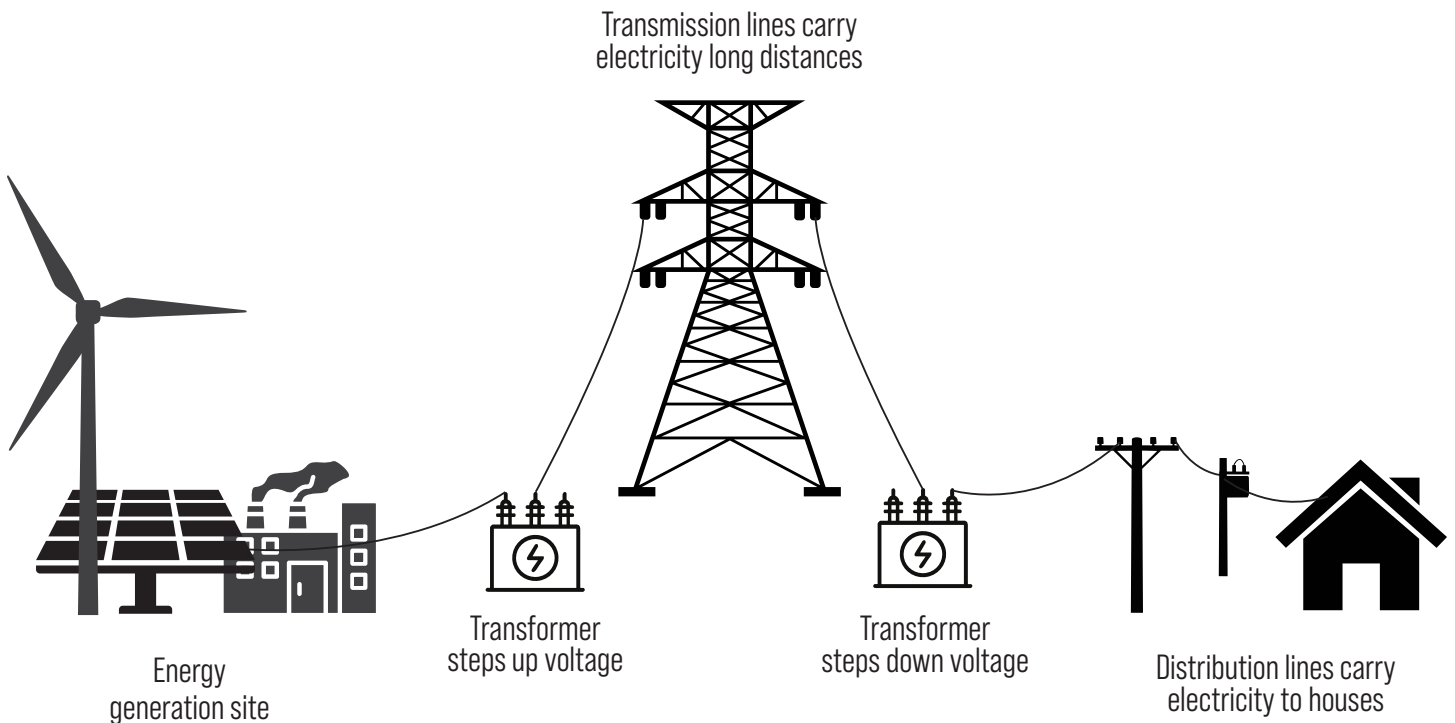
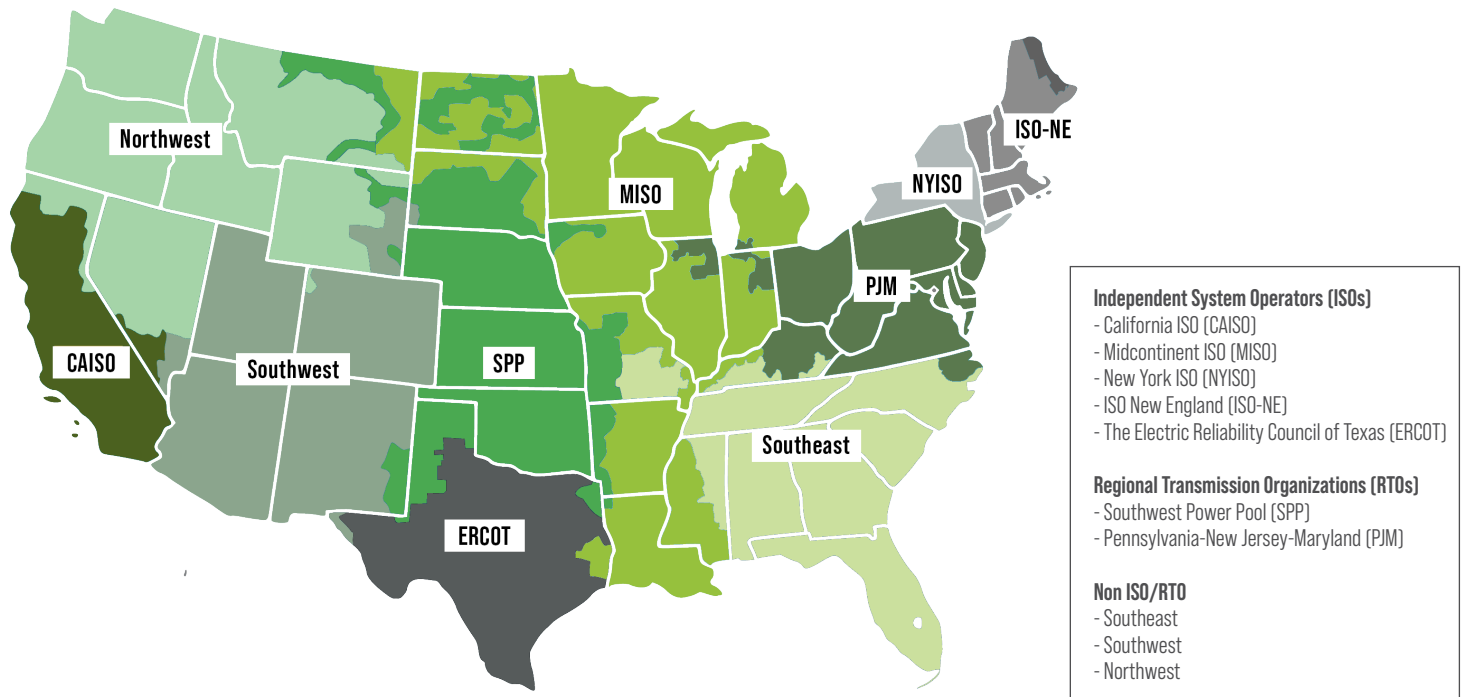



Figure 2. Transmission regions in the U.S.



Transmission planning and expansion is vital

The U.S. power grid relies on interconnectivity, allowing transfers of electricity based on demand. Ten distinct transmission regions facilitate the reliable and efficient distribution of power production and transmission across the country. See Figure 2.¹ The individual entities managing each region oversee the generation, transmission, and retail service of electricity, which allows power-producing companies and facilities to sell their power in a given area.²

Planning within and between regions is essential to ensure demand can be met reliably, efficiently, and affordably. 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 power demand.³



With the continued rise of renewable energy development, unprecedented opportunities are available to improve connectedness and energy flow between regional grids and to meet demand by expanding and modernizing the current transmission system. Linking new and existing renewable energy sources to more areas will help fully utilize production and decrease energy costs.

1 “RTOs and ISOs.” Federal Energy Regulatory Commission, Jan. 17, 2024, [ferc.gov/power-sales-and-markets/rtos-and-isos](https://www.ferc.gov/power-sales-and-markets/rtos-and-isos). Accessed October 2025. Figure 2 has been modified from this source.

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

3 “National Transmission Planning Study.” U.S. Department of Energy, 2024, [energy.gov/gdo/national-transmission-planning-study](https://www.energy.gov/gdo/national-transmission-planning-study). Accessed September 2025.

Benefits of transmission expansion

Economic

Investments made in the transmission system will provide cost-effective benefits, with a return of \$1.60 to \$1.80 for every dollar spent on expansion. According to the 2024 National Transmission Planning Study, improving the transmission system and increasing the capacity of renewable energy would save the U.S. \$270 billion to \$490 billion through 2050, and help the nation drastically reduce carbon emissions.⁴

Transmission expansion also offers the opportunity to address the cost of curtailing energy projects, alleviate bottlenecks on the grid that inhibit energy flow, and provide employment opportunities.

➔ Addressing the cost of curtailment

When the grid does not have adequate room to move the electricity being produced, that energy faces curtailment—the reduction or stoppage of energy production to prevent overloading the system and blackouts. This can be due to capacity limitations of existing transmission lines, an inadequate number of lines, or energy production exceeding electricity demand. Curtailment negatively impacts renewable energy projects, as it prevents a system from producing the maximum amount of energy it is able to, which limits how much low-cost energy reaches consumers.⁵

Furthermore, counties that are home to renewable energy projects often benefit from both the energy production and tax revenue created. This revenue, which often supports local schools, emergency

services, and local infrastructure, is affected when energy production is curtailed, resulting in major county income losses.

➔ Alleviating congestion

When demand is high, grid congestion that limits available electricity supply can increase energy prices. Like a traffic jam, this congestion causes transmission lines to become overcrowded when demand is high, which can lead to higher prices to consumers for electricity coming from more expensive energy sources. In 2022 alone, grid congestion cost consumers \$20.8 billion in the U.S.⁶

Replacing old infrastructure and installing additional transmission lines reduces the effects of grid congestion, ensuring power can flow where it is needed. This is especially true when transmission lines connect regional grids, allowing greater flexibility between systems. Improved interconnectedness provides access to additional energy sources, which helps the system adapt in times of particularly high or low demand, or in times of outage in specific areas.

➔ Providing employment opportunities

Large-scale transmission installation projects can create hundreds of thousands of jobs, offering both short-term and long-term employment in rural communities.⁷ According to a study by Americans for a Clean Energy Grid, investment in 22 shovel-ready transmission projects across the U.S. could create about 600,000 jobs.⁸ Another report from Americans for a Clean Energy Grid estimates that an investment in 36 identified shovel-ready transmission projects could add 2 million jobs in the wind and solar industries.⁹

4 Ibid.

5 Moudgalya, Pranav, et al. “Interregional Transmission, Economic Development and Workforce Opportunities.” Harvard University, 2024, scholar.harvard.edu/dtingley/publications/interregional-transmission-economic-development-and-workforce-opportunities. Accessed August 2025.

6 “How Renewable Energy Can Make the Power Grid More Reliable and Address Risks to Electricity Infrastructure.” Joint Economic Committee Democrats, Jan. 19, 2024, jec.senate.gov/public/index.cfm/democrats/2024/1/how-renewable-energy-can-make-the-power-grid-more-reliable-and-address-risks-to-electricity-infrastructure. Accessed August 2025.

7 Moudgalya, Pranav, et al. “Interregional Transmission, Economic Development and Workforce Opportunities.” Harvard University, 2024, scholar.harvard.edu/dtingley/publications/interregional-transmission-economic-development-and-workforce-opportunities. Accessed August 2025.

8 Goggin, Michael, et al. “Transmission Projects Ready to Go: Plugging Into America’s Untapped Renewable Resources.” Americans for a Clean Energy Grid and Grid Strategies LLC, April 2021, cleanenergygrid.org/wp-content/uploads/2019/04/Transmission-Projects-Ready-to-Go-Final.pdf. Accessed August 2025.

9 Zimmerman, Zachary, et al. “Ready-to-Go Transmission Projects 2023.” Americans for a Clean Energy Grid and Grid Strategies LLC, September 2023, cleanenergygrid.org/wp-content/uploads/2023/09/ACEG_Transmission-Projects-Ready-To-Go_September-2023.pdf. Accessed August 2025.



Reliability and resilience

Much of the U.S. electric grid was built in the 1960s and 1970s, and many transmission lines are approaching the end of their typical 50-to-80-year life cycles, putting consumers at higher risk of prolonged outages.^{10,11} Expanding and modernizing the transmission system reduces this risk and improves reliability—especially during extreme weather events—ensuring continued electrical service during emergencies.¹²

Case Study: Cost of congestion in Minnesota¹³

A key incentive for rural counties to approve renewable energy and transmission line projects is the tax revenue they generate. Counties get the most out of these projects when they run at full capacity, especially in states like Minnesota, where tax revenue from wind and solar energy projects is based on production. When energy production is limited by transmission capacity, counties can experience significant financial losses.

In 2021, wind projects in southwestern Minnesota still brought in revenue, but curtailment cut energy production in half, which accounted for financial losses of more than \$1 million for just three counties.

Another loss was in Murray County, Minnesota, which is well-suited for renewable energy. Residents and officials were interested in the development of more wind energy projects, but the area was passed over due to a lack of transmission availability. A major barrier like this can exacerbate the financial losses due to inadequate grid support.

In Minnesota, state law requires a contribution to property taxes for transmission line usage, with a portion of funds going directly to local schools.¹⁴ Jackson County, for example, received \$3.1 million in property taxes from transmission companies alone in 2021. These funds allowed the county to reduce local taxes, restore its courthouse, and invest in a new public works campus.¹⁵

Conclusion

A robust electrical grid is necessary to tap into the benefits of renewable energy. Developing a modernized and expanded transmission system can reduce energy prices by alleviating grid congestion, preventing curtailment, and connecting consumers to the lowest-cost energy. Investments in transmission infrastructure will be necessary to consistently and safely deliver our nation's growing energy demand.

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

11 Ibid.

12 "How Renewable Energy Can Make the Power Grid More Reliable and Address Risks to Electricity Infrastructure." Joint Economic Committee Democrats, Jan. 19, 2024, jec.senate.gov/public/index.cfm/democrats/2024/1/how-renewable-energy-can-make-the-power-grid-more-reliable-and-address-risks-to-electricity-infrastructure. Accessed August 2025.

13 Malone, Molly. "Industry on the Prairie: Minnesota Wind Energy Production Tax Impact Studies." Center for Rural Affairs, Nov. 29, 2022, cfra.org/publications/industry-prairie-minnesota-wind-energy-production-tax-impact-studies. Accessed October 2025.

14 "2024 Minnesota Statutes, Section 273.42 (1,3)." Minnesota Legislature, 2025, revisor.mn.gov/statutes/cite/273.42. Accessed August 2025.

15 Malone, Molly. "Industry on the Prairie: Minnesota Wind Energy Production Tax Impact Studies." Center for Rural Affairs, October 2022, cfra.org/publications/industry-prairie-minnesota-wind-energy-production-tax-impact-studies. Accessed October 2025.