Updates
November 10, 2023
DOE Study Finds US Must Double Regional Transmission Capacity To Meet 2035 Clean Energy Goal

Last week, the U.S. Department of Energy (DOE) released its National Transmission Needs Study (Needs Study), which concludes that there is a pressing need for additional transmission infrastructure.

That need is expected to increase sharply in the future as generation shifts towards renewable energy and catastrophic events increase in frequency and magnitude due to climate change. The Needs Study also observes that investments in transmission are declining instead of keeping up with the growing need.

The Needs Study acknowledges that alternative solutions—such as energy storage, grid-enhancing technologies, advanced conductoring, and "strategic siting" of generating resources—could defer or avoid the need for some large transmission infrastructure projects. However, the Needs Study concludes that these alternative solutions are insufficient to meet the full scope of future transmission needs. It also identifies regions where demand for new transmission infrastructure is the greatest—the Midwest, the Great Plains, and Texas. The limited scope of the Needs Study, however, did not permit DOE to delve into critical issues preventing development of interregional transmission infrastructure. While the study will provide useful data for DOE, Federal Energy Regulatory Commission (FERC), state agencies, and other stakeholders as they consider opportunities for funding transmission investment and policies on transmission planning, it is still unclear whether the Needs Study will help move the needle on facilitating development of interregional transmission infrastructure.

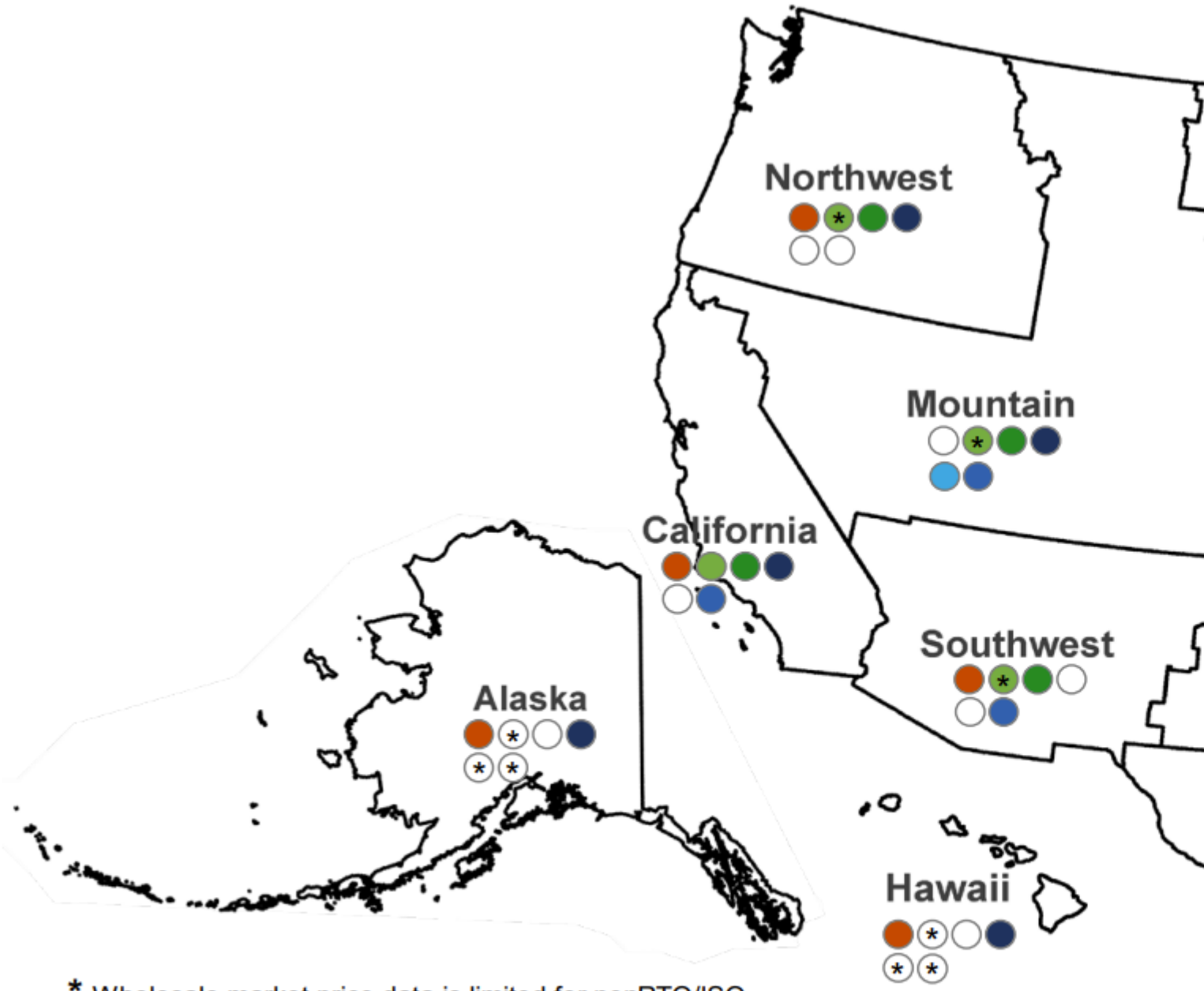
Background on the National Transmission Needs Study

Under the Federal Power Act (FPA), DOE is required to conduct assessments of national electric transmission capacity constraints and congestion at least once every three years.[1] DOE issued a draft 2023 Transmission Needs Study in February 2023 and requested feedback on the analysis used, gaps, and conclusions.[2] The final version, which fulfills the FPA mandate, incorporates comments received from states, tribes, regional transmission entities, and the general public.

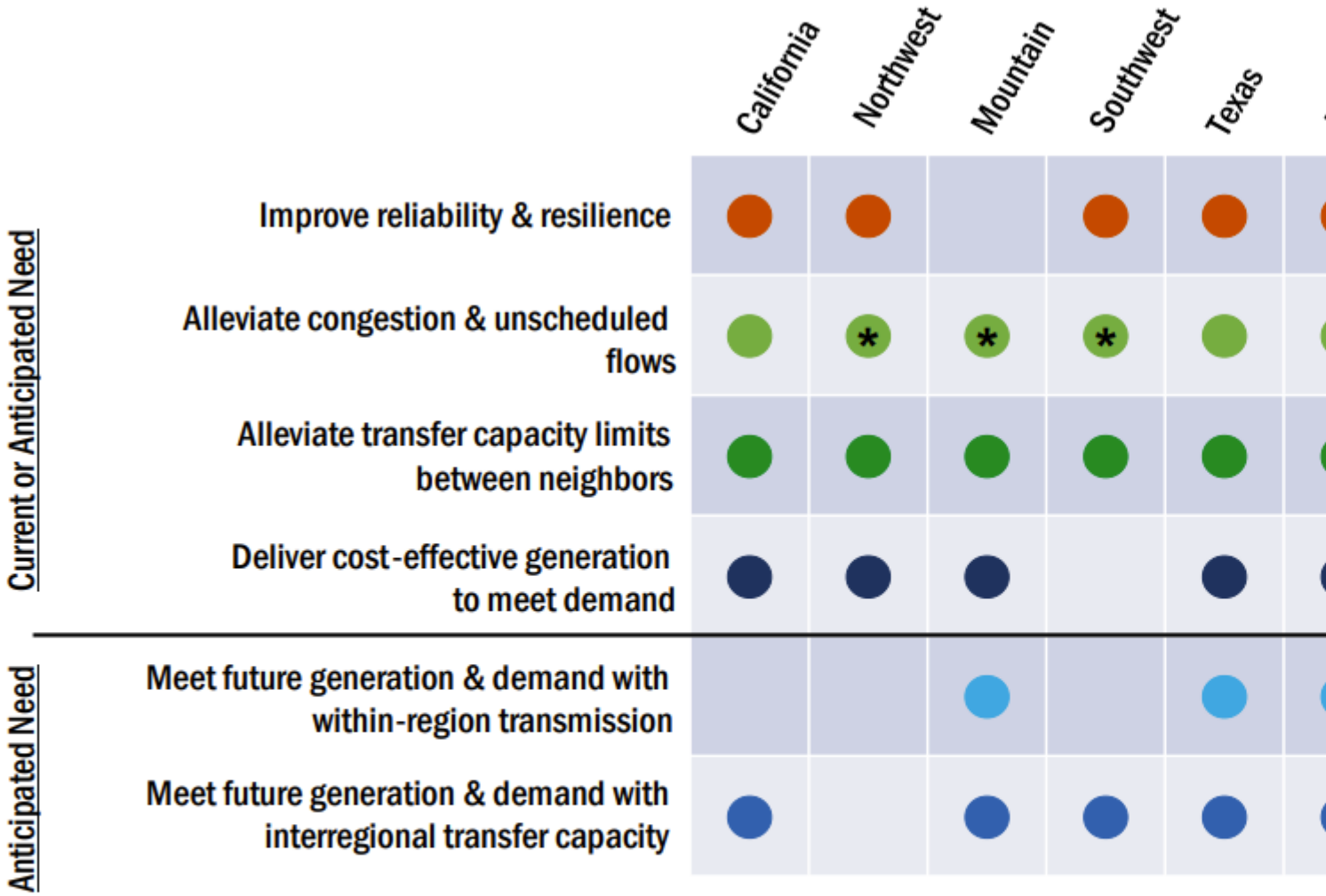
The Needs Study identifies transmission needs that are currently harming consumers—or could do so in the future—and that could be alleviated by transmission solutions. It also provides information about current and anticipated future capacity constraints and congestion on the nation's electric transmission grid through 2040. The study is based on a review of publicly available data and more than 120 recently published reports that consider historic and anticipated future needs given a range of electricity demand, public policy, and market conditions. While previous studies only considered historic transmission constraints and congestion, the 2023 Needs Study considers both historic and anticipated future transmission constraints and congestion as required by Congress in section 40105 of the Infrastructure Investment and Jobs Act.[3]

National Need for Additional Transmission Infrastructure

The Needs Study finds a pressing need for additional electric transmission infrastructure in nearly all regions of the country to improve reliability and resilience, address high energy costs, and reduce congestion and constraints. According to the study, regions with historically high levels of intraregional congestion (e.g., New York) and regions with unscheduled flows that pose reliability risks (e.g., the Mountain and Southwest regions) need additional, strategically placed transmission assets to reduce this congestion.



* Wholesale market price data is limited for non-RTO/ISO regions and capacity expansion modeling data is limited for Alaska and Hawaii. Absence of data does not necessarily indicate that there is no need for new transmission.



Note: Reproduction of Figure ES-7 in the 2023 National Transm

Figure S-1. Summary of current and future transmi
geographic region.

System Reliability and Resilience Expected To Be Key Drivers

Additional transmission investment will be necessary to improve the reliability and resiliency of the transmission grid due to economic factors and clean energy goals prompting higher deployment of variable resources (e.g., wind and solar) and extreme weather events nationwide continuing to increase in frequency and intensity. Study findings indicate that interregional and cross-interconnection transmission investments will improve system resilience and alleviate resource adequacy concerns by enabling increased access to diverse generation resources across different climatic zones. Throughout the country over the next decade and beyond, increasing consumer

demands, electric utility decarbonization targets, and federal and state policy are expected to drive changes in electricity supply and the way electricity is used, including by increasing electrification of end-use technologies.

The Needs Study concludes that new transmission investment will be necessary to access clean energy resources. The length of time from interconnection request to operation for all generation and storage resources has grown from less than two years in 2008 to more than five years in 2022. Additionally, the generation mix will continue to shift toward more wind, solar, and battery storage technologies. For example, offshore wind is poised to play a significant role in the country's decarbonization as it expands beyond the existing 42 MW of operational offshore wind capacity.[4] Yet, transmission infrastructure along the nation's coasts remains insufficient to accommodate utility-scale injection of offshore wind. Generation resources with strong technical and economic potential located far from the existing transmission system—notably wind energy—require building new transmission to bring these low-cost resources to load.[5]

For these reasons, the study estimates that to meet the administration's goal of a carbon pollution-free power sector by 2035, the United States must more than double the existing regional transmission capacity and expand existing interregional transmission capacity by more than fivefold. It concludes that these regional and interregional transmission needs increase even further to achieve the administration's goal of economywide decarbonization by 2050.

Transmission Investments Steadily Declining

Capital expenditures in transmission between 2011 and 2020 resulted in a national total of only 33,000 circuit-miles of newly constructed or rebuilt transmission lines rated above 100 kilovolts (kV), which equates to roughly 3,300 miles per year. Of these, 20,000 circuit-miles were higher capacity lines rated at least at 345-kV. Only 70 circuit-miles of interregional transmission were energized between the regions on average each year. Most of these investments were made in the first half of the decade, with transmission investments steadily declining since 2015. An additional 560 circuit-miles were installed each year from 2011 to 2015 nationwide, but the rate of annual installation between 2016 and 2020 actually decreased to a negative 79 circuit-miles per year.

The Needs Study suggests that the lack of investment in transmission may be, in part, because siting and permitting transmission can be a major challenge to grid expansion. The study suggests that siting challenges can increase the cost of a transmission project by a factor of five in some scenarios. In addition, developers must navigate multiple state processes as well as federal and local requirements. Obtaining approvals in each state is often difficult because many states focus on intrastate burdens and benefits. So, a transmission line that does not directly connect resources within a state might not receive permits required to traverse the state. This is further complicated by local reviews that may be required for local authorizations (such as zoning permits) and federal reviews where transmission lines cross federal lands. Conflicting interests between transmission developers and landowners and communities can often lead to project opposition.

The Needs Study suggests that alternative transmission solutions (e.g., energy storage, grid-enhancing technologies, and advanced conductors and cables) and the strategic siting of generation and transmission may help avoid these challenges in some, but not all, cases. However, the Needs Study concludes that such solutions will "almost certainly fail" to meet the full scope of transmission needs identified.

Areas With Greatest Transmission Congestion and Constraints

Several regions of the country have had either consistently high or consistently low electricity prices over the past three to five years. Increased transmission access to persistently high-priced regions provides one way to lower prices for those consumers. These regional and interregional transmission links have significant potential to reduce congestion and expand opportunities for trade.

Table IV-2. High- and low-priced areas identified within the wholesale markets of the three Interconnections. Regions are defined based on a regional concentration of nodes identified with the Market Price Differential metric.

Region	Low-Priced Areas	High-Priced Areas
Plains	Southern and Western KS OK/TX Panhandles	Southern OK Southwest MO
Midwest	Southwest and Central IA Southern MN	Northwest WI Eastern and UP MI
Mid-Atlantic	Northeast IL Southeast PA	Eastern MD/VA Delmarva Peninsula MD & DE
New York	Upstate NY	Long Island NY
New England	North VT/NH	–
California	Mojave Desert CA	Southern Coast CA Northern Coast CA
Mountain	Eastern WY	–
Texas	Northern TX Western TX Southern TX	–

The Needs Study also concludes that interregional price differentials demonstrate a need for cross-interconnection transmission to alleviate congestion. The Needs Study emphasizes that interregional transmission—the ability to move power across regions of the country—is especially critical to move electricity from where it is available to where it is needed and results in the largest benefits to customers in reducing congestion and constraints. According to the Needs Study, large deployments of interregional transfer capacity are needed between the Mississippi Delta and the Great Plains, the Midwest and the Great Plains, and the Mid-Atlantic and Midwest by 2030 to meet future demands. By 2040, the Needs Study predicts there will be a significant need for new interregional transmission between nearly all regions.

However, the Needs Study glosses over some of the thorniest issues preventing development of interregional transmission other than permitting and siting challenges. For example, power prices in regions where prices have been consistently low may rise due to interregional capacity that allows pricing to equalize across regions; this makes the cost of building interregional transmission a hard sell in those low-priced regions. Likewise, it can be difficult to advance large interregional transmission projects that cross multiple states to connect remote renewable generation to distant load centers. This is because the states and stakeholders in the intervening states may not see significant, direct benefits from the new transmission capacity. While the Needs Study develops a compelling picture of where transmission investment likely would benefit consumers at a national level, proposing solutions to overcome these regional and state-specific roadblocks is beyond its scope.

Implications of the Needs Study

The Needs Study will inform DOE's new and existing programs that relate to electric transmission. DOE has stated that the study's findings can inform its implementation of the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, including provisions related to transmission expansion, grid resilience, and grid technology. The Needs Study will also support implementation of existing DOE programs, including funding programs, technical assistance and broader transmission planning activities, and the potential designation of National Interest Electric Transmission Corridors (NIETCs).[6]

The Needs Study may also complement work that FERC and the North American Electric Reliability Corporation (NERC) are doing to advance interregional transmission planning. For example, in December 2022, FERC held a workshop to discuss whether and how FERC could establish a minimum requirement for Interregional Transfer Capability for public utility transmission providers in transmission planning and cost allocation processes. This workshop was followed by an extended comment period into midsummer 2023 and

may provide a springboard for further FERC action. Meanwhile, NERC is conducting a separate Interregional Transfer Capability Study intended to analyze the amount of power that can be moved or transferred reliably from one region to another, a study required under the Fiscal Responsibility Act of 2023. NERC must file that study with FERC by December 2, 2024.

The Needs Study also highlights significant information gaps regarding transmission congestion, particularly outside of regions where transmission planning is done through regional transmission organizations (RTOs) or independent system operators (ISOs). In many instances, the Needs Study noted that accurate assessment of transmission needs or comparisons across regions was difficult or impossible due to the lack of that information. This information gap may be another issue that FERC could consider as it develops revisions to its policies for regional and interregional transmission planning.

DOE has been explicit that "the Needs Study does not designate any NIETCs and its findings do not include any recommendations or specific next steps regarding corridor designation." DOE has also stated that applications for DOE transmission and grid resilience-related financing will not receive priority preference simply because those applications involve projects located within an area identified in the Needs Study. However, it may provide applicants with additional talking points to support their proposals, since the Needs Study will inform many of DOE's funding programs. In fact, the Needs Study was already used to inform a DOE announcement of entering into capacity contract negotiations (through its Transmission Facilitation Program) with a commitment of up to $1.3 billion in three interregional transmission lines crossing six states. These lines are expected to add 3.5 gigawatts (GW) of additional grid capacity throughout the United States, which is enough energy to power approximately three million homes.[7]

Endnotes

[1] 16 U.S.C. 824p(a)(1).

[2] See our prior Update.

[3] See our prior Update on the transmission provisions in the IIJA.

[4] Advancing Offshore Wind Energy in the United States.

[5] *Id.*; Offshore Wind Transmission Development in the US Atlantic (Interim Draft) (Sept. 2023).

[6] See our prior Update on the NIETCs.

[7] Biden-Harris Administration Announces $1.3 Billion To Build Out Nation's Electric Transmission and Releases New Study Identifying Critical Grid Needs | Department of Energy.

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