New report: How market and operating practices impact benefits of coordinated transmission operations and planning

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Interregional transmission—lines that connect multiple planning regions—can provide many benefits to electric customers, but market

and operating practices were not necessarily designed for this type of interconnected system.

"As we build up our interregional transmission systems, we need to take a fresh look at improving the efficiency and efficacy of the existing system, which could increase grid reliability while reducing cost," said Christina Simeone, grid researcher at the National Renewable Energy Laboratory (NREL).

A new NREL report led by Simeone, "Barriers and Opportunities To Realize the System Value of Interregional Transmission," examines issues that prevent existing transmission facilities from delivering maximum potential value and offers a suite of options that power system stakeholders can pursue to overcome those challenges.

The report groups barriers and opportunities for interregional transmission among all regions, between non-market or a mix of market and non-market areas, and between market areas.

Barriers and opportunities among all regions

A common barrier to interregional transmission among all regions is the lack of clarity on resource adequacy sharing—or how we plan to share electricity generation resources across broad geographic areas to keep the lights on even when demand is high.

In addition, transmission owners and operators typically cannot predict when large power transfers are needed and the types of irregular power flows that might occur, such as during extreme weather events. Ensuring internal power networks can handle the large energy flows needed between regions during these events lies outside of current transmission planning and operating practices.

Some options to overcome these common barriers could be creating an interregional resource adequacy sharing framework, performing joint studies of transfer needs and means to mitigate power issues, and assessing the internal transmission system's large power transfer capability as the generation mix changes.

Barriers and opportunities between non-market areas or a mix of market and non-market areas

In regions that either operate without a market or with a mix of market and non-market systems, the biggest barrier to efficiently using interregional transmission is inconsistent and nontransparent methods of transmission scheduling and real-time operating.

NREL also finds transmission system congestion management tends to be uncoordinated in these regions. This could ultimately lead to higher supply costs or reliability risks along vital transmission corridors.

"Even in regions with no markets, there are different options for grid operators to reduce costs for electricity customers through greater coordination with other regions," Simeone said. A few of these options could include creating coordinated scheduling and operations platforms between systems and developing consistent methods for calculating available transfer capacity.

Barriers and opportunities between market areas

Programs have been established through joint operating agreements to increase the use of interregional transmission between market areas. However, NREL finds these programs can have inaccurate price forecasting and high transaction fees in coordinated transaction scheduling platforms.

In some instances, there are also outdated power flow limits and inaccurate modeling for interregional transmission that can lead to higher congestion management costs. Ultimately, these costs are then passed on to consumers.

Additionally, in most regional markets, excess high-voltage direct current (HVDC) transmission capacity tends to not be used efficiently, which could otherwise help meet demand. Efforts like removing fees and enhancing price forecasting for coordinated transaction scheduling could make a difference.

Transformative actions for all regions

Transformative actions could be applied to all regions to increase the value of interregional transmission, like national coordination of network and resource adequacy planning.

"Many of the changes outlined in the report are technically complex to implement and impact power system stakeholders in different ways," Simeone said. "But the goal is for the suite of options to be considered alongside other local, state, and regional objectives to enhance systemwide benefits."

Understanding how to modernize market and operating practices is one piece of a larger national transmission picture that NREL and the Pacific Northwest National Laboratory (PNNL) have been studying for more than two years.

The National Transmission Planning Study (NTP Study) led by the U.S. Department of Energy's Grid Deployment Office, in partnership with NREL and PNNL, aims to identify transmission options that will provide broad-scale benefits to electric customers, inform regional and interregional transmission planning processes, and identify interregional

and national strategies to accelerate decarbonization while maintaining system reliability.

The NTP Study is complemented by several companion reports, including this latest report on market and operating practices and a previous report on interregional renewable energy zones, or high-value interregional zones for renewable energy development. The NTP Study and its key findings will be released later this year.

More information: Barriers and Opportunities To Realize the System Value of Interregional Transmission.
www.nrel.gov/docs/fy24osti/89363.pdf

Provided by National Renewable Energy Laboratory

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