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Meeting Clean Energy Goals Will Require the Grid of the Future

The transmission grid is the critical super-highway that connects energy supply and demand. But our grid was designed for the power plants of the past—not for the diverse range of resources and technologies of our clean energy future. Over 70 percent of the nation’s transmission infrastructure is more than 25 years old, and in many areas of the country constraints have already been an impediment to renewable power. To meet greenhouse gas reduction goals, we will need to expand electric transmission systems by 60 percent by 2030 and possibly triple the capacity of these systems by 2050. The Inflation Reduction Act has large loan guarantees to spur grid investment, but hundreds of billions more will be eventually needed.

Grid modernization will require the Federal Energy Regulatory Commission, which oversees the interstate transmission of electricity, to take a leadership role in coordinating with industry investors and other agencies as we balance the reliability, cost allocation, and environmental concerns

associated with transmission grid expansion. Last summer, FERC adopted new policies that remove many barriers for new solar and wind power suppliers interconnecting with the grid. Meanwhile, a proposed Department of Energy rule would speed upgrades by having DOE manage environmental reviews, which must be completed within two years.

Still, many critical policy issues within FERC’s wheelhouse remain unresolved. These include improving the transmission planning process, coordinating with utilities and with states so new lines can be placed where they are needed. But how should environmental and land impacts be considered and balanced in this process? Who should build new transmission lines, and can expansion of the grid balance the needs of the regional power markets and states? How will the costs of expanding transmission be allocated in a manner that is cost effective and fair? As the transmission grid faces more physical interruptions due to extreme weather events, what is the role of FERC in safeguarding reliability and resilience?



Ken Berlin
Senior Fellow
Atlantic Council

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Speedy Processes Needed to Meet 2035 Carbon Goal

By Ken Berlin

The U.S. power grid needs to be upgraded and expanded to meet the country's goal of 100 percent clean electricity by 2035. Currently, the aging transmission system and the associated planning and permitting processes cannot support the transition to clean energy. Power lines are 40 years old on average. More than a quarter of projects were built over 50 years ago and 70 percent of lines are more than 25 years old.

One study estimates that high-voltage transmission capacity will need to expand by about 60 percent by 2030 and triple by 2050 to meet electrification needs and demand growth. The total cost is estimated to be \$330 billion through 2030 and \$2.2 trillion through 2050. The permitting and planning process for transmission infrastructure is decentralized and complex, which leads to excessively long lead times that slow the pace of transmission deployment—many took longer from initiation to construction than the time remaining until 2035, when the grid needs to be carbon-free.

Energy permitting and planning reform is well underway through measures passed across the government but has so far failed to address transmission infrastructure directly. In May, Congress passed the debt ceiling bill, which included permitting provisions to shorten the time-line to conduct National Environmental Policy Act reviews to two years, one year, and six months for different energy projects. In July, the Federal Energy Regulatory Commission passed a new rule to accelerate the interconnection process for the over 2,000 gigawatts of renewable energy waiting in the queue. FERC

is also drafting a new rule on transmission planning that will address cost allocation and long-term planning within regions. The Department of Energy published a draft National Transmission Needs Study and will publish a National Transmission Planning Study later this year or early next year. The progress so far is significant and commendable, but more must be done to address transmission infrastructure specifically.

Perhaps the most immediate solution is for FERC and the DOE to use an existing, never fully implemented authority under Section 216 of the Federal Power Act. Under the act, DOE has the authority to designate National Interest Electric Transmission Corridors where the agency has identified present or expected constraints or congestion on transmission capacity. Once a NIETC is established, FERC can use its existing authority to approve a competitively sourced transmission project or projects within the NIETC, providing significant benefits to the communities in the states where the project is built.

DOE and FERC first used the NIETC designation in 2007, but two courts vacated the rules and NIETCs mainly on environmental, and not statutory, grounds. DOE has since released a Notice of Intent in May that would establish an applicant-driven, route-specific process. FERC released a proposed rulemaking for siting lines within NIETCs in December of last year. Now, DOE and FERC should work to operationalize the NIETC framework to deliver high-value interregional transmission lines at the pace necessary to meet clean electricity goals in 12 years.

Establishing NIETCs would have a major impact on the buildout of transmission infrastructure by facilitating the construction of interregional transmission lines. The DOE national transmission needs study affirmed that interregional transmis-

sion lines are the highest-value projects, which would bridge the three U.S. interconnections and provide additional reliability to the grid during increasingly frequent extreme weather events. DOE estimates suggest that interregional transfer capacity will need to expand sevenfold on average by 2035 and more by 2040. Transmission investments can lower electricity bills by expanding the system to lower-cost generators and reducing the likelihood of outages. One simulation showed that additional transmission could save \$3 billion per year in 2035 and \$4 billion per year in 2040.

With only twelve years remaining for the United States to meet its stated clean energy goal and transmission projects taking at least five to ten years or more to site, permit, and construct, immediate solutions like the NIETC process are needed.

While legislation would be another effective tool to accelerate infrastructure development, permitting discussions in Congress have stalled. Nevertheless, legislation that mandates minimum interregional transfer capacity, gives FERC exclusive jurisdiction over interstate transmission, and provides direction on cost allocation and eminent domain procedures would significantly accelerate transmission deployment, including within the NIETC process. Passing this type of legislation may not be possible now but will be reassessed based on the results of the 2024 election.

Ken Berlin is a senior fellow and director of the Financing and Achieving Cost Competitive Climate Solutions project at the Atlantic Council Global Energy Center. He is the former CEO of the Climate Reality project. He was aided in writing this article by Frank Willey, a project assistant at the center.

No Transition Without Transmission

By Rob Gramlich

Transmission expansion may be the most important opportunity for decarbonization in the United States and most other countries. Renewable energy replacing fossil power generation is among the least-cost, fastest, and most scalable opportunities. But large-scale renewable deployment can only happen with significant transmission expansion. As it stands, most needed renewable energy generators are stuck in five-year-long interconnection queues, and those that are on line and operating are subject to frequent curtailment when grid capacity prevents them from delivering to electricity customers.

You don't need to support speedy action on climate to support large-scale expansion of the transmission system. Reliability and resilience also require a major grid upgrade. In many recent instances of polar vortices and heat domes, it has been the movement of large volumes of power, often over 10 gigawatts, from one region to the next that has kept the lights on. Power scarcity happens in individual regions but there is typically plenty of available power in neighboring regions that can be delivered, if and only if we have sufficient inter-regional transmission capacity. Power from the Mid-Atlantic helped keep the lights on in the Dakotas during Winter Storm Uri in 2021, to give one example, and that was simply not possible in Texas because the state's import capacity was too limited, causing tragic deaths and economic harm.

So how do we expand the grid? We need to address the barriers, which are the "3Ps": planning, permitting, and paying.

Planning: The first step is to plan for the future resource mix and determine an efficient, reliable, and environmentally responsible set of lines and upgrades. Unfortunately, in a recent report card of regional planning around the country by Grid Strategies for Americans for a Clean Energy Grid, most regions received a C grade or worse.

Congress and the Federal Energy Regulatory Commission can rectify this poor performance. FERC's transmission planning and cost allocation rule has the potential to be the most important energy policy in the country for this reason. Independent transmission developers and utilities need not wait; they can identify valuable routes and find viable rights-of-way right now, and then bring proposals into planning, and permitting, and cost allocation processes.

Planning is also the way to balance land and wildlife considerations. As Marshall Johnson, chief conservation officer of the Audubon Society, said in its 2023 report "Birds and Transmission: Building the Grid Birds Need": "Not only does Audubon understand the urgency of making the critical investments that will prepare the transmission grid to handle a clean energy future, we also understand how important it is to do it in the right way. How and where new transmission is constructed will have a tremendous impact on birds and our communities." That requires planning with key stakeholders involved, including wildlife protection organizations.

Permitting: Recently 10 major lines moved from the ready-to-go category into construction. This is important progress. But many of these lines were over a decade in the making. We simply do not have time for lines to take over ten years. The Department of Energy's lead agency function, along with its public-private partnership, Transmission Facilitation Program, and National Interest Electric Transmission Corri-

dor authority can help move project approvals faster while preserving environmental standards. Greater authority for FERC will help as well.

Paying: While there is no shortage of capital to invest in transmission, the structure of the electric industry was not designed for planning or recovering costs from large interstate-highway-type lines. Transmission is a classic public good, in which the beneficiaries are so many and so dispersed that it is in no individual's economic self-interest to help fund it. We have two ways in a modern democracy to pay for public goods: taxpayer funding (e.g., grants and tax credits), or regulatory cost allocation, where costs are assigned to appropriate electricity ratepayers. Either one could do the job.

A transmission tax credit and FERC cost allocation are both being considered by Congress, and FERC's regional transmission planning proposed rule includes cost allocation. FERC can and should do the same for interregional transmission. Cost allocation by FERC follows a "beneficiary pays" principle under various court decisions interpreting the Federal Power Act to ensure a fair allocation among users of the system. Whether the builder of transmission is a utility, independent developer, or combinations of different types of companies, taxpayer or ratepayer funding will be required.

There is no better time than now. The best time to start working through the planning, permitting, and paying challenges would have been ten years ago. But it didn't happen, and almost no long-haul large capacity transmission was built over the last decade. The next best time is right now.

Rob Gramlich is the founder and president of Grid Strategies LLC, a Washington, DC-based consulting firm focused on electricity transmission and power markets to support low-cost decarbonization.

Even Without New Legislation, Plenty to Do

By Alexandra B. Klass

Under the Federal Power Act, FERC has an obligation to maintain national grid reliability and to ensure “just and reasonable” rates for wholesale electricity sales and transmission. Notably, Congress has not granted FERC authority over the siting and permitting of most interstate transmission lines, as it has with interstate natural gas pipelines, leaving that authority over power lines primarily with the states. Even in the absence of congressional action, however, FERC has powerful tools using its existing statutory authority over rates and reliability to incentivize regulated transmission owners and grid planners to build the large-scale regional “macro-grid” the country needs. This transformation is critical to incorporate the increasing amounts of low-cost wind, solar, and battery resources rapidly being financed and built across the country to replace aging fossil-fuel generation.

To date, FERC has failed to direct regional transmission organizations and regulated utilities to engage in the type of planning needed to support the electric grid of the future, despite its efforts to encourage such actions in Order 1000 in 2011. Integrating new carbon-free resources into the grid and maintaining both reliability and just and reasonable rates falls squarely within FERC’s jurisdiction and is even more urgent than it was in 2011—because of the increasing number of blackouts and brownouts nationwide due to aging grid infrastructure and severe weather events arising from climate change.

Importantly, clean energy is currently the lowest-cost electricity resource even without federal financial support. The massive new influx of funding for carbon-free energy re-

sources and grid expansion under new federal laws only make these resources more financially desirable, prompting utilities across the country to retire coal plants in favor of new wind, solar, and battery resources.

To date, however, two of the four FERC commissioners continue to ignore the reality of today’s energy mix based on arguments that not all states have enacted clean energy policies and thus should not pay for transmission infrastructure to support other states’ policies. Such arguments ignore the fact that renewable power resources are being built not only in states with clean energy standards like California, Minnesota, and New York, but at an even faster pace in states that often proclaim as a policy matter that they oppose a clean energy transition, like Texas, Florida, Iowa, and Oklahoma—which are the top states nationally for installed capacity of wind and/or solar energy. Indeed, during the summer heat waves of 2023, the Texas grid maintained reliability in large part because of the private-sector investment in solar resources and batteries. The grid does not stop and start at state boundaries. FERC is responsible for ensuring a reliable grid nationwide that supports the significant changes to the generation mix across the country.

Beyond its fraught efforts to reach agreement on regional and inter-regional transmission-planning reforms, there are additional actions FERC can take to support a modern and reliable electric grid using existing statutory authority.

FERC can use its authority over return on equity to encourage transmission owners to build regional and inter-regional lines. Setting a higher ROE for such lines will counteract transmission owners’ desire to build local lines that they can include in their rate base and that are exempt from competitive bidding from merchant transmission line companies.

The commission can require regulated utilities and regional transmission organizations to offer expanded demand-response programs. Trans-

mission planning, permitting, and construction can take over a decade to complete, which is too long to keep pace with the hundreds of billions of dollars of investments that must, under federal law, be spent sooner than that, and will rapidly electrify the nation’s building and transportation systems. Demand response is a low-cost bridge solution that FERC can implement now.

FERC should engage with states, regional transmission organizations, and transmission owners to support co-locating transmission lines with other types of existing infrastructure, like the SOO Green line—an underground high-voltage line along railroad rights-of-way to transmit wind power to where it is needed. This is the type of large-scale inter-regional project that must be replicated. But the project has faced obstacles from regional transmission organizations’ interconnection and cost-recovery requirements that were not designed with projects like these in mind.

Using the revived backstop siting authority Congress granted in 2021, FERC can approve important but embattled transmission projects like the New England Clean Energy Connect in Maine and other regional or inter-regional projects. Doing so will create a template for similar projects and demonstrate to states that FERC is serious about using its enhanced authority.

Finally, FERC needs to recognize energy justice concerns as part of its obligation to ensure just and reasonable rates. Order 1000 requires planning processes that consider needs driven by state or federal requirements. State legislatures and public utility commissions are increasingly recognizing the need to incorporate energy justice into rates and policies. When underserved communities pay more for less reliable electric service, such rates—which include wholesale energy costs within FERC’s jurisdiction—are not just and reasonable.

Alexandra B. Klass is the James G. Degnan Professor of Law at the University of Michigan Law School.

FERC Should Stick to Just Being Boring

By Josiah Neeley

In the coming years, the nation's electric grid is going to undergo a transformation, as new technologies and the widespread buildout of clean energy resources necessitate major upgrades and expansions of the electrical transmission system. It's natural to ask what role America's main federal electricity regulator, the Federal Energy Regulatory Commission, will play in this metamorphosis.

Some would like to see FERC become a green advocate, actively seeking to push the grid in a more climate-friendly direction. But this would be a mistake. Ironically, FERC will have the greatest impact if it focuses on boring but important technology-neutral market reforms rather than pursuing headline-grabbing but ultimately insignificant sustainability mandates.

FERC is not an environmental regulator of the electrical sector. Nor should it be. Its mission is to ensure that the electric grid functions properly. Its staff has technical experience with matters of electric reliability, wholesale markets, and other related issues. Attempts to give FERC an explicit decarbonization mandate, such as making it consider the emissions impact of particular projects, risks degrading its effectiveness both at its core mission and side goals.

Instead, the best way for FERC to help aid the energy transition is to focus on what it does best. For example, one of the biggest barriers to renewable energy deployment is backlogs in generator interconnection. Zero-carbon resources compose 90 percent of new projects in grid interconnection, totaling about three-quarters of the capacity of all existing power plants. Regulatory

delays can slow a project by years. Partly as a result of these delays, only about one quarter of projects reach completion. Reducing interconnection backlogs is not a sexy issue, but it's an important one and is well within FERC's wheelhouse.

Under the Biden administration, FERC has taken initial steps toward interconnection reform, but has accomplished a modest amount to date. The administration's most celebrated action was FERC's recent Order 2023, which reduces barriers to new generator interconnection. Upon closer inspection, however, the order does not require much more than what all regional grid operators otherwise planned to do. More importantly, it does not address the core problems driving massive interconnection costs and backlogs. This requires deeper reform, including synergies with transmission reform.

Another key barrier to clean energy adoption that is squarely within FERC's remit to address is transmission congestion. Transmission congestion can prevent electricity from clean energy sources from reaching centers of electrical demand, which raises prices as well as emissions and can even exacerbate reliability problems. Grid-enhancing technologies can dramatically reduce grid congestion and double renewable energy integration in some regions.

Transmission owners, who make money based on their regulated rate base, have a perverse incentive to use their own lines more efficiently. Therefore, this puts FERC in the role of substituting for competitive forces, which it did in requiring use of one grid-enhancing technology in Order 881. Further reforms are hamstrung by the lack of grid congestion transparency in the Southeast, which makes it hard to legally demonstrate the cost savings of these technologies.

A third way FERC can provide a constructive role in grid modernization is by helping to develop better

market rules for pricing reliability services. FERC is also undergoing region-specific reforms to rules that credit resources for their reliability value. This is tricky math, as unconventional wind, solar, and storage are imperfect substitutes for conventional thermal power plants. If FERC tilts the scales in favor of thermal power, it could undermine the clean energy transition, but if it over-credits renewables it risks reliability problems that will undoubtedly spur government interventions, delaying the transition.

Modernizing reliability policy also requires addressing historic blind-spots. None is larger than the fact that nearly all consumption is presumed to have the same reliability value. The result is that modest supply shortfalls from, say, an abrupt wind downturn or natural gas pipeline problem result in involuntary, widespread outages. Market-friendly reforms would enable low-value uses of electricity to curtail voluntarily for compensation, while augmenting reliability for high-value uses. Such demand flexibility is an essential ingredient to integrate high levels of renewable energy.

None of these policies explicitly favor clean energy or are based on environmental considerations. But FERC's emissions impact by implementing its mission robustly should not be understated. In fact, policies such as these can have a greater influence on emissions trajectories than the Inflation Reduction Act and EPA's newly released power plant regulations. In the end, FERC epitomizes how market-friendly economic policy can be a boon to both our pocketbooks and planet. When it comes to what drives power industry decarbonization, the mundane is the sublime.

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