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Subcommittee on Energy

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Chairman Rush, Ranking Member Upton, and distinguished members of the Subcommittee, thank you for the opportunity to testify on behalf of the Department of Energy (DOE or Department) on the role of transmission in achieving the Biden-Harris Administration's clean energy goals; the Department's authorities related to transmission infrastructure, including new authorities that have been proposed in the Committee's CLEAN Future Act; and other legislation.

The Importance of Transmission

Modernizing and expanding the electric transmission grid could unlock access to cleaner, lower-cost energy for consumers and businesses, while improving the reliability and resilience of electricity delivery in the face of extreme weather and supply disruptions. To meet electricity demand in high electrification scenarios, installed capacity growths within a given region are expected to more than double 2018 levels by 2050[1]. President Biden has established ambitious climate goals: a carbon pollution-free power sector by 2035, and a net-zero greenhouse gas emissions economy by 2050.[2] Building up the Nation's electric transmission system will play a key part in achieving those goals.

An independent analysis[3], by the Americans for a Clean Energy Grid, confirms the importance of investing in our electricity grid. It identifies more than 20 major transmission projects that may be poised to move forward, potentially creating more than 600,000 new transmission-related jobs, and an additional 640,000 jobs from new clean energy generation projects enabled by the new transmission lines.

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[1] *See* National Renewable Energy Laboratory, *Electrification Futures Study Scenarios of Power System Evolution and Infrastructure Development for the United States* (January 2021), https://www.nrel.gov/docs/fy21osti/72330.pdf

[2] *See* Exec. Order No. 14008 of Jan. 27, 2021, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Feb. 1, 2021), https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad; *Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies* (Apr. 22, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.

[3] See Americans for a Clean Energy Grid, *Transmission Projects Ready to Go: Plugging into America's Untapped Renewable Resources*, (April 23, 2021) at https://cleanenergygrid.org/transmission-time-transmission-projects-ready-to-go/.

Spurred by rapidly declining costs for wind, solar, and storage, a significant transformation of the electricity system is already underway. But to meet the goal of 100 percent clean electricity by 2035, an even greater amount of electricity generation from renewable sources will be needed.[4]

The most economically attractive potential renewable resources are typically located in geographic areas that are remote from the areas where demand centers are located.[5] Therefore, further promoting the shift toward a clean power sector requires investment in critical enabling infrastructure such as transmission to increase access to these renewable energy sources.[6] Numerous studies find "that a reliable power system that depends on very high levels of renewable energy will be impossible to implement without doubling or tripling the size and scale of the [N]ation's transmission system."[7] Such investments in transmission infrastructure include increasing the capacity of existing lines, minimizing transmission losses through the use of new technologies, and building new long-distance, high-voltage transmission lines. Recent research shows that over 755 GW of generation capacity is seeking transmission interconnection, but failure rates and wait times are suggestive of growing interconnection and transmission challenges.[8] There have been growing calls for interconnection reform and changes to broader transmission planning processes.[9] Without upgraded and new transmission capacity, the electric grid cannot reliably and consistently deliver electricity from renewable sources currently in the interconnection queue to geographically dispersed, high-demand locations. In fact, lack of transmission capacity and grid upgrades remains a barrier to clean energy utilization in several areas.[10]

In addition to supporting the clean energy transition, a robust transmission system further enhances grid reliability and resilience. Investment in replacing, upgrading, and expanding transmission infrastructure can help prevent power outages, protect the grid against climate-induced extreme weather, and restore electricity more quickly when outages do occur. Most

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[4] *See* Energy Systems Integration Group, *Transmission Planning for 100% Clean Electricity*, at 4 (Feb. 18, 2021), https://www.esig.energy/wp-content/uploads/2021/02/Transmission-Planning-White-Paper.pdf [hereinafter ESIG Report]. In the ESIG Report, "[c]lean electricity refers to electricity that does not have carbon emissions as a byproduct of generation," including wind solar, hydroelectric, and nuclear energy. "Renewable energy refers to electricity sources that rely on energy that can be easily replenished," such as wind, solar, and hydroelectric sources. *See id.* at 4 n.1.

[5] *See id.* at 4-5.

[6] *See* Eric Larson, et al., *Net-Zero America: Potential Pathways, Infrastructure, and Impacts*, at 13-14 (Dec. 15, 2020), https://netzeroamerica.princeton.edu/img/Princeton_NZA_Interim_Report_15_Dec_2020_FINAL.pdf.

[7] ESIG Report at 10 (providing a summary of six studies at Appendix B).

[8] Rand et al. 2021. "Queued Up: Characteristics of Power Plants Seeking Transmission Connection As of the End of 2020." Berkeley Lab. https://emp.lbl.gov/publications/queued-characteristics-power-plants.

[9] Caspary et al. 2021. "Disconnected: The Need for a New Generator Interconnection Policy." Americans for a Clean Energy Grid. https://cleanenergygrid.org/wp-content/uploads/2021/01/Disconnected-The-Need-for-a-New-Generator-Interconnection-Policy-1.14.21.pdf/.

[10] *See, e.g.*, Jennie Jorgenson, et al., *Reducing Wind Curtailment through Transmission Expansion in a Wind Vision Future*, at iv (Jan. 2017) ("Absent significant upgrades to the western transmission network. . . a substantial amount of renewable energy cannot be utilized by the system, and therefore is curtailed."), https://www.nrel.gov/docs/fy17osti/67240.pdf; Joseph Rand, et al., *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2020* (May 2021), https://eta-publications.lbl.gov/sites/default/files/queued_up_may_2021.pdf.

importantly, expanding transmission capacity improves the resilience and flexibility of the energy system by creating more numerous energy delivery pathways. For instance, when one generation source is physically unavailable or uneconomic, transmission enables delivery from other generation sources, making the system better equipped to nonetheless meet delivery requirements.

Transmission may also help lower costs for customers and grow the economy. By diversifying electric generation sources and reducing congestion, transmission modernization efforts can help promote energy security, create cost savings for consumers, and facilitate economic growth through enhanced grid reliability and resilience. Diversification helps to mitigate infrastructure interdependencies which left unconstrained (or not understood) could otherwise threaten energy security.

An enhanced grid also supports environmental justice and economic development and allows underrepresented and underserved communities to access clean energy as we transition from fossil fuels.

Research and Development and Technical Assistance

The Office of Electricity is specifically looking at how to support operational efficiencies and flexibility within the delivery system in support of Administration goals through development and demonstration of improved sensors, flow control, and flexible technologies like energy storage.

The Department has several critical tools that have already been authorized by Congress to aid in the development of transmission. Moving to accelerate transmission development using existing authorities and available funding is key goal. Transmission projects, particularly with appropriate stakeholder engagement, take years in development time, and appropriate processes to engage DOE authorities will take time as well. These authorities include analytical capabilities to identify critical future transmission needs and development of transmission plans; convening power to align states, tribes, and other stakeholder interests with identified needs/plans; financing tools to reduce risk for merchant transmission developers; and authorities to facilitate development of projects where State and incumbent utility opposition has stymied that development. The Department intends to use these tools in a strategic and considered way to push further transmission deployment.

DOE Transmission Authorities

In general, the siting of electric transmission lines is done at the state level, and the setting of interstate electric transmission rates is done by the Federal Energy Regulatory Commission (FERC). DOE's Office of Electricity has a number of authorities that relate to electricity transmission, including the following:

Transmission Congestion Study and National Interest Electric Transmission Corridor Designation: Section 216(a) of the Federal Power Act (FPA) directs the Secretary of Energy (Secretary) to conduct an electric transmission congestion study every three years and to prepare it in consultation with affected states and regional reliability organizations. In the study, the

Department seeks to provide specific indications of transmission constraints and congestion and their consequences. The statute also directs the Secretary, "[a]fter considering alternatives and recommendations from interested parties (including an opportunity for comment from affected States), [to] issue a report, based on the study, which may designate any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers as a national interest electric transmission corridor." The most recent Transmission Congestion Study was issued in September 2020 for public comment.

Third-Party Financing for Transmission Projects: Section 1222 of the Energy Policy Act of 2005 (EPACT) authorizes the Secretary, acting through the Administrator of the Western Area Power Administration (WAPA), the Administrator of the Southwestern Power Administration (SWPA), or both, to "design, develop, construct, operate, maintain or own, or participate with others in designing, developing, constructing, operating, maintaining or owning" electric transmission and related facilities that are (1) located in designated national interest electric transmission corridors and will reduce electric transmission congestion, or (2) "necessary to accommodate an actual or projected increase in demand for electric transmission capacity." Section 1222 of EPACT applies to both existing facilities and new facilities and provides for the use of contributed funds from third parties, which funds are to "be available for expenditure for the purpose of carrying out [a given project] — (A) without fiscal year limitation; and (B) as if the funds had been appropriated specifically for that [particular project]."

Coordination of Authorizations for Electric Transmission Facilities on Federal Lands: Section 216(h) of the FPA provides for DOE to coordinate Federal authorization decisions on electric transmission facilities, including environmental reviews, and the setting of intermediate milestones and ultimate deadlines for the completion of Federal decisions.

Designation of Energy Right-of-Way Corridors on Federal Lands: Section 368 of EPACT directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior, in consultation with FERC and with state, tribal, and local governments as appropriate, as well as utilities "and other interested persons," to "designate, under their respective authorities, corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal lands in the eleven contiguous Western States" (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming), to perform any required environmental reviews, and to "incorporate the designated corridors into the relevant agency land use and resource management plans or equivalent plans." The statute also calls for identifying corridors "in States other than [the 11 contiguous Western States]" and for expediting processes for future projects in these energy corridors.

Transmission Planning

Building a transmission network that can offer access to a diversity of energy resources across geographic regions requires strategic planning. Transmission planning processes often narrowly focus on specific short-term reliability and local needs without identifying the long-term, flexible, inter-regional solutions that will enhance electric system resilience across regions, lower the cost of delivered power for consumers, or integrate the highest-potential clean energy resources that are needed to meet state and local clean energy policy and corporate and

individual clean energy preferences. Improving transmission planning can provide greater certainty to drive investment to the highest-need transmission projects and enable development of the projects with the largest benefits for consumers.

DOE has several activities that aid transmission planning. The Energy Zones Mapping Tool is an online mapping tool developed by The Eastern Interconnection States' Planning Council and three National Laboratories that can be used to identify potential energy resource areas and energy corridors in the United States. The Regulatory and Permitting Information Desktop Toolkit offers one location for agencies, developers, and industry stakeholders to work together on state and federal bulk transmission and renewable energy regulatory processes by using a wiki environment to share permitting guidance, regulations, contacts, and other relevant information. The Transmission Resilience Maturity Model is a model developed by the North American Transmission Forum, the Department of Energy Office of Electricity, the Electric Power Research Institute, and the Pacific Northwest National Laboratory that enables utilities to measure the maturity of their transmission resilience programs and identify improvements to increase the resilience of their transmission systems. The North American Energy Resilience Model is a national-scale energy planning and real-time situational awareness tool that DOE and several National Laboratories are developing.

Financing Opportunities at DOE

President Biden is committed to accelerating efforts to expand and modernize the Nation's electrical grid, and to creating well-paying union jobs while increasing access to reliable, affordable, clean power. There are financing and loan guarantees available from DOE's Loan Programs Office (LPO) and from WAPA for efforts to expand and improve the Nation's transmission grid.

Under section 301 of the Hoover Power Plant Act of 1984, as amended by the American Recovery and Reinvestment Act of 2009, WAPA has permanent statutory authority to borrow from Treasury up to $3.25 billion to finance electric transmission infrastructure and related facilities that support the delivery of renewable energy to market and have a terminus in WAPA's service territory. Commercially deployed utility-scale (front of meter) storage is eligible. Two completed transmission lines include the Electric District No. 5 to Palo Verde Hub project, which added 410 megawatts (MW) of bi-directional capacity to the electric grid in Arizona, and the Montana-Alberta Tie Limited project, which enabled 300 MW of capacity on a 214 mile, 230-kilovolt transmission line that enabled 189 MW of wind power to be deployed from the Rim Rock wind farm in Montana.

As announced in April, up to $5 billion in loan guarantees from LPO's Innovative Energy Loan Guarantee Program under EPACT Title XVII (Title 17) and Tribal Energy Loan Guarantee Program are available. The loan guarantees will enable DOE to support innovative transmission projects, along with transmission projects owned by federally recognized tribal nations or Alaska Native Corporations. These could include high-voltage direct current systems, transmission to connect offshore wind, and facilities sited along rail and highway routes.

Permitting

It is important that permitting requirements are coordinated to reduce the time to build transmission. The Secretary is responsible for authorizing exports of electric energy (under section 202(e) of the FPA) and for issuing Presidential permits for the construction, operation, maintenance, and connection of electric transmission facilities at the international border (under Executive Order No. 10,485). In carrying out the electricity export authorization and Presidential permit programs, the Department aims to enhance the resilience of the North American electric grid, bolster the reliability of the domestic electric power supply, and collect, analyze, and disseminate information on the international electricity trade. Department of Transportation has committed to facilitate the use of public highways and other transportation rights-of-way to speed the siting and permitting of transmission lines and build renewable energy projects.

Congressional Budget Request for Fiscal Year 2022

The Fiscal Year 2022 Budget Request for the Office of Electricity will develop innovative grid technologies, upgrade and expand our transmission capacity, and support electrification. It will help us advance R&D, expand the development of power electronics for next-generation transformers, accelerate microgrid building blocks, grow grid-scale energy storage, and set long-term transformational strategies to decarbonize the electric grid through grid modernization. The Fiscal Year 2022 Budget has proposed investments in grid resilience that include technologies that will strengthen our Nation's transmission system through the following subprograms:

- Transmission Reliability and Resilience focuses on addressing challenges across integrated energy systems, supporting measurement and controls research and development (R&D) for the electricity system, and developing pathways to achieve an equitable transition to decarbonization and electrification.
- Resilient Distribution Systems is developing transformative technologies that will modernize the electric distribution system to support innovative clean energy solutions like electric vehicles, connected homes and buildings, solar, and energy storage.
- Energy Storage is developing technologies, such as flow batteries, and supporting energy storage planning, sizing, placement, valuation, and societal and environmental impacts, all while ensuring the stability, reliability, and resilience of our electricity infrastructure. Energy storage can be an integral part of transmission infrastructure, sometimes deferring or eliminating the need for more expensive legacy solutions.
- Transformer Resilience and Advanced Components is advancing grid hardware that carries, controls, and converts electricity, and adapts the electricity delivery system to the ever-evolving electric power grid—laying the foundation for domestic transformer manufacturing.
- Energy Delivery Grid Operations Technology is supporting a public–private partnership to develop national-scale energy planning and real-time situational awareness capabilities, by focusing on electric system interdependencies and risk.
- Transmission Planning and Technical Assistance is working with electricity system partners and stakeholders to modernize the grid and ensure equitable and adequate transmission capacity across the United States.

The increasing frequency of wildfires has become a stark reminder of the effect climate change has had on our world. Wildfires pose an increasing threat to the country's electric infrastructure, which is a vital piece of our Nation's safety, prosperity, and wellbeing. To begin addressing this problem, OE held a series of four Wildfire Mitigation webinars in April 2021 to educate the utilities and to offer capabilities and technological solutions for mitigating this growing risk.

We will continue to work with states and industry to find transformative solutions to mitigate these risks. This will be one of the many challenges that will be addressed as we continue to build the grid of the future. Our Fiscal Year 2022 budget request supports that goal.

Legislative Action Would Unlock More Transmission

While the tools that Congress has already provided the Department can help overcome barriers to transmission development, the additional Congressional action outlined in the FY 2022 President's Budget and the American Jobs Plan could make a significant difference.

As part of the American Jobs Plan, the President has proposed to invest in America to create millions of good jobs, rebuild our Nation's infrastructure, and position the United States as a global leader. Through investments in the grid—especially transmission—that modernize and build a more resilient system, we can move cheaper, cleaner electricity to where it is needed most, reduce power outages in homes across America, and lower energy bills for all Americans.

This starts with the creation of a targeted investment tax credit that incentivizes the buildout of at least 20 high-voltage capacity power lines and could mobilize tens of billions in private capital off the sidelines – right away. Additionally, the American Jobs Plan proposes establishing a new Grid Deployment Authority at the Department of Energy that allows for better leverage of existing rights-of-way and supports creative financing tools to spur additional high priority transmission lines.

The Administration has also proposed an Energy Efficiency and Clean Electricity Standard to rapidly grow new clean energy supply while also supporting existing low-carbon supply.

The Department also recognizes that this Committee has put forward a number of additional policy proposals to address barriers to transmission development, including a variety of transmission provisions in Title II of the CLEAN Future Act, Congressman Peters' (CA-52) POWER ON Act and Congressman Casten's (IL-6) Interregional Transmission Planning Improvement Act. While the Administration has not taken a position on these particular proposals, the Department looks forward to continuing to work with this Committee to ensure effective planning, payment, and permitting of interstate transmission. As the Committee considers these and other policies, the Department recommends consideration of the following existing and new areas that can help accelerate deployment:

1) *Increase the capacity on the existing system in the near-term.* This includes advancing dynamic line ratings, power flow control, reconductoring, and transmission-level energy storage.

2) *Accelerate interconnection of resources to the system, including by addressing delays moving projects to interconnection queues, and fairly allocating the costs of resulting system upgrade.*
3) *Plan for interregional transmission and accelerate developers' ability to site, permit, allocate costs, and build*.

Conclusion

A secure and resilient power grid is vital to preserving our Nation's security and economic prosperity and affects the livelihood of all Americans. Transmission investment is critical to achieving our goals of a clean, reliable, and resilient electric grid. Thank you, and I look forward to your questions.