WHITE PAPER RECAP:

ELECTRIC TRANSMISSION CAPACITY AND RENEWABLE ENERGY

The United States' electric transmission network was originally designed to connect large, fossil fuel-powered plants to population centers with high demand. The way we generate electricity has changed significantly, and the existing electric grid often fails to meet the needs of new generation. As more renewable energy is developed across the nation, the grid must be updated or expanded to provide consumers with reliable access to clean energy.

Transmission capacity for renewables

- As electric demand grows and new generation is developed to service the electric needs of consumers, we must invest in additional transmission capacity.
  - 70 gigawatts (GW) to 220 GW of new generation by 2030 would require an annual infrastructure buildout of $3 billion to $7 billion to create the necessary transmission capacity.[1]
- Historic trends in renewable energy development and transmission expansion or upgrades offer insight into the need for new capacity.
  - From 2007 to 2016, there were 93 GW of wind and solar placed into service in the U.S., as well as $120 billion worth of investment in transmission infrastructure.
  - Drawing from this historic data, an estimated kilowatt (kW) of renewable capacity would require $300 to $700 of accompanying transmission investment.[2]
- In the Midwest and Great Plains, there is significant renewable generation in various stages of study and development that would require transmission capacity.
  - There are currently 36.7 GW of wind and 35.2 GW of solar projects in the Midcontinent Independent System Operator's generator interconnection queue.[3] The Southwest Power Pool's queue has 50.4 GW of wind and 25.9 GW of solar under study.

Retirement of aging coal generation

- Coal-fired generating capacity has dropped since reaching its peak in 2011.
  - 23.5 percent of coal capacity retired across the country between 2011 and 2018, taking a total of 75 GW of generation offline.
- A contributing factor to these retirements was the availability of lower-cost renewables.
  - Wind and solar were cheaper generating resources when compared to 211 GW of nearby existing coal-fired capacity in 2018, or about 74 percent of the entire coal fleet in the U.S.[4]
  - 94 GW of the total coal-fired capacity was deemed to be at substantial risk by providing energy for prices at least 25 percent lower than competing coal-fired generation.[5]

Expansion of renewable energy

- As the wind and solar energy industries continue to grow, costs have declined due to new technology and improved efficiency. From 2009 to 2018:
  - Levelized cost of energy for wind decreased by 69 percent.
  - Levelized cost of energy of solar decreased by 88 percent.
- A total of 35,135 megawatts (MW) of wind capacity was in development in 31 states at the end of 2018—an expected 36 percent increase in capacity from the 96,433 MW already in operation.
- Utility-scale photovoltaic solar set an all-time record for projects, with 25.3 GW worth of projects proposed by the end of 2018.[6]

Demand for new renewable generation

- Electric demand is likely to grow as electrification increases for transportation and other sectors—an increase that may range from 5 percent to 15 percent by 2030. Estimates point to 70 GW to 220 GW of new electric generation required as early as 2030 to meet growing demand.
- Counties and cities across the nation have also made clean energy commitments:
  - By the end of 2018, 11 counties and 104 cities have pledged to 100 percent clean energy goals.[8]
  - 29 states and the District of Columbia have renewable portfolio standards, and eight states have renewable portfolio goals.[9]
  - Proposed legislation in several states would also generate demand for clean energy in the form of 100 percent carbon-free or renewable standards.

Sources

1 Weiss, Jurgen, et al. "The Coming Electrification of the North American Economy." WIRES, March 2019, wiresgroup.com/new/wp-content/uploads/2019/03/Electrification_BrattleReport_WIRES_FINAL_03062019.pdf. Accessed July 2019.

2 Ibid.

3 "MTEP 18 Transmission Enhancement Plan." Midcontinent Independent System Operator, 2018, cdn.misoenergy.org/MTEP18%20Full%20Report264900.pdf. Accessed July 2019.

4 Gimon, Eric, et al. "The Coal Cost Crossover: Economic Viability of Existing Coal Compared to New Local Wind and Solar Resources." Vibrant Clean Energy and Energy Innovation, March 2019, energyinnovation.org/wp-content/uploads/2019/04/Coal-Cost-Crossover_Energy-Innovation_VCE_FINAL2.pdf. Accessed June 2019.

5 Ibid.

6. Perea, Austin, et al. "U.S. Solar Market Insight." Solar Energy Industries Association and Wood Mackenzie Power & Renewables, 2019, woodmac.com/research/products/power-and-renewables/us-solar-market-insight/. Accessed July 2019.

7 Weiss, Jurgen, et al. "The Coming Electrification of the North American Economy." WIRES, March 2019, wiresgroup.com/new/wp-content/uploads/2019/03/Electrification_BrattleReport_WIRES_FINAL_03062019.pdf. Accessed July 2019.

8 Feldman, David, et al. "Q3/Q4 2018 Solar Industry Update." National Renewable Energy Laboratory, 2019, nrel.gov/docs/fy19osti/73234.pdf. Accessed July 2019.

9 "Renewable Portfolio Standard Policies." DSIRE, 2018, ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2018/10/Renewable-Portfolio-Standards-2018.pdf. Accessed July 2019.

VIEW THE ENTIRE WHITE PAPER:

"Capacity for Change: The Role of Transmission Infrastructure in Energy Transition," a white paper published in 2019 by Lucas Nelsen and the Center for Rural Affairs, can be found at cfra.org/publications/CapacityForChange.