National Electrical Manufacturers Association

TRANSMISSION

Before electricity is distributed to consumers, it is first transmitted from its generation source to the grid. The U.S. electric grid currently contains over 642,000 miles of high-voltage transmission lines.[1] Expanding transmission capacity is essential for sourcing new and high-quality renewable energy resources. Preventing region-wide blackouts and ensuring consistent, equitable access to electricity depends on updated transmission infrastructure and advanced transmission technologies.

Key Technologies

- **High-voltage transmission lines**
  - Sensor and software solutions
  - Dynamic line rating
- **Topology optimization controls**
- **Actuators and hardware solutions**
  - AC and DC power flow controllers

Potential Market Size & Timing

To meet net-zero scenarios, the capacity of the transmission system will need to at least double by 2030 and possibly triple by 2050.[2] Even in lower transmission estimate scenarios where construction is more difficult and costly, current domestic transmission capacity will still need to increase by approximately 26%. The most successful low-cost net-zero scenarios demonstrate a clear relationship between transmission and wind, as wind generation is most dependent on new transmission capacity.

Barriers

- Siting and permitting
- Aging infrastructure
- High cost of infrastructure and technology
- System congestion

Accelerators

- Governments globally are funding grid improvement and reliability projects.
- Permitting reform (including eminent domain or similar tools) to ensure projects can be built in a commercially reasonable time.
- **Full implementation of Bipartisan Infrastructure Law** provisions accelerating transmission:
  - **Transmission Facilitation Program:** $2.5 billion for high-capacity transmission projects
  - Energy improvements in **rural or remote areas** provision funding for cost-effectiveness and siting for transmission systems.
- Full implementation of an estimated $20 billion globally allocated for transmission and distribution systems spending between 2020-2023.
- DOE's Building a Better Grid Initiative focuses on domestic deployment of new and upgraded high-capacity electricity transmission lines.
- Using existing rights-of-way corridors such as highways, railways, and pipelines to co-locate transmission can address some of the issues associated with the transmission siting and permitting process.

Relevant NEMA Technologies and Products

- Transmission and distribution voltage regulators
- Power and control cables
- High voltage insulators
- Power conversion devices
- Transformers
- Switchgear

1 Advanced Transmission Technologies Report - final as of 12.3 - FOR PUBLIC_0.pdf (energy.gov)
2 Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035 (nrel.gov)