

# 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.<sup>1</sup> Expanding transmission capacity is instrumental in 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.<sup>2</sup> 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 challenges
- Aging infrastructure
- High infrastructure and technology costs
- 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 provide 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."

## Relevant NEMA Technologies

- Transmission and distribution voltage regulators
- Power & control cables
- High voltage insulators

<sup>1</sup> [Advanced Transmission Technologies Report - final as of 12.3 - FOR PUBLIC\\_0.pdf \(energy.gov\)](#)

<sup>2</sup> [Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035 \(nrel.gov\)](#)