

# DOE Workshop on Electric Transmission Development and Siting Issues

Are there unmet needs for additional long-distance, high-voltage transmission lines?

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# Resiliency and Interdependency of Critical Infrastructure to Transmission

- System Trends
  - New Threats
  - Changes in Resource Mix
  - Changes in State Public Policy Initiatives
- Need for long-distance, high-voltage transmission
  - Need for long-distance transmission will be very specific to regional needs and regional plans

# New Threats

- Threats
  - Severe weather
    - Severe cold, i.e., Polar Vortex
    - Severe heat, including wildfires
    - Hurricanes, flooding, windstorms
  - Physical Attacks
  - Cyber Attacks
  - Interdependent Infrastructure, *i.e.*, natural gas supply
- Impact on Need for New Long-Distance High Voltage Transmission
  - Design and build resiliency within existing system – all hazards
  - Mitigate potential vulnerabilities of substations and rights of way
  - Mitigate potential vulnerabilities of interdependent infrastructure
  - New transmission may not provide all the solutions
    - Ex. Western Interconnection Gas – Electric Interface Study – mitigation options for Desert Southwest/Southern California for pipeline disruption were not electric transmission
    - Possible market design solutions – depends on regulatory structure

## Changes to Resource Mix

- Increased reliance on natural gas generation
- Increasing solar and wind resources requires larger amounts of flexible capacity to support the increasing ramping requirements
  - Slides presented to Nov. 6, 2018 NERC MRC on 2018 Long-Term Reliability Assessment
- Impact on Need for New Long-Distance High Voltage Transmission
  - Need transmission to interconnect and deliver new generation, including generation incented by state public policies – very location specific
    - For example, if states in the east coast have public policies support off-shore wind, what is the need for long-distance transmission to deliver wind from the Great Plains?
  - Need transmission for local upgrades to maintain reliability following generator retirement (may also require voltage support through SVCs, instead of or in addition to new transmission lines)
    - Need to consider time to site new transmission to maintain reliability in the face of retirements

# Change in State Public Policy Initiatives

- Environmental
  - Carbon free resources
  - Off-shore wind
  - Solar, Distributed Energy Resources (DERs); Microgrids
- Energy Efficiency
  - Reduction in load growth – 10-year compounded annual growth rate for North America projected to be 0.57% summer and 0.59% winter
- Impact on Need for New Long-Distance High Voltage Transmission
  - Reduced load growth estimates means transmission expansion needs to be focused locally based on specific load growth; need to consider off-peak energy usage (electric vehicle charging) in ratings for equipment
  - In areas like PJM, where a states are pursuing off-shore wind, need transmission to (1) interconnect off-shore wind; and (2) develop network to provide optionality to deliver future off-shore wind efficiently
  - Off-shore wind is alternative to very long distance transmission to deliver western wind, which are not part of public policy initiatives of states to which the western wind would be delivered

## Final Thoughts

- Need to address new threats – keep system reliable and increase resiliency
- Need to account for changing resource mix
- Need to account for state public policy preferences – study new resources in state plans and how to integrate them into the system
- The regional needs and the regional plan are important
- Looking at the system as a whole, need to consider difficulties in transmission siting, i.e., nearby is better, takes less time, less siting issues