

# Improving Electrical Grid Reliability & Resilience to Withstand Extreme Weather Events

Aging electrical systems cannot withstand catastrophic weather events



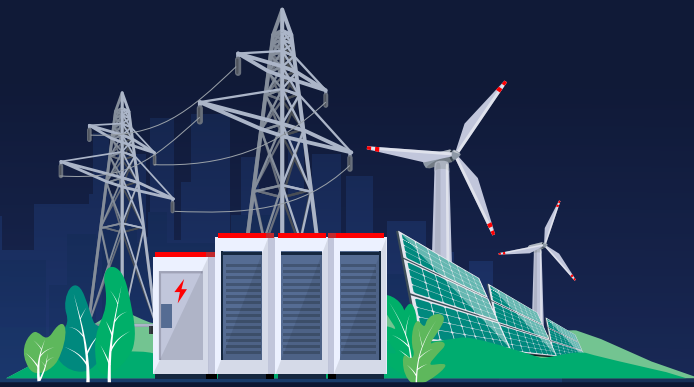
Heat and ice



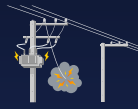
Tornadoes



Hurricanes



## Negative impacts on the electrical grid



Damage and collapse of overhead power lines



Nationwide blackouts causing damages in billions of dollars every year



Supply unable to keep up with the demand for electricity



Climate change and the consequent rise in harsh weather in the United States has highlighted the need for reliable and resilient electrical grids

## ASCE collection on the impact of extreme weather on the electrical grid



### Simulation models

- Fragility and reliability assessment
- Power grid vulnerability and robustness assessment
- Icing hazard reliability assessment

### Case studies

- Probabilistic risk analysis for transmission towers in Mexico
- Analysis of blackout hazards following Hurricane Irma
- Cost estimation for storm-induced power outages in Texas
- Energy management analysis of Alexandria, Egypt's distribution network
- Grid performance analysis for posthurricane investigation in Puerto Rico

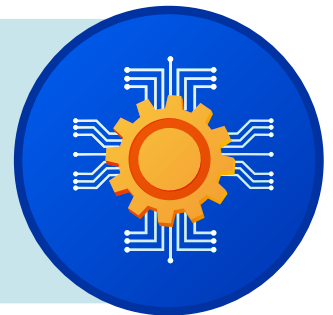


### Development of power grid resilience strategies

- Machine learning-based framework for predicting rapidity of a power structure following outages to improve resilience
- Assessing grid vulnerability and robustness through simulating cascading failure propagations using a dynamic cascading failure physics-based model

### Upgrading old technologies and implementing new technologies

- Upgrading to modern aluminum conductor composite core conductors in old transmission lines in Brookfield Smoky Mountain
- Employing smart meters, automated switches, and microgrids
- Switching to smart grids



These studies help civil and structural engineers build more resilient and reliable electrical grids, which help with:



Supply of continuous energy to Americans



Healthy integration of renewable energy to achieve climate goals



Reduction of energy costs to have a positive impact on the economy



Technically sound structural design of distribution infrastructure



Funding now available through the Bipartisan Infrastructure Law will help with improving this critical energy infrastructure and create new jobs in the process