

# Unlocking the queue:

How advanced transmission technologies can double renewable energy build



## Grid-Enhancing Technologies (GETs):

hardware or software that increases the capacity, efficiency, and/or reliability of transmission facilities



### Dynamic Line Ratings

Measure the true capacity of transmission lines based on ambient conditions



### Advanced Power Flow Control

Reroutes power from congested to underutilized lines



### Advanced Topology Control

Identifies grid reconfigurations to reroute flows around bottlenecks

## The Benefits of GETs

## in Kansas and Oklahoma



**2x** the renewable energy capacity



Paid for in **6 MONTHS**



**3 MILLION TONS** carbon emissions avoided annually



**\$175 MILLION** annual production cost savings



**11,300** direct short-term jobs  
**650** direct long-term jobs

## Potential Nationwide

## Benefits



**20 MILLION** carbon emissions cuts equal to 20 million cars off the road



**OVER \$5 BILLION** production cost savings

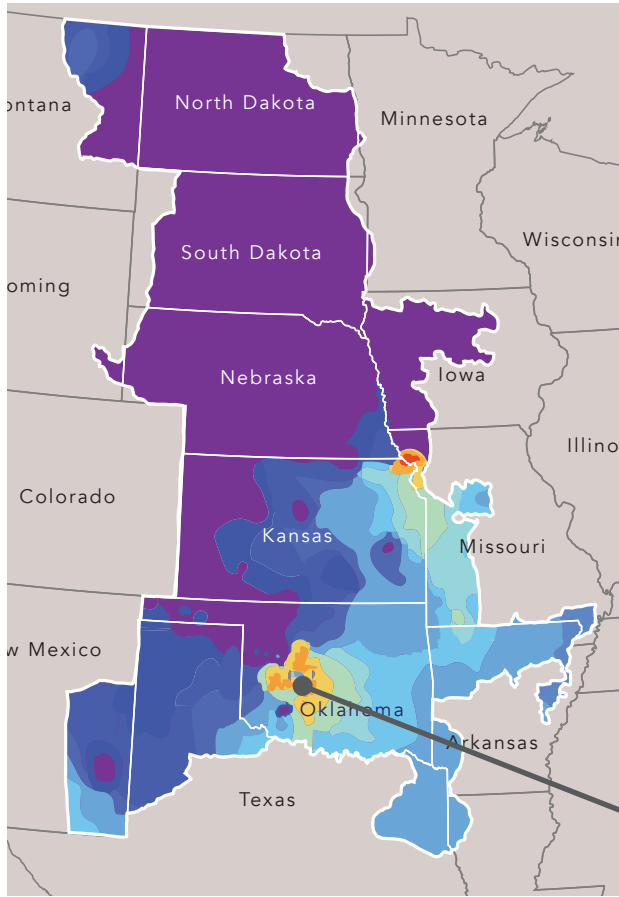


**TENS OF THOUSANDS** of local construction jobs, and thousands of long-term, high-paying jobs



**IMMEDIATE PROGRESS** towards a decarbonized grid





## Case Study: Oklahoma and Kansas

Kansas and Oklahoma are two of the most wind-rich states in the United States. Their transmission grids were designed for centralized power stations, but the boom in wind power means that electricity is being generated further from cities. **Transmission constraints cause congestion on lines, generator curtailment, and prevent new renewable energy development.** Both states are in the Southwest Power Pool (SPP), a regional transmission organization which coordinates transmission planning in the region and manages 68,000 miles of transmission lines.

### ABOUT THE STUDY: UNLOCKING THE QUEUE

*Unlocking the Queue, published in February 2021, is available for download at [watt-transmission.org](http://watt-transmission.org). The study was undertaken by The Brattle Group, with input from the WATT Coalition and funding from GridLab, EDF Renewables North America, NextEra Energy Resources, and Duke Energy Renewables.*

*Price contours in KS and OK show the price impact of transmission congestion, which also led to thousands of megawatts of curtailed wind generation on the morning of February 4, 2021. Blue indicates some congestion, while yellow and orange indicate significant congestion.*

## Unlocking the Queue Methodology

What does 2025 look like?

### STATUS QUO:

Based on projects in the interconnection queues, planned generation retirements and transmission expansion in KS and OK, the 2025 base case scenario can support

**2,600 MW**

of new wind and solar generation using traditional planning approaches.

### GETs IMPACTS:

The potential transmission capacity improvements from dynamic line ratings, advanced power flow control and advanced topology control were calculated using representative power flow snapshots and a model of the entire SPP network. Based on the increased transfer capacity, more projects from the interconnection queue could be built.

WITH GETs, OVER  
**5,200 MW**

of new renewable generation can be economically built in KS and OK, by 2025.

Half as much will be built without GETs.

The installation cost of

**\$90 MILLION**  
would be recouped  
in **6 months.**



# How to Unlock the Benefits

## Rethink the grid as a resource

Its capabilities are not static; they vary based on ambient conditions and its utilization, and its operation must reflect that in order to achieve maximum consumer benefits.

### Infrastructure Stimulus

GETs create jobs, improve infrastructure and save money – federal stimulus should invest to deploy these proven, common-sense tools.

### Transmission Policy Reform

Today, GETs are not integrated into transmission operations and planning, and the cost-recovery business model for transmission disincentivizes their use. The Federal Energy Regulatory Commission (FERC) can act to fix both problems.

### Improve Interconnection Process

Renewable developers should be allowed to request and have GETs offered as least-cost solution to connect to the grid. Transmission providers and FERC could implement this change.



### About the WATT Coalition

The Working for Advanced Transmission Technologies (WATT) Coalition advocates for policy that supports wide deployment of Grid Enhancing Technologies (GETs), to improve grid planning and operations. Dynamic Line Ratings determine the true, real-time capacity of power lines. Advanced Power Flow Control allows operators to reroute power to lines with available capacity. Advanced Topology Control identifies the best grid reconfigura-

tions to reroute flow around bottlenecks. In operations, these technologies reduce congestion costs and improve economic dispatch, situational awareness and reliability. In planning, they reduce the time, cost and complexity of integrating new generation and load. WATT members include Ampacimon, LineVision, Lindsey Systems, NewGrid, Smart Wires, and WindSim Americas Inc. Learn about unlocking more value from the grid at [watt-transmission.org](http://watt-transmission.org)

