

# Grid-Enhancing Technologies

*Solutions for Reliability and Resilience, Renewable Interconnection and Cost Savings*

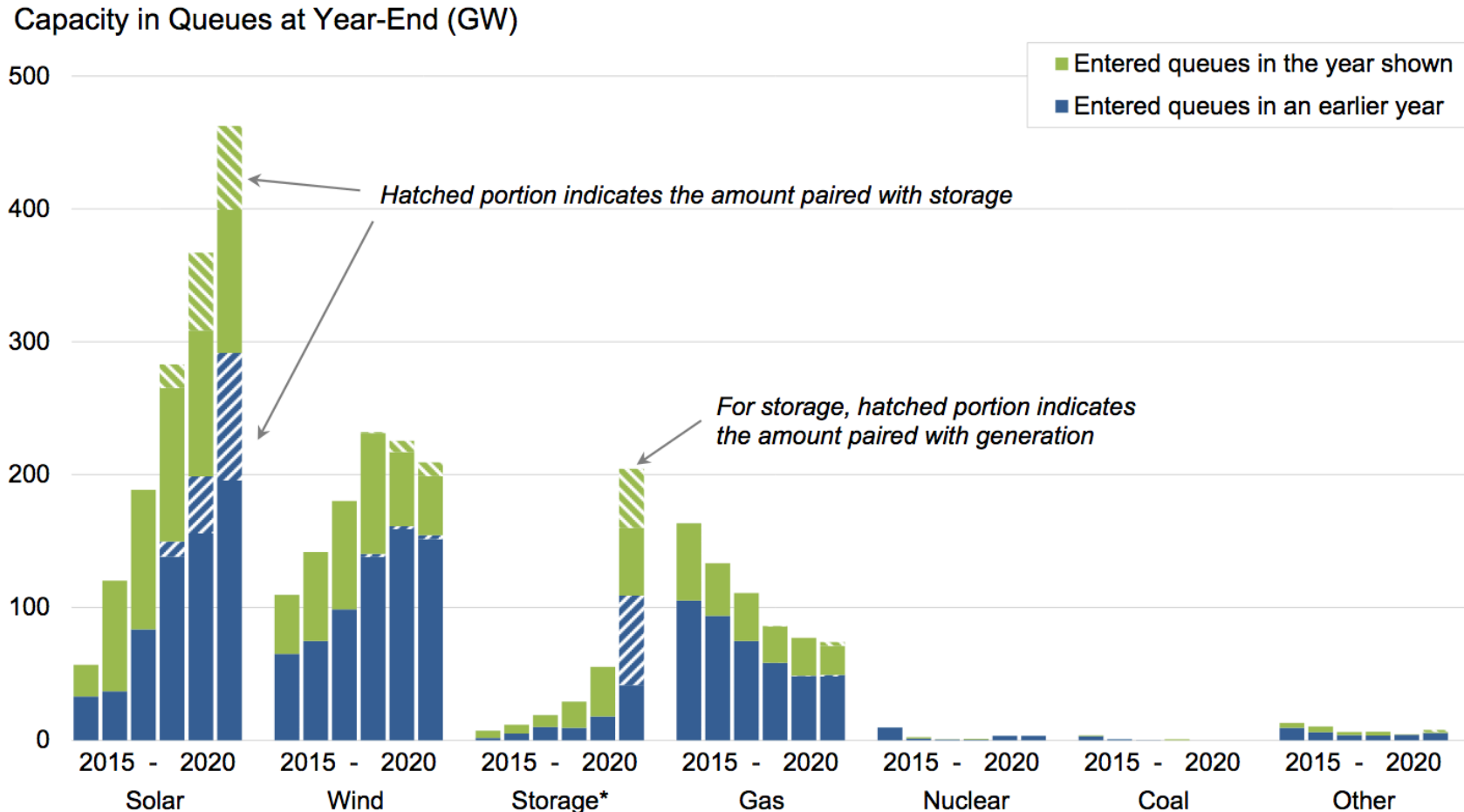
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Grid Strategies, [www.gridstrategiesllc.com](http://www.gridstrategiesllc.com)

WATT Coalition, [www.watt-transmission.org](http://www.watt-transmission.org)



# Generation is Stuck in Interconnection Queues



844 GW of generation – 90% renewables, storage, and hybrids stuck in queues, end of 2020



# Transmission Congestion Costs (\$ millions) for RTOs from 2016-2019

RTO	2016	2017	2018	2019
ERCOT	497	976	1,260	1,100
ISO-NE	39	41	65	33
MISO	1,400	1,500	1,400	900
NYISO	529	481	596	462
PJM	1,024	698	1,310	583
SPP	280	500	450	457
<b>Total</b>	<b>3,769</b>	<b>4,196</b>	<b>5,080</b>	<b>3,535</b>

RTO regions = 58% of U.S. market, scaling yearly costs to **\$6 billion+**



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# Implement Grid-Enhancing Technologies to mitigate queue and congestion issues

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Immediate impact  
Low cost  
Can be redeployed





# 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



# Benefits of Grid Enhancing Technologies (GETs)

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*Economic, Reliability and Clean Energy Benefits*

## **Cost Savings**

- Decreased congestion costs – estimated savings of up to *\$2 billion per year*
- Lowest cost increase in transmission capacity
- Cheaper generation unlocked
- GETs are very low cost: roughly \$0.5k - \$25m per installation

## **Cleaner energy, faster**

- GETs can *double* the integration of new renewable energy capacity of a transmission system, without any new lines
- GETs deploy in months for rapid energy transition

## **Reliability through flexibility and awareness**

- Data-driven decisions, real-time visibility, and enhanced control over the system support reliable grid operation

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# 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

Results from SPP transmission system model, historical power flow snapshots and 2020 generation interconnection queue. Full report at [watt-transmission.org/unlocking-the-queue](http://watt-transmission.org/unlocking-the-queue)



# Federal action on multiple fronts

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- **FERC**

- ANOPR - 90 parties supported including GETs in transmission planning and cost allocation processes
- Shared Savings Incentive
- New Dynamic Line Ratings Docket

- **Congress**

- Infrastructure Investment and Jobs Act
  - Smart Grid Investment Grants – \$3 billion
  - Transmission resilience - \$5 billion

