

Advanced Transmission Technologies

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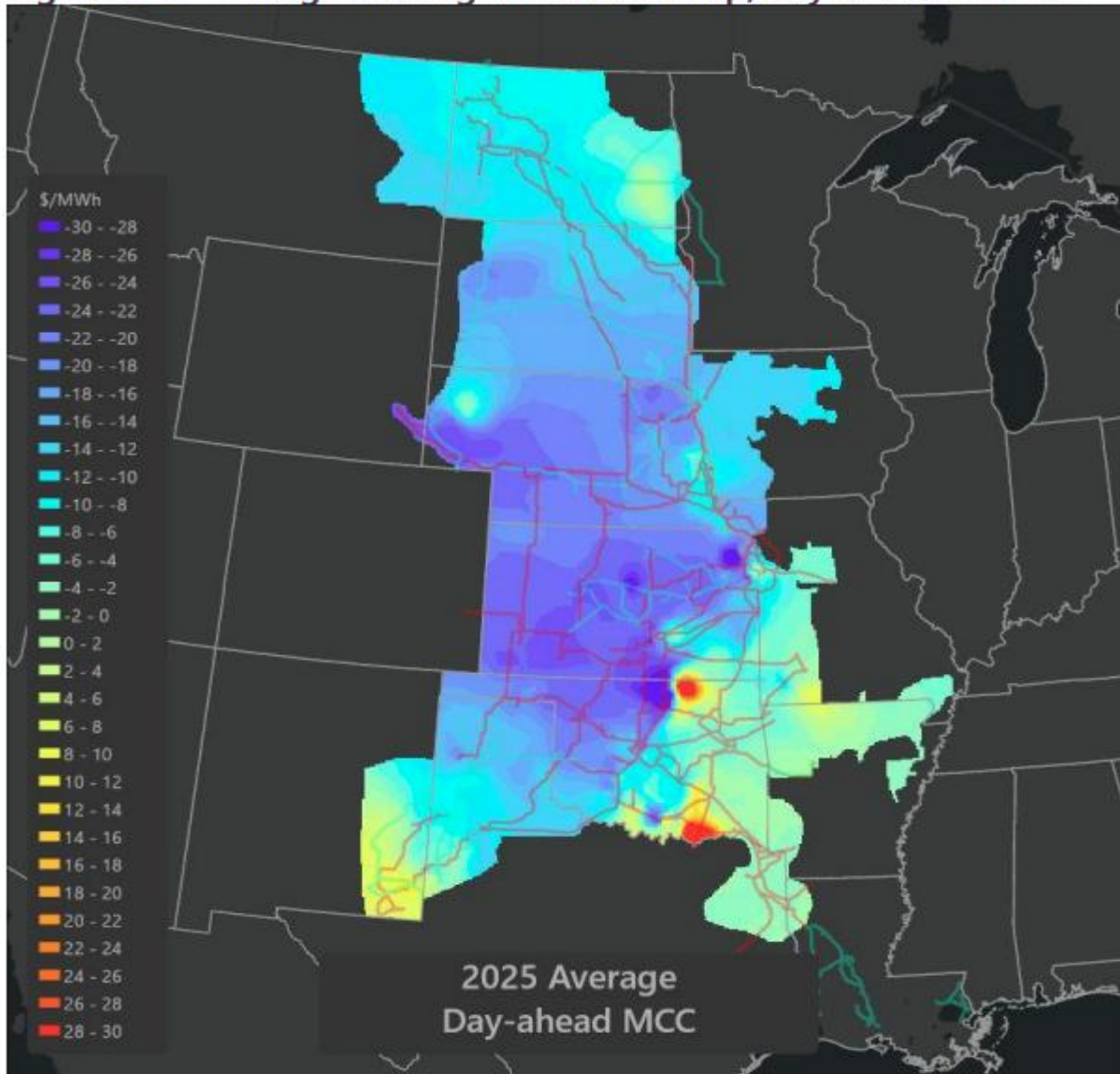
Oklahoma Interim Study on Grid Resilience and Innovation
September 23, 2026

Pew

What is Congestion?

- **Congestion** occurs when power plants can produce electricity at a competitive price but cannot deliver that power to consumers.
 - It is a **symptom of a constraint** or a combination of constraints in a transmission system
 - Congestion **raises prices for consumers** because they must pay for more expensive electricity

Figure 5–2 Marginal congestion cost map, day-ahead market



- Total congestion costs in SPP averaged **\$1.6 billion a year** from 2023-2025
- The **highest average congestion costs in SPP** exist in Tulsa and Oklahoma City

Source: Southern Power Pool Market Monitoring Unit, 2025 Annual State of the Market Report, https://www.spp.org/documents/76798/2025_annual_state_of_the_market_report.pdf.

7 of Top 10 Constraints in the Southern Power Pool are in Oklahoma

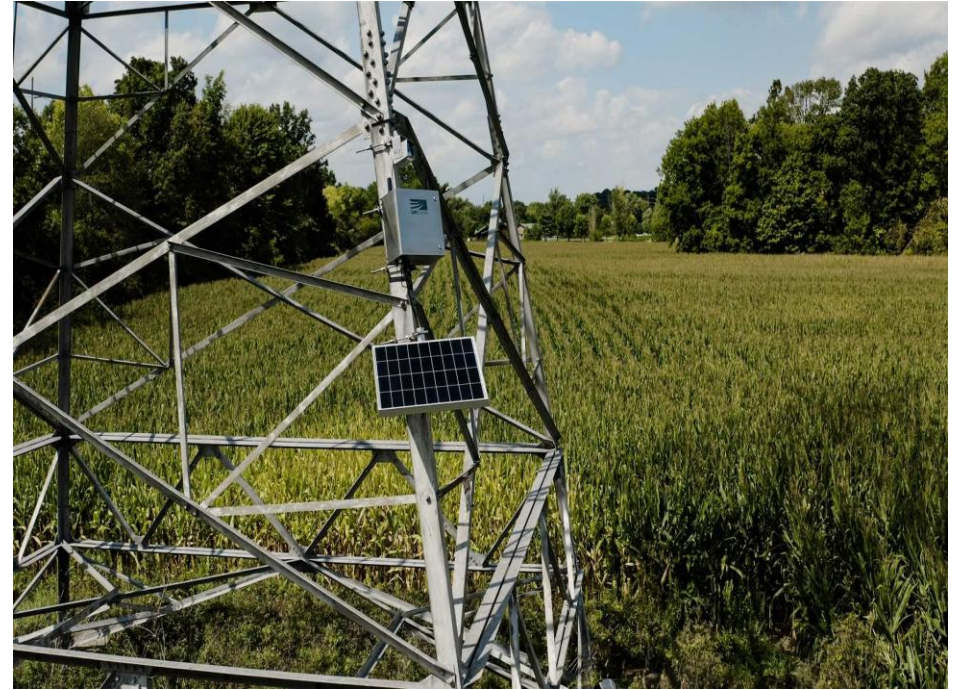
	Flowgate name	Region	Flowgate location
	OSAWEBCLESOO	Northern Oklahoma	Osage-Webber Tap 138 kV (CSWS, OKGE) ftlo Sooner-Cleveland 345 kV (GRDA, OKGE)
	TMP128_29363	Southern Oklahoma	Russett-S. Brown 138 kV (WFEC) ftlo Bodle-Brown Tap 138 kV and six additional elements (OKGE)
	TMP336_31246	Southern Oklahoma	Duncan transformer 138/69 kV (CSWS) ftlo Empire-Comanche 138 kV, Empire-Fletcher SW 138 kV, Georgia tap-Anadarko 138 kV, Georgia tap-Fletcher SW (WFEC)
	EDWXFR87CRAI	Kansas City, Kansas area	Edwardsville transformer 115/161 kV (WR) ftlo 87 th St.-Craig 345 kV (WR)
	TMP311_30771	Southern Oklahoma	Carter Tap-Chickasaw 138 kV (OKGE) ftlo Johnson County transformer 138/1 kV (OKGE)
	TMP270_23432	Northeast Oklahoma	Cleveland to Cleveland AECI 138 kV (GRDA) ftlo Cleveland-Tulsa North 345 kV (CSWS, GRDA)
	FORTIEHANWAH*	Southeast North Dakota	Forman-Forman 115 kV (OTP, WAUE) ftlo Hanson-Wahpeton 230 kV, Wahpeton transformer 1/115 kV (OTP)
	TMP743_31320	North Central Oklahoma	Osage-Webber Tap 138 kV (CSWS, OKGE) ftlo Neosho-Neosho 345 345 kV (WR)
	TMP563_26603	Southern Oklahoma	Russett-South Brown 138 kV (WFEC) ftlo Bison-Hugo 345 kV (OKGE, WFEC)
	TMP266_27514	Southeast Kansas	Franklin transformer 161/69 kV (WR) ftlo Franklin-Litchfield 161 kV (WR)

* SPP market-to-market flowgate during all or part of 2025

Source: Southern Power Pool Market Monitoring Unit, 2025 Annual State of the Market Report, https://www.spp.org/documents/76798/2025_annual_state_of_the_market_report.pdf.

Advanced Transmission Technologies (ATTs)

- **Unlock more capacity** out of our existing grid
- **Upgrade the grid faster and for less cost** than traditional transmission infrastructure
- **Reduce congestion costs** for consumers
- **Minimize land use impacts** by increasing capacity within existing rights-of-way



Topology Optimization

- A **software solution** that helps determine the best available routes for power
- Looks for ways to **reroute power** to relieve congestion and **test reconfigurations** quickly
- Allow grid operators to **safely increase** the flow of power on lines
- In 2022, a TO reconfiguration solved a constraint identified in the Cimarron 345/138kV transformer in Oklahoma

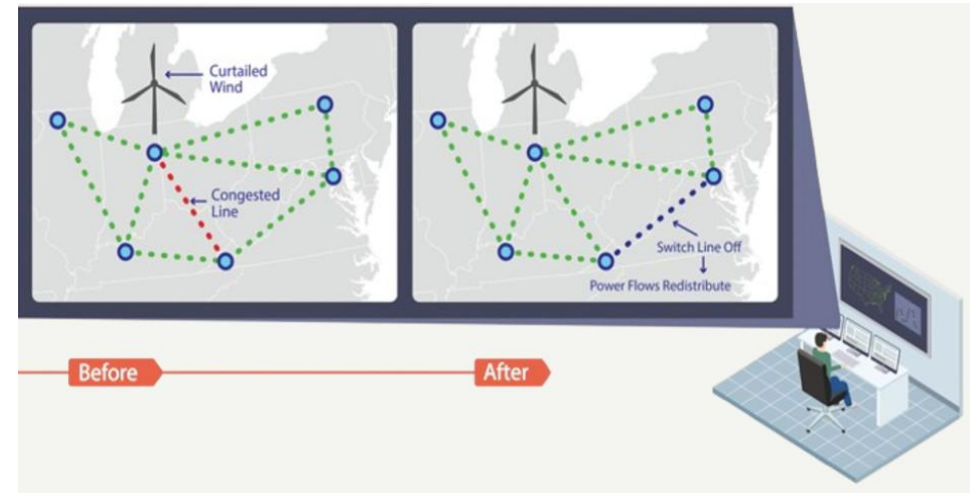
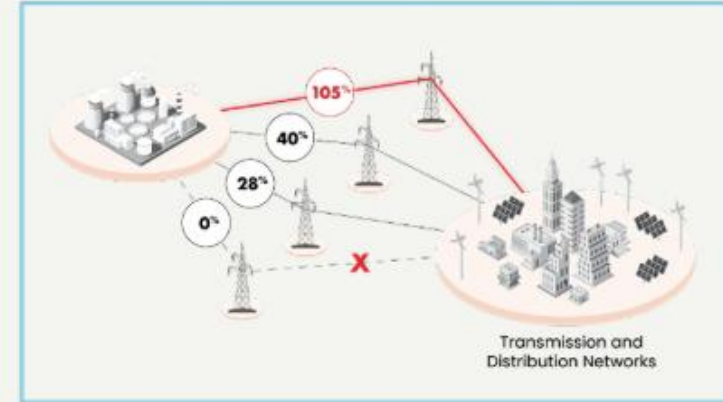


Photo credit: WATT Coalition

Advanced Power Flow Control (APFC)

- **Modular devices** that can push and pull power off overloaded circuits and onto underutilized lines.
- Can **control voltage**, which enhances grid stability
- Can be **scaled or redeployed** due to their modular nature

BEFORE POWER FLOW CONTROL



WITH POWER FLOW CONTROL

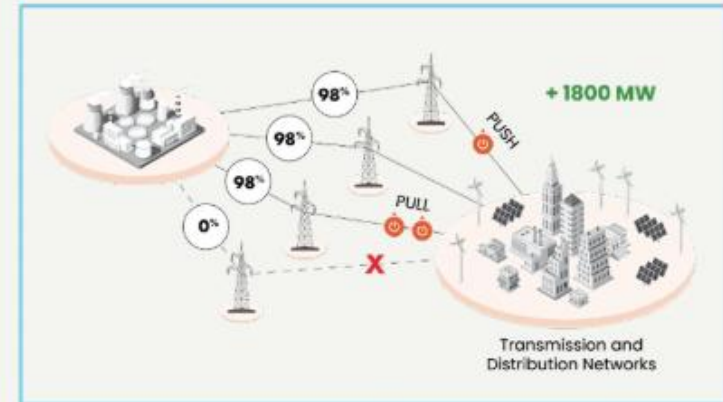


Photo credit: WATT Coalition

Advanced Conductors

- Modern wires that use **more efficient and resilient materials** to boost carrying capacity
- Can carry **50-110% more power** than conventional lines
- Advanced conductors **do not "sag"** like traditional lines, and **can be deployed on existing rights of way**



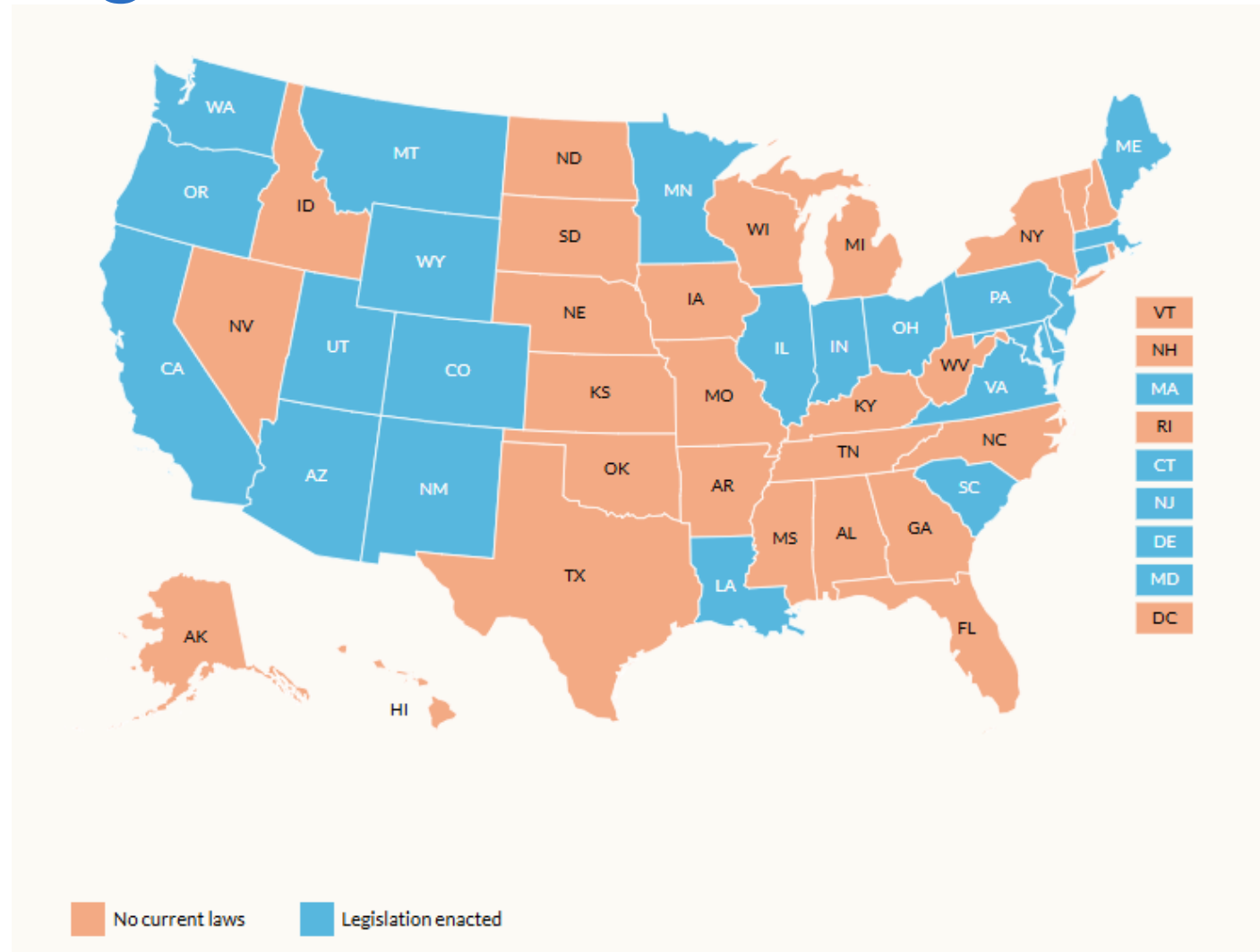
Photo credit: CTC Global

Dynamic Line Ratings (DLRs)

- **Small devices** installed onto existing transmission lines
 - Individual devices can be deployed in under 30 minutes
- DLRs **continuously monitor** real-time weather and temperature conditions
- Allow grid operators to **safely increase** the flow of power on lines



States with Legislation on ATTs

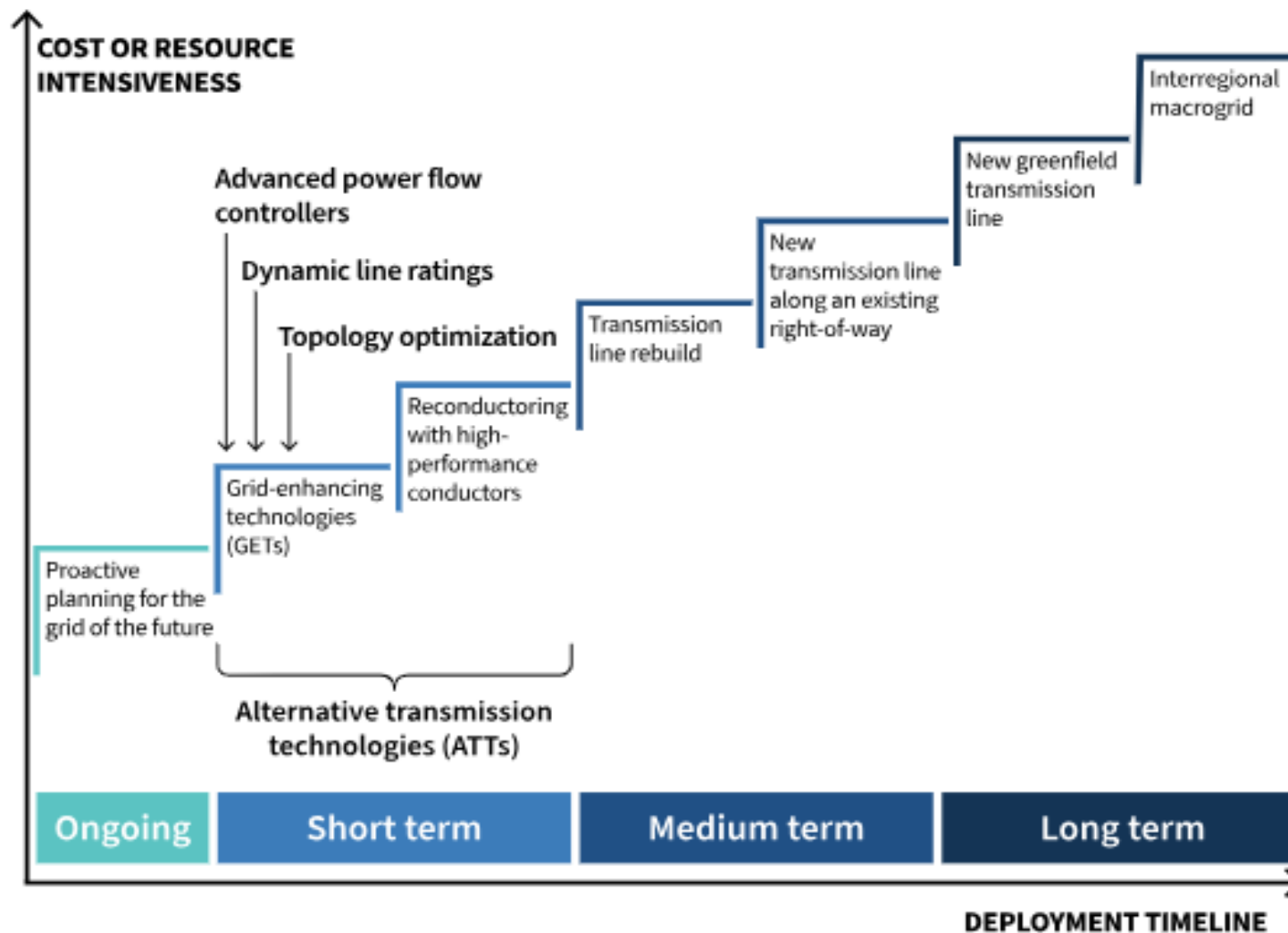


<https://www.pew.org/en/research-and-analysis/articles/2025/12/15/to-boost-electric-grid-states-look-to-advanced-transmission-technologies>

Policy Approaches

Policy Approach	Description	States
<i>Studies</i>	Tasks state agencies or regulatory bodies to investigate the use case of ATTs.	IN, ME, CO, LA
<i>Utility Planning</i>	Requires utilities to evaluate ATTs in their planning, such as integrated resource plans (IRP).	MN, VA, IN, UT
<i>Congestion Targeting</i>	Requires utilities to identify specific highly congested areas on the transmission system.	OH, MN
<i>Streamline Permitting</i>	Expedites applications or reduces permitting requirements for ATTs.	AZ, CO, SC
<i>Cost Recovery</i>	Allows utilities to recover costs associated with ATTs from their rate bases.	MT, MN
<i>Commission Assessment</i>	Requires utility commissions to consider ATTs when determining how to complete certain new transmission projects.	VA

Where do ATTs fit in to transmission planning?



Source: Rocky Mountain Institute, "Getting Alternative Transmission Technologies to Scale," <https://rmi.org/resources/getting-advanced-transmission-technologies-to-scale/>

DOE offers \$1.9B for transmission reconductoring, advanced tech

The SPARK funding opportunity renames the Biden-era Grid Resilience and Innovation Partnerships program.

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<https://www.utilitydive.com/news/doe-makes-19b-available-for-transmission-reconductoring-advanced-tech/814666/>

FERC eyes 'grid-enhancing technology' incentives: Chairman Swett

Data centers, competition in the transmission sector and PJM Interconnection governance reform were other key topics at the Senate Energy and Natural Resources Committee hearing.

Published July 23, 2026



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<https://www.utilitydive.com/news/ferc-grid-enhancing-technology-incentives-atts-senate-hearing/825992/>

FERC approves SPP 'topology optimization' plan for cutting grid congestion

The Midcontinent Independent System Operator's power market has saved nearly \$100 million this year under a similar approach for topology reconfiguration.

Published Aug. 20, 2026



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<https://www.utilitydive.com/news/ferc-spp-topology-optimization-grid-congestion/828366/>

STATEMENTS

Commissioner Rosner's Concurrence to Order Accepting Southwest Power Pool, Inc.'s 05/21/2026 Filing of Revisions to Attachment AE of its Open Access Transmission Tariff

August 19, 2026



<https://www.ferc.gov/news-events/news/commissioner-rosners-concurrence-order-accepting-southwest-power-pool-incs>

Thank You!



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