



Grid Enhancing Technologies

- What are they?
- Who cares?
- What is happening?

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**Working for Advanced Transmission Technologies (WATT)
Coalition**

ESIG Fall Technical Workshop – October 23, 2023

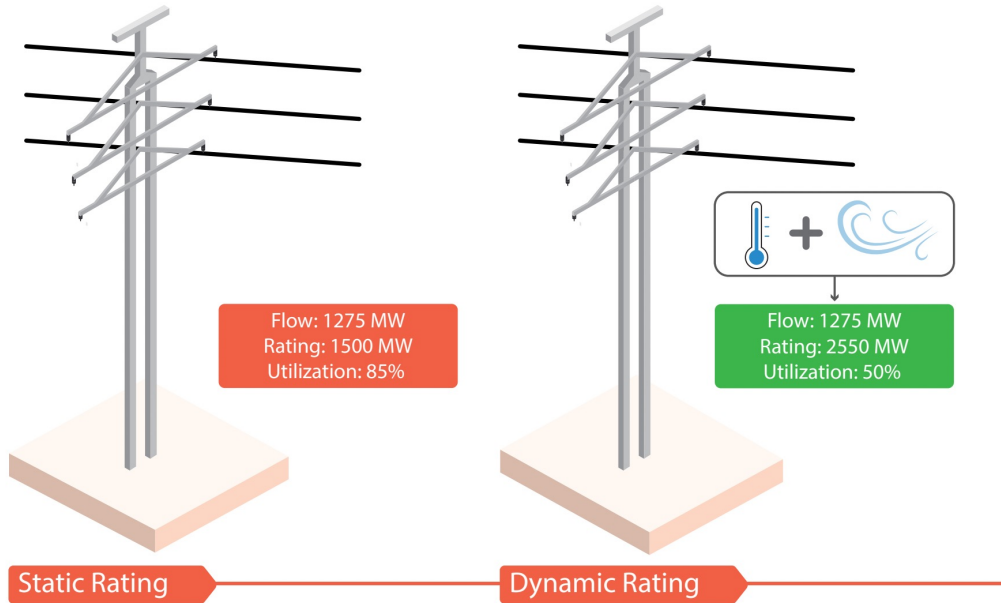
Have you heard of GETs?

Hardware and software that increase transmission capacity on existing infrastructure by unlocking the grid's dynamic capabilities

- Quickly deployed
- Easily scaled to meet the size of the need
- Able to be redeployed



Dynamic Line Ratings



Results from 2021 deployment in 3 states:

DRL exceeded static reference ratings by

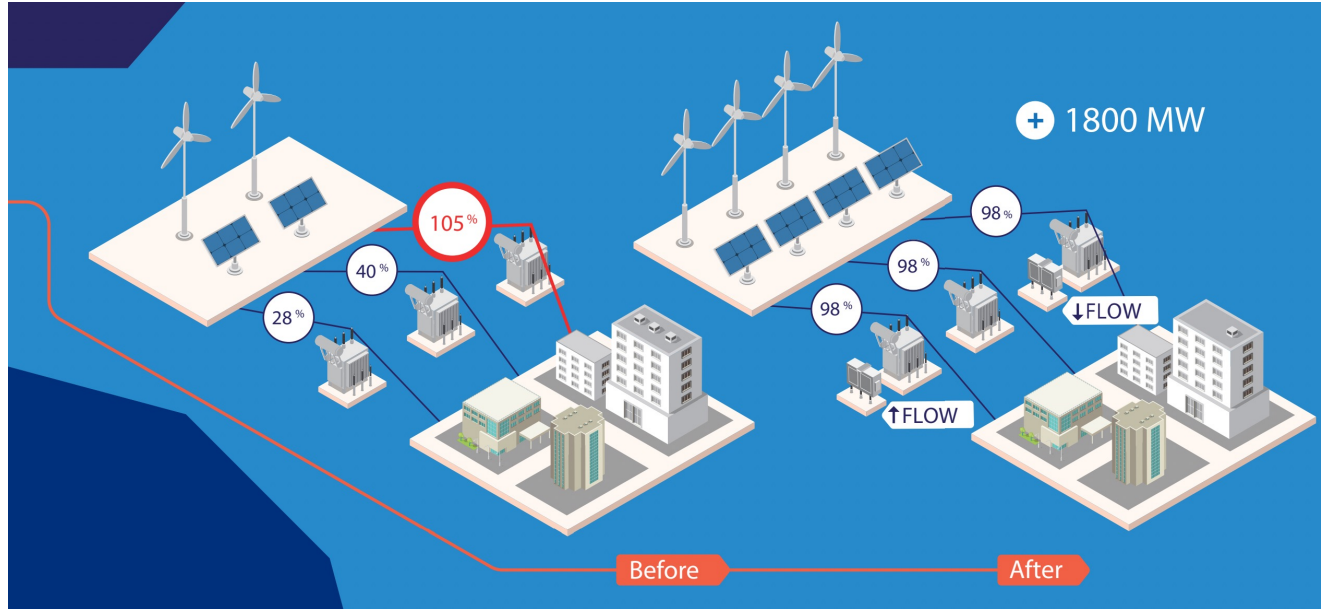
- **9-33% in winter**
- **26-36% in summer**

DLR exceeded static ratings over 85% of the time

From [*A Guide to Case Studies of Grid Enhancing Technologies*](#)



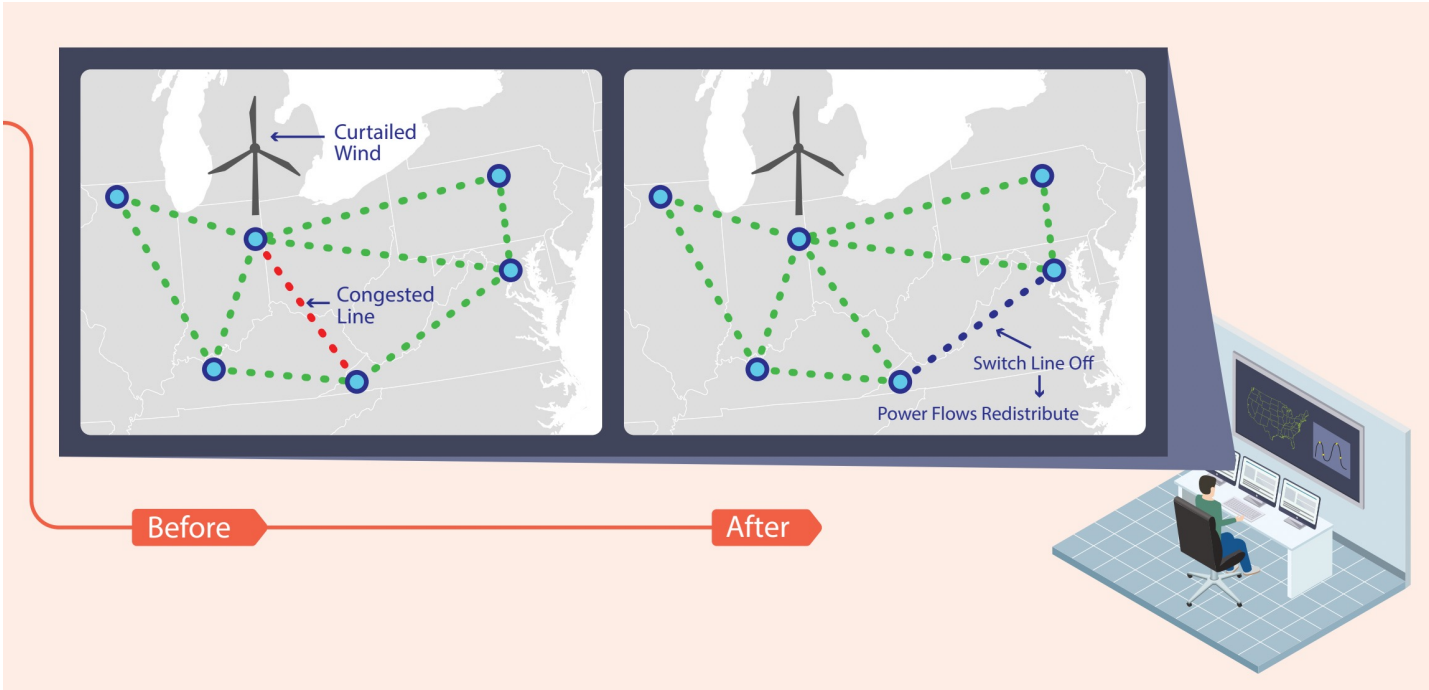
Advanced Power Flow Control



Deployments in the UK by National Grid unlocked capacity for 1.5 GW of new renewable energy saving UK ratepayers over \$500 million



Topology Optimization



Topology Optimization could reduce PJM congestion costs by 50% on average



GETs double capacity for renewable energy

Modeling on the Kansas and Oklahoma grids, based on queue projects with signed interconnection agreements showed **GETs paid for themselves in 6 months**

ADDITIONAL RENEWABLES INTEGRATED									
State	Base Case			With GETs Case			Delta (GETs - Base)		
	Wind	Solar	Total	Wind	Solar	Total	Wind	Solar	Total
Kansas	1,710	0	1,710	1,910	0	1,910	200	0	200
Oklahoma	770	100	870	3,200	140	3,340	2,430	40	2,470
Total	2,480	100	2,580	5,110	140	5,250	2,630	40	2,670



[Rounded to the nearest 10 MW]



We need transmission capacity yesterday

Unacceptable interconnection timelines and costs

- 1) 4 years to schedule an outage
- 2) 7 years to complete an upgrade
- 3) \$100,000,000+ costs

Supply chains for transformers, HVDC etc. are back-ordered

Transmission lines take years to site, permit and finance

RTO congestion costs ->

TABLE 2. *Estimated Congestion Costs for Entire U.S. (\$ millions)*

2016	\$6,501
2017	\$7,266
2018	\$8,776
2019	\$6,379
2020	\$6,686
2021	\$13,353
2022	\$20,777



Awareness & flexibility from GETs



Improved resilience & reliability

Outage scheduling and mitigation:

- DRL can be installed with no outage to increase line capacity
- Avoiding redispatch with APFC saved \$70m over 3.5 year outage
- Topology Optimization could have saved \$40m over 9 mo outage
 - Software is useful for outage scheduling

Building a Better Grid: HOW GRID-ENHANCING TECHNOLOGIES COMPLEMENT TRANSMISSION BUILDOUTS

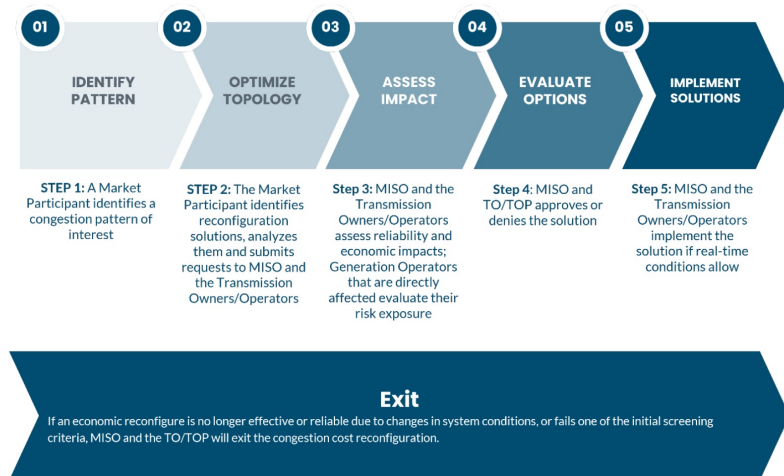
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GETs going mainstream:

- MISO reconfiguration process to reduce congestion costs



- PPL wins 95th Edison Award for DLR integration in PJM
- FERC Orders 881 and 2023
- SPP revision request 589 for user-funded DLR – comments due 10/31



Barriers to adoption

Why are these beneficial technologies not being used?

Awareness

- Many planners, utility executives, regulators, and stakeholders are unfamiliar with advanced transmission technologies, their benefits, and how to operationalize them

No incentive to innovate

- Can't be blamed for doing things the same way as usual
- Lower returns on lower capital cost expenditures





www.watt-transmission.org

Working for Advanced Transmission Technologies

Mission: The Working for Advanced Transmission Technologies (WATT) Coalition advocates for policy that supports wide deployment of Grid Enhancing Technologies (GETs) to accelerate the clean energy transition and lower energy costs.

