Grid-Enhancing Technologies

(GETs) Can Expand Power Capacity Quickly

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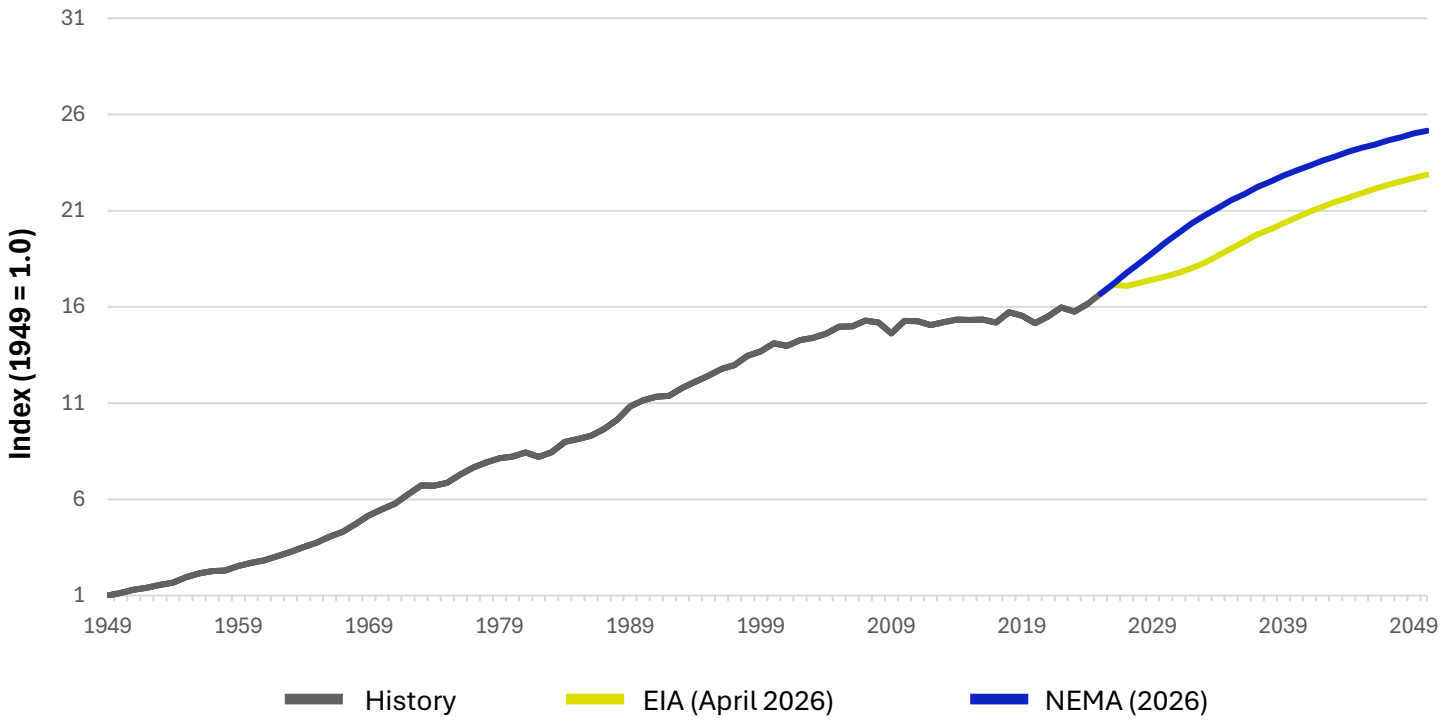
Electricity Demand is Rising Faster Than Traditional Grid Infrastructure Can Expand

NEMA's Grid Reliability Study shows electricity demand rising over 55% by 2050, with the strongest growth occurring through 2030

U.S. Electricity Consumption Index 1949-2050



Electricity demand is rising sharply in the near term

Growth driven by data centers, electrification, and reindustrialization is placing new strain on an already constrained grid

Traditional infrastructure expansion requires long lead times

Permitting hurdles, capital requirements, and supply chain bottlenecks are extending transmission and distribution buildout timelines

Peak demand growth amplifies system stress

New loads often concentrate during peak hours, increasing reliability risk

Adoption of GETs can help to meet near-term demand growth

Grid-enhancing technologies and market reforms can unlock capacity within existing infrastructure

What Are Grid-Enhancing Technologies?

GETs, also known as Advanced Transmission Technologies (ATTs), are hardware and software technologies that **increase transmission capacity** and reduce congestion by optimizing how existing lines operate

Dynamic Line Ratings (DLR)

Equipment that calculates how much electricity a line can safely carry in real time.

- Line-mounted sensors
- Substation comms equipment
- Protection and control systems

Topology Optimization (TO)

Software that reconfigures flows toward less congested lines by opening or closing circuit breakers

- Circuit breakers and switches
- Substation control systems
- Grid management software

Power Flow Controllers (PFCs)

Hardware that actively controls how much electricity flows on a line to relieve congestion

- Breakers and protection systems
- Power electronics modules
- Substation control equipment

Reconductoring

Replacing existing wires with advanced conductors along an existing corridor

- Advanced high-capacity conductors
- Line hardware and insulation
- Substation terminations

GETs Deliver the Fastest Capacity Uplift at the Lowest Cost

	Advanced Transmission Technology	Development Time	Typical Capacity Increase	Permitting Speed	Design Speed	Construction Speed	Cost
Solutions	GETS including Dynamic Line Ratings		10-30%				$
Solutions	Reconductoring w/Advanced Conductors		50-110%				$$
Challenge	Greenfield Transmission						$$$$

Source: WRI | GridLab

GETs deploy on near-term timelines

Often implemented within months, GETs benefit from faster permitting, design, and construction relative to traditional transmission expansion

GETs unlock capacity quickly on existing infrastructure

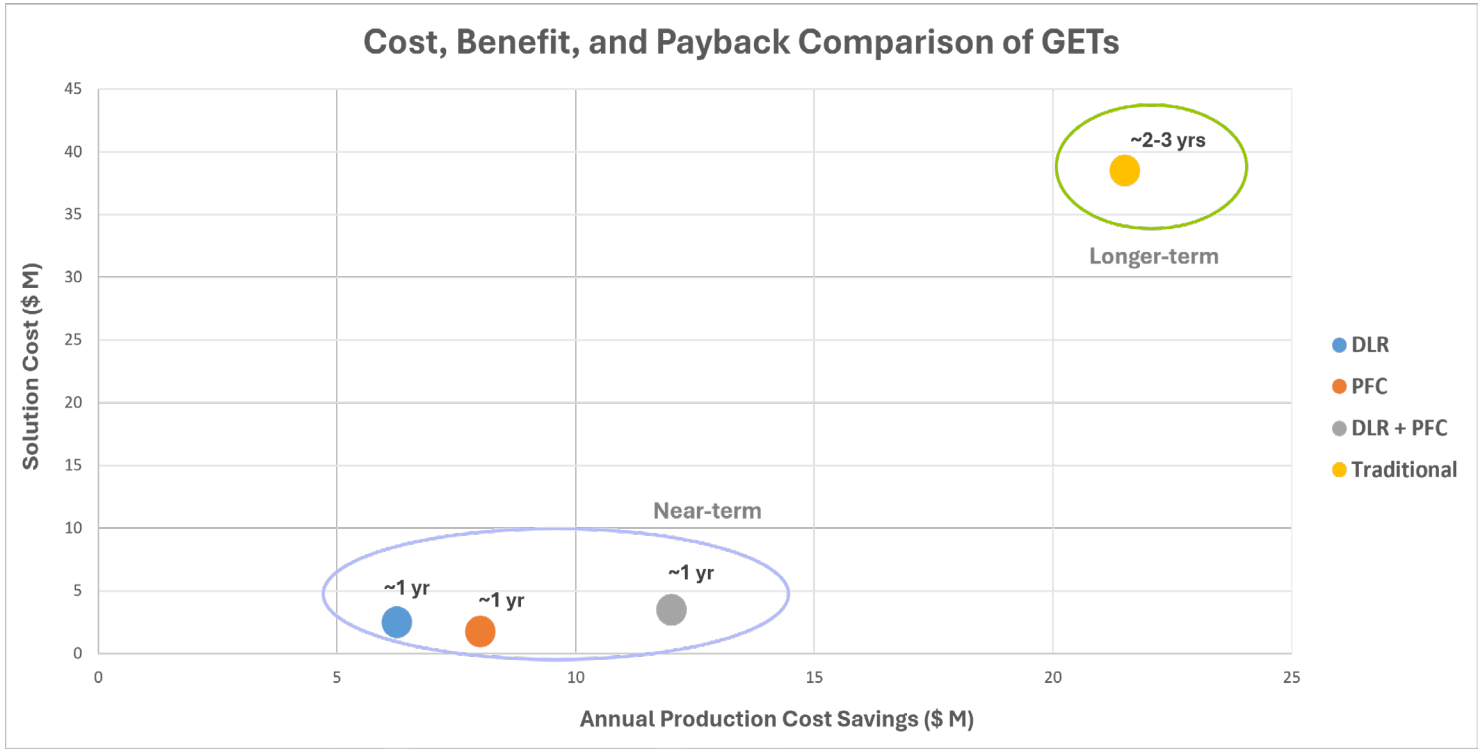
GETs provide meaningful incremental capacity where constraints are binding—without waiting for major transmission construction

GETs deliver benefits at a lower cost

GETs are a cost-effective complement to longer-term traditional transmission expansion

GETs Provide Payback in Months While Traditional Transmission Upgrades Take Years

Results from an ISO – New England power system investment analysis



Source: Idaho National Lab

GETs deliver payback within roughly one year

Across dynamic line ratings (DLRs), power flow controllers (PFCs), and combined deployments, modeled results show near-term payback driven by system-wide production cost savings that exceed upfront costs

Traditional transmission upgrades require longer payback periods

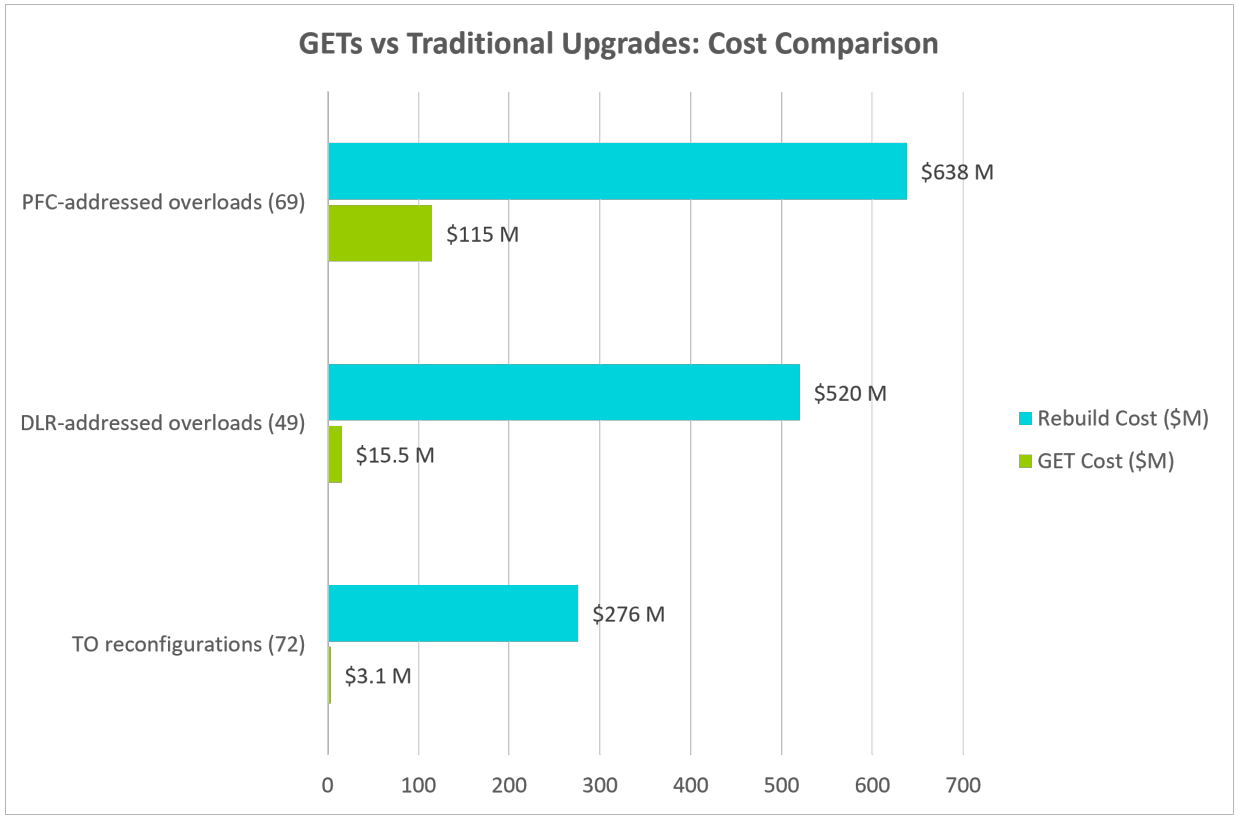
Higher capital costs and longer development timelines result in multi-year payback periods for conventional transmission upgrades

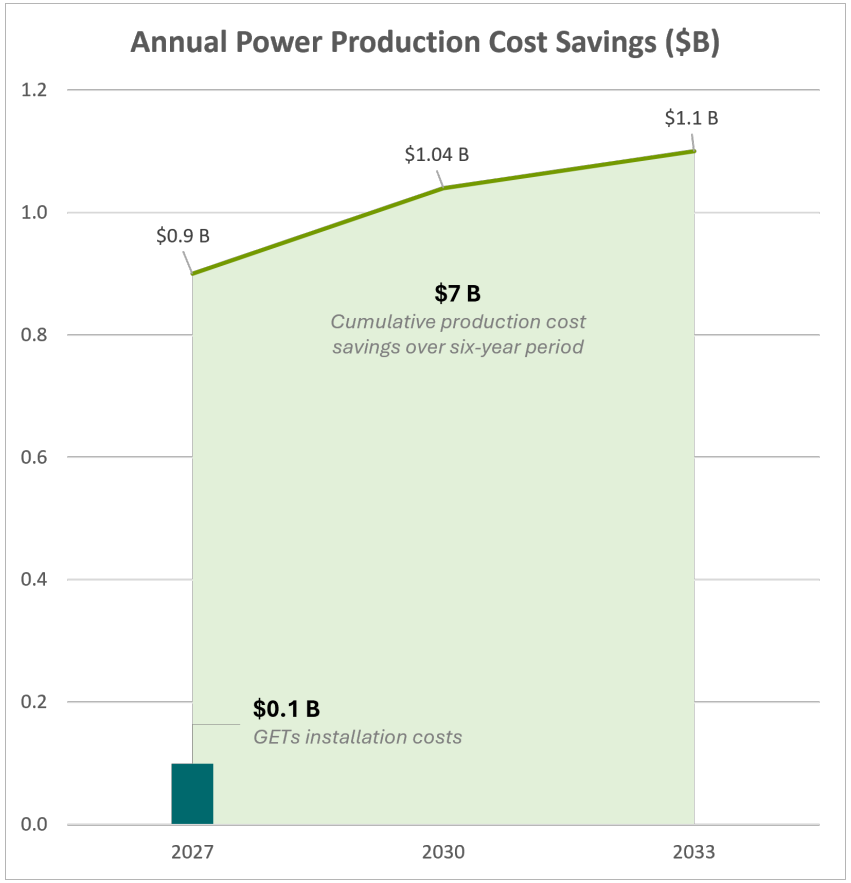
GETs address near-term constraints while long-term projects advance

GETs help bridge timing gaps between electricity demand growth and new infrastructure delivery

PJM Modeling Shows GETs Convert Grid Congestion into Usable Capacity While Saving Costs

Source: Quantam | RMI



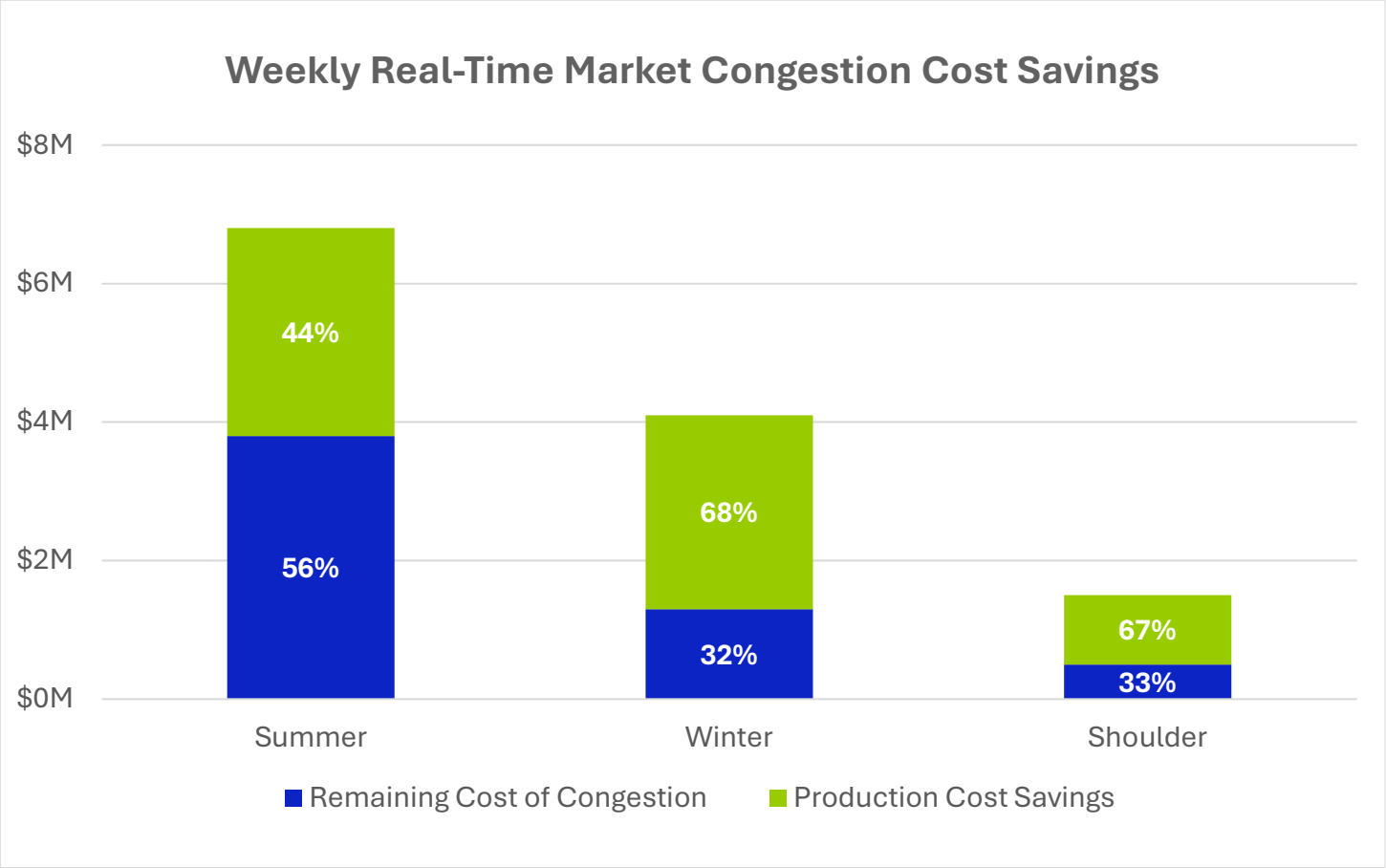


- PJM case study shows **GETs unlock 6 - 7 GW of usable capacity**

- System-wide power production cost savings reach **$7B over six years**, far exceeding upfront installation costs

Topology Optimization Curbs Real-Time Congestion Costs

Results from a PJM market case study



Source: Brattle

Dollar values approximated from published chart

50% reduction in real-time congestion costs

Topology optimization delivers substantial congestion cost reductions across summer, winter, and shoulder periods, with savings varying by system conditions

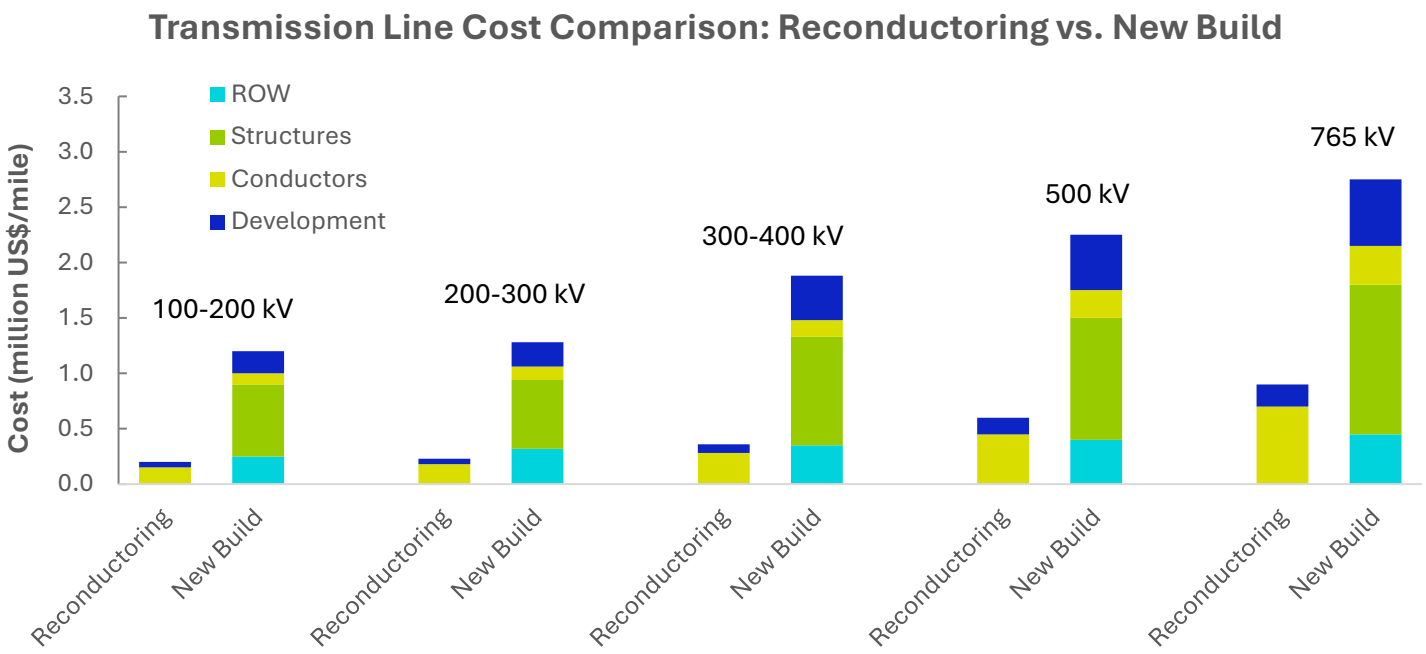
Operational changes drive immediate production cost savings

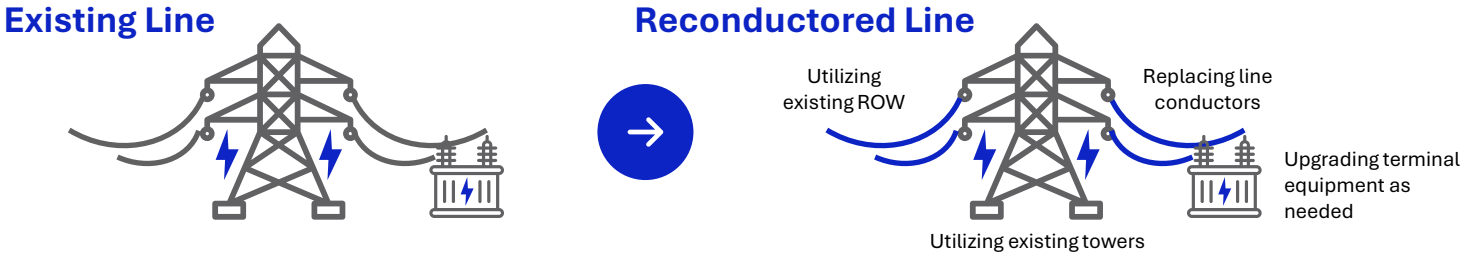
By reconfiguring existing transmission paths, topology optimization lowers dispatch costs without new infrastructure, delivering savings directly through market operations

Market-scale impact reaches $100 million annually

Extrapolating weekly real-time savings suggests topology optimization could deliver on the order of $100 million per year in power production cost savings for the PJM alone

Advanced Conductoring Can Double Transmission Capacity Using Existing Rights-of-Way (ROW)





Reconductoring can double transmission capacity within existing corridors

Advanced composite-core conductors allow utilities to increase line capacity by up to 2× without building new transmission routes, accelerating expansion while avoiding right-of-way constraints

Upgrading existing lines costs millions less per mile than building new transmission

Across voltage classes, new transmission construction can cost several million dollars per mile, while reconductoring projects are substantially cheaper by reusing existing infrastructure

Reusing towers and rights-of-way reduces permitting barriers and build timelines

Reconductoring uses existing utility towers, corridors, and portions of terminal equipment, limiting environmental review and permitting requirements compared with new transmission builds

Source: PNAS

Dynamic Line Rating Adds Capacity And Avoids Downtime While Reconductoring Delivers Larger Capacity Gains Longer Term

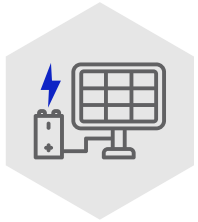
	Time to Implement	Downtime	Cost	Est. Capacity Benefit
Reconductored	2-3 Years	Extended Outages	$0.5M per mile	+34%
Rebuild	3-5 Years	Extended Outages	$2-3M per mile	+106%
Dynamic Line Rating	~1 Year	No Outages	<$1M per mile	+10-30%

Source: Brattle | WATT

GETs Translate Fast Grid Relief Into Broad Economic Benefits That Outweigh Costs

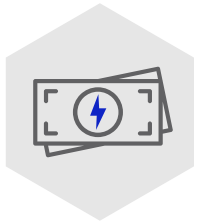
Southwest Power Pool (SPP) case study shows rapid payback from GETs deployment

The Benefits of GETs in Kansas and Oklahoma



2x
the energy capacity

6 Months
to recoup $90M investment



$175M
annual production cost savings

11,300
direct short-term jobs

Potential Nationwide Benefits

$5B+
production cost savings

10,000+
local construction jobs + thousands of long-term jobs

Source: Brattle | Watt

Policy Priorities that Support Faster GETs Deployment

Advance Grid Enhancing Technology Solutions and All-of-the-Above Energy System Solutions

A primary objective is to secure tax and policy approaches that encourage utilities to invest in GETs solutions to bridge the looming near-term gap between peak power demand and supply

Incorporate GETs into transmission planning and interconnection processes

Regulators and system operators should evaluate GETs alongside traditional transmission upgrades in regional planning and generator interconnection studies to ensure lower-cost, faster-to-deploy solutions are considered alongside major infrastructure expansions

Enable cost recovery and performance incentives for grid optimization investments

Regulatory frameworks should allow utilities to include GETs investments in the rate base and consider performance incentives tied to congestion reduction, capacity gains, and system cost savings to accelerate adoption

Require transparent evaluation of GETs in grid planning decisions

Planning authorities should ensure GETs are evaluated as part of transmission planning and upgrade proposals so that grid operators can identify the most cost-effective combination of operational technologies and infrastructure investments

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