



*National Association of  
State Energy Officials*

# Advanced Grid Solutions

NASEO Electricity Committee Webinar

October 7, 2024



# NASEO Programs and Priorities



Buildings



Electricity



Climate



Financing



Workforce



Resilience



Equity



Planning



Innovation



Transportation



Solar



Policy



Security

# NASEO Electricity Committee

## **NASEO Electricity Committee**

- convenes the State and Territory Energy Offices and NASEO Affiliate members for discussions and exchanges of best practice on electricity issues

## **Leadership Team**

- Chris Yunker – HI (West) – Co-Chair
- Jacqueline Waite NM (Southwest) – Co-Chair
- Asa Hopkins (affiliate rep -Synapse) – Co-Chair
- Eric Annes CT (Northeast)
- Edith Bayer OR (West)
- Eric Coffman MD (Mid-Atlantic)
- Ryan Hadley IN (Mid-West)
- James Lester CO (Central)
- TBD (Southeast)

# Advanced Grid Solutions



## AGENDA

- Welcome & Introductions
- *Grid Enhancing Technologies*
  - Pablo Ruiz, CEO & CTO, NewGrid
- *High-performance Conductors*
  - Casey Baker, Senior Program Manager, GridLab
- States' Roundtable Discussion
  - James Lester, Senior Advisor, Colorado Energy Office
  - Jeff Blend, Energy Resource Professional, Montana Energy Office
- Q & A



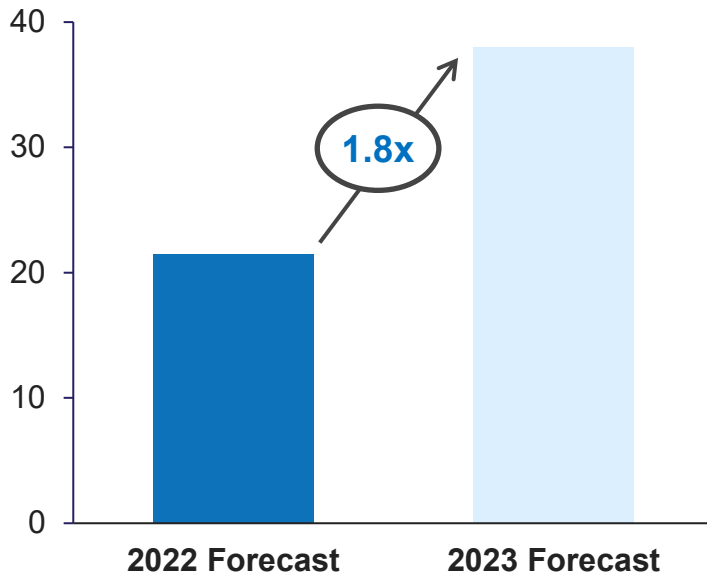
# **How can state energy offices and governors unlock the benefits of Grid Enhancing Technologies?**

NASEO Webinar on Advanced Grid Solutions  
October 7, 2024

# New tools are required to address changing demands on the power grid

The demands on the US electric grid are rapidly changing...

5-Year Nationwide Summer Peak Demand Growth Forecast, GW



**New industry: \$481 billion** in commitments for new industrial facilities since 2021

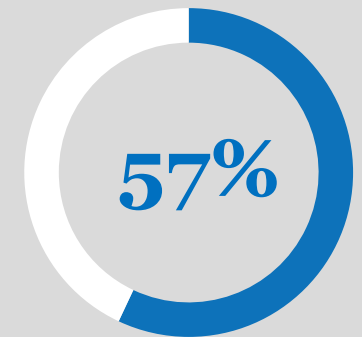


**Data centers: \$150 billion** in forecast data center growth through 2028



**Extreme weather: 85.6 GW** all-time peak demand in ERCOT on August 10, 2023

...requiring significant capacity expansion



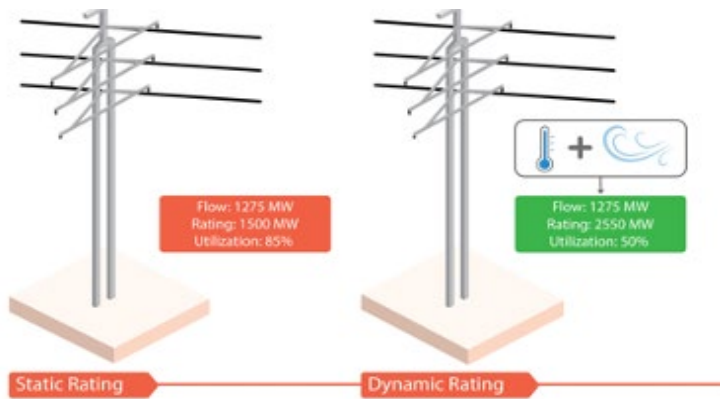
Increase in transmission capacity need by 2035, according to the [U.S. Department of Energy](#).

Source: [2023 FERC filings](#), [The Era of Flat Power Demand is Over](#), [NOAA](#)



# Grid Enhancing Technologies:

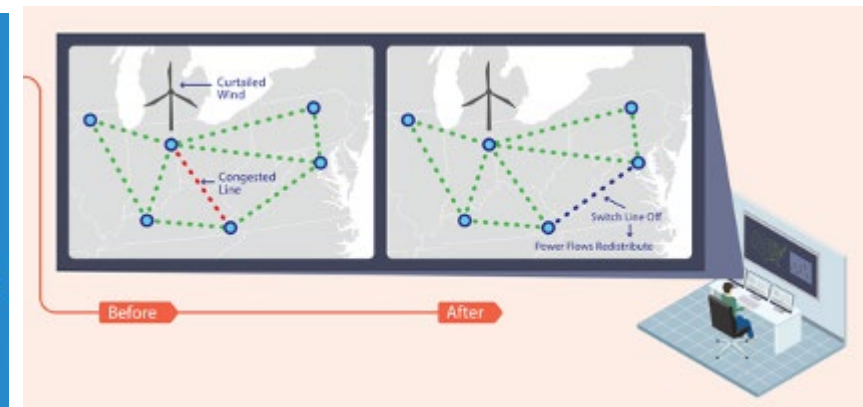
hardware, software, or both that dynamically increase the **capacity, efficiency, reliability or safety** of power lines, faster and at lower cost than traditional grid infrastructure.



**Dynamic Line Ratings** (DLRs) measure and calculate the true carrying capacity of transmission lines – often finding 20% or more capacity than assumed.



**Advanced Power Flow Control** redirects power to lines with extra capacity, preventing overloads and balancing the use of the grid.



**Topology Optimization** is software that finds the best use of grid infrastructure to redistribute power and unlock more capacity.

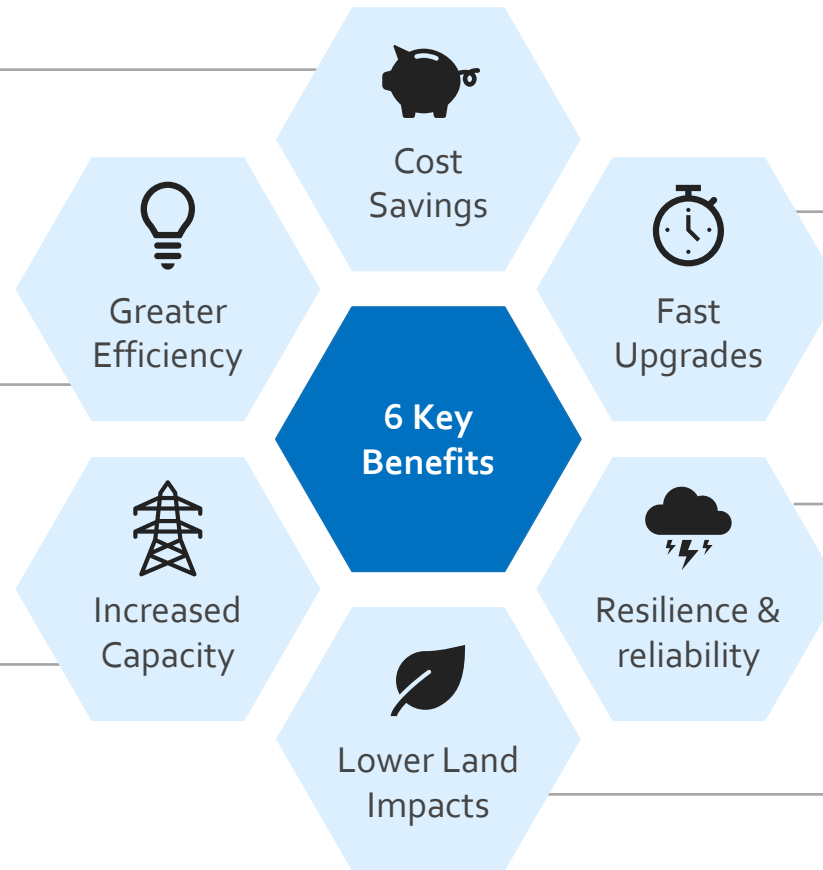


# Wide spread adoption of Grid Enhancing Technologies could provide 6 key benefits for the grid

GETs can **decrease congestion costs** by ~40%, resolving constraints for ~5% the cost of traditional upgrades

GETs can **increase grid utilization** of high-voltage lines by 15 – 22%.

GETs can **increase transmission capacity** by 20%+



GETs can be **deployed in months, doubling the capacity for new generation** to integrate on the existing transmission grid

GETs allow utilities to make data-driven decisions and have **real-time visibility** and **enhanced control** over the system

GETs increase transmission capacity using **existing infrastructure and rights-of-way**.





# Topology Optimization Example: Alliant's IPL Saved 50+% in Congestion Since 2021



- Alliant Energy and NewGrid pilot:
  - Identify, analyze **regionally beneficial** reconfigurations using topology optimization
  - Request their implementation, leveraging the [MISO Congestion Cost Reconfiguration Process](#)
  - Evaluate congestion cost mitigation for Alliant's Interstate Power and Light (IPL) subsidiary/operating company
- Looking for low-hanging fruit
  - Simple & robust solutions

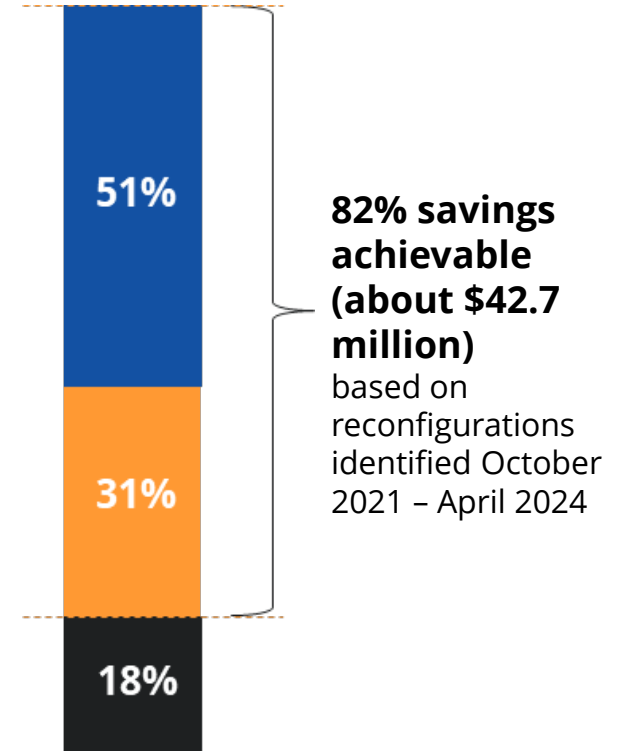


**IPL Congestion Savings  
(Solutions implemented):  
\$26.6 million**

between Oct 2021 and April 2024

**IPL Foregone Opportunity  
(Solution not implemented):\*  
\$15.9 million**

**IPL Residual Congestion:  
\$9.4 million**



\* Impacts of solutions declined on a non-technical basis, and solutions not requested due to lack of a request process (prior to July 2023).

Source: [Congestion and Overload Mitigation with Optimal Transmission Reconfiguration in MISO and SPP](#) (FERC Docket AD10-12-04).



# Grid Enhancing Technologies have been commercially available for years, but wide adoption is blocked

## FROM: Institutional inertia and misaligned utility incentives



**Institutional inertia:** Utilities and system operators are slow to change their practices and adopt new approaches.



**Misaligned incentives:** Investor-owned utilities are not rewarded for reducing energy or transmission costs – their business models are based on building new infrastructure, so they do not have teams working on operational efficiency.



## TO: Innovative GETs deployment and properly aligned utility incentives



**Support for innovation:** Utilities should be encouraged to innovate for customer benefit, including through mechanisms such as FERC mandates and inquiries



**Prioritization of system and process changes:** Many planners, utility executives, and stakeholders have never evaluated or deployed GETs



**Aligned incentives:** Lower returns on lower capital cost expenditures, and uncertainty about cost recovery

***Policymakers at all levels of government can adjust utility expectations, requirements, and incentives to drive grid modernization and unlock the power and value behind GETs***



# NASEO members can support GETs adoption


## NASEO members can support legislation


Best practices:


- A. Tie GETs requirements to state-jurisdictional process: resources (including clean energy goals) or siting.
- B. Avoid transmission rates – FERC jurisdictional.
- C. Make compliance measurable and timely.

***Successful examples of state legislation passed in 2024 include:***

 **Minnesota**  
(HF 5247)

 **Maine**  
(LD 589)

 **California**  
(SB 1006)

 Key actions for high impact

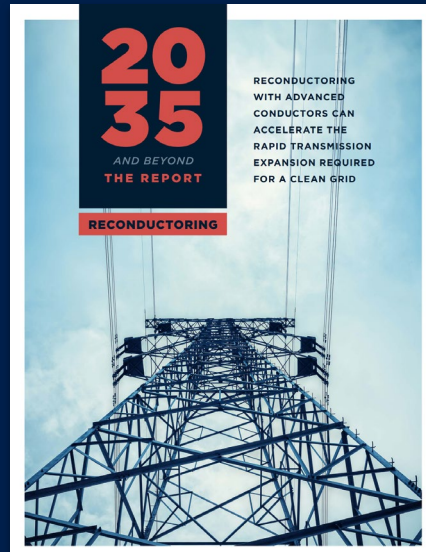
## NASEO members can leverage “soft power”

1. Governors sign on to the White House’s [Federal-State Modern Grid Deployment Initiative](#)
2. Lead [GRIP](#) round 3 applications with utilities and system operators to subsidize these technologies.
3. Convene stakeholders around grid modernization
4. Write letters to utilities, RTO/ISO, and regulators in support of the use of GETs
5. Participate in regional stakeholder processes.
6. Support FERC’s [Advanced Notice of Proposed Rulemaking](#) on Dynamic Line Ratings.



# High Performance/ Advanced Conductors

Casey Baker



GridLAB

<https://www.2035report.com/reconductoring/>



# Advanced Tower Raising and Rehabilitation

- Power lines are often limited by their “sag”
- Raising or strengthening towers can increase capacity 10-40%
- New technologies and techniques allow towers to be raised while energized

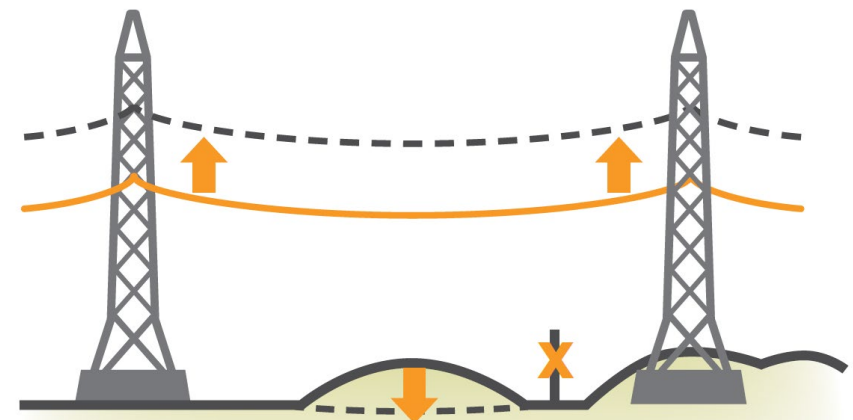
**Traditional Lifting Method**  
(costly cranes and heavy footprint)



**AMPJACK® Raise Method**  
(no cranes and minimal footprint)



RE-TENSIONING



SPAN-SPECIFIC CLEARANCE ENHANCEMENT

# High Performance Conductors (a.k.a. “Advanced Conductors”)

## Conventional Conductor

“Aluminum Conductor  
Steel Reinforced”  
(ACSR)



## High Performance or Advanced Conductors

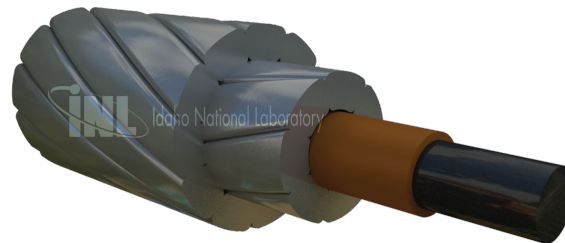


“ACSS”  
Trapezoidal  
Wire



3M “ACCR”

- ☑ 2-3x Capacity
- ☑ Reduce Losses 10-40%
- ☑ Increase Resiliency



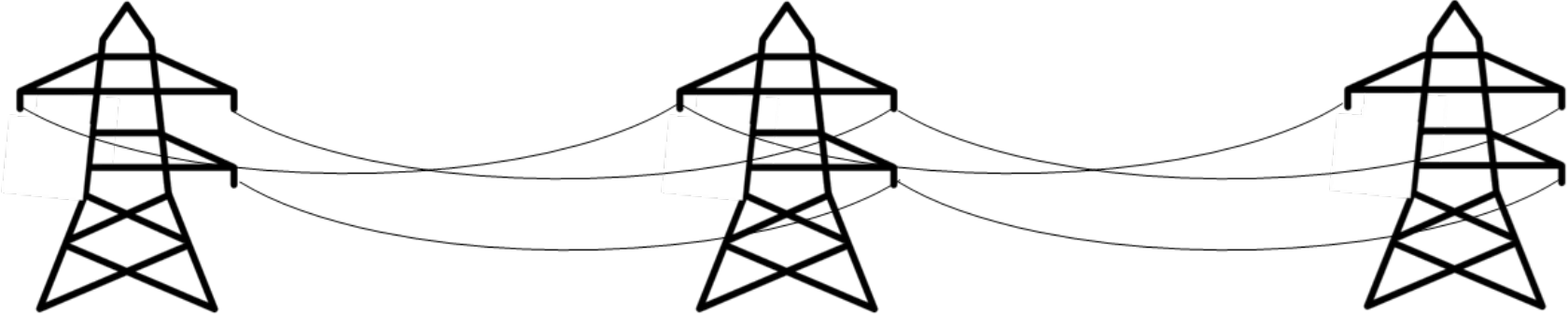
CTC Global  
“ACCC”



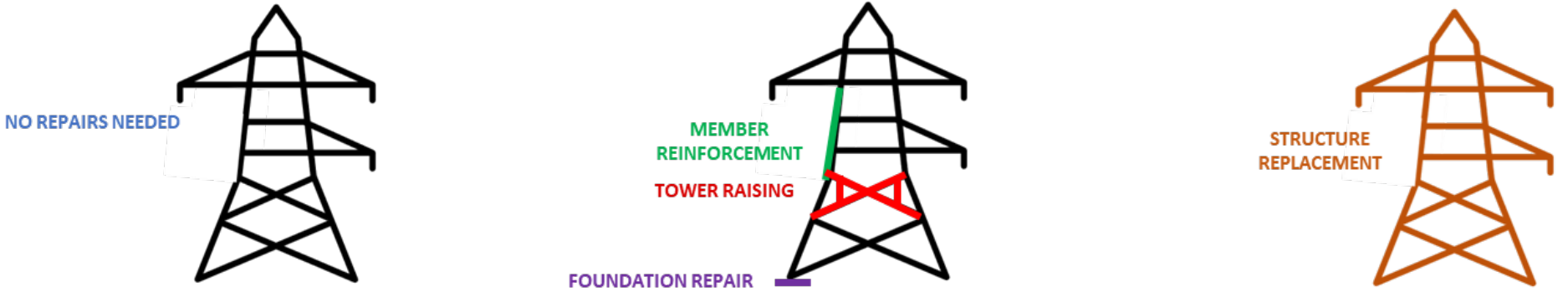
TS Conductor

# Advanced Reconductoring

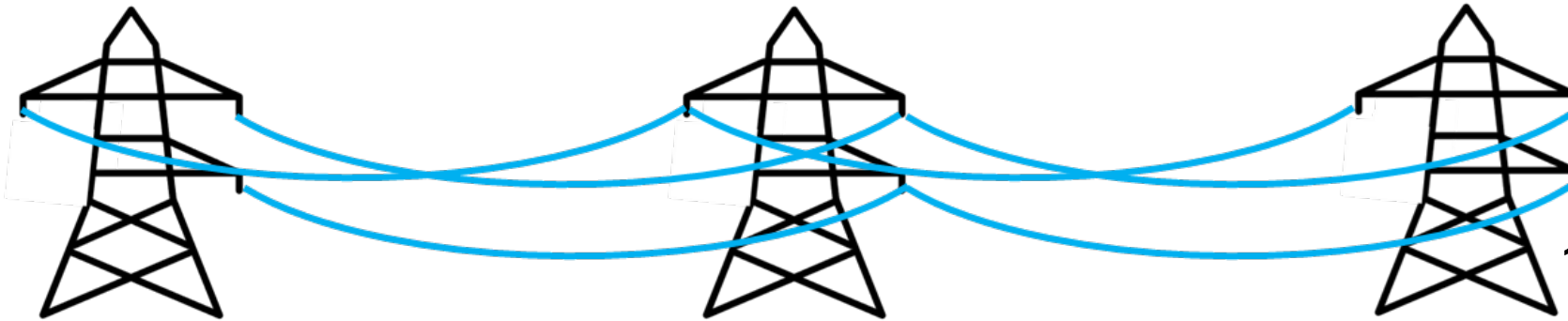
Existing  
powerline



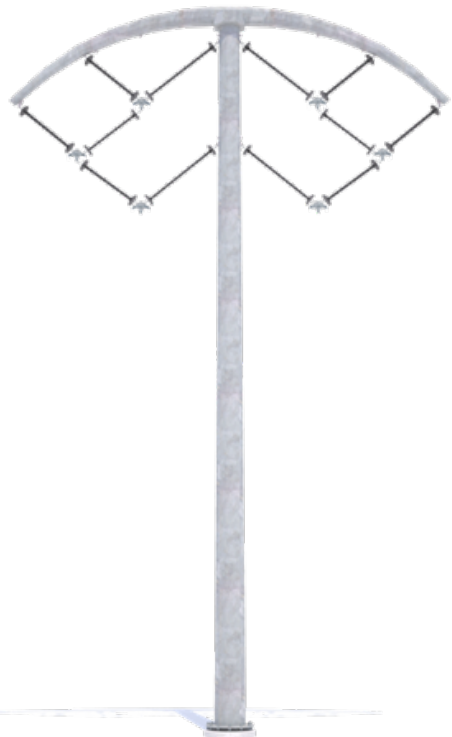
Remove  
Conductor,  
repair/replace  
structures



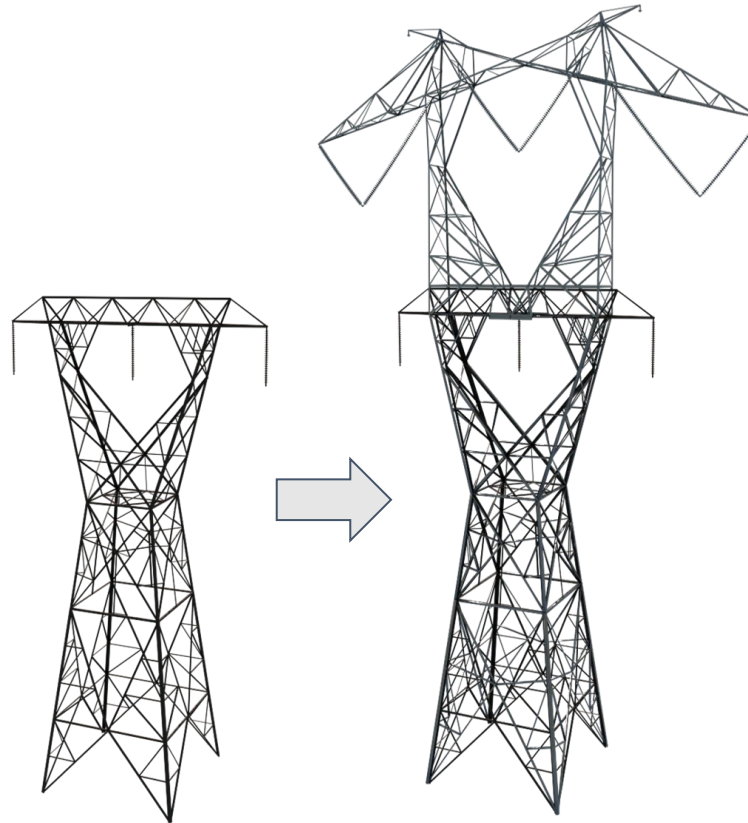
Install High  
Performance  
Conductor  
2x capacity



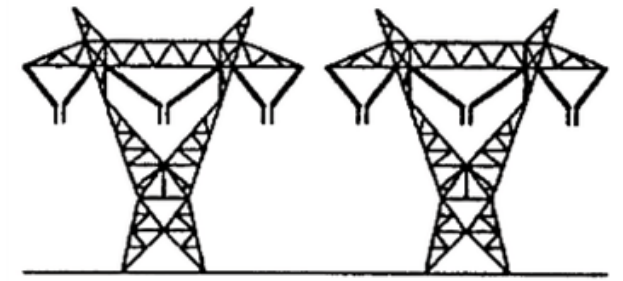
# Advanced Tower Design



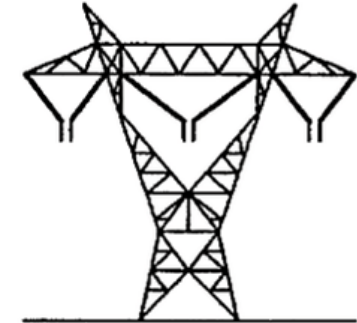
BOLD<sup>(R)</sup> Structure



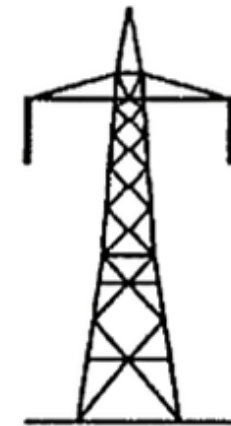
“ExoGrid”™ Structure



2 x 500 kV AC



800 kV AC



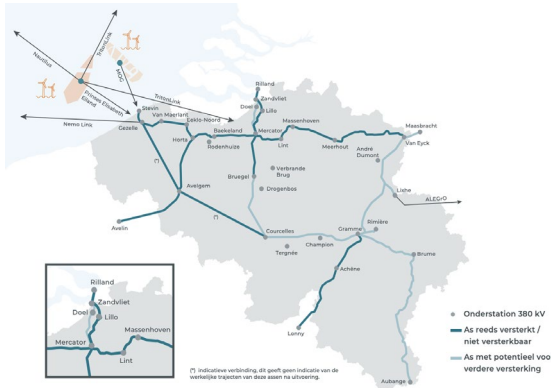
± 500 kV DC

HVDC Conversion 16



# High Performance Conductors are being deployed at scale around the world

## Belgium



Belgium's Transmission System Operator (TSO) Elia is reconducting most high voltage (380 kV) lines by 2035, in order to accommodate increasing offshore wind capacity and rapid electrification

## Netherlands



The Dutch TSO TenneT is similarly reconducting their high voltage grid, recognizing their value in faster project realization, avoiding permitting delays and much lower project Capex

## Italy



In addition to reconducting, Italy is building out a multi-terminal HVDC network, with new subsea HVDC lines and converting existing AC lines to DC, supporting RE integration

## India



India's transmission planning philosophy encourages the optimization of existing ROW first, leading to the adoption of efficient advanced conductors, smart grid technologies

## China



China, which sees \$50 billion in transmission investment each year, is utilizing advanced conductors in both reconducting as well as new-build projects to keep up with growing electricity demand

# Barriers to Deployment

- High **upfront costs**
- Utilities are incentivized towards major infrastructure projects, upgrades and improvements on existing infrastructure are less attractive
- Utilities are intentionally **slow to adopt** new technologies to avoid risks on cost recovery
- Operational and engineering **changes are required**
- Different technologies are needed for different situations
  - No technology is a fix-all solution, BUT **there are many technologies not being used**

Where can Energy Offices step in?

# Options for Governor's Offices



- Require utilities to **consider new technologies** like GETS and High Performance Conductors in **IRPs**
- Create **shared savings mechanisms** where utilities and customers share the savings
- “de-risk” or **provide incentives** for utilities to test out new technologies
- Require **multiple benefit streams** to be included in IRPs including savings, resiliency, reliability evaluated over 20+ years
- **Energy efficiency standard** or **congestion limits** for transmission lines
- Allow funding for **advanced mapping and imaging** of the existing system to find “low-hanging fruit” ways to increase system capacity



Q & A

# State Roundtable





Q & A

Thank you!

