



## NPCC Distributed Energy Resources/Variable Energy Resources Forum

April 27, 2023, 9:00 a.m. – 12:00 p.m. EDT **WebEx Meeting**

Dial-In: 415-655-0003 (USA) / 416-915-6530 (Canada)

Guest Code: 24307049644

Password: UYmhte3B\*76 (89648332 from phone)

[WebEx Link](#)

### 1.0 Distributed Energy Resources (DER) Variable Energy Resources (VER) Forum Topics

- 1.1 Welcome and Safety Message: Gerry Dunbar, NPCC Director Reliability Standards and Criteria (9:00 am - 9:05 am)
- 1.2 Antitrust Compliance Guidelines, Public Notice, and Meeting Protocols: Ruida Shu, NPCC Manager of Reliability Standards (9:05 am – 9:10 am)
- 1.3 NPCC VER/DER Outreach Efforts: Gerry Dunbar, NPCC Director Reliability Standards and Criteria (9:10 am – 9:15 am)
- 1.4 Transmission: Current Shortfalls, Future Solutions – Christina Hayes, Executive Director, Americans for a Clean Energy Grid (ACEG) (9:15 am – 9:55 am)
- 1.5 Grid Interconnections: Building the Grid We Need, When and Where We Need it – Katie Jereza, Corporate Vice President, Corporate Affairs, EPRI (9:55 am – 10:35 am)

#### **Break (10:35 am – 10:40 am)**

- 1.6 Building a Better Grid: The Department of Energy's Transmission Deployment Strategy – Jeff Dennis, Deputy Director, Transmission, Grid Deployment Office, U.S. Department of Energy (DOE) (10:40 am – 11:20 am)
- 1.7 Constructing the Grid of the Future: Lessons Learned from past projects – Jason Kalwa, Public Service Enterprise Group (PSEG) (11:20 am – 12:00 pm)
- 1.8 Closing – Gerry Dunbar



## Northeast Power Coordinating Council, Inc. (NPCC)

### Antitrust Compliance Guidelines

It is NPCC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. The antitrust laws make it important that meeting participants avoid discussion of topics that could result in charges of anti-competitive behavior, including: restraint of trade and conspiracies to monopolize, unfair or deceptive business acts or practices, price discrimination, division of markets, allocation of production, imposition of boycotts, exclusive dealing arrangements, and any other activity that unreasonably restrains competition.

It is the responsibility of every NPCC participant and employee who may in any way affect NPCC's compliance with the antitrust laws to carry out this commitment.

Participants in NPCC activities (including those participating in its committees, task forces and subgroups) should refrain from discussing the following throughout any meeting or during any breaks (including NPCC meetings, conference calls and informal discussions):

- Industry-related topics considered sensitive or market intelligence in nature that are outside of their committee's scope or assignment, or the published agenda for the meeting;
- Their company's prices for products or services, or prices charged by their competitors;
- Costs, discounts, terms of sale, profit margins or anything else that might affect prices;
- The resale prices their customers should charge for products they sell them;
- Allocating markets, customers, territories or products with their competitors;
- Limiting production;
- Whether or not to deal with any company; and
- Any competitively sensitive information concerning their company or a competitor.

Any decisions or actions by NPCC as a result of such meetings will only be taken in the interest of promoting and maintaining the reliability and adequacy of the bulk power system.

Any NPCC meeting participant or employee who is uncertain about the legal ramifications of a particular course of conduct or who has doubts or concerns about whether NPCC's antitrust compliance policy is implicated in any situation should call NPCC's General Counsel and Corporate Secretary, Mr. Damase Hebert at (646) 737-2335 or [dhebert@npcc.org](mailto:dhebert@npcc.org).



## **Distributed Energy Resources and Variable Energy Resources Forum Disclaimer Statement**

### 1. General

Any information presented [at NPCC forums] is for informational purposes only. NPCC accepts no responsibility for the accuracy of such presentations, or for your reliance on any information contained within the content available through such forums. Discussions represent a wide range of views and interests of the participating individuals and organizations. Statements made during discussions do not necessarily reflect those of NPCC.

### 2. Vendors

Information presented is for stakeholder informational purposes only and does not imply NPCC's endorsement or approval. NPCC does not promote technology, tools, products, services, or vendors that may be used by entities within the electric industry. Questions or concerns about vendors or the services or products they offer must be directed to the vendor. It is the responsibility of the owner, operator, or the user of the bulk power system to research the services the vendors offer. Those that utilize the services of vendors assume full responsibility for claims directly or indirectly arising thereunder and NPCC is not responsible or liable for any claim or harm, directly or indirectly, that transpires from the use of any information.



## **Public Announcement**

RSC and DER/VER Forum Meetings, WebEx, and Conference calls:

Participants are reminded that this meeting, WebEx, and conference call are public. The access number was posted on the NPCC website and widely distributed. Speakers on the call should keep in mind that the listening audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.





## **Meeting Logistics**

Participants will be muted upon entry, and you are encouraged to use the “Chat” feature of the WebEx if you wish to ask a question. The questions will be answered by the presenter at the end of each presentation. NPCC DER/VER Forum will be recorded, the recording and meeting material will be posted on the DER Forum section of the NPCC website.

Thank you for your cooperation.

# NPCC 2023 Outreach Activities

Gerry Dunbar  
Director Reliability Standards and  
Criteria

April 27, 2023



**NPCC, Inc.**



# NPCC 2023 – 2026 Strategic Plan

## Strategic Focus Area

Reliably Integrate Resources Brought Forward by Decarbonization Objectives

### NPCC 2023 Planned DER/VER Forums:

- April 27, 2023:
  - Transmission
- May 25, 2023:
  - IEEE-2800
- August/October:
  - Topics TBD



# Grid Security Conference (GridSecCon 2023)

- October 17-20 Quebec City, Canada
- Co hosted by NERC, the E-ISAC and NPCC
- Gov't and Industry Cyber and Physical Security Leaders
  - Expert Training Sessions
  - Best Practices and Lessons Learned
  - Threat Mitigation Programs
- Topics:
  - Cyber and Physical Security
  - Supply Chain
  - Special Topics

*April 27, 2023*




Americans for a  
Clean Energy Grid

# Transmission: Current Shortfalls, Future Solutions

*Northeast Power Coordinating Council*



# ***America's transmission grid is outdated and insufficient to support a modern economy.***

- The average age of the installed base of transmission infrastructure is 40 years old. More than a quarter of the grid is 50+ years old.
  - The U.S. needs up to three times as much transmission capacity to reach 100% clean energy.
  - Roughly 700 GW of solar power, 400 GW of energy storage, and 200 GW of wind power are stuck in interconnection queues.
  - Models [show](#) that transmission is needed in addition to DERs to meet energy demands and reduce costs.
- 

# ***New England faces power shortfalls.***

- FERC and NERC assessments have warned of potential power shortfalls in New England.
- The Mystic Generating Station in Everett, Mass. — with a nameplate capacity of 2GW or nearly 10% of ISO-NE peak load — is in the process of retiring.
  - A series of controversial FERC decisions and related court decisions led to uncertainty in cost recovery for the Mystic generating units and associated LNG facility.
- Spectra Energy's Access Northeast pipeline project failed in 2016 because the Massachusetts Supreme Judicial Court held that electric ratepayers could not be charged for the new gas pipeline costs.



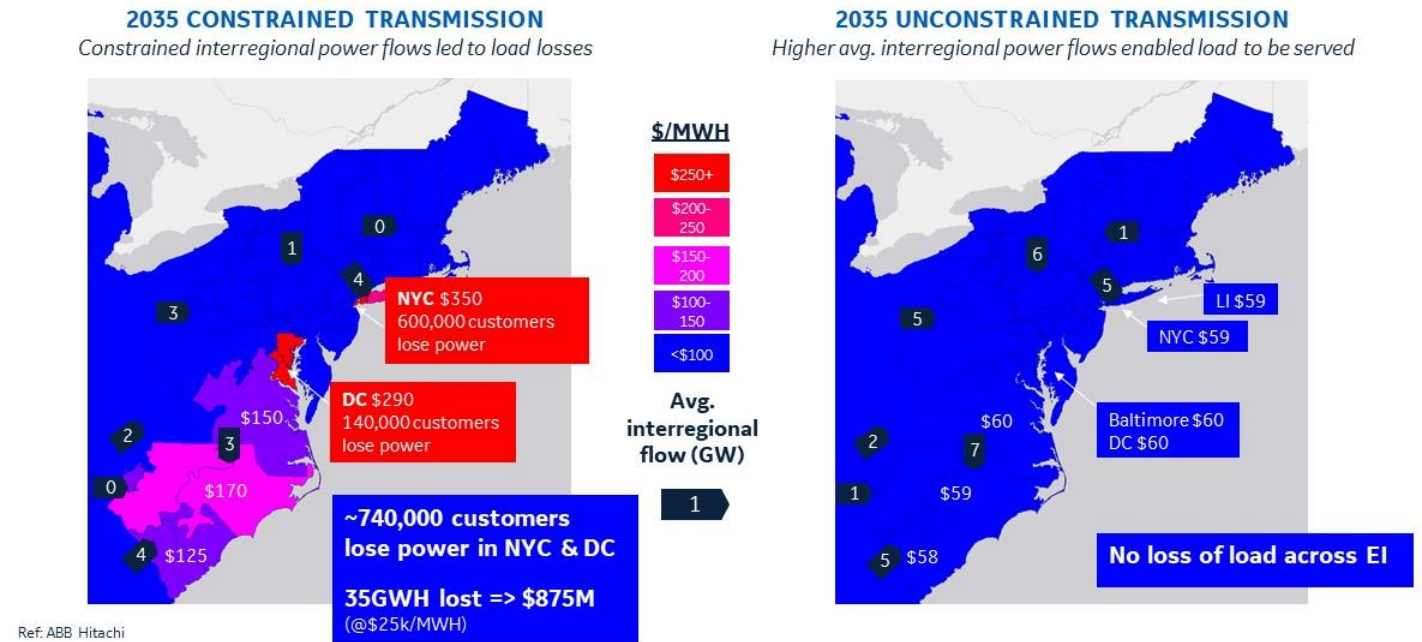


# Transmission Keeps the Lights On — Summer Edition

- Expanded transmission prevents dangerous power outages during extreme weather, saving millions of dollars and saving lives.
- In a simulation based on a real 2018 heat-wave, unconstrained transmission prevented outages for 740,000 customers.

## Heat wave 2035: Unconstraining transmission eliminates load losses

*Demand increased 30% due to heat*

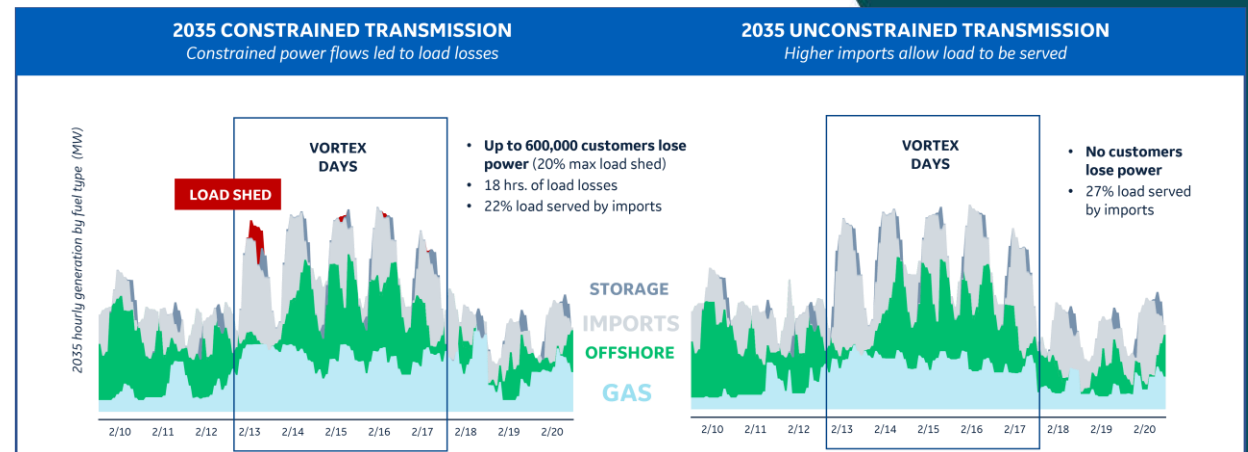
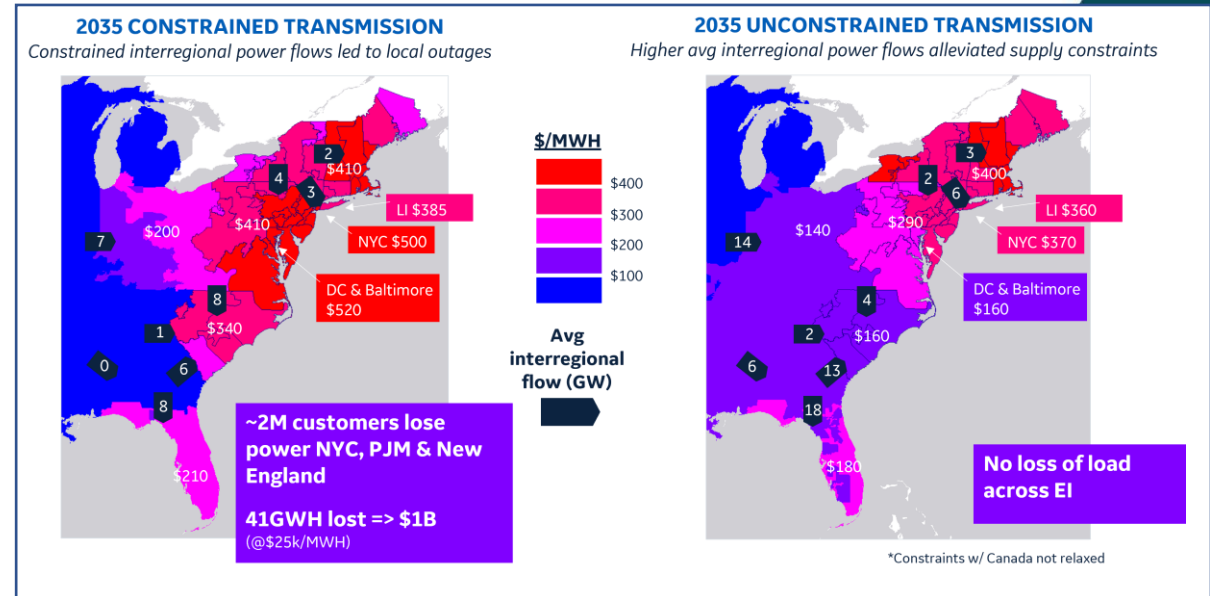


Source: NRDC and GE Energy Consulting



# Transmission Keeps the Lights On — Winter Edition

- In a simulation based on a real 2014 polar vortex, unconstrained transmission prevented outages for 2 million East Coast customers.
- Unconstrained transmission results in no load shedding during the polar vortex. During this period, 27% of the load is imported through transmission.



Source: NRDC and GE Energy Consulting

# Offshore Wind Transmission: Obstacles & Opportunities

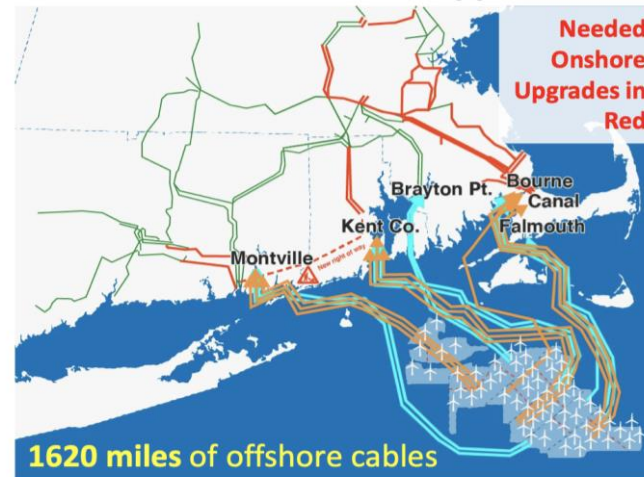
- We urgently need more transmission to integrate offshore wind energy.

***Proactively planning for at least 100 GW of new OSW generation can:***

- Reduce overall transmission costs by \$20 billion;
- Limit shore crossings by 60-70%;
- Reduce marine transmission cable installations by 50%.

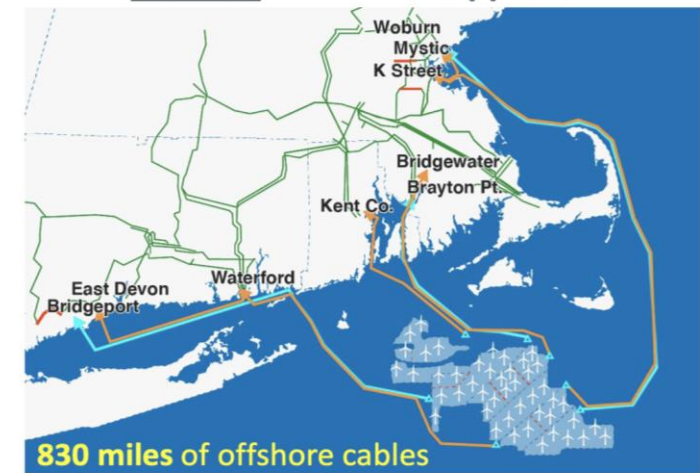
## Planned vs. Unplanned Transmission for New England OSW

Plausible AC Gen-Tie Approach



Source: The Brattle Group

Planned HVDC+POI Approach




# Overcoming Transmission Obstacles: Tools You Can Use

## **Bipartisan Infrastructure Law**

- Strengthens FERC's backstop siting authority;
- \$2.5 billion revolving fund for DOE to serve as anchor tenant on transmission projects.

## **Inflation Reduction Act**

- \$2 billion in low-interest direct loans to support transmission projects in the national interest;
  - \$760 million in grants to facilitate siting of interstate electricity lines;
  - \$3.6 billion for DOE Loan Programs Office;
  - \$100 million for DOE to conduct analysis of interregional and offshore wind transmission.
- 

# Overcoming Transmission Obstacles: Tools You Can Use

## **Federal Power Act Section 216(h)**

- Allows transmission projects to obtain a single environmental review under DOE authority.

## **Proactive Outreach**

- Developers that engage thoughtfully with landowners, communities, and Tribes can build trust, reduce litigation risks, and improve a project's chance of success. A recent ACEG paper recommended 30+ siting practices for developers.

## **DOE Analysis**

- A new DOE report quantifies the need for expanded transmission capacity by region and can serve as a helpful tool for planners.
- 


# Overcoming Transmission Obstacles: Tools We Still Need

**Transmission Tax Credit:** Congress should establish an investment tax credit for transmission, including high-capacity offshore lines.

**Siting and Permitting Reform:** Congress should pass legislation that improves the environmental review process for transmission and makes project siting more efficient.

**Community Benefit Agreements:** Communities or tribes impacted by a project should receive funds to participate in the transmission planning and development process, and a portion of federal lease payments should go toward community benefit funds for these communities.

**FERC's Transmission Planning Rule:** FERC should require robust, forward-looking interregional planning. A final rule should broadly define transmission's benefits — such as the reliability benefits OSW would provide to ISO-NE — and allocates related costs accordingly.

- Regions can also work among themselves to proactively design transmission to maximize benefits and allocate costs in proportion to those benefits.
- 



# Sources:

*Denholm, Paul, Patrick Brown, Wesley Cole, et al, :Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035," National Renewable Energy Laboratory (NREL), Aug. 2022.*

*Tandon Manz, Sheila, "Economic, Reliability, and Resiliency Benefits of Interregional Transmission Capacity," NRDC and GE Energy Consulting, Oct. 2022.*

*Pfeifenberger, Johannes P., et al, "The Benefit and Urgency of Planned Offshore Transmission: Reducing the Costs of and Barriers to Achieving U.S. Clean Energy Goals," The Brattle Group, Jan. 2023.*

*Questions?*



# DER Grid Interconnections

## Designing the Grid We Need, When and Where We Need it

Katie Jereza  
Vice President, Corporate Affairs

NPCC  
April 27, 2023





# EPRI: Leading Collaborative Energy R&D Around the World

EPRI advances energy technologies and informs decision-making through ~\$460M in collaborative annual research involving nearly 400 entities in ~40 countries - spanning the generation, delivery, and use of electricity.



## ENGAGING

- Utilities
- Academia
- OEMs
- Regulators



## LISTENING

- Financial Community
- Policy Makers
- Consumer Advocates
- Media

# Reimagining the Future Energy System



## Decarbonization

Accelerate economy-wide, low-carbon solutions

- Electric sector decarbonization
- Transmission and grid flexibility: storage, demand, EVs
- Efficient electrification

Achieve a net-zero clean energy system

- Ubiquitous clean electricity: renewables, advanced nuclear, CCUS
- Negative-emission technologies
- Low-carbon resources: hydrogen and related, low-carbon fuels, biofuels, and biogas

## Transformation

Drive affordability of a clean and resilient energy system through digital transformation

- Power system modernization: pervasive sensors, monitoring, advanced analytics using AI
- Upgraded and expanded communications infrastructure and control systems

## Resiliency

Mitigate climate impacts and cyber/physical risks

- System and asset hardening
- Improved response
- Faster recovery
- Cybersecurity

Future proof energy system design basis

- Resilient power system design
- Advanced asset design and strategic undergrounding
- Smart integration of energy carriers

## Making Energy More

Clean

Affordable

Reliable

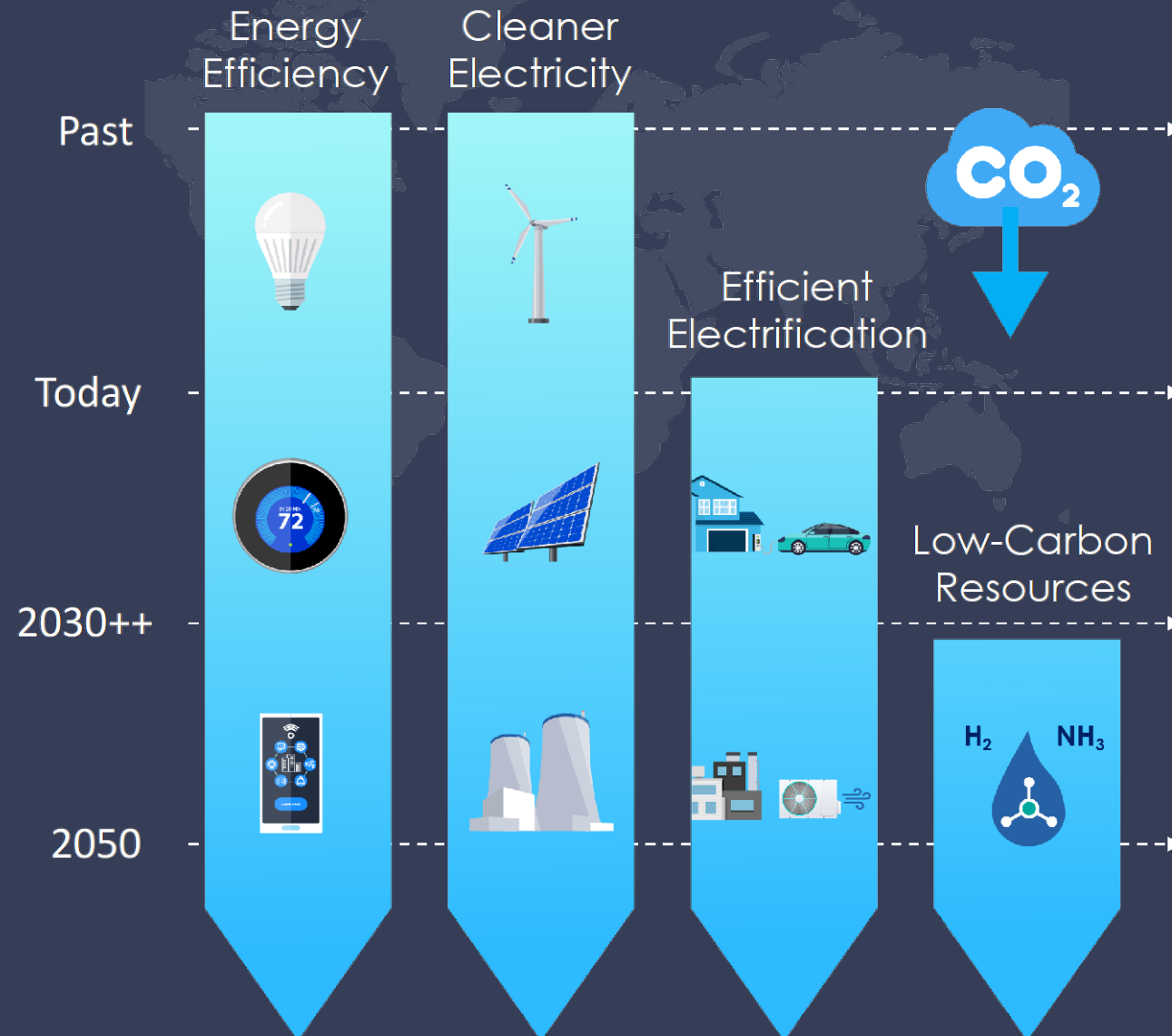
~10-15 years

~15-30 years

~10-15 years

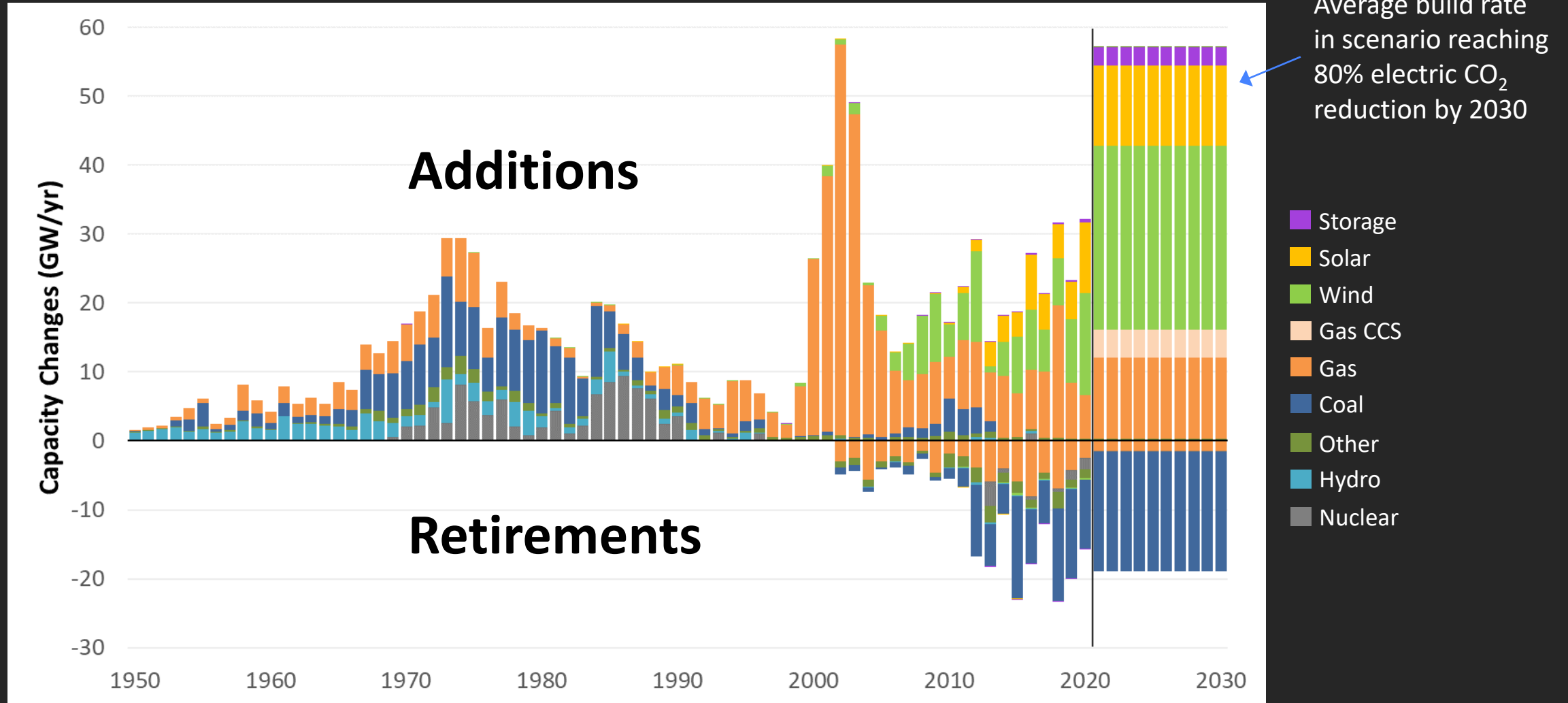
~15-30 years

# 2030 Imperative: Renewable & EV ready Grid



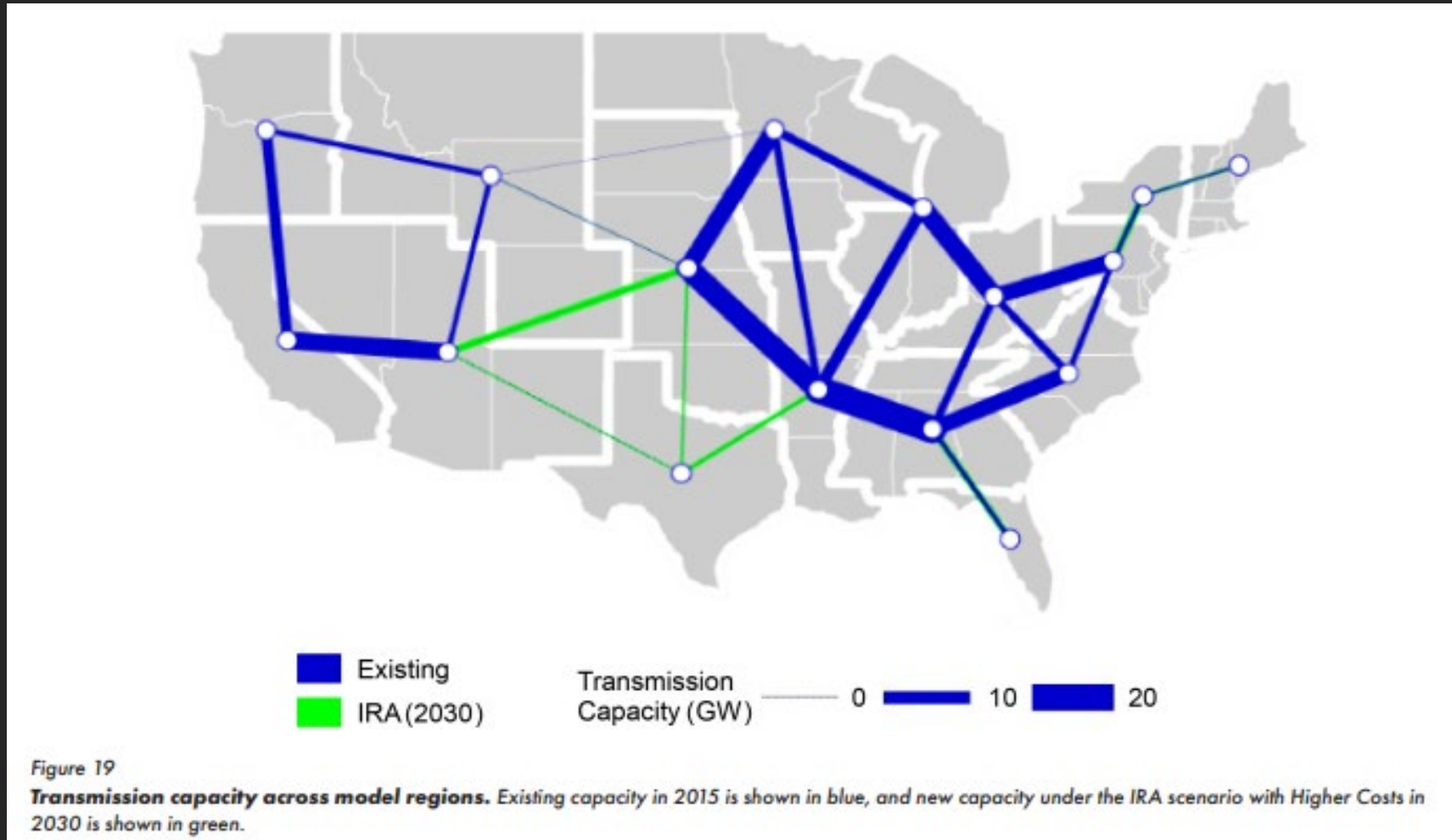
# Meeting the US 2030 Target: Massive Grid Deployment

50x30 Scenario



Historical maximum additions and retirements exceeded each year for the next ten years

# 2030 Scenario: Expanded Grid to Maintain Reliability



<https://www.epri.com/research/products/000000003002026229>

## High Wind and Solar and Electrification of Other Sectors



# An Integrated Grid Efficiently Linking Resources and Active Demands

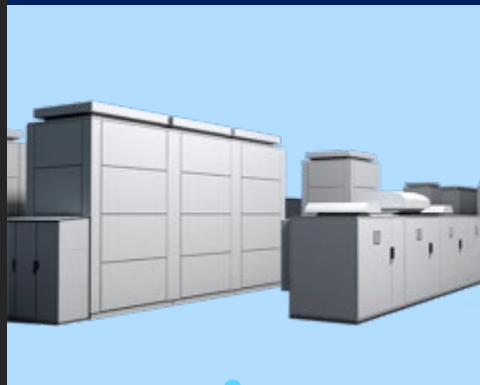
**Smart and Fast Charging of EV**



**Enabling Higher Penetration of EV/Solar/DER**



**Grid-Integrated Energy Storage**



**Vehicle-to-Grid System Resource**



**Connected, Smart Demand-Responsive Load**



# Grid-integrated Distributed Energy Resources (DER)



DER must be visible and integrated with grid planning and operations



Grid modernization upgrades needed to maximize value of DER



New approaches and metrics to evaluate the economics of DER are needed



**DER can support a resilient, low-carbon power system**

# Key Aspects of DER Integration



When used for reliability services, DER management becomes crucial!



- When DER are used for vital grid functions, they become part of the grid
- For non-wires, grid operators must rely on real-time control of DER

**Grid operators must be aware of DER and their characteristics**



# Maximizing the Value

## Grid modernization building blocks



Investment in Grid Modernization is Foundational to DER Integration

- Physical grid infrastructure upgrades where necessary
- Grid monitoring, sensing and measurement
- Grid communications, interoperability and cybersecurity
- Grid management and controls systems

Each provides grid and customer benefits through improved reliability, resilience, and operation

# New Economic Evaluation Methods Needed

Traditional least-cost approaches do not capture the value of grid modernization



Cost effectiveness for  
DER applications  
needs to be better  
understood



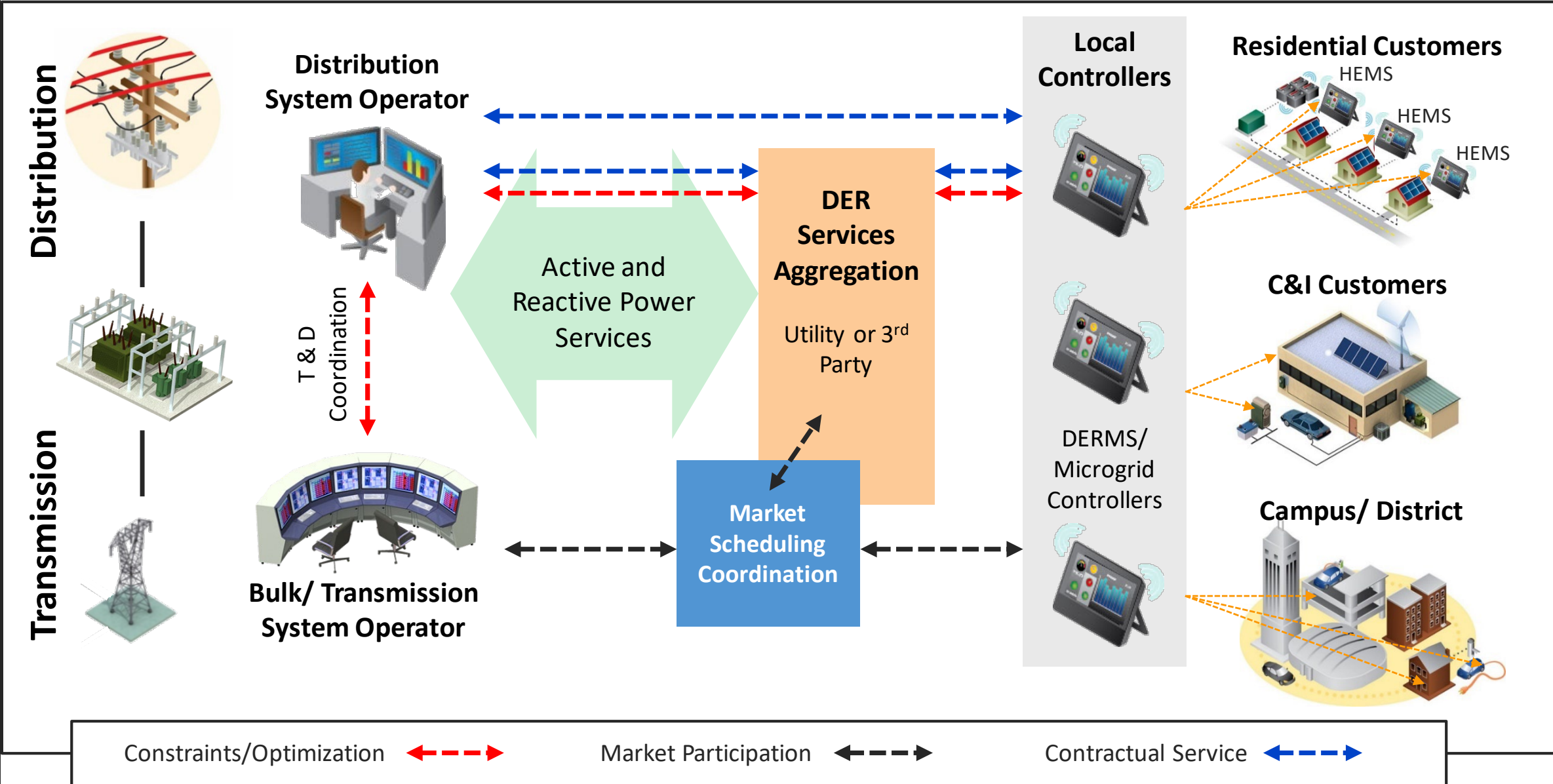
Interdependent  
investments must be  
evaluated together, rather  
than independently



Value from DER  
applications may vary  
depending on location and  
other factors

**Consider perspectives of electric utilities, customers, and society**

# EPRI Vision of an Integrated Grid



# DOE SOLACE Project

*SOLAR Critical infrastructure Energization system*

## Project Goals

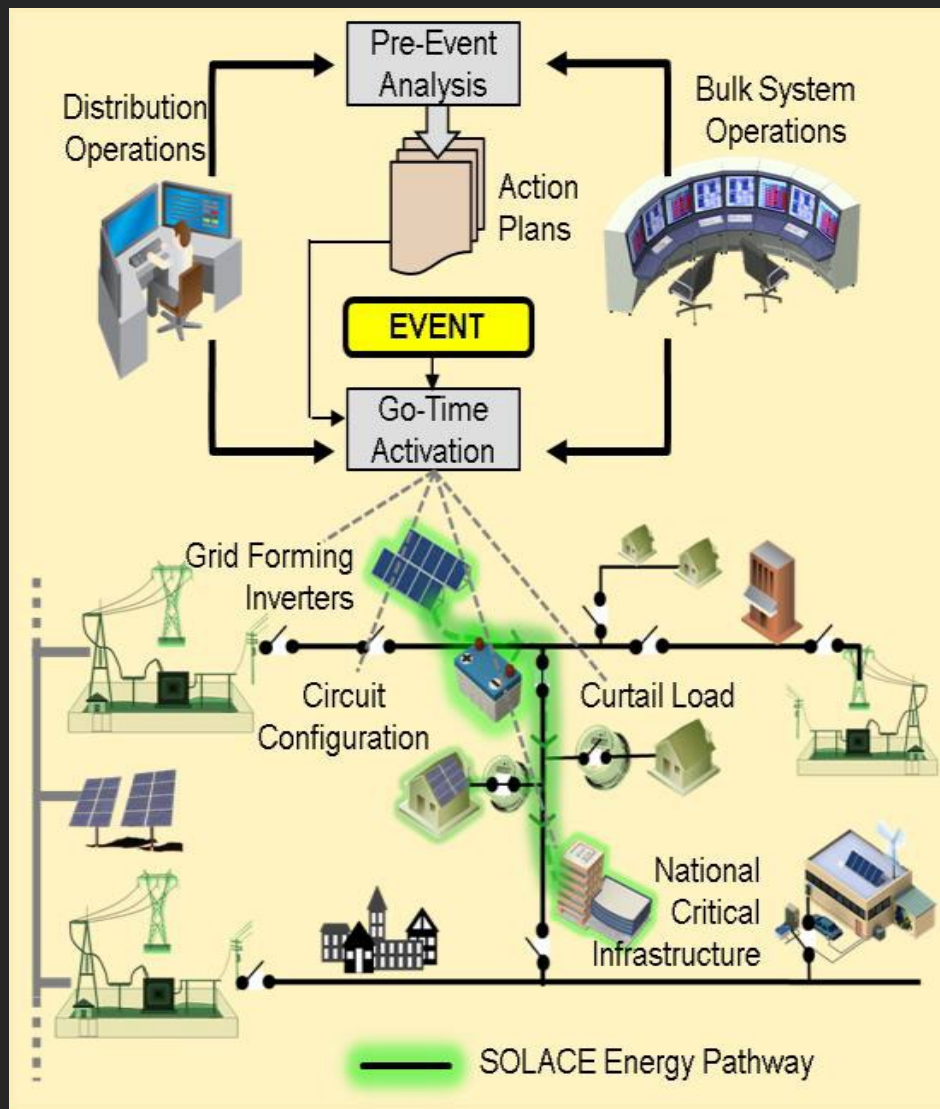
- Gain ability to leverage DER for grid resiliency
- Preparedness for extreme weather and cyber events
- Operating local communities or select critical facilities autonomously when the grid is down

## Project Components

- Pre-event planning and analysis for viability
- Grid-Forming Inverters
- Go-time operation through advanced DMS and DERMS
- Field Demonstration

## Partners

UT Austin, Austin Energy, Duke Energy, NREL, Sandia, Solectria, Pecan Street, Schneider



# Need for Energy Storage

## ■ Enabler

- Energy storage is an enabler for a low-carbon future. As more renewables are installed, it will be needed to help provide grid stability and reliability.

## ■ Need

- A substantial amount will be needed: 125–680 GWs of new energy storage is projected for the U.S. by 2050.\* Globally, energy storage is also predicted to grow significantly.

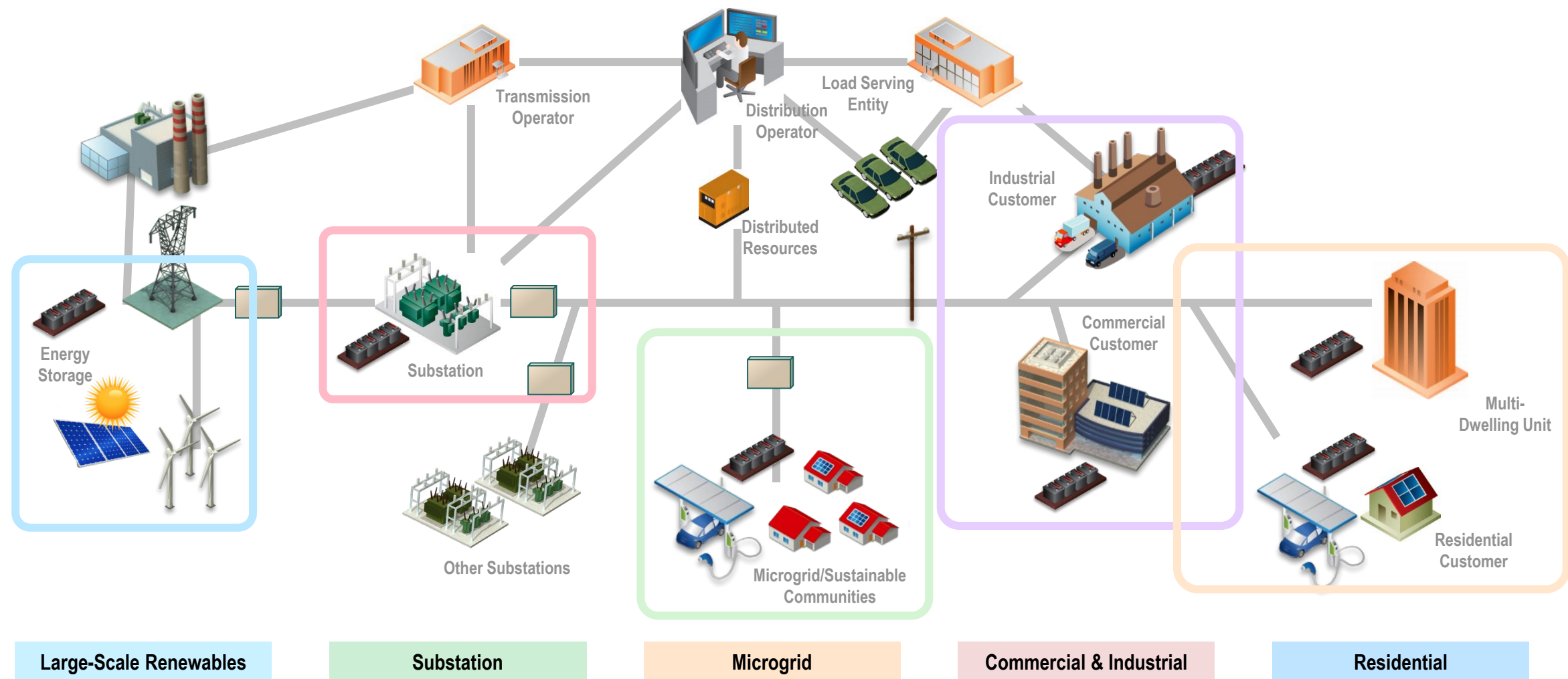
\* “Economic Potential of Diurnal Storage in the U.S. Power Sector,” NREL, July 2021.

## ■ Options

- Energy storage comes in a variety of types and durations, and we will benefit from a portfolio of reliable technologies



# Energy Storage Application



Energy storage has potential applications across the entire electricity enterprise value chain

A blue-tinted photograph of four people standing in a row. From left to right: a man with curly hair and glasses in a lab coat; a man with glasses in a lab coat; a woman wearing a hard hat and a dark polo shirt with the EPRI logo; and a man with glasses and a beard in a light blue button-down shirt. They are all smiling and looking towards the camera. The background is a plain, light-colored wall.

**Together...Shaping the Future of Energy®**



# Building a Better Grid: The Department of Energy's Grid Deployment Strategy

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**Jeff Dennis**  
Deputy Director, Transmission Development  
U.S. Department of Energy, Grid Deployment Office

NPCC DER/VER Forum

April 27, 2023





# DOE's Grid Deployment Office

**Mission Statement:** The Grid Deployment Office (GDO) works to provide electricity to everyone, everywhere by maintaining and investing in critical generation facilities to ensure resource adequacy and improving and expanding transmission and distribution systems to ensure all communities have access to reliable, affordable electricity.

## Generation Credits Division

The Generation Credits Division works with existing generation facilities to ensure resilience and reliability.

## Transmission Division

The Transmission Division supports innovative efforts in transmission reliability and clean energy analysis and programs, and energy infrastructure and risk analysis in support of the Administration's priorities to enhance grid resilience.

## Grid Modernization Division

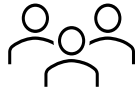
The Grid Modernization Division oversees activities that prevent outages and enhance the resilience of the electric grid.





# U.S. DEPARTMENT OF ENERGY

## Building a Better Grid



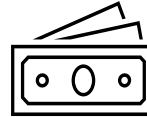
### Engagement and Collaboration

- Federal agencies
- States
- Tribal Nations
- ISOs/RTOs
- Stakeholders



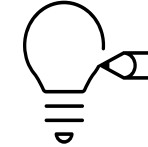
### Enhanced Transmission Planning

- Transmission Needs Study
- National Transmission Planning Study
- Atlantic + Pacific Offshore Wind Transmission Studies



### Federal Financing Tools (>\$20B)

- Transmission Facilitation Program (\$2.5B)
- Transmission Facility Financing (\$2B)
- Grid resilience formula grants for states, tribes, and territories (\$2.5B)
- Grid Resilience and Innovation Partnerships (GRIP) Program (\$10.5B)



### Transmission Permitting Process

- Improve federal permitting regimes with federal agency partners
- Public private partnerships
- Designation of national interest electric corridors
- Grants to siting authorities and affected communities (\$760m)



### Transmission Related R&D

- “Next generation” electricity delivery technologies
- Advanced Conductors/Reconductoring
- Grid Enhancing Technologies





# Enhanced Transmission Planning: Transmission Needs Study

# Needs

## Overview of National Transmission ~~Congestion~~ Study

as amended by Bipartisan Infrastructure Law

Federal Power Act §216(a) ✓ directs DOE to conduct assessments of:

historic and expected transmission capacity constraints and congestion  
every three years

with consultation\* from States, Indian tribes, and regional grid entities

- ▶ Department's triennial **state of the grid report**
- ▶ Reviews historic industry data, recent power system studies, published capacity expansion results
- ▶ Final published Summer 2023 **following public comment period**



# How will the Needs Study be Used?

Helps inform **DOE prioritization of future funding** and **focuses the attention** of federal, state, and Tribal policymakers, industry, and other stakeholders on most pressing national and regional transmission needs

Helps inform **designation of National Interest Electric Transmission Corridors** (NIETC, \nit-SEE\) under FPA §216

- **The Needs Study does not designate any NIETCs**
- While DOE must complete the Needs Study before designating a NIETC, actual designation happens through a separate process
- NIETC designation considers the Needs Study and many other statutory factors, including whether designation would promote economic vitality, diversity of supply, reduction of consumers' costs, and national energy security and independence.

# Understanding the Needs Study

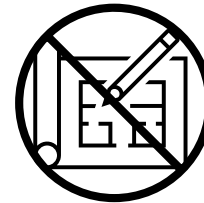
## What It Is

## What It Isn't

### Objective



Assessment of Needs

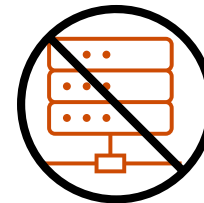


Not prescribing solutions

### Methods



Considers published data and reports (80 references)



No new modeling, cost-benefit analysis, or system planning

### Output



Needs organized by geographic regions



Regions not synonymous with corridors

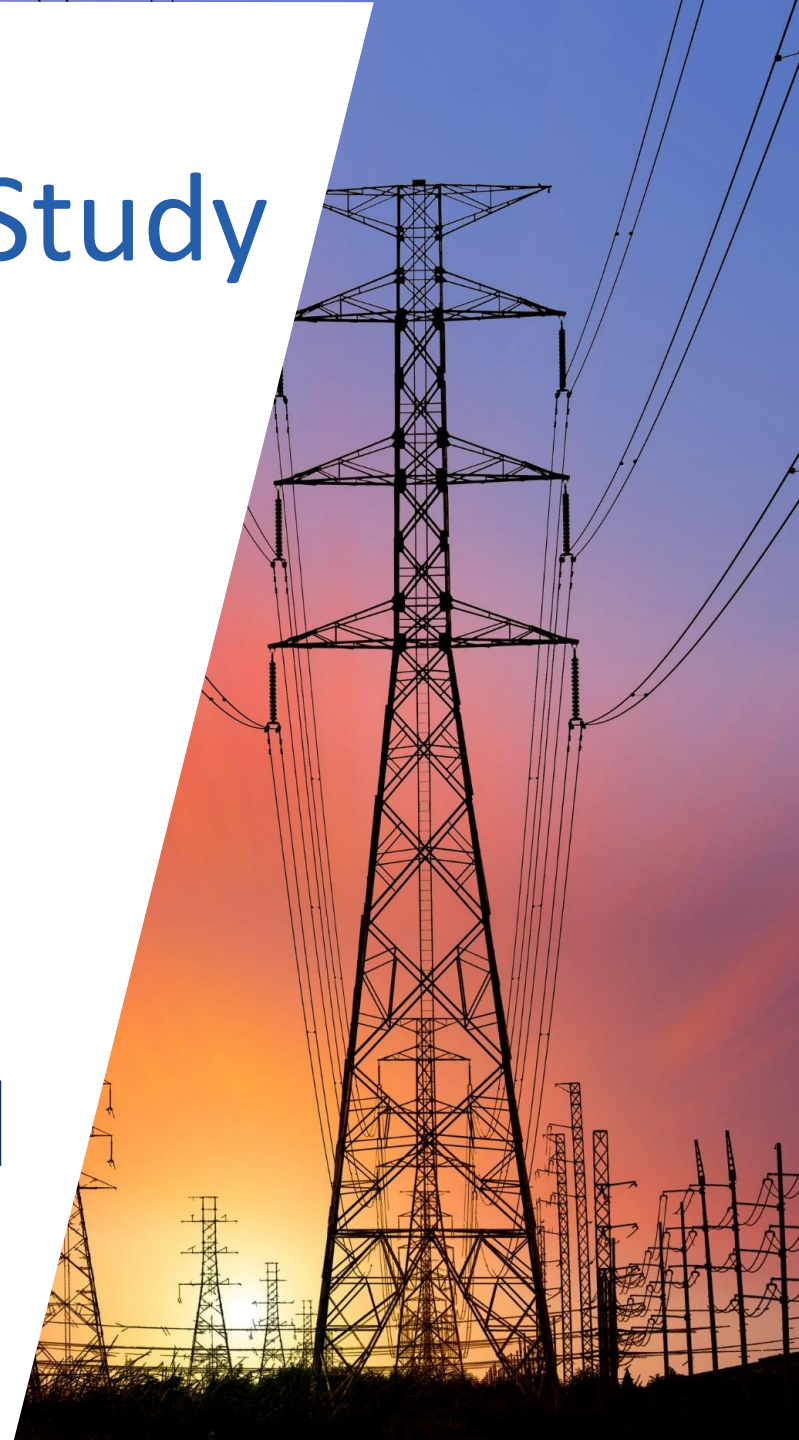


# National Transmission Needs Study

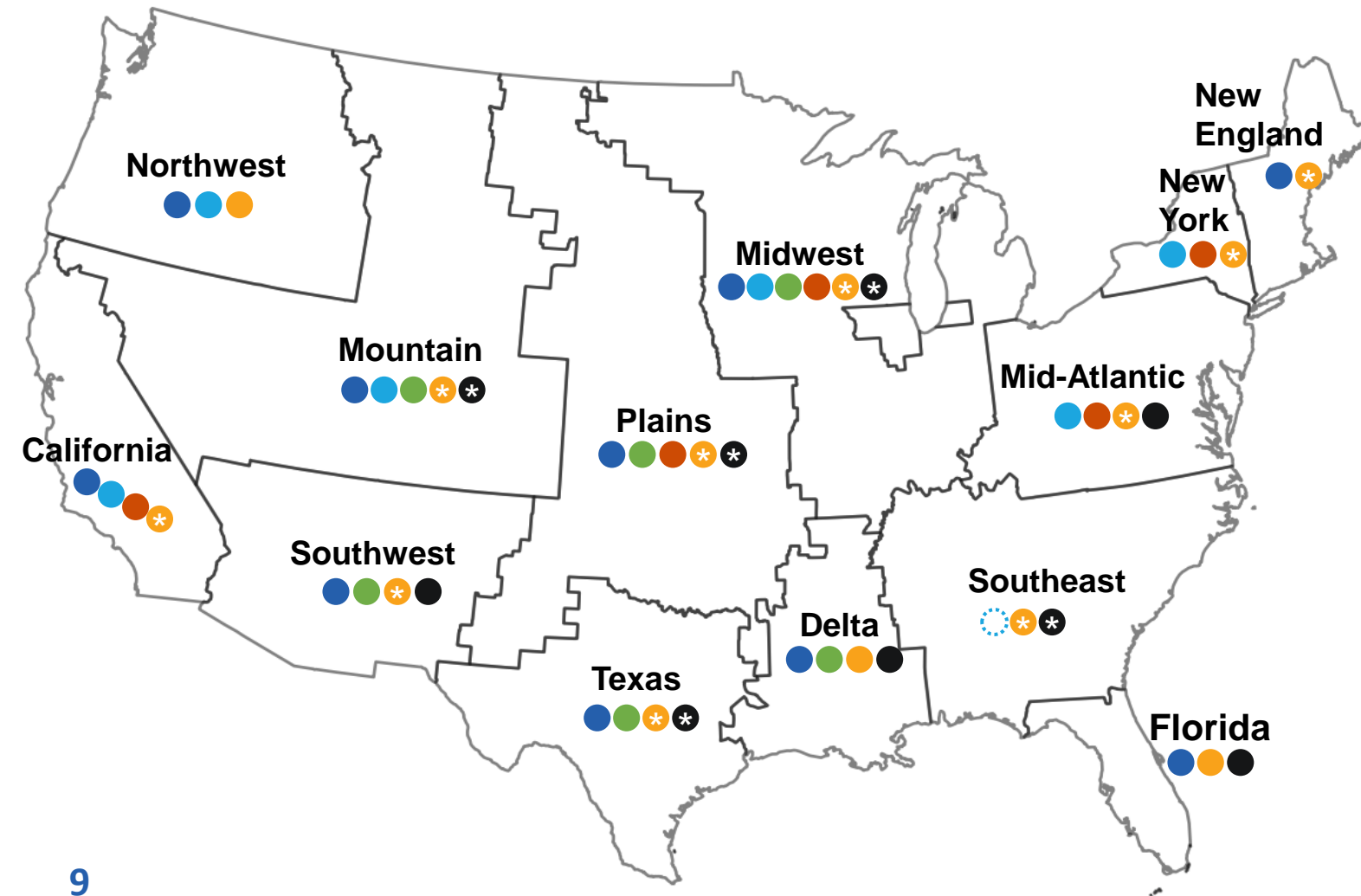
## Executive Summary

- I. Introduction
- II. Legislative Language
- III. Transmission Concepts
- IV. Historical Data: **Current Need**
- V. Review of Existing Studies: **Current and Future Needs**
- VI. Capacity Expansion Modeling: **Anticipated Future Need**

<https://www.energy.gov/gdo/national-transmission-needs-study>



## High-level summary of regional needs, supported by detailed findings.



### Current:

Improve reliability and resilience

Alleviate congestion & unscheduled flows

Alleviate transfer capacity limits between neighbors

Deliver low-cost generation to high-priced demand

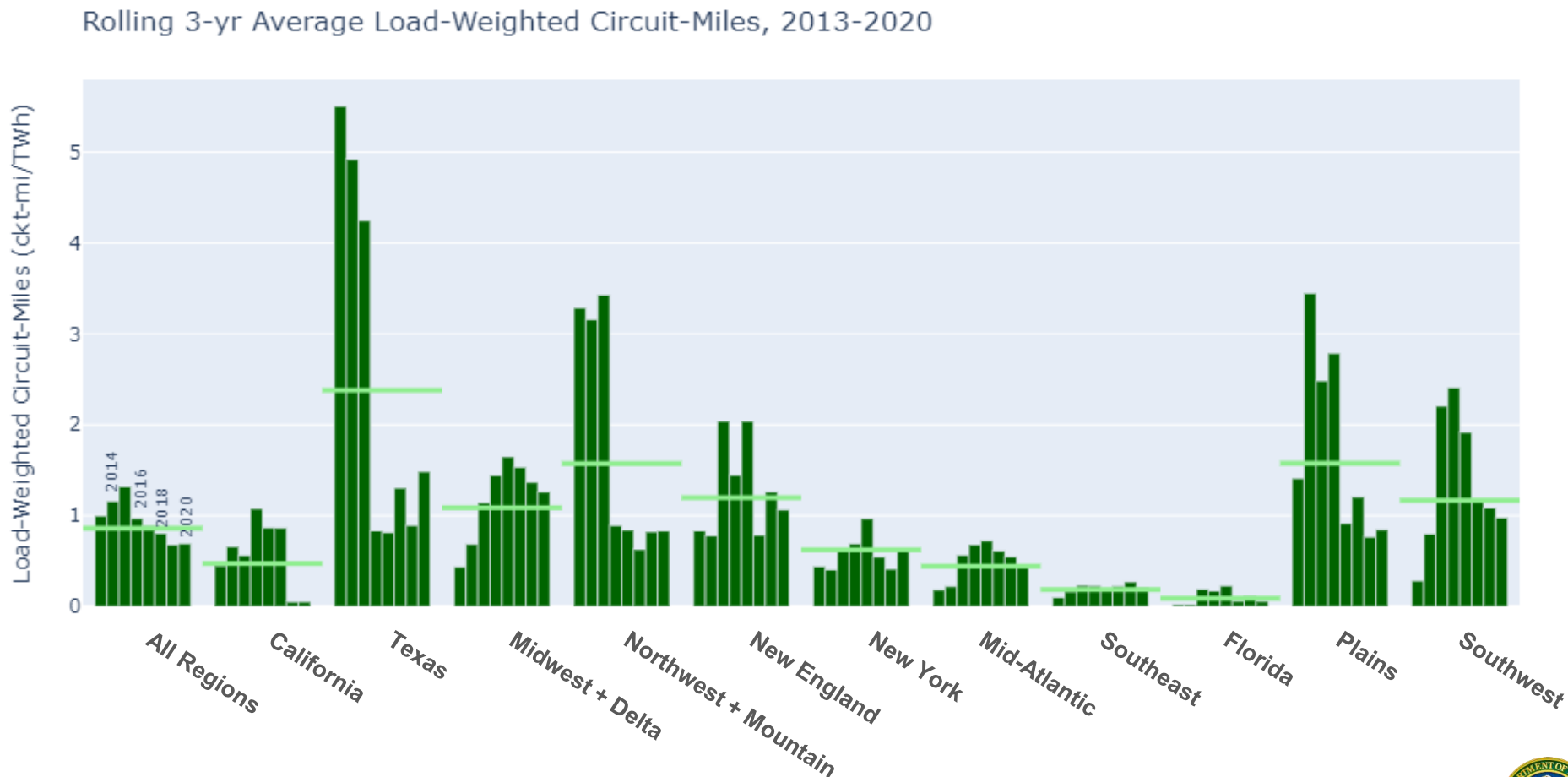
### Anticipated future:

Meet future demand with interregional transfer capacity

Meet future demand with regional transmission

\* Represents  $\geq 50\%$  growth in 2035 relative to 2020 for mod/high scenario  
⦿ Lack of transparency in dataset used

## Transmission investments decreased during the second half of the 2010's.

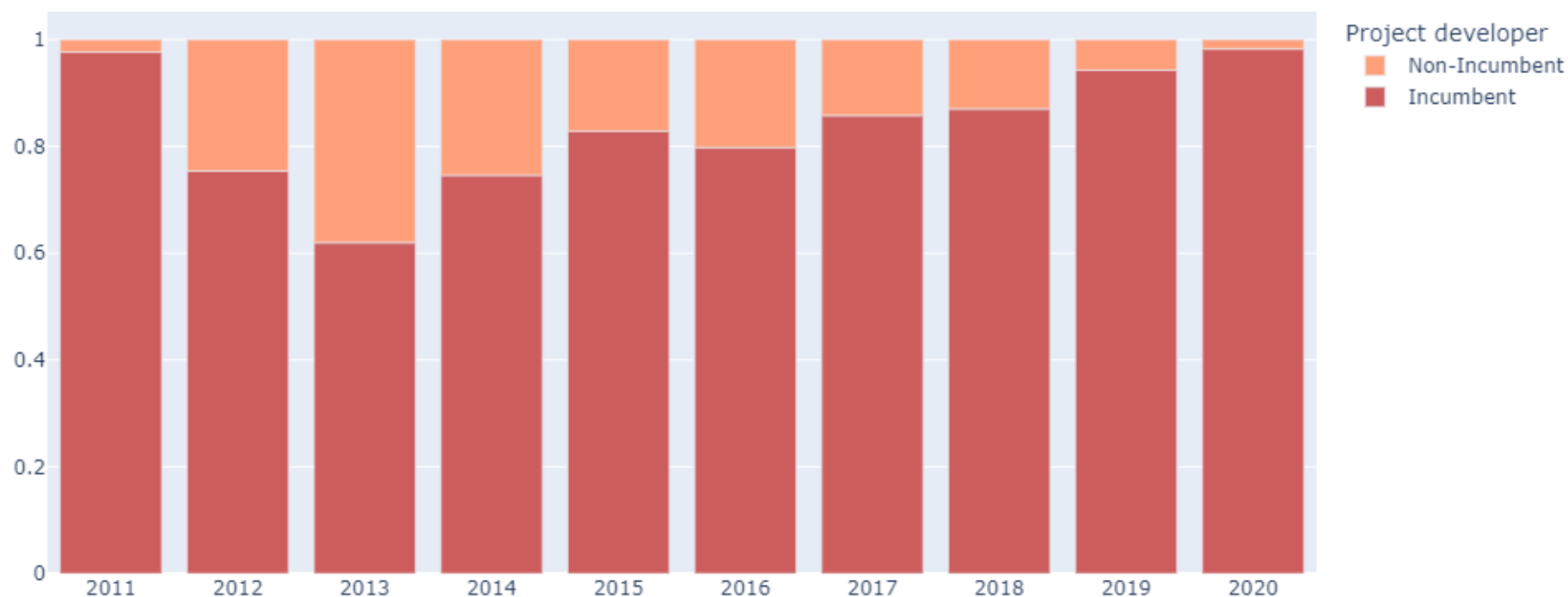


# Transmission investments decreased during the second half of the 2010's.



**Non-incumbent developers'** share of energized projects has decreased from 40% in 2013 to less than 5% in 2020.

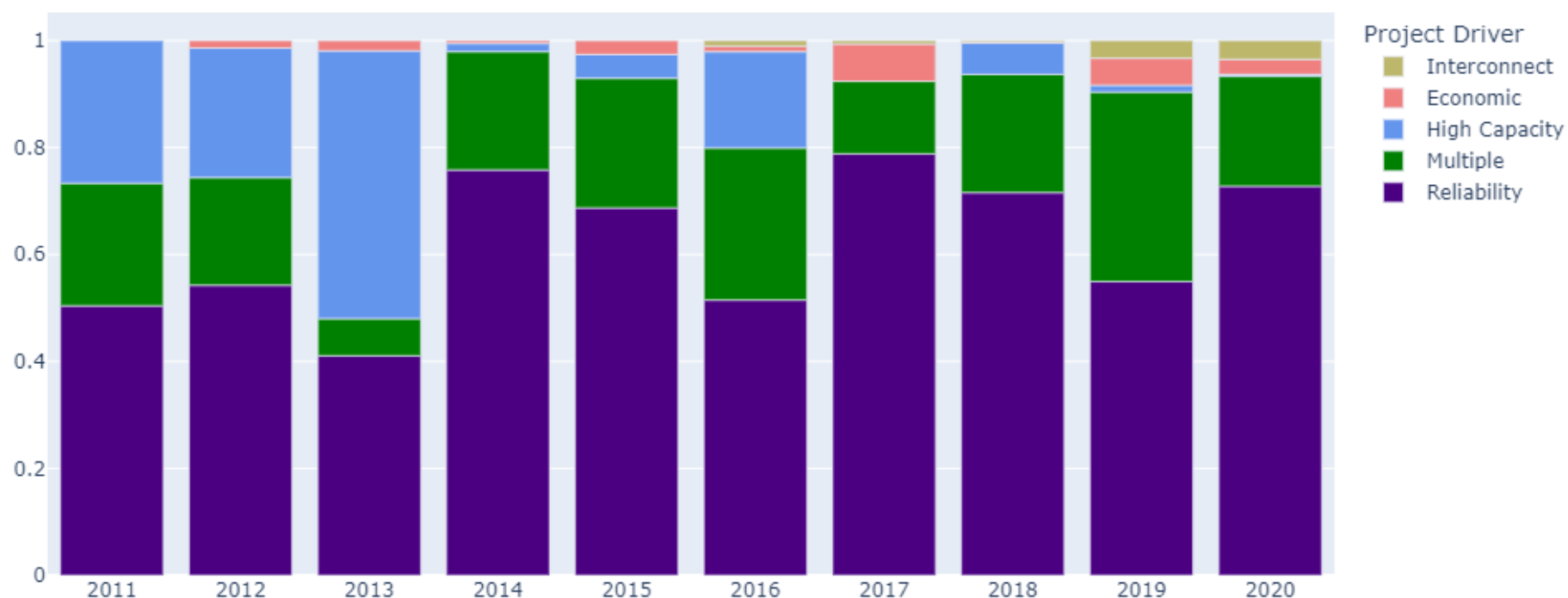
Proportion of national circuit-miles installed each year by developer type



Data from MAPSearch Transmission Database (2020). All transmission lines rated at or above 100kV.

Share of projects addressing **reliability** concerns have increased.  
Share of **high-capacity** projects moving generation have decreased.

Proportion of national circuit-miles installed each year by project driver



Data from MAPSearch Transmission Database (2020). All transmission lines rated at or above 100kV.

*Interconnect* projects are designed to connect power plants to grid.

*Economic* projects are designed to alleviate congestion causing high electricity prices.

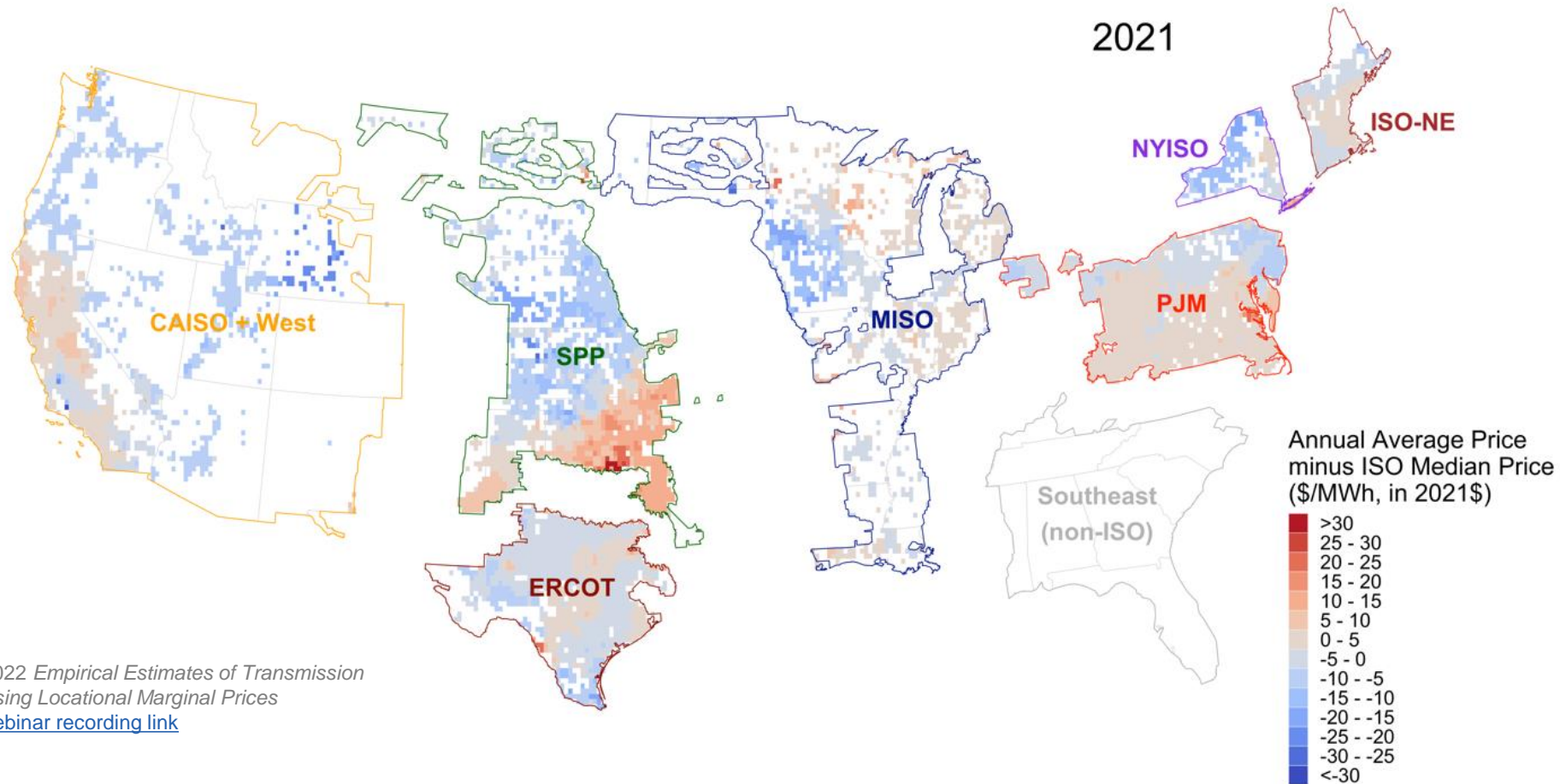
*High-capacity* projects are designed to bring large amounts of generation far distances, usually at voltages  $\geq 345$ kV.

*Reliability* projects are meant to address a reliability concern on the grid.

*Multiple* drivers are for projects designed for at least two of the above drivers.



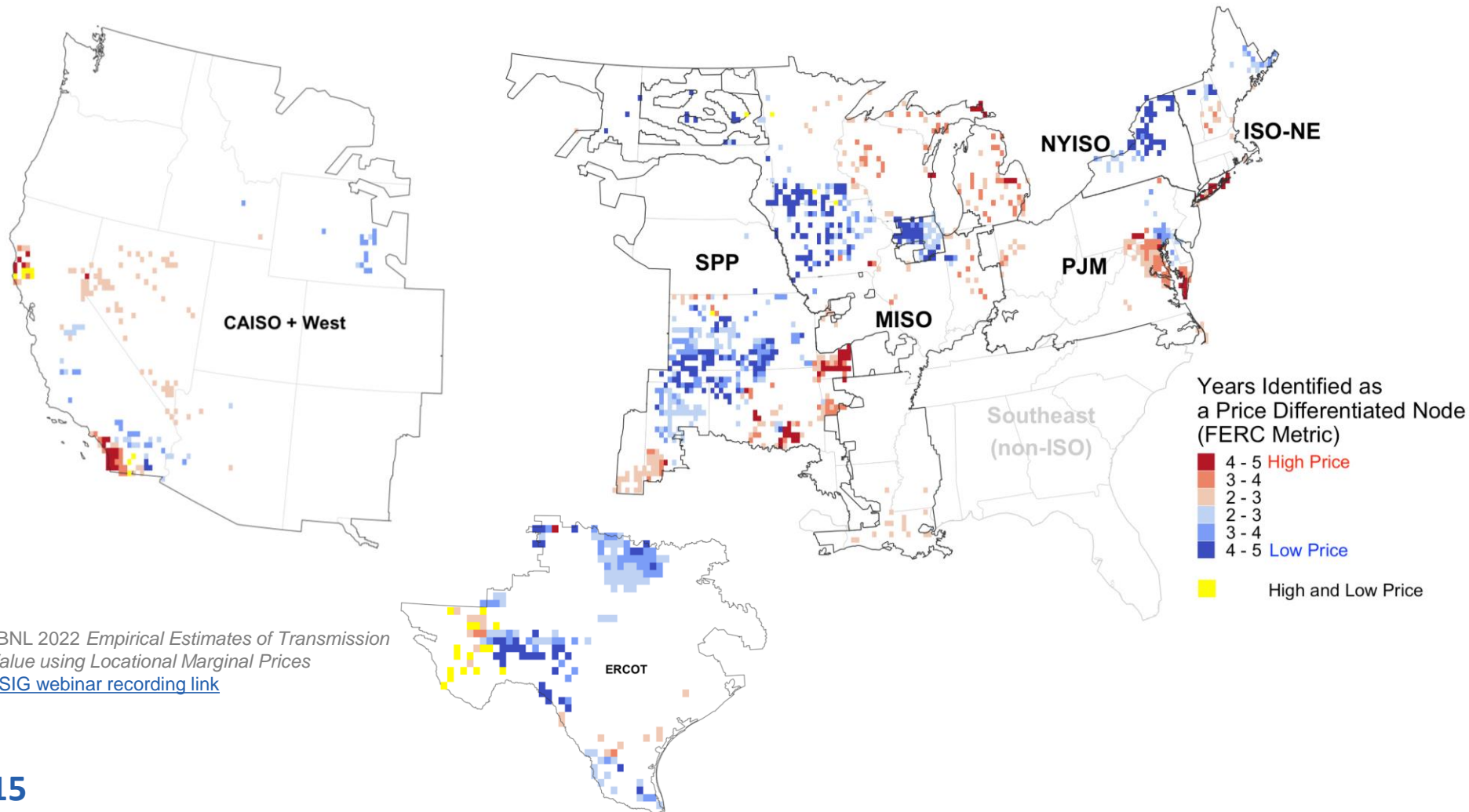
Historic electricity prices reveal areas experiencing congestion today.  
Directions of within region congestion is maintained over time.



LBNL 2022 Empirical Estimates of Transmission  
Value using Locational Marginal Prices  
[ESIG webinar recording link](#)

Increased  
transmission  
capacity between  
high- and low-  
priced areas would  
enable low-cost  
generation to reach  
high-priced  
markets.

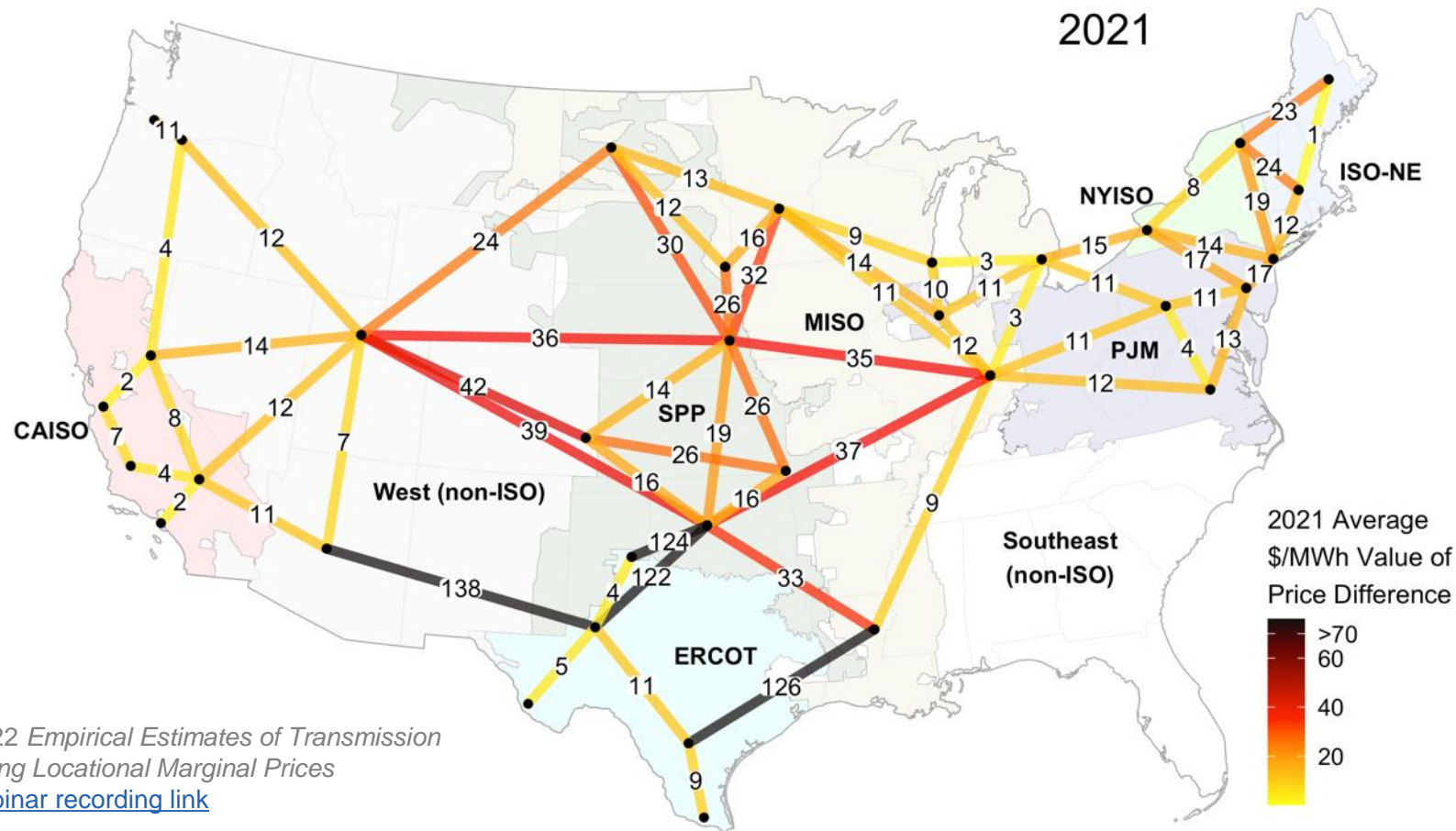
A look at persistently **high** and low prices isolates areas that are strongly impacted by congestion, regardless of average annual price.



LBNL 2022 *Empirical Estimates of Transmission Value using Locational Marginal Prices*  
[ESIG webinar recording link](#)

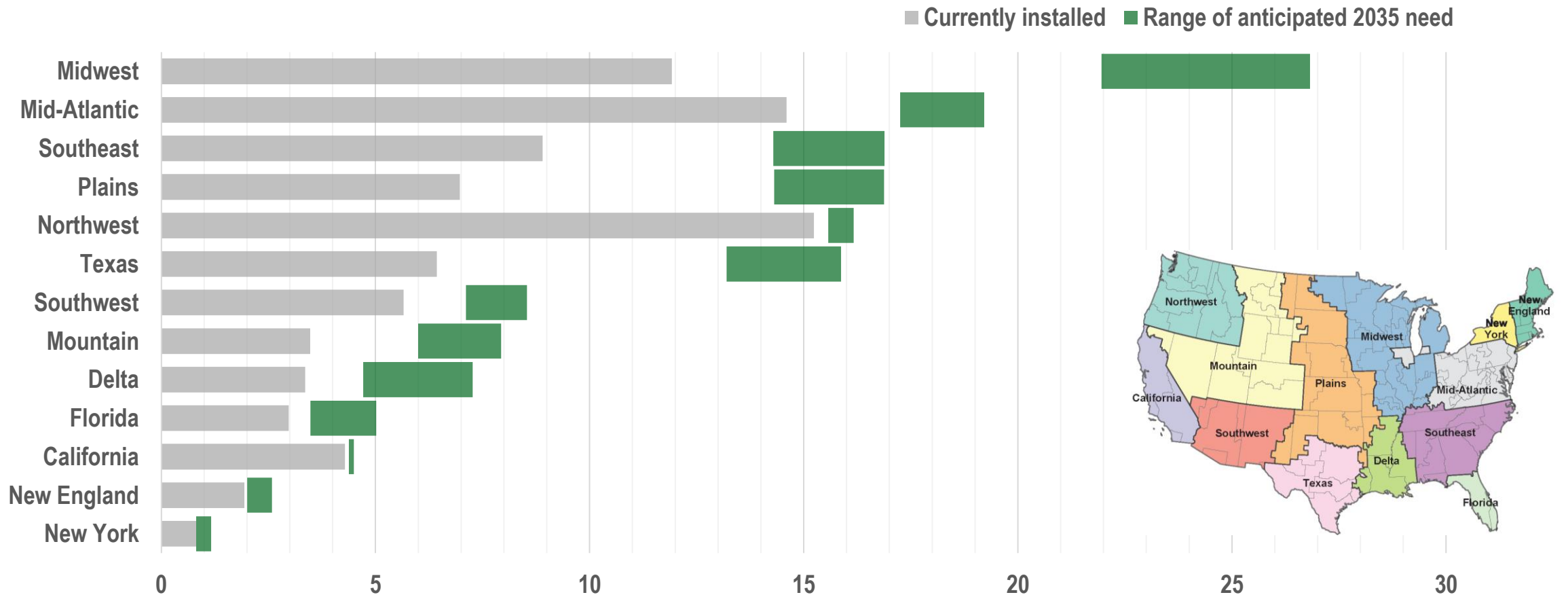
The Market Price Differential Metric helps identify opportunities for transmission, even when grouping all interconnect regions together.

Largest **congestion value** of new transmission is across the interconnects and during extreme weather events.



LBNL 2022 *Empirical Estimates of Transmission Value using Locational Marginal Prices*  
[ESIG webinar recording link](#)

# Regional Transmission Expansion Results: 2035 Mod/High

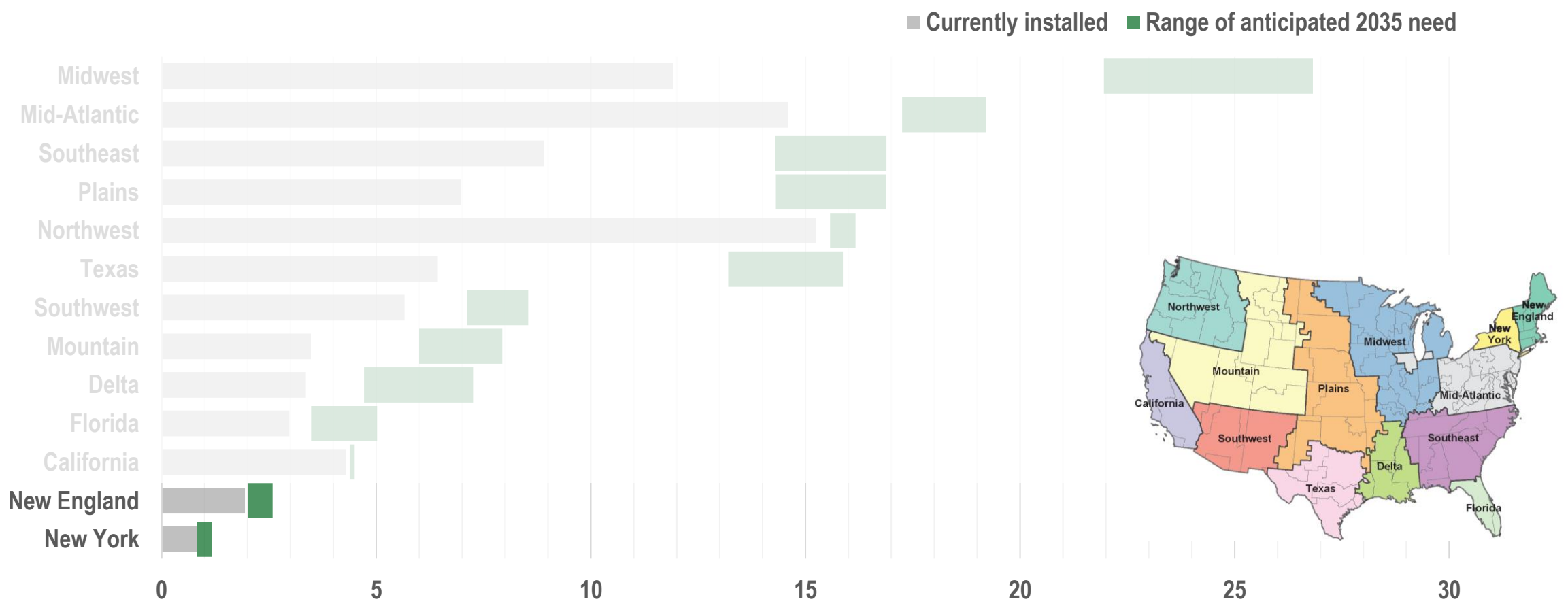


Results of scenarios which enable a 2040 power system:

- 80% - 100% clean energy deployment
- 25% - 75% load growth
- 95 - 100% decarbonization from 2005 levels



# Regional Transmission Expansion Results: 2035 Mod/High



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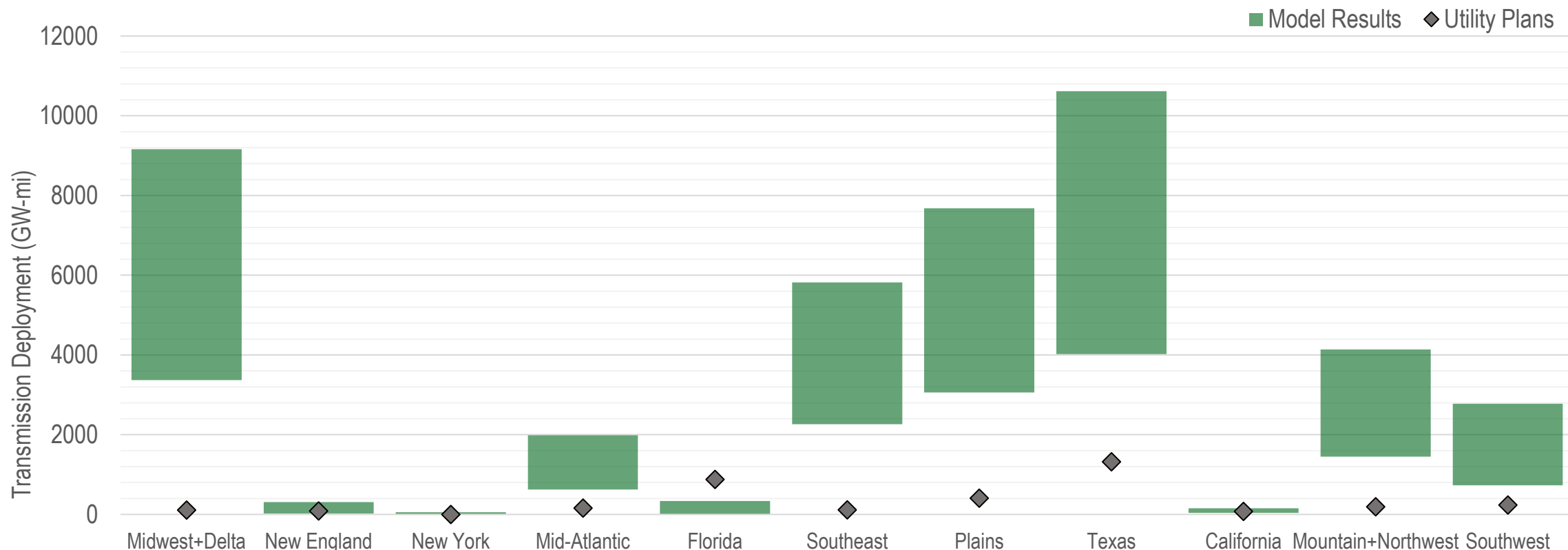
- 80% - 100% clean energy deployment
- 25% - 75% load growth
- 95 - 100% decarbonization from 2005 levels

Transmission (TW-mi)



# How close are we to realizing these futures?

## Comparison of utility plans against 2030 Mod/High results



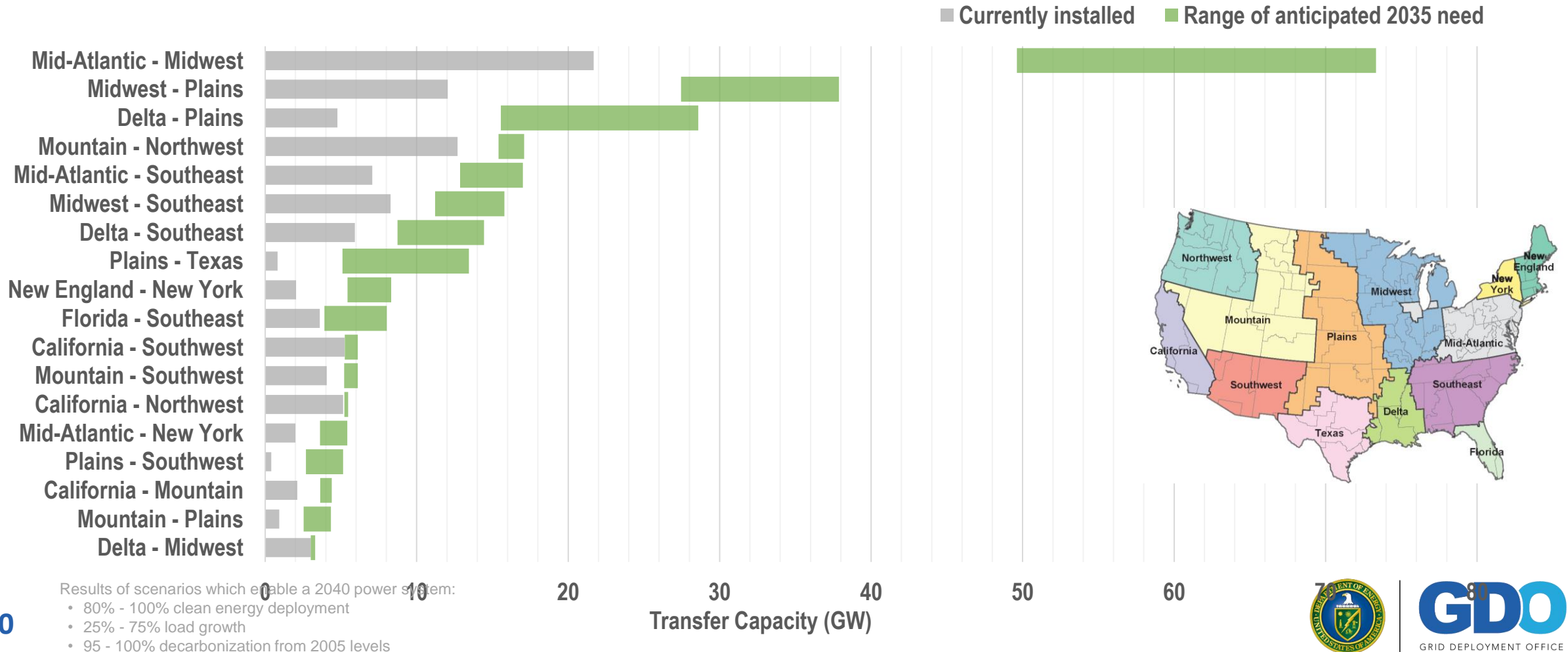
Utility Plans from NERC Energy Supply & Demand 2020 database

Results of scenarios which enable a 2040 power system:

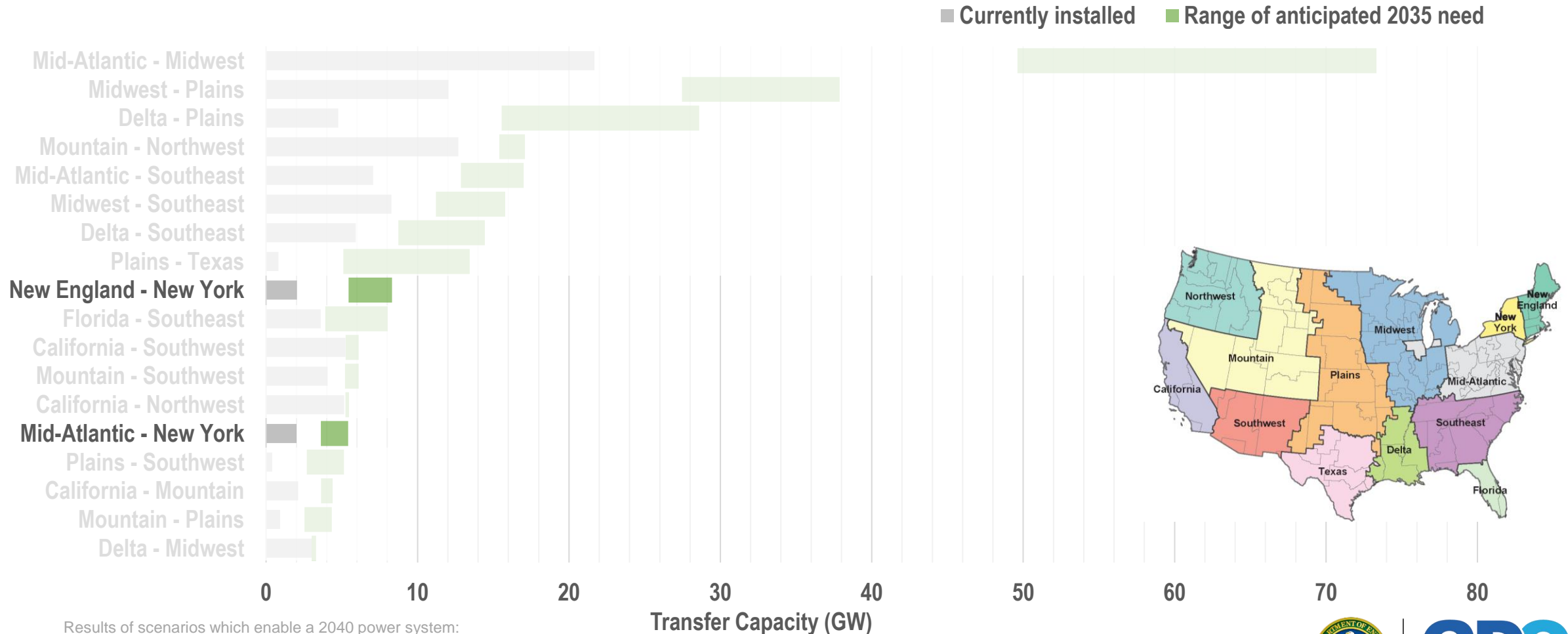
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# Interregional Transfer Capacity Expansion Results: 2035 Mod/High



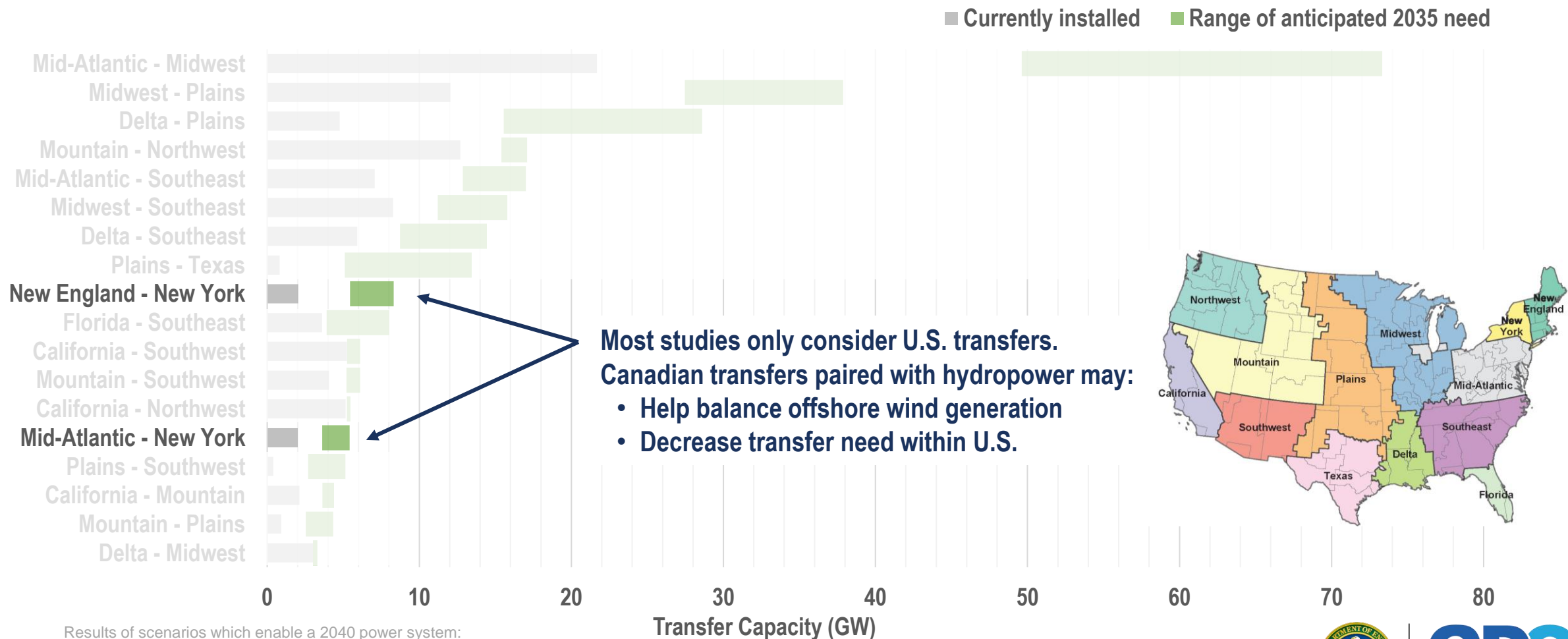
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# **Enhanced Transmission Planning: Atlantic Offshore Wind Transmission Planning**



U.S. DEPARTMENT OF  
**ENERGY**

**BOEM**  
Bureau of Ocean Energy  
Management

# Atlantic Offshore Wind Transmission Preliminary Findings and Recommendations

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# Immediate Recommendations



Partnerships & Collaborations



Planning & Operations



Technologies & Standardization



Economics & Support Initiatives



Siting & Permitting

## Immediate Actions Before 2025

★★★	Multi-State Offshore Wind Transmission Collaborative	1.1.1
★★★	Regional Transmission Planning Collaborative	1.1.2
★★★	Tribal Nation Engagement	1.1.3
★★★	Systematic Evaluation of POI Capacities of Landfall Sites	2.1.2
★★★	NERC Reliability Standards Around Offshore Transmission	2.3.1
★★★	Voluntary Cost Allocation Assignments	4.1.1
★★★	Offshore Transmission Investment Tax Credits	4.2.1
★★	“Network-Ready” Equipment Standards	3.1.1
★★	Equipment Rating Standardization for Transmission Components	3.1.2
★★	R&D for Offshore Transmission Technology Commercialization	3.3.1
★★	Expansion of Domestic Supply Chain and Manufacturing	3.4.1
★★	Skilled U.S. Workforce Development	3.4.2
★★	Federal-State Aligned Offshore Wind Transmission Siting	5.1.3
★★	Guidance for Federal Environmental Review and Permitting Requirements and Procedures	5.2.2
★	Environmental R&D for Offshore Wind Transmission	3.3.2

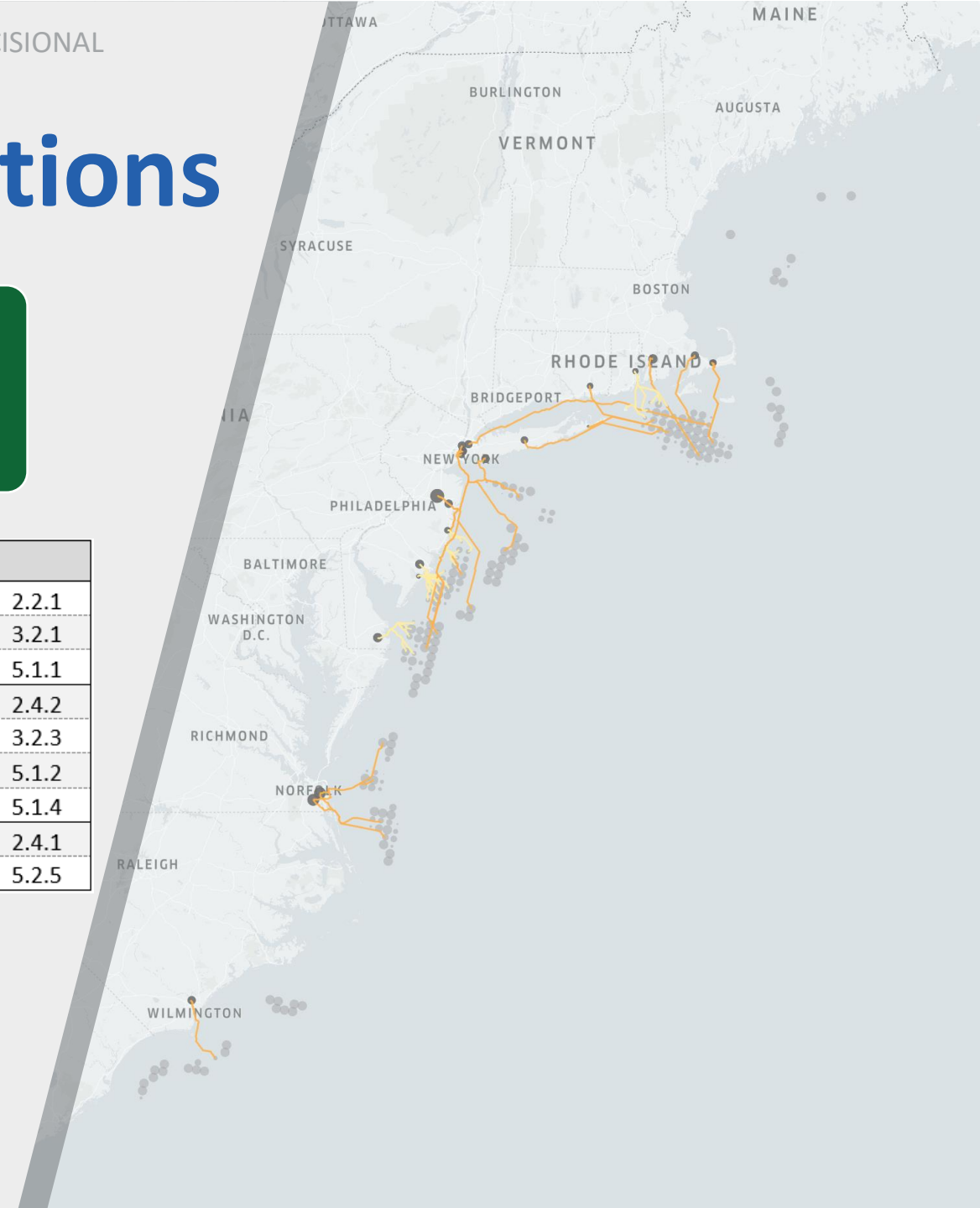


# 2025-2030 Recommendations



## Near-Term Actions for 2025–2030

★★★★	Interregional Offshore Topology Planning	2.2.1
★★★★	HVDC Standards Development	3.2.1
★★★★	Federal Preferred Routes for Transmission in the Outer Continental Shelf	5.1.1
★★★	Regulatory Guidance for Ownership of Network-Ready Projects	2.4.2
★★★	Data Sharing for Interoperability of HVDC Offshore Systems	3.2.3
★★★	BOEM Competitive Right-of-way Grant Issuance Process for Preferred Routes	5.1.2
★★★	Multi-state Partnership on Clean Energy Standards and Offshore Wind Goals	5.1.4
★★	Interconnection Queue Process Reform	2.4.1
★	Community Benefit Agreements	5.2.5



# 2030-2040 Recommendations



Partnerships & Collaborations



Planning & Operations



Technologies & Standardization



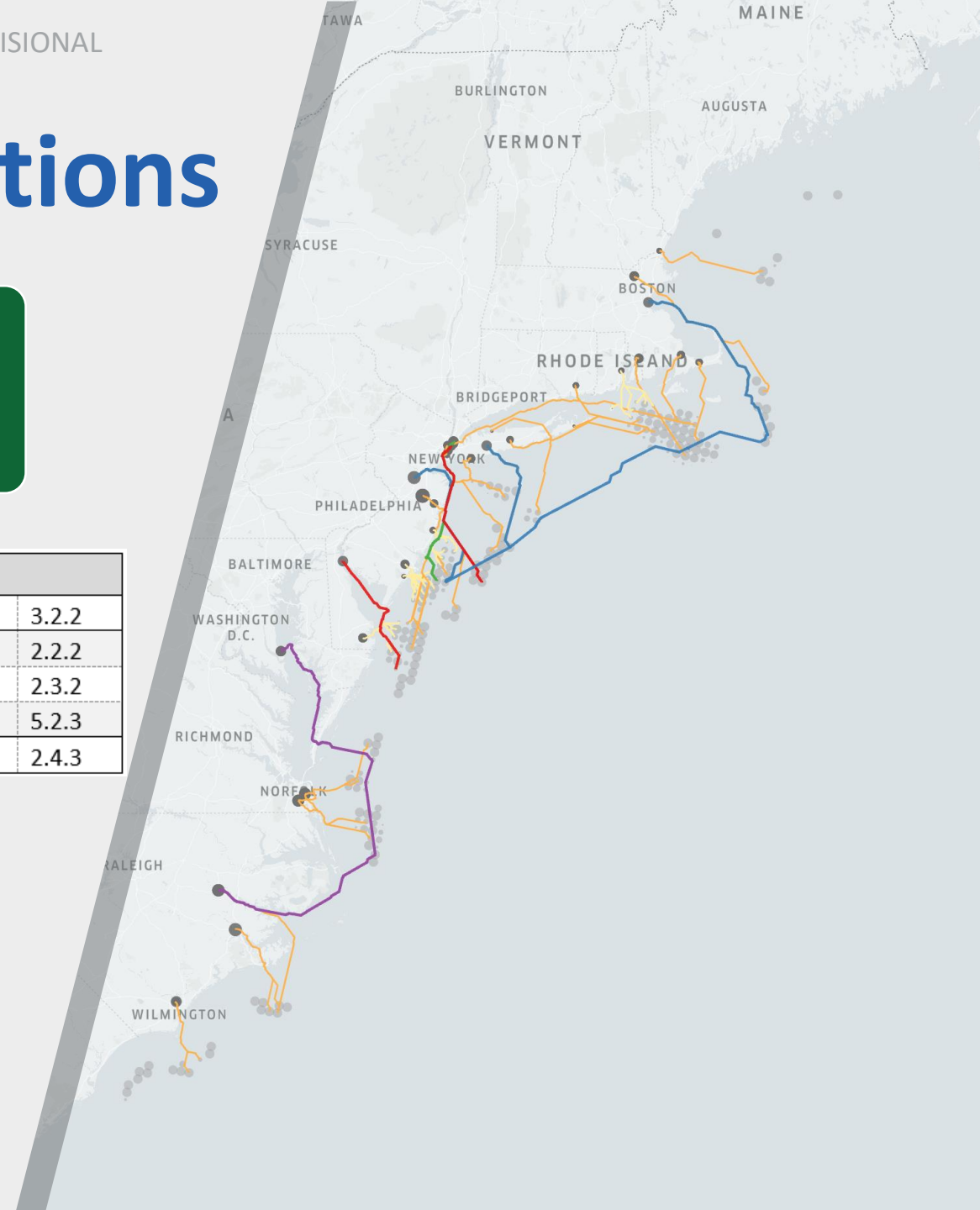
Economics & Support Initiatives



Siting & Permitting

## Mid-Term Actions for 2030–2040

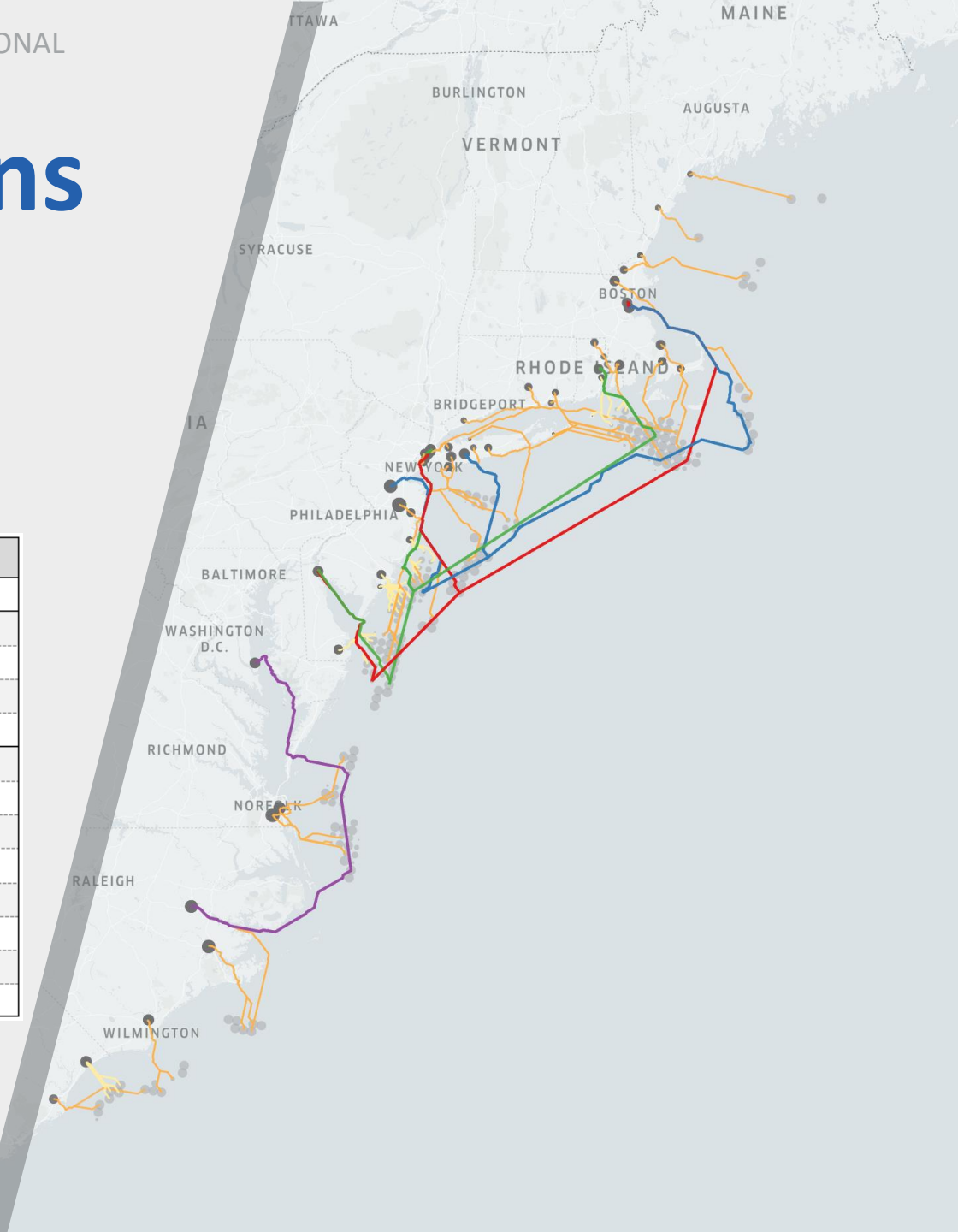
★★★	Multi-Terminal HVDC Test and Certification Center	3.2.2
★★	Regulated Interregional Joint Planning Processes	2.2.2
★★	Interregional Transfer Capacity Minimums	2.3.2
★★	Assignment of Offshore Cables and Substations for Continued Use as Shared Infrastructure	5.2.3
★	Enhancement of Existing Market Monitoring Roles	2.4.3



# All-Time Recommendations



Sustained Actions for Enduring Growth		
★★★	Improved Environmental Review and Permitting Frameworks	5.2.1
★★	State-Led Transmission Planning	2.1.1
★★	Cost Allocation Methodology	4.1.3
★★	Federally Designated National Interest Electric Transmission Corridors	4.2.3
★★	Permitting Agency Resources and Staffing	5.2.4
★	International Cooperation	1.2.1
★	Communication Practices and Public Engagement	1.2.2
★	Transmission Optimization with Grid-Enhancing Technologies	3.1.3
★	Best Practices for Benefit Valuation	4.1.2
★	Equity in Ratemaking	4.1.4
★	Consumer Advocates	4.1.5
★	Relevant Federal Funding, Financing, and Technical Support	4.2.2
★	Utilization of Existing Federal Facilities Along the Coast	5.1.5



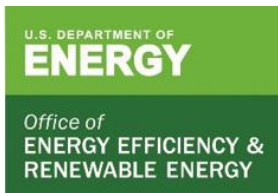
# Contact Us



[www.energy.gov/gdo/offshore-wind-transmission-federal-planning-support](http://www.energy.gov/gdo/offshore-wind-transmission-federal-planning-support)



[OSWTransmission@hq.doe.gov](mailto:OSWTransmission@hq.doe.gov)



U.S. DEPARTMENT OF THE INTERIOR



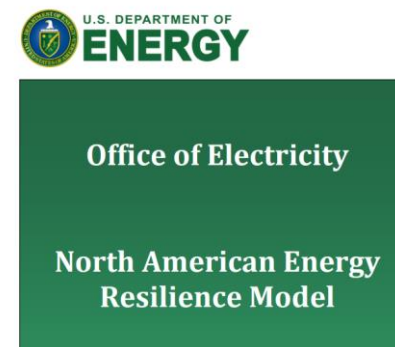
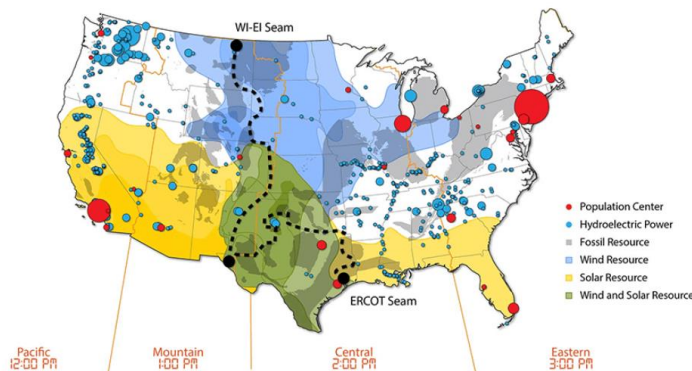


# Enhanced Transmission Planning: National Transmission Planning Study



# National Transmission Planning Study: Project team

- ▶ This study is being conducted by a joint National Renewable Energy Laboratory (NREL) and Pacific Northwest National Laboratory (PNNL) project team
- ▶ This study builds on past projects and expertise at NREL and PNNL with the support and direction of DOE's Office of Electricity





# National Transmission Planning Study: Objectives

1

- ▶ Identify **interregional and national strategies** to accelerate cost-effective **decarbonization** while maintaining system reliability

2

- ▶ Inform regional and interregional transmission planning processes, particularly by **engaging stakeholders** in dialogue

3

- ▶ Identify **viable and efficient** transmission options that will provide broad-scale benefits to electric customers



# National Transmission Planning Study:

## Desired outcomes



- ▶ Results help **prioritize future DOE funding** for transmission infrastructure support



- ▶ Results help **fill existing gaps** within interregional transmission planning



- ▶ Study provides a framework for stakeholders to discuss **desired grid outcomes** and **address barriers** to achieving them



# Transmission Siting and Permitting



# National Interest Electric Transmission Corridors (NIETCs)

- ▶ Federal Power Act Section 216(a)
  - Authorizes the Secretary to designate as an NIETC any geographic area that—(i) is experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers; or (ii) is expected to experience such energy transmission capacity constraints or congestion.
  - Based on the results of the Needs Study and additional statutory criteria
- ▶ NIETC designation unlocks statutory tools to advance transmission deployment, including:
  - Public-Private Partnerships under the IIJA's Transmission Facilitation Program
  - Transmission Facility Financing loans under the IRA
  - FERC backstop permitting authority under FPA Section 216(b)
- ▶ DOE is designing an “applicant driven, route-specific” NIETC designation process:
  - Builds on lessons learned from prior implementation through broad corridors
  - Intended to focus resources on actual projects in development

# Transmission Siting and Economic Development Grants

- ▶ \$760 million in grant authority provided by the Inflation Reduction Act to:
  - Facilitate the siting and permitting of interstate and offshore electricity transmission lines; and
  - Provide economic development grants to communities affected by the construction and operation of interstate and offshore transmission lines
- ▶ Siting authorities (e.g., state PUCs) can receive grants to support siting and permitting activities (e.g., analysis of alternative routes, participation in other siting or cost allocation proceedings, etc.)
- ▶ Economic development grants can support a range of community priorities
  - Available to siting authorities and local, State, or Tribal governmental entities
  - Includes considerations of environmental and energy justice, equity, and job quality, and Tribal cultural resources.
- ▶ Conditions:
  - For siting activities, siting authorities must reach a final decision with two years of the grant
  - Economic development grants conditioned on approvals or start of construction, depending on recipient

# Federal Permitting Coordination

- ▶ Federal Power Act Section 216(h)
  - Authorizes DOE to act as the Lead Agency to coordinate Federal authorizations and related environmental reviews required to site an interstate electric transmission facility.
  - Includes establishment of schedules and preparation of a single environmental document.
- ▶ President Biden recently directed Federal agencies to come together under White House direction to develop and execute a new MOU to implement FPA Section 216(h)
  - Will update and supersede 2009 MOU
- ▶ GDO is building capacity to implement this directive and to develop new resources to make federal permitting more efficient





# Commercial Facilitation and Financing



# BIL, IRA and Other Transmission Funding Programs

Program Name (DOE)	Total Funding	Program Goal
<u>BIL: Transmission Facilitation Program</u>	\$2.5 billion	<ul style="list-style-type: none"><li>Transmission deployment of new and upgrading high-capacity transmission lines. 3 tools: Capacity contracts, loans, and public-private partnerships</li></ul>
<u>IRA: Transmission Facility Financing</u>	\$2 billion	<ul style="list-style-type: none"><li>Loans for projects designated by the Secretary to be necessary in the national interest under section 216(a) of the Federal Power Act</li></ul>
Loan Programs Office: Title 17 Innovative Clean Energy Loan Guarantee Program	\$40 billion in loan guarantee authority	<ul style="list-style-type: none"><li>Innovative transmission expansion projects and emerging technologies (including HVDC deployment) are eligible</li></ul>
Loan Programs Office: Title 17 Energy Infrastructure Reinvestment (EIR) Financing (Loan Guarantees)	\$250 billion in loan authority	<ul style="list-style-type: none"><li>Retool, repower, repurpose or replace energy infrastructure (including transmission) that has ceased operations or enable operating energy infrastructure to avoid air pollutants</li></ul>
<u>IRA: Grants to Facilitate Siting and Permitting of Transmission</u>	\$760 million	<ul style="list-style-type: none"><li>Grants to siting authorities and state, local, and Tribal authorities to support activities to facilitate siting and permitting of transmission lines and provide economic development opportunities to affected communities</li></ul>

# BIL Programs for the grid include transmission and distribution

Program Name (DOE)	Total Funding	Program Goal
<u>Preventing Outages and Enhancing the Resilience of the Electric Grid / Hazard Hardening - (40101(d) "State, Territory and Tribal Formula Grid Resilience Grants")</u>	\$2.5 billion	<ul style="list-style-type: none"><li>• Formula funding for Grid Resilience and Hardening Investments tied to state &amp; tribal led objectives, criteria and methods for resilience investments</li></ul>
<u>Preventing Outages and Enhancing the Resilience of the Electric Grid / Hazard Hardening - (40101(c) "Utility/Industry Grid Resilience Grants")</u>	\$2.5 billion	<ul style="list-style-type: none"><li>• Competitive funding for Grid Resilience and Hardening Investments tied to state &amp; tribal led objectives, criteria and methods for resilience investments</li></ul>
<u>Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency (40103(b) "Grid Innovation Program")</u>	\$5 billion	<ul style="list-style-type: none"><li>• Large infrastructure projects, including transmission, distribution and storage.</li><li>• Partnership between state entities and project/infrastructure developers</li></ul>
<u>Deployment of Technologies to Enhance Grid Flexibility (40107 "Smart Grid Grants")</u>	\$3 billion	<ul style="list-style-type: none"><li>• Deployment of technology at scale, prioritization of technologies that increase transmission capacity, mitigate wildfires, manage load / electrification of “edge devices”, and incorporate secure communications / cybersecurity</li></ul>



# Constructing the Grid of the Future

Lessons learned from past projects

Jason Kalwa

Director - Projects

April 27, 2023

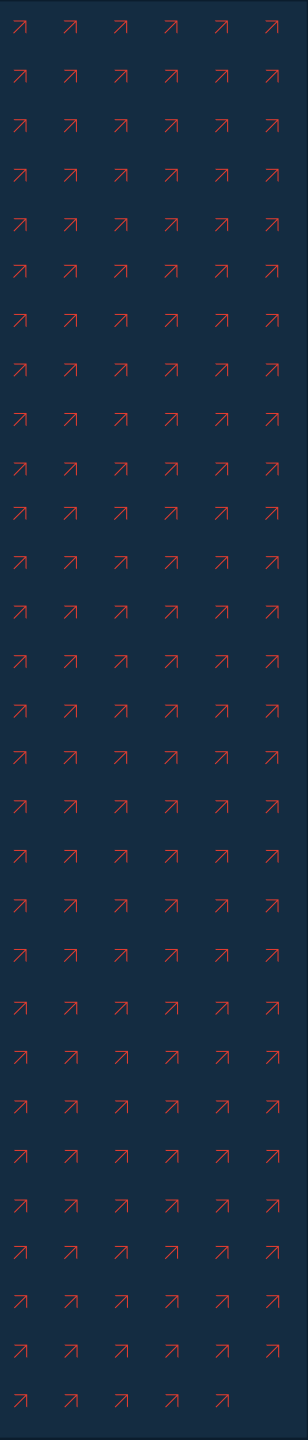


# Agenda

My Background

About PSEG

Our Experience





# About Jason Kalwa



## ***Professional Background***

*Employed by PSEG since 2006  
with roles in*

- Construction & Maintenance
- Project Management
- Development

## ***Projects***

- Overhead and Underground Transmission
- 230kV to 500kV Rebuilds
- OPGW
- Cellular Sites
- Offshore Wind





# PSEG Companies

- PSEG has been a reliable corporate citizen in NJ for 120 years
- PSE&G – Largest utility constructor of transmission facilities within PJM and NJ over the last 10 years
  - 2.3M electric and 1.9M gas customers
  - 2022 Edison Award - The electric utility industry's most prestigious award 2022
  - 2022 ReliabilityOne® Award in the Mid-Atlantic Metropolitan Area -- 21st consecutive year PSE&G has received the reward
- PSEG Nuclear
  - Operates Salem 1 & 2 and Hope Creek, nation's 3<sup>rd</sup> largest nuclear power site
  - 50% owner of Peach Bottom 2 & 3
- PSEG Long Island
  - Operates the electric distribution and transmission infrastructure of LIPA
  - Serves 1.1 million customers
- Other
  - Potential hydrogen investments
  - Offshore wind transmission



# Projects



- Nearly 600 miles of lines upgraded since 2007
- New substations and substation rebuilds

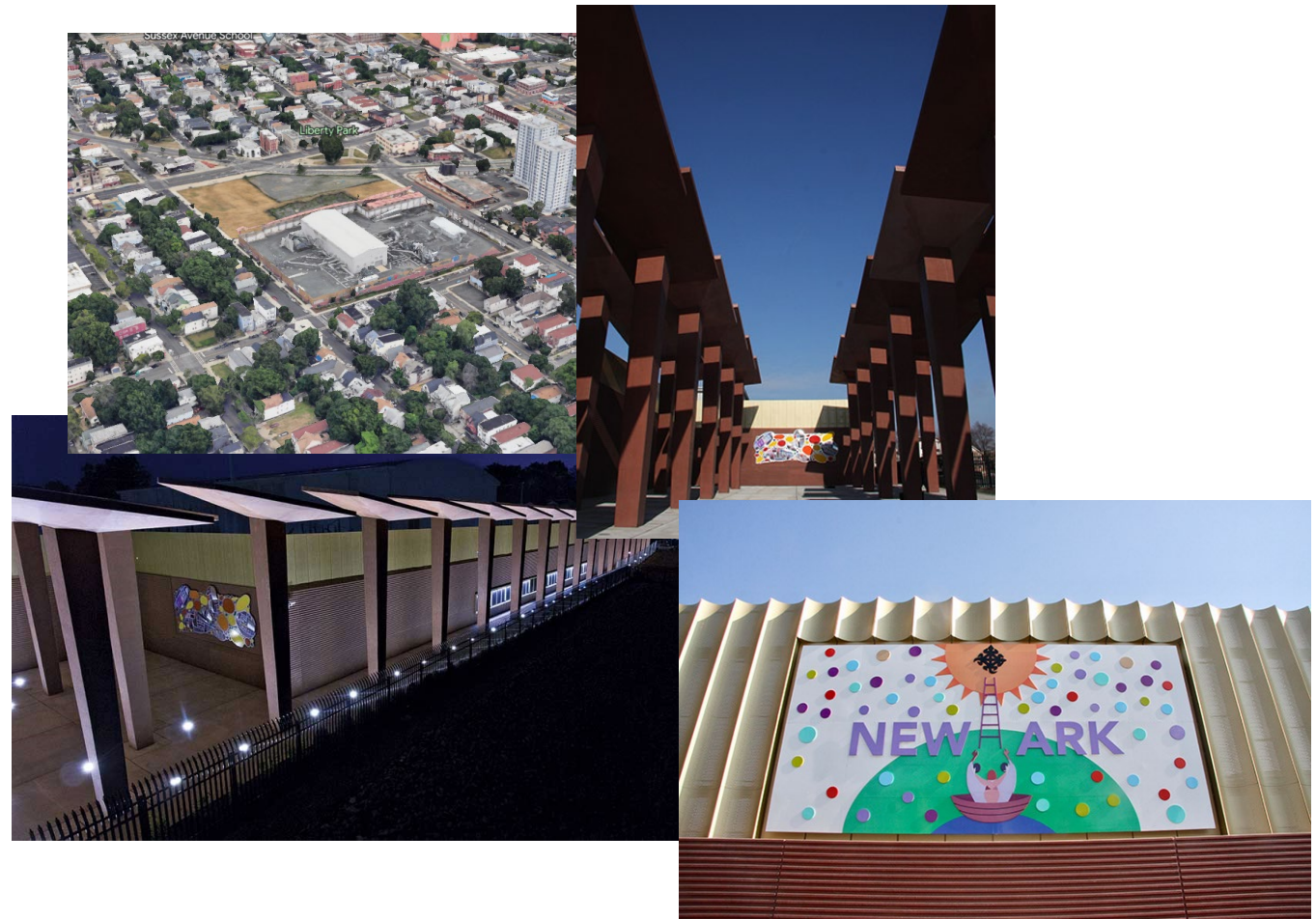


# Example Projects

Susquehanna-Roseland

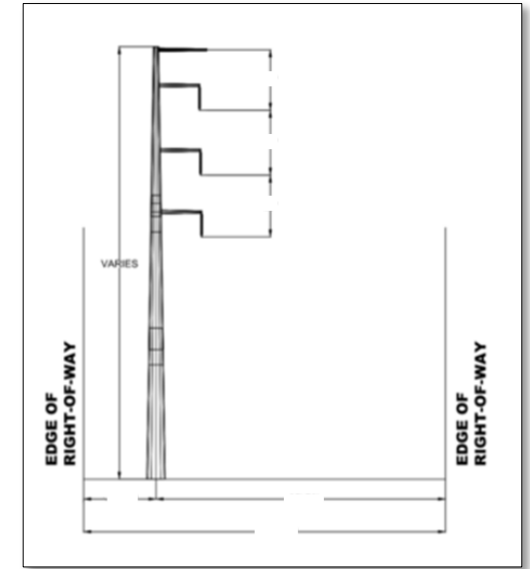


McCarter Switch



# Early and Often

- Don't wait – engage early, engage often
- Many key aspects stakeholders concerned about known relatively early in design process
  - Where is it going?
  - What will the construction be like?
  - How noticeable will it be? Will I see it?



*Communicate, communicate, communicate!*



# Build Working Relationships



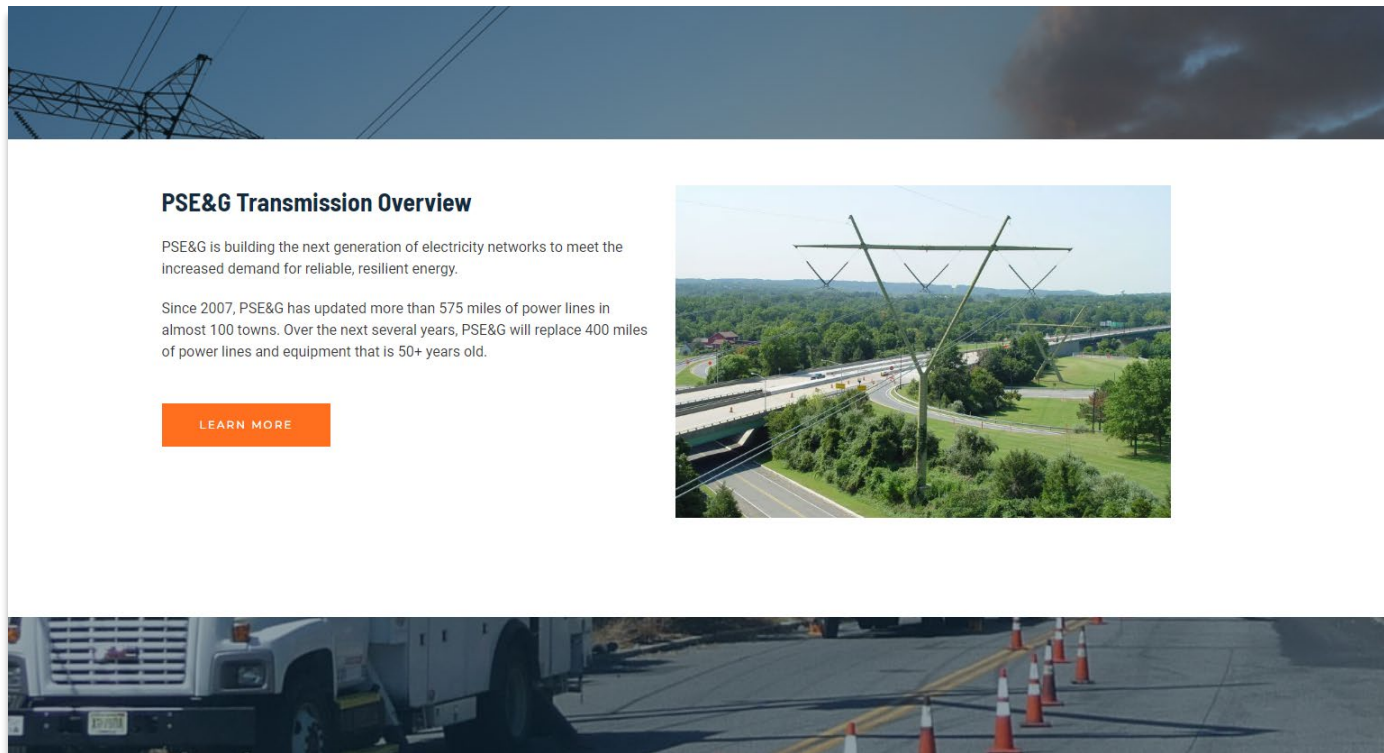
- Commitments build credibility
- Value the input received – do something with it
- Listen, understand, and adapt

# Public Engagement





# Systems and Processes



- Project specific 1-800 numbers
- Active monitoring of inquiries
- Tracking system to understand commitments made

# Engagement

- Participate, participate, participate
- Engage with communities
- Engage with policy makers and federal, state, and local agencies



- National Transmission Needs Study
- Atlantic Offshore Wind Study



A large, thick orange arrow graphic pointing diagonally upwards and to the right, positioned to the left of the word "Thank".

# Thank *you*

Contact Information

Jason Kalwa

[jason.kalwa@pseg.com](mailto:jason.kalwa@pseg.com)



# NPCC 2023 – 2026 Strategic Plan

## Strategic Focus Area

Reliably Integrate Resources Brought Forward by Decarbonization Objectives

- 2023 -- DER/VER Forums
  - April, May, August, October
    - April --- Transmission Integration
    - May --- IEEE-2800
    - August and October --- TBD
- NPCC DER/VER Guidance Document



# NPCC Outreach Activities

## Comments /Suggestions:

Gerry Dunbar  
NPCC Director Standards and Criteria  
[GDunbar@NPCC.org](mailto:GDunbar@NPCC.org)

Ruida Shu  
NPCC Manager Reliability Standards  
[RShu@NPCC.org](mailto:RShu@NPCC.org)

[NPCC Strategic Plan](#)

[NPCC DER Guidance Document](#)