CleanEnergy States Alliance

Load Growth and Electric System Reliability

April 22, 2025

Webinar Logistics

We are now using Zoom Webinars!
Thank you for your patience as we get used to this platform. We encourage you to provide feedback in the post-webinar survey or via email.

All attendees are in “listen only” mode – your webcam and microphone are disabled.
The Chat function is also disabled for attendees.

Submit questions and comments via the Q&A panel

Automated captions are available

Speakers' bios will be made available in the chat

This webinar is being recorded. We will email you a webinar recording within 48 hours. This webinar will be posted on CEG’s website at www.cesa.org/webinars

Celebrating 20 Years of State Leadership

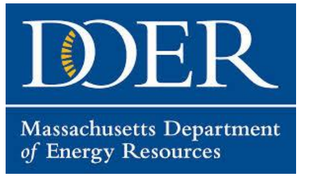
Clean Energy States Alliance

The Clean Energy States Alliance (CESA) is a national, nonprofit coalition of public agencies and organizations working together to advance clean energy.

CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

CleanEnergy States Alliance

www.cesa.org



For State and Federal Government Officials

National Energy Summit for States

Navigating Energy Trends and Federal Programs

May 28-29, 2025

Washington, D.C.

cesa.org/2025-summit

Webinar Speakers

Warren Leon
Executive Director
Clean Energy States Alliance
(Moderator)

Mark Olson
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Thank You

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Upcoming Webinars

A Climate Resilient Energy Code for Multifamily Affordable Housing
(April 29)

Solar+Storage Financing Options for Nonprofits
(May 7)

Impact of Direct Pay: How a Washington Church Installed Resilient Solar+Storage
(May 20)

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NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Load Growth and Grid Reliability

Insights from the 2024 Long-Term Reliability Assessment and 2025 Reliability Leadership Summit

Mark Olson, Manager, Reliability Assessments
Clean Energy States Alliance Webinar
April 22, 2025

2025 Reliability Leadership Summit

- Leaders from industry and government shared perspectives on top reliability and security issues with NERC's Reliability Issues Steering Committee (RISC)
- **Dramatic load growth coinciding with the present headwinds for building infrastructure is a key concern**
- Solutions:
  - All-of-the-above approach to new resources and technologies
  - Permitting reform
  - Robust supply chains that reduce uncertainty
- Stream recordings from each panel:

Grid Resilience | Security | Energy Policy | Chief Concerns

- Insights are used to help NERC and industry focus resources on the most critical issues

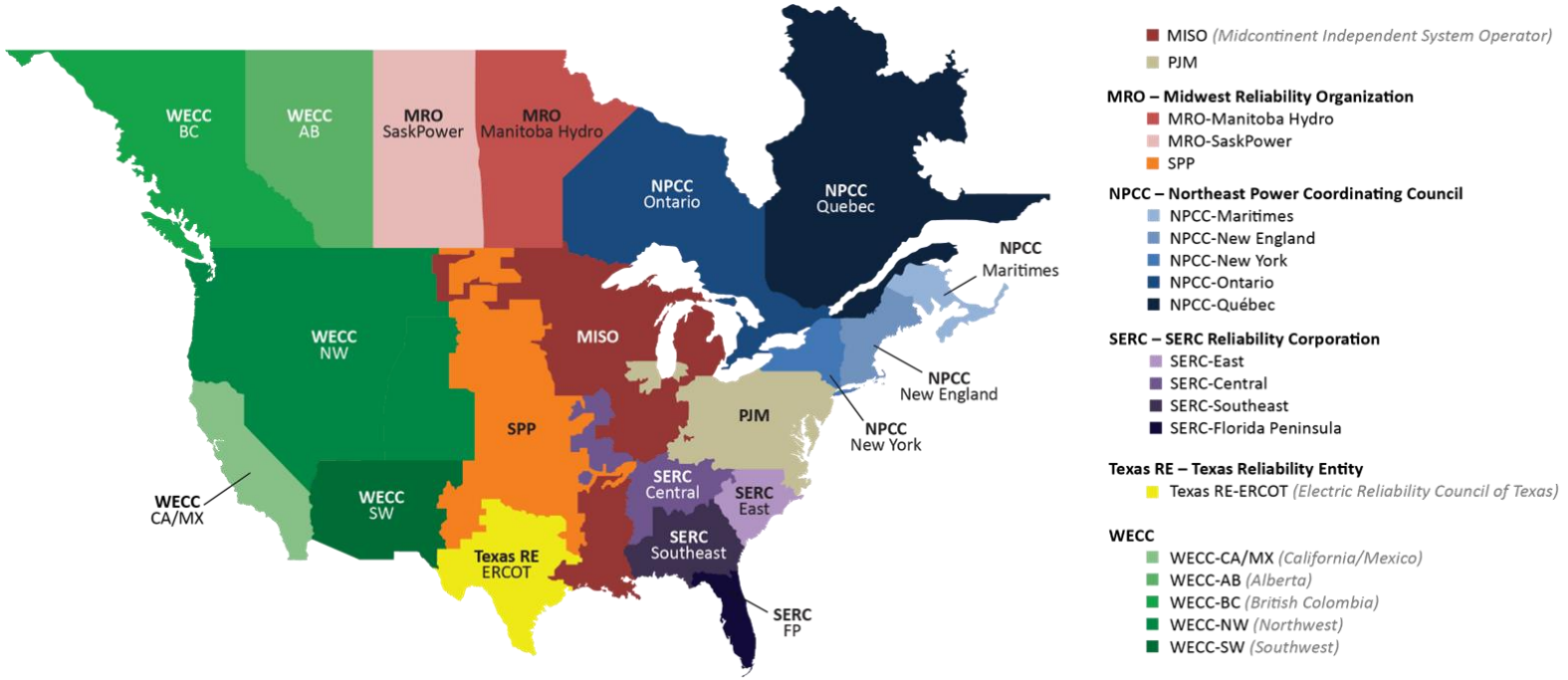
Energy Policy Panel | February 27, 2025

The **Reliability Leadership Summit** is a key building block to the *ERO Reliability Risk Priorities Report.*

The report will be issued in Fall 2025. See the *2023 Reliability Risk Priorities Report*.

Long-Term Reliability Assessment (LTRA)

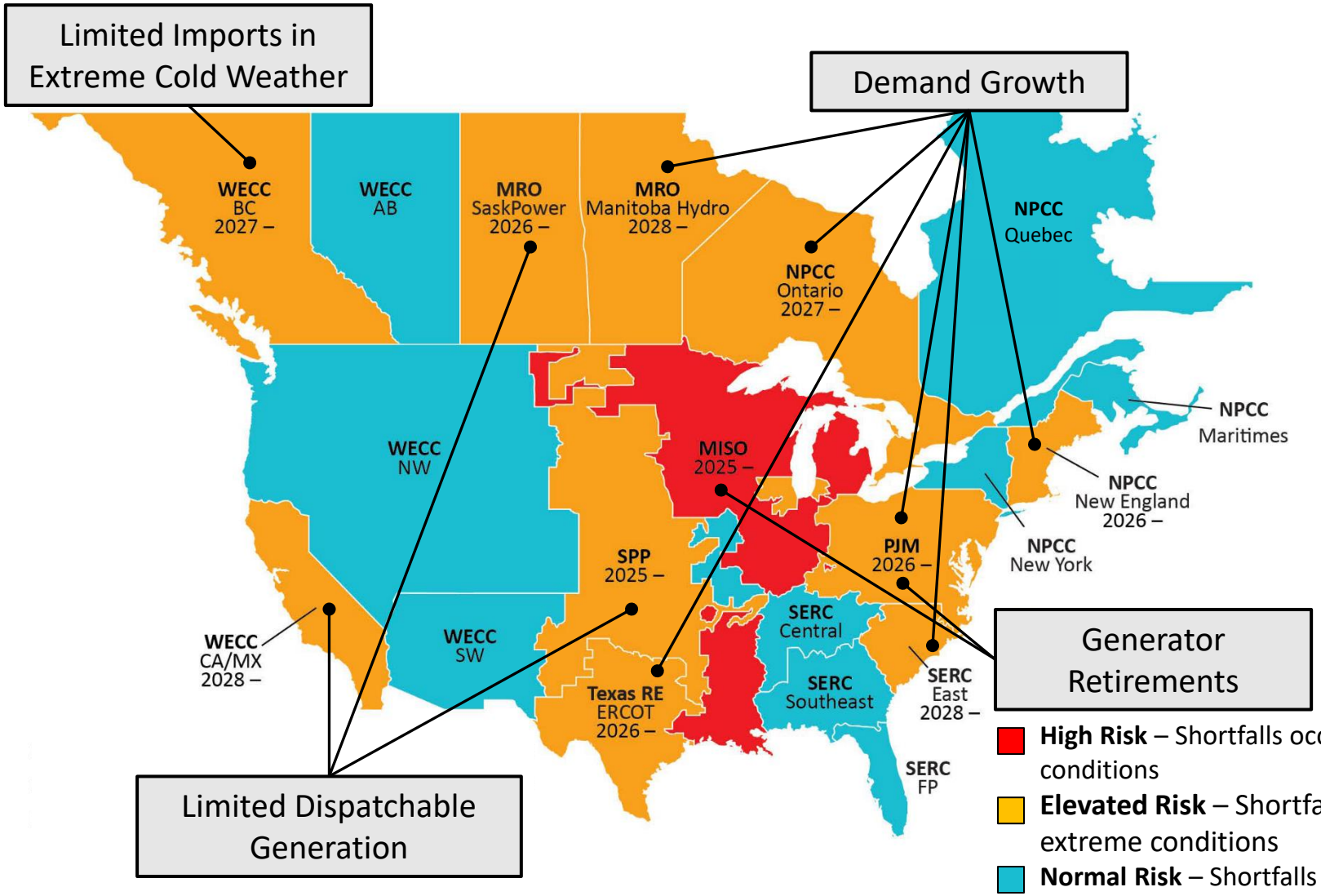
- 10-year assessment of resource capacity and energy risks
- Uses industry's demand and generation forecasts and transmission projections
- Coordination and review with Region Entities and stakeholders
- Includes emerging issues that can impact future reliability



Key Findings

- **Assessment** Over half of North America is at risk of energy shortfalls over the next 10 years
- **Assessment** Projected generator retirements remain at high levels and accelerate the need for resources
- **Trend** Demand growth is rising rapidly driven by electrification, data centers, and industrial load
- **Trend** Projections of future resources reflect slower rate of additions
- **Trend** Transmission development is increasing, with more projects in planning

Increasing Energy Risks Over The Next 5 Years



Risk Map | with Risk Drivers and Initial Shortfall Years

High Risk – Shortfalls occurring in normal peak conditions

Elevated Risk – Shortfalls occurring in extreme conditions

Normal Risk – Shortfalls not expected under studied conditions

Assessment Inputs:

- Probabilistic Assessment (Studied Years 2026 and 2028)
- Planning Reserve Margins (2025 through 2029)

Risk determination based on established resource adequacy criteria (1-day-in-10 years) and NERC-National Academy of Engineering Workshop Report criteria for load-loss and unserved energy

Increasing Energy Shortfall Risks in Texas RE – ERCOT

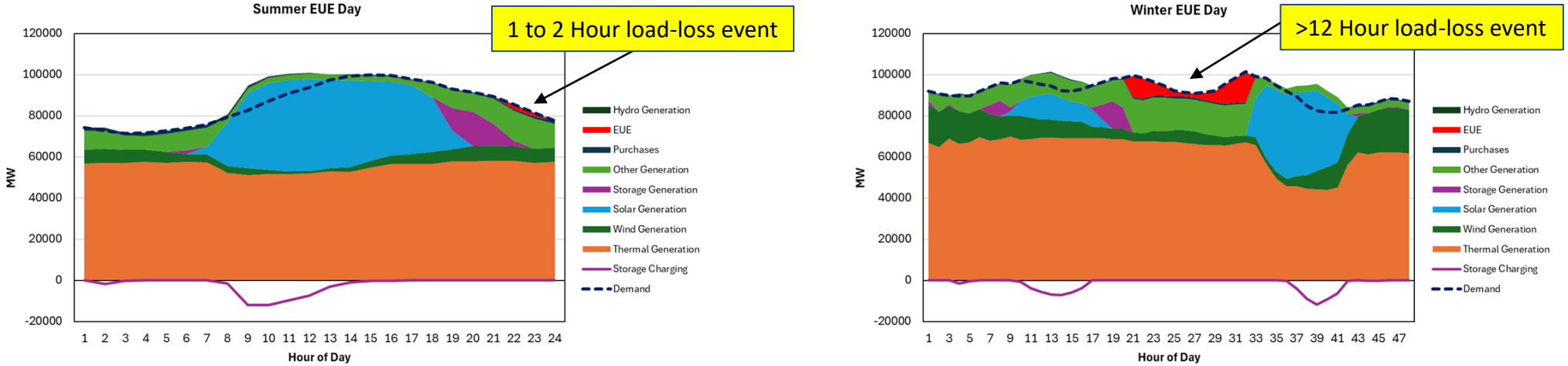
- Probabilistic assessment reveals higher levels of future unserved energy due to load growth projections and the characteristics of the resource mix

Base Case Summary of Results			
	2026*	2026	2028
EUE (MWh)	1,235	**11,090**	**781**
EUE (PPM)	2.63	**18.95**	**1.12**
LOLH (hours per year)	0.30	**1.57**	**0.16**
Operable On-Peak Margin	35.9%	**28.8%**	**46.9%**

* Provides the 2022 ProbA Results for Comparison

- *2026 study year shows increasing risk since previous ProbA*
- *2028 study year includes expansion resources from ERCOT Long-Term System Assessment*

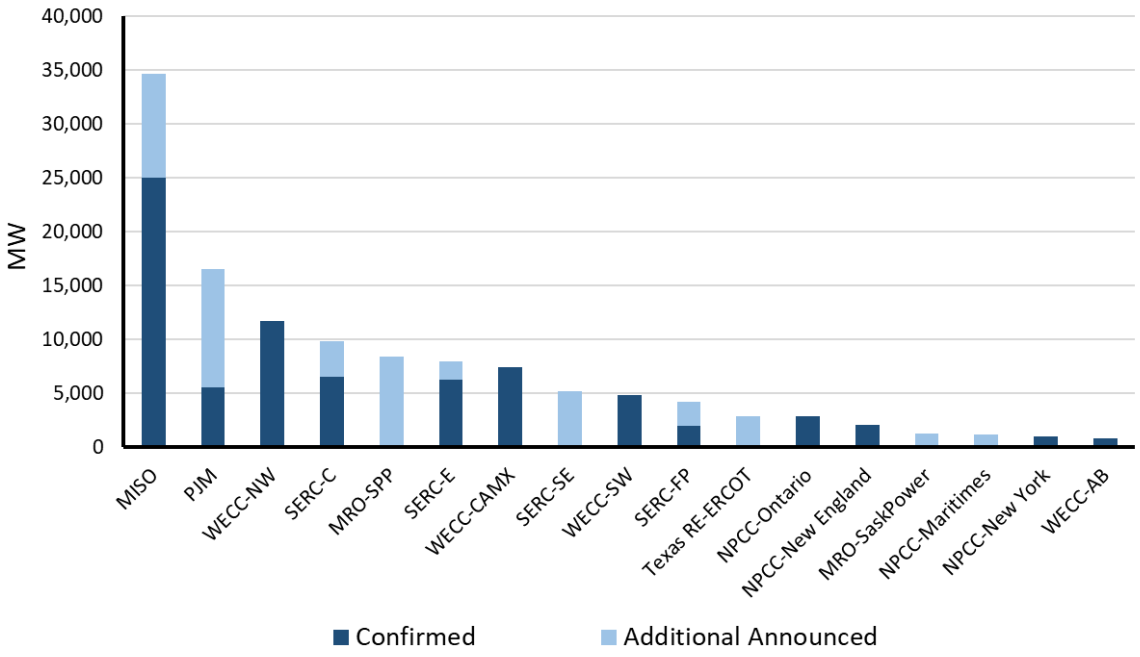
- Load-loss events: more *likely* in summer…more **severe** in winter



Unserved Energy Events in Probabilistic Assessment Study Year 2026

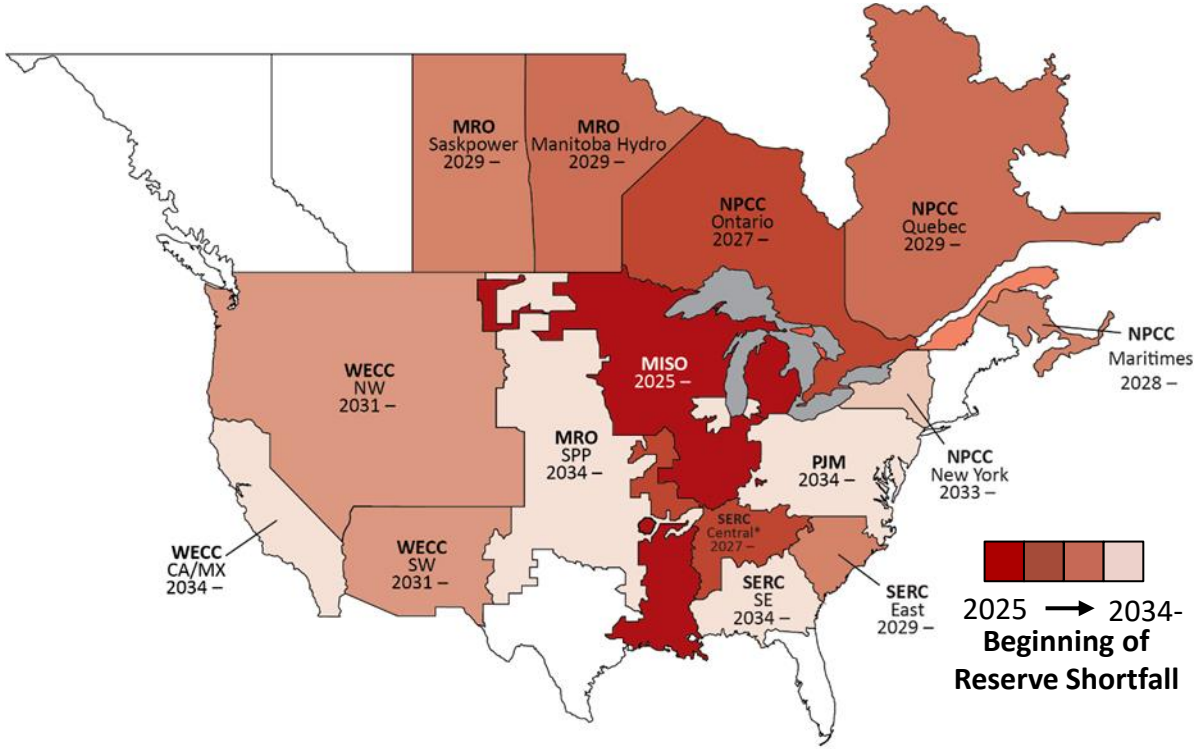
More Resources Are Needed To Meet Expected Retirements

- Areas are projected to fall short of reserve margin requirements as generation retirements continue at rapid pace
- Generator retirements through 2034 (thermal): 78 GW confirmed + 37 GW announced



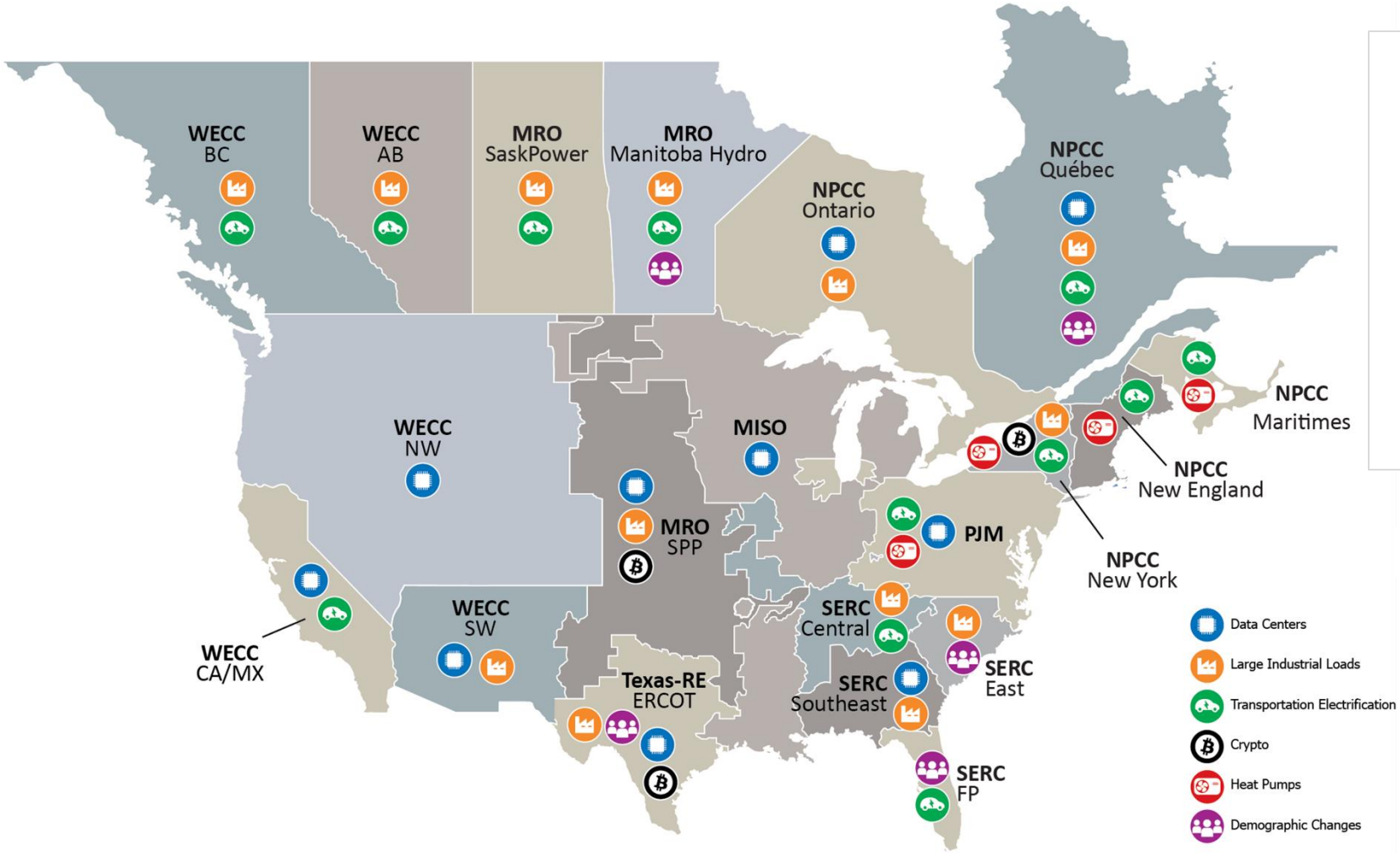
Fossil-fired and Nuclear Generator Retirements by 2034

Source: Energy Ventures Analysis, Inc and LTRA Data

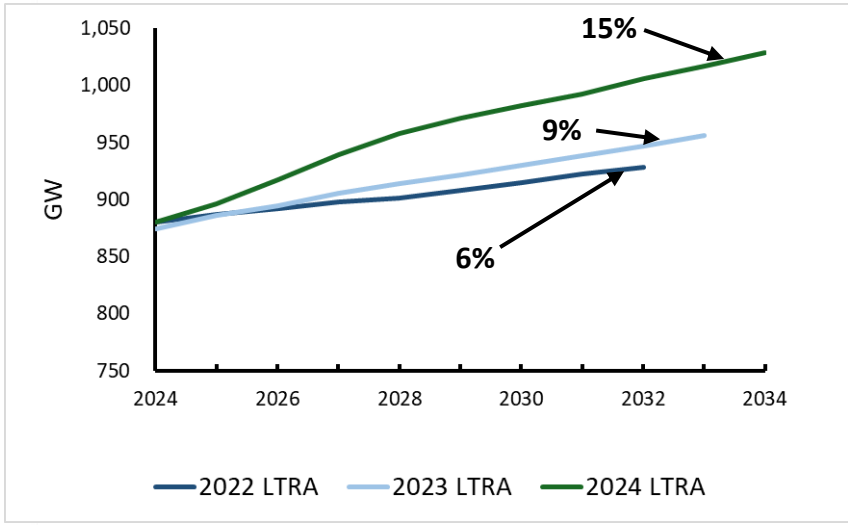


Reserve Margin Shortfall Projections Over the 10-Year Period

Demand Growth Is Accelerating



Demand Growth Drivers



10-year BPS Summer Peak Demand Growth

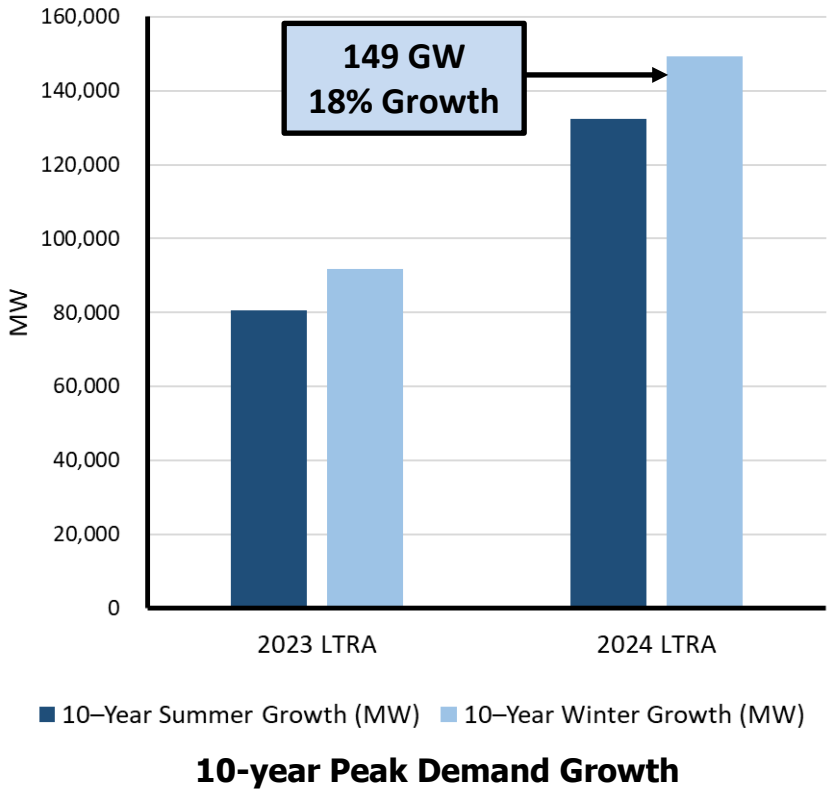
With 10-year Growth From Previous LTRA

2025 Summer Update: Peak Demand Forecast Increased by 12 GW (more than 2x the 2024-2025 increase)

Demand Growth | Winter Is Outpacing Summer

- Winter peak demand continues to rise faster than summer peak demand
- This trend is driven by electrification and increasing amounts of solar PV distributed energy resources
- In 10 of 14 summer-peaking assessment areas: winter demand growth rates > summer growth rates

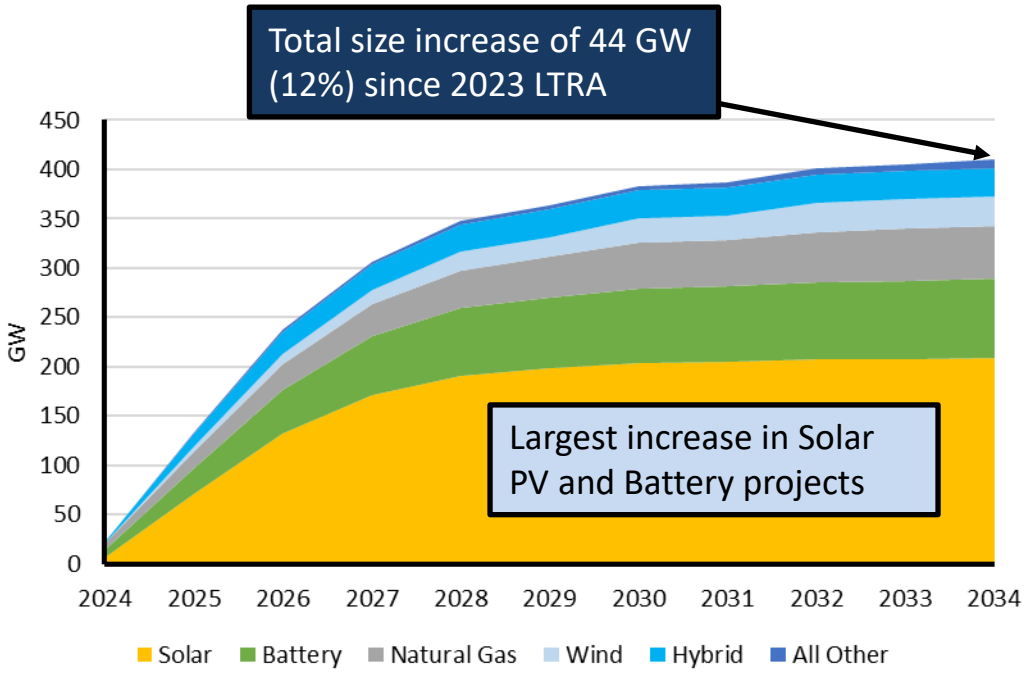
- **Resource planning must increasingly focus on winter fuel and energy risks, generator performance, and load forecasting**



10-year Peak Demand Growth

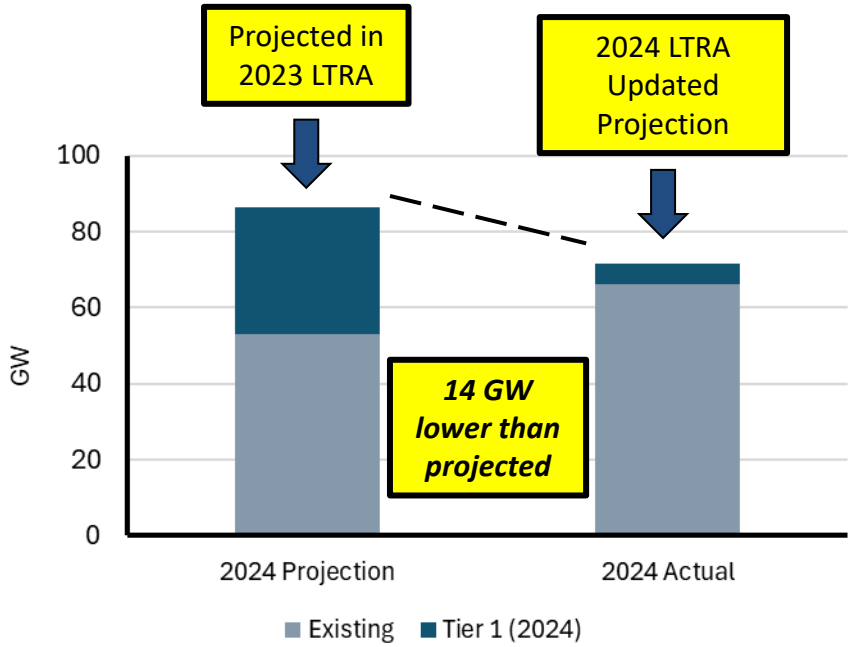
Resources Projections Reflect Slower Rate of Additions

- Resources in the interconnection process continue to grow



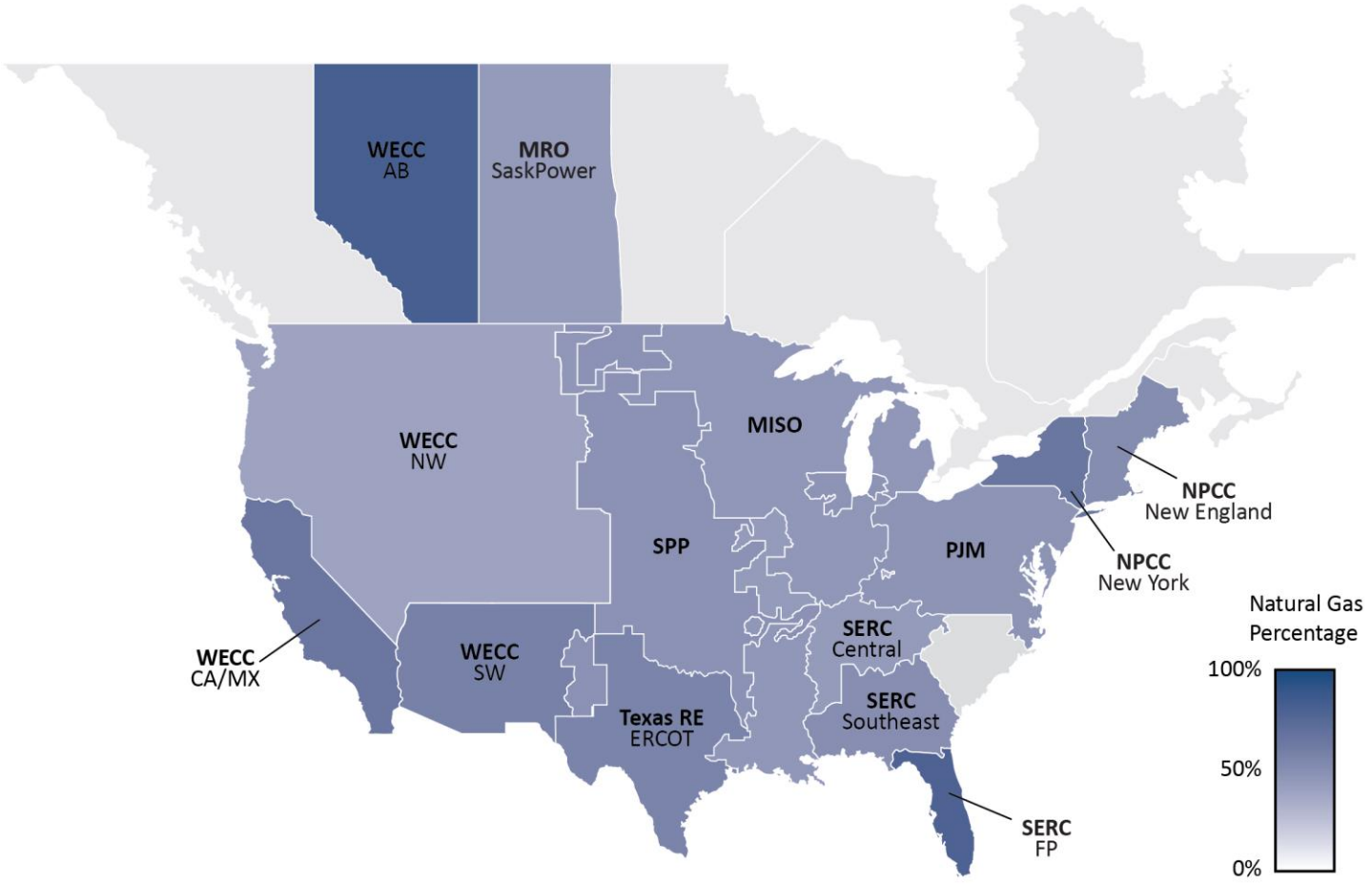
Resources in Interconnection Process
Tier 1 (Signed Agreements) and Tier 2 (Processing)

- Project delays and cancellations are causing resource growth to fall short of projections



Solar On-Peak Capacity | prior-year projection v. current year actual

Criticality of Natural Gas Intensifies

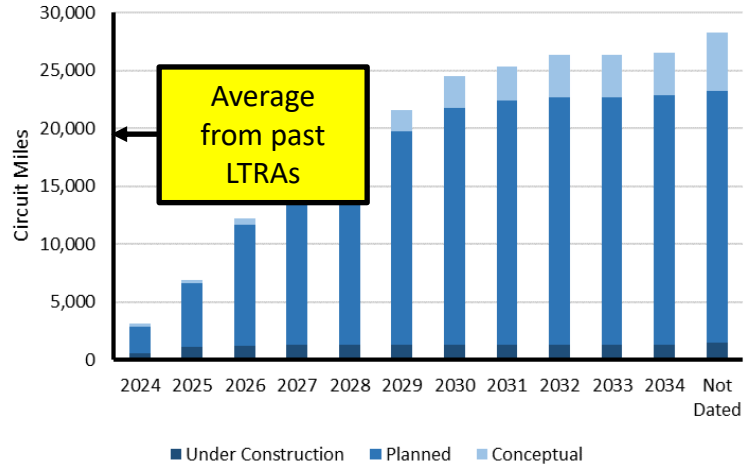


Note: Areas with less than 35% natural gas are shown in light grey.

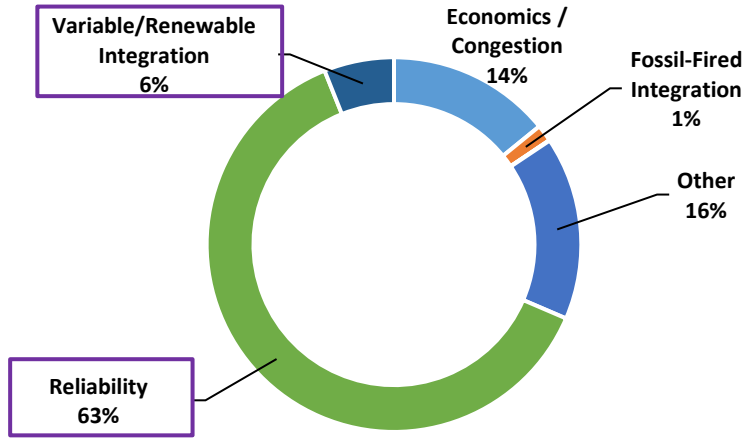
	Natural-Gas-Fired Generation	
	Peak Winter Capacity	Contribution to Total Winter Resource Mix
MISO	62.3 GW	45%
MRO-SaskPower	2.4 GW	43%
NPCC-New England	15.0 GW	51%
NPCC-New York	24.5 GW	66%
PJM	84.4 GW	47%
SERC-Central	22.0 GW	43%
SERC-Florida Peninsula	49.8 GW	80%
SERC-Southeast	31.9 GW	50%
SPP	29.9 GW	48%
Texas RE-ERCOT	55.3 GW	57%
WECC-AB	13.9 GW	83%
WECC-CA/MX	37.8 GW	65%
WECC-NW	33.6 GW	39%
WECC-SW	18.1 GW	58%

Transmission Development Is Increasing

- **Increase in transmission development:** Miles of transmission in-development have risen vs. past LTRA average
- Miles of new transmission projects *under construction* have not increased
- Siting and permitting issues continue to delay projects (affects over 1,200 miles of transmission)
- Assessment areas report significant investment in transmission development including projects to increase transfer capability



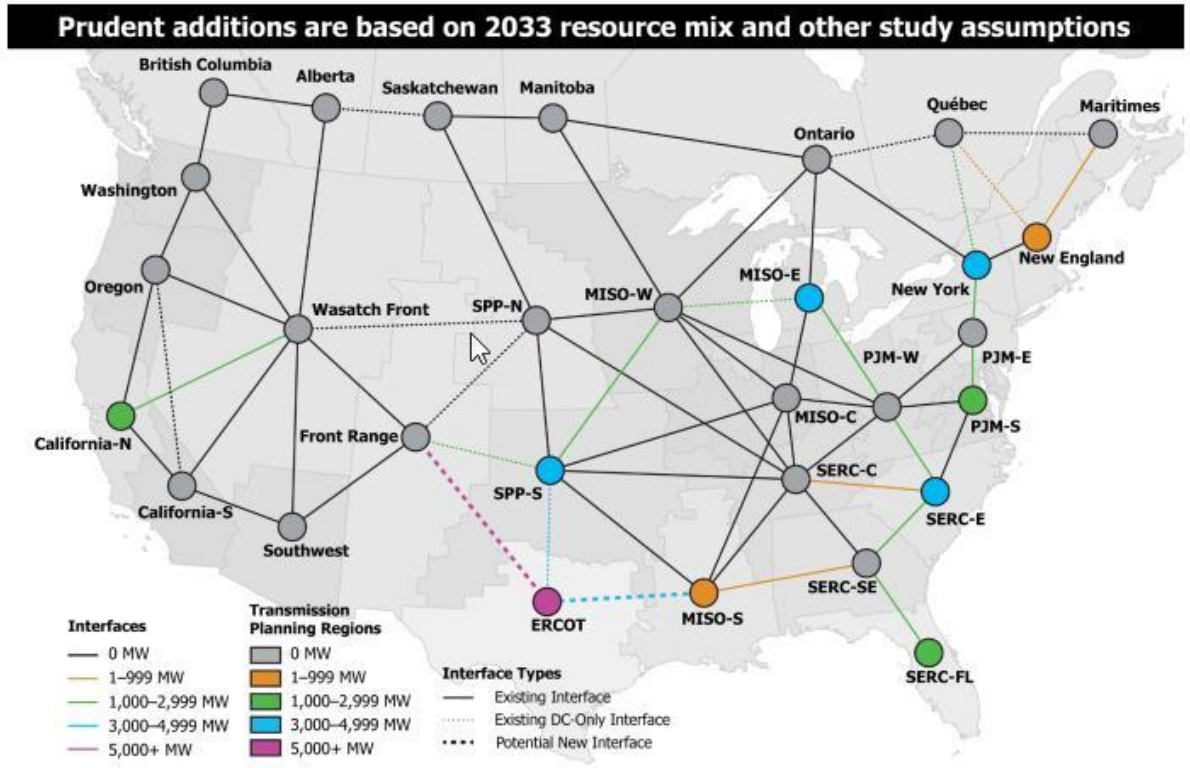
2024 LTRA Cumulative Transmission Projects >100 kV



2024 LTRA Transmission Project Primary Driver

Increasing Transfer Capability Can Reduce Energy Shortfalls

- NERC Interregional Transfer Capability Study (ITCS) finding: **additional 35 GW transfer capability in the U.S. would improve energy adequacy in extreme weather**
- Transmission alone will not resolve all identified shortfalls → supply resources are needed
- ITCS recommendations to planners include considering all options to address system needs:
  - Transmission and transfer capability
  - Local generation and storage
  - Demand side management



ITCS Prudent Additions to Transfer Capability

NERC performed the ITCS to meet the requirements of the Fiscal Responsibility Act of 2023. Study information and results can be found on NERC's ITCS Webpage

2024 LTRA | Emerging Issues

Data Centers and Large Industrial Load	Growth in large load parcels like data centers and industrial facilities pose various challenges for system planners and operators.
Battery Energy Storage Systems (BESSs)	Poor visibility of BESSs' state-of-charge poses risks for operators who expect energy available for dispatch.
Electric Vehicles and Electric Load	With increased adoption of Electric Vehicles (EVs) there is a need to understand the impact of battery charging on system performance.
Energy Drought	More reliance on wind, solar, and hydro resources in the resource mix has the potential to expose the electricity system to supply shortages under abnormal weather patterns.

2024 LTRA Recommendations

Resource planners, market operators, and regulators| **carefully manage generator deactivations**

NERC and Regional Entities| **improve the LTRA with energy metrics, consistent methods, and wide-area energy analysis**

Regulators and Policymakers| **streamline siting and permitting to remove barriers to resource and transmission development**

Regulators, industry, and gas industry| **implement a framework for addressing reliability needs of the interconnected energy system**

ISOs/RTOs, regulators| **continue steps to ensure sufficient Essential Reliability Services**

Questions and Answers