NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Agenda
NERC Quarterly Technical Session

May 7, 2025 | 3:00-5:00 p.m. Eastern

In-Person (Board, MRC, NERC Staff ONLY)

NERC DC Office
1401 H Street NW, Suite 410
Washington, D.C. 20005

Virtual Attendees *(including presenters)*
Webinar Link: Join Meeting
Attendee Password: Day1ATTMay725 (32912886 from phones)
Audio Only: 1-415-655-0002 US | 1-416-915-8942 Canada | Access Code: 2309 991 078

NERC Antitrust Compliance Guidelines

Agenda Items

1. **Panel Session on Gas-Electric Coordination* - Update**
   a. Northeast Electric/Gas System Study and Implications
   b. Wellhead Winterization
   c. Electric/Gas Market and Operational Coordination
   d. NERC's Work Plan and Activities
2. **Summer Reliability Assessment Preview* - Review**
3. **State of Reliability Report Preview* - Review**
4. **Other Matters and Conclude Session**

*Background materials included.

Panel Session on Gas-Electric Coordination

Action
Update

Background

Prioritizing Gas-Electric Interdependency Risks and Mitigation Efforts
Gas-electric coordination continues to be a key risk area during the energy transition as the role of natural gas fired generation becomes increasingly essential to provide the energy to meet load, grid essential reliability services, and the flexibility to integrate large amounts of variable energy resources such as wind and solar. The need for higher levels of coordination to address the interconnection risks between the two energy subsectors have been highlighted in multiple "cold weather event" investigations by NERC and FERC, notably 2021's Winter Storm Uri and 2023's Winter Storm Elliott reports.

In February 2024, NERC's Quarterly Technical Session featured a panel on gas-electric coordination where energy providers and NERC discussed issues seen during recent cold weather events, risks related to gas-electric coordination, and collaborative approaches needed to mitigate risks. As discussed during that technical session, several industry efforts are underway with recommendations related to improving gas-electric coordination. These efforts include the North American Energy Standards Board's (NAESB) forum on gas-electric harmonization[1], which recommended the formation of a Gas Reliability Organization among other proposals; a whitepaper developed by the Natural Gas Association of America (NGSA), Interstate Natural Gas Association of American (INGAA), and Electric Power Supply Association (EPSA)[2] proposing several ways for better coordination between the gas and electric sectors; a whitepaper developed by MISO, PJM, SPP and ISO New England[3] with several strategies for enhanced gas-electric coordination; and efforts by the National Association of Regulatory Utility Commissioners (NARUC) through its Gas-Electric Alignment for Reliability (GEAR) Task Force that has begun to implement initiatives to improve coordination efforts between the industries.

For its part, NERC continues to collaborate extensively with industry and policymakers. NERC has enhanced its Reliability Standards to prepare generators for winter extremes, implement training, and establish communication protocols between generators and grid operators. Current standards projects encompass extreme weather planning and energy assurance requirements. NERC's reliability assessments, including the *2024 Long-Term Reliability Assessment* and *2024-2025 Winter Reliability Assessment*, both published in late 2024, continued to highlight the risks associated with the increasing dependence on natural gas systems and promote gas-electric system coordination. In January 2025, the Northeast Power Coordinating Council (NPCC) published a study[4] underscoring how natural gas dependency in New England and New York

[1] *NAESB Gas Electric Harmonization Forum Report* – July 28, 2023
[2] Whitepaper: *Exploring Real-Life Challenges with Ensuring Natural Gas Availability for Power and Joint Industry Suggested Mitigation Strategies*
[3] Whitepaper: *Strategies for Enhanced Gas-Electric Coordination: A Blueprint for National Progress*
[4] *Northeast Gas/Electric System Study*

poses a high risk for electric reliability during extreme winter weather under certain circumstances. This study was informed by contributions from a diverse steering committee comprised of electric and gas systems operators, the Northeast Gas Association, NPCC, and NERC. NERC's February 2025 Reliability Leadership Summit also highlighted the need for continued focus on gas-electric coordination.

In March 2025, NERC released *Reliability Insights: The Interconnected Gas and Electric Systems* summarizing the implications of the increased level of connectivity between the electric and gas systems. In the document, NERC identified four key reliability risks: (1) natural gas supply and transportation risks; (2) electric and gas market harmonization; (3) resource adequacy and capacity to support large variability in load and resources; and (4) the lack of comprehensive generator winterization. NERC also highlighted opportunities for mitigation related to enhanced winterization requirements; operational preparedness; improved communication protocols; market reforms; cross-market coordination; capacity and energy planning for ramps; and regulatory reform.

Summary

NERC and industry representatives will discuss gas and electric system interdependencies, focusing on prioritization of risks and discussing key projects aligned with mitigating high priority risks. To facilitate the discussion, NERC has developed a Work Plan that summarizes NERC's ongoing key initiatives and how they mitigate the risks identified in the Reliability Insights published earlier this year.

Panel topics will include:

- Northeast Electric/Gas System Study and Implications
- Wellhead Winterization
- Electric/Gas Market and Operational Coordination
- NERC's Work Plan & Activities

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NERC Electric/Gas Efforts Work Plan and Activities

John Moura, Director, Reliability Assessment and Performance Analysis
NERC Quarterly Technical Session
May 7, 2025

Key Reliability Risks / Mitigation Opportunities

From Reliability Insights

Natural Gas Supply and Transportation Risks

- Production Well Freeze-Offs and Winterization
- Dependence on Electricity
- Pipeline Constraints
- Facility Outage / Disruption

Electric and Gas Market Harmonization Risks

- Fuel and Transportation Scheduling
- Unit Commitment
- Operational Coordination
- Planning Coordination

Resource Adequacy and Capacity to Support Large Ramps Risks

- Resource Performance During Winter Peak Demand
- Generation Preparedness and Fuel Assurance

Vulnerabilities in Generator Winterization Risks

- Implementation Challenges
- Actual Winter Conditions More Severe than Design Capability
- Back-up Fuel Unavailability

Mitigation Opportunities

- Enhanced Winterization Requirements
- Operational Preparedness
- Improved Communication Protocols
- Market Reforms
- Cross-Market Coordination
- Capacity and Energy Planning for Ramps
- Regulatory Reform

Major Initiatives Overview

NERC-Driven Initiatives

Study-Driven Initiatives

Engagement-Driven Initiatives

Major Initiatives Overview

NERC-Driven Initiatives

Enhanced Winterization

Initiative	Description	Lead	Timeline
Monitor compliance with mandatory generator winterization requirements	• Proactive engagement with industry ahead of Standard effective dates through Small Group Advisory Sessions • Ongoing focus area in the CMEP Implementation Plan (CMEP IP) with a variety of tools being used (e.g. Audits, Spot Checks, Self-Certifications)	CMEP	Ongoing
Monitor implementation of voluntary pipeline and production well winterization standards	Follow Readiness Forum (subset of GEAR) who fosters operational education, situational awareness and peer-to-peer connections across the entire natural gas industry, electric sector, and federal and state government and end-users	RAPA	Ongoing
Implement next state of energy assurance standards	• Project 2023-08 ensures various forms of historical and forecast Demand, energy data, and information for reliability studies and assessments • Project 2024-02 will require energy reliability assessments for the Long-Term Transmission Planning horizon including availability of fuel	Standards	Ongoing
Assess generator performance during extreme cold events	Annually evaluated through assessment of GADS and EIA data and published in State of Reliability report, winter performance reviews, and other post-event analysis.	EA	Q2 – 2025, As needed

Major Initiatives Overview

Study-Driven Initiatives

Operational Readiness

Initiative	Description	Lead	Timeline
Implement new gas situational awareness tools	BPSA to implement monitoring of critical gas assets impacting BPS operations	BPSA	Q4 – 2025
Provide monitoring through DNG-ISAC coordination	Continue supporting the Downline Natural Gas Information Sharing and Analysis Center through contract	E-ISAC	Ongoing

Improved Communication Protocols

Initiative	Description	Lead	Timeline
Participate in AGA/NARUC's Natural Gas Readiness Forum	Participate in Forum that focuses on enhancing electric reliability by fostering better planning and operating coordination among the full natural gas value chain, grid operators, and regulators, particularly for winter preparations and operations	RAPA, BPSA	Ongoing
Finalize FERC/NERC winter 2025 event evaluation	NERC Event Analysis co-leads Joint FERC-NERC cold period system performance reviews. The team dedicates a high-level view of gas system performance during named cold weather periods of interest.	RAPA	Q2 – 2025

Major Initiatives Overview

Study-Driven Initiatives

Capacity and Energy Planning for Ramps

Initiative	Description	Lead	Timeline
Implement enhanced energy analysis into the reliability assessments	Investigate and select an industry modeling tool to enhance gas availability characteristics (e.g., ServM) to incorporate natural gas risk analysis into NERC assessments	RAPA	Pilot Complete 2025
Finalize Natural Gas Coalition study	Provide advisory input into the Natural Gas Coalition pilot study regarding intra-day/hourly ramping in PJM-East	RAPA	Phase I Complete Q4 – 2025
Finalize NPCC Gas-Electric Study and Recommendations	NERC supported the study recently released. The study quantified the physical capability of the consolidated network of pipeline and natural gas storage infrastructure to serve gas-fired generation under cold weather conditions; and, identified key uncertainty variables and risk factors affecting gas/electric interdependencies.	RAPA	Awaiting Approval from DOE Sec.
Finalize SPOD analysis and communicate externally	Complete the 2024 study of single points of disruption on the natural gas system report and communicate the risks to stakeholders	RAPA	Q2 – 2025
Conduct additional analysis on key gas system contingencies	Leverage analytical tools from NPCC study on gas contingencies in New England and New York and expand analysis to all other regions in North America	RAPA	Scoping, 2026

Major Initiatives Overview

Engagement-Driven Initiatives

- Market Reforms
- Cross-Market Coordination
- Regulatory Reform

Initiative	Description	Lead	Timeline
Review of FERC natural gas regulatory jurisdiction	Confirming scope of NERC authority, as well as other regulatory agencies such as FERC	Legal	2025
Engagement with Gas Trades and industry participants	Continue to discuss NERC's risk mitigation strategies with key gas trades (AGA, INGAA, NGSA, AXPC, Marcellus Shale Coalition) through different engagement strategies	External Engagement	Ongoing
Coordinate with NARUC's GEAR Task Force	Track and inform – as requested – GEAR's task force efforts; share recommendations across NERC's ecosystem	External Engagement	Ongoing
Explore engagement efforts with FERC	Continue to explore implementation of lessons learned and explore opportunities for joint efforts/engagements	External Engagement	Ongoing
Engage in Canadian Gas-Electric efforts	Support voluntary industry efforts to increase gas/electric coordination in Canada	External Engagement	Ongoing

Questions and Answers

2025 Summer Reliability Assessment

Action
Review

Background
The NERC 2025 Summer Reliability Assessment (SRA) identifies, assesses, and reports on areas of concern regarding the reliability of the North American bulk power system (BPS) for the upcoming summer season. In addition, the SRA will present peak electricity supply and demand changes, as well as highlight any unique regional challenges or expected conditions that might impact the BPS. The reliability assessment process is a coordinated reliability evaluation between the Reliability Assessment Subcommittee (RAS), the Regional Entities, and NERC staff.

The final report reflects NERC's independent assessment and is aimed at informing industry leaders, planners and operators, as well as regulatory bodies so that they can be better prepared to take necessary actions to ensure BPS reliability. The report also provides an opportunity for the industry to discuss their plans and preparations for ensuring reliability throughout the upcoming summer period.

Pursuant to delegated authority from the Board of Trustees, NERC management expects to issue the SRA on or about May 14, 2025. The review schedule below identifies key milestones for the report.

Summer Reliability Assessment Review Schedule	
Date	**Description**
April	Draft sent to NERC Reliability and Security Technical Committee (RSTC)
May 7	Report sent to NERC President and CEO for acceptance
May 9	Report sent to NERC Board of Trustees
May 12	Pre-publication Report sent to ERO Executive Committee and MRC
May 14	Report release

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2025 Summer Reliability Assessment Preview

Preliminary Data | Assessment Publication in May

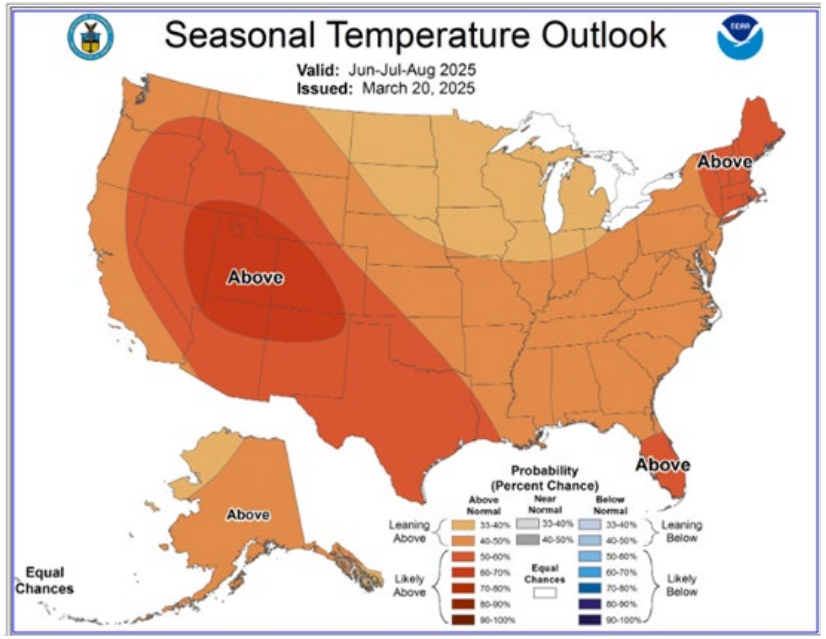
John Moura, Director, Reliability Assessment and Performance Analysis
NERC Quarterly Technical Session
May 7, 2025

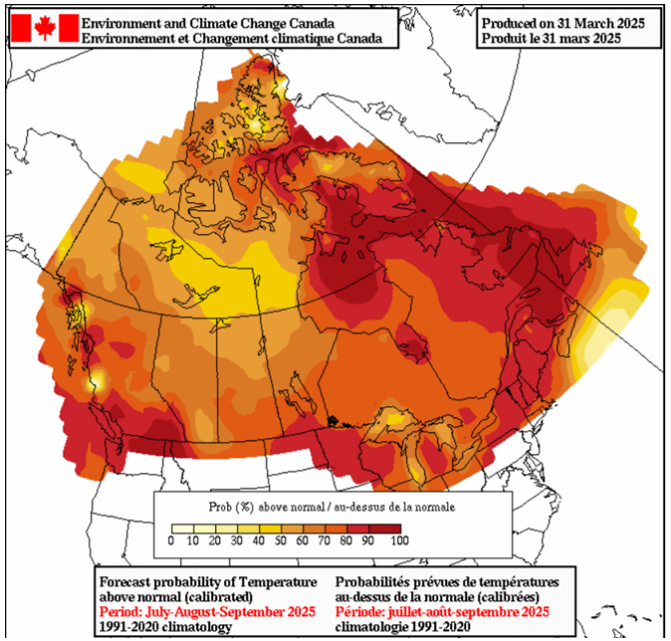
Key Takeaways

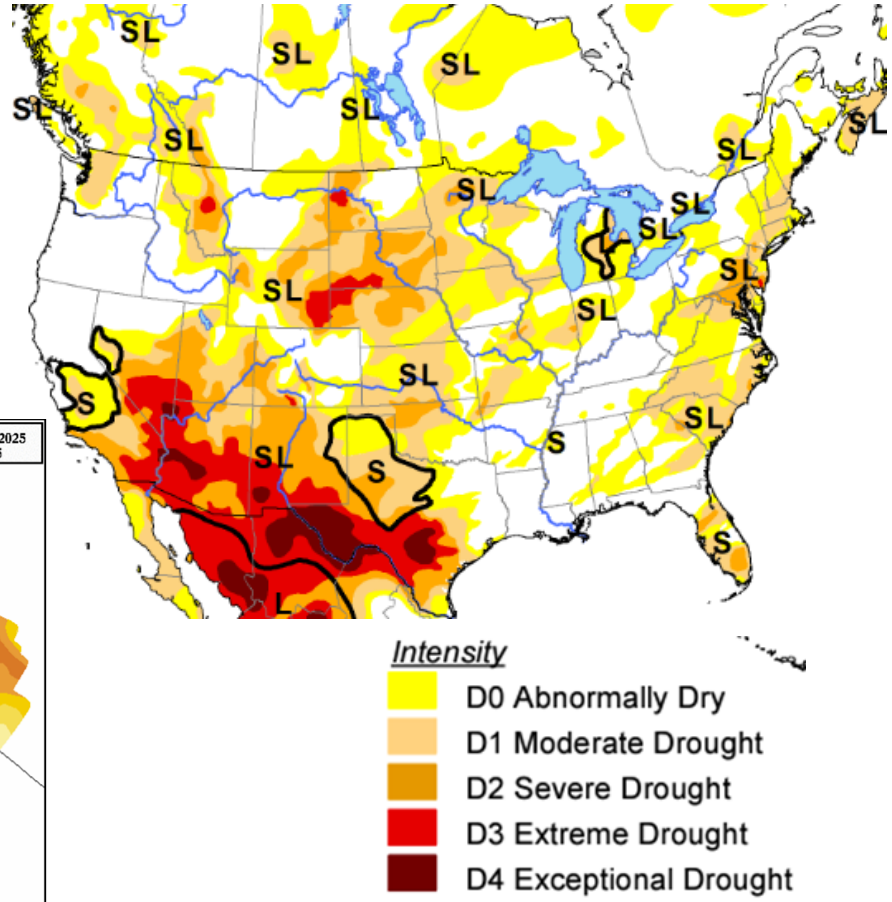
- Parts of North America are at risk of electricity supply shortfalls when demand peaks this summer due to limited energy resources and strong load growth
- Solar photo-voltaic (PV) and battery resource additions in Texas and the U.S. West are reducing energy shortfalls associated with supply variability and demand spikes
- Reliability risks from inverter-based resources (IBR) are growing as performance issues go unaddressed
- Generator retirements are contributing to shrinking reserves and energy risks associated with limited dispatchable generation
- Operation of the transmission network is increasingly affected by growing wildfire risk affecting power delivery and long-distance transfers

Summer Temperature and Drought Outlook

- Above average temperatures expected across North America
- Drought conditions across Canada and in the U.S. Southwest can contribute to high temperatures and impact generation and transmission







3-Month Temperature Outlook (U.S. National Weather Service, Environment and Climate Change Canada) and April North American Drought Monitor (NADM)

2025 SRA Risk Areas (Preliminary)

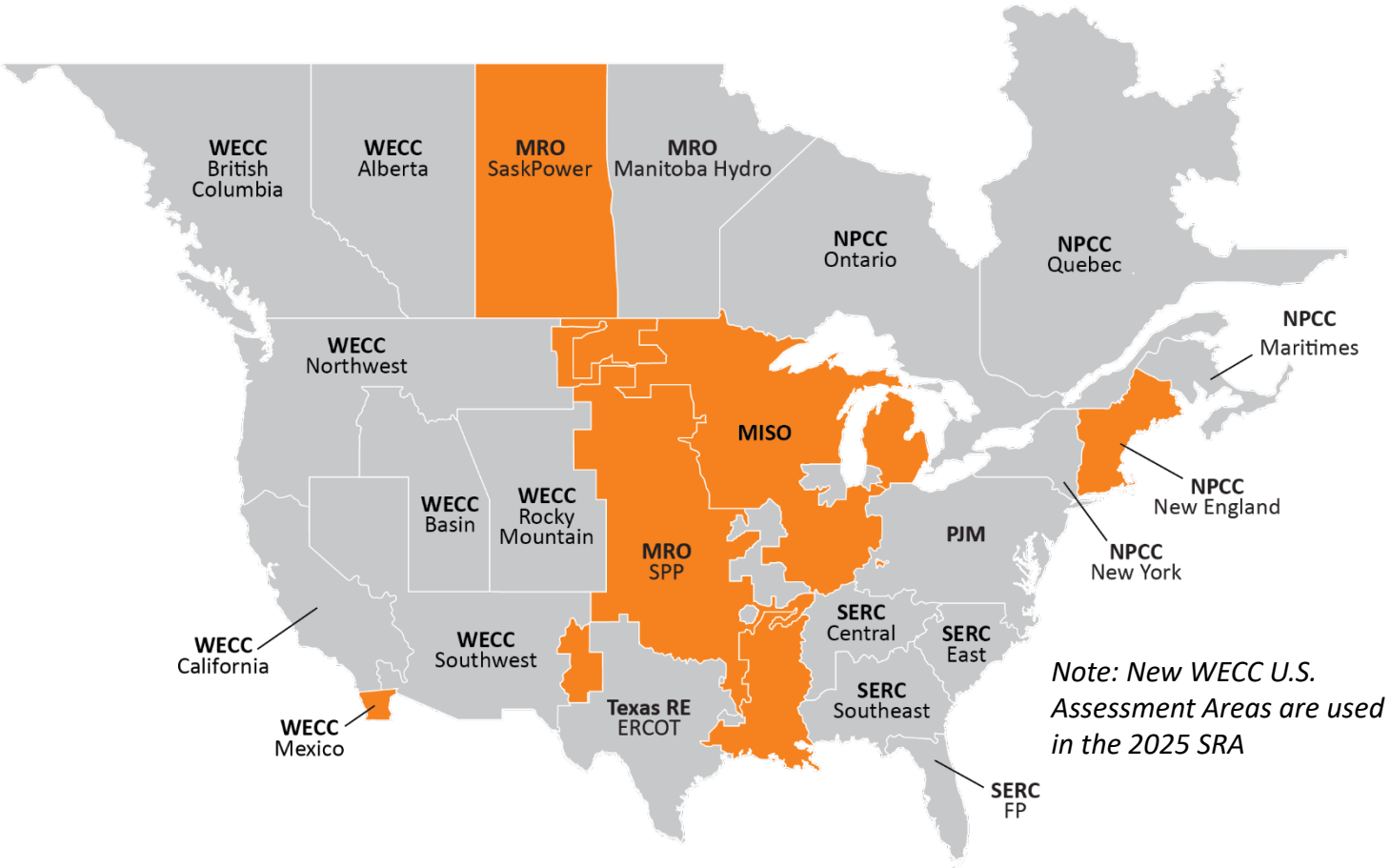
Supply shortages anticipated during extreme summer conditions

SPP and MISO: Supply shortfalls can occur during high demand/low wind output periods

NPCC-New England: Minimum operating reserves for peak summer demand

SaskPower: Large generator forced outages at peak demand can trigger supply shortfalls

WECC-Mexico: Supply shortfalls can occur during peak demand



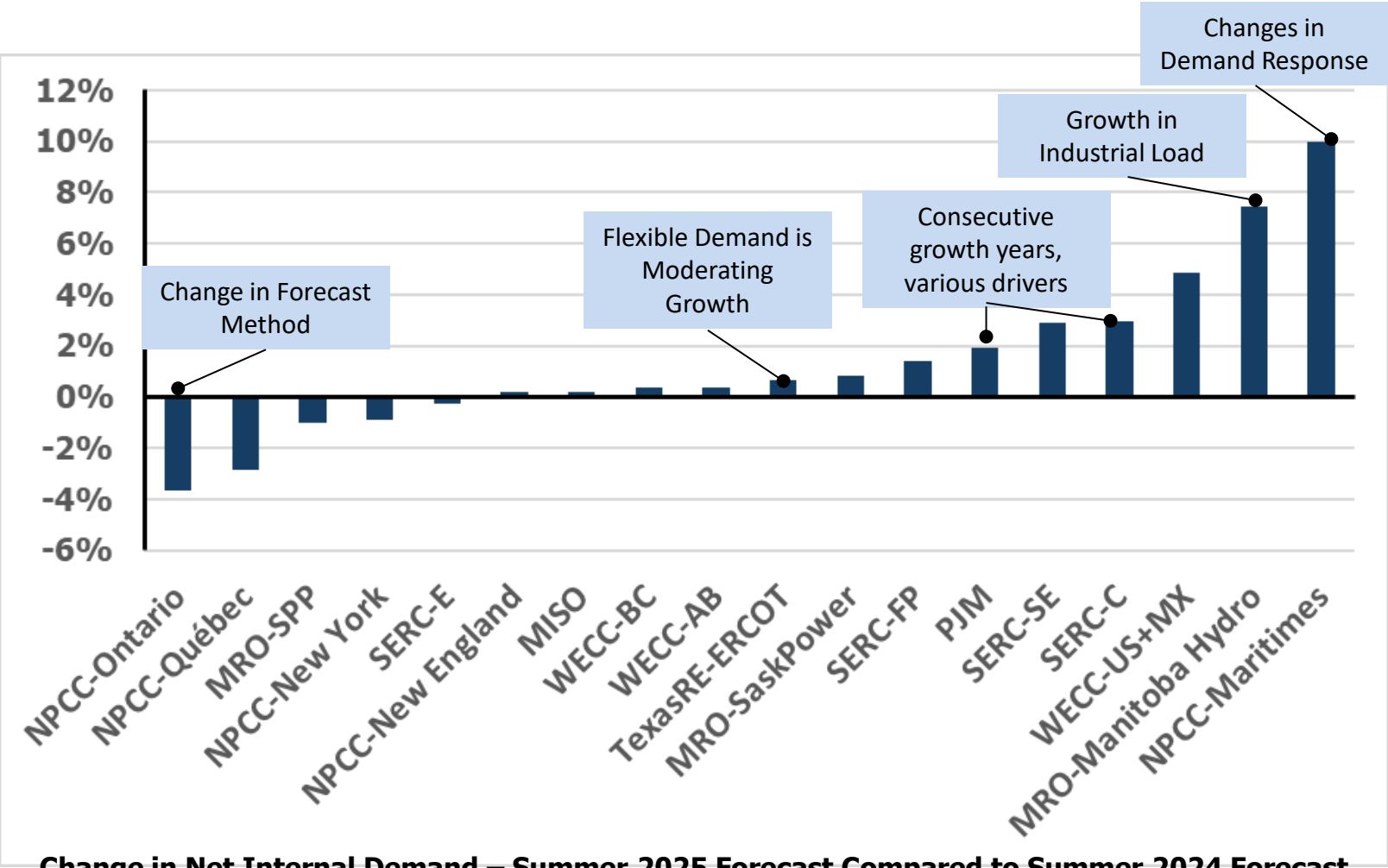
Note: New WECC U.S. Assessment Areas are used in the 2025 SRA

Seasonal Risk Assessment Summary	
Elevated	Insufficient Operating Reserves in Extreme Conditions
Normal	Sufficient Operating Reserves

Extreme summer conditions include 90/10 demand scenarios, historical high generator outage rates, and low variable energy resource scenarios

Demand Growth Trend Continues at Varying Rates

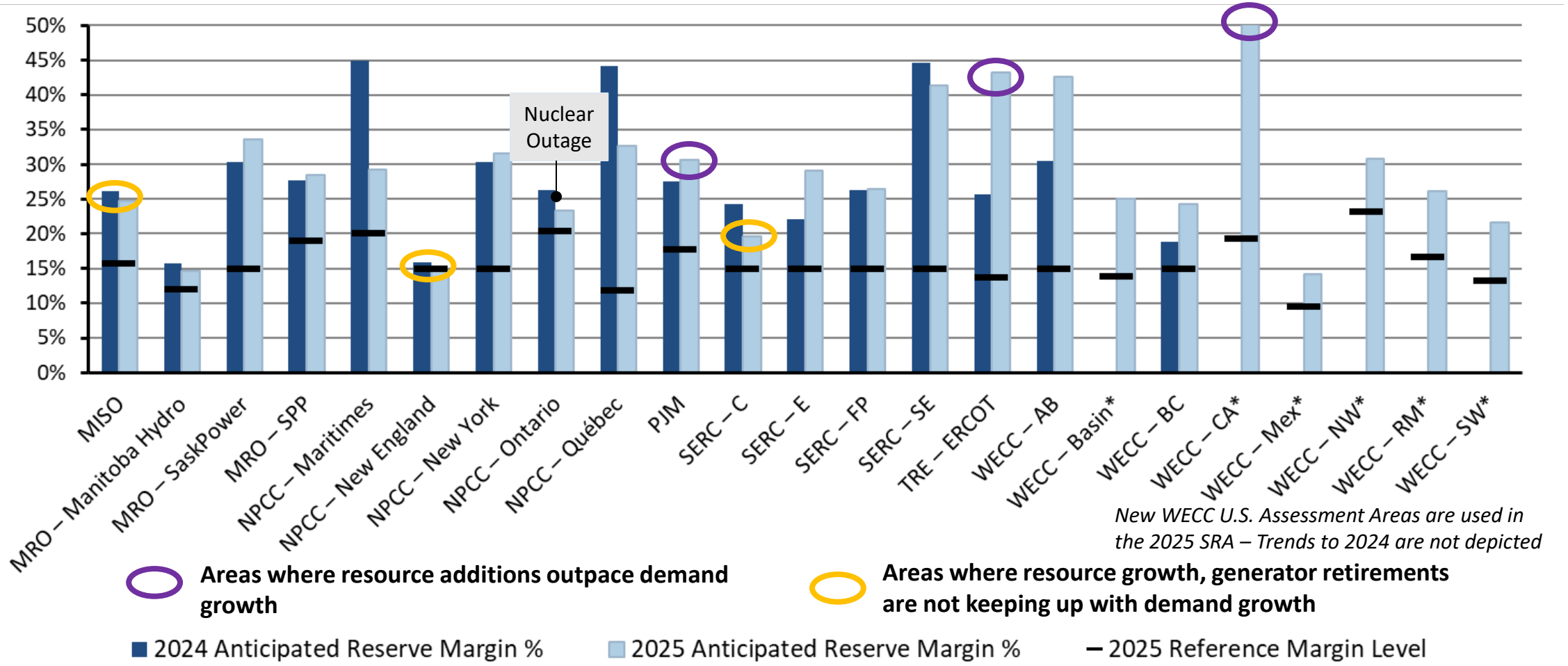
Summer peak demand has risen by 12 GW (v. 5 GW between 2023 summer and 2024 summer)



Change in Net Internal Demand – Summer 2025 Forecast Compared to Summer 2024 Forecast
With trend drivers and highlights

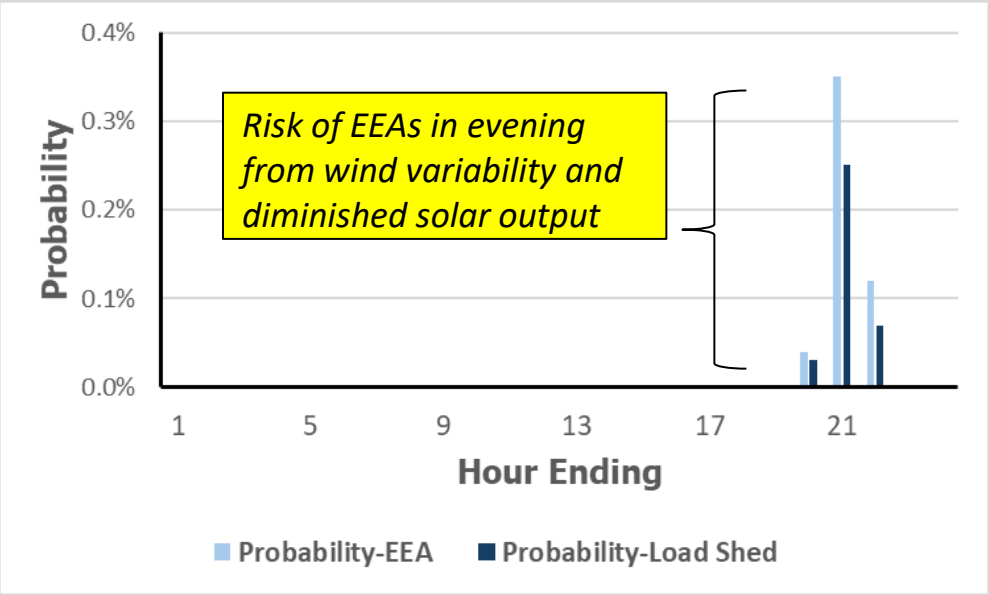
Resource and Demand Changes Drive Reserve Margins Trends

- Solar PV and battery resource additions are increasing reserve margins in several areas



Energy Assessments are Key to Identifying Potential Shortfalls

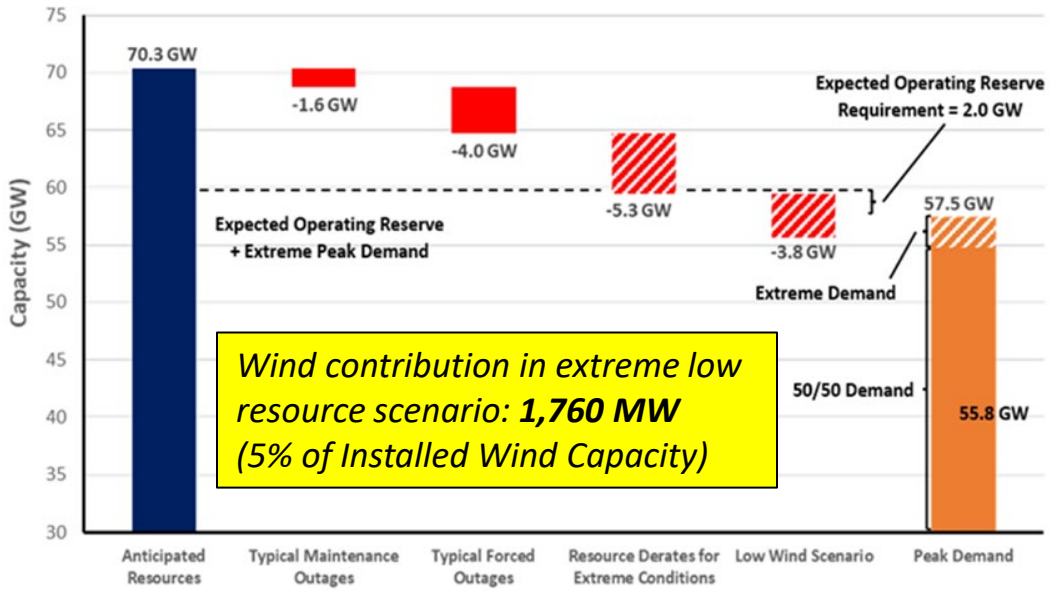
- Batteries and demand response are reducing energy risks from solar ramps
  - ERCOT Probability of EEA at the risk hour expected to fall from 18% (2024) to 3% (2025)



ERCOT Probabilities of Energy Emergencies for **June 2025** Projected Peak Day

Source: ERCOT. August projection will be published in May 2025

- Scenario analysis of potential conditions in SPP reveals shortfall risk from energy limitations



SPP Risk Scenario – 2025 SRA

Recommendations

- Reliability Coordinators (RC), Balancing Authorities (BA), and Transmission Operators (TOP) in elevated risk areas review operating plans and protocols for resolving supply shortfalls
  - Employ conservative outage coordination procedures
  - Engage state or provincial regulators and policymakers to prepare for efficient implementation of demand side management mechanisms
- RC, BA, and TOP consider the potential for unexpected loss of IBR resources in operating plans
- Generator Owners with solar PV resources implement recommendations in NERC's Inverter-Based Resource Performance Issues Alert (Level 2)
- State regulators and industry should have protocols in place at the start of summer for managing emergent requests to preserve generation needed for periods of high demand

Questions and Answers

2025 State of Reliability Report

Action
Review

Background
The State of Reliability Report (SOR) is prepared annually to provide objective, credible, and concise information to policy makers, industry leaders, and the NERC Board of Trustees (Board) on issues affecting the reliability and resilience of the North America bulk power system (BPS). Specifically, the report:

- Identifies system performance trends and emerging reliability risks;
- Determines the relative health of the interconnected system; and
- Identifies and summarizes mitigation activities deployed.

The key findings and recommendations of the report serve as the technical foundation for NERC's range of risk-informed efforts addressing reliability performance and serve as key inputs to the ERO Reliability Risk Priorities Report prepared by the Reliability Issues Steering Committee (RISC). The metrics measured in the report address the characteristics of an adequate level of reliability (ALR).

In developing the 2025 SOR, NERC staff and the Performance Analysis Subcommittee provide both a technical assessment for those interested in the underlying data and detailed analytics, and an overview assessment to tailor content for the policy maker and industry leader audience. NERC management expects to issue the 2025 SOR on or about June 12, 2025. The review schedule below identifies key milestones for the report.

2025 State of Reliability Report Schedule	
Date	**Description**
March-April	Perform analysis and draft SOR Technical document
May	Finalize key findings, draft SOR Overview document, present to NERC Board of Trustees, perform reviews, draft video and infographic
End of May	Provide SOR documents, video and infographic to executive team for review, incorporate comments
Beginning of June	Submit SOR for NERC President and CEO acceptance
June 12	Report release (target)

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2025 State of Reliability

Preliminary Key Items

Jack Norris, Manager, Performance Analysis
NERC Quarterly Technical Session
May 7, 2025

Preliminary Key Finding 1: BPS Performed Well Amid Ongoing Grid Transformation

4,856,251 GWh
2024 Actual Energy

1,087,354 GW
2024 Summer Peak Capacity

526,833 mi
Total Transmission Circuit Miles > 100kV

5,840
Number of Conventional Generating Units > 20MW

>99.9%
Time with no operator-initiated firm load shedding associated with EEA-3
(0.1 GWh energy unserved)

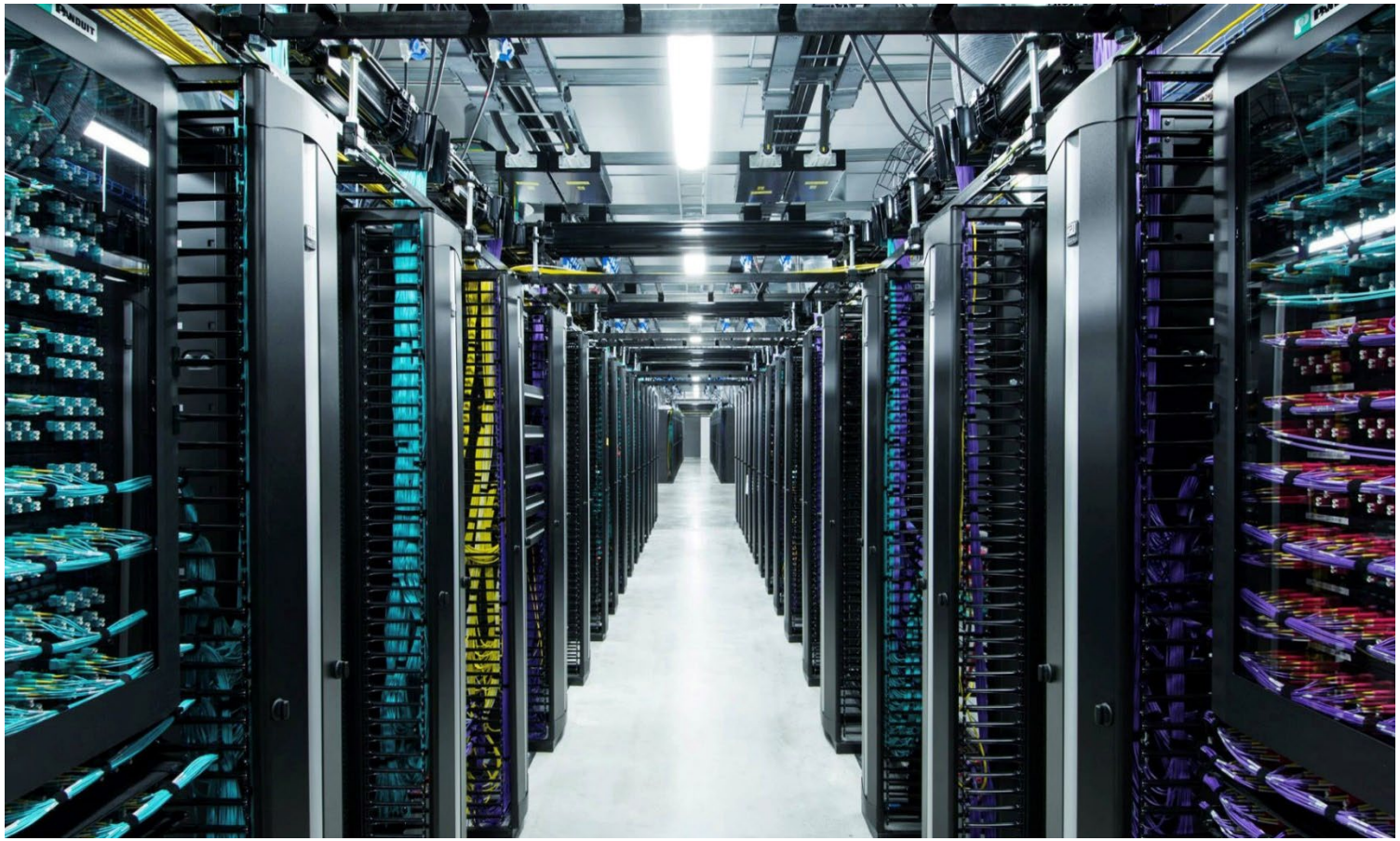
0.4 hours
Number of hours of operator-initiated firm load shedding associated with EEA-3
(0.005% of all hours of the year)

0.1 GWh
Amount of unserved energy associated with EEA Level 3 in 2024

1
Category 3 Events
(non-weather related)

Preliminary Key Finding 2: Loss of Large, Voltage Sensitive Loads

- Unexpected customer-initiated load loss
- Oscillation events
- Short-term forecasting



Preliminary Key Finding 3: Improvement in Frequency Response Attributable to BESS

Preliminary Key Finding 4: Data Collection Efforts Lag Behind BPS Risks

ERO Areas of Ongoing Reliability Focus

- Inverter-Based Resources (IBRs)
- Distributed Energy Resources (DERs)
- Cold Weather Impacting the BES

Questions and Answers

NERC Bulk Power System Awareness Update

Action
Information

Background

NERC's Bulk Power System Awareness (BPSA) group acquires and disseminates timely, accurate, and complete information regarding the status of the bulk power system (BPS) and threats to its reliable operation, to enable ERO Enterprise to effectively assure the reliability of the BPS. During major system disturbances, extreme weather, fires, hurricanes, physical events, and geomagnetic disturbances, etc. the BPSA facilitates effective communications between the ERO Enterprise, industry, and government stakeholders.

NERC BPSA, in collaboration with the E-ISAC and the ERO Enterprise Situation Awareness teams, maintains a near real-time situation awareness of conditions on the BPS. Notifies the Industry of significant BPS events that have occurred in one area, and which have the potential to impact reliability in other areas. Maintains and strengthens high-level communications, coordination, and cooperation with governments and government agencies regarding real-time conditions.

Summary

The BPS remained stable throughout Q1 2025. Despite several significant events–including a geomagnetic storm, extreme cold weather, and wildfires in Southern California–the NERC BPSA team provided regular updates to ERO leadership, FERC, and the DOE on the status of the BPS during these events.

- **January Geomagnetic Storm:** A Kp-8 level geomagnetic storm was observed by NOAA's Space Weather Prediction Center
- **Extreme Cold Weather**: Severe cold affected the Central Great Plains, Ohio and Tennessee Valleys, and the Mid-Atlantic region. January and February saw multiple extreme weather events across most of North America.
- **Southern California Wildfires:** Numerous wildfires occurred due to a combination of dry vegetation, low humidity, strong Santa Ana winds, and generally unfavorable fire weather conditions.
- **March–April Load Shed Events:** Load shedding occurred across the SPP and MISO footprints due to multiple weather-related forced outages, scheduled generation outages, and low wind generation.
    - MISO shed 115 MW.
    - SPP shed 122 MW.

Registered entities postured the system to ensure reliability and implemented operating procedures during these events.