



Reliability Overview and Recent Reliability Actions

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Agenda

- FERC's Reliability Authority
- Significant Recent Reliability Actions
 - Cyber and Physical Security
 - Extreme Weather
 - Changing Resource Mix
- Reliability Outlook



Federal Power Act Section 215

- Enacted as part of Energy Policy Act of 2005
- Provides for FERC to oversee reliability of the U.S. interconnected electric transmission system
 - Pertains to operating reliability of the grid
 - Does not include local distribution systems
 - Does not include resource adequacy
- FERC acts through an Electric Reliability Organization (ERO)
 - NERC is the FERC-certified ERO
 - NERC develops, implements and enforces reliability standards subject to FERC oversight
 - FERC may not develop a standard, but may approve or remand standards



The Dedicated Staff of the Office of Electric Reliability

- Advise on whether to approve, remand or require changes to reliability standards proposed by NERC
- Oversee compliance with approved standards by users, owners, and operators of the Bulk-Power System (BPS); review NERC-proposed penalties
- Provide engineering support on rate filings, focusing on potential reliability impacts
- Monitor the status of the BPS to keep the Commission informed of evolving events
- Review blackouts and major events for possible violations of, or gaps in, reliability standards
- More info available in [Electric Reliability Primer](#)



FERC's Reliability Priorities

1. Protecting the grid from cyber and physical attacks
2. Preparing for extreme weather
3. Ensuring reliability as the resource mix changes



Cyber and Physical Security

- Cyber security
 - January 2023 – Internal Network Security Monitoring (INSM) – Final Rule directing NERC to develop and submit a reliability standard requiring INSM for critical grid cyber systems
 - March 2023 – Order approving a revised reliability standard requiring vendor remote access management
 - May 2023 – Order No. 893 approving incentive-based rate treatments to encourage utilities to invest in advanced cybersecurity technology and participate in cybersecurity threat information sharing programs to benefit consumers
- Physical Security
 - April 2023 – NERC submits report assessing efficacy of the physical security reliability standard
 - August 2023 – Joint FERC-NERC conference regarding physical security of the bulk-power system



Extreme Weather

- February 2023 - FERC approved cold weather reliability standards EOP-011-3 (Emergency Operations) and EOP-012-1 (Extreme Cold Weather Preparedness and Operations) and directed changes to EOP-012-1.
- June 2023
 - Order No. 896 directs NERC submit the new or revised reliability standards to include extreme heat and cold events in transmission planning requirements.
 - Order No. 897 directed one-time reports on extreme weather vulnerability assessments. Transmission providers submitted reports in October 2023
- November 2023 - FERC, NERC and RE Joint Team released the final report on Winter Storm Elliott



Changing Resource Mix – Inverter-Based Resources

- Inverter-based resources (IBR) – solar, wind and battery systems – pose reliability risks due to the way they interconnect to the grid
- May 2023 – Approved NERC’s workplan for registering new IBR
- July 2023 – Included modeling and ride-through requirements for newly interconnecting IBR
- October 2023 – Order No. 901 directed the development of reliability standards for IBR:
 - Must cover four areas: IBR data sharing, model validation, planning and operational studies, and performance requirements
 - NERC must file the new or revised standards in three tranches, over the next three years



Emerging Challenges Pose Continued Risk to Reliability

“Reliability is Job Number One,” Chairman Phillips

- Cyber and physical security
 - Cloud computing
 - Artificial intelligence
- Changing resource mix
 - Electrification and load growth
 - Energy adequacy
 - Gas-electric coordination
- FERC is committed to maintaining and improving reliability and security in the face of these changes



Thank you!



Cold Weather Preparedness

Federal Energy Regulatory Commission

Washington D.C.



FEDERAL ENERGY
REGULATORY COMMISSION

- **2022 Winter Storm Elliott Inquiry Findings**
- **Recent Standards for Cold Weather Preparedness**
- **Gas-Electric Coordination since Winter Storm Uri**

David Huff
Office of Electric Reliability
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January 25, 2024

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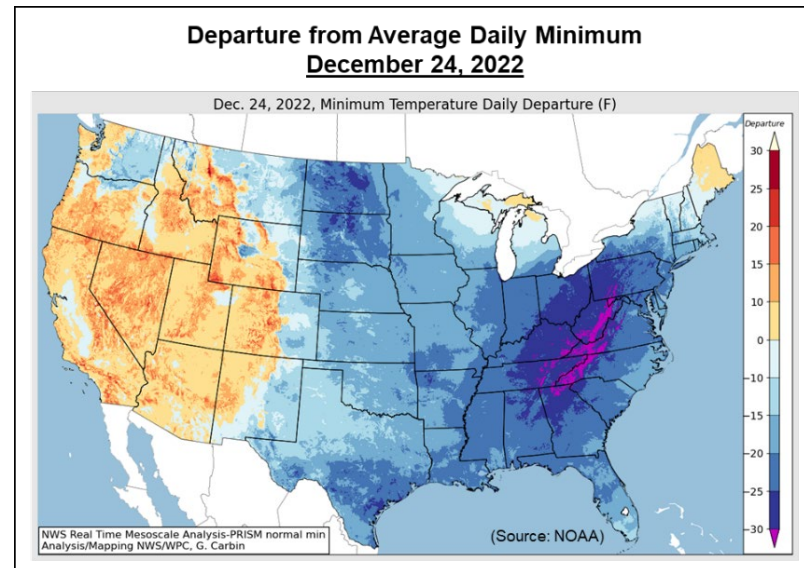
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Winter Storm Elliott's Effects on Grid Reliability - December 24

- ❑ Unprecedented unplanned electric generation outages of **90,500 MW**, at worst point (150 percent of URI outages)
- ❑ Including generation already on outage, 127,000 MW (**18 percent**) of the U.S. portion of the anticipated resources in the Eastern Interconnection were unavailable
- ❑ FERC/NERC Joint Inquiry initiated on **December 28, 2022**

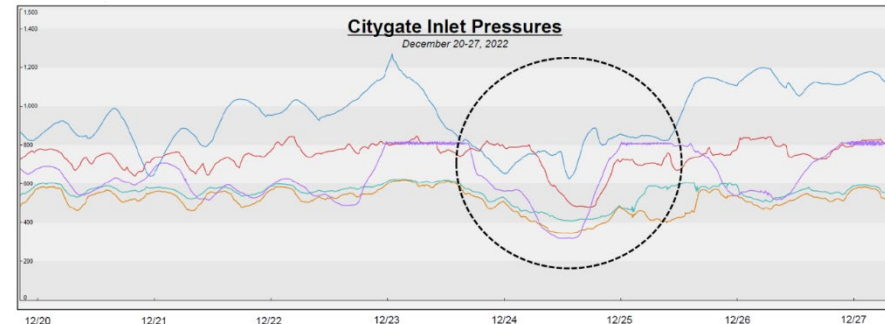
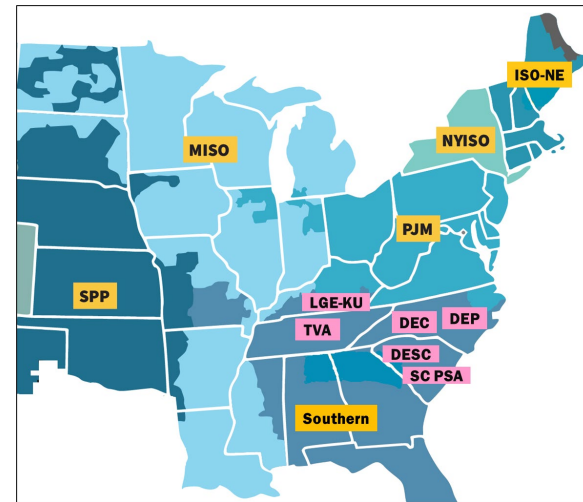


(Source: NOAA)



Electric Firm Load Shed and Internal Gas System Emergency

- ❑ December 24: Largest ever controlled firm load shed recorded in the history of the Eastern Interconnection (5,400 MW)
- ❑ Consolidated Edison (NY) Gas Operations – On December 24, 2022, experienced reliability-threatening delivery pressure decreases and declared an internal Gas System Emergency





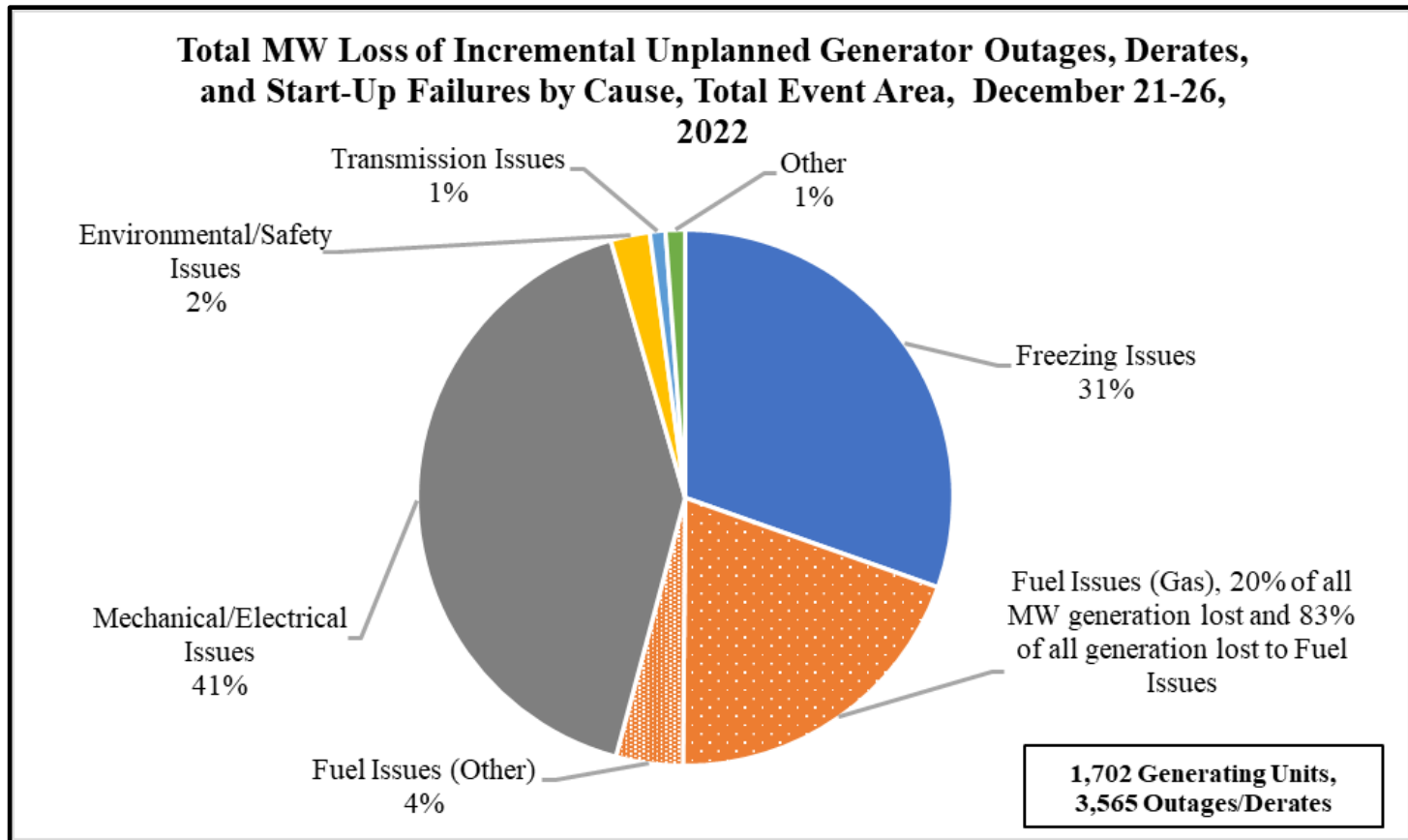
Similarities to Past Extreme Cold Weather Events

- ❑ **Fifth** event since 2011 in which cold weather-related unplanned generating unit outages jeopardized bulk-power system reliability

	2011 Event	2014 Event	2018 Event	2021 Event	2022 Event
Significant levels of incremental unplanned electric generating unit losses with top causes found to be mechanical/electrical, freezing, and fuel issues.	✓	✓	✓	✓	✓
Significant natural gas production decreases occurred, with some areas of the country more severely affected.	✓			✓	✓
Short-range forecasts of peak electricity demands were less than actual demands for some BAs in event area.	✓		✓	✓	✓
Significant natural gas LDC outages or near miss	✓				✓



Causes of Generation Shortfalls





Elliott Report (October 2023): 11 Recommendations

- ❑ Categories of recommendations include improvements to:
 - Generator Cold Weather Reliability
 - Natural Gas Infrastructure Cold Weather Reliability
 - Gas-Electric Coordination Cold Weather Reliability
 - Electric Grid Operations Cold Weather Reliability

- ❑ Where appropriate, recommendations include timeframes for implementation/initiation

- ❑ The full report can be found at: <https://www.ferc.gov/news-events/news/ferc-nerc-release-final-report-lessons-winter-storm-elliott>



Reliability Standards Actions for Cold Weather Preparedness

- ❑ In **August 2021**, Commission approved first set of Reliability Standards requiring generator cold weather preparedness plans
- ❑ In **February 2023**, Commission approved cold weather preparedness Standard EOP-012-1, addressing Key Recommendations 1d, 1e, 1f, and 1j from Winter Storm Uri Inquiry Report
 - Applicability: all BES generating units (includes nuclear)
- ❑ In **October 2023**, NERC Standards EOP-011-4 and TOP-002-5 addressing Key Recommendations 1g, 1h, and 1i from the Uri Report were filed with the Commission for approval
- ❑ Additional filing by NERC anticipated in **February 2024** aiming to address Commission directives to modify approved Standard EOP-012-1



Additional NERC Actions Taken Since Winter Storm Elliott

- ❑ In May 2023, NERC issued its first Level 3 Alert containing essential actions addressing cold weather preparedness for extreme weather events
- ❑ The overwhelming majority of GOs responded that 91-100% of their capacity would be capable of operating at the cold weather Standard (EOP-012-1)-defined Extreme Cold Weather Temperature by Winter 2023-2024
- ❑ A relatively small number of GO entities indicated that most of their capacity that experienced a cold weather reliability event in Winter 2022-2023 were vulnerable to being impacted by the same cause in Winter 2023-2024 due to known issues that cannot or will not be mitigated



Additional NERC Actions Taken Since Winter Storm Elliott (cont'd.)

- ❑ Response to Elliott Report Recommendation 1: Winter 2023-2024 cold weather preparedness verification actions by NERC, focusing on highest risk generating units
- ❑ Ongoing engagement with Generator Owners ahead of Winter 2023-2024 through meetings, webinars, workshops, on-site visits, surveys, and partnering with Reliability Coordinators
- ❑ FERC, NERC and Regional Entity staff evaluated the availability of blackstart resources in the Texas Interconnection during extreme cold weather conditions and published its report on 12/19/2023. The report can be found at <https://www.ferc.gov/news-events/news/blackstart-study-recommends-collaboration-planning-resilience>



Natural Gas-Electric Coordination Actions Since Uri, Elliott

- ❑ Post-Uri Report:
 - Commission hosted New England Winter Gas-Electric Forum (**2022**)
 - NAESB Gas-Electric Harmonization Forum and report (20 recommendations) (**2022-2023**)

- ❑ Post-Uri and Elliott Reports:
 - NAESB planning for revisions to Gas / Electric Coordination Business Practice Standards to improve communication among operators and natural gas production facilities (**2024-**)
 - NARUC Gas-Electric Alignment for Reliability (GEAR) working group (**2024-**)



Questions?



FERC-NRC Annual Meeting Update on FERC Activities - Jan 2024



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Agenda:

- OER's Division of Cyber Security Oversees CIP Reliability Standard Implementation
- Cybersecurity Update
- Lessons Learned Report

The views expressed in this presentation are my own and do not represent those of the Commission or any individual Commissioner

Version 1.1



OER's Division of Cyber Security Oversees CIP Reliability Standard Implementation

- Monitor and participate in the Electric Reliability Organization (ERO) and Regional Entities (RE) reliability standards development process;
- Analyze proposed modified or new ERO Critical Infrastructure Protection (CIP) reliability standards;
- Monitor ERO CIP Committee activities;
- Monitor and participate in ERO/RE CIP audits; evaluate industry compliance; participate in incident analyses;
- Track and review all CIP violations;
- Participate in inter-agency activities and monitor vendors of security-related products.



Cybersecurity Update

- **CIP-007-6 (System Security Management):** FERC Order No. 887 directs NERC to develop requirements within the Critical Infrastructure Protection (CIP) Reliability Standards for internal network security monitoring (INSM) of all high impact BES Cyber Systems and medium impact BES Cyber Systems with External Routable Connectivity (ERC).
 - CIP Networked Environment to include INSM, includes BES Cyber Systems that have a 15-minute impact to reliability as well as associated cyber systems supporting BES Cyber Systems
 - Improves defense-in-depth strategy by implementing controls to detect lateral movement between cyber systems within the CIP Networked Environment



Cybersecurity Update (con't)

- **CIP-008-6 (Incident Reporting):** Since the effective date of the standard, there has not been a material change in the reported number of Reportable Cyber Security Incidents or Cyber Security Incidents that were determined to be an attempt(s) to compromise an applicable system.
 - NERC: CIP-008-6 Effectiveness Study Summary Assessment of Cyber Security Incident Reporting and Response, June 27, 2022
 - 2023 Annual Report on Cyber Security Incidents expected March 2023
 - Currently updating standard to define attempt to compromise
- **Cloud Standard (under ERO development):** Standards Authorization Request (SAR) approved for the use of cloud services for the Bulk Electric System (BES)
 - SAR proposes the use of third-party accreditation to meet compliance for high and medium impact BES Cyber Systems
 - Cloud services being used today for low impact BES Cyber Systems with no reported incidents or impact to reliability



Lessons Learned Report – Background

- A staff report derived from the Commission's nonpublic CIP compliance audits conducted over the previous fiscal year.
- Issued publicly on an annual basis to help entities assess cybersecurity risk and compliance with mandatory reliability standards and, more generally, facilitate efforts to improve the security of the nation's electric grid.
 - Seven (7) reports issued since 2017
 - 2023 Report: <https://www.ferc.gov/news-events/news/ferc-staff-report-offers-lessons-learned-2023-cip-audits>
- Contains recommendations to help users, owners, and operators of the BPS improve their compliance with the CIP Standards and their overall cybersecurity posture.



2023 Lessons Learned Report

CIP-002 (BES Cyber System Categorization)

- Identify and categorize all BES Cyber Systems and their associated BES Cyber Assets.

CIP-003, CIP-007, and CIP-008 (sub requirements related to Incident reporting)

- Ensure reportable Cyber Security Incidents and attempts to compromise that were identified as Cyber Security Incidents are reported to Electricity Information Sharing and Analysis Center (E-ISAC) and Cybersecurity and Infrastructure Security Agency (CISA).



2023 Lessons Learned Report (con't)

CIP-007 (System Security Management)

- Restrict all inbound and outbound access permissions, including the reason for granting access and denying all other access by default.

CIP-013 (Supply Chain Risk Management)

- Enhance supply chain risk management programs to include evaluating the supply chain risks of existing vendors and develop a plan to respond to the risks that are identified.

