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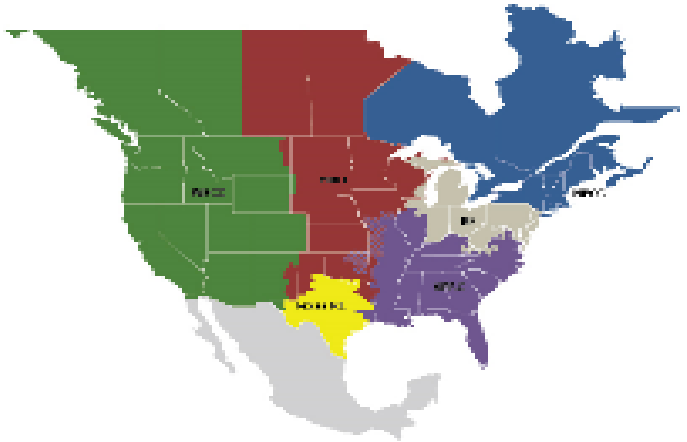


December 2022 Winter Storm Elliott Inquiry into Bulk-Power System Operations

FERC, NERC and Regional Entity Joint Team

Status Update - June 15, 2023

This report was prepared by the staff of the Federal Energy Regulatory Commission in consultation with staff from the North American Electric Reliability Corporation and its Regional Entities. This report does not necessarily reflect the views of the Commission.

Overview

- On December 28, 2022, FERC, NERC, and NERC's Regional Entities announced that they would open a joint inquiry into the operations of the bulk-power system during Winter Storm Elliott. Since then, the inquiry team has been gathering and analyzing relevant data to determine the effects of Elliott on the bulk-power system.
- Today's presentation is a status update on the inquiry with some preliminary observations.

Early Observations Confirm Themes from Prior Inquiries

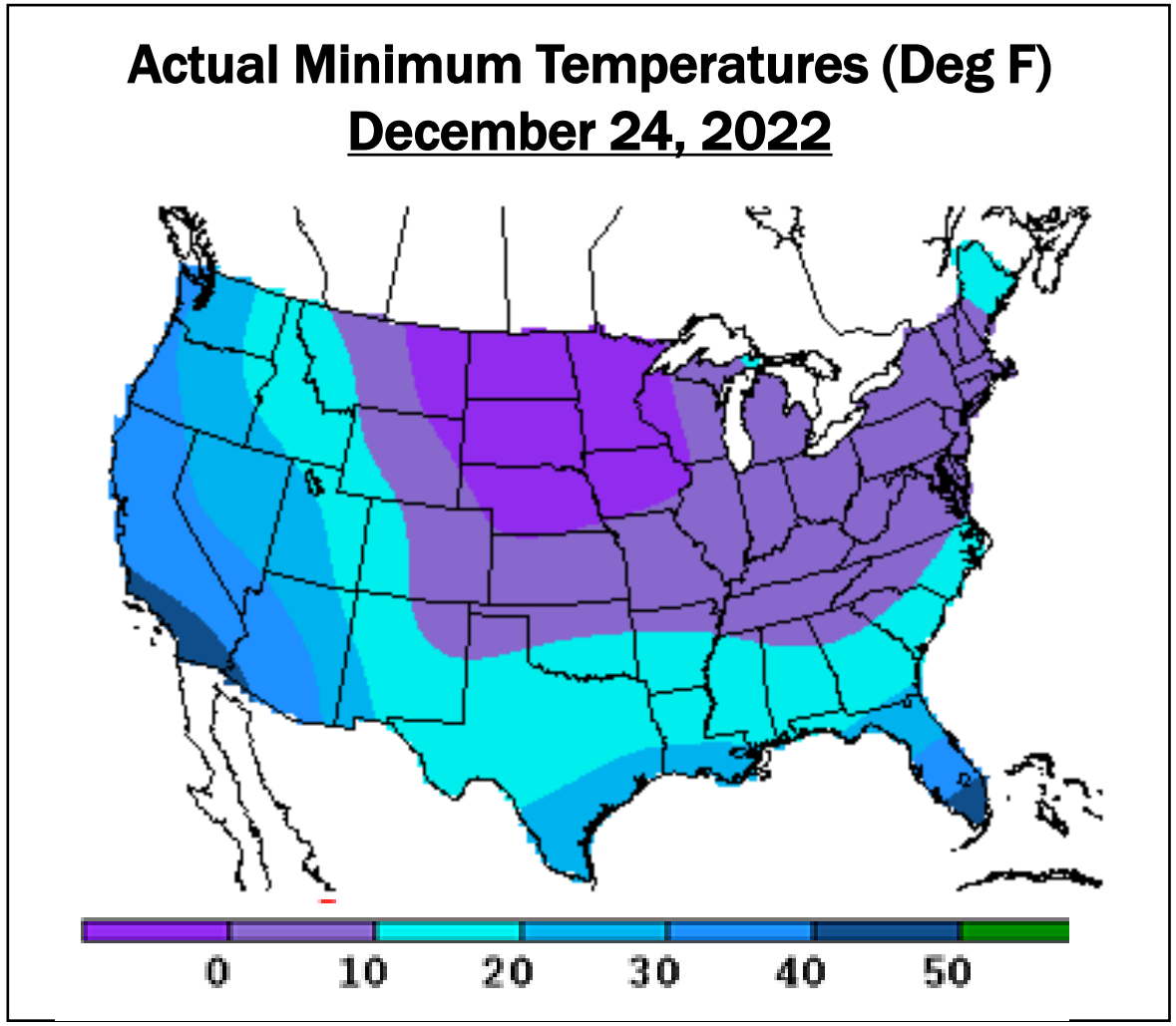
- The team's early observations reinforce themes and recommendations from prior inquiry team reports.
- Consistent themes include:
  - need for generating unit cold weather preparedness,
  - natural gas–electric interdependencies, and
  - need for grid operations preparedness (e.g., load forecasting, grid emergencies).

- Continuing to implement the recommendations of past inquiry reports could have helped mitigate the effects of Elliott and recommendations should be implemented now to prepare for the coming winter.

Winter Storm Elliott's Effects on the Bulk-Power System*

- **December 21-26, 2022**: Frigid arctic air with strong winds arrived over the eastern half of the country.
- Peak winter electricity demands, coupled with significant unplanned electric generation supply losses **exceeding 70,000 MW,** occurred during the coldest weather across the Southeastern, Mid-Atlantic, Midwest, and Northeastern U.S..
- **Several southeastern U.S. Balancing Authorities (BAs) ordered firm load shed on December 24, 2022, in total exceeding 5,000 MW.**

* Inquiry team is still gathering and analyzing data on all of these subjects.



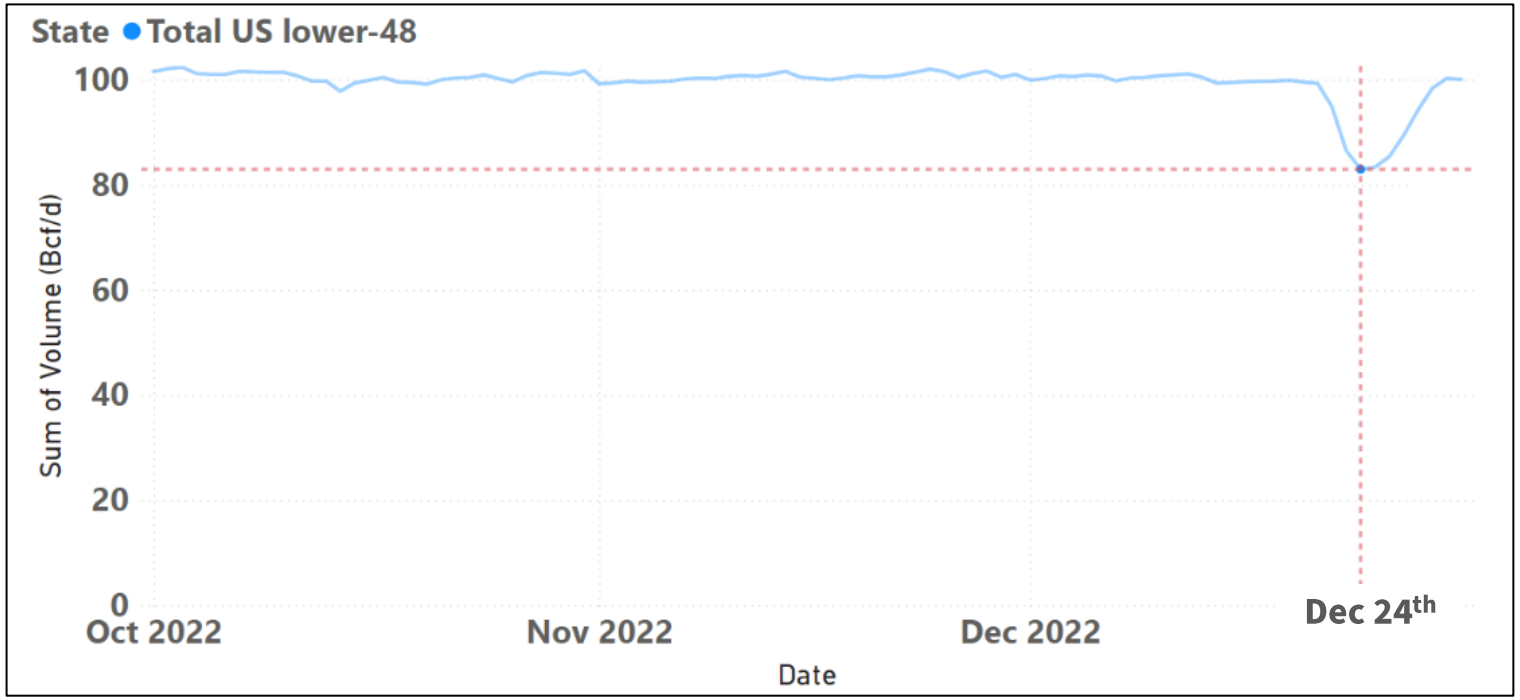
(Source: NOAA)

Effects on Natural Gas System*

- "Dry natural gas production in the Lower 48 states dropped to a low of 82.5 Bcf on **December 24**, a 16 percent decrease (16.1 Bcf/d) from December 21...." (EIA)

- The Marcellus and Utica Shale regions experienced the greatest declines in gas production during the period (22-54%). (S&P)

Total US lower-48 Production (Bcf/d)



(Source: S&P Global Commodity Insights)

* Inquiry team is still gathering and analyzing data on all of these subjects.

Generating Unit Loss Causes - Early Observations*

- The major categories of causes identified from early review (final rankings to be determined) are:
  - freezing Issues,
  - mechanical/electrical Issues, and
  - fuel Issues.
- Combined, these causes represent the majority of the generating unit outages, derates and failures to start.

* Inquiry team is still gathering and analyzing data on all of these subjects.

Natural Gas System Early Observations*

- Production – The event was characterized by a significant loss of production (from natural gas wells and gathering facilities) and reports of equipment freezing.
- Processing – In some locations, natural gas processing facilities experienced a reduced or total loss of natural gas receipts between December 23-26 due to production declines, which resulted in reduced output into pipelines.
- Pipeline – In certain regions, pipeline operators were faced with challenges including reduced production volumes, increased demand for gas, and unplanned compressor facility outages. Operators used storage and line pack, issued critical notices consistent with their Tariff (e.g., weather advisories and Operational Flow Orders) and reduced interruptible natural gas transportation service in order to maintain pressures and meet firm obligations.

* Inquiry team is still gathering and analyzing data on all of these subjects.

Similarities to Past Extreme Cold Weather Events

	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.	✓		✓	✓	✓

Early Observations Reinforce Past Report Recommendations: Generating Unit Cold Weather Preparedness

- Add/modify Reliability Standards regarding generating unit freeze protection measures (2021 "Uri" Report, Key Rec. 1a-1f)
- Utilize pre-operational warming prior to severe cold weather (2011 Report, Rec. 5)
- Review and update generating unit weatherization based on lessons learned, and conduct reviews of generating unit winter readiness (2014 Polar Vortex Report, Recs. 2, 3)
- Perform adequate/timely inspection of generating unit freeze protection measures; inspect/maintain heat trace and insulation (2011 Report, Recs. 14-16)
- Ensure winterization supplies/equipment are in place, and ensure adequate staffing for cold weather events (2011 Report Rec. 19)

Early Observations Reinforce Past Report Recommendations: Gas–Electric Preparedness

- Require natural gas facilities to implement cold weather preparedness plans; implement measures to protect natural gas infrastructure from freezing; adopt minimum uniform standards for winterization of natural gas production and processing facilities (2021 "Uri" Report, Key Recs. 5, 6; 2011 Report, Natural Gas Rec. 1)
- Establish a forum to improve reliability of natural gas infrastructure to support the Bulk Electric System (2021 "Uri" Report, Key Rec. 7)
- Protect critical natural gas infrastructure loads from demand response and load shedding (2021 "Uri" Report, Key Recs. 1h – 1i)

Early Observations Also Reinforce NERC's Cold Weather Guidelines and Alerts

- NERC's Winter Readiness Guideline provides additional details on cold weather readiness: Reliability Guideline: Generating Unit Winter Weather Readiness v4 - Clean (nerc.comhttps://www.nerc.com/comm/RSTC_Reliability_Guidelines/Reliability_Guideline_Generating_Unit_Winter_Weather_Readiness_v4-Clean.pdf#search=winter%20readiness%20guideline)

- NERC recently issued an "Essential Action Alert for Cold Weather Preparations for Extreme Weather Events" to improve winter readiness of the grid going into the 2023-2024 winter season: https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/Level%203%20Alert%20Essential%20Actions%20to%20Industry%20Cold%20Weather%20Preparations%20for%20Extreme%20Weather%20Events%20III.pdf

The Joint Team urges industry to continue its efforts to respond to the past cold weather report recommendations, NERC guidelines and Alerts, and implement as many actions as possible in preparation for the upcoming winter!

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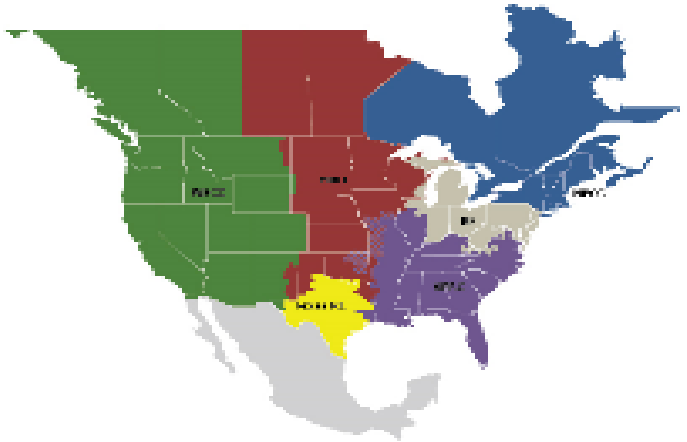

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