



Summary of FERC/NERC Inquiry and NERC 2023/2024 Winter Reliability Assessment

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December 7, 2023
Operating Committee

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

FERC, NERC and Regional Entity Staff Report
October 2023



FEDERAL ENERGY REGULATORY COMMISSION

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Regional Entities:
Midwest Reliability Organization, Northeast Power Coordination Council, ReliabilityFirst Corporation, SERC Corporation, Texas Reliability Entity, Western Electricity Coordinating Council

[NERC/FERC – Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott](#)

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2023–2024 Winter Reliability Assessment

November 2023

[WRA Infographic](#) | [WRA Video](#)



[NERC – 2023-2024 Winter Reliability Assessment](#)



Recommendations

NERC/FERC – Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott

See page 131-151 in [NERC/FERC – Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott](#)



NERC/FERC Inquiry – Recommendations

A. Generator Cold Weather Reliability

Impact

1 (a) Prompt development and implementation of the remaining recommended revisions from 2021 Report Key Recommendation 1 to strengthen generators’ ability to maintain extreme cold weather performance.

GOs

1 (b) Identify highest risk units during extreme cold weather and work with Regional Entities to perform cold weather verifications of those generating units (Verify highest risk units by Q4, 2023; implement by Q3, 2024).

NERC and
Regional Entities

1 (c) Assess freeze protection measure vulnerability.

GOs

Perform targeted cold weather verifications pursuant to a risk-based approach

NERC and
Regional Entities

GOs – Generator Owners/Operators



NERC/FERC Inquiry – Recommendations

A. Generator Cold Weather Reliability

Impact

1 (d) Conduct engineering design reviews to evaluate:

GOs*

1. accuracy and completeness of existing design information/cold weather operational thresholds
2. existing freeze protection measures
3. design features to address cold weather and freezing conditions
4. impact of an modifications/additions to documented operating temperature limits
5. Modifications/additions resulted in new generator cold weather critical components
6. impact a unit's "cold" versus "hot" status has on its design limits
7. generating unit's operating characteristics

**Note: GOs that experienced outages, derates, or failures to start above their documented operating temperature limits*

1 (e) Conduct operational/functional testing of "active" freeze protection systems.

GOs

1 (f) Communicate low temperature limits, and changes to those limits, to their Balancing Authority and Reliability Coordinator on a real-time basis.

GOs



NERC/FERC Inquiry – Recommendations

A. Generator Cold Weather Reliability

Impact

1 (g) Complete preparations for winter no later than the earliest first freeze date for the generating unit's location and maintain preparations until after the last freeze date.

GOs

2 Initiate a technical review of the individual causes of cold-weather-related unplanned generation outages caused by Mechanical/Electrical Issues during the event.

NERC

3 Collaborate with FERC staff to study the overall availability and readiness of blackstart units to operate during cold weather conditions.

**Joint
NERC-Regional
Entity team**

GOs – Generator Owners/Operators



B. Natural Gas Infrastructure Cold Weather Reliability

Impact

4 Legislation to establish reliability rules for natural gas infrastructure necessary to support the grid and natural gas local distribution companies that address the needs described in 4(a), (b) and (c).

**Congress
& state
legislatures**

4 (a) Address the need for natural gas infrastructure reliability rules:

**Congress
& state
legislatures**

1. Requiring cold weather preparedness plans (from wellhead through pipeline)
2. Freeze protection measures and operating measures for when extreme cold weather periods are forecast and during extreme cold weather periods.

4 (b) Address the need for regional natural gas communications coordinators, with situational awareness of the natural gas infrastructure that can:

**Congress
& state
legislatures**

1. Share timely operational communications throughout the natural gas infrastructure chain
2. Communicate potential issues to grid reliability entities.



B. Natural Gas Infrastructure Cold Weather Reliability

Impact

**Congress
& state
legislatures**

- 4 (c) Address the need to require natural gas infrastructure entities to identify natural gas infrastructure loads that:
1. Should be designated as critical for priority treatment during load shed
 2. Provide criteria for identifying such critical loads.

GO – Generator Owners



NERC/FERC Inquiry – Recommendations

C. Natural Gas-Electric Coordination for Cold Weather Reliability

Impact

- 5 Convene natural gas infrastructure entities, electric grid operators, and LDCs to identify improvements in communication during extreme cold weather events to enhance situational awareness. (Q2, 2024)
- 6 Consider whether to order Commission-jurisdictional natural gas entities to provide the Commission with onetime reports describing their roles in extreme cold weather events.
- 7 Perform studies to analyze whether additional natural gas infrastructure is needed to support the reliability of the electric grid and meet the needs of natural gas Local Distribution Companies. (Initiate study Q1, 2024)

North American Energy Standards Board

FERC

Independent research group

GO – Generator Owners



NERC/FERC Inquiry – Recommendations

D. Electric Grid Operations Cold Weather Reliability

Impact

8 Assess whether new processes/changes are needed to address anticipated capacity shortages or transmission system-related reliability problems during extreme cold weather events.

BA

9 Improve short-term load forecasts for extreme cold weather periods by implementing lessons and practices identified in the report and sharing newly identified effective practices with peer BAs. (Implement sharing Q4, 2023)

BA

10 Sponsor joint-regional reliability assessments of electric grid conditions that could occur during extreme cold weather events. (Initiate assessments, Q4, 2024)

**Resource
Planners
and LSEs**

BA – Balancing Authorities | LSE – Load Serving Entities



NERC/FERC Inquiry – Recommendations

D. Electric Grid Operations Cold Weather Reliability

Impact

- 11 Conduct a study of the state of the Eastern Interconnection during Dec. 23-24, 2022 to examine dynamic stability, system inertia and determine how close the interconnection may have been to triggering an underfrequency load shed event. (Initiate study, Q1, 2024)

Team of subject-matter experts

BA – Balancing Authorities | LSE – Load Serving Entities



Summary

NERC – 2023–2024 Winter Reliability Assessment

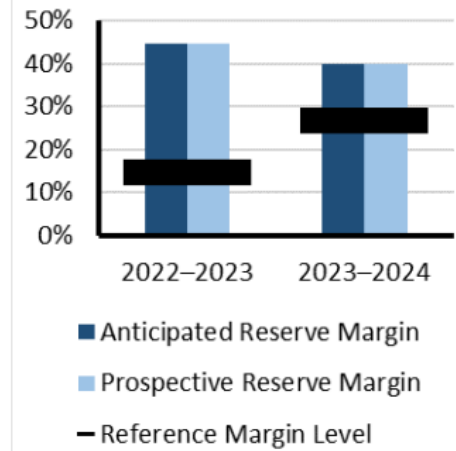


- A regional transmission organization that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.
- Serves 65 million customers and covers 369,089 square miles.
- A BA, PC, Transmission Planner, Resource Planner, Interchange Authority, TOP, Transmission Service Provider, and RC

Highlights

- Installed capacity is significantly higher (13 percentage points) than PJM's Reserve Requirements.
- PJM does not expect to encounter resource problems for anticipated conditions over the 2023–2024 winter Peak season.
- A severe cold weather event that extends to the South can lead to energy emergencies as operators face sharp increases in generator forced outages and electricity demand.
- Forecasted peak demand has risen while resources have decreased since 2022 when Winter Storm Elliot caused energy emergencies in PJM and surrounding areas.

On-Peak Reserve Margin



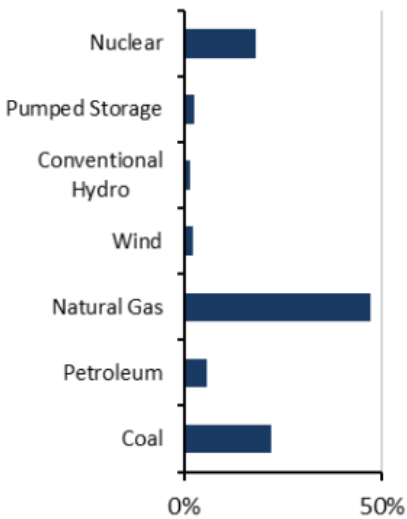


PJM Regional Assessment Dashboard

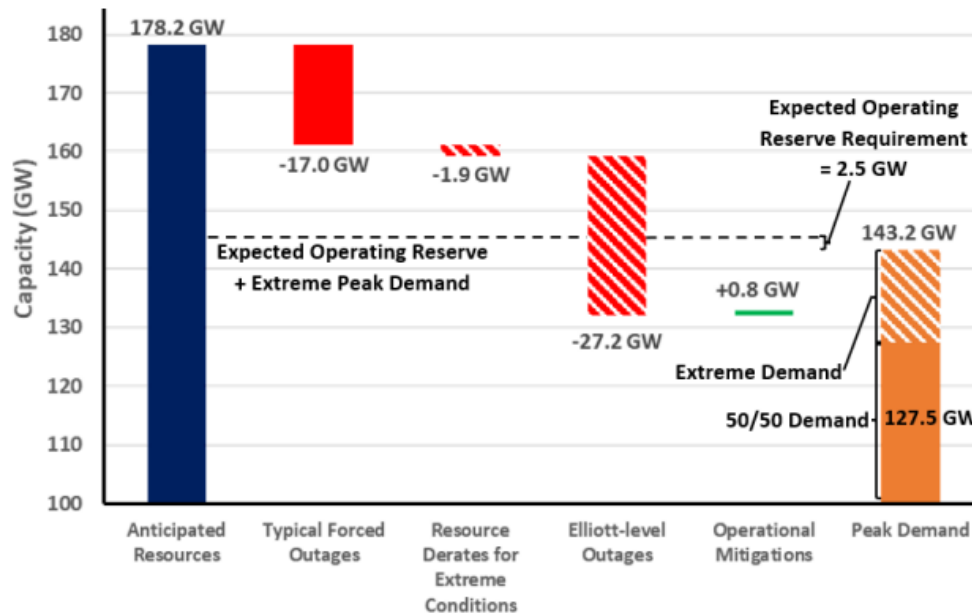
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed normal and extreme scenarios. Generator outages on a level of those experienced during Winter Storm Elliott would lead to energy emergencies.

On-Peak Fuel Mix



2023–2024 Winter Risk Period Scenario



SCENARIO DESCRIPTION

- **Risk Period:** Highest risk for unserved energy at peak demand hour
- **Demand Scenarios:** Net internal demand (50/50) and (90/10) demand forecast
- **Forced Outages:** Based on historical data and trending
- **Extreme Derates:** Accounts for reduced thermal capacity contributions due to performance in extreme conditions
- **Elliott-level Outages:** Additional forced outages equal to the total MW capacity on outage due to freezing and fuel issues during winter storm Elliott in 2022.
- **Operational Mitigations:** A total of 0.8 GW based on operational/emergency procedures



Key Findings

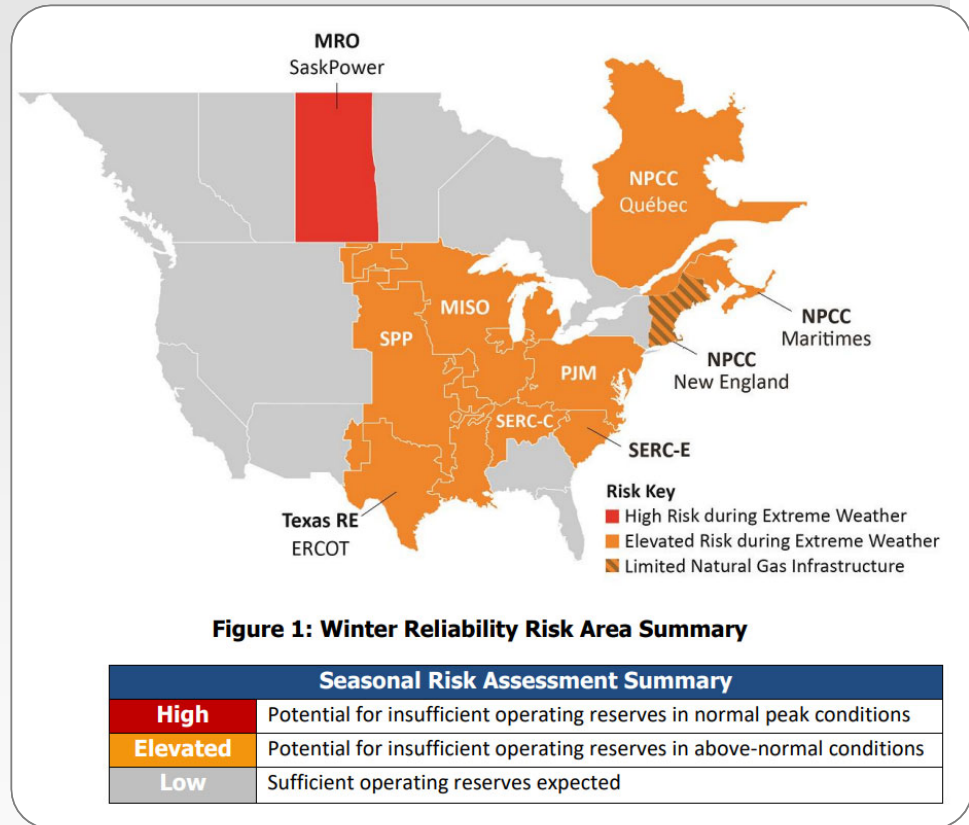
NERC – 2023–2024 Winter Reliability Assessment

See page 5-7 in [NERC – 2023–2024 Winter Reliability Assessment](#)

1 A large portion of the North American BPS is at risk of insufficient electricity supplies during peak winter conditions.

These areas are at greatest risk for electricity supply shortfalls this winter:

- Midcontinent ISO (MISO):
- MRO-SaskPower
- NPCC-Maritimes
- NPCC-New England:
- NPCC-Québec
- PJM, SERC-East, and SERC-Central
- Southwest Power Pool (SPP)
- Texas RE-ERCOT





NERC Winter Reliability Assessment – Key Findings

- 2 Generator fuel supplies remain at risk during extreme, long-duration cold weather events.
- 3 Load forecasting in winter is growing in complexity. Underestimating demand is a risk to reliability in extreme cold temperatures
- 4 Curtailment of electricity transfers to areas in need during periods of high regional demand is a growing reliability concern.
- 5 New cold weather Reliability Standards in place at the start of the 2023–2024 winter are aimed at improving coordination between Generator Owners/Operators and BPS Operators.
- 6 Industry responses to NERC’s Level 3 Alert – Cold Weather Preparations for Extreme Weather Events – III indicate that generator winter preparations are on a positive trend, but freezing temperatures remain a concern for some generators.



Recommendations

NERC – 2023–2024 Winter Reliability Assessment

See page 8 in [NERC – 2023–2024 Winter Reliability Assessment](#)



NERC/FERC Inquiry – Recommendations

Recommendations to reduce the risks of energy shortfalls on the BPS this winter:

Impact

- Review seasonal operating plans and protocols for communicating and resolving potential supply shortfalls in anticipation of high generator outages and extreme demand levels. Operators should be trained and familiar with manual load shedding plans prior to winter and review procedures in advance of severe winter weather.

RCs, BAs,
and TOPs
identified in
key findings

- Implement the essential actions identified in the NERC Level 3 alert, Cold Weather Preparations for Extreme Weather Events–III, and take recommended weatherization steps prior to winter.

TOPs, BAs,
and GOs

- Be cognizant of the potential for short-term load forecasts to underestimate load in extreme cold weather events and be prepared to take early action to implement protocols and procedures for managing potential reserve deficiencies.

BAs

RC – Reliability Coordinators | BA – Balancing Authorities | TOP – Transmission Operator | GO – Generator Owner



NERC/FERC Inquiry – Recommendations

Recommendations to reduce the risks of energy shortfalls on the BPS this winter:

- Implement generator fuel surveys to monitor the adequacy of fuel supplies. Prepare operating plans to manage potential supply shortfalls and take proactive steps for generator readiness, fuel availability, load curtailment, and sustained operations in extreme conditions.
- Assist grid owners and operators in advance of and during extreme cold weather by supporting requested environmental and transportation waivers as well as public appeals for electricity and natural gas conservation.

Impact

**RCs and
BAs**

**State and
provincial
regulators**

RC – Reliability Coordinators | BA – Balancing

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POWER GRID
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phishing emails.



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