# Issue in Focus: Fortifying Grid Reliability After Winter Storm Elliott

In December 2022, Winter Storm Elliott caused power outages for millions of electricity customers in significant portions of the eastern half of the U.S. At a September Federal Electricity Regulatory Commission (FERC) meeting, Chairman Willie Phillips noted, "It's abundantly clear that we must make major improvements to the cold-weather reliability of both the natural gas and electricity production and grid systems."

**The first lesson of Winter Storm Elliott is that no region, market model, or generation technology is immune to extreme weather conditions. So how can the power grid be fortified to ensure customers have the electricity they need?**

## What Happened: Key Event Facts

FERC and the North American Electric Reliability Corporation (NERC) and its regional entities released the final report from their Joint Inquiry Into Bulk-Power System Operations During December 2022 Winter Storm Elliott. The report provides valuable data as EPSA and its member companies continue their ongoing effort to analyze and address the event, lessons learned, and next steps to improve access to essential natural gas power generation resources during all weather conditions.

### The FERC-NERC inquiry found that:

**Some balancing authorities in the southeastern U.S. ordered a total of more than 5,400 MW of firm load shed** – resulting in rolling blackouts for hundreds of thousands of customers in the regions they serve – at different times throughout the event. These included the Tennessee Valley Authority, Duke Energy Progress and Duke Energy Carolinas, Louisville Gas and Electric-Kentucky Utilities, and Dominion Energy South Carolina and South Carolina Public Service Administration/Santee Cooper (FERC-NERC Presentation). All of these areas do not operate within an RTO/ISO or in a competitive power market.

**Of the 1,702 impacted units, 825 were natural gas-powered plants** (FERC-NERC Presentation). Generating units of all types, including coal, oil, wind, solar, hydropower, and nuclear also experienced outages.

**63 natural gas-fired generating unit outages/ derates, totaling 10,038 MW**, were due to firm gas transportation curtailments during the event (FERC-NERC Presentation).

Contributing to the loss of gas generation was a **16 percent decline in production**. The greatest gas production declines occurred in the Marcellus and Utica Shale formations, where it dropped by 23-54% during this event (FERC-NERC Presentation).

**Natural gas pipeline infrastructure experienced weather-related and freezing issues and mechanical issues** that impeded end-users' (including generators') access to natural gas supply (FERC-NERC presentation).

**More than 1,702 power generation units** were forced to shut down or reduce generation output due to the extreme cold.

**Mechanical, electrical, and other operational issues** related to the extreme freezing temperatures were a significant cause of generator outages.

**Grid operators underestimated peak electricity demand for December 23 and 24 by as much as 11.6%** (FERC-NERC Presentation). PJM separately reported under forecasting its **peak load by at least 10,000 MW** – enough to power 10 million homes (PJM Winter Storm Elliott FAQ, April 2023). That impacted fuel procurement decisions during Elliott, by companies that were told they weren't needed and did not procure gas in advance through day-ahead contracts when it turns out they were in fact needed.

**Additional factors have been identified as industry participants, grid operators, and other key stakeholders have evaluated the event over the past year. These include operational and process issues, including a lack of clear communications and instructions from grid operators to generator resources with respect to dispatch and scheduling, which exacerbated gas-electric coordination issues (including obtaining natural gas supply).**

**Takeaway:**

### Real Solutions Are Needed to Enhance the Reliability of all Resources, Market Models, and Regions

While some are taking the Winter Storm Elliott event as an opportunity to point fingers at competitive markets and fuel types like natural gas as the source of the problem, neither of those scapegoats is the root cause of the system problems. Abandoning them would in fact take us further from achieving our nation's energy goals and delivering reliable power. Winter Storm Elliott provides a chance to find real solutions to enhance grid reliability and the resiliency of all resources during all weather conditions.

**Takeaway:**

### Natural Gas Reliability

Despite the challenges revealed, natural gas-powered generation remains critical to a reliable power system and is one of the only technologies capable of producing dispatchable electricity on an as-needed basis at necessary scale and duration. Adequate access to natural gas generation, both existing and new resources, will continue to be needed throughout the U.S. to support increased renewable integration and rising demand.

**Takeaway:**

### Competitive Power Markets and Reliability

While the above listed challenges and outages were experienced during Winter Storm Elliott, the PJM Interconnection market and its participants provided more than enough power to meet demand—even exporting excess power to help neighboring regions at crucial times. PJM as the system operator managed to deliver power to consumers and businesses reliably and keep the lights on. Meanwhile, as cited in the FERC-NERC report, some regions served by vertically integrated utilities and public power impacted by the storm experienced rolling blackouts and relied heavily on imports from competitive market regions to avoid further load shed.

### Commitment to Reliability and Winterization

EPSA and its member companies have long been and remain committed to providing reliable electricity and improving power generation operations. EPSA member companies work every day to ensure that their generation resources and facilities are prepared to operate reliably and when needed. They have also invested millions of dollars and significant resources to that end. As an association, EPSA advocates tirelessly to promote cost-effective reliability solutions at ISOs/RTOs and in policy and regulatory arenas and point out policies or regulatory actions that may disrupt our member companies' ability to provide reliable electricity.

On an individual operational level, power generation owners and operators take measures to secure the system from winter weather interruptions.

Prepare winter readiness plans well in advance of the season, starting in March and April, with a review of operations and lessons learned from the previous season, including any experience with equipment freezing.

Train personnel on winter preparedness and readiness plans and prepare staffing plans.

Take maintenance and assessment measures to shore up critical equipment, including but not limited to: determining the lowest temperature at which plants can reliably operate, identifying critical equipment that may be impacted by winter weather, performing and documenting annual preventative maintenance activities, and identifying needed areas of insulation.

**There is no one-size-fits-all approach to winterizing power generation equipment. Facilities consider many factors, including among other things, the region in which the plant is located, the physical orientation of the facility, design of the facility, age of the facility, and the experience of the facility in prior weather events. Experience teaches that new assets need to go through weather events to identify weaknesses and allow owners to implement solutions that improve performance over time.**

### Solutions to Enhance Grid Reliability in all Weather Conditions:

Adopting the right solutions to ensure the grid can reliably perform and deliver power is critical to ensuring that it is prepared for the next major winter storm. EPSA and its member companies agree with FERC Chairman Phillips's call to action to improve reliability.

The following solutions will enhance grid reliability and help keep dispatchable resources like natural gas available when customers need power:

- Ensuring that new policies and regulatory proposals do not put reliability on the back burner. Current policies and regulations are accelerating the retirement of critical dispatchable natural gas resources, which face economic challenges due to existing market design flaws and out-of-market actions.
- Investing in weatherization and system hardening, while ensuring that market mechanisms and other avenues support investments made. Owners/operators must be allowed to recover the costs to ensure the reliable operation of facilities and should not be denied recovery for prudently incurred expenses to achieve that end.
- Streamline energy project permitting and create predictable timelines to provide confidence for investors and increase the amount of new infrastructure being built to support reliable fuel supplies and continued emissions reductions.
- Engaging the natural gas supply sector and all relevant stakeholders to understand and address the challenges of gas-electric coordination. This should include improved planning and preparation by both the electric and natural gas systems. Additionally, improvements to Day Ahead notification and scheduling are needed to avoid leaning on real-time markets when gas-fired generation is going to be needed but conditions are impacting the gas system as well. Market design reforms and/or compensation mechanisms must better align the operations of these two systems during critical periods.
- Improving load forecasting in anticipation of an expected extreme weather event and utilizing situational awareness of the power and natural gas systems to inform a conservative, clear approach to notification, scheduling, and dispatch that allows generators to prepare and be available when called.
- Continuing to incorporate lessons and tests from extreme events to build on our understanding of how infrastructure can be prepared to perform in future extreme weather scenarios.

## The Bottom Line

Winter Storm Elliott was a high-profile extreme weather event that impacted Americans as they traveled and hosted families and friends during the holiday season. It wasn't the first – nor the last – winter storm that will have a severe impact on our power grid. Misdiagnosing the cause and the potential remedies, however, makes the United States power system vulnerable to the next Winter Storm Elliott.

Policymakers, grid operators, power generators, and the natural gas production, transportation, and marketing sectors must coordinate to implement needed reforms to fortify the electric grid for all weather conditions. As the FERC Chairman noted, "It shouldn't take five winter storms in 11 years to show us the gravity of the situation we find ourselves in."

## Competitive Wholesale Electricity Markets Nationwide

The Electric Power Supply Association (EPSA) is the national trade association representing America's competitive power suppliers. EPSA members provide about 150,000 MW of reliable and competitively priced electricity from environmentally responsible facilities using a diverse mix of fuels and technologies including natural gas, wind, solar, hydropower, geothermal, storage, biomass, and coal. EPSA seeks to bring the benefits of competition to all power customers.