Northeast Gas / Electric System Study

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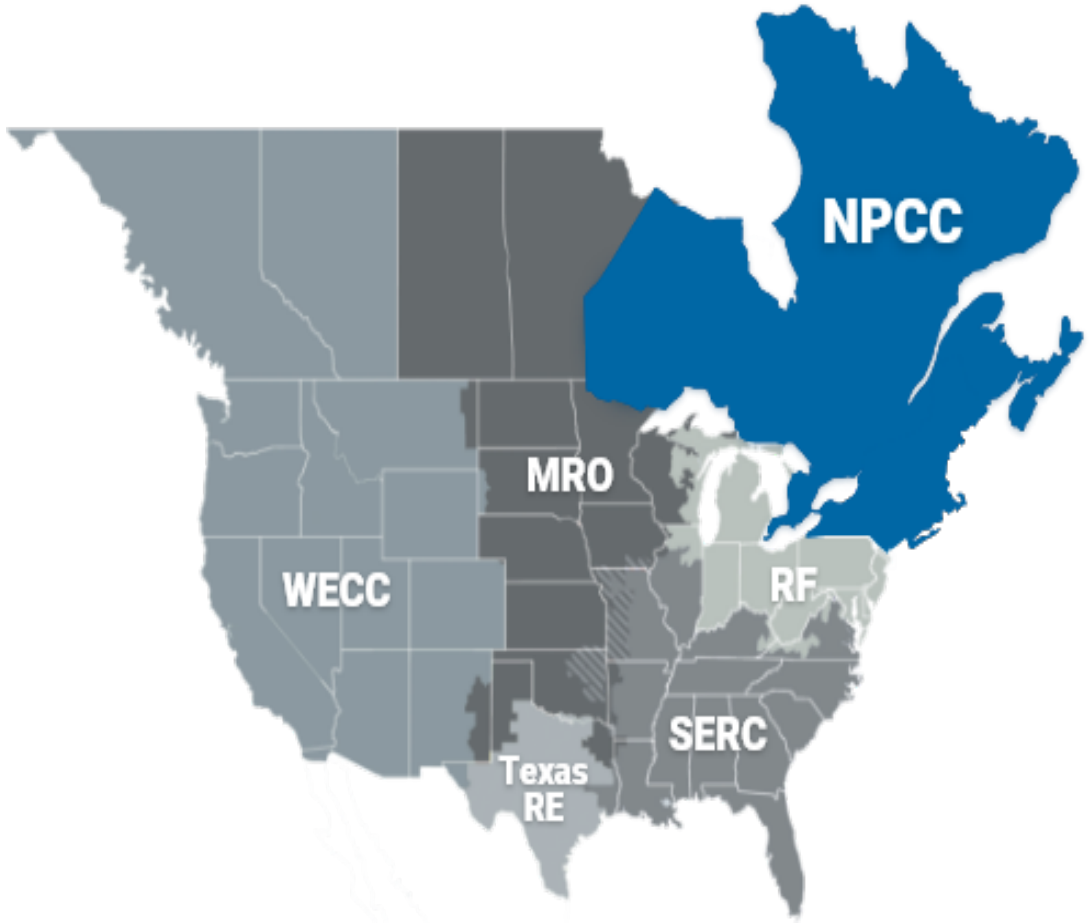
About NPCC



The NPCC geographic region includes the **State of New York** and the six **New England states** as well as the Canadian provinces of **Ontario, Québec** and the Maritime provinces of **New Brunswick** and **Nova Scotia**. Overall, NPCC covers an area of nearly **1.2 million square miles**, populated by more than **56 million people**. In total, from a net energy for load perspective, **NPCC is approximately 43% U.S. and 57% Canadian**. With regard to Canada, approximately **65% of Canadian net energy for load is within the NPCC** Region.

NPCC_2025_Business_Plan_and_Budget.pdf

Reason For Study

FERC New England Winter Gas - Electric Forum

- 1st Forum - September 2022 / Vermont
  - New England Winter Gas-Electric Forum | Federal Energy Regulatory Commission
- 2nd Forum – June 2023 / Maine
  - 2023 New England Winter Gas-Electric Forum | Federal Energy Regulatory Commission

'What a Difference a Day Makes'

Study Findings

- U.S. Northeast natural gas system deemed sufficient to support electric system under studied conditions with existing infrastructure.
- However, reliability risk will increase as conditions become more extreme.
- The Repsol liquified natural gas facility is NOT a perfect substitute for the Everett Marine Terminal; Everett should be retained until additional fuel sources are available.
- There are contingencies on the gas system that cannot be mitigated by the electric system under current market/regulatory constructs.

Source: NPCC Northeast Gas Electric System Study.pdf

NPCC / NERC Study Implications

All gas dependent regions of the country should conduct fuel security assessments on a periodic basis.

More gas infrastructure is needed. As load grow and more variable generation is added, this need will become more acute.

FERC should assess its authority (and seek expansion as appropriate) to address integrated gas-electric system reliability challenges.

FERC should consider proceedings addressing related market design changes.

Natural Gas Supply and Transportation Risks

- Production Well Freeze-Offs and Pipeline Winterization
- Dependence on Electricity
- Pipeline Constraints

Electric and Gas Market Harmonization Risks

- Scheduling
- Operational Coordination
- Planning Coordination

Resource Adequacy and Capacity to Support Large Ramps Risks

- Winter Peak Demand
- Generation Preparedness and Fuel Assurance

Vulnerabilities in Generator Winterization Risks

- Implementation Challenges

Opportunities for Mitigation

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

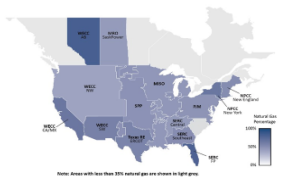
Source: NERC Reliability Insights.pdf

Reliability Insights

The Interconnected Gas and Electric Systems

March 2025

North America's electric generating resources are significantly shifting due to retirements of conventional generation coupled with the growth in solar, battery, natural gas, and wind resources. Regulatory rulings and state policies are driving the development of more renewable energy resources. Meanwhile, due to the rapidly retiring coal fleet, natural-gas-fired generation has increased its share of the thermal resource mix and represents more than 80 percent of peak winter capacity in some areas of North America.



	Natural-Gas-Fired Generation Peak Winter Capacity	Contribution to Total Winter Resource Mix
MISO	62.3 GW	45%
MRO-SaskPower	2.4 GW	43%
NPCC-New England	15.0 GW	51%
NPCC-New York	24.5 GW	66%
PJM	84.4 GW	47%
SERC-Central	22.0 GW	43%
SERC-Florida Peninsula	69.8 GW	80%
SERC-Southeast	31.9 GW	50%
SPP	29.9 GW	48%
Texas RE-ERCOT	55.3 GW	57%
WECC-AB	13.9 GW	83%
WECC-CA/MX	37.8 GW	65%
WECC-NW	33.6 GW	39%
WECC-SW	18.1 GW	58%

This growing dependence on natural gas infrastructure has created new operational and planning challenges, such as those experienced during Winter Storm Elliott in December 2022 (when extreme temperatures in the Eastern Interconnection precipitated a sharp spike in peak electricity demand, driving many grid operators to declare energy emergencies). At the same time, natural gas production in Appalachia fell by more than 6 billion cubic feet (Bcf) per day due to freeze-offs at the wellhead, other mechanical freezes, and icy roadways that delayed repairs. This loss in supply for major gas pipeline operators in the region threatened fuel delivery to power sector customers. At one point, unplanned generation outages caused by freezing generators and fuel supply issues totaled 90,500 MW, equivalent to 13 percent of the resources in the U.S. Eastern Interconnection. In the Southeast, Transmission Operators ordered more than 5,400 MW of firm load shed, the largest recorded manual load shed in the Eastern Interconnection's history. Natural gas production was also extremely impacted, leaving the Marcellus and Utica Shale formations with a production drop of 23% and 54%, respectively, at its peak. This event, and others, spotlights the wide-area challenges that winter weather can bring and energy constraints that may not be resolved by relying on assistance from neighboring areas.

The critical role of dispatchable power generation, such as coal, natural gas, and nuclear, in maintaining grid reliability (particularly during periods when weather-dependent variable resources like wind and solar are unavailable) became evident in 2016. A well leak at the Aliso Canyon natural gas storage facility in Southern California disrupted essential natural gas infrastructure, directly impacting bulk power system (BPS) reliability. This incident highlights the increasing vulnerability of the electric system as reliance on natural gas grows—any outage at a key facility can have significant consequences. Ensuring the resilience of natural gas storage, pipelines, compressor stations, and liquefied natural gas facilities is essential for the electric industry to meet its reliability obligations.

Interconnected Systems Need Coordinated Planning and Operations

The natural gas and electric systems are constituent parts of an interconnected energy delivery system. High-profile disruptions to natural gas availability in recent years have raised awareness of the interdependence between the natural gas system and the BPS infrastructure, resulting in calls for closer coordination in planning and operating these two systems to identify and mitigate risk.

RELIABILITY INSIGHTS

Key Reliability Risks

Natural Gas Supply and Transportation Risks

- **Production Well Freeze-Offs and Winterization:** During extreme cold, natural gas wells can freeze, leading to significant reductions in supply.
- **Dependence on Electricity:** Upstream and midstream gas facilities (compressors, processing plants, and wellheads) rely on electricity from the grid to operate.
- **Pipeline Constraints:** Constrained pipeline capacity, particularly in the U.S. Mid-Atlantic and Northeast, poses challenges in delivering natural gas during peak demand, leaving little operational flexibility should any natural gas facilities be out of service.

Electric and Gas Market Harmonization

- **Scheduling:** Discrepancies between gas and electric market schedules can lead to delays in natural gas availability for power generation during peak demand.
- **Operational Coordination:** Inadequate communication between market operators and pipeline operators prevents alignment of resource availability and electricity demand.
- **Planning Coordination:** Gas and electric system planning is not integrated, and assessments of infrastructure are needed to assure the reliability and adequacy of both systems.

Resource Adequacy and Capacity to Support Large Ramps

- **Winter Peak Demand:** Extreme cold can cause sharp increases in electricity demand during the morning and evening hours, requiring generation resources to ramp up quickly.
- **Generation Preparedness and Fuel Assurance:** Natural gas power plants that are ill-prepared for rapid ramping may fail to secure fuel in real-time conditions.

Vulnerabilities in Generator Winterization

- **Implementation Challenges:** Despite recent progress, some generators still face challenges implementing comprehensive winterization measures.

Opportunities for Mitigation

- **Enhanced Winterization Requirements:** Continue monitoring of compliance with mandatory generator winterization requirements as well as voluntary pipeline and production well winterization standards.
- **Operational Preparedness:** Identification of critical gas facility loads by local grid operators and inclusion in restoration plans will speed recovery during interruptions and limit cascading effects on gas production.
- **Improved Communication Protocols:** Information-sharing practices between market operators and fuel providers should be strengthened to align generation capacity with fuel delivery timelines.
- **Market Reforms:** Market structures to better assure operational performance and fuel certainty by incentivizing and rewarding actions that promote reliability (e.g., firming fuel supply and transportation, as well as winterization investments) should be developed.
- **Cross-Market Coordination:** Policy initiatives that promote closer alignment of gas and electric market schedules during critical weather periods are necessary.
- **Capacity and Energy Planning for Ramps:** Investments in flexible generation and storage solutions are needed to support larger, more frequent ramping events.
- **Regulatory Reform:** Formalized coordination and collaboration, including the development of Standards that encompass both systems, will help assure the reliable operation of both systems.

Conclusion

Reliable natural gas supply and electric system performance are essential to meet energy demands. The reliable delivery of energy to end users during extreme weather will be better assured by addressing risks to reliability across both systems. Immediate action is needed across the policy, market, and infrastructure domains to bolster grid resilience during winter's toughest moments.

RELIABILITY INSIGHTS

Source: NERC Reliability Insights.pdf

Questions