



2023-2024 Winter Energy Market and Electric Reliability Assessment

November 16, 2023

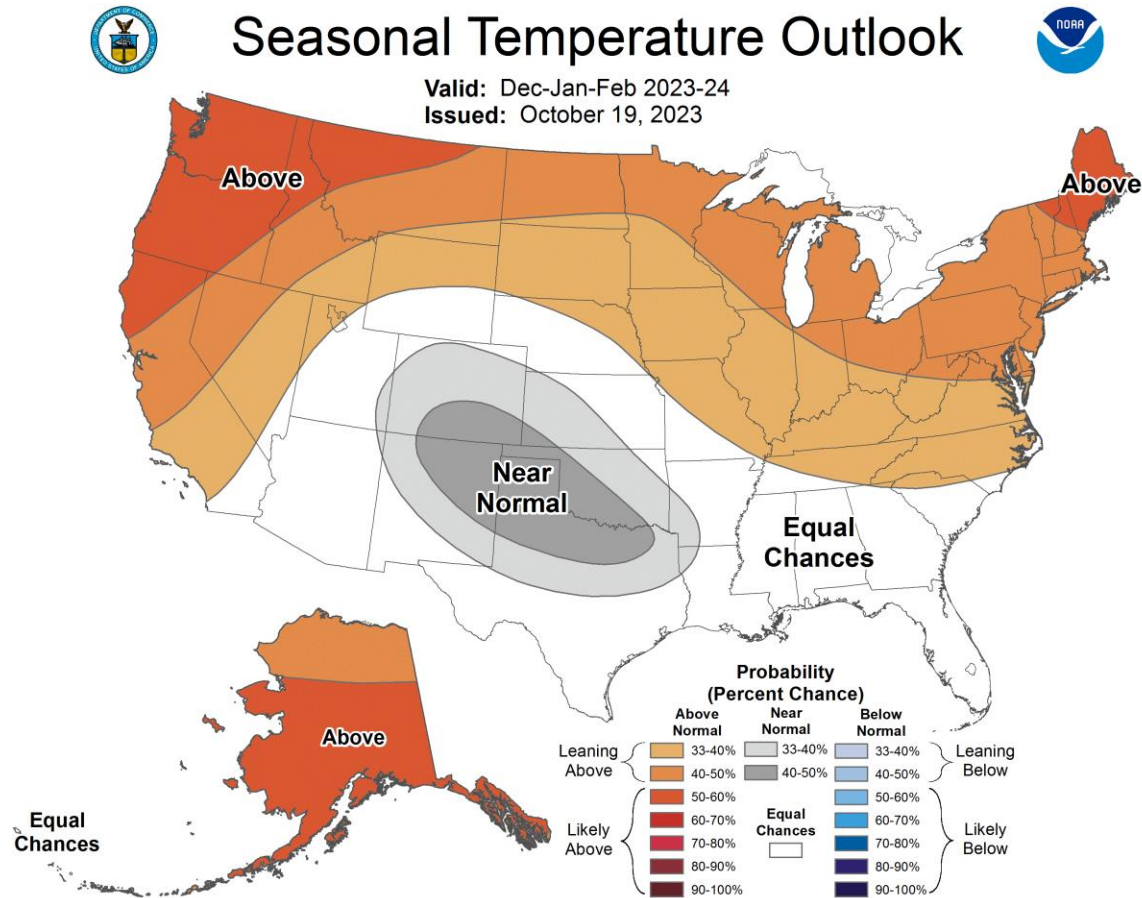


Key Findings

- Mild temperatures likely this winter for northern half of country.
- Natural gas futures prices decrease and natural gas demand to grow slightly.
- The rate of resource additions expected to increase year-over-year.
- New transmission capacity mostly for aging infrastructure, load growth, reliability.
- Adequate resources in all regions for normal winter.
- Possible reliability challenges for some regions under certain conditions.
- NERC highlights wide area cold events threaten reliability.
- NERC recommends cold weather preparations, fuel surveys, anticipating load forecasting errors in extreme cold, and support from state regulators and policy makers.



Mild Temperatures Likely This Winter For The Northern Half Of The United States



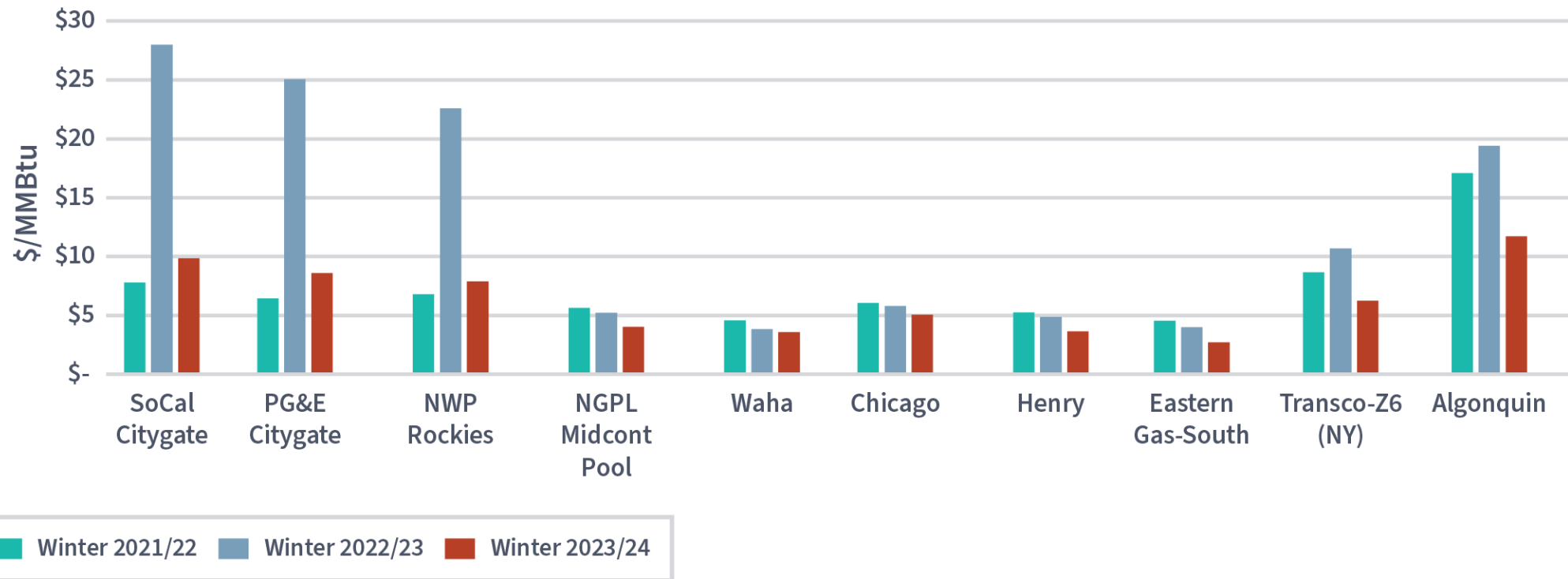
Source: National Oceanic and Atmospheric Administration



11/16/2023

Natural Gas Futures Prices Decrease

Natural Gas Futures Prices At Major Hubs (December-February)

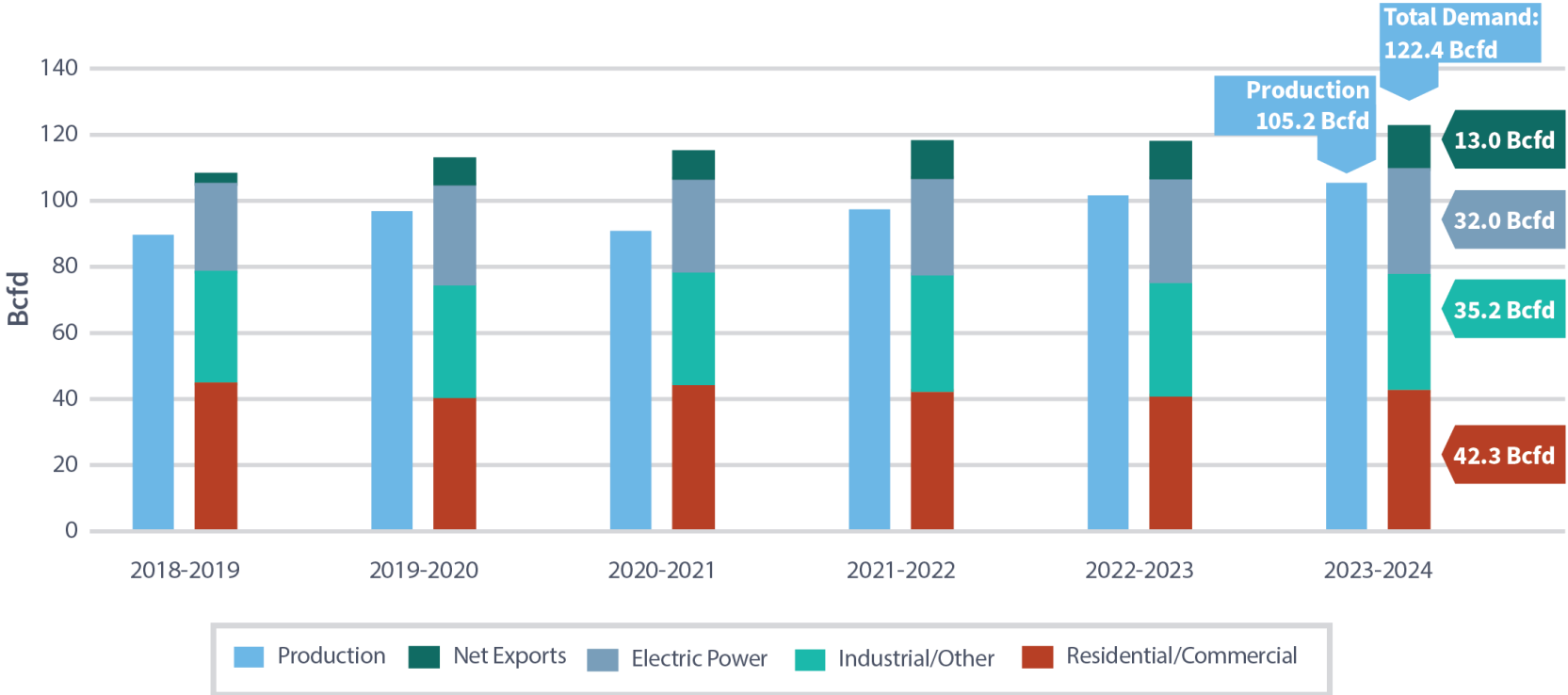


Source: InterContinental Exchange, Inc.



Natural Gas Demand To Grow Slightly

U.S. Natural Gas Demand and Production

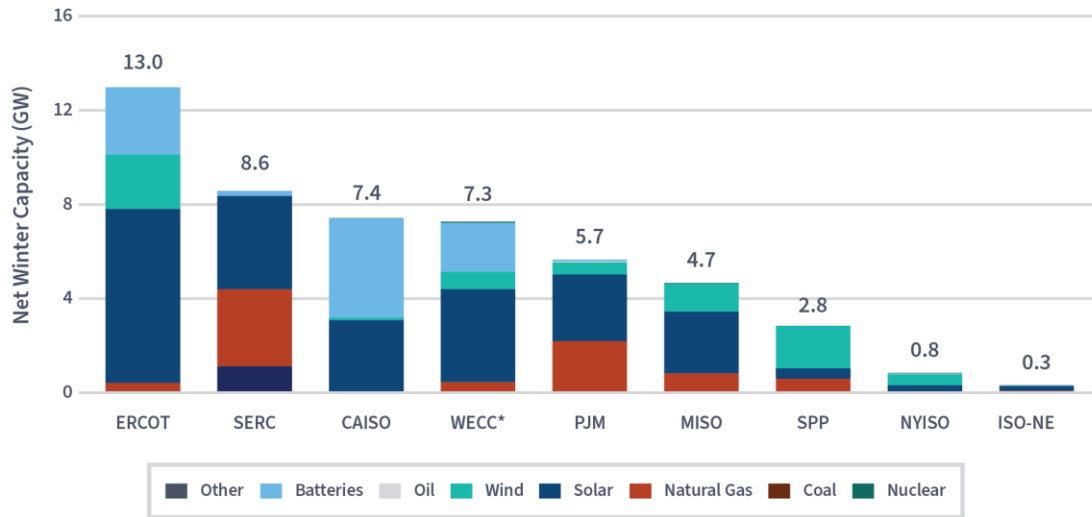


Source: U.S. EIA

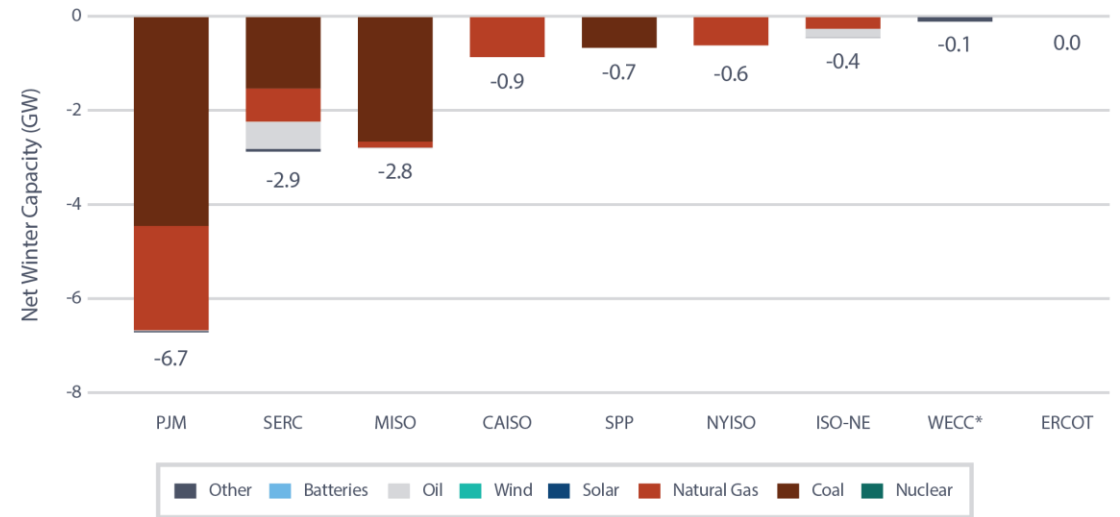


The Rate Of Resource Additions Expected To Increase Year-Over-Year

Net Winter Capacity Additions



Net Winter Capacity Retirements

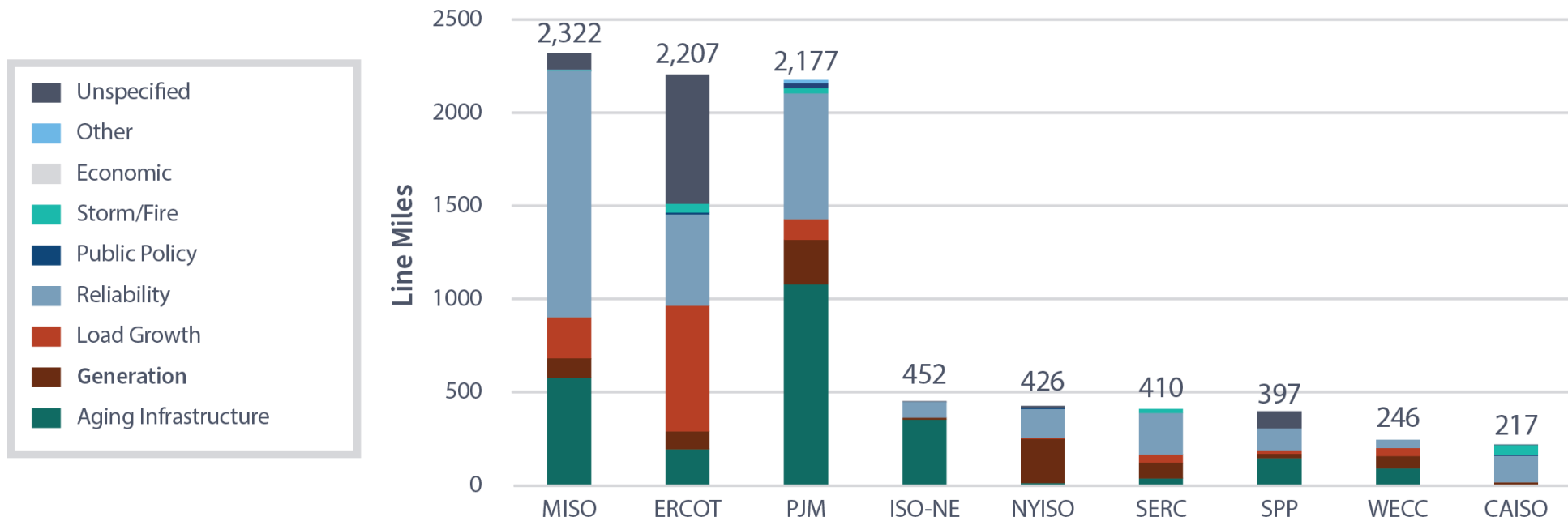


Source: U.S. EIA



New Transmission Capacity Mostly For Aging Infrastructure, Load Growth and Reliability

Transmission Projects Scheduled to Enter Service

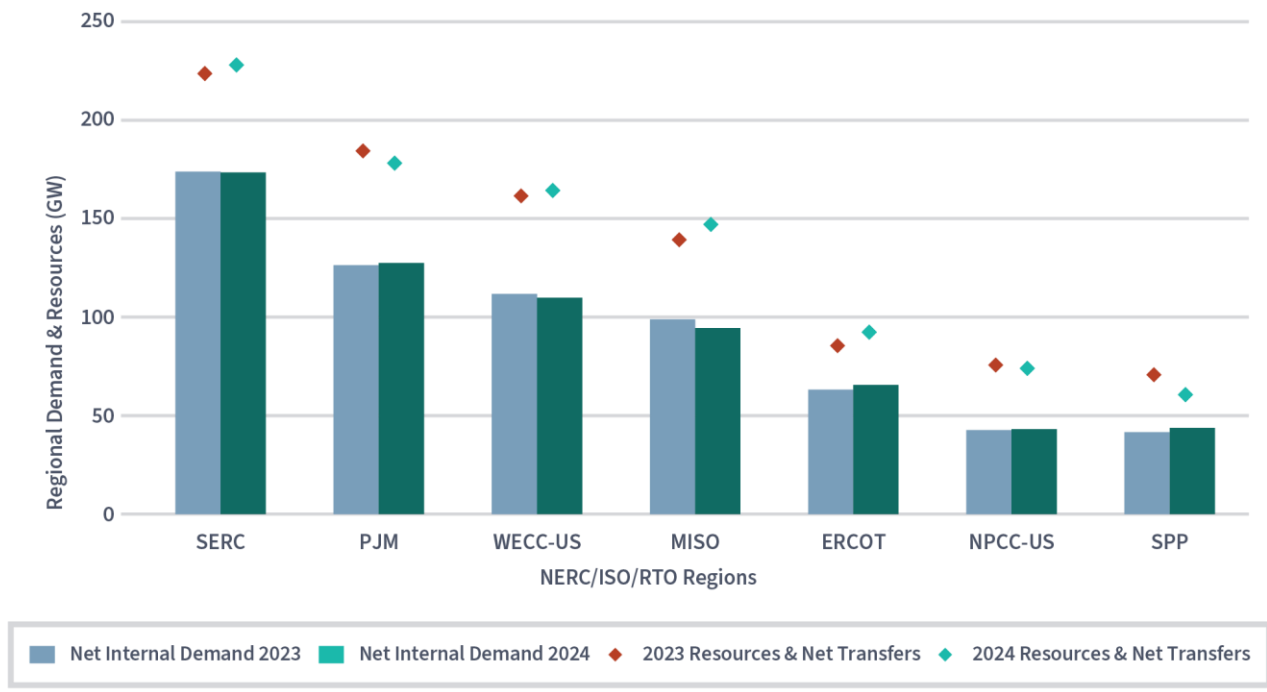


Source: North American Electric Transmission and Distribution Project Database, The C Three Group, L.L.C



Adequate Resources In All Regions For Normal Winter

NERC 2022-2023 and 2023-2024 Regional Demand and Resources



Source: NERC



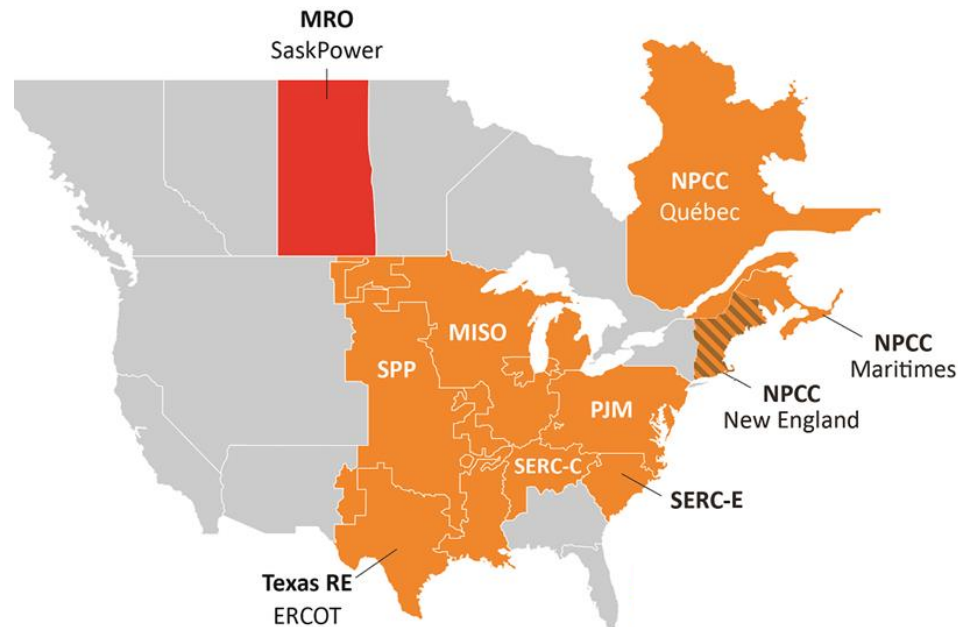
Possible Challenges For Some Regions Under Certain Conditions

- Ongoing drought conditions affect generation availability in some regions.
- Potential fuel constraints or limitations on components for maintenance and repair could affect timing of system restoration after a disturbance.
- Operator actions may be needed in some regions during extreme winter events under tight conditions.
- Forecasted changing weather conditions this winter highlight the potential for enhanced extreme weather impacts.
- If it occurred, a physical attack could affect grid reliability.
- Many regions are revamping their operating procedures in response to past events to better prepare for future extreme events.



Wide area cold events threaten reliability

- Risk factors
 - Rising demand forecasts and operational challenges
 - Generator and fuel vulnerability
 - Interconnected BPS and natural gas systems
- Generator availability assessed for extreme winter scenarios



2023-2024 Winter Reliability Risk Map

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in extreme conditions
Low	Sufficient operating reserves expected

Extreme conditions include 90/10 demand scenarios, historical high generator outage rates, and low variable energy resource scenarios

- **Cold Weather Preparations** – Implement *Essential Actions* in NERC Level 3 Alert (May 2023) and winter operating plans
- **Fuel** –Reliability Coordinators and Balancing Authorities should implement fuel surveys and monitor fuel supply adequacy
- **Load Forecasting** – Anticipate potential for underestimating load in extreme cold and take early action to reduce the risk of reserve shortfall
- **State regulators and policy makers** – Support public appeal for reduced energy use and be prepared to handle requests for environmental waivers when needed for reliability



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