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2023-2024 Winter Reliability Assessment

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- A large portion of North America remains at risk of insufficient electricity supplies during peak winter conditions
- Factors contributing to reliability risks in affected areas include:
 - Higher peak-demand projections and more load forecasting complexity
 - Generator and fuel supply vulnerability to extreme weather
 - Interconnected natural gas and electric systems
- Industry cold weather preparations are on a positive trend but generators and fuel supplies in warmer zones are still likely to have performance issues in freezing temperatures



Demand forecasts contribute to reserve margins and risk profile



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Areas where demand change is affecting WRA risk outlook



• Changes in available winter capacity are having a strong affect on reserve margins in MISO, SPP, and California-Mexico



Winter 2022–2023 and Winter 2023–2024 Anticipated Reserve Margins Year-to-Year Change



- Natural gas fuel is essential for winter reliability
- Weather-related generator and fuel system failures can widen the reliability impact of extreme winter events



	Natural-Gas-Fired Generation	
	Peak Winter Capacity	Contribution to Total Winter Resource Mix
1150	67.5 GW	46%
1RO-SaskPower	2.1 GW	46%
PCC-New England	17.3 GW	54%
PCC-New York	24.5 GW	66%
M	84.9 GW	47%
ERC-Central	22.7 GW	44%
ERC-Florida Peninsula	50.6 GW	79%
ERC-Southeast	31.5 GW	51%
PP	27.4 GW	41%
exas RE-ERCOT	54.2 GW	62%
VECC-AB	11.4 GW	75%
VECC-CA/MX	39.9 GW	65%
VECC-NW	31.0 GW	39%
VECC-SW	18.2 GW	62%

Natural-Gas-Fired Generation Capacity Contributions to 2023–2024 Winter Generation Mix 5 RELIABILITY | RESILIENCE | SECURITY



2023-2024 Winter Reliability Assessment Highlights

Wide area cold events threaten reliability

- Capacity and Energy Risk Assessment inputs
 - On-peak reserve margins
 - Operational risk analysis
 - Probabilistic energy metrics
- 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

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Winter Energy and Capacity Risk Summary

- PJM, SERC-East, and SERC-Central
 - Area resource capacities are same or lower compared to 2022
 - Generator outages on the scale of Winter Storm Elliott are likely to result in energy emergencies
- NPCC-New England
 - Natural gas infrastructure insufficient for both electric generation and local-distribution in extreme cold
 - Stored fuels can be exhausted in long-duration winter weather conditions



Winter Reliability Risk Map



Winter Energy and Capacity Risk Summary

- Texas RE-ERCOT
 - Load growth strains available dispatchable resources
- SPP
 - Reserve margins are 30 percentage points lower than last winter
- MISO
 - New wind, natural-gas-fired generation & delayed retirements have increased available resources



Winter Reliability Risk Map

Extreme Cold Scenario Reserve shortages result from low wind energy or generator performance and fuel issues



- 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 electricity and natural gas use and be prepared to handle requests for environmental and transportation waivers when needed for reliability

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2023 Long-Term Reliability Assessment Preview

Report Release: December 13





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Summary

- 10-year assessment of resource capacity and energy risks
- Uses industry's demand and generation forecasts and transmission projections
- Coordination and Review with Regions and Stakeholders
- Includes emerging issues that can impact future reliability
- Publication: December 13





Trend: Demand Growth Outpacing Resources



Demand

- Highest demand and energy growth rates in recent years
- Northeast and Southeast become winter peaking as early as 2028
- New load behavior is changing daily load profile, challenges operational forecasting



Generation On-Peak Capacity

<u>Supply</u>

- Total capacity growth of 34 GW over next 10 years (Tier 1 additions – retirements)
- Most additions are Solar (69 GW)
- Retirements: 83 GW through 2033
- New emissions regulations likely to prompt additional retirements RELIABILITY | RESILIENCE | SECURITY



2023 LTRA Preliminary Findings

Growing number of areas face capacity and energy risks in the next 10 years

- Generator retirements expected before sufficient replacement resources will be in service
- Energy risks identified in areas where future resource mix is not be balanced between dispatchable and variable energy resources
- Risk assessment accounts for over 80 GW in generator retirements



Risk Area Summary 2024-2033



 Solar, battery, and wind resource additions – Generator retirements = Changing Resource Mix





- 1. Add new resources with needed reliability attributes, manage retirements, and make existing resources more dependable
- 2. Expand the transmission network to deliver supplies from new resources and locations to changing loads
- 3. Adapt BPS planning, operations, and resource procurement markets and processes for a more complex power system
- 4. Strengthen relationships among policymakers and reliability stakeholders



Questions and Answers

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Winter Energy and Capacity Risk Summary

MRO-SaskPower

- Peak demand forecast, generator retirement and planned maintenance reduce reserve margin
- Forced generator outages can cause supply shortfalls at peak winter demand
- NPCC-Québec and NPCC-Maritimes
 - Higher demand forecast reduces reserve margin
 - Non-firm imports are likely to be needed if demand levels exceed forecasted peak



Winter Reliability Risk Map