



MIDWEST  
RELIABILITY  
ORGANIZATION

# Managing Risk in a Transforming Grid

A Reliable and Secure Bulk Power System

March 5



# MRO Overview

KEY PLAYERS | MRO TERRITORY | RESPONSIBILITIES



 CONNECTION

 CURIOSITY

 COMMITMENT

 COMPETENCY

# MRO Company Profile

## MISSION

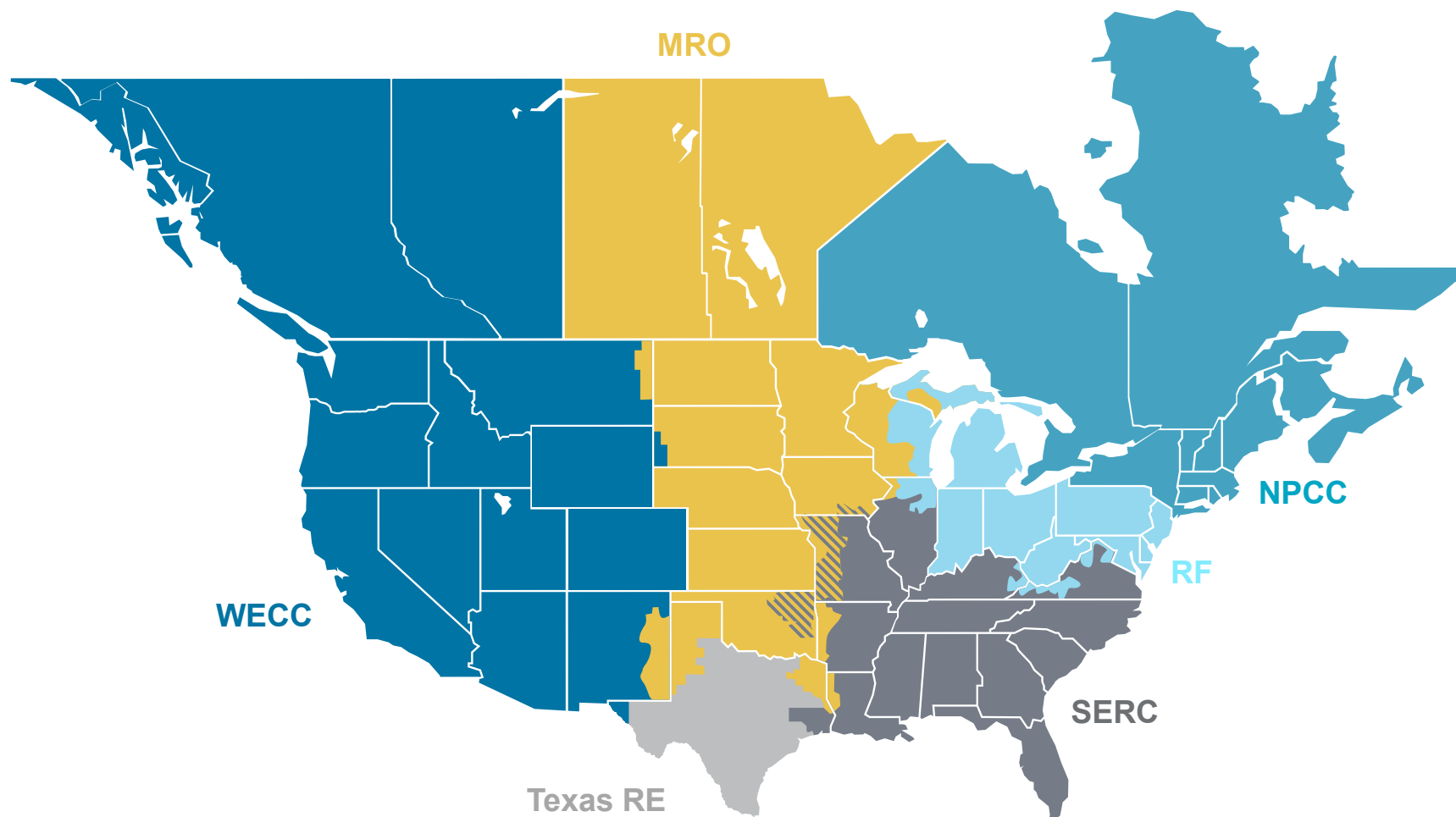
To identify, prioritize and assure effective and efficient mitigation of risks to the reliability and security of North American bulk power system by promoting Highly Effective Reliability Organizations (HEROs)

- Incorporated in 2002; began operations in 2007
- 501(c)(3) tax exempt not-for-profit
- Headquartered in Saint Paul, Minnesota
- Currently 80+ employees
- Operates under a delegation agreement with the North American Electric Reliability Corporation (NERC), approved by the Federal Energy Regulatory Commission (FERC)



# MRO Regional Territory

- All or part of **16 states**
- **2 Canadian provinces** (Saskatchewan and Manitoba)
- **27+ million people**
- Oversight authority for approximately **250 utility companies**
- Lies between the Western, Eastern, and Texas Interconnections



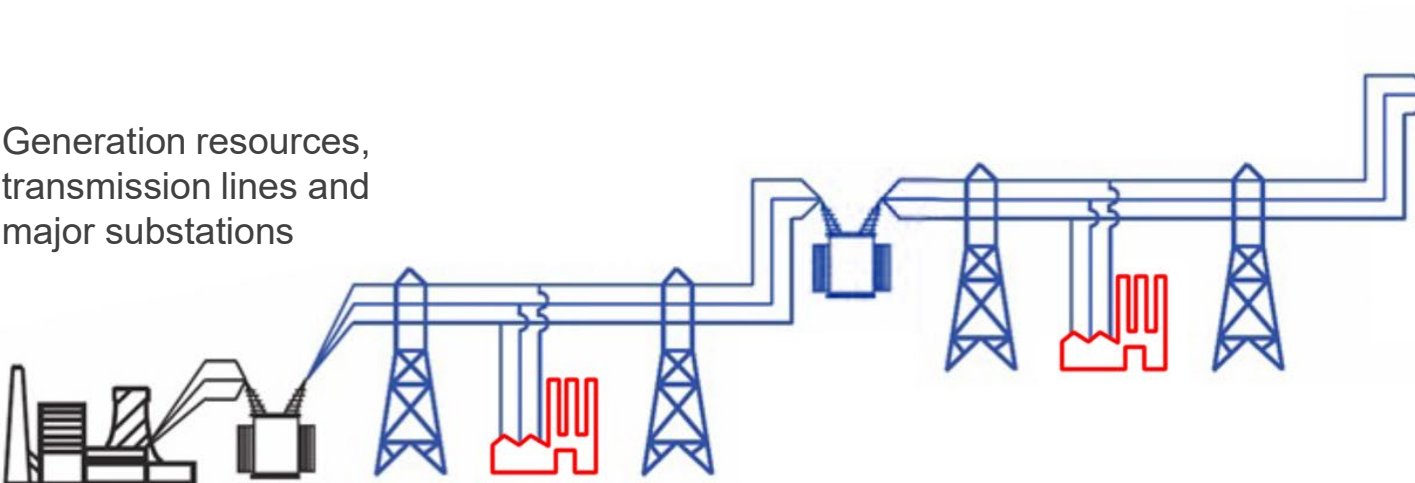
# Regulatory Scope

## Bulk Power System (BPS)

Regulated by FERC, NERC, ERO Enterprise, and Canadian Government Agencies

Focused on regional and national grid stability

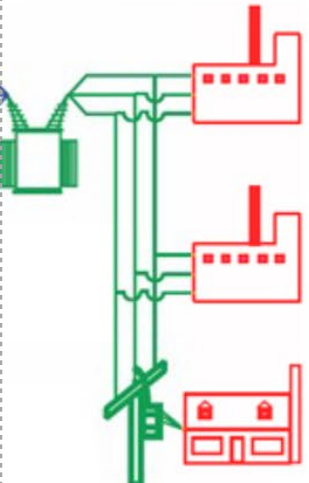
Generation resources, transmission lines and major substations



## Distribution System

Regulated by individual states and provinces

Focused on local reliability and customer service



Delivery to homes and most businesses



# Primary Responsibilities



**Registration & Certification**



**Compliance Monitoring & Enforcement**



**System Assessment & Performance Analysis**



**Risk Identification & Mitigation**



**Critical Infrastructure Security**



**Industry Collaboration & Information Sharing**





# Risk Management

REGIONAL RISK ASSESSMENT PROCESS | 2026 RRA



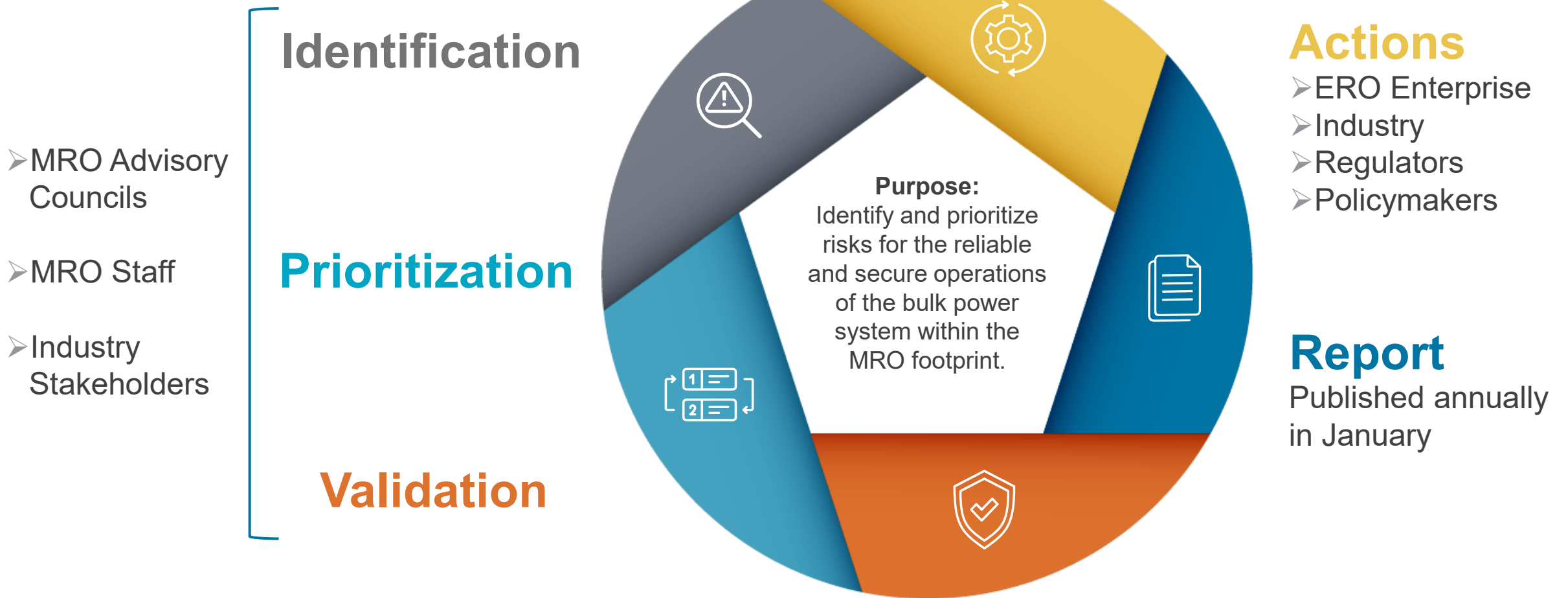
 CONNECTION

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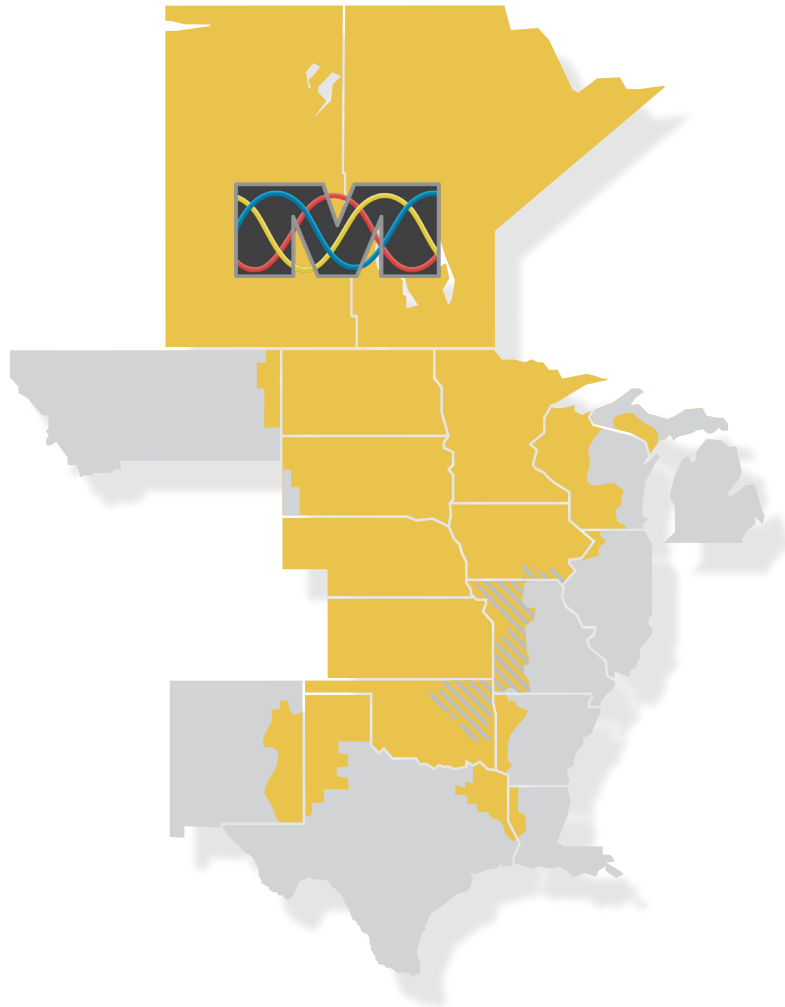
 COMPETENCY

# Regional Risk Assessment Process



# 2026 Regional Risk Assessment

TOP SEVEN RISKS to reliable and secure operation of the regional bulk power system



**1 EXTREME:** Uncertain Energy Availability



**2 HIGH:** Nation-State Threats



**3 HIGH:** Generation Outages During Extreme Cold Weather



**4 HIGH:** Supply Chain Compromise



**5 HIGH:** Inadequate Inverter Performance and Modeling



**6 HIGH:** Material and Equipment Unavailability



**7 HIGH:** Malicious Insider Threat





The region faces risk that electricity supply will not be available to meet demand during critical periods, particularly during extreme weather or extended low renewable output.

## RISK DRIVERS

- Rapid demand growth driven by data centers, AI, EVs and more
- Retirement of coal and natural gas generation faster than replacement energy is added
- Increased reliance on variable resources (wind and solar) that cannot always deliver energy when needed
- Barriers to timely deployment of new infrastructure

## RECOMMENDED ACTIONS

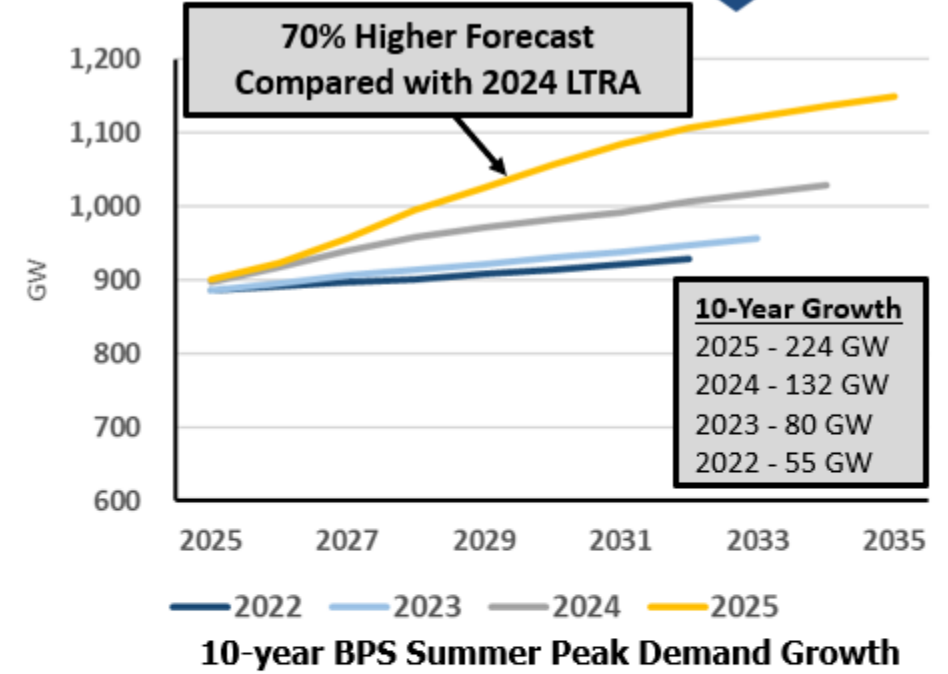
- Need for new energy adequacy metrics
- Improved planning standards
- Careful management of retirements

**IMPACT:** Major

**LIKELIHOOD:** Likely to Almost Certain

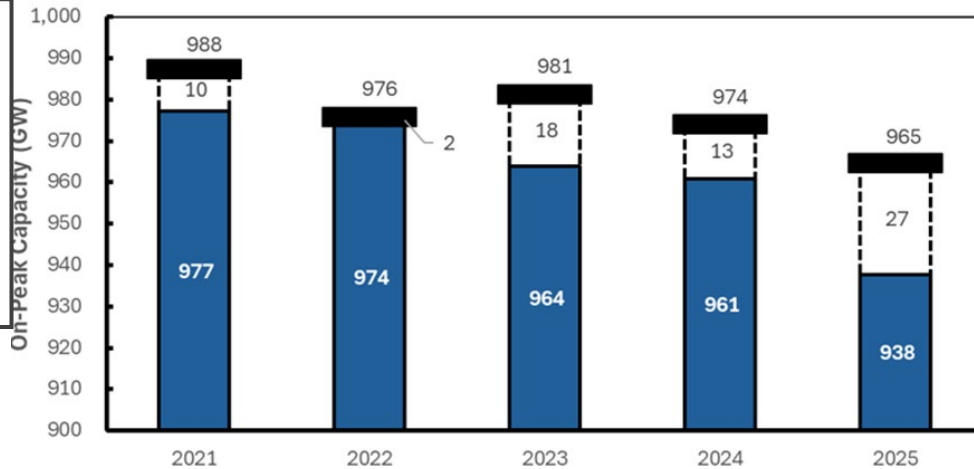
# Demand Forecasts Continue Rapid Ascent; Resources Lag

- Assessment area summer peak demand is forecast to rise by over 224 GW (24% increase from 2025 peak demand)
- New data centers are the main source of load growth followed by other large industrial loads and electrification
- Winter peak demand growth continues to exceed summer growth (Rising 245 GW over 10 years)

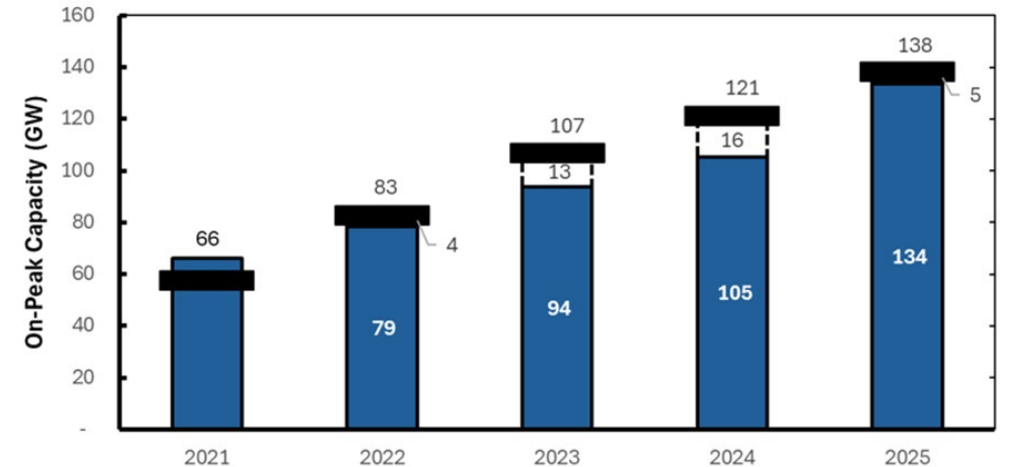


Actual Non-Variable Resource Capacity vs. Prior LTRA Projection

3-year trend of Tier 1 resources falling behind projections



Actual Variable Resource Capacity vs. Prior LTRA Projection



■ Existing + Tier 1 (Actual) □ Difference (Existing + Tier 1) — Existing + Tier 1 (Previous Year's Projection)

AMITM

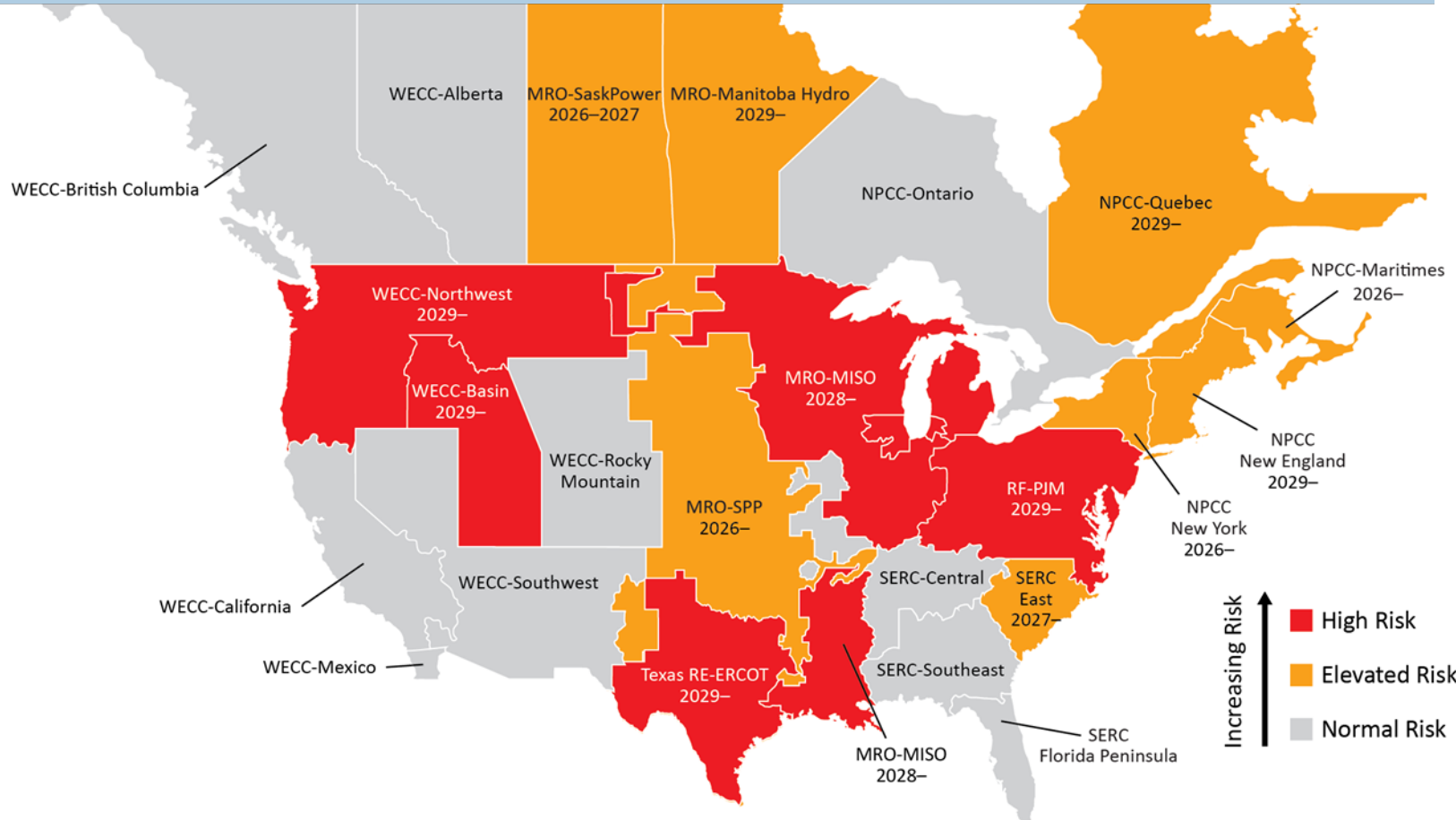
■ Existing + Tier 1 (Actual) □ Difference (Existing + Tier 1) — Existing + Tier 1 (Previous Year's Projection)



# NERC 2025 LTRA Risk Summary

## Risk Area Summary 2026 – 2030

Shows highest risk category in the 5-year period and the year it occurs

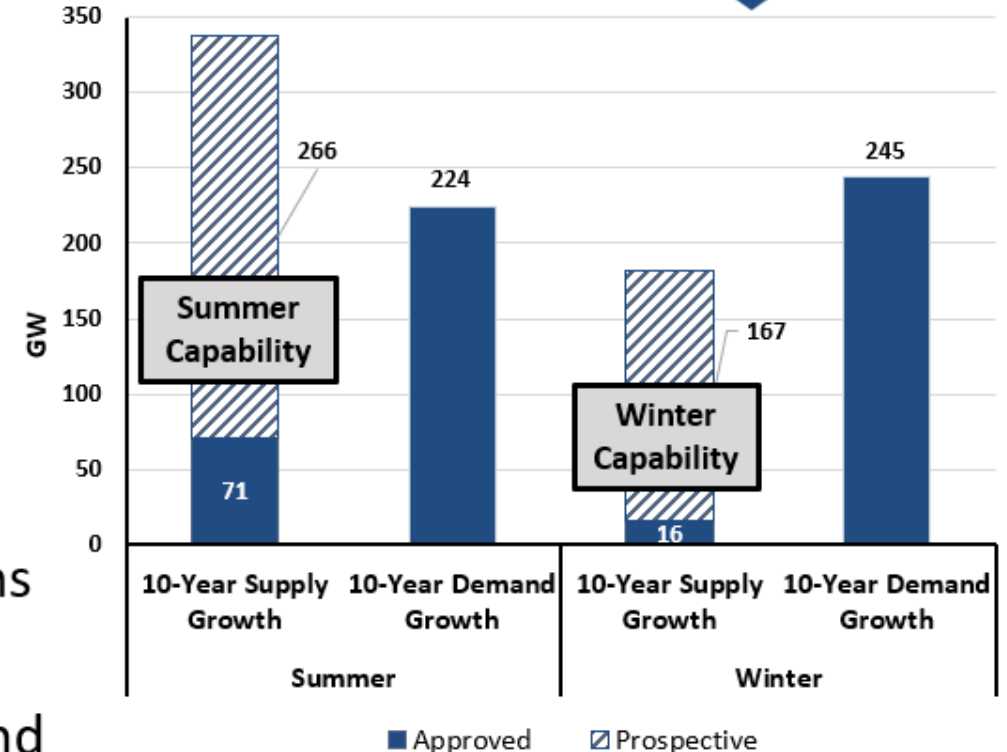


Note: Assessment inputs include: 1) Probabilistic assessment (studied years 2027 and 2029) and planning reserve margins (2026 through 2030). Risk determination based on established resource adequacy criteria (1-day-in-10 years) and [NERC-National Academy of Engineering Workshop Report](#) criteria for load-loss and unserved energy



# Shortfall Between Projected Resources and Demand

- High levels of sustained resource growth over the 10-year period is needed to meet demand forecasts
- BPS resource capacity fell short of 2024 LTRA projections due to unanticipated generator retirements and delays in connecting new resources
- Expedited resource programs are stimulating the flow of additional resources
- Some new resources from recently approved programs are not included in the 2025 LTRA risk assessment
- More winter capacity is needed to meet future demand



**Projected Growth in Demand and Resources (10-years)**

**Approved** Resources with Interconnection Agreements or in an approved Integrated Resource Plan (Tier 1)  
**Prospective** Resources In earlier planning (Tier 2)





As evidenced in recent years, extreme winter storms pose a reliability risk by causing widespread generation and fuel supply outages during periods of peak electricity demand.

### RISK DRIVERS

- Severe cold drives high demand and elevated generation outages
- Inadequate winterization of electric and natural gas infrastructure
- Growing reliance on just-in-time natural gas delivery
- Reduced operating margins from coal and gas retirements
- Limited ability to import power when neighboring regions face similar conditions

### RECOMMENDED ACTIONS

- Strengthen winterization of generation and fuel infrastructure
- Improve electric–gas system coordination
- Preserve sufficient dispatchable resources for extreme conditions

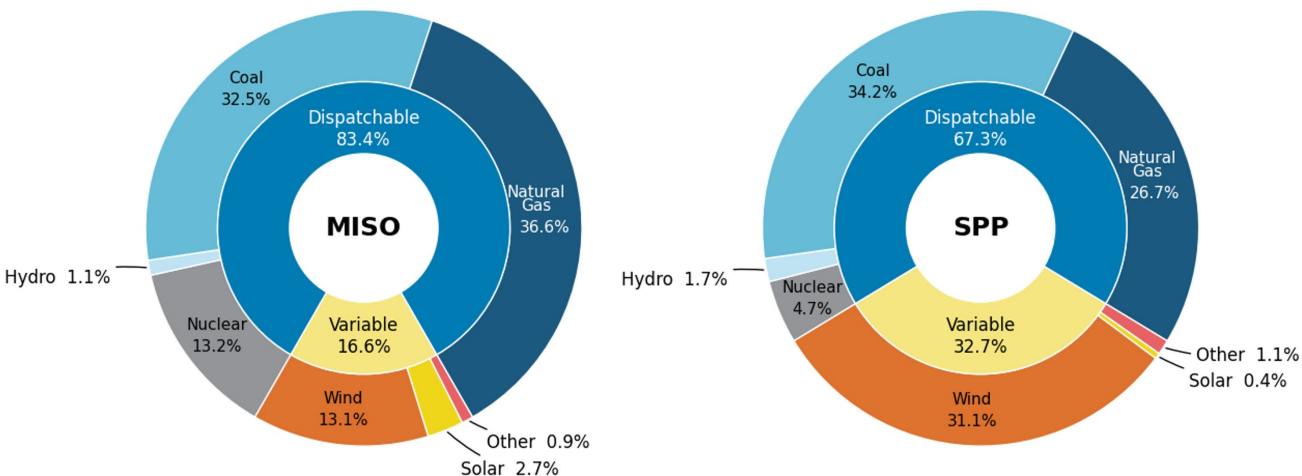


IMPACT: Major

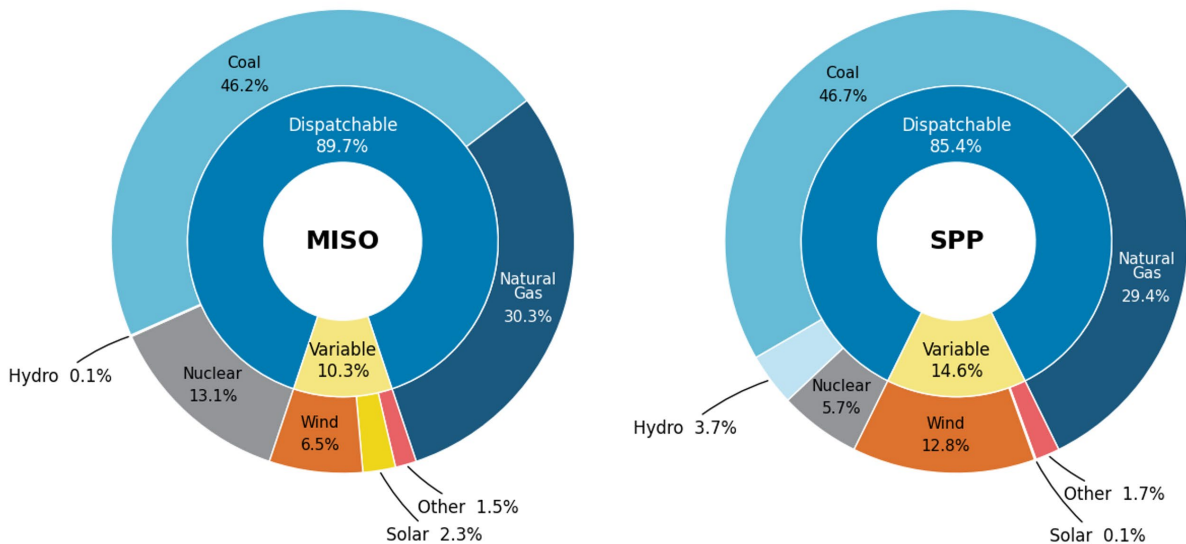
LIKELIHOOD: Possible

# Winter Storm Performance

Electricity Generation During Winter Storm Fern (1/23-1/26 2026)



Electricity Generation During Winter Storm Uri (2/13-2/17 2021)



## Winter Storm Fern Highlights

- Peak demand within seasonal projections, below what was projected for extreme weather
- Dispatchable generation provided majority of electricity during event
  - Wind generation in SPP allowed cross-regional support
- Generation performance has shown improvements, but still see availability challenges
- MISO and SPP used conservative operations to manage through event
- MISO entered a grid emergency declaration on 1/24/26



# MRO Generator Winterization Program (GWP)

Improving Generator Performance and Availability During Extreme Cold Weather

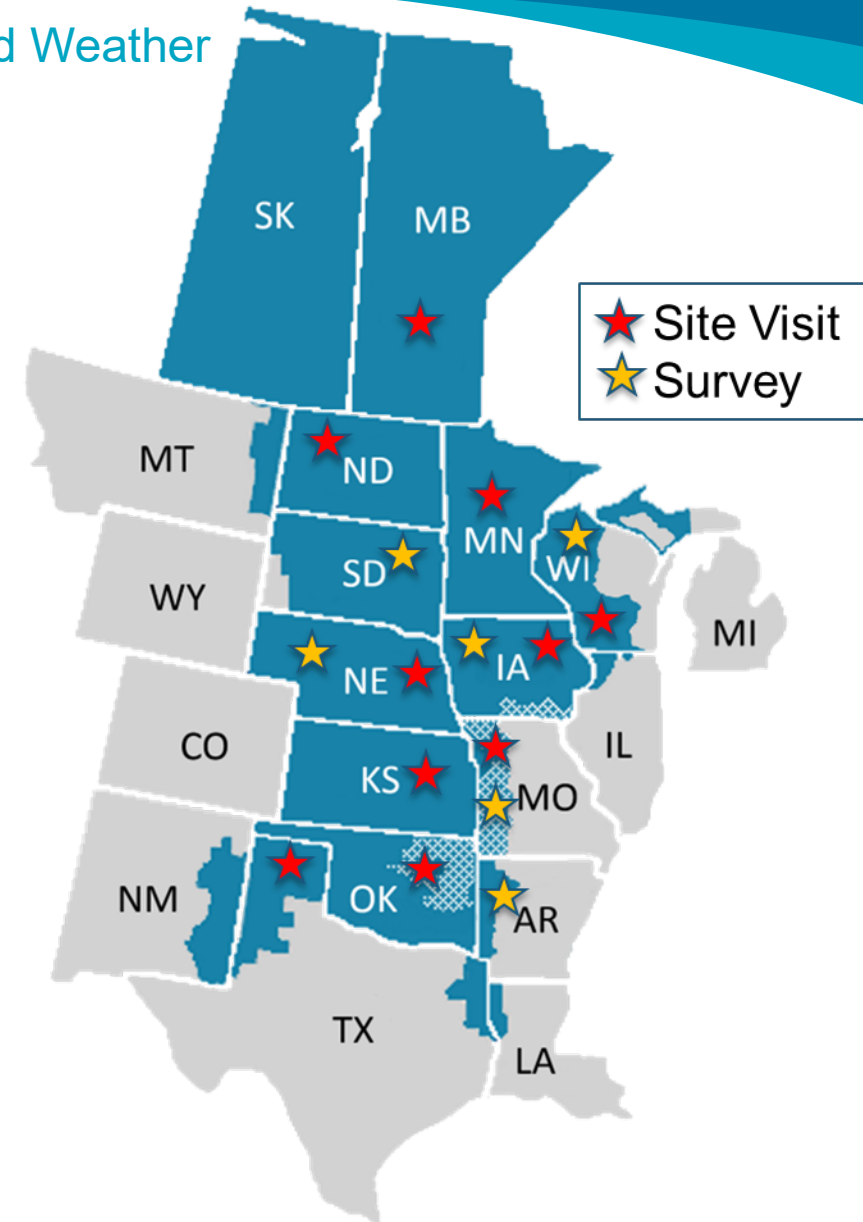
## What Is the Program?

- Supports Bulk Power System reliability
- Voluntary, non-regulatory participation
- Surveys and site visits are performed to assess winter readiness
- Addresses winterization plans and readiness measures for extreme cold
- Identifies winterization vulnerabilities and effective protection measures

## Recent Activities

- Almost 50 generation sites have participated since 2021
- 2025 General Findings Report shares region's top winterization practices
- Collaboration with other regional entities ensures program reflects best practices
- Participant feedback is gathered to continuously improve the program

## Updates to EOP-012-3





Limited availability of critical electrical equipment goes beyond a procurement hurdle, increasing reliability risk by delaying infrastructure projects and prolonging recovery from equipment failures.

### RISK DRIVERS

- Surging demand to replace aging assets and build new infrastructure
- Competition for equipment driven by large data center development
- Extended lead times for critical components such as transformers and breakers
- Limited manufacturing capacity for specialized electrical equipment

### RECOMMENDED ACTIONS

- Expand spare equipment programs and mutual assistance agreements
- Strengthen vendor relationships and long-term procurement planning
- Improve inventory management for critical components

IMPACT: Moderate

LIKELIHOOD: Likely

# Thank You

## Stay in Touch

- Email: [William.seuffert@mro.net](mailto:William.seuffert@mro.net)
- MRO Reliability, Security and CMEP Summit:  
May 12 & 13, 2026 | Omaha, NE
- Follow MRO on LinkedIn