



MIDWEST
RELIABILITY
ORGANIZATION

MRO 2022 REGIONAL SUMMER ASSESSMENT

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CLARITY

ASSURANCE

RESULTS



Reliability Guideline

Suggested approaches or behavior in a given technical area for the purpose of improving reliability. Guidelines are not enforceable, but may be adopted by a responsible entity in accordance with its own policies, practices, and conditions.



NERC Alert: Level 2-3

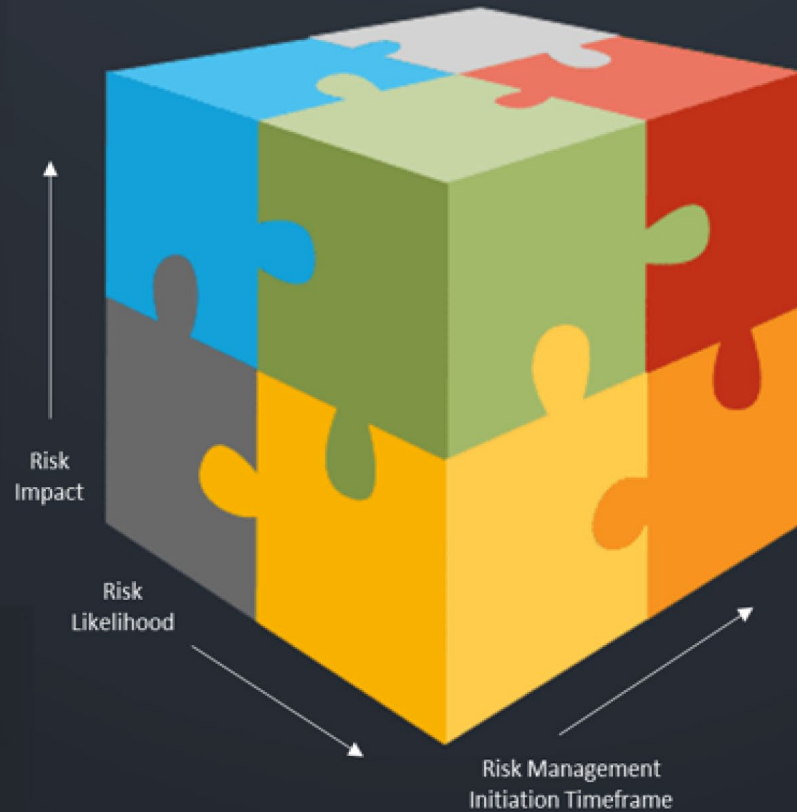
NERC alerts are divided into three distinct levels, 1) Industry Advisory, 2) Recommendation to Industry, and 3) Essential Action, which identifies actions to be taken and require the industry to respond to the ERO.



Technical Engagement

Technical Engagement is a catch-all for a variety of technical activity that is conducted between the ERO and entities. This includes, technical committee activities, technical reference documents, workshops and conferences, assist visits, joint and special studies, etc.

Electric Reliability Organization: Reliability Risk Mitigation Toolkit



Reliability Standards



NERC Reliability Standards define the mandatory reliability requirements for planning and operating the North American BPS and are developed using a results-based approach focusing on performance, risk management, and entity capabilities.

Reliability Assessment



NERC independently assesses and reports on the overall reliability, adequacy, and associated risks that could impact BPS reliability. Long-term assessments identify emerging reliability issues that support public policy input, improved planning and operations, and general public awareness.

NERC Alert: Level 1



NERC Alerts are divided into three distinct levels, 1) Industry Advisory, 2) Recommendation to Industry, and 3) Essential Action, which identifies actions to be taken and require the industry to respond to the ERO.



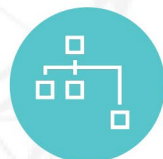
MRO 2022 Regional Risk Assessment

Top risks to the reliable and secure operation of the North American bulk power system in MRO's regional footprint.

Top Reliability Risks

Uncertainty of Winter Planning Reserve Margins

Analyses of recent system events indicate that actual system conditions can and have exceeded forecast winter reserve margins, particularly during cold weather conditions in the south central U.S.



Generation Availability During Severe Cold Weather

Generation availability assumed during cold weather in the southern U.S. has been shown to be unrealistically high due to a lack of generator winterization and natural gas curtailments.



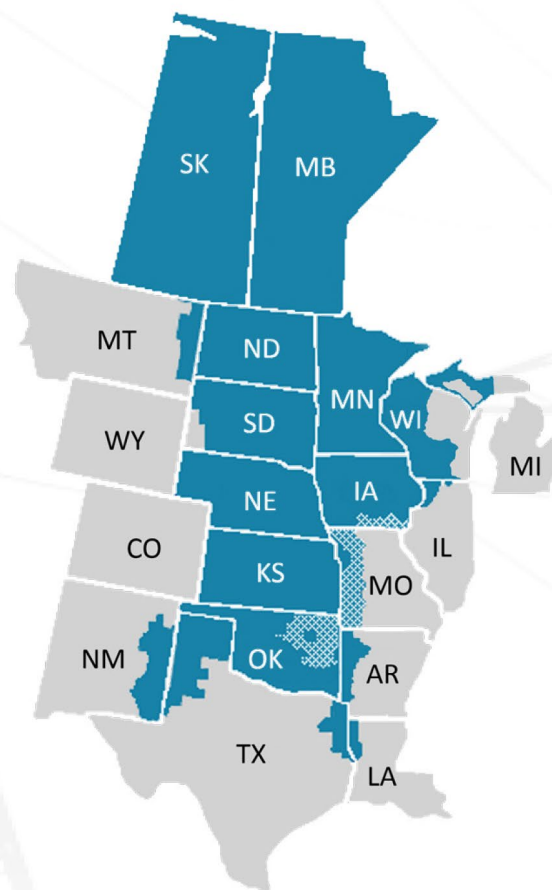
Lack of Energy Assurance Assessments

The rapidly changing resource mix requires rethinking the way in which generating capacity, energy supply, and load serving needs are studied. Energy assurance will need to be accurately assessed for all hours of the year with increasing reliance on wind and solar as a fuel source.



Bulk Power System Modeling Accuracy

The rapid increase in inverter-based resources, along with the changing characteristics and magnitude of load related to distributed energy resources (DER), is challenging current bulk power models.



Top Security Risks

Supply Chain Compromise

The risk of a cybersecurity event carried out through the vendor supply chain and possibly impacting reliability of the bulk power system remains high.



Insider Threats

The threat of an employee or a contractor using authorized access, wittingly or unwittingly, to do harm to the security of the bulk power system has increased given remote connectivity during the pandemic.



Malware and/or Ransomware

Vulnerability to a malware and/or ransomware attack on the bulk power system continues to increase with modernization and the deployment of new technologies.



More information on these risks along with mitigation recommendations can be found in the full report here: www.mro.net





MRO 2022 Regional Summer Assessment

Areas at elevated or high risk that will require increased monitoring during the 2022 summer season

Balancing Authority Risk Areas

Midcontinent ISO (MISO)

High Risk. Capacity shortfalls are anticipated in North and Central areas of MISO's footprint during peak summer conditions, which may result in temporary, controlled load shedding. This is primarily the result of a decrease in generation capacity of 3.2 GW compared to the 2021 summer season and an increase of 1.7% in projected peak demand.

Manitoba Hydro (MH)

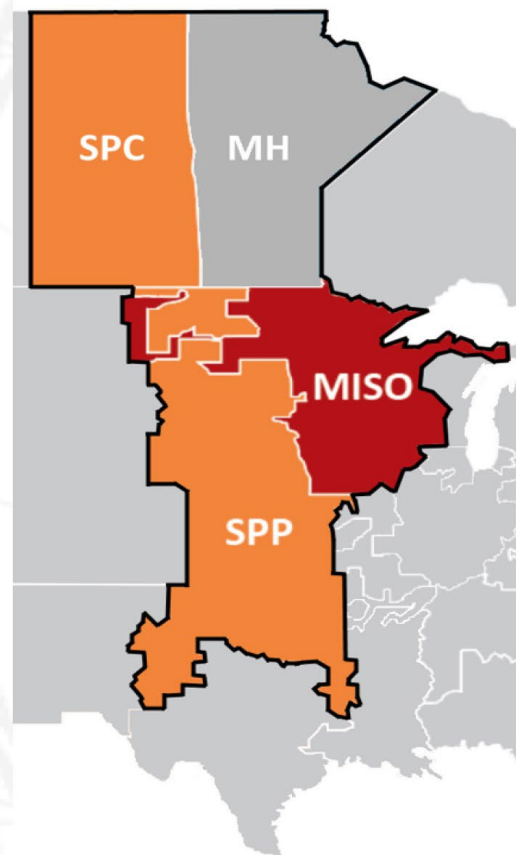
Low Risk. Anticipated resources are sufficient to meet reserve margin requirements under normal and extreme demand scenarios for the 2022 summer season.

Saskatchewan Power Corp. (SPC)

Elevated Risk. A 7.5% increase in peak demand projections related to economic load growth returning to pre-pandemic levels, increased oil and gas development activities, and revised forecast methodology for capturing summer peak demands, place SPC at greater risk for energy emergencies during periods of high demand.

Southwest Power Pool (SPP)

Elevated Risk. Drought conditions impacting the Missouri River and other water sources relied upon by SPP entities for generation and once-through cooling processes could lead to reduced output require emergency procedures to meet peak demand during periods of high generator unavailability due to insufficient cooling water.



Risk Definitions



High Risk

Resources are potentially insufficient to meet peak load during both normal and extreme conditions.



Elevated Risk

Resources are likely sufficient to meet peak load during normal conditions, but potentially insufficient during extreme conditions.



Low Risk

Resources are sufficient to manage normal summer peak demand and are at low risk of energy shortfalls from more extreme demand or generation outage conditions.

Important Trends

- Generation forced outage rates are increasing as a result of component fatigue and an aging fleet, due in part to higher penetrations of intermittent resources that cause conventional generation to cycle more.
- As dependence on intermittent resources increases, there will be a greater need for fast responding dispatchable resources capable of following large unexpected changes in intermittent resource output.
- The time of greatest risk may not be during summer peak periods, especially as the resource mix evolves. The electric power industry needs to develop new and better methods to evaluate supply adequacy, especially when a significant amount of generation capacity has an intermittent fuel source that is difficult to forecast.

More information on these risks along with mitigation recommendations can be found in the full report here: www.mro.net



MRO Key Findings

- **MISO North and Central areas are at high risk for energy emergencies**
- **SPC is at an elevated risk for energy emergencies**
- **SPP is at an elevated risk for energy emergencies**

2022 Summer Projections

Assessment Area	Anticipated Resources	Typical Maintenance and Forced Outages	Anticipated Resources with Typical Outages	Net Internal Demand	Anticipated Reserve Margin with Typical Outages	Reserve Margin Requirements
MH	3,893	177	3,716	3,059	21.5%	12.0%
MISO	143,197	21,155	122,042	118,220	3.2%	17.9%
SPC	4,033	344	3,689	3,596	2.6%	11.0%
SPP	67,101	9,384	57,717	51,382	12.3%	16.0%



2022 Summer Projections

Assessment Area	Anticipated Resources with Typical Outages	Extreme Derates	Extreme Low Generation	Operational Mitigations	Extreme Low Generation + Operational Mitigations	Extreme Peak Load
MH	3,716	70	3,646	0	3,646	3,381
MISO	122,042	9,648	112,394	2,400	114,794	125,192
SPC	3,689	154	3,535	0	3,535	3,734
SPP	57,717	8,299	49,418	2,000	51,418	53,952



Normal/Typical/Extreme Scenarios

Assessment Area	Normal Conditions	Typical Outages	Extreme Outages
MH	27.3%	21.5%	+7.8%
MISO	21.1%	3.2%	-8.3%
SPC	12.2%	2.6%	-5.3%
SPP	30.6%	12.3%	-4.7%



Questions