



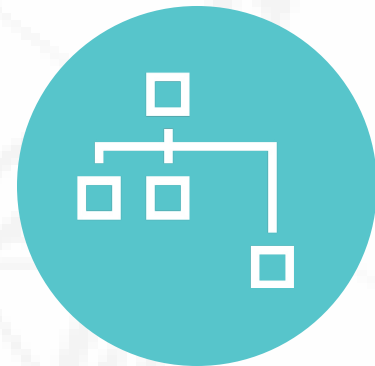
MRO 2022 Regional Risk Assessment

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

Top Reliability Risks

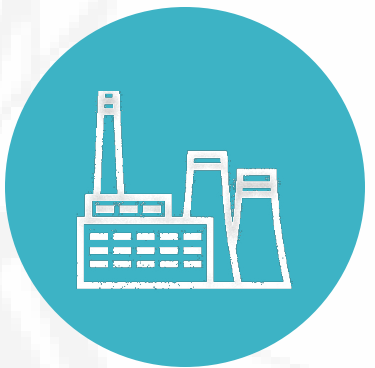
Uncertainty of Winter Planning Reserve Margins

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.



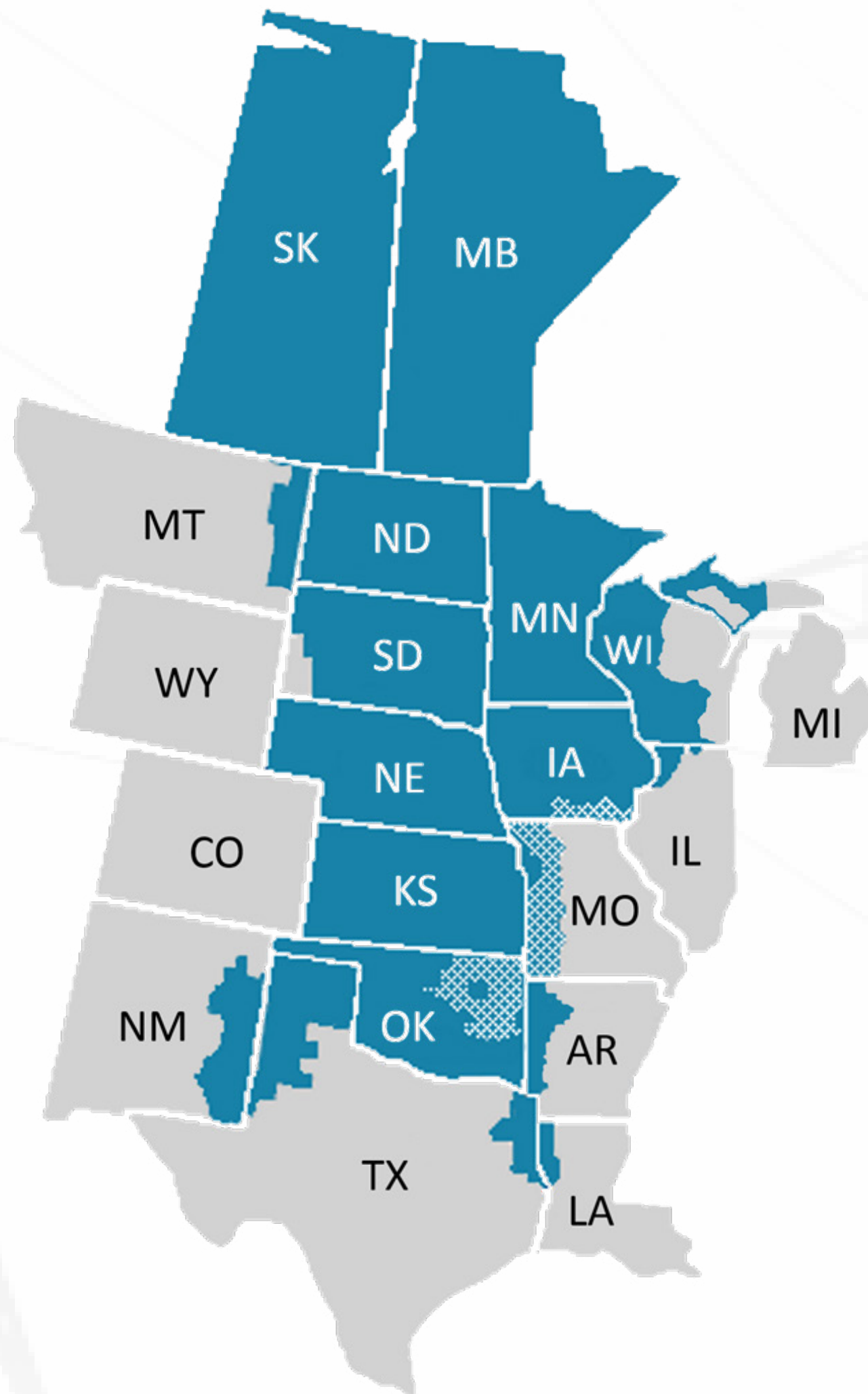
Lack of Energy Assurance Assessments

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