MIDWEST RELIABILITY ORGANIZATION

Assessing Power Grid Reliability in the Midwest Today and Tomorrow

Mark Tiemeier

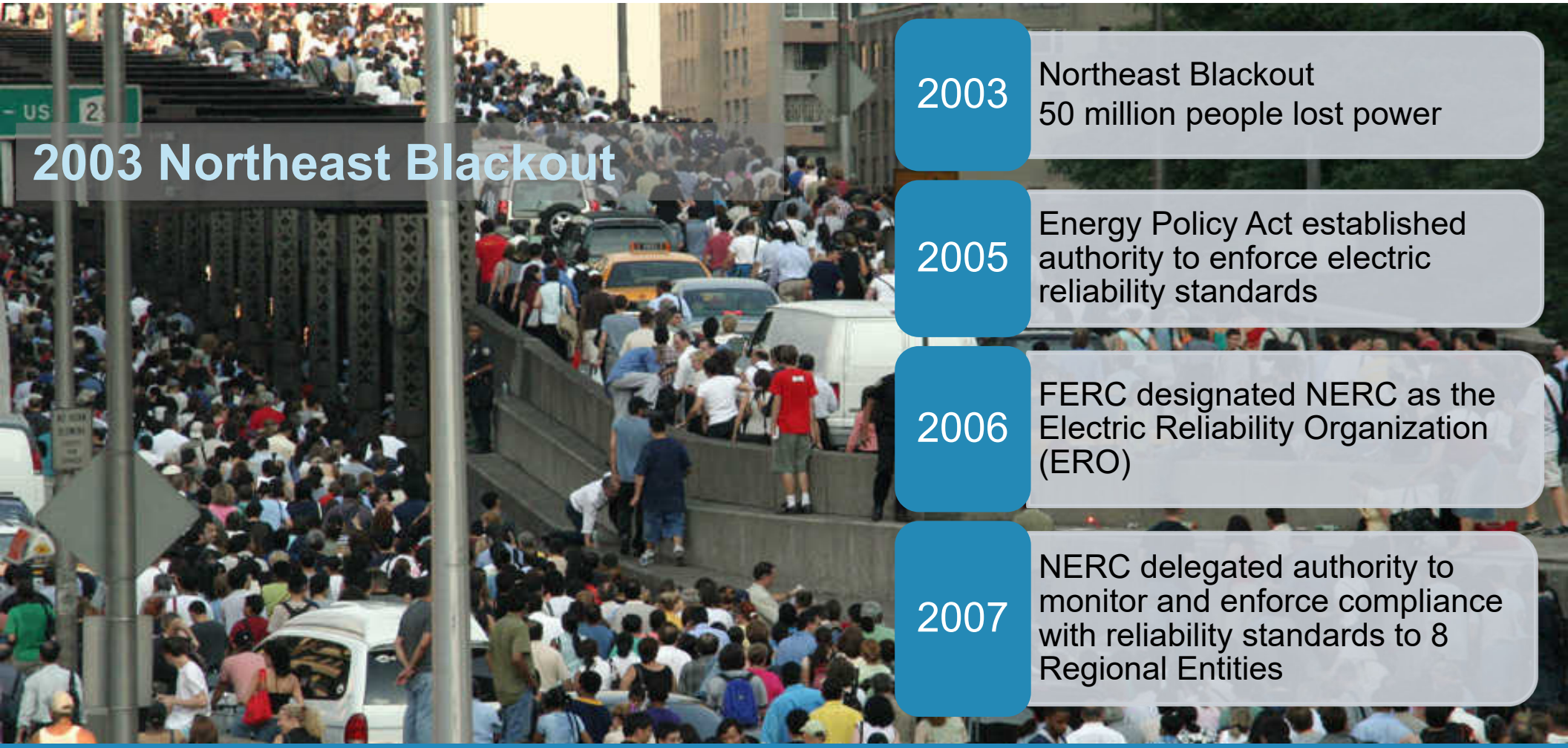
Director of Power System Risk Management

Midwest Reliability Organization

CLARITY | ASSURANCE | RESULTS

Agenda

- **MRO Overview**
- **MRO Reliability Assessments**
  - Process and Timeline
- **2025 Risk Assessment**
- **Resource Adequacy: Present and Future**

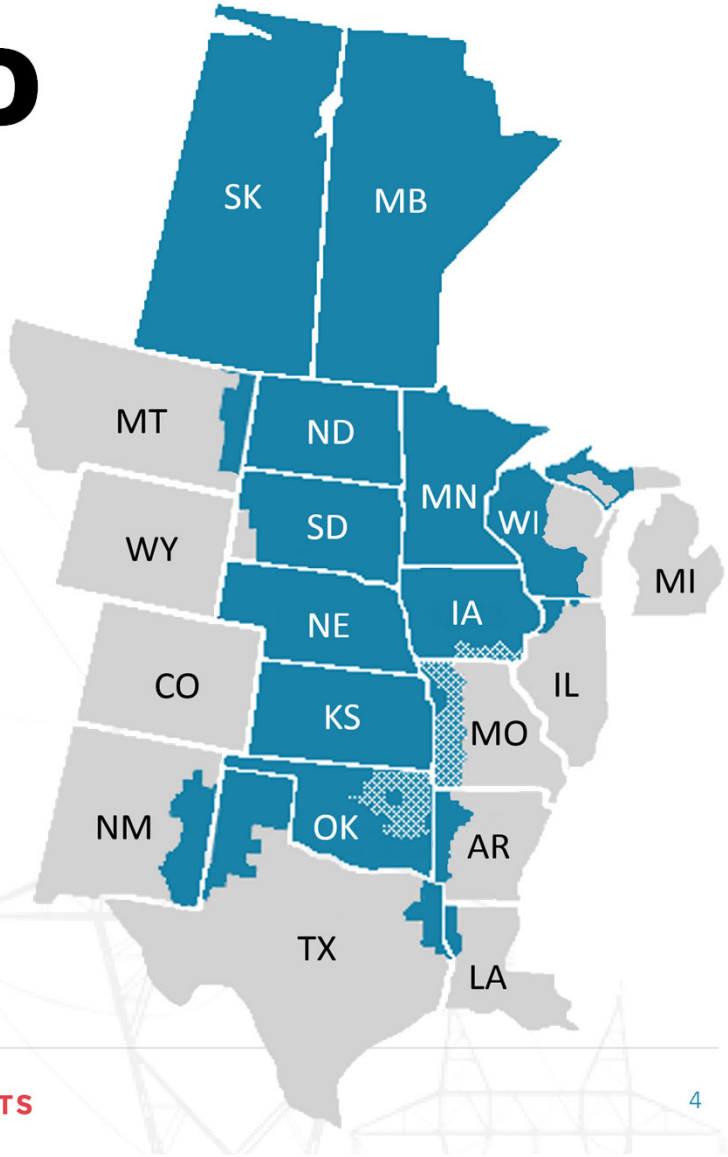


2003	Northeast Blackout 50 million people lost power
2005	Energy Policy Act established authority to enforce electric reliability standards
2006	FERC designated NERC as the Electric Reliability Organization (ERO)
2007	NERC delegated authority to monitor and enforce compliance with reliability standards to 8 Regional Entities

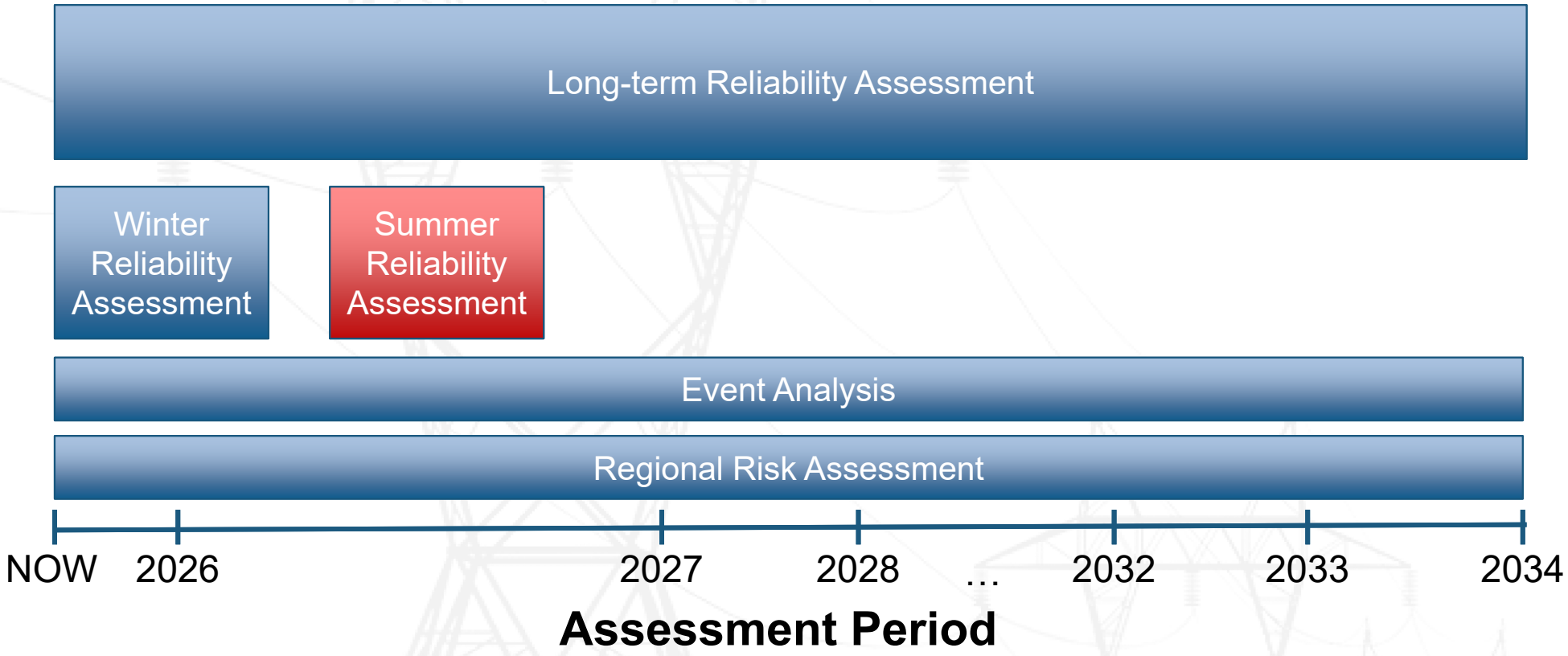
The Impetus of Regulation

About MRO

- **Company profile:**
  - Incorporated in 2002; began operations in 2007
  - Headquartered in St. Paul, MN
  - Regional footprint includes more than 245 registered entities



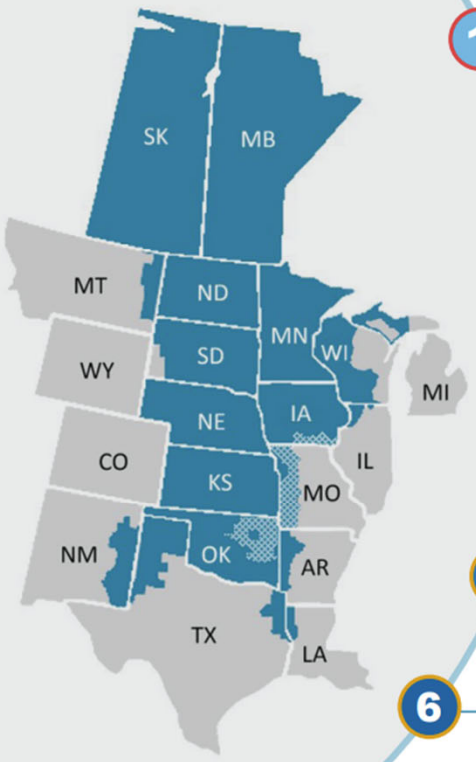
Assessing Reliability



MIDWEST RELIABILITY ORGANIZATION

2025 Regional Risk Assessment

Top six risks to reliable and secure operation of the regional bulk power system



MRO Regional Territory

Public

1

Extreme: Uncertain Energy Availability

Increasing electricity demand coupled with rapid retirement of traditional power plants creates potential energy shortfalls. This is especially true when replacement generation is variable, weather-dependent and may not be available when needed.

DRIVERS: Legislative policies, generator retirements, new resource constraints, demand growth, inadequate transmission

2

High: Generation Outages During Extreme Cold Weather

The electricity grid faces significant challenges during extreme cold weather, which is occuring more often and with greater intensity and duration. Recent events resulted in unprecedented customer load shed to maintain system stability.

DRIVERS: Insufficient winterization, lack of fuel supply, gas/electric interdepencies, generator retirements

3

High: Nation-State Threats

The strategic objectives of nation-state-sponsored actors from China, Russia, and Iran pose significant cyber threats to the North American bulk power system. Their objectives vary, but generally aim to weaken our military and economic capabilities.

DRIVERS: Heightened geopolitical tensions, increasing sophistication of threat actors, insufficient internal controls

4

High: Supply Chain Compromise

Occurs when a vendor is the vector for a threat actor who manipulates hardware, software, connected services, or software delivery mechanisms for financial gain. The risk is amplified by the limited number of vendors serving the industry as a whole.

DRIVERS: Supply chain complexity, growing reliance on third-parties, lack of third-party controls and visibility

5

High: Malicious Insider Threat

Malicious insiders (employees, vendors, contractors) with access to critical systems and intent to do harm, can disrupt bulk power system operations. This risk does not include insider negligence.

DRIVERS: Limited detective controls in place, lack of insider threat programs

6

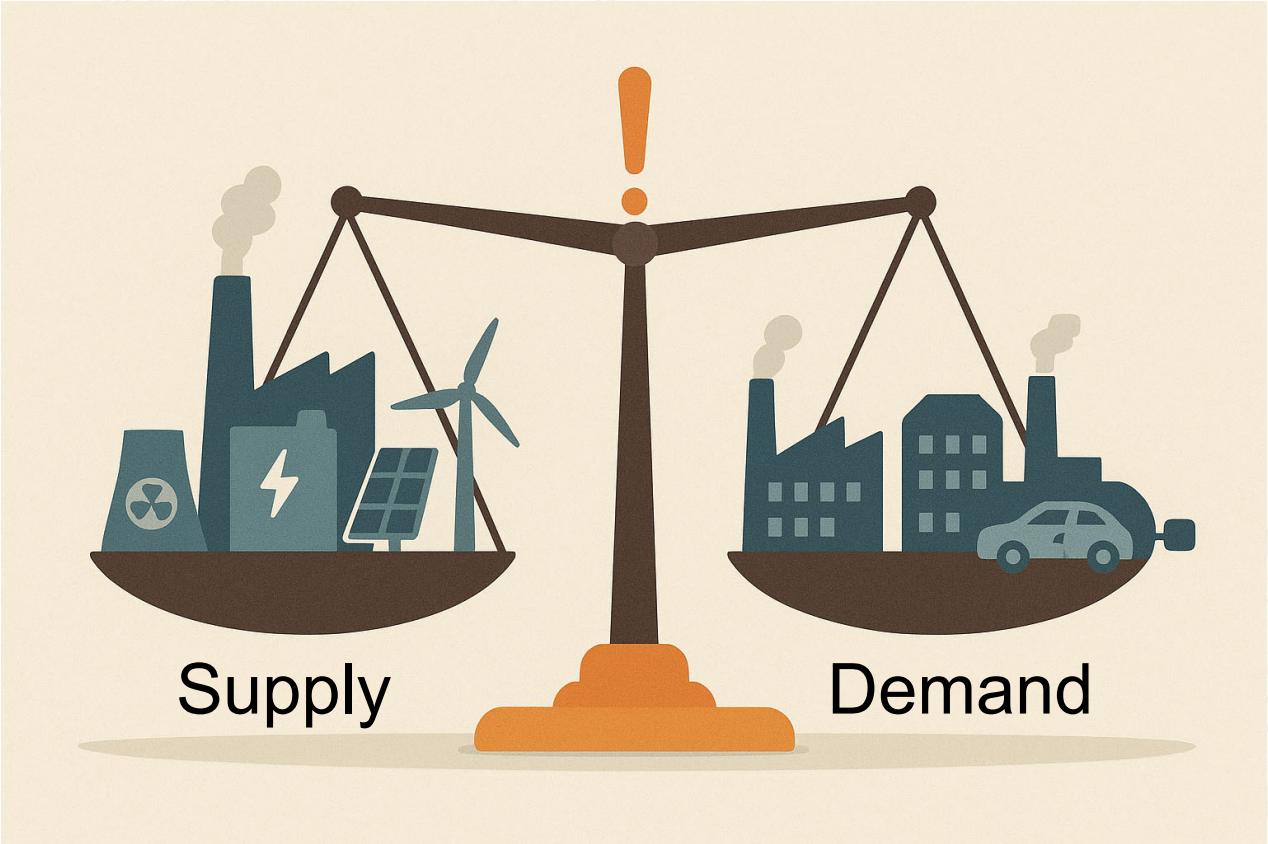
High: Inadequate IBR and DER Performance and Modeling

Inverter-Based Resources (IBRs) and Distributed Energy Resources (DER)—wind, solar, and battery—are a relatively new technology for generating electricity. Industry and manufacturers are learning how to reliably integrate these resources into the power grid.

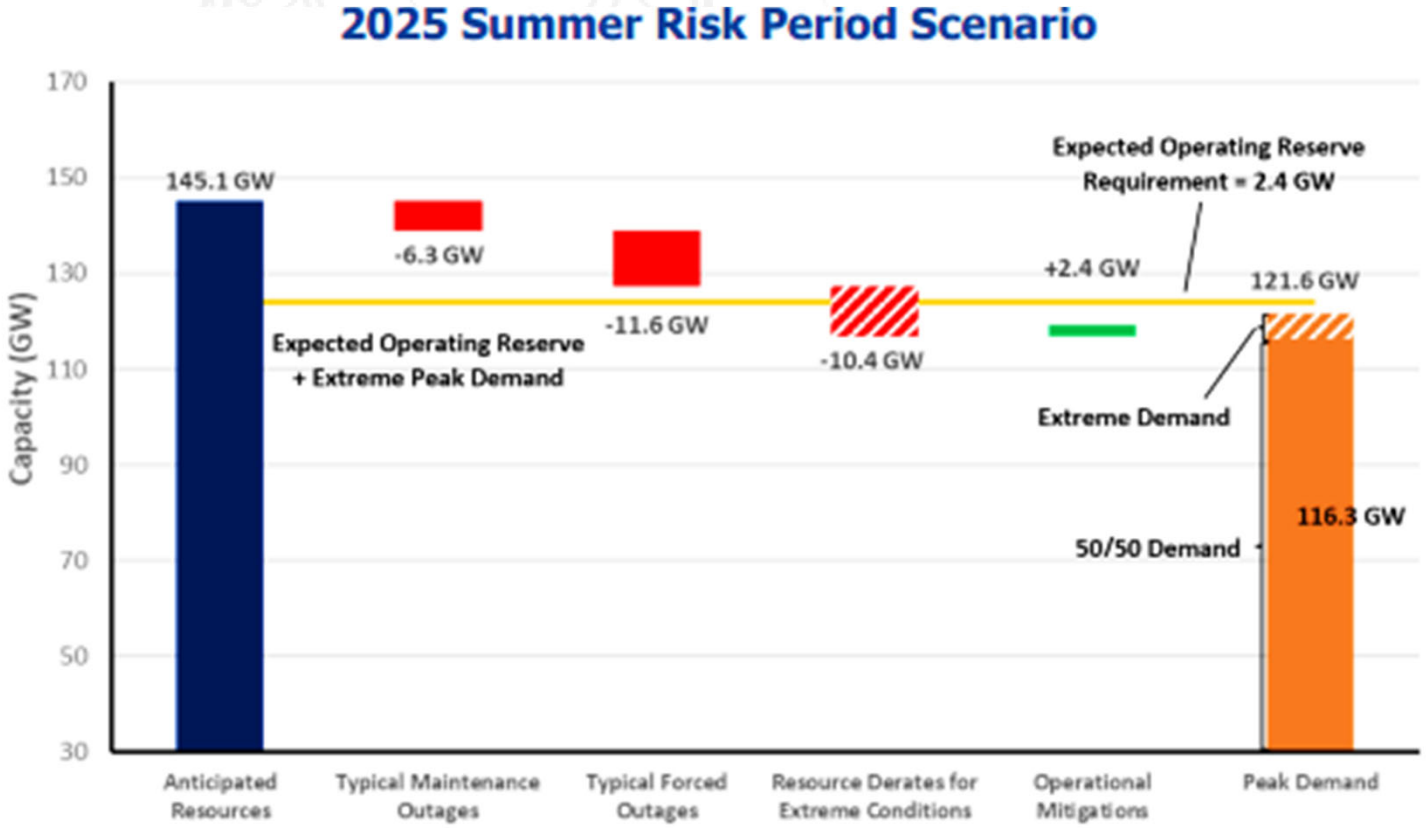
DRIVERS: Increasing reliance on IBRs to serve load, lack of visibility, lack of experience with technology

Read the full report at www.mro.net

Supply and Demand Balance



Resource Adequacy: Present



Resource Adequacy: Present

Loss Of Load Expectation

1-day-in-10 years criterion

Assumptions:

- Fuel is available 24/7
- Demand Peak is most constrained time
- Generation outages occur at random

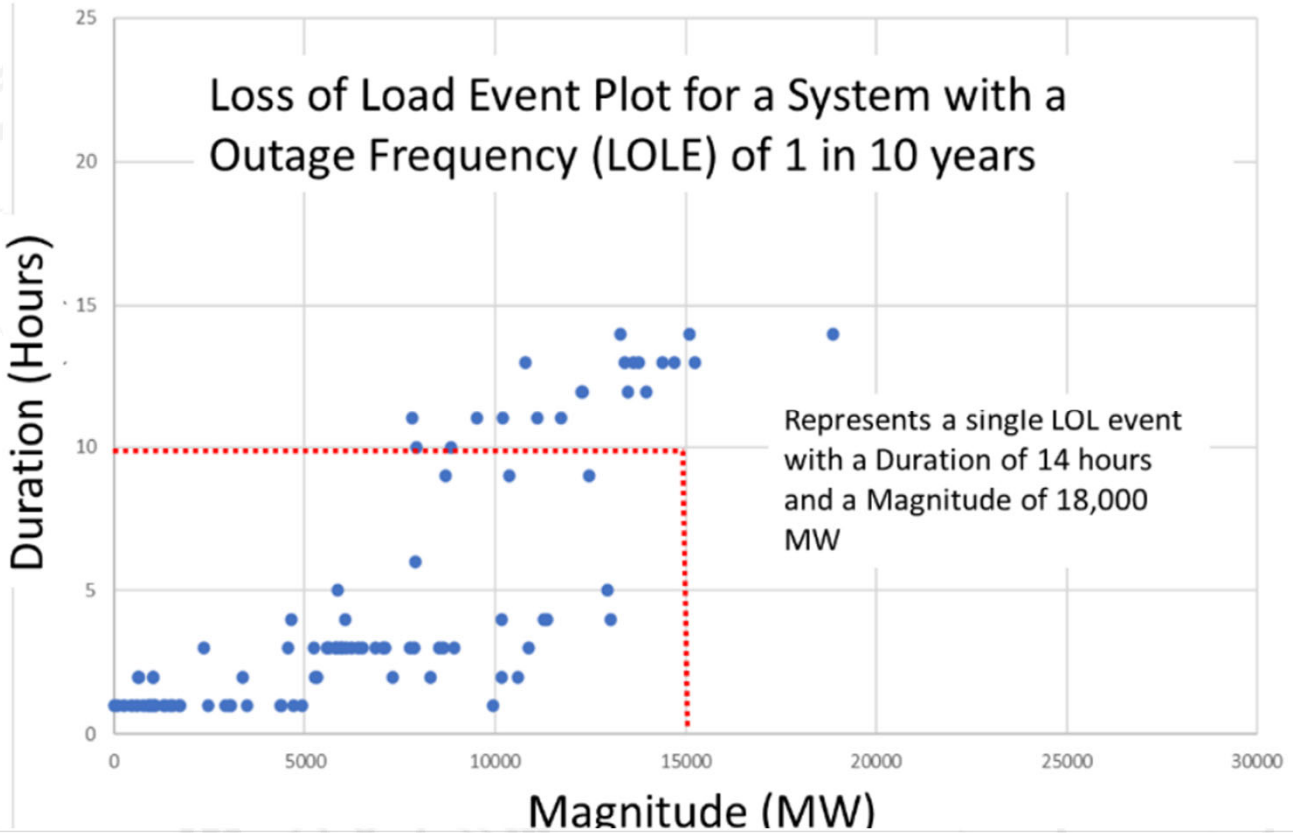
Reality:

- Generation with uncertain fuel supply (wind, sun, natural gas) is growing
- Constrained periods increasingly occur when resource groups (wind, solar) have low output
- Generation outages occur at random

Resource Adequacy: Future
FMD Era

- **F**REQUENCY
  - How often are we short of energy?
  - LOLE measures this
- **M**AGNITUDE
  - How much energy are we short?
- **D**URATION
  - How long are we short for?

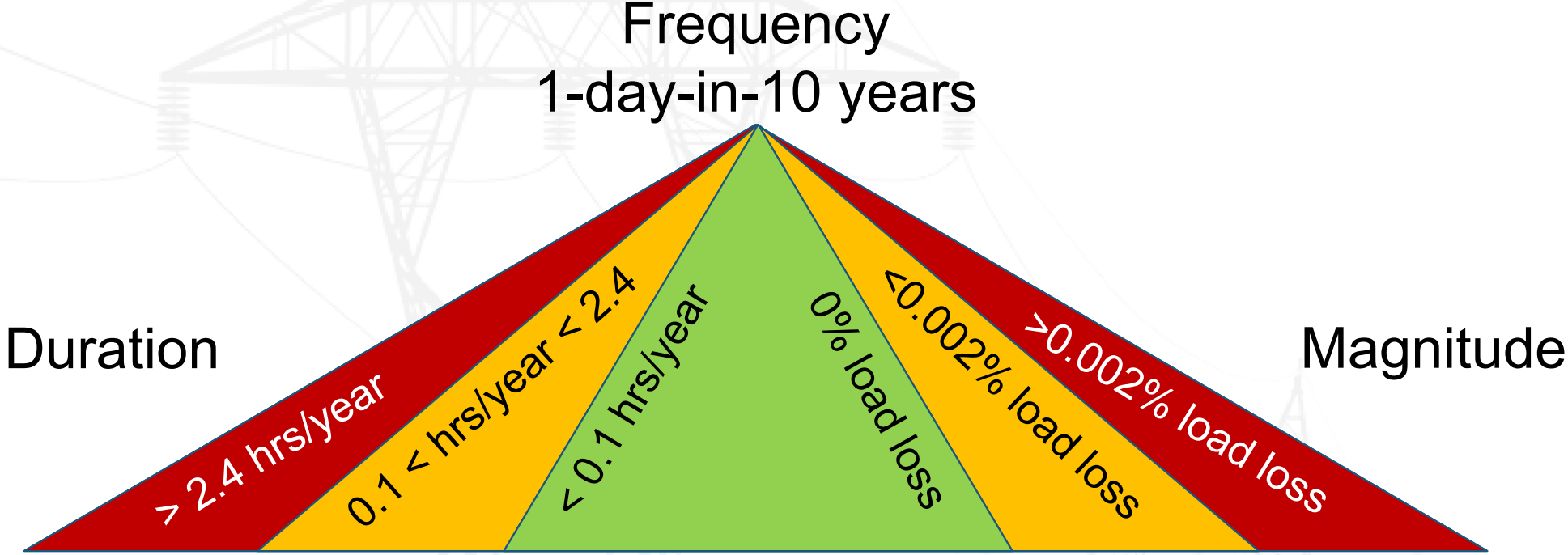
Magnitude and Duration



*Based on ERCOT Example

Resource Adequacy: Future

Risk Criteria



Historical Event Examples

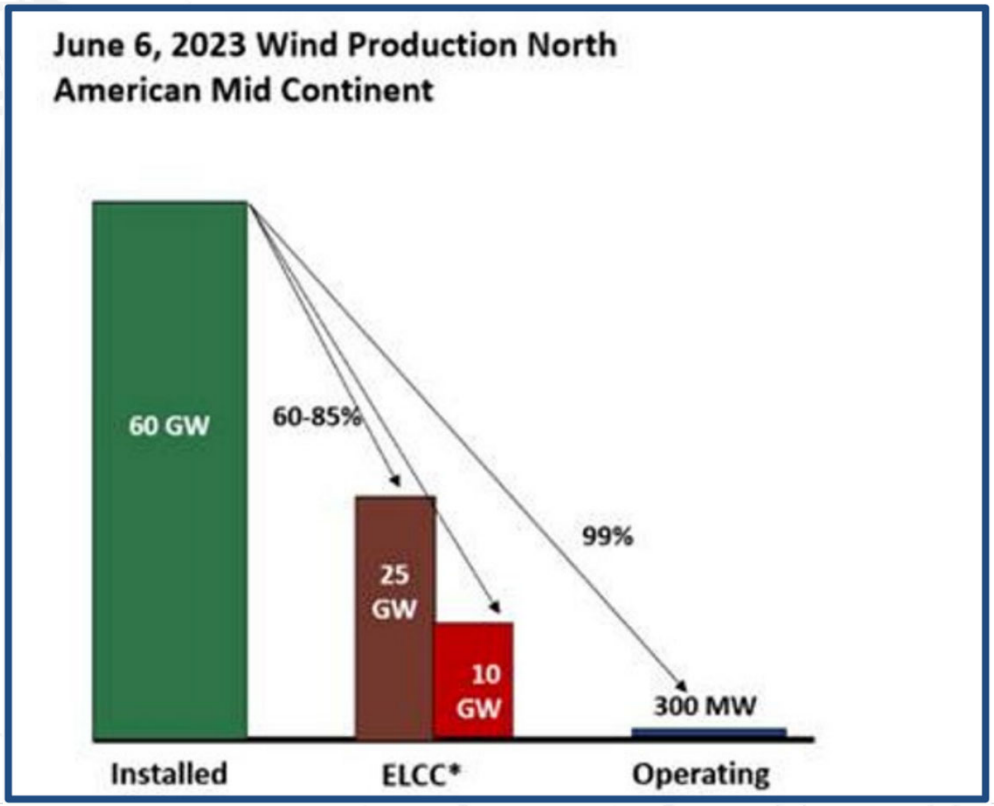
For Metric Comparison

Event	Area	Duration (Hours)[8]	Firm Load Shed (MW)[11]	Unserved Energy (MWh)[9]	Unserved Energy (Percent Annual)[10]
2020 Heat Dome	California-Mexico (CAMX)	8	1,879	7,772	0.0030
2021 Winter Storm Uri	ERCOT	105	20,000	1,002,375	0.2366
	SPP	9	3,443	12,010	0.0045
2022 Winter Storm Elliott	SERC Central	18	4,820	70,182	0.0311
	SERC East	10	1,961	19,225	0.0086

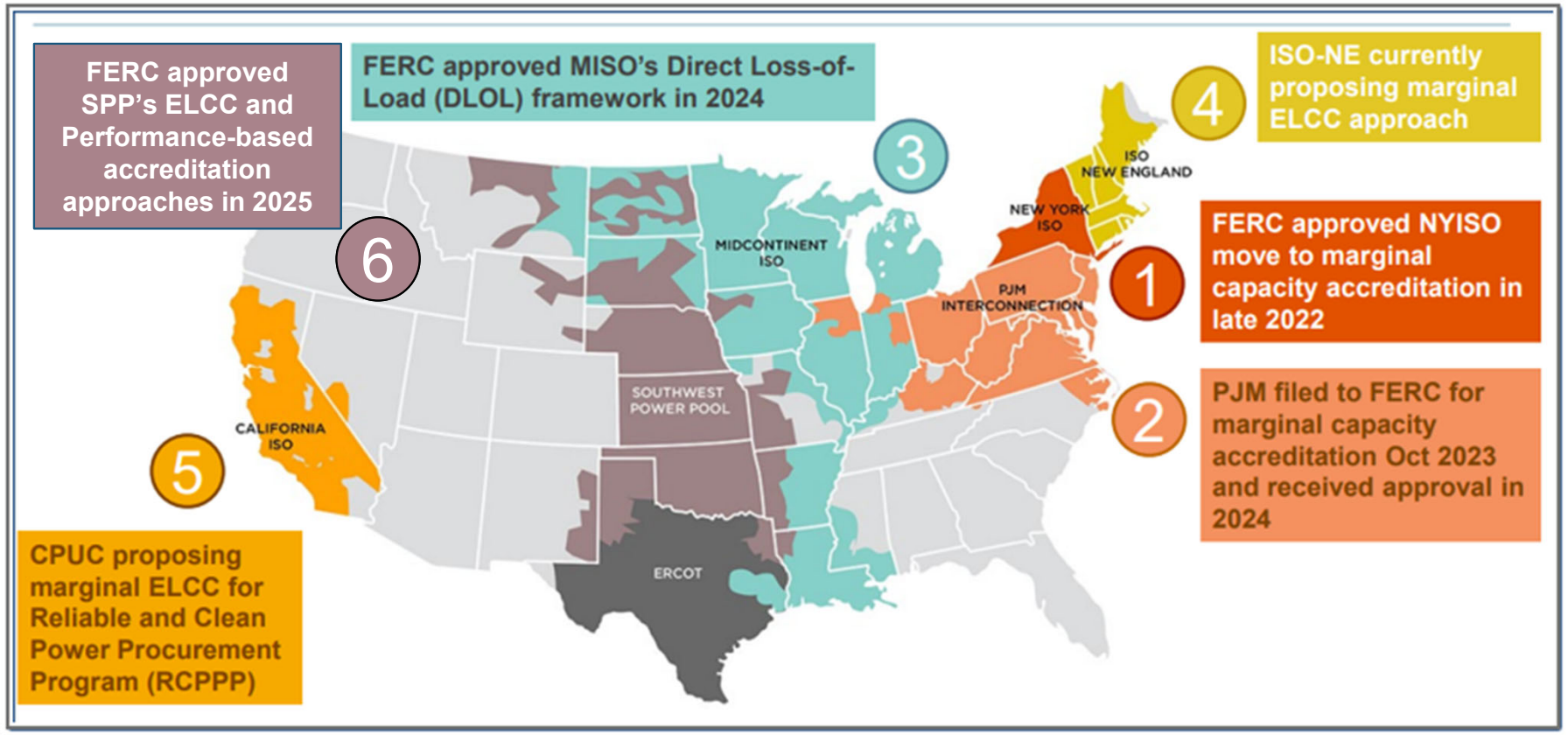
Capacity Accreditation

Effective Load Carrying Capability

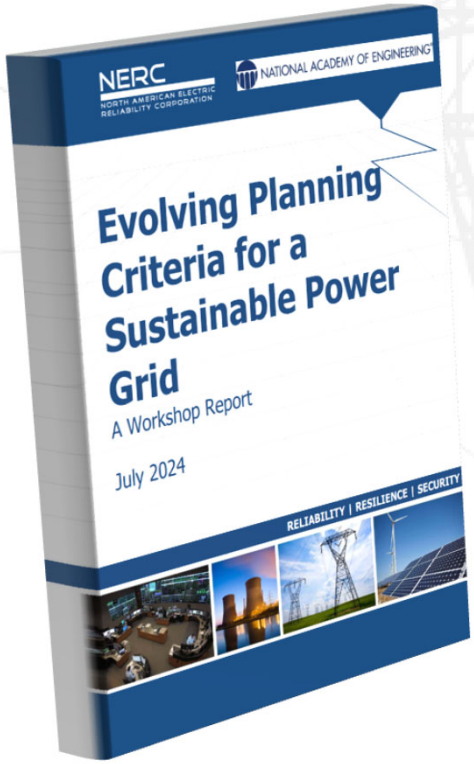
- **Answers the Question: How much load will a generator serve if added to an existing system?**
- **Statistical approximation for planning purposes, may not represent actual operating conditions**



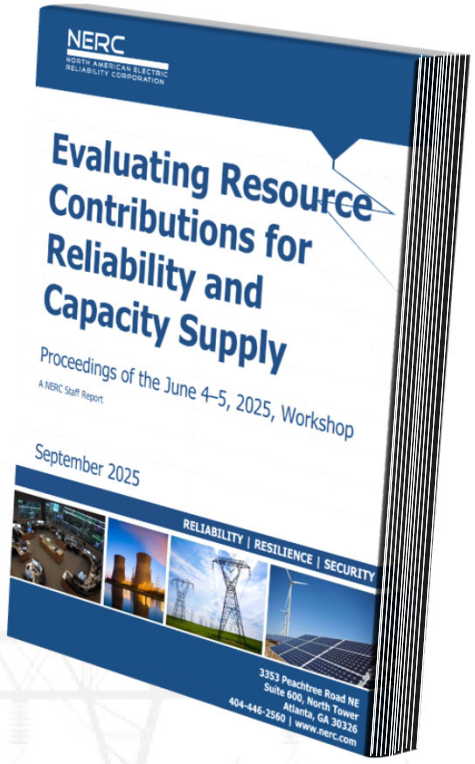
Ongoing ELCC Adoption



ERO Enterprise Mitigation Efforts



- Incorporate **Duration** and **Magnitude** criteria in Reliability Assessments
- Increased Outreach to Policymakers
- NERC Reliability Standard [Project 2024-02 Planning Energy Assurance]



Thank You

- **Upcoming MRO Publications**
  - MRO Regional Winter Assessment: 11/24/25
  - 2026 Regional Risk Assessment: Q1 2026
- **Stay in Touch**
  - regulatoryaffairs@mro.net
  - MRO Reliability, Security and CMEP Summit: **May 12/13, 2026, Omaha, NE**
  - Follow MRO on LinkedIn