



MIDWEST
RELIABILITY
ORGANIZATION

MRO 2022 REGIONAL WINTER ASSESSMENT

MRO Reliability Analysis Department
December 15, 2022

10:00 a.m. – 11:00 a.m. Central

Salva Andiappan, MRO
Summer Stephens, MRO
David Kuyper, MRO
Jake Bernhagen, MRO

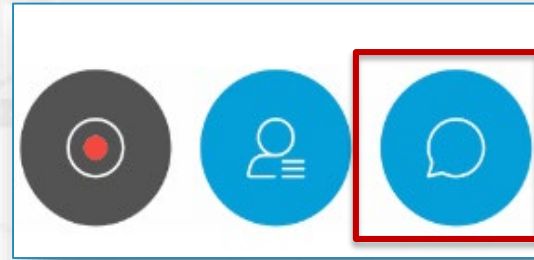
CLARITY

ASSURANCE

RESULTS

WebEx Chat Feature

Open the Chat Feature:



The chat feature will appear to the right of the WebEx window.

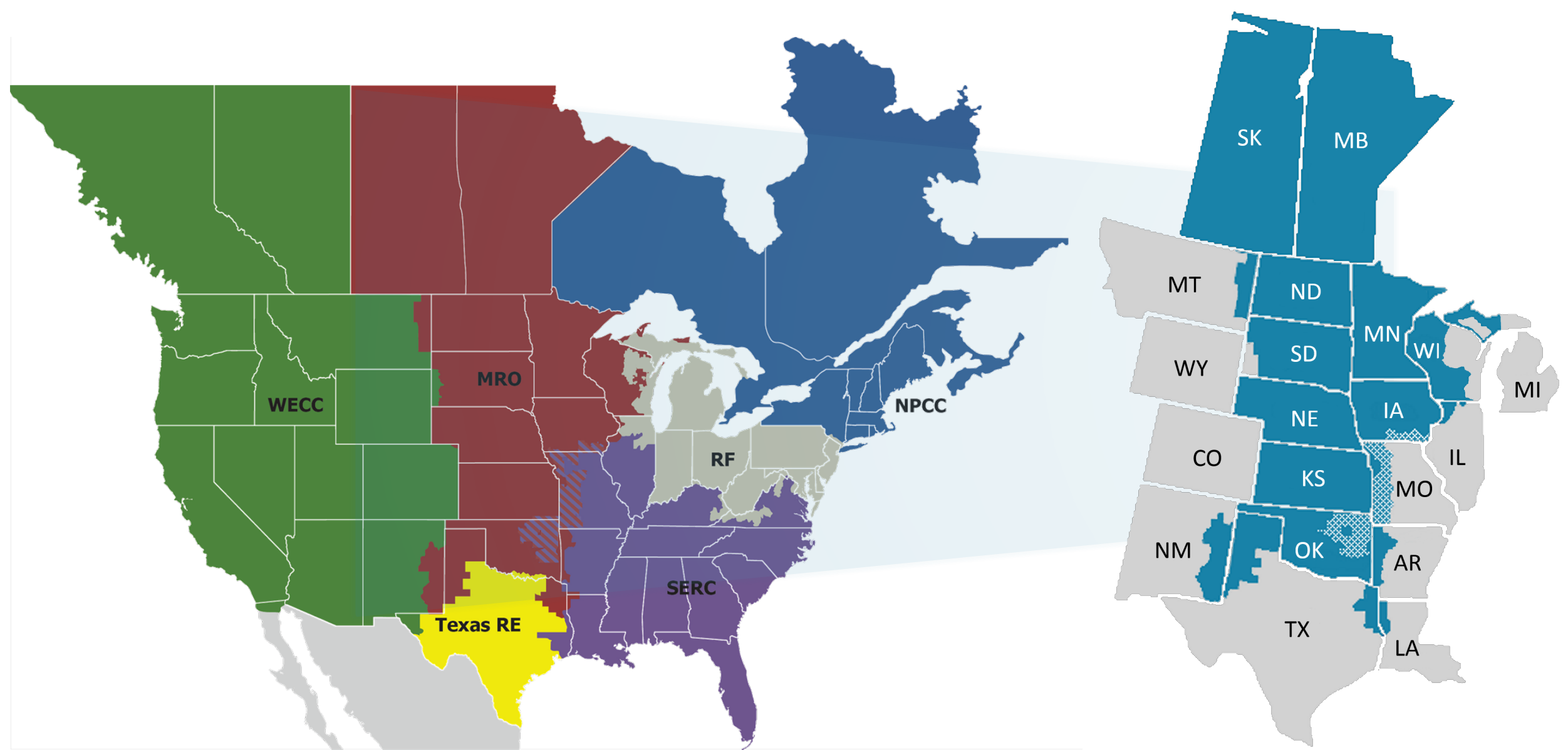
Attendees should chat their questions to: “MRO Host”.

Select MRO Host by using the drop down arrow in the “To” field.

MRO's Mission Supports the Vision

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





The ERO Enterprise and MRO

About MRO's Reliability Analysis Department

- **What we do:**
 - Reliability Assessments
 - Bulk Power Situational Awareness
 - Event Analysis
 - Performance Analysis
 - Entity Registration and Certification



MRO 2022 Regional Winter Assessment

- Purpose, Data collection and Review Process
- Winter 2022 Forecast, Findings and Recommendations
- MRO Generator Winterization Program
- Generator Availability Data System (GADS)
- Transmission Availability Data System (TADS)
- Misoperations Information Data Analysis System (MIDAS)



Purpose

- **Provide information and raise awareness on MRO regional reliability challenges, concerns, and trends.**
- **Review, evaluate and assess the Reliability Coordinator (RC) and Planning Coordinator (PC) areas within the MRO Region for reliability purposes.**
- **Coordinate reliability evaluation between NERC stakeholder group Reliability Assessment Subcommittee (RAS), NERC, and Regional Entities.**

Data Collection and Review Process

- **Performance Analysis (PA) data for GADS, TADS, MIDAS, and EA are collected and analyzed based on the MRO regional footprint including the entire SPP area.**
- **Reliability Assessment (RA) information is collected and analyzed based on PCs footprint - Manitoba Hydro, MISO, Saskatchewan Power and SPP.**
- **MRO collects data for entire MISO area for NERC RA.**
- **PA data is trended beyond one winter season.**

2022 Winter Seasonal Forecast

- **Assessment period from Dec. 2022 through Feb. 2023.**
- **Reserve Margin % used as an indication of adequacy.**
- **Analysis looks at two different load and outage conditions:**
 - Normal (50/50) peak load forecast with typical outages
 - Extreme (90/10) peak load forecast with extreme derates

Normal Peak Demand with Typical Outages

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	5,418	85	5,333	4,588	16.2%	12.0%
MISO	141,565	28,818	112,747	98,939	14.0%	17.9%
SPC	4,779	249	4,530	3,714	22.0%	15.0%
SPP	70,772	10,600	60,172	41,637	44.5%	16.0%

Anticipated Reserve Margin for Normal Forecast with Typical Outages (in MWs)

- MISO experienced 4.2 GW reduction in generation this winter from coal and nuclear plant retirements.
- MH, SPC and SPP resources are sufficient to meet reserve margin requirements under normal with typical outages.

Extreme Winter Resource and Peak Demand Scenario

Assessment Area	Anticipated Resources with Typical Outages	Extreme Derates	Extreme Low Generation	Operational Mitigations	Extreme Low Generation + Operational Mitigations	Extreme Peak Load
MH	5,333	0	5,333	0	5,333	4,882
MISO	112,747	17,624	95,123	2,400	97,523	105,513
SPC	4,530	123	4,407	0	4,407	3,914
SPP	60,172	11,940	48,232	0	48,232	44,137

Extreme Winter Resource and Peak Demand Scenario (in MWs)

- MISO has insufficient resources to cover extreme winter peak condition and could result in operating mitigations and/or Energy Emergency Alerts

Normal vs. Typical Outages vs. Extreme Scenario

The Difference

Assessment Area	Reserve Margin Requirements	Anticipated Reserve Margin	Typical Outages	Extreme Conditions
MH	12.0%	18.1%	16.2%	+9.2%
MISO	17.9%	43.1%	14.0%	-7.6%
SPC	15.0%	28.7%	22.0%	+12.6%
SPP	16.0%	70.0%	44.5%	+9.3%

Recommendations

- Review NERC level 2 alert related to cold weather preparedness and participate in MRO's voluntary Generator Winterization Program.
- Maintain situational awareness of unplanned generation outages and low wind forecasts and employ operating mitigations when needed during extreme weather conditions.
- Assess and 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.
- Preserve critical generation resources at risk of retirement ahead of the winter season to maintain reliability.
- Understand requests for environmental and transportation waivers that place fuel at risk.
- Support electric load and natural gas distribution company conservations and public appeals during emergencies.



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For more information, please contact:

Salva Andiappan, Principal Reliability
Assessment Engineer
Salva.Andiappan@mro.net

Questions



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Summer Stephens

Senior Reliability Specialist

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MRO Generator Winterization Program

- **Address risk not covered by Reliability Standards**
- **Promotes winter weather preparedness for Generator Owners/Operators**
- **Voluntary program**
- **Winterization Readiness Evaluation**
- **Identify best practices and recommendations**



MRO Generator Winterization Program Summary

Survey

- High level survey to develop baseline understanding of facility's winterization efforts

Generator Site Visit

- Observation of efforts taken by generation facilities to minimize impact of cold weather to plant operations

Report

- Summarize findings from the survey and site visit, identify best practices and make recommendations



MRO Generator Winterization Program

- **Introduced in 2021**

- Focused on identifying preparations and establishment of winterization program/plan
- Ten GOs volunteered
- On-site visits at four of the ten sites, others surveyed
- All had some level of winter preparation activities taking place, but not all had an established winterization program/plan
- Heat tracing and insulation were identified as the prominent preventative measures



MRO Generator Winterization Program

- **2022 GWP Program**

- Focused on level of readiness and the program/plan's effectiveness
- Surveyed and conducted six on-site visits
- All had establishment of winter preparedness activities and documented program/plans
- Challenges in determining plant OEM minimum designed or operating temperatures

- **GWP 2021-2022 Report to be publish in 2023**



ERO-wide Winterization Efforts

- **NERC Alert Cold Weather Events II (R-2022-09-12-01)**
- **FERC issued its Order Approving Cold Weather Reliability Standards on August 24, 2021**
- **Compliance effective date April 1, 2023**
- **Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination- SDT Development team has started phase 2 drafting work. An Initial ballot for phase 2 is expected in January/February of 2023.**

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For more information, please contact:

Summer Stephens, Senior Reliability
Specialist

Summer.Stephens@mro.net

Questions



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David Kuyper

Power Systems Engineer II

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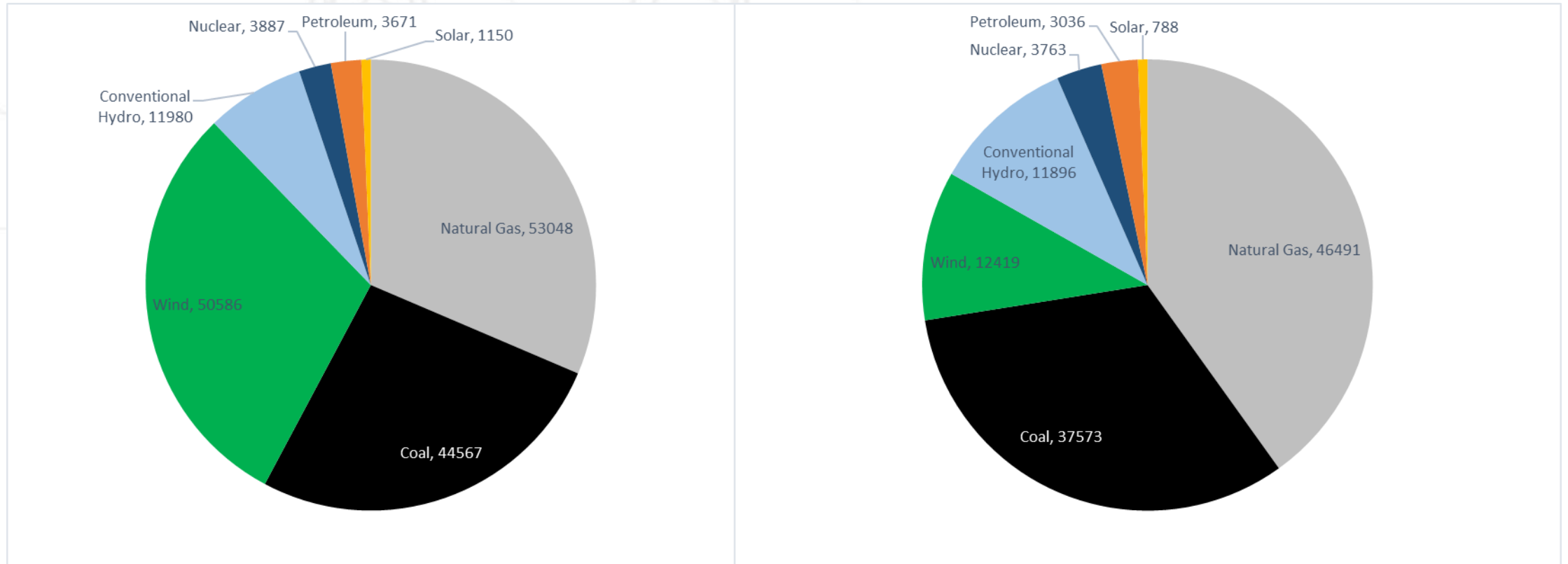
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Generator Availability Data System (GADS)

- Collects information on performance of electric generating equipment (conventional generator 20 MW and larger, wind turbine facilities of 75 MW or greater).
- Collected per [Section 1600](#) data request.
- Wind turbine component outage information not included in this assessment until mandatory and representative data sets are available.

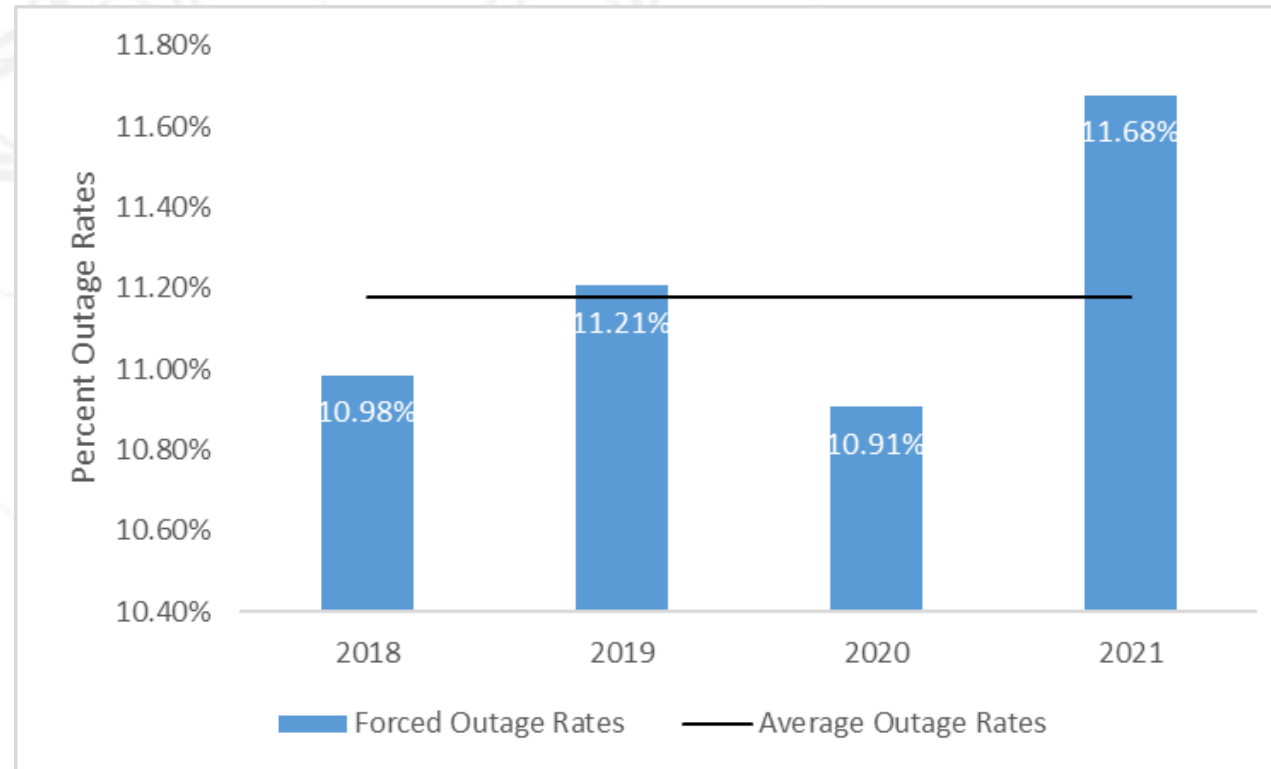
Resource Mix



MRO 2022 Winter Nameplate

MRO 2022 Winter Peak Capacity

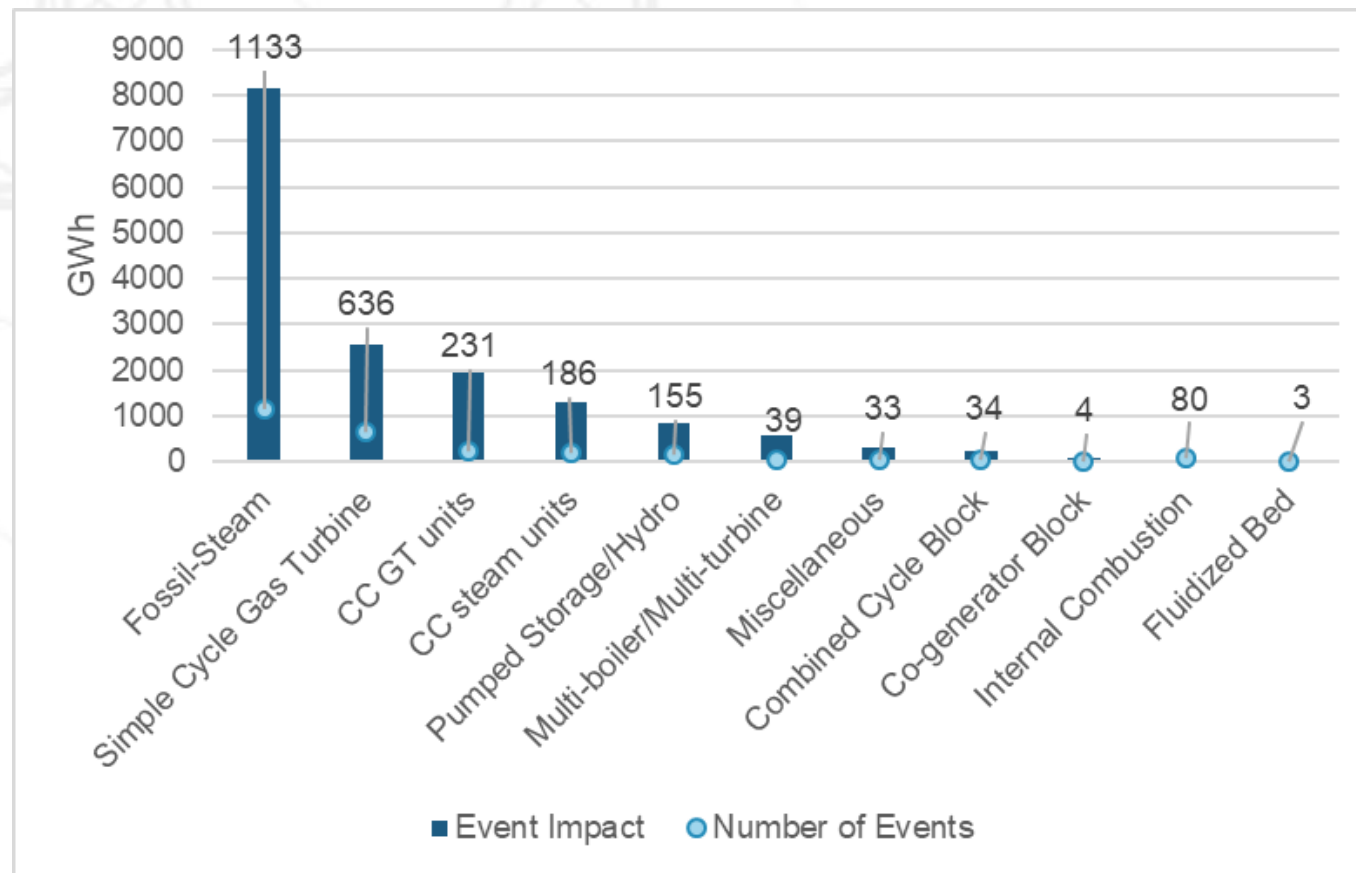
Generator Availability Data System (GADS)



MRO Annual Generator MW-Weighted EFOR

- Long term trends continue to indicate increasing EFOR rates.

Generator Availability Data System (GADS)



Total Event Impact and Number of Event Impact for Winter 2021

Generator Availability Data System (GADS)

- **Fossil steam outage causes are somewhat scattered**
- **Simple Cycle Gas are dominated by fuel outages accounting for 42% of event impact in the last 5 years, but outage types are scattered outside this**
- **This scattered outage behavior may be indicative of aging when coupled with rising WEFOR.**

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For more information, please contact:

David Kuyper, Power System Engineer II
David.Kuyper@mro.net

Questions



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Jake Bernhagen

Senior Systems Protection Engineer

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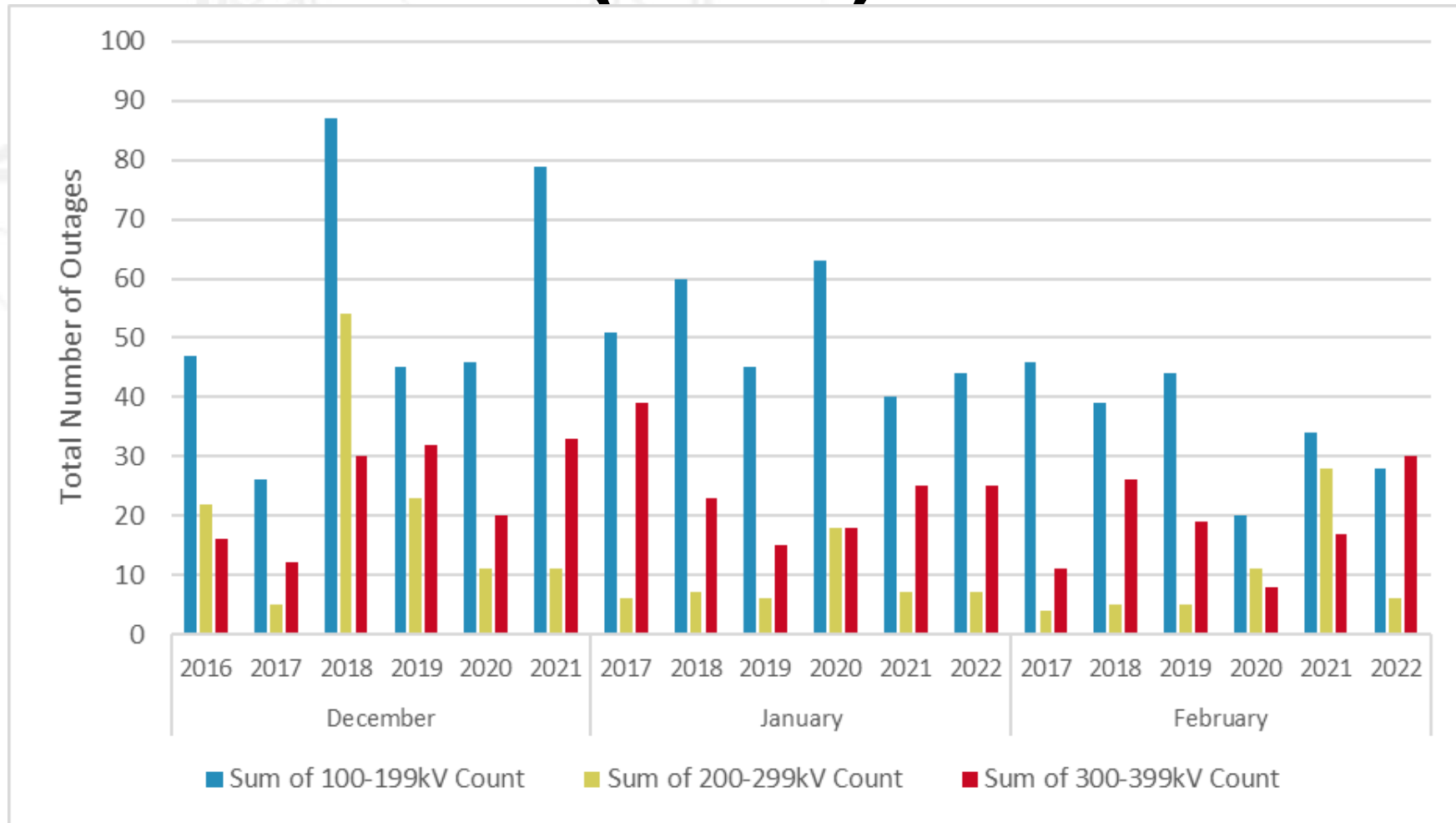
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Transmission Availability Data System (TADS)

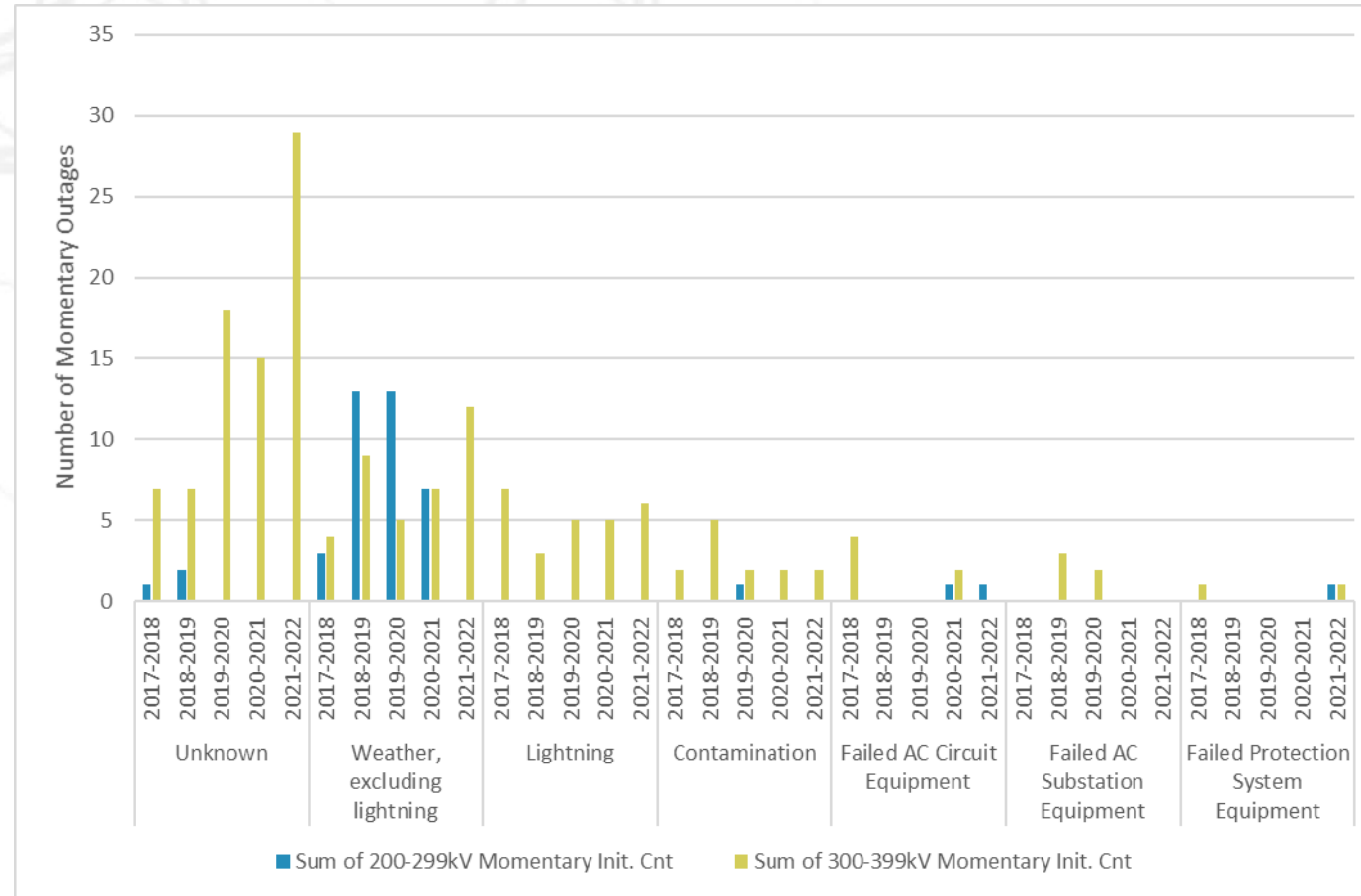
- **Collects information on performance of transmission lines and transformers 100-kV and above.**
- **Collected per Section 1600 data request.**

Transmission Availability Data System (TADS)



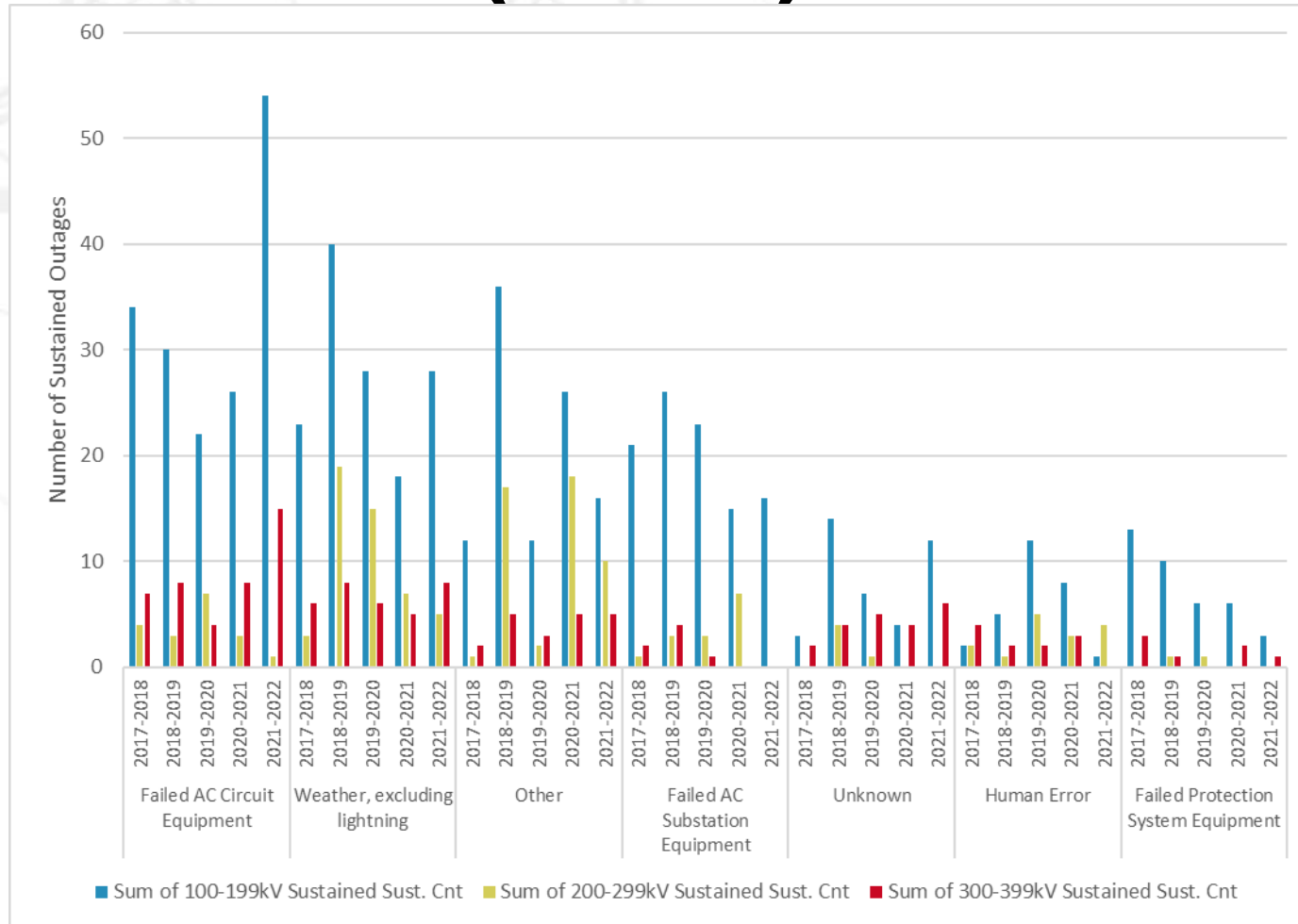
Winter Automatic Outages by Month

Transmission Availability Data System (TADS)



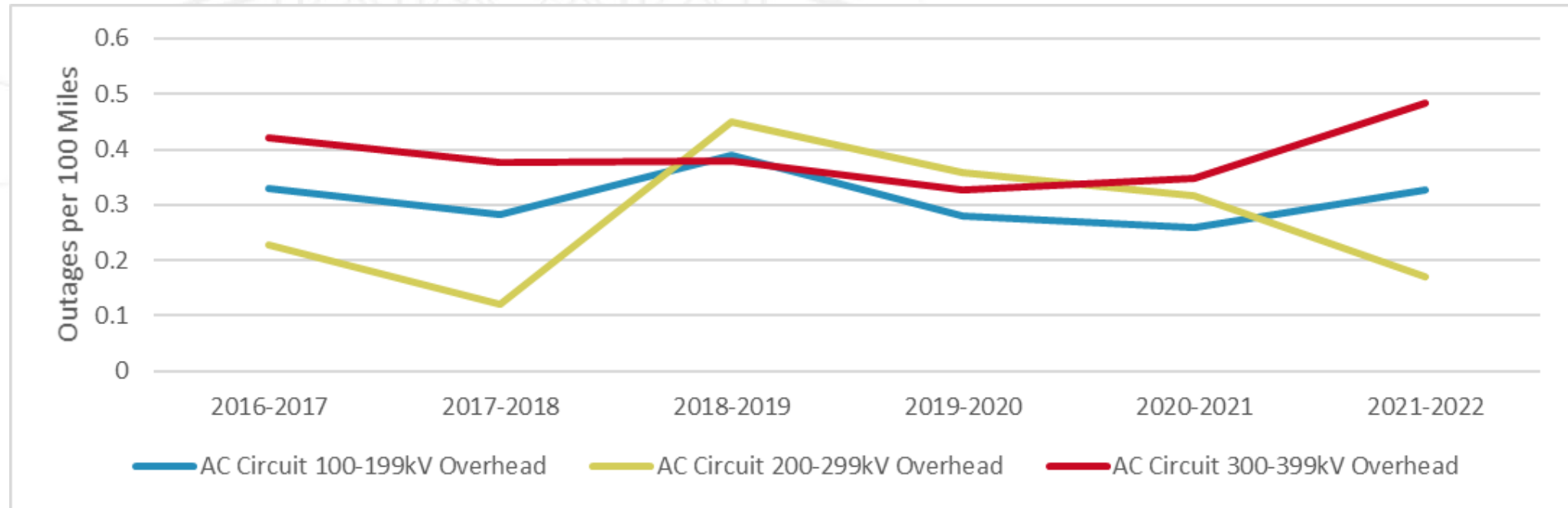
Winter Momentary Outages by Cause

Transmission Availability Data System (TADS)



Winter Sustained Outages by Cause

Transmission Availability Data System (TADS)



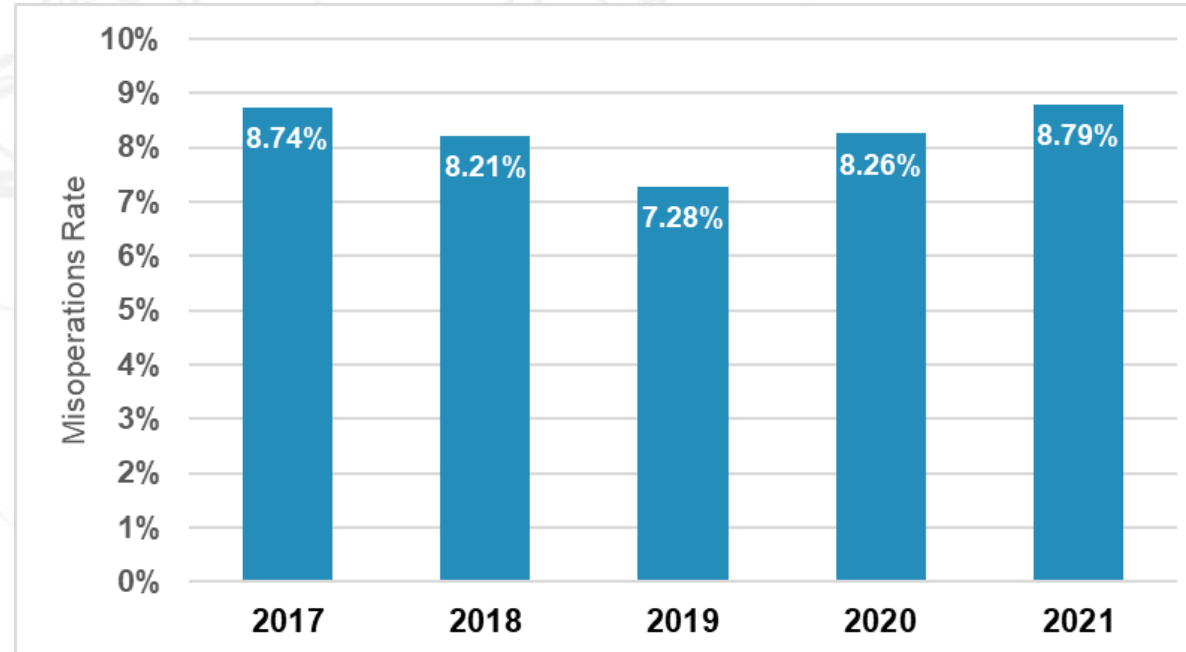
Yearly Winter Total Transmission Outages per 100 Circuit Miles

- Increase in outages for 2021-22 winter in the 100-199kV and 300-399kV voltages due to the derecho that swept through the MRO region December 15th and 16th 2021.

Misoperations Information Data Analysis System (MIDAS)

- **Collects information on protection system operations and misoperations.**
- **Collected per Section 1600 data request.**

Misoperations Information Data Analysis System (MIDAS)



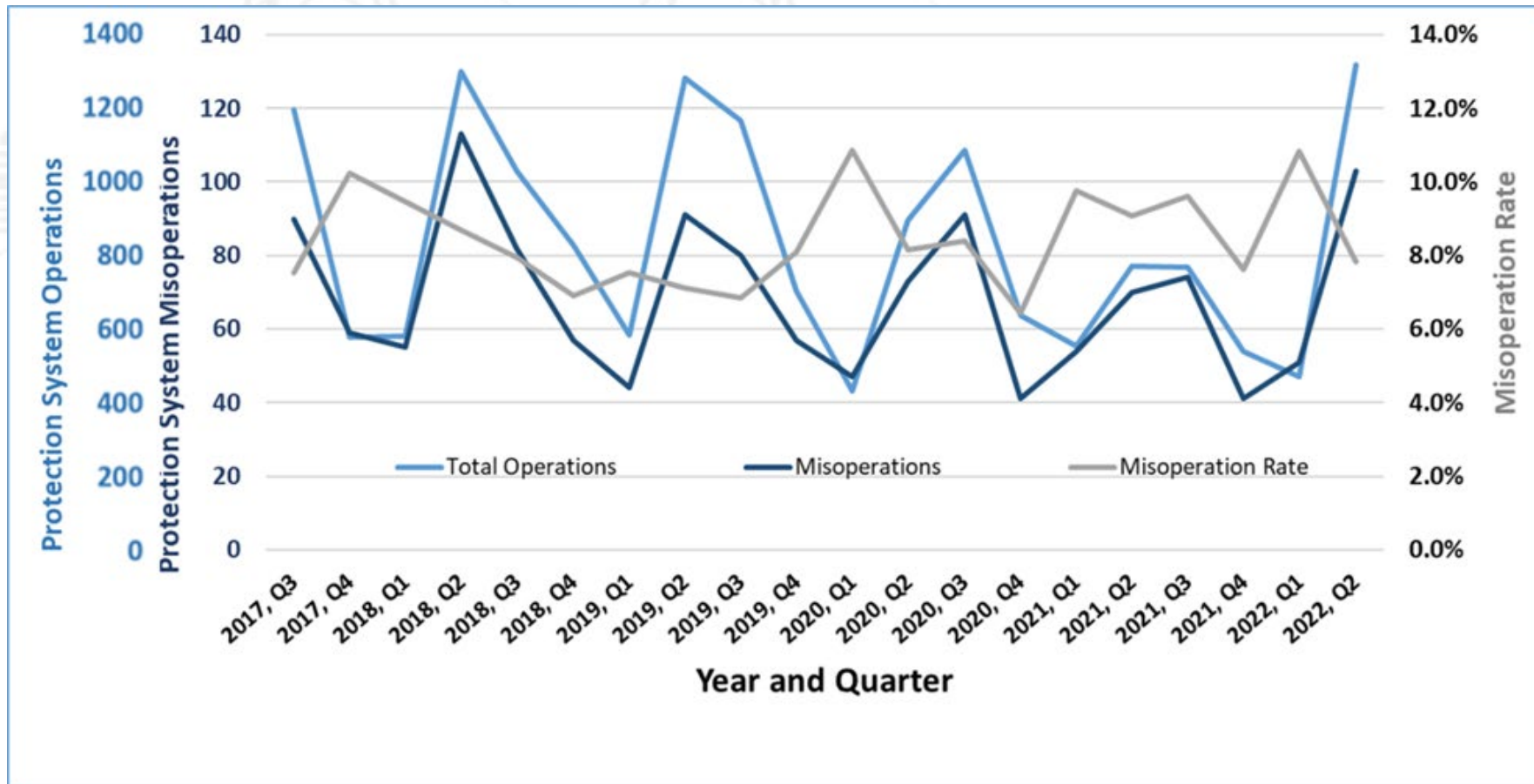
MRO Misoperation Rates by Year

- Misoperation rate trending downward until 2020.
- 2,628 operations and 231 misoperations reported in 2021.
- Total protection system operations were down but total misoperations did not proportionally decrease resulting in higher misoperation rate in 2021.

Misoperation Rate = (No. of Misoperations / No. of Total Operations) X 100%



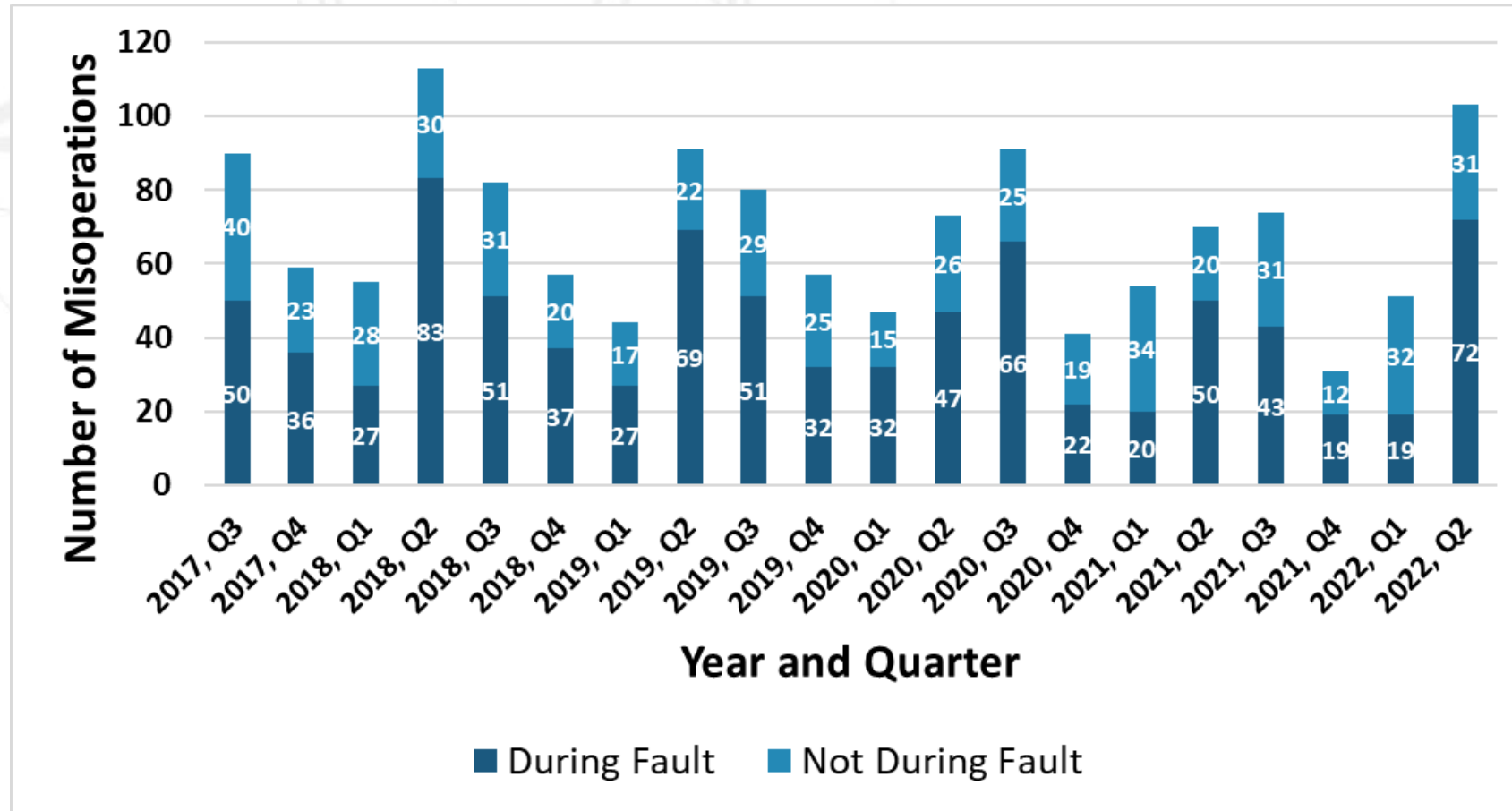
Misoperations Information Data Analysis System (MIDAS)



Protection System Operations and Misoperations Rate



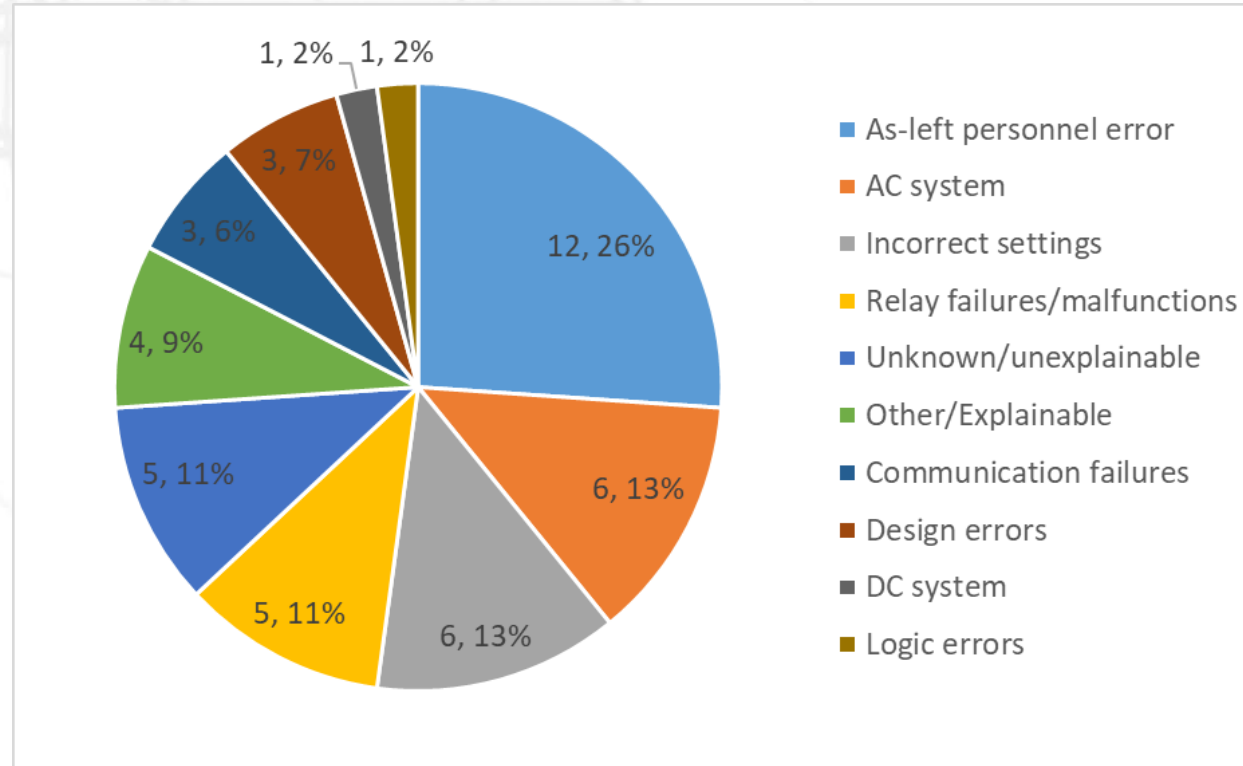
Misoperations Information Data Analysis System (MIDAS)



Fault Associated and Non-Fault Associated Misoperations



Misoperations Information Data Analysis System (MIDAS)



Winter 2021 Misoperations by Cause

- Total 46 misoperations between December 1, 2021 and February 28, 2022.
- Nearly half were attributable to Human Errors.

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For more information, please contact:

Jake Bernhagen, Senior Systems Protection
Engineer

Jake.Bernhagen@mro.net

Questions

Thank you for attending this event!

- Please provide your feedback using the QR code below:

