



MIDWEST
RELIABILITY
ORGANIZATION

OVERVIEW OF MRO 2024 REGIONAL WINTER ASSESSMENT

Presented by: Salva Andiappan
RA Department

CLARITY

ASSURANCE

RESULTS

Key Findings

- **MISO and SPP is at risk of implementing Energy Emergency Alerts (EEAs) for above-normal winter peak load with unplanned outages.**
- **MH and SPC anticipate resources are sufficient to meet reserve margin requirements under normal and extreme demand for the 2024 winter season.**
- **Conventional generation Weighted Equivalent Forced Outage Rates (WEFOR) for 2023 were higher than the five-year moving average.**
- **Weather (excluding lightning), failed AC circuit equipment and failed AC substation equipment are major contributors to sustained transmission line outages for winter seasons.**
- **Protection system misoperation continues to be the top event causes in the MRO region.**



2024 Winter Seasonal Forecast

Assessment Area	Anticipated Resources with Typical Outages	Extreme Peak Load	Reserve Margin Under Extreme Peak Load	Likelihood to issue EEAs
MH	5,292	5,060	4.6%	Low
MISO	99,207	97,423	1.8%	Medium
SPC	5,093	3,897	30.7%	Low
SPP	53,636	47,054	14.0%	Low

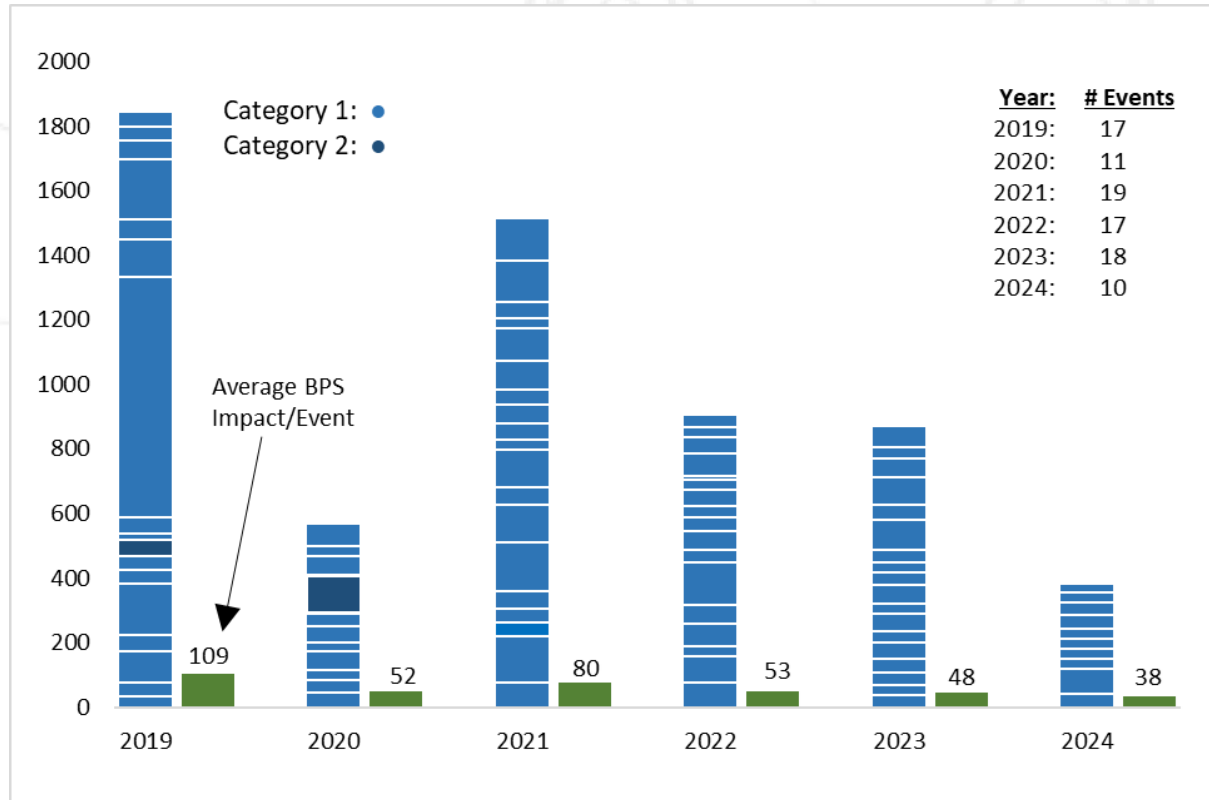
Reserve Margin Percentage with Typical Outages and Extreme Peak Load

Assessment Area	Anticipated Resources with Typical Outages	Extreme Resource Derates	Extreme Low Generation	Extreme Peak Load	Reserve Margin Under Extreme Resource Derates and Extreme Peak Load	Likelihood to issue EEAs
MH	5,292	0 [†]	5,292	5,060	4.6%	Low
MISO	99,207	0 [†]	99,207	97,423	1.8%	Medium
SPC	5,093	408	4,685	3,897	20.2%	Low
SPP	53,636	9,000	44,636	47,054	-5.1%	High

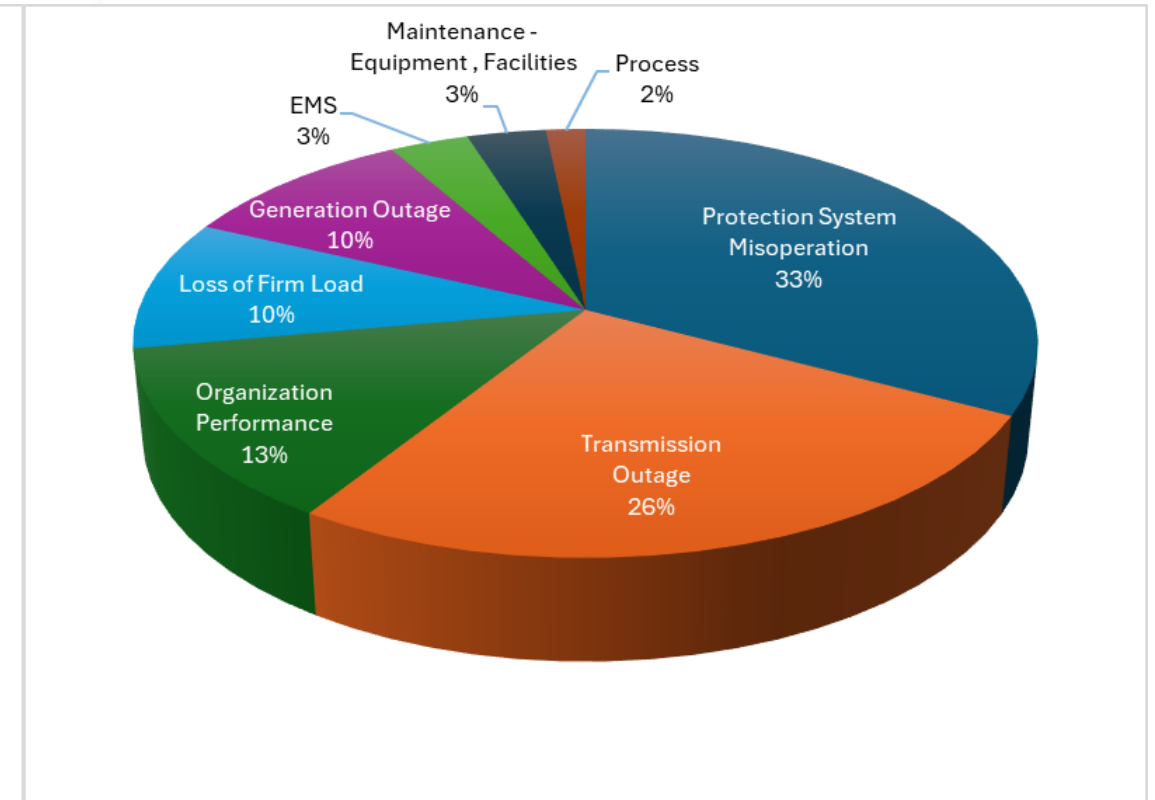
Reserve Margin Percentage with Extreme Resource Derates and Extreme Peak Load



BES Event Analysis



MRO Event Severity Index

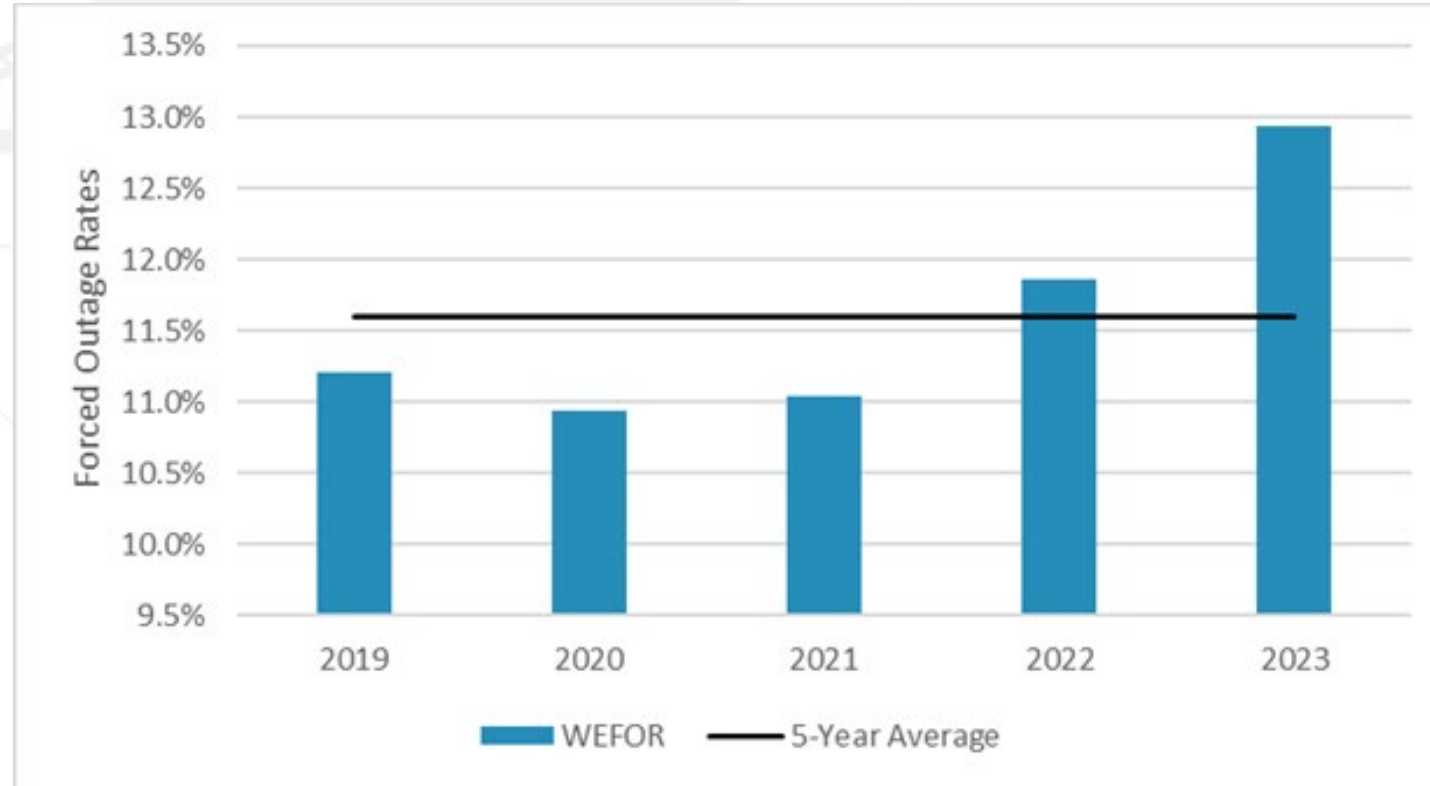


Top Event Causes 2019 - 2023

- Total 2 transmission events occurred in 2023 winter with no EEAs.



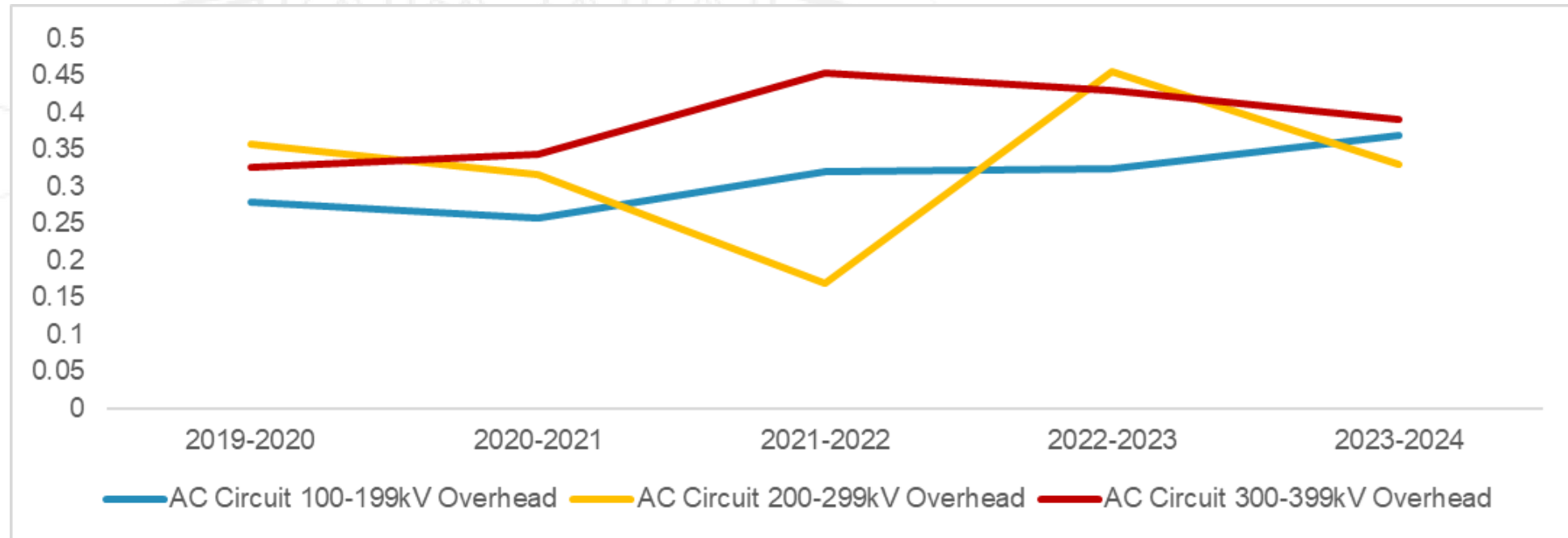
MRO 5-Year Generator MW-Weighted EFOR



- Long term trends continue to indicate increasing EFOR rates.



Annual Winter Total Outages Per 100 Circuit Miles

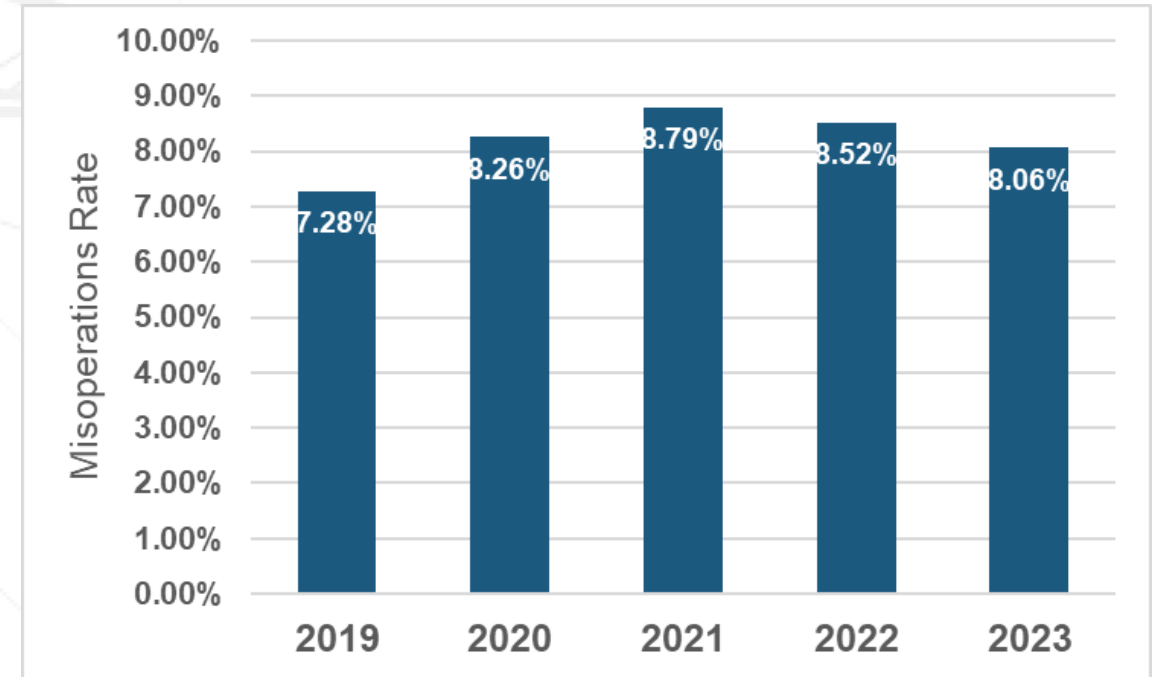


- Increase in outages for the 100-199kV due to storm in the central and northern regions but lower outages for 200-399kV voltages.



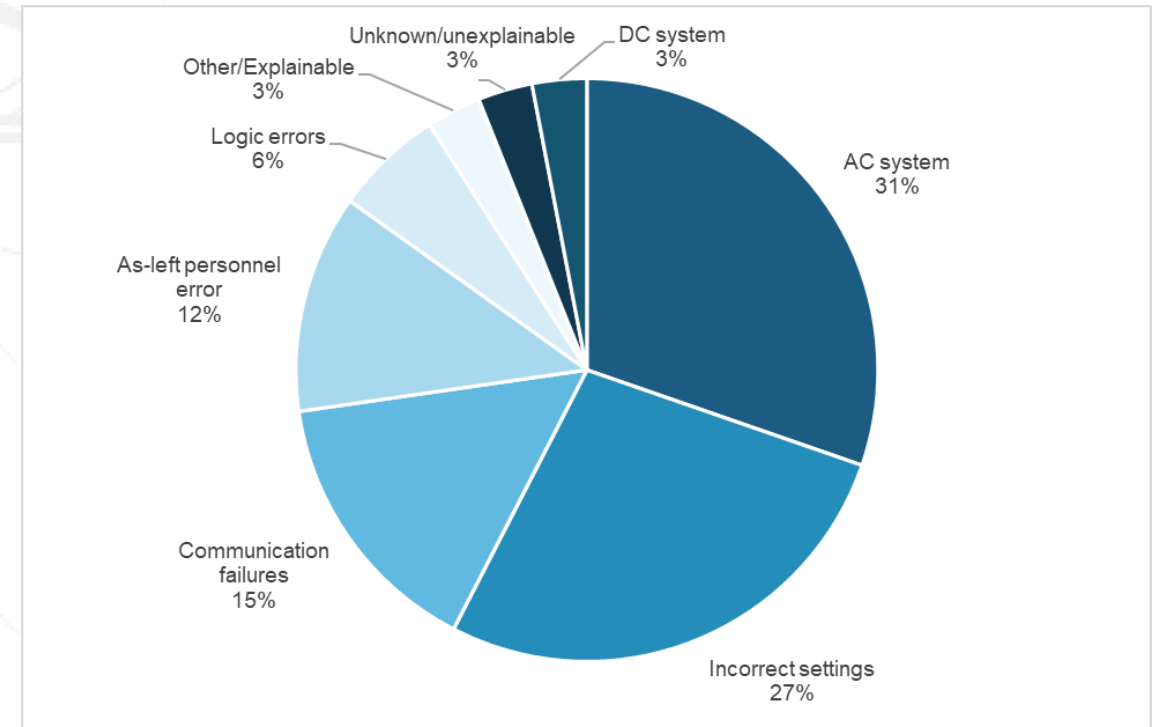
MRO Misoperation Rates by Year

- Total protection system operations down 9.7%.
- Total misoperations down 14.5%.
- Resulted in slightly lower misoperation rate in 2023.
- $$\text{Misop Rate} = \frac{\text{Number of Misoperations}}{\text{Number of Total Operations}} \times 100\%$$



Winter Misoperations by Cause

- Total 33 misoperations between December 2023 thru February 2024.
- 45 percent attributed to human errors (Incorrect Settings, As-Left Personnel Error, and Logic Errors)



Questions



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