



MIDWEST  
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# MRO 2023 REGIONAL SUMMER ASSESSMENT

MRO Reliability Analysis Department  
June 29, 2023

10:00 a.m. – 11:00 a.m. Central

Cris Zimmerman, MRO  
Salva Andiappan, MRO  
Max Desruisseaux, MRO  
David Kuyper, MRO  
John Grimm, MRO

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# Cris Zimmerman

Manager of Outreach and Stakeholder  
Engagement

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# MRO Upcoming Events

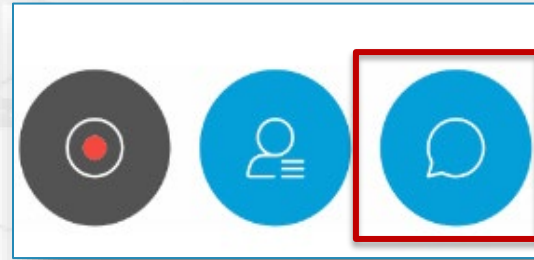
## ● Conferences

- July 25<sup>th</sup> CMEP Networking Reception, St. Paul
- July 26<sup>th</sup> CMEP Hybrid Conference, St. Paul
- Sept 26<sup>th</sup> – 28<sup>th</sup> Hybrid Security Conference in OKC



# WebEx Chat Feature

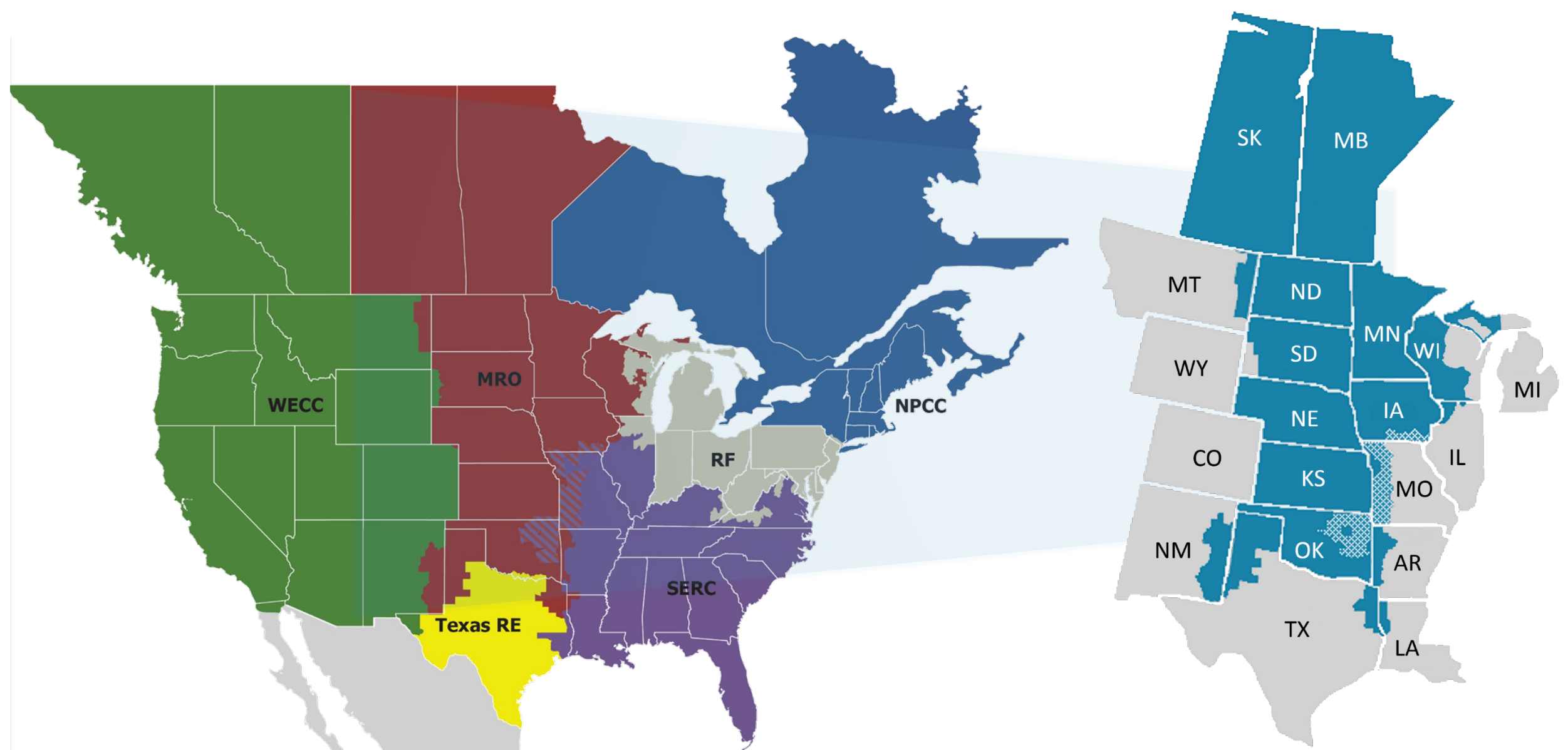
**Open the Chat Feature:**



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

**Attendees should chat their questions to: “All Panelists”.**

**Select All Panelists by using the drop-down arrow in the “To” field.**



# The ERO Enterprise and MRO

# **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)**.*







# HERO

HIGHLY EFFECTIVE RELIABILITY ORGANIZATION

## FIVE BASIC PRINCIPLES:

### 1. **Preoccupation with failure**

Attention on close calls and near misses (“being lucky vs. being good”); focus more on failures rather than successes.

### 2. **Reluctance to simplify interpretations**

Solid “root cause” analysis practices.

### 3. **Sensitivity to operations**

Situational awareness and carefully designed change management processes.

### 4. **Commitment to Resilience**

Resources are continually devoted to corrective action plans and training.

### 5. **Deference to Expertise**

Listen to your experts on the front lines (ex. authority follows expertise).

# Annual HERO Award

Nominate Someone  
Today!



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[www.mro.net/about/hero/](http://www.mro.net/about/hero/)



**HERO**

HIGHLY EFFECTIVE RELIABILITY ORGANIZATION







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# Salva Andiappan

Principal Reliability Assessment Engineer

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# MRO 2023 Regional Summer Assessment

- Summer Seasonal Forecast and Recommendations
- BES Event Analysis (EA) and Energy Emergency Alerts (EEA)
- Generator Availability Data System (GADS)
- Transmission Availability Data System (TADS)
- Misoperations Information Data Analysis System (MIDAS)

# 2023 Summer Seasonal Forecast

- **Data is collected and analyzed based on each PCs footprint.**
- **Assessment period from June 2023 through Sept. 2023.**
- **Reserve Margin % used as an indication of adequacy.**
- **Analysis looks at two different load and outage conditions:**
  - Normal peak load forecast with typical outages
  - Extreme 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	Normal Peak Load	Anticipated Reserve Margin with Typical Outages	Planning Reserve Margin
MH	3,950	106	3,844	3,060	<b>25.6%</b>	12.0%
MISO	143,668	21,853	121,815	116,825	<b>4.3%</b>	15.9%
SPC	4,503	568	3,935	3,489	<b>12.8%</b>	15.0%
SPP	65,583	5,450	60,133	52,626	<b>14.3%</b>	19.0%

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

- MH, MISO, SPC and SPP have sufficient operating reserve to meet normal forecasted peak load with typical outages.



# Extreme Peak Demand and Derates

Assessment Area	Anticipated Resources with Typical Outages	Extreme Derates	Extreme Low Generation	Operational Mitigations	Extreme Low Generation + Operational Mitigations	Extreme Peak Load
MH	3,844	10	3,834	0	3,834	3,390
MISO	121,815	8,950	112,865	2,400	115,265	123,871
SPC	3,935	372	3,563	347	3,910	3,633
SPP	60,133	7,196	52,937	0	52,937	55,126

Extreme Peak Demand and Derates (in MWs)

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

# Normal vs. Typical Outages vs. Extreme Derates

Assessment Area	PRM Requirement	With No Outages	With Typical Outages	With Extreme Outages
MH	12.0%	29.1%	25.6%	+13.1%
MISO	15.9%	23.0%	4.3%	-6.9%
SPC	15.0%	29.1%	12.8%	+7.6%
SPP	19.0%	24.6%	14.3%	-4.0%

# Recommendations

- Maintain situational awareness of unplanned generation and transmission outages, abnormal and extreme weather conditions, and low wind forecast period.
- Have safeguard protocols in place to ensure adequate generation resources are available prior to the summer season high demand period and plans for managing emergency requests from grid operators.
- Develop new and improved methods to assess and evaluate supply adequacy.



**For more information, please contact:**

Salva Andiappan  
Principal Reliability Assessment Engineer  
[Salva.Andiappan@mro.net](mailto:Salva.Andiappan@mro.net)

# Questions





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# Max Desruisseaux

## Senior Power Systems Engineer

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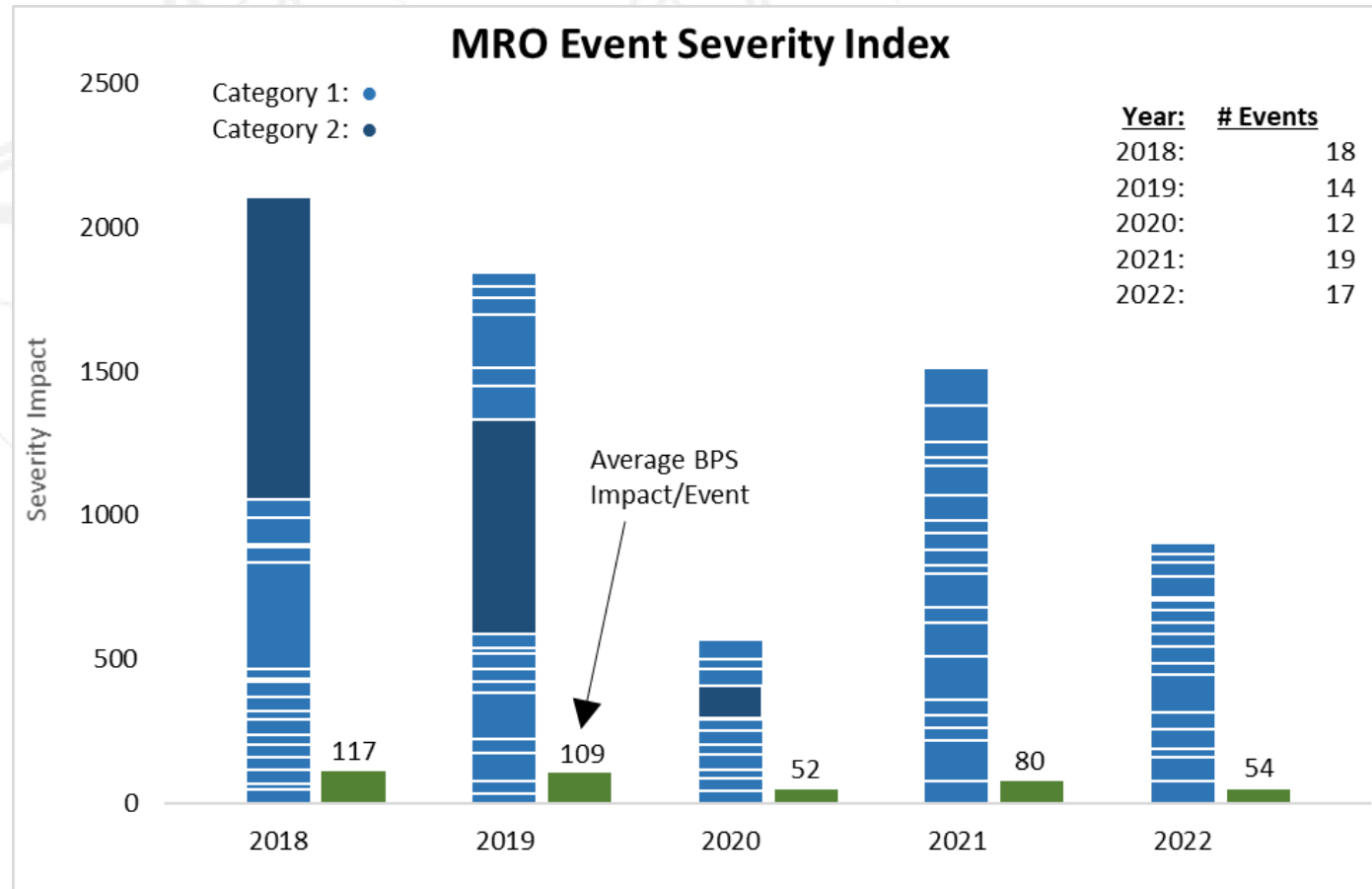
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# BES Event Analysis (EA)

- Data is collected and analyzed based on MRO regional footprint.
- Review historical performance of bulk power system events.
- Follows the [ERO Event Analysis Process](#).
- Registered Entity develops a brief report.
- Perform root cause analysis.
- Provide recommendations and lessons learned.

# BES Event Analysis (EA)



MRO Event Severity Index

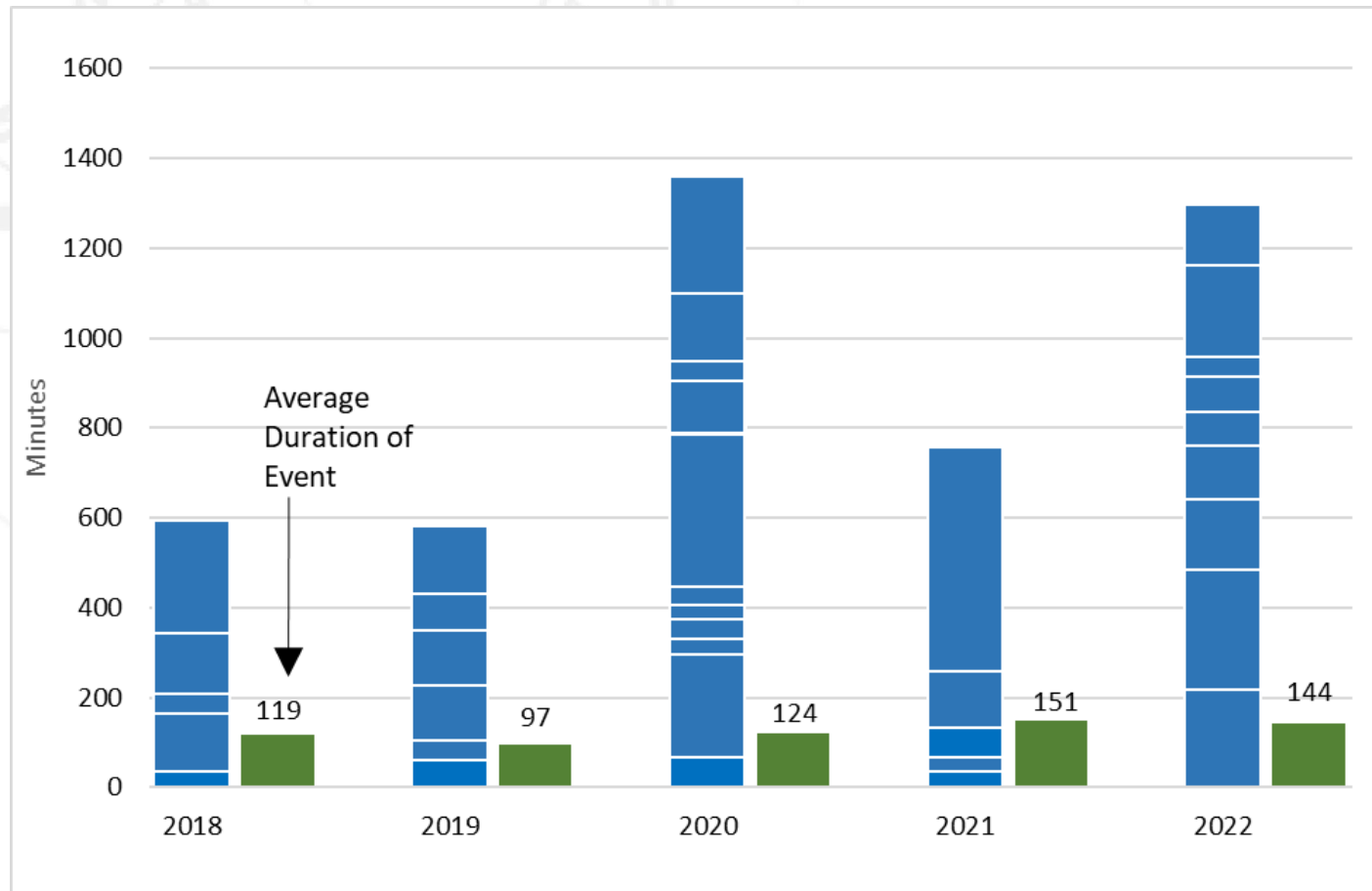


# **BES Event Analysis (EA)**

- **Total of 17 transmission events from Jan. 2022 thru Dec. 2022.**
- **2 of 17 events occurred in summer 2022.**
- **All of the summer events related to unintended operation of protection systems.**
- **3 EMS event occurred in summer 2022.**



# BES Event Analysis (EA)



Loss of EMS Event Time Duration

# Energy Emergency Alerts (EEA)

- Energy Emergency Alerts (EEAs) are issued by RCs per [EOP-011-2.](#)
- 2 EEA Level 2 alert issued during June 2022
- 2 EEA Level 2 alert issued during July 2022
- 1 EEA Level 1 alert issued during August 2022
- All events had no firm load shed



**For more information, please contact:**

Max Desruisseaux  
Senior Power Systems Engineer  
[Max.Desruisseaux@mro.net](mailto:Max.Desruisseaux@mro.net)

# Questions



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# David Kuyper

## Power Systems Engineer II

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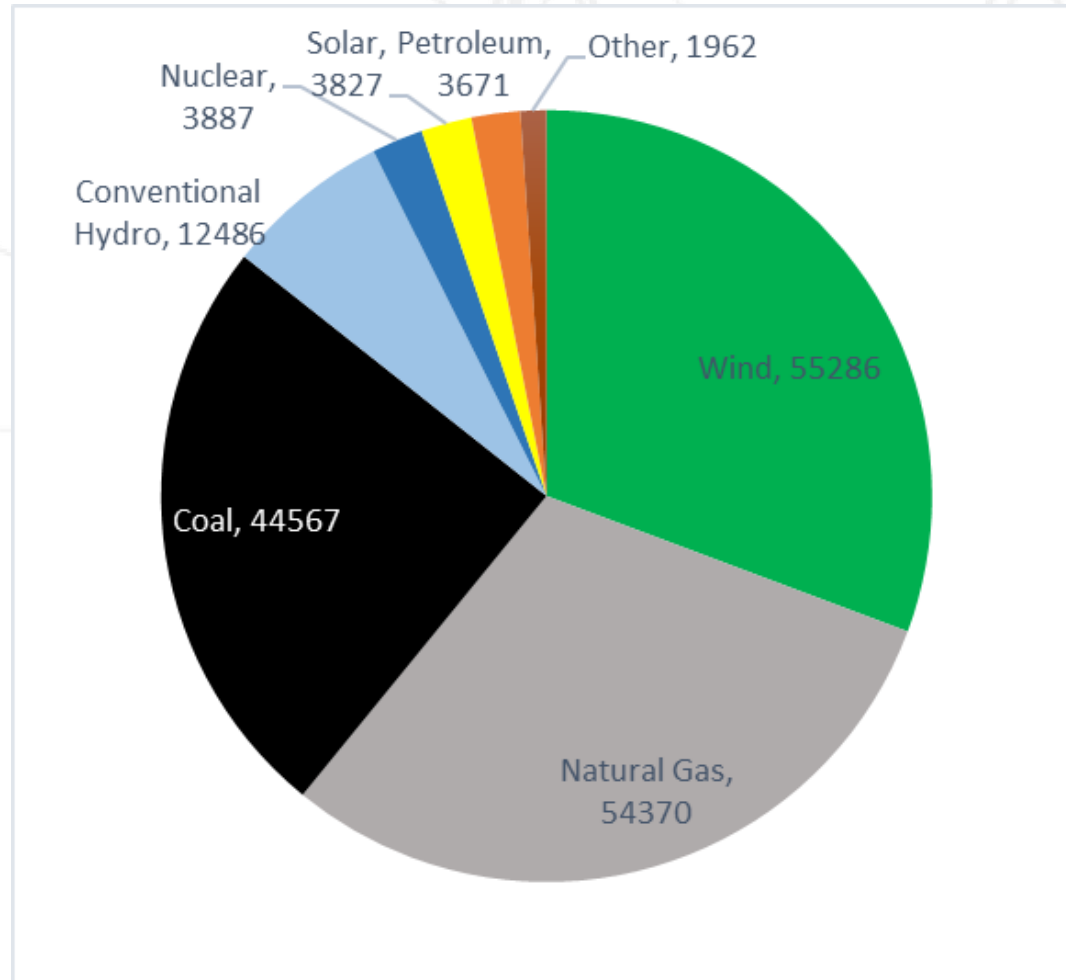
RESULTS



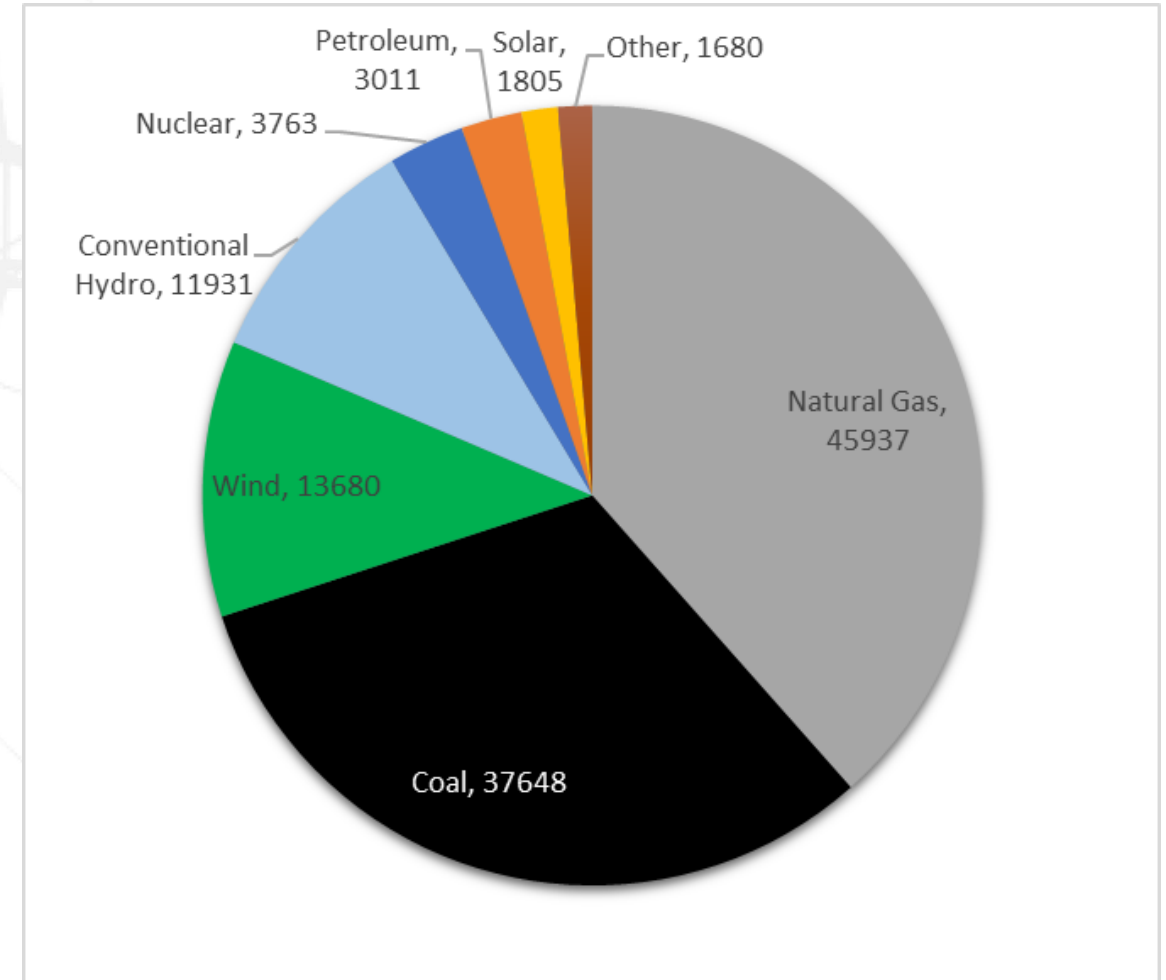
# Generator Availability Data System (GADS)

- Data is collected and analyzed based on MRO regional footprint.
- Review historical performance on conventional generators 20 MW and larger, and wind turbine 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

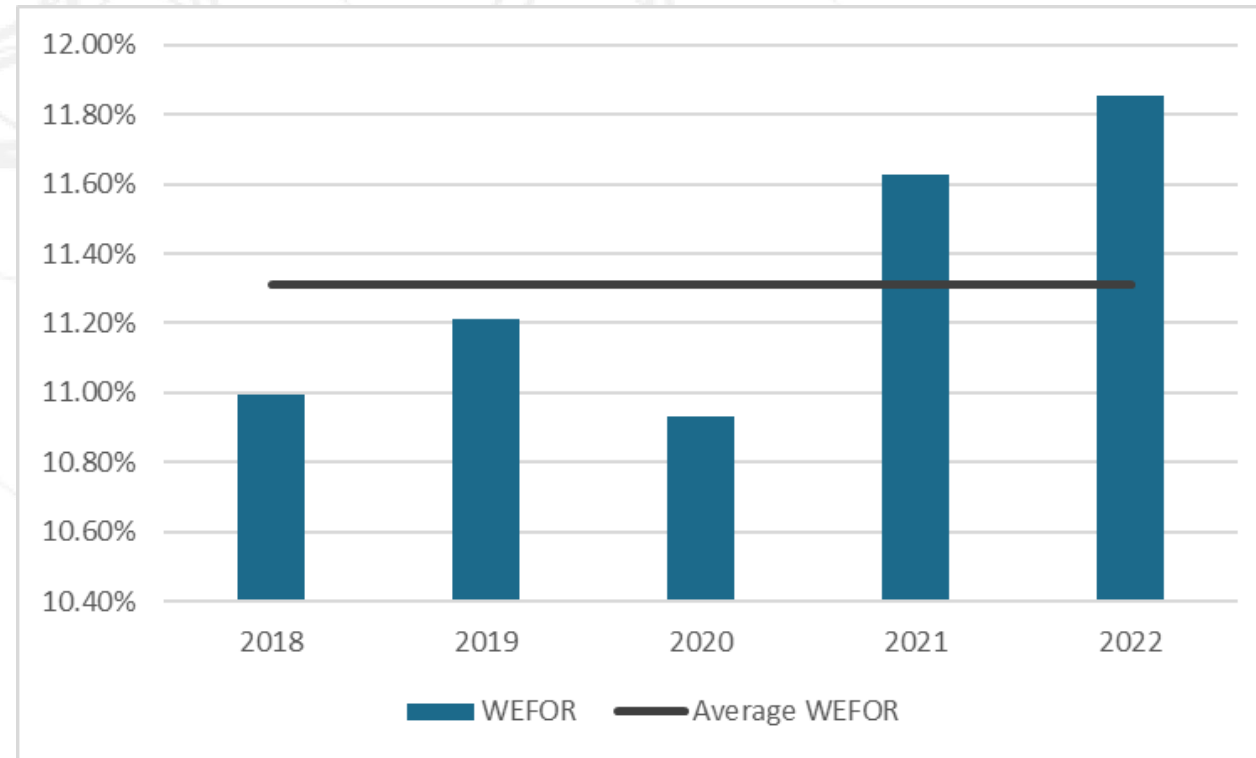


MRO 2023 Summer Nameplate



MRO 2023 Summer Peak Capacity

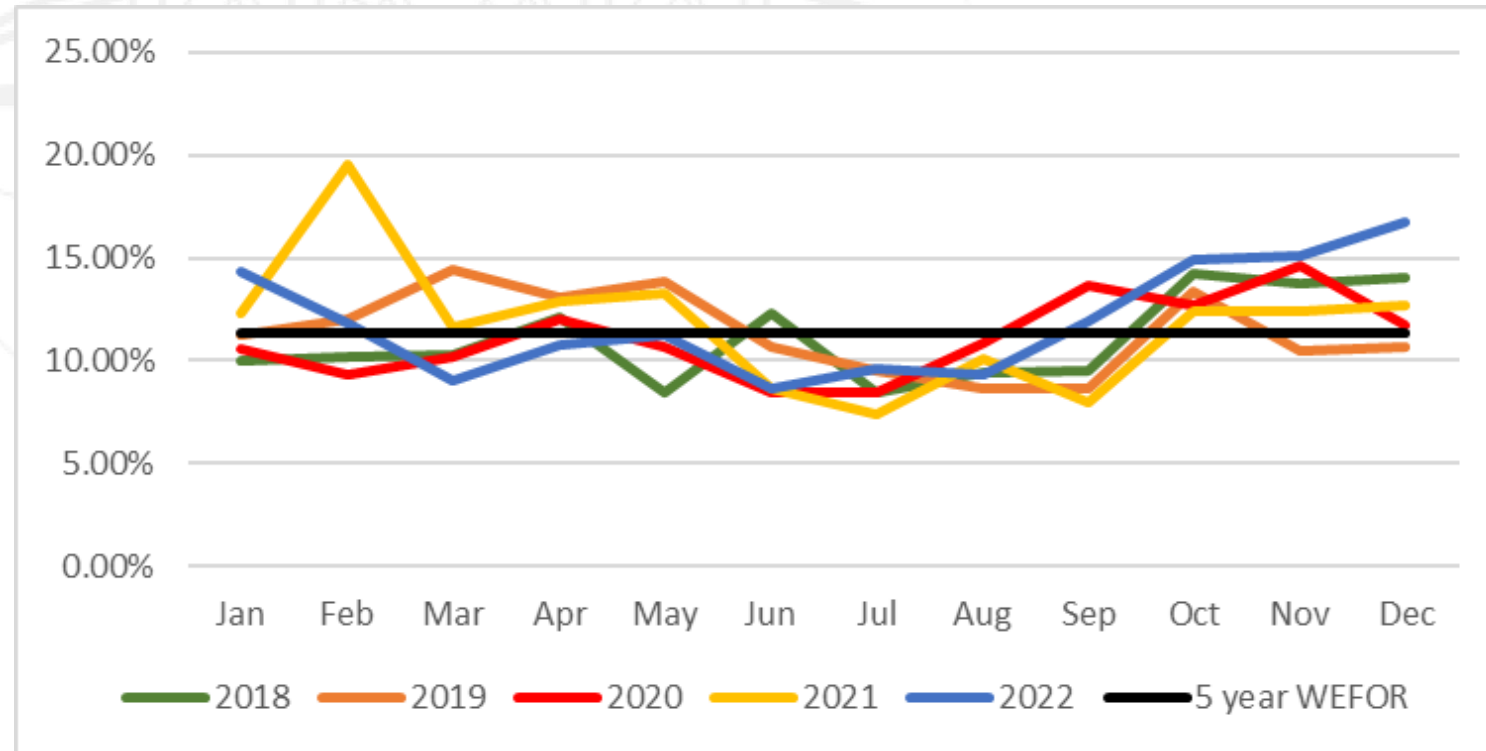
# Generator Availability Data System (GADS)



MRO Annual Generator MW-Weighted EFOR

- Long term trends continue to indicate increasing EFOR rates.

# Generator Availability Data System (GADS)

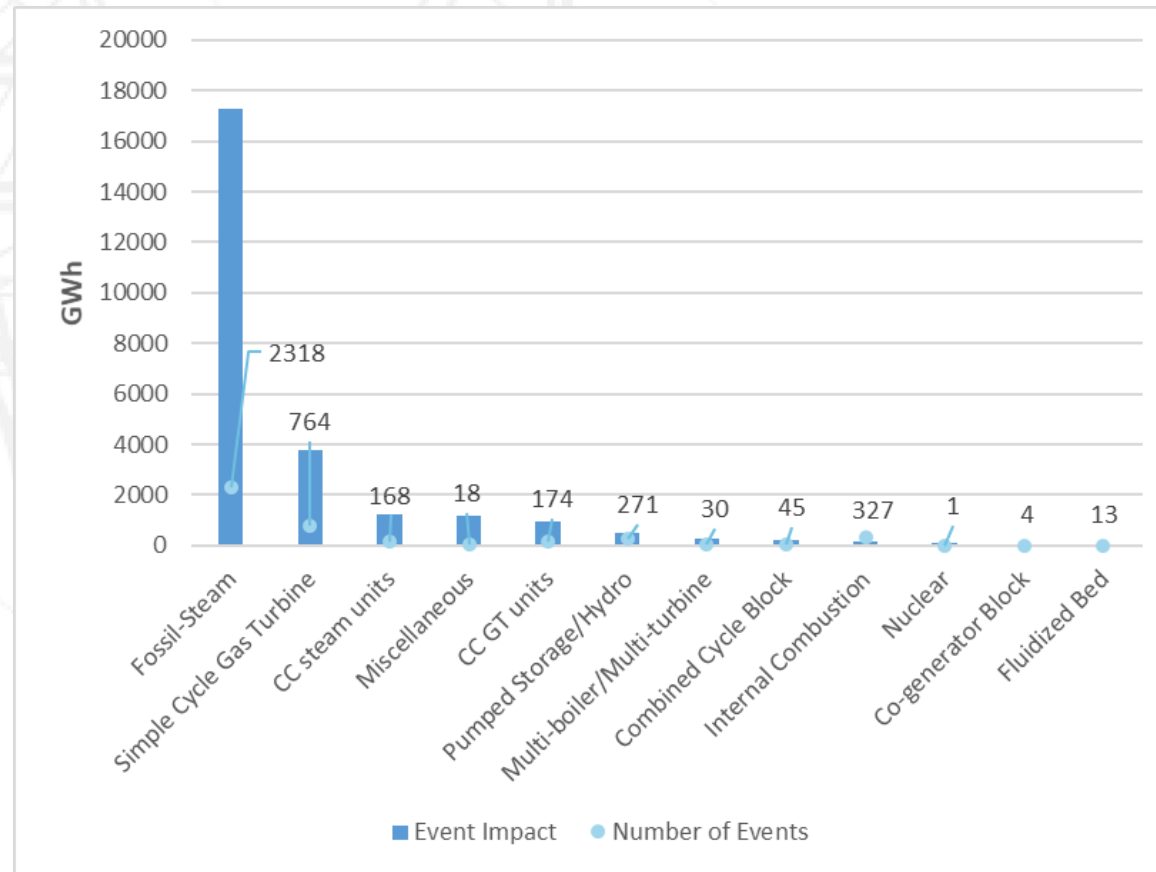


MW-Weighted EFOR By Month

# **Generator Availability Data System (GADS)**

- **2022 summer saw higher generator event impact than last summer**
- **Fossil steam had higher event impacts and increased WEFOR percentages in August and September**
- **Fossil-steam generation showed high event impact but overall have lower impact to the BES**
- **Top 5 2022 Summer Cause Types: Waterwall, Unit Auxiliaries Transformer, First Reheater, Buckets or Blades C and Circulating Water Pumps**

# Generator Availability Data System (GADS)



Total Event Impact and Number of Event Impact for Summer 2022





**For more information, please contact:**

David Kuyper  
Power System Engineer II  
[David.Kuyper@mro.net](mailto:David.Kuyper@mro.net)

# Questions



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# John Grimm

## Principal Systems Protection Engineer

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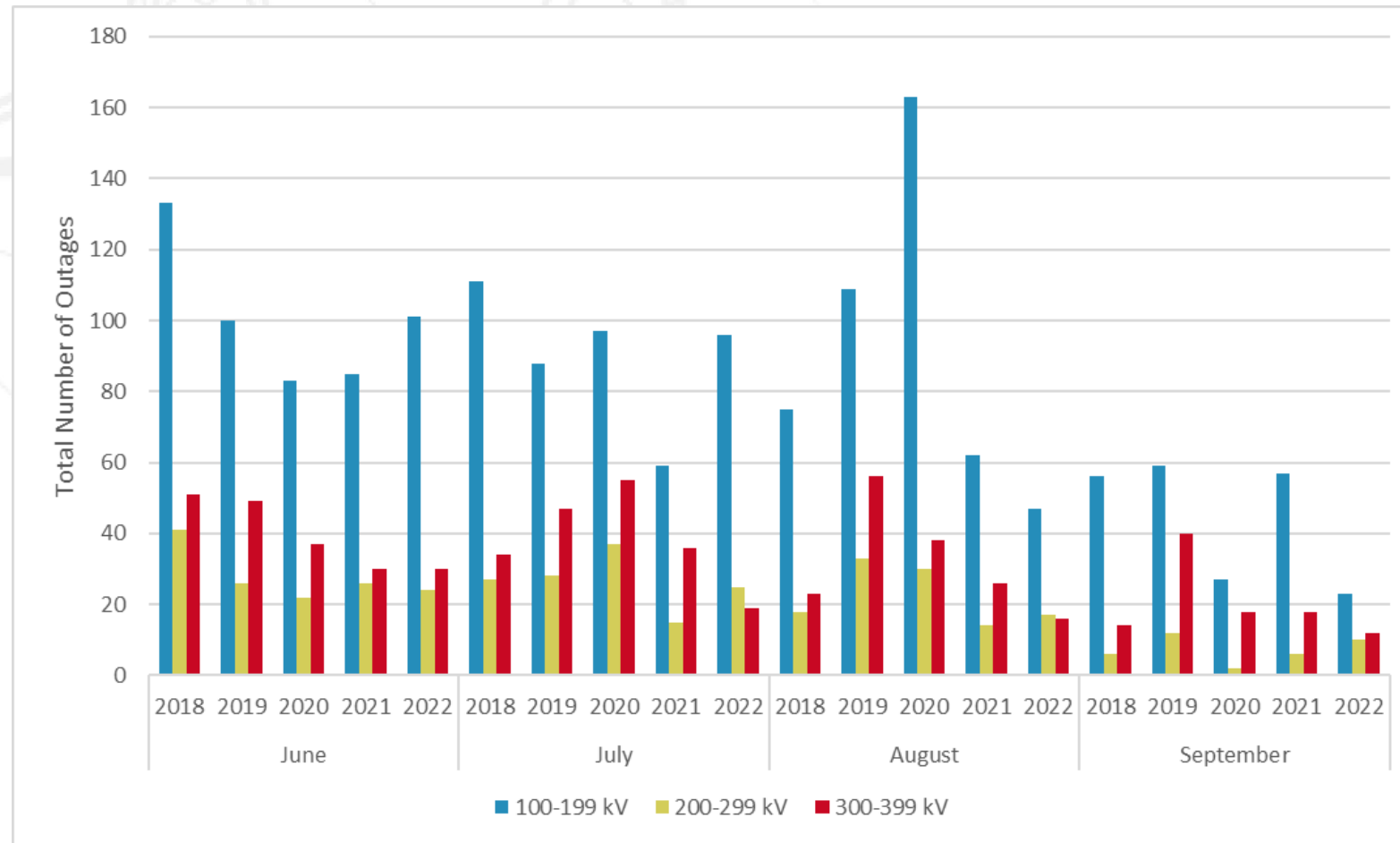
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# **Transmission Availability Data System (TADS)**

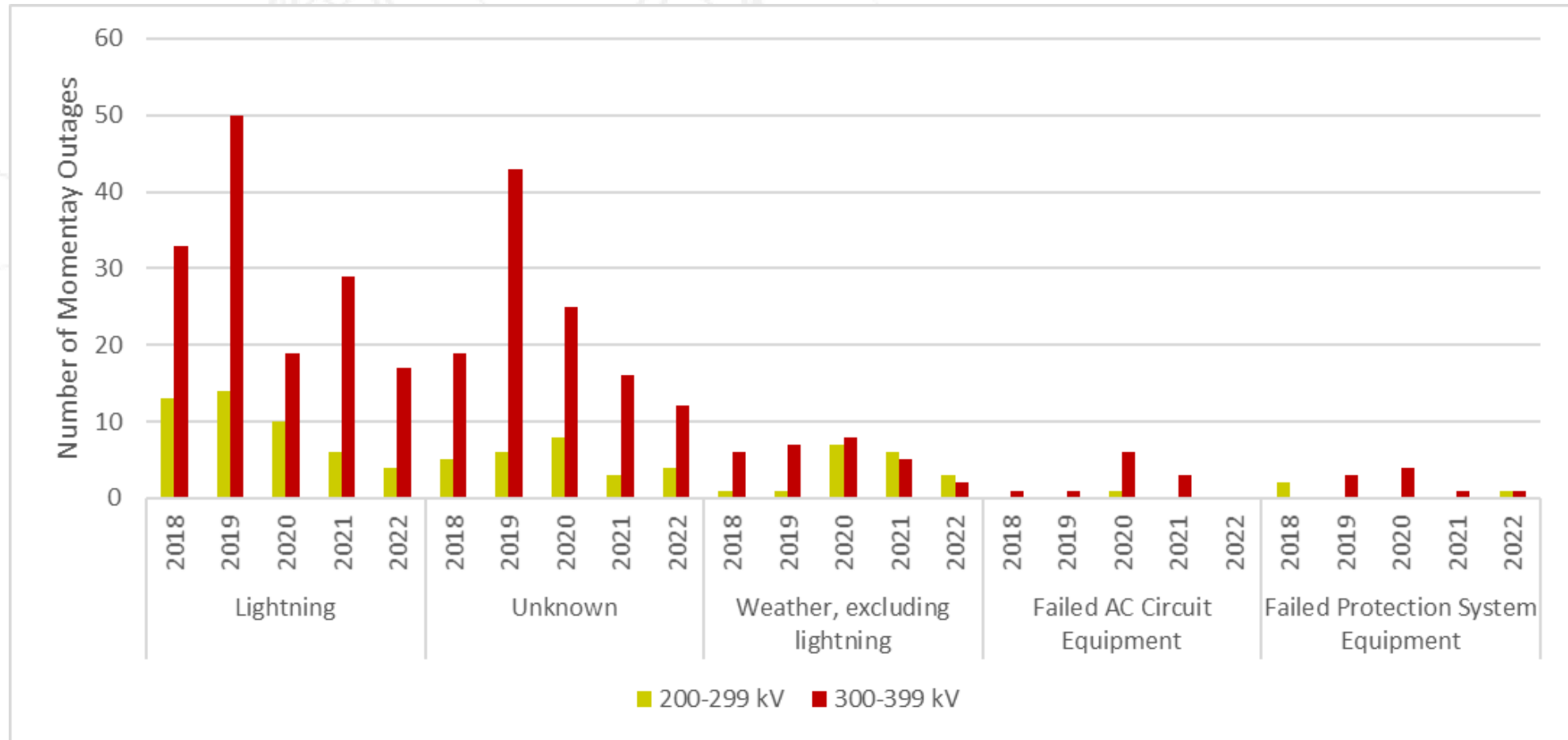
- **Data is collected and analyzed based on MRO regional footprint.**
- **Review historical performance on transmission lines and transformers 100-kV and above.**
- **Collected per Section 1600 data request.**

# Transmission Availability Data System (TADS)



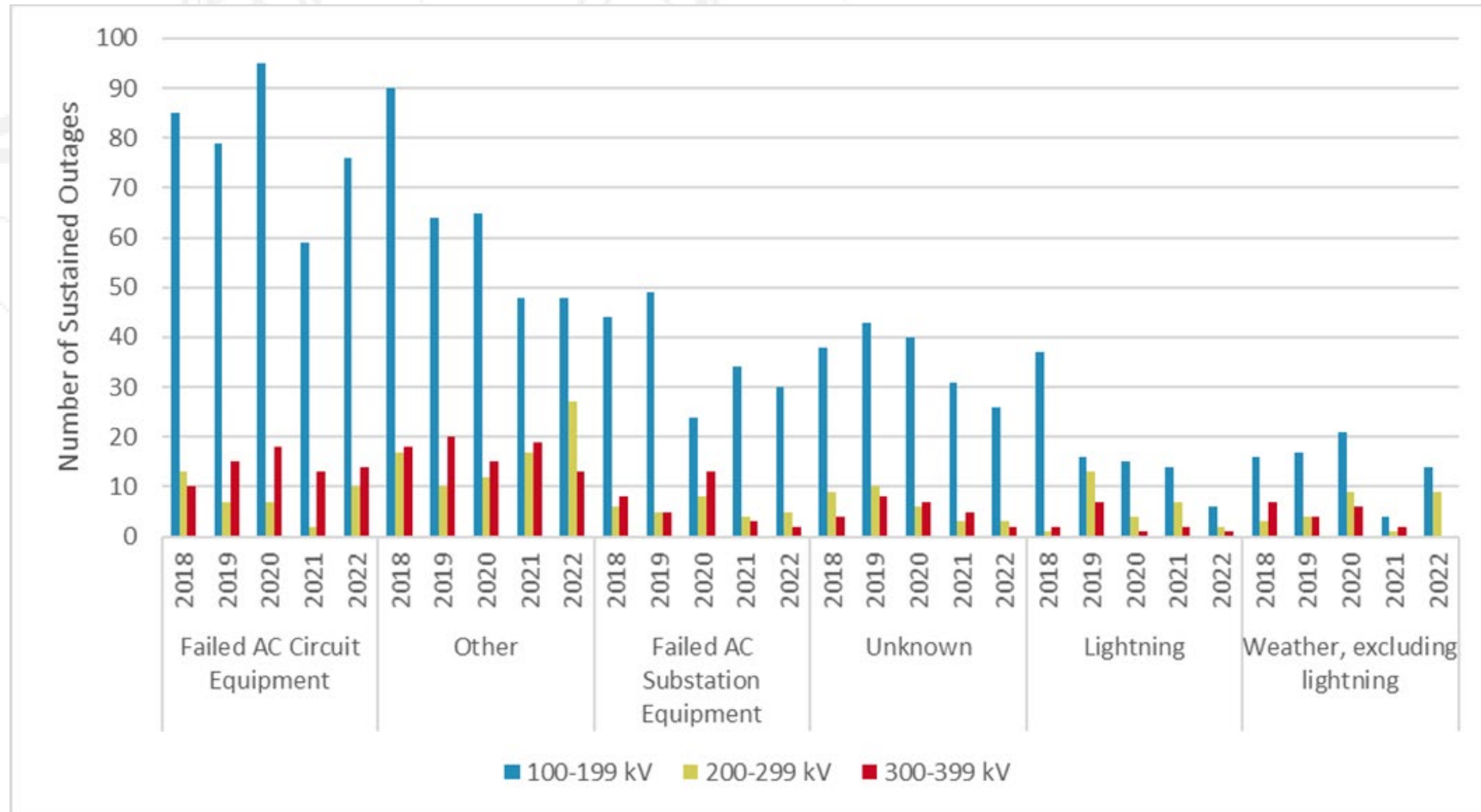
Summer 2018-2022 Automatic Outages by Month

# Transmission Availability Data System (TADS)



Summer 2022 Momentary Outages by Cause

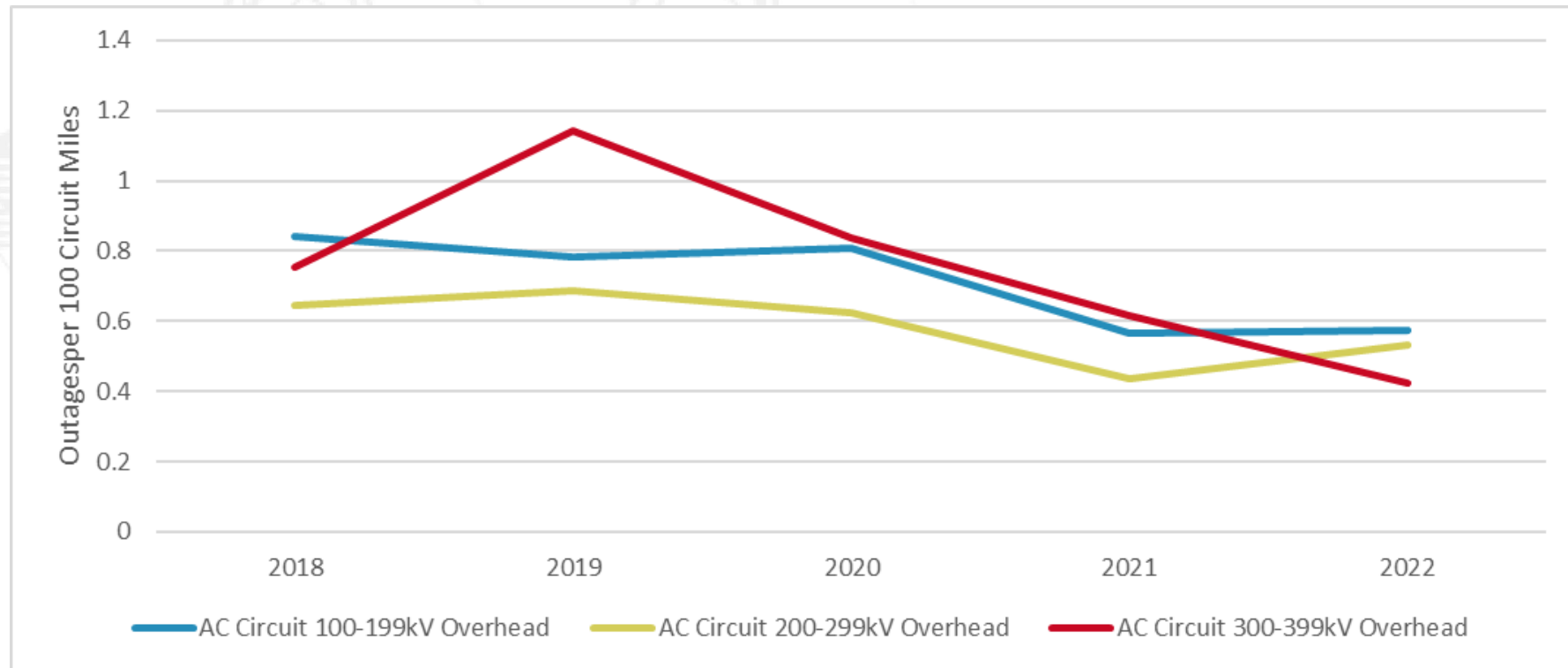
# Transmission Availability Data System (TADS)



Summer 2022 Sustained Outages by Cause



# Transmission Availability Data System (TADS)



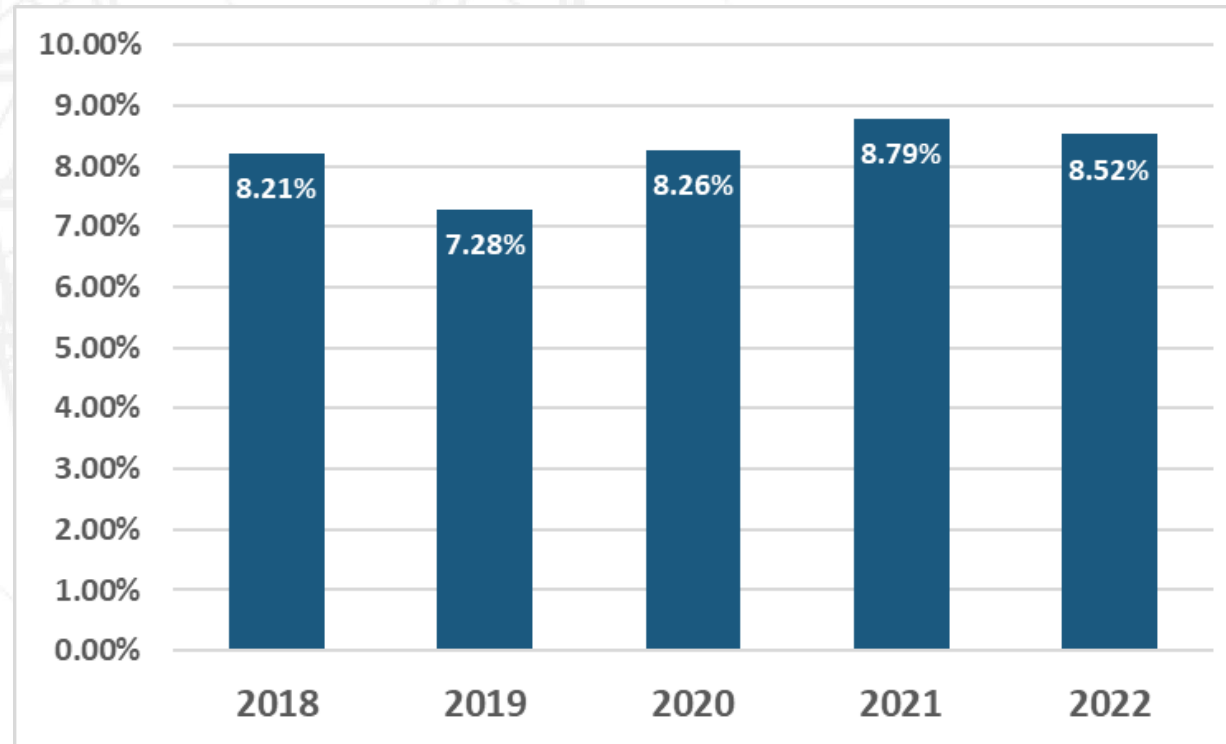
Summer Total Transmission Outages per 100 Circuit Miles

- Decreasing outages for 2020-2021 summer and levelling off in 2022
- High momentary outages for 300-399kV circuits in 2019

# Misoperations Information Data Analysis System (MIDAS)

- Data is collected and analyzed based on MRO regional footprint.
- Review historical performance on protection system operations and misoperations.
- Collected per Section 1600 data request.

# Misoperations Information Data Analysis System (MIDAS)

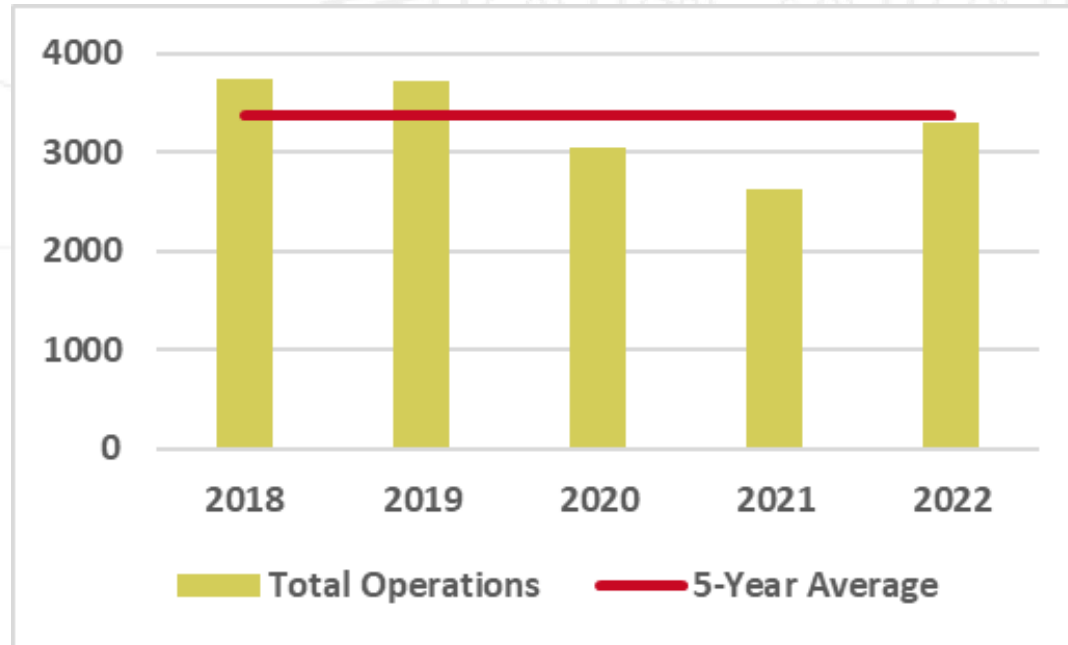


- Upward trend seen in 2020 and 2021 did not continue in 2022
- Total protection system operations increased about 25 percent and total misoperations increased approximately 22 percent.

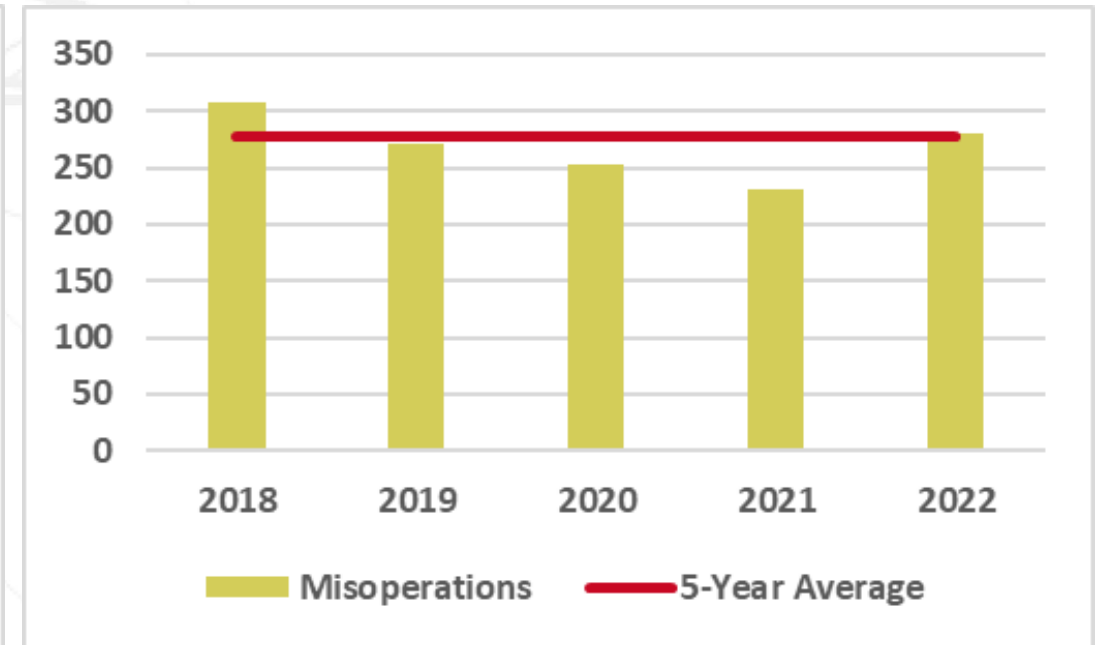
Misoperation Rate = (No. of Misoperations / No. of Total Operations) X 100%



# Misoperations Information Data Analysis System (MIDAS)

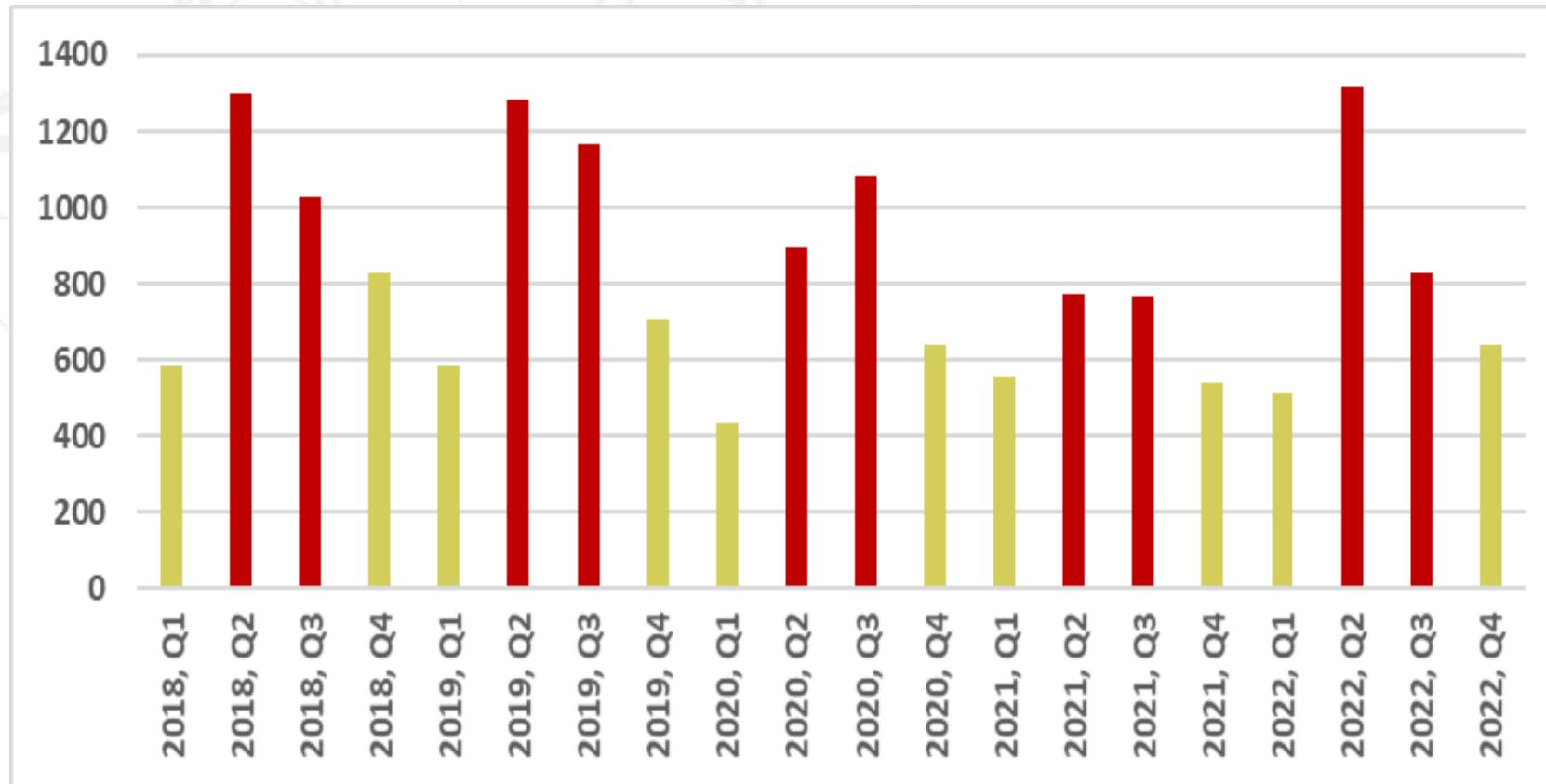


Protection System Operations by Year



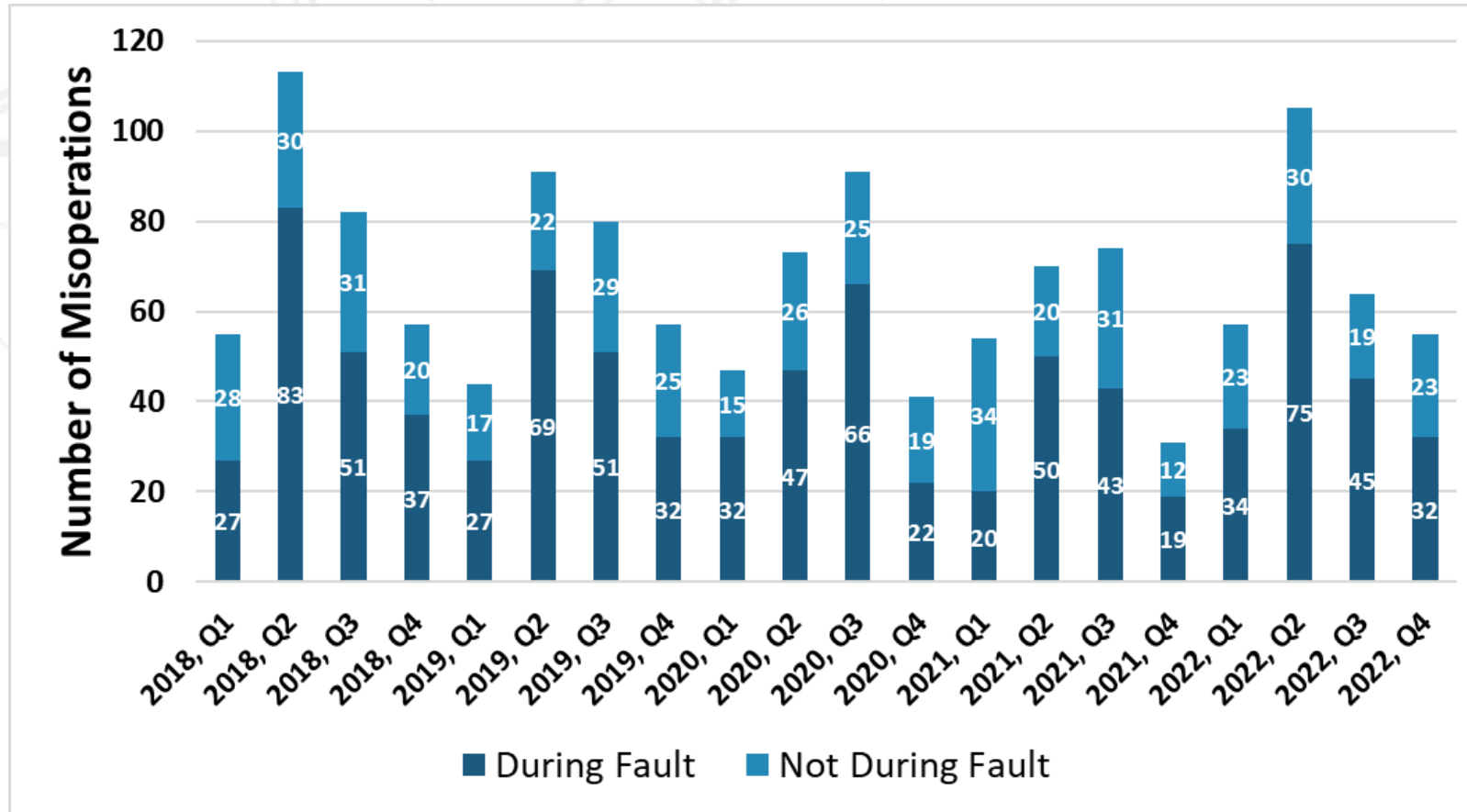
Misoperations by Year

# Misoperations Information Data Analysis System (MIDAS)



Total Operations (Spring/Summer vs. Autumn/Winter)

# Misoperations Information Data Analysis System (MIDAS)

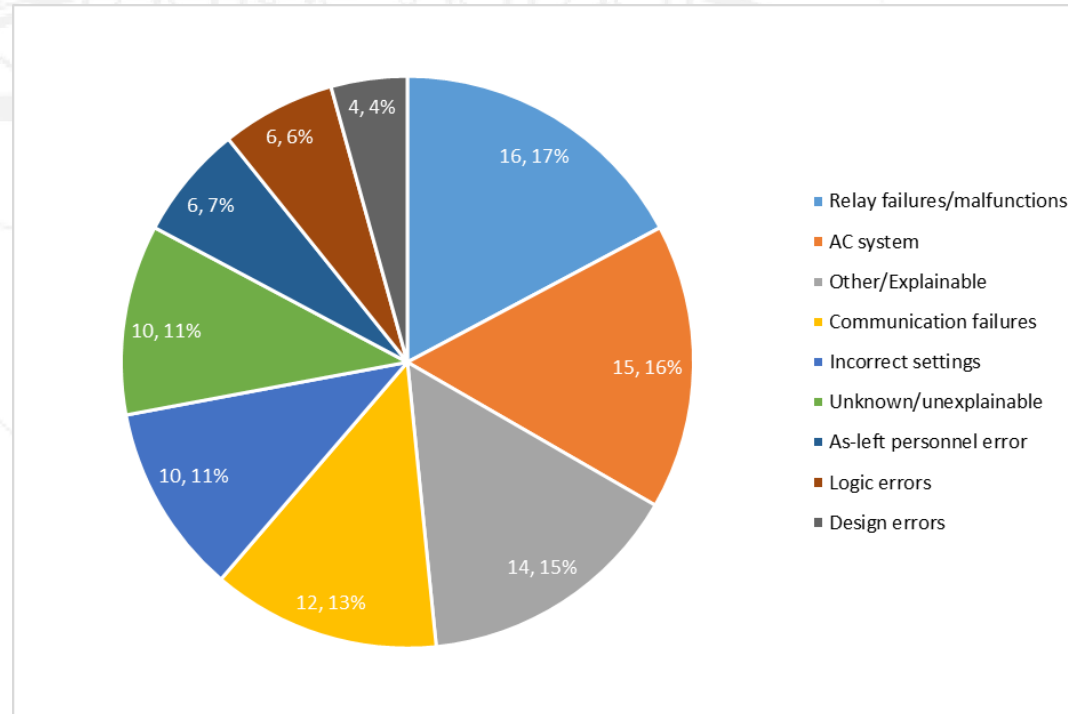


Fault Associated and Non-Fault Associated Misoperations





# Misoperations Information Data Analysis System (MIDAS)



Summer 2022 Misoperations by Cause

- Total 93 misoperations between June 1, 2022 and September 30, 2022
- 28% were attributable to Human Errors



**For more information, please contact:**

John Grimm  
Principal Systems Protection Engineer  
[John.Grimm@mro.net](mailto:John.Grimm@mro.net)

# Questions

# Thank you for attending this event!

- Please provide your feedback using the QR code below:



<https://www.surveymonkey.com/r/6WXSCSV>



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