



MIDWEST
RELIABILITY
ORGANIZATION

MRO 2022 REGIONAL SUMMER ASSESSMENT

MRO Reliability Analysis Department

June 30, 2022

10:00 a.m. – 11:00 a.m. Central

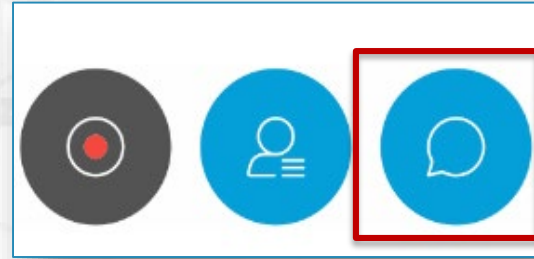
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WebEx Chat Feature

Open the Chat Feature:



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

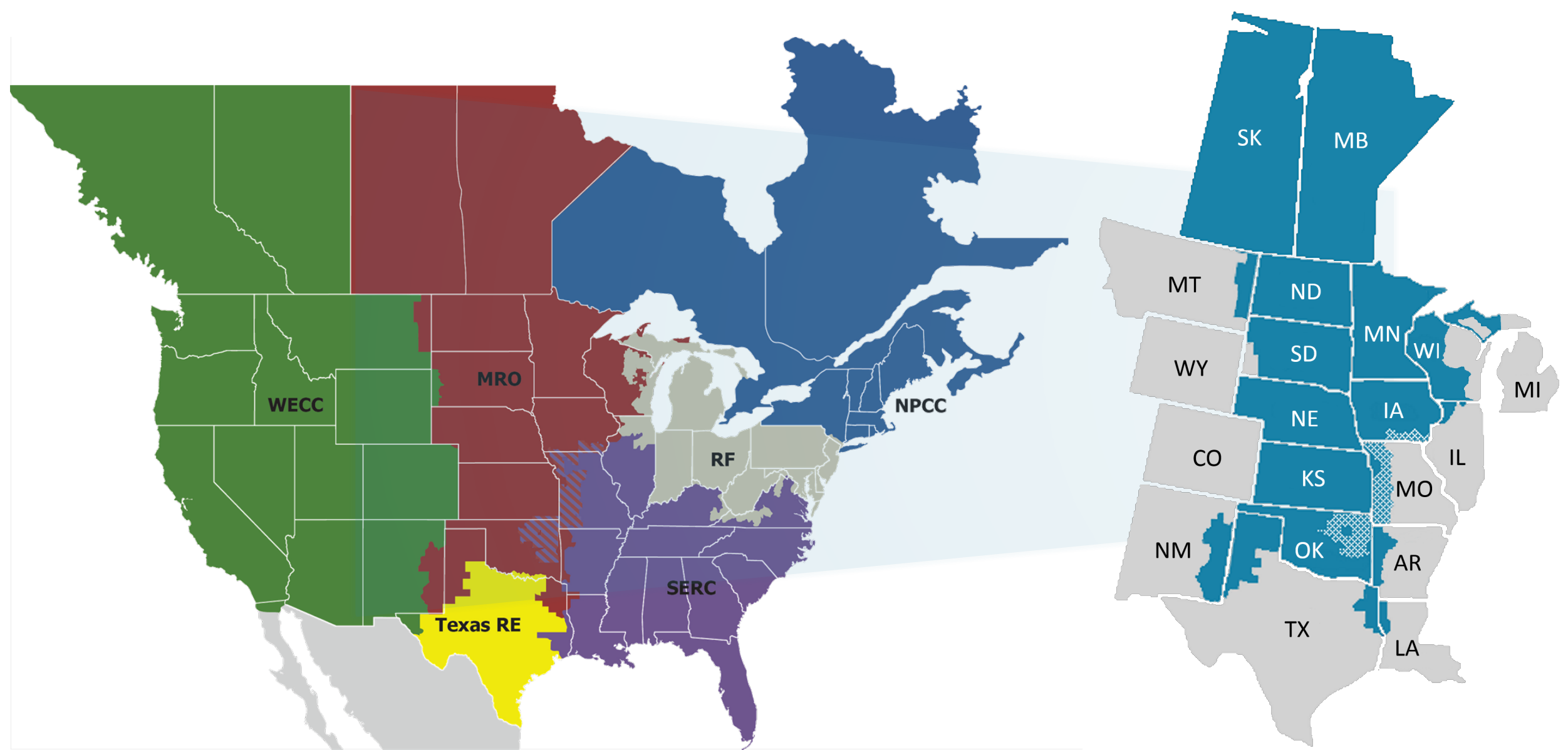
Attendees should chat their questions to: “MRO Host”.

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



MRO 2022 Regional Summer Assessment

Areas at elevated or high risk that will require increased monitoring during the 2022 summer season

Balancing Authority Risk Areas

Midcontinent ISO (MISO)

High Risk. Capacity shortfalls are anticipated in North and Central areas of MISO's footprint during peak summer conditions, which may result in temporary, controlled load shedding. This is primarily the result of a decrease in generation capacity of 3.2 GW compared to the 2021 summer season and an increase of 1.7% in projected peak demand.

Manitoba Hydro (MH)

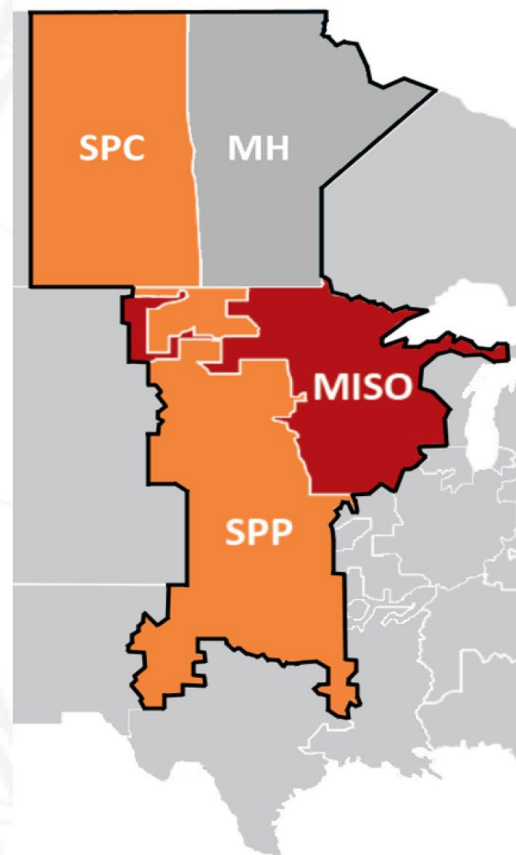
Low Risk. Anticipated resources are sufficient to meet reserve margin requirements under normal and extreme demand scenarios for the 2022 summer season.

Saskatchewan Power Corp. (SPC)

Elevated Risk. A 7.5% increase in peak demand projections related to economic load growth returning to pre-pandemic levels, increased oil and gas development activities, and revised forecast methodology for capturing summer peak demands, place SPC at greater risk for energy emergencies during periods of high demand.

Southwest Power Pool (SPP)

Elevated Risk. Drought conditions impacting the Missouri River and other water sources relied upon by SPP entities for generation and once-through cooling processes could lead to reduced output require emergency procedures to meet peak demand during periods of high generator unavailability due to insufficient cooling water.



Risk Definitions



High Risk

Resources are potentially insufficient to meet peak load during both normal and extreme conditions.



Elevated Risk

Resources are likely sufficient to meet peak load during normal conditions, but potentially insufficient during extreme conditions.



Low Risk

Resources are sufficient to manage normal summer peak demand and are at low risk of energy shortfalls from more extreme demand or generation outage conditions.

Important Trends

- Generation forced outage rates are increasing as a result of component fatigue and an aging fleet, due in part to higher penetrations of intermittent resources that cause conventional generation to cycle more.
- As dependence on intermittent resources increases, there will be a greater need for fast responding dispatchable resources capable of following large unexpected changes in intermittent resource output.
- The time of greatest risk may not be during summer peak periods, especially as the resource mix evolves. The electric power industry needs to 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.

More information on these risks along with mitigation recommendations can be found in the full report here: www.mro.net



About MRO's Reliability Analysis Department

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





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Salva Andiappan

Principal Reliability Assessments Engineer

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About MRO's 2022 Regional Summer Assessment

- **Purpose, Data collection and Review Process**
- **2021 Summer Seasonal Review**
 - 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)
 - Historical Summer Load Forecast and Actuals

Discussion Topics

- **2022 Summer Seasonal Forecast**
 - Anticipated Winter Resource and Peak Demand Scenarios
- **Key Findings**

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 summer season.**



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Max Desruisseaux

Senior Power Systems Engineer

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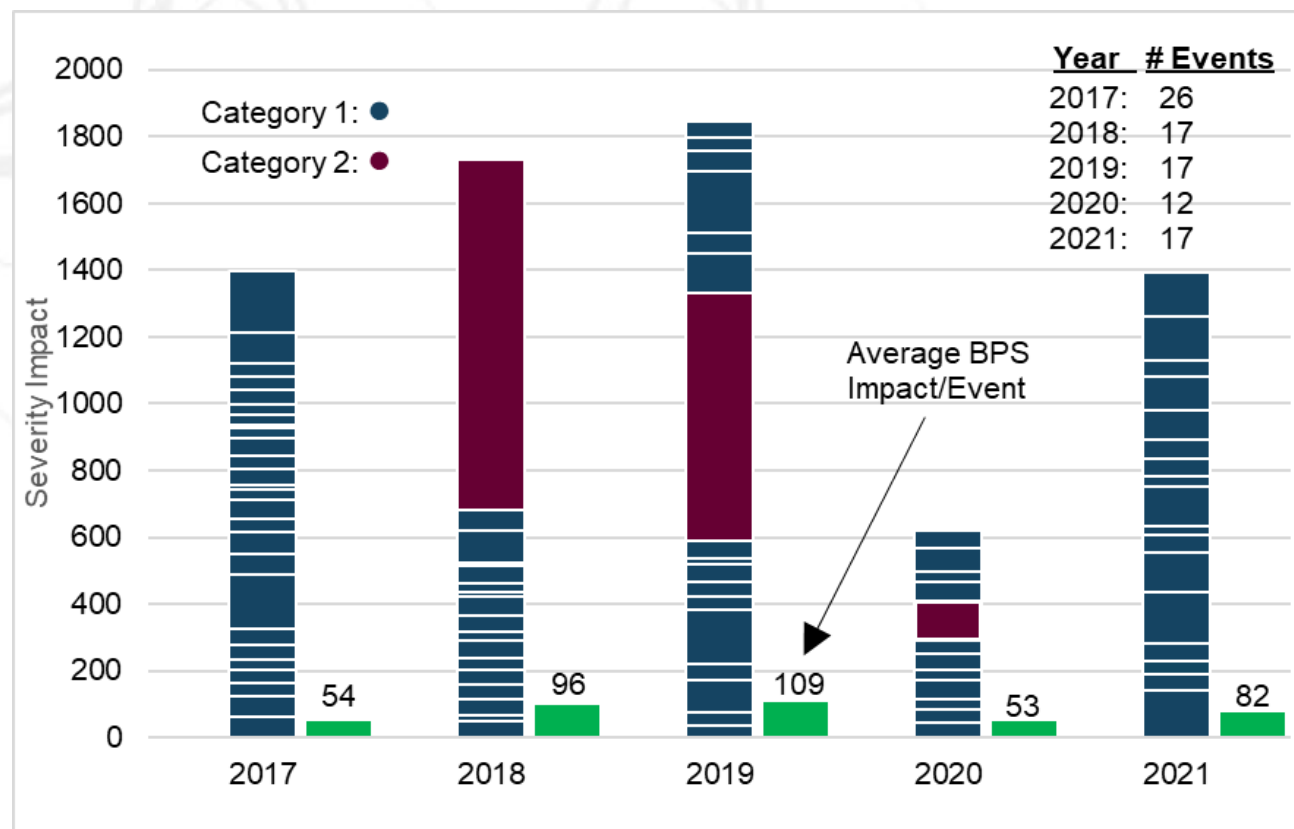
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BES Event Analysis (EA)

- 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



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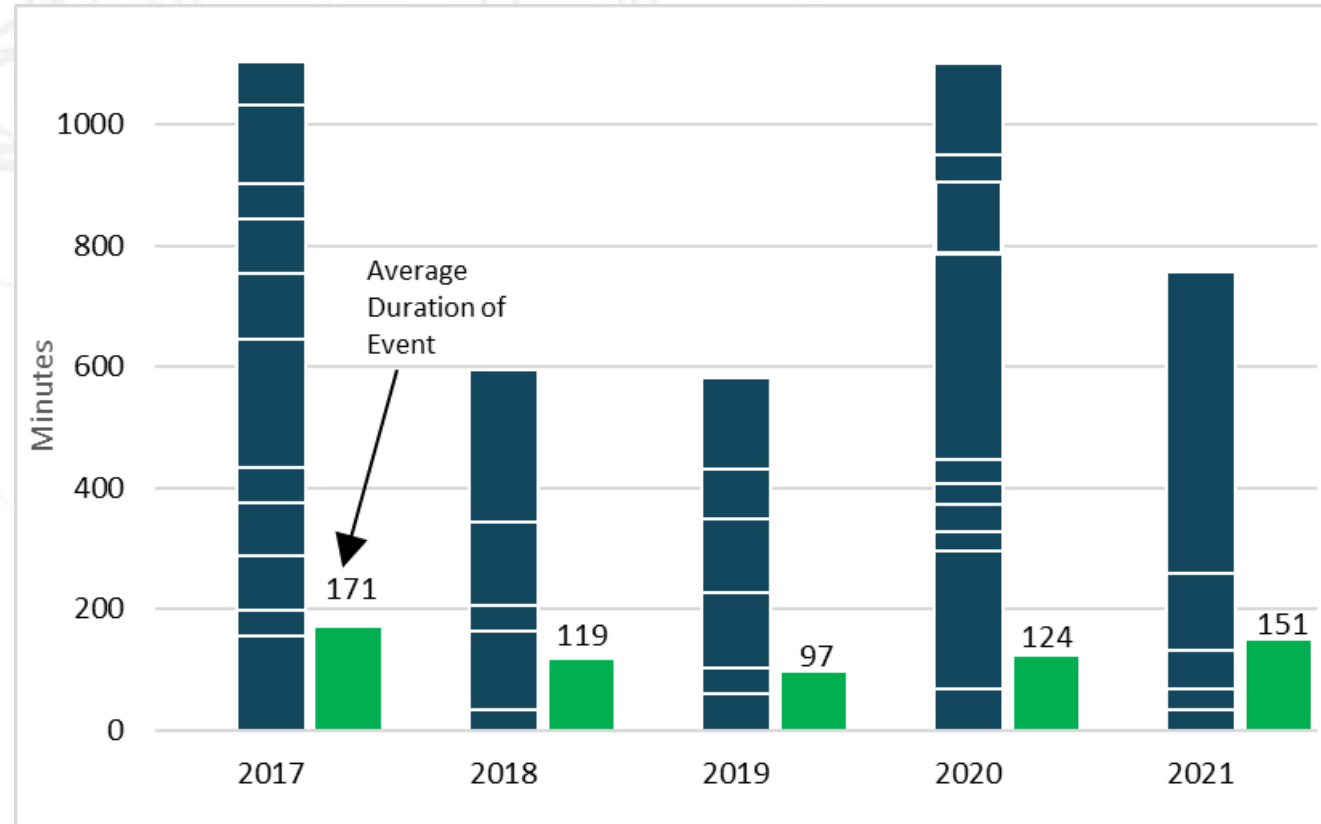
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BES Event Analysis (EA)

- **Total of 17 transmission events from Jan. 2021 thru Dec. 2021.**
- **Six of 17 events occurred in summer 2021.**
- **All of the summer events related to unintended operation of protection systems.**
- **One EMS event occurred in summer 2021.**

BES Event Analysis (EA)



Loss of EMS Event Time Duration

Energy Emergency Alerts (EEA)

- Energy Emergency Alerts (EEAs) are issued by RCs per [EOP-011-1](#).
- One EEA Level 2 alert issued during June 2021.
- One EEA Level 3 alert issued during July 2021.
- Both event had no firm load shed.



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David Kuyper

Power Systems Engineer II

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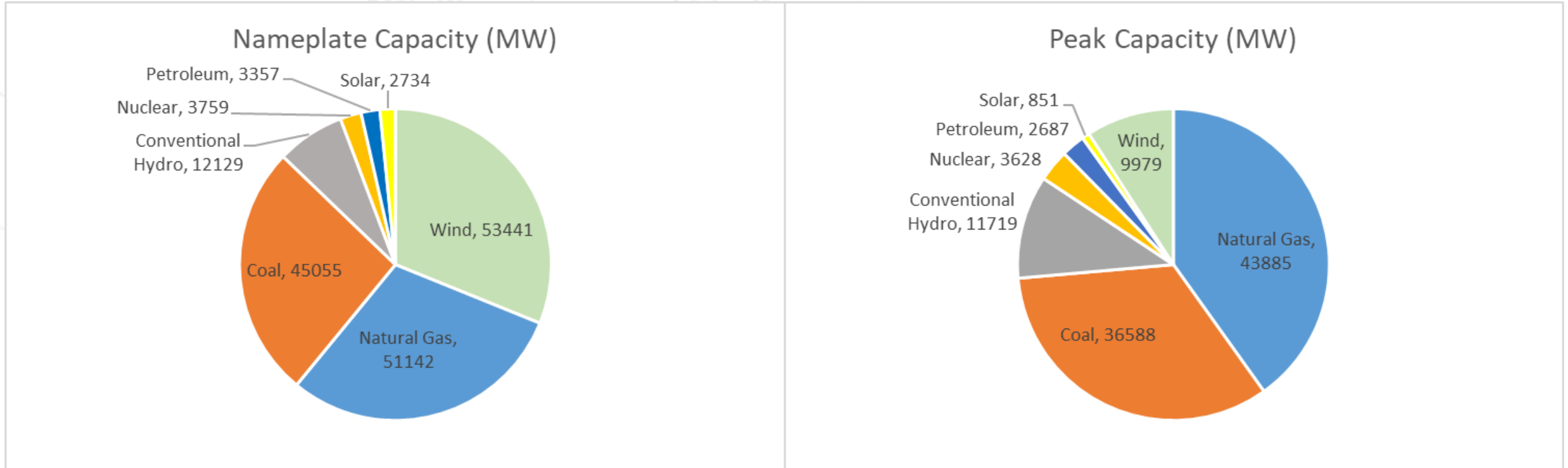
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Generator Availability Data System (GADS)

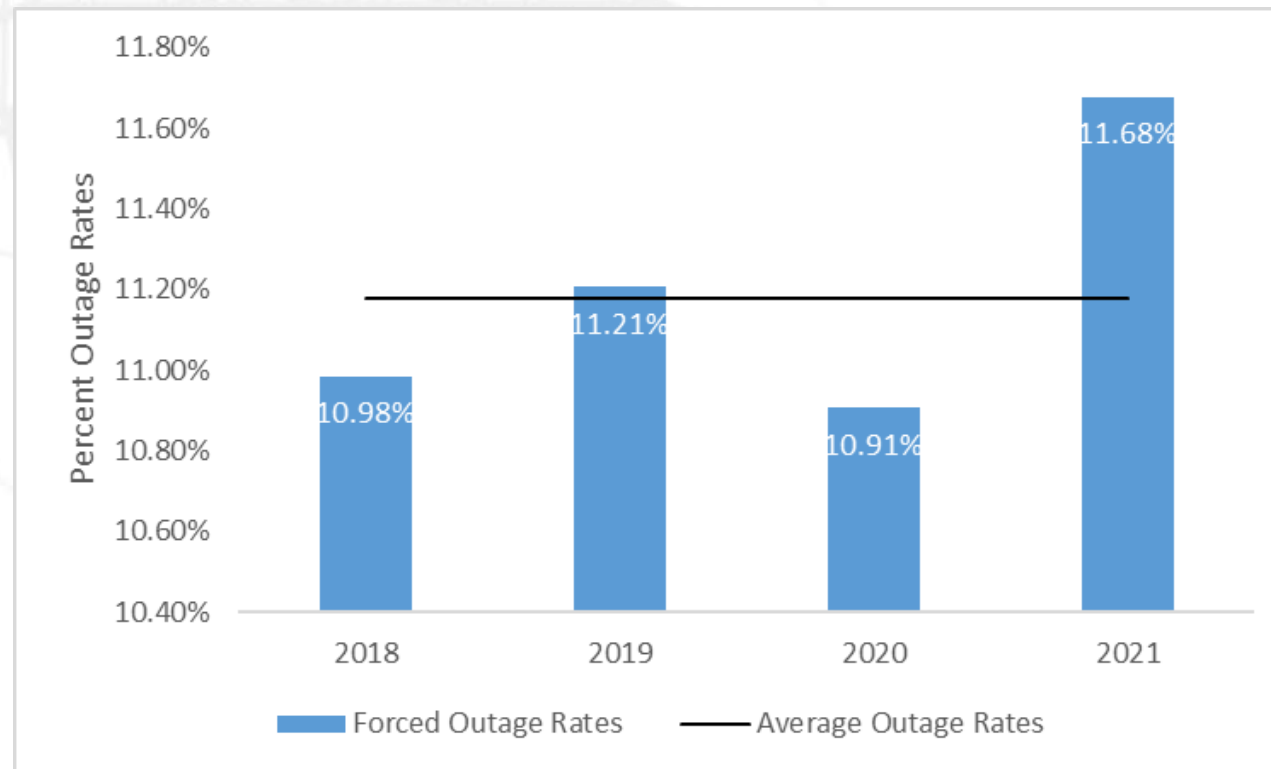
- Collects information on performance of electric generating equipment (conventional generator 20 MW and larger, wind turbine facilities of 75 MW or greater).
- Collected per [Section 1600](#) data request.
- Wind turbine component outage information not included in this assessment until mandatory and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

Resource Mix



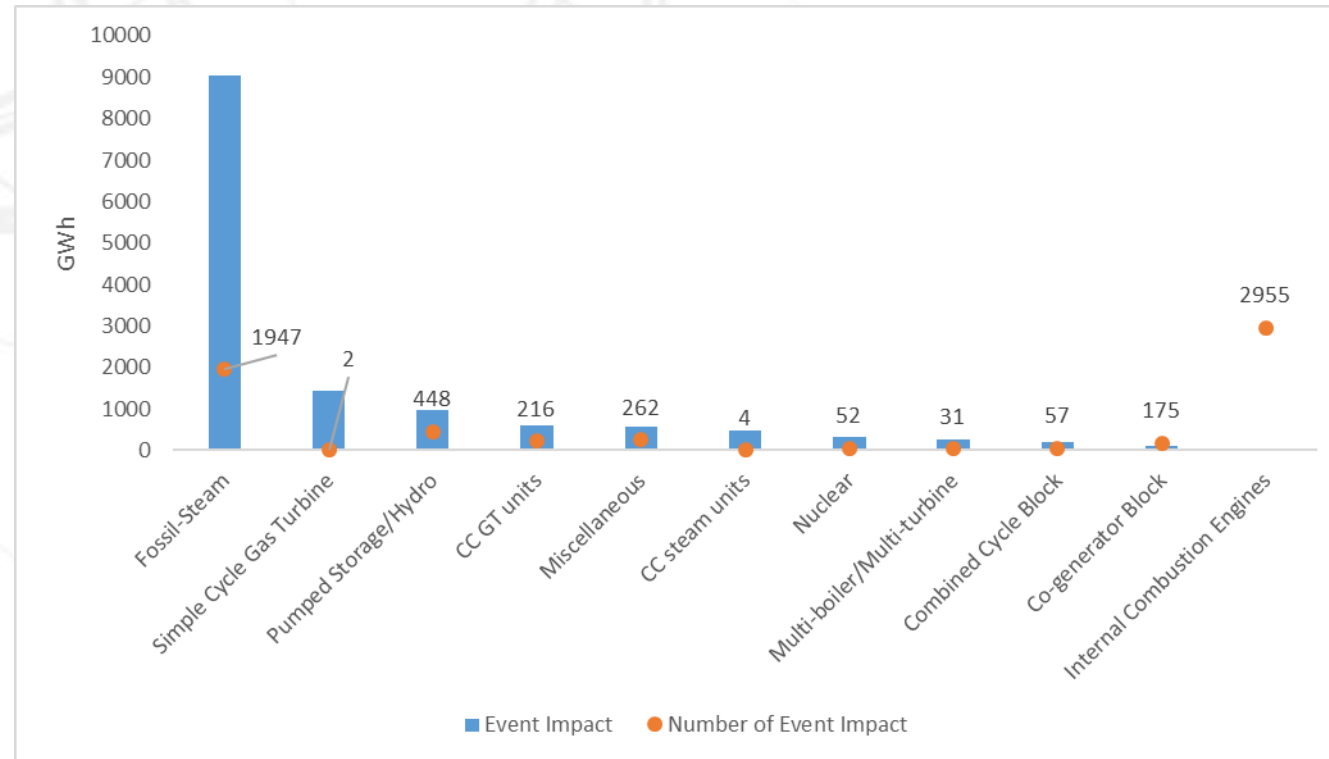
MRO 2022 Summer Nameplate and Peak Capacity by Fuel Types

Generator Availability Data System (GADS)



MRO Annual Generator MW-Weighted EFOR

Generator Availability Data System (GADS)



Total Event Impact and Number of Event Impact for Summer 2021



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John Grimm

Principal Systems Protection Engineer

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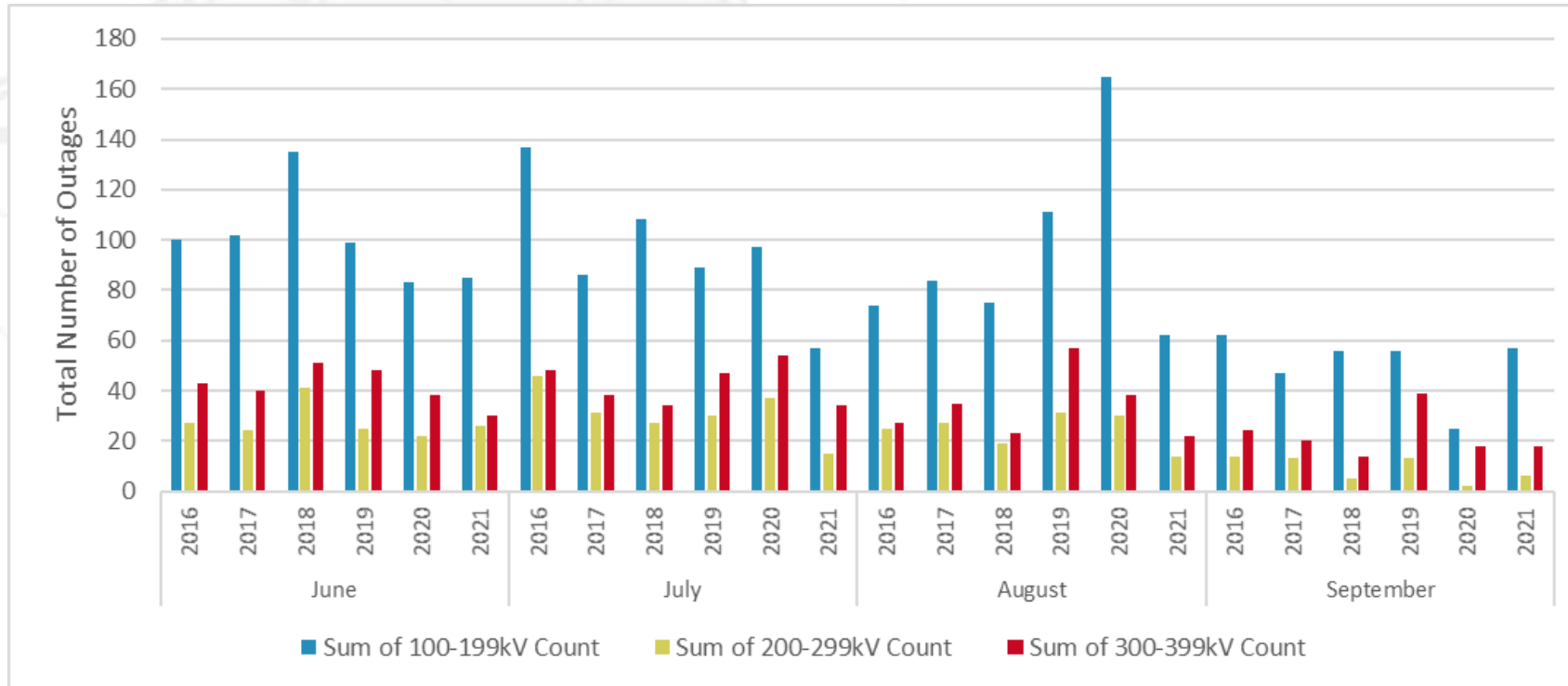
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Transmission Availability Data System (TADS)

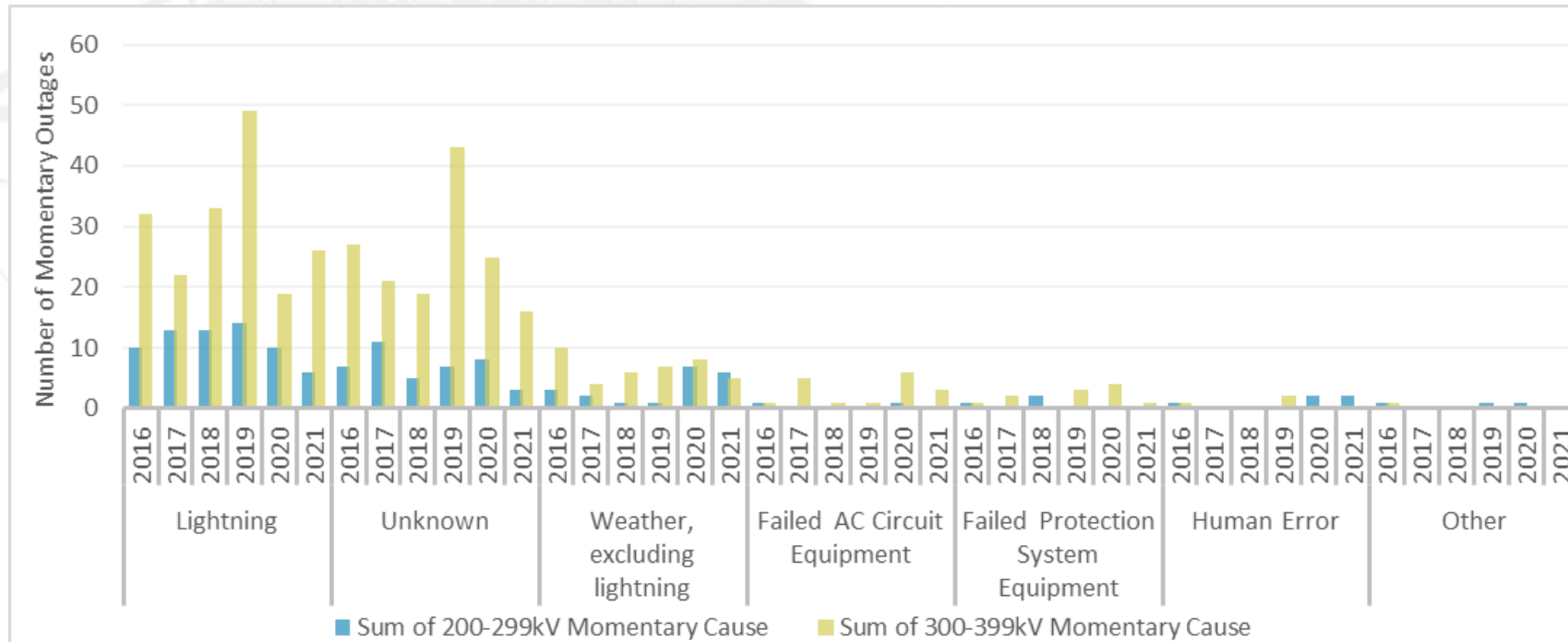
- **Collects information on performance of transmission lines and transformers 100-kV and above.**
- **Collected per Section 1600 data request.**

Transmission Availability Data System (TADS)



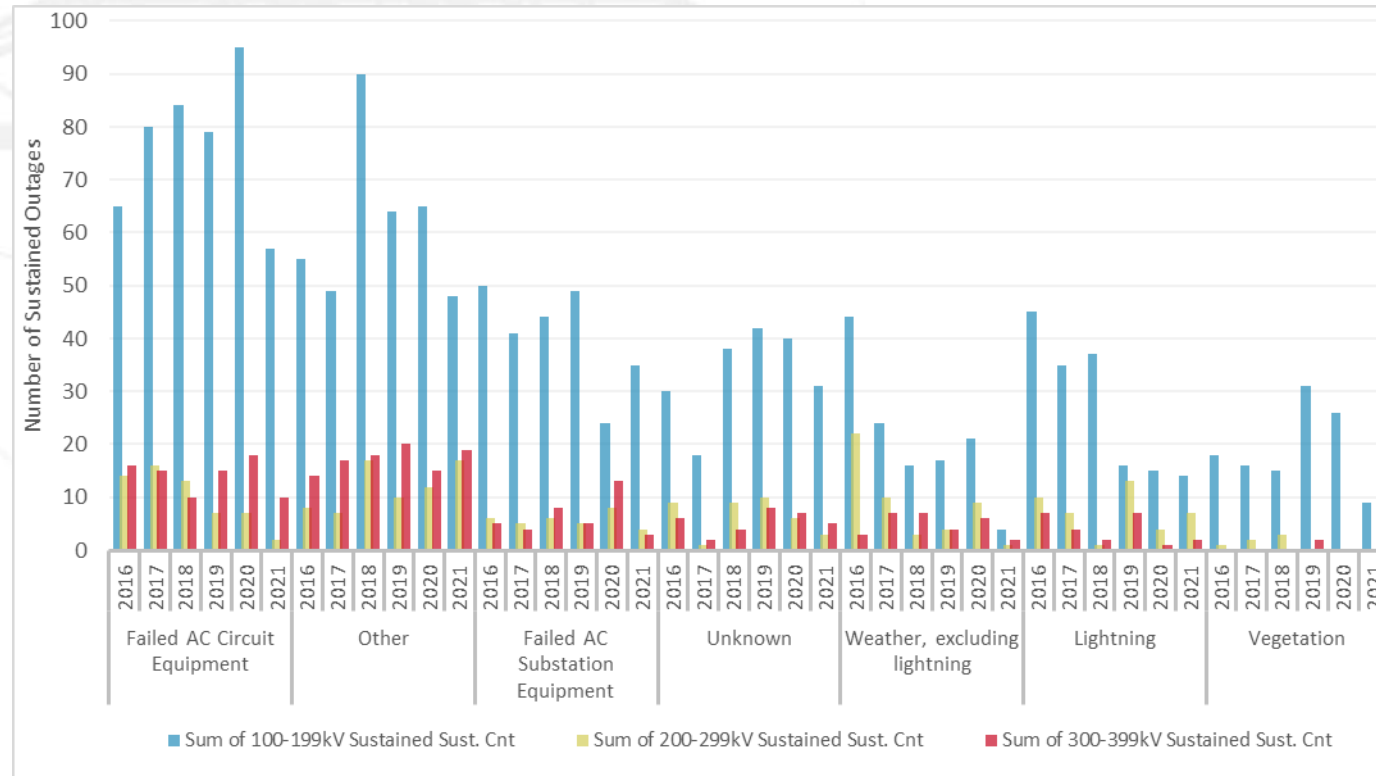
Summer 2021 Automatic Outages by Month

Transmission Availability Data System (TADS)



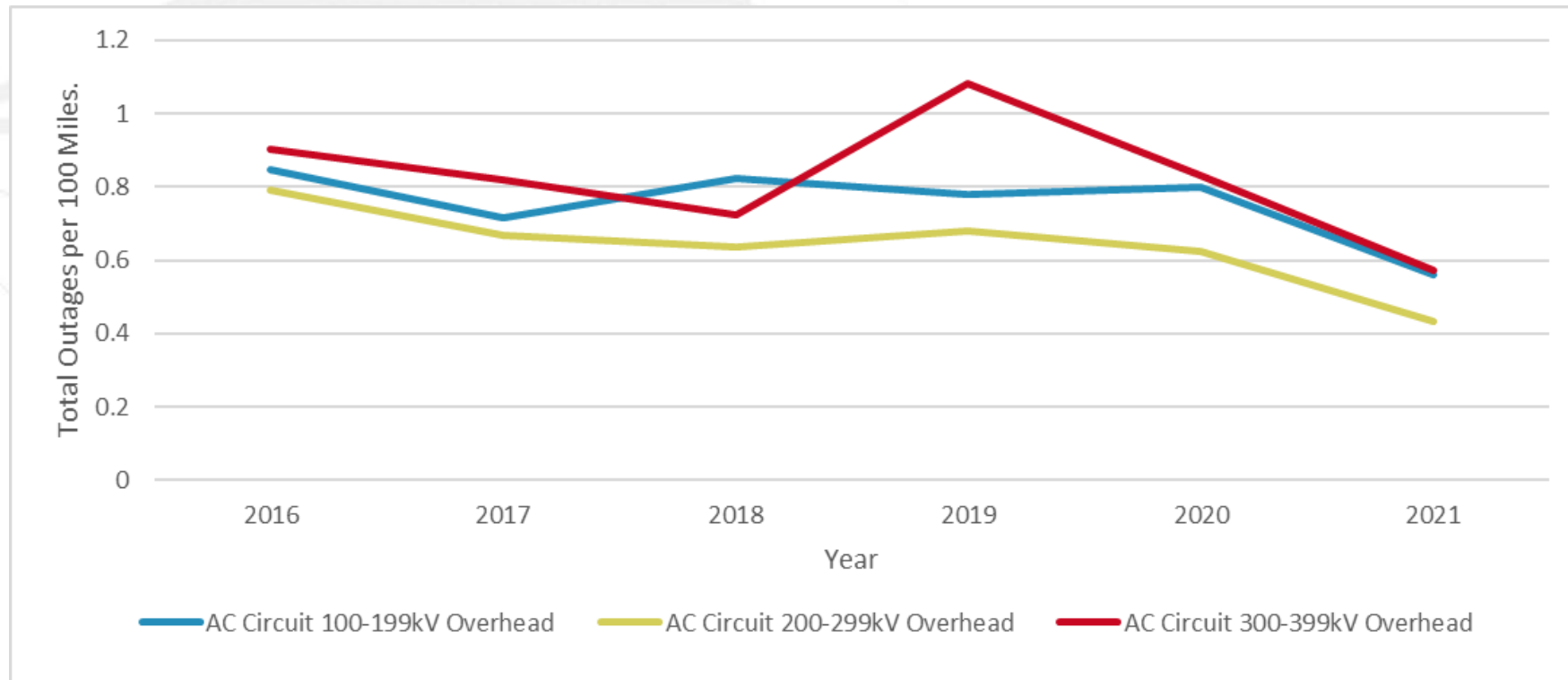
Summer 2021 Momentary Outages by Cause

Transmission Availability Data System (TADS)



Summer 2021 Sustained Outages by Cause

Transmission Availability Data System (TADS)



Total Transmission Outages per 100 Circuit Miles



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Jake Bernhagen

Senior Systems Protection Engineer

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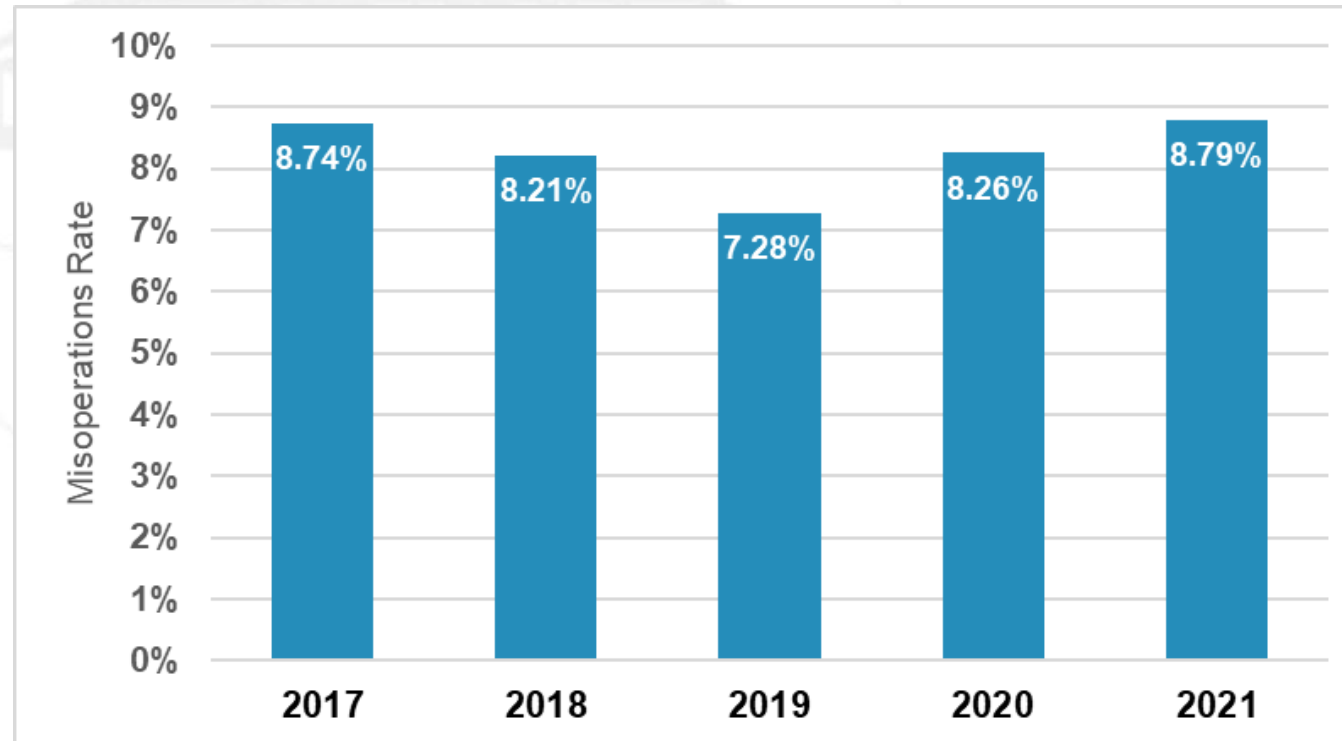
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Misoperations Information Data Analysis System (MIDAS)

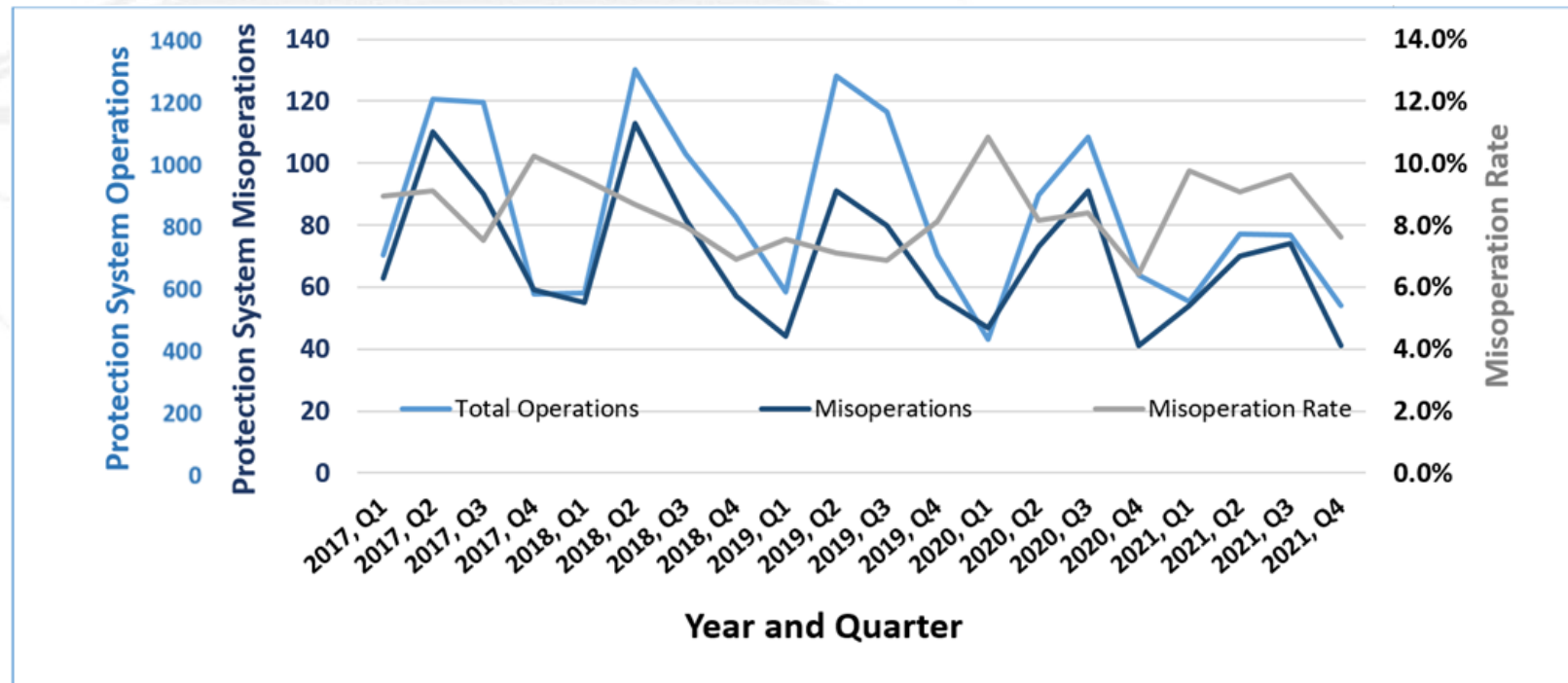
- **Collects information on protection system operations and misoperations.**
- **Collected per Section 1600 data request.**

Misoperations Information Data Analysis System (MIDAS)



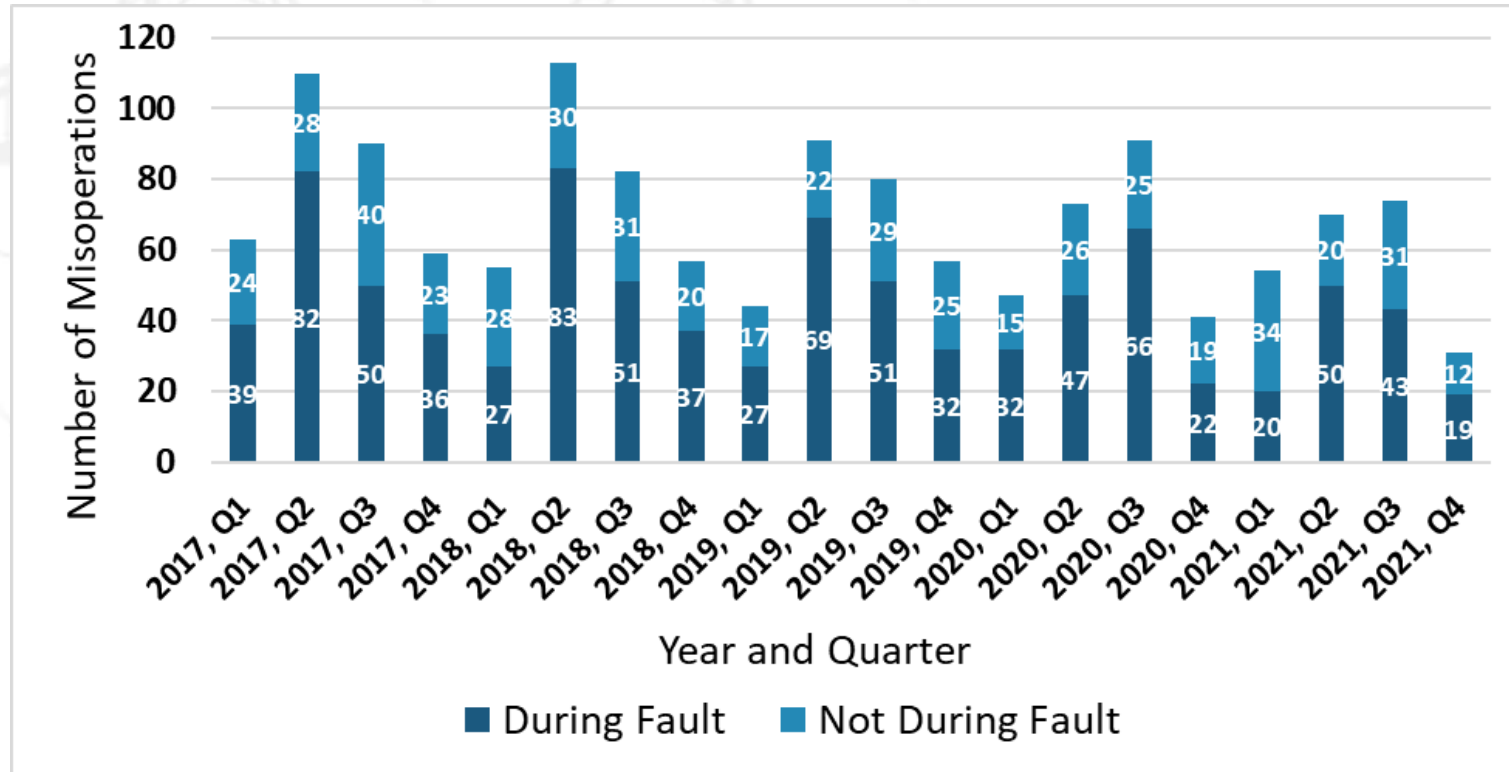
MRO Misoperation Rates by Year

Misoperations Information Data Analysis System (MIDAS)



Protection System Operations and Misoperations Rate

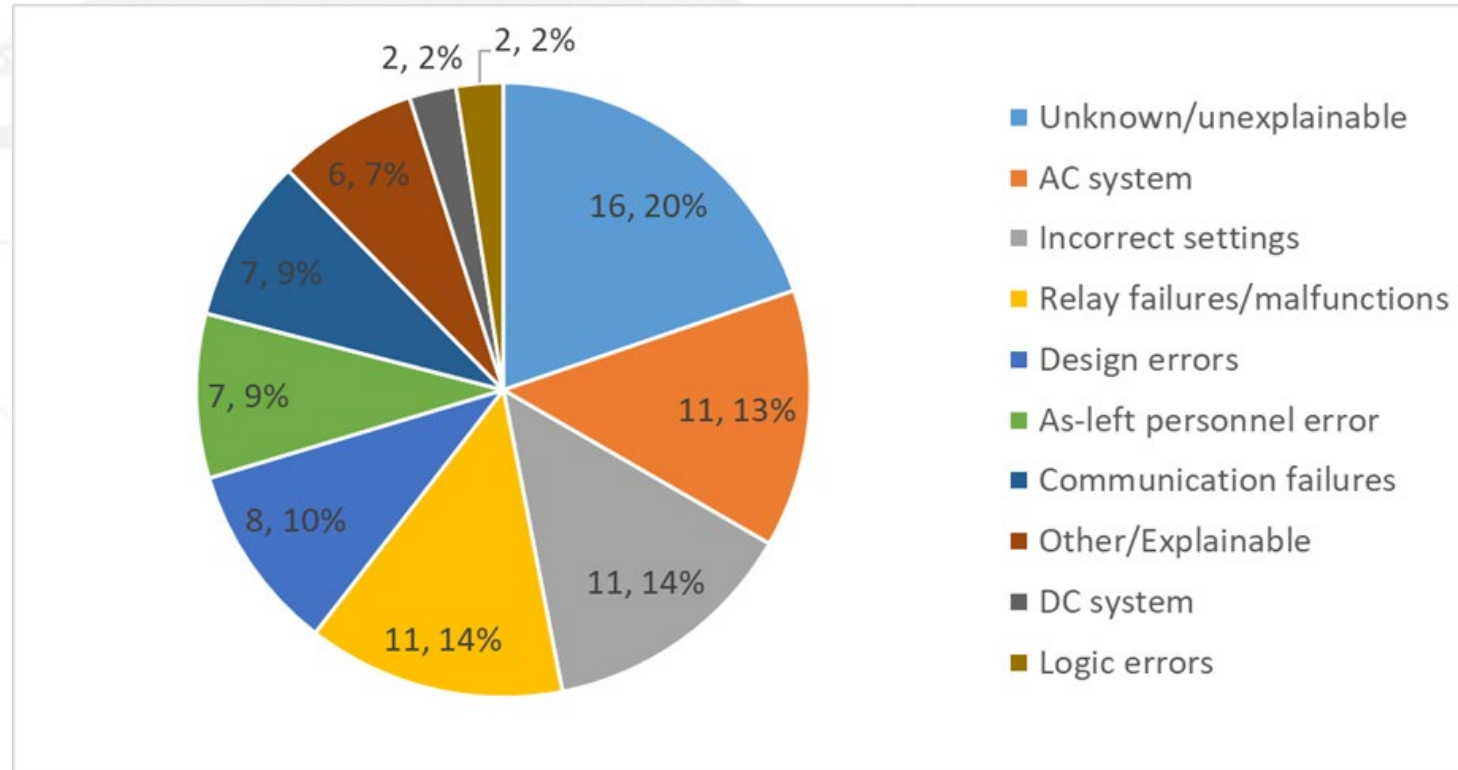
Misoperations Information Data Analysis System (MIDAS)



Fault Associated and Non-Fault Associated Misoperations



Misoperations Information Data Analysis System (MIDAS)



Summer 2021 Misoperations by Cause



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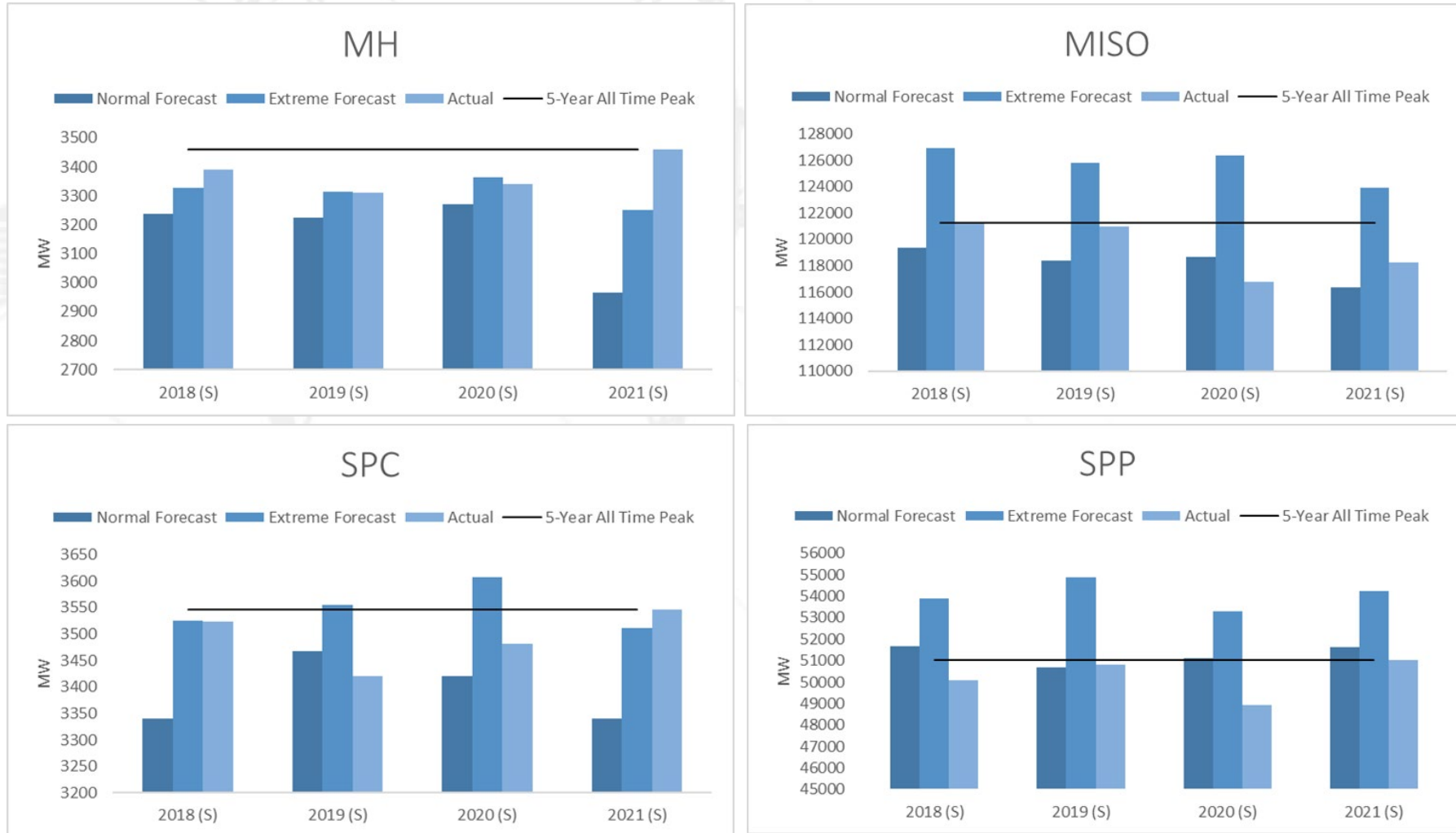
Principal Reliability Assessment Engineer

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Historical Summer Load Forecast and Actuals



4-Year Historical Summer Load Forecast



2022 Summer Seasonal Forecast

- **Assessment period from Jun. 2022 through Sept. 2022.**
- **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	3,893	177	3,716	3,059	21.5%	12.0%
MISO	143,197	21,155	122,042	118,220	3.2%	17.9%
SPC	4,033	344	3,689	3,596	2.6%	11.0%
SPP	67,101	9,384	57,717	51,382	12.3%	16.0%

Anticipated Reserve Margin for Normal Forecast with Typical Outages

MISO and SPC significantly fell below their reserve margin requirements and have insufficient resources under normal summer peak demand.

Extreme Summer 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	3,716	70	3,646	0	3,646	3,381
MISO	122,042	9,648	112,394	2,400	114,794	125,192
SPC	3,689	154	3,535	0	3,535	3,734
SPP	57,717	8,299	49,418	2,000	51,418	53,952

Extreme Summer Resource and Peak Demand Scenario (in MWs)

Normal vs. Typical Outages vs. Extreme Scenario

The Difference



A diagram consisting of a horizontal line with two downward-pointing arrows at each end, positioned above the 'Typical Outages' column of the table. The text 'The Difference' is centered above this diagram.

Assessment Area	Normal Conditions	Typical Outages	Extreme Outages
MH	27.3%	21.5%	+7.8%
MISO	21.1%	3.2%	-8.3%
SPC	12.2%	2.6%	-5.3%
SPP	30.6%	12.3%	-4.7%

Key Findings

- **Extreme summer peak loads coupled with planned and unplanned generation outages could result in energy shortfalls across the MRO region.**
- **MISO is at High Risk of capacity shortfalls in North and Central areas of MISO's footprint during peak summer conditions, which may result in temporary, controlled load shedding.**
- **MH is at Low Risk with anticipated resources are sufficient to meet reserve margin requirements under normal and extreme demand.**
- **SPC is at Elevated Risk due to demand increase and load growth activities with greater risk for energy emergencies during periods of high demand.**
- **SPP is at Elevated Risk due to drought conditions impacting the Missouri River and other water sources that could lead to reduced output resulting in emergency procedures required to meet peak demand during periods of high generator unavailability.**

MRO 2022
Regional Summer Assessment



For more information, please contact:

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Questions