MIDWEST RELIABILITY ORGANIZATION

MRO 2020 REGIONAL WINTER ASSESSMENT

MRO Reliability Analysis Department

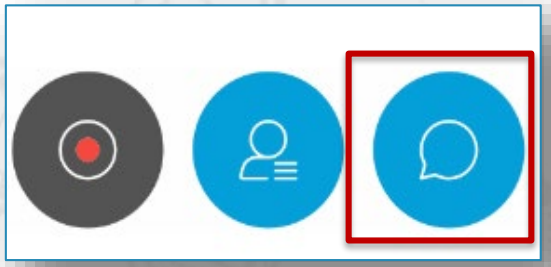
January 26, 2021

10:00 a.m. – 11:00 a.m. Central

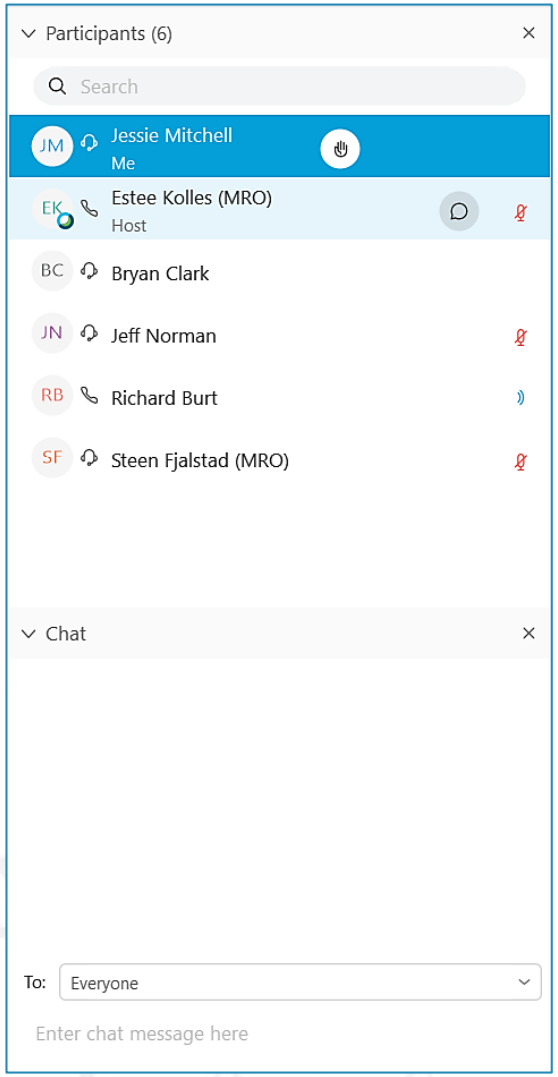
CLARITY | ASSURANCE | RESULTS

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: “Dana Klem.”

Select Dana Klem by using the drop down arrow in the “To” field.

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

About MRO's 2020 Regional Winter Assessment

- **Purpose**
- **Data collection and review process**
- **2019 winter seasonal review**
  - Energy Emergency Alerts (EEA) and BES Event Analysis (EA)
  - Generator Availability Data System (GADS)
  - Baseload Generation Capacity Factor
  - Transmission Availability Data System (TADS)
  - Misoperations Information Data Analysis System (MIDAS)
  - Winter Load Forecast versus Actual

Discussion Topics

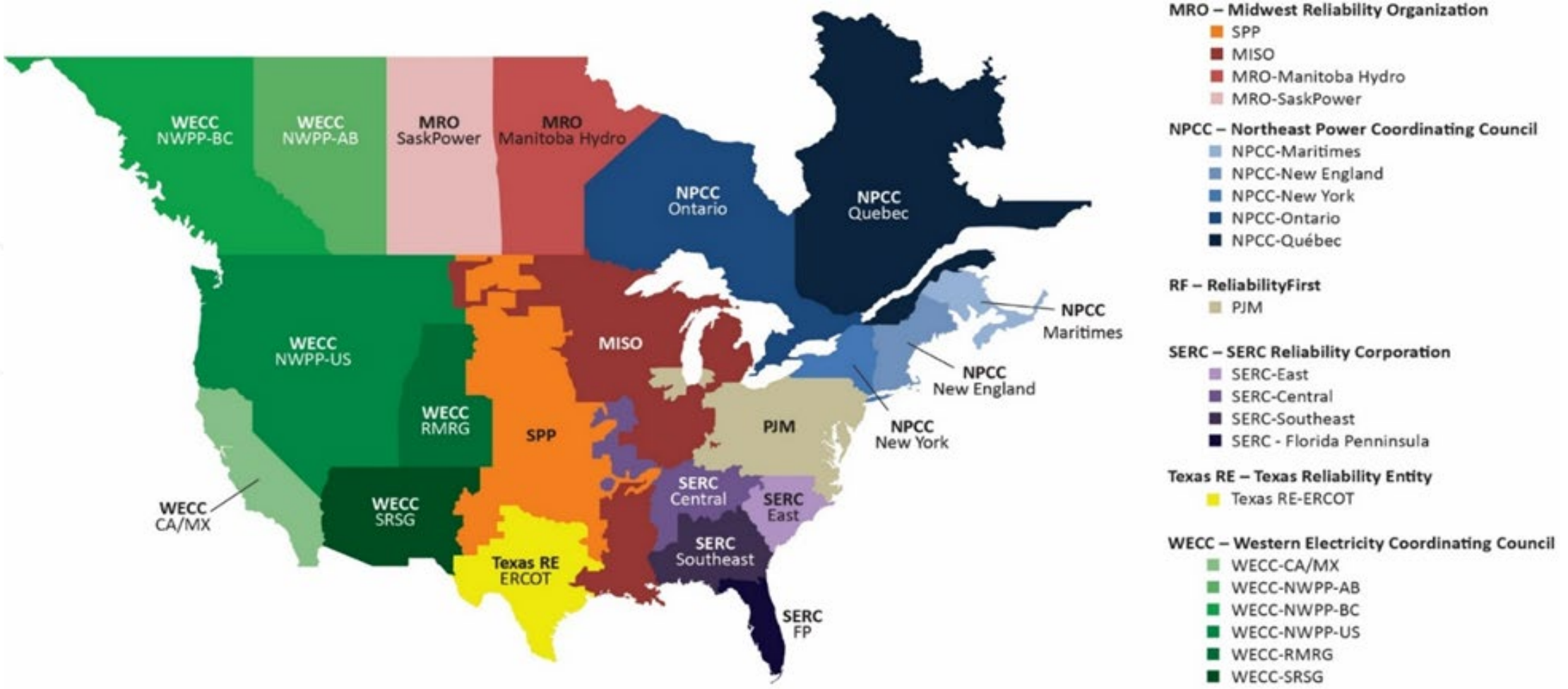
- **2020 Winter Seasonal Forecast**
  - Winter Resource and Peak Demand Scenarios
  - Distributed Energy Resources (DERs)
  - Wind
  - Focus Areas for Winter 2020-2021

Purpose

- Review, evaluate and assess the Reliability Coordinator (RC) and Planning Coordinator (PC) areas within the MRO Region for reliability purposes.
- Coordinated 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 the winter season.



NERC Assessment Areas

2019 Winter Review Period

- Assessment period from December 2019 through February 2020.

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Max Desruisseaux

Senior Power Systems Engineer

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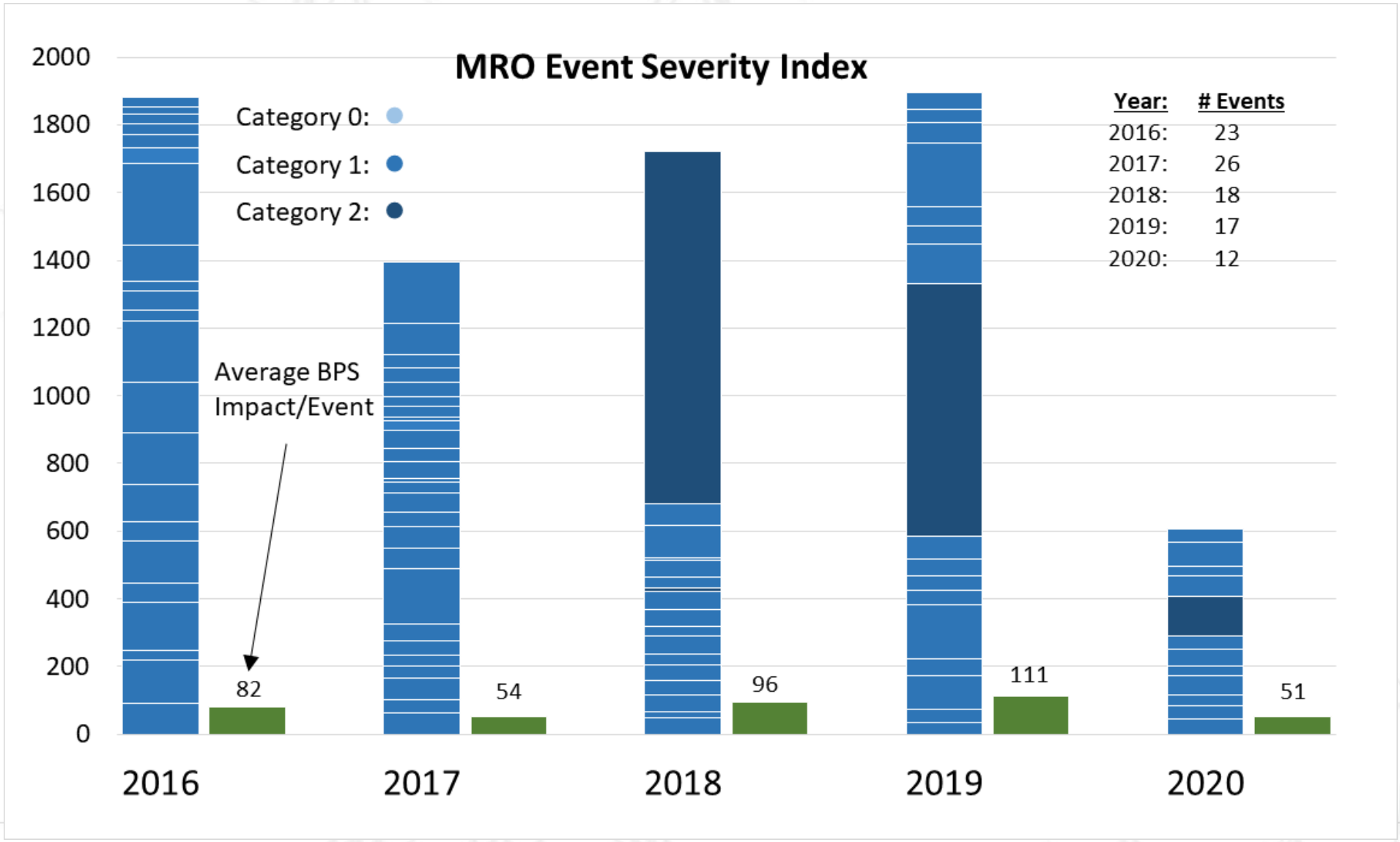
Energy Emergency Alerts (EEA)

- Energy Emergency Alerts (EEAs) are issued by RCs per EOP-011-1.
- Three EEA Level 3 alerts issued during winter 2019-2020.
- No firm load shed and recovered within reasonable amount of time.

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)



BES Event Analysis (EA)

- Total of 17 events in 2019, and 12 events in 2020.
- 7 of 26 events occurred in winter of 2019-2020.
- Majority of the winter events related to protection system misoperations.
- 6 EMS events occurred in winter of 2019-2020.

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David Kuyper

Power Systems Engineer

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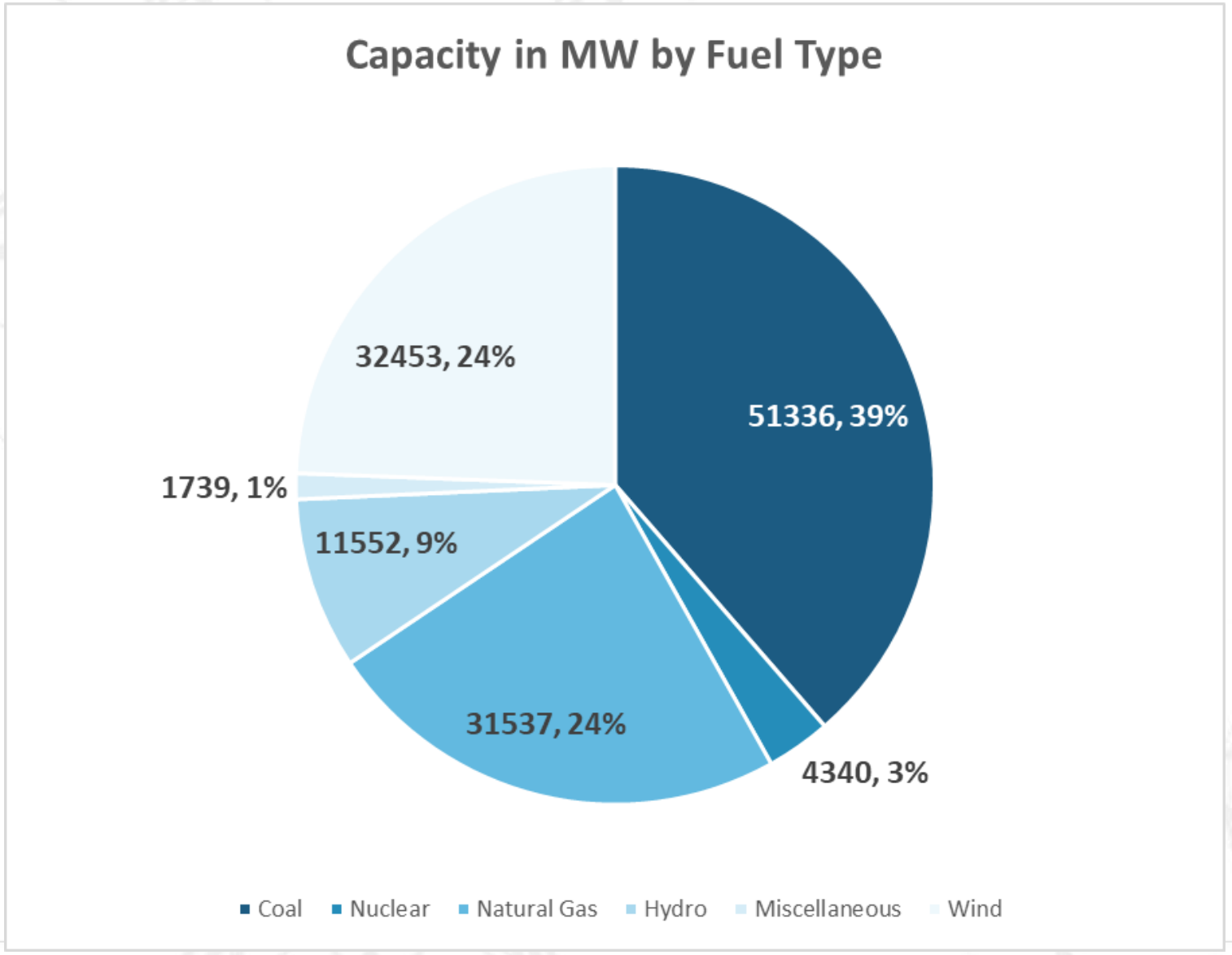
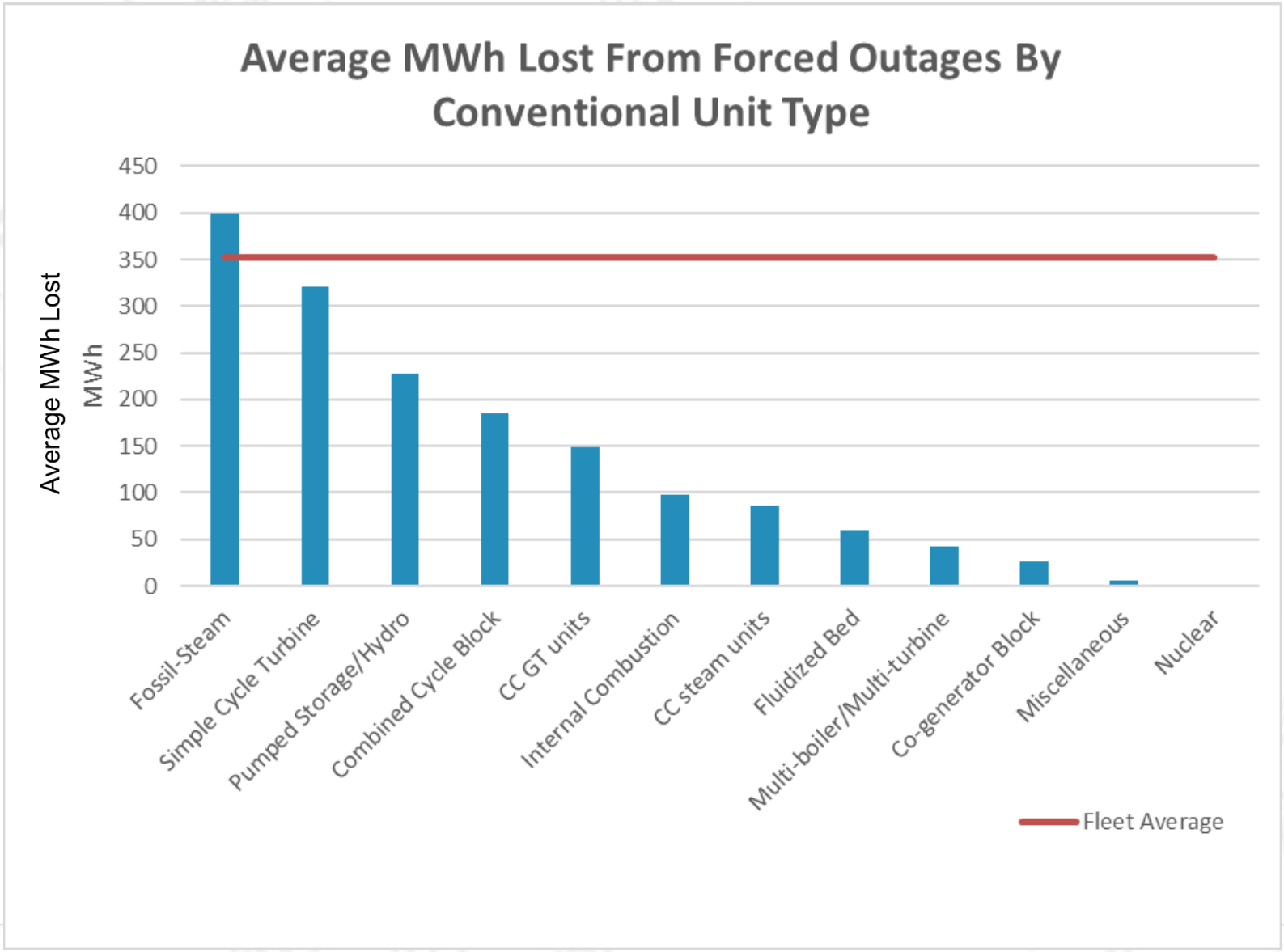
Generator Availability Data System (GADS)

- 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.

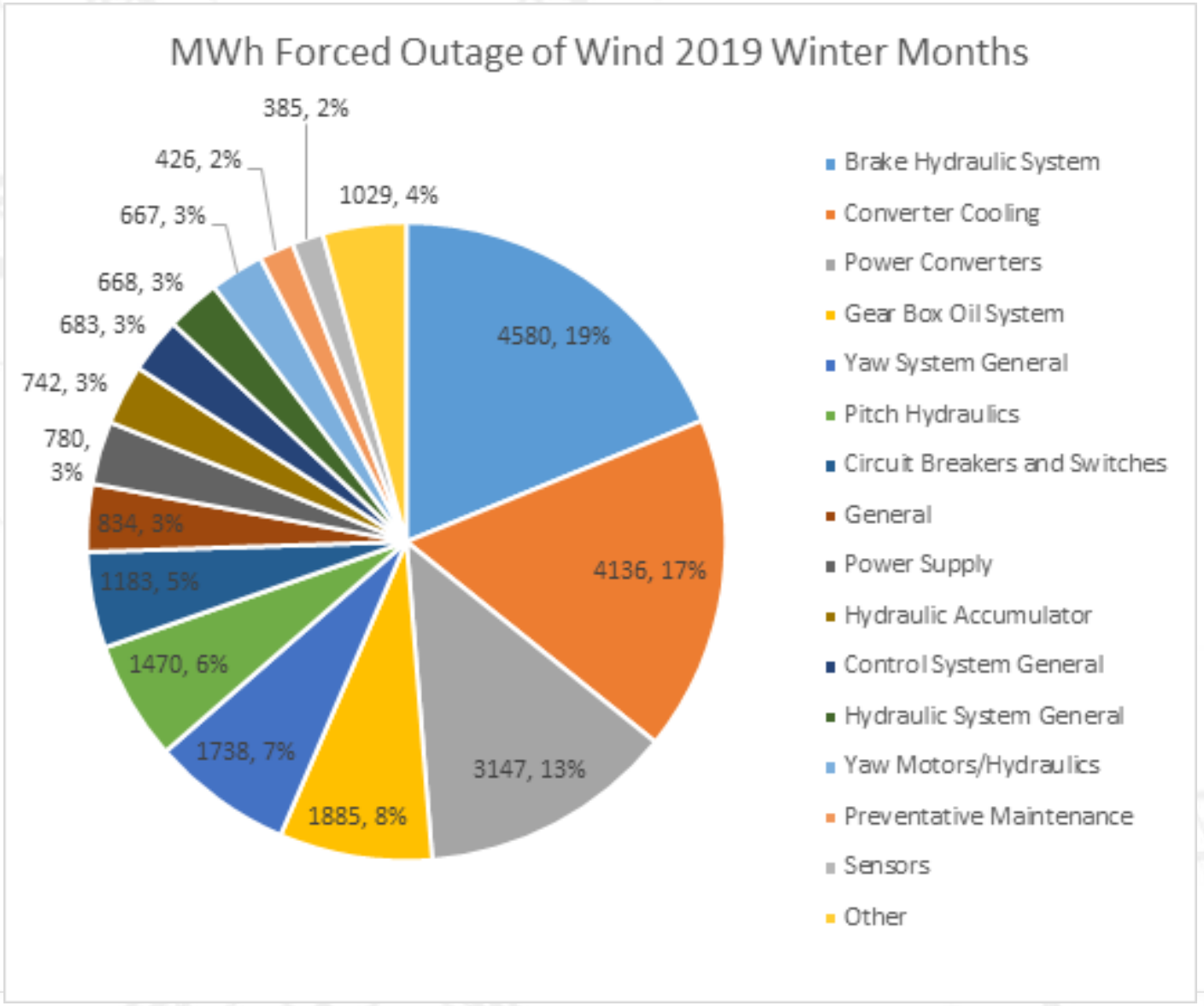
Resource Mix



Generator Availability Data System (GADS)



GADS WIND


MWh Forced Outage of Wind 2019 Winter Months
385, 2%
426, 2%
667, 3%
1029, 4%
668, 3%
683, 3%
742, 3%
780, 3%
834, 3%
1183, 5%
1470, 6%
1738, 7%
1885, 8%
3147, 13%
4136, 17%
4580, 19%
Brake Hydraulic System
Converter Cooling
Power Converters
Gear Box Oil System
Yaw System General
Pitch Hydraulics
Circuit Breakers and Switches
General
Power Supply
Hydraulic Accumulator
Control System General
Hydraulic System General
Yaw Motors/Hydraulics
Preventative Maintenance
Sensors
Other

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Dianlong Wang

Senior Power Systems Engineer

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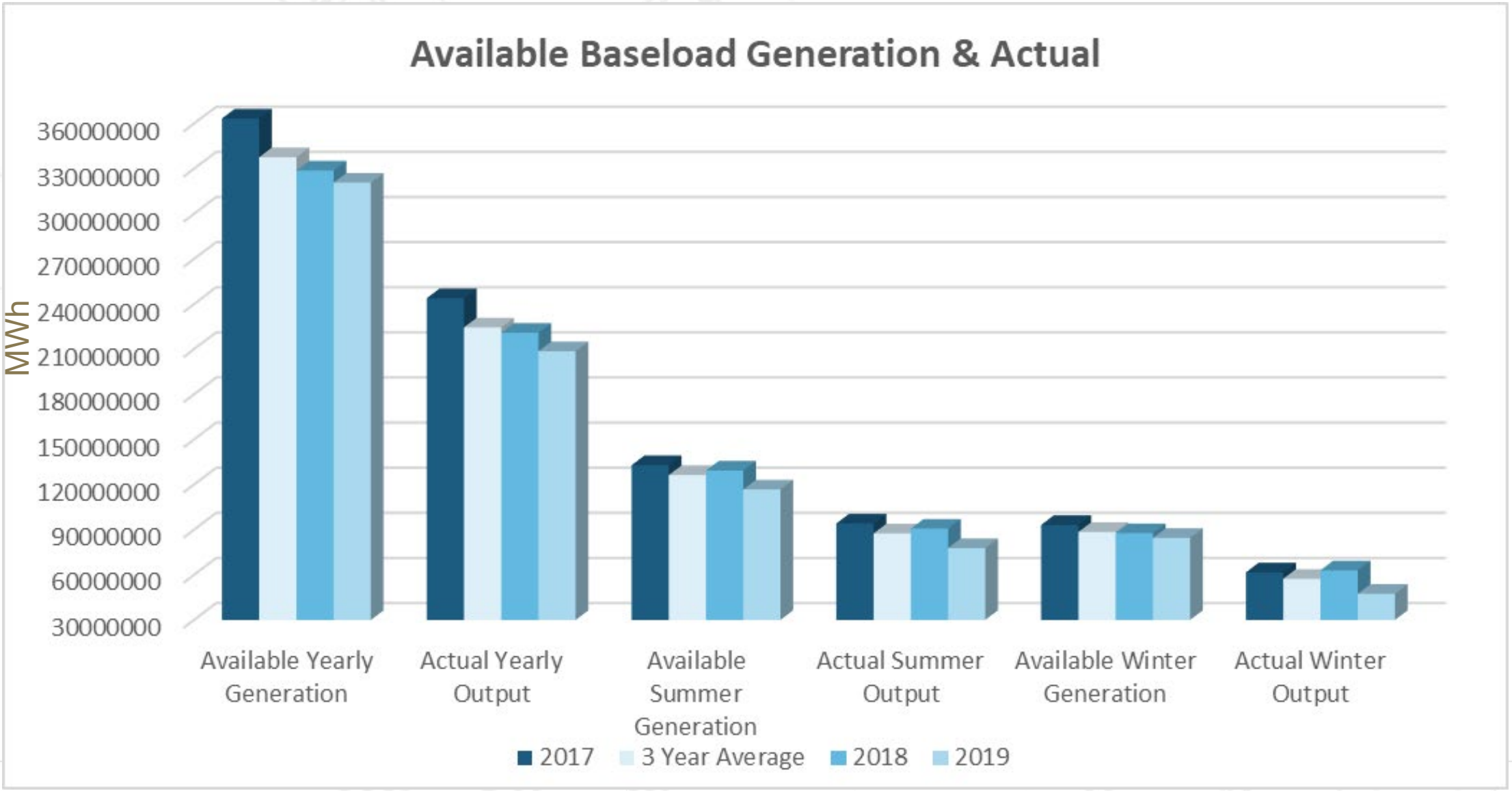
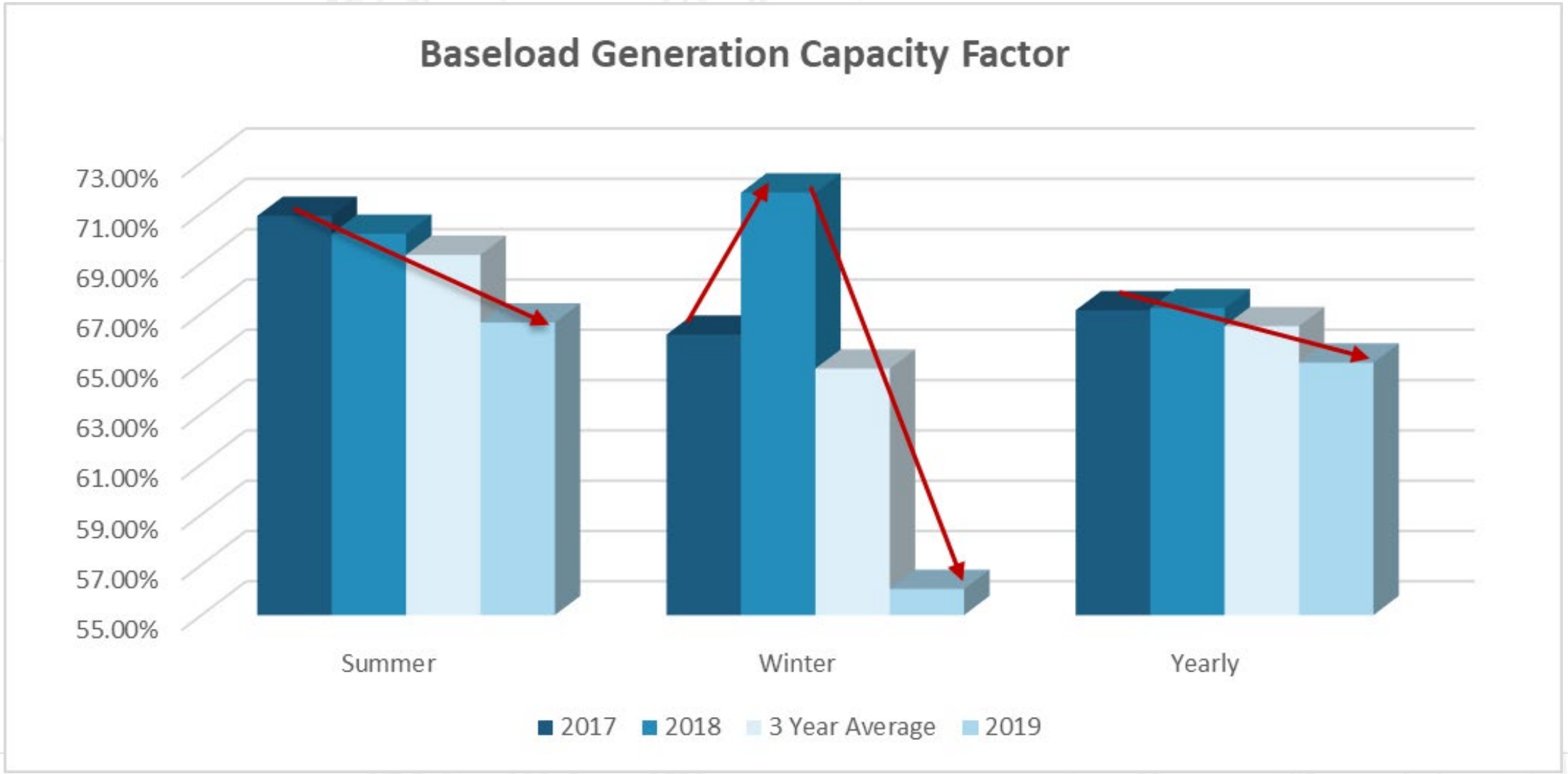
Baseload Generation Capacity Factor



Baseload Generation Capacity Factor



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Jake Bernhagen

Senior Protection Systems Engineer

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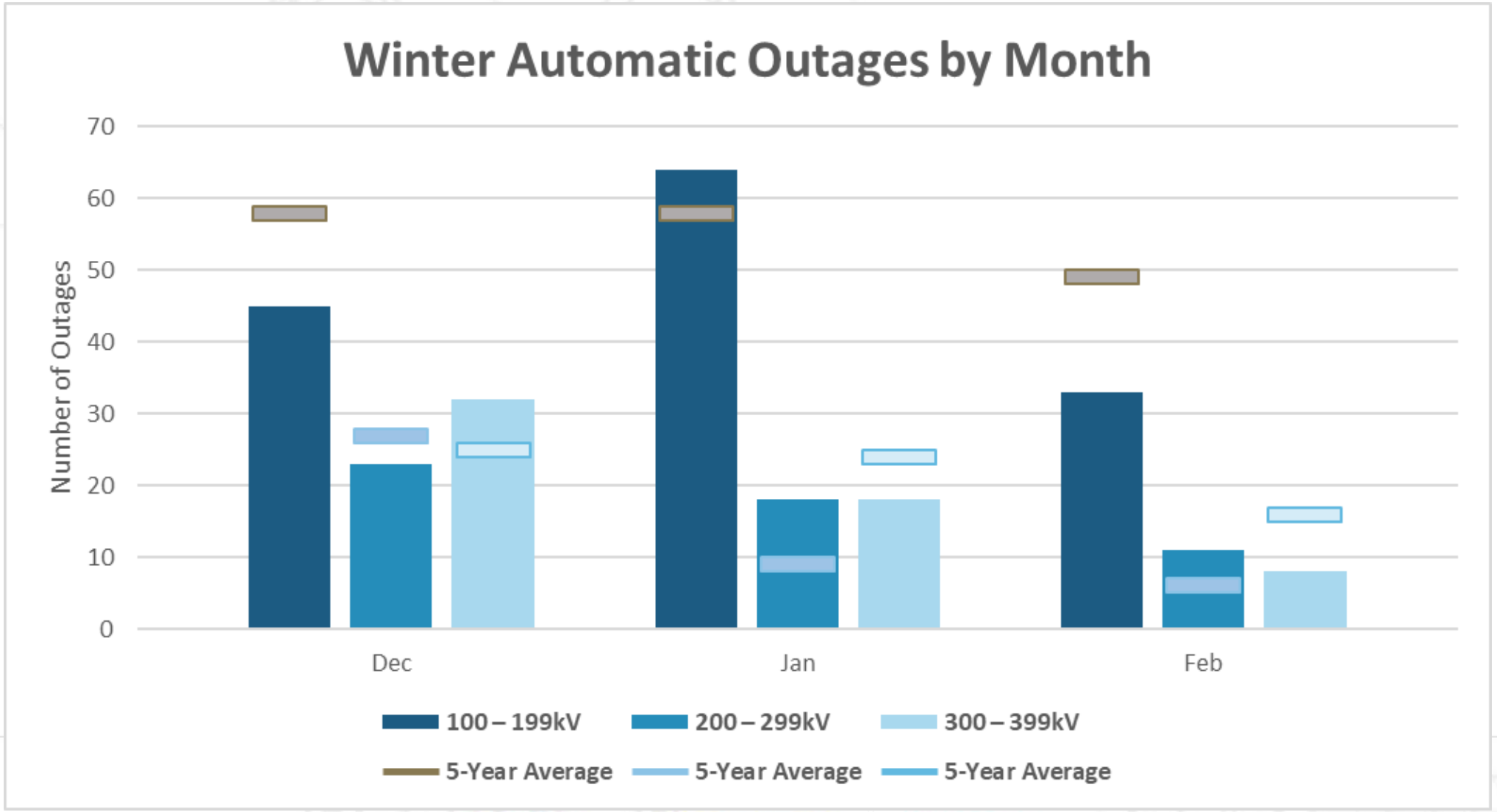
Transmission Availability Data System (TADS)

- Collects information on performance of transmission lines and transformers 100 kV and above.
- Collected per Section 1600 data request.
- Manitoba Hydro data included.
- Working with SPC to promote their participation.

Transmission Availability Data System (TADS)



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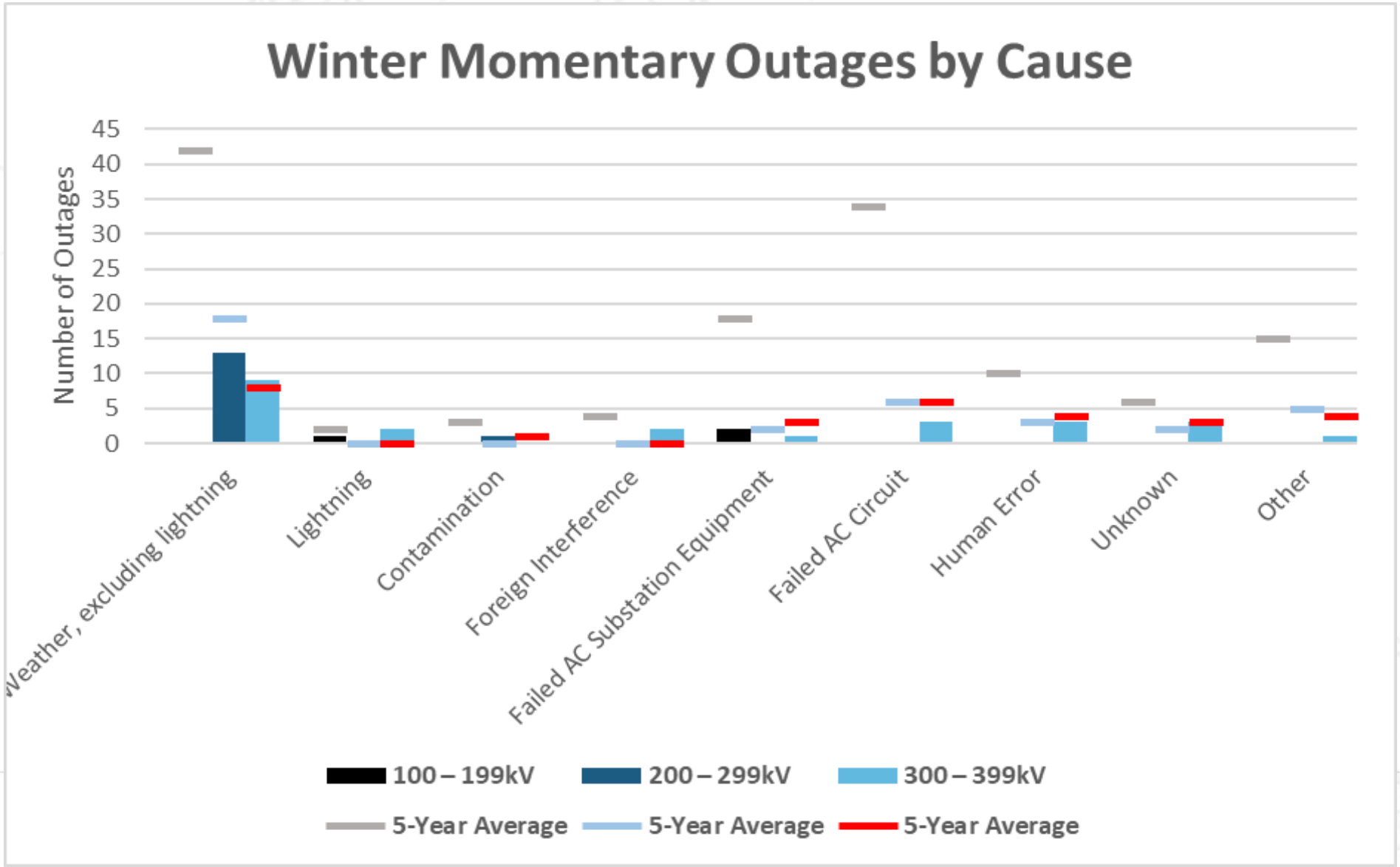
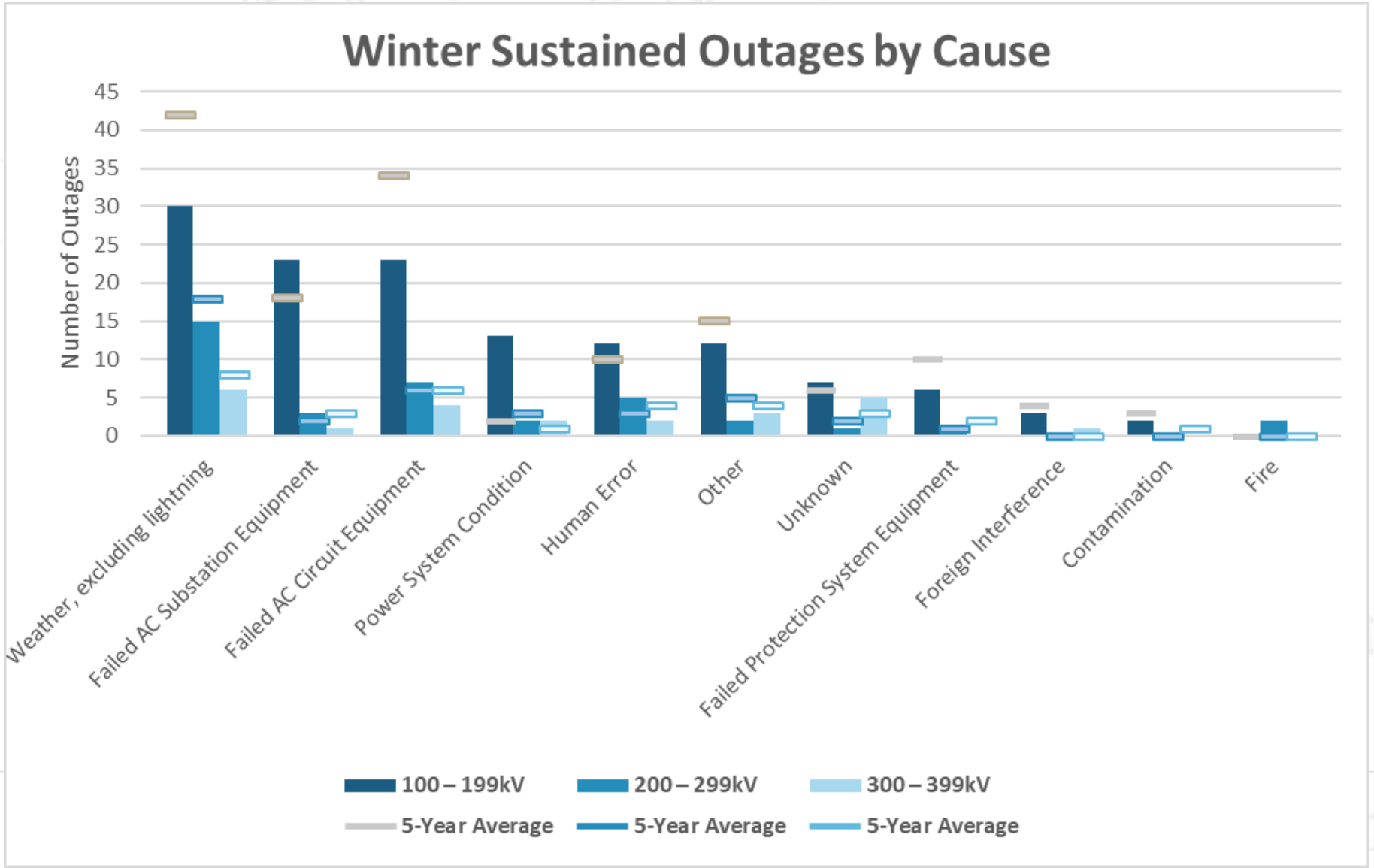


Transmission Availability Data System (TADS)



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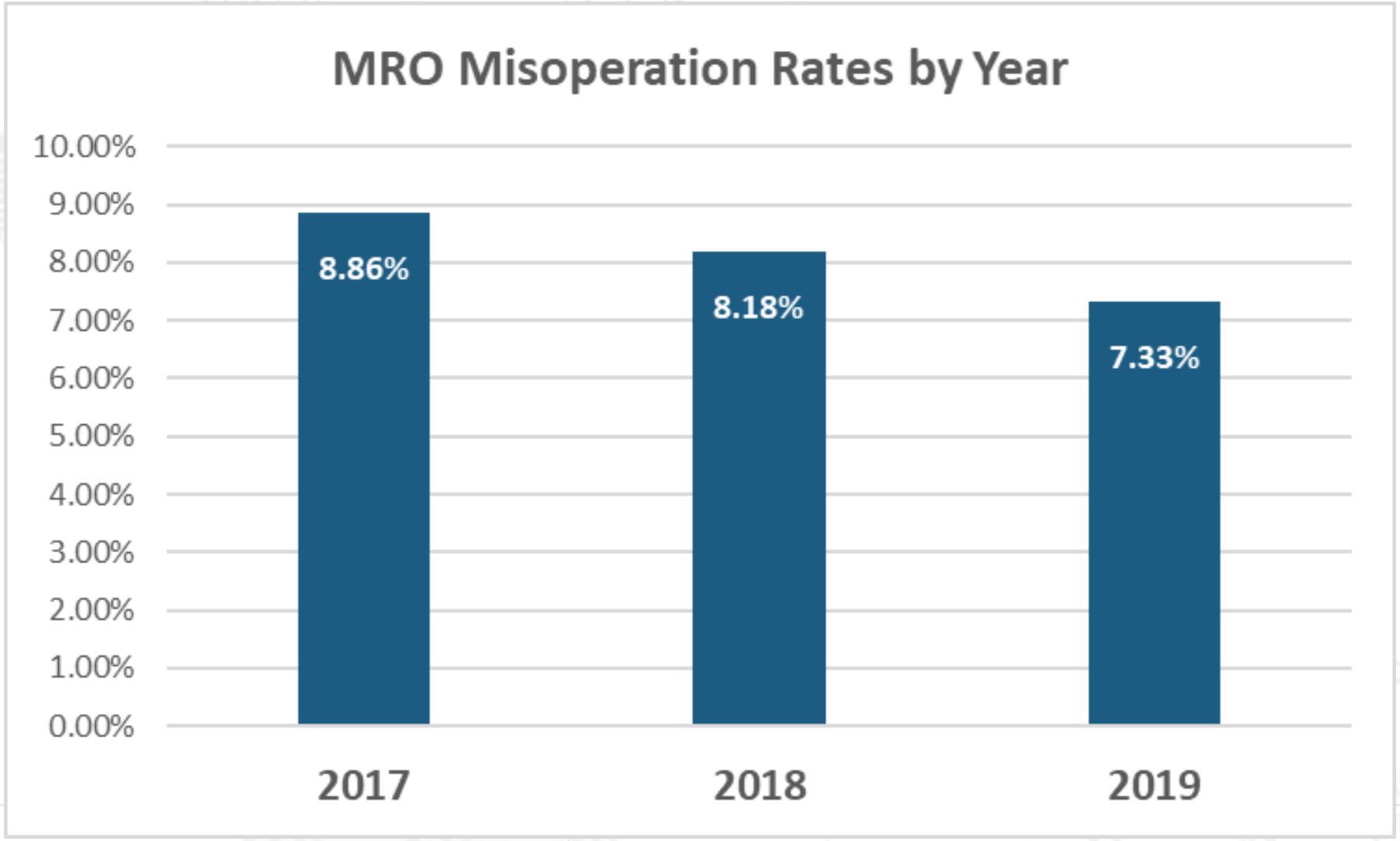
Mike Bocovich

Principal Systems Protection Engineer

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)



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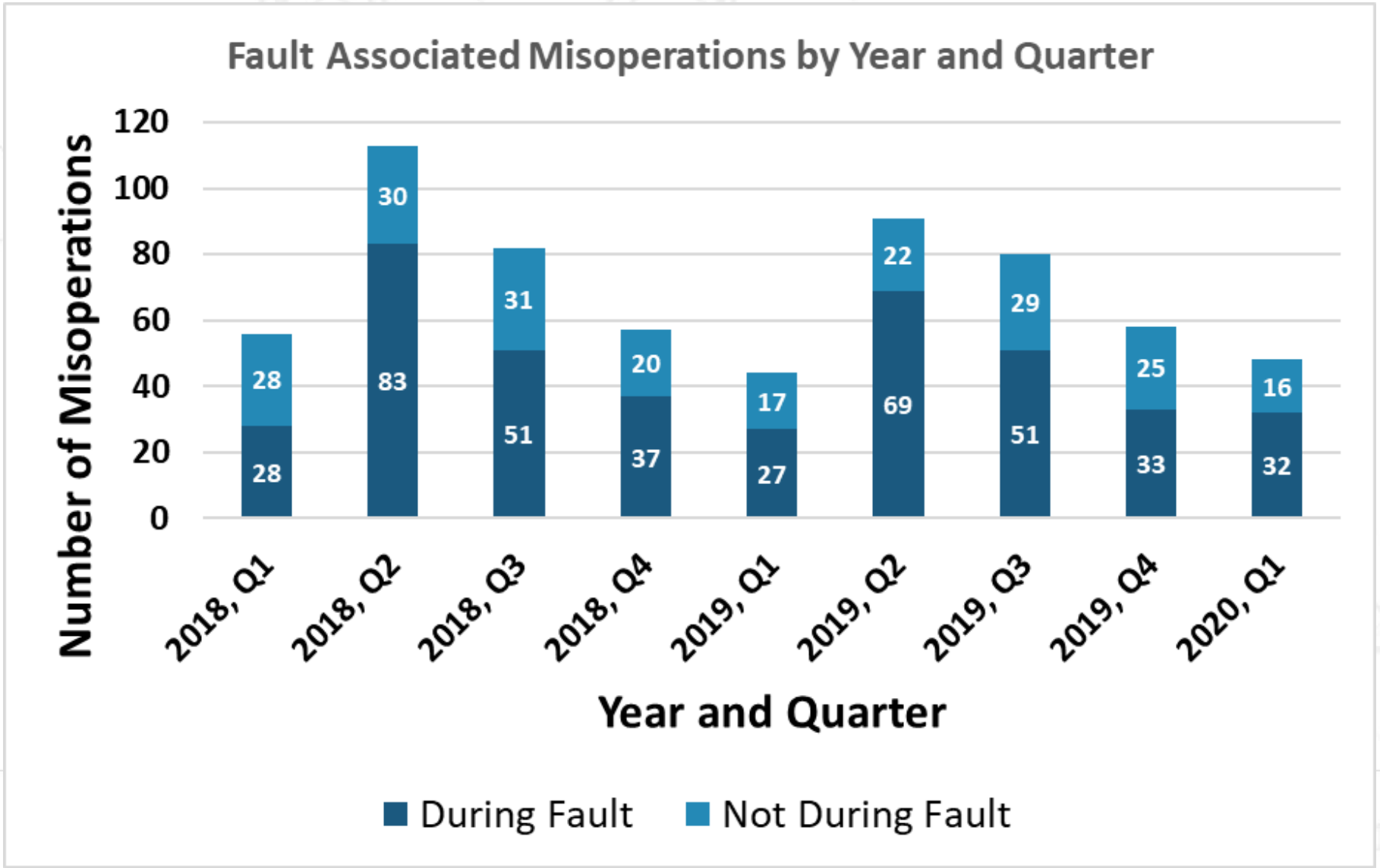

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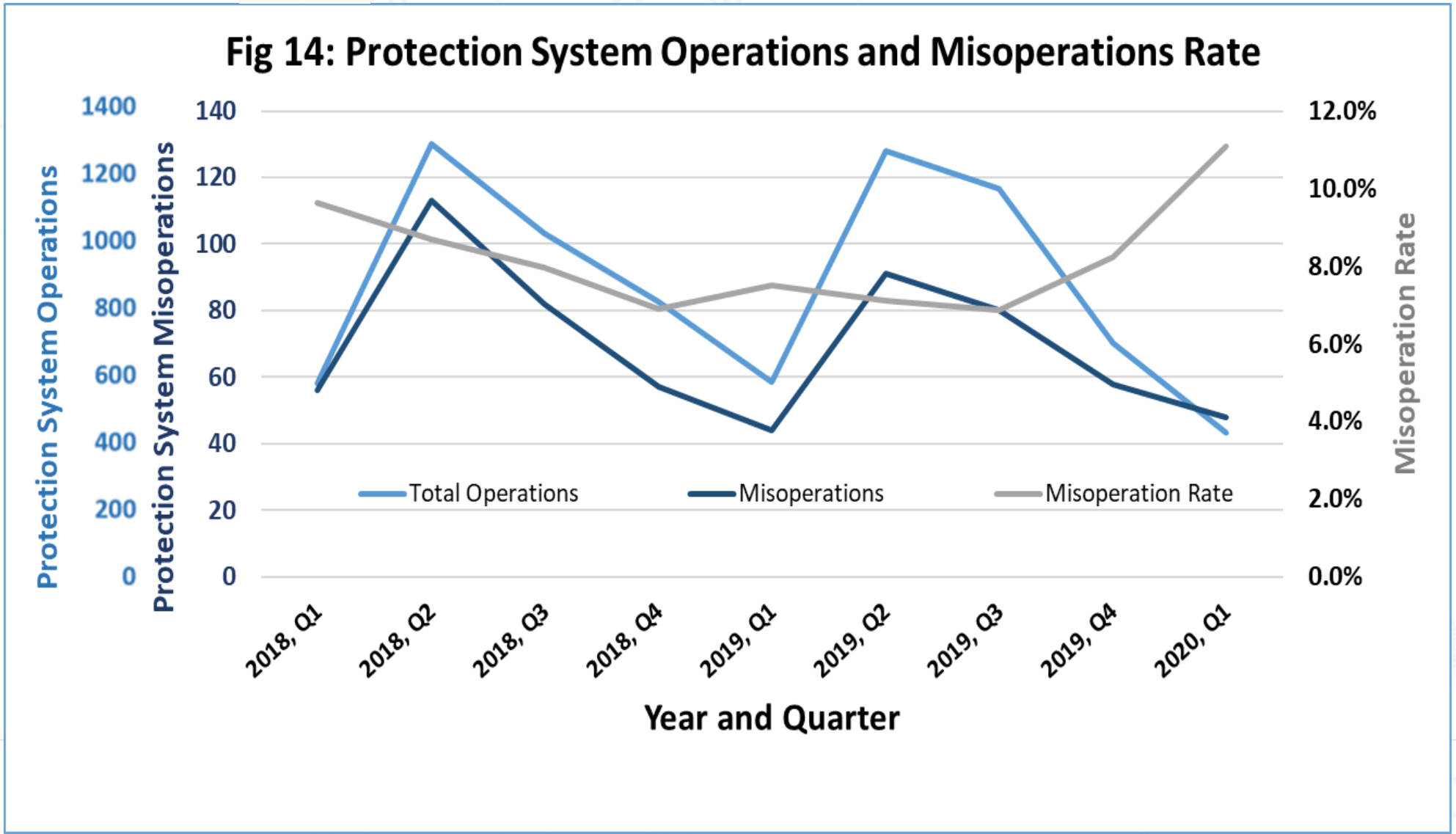

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Salva Andiappan

Principal Reliability Assessment Engineer

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2019 Winter Load Forecast versus Actual

Winter Forecast Net Internal Demand versus Actual			
Assessment Area	**Forecast (MW)**	**Actual (MW)**	**Difference (%)**
MH	4,505	4,692	4.2
MISO	100,019	95,527	4.7
SPC	3,718	3,722	0.1
SPP	42,176	40,056	5.3

The all-time winter peak demand recorded for each of the MRO assessment areas are:

- MH – 4,936 MW in 2019
- MISO – 109,300 MW in 2014
- SPC – 3,792 MW in 2017
- SPP – 43,584 MW in 2018

2020 Winter Seasonal Forecast

- **Assessment period from December 2020 through February 2021.**
- **Reserve Margin % used as an indication of adequacy.**
- **Analysis looks at two different load conditions:**
  - Normal (50/50) peak load forecast
  - Extreme (90/10) peak load forecast

Winter Resource and Normal Peak Demand

Table 5: Winter Resource and Peak Demand based on 50/50 Forecast				
Assessment Area	**Anticipated Resources (MW)**	**Net Internal Demand (MW)**	**Anticipated Reserve Margin**	**Planning Reserve Margin Requirements**
MH	5,226	4,582	**14.1%**	12.0%
MISO	147,861	98,631	**49.9%**	18.0%
SPC	4,473	3,558	**25.7%**	11.0%
SPP	66,539	41,811	**59.1%**	15.3%

Winter Resource and Peak Demand Scenario in MW

Table 6: Winter Resource and Peak Demand Scenario							
Resource Outages and Extreme Capacity Derates (MW)					**Extreme Demand (MW)**		
PC	**Anticipated Resources**	**Outages and Extreme Derates (-)**	**Operational Mitigations (+)**	**Extreme Low Generation**	**Expected Operating Reserves**	**Extreme Peak Load**	**Expected Operating Requirement**
MH	5,226	87	0	5,139	250	4,781	5,031
MISO	147,861	46,884	2,310	103,287	11,884	109,853	121,737
SPC	4,473	186	0	4,287	348	3,722	4,070
SPP	66,539	21,600	2,500	47,439	1700	44,166	45, 866

Distributed Energy Resources (DERs)

Total installed DER/Behind the Meter (BTM) solar PV nameplate and peak capacity			
Assessment Area	2019-2020 Winter Nameplate (MW)	2020-2021 Winter Nameplate (MW)	2020-2021 Winter Peak Capacity MW)
MH	12*	0	0
MISO	850	861	431
SPC	21	35	0[α]
SPP	43	40	0[α]

*NERC 2019 Long Term Reliability Assessment (LTRA) values for Total Installed DER/BTM Solar PV were based on that year's MH DSM Forecast, which is dated. Further, with the move to Efficiency Manitoba DSM for 2020, Efficiency Manitoba is not projecting to launch a DER/BTM solar program until 2022.

[α]Available peak capacity is zero as it is not counted for the Reserve Margin purpose.

Wind

Total installed wind nameplate and peak capacity			
Assessment Area	**2019-2020 Winter Nameplate (MW)**	**2020-2021 Winter Nameplate (MW)**	**2020-2021 Winter Peak Capacity (MW)**
MH	259	259	52
MISO	20,966	26,064	4,227
SPC	241	241	114
SPP	20,786	23,546	5,540

Focus Areas for Winter 2020-2021

- Resources are sufficient to meet operating reserve requirements under normal winter peak demand.
- Extreme winter peak demand could result in a need to employ maximum generation alerts or EEAs to mitigate resource shortfalls for MISO and SPC.
- Outages for construction and maintenance are becoming more common in winter and may cause transmission congestion in local areas.
- There are no known risks due to COVID-19 for the winter season.

MRO 2020
Regional Winter Assessment

For more information, please contact:

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Questions