



National Severity Index

September 8, 2022

State of Reliability

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

2022 State of Reliability

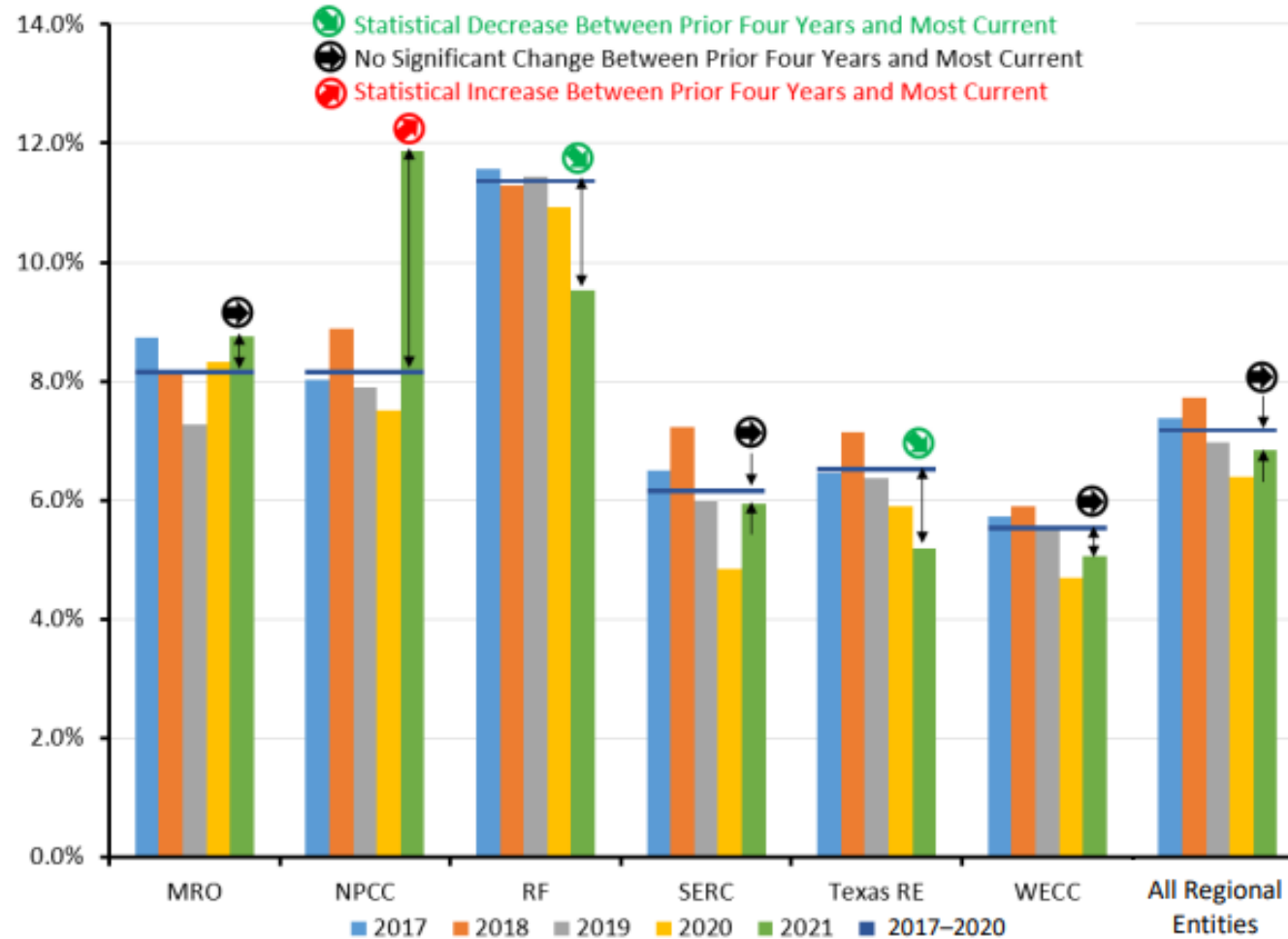
July 2022



An Assessment of 2021
Bulk Power System
Performance

https://www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/NERC_SOR_2022.pdf

Trending of Misoperations Rate



Misoperations Cause Codes

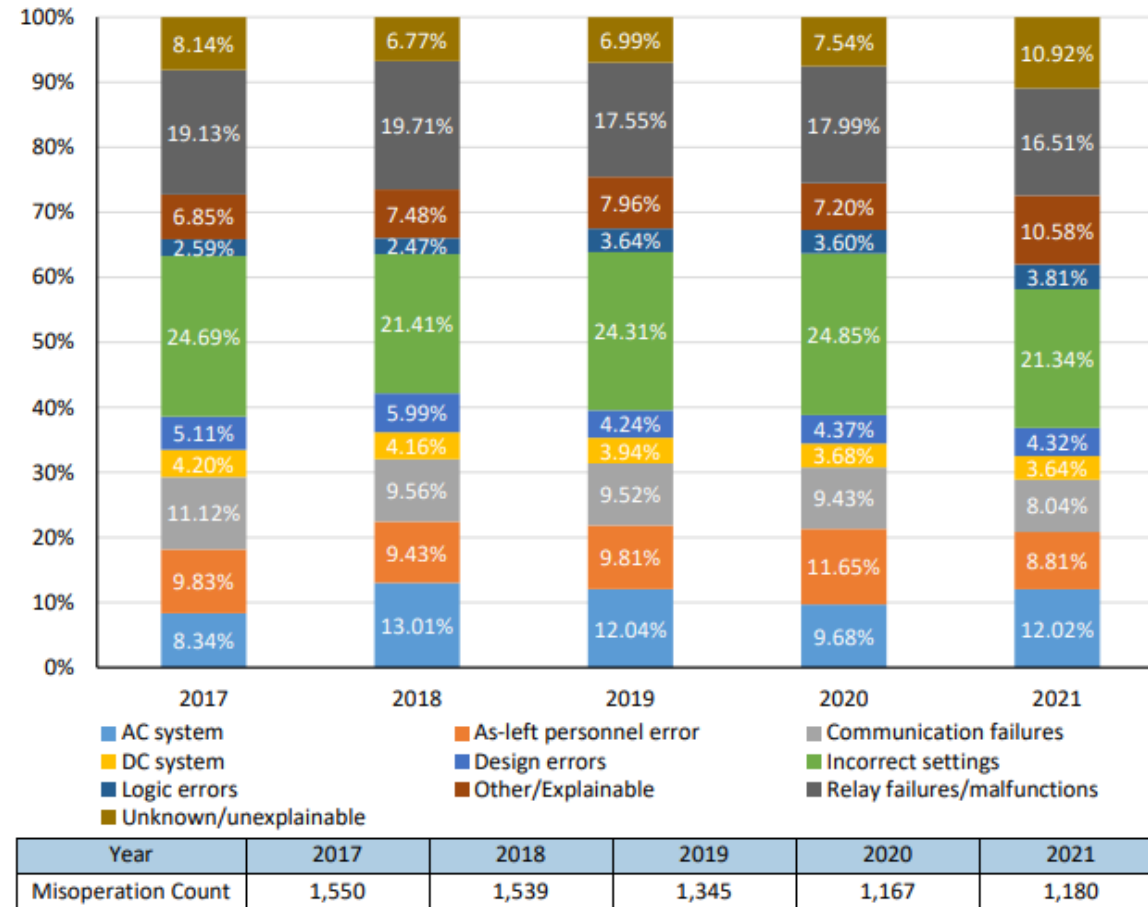


Figure 4.23: Misoperations by Cause Code (2017–2021)

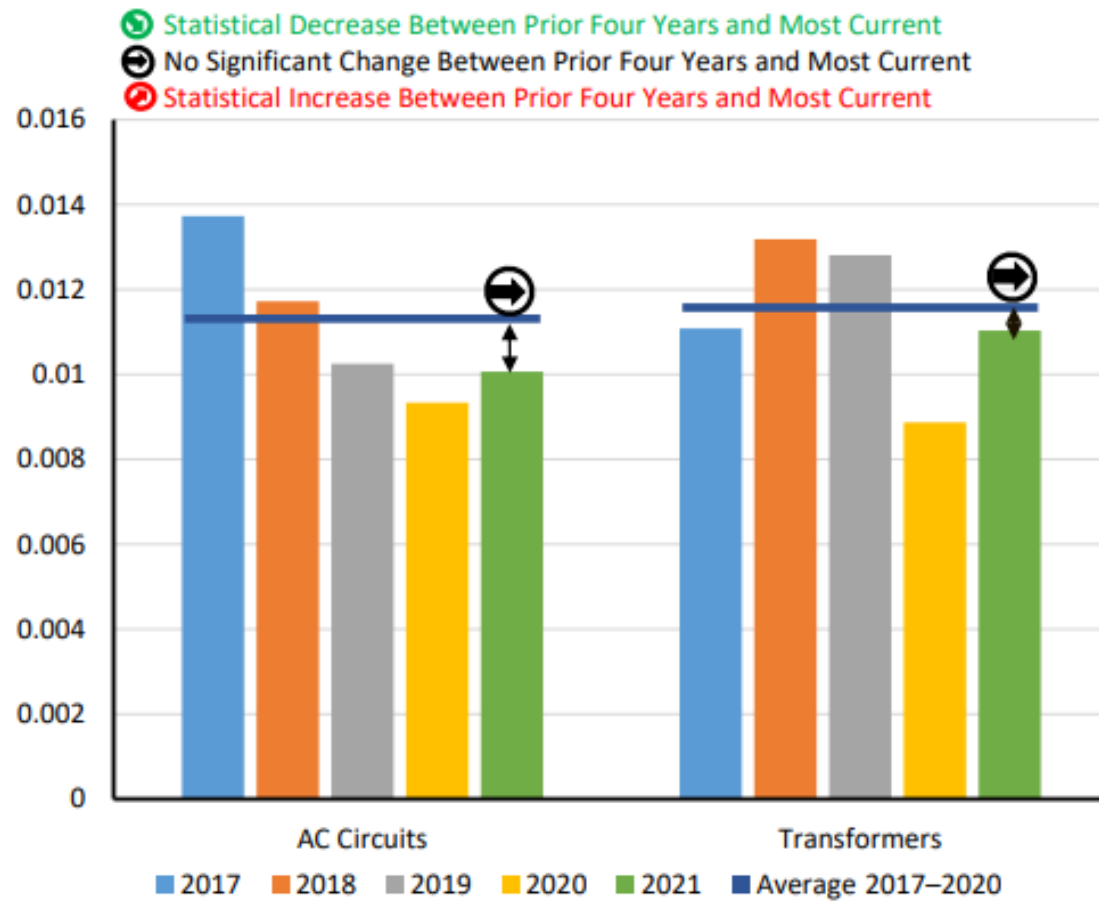


Figure 4.24: Failed Protection System Equipment

Events with Misoperations

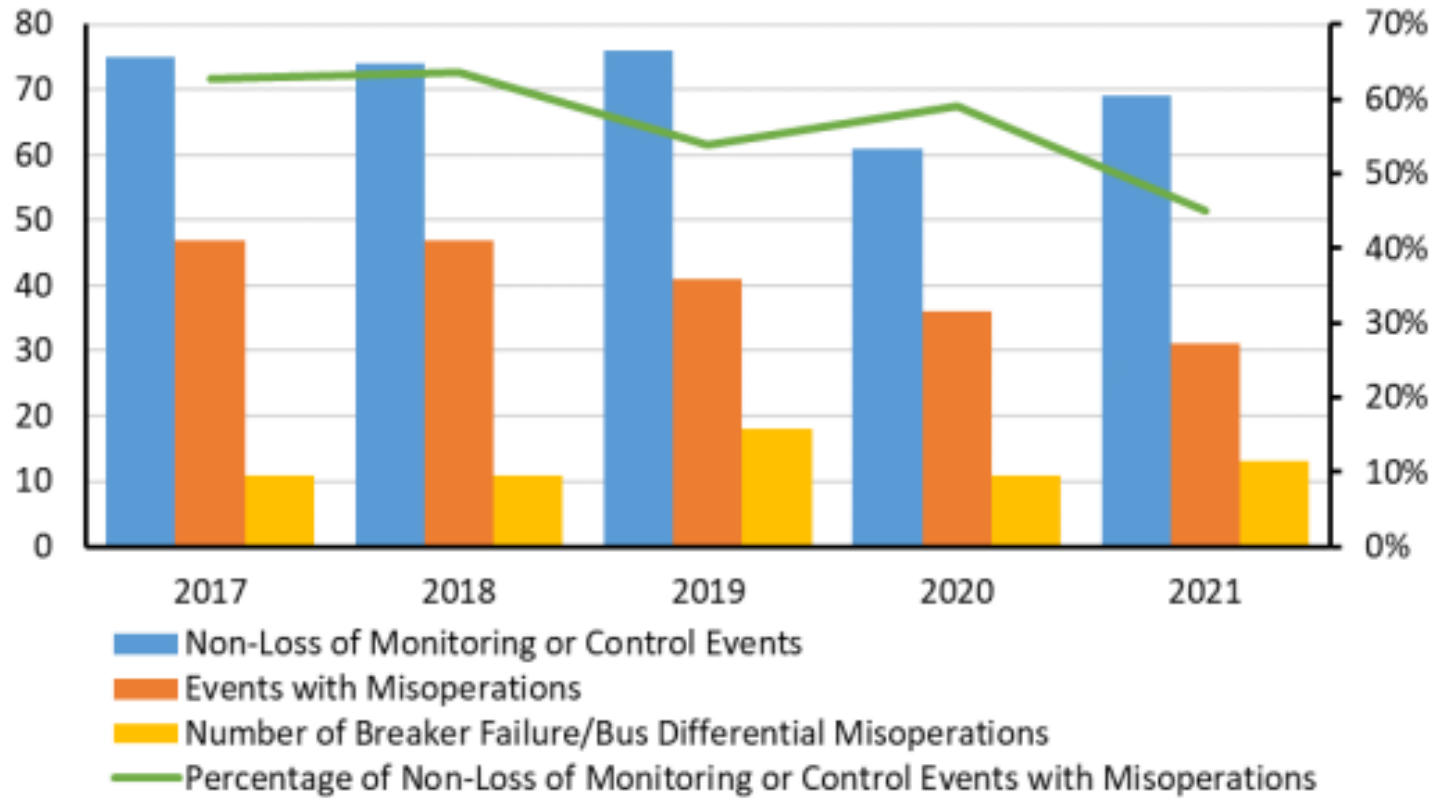


Figure 4.25: Events with Misoperations

National Severity Index

- Concerns with current Misoperation Rate
 - Susceptible to changes not indicative of reliability
 - All Misoperations aren't equal
 - "Unnecessary Trip – Other than fault" has a near 100% rate, despite being arguably one of the less impactful categories
 - "Failure to Trip – During Fault" likely has a relatively low rate due to additional equipment operating to clear the fault, despite being very impactful
 - Can fluctuate wildly for small entities with fewer than 10 PSOs/quarter
- New metric purpose
 - Determine if Misoperations are becoming more or less impactful to reliability
 - Determine if there are "common" high-impact Misoperations with similar causes
 - Be scalable for any granularity
 - Present information in a concise easy to understand way at a high level

Approaches Considered

- Impact
 - Who/what has the biggest impact on the BPS?
 - Which field(s) are the most impactful?
- Controllable Risk
 - Controllable Actions: Cause, Category
 - Where can we improve?
 - Are we doing everything we can to improve?
 - Controllable Planning: Voltage, Equipment Type

Severity Index Fields

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Equation Breakdowns

Fields	Impact
Voltage Class	30%
Equipment Type	20%
Cause	10%
Category	40%
Misoperation Rate	

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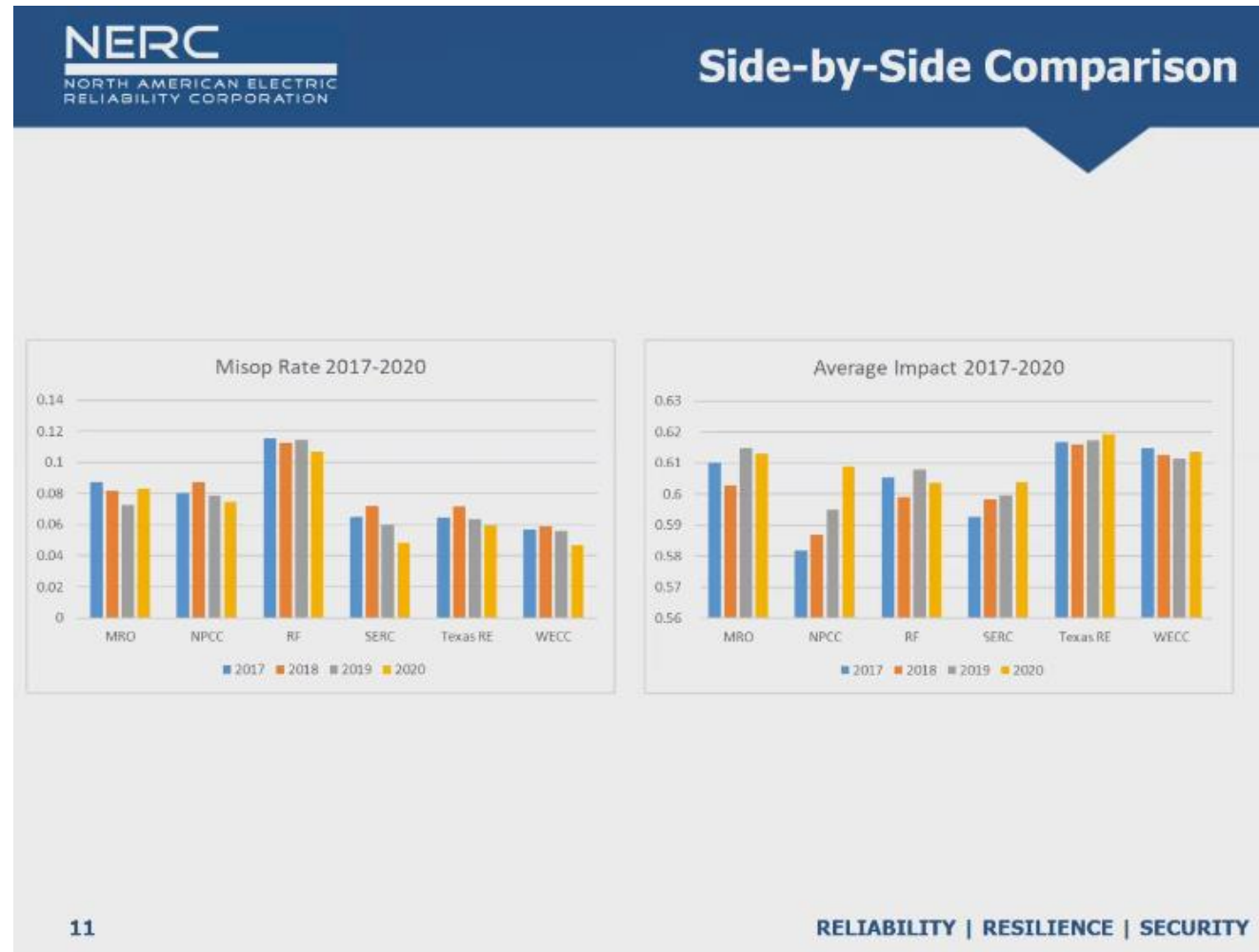
Weighting Factors

NERC NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION		Field Factors
Field	Value	Factor
Voltage Class	0-99 kV	.4
	100-199 kV	.5
	200-299 kV	.65
	300-499 kV	.85
	500-765 kV	1
Equipment Type	BES UFLS, BES UVLS	.333
	Shunt Capacitor, Shunt Reactor/Inductor	.5
	HVdc, Line, Series Capacitor, Series Reactor/Inductor, Transformer	.667
	Bus, Other	.833
	Breaker, Dynamic Var Systems, Generator	1
Cause	Equipment Errors (and Other)	.5
	Human Errors	.85
	Unknown	1
Category	Slow Trip – Other than Fault	.167
	Unnecessary Trip – Other than Fault	.333
	Failure to Trip – Other than Fault, Unnecessary Trip – During Fault	.667
	Failure to Trip – During Fault, Slow Trip – During Fault	1

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Misops Rate Vs Suggested Severity Index





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