

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

2022 NERC Case Quality Metrics

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RELIABILITY | RESILIENCE | SECURITY



- **Case Quality:** Reasonableness of the data for individual Element models that comprise the powerflow and dynamics cases.
 - Assessment of accuracy of model compared to reality
 - Driven by actual models implemented to represent grid Elements
 - Does not account for how well compilation of models represents nature of the grid
 - Only focuses on how well models are implemented
- **Case Fidelity:** Ability of the case to accurately represent measured power system behavior.
 - Assessment of how well model matches actual system response
 - Focuses on steady-state powerflow and dynamics cases
 - Compares modeled response to actual performance of the grid

- Started in NERC SAMS to measure effectiveness of base case improvement guidance from the group
 - Continued as a NERC modeling assessment after group disbanded
- Goal is to trend towards improvement
 - Color codes reflect broad categories
- Year over Year trending analysis supplements individual year values

The following subsections describe the performance scores for the assessment of each powerflow and dynamics case analyzed in the EI, TI, and WI. Note that performance scores greater than 5% are marked in **red**.

	Consistent performance under 5% performance score, or performance score moved from greater than 5% to less than 5%
	Positive performance improvements (decrease in score of 2% or more from previous year)
	Continued performance above 5% performance score with no noticeable improvement
	Noticeable performance degradation (increase of 1% or more from previous year), or performance score moved from less than 5% to greater than 5%

Metric	Bad Data	Suspect Data	Case Setup Issue
P_{max} Exceedances			X
P_{min} Exceedances			X
Scheduled Interchange Sum			X
Voltage Schedule Conflicts			X
Tap Step Conflicts		X	
Tap Step Conflicts (Severe)		X	
Low Emergency Rating		X	
High Emergency Rating		X	
Thermal Overloads			X
Thermal Overloads (Severe)			X
Gen Reactive at Limits			X
Gen Reactive Limit Power Factor		X	
Positive Sequence TX Circulating Current		X	
Poor Load Power Factor		X	
Generator R_{source}:X_{series} Ratio	X		
Generator Terminal Voltage			X
Generator Reactive Capability Curve		X	
X/R Ratio Check		X	
Natural Gas Generator P_{max}	X	X	
Gens without Models		X	X
Netted Gens with Models		X	X
Netted Generators		X	
Gens with Classical Models		X	
Unacceptable Models	X		
Not Recommended Models		X	
User-Written Models ²³		(X)	
Inconsistent Reactances	X		
Inconsistent Time Constants	X		
Unreasonable Inertia Constants		X	

Metrics started from SAMS feedback

Metrics can be added or changed based on NERC and industry feedback

Metric	Bad Data	Suspect Data	Case Setup Issue
Unreasonable Saturation Factors		X	
Severe Saturation Factors	X		
PSS but no Excitation		X	
Inconsistent Speed Damping	X		
Inconsistent Lead-Lag Time Constant	X		
Erroneous Power Dev Fractions	X		
DC Exciter Self-Excitation Errors	X		
Inconsistent Type III Wind Speeds	X		



Strong engagement with MOD-032 Designees

Detail given to MOD-032 Designees, high level posted at Modeling Assessment Page

- Assessment and Scripts posted
 - Bug fixes and improvements done annually based on submitted request
 - Assessment contains high level
 - Detailed information/report sent to Interconnection MOD-032 Designees

Modeling Assessments

Type

Title

[-] Case Quality Metrics (16)

[-] 2021 (2)



2021 Case Quality Metrics Assessment



2021 Case Quality Metrics Scripts

<https://www.nerc.com/pa/RAPA/ModelAssessment/Pages/default.aspx>



Questions and Answers

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