

M-17

Transmission Outage Severity (TOS)

Submittal Date	Submitted June 17, 2020		
Proposal Type	New <input type="checkbox"/> Approved by PAS on July 28, 2020	Revision <input checked="" type="checkbox"/>	Metric Analysis <input type="checkbox"/>
Definition	Transmission Outage Severity (representing the impact of a TADS transmission outage event by its equivalent MVA value, as defined in the SRI, compared to the total equivalent MVA of the Bulk Power System (BPS). The metric is calculated for transmission outage events that involve sustained outages of 100 kV and above ac circuits and transformers.		
Rating Criteria	<ul style="list-style-type: none"> Red (actionable): Both average TOS and average duration show a statistically significant increase compared to the previous five-year period. Yellow (monitor): Either average TOS or average duration show a statistically significant increase compared to the previous five-year period. White (stable): No statistically significant change in the average TOS and duration compared to the previous five-year period or either average TOS or average duration show a statistically significant decrease compared to the previous five-year period. Green (good/improving): Both average TOS and average duration show a statistically significant decrease compared to the previous five-year period. 		
Purpose	To compare the average impacts and durations of transmission outage events for a specific Initiating Cause Code (ICC) and the frequency of those events.		
Formula or Type of Statistical Analysis	<p>Average TOS is calculated as the ratio of the average equivalent MVA per event for all of the transmission sustained outage events with a specific ICC compared to the total equivalent MVA of the BES transmission inventory reported in TADS for a given year, expressed in percent. Changes in the average TOS and the average event duration are statistically tested by the pooled or un-pooled t-test.</p> $\text{Average TOS}(\text{Year } X) = \frac{\sum \text{MVA of sustained outages for ICC Events started in Year } X}{[\text{Total MVA of TADS inventory for Year } X] \times [\sum \text{ICC Events for Year } X]} * 100.$		

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	<p>The metric is calculated for transmission outage events that involve sustained outages of the 100 kV and above ac circuits and transformers. The severity of a transmission outage is calculated based on its estimated contribution of power flow capacity through TADS transmission element based on its voltage class as defined in the SRI.</p> <p>Note: Outages per element are limited to one per calendar day.</p>
Time Horizon	Historical perspective
Metric Start Time or Baseline	Five most recent years are calculated and statistically compared for trends. Calculations from TADS outage and inventory data starting with 2015.
Data Collection Interval and Roll Up	Data collection is through the NERC TADS procedure and is calculated and analyzed annually.
Ease of Collection	The TADS database makes this metric easily reportable on a uniform basis.
Aggregation	Reported on an aggregate basis by NERC.
Links to NERC Standard	None
Data Source	The NERC TADS definitions and data.
Data to be Submitted By	Transmission Owners via TADS procedures
Revision History	<p>Revised February 19, 2025:</p> <ul style="list-style-type: none"> • Formula or Type of Statistical Analysis: Limited outages per element to one per calendar day. • Minor editorial changes made <p>Revised Sept. 21, 2022</p>

PAS and NERC Staff Use						
Need for Validation or Pilot	No, the data and results are reported via the TADS process and have been a part of the statistical analysis of TADS data included in the State of Reliability reports since 2013.					
SMART Rating PAS SMART rating of proposed metric, metric revision, or new metric analysis method	Total Score	Specific/Simple	Measurable	Attainable	Relevant	Tangible/Timely
	15	3	3	3	3	3
Publications and Documentation	State of Reliability Report					