

Reliability and Security Indicator Dashboard

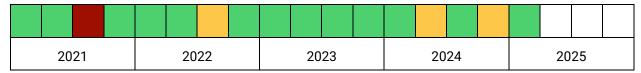
QUARTER 1 - 2025

Index

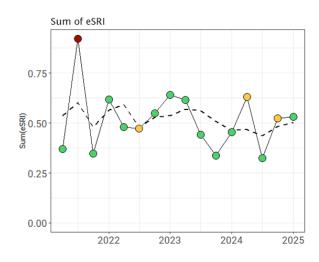
<u>Indicator 1</u>	
Reportable Events	1
<u>Indicator 2</u>	
Protection System Misoperations	. 2
Indicator 3	
Transmission Outages	3
Indicator 4	
Energy Emergency Alerts	4
Indicator 5	
Operation Outside BAAL	5
Indicator 6	
System Frequency	6



Indicator 1 Performance History—by Year and Quarter



Trend Charts



Quarterly Evaluation

There were nine categorized events in the Western Interconnection in Q1 of 2025. Six of these events were category 1a events, one was category 1c, and two were category 1h.

Of these nine events, five resulted in transmission lines tripping out of service, four affected loads, with return to service from several minutes to over two hours. Five of the events affected generation resources.

The eSRI sum for the quarter shows slightly higher than Q4 of 2024 due to the effects of two of the more influential Category 1a events. Comparing this quarter to the historical combined impact of events to the overall power system, the metric is slightly above the rolling average, resulting in this indicator being green for this quarter.

What it measures

Indicator 1 measures the frequency and severity of events that occur on the system each quarter. This measurement is based on the NERC Event Analysis Process to track and evaluate events. The indicator measures only reported events evaluated through that process.

How it is measured

Indicator 1 is based on two characteristics of reported events:

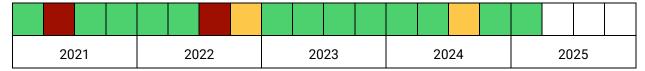
- 1. Sum of the Event Severity Risk Index (eSRI) number for each event every quarter.
- 2. Number of Category 2 and higher events each quarter.*

Why this matters

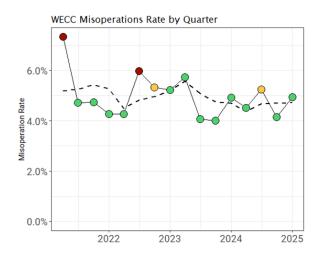
Events pose a risk to system reliability. Category 2 or higher events are more significant events that have severe impacts on the system.

^{*}Category 2 and higher events are rare, typically fewer than one per year. One Category 2 event occurred in Q3 2022.

Indicator 2 Performance History—by Year and Quarter



Trend Charts



Quarterly Evaluation

There were 37 misoperations reported in Q1 2025 along with 788 operations resulting in a misoperations rate of 4.7%. The leading causes for misoperations in the first quarter of 2025 were Incorrect Settings (19), Failures/Malfunctions (6), and DC Systems (4). While Incorrect Settings are historically the highest contributor to misoperations, there was a higher percentage in Q1 of 2025 (51%) than the contribution to total misoperations in 2024 of 40%. All but one misoperation for the quarter were unnecessary trips, which are generally less influential to the system. The 4.7% misoperations rate is favorable, resulting in this indicator being green for the quarter.

What it measures

Indicator 2 measures the effectiveness of protection systems in safeguarding system reliability.

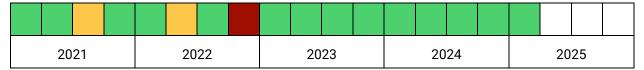
How it is measured

Indicator 2 tracks the ratio of protection system misoperations to the total number of protection system operations.

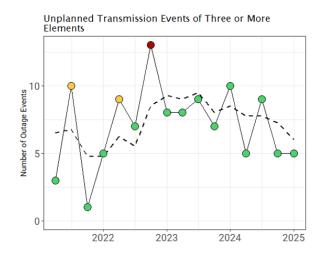
Why this matters

System reliability is reduced when protection systems fail to operate, or they operate incorrectly ("misoperation"). Misoperations are a major contributor to transmission outage severity.

Indicator 3 Performance History-by Year and Quarter



Trend Charts



Quarterly Evaluation

There were five events involving three or more elements, which is below the running mean, so the indicator is green.

What it measures

Indicator 3 measures how often potentially high-risk, unplanned transmission outages occur on the system.

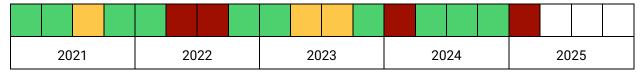
How it is measured

Indicator 3 tracks the number of unplanned transmission events involving three or more Bulk Electric System elements each quarter.

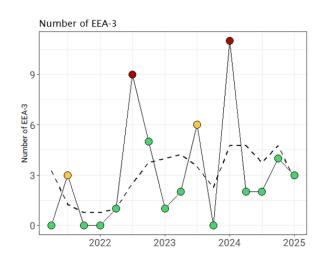
Why this matters

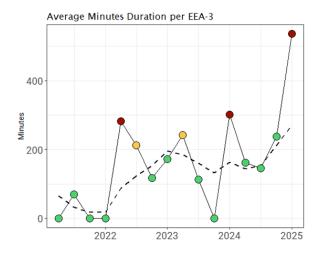
While most transmission events involve an outage of a single element, some events involve multiple elements. Though relatively uncommon, events involving three or more elements pose a higher risk because they are more extensive than the n-1 and n-2 contingencies typically considered by planners.

Indicator 4 Performance History—by Year and Quarter



Trend Charts





Quarterly Evaluation

The three EEA-3s for the quarter were a direct result of a single BA experiencing generator forced outages, making the entity reserve deficient. The indicator is classified "Red" because of the longer average duration of EEA-3s for the quarter (one EEA-3 lasted 20 hours).

What it measures

Indicator 4 measures the number and duration of Level 3 Energy Emergency Alerts (EEA-3) issued to Balancing Authorities each quarter. An EEA-3 alert is defined as a situation in which firm load interruption is imminent or in progress.

How it is measured

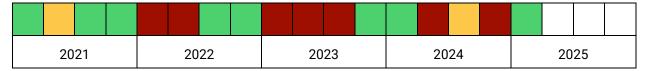
Indicator 4 is based on two metrics related to EEA-3 alerts:

- 1.The number of EEA-3 alerts issued each quarter.
- 2.The mean duration of the EEA-3 alerts issued each quarter.

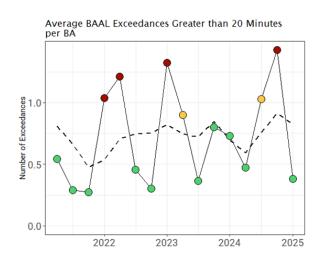
Why this matters

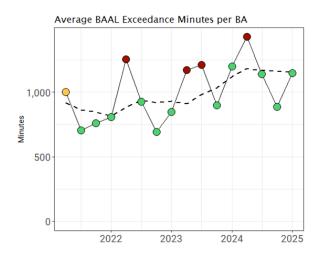
EEA-3 alerts can indicate a lack of sufficient bulk electric system generation capacity, energy, or transmission capability. EEA-3 alerts are an important indicator of system operational reliability.

Indicator 5 Performance History—by Year and Quarter



Trend Charts





Quarterly Evaluation

Exceedances greater than 20 minutes dropped significantly for the quarter, well below the rolling average. Average exceedance minutes increased slightly but remained on the rolling average. Therefore, the indicator for Q1 2025 is green, indicating consistent operating performance by the Balancing Authorities.

What it measures

Indicator 5 measures the system's ability to maintain frequency within defined limits.

How it is measured

Indicator 5 is based on two metrics related to Real Power Balancing Control Performance:

- 1. The mean number of Balancing Authority Area Control Error (ACE) Limit (BAAL) exceedance minutes per BA each quarter.
- 2.The mean number of BAAL exceedances greater than 20 minutes per BA each quarter.

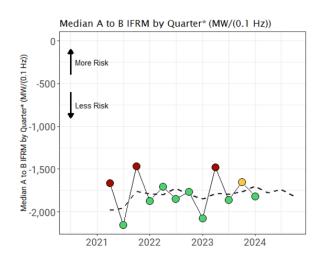
Why this matters

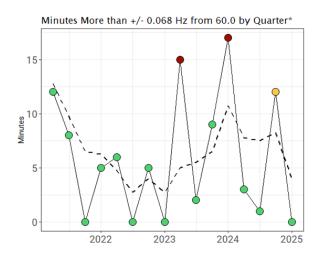
Operation within the BAAL supports reliability by maintaining system frequency within defined limits. Instances where the BAAL is exceeded may put the reliability of the interconnection at risk.

Indicator 6 Performance History-by Year and Quarter



Trend Charts





Quarterly Evaluation

Beginning with Q1 2022, Indicator 6 has been modified to use the "operating calendar" rather than the "standard calendar." Per the operating calendar, December 2021 through February 2022 represents the first quarter of the 2022 operating year. This change will align Indicator 6 with the meeting, data availability, and reporting schedule of the NERC Resources Subcommittee (RS), which is the source of the IFRM data supporting this indicator. Other indicators will continue to use the standard calendar.

System frequency did not deviate from 60.0 Hz by more than +/- 0.068 Hz for more than one minute in Q1 2025, which is fewer minutes than the rolling average. Use of the IFRM metric has been suspended due to insufficient measurement events. Therefore, Indicator 6 is green.

What it measures

Indicator 6 measures the system's ability to respond to changes in frequency and maintain 60 Hz frequency.

How it is measured Indicator 6 is based on two

characteristics of system frequency:

- 1. Frequency response to large disturbances—Frequency stability in response to events such as sudden generation or load loss, measured by NERC's A-B IFRM metric.
- 2. Frequency performance under normal frequency behavior—
 Frequency stability at all times, measured as the number of minutes with a mean frequency exceeding +/-0.068 Hz from 60 Hz.

Why this matters

Frequency should be kept as close to 60 Hertz as possible. When large disturbances occur, frequency should not deviate far from 60 Hertz and should be restored quickly. Maintaining frequency is a coordinated effort among BAs to balance generation and load. When one BA is unable to perform this balance, it can adversely impact the entire interconnection and, if not resolved, can lead to issues on the BPS that may include shedding firm load