

Indicator 1: Number and Severity of Reported Events



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.*

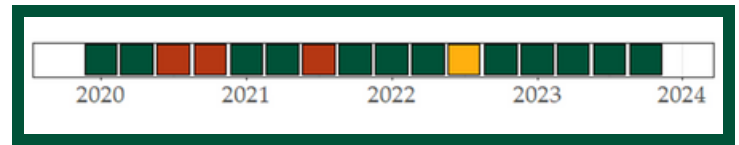
*Category 2 and higher events are rare, typically fewer than one per year. One Category 2 event occurred in Q3 2022.

Why this matters

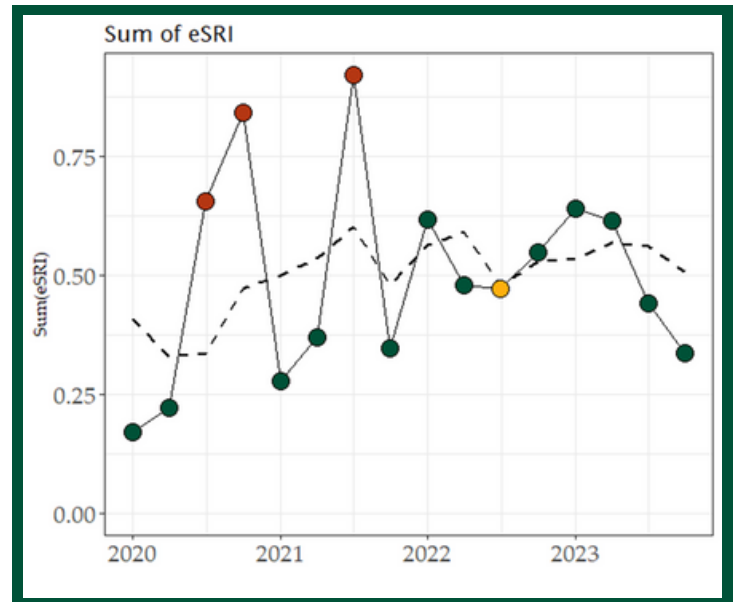
Events pose a risk to system reliability. Category 2 or higher events are more significant events that have severe impacts on the system.

What does the Q4 2023 evaluation tell us?

There were four categorized events in the Western Interconnection in Q4 of 2023. All these events were Category 1a events. Of these events, two affected customer loads, while one event affected generation resources. The eSRI for the quarter is below the moving average for the year and is the lowest since the first quarter of 2021.



Indicator Performance History



DATA SOURCE

The Event Analysis Management System
NERC eSRI metric

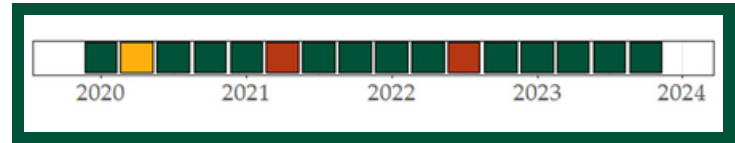


Indicator 2: Rate of Protection System Misoperations



What it measures

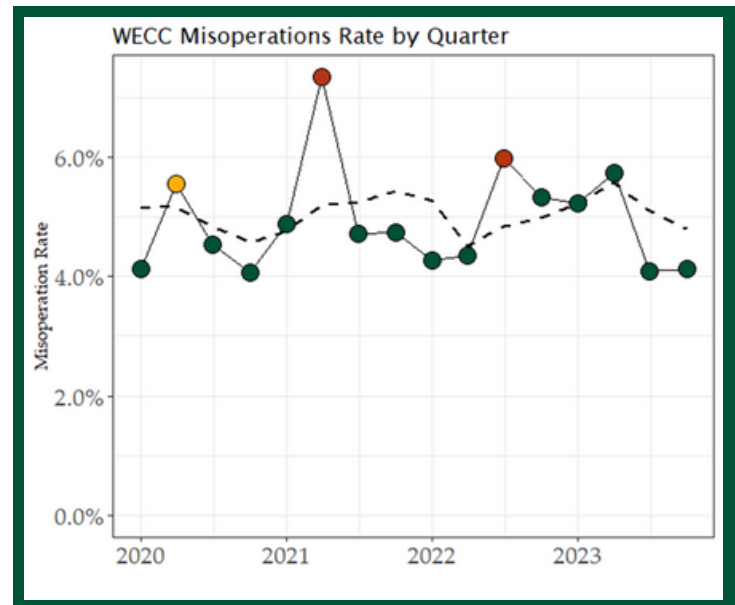
Indicator 2 measures the effectiveness of protection systems in safeguarding system reliability.



Indicator Performance History

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.

What does the Q4 2023 evaluation tell us?

There were 34 misoperations reported in Q4 2023 along with 852 operations resulting in a misoperations rate of 4%. The leading causes for misoperations in the fourth quarter of 2023 were Incorrect Settings(10), Communication Failures(6), and Relay Failures/Malfunctions(5). This is fairly consistent with historical causes. 59% of the misoperation for this quarter were categorized as Unnecessary Trip – Other Than Fault. This means the misoperation took place when there was no fault on the system. This usually represents a less severe misoperation and is common when there are issues with system equipment. The favorable 4% misoperations rate for the quarter leads to this indicator being green.

DATA SOURCE

Misoperation Information Data Analysis
System (MIDAS)

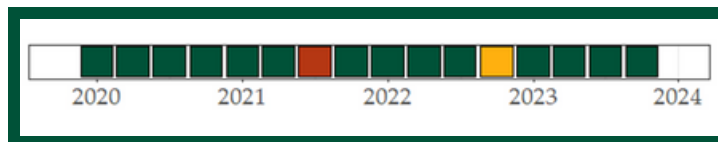


Indicator 3: Unplanned Outages of Multiple Transmission Elements



What it measures

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



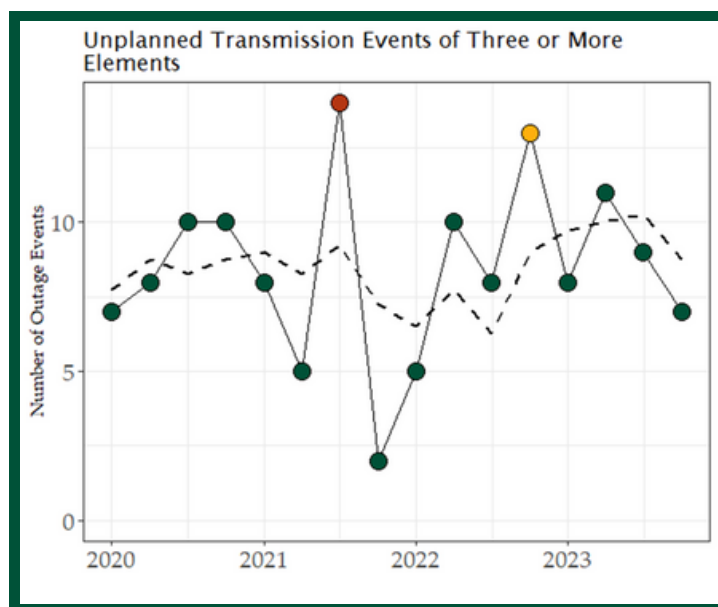
Indicator Performance History

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.



What does the Q4 2023 evaluation tell us?

There were seven unplanned transmission events involving three or more elements in Q4 of 2023, which trends with the moving average, classifying the quarter as “green.” Two of these events lasted one hour or less, three events lasted less than eight hours, and two events resulted in elements remaining out of service for longer than eight hours.

DATA SOURCE

Transmission Availability
Data System (TADS)

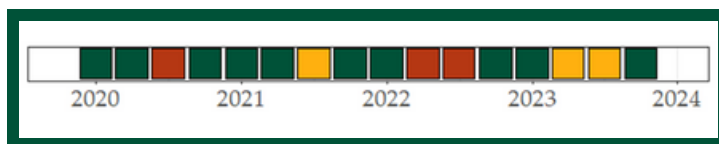


Indicator 4: Number And Duration of Energy Emergency Alerts

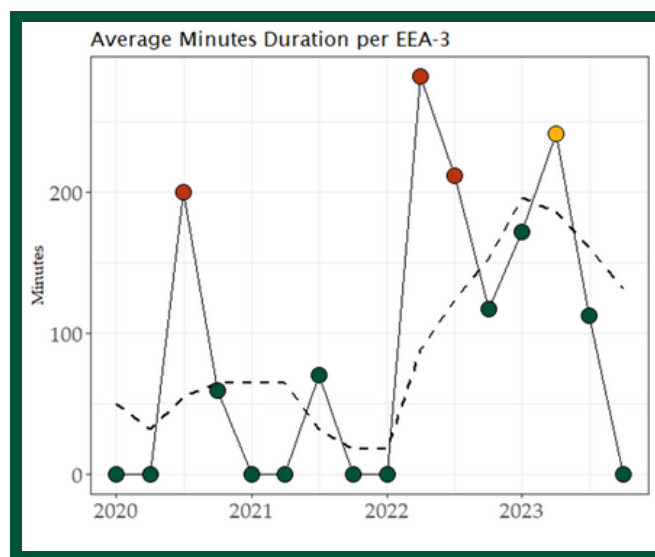
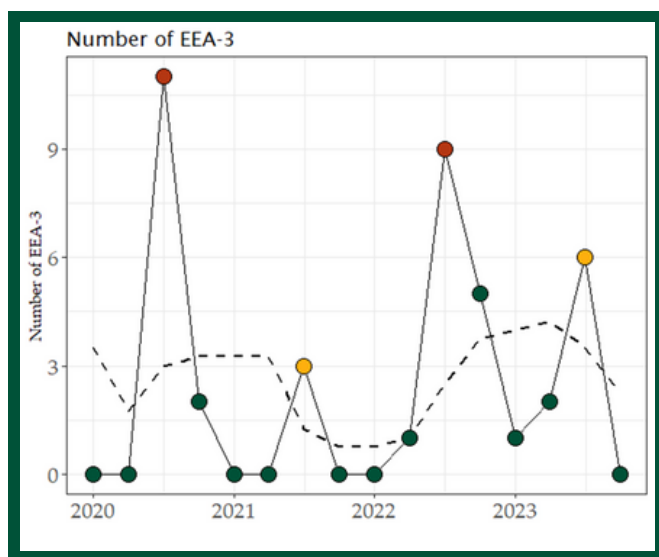


What it measures

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.



Combined Indicator Performance History



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.

What does the Q4 2023 evaluation tell us?

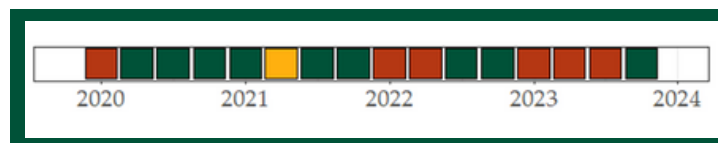
The Western Interconnection experienced zero EEA-3 events during the quarter. Therefore, the indicator is green.

Indicator 5: System Operation Outside Balancing Authority ACE Limit (BAAL)

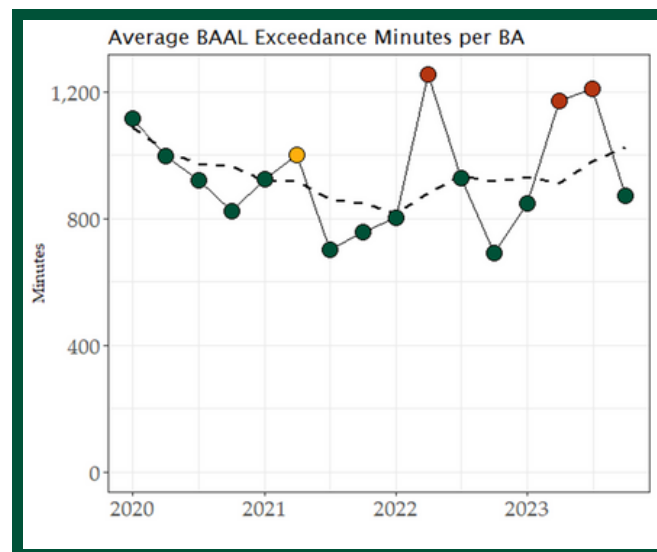
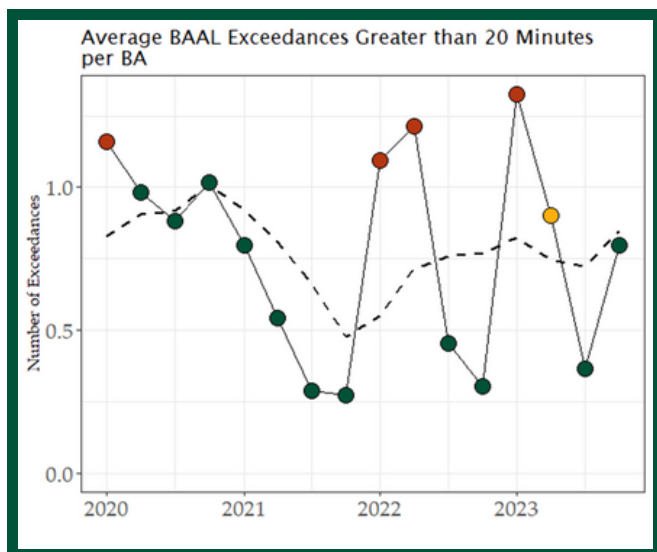


What it measures

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



Combined Indicator Performance History



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.

What does the Q4 2023 evaluation tell us?

Indicator 5, "Operations outside of BAAL," remains steady and in the green with no decrease in overall control performance. This performance indicator does have a seasonal variation due to interconnection load vs. dispatchable resources, and 2023 Q4 is operating in a similar manner as previous years of the same quarter.

DATA SOURCE

NERC BA Submission Site (BASS)

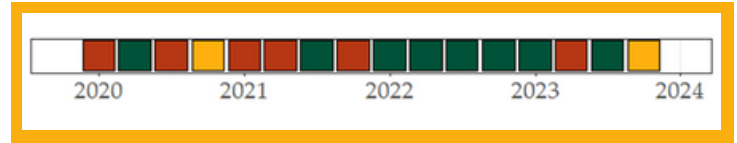
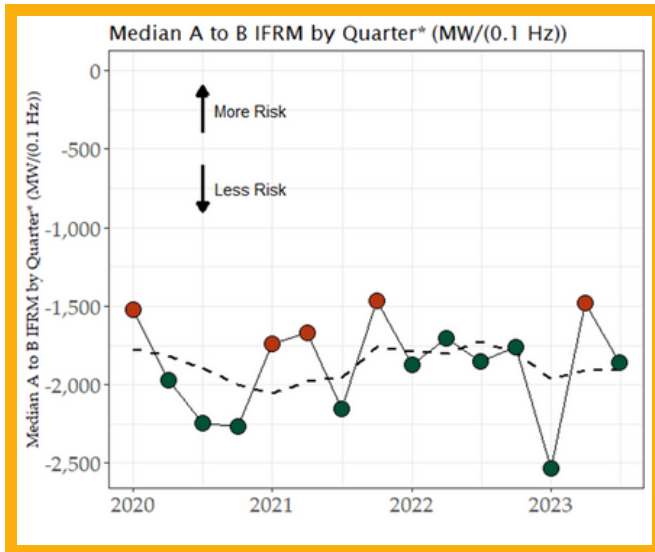


Indicator 6: Interconnection Frequency Response and Performance

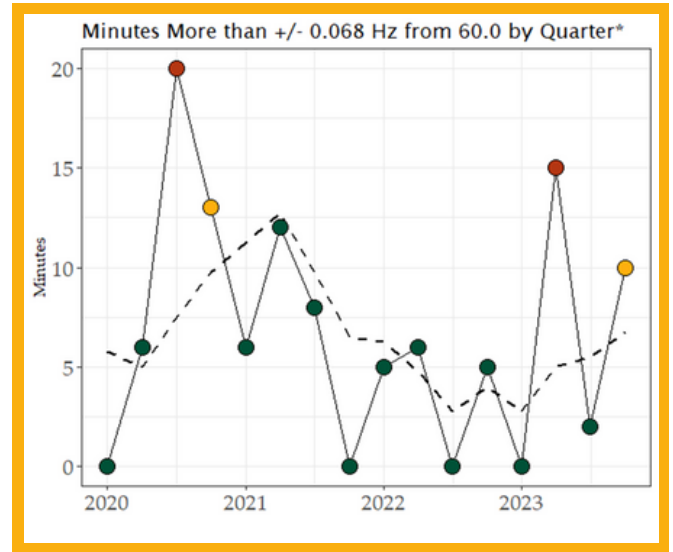


What it measures

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



Combined Indicator Performance History



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.

What does the Q4 2023 evaluation tell us?

The frequency response metric (median IFRM) in Q4 2023 was equal to the rolling mean and improved from red to green from the previous quarter. The frequency performance metric (number of minutes more than ± 0.068 Hz from 60 Hz) increased from 4 minutes to 10 minutes, changing the metric from green to yellow. Therefore, the indicator for Q4, 2023 is yellow. One event accounted for 6 minutes during a planned Islanding event when Path 1 and Path 83 were removed from service for emergency repairs on a disconnect switch at the Path 1 end. Whenever Path 1 is opened, Path 83 opens due to the weak connection (138 kV) between the U.S. and Alberta. Frequency declined to a low of 59.925 Hz and remained below the threshold of 59.932 Hz for 6 minutes in the early morning hours of September 4, 2023. Path 1 returned to service after a 20-minute outage followed by Path 83. The interconnection experienced no other negative impacts due to the low frequency.

DATA SOURCE

NERC IFR Master Event List (Redacted)

