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 <u>NERC Event Analysis Process</u> to track and evaluate events. The indicator measures only <u>reported events</u> evaluated through that process.

How it is measured

Indicator 1 is based on two characteristics of reported events:

1. Sum of the <u>Event Severity Risk Index</u> (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.

2019 2020 2021 2022 2023

Indicator Performance History



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 Q1 2023 evaluation tell us?

There were eight categorized events in the Western Interconnection in Q1 of 2023; however, none were Category 2 or higher. There were five Category 1a events and three Category 1h events. Of these events, four impacted customer loads, while two of those four also impacted generation. The eSRI for the quarter is below the moving average for the year and the lowest since the fourth quarter of 2021. The status of this indicator is green.

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.

How it is measured

Indicator 2 tracks the ratio of protection system <u>misoperations</u> 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 Performance History



What does the Q1 2023 evaluation tell us?

The MIDAS reporting for Q1 2023 included 1,033 operations with 50 misoperations, yielding a favorable misoperations rate of 4.8%. It was noticed that a single entity reported 16% of the misoperations for the quarter. Another piece of data that stood out was an increase in the number of unknown/unexplainable misoperations reported for the quarter, which was 16%. This cause of misoperations is concerning since no corrective actions are taken to prevent a recurrence, so the conditions are ripe for repeat misoperations. The quarter's misoperations rate is below the moving average resulting in the indicator being "green."



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.

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 Performance History



What does the Q1 2023 evaluation tell us?

There were six unplanned transmission events involving three or more elements in Q1 of 2023, which is lower than the moving average, classifying the quarter as "green." Five of these events lasted six hours or less, while the elements of one remained out of service until the end of the quarter.



DATA SOURCE NERC System Awareness

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 <u>EEA-3</u> 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 <u>mean duration</u> 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 Q1 2023 evaluation tell us?

A single EEA-3 lasted 172 minutes in Q1 2023. Both these metrics are sufficiently close to their running averages that the indicator is "green" in Q1 2023. The single EEA-3 event occurred when the BA had more than 1,000 MWs of generation planned or forced out, causing the BA to become deficient in Contingency Reserves. The BA was not required to shed any Firm or Interruptible load during the EEA-3.

Combined Indicator Performance History

2019

2020









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 Q1 2023 evaluation tell us?

The number of BAAL exceedances greater than 20 minutes per BA averaged 1.32, well above the mean of approximately 0.8, causing this measure to be in the red. WECC SA gains additional insight to these BAAL exceedances through their participation in the NERC Resource Subcommittee. This was driven heavily by a single BA that had five large exceedances. BAAL exceedances averaged 848 minutes per BA, slightly under the mean for this measure. Consequently, this indicator is "red" for Q1 2023.





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 Q1 2023 evaluation tell us?

The magnitude of the Q4 median A-to-B IFRM (based on four events) increased significantly (a good thing), indicating frequency response during the quarter was outstanding. Similarly, the number of minutes during which the system frequency was more than 0.068 Hz from 60.0 (zero)was well below the running average of that metric. Consequently, Indicator 6 is "green" for Q1 2023.



Indicator 7: Proportion of Entities With Repeated or Coincident Potential Compliance Violations



What it measures

Indicator 7 measures aspects of entity compliance behavior related to multiple potential violations.





Combined Indicator Performance History



How it is measured

Indicator 7 is based on two metrics:

1. Number of entities with repeat serious or moderate potential violations of the same standard and requirement within a five-year period.

2. Number of entities with three or more concurrent serious or moderate potential violations within a standard family issued during a given quarter.

Why this matters

Repeated or concurrent serious or moderate potential violations can be indicators of systemic or programmatic issues within the entity.

What does the Q1 2023 evaluation tell us?

The number of entities with repeated or concurrent potential violations was zero for Q1 of 2023. Consequently, this indicator is classified as "green."





Under Development

Indicator 8 is currently under development and will focus on reported cyber and physical threats to the Western Interconnection. WECC currently receives notification of these threats through the EOP-004-2 and OE-417 reporting process; however, these reports may not reflect the full spectrum of the threats. Consequently, WECC does not currently have adequate data to develop an accurate indicator for physical and cyber security. WECC is working with other organizations (ex., NERC, E-ISAC) to determine potential datasets for this indicator that can provide a broader and more complete assessment.

