NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2021 ERO Enterprise Reliability Indicators

RELIABILITY | RESILIENCE | SECURITY




Indicator 1: Fewer, Less Severe Events

- **Why is it important?**
  - Provides a quantitative measure and trend of actual impacts on the BPS
- **How is it measured?**
  - Count: Number of Category 3 or above events
  - Trend: Statistical test is performed on the five-year cumulative daily event Severity Risk Index (eSRI) for (Category 1–3) events

*No Change in this indicator from previous year

Indicator 2: Compliance Violations

- **Why is it important?**
  - Reduce risk to BPS reliability from Standard violations by registered entities
- **How is it measured?**
  - Moderate and serious risk noncompliance with a relevant history of similar past conduct
  - The number of violations discovered through self-reports, audits, etc.
  - Risk to the BPS based on the severity of Standard violations

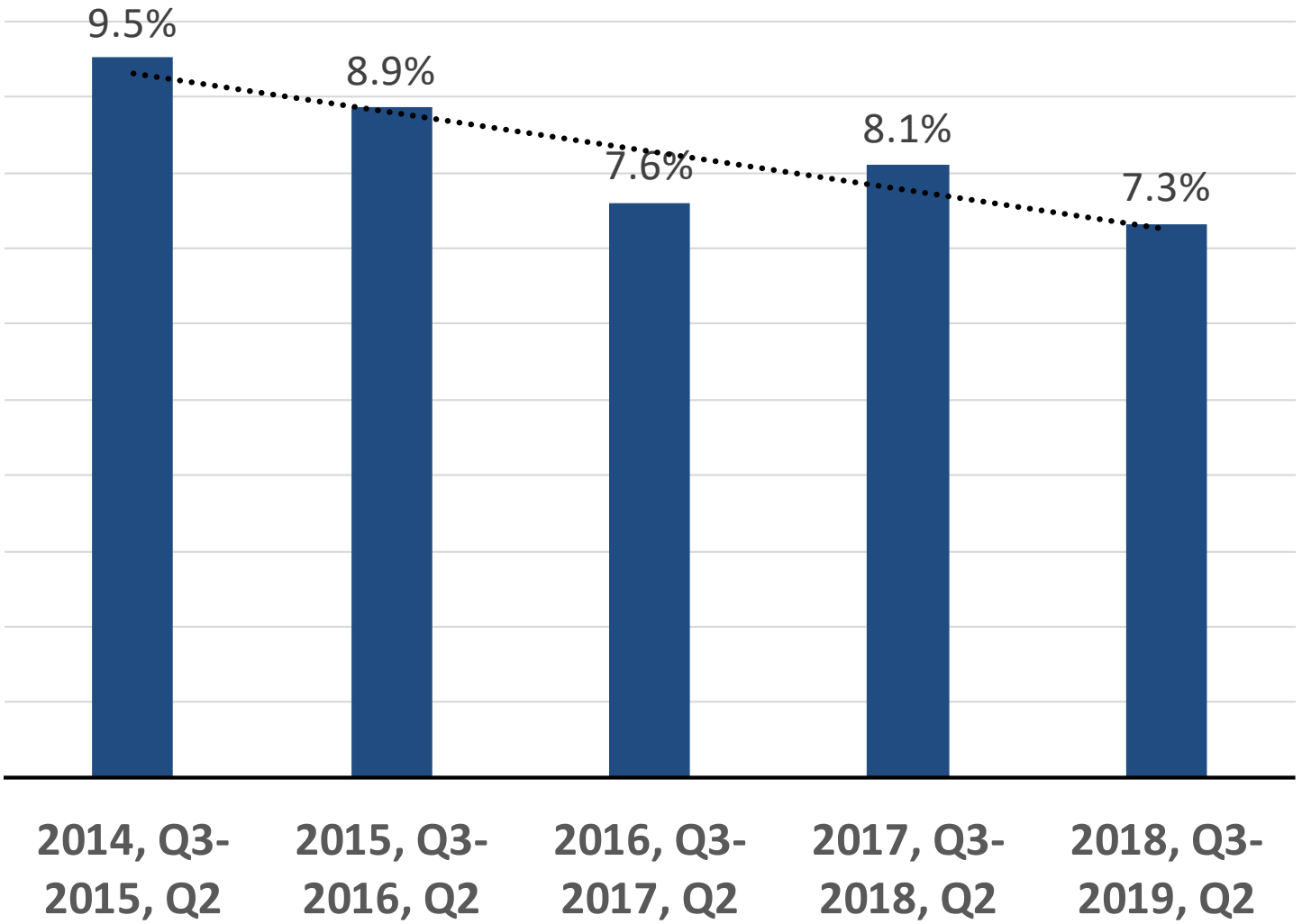
* No Change in this indicator from previous year

Indicator 3: Protection System Misoperations Rate

- **Why is it important?**
  - Protection system misoperations exacerbate event impacts for the BPS, thereby increasing their severity.
- **How is it determined?**
  - By calculating an annual misoperations rate
  - By comparing annual misoperations rates

* The graphic has been changed for this indicator and no longer included loss of load/event

Indicator 3: Protection System Misoperations Rate

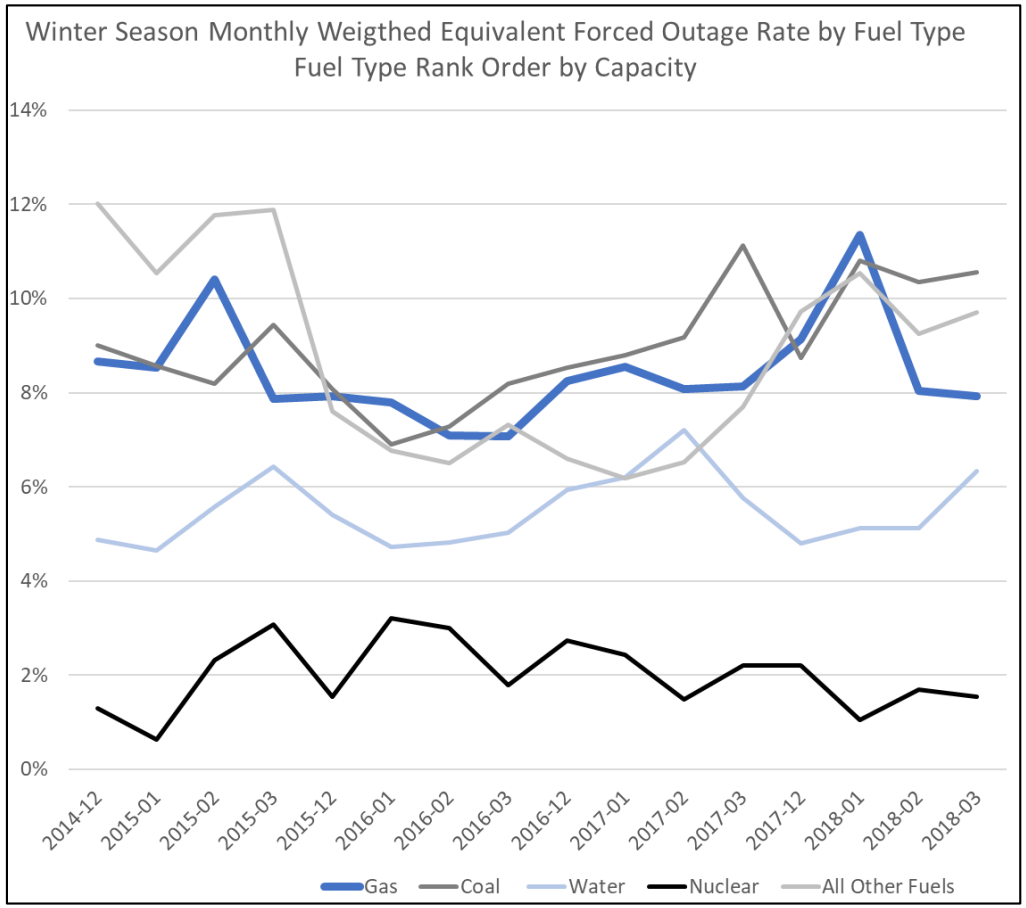


Indicator 4: Forced Outage Rate During Cold Weather Months and Potential Production MWH Loss Due to Lack of Fuel

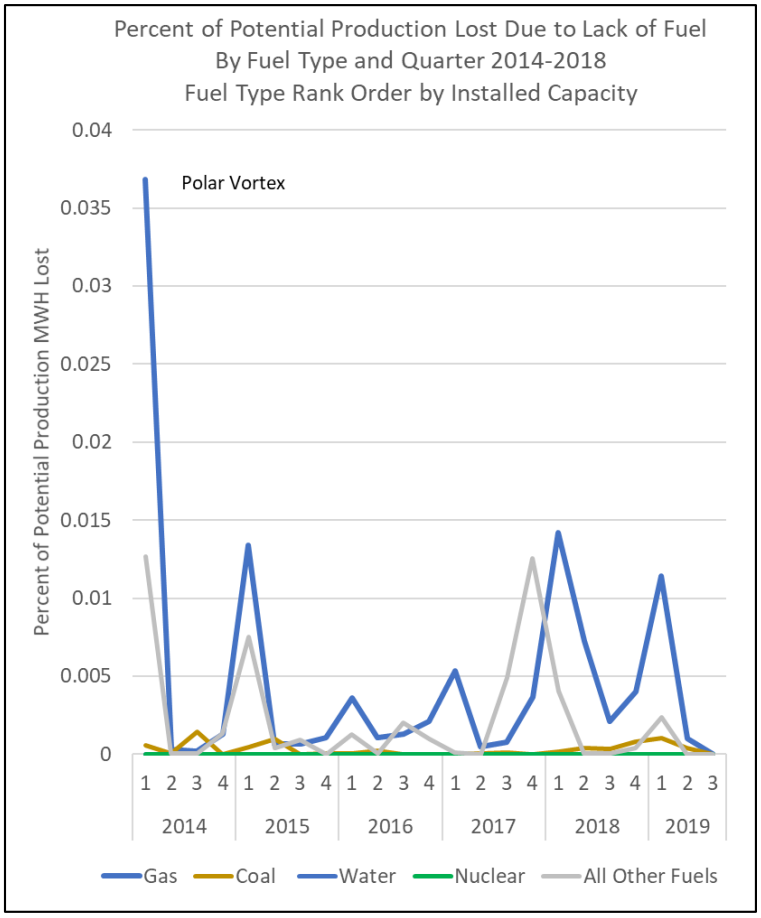
- **Why is it important?**
  - Reduce risk to BPS reliability due to unit outages during cold weather or gas unavailability
- **How is it measured?**
  - Weighted Equivalent Forced Outage Rate (WEFOR) by fuel type during cold weather season (Dec. – March)
  - Quarterly potential production MWH lost by fuel type due to lack of fuel

* This indicators is being expanded to reflect outages during cold weather of all types reported in NERC GADS

Indicator 4: Forced Outage Rate During Cold Weather Months and Potential Production MWH Loss Due to Lack of Fuel



Winter Season Monthly Weighted EFOR by Fuel Type



Percent of Potential Production Lost Due to Lack of Fuel

Indicator 5: Reduce AC Transmission Line Forced Outages

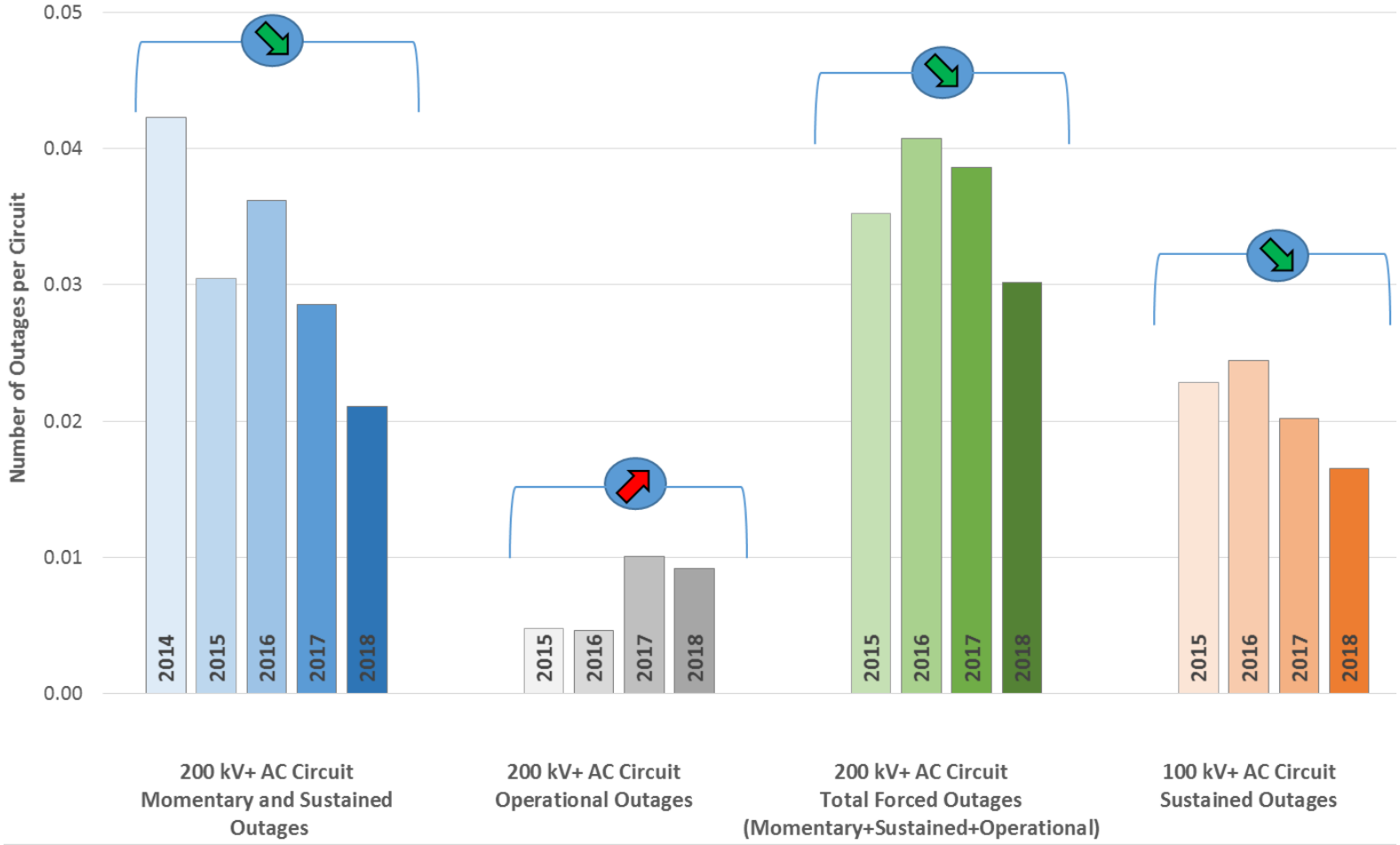
- **Why is it important?**
  - Measures risks to BPS reliability from three priority causes:
    1. Operator or other human performance issues
    2. Substation equipment failures or failed circuit equipment
    3. Vegetation encroachment

Indicator 5a: Operator or Other Human Performance Issues

- **How is it measured?**
  - Number of transmission line outages caused by Human Error divided by the total inventory of circuits

* Depiction of this indicator has been modified from previous year

Indicator 5a: Operator or Other Human Performance Issues



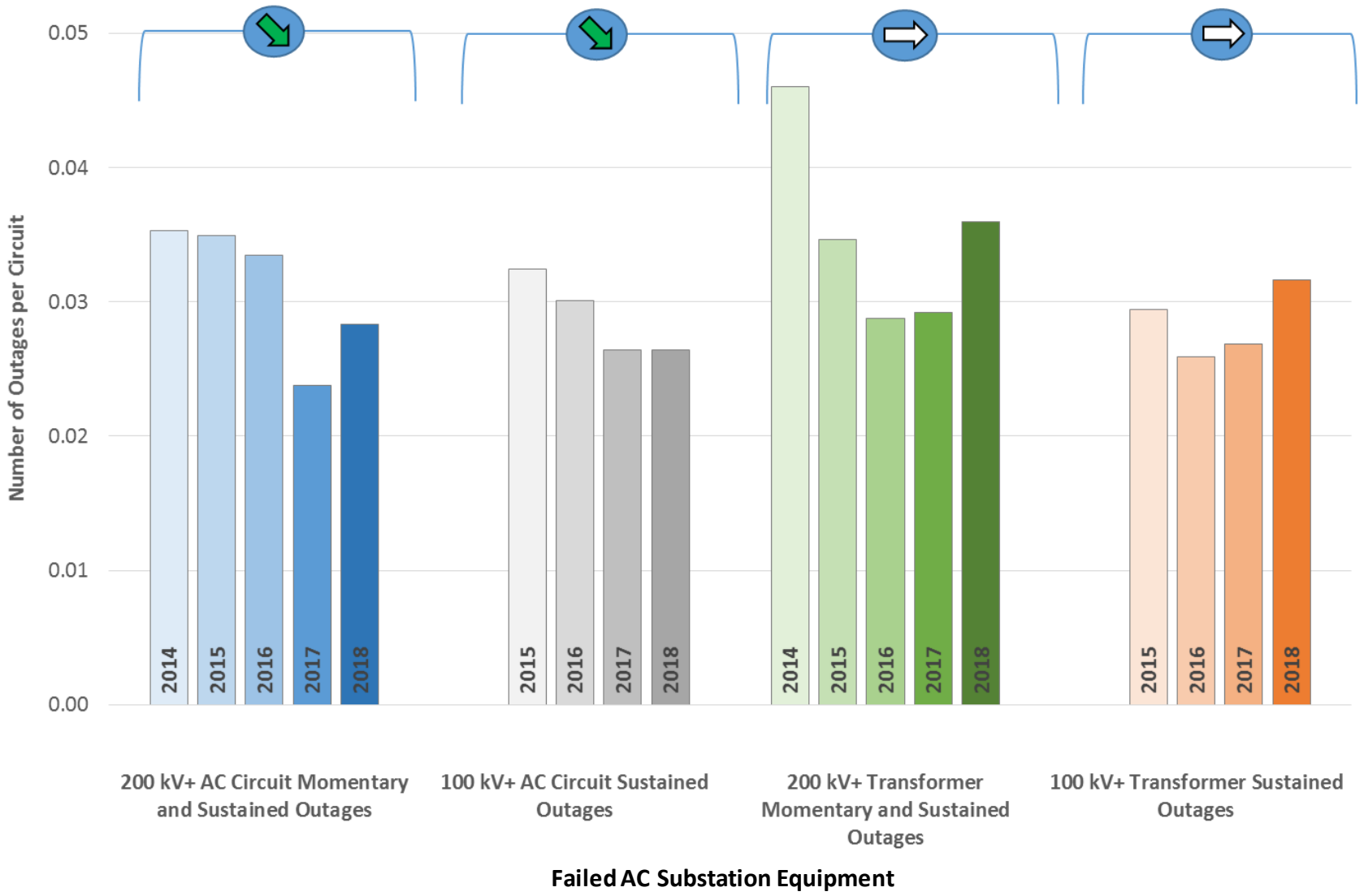
Outages Caused by Human Error
AC Circuits

Indicator 5b: Substation Equipment Failures or Failed Circuit Equipment

- **How is it measured?**
  - Number of transmission line outages caused by AC substation equipment outage failures and failed AC circuit equipment (such as transformers), divided by the total inventory of circuits

* Depiction of this indicator has been modified from previous year

Indicator 5b: Substation Equipment Failures or Failed Circuit Equipment

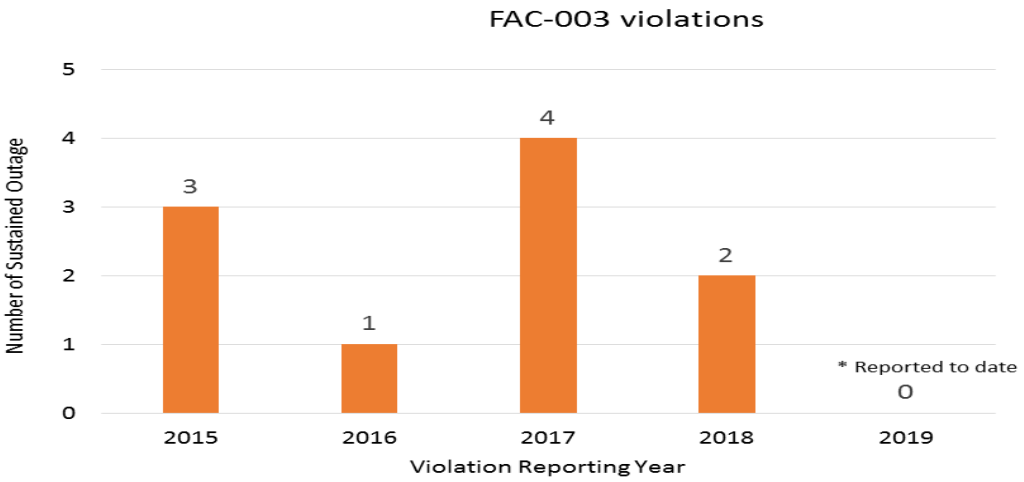


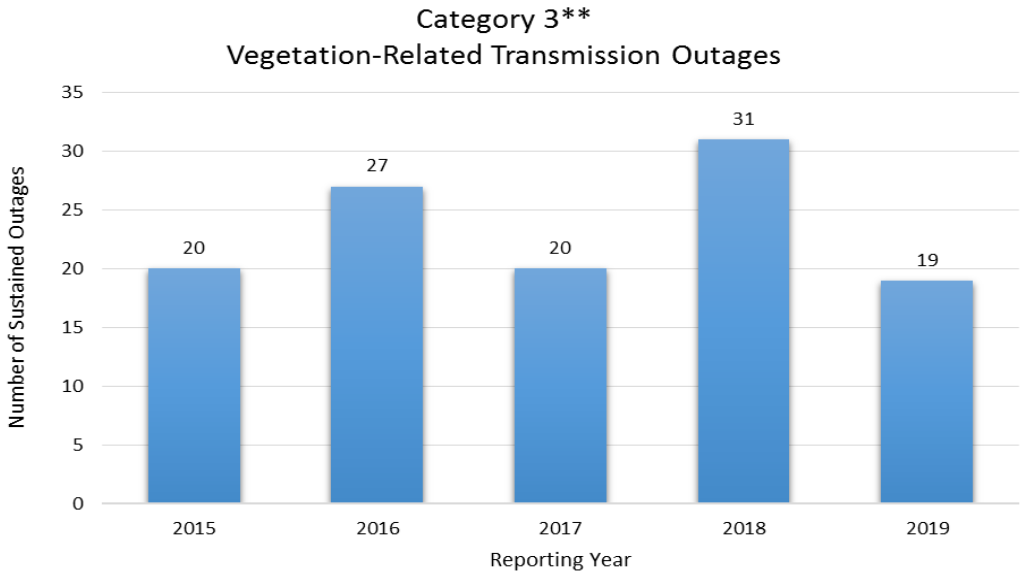
Indicator 5c: Vegetation Encroachment

- **How is it measured?**
  - Number of vegetation encroachments and Sustained Outages

* No change to this indicator from previous year

Indicator 5c: Vegetation Encroachment





Indicator 6: Disruptions Due to Physical or Cyber Security Incidents

- **Why is it important?**
  - Measures impact to the BPS from cyber or physical security attacks
- **How is it measured?**
  - Based on industry-submitted OE-417 and/or EOP-004 Electric Emergency Incident and Disturbance Reports

* Indicator changed to reflect actual disruptions

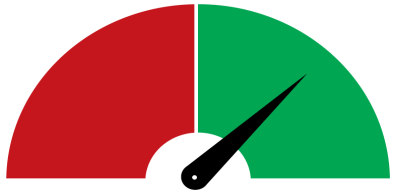
Indicator 7: Real Power Balancing Control Performance (BAAL)

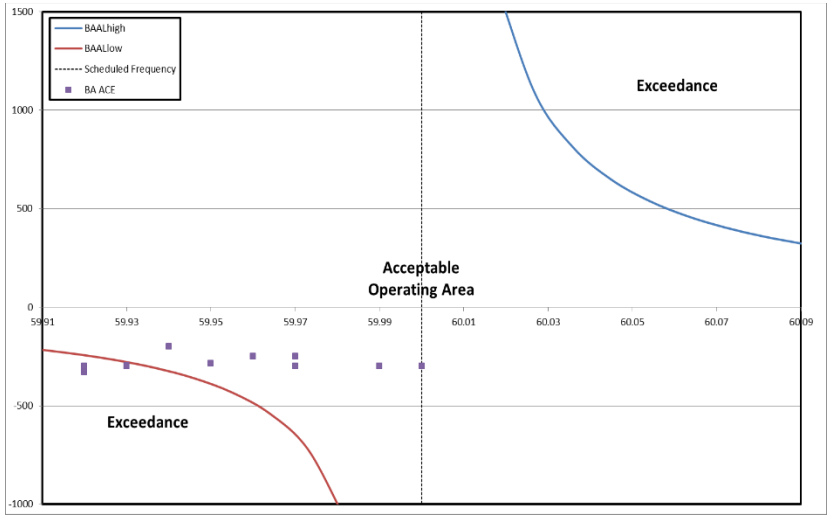
Why is it important?

Each Balancing Authority (BA) is required to operate such that its clock-minute average of reporting area control error (ACE) does not exceed its clock-minute BA ACE limit (BAAL) for more than 30 consecutive clock-minutes. The purpose of this metric is to measure risk to the BPS by monitoring the trend in the number of clock minutes in which BAs return their ACE to within their BAAL after an exceedance has occurred.

How is it measured?

Success (green) is achieved when the linear regression line of the most recent four years of quarterly BAAL exceedances greater than or equal to 15 clock minutes has a statistically significant negative slope or when the slope of the time trend is statistically neither increasing nor decreasing. This equates to either improvement or no decline in performance. Failure (red) occurs if slope of the time trend is increasing with statistical significance.





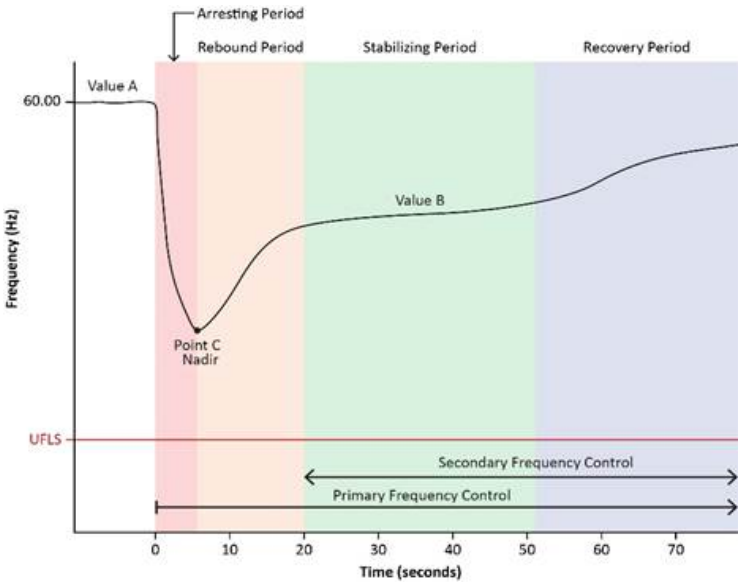
Indicator 8: Interconnection Frequency Response

Why is it important?

Measures risk and impact to the BPS by evaluating the trend in the magnitude of the decline in Interconnection frequency experienced in each Interconnection during low frequency events selected for BAL-003-1 compliance. The Indicator will evaluate whether the risk of activating under frequency load shed devices is increasing or decreasing.

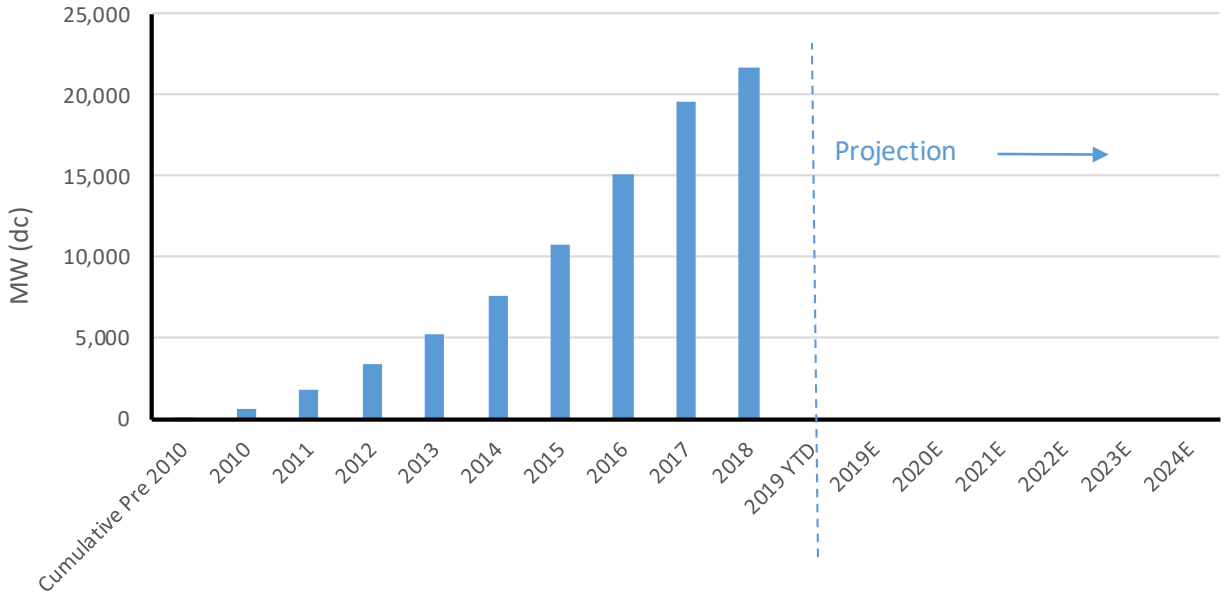
How is it measured?

Success (green) is achieved when the linear regression line of the most recent four years of quarterly mean values of Frequency A minus Frequency C has a statistically significant negative slope or when the slope of the time trend is statistically neither increasing nor decreasing. This equates to either improvement or no decline in performance where Interconnection risk has not changed or declined. Failure (red) occurs if the slope of the time trend is increasing with statistical significance or if under frequency load shedding is activated for any single BAL-003 frequency event in any Interconnection.



Indicator 9: DER Penetration

- The objective of this Indicator is to provide forward looking grid attributes affected by increases in DER which may demonstrate areas for further analysis and monitoring by the ERO and industry. This is a new indicator for 2021.

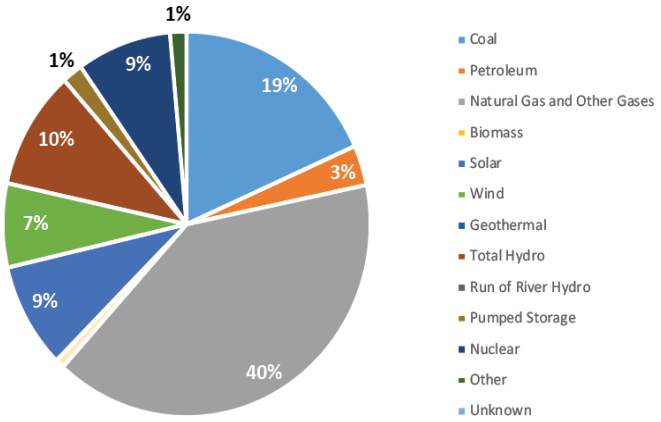


Indicator 10: Measure of the Changing Resource Mix

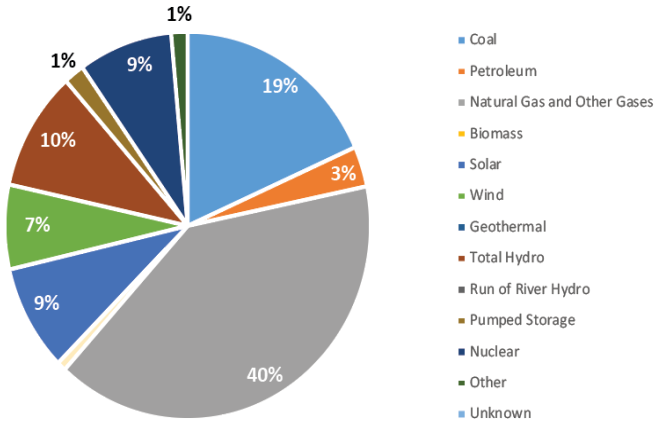
- The objective of this Indicator is to provide forward looking grid attributes affected by changes in the resource mix which may demonstrate areas for further analysis and monitoring by the ERO and industry. This is a new indicator for 2021.

Indicator 10: Measure of the Changing Resource Mix

2011 Resource Mix



2021 Resource Mix



2031 Resource Mix