



# NERC Standard BAL-003-1

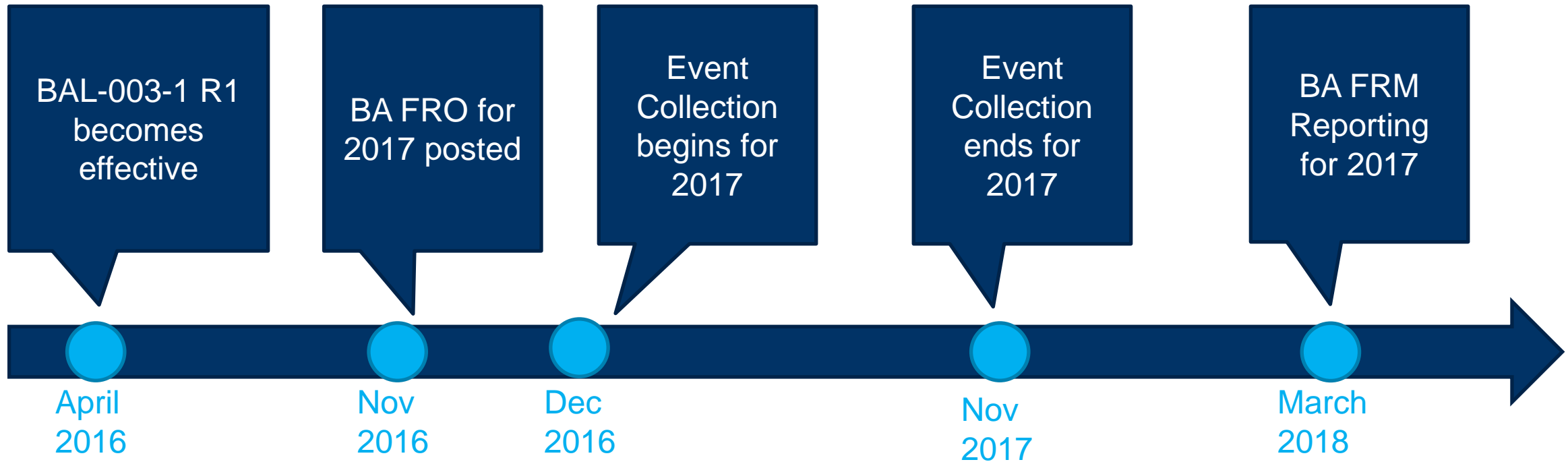
## Frequency Response & Frequency Bias Setting



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- Effective: BAL-003-1 R1
- PJM Frequency Response Obligation for 2017
- PJM BAL-003-1 Performance
- Frequency Response Activities

**Requirement 1:** Each Balancing Authority shall achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO) ...



## Balancing Authority FRO Allocation:

Interconnection Frequency Response Obligation x Balancing Authority Pro-rata Share

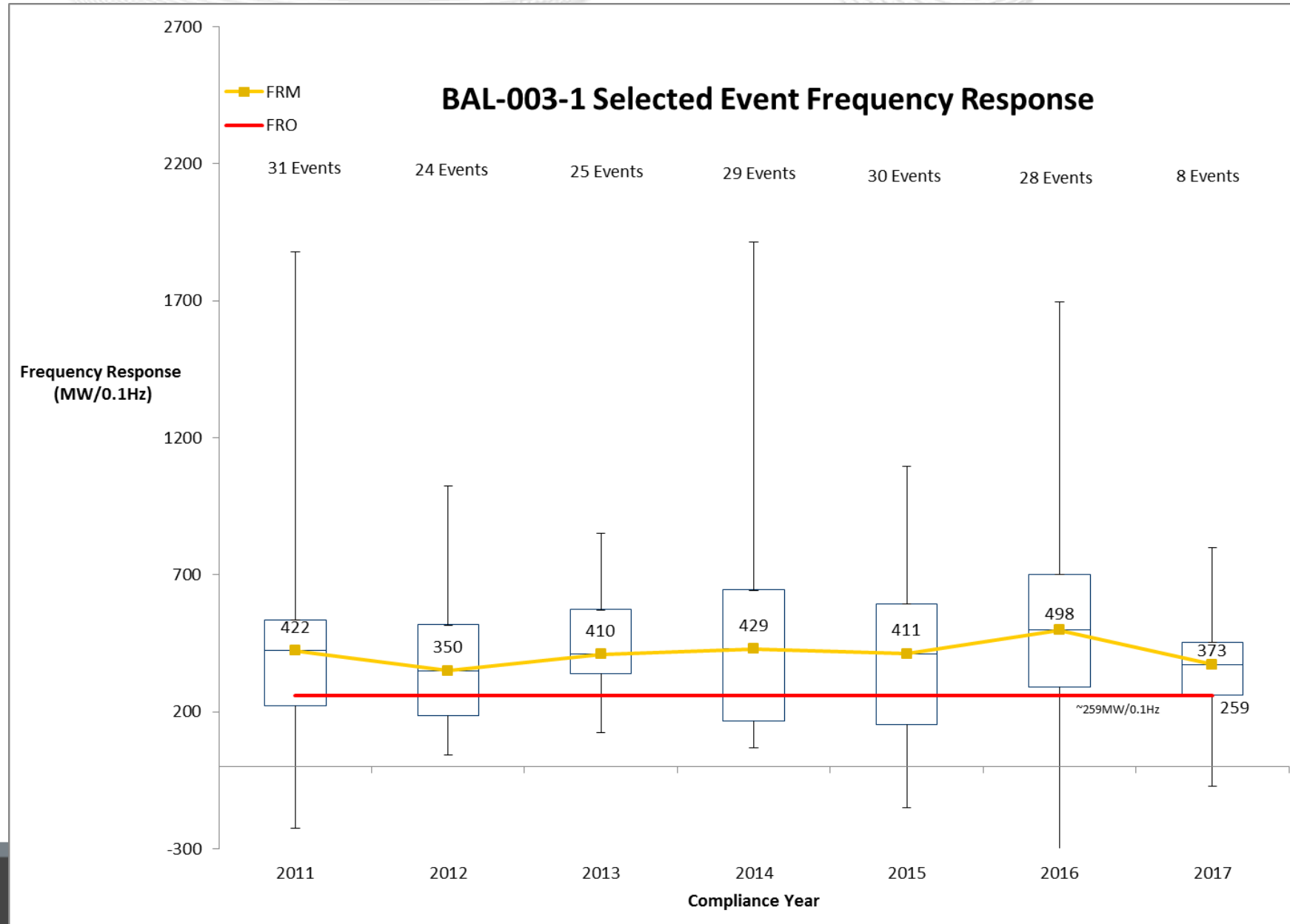
$$FRO_{BA} = IFRO \times \frac{\text{Annual Gen}_{BA} + \text{Annual Load}_{BA}}{\text{Annual Gen}_{Int} + \text{Annual Load}_{Int}}$$

**PJM FRO for 2017 operating year = (-1015MW/0.1Hz) x (25.44%) = -258.2 MW/0.1Hz**  
**2017 Operating Year: December 2016 – November 2017**

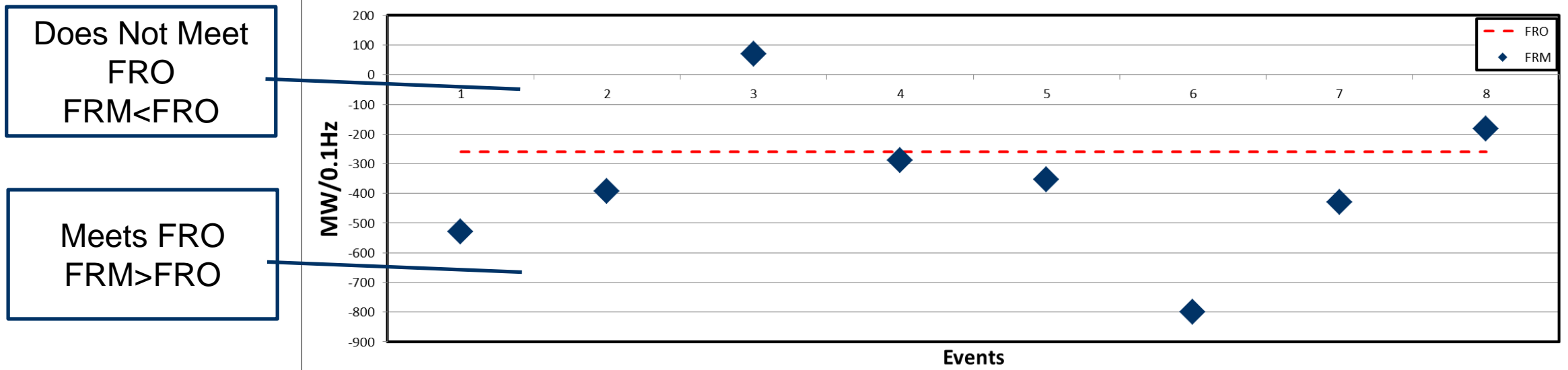


# PJM BAL-003-1 To-Date Performance

Performance is measured as the median of all NERC selected events; frequency response measured included generator governor response, & load response



- Events for 2017 Operating Year continue to show variability in Frequency Response



- NERC
  - SAR for BAL-003-1 modification in work
    - Address minor errors in assumptions and process inefficiencies
  - 2016 Frequency Response Annual Analysis Report (FRAA), Sept 2016
    - Frequency withdrawal continues to be a predominant characteristic in the EI with 37 out of 84 events having a secondary nadir
    - Improved value B, CB ratio still much lower than other interconnections
  - 2017 State of Reliability (SOR) 2017, June 2017
    - Enhance measurements of frequency response to quantify the effects from changing resource mix
    - Modification to generator interconnection agreements
    - Increase awareness of frequency response challenges

# Appendix



Primary frequency response is the first stage of frequency control and is the response of generator governors and loads **to arrest locally detected changes in frequency.**

Primary frequency response is automatic, **is not driven by any centralized system,** and begins within seconds after the frequency changes, rather than minutes.

## Primary frequency is essential for reliability of the Interconnection and is

- the first line of defense
- critical for system restoration
- needed for accurate modelling and event analysis
- necessary for compliance to BAL-003-1