



Performance Assessment for Primary Frequency Response Update

PFRSTF

December 20, 2017



- Detailed event selection criteria
- Added references to PFR being bi-directional
- Changed Pmin/Pmax to EcoMin/EcoMax for consistency
- Detailed process on non-performance

- PJM will reserve the right to perform performance assessment between 25-35 times a year
 - PJM will aim to find 2 frequency events per month for performance assessments, however system conditions may provide less opportunities
 - Events selected will be ‘clean’ frequency excursions where frequency went outside the deadband and should have engaged governors
 - Frequency outside $\pm 40\text{mHz}$
 - Frequency stays outside of deadband for 60 seconds
 - PJM will aim to select events in both directions
 - Events with high frequency (above 60.04) and events with low frequency (below 59.96)

- Process for non-performance
 - PJM will review first failed PFR assessment with stakeholder to discuss details of failed response
 - This is to ensure that failed attempt is not due to data issues, maintenance issues, etc.
 - This is a one-time review for PJM and the participant to work through any issues that are uncovered
 - Subsequent failed PFR assessment will be referred to IMM and possibly FERC for follow-up
 - Participants will have the opportunity to provide data to document performance before referral if data issues are assumed for the failure
 - No monthly payments for cost of service until demonstrated successful performance (TBD based on compensation discussion)

Performance Assessment for Primary Frequency Response

PFRSTF

December 1, 2017



- Resources expected performance will be calculated with the primary frequency control calculation

- Frequency below governor deadband

$$MW_{PrimaryControl} = \left[\frac{(HZ_{actual} - 60 + DB)}{(60 * Droop - DB)} \right] * (FrequencyResponsiveCapacity) * (-1)$$

- Frequency above governor deadband

$$MW_{PrimaryControl} = \left[\frac{(HZ_{actual} - 60 - DB)}{(60 * Droop - DB)} \right] * (FrequencyResponsiveCapacity) * (-1)$$

- 36mHz deadband (or less), 5% droop (or less)

- Calculation will be performed with 36mHz and 5% droop unless different settings are communicated to PJM

- Threshold will be set to determine Pass/Fail assessment
 - Unit will need to provide 50% of expected response to Pass (in MW)
 - Response measured within 20-52 seconds (alignment with BAL-003-1)
 - Sustain frequency response out to 60 seconds or duration of event
- Pass/Fail assessment due to some data quality
 - 10 second scan rates
 - Data deadband storage in historian
- Assessments will be performed on market units
 - Further breakdown assessments will be available upon request

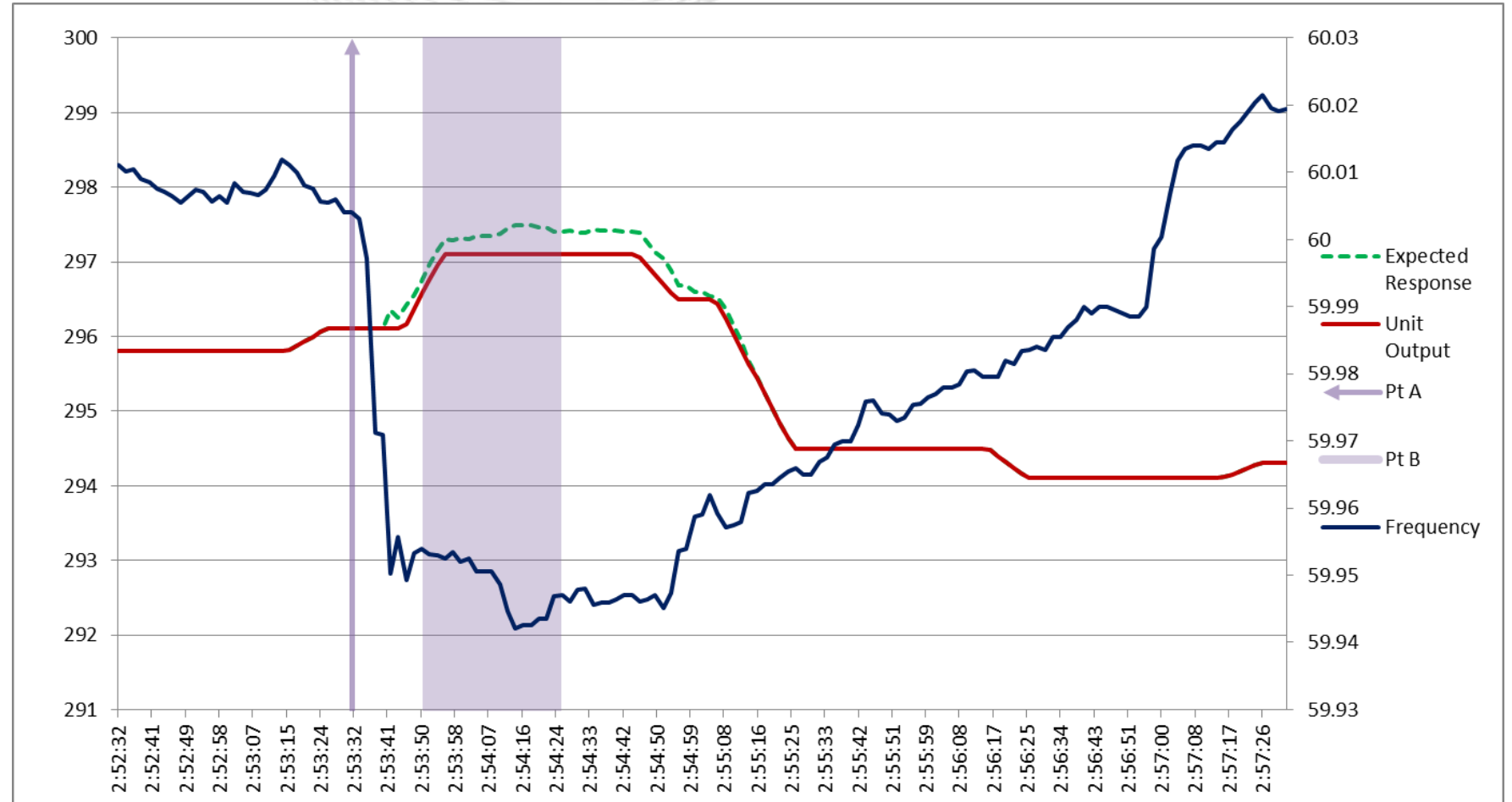
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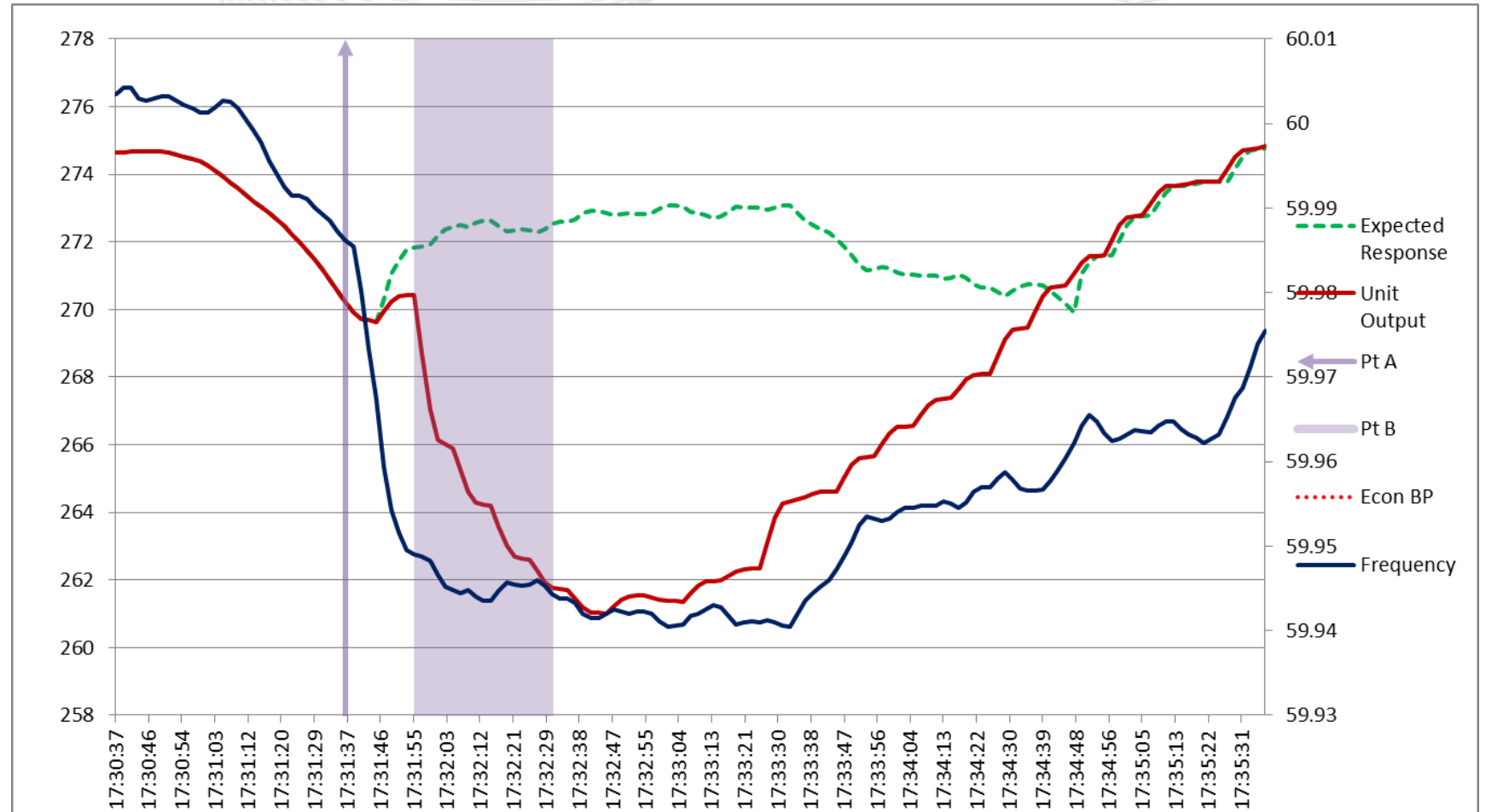
- When we will evaluate a resource to provide PFR:
 - Unit is operating between **EcoMin** and **EcoMax**
 - And Unit is online providing energy and has available headroom **(for low frequency periods)** or footroom **(for high frequency periods)**
 - And/Or Unit is assigned reserves

- When we will not evaluate a resource to provide PFR:
 - Unit is not currently providing real-time energy/reserves
 - Or Unit is not operating between **EcoMin** and **EcoMax**
 - Or Unit has an exception
 - Long-term exception developed through the exception process
 - Short-term exception based on current operating parameters
 - Documented in EDART – max 30 day exception
 - Or Unit is providing regulation

- Expected MW
1.4MW
- Actual MW
1.1MW
- Performance
78%



- Expected MW
2.73MW
- Actual MW
-7.158MW
- Performance
-362%



Frequency Profile Nov 2016 – Oct 2017

