Performance Assessment for Primary Frequency Response Update

PFRSTF
December 20, 2017
Summary of changes

- Detailed event selection criteria
- Added references to PFR being bi-directional
- Changed $P_{min}/P_{max}$ to $Eco_{min}/Eco_{max}$ for consistency
- Detailed process on non-performance
When will assessment take place?

• 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 outsides +/- 40mHz
    • 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)
When will assessment take place?

- **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)*

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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
    \[ MW_{PrimaryControl} = \left[ \frac{HZ_{actual} - 60 + DB}{60 \times Droop - DB} \right] \times (FrequencyResponsiveCapacity) \times (-1) \]
  – Frequency above governor deadband
    \[ MW_{PrimaryControl} = \left[ \frac{HZ_{actual} - 60 - DB}{60 \times Droop - DB} \right] \times (FrequencyResponsiveCapacity) \times (-1) \]
  – 36mHz deadband (or less), 5% droop (or less)
    • Calculation will be performed with 36mHz and 5% droop unless different settings are communicated to PJM
Pass/Fail Assessment

• 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/will not evaluate a resource to provide PFR:

- 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/will not evaluate a resource to provide PFR:

- 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
Example of Passed Performance

- **Expected MW**: 1.4MW
- **Actual MW**: 1.1MW
- **Performance**: 78%
Example of Failed Performance

- Expected MW: 2.73MW
- Actual MW: -7.158MW
- Performance: -362%
Frequency Profile Nov 2016 – Oct 2017

- x > 5 minutes: 8
- 5min > x > 4min: 7
- 4min > x > 3min: 9
- 3min > x > 2min: 37
- 2min > x > 1min: 156
- 1min > x > 30sec: 309
- x < 30 seconds: 3525

Legend:
- Low Freq
- High Freq