



BAL-003-2 Performance Update

&

Manual 12 Primary Frequency Response (PFR) Review

Ross Kelly

Performance Compliance

December 7, 2023

Operating Committee

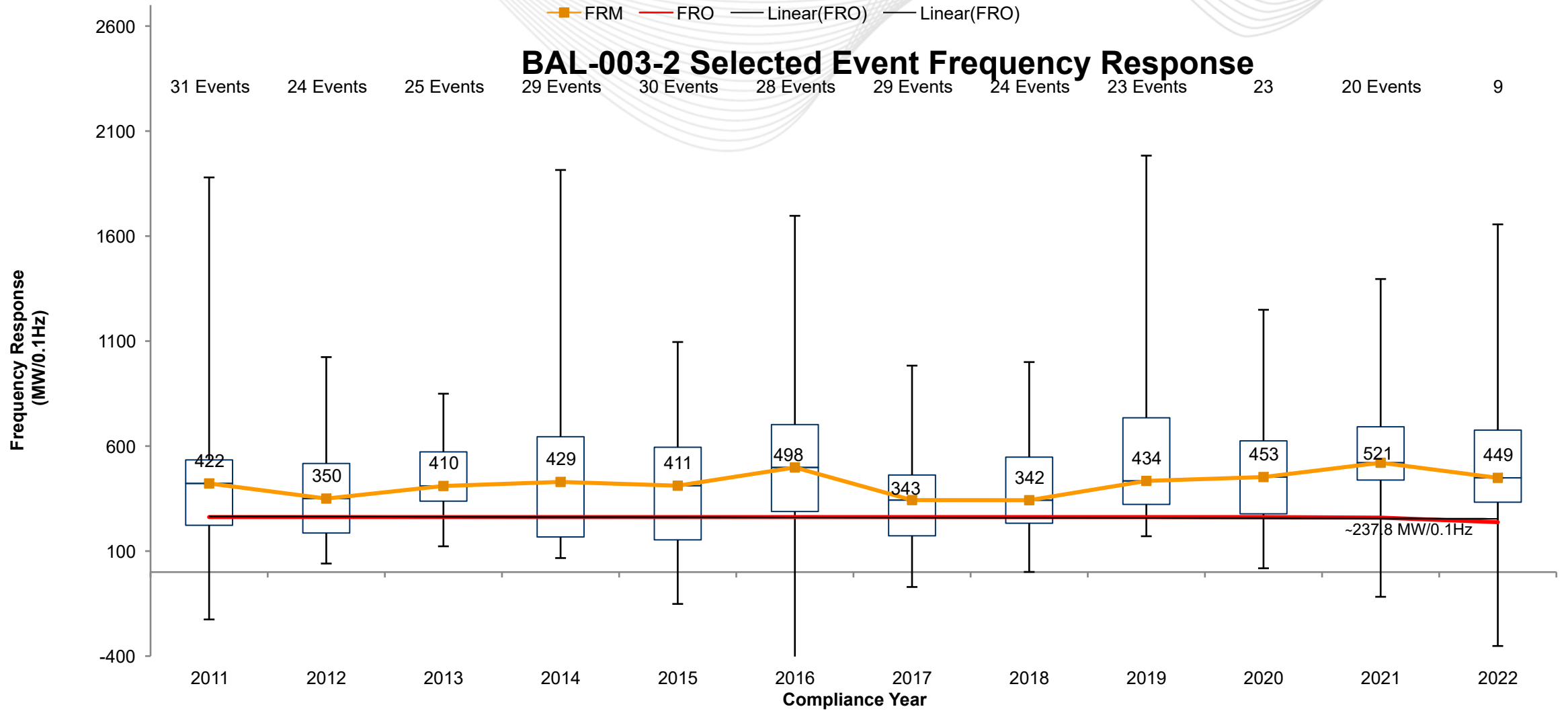
- **Purpose:** To require sufficient Frequency Response from the Balancing Authority (BA) to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting (FBS).
- **Applicability:** PJM is a Balancing Authority. PJM is not a member of Frequency Response Sharing Group (FRSG).
- **Effective Date:** 12/1/2020

- R1:** Each Frequency Response Sharing Group (FRSG) or Balancing Authority (BA) that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation (IFRO).

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

– 2022 Operating Year (OY) runs from December 2021 until November 2022

- FRO_{PJM} for 2022 OY = $IFRO_{PJM} \times \text{Pro-rate Share}_{PJM}$
 = $(-915 \text{ MW}/0.1\text{Hz}) \times (25.989\%) = -237.8 \text{ MW}/0.1 \text{ Hz}$



- The NERC Resource Subcommittee (RS)
 - Posted 2023 Frequency Bias Settings and L10 values
 - <https://www.nerc.com/comm/OC/Pages/Resources-Subcommittee.aspx>
- PJM updated Frequency Bias Setting and L10 value in EMS and applicable systems on June 7, 2023.

- [Project 2017-01](#) Modifications to BAL-003 Phase II
 - BAL-003-3 Draft 1 was posted and opened for a 45-day formal comment period. Initial ballots for the standard and implementation plan, as well as a non-binding poll of the associated Violation Risk Factors and Violation Severity Levels were conducted August 29 – September 7, 2022. Additional ballots for the standard were conducted May 23 – June 1, 2023. The standard did not pass.

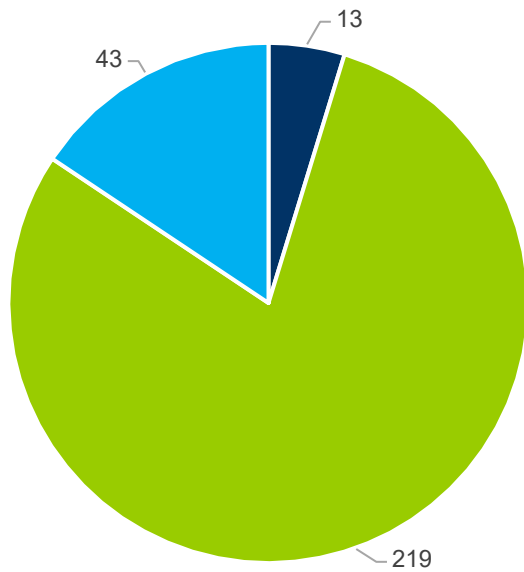
- PJM continues to monitor unit PFR performance using criteria described in PFRSTF and documented in PJM Manual 12.
 - <https://www.pjm.com/library/manual>
- Event Selection
 - Frequency goes outside +/- 40mHz deadband
 - Frequency stays outside +/- 40mHz deadband for 60 continuous seconds
 - Minimum/maximum frequency reaches +/- 53mHz

- Today’s review included
 - High Frequency Event
 - 09/05/2023 07:00:15
 - Low Frequency Events
 - 09/17/2023 19:13:17
 - 11/03/2023 17:38:28
 - 11/06/2023 23:00:05
 - 11/10/2023 00:00:26

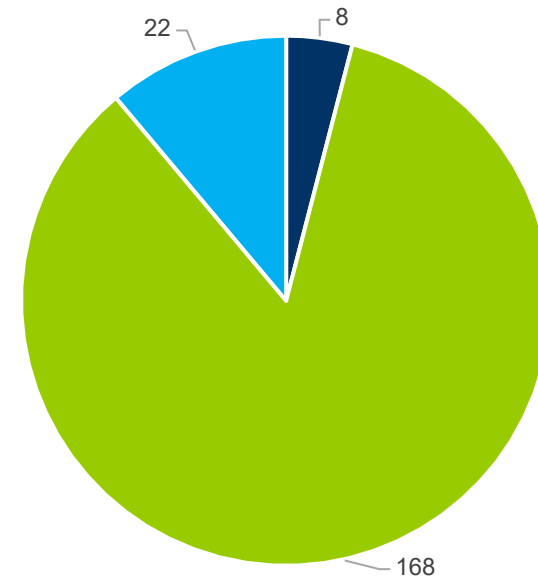
Fuel Type	# of Units evaluated
Coal	177
Hydro	25
Natural Gas	278
Oil	39
Solar	34
Wind	87
Other	7
Total	647

09/05/2023 07:00:15

09/17/2023 19:13:17

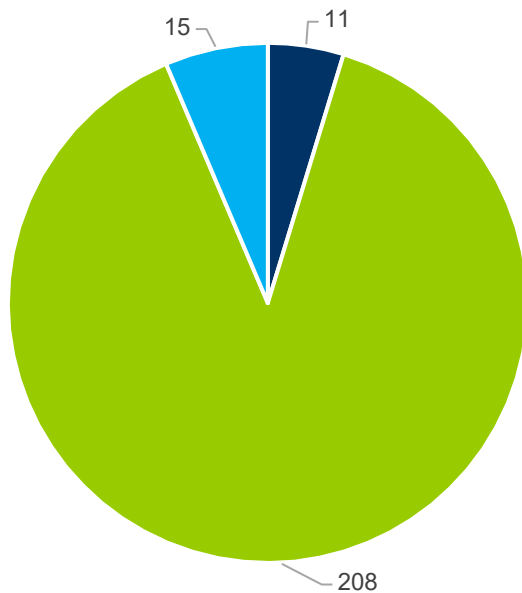


- Further Evaluation Needed
- No PFR
- PFR

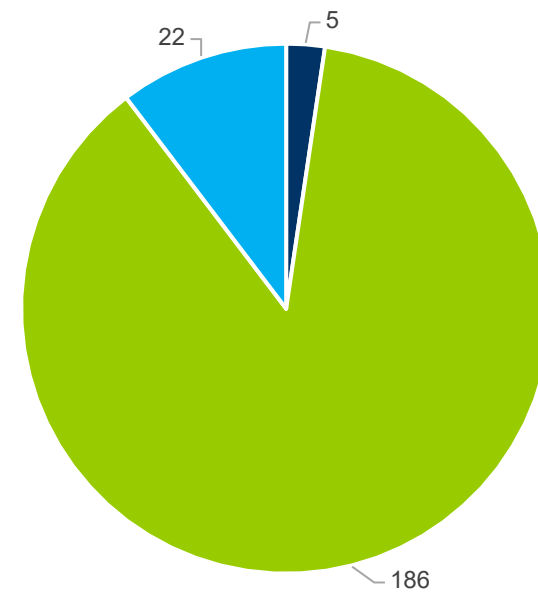


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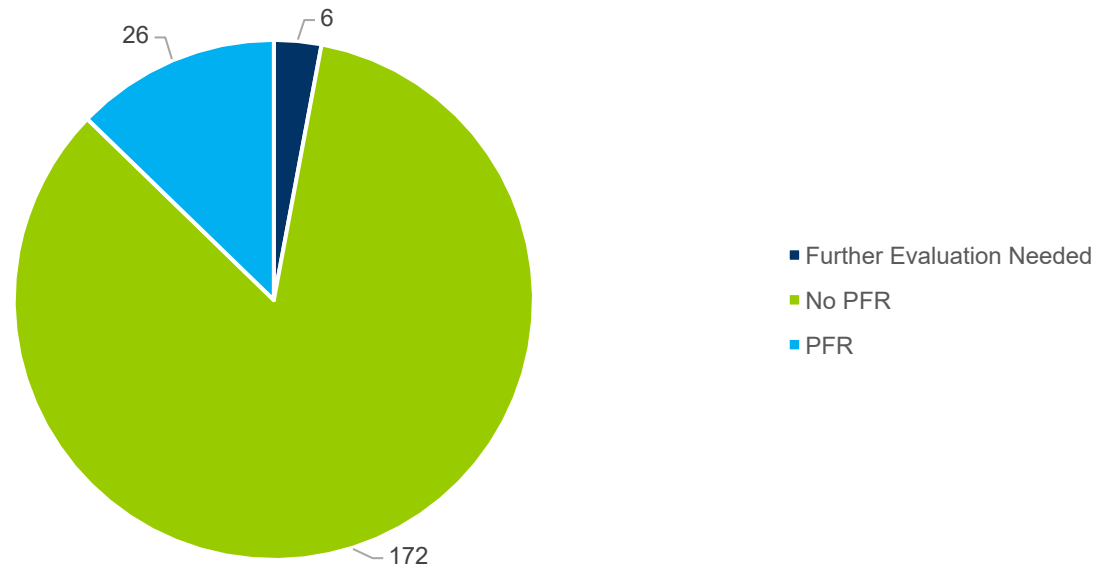
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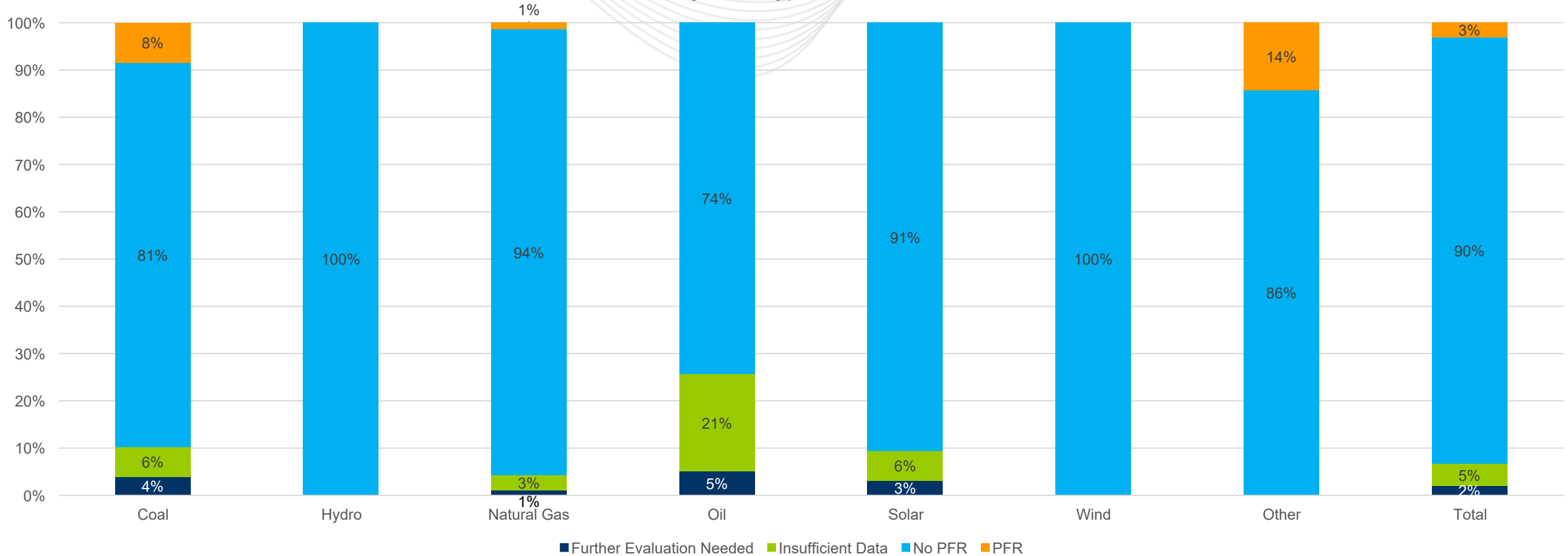
- Further Evaluation Needed
- No PFR
- PFR



11/10/2023 00:00:26



M-12 PFR by Fuel Type For Units > 50 MW



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Member Hotline

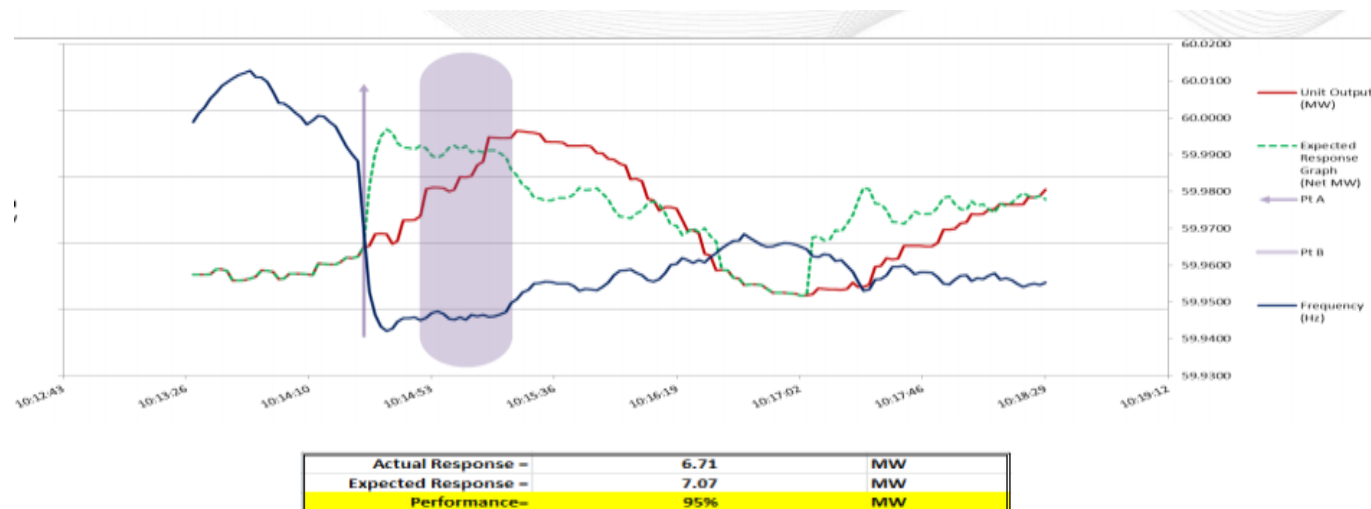
(610) 666 – 8980

(866) 400 – 8980

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Appendix

- Interactive tool for members to use to assist with understanding unit performance
 - <https://www.pjm.com/-/media/committees-groups/task-forces/pfrstf/20181127/20181127-fr-performance-events.ashx>



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THINK BEFORE
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