BAL-003-2 Performance Update
&
Manual 12 Primary Frequency Response (PFR) Review

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Performance Compliance
March 6, 2025
Operating Committee

BAL-003-2 Frequency Response & Frequency Bias Setting

- **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

BAL-003-2 Requirement 1

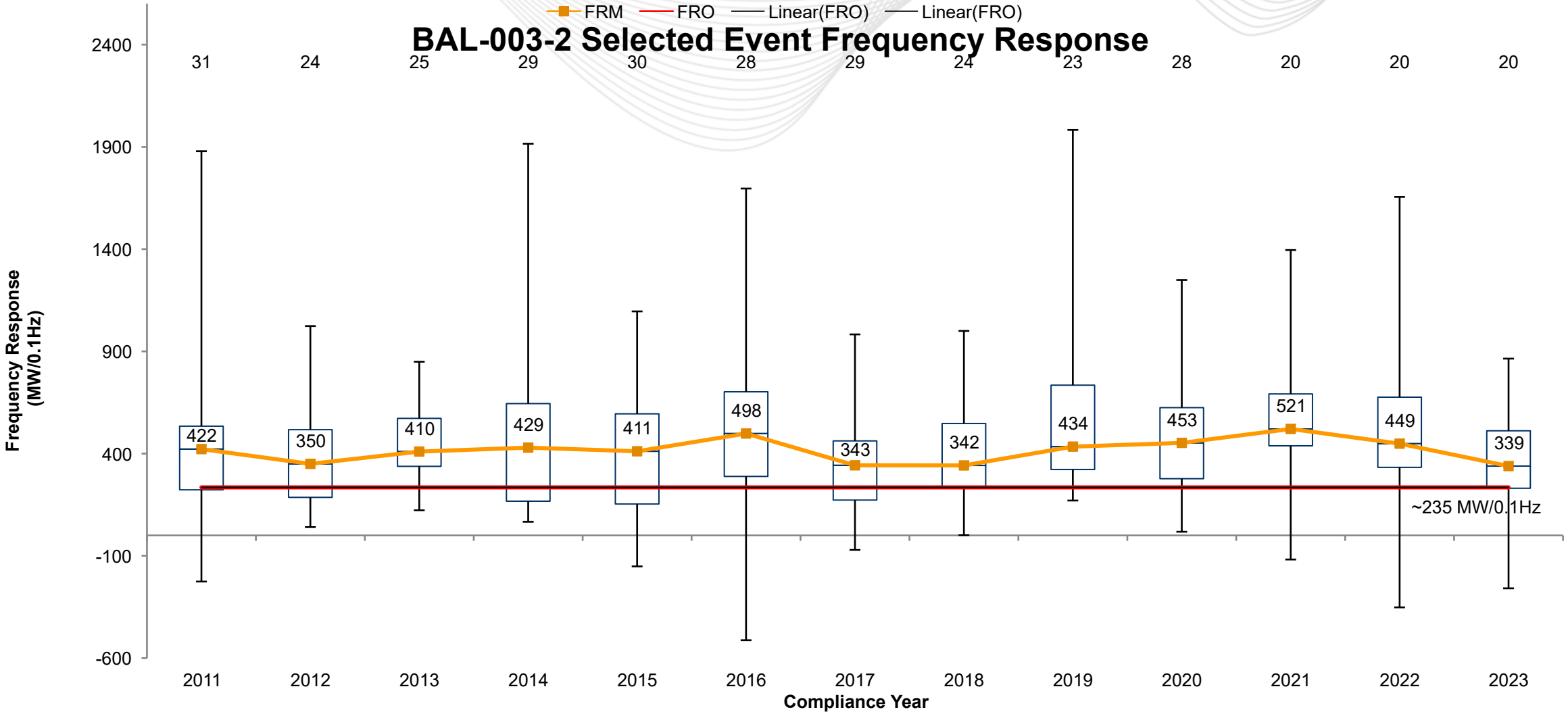
- **R1:** Each Frequency Response Sharing Group (FRSG) or Balancing Authority (BA) that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation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

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

  - 2025 Operating Year (OY) runs from December 2024 until November 2025

    - FRO_{PJM} for 2025 OY = IFRO_{PJM} x $\text{Pro-rate Share}_{\text{PJM}}$
      = (-923 MW/0.1Hz) x (25.46%) = -235 MW/0.1 Hz

Historic PJM BAL-003 Performance



Frequency Bias Setting and L10 Value

- The NERC Resource Subcommittee (RS)
  - Posted 2024 Frequency Bias Settings and L10 values
  - https://www.nerc.com/comm/OC/Pages/Resources-Subcommittee.aspx

- PJM updated the Frequency Bias Setting and L10 values in the EMS and applicable systems on June 26, 2024.

M-12 Primary Frequency Response

- 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

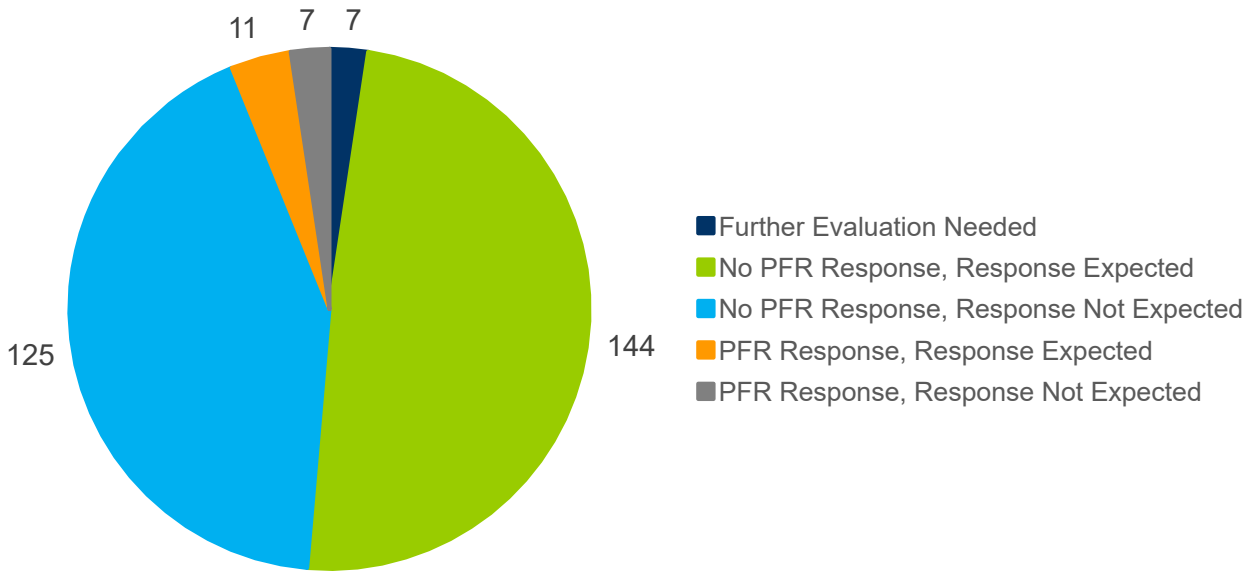
M-12 PFR Selected Events

- **Today's review includes:**
  - Low Frequency Events
    - 12/06/24 17:29:56
    - 01/14/25 22:02:12
    - 02/06/25 13:55:09
    - 02/11/25 08:59:33
    - 02/25/25 06:00:33

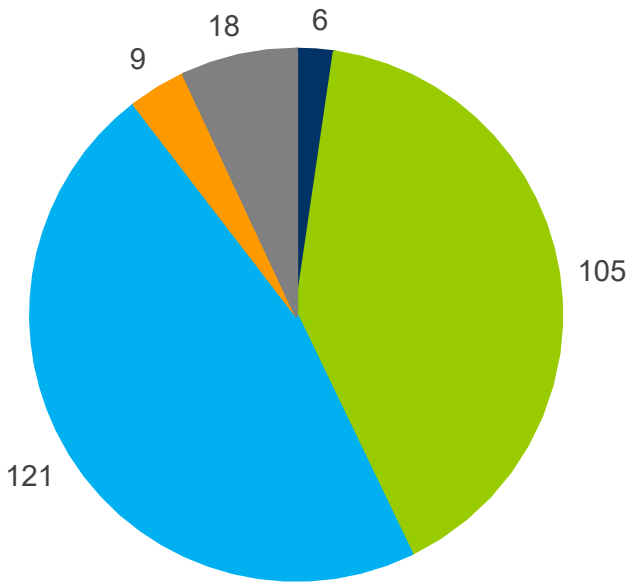
Fuel Type	# of Units evaluated
Coal	177
Hydro	25
Natural Gas	278
Oil	39
Solar	34
Wind	87
Other	7
Total	**647**

M-12 PFR Unit Performance Results

12/06/24 17:29:56

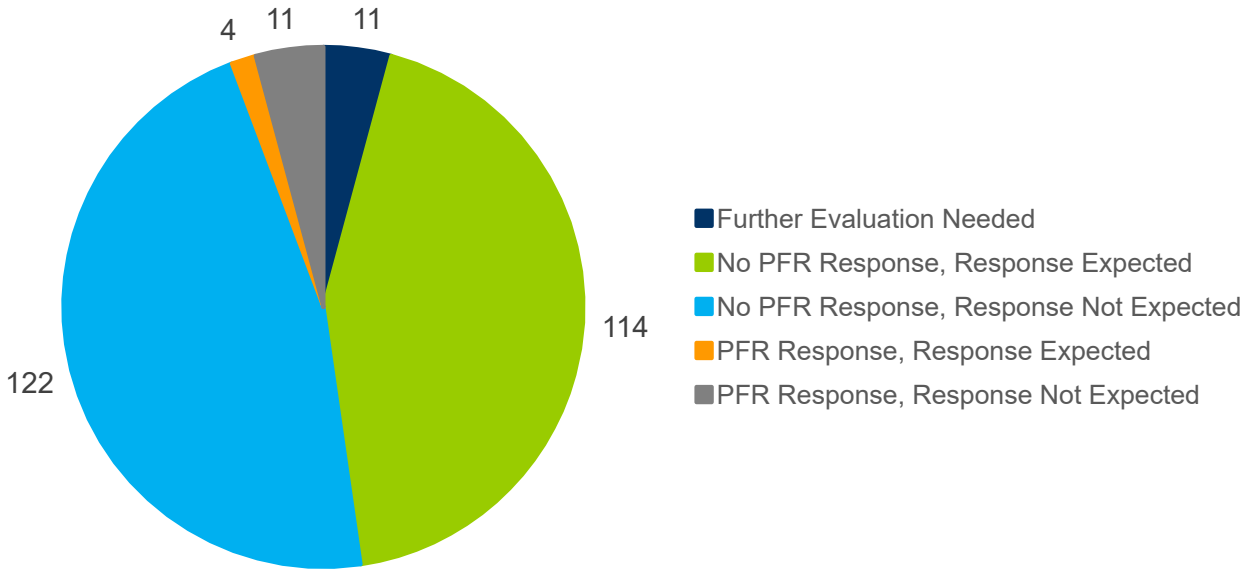


01/14/25 22:02:12

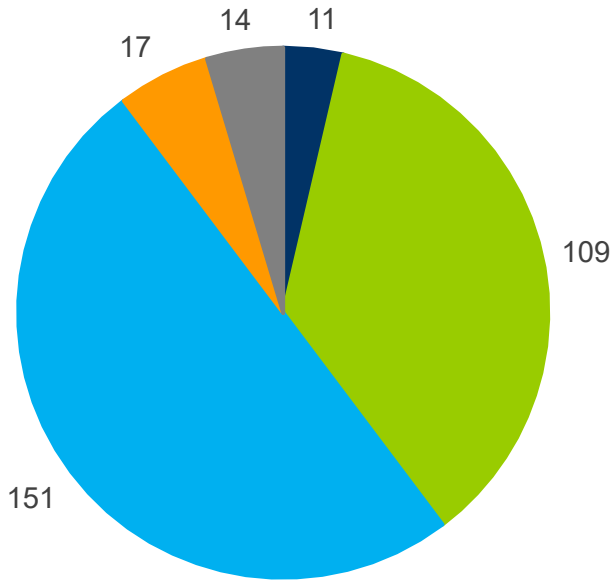


M-12 PFR Unit Performance Results

02/06/25 13:55:09

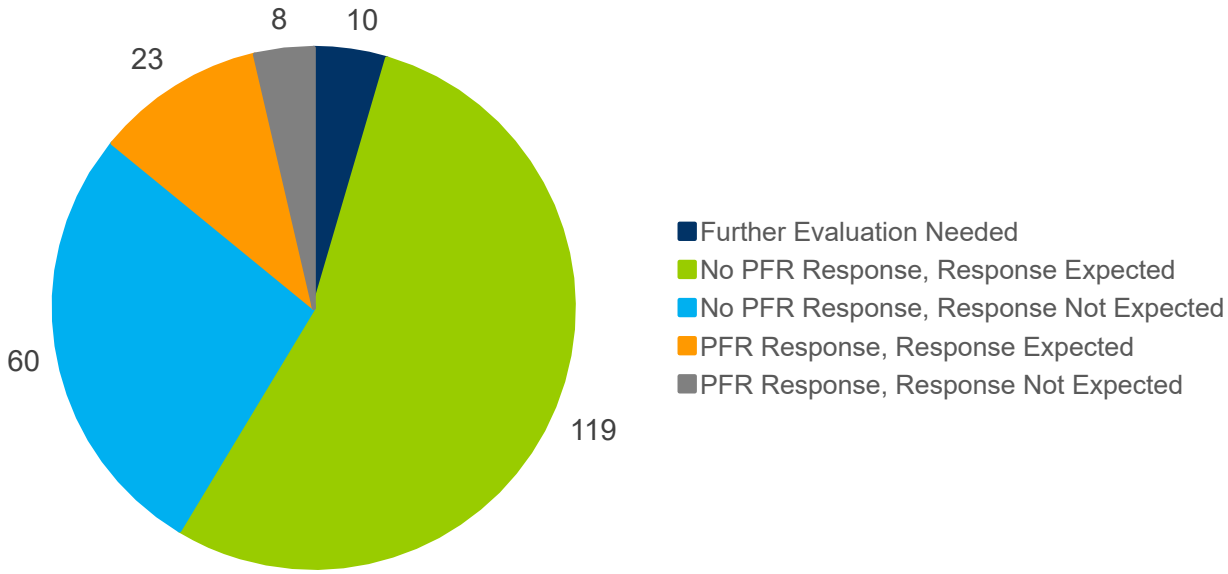


02/11/25 08:59:33

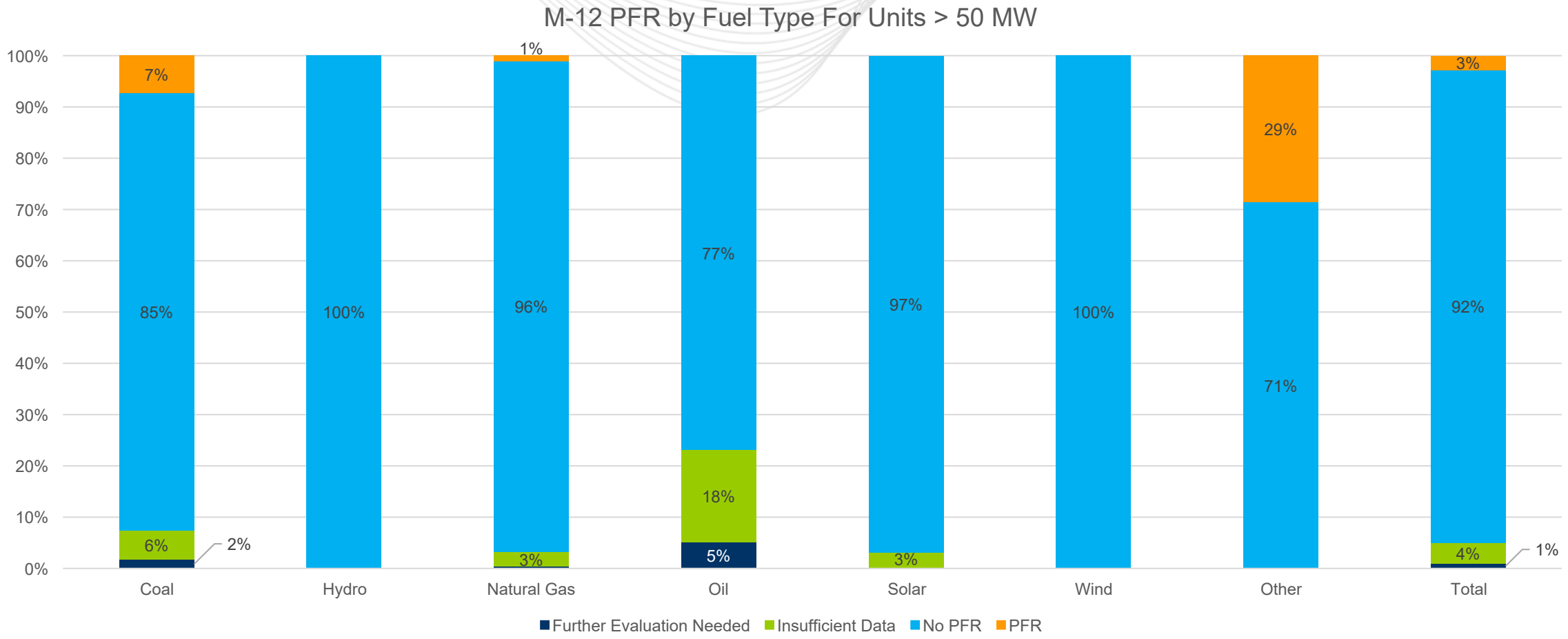


M-12 PFR Unit Performance Results

02/25/25 06:00:33



PJM Primary Frequency Response Review



Contact

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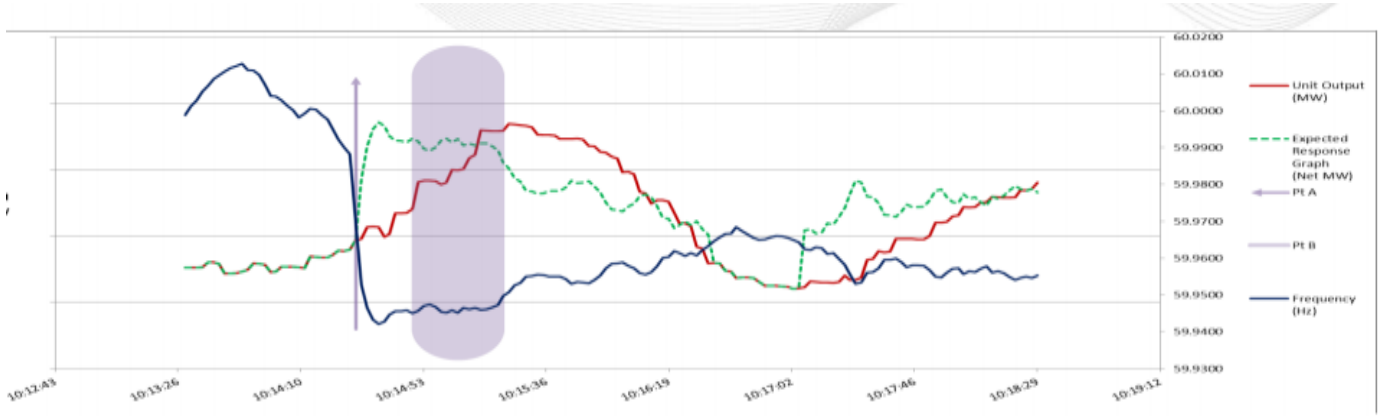
Appendix

PJM Interactive Tool

- 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



Actual Response =	6.71	MW
Expected Response =	7.07	MW
Performance=	95%	MW

PROTECT THE POWER GRID

THINK BEFORE YOU CLICK!

pjm

Be alert to malicious phishing emails.

Report suspicious email activity to PJM.

(610) 666-2244 / it_ops_ctr_shift@pjm.com