
# Implementation of the National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020

**Status as at 28 Aug 2020**

A report for the National Electricity Market

# Important notice

## PURPOSE

AEMO publishes this report to inform industry about AEMO's implementation of the National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020 (Mandatory PFR Rule).

This publication has been prepared by AEMO using information available at 28 August 2020. This information will be updated and superseded by future implementation reports until full implementation.

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# Contents



# Tables



# Figures

# 1. Summary

This report provides information on the implementation of the National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020[1] (Mandatory PFR Rule) and will be updated periodically as implementation proceeds, at intervals of approximately three weeks.

The Mandatory PFR Rule affects all *Scheduled Generators* and *Semi-Scheduled Generators* (Affected Generators). They are required to demonstrate the ability of their *generating systems* (Affected GS) to provide *primary frequency response* (PFR) in accordance with the *primary frequency response parameters* (PFRP) specified in the interim *Primary Frequency Response Requirements* (IPFRR). Implementation of the Mandatory PFR Rule will be carried out in three tranches, as specified in the IPFRR.

The results of the self-assessments (Results) for Tranche 1 Affected Generators were due on 28 August 2020. AEMO had been in contact with several Affected Generators prior to that date, and many provided draft Results and discussed issues associated with meeting the PFRP. Table 1 shows the number of Results, applications for variation and exemption received to date.

**Table 1 Incoming Results and Applications**

| Number of Affected GS | Results | Applications for Variation | Applications for Exemption |
|---|---|---|---|
| **Tranche 1** | 67 | 21 | 2 |
| **Tranche 2** | 5 | 0 | 2 |
| **Tranche 3** | 1 | 0 | 1 |

# 2. Self-Assessments

AEMO received Results in respect of 29 Affected GSs prior to 28 August 2020 and has completed its review for 22 of those.

AEMO received a further 44 Results on 28 August 2020, including for some Affected GSs in Tranches 2 and 3.

Several Affected Generators have provided AEMO with draft Results, to facilitate discussion on the adequacy of the information provided and work through implementation plans.

[1] Available at https://www.aemc.gov.au/rule-changes/mandatory-primary-frequency-response.

# 3. Applications for Variation

As at the date of this report, AEMO has received 21 applications for variation in relation to Affected GS and has responded to 4 of these.

# 4. Applications for Exemption

AEMO has received and responded to two applications for exemption in respect of a Tranche 1 Affected GS. AEMO did not grant exemptions in either case.

AEMO has received two applications for exemption in respect of a Tranche 2 Affected GS. AEMO has not yet responded to these. AEMO has received two applications for exemption in respect of a Tranche 3 Affected GS. One was subsequently withdrawn so is not shown in Table 1. AEMO has not yet responded to the other application.

# 5. Implementation Plan

AEMO's implementation plan is evolving as more information comes to hand through the self-assessment process. AEMO is cognisant of the need to review the Results before being more definitive about implementation.

## 5.1 Tranche 1 Implementation

AEMO is hopeful that a substantial proportion of Tranche 1 will have achieved significant progress towards the provision of PFR prior to Summer 2020-21.

AEMO is proposing two key target dates for the completion of changes to Tranche 1 Affected GS to achieve the PFRP (or any varied PFRP as applicable), which are:

- 30 September 2020
- 28 October 2020

This timing allows for staged changes in frequency response deadbands, which a number of Tranche 1 Affected Generators have indicated as their preference.

Both of these dates occur on a Wednesday, which AEMO considers will provide Affected Generators an opportunity to observe their Affected GS' operation following the changes before a weekend occurs and to make any adjustments, if necessary.

Based on information received to date, AEMO considers that the required changes should be achievable for a material proportion of Tranche 1 Affected GS by these dates, noting that this can only be confirmed once AEMO has received and assessed all Results from Tranche 1 Affected Generators.

## 5.2 Flexible Implementation Dates

The implementation dates referred to in section 5.1 are target dates.

Affected Generators will be required to have implemented agreed changes to their Affected GS by these dates, but may make those changes earlier, and in an incremental manner, provided they have notified AEMO and AEMO has agreed to the earlier implementation.

Where necessary, AEMO may also agree to later dates for making changes to Affected GS, for example, to accommodate planned generating unit outages.

Some minor flexibility around exact dates for implementation of changes may be required, in order to ensure a degree of staggering of control changes, and to avoid large numbers of Affected GS altering settings near simultaneously. Power system conditions, such as major network outages, may potentially also require some minor alterations in implementation dates.

## 5.3 Implementation of Subsequent Tranches

As outlined in the IPFRR, Tranche 2 and Tranche 3 Affected GS are required to complete their self-assessments by 19 November 2020, and 17 February 2021, respectively.

These self-assessments will be key to determining implementation dates that are compatible with the urgency of the required changes, but cognisant of the practicalities of undertaking the necessary work (especially around COVID-19 impacts) and the prevailing power system conditions.

Power system reliability and security concerns suggest that requiring control system setting changes across a large number of Affected GSs in the middle of Summer 2020/21 might not be prudent, during what is typically the most challenging period of the year for power system operations.

Noting these competing demands, it is currently proposed that implementation of setting changes would be targeted for completion by the following dates:

- Tranche 2 (DUIDs 80 MW – 200 MW) – By 30 March 2021
- Tranche 3 (DUIDs below 80 MW) – By 30 June 2021

# 6. Implementation of PFR settings

## 6.1 Generation providing PFR prior to Mandatory PFR Rule

Previous surveys of generator active power controls, and more recent engagement with Affected Generators indicate that no large Affected GS were providing PFR that met the PFRP prior to the Mandatory PFR Rule.

AEMO is aware of a small number of, typically, smaller or low capacity factor Affected GS that are operating in a way that could meet the PFRP and may not need further changes to comply with the Mandatory PFR Rule. AEMO will confirm this after receiving and assessing the Results for those Affected GS and will report accordingly.

## 6.2 Early Implementation

Some Affected Generators have indicated that they wish to implement setting changes to their Affected GS earlier than AEMO's target implementation dates noted in Section 5.1. AEMO understands that, in some cases, this is due to the availability of specialist resources, or the need to coordinate the PFR setting changes with other planned works prior to Summer 2020-21.

To date, one Affected GS is already operating in accordance with the Mandatory PFR Rule. AEMO was advised that the Affected Generator opted to retain its setting changes after testing the Affected GS for the purposes of self-assessment.

Three further affected GS have commenced altering PFR settings in a staged manner, in order to meet the agreed settings by the dates nominated in Table 2.

Multiple affected GS have operated with altered PFR settings on a trial basis, for short periods, to assess the impact on their units, and to undertake testing. These units restored their original PFR settings at the conclusion of these tests.

# 7. Register of Affected GS

Table 2 details, for each Tranche 1 Affected GS, the implementation date for completion of implementation of PFR settings in accordance with the IPFRR, and whether AEMO has granted an exemption or variation from the PFRP. Where a variation has been granted, the table also indicates which PFRP has been varied.

**Table 2 Register of Tranche 1 Affected GS**

| Station Name | DUID | Reg Cap (MW) | PFR Settings changes implemented by | Exemption | Variation | PFRP Varied |
|---|---|---|---|---|---|---|
| Ararat Wind Farm | ARWF1 | 241 | | | | |
| Barker Inlet Power Station | BARKIPS1 | 211 | | | | |
| Bayswater Power Station | BW01 | 660 | | | | |
| Bayswater Power Station | BW02 | 660 | | | | |
| Bayswater Power Station | BW03 | 660 | | | | |
| Bayswater Power Station | BW04 | 660 | | | | |
| Bogong / Mackay Power Station | MCKAY1 | 300 | | | | |
| Callide B Power Station | CALL_B_1 | 350 | | | | |
| Callide B Power Station | CALL_B_2 | 350 | | | | |
| Callide C Power Station | CPP_3 | 420 | | | | |

| Station Name | DUID | Reg Cap (MW) | PFR Settings changes implemented by | Exemption | Variation | PFRP Varied |
|---|---|---|---|---|---|---|
| Callide C Power Station | CPP_4 | 420 | | | | |
| Coopers Gap Wind Farm | COOPGWF1 | 452 | | | | |
| Darling Downs Power Station | DDPS1 | 644 | 15 Jun 20 | | | |
| Darlington Point Solar Farm | DARLSF1 | 324 | 30 Sep 20[2] | | | |
| Eraring Power Station | ER01 | 720 | | | | |
| Eraring Power Station | ER02 | 720 | | | | |
| Eraring Power Station | ER03 | 720 | | | | |
| Eraring Power Station | ER04 | 720 | | | | |
| Gladstone Power Station | GSTONE1 | 280 | | | | |
| Gladstone Power Station | GSTONE2 | 280 | | | | |
| Gladstone Power Station | GSTONE3 | 280 | | | | |
| Gladstone Power Station | GSTONE4 | 280 | | | | |
| Gladstone Power Station | GSTONE5 | 280 | | | | |
| Gladstone Power Station | GSTONE6 | 280 | | | | |
| Gordon Power Station | GORDON | 432 | Unit 1 – 11 Dec 20<br>Unit 2 – 30 Sep 20<br>Unit 3 – 30 Sep 20 | | | |
| Hallett Power Station | AGLHAL | 217 | 31 Oct 20[3] | | | |
| Kiamal Solar Farm | KIAMSF1 | 239[4] | 30 Sep 20[5] | | | |
| Kogan Creek Power Station | KPP_1 | 744 | | | | |
| Liddell Power Station | LD01 | 500 | | | | |
| Liddell Power Station | LD02 | 500 | | | | |
| Liddell Power Station | LD03 | 500 | | | | |
| Liddell Power Station | LD04 | 500 | | | | |
| Limondale Solar Farm 1 | LIMOSF11 | 275 | 30 Sep 20[6] | | | |
| Lincoln Gap Wind Farm | LGAPWF1 | 212 | | | | |
| Loy Yang A Power Station | LYA1 | 560 | | | | |
| Loy Yang A Power Station | LYA2 | 530 | | | | |
| Loy Yang A Power Station | LYA3 | 560 | | | | |

[2] Or upon reaching a 200 MW commissioning hold point, whichever date is later.

[3] Applicable to one generating unit, remainder previously complied with the PFRP.

[4] This project has not yet achieved registration. Final registration details may change from those shown here.

[5] Or upon reaching a 200 MW commissioning hold point, whichever date is later.

[6] Or upon reaching a 200 MW commissioning hold point, whichever date is later.

| Station Name | DUID | Reg Cap (MW) | PFR Settings changes implemented by | Exemption | Variation | PFRP Varied |
|---|---|---|---|---|---|---|
| Loy Yang A Power Station | LYA4 | 560 | | | | |
| Loy Yang B Power Station | LOYYB1 | 500 | | | | |
| Loy Yang B Power Station | LOYYB2 | 500 | | | | |
| Macarthur Wind Farm | MACARTH1 | 420 | | | | |
| Millmerran Power Plant | MPP_1 | 426 | 30 Sep 20<br>28 Oct 20[7] | | Yes | Response time |
| Millmerran Power Plant | MPP_2 | 426 | Upon returning from outage in Nov 2020. | | Yes | Response time |
| Mortlake Power Station | MORTLK11 | 283 | 30 Sep 20 | | | |
| Mortlake Power Station | MORTLK12 | 283 | 30 Sept 20 | | | |
| Mt Piper Power Station | MP1 | 700 | 30 Sep 20<br>28 Oct 20[8] | | | |
| Mt Piper Power Station | MP2 | 700 | 30 Sep 20<br>28 Oct 20[9] | | | |
| Murra Warra Wind Farm | MUWAWF1 | 231 | | | | |
| Murray Power Station | MURRAY | 1500 | | | | |
| Newport Power Station | NPS | 500 | 30 Sep 20<br>30 Oct 20[10] | | | |
| Pelican Point Power Station | PPCCGT | 478 | 30 Sep 20 | | | |
| Poatina Power Station | POAT220 | 200 | | | | |
| Sapphire Wind Farm | SAPHWF1 | 270 | | | | |
| Shoalhaven Power Station | SHGEN | 240 | Bendeela Unit 2 - 31 August 2021<br>Kangaroo Valley Unit 4 - 31 August 2021<br>Bendeela Unit 1 – 31 October 2022<br>Kangaroo Valley Unit 3 - 30 November 2023 | | | |
| Stanwell Power Station | STAN-1 | 365 | | | | |
| Stanwell Power Station | STAN-2 | 365 | | | | |
| Stanwell Power Station | STAN-3 | 365 | | | | |

[7] Deadband to be adjusted in two stages.

[8] Deadband to be adjusted in two stages.

[9] Deadband to be adjusted in two stages.

[10] Deadband to be adjusted in two stages.

| Station Name | DUID | Reg Cap (MW) | PFR Settings changes implemented by | Exemption | Variation | PFRP Varied |
|---|---|---|---|---|---|---|
| Stanwell Power Station | STAN-4 | 365 | | | | |
| Swanbank E Gas Turbine | SWAN_E | 385 | | | | |
| Tallawarra Power Station | TALWA1 | 440 | 31 Dec 2020 | | | |
| Tamar Valley Combined Cycle Power Station | TVCC201 | 208 | | | | |
| Tarong North Power Station | TNPS1 | 443 | | | | |
| Tarong Power Station | TARONG#1 | 350 | | | | |
| Tarong Power Station | TARONG#2 | 350 | | | | |
| Tarong Power Station | TARONG#3 | 350 | | | | |
| Tarong Power Station | TARONG#4 | 350 | | | | |
| Torrens Island Power Station | TORRB1 | 200 | | | | |
| Torrens Island Power Station | TORRB2 | 200 | | | | |
| Torrens Island Power Station | TORRB3 | 200 | | | | |
| Torrens Island Power Station | TORRB4 | 200 | | | | |
| Tumut 3 Power Station | TUMUT3 | 1500 | | | | |
| Tumut Power Station | UPPTUMUT | 616 | | | | |
| Vales Point "B" Power Station | VP5 | 660 | 30 Sep 20 | | Yes | Deadband[11] |
| Vales Point "B" Power Station | VP6 | 660 | 30 Sep 20 | | Yes | Deadband[12] |
| Wivenhoe Power Station | W/HOE#1 | 285 | | | | |
| Wivenhoe Power Station | W/HOE#2 | 285 | | | | |
| Yallourn 'W' Power Station | YWPS1 | 360 | 30 Sep 20[13]<br>28 Oct 20 | | | |
| Yallourn 'W' Power Station | YWPS2 | 360 | 30 Sep 20[14]<br>28 Oct 20 | | | |
| Yallourn 'W' Power Station | YWPS3 | 380 | 30 Sep 20[15]<br>28 Oct 20 | | | |
| Yallourn 'W' Power Station | YWPS4 | 380 | 30 Sep 20[16]<br>28 Oct 20 | | | |

[11] AEMO has granted a variation to the deadband at ±100 mHz based on the unique condition of the Affected GS for a period of 12 months. This information is included with the consent of the Affected Generator.

[12] AEMO has granted a variation to the deadband at ±100 mHz based on the unique condition of the Affected GS for a period of 12 months. This information is included with the consent of the Affected Generator.

[13] Deadband to be adjusted in two stages.

[14] Deadband to be adjusted in two stages.

[15] Deadband to be adjusted in two stages.

[16] Deadband to be adjusted in two stages.

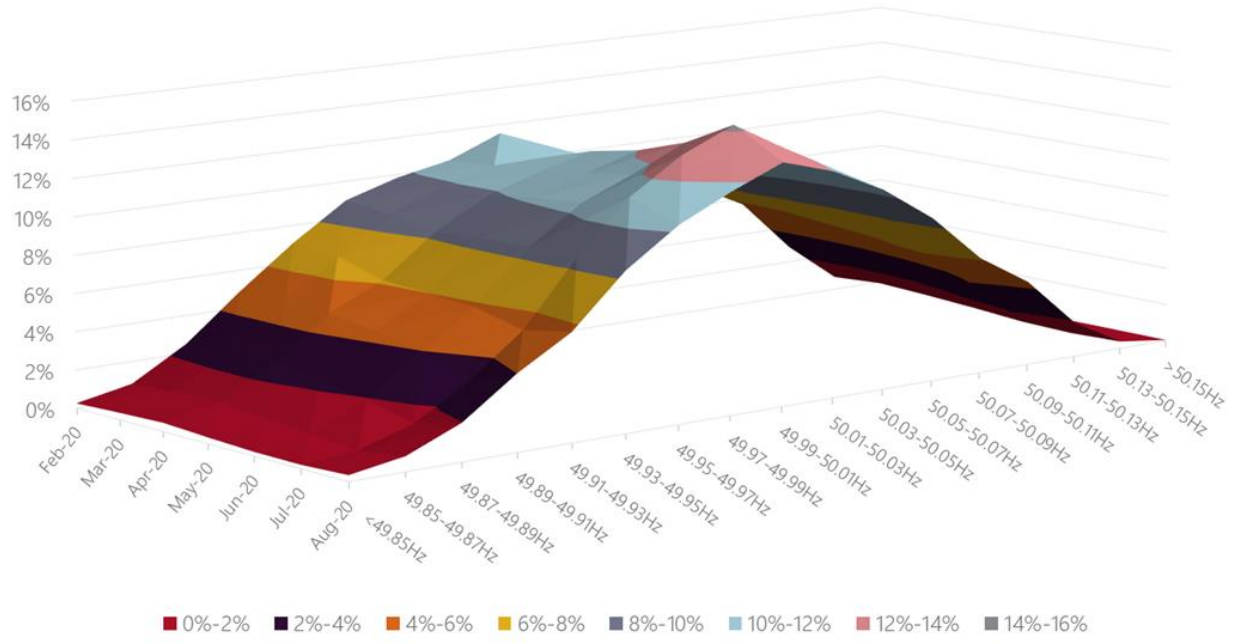
# 8. Impact on Frequency Performance

AEMO provides detailed reporting on power system frequency performance in its Frequency and Time Error Monitoring reports[17] that are published quarterly. The most recent report was published in August 2020.

This report will focus on a sub-set of the matters raised in the quarterly report. It will provide some information focusing on relatively recent frequency performance to help capture impacts on power system frequency that are (at least in part) associated with the implementation of the Mandatory PFR rule.

Figure 1 shows the monthly frequency distribution for the last six months (1 Feb 2020 to 26 Aug 2020). July saw a noticeable improvement, however performance in August has not been quite as good.

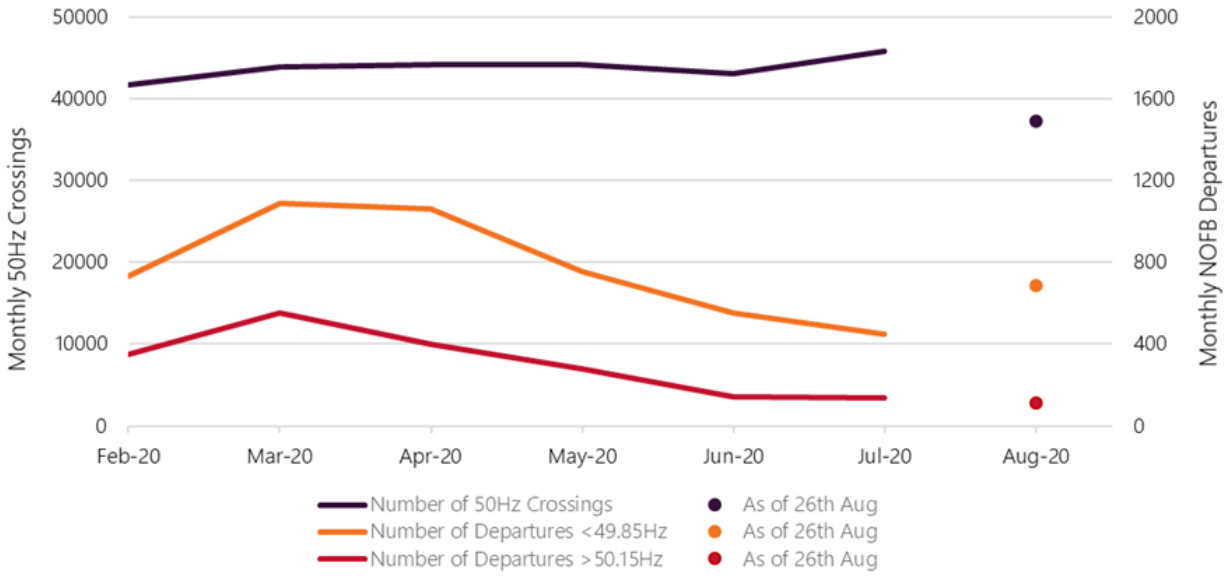
**Figure 1 Monthly frequency distribution (six-month rolling, Feb 2020 to 26 Aug 2020)**




The total number of departures from the normal operating frequency band (NOFB) and the number of times frequency crossed the nominal 50 Hz is shown in Figure 2. While there was a clear downtrend observed in NOFB departures from May, August has seen an uptick in low frequency events (i.e. frequency exiting the lower bound of the NOFB).

[17] Available at https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/ancillary-services/frequency-and-time-deviation-monitoring.

**Figure 2 Monthly frequency crossings – under 49.85 Hz, across 50 Hz, beyond 50.15 Hz**



# Glossary

This document uses many terms that have meanings defined in the National Electricity Rules (NER). The NER meanings are adopted unless otherwise specified.

| Term | Definition |
|---|---|
| Affected Generator | As defined in the IPFRR. |
| Affected GS | As defined in the IPFRR. |
| DUID | Dispatchable unit identification. |
| IPFRR | Interim Primary Frequency Response Requirements. |
| Mandatory PFR Rule | National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020. |
| NOFB | *normal operating frequency band.* |
| PFR | *primary frequency response.* |
| PFRP | *primary frequency response parameters.* |
| Results | As defined in the IPFRR. |
| Tranche 1 | Affected GS with a *nameplate rating* of >200 MW. |
| Tranche 2 | Affected GS with a *nameplate rating* between 80 MW and 200 MW. |
| Tranche 3 | Affected GS with a *nameplate rating* of <80 MW. |