

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

Status as at 11 Sep 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 11 September 2020. This information will be updated and superseded by future implementation reports until full implementation.

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1. Summary

This report provides information on the implementation of the National Electricity Amendment (Mandatory Primary Frequency Response) Rule 2020¹ (Mandatory PFR Rule). It will be updated periodically as implementation proceeds, at intervals of approximately two to three weeks.

The Mandatory PFR Rule affects all *Scheduled Generators* and *Semi-Scheduled Generators* (Affected Generators). They are initially required to undertake a self-assessment of 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 has received almost all of these.

AEMO has also started receiving Results from Affected Generators with Affected GSs in Tranche 2 and 3. Some have provided draft Results and discussed issues associated with meeting the PFRP.

Table 1 shows the number of Results, applications for variation and exemption received as at the date of this report.

Table 1 Incoming Results and Applications

Number of Affected GS	Results	Applications for Variation	Applications for Exemption
Tranche 1	70	18	2
Tranche 2	5	2	3
Tranche 3	3		1

2. Self-Assessments

AEMO has received Results in respect of 78 Affected GSs, including for some Affected GSs in Tranches 2 and 3.

AEMO has completed its review for 60 of those, covering around 28,800 MW of installed capacity. A register of Affected GSs who have been sent their PFR Settings by AEMO is listed in Table 4.

One Affected Generator with Affected GS in Tranche 2 withdrew its Results since the last report. These Results are not counted in the figures in Table 1.

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

3. Applications for Variation

Table 2 details the number of applications for variation received in respect of Affected GS, those granted and those still under consideration as at the date of this report.

The majority of applications for variation in Tranche 1 were in relation to response time.

Table 2 Variations

Number of Affected GS	Applications for Variation	Variations Granted	Variations not Granted	Variations being Assessed
Tranche 1	18	14		4
Tranche 2	2			2
Tranche 3				

4. Applications for Exemption

Table 3 details the number of applications for exemption received in respect of Affected GS, those granted and those still under consideration as at the date of this report.

Table 3 Exemptions

Number of Affected GS	Applications for Exemption	Exemptions Granted	Exemptions not Granted	Exemptions being Assessed
Tranche 1	2		2	
Tranche 2	3			3
Tranche 3	2			1

5. Implementation Plan

AEMO's implementation plan has evolved as more information has come to hand through the self-assessment process. AEMO has been cognisant of the need to review the Results before being more definitive about implementation.

5.1 Tranche 1 Implementation

AEMO is now working to achieve implementation of PFR Settings across a large proportion of Tranche 1 Affected GSs prior to Summer 2020-21.

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

- 30 September 2020
- 28 October 2020

These two dates allow staged changes to frequency response deadbands, which a number of Tranche 1 Affected Generators have indicated is their preference.

Table 4 shows changes to these dates for several Tranche 1 Affected GSs. The changes have been necessary because of the following factors:

- Affected Generator resourcing or other constraints.
- Affected GS outages.
- Works required to meet the PFRP cannot be completed prior to Summer 2020-21.

In these cases, the earliest reasonably achievable date has been determined in conjunction with the relevant Affected Generator.

5.2 Flexible Implementation Dates

As noted in section 5.1, the implementation dates are flexible and can be adjusted to accommodate a range of concerns.

Where Affected Generators have agreed to certain target dates, they will be required to have implemented agreed changes to their Affected GS by those 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.

Some minor flexibility around exact dates for implementation of changes may be required in order to stagger control changes, 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 to 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, as this 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

Again, some flexibility around these target dates is possible, particularly where Affected Generators may wish to make changes earlier.

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 GSs 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 GSs that are operating in a way that could meet the PFRP and may not need further changes to comply with the Mandatory PFR Rule. Table 4 has been updated to confirm the identity of those Affected GSs.

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 has already altered settings to operate 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.

At the date of this report, three further Affected GS have commenced altering operating their control settings in a staged manner, in order to meet the PFR Settings by the dates nominated in Table 4.

Many Affected GSs have operated in accordance with their PFR Settings on a trial basis, for short periods, to assess the impact on their Affected GSs, and to undertake testing and restored their original control settings at the conclusion of these tests.

7. Register of Affected GS

Table 4 details, for each Tranche 1 Affected GS, the implementation date for completion of implementation of the PFR Settings notified by AEMO 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.

As assessments are completed, Tranche 2 and Tranche 3 generation will also be added to this table.

Table 4 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	23 Sep 20 21 Oct 20 ²			
Barker Inlet Power Station	BARKIPS1	211	Implemented prior to rule		Yes	Response time ³
Bayswater Power Station	BW01	660	30 Sep 20 14 Oct 20 ⁴			
Bayswater Power Station	BW02	660	14 Oct 20			
Bayswater Power Station	BW03	660	14 Oct 20			
Bayswater Power Station	BW04	660	30 Sep 20 14 Oct 20 ⁵			
Bogong / Mackay Power Station	MCKAY1	300	28 Oct 20			
Callide B Power Station	CALL_B_1	350	26 Sep 20 28 Oct 20 ⁶			
Callide B Power Station	CALL_B_2	350	26 Sep 20 28 Oct 20 ⁷			
Callide C Power Station	CPP_3	420	26 Sep 20 28 Oct 20 ⁸		Yes	Response time
Callide C Power Station	CPP_4	420	26 Sep 20 28 Oct 20 ⁹		Yes	Response time
Coopers Gap Wind Farm	COOPGWF1	452				

² Deadband to be adjusted in two stages.

³ AEMO has granted a variation in respect of response time, where 12 sec is required to achieve a 5% change in output. This information is included with the consent of the Affected Generator.

⁴ Deadband to be adjusted in two stages.

⁵ Deadband to be adjusted in two stages.

⁶ Deadband to be adjusted in two stages.

⁷ Deadband to be adjusted in two stages.

⁸ Deadband to be adjusted in two stages.

⁹ Deadband to be adjusted in two stages.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Darling Downs Power Station	DDPS1	644	15 Jun 20			
Darlington Point Solar Farm	DARLSF1	324	30 Sep 20 ¹⁰			
Eraring Power Station	ER01	720	30 Sep 20 30 Oct 20 ¹¹		Yes	Response time
Eraring Power Station	ER02	720	30 Sep 20 30 Oct 20 ¹²		Yes	Response time
Eraring Power Station	ER03	720	30 Sep 20 30 Oct 20 ¹³		Yes	Response time
Eraring Power Station	ER04	720	30 Sep 20 30 Oct 20 ¹⁴		Yes	Response time
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 Unit 2 – 30 Sep 20 Unit 3 – 30 Sep 20			
Hallett Power Station	AGLHAL	217	31 Oct 20 ¹⁵			
Kiamal Solar Farm	KIAMSF1	239 ¹⁶	30 Sep 20 ¹⁷			
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 ¹⁸			
Lincoln Gap Wind Farm	LGAPWF1	212				

¹⁰ Or upon reaching a 200 MW commissioning hold point, whichever date is later.

¹¹ Deadband to be adjusted in two stages.

¹² Deadband to be adjusted in two stages.

¹³ Deadband to be adjusted in two stages.

¹⁴ Deadband to be adjusted in two stages.

¹⁵ Applicable to one generating unit, remainder previously complied with the PFRP.

¹⁶ This project has not yet achieved registration. Final registration details may change from those shown here.

¹⁷ Or upon reaching a 200 MW commissioning hold point, whichever date is later.

¹⁸ 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	LYA1	560	30 Sep 20			
Loy Yang A Power Station	LYA2	530	30 Sep 20			
Loy Yang A Power Station	LYA3	560	30 Sep 20			
Loy Yang A Power Station	LYA4	560	30 Sep 20			
Loy Yang B Power Station	LOYB1	500	12 Dec 20 17 Dec 20 ¹⁹			
Loy Yang B Power Station	LOYB2	500	30 Sep 20 28 Oct 20 ²⁰			
Macarthur Wind Farm	MACARTH1	420	16 Nov 20			
Millmerran Power Plant	MPP_1	426	30 Sep 20 28 Oct 20 ²¹		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 28 Oct 20 ²²			
Mt Piper Power Station	MP2	700	30 Sep 20 28 Oct 20 ²³			
Murra Warra Wind Farm	MUWAWF1	231	16 Sep 20			
Murray Power Station	MURRAY	1500	31 March 21 ²⁴			
Newport Power Station	NPS	500	30 Sep 20 30 Oct 20 ²⁵			
Pelican Point Power Station	PPCCGT	478	30 Sep 20			
Poatina Power Station	POAT220	200				
Sapphire Wind Farm	SAPHWF1	270	30 Oct 20			
Shoalhaven Power Station	SHGEN	240	Bendeela Unit 2 - 31 August 2021 Kangaroo Valley Unit 4 - 31 August 2021			

¹⁹ Deadband to be adjusted in two stages.

²⁰ Deadband to be adjusted in two stages.

²¹ Deadband to be adjusted in two stages.

²² Deadband to be adjusted in two stages.

²³ Deadband to be adjusted in two stages.

²⁴ One unit will implement PFR settings upon return from outage in Oct 2021

²⁵ Deadband to be adjusted in two stages.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
			Bendeela Unit 1 – 31 October 2022			
			Kangaroo Valley Unit 3 - 30 November 2023			
Stanwell Power Station	STAN-1	365	28 Oct 20			
Stanwell Power Station	STAN-2	365	28 Oct 20			
Stanwell Power Station	STAN-3	365	28 Oct 20			
Stanwell Power Station	STAN-4	365	28 Oct 20			
Swanbank E Gas Turbine	SWAN_E	385	16 Nov 20		Yes	Response Time
Tallawarra Power Station	TALWA1	440	31 Dec 20			
Tamar Valley Combined Cycle Power Station	TVCC201	208				
Tarong North Power Station	TNPS1	443				
Tarong Power Station	TARONG#1	350	30 Sep 20			
Tarong Power Station	TARONG#2	350	11 Nov 20			
Tarong Power Station	TARONG#3	350	30 Sep 20			
Tarong Power Station	TARONG#4	350	30 Sep 20			
Torrens Island B Power Station	TORRB1	200				
Torrens Island B Power Station	TORRB2	200				
Torrens Island B Power Station	TORRB3	200				
Torrens Island B Power Station	TORRB4	200				
Tumut 3 Power Station	TUMUT3	1500	30 Nov 20			
Tumut Power Station	UPPTUMUT	616	30 Nov 20			
Vales Point "B" Power Station	VP5	660	30 Sep 20		Yes	Deadband ²⁶
Vales Point "B" Power Station	VP6	660	30 Sep 20		Yes	Deadband ²⁷
Wivenhoe Power Station	W/HOE#1	285	12 Oct 20		Yes	Response Time
Wivenhoe Power Station	W/HOE#2	285	13 Oct 20		Yes	Response Time
Yallourn 'W' Power Station	YWPS1	360	30 Sep 20 ²⁸ 28 Oct 20			

²⁶ 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.

²⁷ 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.

²⁸ Deadband to be adjusted in two stages.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Yallourn 'W' Power Station	YWPS2	360	30 Sep 20 ²⁹ 28 Oct 20			
Yallourn 'W' Power Station	YWPS3	380	30 Sep 20 ³⁰ 28 Oct 20			
Yallourn 'W' Power Station	YWPS4	380	30 Sep 20 ³¹ 28 Oct 20			

8. Impact on Frequency Performance

AEMO provides detailed reporting on power system frequency performance in its Frequency and Time Error Monitoring reports³² 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 and 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 Mar 2020 to 10 Sep 2020). July saw a noticeable improvement, however performance over August and September to date has not been quite as good. This may be explained by seasonal factors including weather and the number of units online.

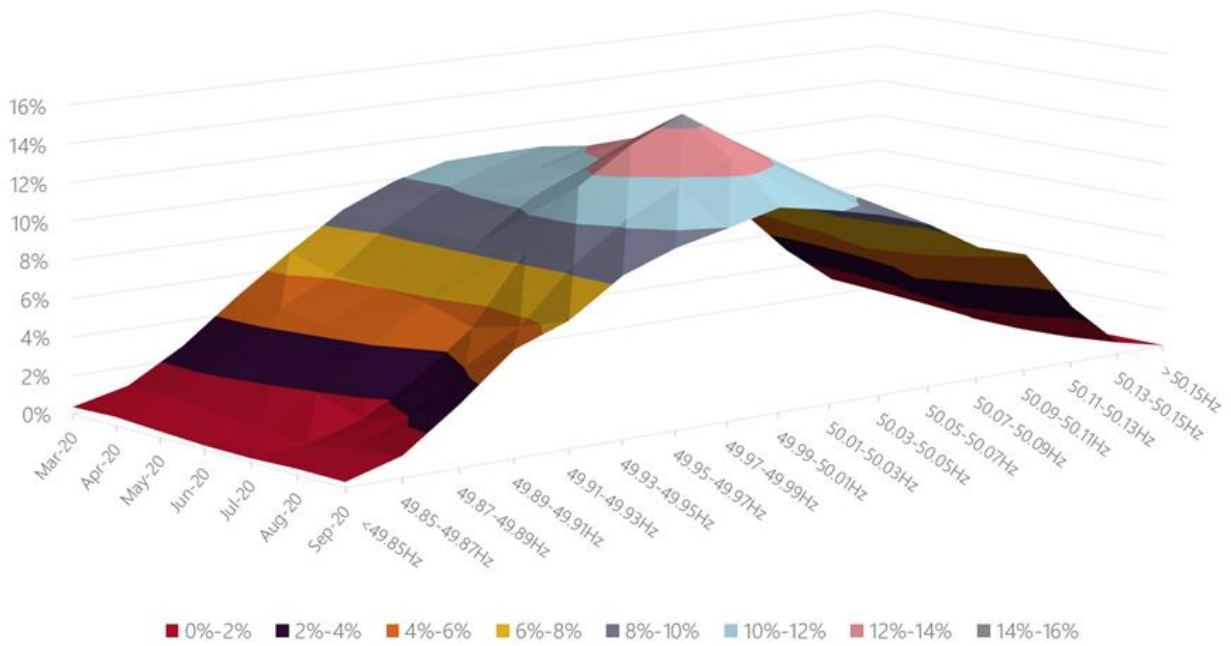
²⁹ Deadband to be adjusted in two stages.

³⁰ Deadband to be adjusted in two stages.

³¹ Deadband to be adjusted in two stages.

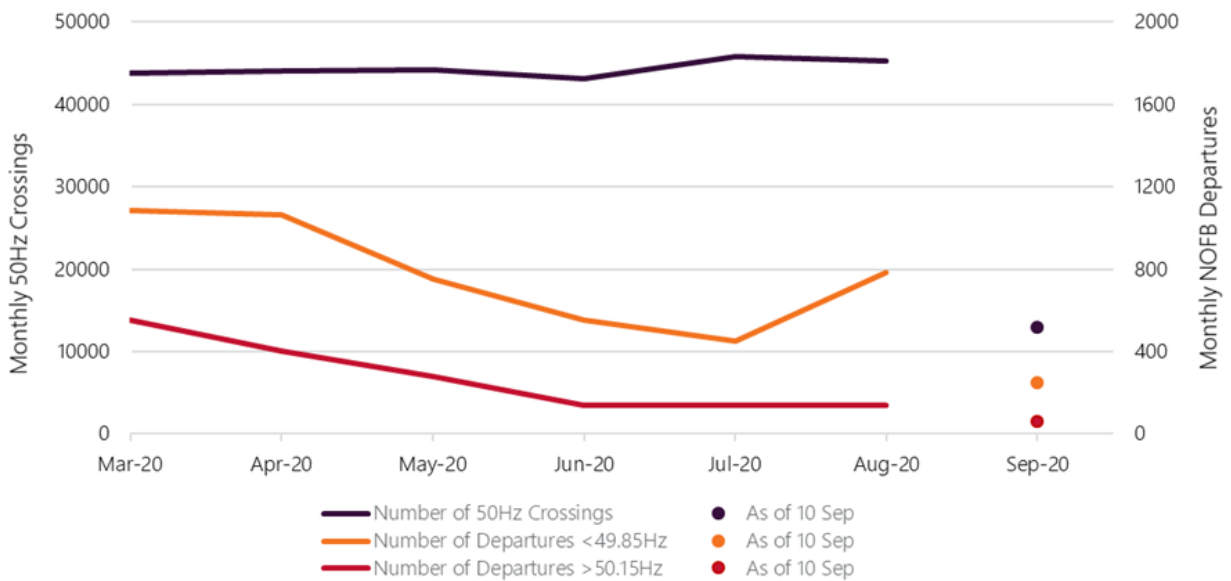
³² Available at <https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/ancillary-services/frequency-and-time-deviation-monitoring>.

Figure 1 Monthly frequency distribution (six-month rolling, Feb 2020 to 10 Sep 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). The September figures are too early to draw conclusions from.

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	<i>normal operating frequency band.</i>
PFR	<i>primary frequency response.</i>
PFRP	<i>primary frequency response parameters.</i>
Results	As defined in the IPFRR.
Tranche 1	Affected GS with a <i>nameplate rating</i> of >200 MW.
Tranche 2	Affected GS with a <i>nameplate rating</i> between 80 MW and 200 MW.
Tranche 3	Affected GS with a <i>nameplate rating</i> of <80 MW.