

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

Status as at 25 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 25 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 This information will be updated and superseded by future implementation reports until full implementation.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 1² Affected Generators were due on 28 August 2020.

AEMO has also started receiving Results from Affected Generators with Affected GSs in Tranches 2 and 3. Some have provided draft Results and discussed issues associated with meeting the PFRP. Results for Affected GSs in Tranche 2 are due by 19 November 2020, and for Tranche 3 by 17 February 2021.

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	76	18	8
Tranche 2	6	2	3
Tranche 3	6		1

2. Self-Assessments

AEMO has received Results in respect of 88 Affected GSs, including for some Affected GSs in Tranches 2 and 3.

AEMO has completed its review for 77 of those, covering around 33,200 MW of installed capacity. A register of Affected GSs who have been sent their PFR Settings by AEMO is listed in Table 4.

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

² Tranche 1 Affected GS are those with a *Registered Capacity* above 200 MW. Tranche 2 Affected GS are between 80 and 200 MW. Tranche 3 are below 80 MW. All Registered Capacities are the level of the individual DUID.

3. Applications for Variation

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

The majority of variations granted 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 GSs, 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	8		8	
Tranche 2	3			3
Tranche 3	1			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 a number of Tranche 1 Affected GSs. The changes have been necessary because of factors including:

- Affected GS outages.
- Affected Generator resourcing constraints, particularly where work is required across multiple sites.
- 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 GSs 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 might be required in order to stagger control changes to avoid large numbers of Affected GSs altering settings near-simultaneously. Power system conditions, such as major network outages, could potentially also require minor alterations to implementation dates.

5.3 Implementation of Subsequent Tranches

As outlined in the IPFRR, Tranche 2 and Tranche 3 Affected Generators 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 are commissioning, or otherwise 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 might 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 GSs 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 fully altered settings to operate in accordance with the Mandatory PFR Rule. AEMO was advised that the Affected Generator opted to retain the setting changes after testing the Affected GS for the purposes of self-assessment.

As at the date of this report, a number of additional Affected GS have commenced altering their control settings in a staged manner to meet their 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 enable the Affected Generator to assess the impact, and to undertake testing, and then restored the original control settings at the conclusion of those tests.

7. Register of Affected GS

Table 4 details, for each 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.

Where multiple implementation dates are listed, this indicates incremental implementation of PFR settings, particularly in relation to staged reductions in deadband. Where a single implementation date is listed, this is the date by which full implementation of agreed settings is to be, or has already been, achieved.

Tranche 2 and Tranche 3 generation is being added to this table as assessments are completed.

Table 4 Register of Affected GS

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Ararat Wind Farm	ARWF1	241	Early Oct 20 21 Oct 20 ³			
Barker Inlet Power Station	BARKIPS1	211	Implemented prior to rule		Yes	Response time ⁴
Bayswater Power Station	BW01	660	29 Sep 20 14 Oct 20 ⁵			
Bayswater Power Station	BW02	660	14 Oct 20			
Bayswater Power Station	BW03	660	14 Oct 20			
Bayswater Power Station	BW04	660	29 Sep 20 14 Oct 20 ⁶			
Bogong / Mackay Power Station	MCKAY1	300	28 Oct 20			
Callide B Power Station	CALL_B_1	350	Upon returning from outage in mid Nov 2020			
Callide B Power Station	CALL_B_2	350	30 Sep 20 28 Oct 20 ⁷			
Callide C Power Station	CPP_3	420	23 Oct 20 28 Oct 20 ⁸		Yes	Response time

³ Deadband to be adjusted in two stages.

⁴ 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.

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.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Callide C Power Station	CPP_4	420	23 Oct 20 28 Oct 20 ⁹		Yes	Response time
Coopers Gap Wind Farm	COOPGWF1	452	30 Nov 20 14 Dec 20 ¹⁰			
Darling Downs Power Station	DDPS1	644	15 Jun 20			
Darlington Point Solar Farm	DARLSF1	324	Upon reaching a 200 MW commissioning hold point			
Eraring Power Station	ER01	720	Upon returning from outage in Oct 2020 30 Oct 20 ¹¹		Yes	Response time
Eraring Power Station	ER02	720	2 Oct 20 30 Oct 20 ¹²		Yes	Response time
Eraring Power Station	ER03	720	7 Oct 20 30 Oct 20 ¹³		Yes	Response time
Eraring Power Station	ER04	720	7 Oct 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			
Jemalong Solar Farm	JEMALNG1	50	Upon completion of hold point testing.			
Kiamal Solar Farm	KIAMSF1	239 ¹⁶	Upon reaching a 200 MW commissioning hold point			

⁹ Deadband to be adjusted in two stages.

¹⁰ Deadband to be adjusted in two stages.

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.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Kogan Creek Power Station	KPP_1	744	Upon returning from outage in mid Nov 2020 ¹⁷			
Liddell Power Station	LD01	500	25 Nov 20			
Liddell Power Station	LD02	500	25 Nov 20			
Liddell Power Station	LD03	500	25 Nov 20			
Liddell Power Station	LD04	500	25 Nov 20			
Limondale Solar Farm 1	LIMOSF11	275	Upon reaching a 200 MW commissioning hold point			
Lincoln Gap Wind Farm	LGAPWF1	212	28 Sep 20			
Loy Yang A Power Station	LYA1	560	Early October 20			
Loy Yang A Power Station	LYA2	530	Late Oct 20			
Loy Yang A Power Station	LYA3	560	Upon returning from outage in Nov 2020			
Loy Yang A Power Station	LYA4	560	Mid Oct 20			
Loy Yang B Power Station	LOYB1	500	12 Dec 20 17 Dec 20 ¹⁸			
Loy Yang B Power Station	LOYB2	500	30 Sep 20 28 Oct 20 ¹⁹			
Macarthur Wind Farm	MACARTH1	420	16 Nov 20			
Millmerran Power Plant	MPP_1	426	30 Sep 20 28 Oct 20 ²⁰		Yes	Response time
Millmerran Power Plant	MPP_2	426	Upon returning from outage in Nov 2020		Yes	Response time
Morgan – Whyalla Pump 1 PV	MWPS1PV1	6	Upon completion of hold point testing in Feb 2021			
Morgan – Whyalla Pump 2 PV	MWPS2PV1	6	Upon completion of hold point testing in Feb 2021			
Morgan – Whyalla Pump 3 PV	MWPS3PV1	8	Upon completion of hold point testing in Oct 2020			
Morgan – Whyalla Pump 4 PV	MWPS4PV1	6	Upon completion of hold point testing in Feb 2021			
Mortlake Power Station	MORTLK11	283	30 Sep 20			
Mortlake Power Station	MORTLK12	283	30 Sept 20			

¹⁷ An implementation date has been agreed for this Affected GS. Discussions with the Affected Generator are ongoing in relation to other settings.

¹⁸ Deadband to be adjusted in two stages.

¹⁹ Deadband to be adjusted in two stages.

²⁰ Deadband to be adjusted in two stages.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
Mt Piper Power Station	MP1	700	Upon return to service from outage in late Dec 20.			
Mt Piper Power Station	MP2	700	29 Sep 20 28 Oct 20 ²¹			
Murra Warra Wind Farm	MUWAWF1	231	9 Oct 20			
Murray Power Station	MURRAY	1500	31 March 21 ²²			
Newport Power Station	NPS	500	28 Sep 20 30 Oct 20 ²³			
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 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	21 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			

²¹ Deadband to be adjusted in two stages.

²² One unit will implement PFR settings upon return from outage in Oct 2021

²³ Deadband to be adjusted in two stages.

Station Name	DUID	Reg Cap (MW)	PFR Settings changes implemented by	Exemption	Variation	PFRP Varied
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 ²⁴
Vales Point "B" Power Station	VP6	660	30 Sep 20		Yes	Deadband ²⁵
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	Upon return to service from outage early Oct 20 ²⁶ 28 Oct 20			
Yallourn 'W' Power Station	YWPS2	360	29 Sep 20 ²⁷ 28 Oct 20			
Yallourn 'W' Power Station	YWPS3	380	29 Sep 20 ²⁸ 28 Oct 20			
Yallourn 'W' Power Station	YWPS4	380	29 Sep 20 ²⁹ 28 Oct 20			

²⁴ 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.

²⁵ 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.

²⁶ Deadband to be adjusted in two stages.

²⁷ Deadband to be adjusted in two stages.

²⁸ Deadband to be adjusted in two stages.

²⁹ Deadband to be adjusted in two stages.

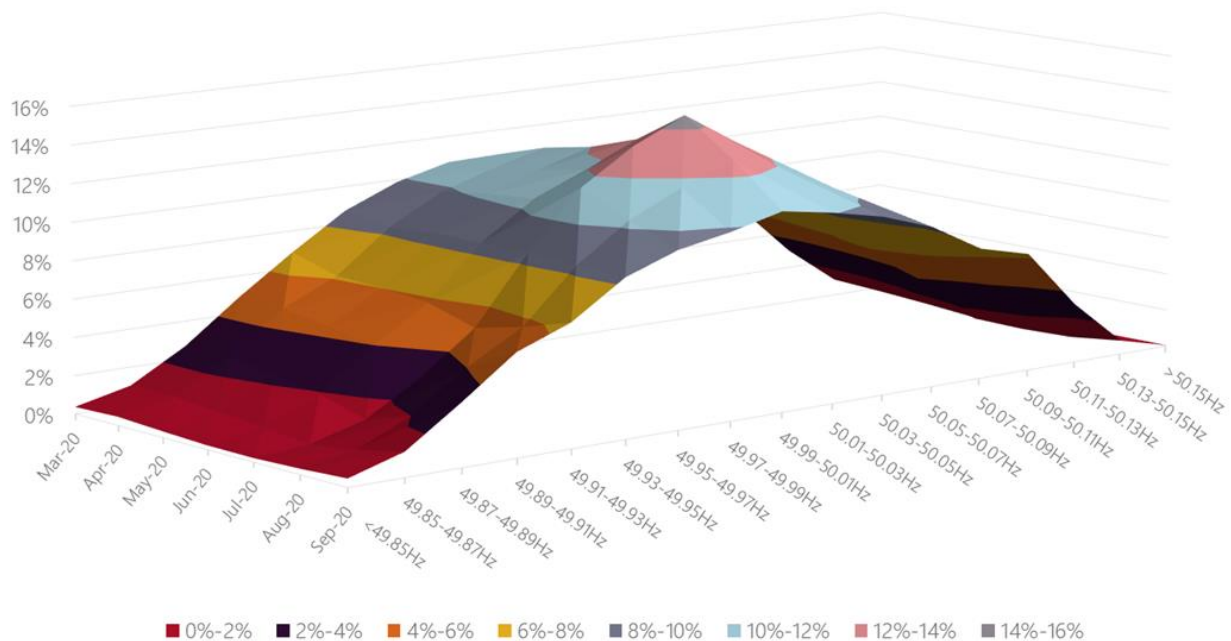
8. Impact on Frequency Performance

AEMO provides detailed reporting on power system frequency performance in its Frequency and Time Error Monitoring reports³⁰ 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 24 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. Other than for brief test periods, there has only been a minor change in the total PFR in the system as yet, however this is expected to change from next week with various Tranche 1 generators commencing implementation (see Table 4).

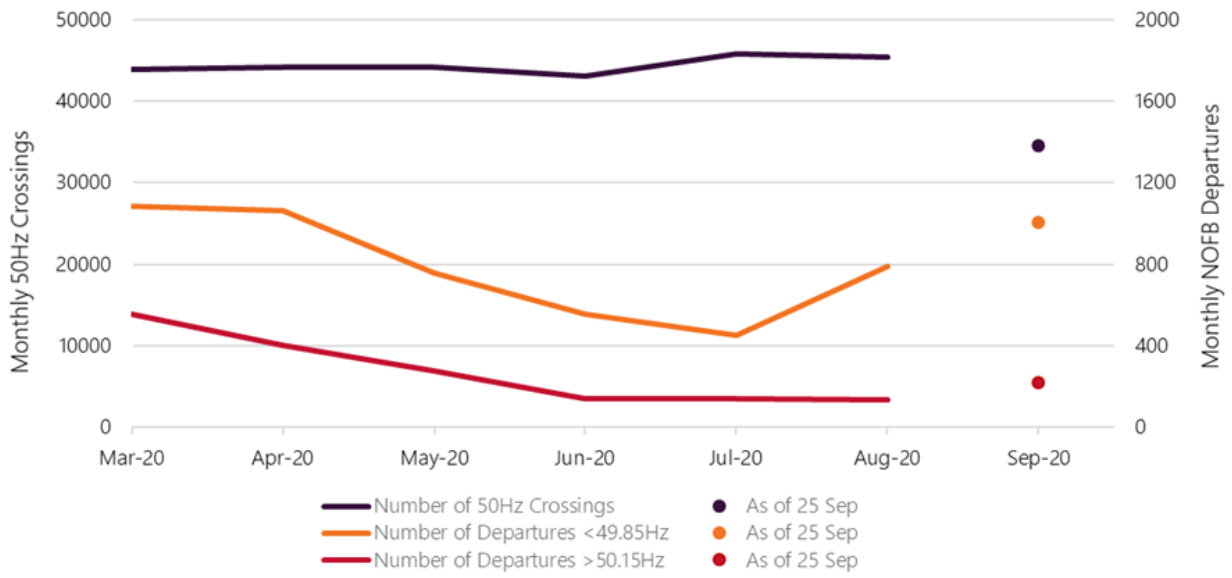
Figure 1 Monthly frequency distribution (six-month rolling, Mar 2020 to 24 Sep 2020)



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 and September has seen this return to the performance observed in April/May.

³⁰ 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	<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.