FREQUENCY AND TIME ERROR MONITORING – 2ND QUARTER 2018

FOR THE NATIONAL ELECTRICITY MARKET

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

IMPORTANT NOTICE

Purpose

AEMO has prepared this document to provide information about the frequency and time error performance in the National Electricity Market Mainland and Tasmania regions for the period April to June 2018 inclusive.

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1. INTRODUCTION

AEMO must use reasonable endeavours to maintain power system frequency and time error within the limits specified by the Reliability Panel in the Frequency Operating Standards (FOS)[1] for the mainland and Tasmanian regions. This document reports on the frequency and time error performance observed during April, May and June 2018 in all regions of the National Electricity Market (NEM). Queensland, New South Wales, Victoria and South Australia are referred to as the 'mainland' throughout the report.

The *Power System Frequency and Time Deviation Monitoring Report – Reference Guide*[2] outlines the calculation procedure used by AEMO to produce the quarterly Frequency and Time Error Monitoring report.

The analysis of the delivery of Slow Raise, Slow Lower, Delayed Raise and Delayed Lower Frequency Controlled Ancillary Services (FCAS) presented in this report are based on 4-second data. Unless otherwise noted, frequency data for the mainland is sourced from 4-second measurements in New South Wales and frequency data for Tasmania is sourced from 4-second measurements in Tasmania.

1 http://aemc.gov.au/Australia-s-Energy-Market/Market-Legislation/Electricity-Guidelines-and-Standards
2 http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Ancillary-services/Frequency-and-time-error-monitoring

2. OPERATION WITHIN THE NORMAL OPERATING FREQUENCY BAND

Mainland frequencies exceeded the Normal Operating Frequency Band (NOFB)[3] for more than 1% of the time twice over the 30-day periods from July 2017 to June 2018 (including time during contingency events).

The mainland frequencies did not exceed the NOFB for more than 1% of the time over the same period when contingency events are not considered.

Tasmanian frequencies exceeded the NOFB for more than 1% of the time for all of the 30-day periods from July 2017 to June 2018 when including the time during contingency events but for 9 out of 12 30-day periods when excluding the time during contingency events, and consequently did not meet the FOS.

The minimum daily values in the last 30 days of the rolling average percentage of time that the frequency was inside the NOFB have been used to create Figure 1. The time outside the NOFB due to contingency events was also included when calculating these values.

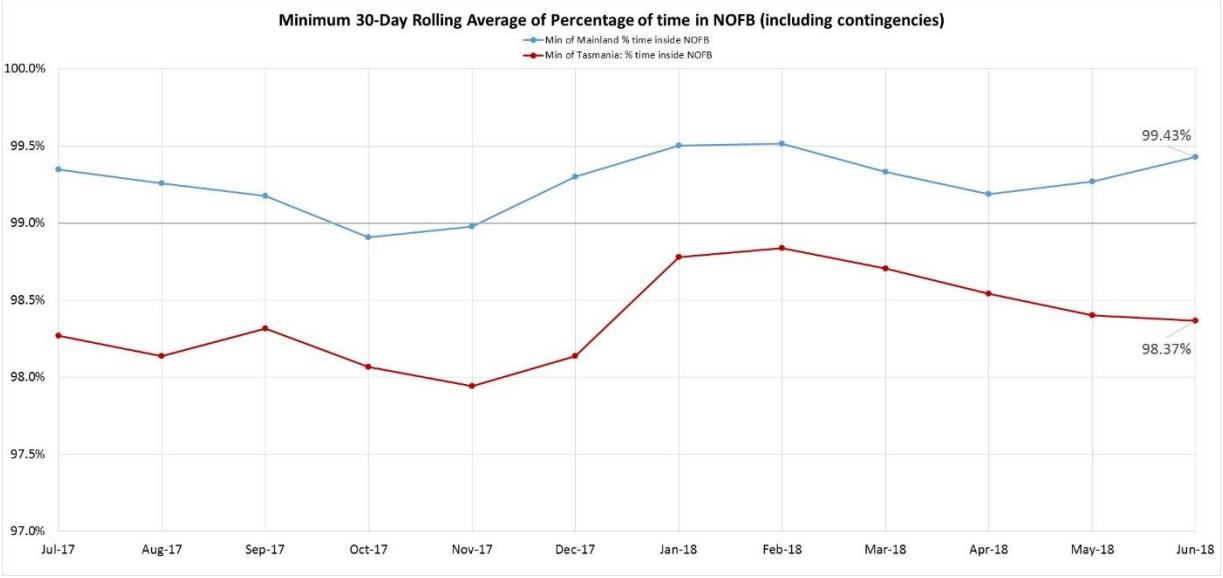

Figure 1 Minimum 30-Day rolling average of percentage of time mainland and Tasmania frequencies remained within NOFB from July 2017 to June 2018

[3] Frequency range of 49.85 Hz – 50.15 Hz

3. EVENTS OUTSIDE THE NORMAL OPERATING FREQUENCY EXCURSION BAND

Table 1 and Table 2 summarise the events in the mainland and Tasmania with frequency excursions outside the Normal Operating Frequency Excursion Band (NOFEB) [4].

For all mainland and Tasmania events in Table 1, frequency returned to the NOFB within the times specified in the FOS. For the events in Table 2, it did not. These events are discussed further in Section 4.

Table 1 Mainland and Tasmania: Frequency excursions outside the NOFEB and returned in FOS timeframes

Event	Low/High/Both Frequency Event	Number of Events	
		Mainland	Tasmania
No contingency or load event	LOW	1	68
	HIGH	1	55
	BOTH	0	6
Load Event	LOW	0	33
	HIGH	0	151
	BOTH	0	30
Generation Event	LOW	11	7
	HIGH	0	2
	BOTH	0	0
Network Event	LOW	0	0
	HIGH	0	0
	BOTH	0	0
Separation Event	LOW	0	0
	HIGH	0	0
	BOTH	0	0
Multiple Contingency Event	LOW	0	0

[4] Frequency range of 49.75 Hz – 50.25 Hz

Event	Low/High/Both Frequency Event	Number of Events	
		Mainland	Tasmania
	HIGH	0	0
	BOTH	0	0

Table 2 Mainland and Tasmania: Frequency excursions outside the NOFEB not returned in FOS timeframes

Event	Low/High/Both Frequency Event	Number of Events	
		Mainland	Tasmania
No contingency or load event	LOW	0	3
	HIGH	0	3
	BOTH	0	6
Load Event	LOW	0	1
	HIGH	1	2
	BOTH	0	8
Generation Event	LOW	2	1
	HIGH	0	0
	BOTH	0	0
Network Event	LOW	0	0
	HIGH	0	0
	BOTH	0	0
Separation Event	LOW	0	0
	HIGH	0	0
	BOTH	0	0
Multiple Contingency Event	LOW	0	0
	HIGH	0	0
	BOTH	0	0

4. EVENTS OUTSIDE THE FREQUENCY OPERATING STANDARDS

This section analyses the events identified as not meeting the standards in the FOS.

4.1 Mainland Events

Eight frequency events were recorded in the mainland that did not meet the FOS during this reporting period. This occurred due to the event duration, where the time outside the NOFB was greater than 300 seconds, or where the frequency was outside than NOFEB for a reason other than a contingency event or a load event. These events are listed in Table 3.

Table 3 Mainland frequency events outside the FOS

Event	Number of Events	Min/Max Mainland Frequency (Hz)	Min/Max Duration outside NOFB - 49.85 – 50.15 Hz (sec)
Generation Events	2	49.55 50.17	372
Load events	4	49.78 50.25	348 320
Frequency outside the NOFEB for reason other than a contingency event or a load event	2	49.71 50.41	188 4

4.2 Tasmanian Events

One hundred and fifty-three frequency events were recorded in Tasmania that did not meet the FOS during this reporting period. These events are listed in Table 4.

Table 4 Tasmania frequency events outside the FOS

Event	Number of Events	Min/Max Tasmanian Frequency (Hz)	Min/Max Duration outside NOFB - 49.85 – 50.15 Hz (sec)
Load Events	11	49.08 50.85	308 528
Generation Event	1	49.35	372
Frequency outside the NOFEB for reason other than a contingency event or a load event	141	49.32 50.49	124 776

5. ACCUMULATED TIME ERROR

The FOS specify that the accumulated time error should be maintained within the range ± 15 seconds in the mainland and Tasmania. Constraint equations used to control mainland accumulated time error by varying the amount of Regulation FCAS enabled, are based on measurements taken in Queensland and New South Wales. The ranges of accumulated time error recorded for measurements in Queensland, New South Wales and Tasmania are provided in Table 5.

Table 5 Maximum and Minimum time error measurements for Queensland, New South Wales and Tasmania

Value	Queensland	New South Wales	Tasmania
Highest positive time error (seconds)	3.24	3.38	6.95
Lowest negative time error (seconds)	-4.36	-4.13	-8.11