

POWER SYSTEM FREQUENCY AND TIME ERROR MONITORING

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1 Disclaimer

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2 Introduction

AEMO must use reasonable endeavours to maintain the power system frequency and time error within the limits specified in the Frequency Operating Standards determined for the Mainland and the Tasmania Region by the Reliability Panel. This document reports on the frequency and time error performance observed during November 2012 in all regions of the NEM. Queensland, New South Wales, Victoria and South Australia are referred to as the Mainland regions throughout the report.

The Frequency Operating Standards for the Mainland regions and the Tasmania region are available on the AEMC web site¹.

The “Power System Frequency and Time Deviation Monitoring Report – Reference Guide²” outlines the calculation processes used by AEMO in the preparation of the monthly Power System Frequency and Time Deviation Monitoring reports.

The analysis of the delivery of Slow Raise service, Slow Lower service, Delayed Raise service and Delayed Lower service presented in this report are based on 4-second definition data. Unless otherwise noted, frequency data for Mainland regions is sourced from 4-second measurements in New South Wales and frequency data for Tasmania region is sourced from 4-second measurements in Tasmania. The analysis of Fast Raise service and Fast Lower service delivered is based on high-speed (50 millisecond or higher definition) data from Market Participants and is only presented in this report for events where the appropriate data is available.

3 Operation within the Normal Operating Frequency Band

During November 2012 the Mainland frequency was within the Normal Operating Frequency Band (49.85 Hz – 50.15 Hz) 99.96% of the time.

During November 2012 the Tasmanian frequency was within the Normal Operating Frequency Band 99.47% of the time.

All frequency excursions within the Normal Operating Frequency Excursion Band returned to the Normal Operating Frequency Band (49.75 Hz – 50.25 Hz) within the times in the Frequency Operating Standards.

4 Operation outside the Normal Operating Frequency Excursion Band

Table 1 summarises events in the Mainland and Tasmanian regions for the month November 2012 with frequency excursions outside the Normal Operating Frequency Excursion Band.

All Mainland events in Table 1 returned to the Normal Operating Frequency Excursion Band within the times in the Mainland Frequency Operating Standard.

Two Tasmanian events in Table 1 did not meet the Tasmania Frequency Operating Standard. These events are discussed in Section 6.

¹ The Frequency Operating Standards for the Mainland and Tasmania regions are available from <http://www.aemc.gov.au/Panels-and-Committees/Reliability-Panel/Guidelines-and-standards.html>

² The Power System Frequency and Time Deviation Monitoring Report – Reference Guide is available from <http://aemo.com.au/Electricity/Resources/Reports-and-Documents/Frequency-and-Time-Error-Monitoring>

5 Events outside Normal Operating Frequency Excursion Band

Table 1: Events in the Mainland and Tasmanian regions with frequency excursions outside the Normal Operating Frequency Excursion Band.

EVENT	LOW/HIGH FREQUENCY EVENT	NUMBER OF EVENTS	
		MAINLAND	TASMANIA
No contingency or load event/Normal event	LOW	1	2
	HIGH	0	1
Load Event	LOW	0	75
	HIGH	0	82
Generation Event	LOW	0	2
	HIGH	0	0
Network Event	LOW	0	0
	HIGH	0	0
Separation Event	LOW	0	0
	HIGH	0	0
Multiple Contingency Event	LOW	0	2
	HIGH	0	0

6 Events that did not meet the Frequency Operating Standards

In this section, details are provided of those events identified as not meeting the Frequency Operating Standard applicable to each event.

6.1 Events in Mainland regions

There were no low or high frequency events recorded in the Mainland region that did not meet the Mainland Frequency Operating Standard during November 2012.

6.2 Events in the Tasmania region

There were two frequency events recorded in the Tasmania Region that did not meet the Tasmania Frequency Operating Standard during November 2012. These events are listed in Table 2.

Table 2: Frequency events in the Tasmania region during which frequency exceeded the Tasmania Frequency Operating Standard.

DATE	EVENT	MIN/MAX FREQUENCY (HZ)	TIME OUTSIDE NORMAL OPERATING BAND (49.85 HZ - 50.15 HZ)(SECONDS)
3/11/2012 23:21	No contingency causing the event could be identified.	49.70	1220
23/11/2012 17:10	No contingency causing the event could be identified.	49.74	52

6.2.1 Event: 03/11/2012 11:21:00

No contingency could be identified at the cause of the event on 3 November 2012. The Tasmanian frequency, shown in Figure 1, was outside the Normal Operating Frequency Band for 1220 seconds between 1121 hours 3 November 2012 and 0045 hours 4 November 2012. The Tasmanian frequency fell to a minimum of 49.70 Hz during this event.

Basslink switched from import to not transmitting power at 1121 hours 3 December 2012. Gordon Power Station was enabled for Raise Regulation and Fast Raise services during the event. The frequency response of Gordon Power Station (about 10-15 MW in each instance) to low frequency excursions outside the Normal Frequency Operating Frequency Band was of such magnitude that it appeared to cause high frequency excursions outside the Normal Operating Frequency Band. The subsequent ramp down following the provision of the Raise Regulation and Fast Raise service by Gordon Power Station was of such magnitude to cause subsequent low frequency excursions, resulting in oscillation of the Tasmania frequency over the duration of the event.

The excursion outside the Normal Operating Frequency Band was not long enough to verify the performance of Slow Raise and Delayed Raise services.

When Basslink resumed transmitting power at 0045 hours on 4 November 2012, the response of the Basslink frequency controller assisted in maintaining the Tasmania frequency within the Normal Operating Frequency Band.

FCAS performance during this event could not be verified:

- a. Fast Raise services were not verified as high speed data was not requested for this event;
- b. Each excursion outside the Normal Operating Frequency Band was not long enough to verify the performance of Slow Raise services; and

- c. Each excursion outside the Normal Operating Frequency Band was not long enough to verify the performance of Delayed Raise services.

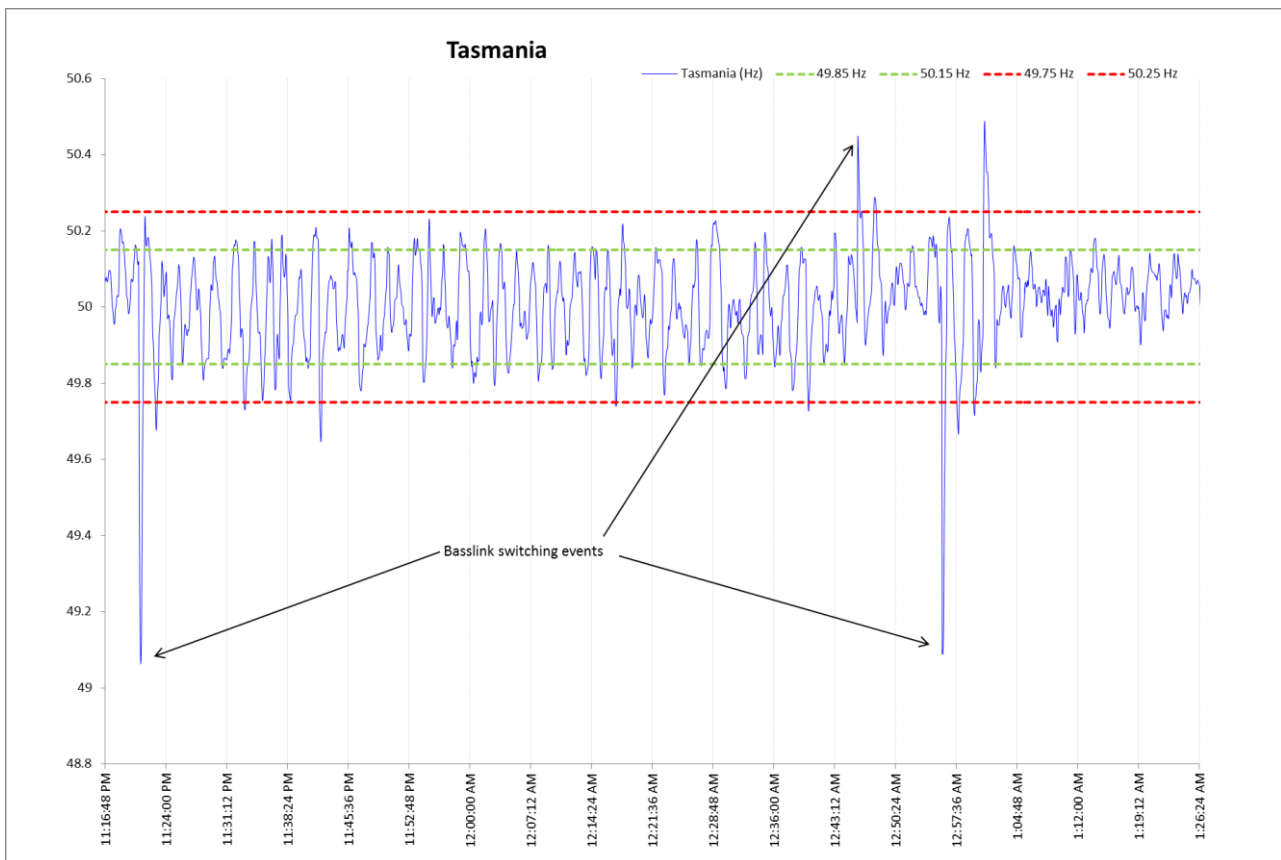


Figure 1: No contingency event in Tasmania that occurred 03/11/2012 1121 hours - 04/11/2012 0045 hours.

6.2.2 Event: 23/11/2012 17:10:00

No contingency could be identified as the cause of the event in Tasmania on 23 November 2012. The Tasmanian frequency, shown in Figure 2, was outside the Normal Operating Frequency Band for 52 seconds. The Tasmanian frequency fell to a minimum of 49.74 Hz during this event. Gordon power station had reduced output by 23 MW, which contributed to the frequency excursion. Basslink was exporting power to the Mainland during this event.

FCAS performance during this event could not be verified:

- d. Fast Raise services were not verified as high speed data was not requested for this event;
- e. The excursion outside the Normal Operating Frequency Band was not long enough to verify the performance of Slow Raise services; and
- f. The excursion outside the Normal Operating Frequency Band was not long enough to verify the performance of Delayed Raise services.

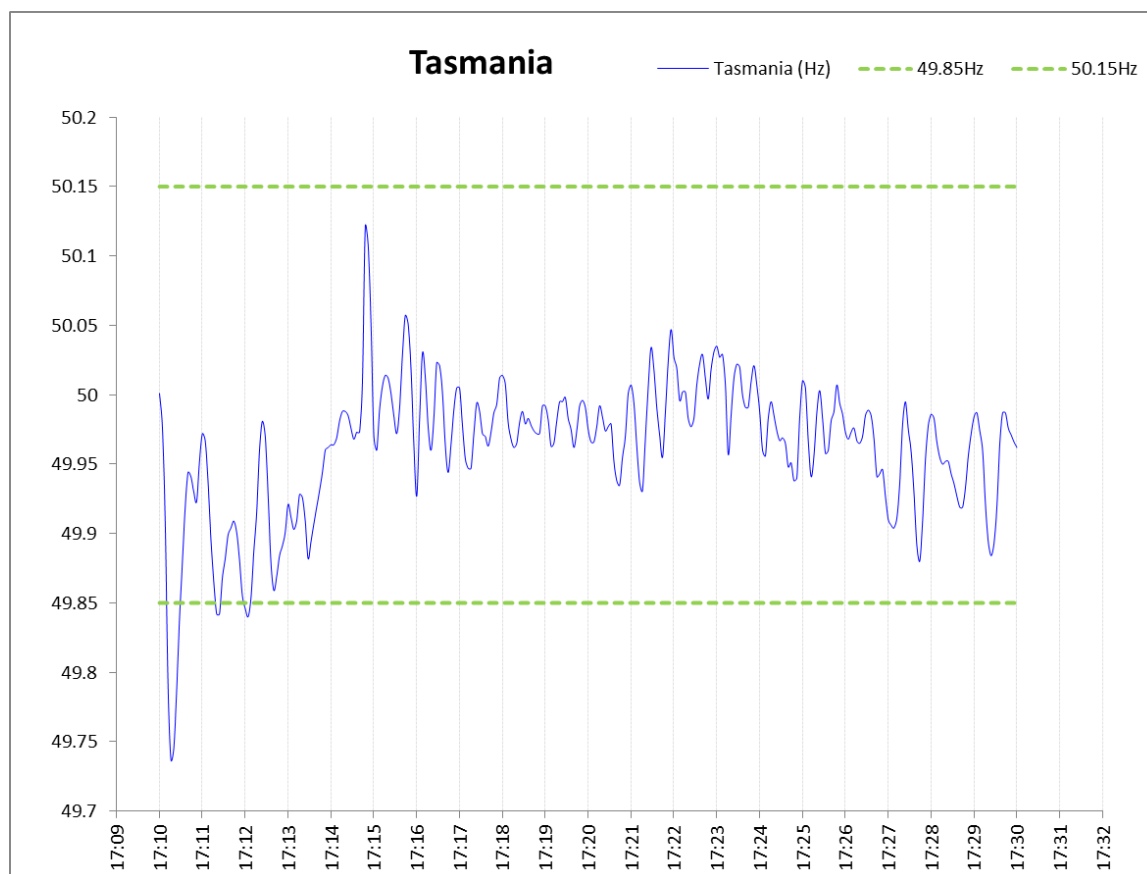


Figure 2: No contingency event in Tasmania that occurred 23/11/2012 1710 hours.

7 Accumulated time error

The Frequency Operating Standards require that the accumulated time error be maintained within the range ± 5 seconds in Mainland regions and ± 15 seconds in Tasmania. Constraints used to control Mainland accumulated time error, by varying the amount of Regulation FCAS enabled, are based upon 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 3.

Table 3: Accumulated time error measurements in November 2012.

VALUE	QLD	NSW	TAS
Highest positive time error (seconds)	2.37	2.84	5.95
Lowest negative time error (seconds)	-4.75	-4.36	-10.82