

# POWER SYSTEM FREQUENCY AND TIME ERROR MONITORING

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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 January 2013 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 site<sup>1</sup>.

The “Power System Frequency and Time Deviation Monitoring Report – Reference Guide<sup>2</sup>” 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 sampled 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 sampling or less) 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 January 2013 the Mainland frequency was within the Normal Operating Frequency Band (49.85 Hz – 50.15 Hz) 99.99% of the time.

During January 2013 the Tasmanian frequency was within the Normal Operating Frequency Band (49.85 Hz – 50.15 Hz) 99.60% of the time.

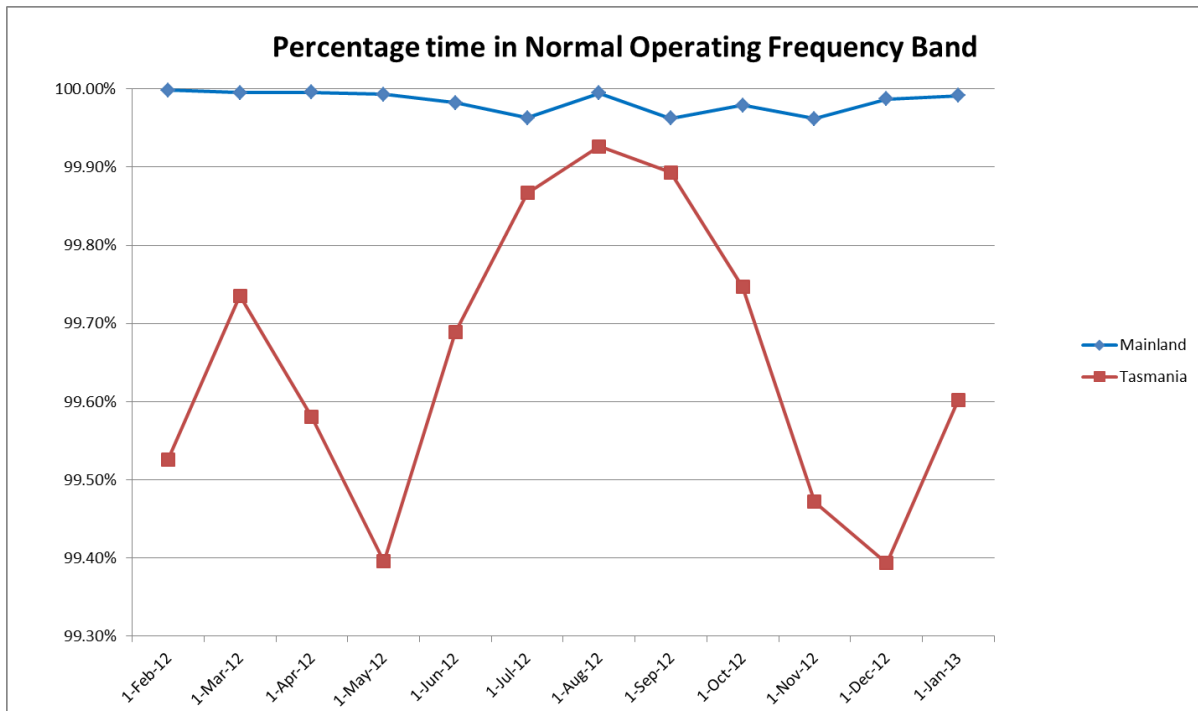
All frequency excursions within the Normal Operating Frequency Excursion Band (49.75 Hz – 50.25 Hz) returned to the Normal Operating Frequency Band within the times in the Frequency Operating Standards.

The percentage time of operation in the Normal Operating Frequency Band over the last 12 months is shown in Figure 1.

<sup>1</sup> 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>

<sup>2</sup> 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>

Figure 1: Percentage time in Normal Operating Frequency Band, last 12 months



#### 4 Operation outside the Normal Operating Frequency Excursion Band

Table 1 summarises events in the Mainland and Tasmanian regions for the month January 2013 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.

One Tasmanian event in Table 1 did not meet the Tasmania Frequency Operating Standard. This event is discussed in Section 6.

## 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	0	1
	HIGH	0	0
Load Event	LOW	0	83
	HIGH	0	93
Generation Event	LOW	0	0
	HIGH	0	0
Network Event	LOW	0	0
	HIGH	0	0
Separation Event	LOW	0	0
	HIGH	0	0
Multiple Contingency Event	LOW	0	0
	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 January 2013.

### 6.2 Events in the Tasmania region

There was one frequency event recorded in the Tasmania Region that did not meet the Tasmania Frequency Operating Standard during January 2013. This event is 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)
0106 hours 5/1/2013	No contingency causing the event could be identified.	49.71 Hz	4

#### 6.2.1 Event: 0106 hours 5/1/2013

No contingency could be identified as the cause of the event in Tasmania on 5 January 2013. One Tasmania generating unit was coming offline from 30 MW, which contributed to the frequency excursion. Basslink was exporting power to the Mainland during this event. Figure 2 shows that the Tasmania frequency was outside the Normal Operating Frequency Band for 4 seconds. The Tasmania frequency fell to a minimum of 49.71 Hz during the event.

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



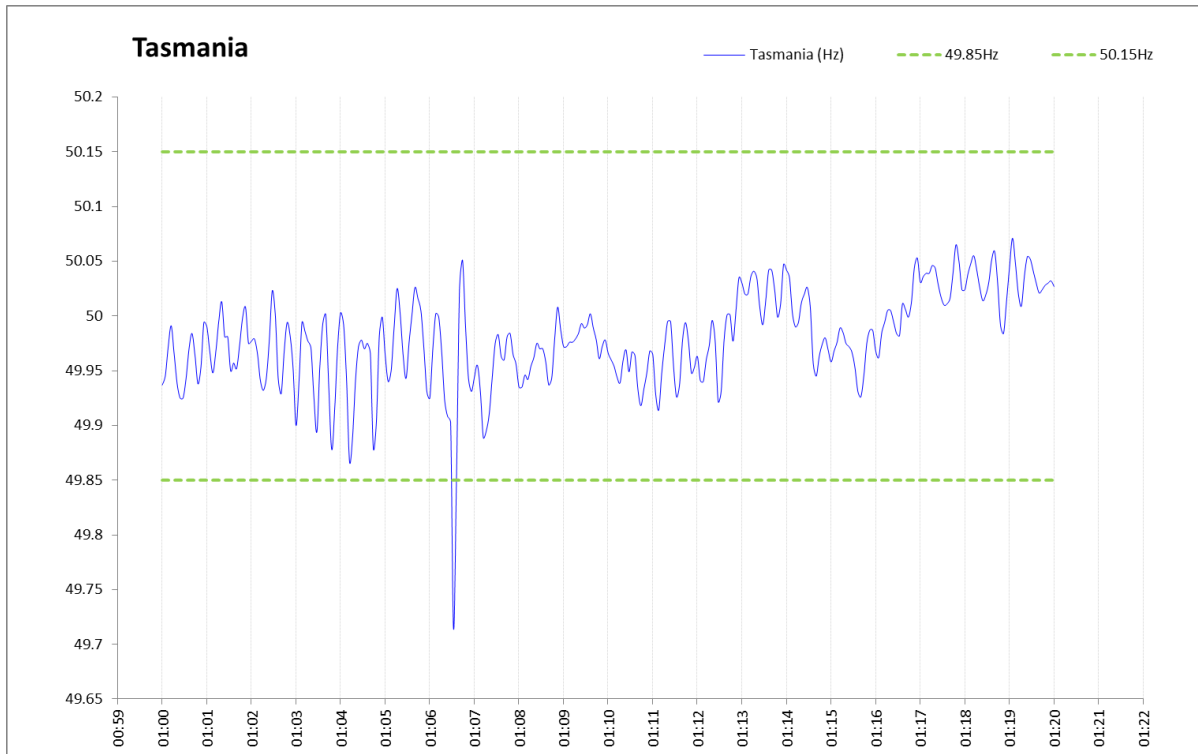


Figure 2: No contingency event in Tasmania that occurred 0106 hours 5/1/2013.

## 7 Accumulated time error

The Frequency Operating Standards require that the accumulated time error be maintained within the range  $\pm 5$  seconds in Mainland regions and  $\pm 15$  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 January 2013.

VALUE	QLD	NSW	TAS
Highest positive time error (seconds)	2.48	2.57	5.96
Lowest negative time error (seconds)	-3.08	-2.89	-10.45