

# FREQUENCY AND TIME ERROR MONITORING – 1ST QUARTER 2014

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## Version Release History

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1.0	1/6/2014	Peter McEnery	Initial release

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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 January 2014, February 2014 and March 2014 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

The Mainland frequency was within the Normal Operating Frequency Band (49.85 Hz – 50.15 Hz) more than 99% of the time, as required by the Frequency Operating Standards.

The Tasmanian frequency was within the Normal Operating Frequency Band more than 99% of the time, as required by the Frequency Operating Standards.

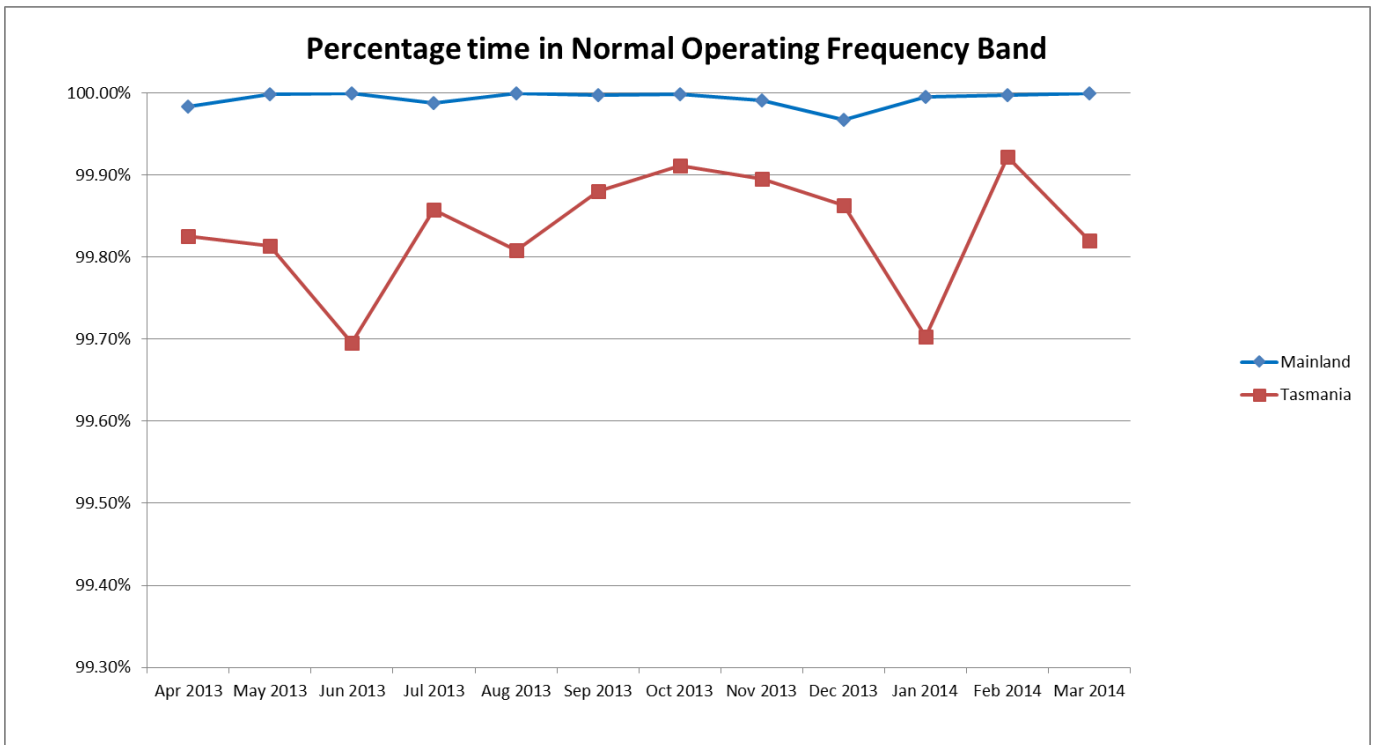
The percentage time of operation in the Normal Operating Frequency Band over the last 12 months is shown in Figure 1.

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<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 with frequency excursions outside the Normal Operating Frequency Excursion Band.

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

Two Tasmania events in Table 1 did not return to the Normal Operating Frequency Band within the times in the Frequency Operating Standards. These events are 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	0
	HIGH	0	2
Load Event	LOW	0	72
	HIGH	0	117
Generation Event	LOW	1	6
	HIGH	0	1
Network Event	LOW	0	1
	HIGH	0	2
Separation Event	LOW	0	0
	HIGH	0	0
Multiple Contingency Event	LOW	0	1
	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 frequency events in the Mainland regions that did not meet the Frequency Operating Standard.

### 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. These events are listed in Table 2.

Table 2: Frequency events in the Tasmania region where the Frequency Operating Standards were not met.

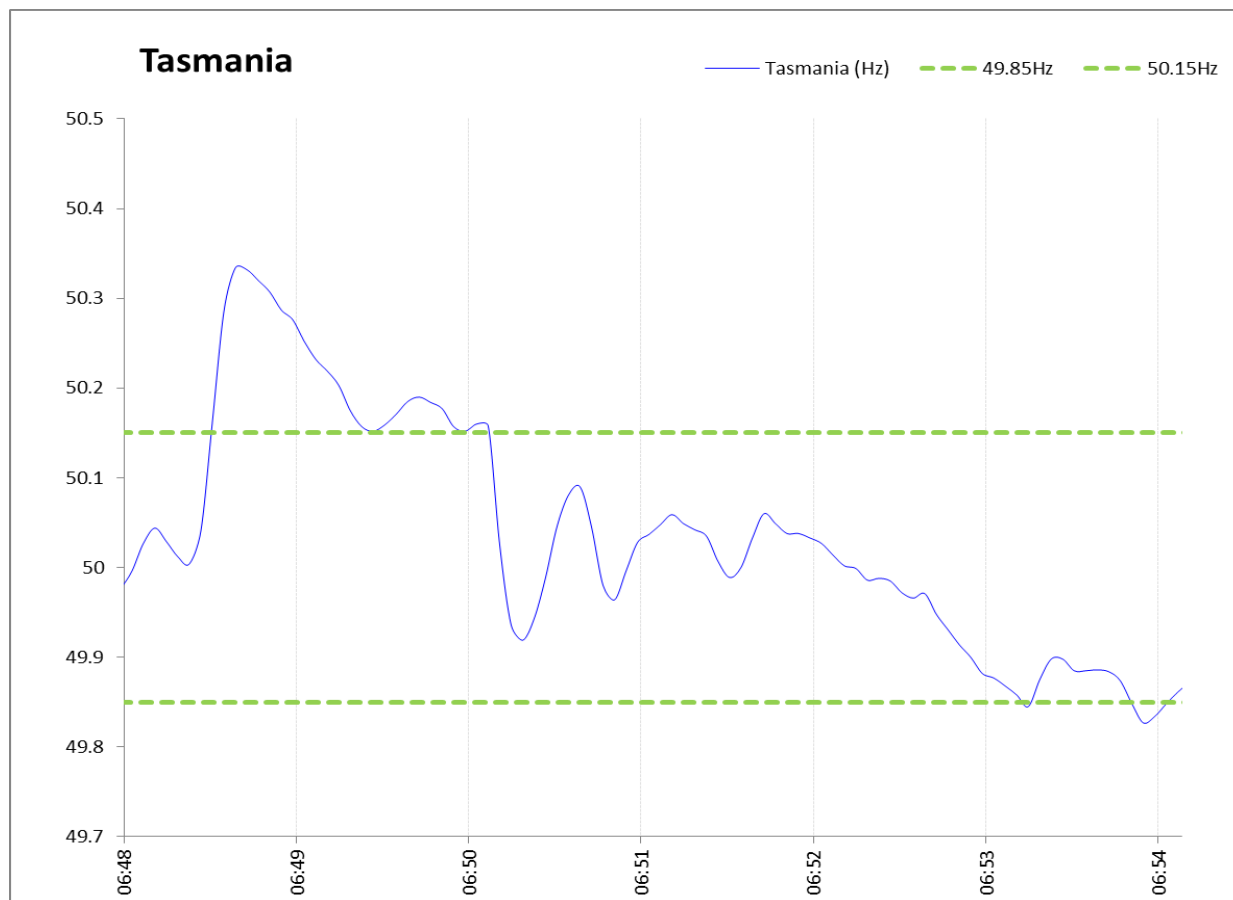
DATE	EVENT	MIN/MAX FREQUENCY (HZ)	TIME OUTSIDE NORMAL OPERATING FREQUENCY BAND (49.85 HZ - 50.15 HZ)(SECONDS)
0648 hrs 15/01/2014	No contingency causing the event could be identified.	50.34	116
1459 hrs 17/3/2014	No contingency causing the event could be identified.	50.26	164

#### 6.2.1 High frequency event: 0648 hrs 15/1/2014

- No contingency could be identified as the cause of this event.
- Gordon Power Station increased power approximately 40 MW over its dispatch target, which contributed to the high frequency excursion.
- The Tasmania frequency reached a maximum of 50.34 Hz during the event, remaining outside the Normal Operating Frequency Band for 116 seconds. This event is shown in Figure 2.
- Basslink was not transferring power during the event, and was therefore unable to reduce power to assist in controlling the Tasmania frequency.
- The performance of Fast Lower services was not evaluated as high speed measurements are not available.
- The frequency excursion was not of sufficient duration to evaluate the performance of Slow Lower or Delayed Lower services.



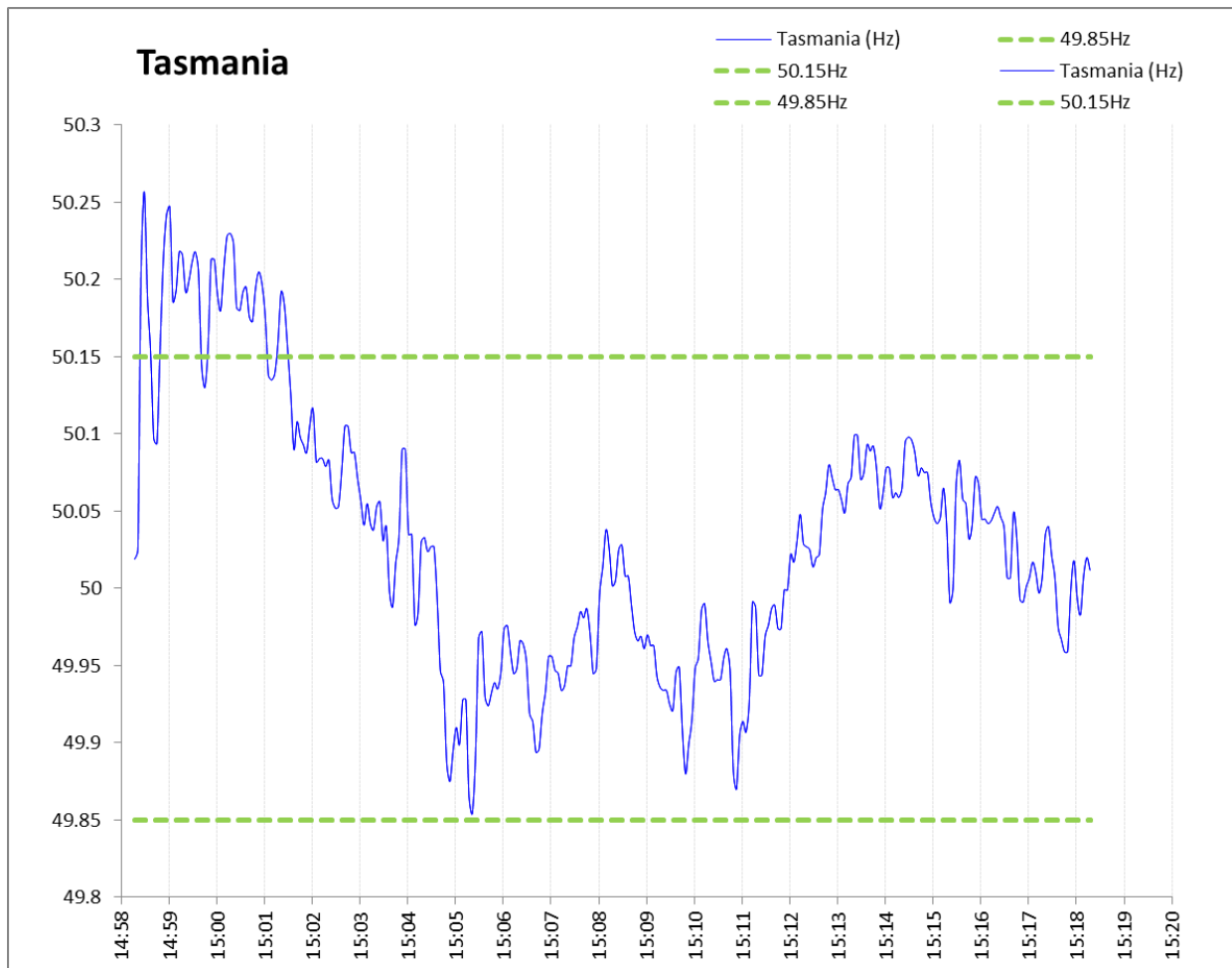
Figure 2: High frequency event that occurred in Tasmania 0648 hrs 15/1/2014



### 6.2.2 High frequency event: 1459 hrs 17/03/2014

- No contingency could be identified as the cause of this event.
- Musselroe Wind Farm increased power approximately 60 MW over its dispatch target, which contributed to the high frequency excursion.
- The Tasmania frequency reached a maximum of 50.26 Hz during the event, remaining outside the Normal Operating Frequency Band for 164 seconds. This event is shown in Figure 3.
- Basslink lowered power transfer to the Mainland by 30 MW in response to the frequency excursion.
- The performance of Fast Lower services was not evaluated as high speed measurements are not available.
- The frequency excursion was not of sufficient duration to evaluate the performance of Slow Lower or Delayed Lower services.

Figure 3: High frequency event that occurred in Tasmania 1459 hrs 17/03/2014



## 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: Maximum and minimum time error measurements, Queensland, New South Wales and Tasmania

VALUE	QLD	NSW	TAS
Highest positive time error (seconds)	2.61	3.06	13.10
Lowest negative time error (seconds)	-4.10	-3.56	-12.54