

POWER SYSTEM OPERATING INCIDENT REPORT – INSECURE OPERATION IN TASMANIA ON 18 APRIL 2012

PREPARED BY: Systems Capability

DATE: 4 October 2012

FINAL

Disclaimer

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Abbreviations and Symbols

Abbreviation	Term
EMS	Energy Management System
EMMS	Electricity Market Management System
R6	Raise 6 Second frequency control ancillary service
RTCA	AEMO real-time contingency analysis tool
FCAS	Frequency control ancillary services
NEM	National Electricity Market
DIs	Dispatch intervals

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1 Introduction

Between 18 and 19 April 2012, there was a period when the power system was not in a secure operating state because there was insufficient frequency control ancillary services (FCAS) enabled in Tasmania.

This report has been prepared under clause 4.8.15 (c) of the National Electricity Rules (NER) to assess the adequacy of the provision and response of facilities and services and the appropriateness of actions taken to restore or maintain power system security.

This report is largely based upon information provided by Hydro Tasmania. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMS) has also been used in analysing the incident.

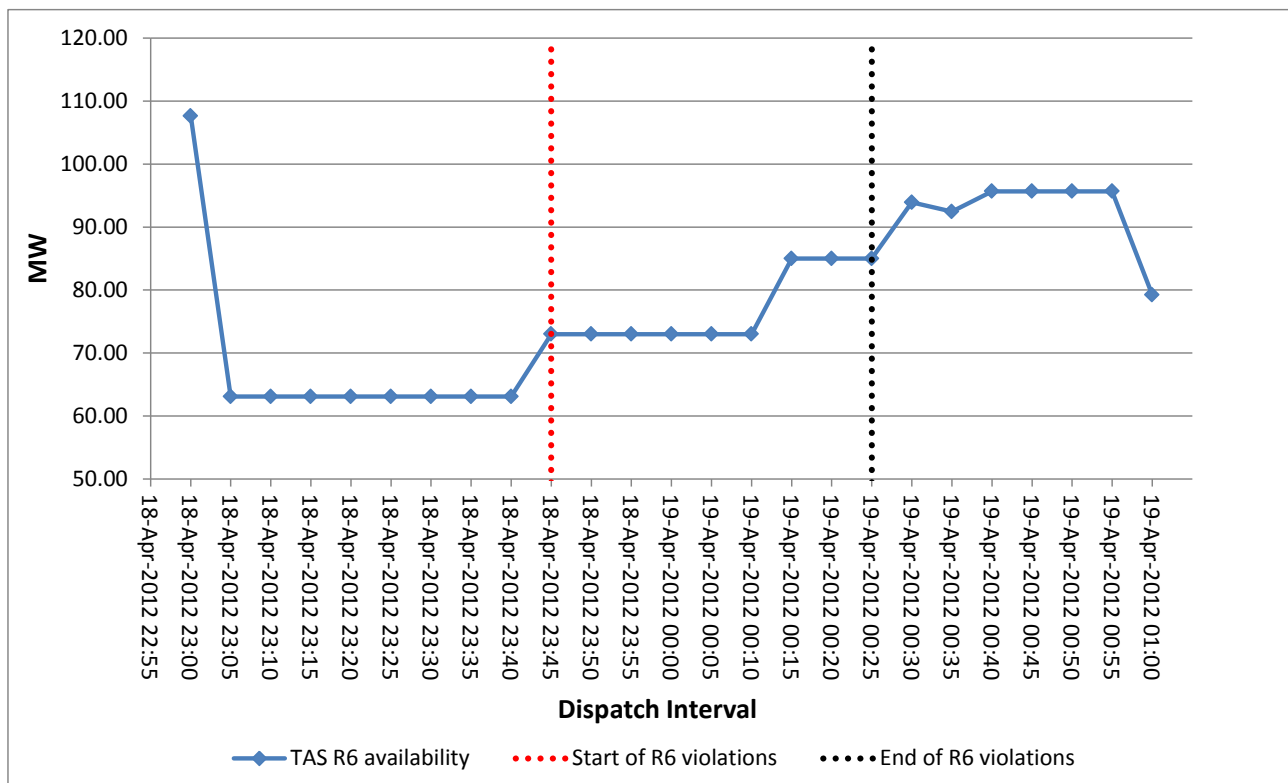
All references to time in this report are to National Electricity Market time (Eastern Standard Time).

2 Pre-Contingent System Conditions

There was an extended planned outage of the Farrell – John Butters 220 kV line between 27 February 2012 and 9 May 2012 to install an optical ground wire. As a result, the John Butters hydro power station - a provider of FCAS - was unavailable during this period.

Shortly before the period of FCAS shortfall there was a 45 MW reduction in available Raise 6 Second (R6) FCAS¹ in Tasmania, as shown in Figure 1.

Figure 1 – R6 FCAS availability in Tasmania

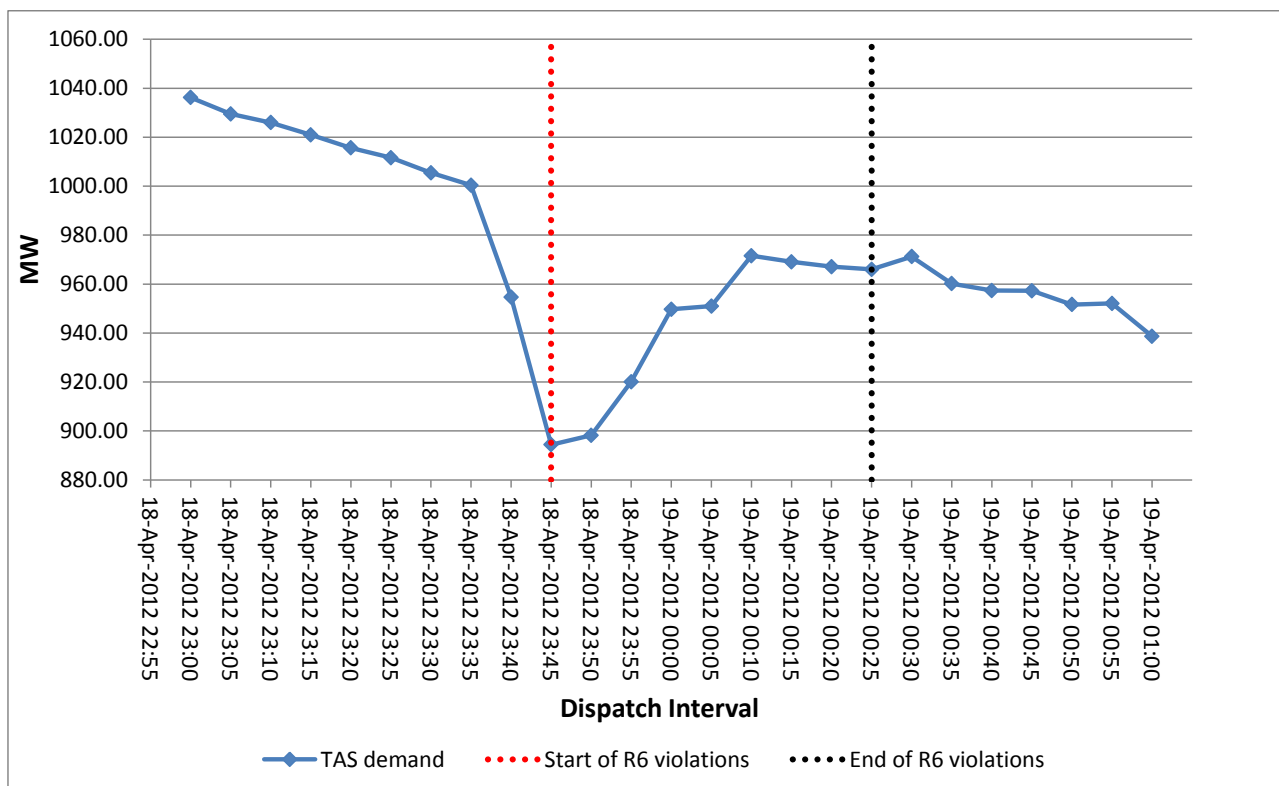


¹ Refer to AEMO's Guide to Ancillary Services in the NEM for more information on definitions of FCAS:

<http://www.aemo.com.au/en/Electricity/Market-and-Power-Systems/Ancillary-Services/Guide-to-Ancillary-Services-in-the-NEM>.

Coincidentally, there was also a decrease in Tasmanian demand prior to the period under consideration. The decrease in demand was approximately 140 MW, as shown in Figure 2, also contributed to an increased R6 requirement in Tasmania.

Figure 2 - Tasmania demand



3 Summary of Events

For nine consecutive dispatch intervals (DIs) between 2345 hrs on 18 April 2012 and 0035 hrs on 19 April 2012, the constraint equations ‘F_T+NIL_MG_R6’ and ‘F_T+NIL_MIG_R6’ violated. These constraint equations specify the minimum R6 FCAS requirements to cover the contingent loss of the generating unit in Tasmania with the largest MW output or largest inertia. Hence these constraint violations were indicative of the R6 FCAS shortages in Tasmania during that period.

4 Immediate Actions Taken

After the R6 violations were observed in the DI 2345 hrs on 18 April 2012, and with power transfer on Basslink still within the no-go zone², AEMO contacted Hydro Tasmania at 2353 hrs to investigate whether they could offer additional R6 FCAS to relieve the shortfall. Hydro Tasmania informed that additional R6 FCAS can be provided using the generating units at Gordon Power Station.

The R6 FCAS violations continued as the submission of re-offers for Gordon generating units was unsuccessful due to difficulties experienced by Hydro Tasmania. Hydro Tasmania was able to successfully submit re-offers for Gordon generating units with additional 12 MW of R6 FCAS at

² Basslink is a high voltage direct current (HVDC) interconnector that operates between Tasmania and Victoria. Being a HVDC link, Basslink is capable of varying its power flows rapidly, which can facilitate the transfer of FCAS between the mainland and Tasmania. However, due to technical limitations of its control system, Basslink has a no-go zone – a power transfer band of approximately ±50 MW on Basslink where it is not possible to vary its power flow rapidly and freely. As such, Basslink is unable to transfer FCAS when its power transfer is within the no-go zone, or when the transfer of FCAS would cause Basslink flow to enter the no-go zone.

0006 hrs on 19 April 2012. However, it was insufficient to meet the complete R6 FCAS requirement.

Following further discussions with AEMO, Hydro Tasmania submitted another re-offer at 0020 hrs on 19 April 2012 for Reece No. 1 generating unit with additional 20 MW of R6 FCAS. AEMO had also advised Hydro Tasmania that a direction³ to obtain R6 FCAS was being considered had the violations persisted after submitting the re-offer for Reece No. 1 generating unit. The violation of R6 FCAS ceased in the DI 0040 hrs on 19 April 2012 after additional R6 FCAS was made available.

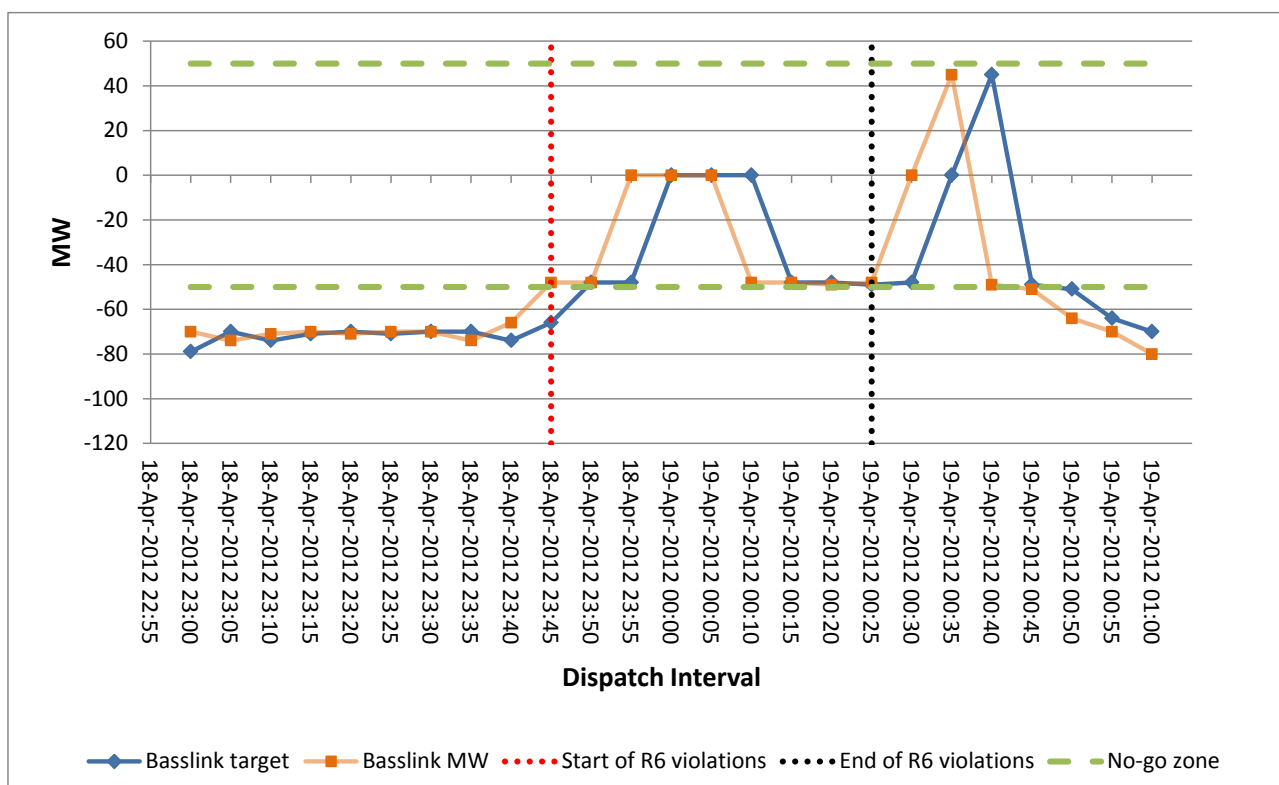
5 Follow-up Actions

Hydro Tasmania informed that the difficulties in submitting re-offers were due to staff unfamiliarity with the bidding systems. Hydro Tasmania has since ensured that the relevant staff are familiarised with the bidding process.

6 Power System Security Assessment

The R6 FCAS requirements in Tasmania can be sourced using local generation and from the mainland through Basslink interconnector. The power transfer on Basslink was within the no-go zone hence it was unable to transfer FCAS for DIs between 2345 hrs on 18 April and 0045 hrs on 19 April. Figure 3 shows Basslink dispatch targets and its power flow during the event.

Figure 3 - Basslink dispatch targets and power flows



This took place during a period of reduced availability of R6 FCAS on Tasmanian generation and reduced Tasmanian demand, as shown in Figures 1 and 2 respectively, resulting in a shortfall of R6 FCAS. Figure 4 shows the shortfall of R6 FCAS during this period. The maximum R6 FCAS shortfall of 16.53 MW was observed in the DI at 0000 hrs on 19 April 2012.

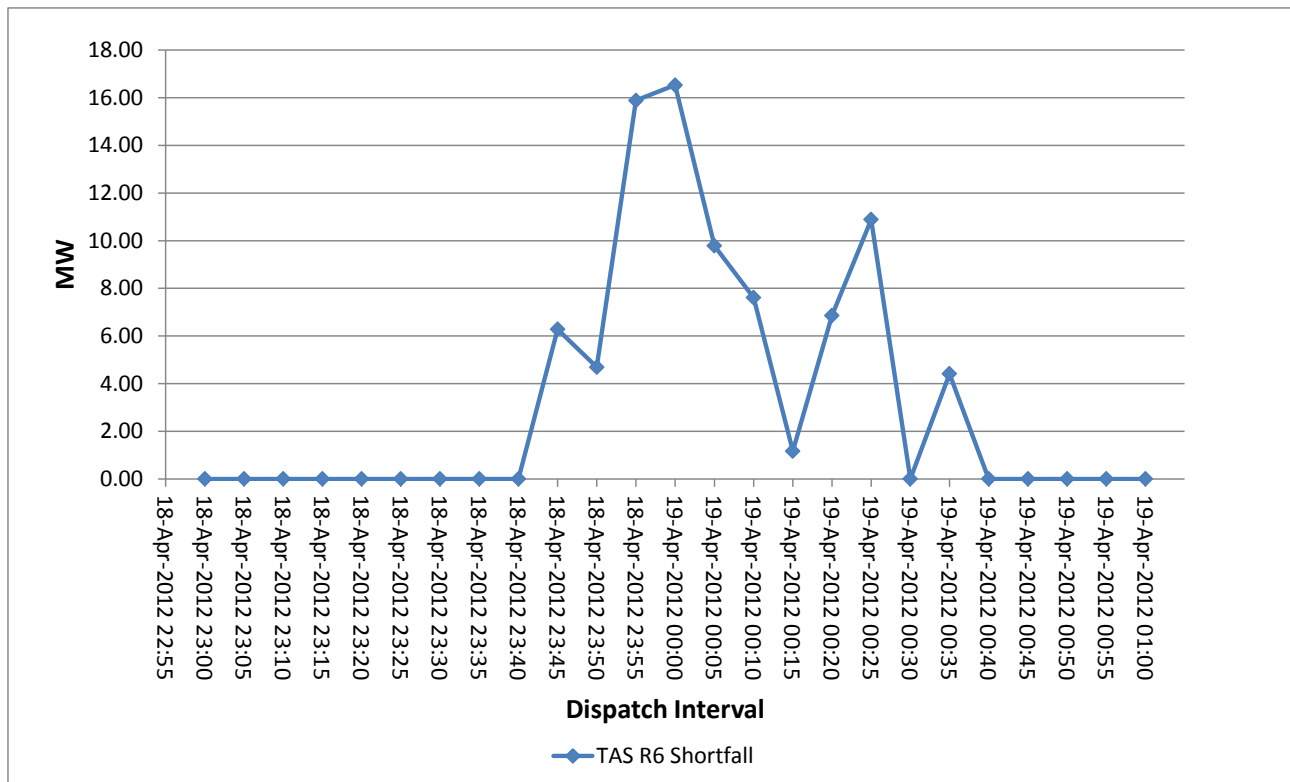
³ Refer to section 4.8.9 of the NER from the Australian Energy Market Commission, which is available at: <http://www.aemc.gov.au/Electricity/National-Electricity-Rules/Current-Rules.html>.

Figure 5 shows the requirements and the availability of R6 FCAS in Tasmania during this period. Whenever FCAS shortfalls exist the power system is not in a secure operating state because the frequency operating standard cannot be satisfied on the occurrence of loss of a generating unit having the largest MW output or the largest inertia.

Further investigations revealed that the actual R6 FCAS shortfall was less than the shortfall shown in market systems because the additional R6 services physically made available by Hydro Tasmania on the Gordon units at 2356 hrs were not reflected in market systems. This was due to the difficulties encountered by Hydro Tasmania in submitting re-offers.

Discussions with Hydro Tasmania also identified that the duration of insecure operation could have been minimised if AEMO could inform the amount of additional R6 requirement to Hydro Tasmania. The Pre-dispatch⁴ did not show any FCAS violation; hence AEMO was not able to provide an indication of the amount of additional R6 FCAS required. Nevertheless, the responses of AEMO and Hydro Tasmania were adequate to restore the power system security within 45 minutes while recognising that the power security violations were minor during this period of time.

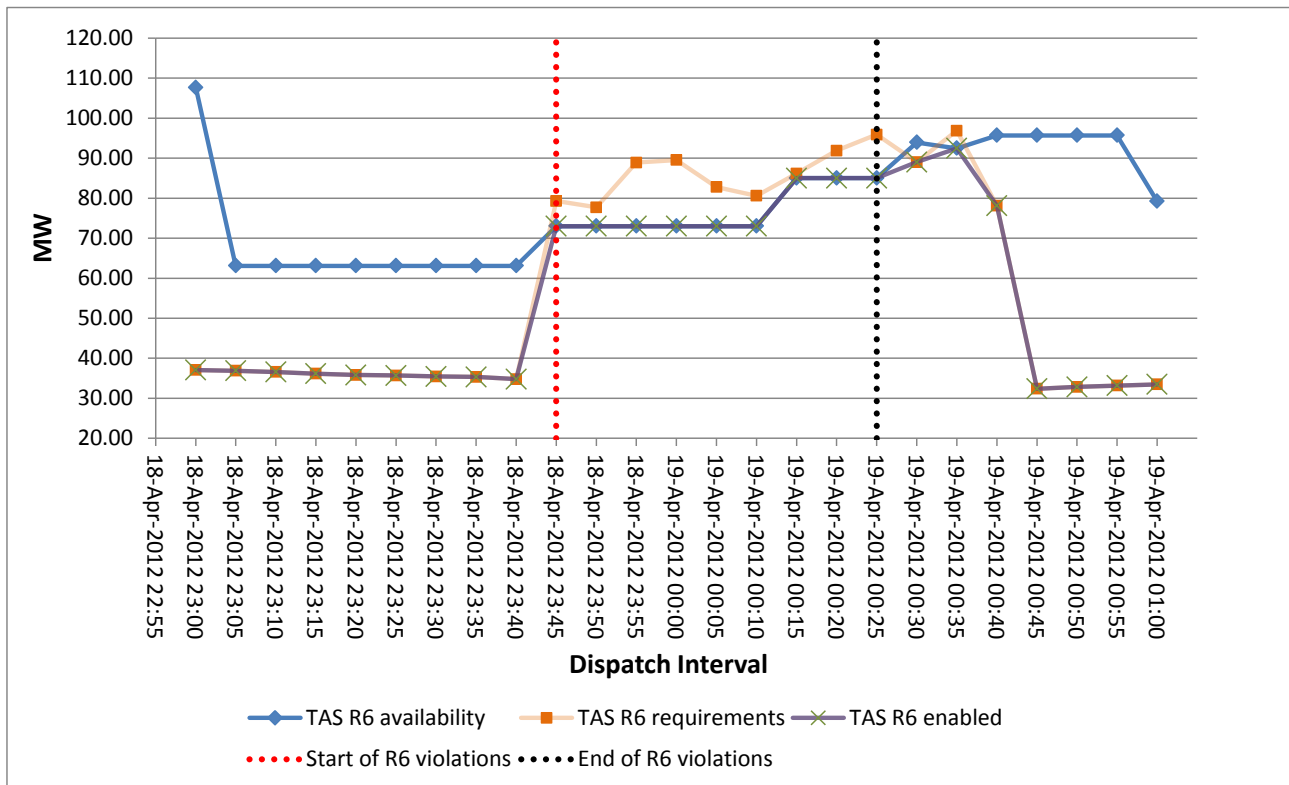
Figure 4 - R6 FCAS shortfall in Tasmania



⁴ Refer to Pre-Dispatch Process Description available at:

<http://www.aemo.com.au/Electricity/Market-Operations/Dispatch/Predispatch-Process-Description>

Figure 5 - R6 FCAS requirements and the availability in Tasmania



7 Conclusions

Between 18 and 19 April 2012, there were periods of R6 FCAS shortfall in Tasmania. The shortfall occurred at a time when the power transfer on Basslink was within the no-go zone with a coincident reduction of R6 FCAS availability in Tasmania.

There were delays in addressing R6 FCAS shortfall because Hydro Tasmania experienced difficulties in submitting re-offers. These issues have now been addressed.

The power system was not in a secure operating state for a period of 45 minutes. AEMO is satisfied that the actions undertaken by AEMO and Hydro Tasmania were adequate to restore power system security.

8 Recommendations

AEMO will investigate whether the constraint equation specifying the R6 FCAS requirement in Tasmania could be improved to provide a more accurate indication of the requirement in the Pre-dispatch time frame. This will be completed by the end of December 2012.