MARKET EVENT REPORT:

30 OCTOBER 2009

HIGH ENERGY AND FCAS PRICES IN TASMANIA

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1. Introduction

This report has been prepared to explain the high energy and Frequency Control Ancillary Service (FCAS) prices that occurred in Tasmania on 30 October 2009. Tasmania experienced high FCAS prices for Trading Intervals (TIs) ending 10:30hrs and 11:00hrs on Friday, 30 October 2009. The Raise 6-second FCAS price was above $4,800/MW/h at DI 10:25hrs and DI 10:30hrs while the Raise 6-second, Raise Regulation and Lower 6-second prices were either near or at $10,000/MW/h at DI 10:40hrs. An energy price of $1704.99/MWh was recorded in Tasmania for the Trading Interval (TI) ending 11:00hrs. Energy and FCAS prices for the mainland were not affected.

The increase in prices was triggered by two separate events. The initial high price coincided with the period when the loss of both Farrell to Sheffield 220kV lines was classified as a credible contingency. The second price excursion, which is the focus of this report, was triggered by a step increase in the Raise Contingency FCAS requirement in Tasmania. During the event, the loss of the Tamar Valley generator became the largest contingency risk in Tasmania when the SCADA data related to the post-contingency load constraint system failed. Prices were subjected to review in this event and were accepted as no manifestly incorrect input was found at that time.

This report examines the market outcomes during this period.

2. Summary of Events

2.1 Pricing Outcomes: Energy and FCAS

Tasmania experienced high energy and FCAS prices in the morning of 30 October 2009. The energy price at TI ending 11:00hrs was $1704.99/MWh, as shown in the highlighted cell in Table 1. The sum of all FCAS prices at TIs 10:30hrs and 11:00hrs were $1728.79 and $5033.86 respectively. Figure 2 shows that the Raise 6-second FCAS price was above $4,800 at DI 10:25hrs and DI 10:30hrs. The Raise 6-second, Raise Regulation and Lower 6-second prices were either at or near $10,000 at DI 10:40hrs.

Prices in Tasmania were triggered as “subject to review” for DIs 10:40hrs and 10:45hrs. The prices were accepted as no manifestly incorrect inputs were identified at that time.

Energy and FCAS prices for the other NEM regions were not materially affected.

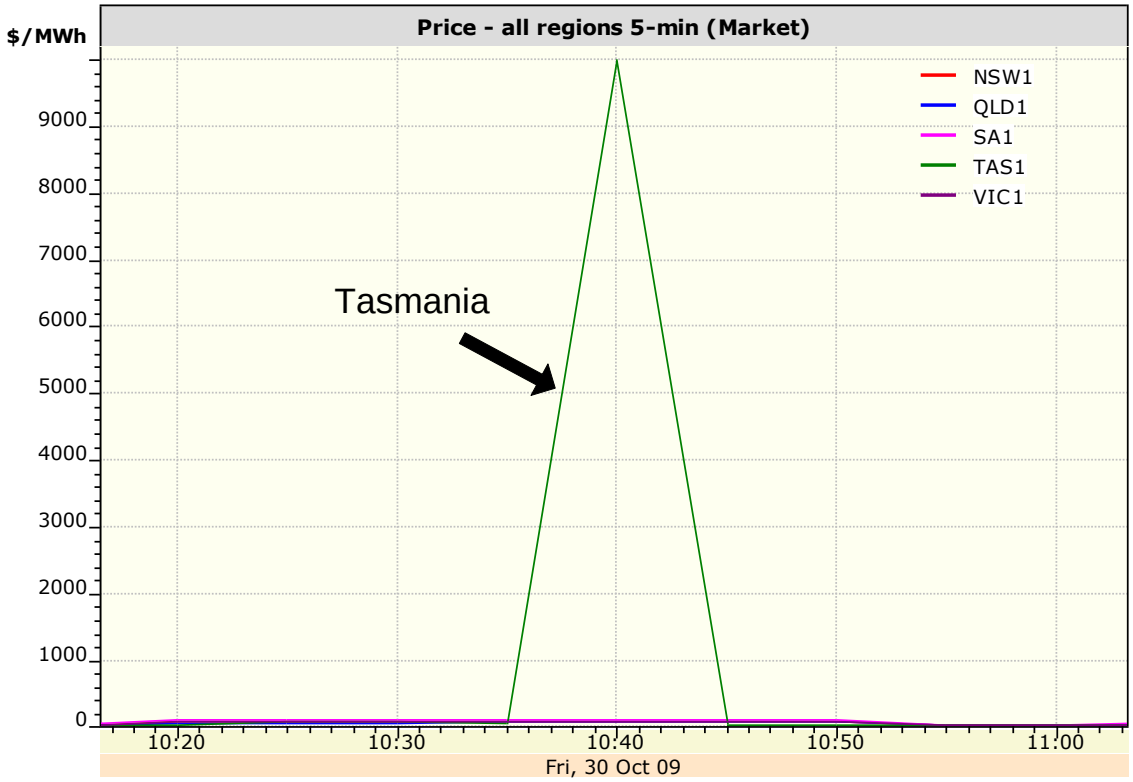

FIGURE 1 ENERGY DISPATCH PRICES FOR ALL REGIONS

TRADING INTERVAL	NSW	QLD	SA	TAS	VIC
30/10/2009 10:30	69.69	53.93	95.1	54.55	69.46
30/10/2009 11:00	76.68	65.64	96.92	**1704.99**	74.85
30/10/2009 11:30	34.17	29.8	42.43	35.96	34.16

TABLE 1 TRADING INTERVAL PRICE TABLE ($/MWH)

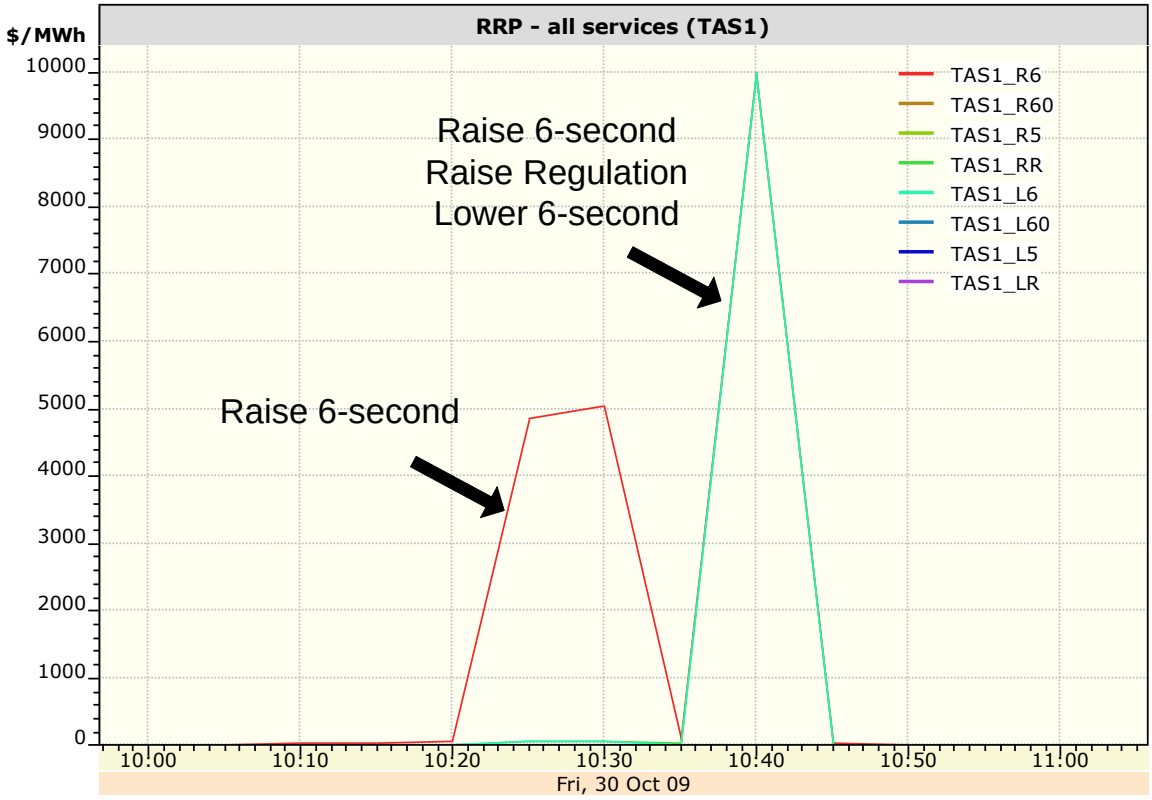

FIGURE 2 FCAS DISPATCH PRICES IN TASMANIA

2.2 Interconnector Flow

Basslink interconnector metered flow (initial MW), target flow (MW flow) and limits are shown in Figure 3. During the high priced DIs, the Basslink interconnector was in the no-go-zone (ie between +50MW and -50MW). Therefore it could not transfer FCAS from Victoria to assist in meeting the Tasmanian requirement.

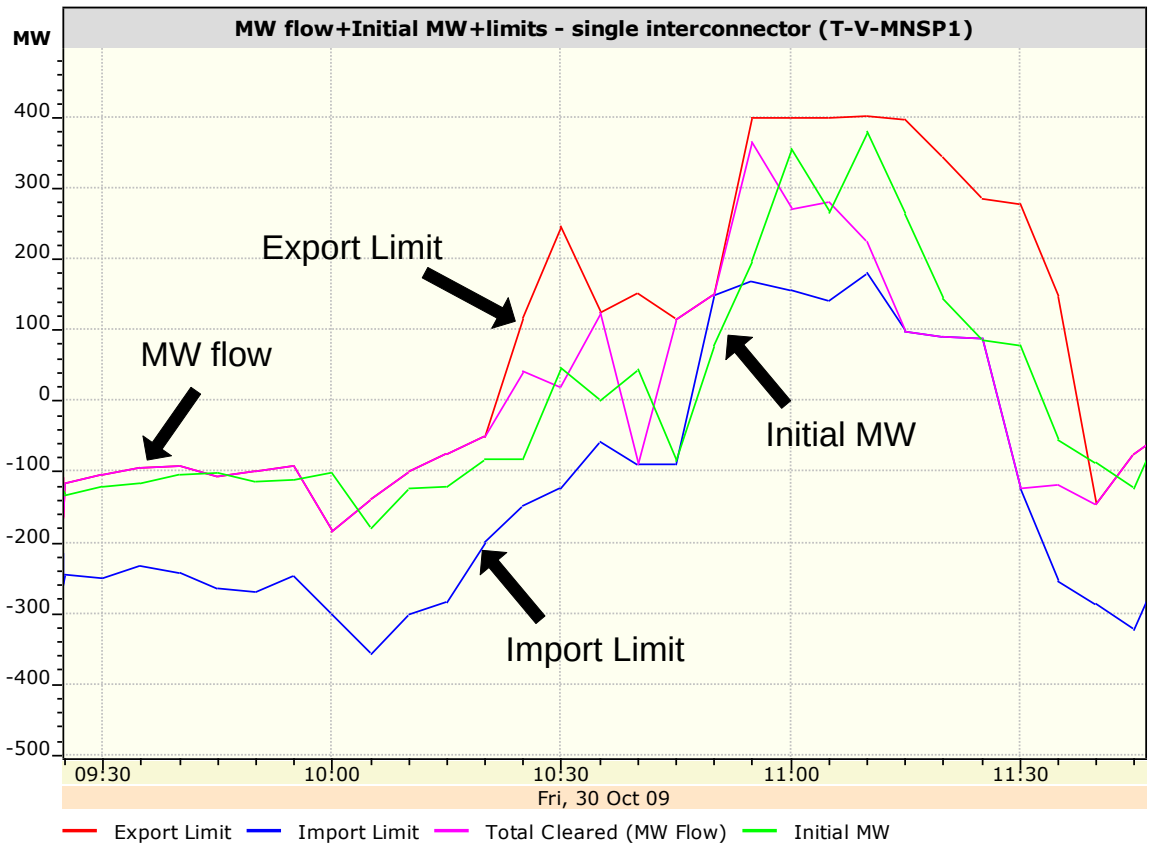

FIGURE 3 BASSLINK INTERCONNECTOR FLOW AND LIMITS

2.3 Tasmanian FCAS requirement

2.3.1 Trading Interval ending 10:30hrs

The loss of both Farrell to Sheffield 220kV lines was declared a credible contingency from 09:10hrs to 10:30hrs due to lightning in the vicinity. Due to the reclassification, a number of Tasmanian generators could not provide Raise Contingency and Regulation FCAS as they would be disconnected from Tasmania on the loss of both lines. At DIs ending 10:25hrs and 10:30hrs, a Tasmanian Raise 6-second FCAS constraint equation which is associated with the reclassification violated and resulted in a spike in the FCAS Raise 6-second price. When the reclassification ended at 10:30hrs, the Basslink interconnector was in its no-go zone for the next four dispatch intervals (DIs) ending 10:30hrs to 10:45hrs.

2.3.2 Trading Interval ending 11:00hrs

A non-scheduled windfarm in Tasmania, Woolnorth, reduced its generation from 120MW at 10:30hrs to 0MW at 10:40hrs. A large scheduled generator, Gordon station, was dispatched up to replace this generation. At the same interval, DI 10:40hrs, the Raise Contingency FCAS requirement in Tasmania increased significantly. The largest increase was the Raise 6-second requirement by approximately 100MW, thus lifting the requirement to 174MW. This was due to a failed SCADA calculation provided to AEMO's real-time energy management system. As the SCADA data's zero value was flagged as good quality, it was used to calculate the Raise Contingency FCAS requirement in AEMO's Energy Management Systems (EMS).

The Tasmanian Raise Contingency FCAS requirement is calculated dynamically in AEMO's EMS via the Dynamic FCAS (XDFCAS) solver. Real time SCADA values are used as input to determine the amount of FCAS required in each of the services for restoring system frequency after a contingency. These values are then passed to the Market Management System (MMS) prior to the next DI.

One of the SCADA values required for the calculation of the Raise Contingency FCAS requirement in Tasmania is the MW amount of the load available for arming. This SCADA value is also required as input to the constraint equation which models the control system that manages the loss of the Tamar Valley generator. The next two subsections details the different SCADA values used.

SCADA Value for Raise FCAS requirement calculation in Tasmania

The received SCADA value dropped from 79MW to 0MW prior to 10:35hrs, as highlighted in Table 2. The 0MW value was automatically used to calculate the Tasmanian raise contingency requirement for DI ending 10:40 in the XDFCAS solver. With no loads available for arming, the loss of Tamar Valley generator with a metered output of 194MW became the largest contingency risk in Tasmania at that interval. As a result, Tasmania saw a step increase in all raise contingency service requirements.

TIME	AMOUNT OF LOAD AVAILABLE FOR ARMING (MW)
30-Oct-09 10:32:00	79.26
30-Oct-09 10:32:13	79.12
30-Oct-09 10:34:15	**0**
30-Oct-09 10:34:34	78.41
30-Oct-09 10:34:46	78.21

TABLE 2 INDICATED LOAD AVAILABLE FOR ARMING FOR LOSS OF TAMAR VALLEY

There was sufficient Raise 60-second and Raise 5-minute FCAS availability offered by Tasmanian generators but not Raise 6-second FCAS. Therefore the constraint equations that manage the Raise 6-second dispatch were violated.

SCADA Value for Other Constraint Equations

SCADA inputs to other constraint equations were not affected since a different set of SCADA values, polled just prior to DI 10:40hrs, were used as input into MMS. The difference is due to the extra time required to calculate the FCAS requirement in the XDFCAS solver prior to passing them on to MMS. A conceptual diagram of the architecture of EMS, XDFCAS and MMS in relation to SCADA inputs is shown in Figure 4. The SCADA data is received at regular intervals and stored in the EMS. At 8 second intervals, the XDFCAS solver uses a copy of these SCADA values for the calculation of the Contingency FCAS requirement. The output is written back into the latest set of SCADA values. Prior to each DI, MMS captures all the required SCADA values including the output from the XDFCAS solver.

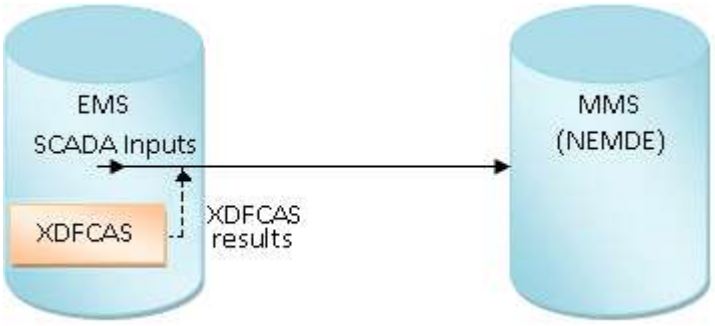

FIGURE 4 ARCHITECTURE OF EMS AND MMS

The SCADA value of the load available for arming for the loss of the Tamar Valley generator that was input into MMS for DI 10:40hrs was 77.43MW. This correct value was used for the right hand side calculation of constraint equations such as one that manages the Tamar Valley Generation Control and the target for Tamar Valley generation was 206MW for that DI. If no loads were available for arming, the Tamar Valley generation would have been reduced to 144MW through constraint action.

With the Basslink interconnector not able to provide FCAS at the time as it was in its no-go zone, energy and FCAS services were co-optimised to meet the increase requirement. That is, generation cleared from selected plant was reduced to enable the dispatch of the required raise FCAS. More expensive generation had to be cleared from other generators to meet the regional demand, resulting in the energy price in Tasmania reaching $9,999/MWh at DI ending 10:40hrs.

3. Conclusion

Tasmania experienced high energy and FCAS prices during two unrelated events on 30 October 2009. In the first event, the loss of both Farrell to Sheffield 220kV lines was declared a credible contingency from 09:10hrs to 10:30hrs due to lightning in the vicinity. Due to the reclassification, a number of Tasmanian generators could not provide Raise Contingency and Regulation FCAS as they would be disconnected from Tasmania on the loss of both lines. At DIs ending 10:25hrs and 10:30hrs, a Tasmanian Raise 6-second FCAS constraint equation which is associated with the reclassification violated and resulted in a spike in the FCAS Raise 6-second price. Outcomes appear to be consistent with the dispatch offers and power system conditions during this event.

In the second event, the Raise Contingency FCAS requirement in Tasmania increased significantly for DI ending 10:40 hrs, resulting in high energy and FCAS prices. A failed SCADA value received from the TNSP was flagged as good quality and was used to calculate the Raise Contingency FCAS requirement in AEMO's EMS before being passed to the MMS. This resulted in a step increase in the Raise Contingency FCAS requirement in Tasmania. SCADA inputs to other constraint equations were not affected.

4. Appendix A – Glossary of Abbreviations

ABBREVIATION	MEANING
DI	Dispatch Interval
EMS	Energy Management System
FCAS	Frequency Control Ancillary Services
L6	Lower 6-second FCAS service
L60	Lower 60-second FCAS service
L5	Lower 5-minute FCAS service
LHS	Left Hand Side
LReg	Lower regulation FCAS service
MMS	Market Management System
R6	Raise 6-second FCAS service
R60	Raise 60-second FCAS service
R5	Raise 5-minute FCAS service
RHS	Right Hand Side
RReg	Raise regulation FCAS service
RRP	Regional Reference Price
SCADA	Supervisory Control and Data Acquisition
TI	Trading Interval
TNSP	Transmission Network Service Provider
XDFCAS	Dynamic FCAS