

# Electricity spot prices above \$5000/MWh

29 November 2012



AUSTRALIAN ENERGY  
REGULATOR

## Introduction

The AER is required to publish a report whenever the electricity spot price exceeds \$5000/MWh.<sup>1</sup> The report:

- describes the significant factors contributing to the spot price exceeding \$5000/MWh, including withdrawal of generation capacity and network availability;
- assesses whether rebidding contributed to the spot price exceeding \$5000/MWh;
- identifies the marginal scheduled generating units; and
- identifies all units with offers for the trading interval equal to or greater than \$5000/MWh and compares these dispatch offers to relevant dispatch offers in previous trading intervals.

## Summary

On 29 November 2012, the spot price in Victoria exceeded \$5000/MWh for the three trading intervals 4 pm to 5 pm inclusive, with the highest spot price of \$9974/MWh occurring at 4.30 pm. These prices were significantly higher than forecast, with forecast prices as late as 1.30 pm only reaching \$655/MWh.

Higher than expected temperatures in Melbourne saw demand levels in Victoria reach 9378 MW at 4.30 pm (the highest since February 2011). Actual demand was more than 350 MW higher than forecast four hours ahead and 1100 MW higher than forecast 12 hours ahead.

The considerably higher than forecast demand led to low generation reserves in Victoria, with lack of reserve level 1 (LOR1) conditions occurring from 3 pm to 5.30 pm.

With a tight supply/demand balance, any reductions in import capability, rebidding of capacity into higher price bands or increases in demand had the potential to result in very high prices.

Rebidding contributed to reduced imports from New South Wales and price volatility. Between 3.15 pm and 4.55 pm the five-minute dispatch price exceeded \$11 500/MWh 14 times.

The events in Victoria also affected outcomes in South Australia, where the spot price reached \$2479/MWh for the same period.<sup>2</sup>

<sup>1</sup> This requirement is set out in clause 3.13.7 (d) of the National Electricity Rules.

<sup>2</sup> A detailed explanation of the events in South Australia on this day is contained in the *Electricity Weekly report* covering the week 25 November to 1 December 2012, available at [www.aer.gov.au](http://www.aer.gov.au).

## Analysis

The AER considers that there were two key contributors to the high spot prices observed in Victoria on 29 November 2012: tight supply/demand conditions associated with higher than forecast demand and rebidding by participants.

### Tight supply/demand conditions

#### *Actual and forecast demand*

Thursday 29 November saw the highest peak demand observed in Victoria since February 2011, with demand peaking at 9378 MW for the 4.30 pm trading interval. This high demand coincided with hot weather across Victoria, with the temperature in Melbourne reaching nearly 40 degrees – around two degrees higher than forecast. Table 1 compares the actual demand, available capacity and spot price in Victoria with that forecast by AEMO four hours and 12 hours ahead of dispatch for the 3.30 pm to 5 pm trading intervals.<sup>3</sup>

Table 1 shows that demand was around 350 MW higher than forecast four hours ahead and around 1100 MW higher than forecast 12 hours ahead. Consistent with the higher than forecast demand, the actual spot price was significantly higher than forecast. In the four hour and 12 hour ahead forecasts, the spot price did not exceed \$500/MWh during the relevant trading intervals.

**Table 1: Actual and forecast demand, spot price and available capacity in Victoria**

Thursday 3:30 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	9318	8951	8187
Spot Price (\$MW/h)	2321	349	349
Available capacity (MW)	9196	9344	9464
Thursday 4.00 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	9373	9018	8263
Spot Price (\$MW/h)	8956	353	349
Available capacity (MW)	9206	9363	9464
Thursday 4.30 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	9378	9092	8274
Spot Price (\$MW/h)	9974	482	349
Available capacity (MW)	9210	9315	9391
Thursday 5.00 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	9339	9021	8255
Spot Price (\$MW/h)	8219	412	111
Available capacity (MW)	9184	9317	9386

<sup>3</sup> The 3.30 pm spot price, although lower than \$5000/MWh, is included in this analysis for completeness.

Available capacity within the region was slightly lower than forecast. A contributing factor was lower than forecast wind farm output.<sup>4</sup> AGL's Macarthur Wind Farm was forecast to generate around 109 MW during the time of high prices, four hours ahead. However its actual generation was 13 MW.

#### *Network Availability*

There were no significant planned or unplanned network outages that affected network availability during the relevant trading intervals. Combined import limits into Victoria during the 3.30 pm to 5 pm trading intervals were close to those forecast four hours ahead of dispatch, but lower than forecast 12 hours ahead. The largest difference was 12 hours ahead on the New South Wales interconnector, primarily as a result of higher than forecast generation from the Murray generator. Output from the Murray generator affects the amount of energy that can be imported from New South Wales due to Murray's location on the main transmission pathway from New South Wales towards the Melbourne load centre.

Table 2 shows the difference between actual import limits and those forecast four hours and 12 hours ahead of dispatch for all interconnectors into Victoria (VIC-NSW, BassLink, Heywood and Murraylink).

**Table 2: Actual and forecast import limits for Victorian interconnectors (MW)**

Interconnector		3.30 pm	4 pm	4.30 pm	5 pm
		Import limit	Import limit	Import limit	Import limit
<b>VIC-NSW</b>	Actual	308	240	243	218
	4 hr forecast	425	384	254	246
	12 hr forecast	435	433	434	870
<b>Heywood</b>	Actual	415	414	358	276
	4 hr forecast	264	224	213	219
	12 hr forecast	313	320	306	420
<b>Murraylink</b>	Actual	53	78	72	80
	4 hr forecast	112	112	15	27
	12 hr forecast	119	117	117	116
<b>Basslink</b>	Actual	478	478	478	478
	4 hr forecast	478	478	478	478
	12 hr forecast	478	478	478	478

#### *Reserves*

A tight supply/demand condition is illustrated by low levels of reserve generation in a region. The amount of reserve generation in a region is equal to supply availability (region generation plus imports) minus demand. AEMO publishes market notices if reserves are forecast to be below (or actually fall below) the capacity of the two largest generating units. This is termed a lack of reserve level 1 (LOR1) condition.<sup>5</sup>

The higher than forecast demand (and to a lesser extent the lower than forecast generator availability and import capability) led to low reserves in Victoria on 29 November.

<sup>4</sup> AEMO hosts a wind energy forecasting system, which produces forecasts of wind generation as an input into dispatch and pre-dispatch. A reduction in wind is reported as a reduction in available capacity in the market systems.

<sup>5</sup> AEMO also publishes market notices if reserves are less than the single largest generating unit. This is termed a lack of reserve level 2 (LOR2) condition.

A forecast lack of reserve level 1 (LOR1) condition for the 3.30 pm to 5 pm trading intervals was published by AEMO on the day at 2.44 pm. The reserve requirement (the two largest generators) was 1180 MW but reserves were forecast to fall to as low as 1022 MW for the 4.30 pm trading interval (a reserve deficit of 158 MW).

At 3.28 pm AEMO subsequently notified the market of an actual LOR1 condition, advising there were insufficient short term capacity reserves in the Victorian region from 3 pm until further notice. The available reserve at 3.15 pm was 1030 MW. The actual LOR1 condition was cancelled by AEMO at 5.58 pm; AEMO confirmed the LOR1 condition had existed from 3 pm to 5.30 pm and had eased as a result of falling demand. The lowest reserve during the LOR1 condition was 881 MW for the 4.55 pm dispatch interval.

Another contributing factor to the LOR1 reserve shortfall observed was that 1590 MW of generation (Yallourn Unit 2, Loy Yang Unit 2, Newport and Hazelwood Unit 3) was out of service on the day. None of this plant was available even given 24 hours notice (this is termed *PASA availability*).

### **Generator offers and rebidding**

Three participants engaged in rebidding on the day, some of which involved the rebidding of low-priced capacity into higher price bands for the relevant trading intervals.

Over a number of rebids between 2.44 pm and 4.31 pm Energy Australia rebid up to 142 MW of capacity at three Yallourn units from prices below \$50/MWh to above \$12 200/MWh for the 3.30 pm to 5 pm trading intervals. The reasons given were related to changes in forecast price and demand.

At 3.03 pm, effective from 3.10 pm, International Power rebid 100 MW of capacity at Hazelwood from prices below \$245/MWh to above \$12 100/MWh. The reason given was "1501A chg in fcast - inc vic dem 5M 9248MW > 30MD 9086MW". About an hour later, 40 MW of this high priced capacity was rebid to prices below \$80/MWh. The reason given was "1608P rebalance portfolio – LYB vacuum limit SL".

At 3.07 pm, effective from 3.15 pm, Snowy Hydro rebid 100 MW of capacity at Valley Power from zero to above \$12 500/MWh. The reason given was "15:06 A Vic: 5MPD price \$9340.75 hgr thn 30MPD 15:50@15:02 SL". The same rebid also saw 510 MW of capacity at Murray shifted from prices above \$146/MWh (148 MW at the price cap) to below \$60/MWh. Following these rebids import capability from New South Wales reduced (with either of two constraints V>>V\_NIL\_3 and V>>V\_NIL\_1B binding for all of the high priced dispatch intervals). These constraints also resulted in the constraining off of the Murray generator. At 3.47 pm, effective from 3.55 pm, Snowy Hydro reduced the ramp down rate at Murray from 50 MW/min to the minimum allowed of 3 MW/min. The reason given was "15:46:A avoid unforecast constrained off Murray SL".

There was no other significant rebidding.

The generators involved in setting the price during the high-price periods, and how that price was determined by the market systems is detailed in **Appendix A**. The closing bids for all participants in Victoria with capacity priced at or above \$5000/MWh for the high-price periods are set out in **Appendix B**.

**Australian Energy Regulator**  
**1 February 2013**

## A Price setters for 29 November 2012

The following table identifies for the trading intervals in which the spot price exceeded \$5000/MWh, each five minute dispatch interval price and the generating units involved in setting the energy price. This information is published by AEMO.<sup>6</sup> Also shown is the energy or frequency control ancillary service offer price involved in determining the dispatch price together with the quantity of that service and the contribution to the total energy price. The 30-minute spot price is the average of the six dispatch interval prices.

### Victoria – 4.00 pm

Time	Dispatch Price	Participant	Unit	Service	Offer price	Marginal Change	Contribution
15:35	\$11 533.45	Origin Energy	MORTLK11	Energy	\$11533.45	0.50	\$5766.73
		Origin Energy	MORTLK12	Energy	\$11533.45	0.50	\$5766.73
15:40	\$3986.17	Origin Energy	URANQ11	Energy	\$1035.70	5.25	\$5440.22
		Snowy Hydro	TUMUT3	Energy	\$349.97	-4.15	-\$1454.02
15:45	\$316.11	Delta Electricity	VP5	Energy	\$290.00	1.09	\$316.10
15:50	\$12 497.76	Ecogen Energy	JLB02	Energy	\$12497.76	1.00	\$12 497.76
15:55	\$12 899.00	Snowy Hydro	VPGS	Energy	\$12899.00	0.68	\$8825.50
		EnergyAustralia (Vic)	YWPS4	Energy	\$12899.00	0.10	\$1244.75
		EnergyAustralia (Vic)	YWPS1	Energy	\$12899.00	0.09	\$1131.24
		EnergyAustralia (Vic)	YWPS3	Energy	\$12899.00	0.13	\$1697.51
16:00	\$12 500.68	International Power	HWPS2	Energy	\$12500.68	0.50	\$6250.34
		International Power	HWPS1	Energy	\$12500.68	0.50	\$6250.34
<b>Spot price</b>		<b>\$8956/MWh</b>					

### Victoria – 4.30 pm

Time	Dispatch Price	Participant	Unit	Service	Offer price	Marginal Change	Contribution
16:05	\$12 497.75	Ecogen Energy	JLB01	Energy	\$12497.75	1.00	\$12497.75
16:10	\$12 497.75	Ecogen Energy	JLB01	Energy	\$12497.75	1.00	\$12497.75
16:15	\$11 533.45	Origin Energy	MORTLK12	Energy	\$11533.45	0.50	\$5766.73
		Origin Energy	MORTLK11	Energy	\$11533.45	0.50	\$5766.73
16:20	\$11 533.45	Origin Energy	MORTLK12	Energy	\$11533.45	0.50	\$5766.73
		Origin Energy	MORTLK11	Energy	\$11533.45	0.50	\$5766.73
16:25	\$11 533.45	Origin Energy	MORTLK12	Energy	\$11533.45	0.50	\$5766.73
		Origin Energy	MORTLK11	Energy	\$11533.45	0.50	\$5766.73
16:30	\$250.68	International Power	HWPS8	Energy	\$250.68	1.00	\$250.68
<b>Spot price</b>		<b>\$9974/MWh</b>					

<sup>6</sup> Details on how the price is determined can be found at [www.aemo.com.au](http://www.aemo.com.au)

## Victoria – 5.00 pm

Time	Dispatch Price	Participant	Unit	Service	Offer price	Marginal Change	Contribution
16:35	\$157.95	Snowy Hydro	TUMUT3	Energy	\$144.99	1.09	\$157.95
16:40	\$12 497.75	Ecogen Energy	JLB01	Energy	\$12 497.75	1.00	\$12 497.75
16:45	\$11 533.45	Origin Energy	MORTLK12	Energy	\$11 533.45	0.50	\$5766.73
		Origin Energy	MORTLK11	Energy	\$11 533.45	0.50	\$5766.73
16:50	\$12 497.76	Ecogen Energy	JLB02	Energy	\$12 497.76	1.00	\$12 497.76
16:55	\$11 533.45	Origin Energy	MORTLK12	Energy	\$11 533.45	0.50	\$5766.73
		Origin Energy	MORTLK11	Energy	\$11 533.45	0.50	\$5766.73
17:00	\$1093.06	Origin Energy	LADBROK2	Energy	\$2077.72	0.55	\$1139.01
		Energy Australia	WATERLWF	Energy	-\$87.26	0.53	-\$45.95
<b>Spot Price</b>		<b>\$8219/MWh</b>					

## B Closing bids for 29 November 2012

Figures B1 to B5 highlight the half hour closing bids for participants in Victoria with significant capacity priced at or above \$5000/MWh during the periods in which the spot price exceeded \$5000/MWh. They also show generation output and the spot price.

Figure B.1 Origin (Mortlake) closing bid prices, dispatch and spot price

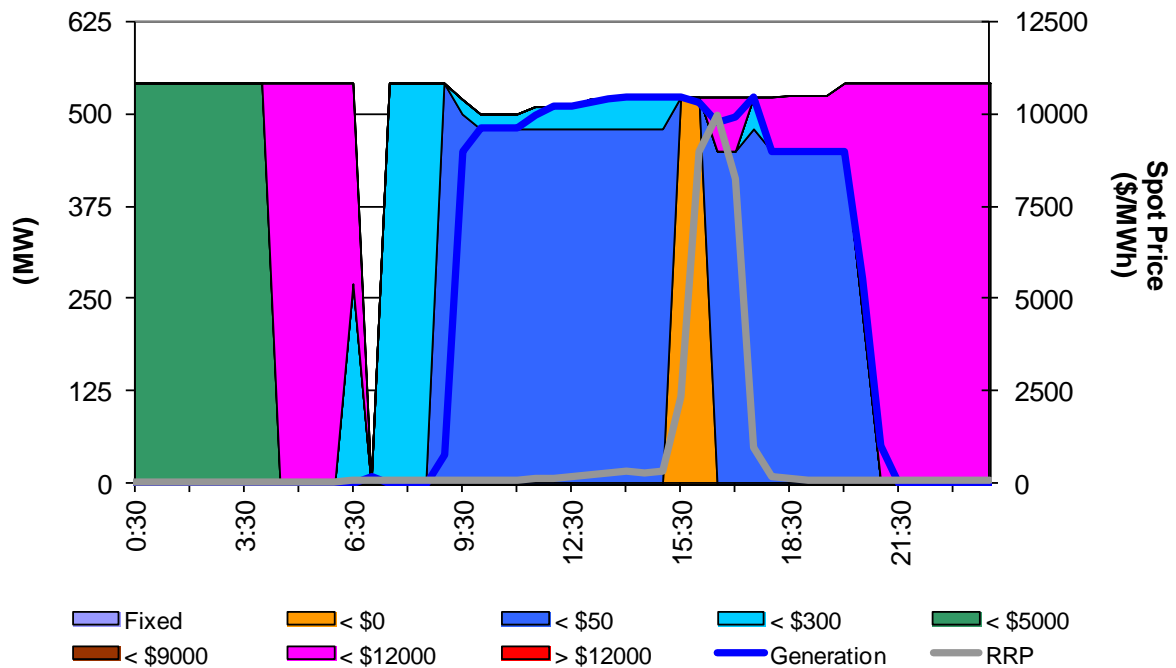


Figure B.2 Ecogen (Jeeralang A and B) closing bid prices, dispatch and spot price

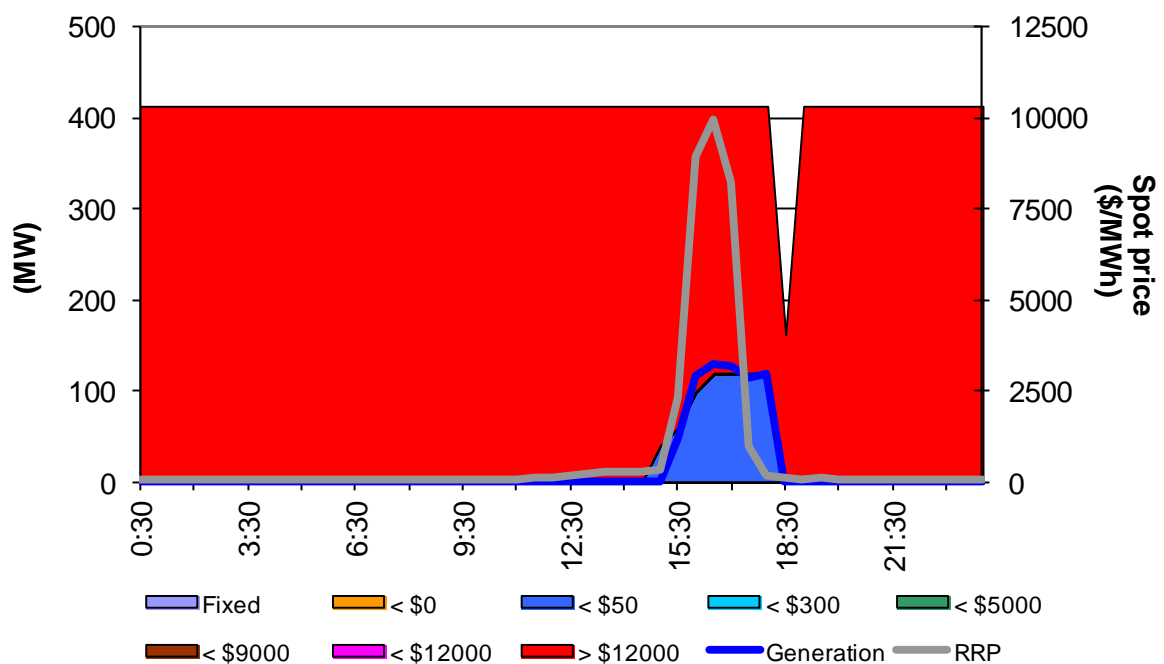


Figure B.3 International Power (Hazelwood) closing bid prices, dispatch and spot price

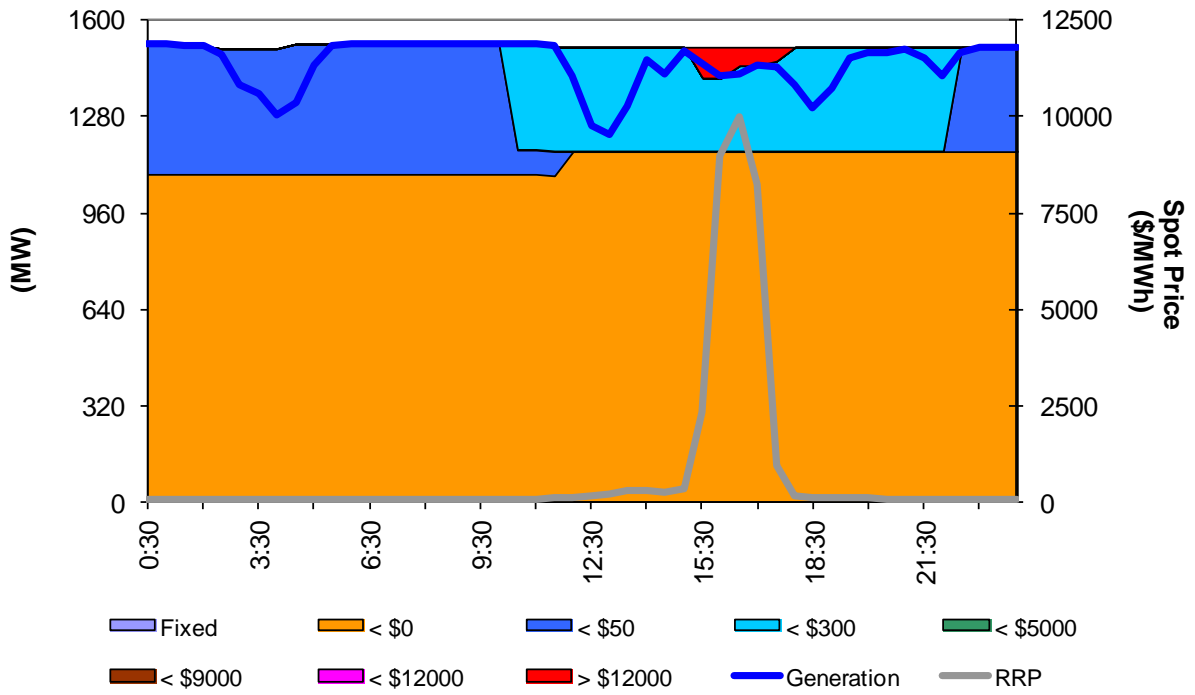


Figure B.4 Snowy Hydro (Valley Power, Laverton North) closing bid prices, dispatch and spot price

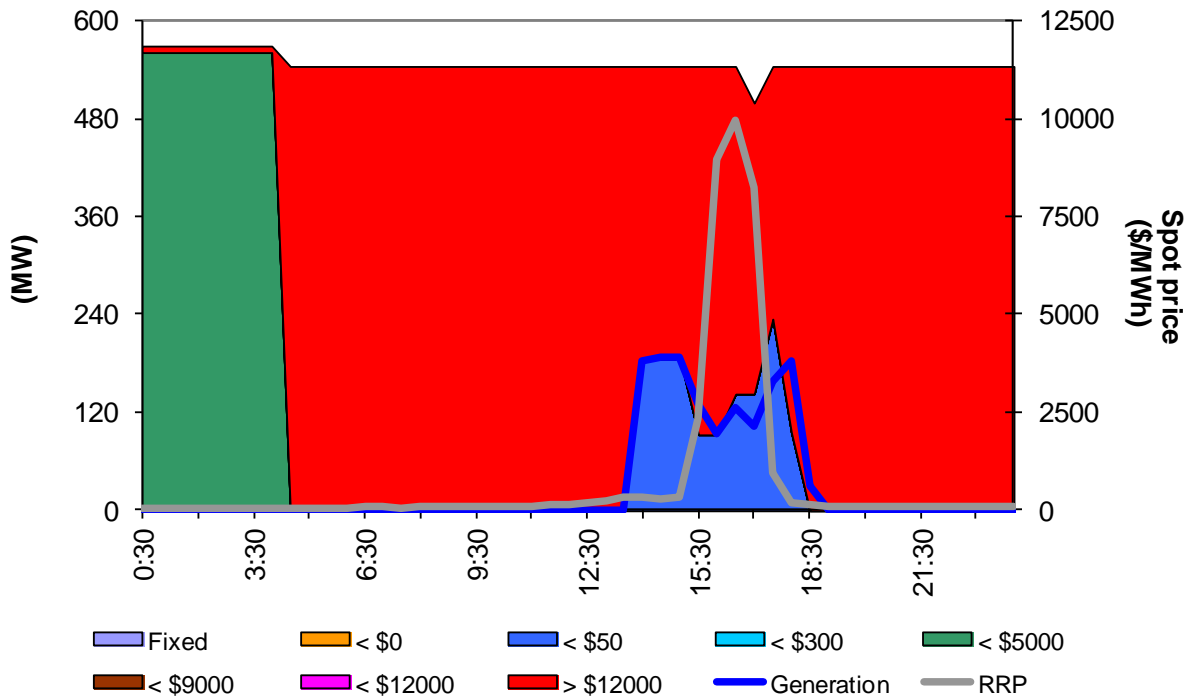




Figure B.5 EnergyAustralia (Yallourn) closing bid prices, dispatch and spot price

