Spot prices greater than $5000/MWh

AUSTRALIAN ENERGY REGULATOR

New South Wales and Queensland - 3 November 2009

Introduction

The AER is required to publish a report covering the circumstances in which the spot price exceeded $5000/MWh, pursuant to clause 3.13.7 (d) of the Rules. That report should:

- describe significant factors contributing to the spot price exceeding $5000/MWh, including withdrawal of generation capacity and network availability;
- assess whether rebidding pursuant to clause 3.8.22 contributed to the spot price exceeding $5000/MWh;
- identify the marginal scheduled generating units; and
- identify all units with offers for the trading interval equal to or greater than $5000/MWh and compare these dispatch offers to relevant dispatch offers in previous trading intervals.

Summary

On 3 November 2009, the spot price in New South Wales and Queensland exceeded $5000/MWh for the 4 pm trading interval, reaching $6337/MWh and $5706/MWh respectively.

The temperature in Sydney reached 37 degrees, four degrees higher than that forecast the previous day. This resulted in the demand reaching a maximum of 12 163MW at 4 pm. Queensland's milder weather conditions saw the demand there reach a moderate level of 7013 MW at 4 pm (this compares to a record high of 8699 MW).

Planned generator outages across New South Wales and plant problems at Eraring power station on the day resulted in a tight supply-demand balance in New South Wales.

This tight supply-demand balance in New South Wales led to higher imports from Queensland. Rebidding into higher prices by Stanwell combined with increased exports from Queensland led to the dispatch of high priced generation in Queensland.

Actual and forecast demand

Demand in New South Wales reached a maximum for the day of 12 163 MW[1] at 4 pm, 320 MW greater than that forecast four hours ahead and just on 1300 MW higher than that forecast 12 hours ahead. Available generation capacity in New South Wales was around 1330 MW less than that forecast four hours ahead.

As a result of the higher demand and lower supplies in New South Wales, prices in New South Wales and Queensland were much higher than forecast for the 3.30 pm and 4 pm trading intervals.

[1] The previous New South Wales summer record demand occurred in the 2008-09 summer, reaching 14 097 MW. The highest-ever demand of 14 287 MW occurred in the winter of 2008.

Demand and available capacity in Queensland was close to forecast.

Figures 1 and 2 compare the actual demand for the 3.30 pm and 4 pm trading intervals[2] in New South Wales and Queensland with that forecast by AEMO four and 12 hours ahead of dispatch. A comparison of actual and forecast available generation and spot price is also included.

Figure 1: Actual and forecast demand, spot price and available generation in New South Wales

Tuesday 3.30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Spot Price ($MW/h)	2693.45	65.16	39.23
Demand* (MW)	12 054	11 890	11 033
Available capacity(MW)	11 528	12 705	12 789
Tuesday 4 pm			
Spot Price ($MW/h)	6337.10	89.52	38.73
Demand* (MW)	12 163	11 843	10 940
Available capacity(MW)	11 462	12 790	12 789

*There was also around 130 MW of non-scheduled generation that is not included in this demand figure. Actual non-scheduled generation was close to that forecast.

Figure 2: Actual and forecast demand, spot price and available generation in Queensland

Tuesday 3.30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	2267.68	60.86	30.68
Demand* (MW)	7067	7016	6931
Available capacity (MW)	9721	9793	9695
Tuesday 4 pm			
Price ($/MWh)	5706.28	79.29	30.49
Demand* (MW)	7013	7005	6933
Available capacity (MW)	9689	9645	9695

*There was also around 30 MW of non-scheduled generation that is not included in this demand figure. This generation was not forecast.

Generator offers and rebidding

The two New South Wales to Queensland interconnectors were unconstrained for most of the high priced period but with higher than forecast flows into New South Wales. As a result, for the purposes of dispatch, the two regions were effectively one combined region.

Around 2800 MW (around a quarter) of New South Wales low cost generation was not offered into the market on the day. During the day a further 1125 MW of generation capacity became unavailable due to plant problems. Up to 1216 MW (12 per cent) of available capacity in New South Wales was priced above $5000/MWh for the 4 pm trading interval.

Over several rebids between 1.17 pm and 2.57 pm on the day, Eraring Energy reduced the available capacity across Eraring units one, two and three by a total of 850 MW (540 MW of which was priced below $25/MWh). These rebids applied for the 3.30 pm trading interval until the end of the day. The reasons given were “P: Fabric filter limitation”, “P: Main Condenser backpressure fault” and “P: Main Condenser salt leak fault”.

[2] The 3.30 pm trading interval is included in this analysis as the five-minute dispatch price increased to above $5000/MWh during this trading interval.

Further rebids at 3.12 pm, effective from 3.20 pm, returned 150 MW of the capacity at Eraring unit one, all of which was priced at above $8600/MWh. At 3.18 pm, effective from 3.25 pm, a further 220 MW of capacity was returned to service at Eraring unit two, 150 MW of which was priced at above $8600/MWh. The reason given for both rebids was "P: Main condenser backpressure improving". At 3.25 pm the Queensland and New South Wales dispatch prices increased from below $500/MWh to above $4500/MWh.

At around 3.30 pm, Eraring unit three tripped from around 430 MW. At 3.32 pm, effective from 3.40 pm Eraring Energy rebid the available capacity of Eraring unit three from 430 MW to zero to reflect this plant failure. This capacity had been priced below $20/MWh. The reason given was "P: Unit Failure @ 15:27". All available generation in New South Wales for the 3.30 pm, 3.35 pm and 3.40 pm dispatch intervals were either fully dispatched, ramp rate limited or trapped in ancillary services[3]. As a result, flows across the three interconnectors into New South Wales violated the limit by up to a total of 106 MW. By 3.45 pm, an additional 207 MW of generation was able to be ramped up in New South Wales allowing flows across the interconnectors to return to safe levels. The 5 minute dispatch price in New South Wales was capped at $10 000/MWh for the 3.35 pm and 3.40 pm dispatch intervals.

Over four rebids at 2.33 pm, 2.56 pm, 3.39 pm and 3.44 pm, Delta Electricity reduced the available capacity across Munmorah unit three and Mount Piper unit two by a total of 370 MW, 310 MW of which was priced below $20/MWh. The reasons given were "1536P FD Fan Limit::Capacity limit change" and "1118P Return to service::ROC change". The majority of the reduction was as a result of the delayed increase in capability of Mount Piper two that had returned to service earlier that day.

Figure 3 shows the low cost generation capacity not available in New South Wales at the time of the high spot prices and whether the outage was planned or unplanned.

Figure 3: New South Wales low cost generation capacity not available

Participant	Capacity not available (MW)	Comment
Delta Electricity		
Munmorah unit three	20	Plant issues during the day
Munmorah unit four	300	Planned – off since March 09
Vales Point unit five	660	Planned - off since 28 October, returned to service on 4 November
Mount Piper unit two	317	Returned to service on 3 November
Macquarie Generation		
Liddell unit two	520	Off since 2 November (plant issues)
Liddell unit three	520	Planned – off since 24 October
Liddell unit four	110	Planned partial reduction
Eraring Energy		
Eraring unit one	160	Plant issues during the day
Eraring unit two	160	Plant issues during the day
Eraring unit three	588	Plant issues during the day
Eraring unit four	660	Planned - off since 21 August 09
Total	**4015**	

[3] If a generator is trapped then its energy target is at an ancillary service enablement limit, which restricts its movement in the energy market.

The tight supply situation in New South Wales contrasted with the situation in Queensland where there was 9700 MW of capacity offered into the market on the day, with a demand of just over 7000 MW. Initial generator offers for this day saw 8400 MW of Queensland generation capacity offered at less than $300/MWh, with the remaining 1270 MW of capacity priced above $8900/MWh.

At 3.26 pm, effective from 3.30 pm, Stanwell Corporation rebid 200 MW of capacity across Gladstone units one, three, five and six from prices below $60/MWh to prices above $9500/MWh. The reason given was "1532 Transmission Constraint–QNI STH Price Separation".

This rebid reduced the availability of Queensland generation capacity priced below $300/MWh to 8200 MW. This meant that with a Queensland demand of 7000 MW and around 1200 MW of exports into New South Wales the dispatch of high priced generation capacity in Queensland occurred.

There was no other significant rebidding.

The generators involved in setting the price during the high-price period, and how that price was determined by the market systems is detailed in **Appendix A**.

The closing bids for all participants in New South Wales and Queensland with capacity priced at or above $5000/MWh for the 4 pm trading interval are presented in **Appendix B**.

Changes to network availability

Total import capability into New South Wales from Victoria was around 524 MW lower than forecast four hours ahead for the 4 pm trading interval. Flows across the Victoria to New South Wales interconnector exceeded the import limit during the 3.35 pm to 3.45 pm dispatch intervals. Figure 4 shows actual and forecast flow and import limit for the Victoria to New South Wales interconnector.

Figure 4: Victoria to New South Wales interconnector actual and forecast flows and limits

Tuesday 3.30 pm	Actual	4 hr forecast	12 hr forecast
Import limit*	1048	1240	1101
Flows into NSW	1048	1240	1101
Tuesday 4 pm			
Import limit	728	1252	1032
Flows into NSW	748	1252	1032

*** This is the limit for flows from Victoria into New South Wales.**

Over three rebids from 3.22 pm, Snowy Hydro rebid all of its 1913 MW of capacity at Tumut three and Upper Tumut from prices above $90/MWh to below zero. The rebid was effective from the 3.30 pm dispatch interval. The reason given was "NSW Prices hghr thn fcast: band shift dwn". The network constraints that were limiting imports across the Victoria to New South Wales interconnector were related to transmission lines between the Snowy Hydro generators at the Tumut stations and Sydney. When Snowy rebid capacity into lower prices at these stations the dispatch of these generators increased from 1391 MW at 3.30 pm to 1879 MW by 4 pm, 1680 MW greater than that forecast four hours ahead. This led to reduced flows from Victoria into New South Wales - 748 MW at 4 pm compared to 1252 MW that was forecast four hours ahead.

Combined flows across the Queensland to New South Wales interconnectors were around 1200 MW, close to their total nominal limit but around 340 MW higher than forecast four hours ahead.

Australian Energy Regulator
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Appendix A – Price setters for the 4 pm trading interval

The following table identifies for the 4 pm trading interval each five minute dispatch interval price and the generating units involved in setting the energy price. This information is published by AEMO[4]. Also shown is the energy 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.

New South Wales– 4 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
15:35	$10 000.00*	Violated network constraint		Energy	$650 000.00	1	$650 000.00
15:40	$10 000.00*	Stanwell	STAN-1	Energy	$9994.93	1.39	$13 876.66
15:45	$8750.01	Eraring Energy	ER01	Energy	$8750.01	0.5	$4375.01
		Eraring Energy	ER02	Energy	$8750.01	0.5	$4375.01
15:50	$318.75	Tarong Energy	W/HOE#2	Energy	$274.68	1.16	$318.75
15:55	$348.09	Tarong Energy	TARONG#2	Energy	$295.79	1.18	$348.09
16:00	$8605.76	Delta Electricity	MP1	Energy	$9917.12	0.87	$8605.78
		AGL	MCKAY1	Energy	$0.00	0.11	$0.00
		AGL	WKIEWA2	Energy	$0.00	0.01	$0.00
		AGL	WKIEWA1	Energy	$0.00	0.03	$0.00
Spot price		**$6337.10/MWh**					

*Price capped to $10 000/MWh

Queensland – 4 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
15:35	$9702.77	Tarong Energy	W/HOE#2	Energy	$9702.77	1.00	$9702.77
15:40	$9994.93	Stanwell Corp	STAN-1	Energy	$9994.93	1.00	$9994.93
15:45	$7490.18	Eraring Energy	ER01	Energy	$8750.01	0.43	$3745.09
		Eraring Energy	ER02	Energy	$8750.01	0.43	$3745.09
15:50	$274.68	Tarong Energy	W/HOE#2	Energy	$274.68	1.00	$274.68
15:55	$295.79	Tarong Energy	TARONG#2	Energy	$295.79	1.00	$295.79
16:00	$7245.30	Delta Electricity	MP1	Energy	$9917.12	0.73	$7245.25
		AGL	MCKAY1	Energy	$0.00	0.09	$0.00
		AGL	WKIEWA2	Energy	$0.00	0.01	$0.00
		AGL	WKIEWA1	Energy	$0.00	0.02	$0.00
Spot price		**$5706.28/MWh**					

[4] Details on how the price is determined can be found at www.aemo.com.au

Appendix B – Closing bids

Figures B1 – B6 highlight the half hour closing bids for participants in New South Wales and Queensland with significant capacity priced at or above $5000/MWh during the trading interval in which the spot price exceeded $5000/MWh. It also shows the generation output of that participant and the spot price.

Figure B1: Delta Electricity closing bid prices, dispatch and spot price

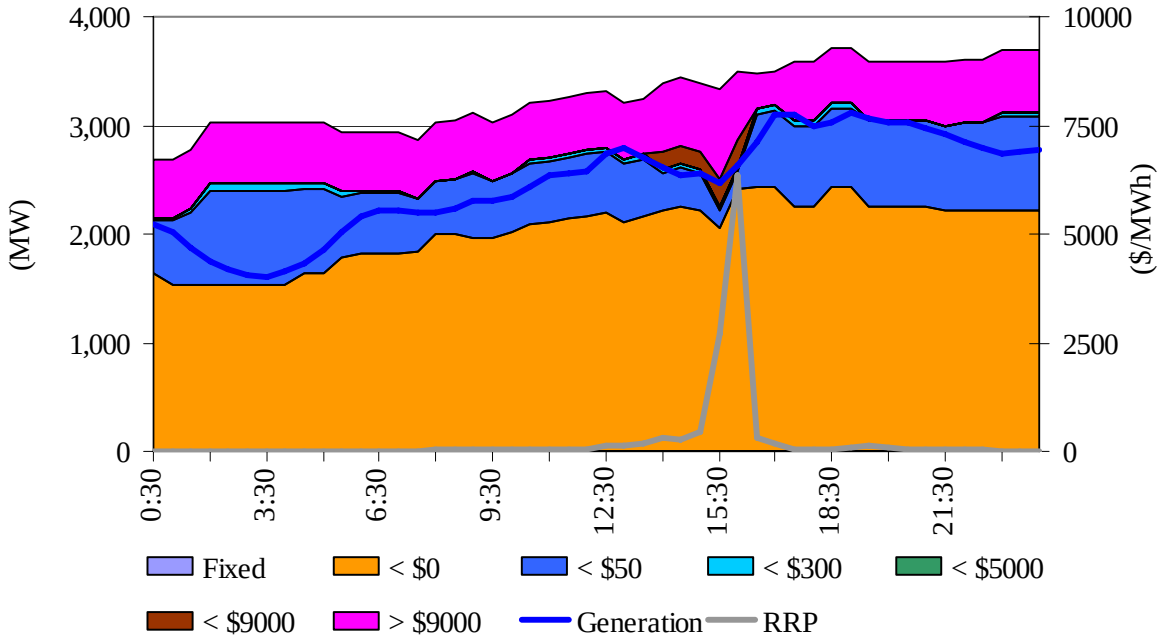

Figure B2: Eraring Energy bid prices, dispatch and spot price

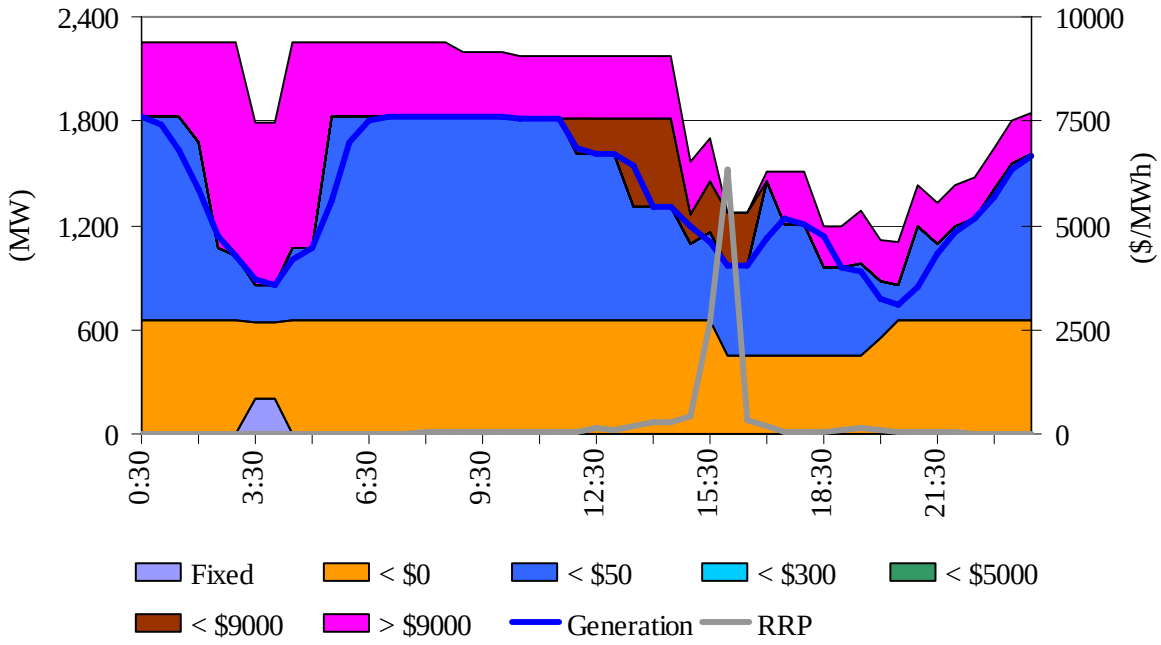

Figure B3:CS Energy closing bid prices, dispatch and spot price

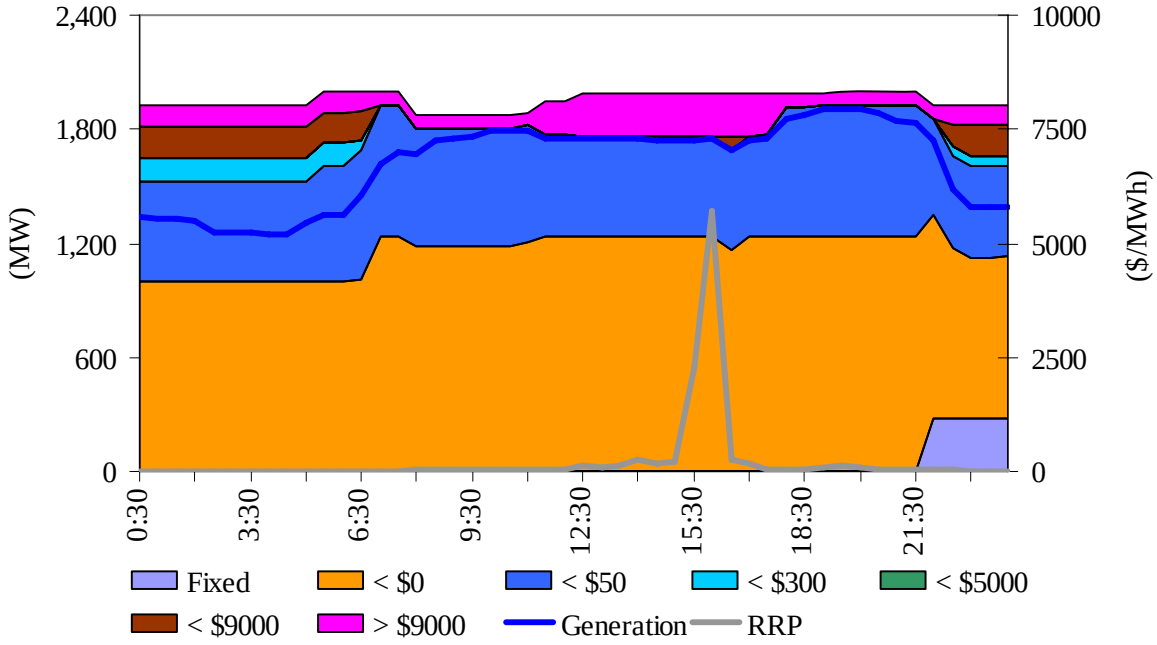

Figure B4:Millmerran closing bid prices, dispatch and spot price

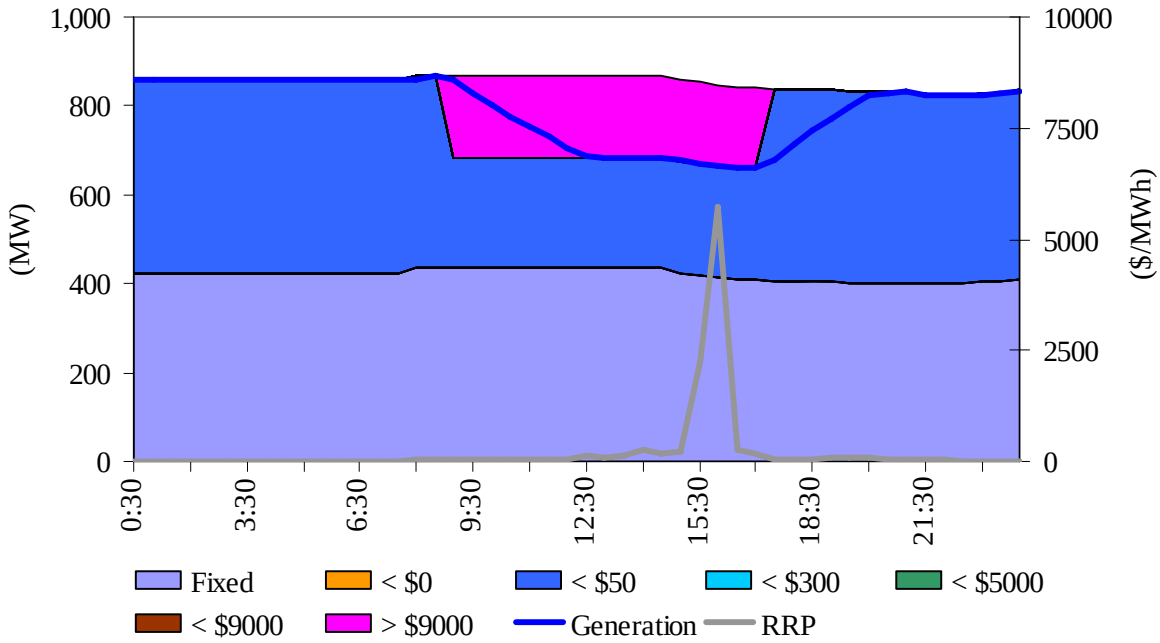

Figure B5: Tarong Energy bid prices, dispatch and spot price

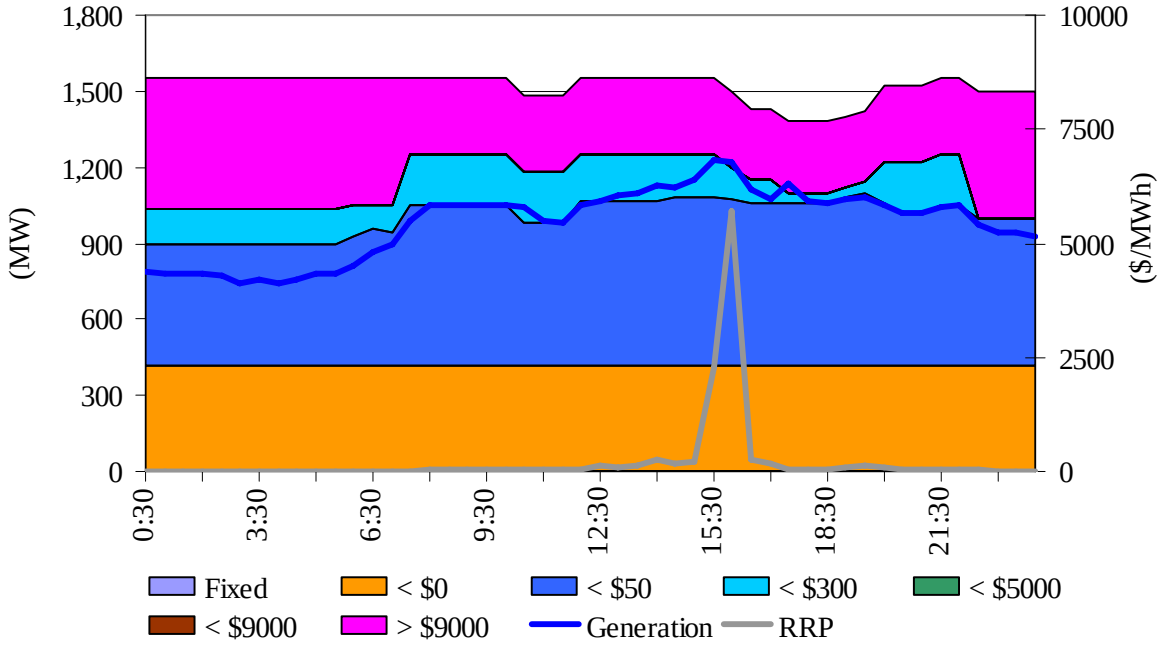

Figure B6: Stanwell bid prices, dispatch and spot price