

Spot prices greater than \$5 000/MWh



AUSTRALIAN ENERGY
REGULATOR

NEW SOUTH WALES 9-10 NOV 2005

Introduction

The AER is required to publish a report within 20 business days of the end of a week in which the spot price exceeded \$5 000/MWh, pursuant to clause 3.13.7 (d) of the Rules. That report should:

- describe significant factors contributing to the spot price exceeding \$5 000/MWh, including withdrawal of generation capacity and network availability;
- assess whether rebidding pursuant to clause 3.8.22 contributed to the spot price exceeding \$5 000/MWh;
- identify the marginal scheduled generating units; and
- identify all units with offers for the trading interval equal to or greater than \$5 000/MWh and compare these dispatch offers to relevant dispatch offers in previous trading intervals.

Description of the circumstances

On Wednesday 9 November and Thursday 10 November temperatures were above 30 degrees in New South Wales, reaching 35 degrees on Wednesday and leading to high demands. Half-hour spot prices were above \$5 000/MWh on four occasions on Wednesday and once on Thursday. Figure 1 identifies those trading intervals for which the price exceeded \$5 000/MWh in New South Wales and the price for the trading interval.

Figure 1 - Spot prices above \$5 000/MWh in New South Wales

Date	Trading interval ending	Spot price (\$/MWh)
9 November 2005	3:00 pm	\$8 648
9 November 2005	3:30 pm	\$5 218
9 November 2005	4:00 pm	\$9 167
9 November 2005	4:30 pm	\$9 036
10 November 2005	4:00 pm	\$8 651

On Wednesday, demand peaked at 11 721MW¹ at 4pm. This was the highest demand in New South Wales since August but still 1 100MW lower than the peak last summer. Peak demand for the day was around 1 700MW higher than for the previous day and 600MW higher than forecast four hours to dispatch. Combined imports into New South Wales from Queensland and Snowy were at times close to 4 000MW.

¹ This demand is taken from the market systems and is referred to as “initial supply”. Initial supply is a measurement of the demand at the start of a dispatch interval and is defined as the:

- sum of the scheduled generation measurements in the region; plus
- net measured interconnector flow into the region.

Around 2 850MW of capacity across Eraring, Liddell, Munmorah, Blowering and Vales Point was unavailable.

From around midday, a series of rebids, by New South Wales generators, moved 1 000MW of capacity from prices of less than \$30/MWh to above \$5 000/MWh. This left around 7 600MW of capacity priced below \$30/MWh with as little as 20MW of capacity priced between \$30/MWh and \$6 500/MWh. As a result, as demand increased prices in New South Wales exceeded \$5 000/MWh for two hours between 3pm and 4.30pm.

On Thursday, temperatures in New South Wales reached 31 degrees with demand peaking at 11 100MW. Generator offers, submitted as part of day-ahead bids, saw around 500MW less capacity offered into New South Wales at prices of less than \$30/MWh compared to the previous day. At 1pm, Macquarie Generation rebid 670MW of capacity to prices of less than \$30/MWh from prices above \$5 000/MWh.

At 2.55pm import capability from Queensland was reduced by around 650MW, as a result of lightning in the vicinity of the New South Wales to Queensland interconnector. Immediately following this reduction, Macquarie Generation rebid 780MW of capacity from less than \$20/MWh to greater than \$5 000/MWh. This rebid was effective from 3.10pm and the price jumped from \$48/MWh at 3.15pm to \$104/MWh at 3.20pm and then \$10 000/MWh at 3.25pm, which was set primarily by Macquarie Generation. The spot price was above \$5 000/MWh for the 4pm trading interval.

Spot prices in New South Wales and how those prices were determined by the market systems on both Wednesday and Thursday are detailed in Appendix 1.

Prices above \$5 000/MWh - Wednesday 9 November

There were four 30 minute trading intervals where the spot price was greater than \$5 000/MWh in New South Wales on Wednesday 9 November. These occurred between 3pm and 4.30pm with the spot price peaking at \$9 167/MWh.

The contributing factors to market prices can be categorised into:

- market forecasts;
- changes to network availability;
- rebidding, including changes to generation capacity; and
- offer prices.

Market forecasts. Figure 2 shows, for the four trading intervals on Wednesday where the spot price was greater than \$5 000/MWh, actual price, demand and available capacity in New South Wales, and compares it with that forecast 4 and 12 hours ahead of dispatch.

Figure 2: New South Wales actual and forecast information

Wednesday, 9 November

3:00 pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	8 647.59	68.77	44.87
Demand (MW)	11 570	11 123	10 923
Available capacity (MW)	9 444	9 444	9 474
3:30 pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	5 217.61	90.98	43.90
Demand (MW)	11 566	11 297	10 961
Available capacity (MW)	9 444	9 444	9 474
4:00 pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	9 166.67	74.28	45.15
Demand (MW)	11 721	11 140	10 955
Available capacity (MW)	9 443	9 444	9 474
4:30 pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	9 036.06	70.12	44.16
Demand (MW)	11 677	11 039	10 822
Available capacity (MW)	9 415	9 444	9 474

Demand was as much as 600MW, or five per cent, higher than forecast four hours to dispatch. Similar errors occurred for forecasts as close as one hour to dispatch for the 4pm and 4.30pm trading intervals.

Changes to network availability. There were no significant changes to the availability of the transmission network throughout the day in New South Wales.

Rebidding. Around 1 000MW of capacity was rebid from prices of less than \$30/MWh to higher prices over the course of the day. This capacity was typically repriced above \$8 000/MWh.

At 10.30am, 1.55pm and 3.10pm, Macquarie Generation rebid as much as 840MW of capacity from prices of less than \$20/MWh to prices of more than \$8 000/MWh. The rebid reasons included “RP/Volume tradeoff – Load expected to vary from forecast”, “RP/Volume trade off – NEMMCO load forecasts increased” and “RP/Volume trade off – Demand management occurring”.

At 2.08pm, effective immediately, Snowy Hydro, rebid 658MW of capacity at Tumut3 from prices of \$92/MWh, \$279/MWh and \$760/MWh to prices of \$7 442/MWh. The rebid reason given was “M:Snowy –NSW const: Bandshift up”. Up to 150 MW was shifted back into lower prices over subsequent rebids. At the time, flows from Snowy into New South Wales were limited to around 2 800MW.

At 2.16pm, effective 2.25pm, Eraring Energy rebid 100MW from prices of less than \$30/MWh to prices above \$8 000/MWh. The rebid reason given was “Increased likelihood of increased profit”.

A combination of rebidding and demand forecast errors contributed to the spot price exceeding \$5 000/MWh.

Offer prices. Figures 3 and 4 present the capacity offered into the market within a series of price thresholds by Macquarie Generation and Eraring Energy, respectively for Wednesday 9 November. Spot price and dispatched generation are overlaid. It highlights the capacity presented at high prices.

Figure 3: Macquarie Generation closing bid prices, dispatch and region price Wednesday 9 November.

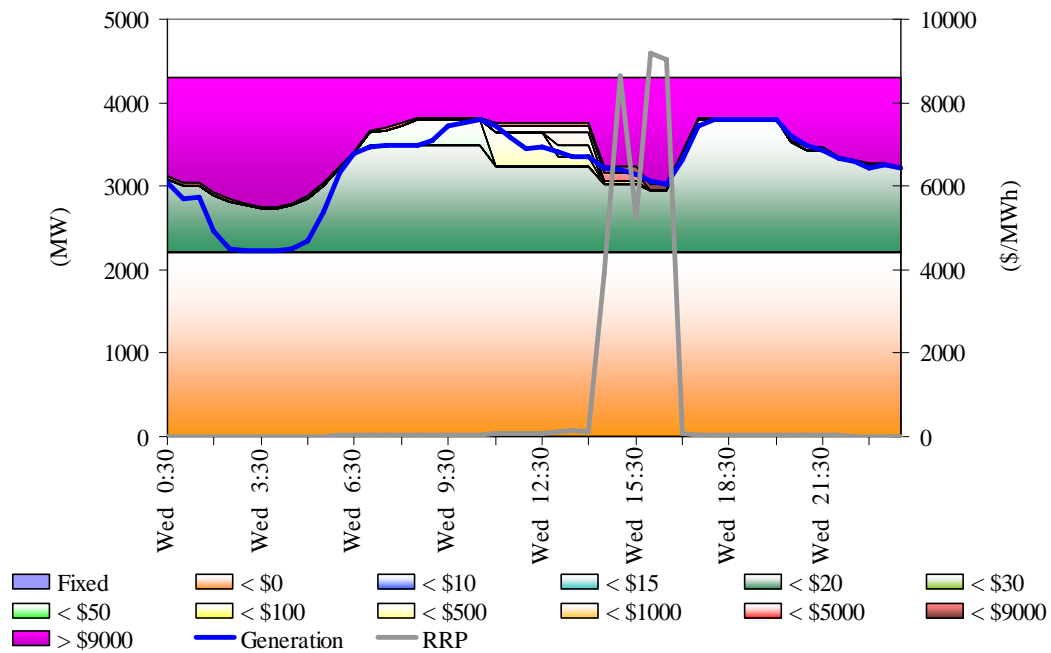
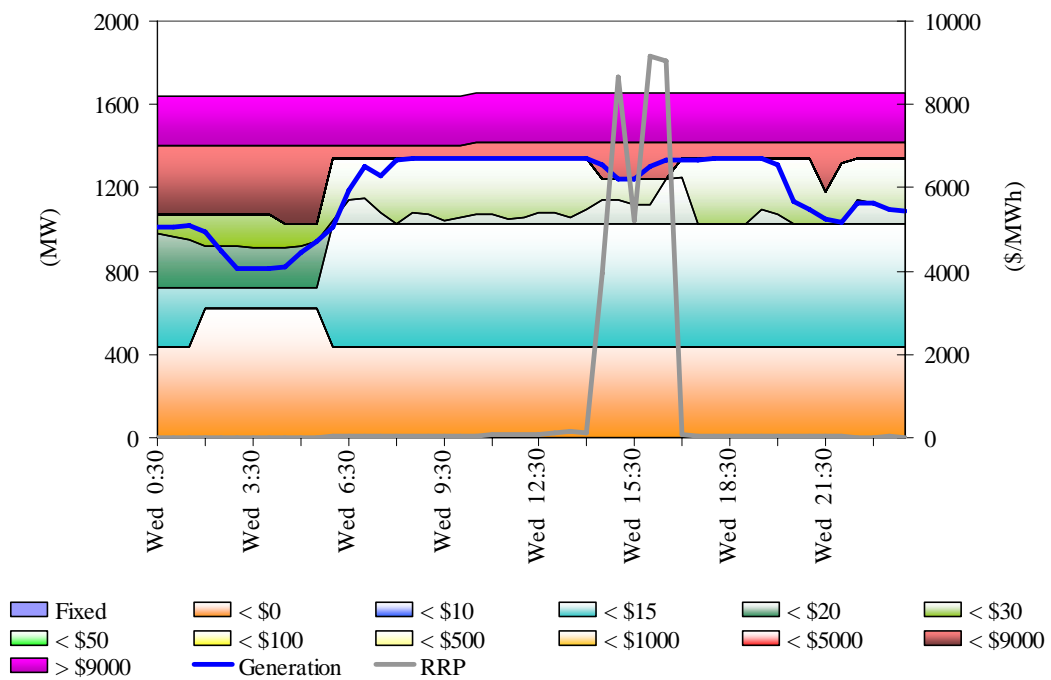


Figure 4: Eraring Energy closing bid prices, dispatch and region price, Wednesday 9 November.



Prices above \$5 000/MWh - Thursday 10 November

There was one occasion at 4pm on Thursday 10 November where the spot price exceeded \$5 000/MWh, reaching \$8 651/MWh.

The contributing factors to market prices can be categorised into:

- Market forecasts;
- Changes to network availability;
- Rebidding, including changes to generation capacity; and
- Offer prices.

Market forecasts. Figure 5 shows a number of key indicators for New South Wales for the trading interval where the spot price was greater than \$5 000/MWh. The table compares actual price, demand and available capacity in New South Wales, to that forecast 4 and 12 hours ahead of dispatch. The table also compares the actual capability (and the constraint identified as limiting that capability), for the New South Wales to Queensland interconnector, with forecasts 4 and 12 hours ahead of dispatch.

Figure 5: Actual and forecast information for New South Wales

Thursday, 10 November

4:00 pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	8 650.67	102.48	101.92
Demand (MW)	10 821	11 157	11 502
Available capacity (MW)	9 344	9 404	9 404
QNI import capability	-325	-985	-861
Constraint ID	F_N+Q_ARDM_L5	Q:N_LS_VC1	V::H_NILQA_R

Note:

QNI import capability is the maximum allowable flow across QNI into New South Wales.

The constraint identified by F_N+Q_ARDM_L5 optimises exports from Queensland together with the extra frequency control ancillary services that are required to manage the credible loss of both circuits of QNI, as a result of lightning in the vicinity.

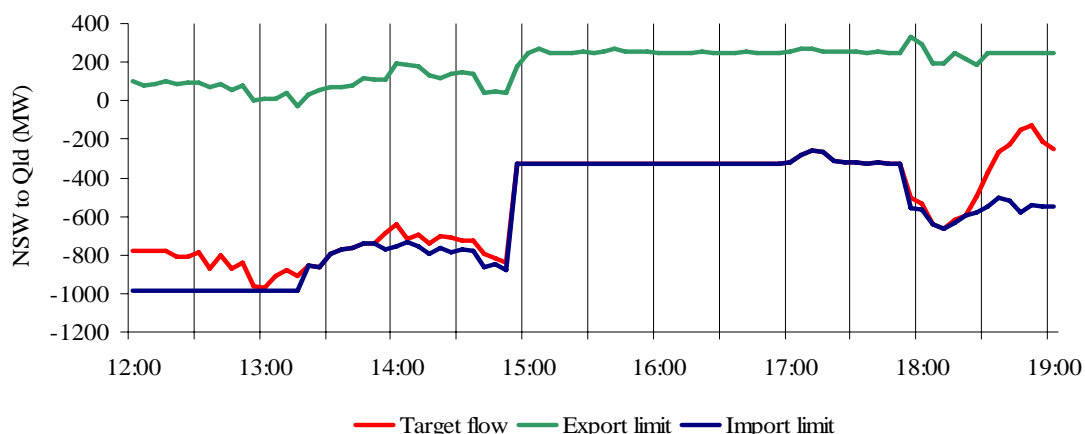
Conditions at the time saw warm weather continue for the second consecutive day. Demand was, however, 300MW lower than forecast four hours ahead and nearly 700MW lower than forecast 12 hours ahead. The limit on flows into New South Wales across the New South Wales to Queensland interconnector was around 660MW lower than forecast four hours to dispatch. The reduced limit was as a result of lightning in the vicinity of the interconnector from 3pm to 6pm.

Changes to network availability. Between 3pm and 6pm, the limit for flows into New South Wales from Queensland, was reduced due to lightning in the vicinity. Lightning increases the likelihood of the loss of multiple lines and the interconnector limit is reduced. Extra frequency control ancillary services are procured to maintain system security should a multiple contingency event occur. The reduction in the limit was not as a result of the removal of network elements from service.

Figure 6 highlights the step change in capability for flows into New South Wales from Queensland (or imports across QNI).²

² Where the red target flow is not visible, the interconnector flow is equal to the blue import limit.

Figure 6: QNI capability and target flow, Thursday 10 November



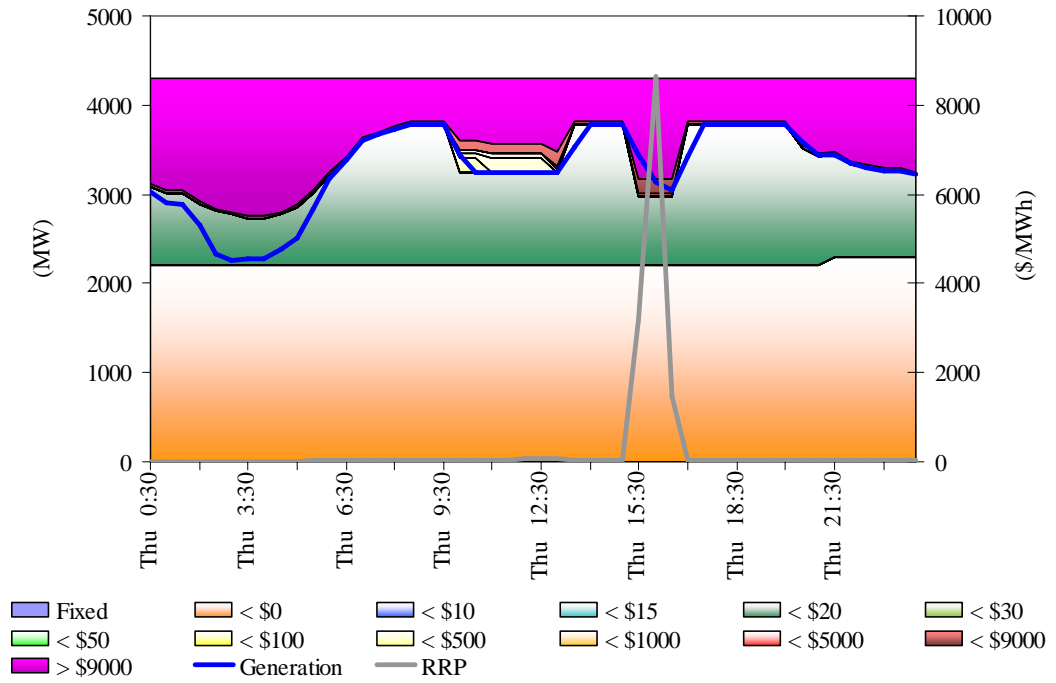
Rebidding. At 8.40am, Macquarie Generation rebid as much as 460MW of capacity from prices of less than \$100/MWh to prices of more than \$800/MWh. The rebid was effective between 10am and 5pm, the reason given was “RP/Volume tradeoff - load expected to vary from forecast”. At 12.58pm, 670MW of this capacity was repriced from above \$500/MWh to less than \$20/MWh. Most of this capacity had been priced above \$9 000/MWh through day-ahead bids. The rebid reason given was “RP/Volume trade off – NEMMCO load forecast reduced”. A third rebid by Macquarie Generation at 2.59pm, effective 3.10pm, shifted 810MW of capacity from prices of less than \$20/MWh to prices above \$4 670/MWh. The rebid reason given was “RP/Volume tradeoff – Management of constraints”. This third rebid coincided with the reduction from 2.55pm, of the Queensland to New South Wales interconnector capability.

Delta Electricity reduced the availability of Wallerawang unit 8 by as much as 60MW at 2.19pm. All of this capacity was priced at less than \$20/MWh. The rebid reason given was “Milling capacity coal feeders::Capacity limit change”.

A combination of network capability and rebidding contributed to the spot price exceeding \$5 000/MWh.

Offer prices. Figure 7 present the capacity offered into the market within a series of price thresholds for Macquarie Generation on Thursday 10 November. Spot price and dispatched generation are overlaid. It highlights the capacity moved into high prices which contribute to the prices exceeding \$5 000/MWh.

Figure 7: Macquarie Generation closing bid prices, dispatch and region price, Thursday 10 November..



APPENDIX 1 – Price setters

The following table identifies for each trading interval in which the spot price exceeded \$5 000/MWh, every five minute dispatch interval price and the generating units, as published in the market systems, involved in setting the energy price. This information is published by NEMMCO³. Also shown is the energy or ancillary service offer price involved in determining the dispatch price together with the quantity and the contribution of that service to the total energy price. Dispatch prices greater than \$10 000 are capped. The 30 minute spot price is the time weighted average of the six dispatch interval prices.

Wednesday 9 November – New South Wales 3 pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
14:35	\$8 627.30	Snowy Hydro	MURRAY	Energy	\$62.00	0.04	\$2.4
			TUMUT3	Energy	\$7 539.69	1.14	\$8,624.9
14:40	\$8 575.99	Snowy Hydro	MURRAY	Energy	\$42.00	0.04	\$1.6
			TUMUT3	Energy	\$7 539.69	1.14	\$8,574.4
14:45	\$8 526.58	Snowy Hydro	MURRAY	Energy	\$62.00	0.04	\$2.3
			TUMUT3	Energy	\$7 539.69	1.13	\$8,524.3
14:50	\$8 689.87	Snowy Hydro	MURRAY	Energy	\$7 440.00	1.17	\$8,689.9
14:55	\$8 771.93	Macquarie	BW03	Energy	\$8 771.93	1.00	\$8,771.9
15:00	\$8 693.89	Snowy Hydro	MURRAY	Energy	\$7 440.00	1.17	\$8,693.9
Spot price	\$8 647.59						

Wednesday 9 November – New South Wales 3.30 pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
15:05	\$7 362.45	Macquarie	LD04	Energy	\$7 362.45	1.00	\$7,362.5
15:10	\$4 964.09	Macquarie	LD04	Energy	\$4 964.09	1.00	\$4,964.1
15:15	\$416.39	Cummins	ANGAS2	Energy	\$292.00	1.43	\$416.4
15:20	\$4 964.09	Macquarie	LD04	Energy	\$4 964.09	1.00	\$4,964.1
15:25	\$4 932.40	Macquarie	LD03	Energy	\$4 932.40	1.00	\$4,932.4
15:30	\$8 666.24	Macquarie	BW02	Energy	\$8 666.24	1.00	\$8,666.2
Spot price	\$5 217.61						

Wednesday 9 November – New South Wales 4 pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
15:35	\$9 000.00	Eraring Energy	ER02	Energy	\$9 000.00	1.00	\$9,000.0
15:40	\$9 000.00	Eraring Energy	ER02	Energy	\$9 000.00	1.00	\$9,000.0
15:45	\$9 000.00	Eraring Energy	ER02	Energy	\$9 000.00	1.00	\$9,000.0
15:50	\$9 000.00	Eraring Energy	ER02	Energy	\$9 000.00	1.00	\$9,000.0
15:55	\$10 059.48 <i>(Capped to \$10 000)</i>	Snowy Hydro	MURRAY	Energy	\$42.00	-0.16	\$-6.7
			TUMUT3	Energy	\$7 539.69	1.34	\$10,066.2
16:00	\$9 000.00	Eraring Energy	ER02	Energy	\$9 000.00	1.00	\$9,000.0
Spot price	\$9 166.67						

³ NEMMCO first published details on how the price is determined, for every dispatch interval, in June 2004. Documentation of this process can be found at <http://www.nemmco.com.au/dispatchandpricing/140-0036.htm>

APPENDIX 1 – Price setters

Wednesday 9 November – New South Wales 4.30 pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
16:05	\$9 576.52	Eraring Energy	SHGEN	Energy	\$9 900.01	0.64	\$6,375.0
		Snowy Hydro	MURRAY	Energy	\$7 440.00	0.01	\$103.0
			TUMUT3	Energy	\$7 539.69	0.41	\$3,098.6
16:10	\$8 932.86	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$285.0
			TUMUT3	Energy	\$7 539.69	1.15	\$8,647.9
16:15	\$8 867.82	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$280.2
			TUMUT3	Energy	\$7 539.69	1.14	\$8,587.6
16:20	\$8 927.15	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$284.6
			TUMUT3	Energy	\$7 539.69	1.15	\$8,642.6
16:25	\$8 929.53	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$284.7
			TUMUT3	Energy	\$7 539.69	1.15	\$8,644.8
16:30	\$8 982.49	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$288.6
			TUMUT3	Energy	\$7 539.69	1.15	\$8,693.9
Spot price	\$9 036.67						

Thursday 10 November – New South Wales 4 pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
15:35	\$8 562.35	Snowy Hydro	TUMUT3	Energy	\$7 511.27	1.14	\$8,562.3
15:40	\$8 572.45	Snowy Hydro	TUMUT3	Energy	\$7 511.27	1.14	\$8,572.5
15:45	\$8 687.45	Macquarie	BW02	Energy	\$8 666.24	1.21	\$10,525.0
		Snowy Hydro	TUMUT3	Energy	\$7 511.27	-0.24	\$-1,837.5
15:50	\$8 815.20	Macquarie	BW03	Energy	\$8 771.93	1.21	\$10,652.6
		Snowy Hydro	TUMUT3	Energy	\$7 511.27	-0.24	\$-1,837.4
15:55	\$8 519.89	Snowy Hydro	TUMUT3	Energy	\$7 511.27	1.13	\$8,519.9
16:00	\$8 746.68	Snowy Hydro	MURRAY	Energy	\$7 440.00	0.04	\$273.8
			TUMUT3	Energy	\$7 511.27	1.13	\$8,472.9
Spot price	\$8 650.67						