Spot prices greater than $5 000/MWh

AUSTRALIAN ENERGY REGULATOR

NEW SOUTH WALES 31 OCT 2005

Introduction

A forced network outage on one of the major transmissions lines between Wallerawang and south Sydney on 30 October, and the need for a further network outage, to facilitate repairs, the following day, resulted in significant disruption to the market.

Spot prices in New South Wales were above $5 000/MWh for five trading intervals on Monday 31 October, when network constraints designed to manage the outage failed to maintain power flows on the network below secure levels. Spot prices peaked at $6 724/MWh in New South Wales with five-minute prices driven to almost zero at times, in all other regions. This event saw almost $180 million added to the energy market turnover in New South Wales and Queensland.

The AER is required to prepare and 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 market Rules. In accordance with that requirement, this report:

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

There are a number of issues arising out of this event that require further examination. The AER is continuing its investigations, in particular with respect to compliance with the rules.

Description of the event

A forced network outage on one of the major transmissions lines between Wallerawang and south Sydney (line 76) occurred on Sunday 30 October at 7.30am. This outage also led to a loss of communications to a number of major power stations and substations west of Sydney. To facilitate repairs to this line, and to reinstate the communication capability, Transgrid requested a further network outage to the parallel line (77) between Wallerawang and south Sydney via Ingleburn. This further outage commenced at around 9.30am the following day. These lines provide a major link to the generation west of Sydney.

As a result of the outage of the 77 line on Monday, network constraints drove a step reduction of up to 1 000MW on transfers into New South Wales across the QNI and

Snowy interconnectors. Furthermore, significant amounts of generation were dispatched out of merit order. The outage of the 77 line was not forecast.

Six New South Wales network constraints bound as a result; four of these were violated for a majority of the outage. The 5-minute price in New South Wales increased from $20/MWh at 9.30am to $6 280/MWh at 9.35am. The price generally remained above $6 000/MWh until 11am when it fell to $91/MWh.

NEMMCO's preliminary operational report into the event, which was released on 4 November, stated that *"the combined constraint action was not effective"*. In order to restore power system security, NEMMCO recalled the 77 line outage at around 10am.

NEMMCO modified the constraints, and at around 2pm a further outage of the 77 line occurred to continue the repairs. No prior notice of that outage was provided to the market. Again, a number of network constraints in New South Wales and Queensland bound as a result; five of these constraints were violated. The 5-minute dispatch price in New South Wales increased from $33/MWh at 1.55pm to $10 000/MWh at 2pm. The price remained above $6 000/MWh for a number of dispatch intervals until around 3pm when it fell to around $320/MWh. The price in Queensland was also close to the price cap for three dispatch intervals from 2pm.

The New South Wales prices and how those prices were determined by the market systems are detailed in Appendix 1.

Prices above $5 000/MWh

There were five 30-minute trading intervals where the spot price was greater than $5,000/MWh, on Monday 31 October. These occurred at 10am, 10.30am, 11am, 2.30pm and 3pm. The spot price peaked at $6 724/MWh in New South Wales with five-minute prices driven to almost zero at times, in all other mainland regions. These events added almost $180 million to turnover in the energy market in New South Wales and Queensland.

The contributing factors to market prices can be categorised into:

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

Market forecasts. Figure 1 shows a number of key indicators for New South Wales for the five trading intervals 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 QNI and Snowy interconnectors, with forecasts 4 and 12 hours ahead of dispatch. This information is extracted from the market data published by NEMMCO.

Figure 1: Actual and forecast information for New South Wales

Monday, 31 October

10:00 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	5 677.08	22.00	20.77
Demand (MW)	9 905	9 460	9 436
Available capacity (MW)	9 105	9 315	9 395
QNI export capability	-276	-161	-147
Constraint ID	N>Q-NIL_1A	N>Q-NIL_1A	N>Q-NIL_1A
QNI import capability	-174	-1059	-1067
Constraint ID	N>>N-NIL_1N	Q:N_NIL_BCK2L-G	Q:N_NIL_BCK2L-G
Snowy export capability	593	1897	1719
Constraint ID	N>>N-NIL_28	H>>H-64_B	H>>H-64_B
10:30 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	6 661.42	20.89	21.58
Demand (MW)	9 853	9 403	9 423
Available capacity (MW)	9 065	9 445	9 425
QNI export capability	-212	-119	-33
Constraint ID	N>Q-NIL_1A	N>Q-NIL_1A	N>Q-NIL_1A
QNI import capability	-429	-1065	-1050
Constraint ID	N>>N-NIL_28	Q:N_NIL_BCK2L-G	Q:N_NIL_N4
Snowy export capability	750	1887	1721
Constraint ID	N>>N-NIL_28	H>>H-64_B	H>>H-64_B
11:00 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	6 489.47	22.00	29.55
Demand (MW)	9 845	9 426	9 451
Available capacity (MW)	9 095	9 445	9 425
QNI export capability	-277	-156	-30
Constraint ID	N>Q-NIL_1A	N>Q-NIL_1A	N>Q-NIL_1A
QNI import capability	-808	-1078	-1028
Constraint ID	N>>N-NIL_28	Q:N_NIL_BCK2L-G	Q:N_NIL_N4
Snowy export capability	781	1742	1751
Constraint ID	N>>N-NIL_28	H>>H-64_B	H>>H-64_B
2:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	6 724.08	20.70	21.36
Demand (MW)	9 908	9 423	9 324
Available capacity (MW)	9 683	9 623	9 803
QNI export capability	-175	58	69
Constraint ID	N>Q-NIL_1A	N>Q-NIL_1A	N>Q-NIL_1A
QNI import capability	-945	-1070	-936
Constraint ID	N>>N-WWSS+WWIG_E	Q:N_NIL_BCK2L-G	Q:N_NIL_N4
Snowy export capability	290	1647	1947
Constraint ID	N>>N-WWSS+WWIG_E	H>>H-64_B	H>>H-64_B
3:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	5 189.30	20.21	21.21
Demand (MW)	9 822	9 462	9 361
Available capacity (MW)	9 720	9 593	9 833
QNI export capability	-122	107	71
Constraint ID	N>Q-NIL_1A	N>Q-NIL_1A	N>Q-NIL_1A
QNI import capability	-1069	-1064	-969
Constraint ID	N>>N-WWSS+WWIG_E	Q:N_NIL_BCK2L-G	Q:N_NIL_N4
Snowy export capability	272	1636	1946
Constraint ID	N>>N-WWSS+WWIG_E	H>>H-64_B	H>>H-64_B

Note:
QNI export capability is the maximum allowable flow across QNI into Queensland. QNI import refers to allowable flows into New South Wales. Snowy export capability is for flows into New South Wales.
The constraint identified by N>>N-NIL_1N manages the flows across the Liddell-Tomago(82) or Liddell-Newcastle(81) line for the loss of either.
N>>N-NIL_28; manages the flows across the Marulan-Dapto(8) or Marulan-Avon(16) line for the loss of either.
N>>N-WWSS+WWIG_E manages flow on the Marulan-Dapto(8) line for a loss of the Marulan-Avon(16) line (with the 76 and 77 lines out). This constraint replaced the (N>N-76+77E) constraint which was used in the morning for the same purpose.

Demand was as much as 500MW higher than forecast four hours to dispatch. This error, which equates to around 5 per cent, is significant, but errors of this magnitude occur in New South Wales on average around seven per cent of the time. The actual capability for flows across the QNI and Snowy interconnectors into New South Wales was significantly lower than forecast.

Delays in the return to service of generators at Vales Point and Liddell resulted in around 400MW less capacity throughout the morning than that forecast 4 and 12 hours ahead.

The outage of the 76 line on Sunday morning was unplanned, and therefore was not forecast. The outage of the 77 line, to facilitate repairs, was initially scheduled for Sunday evening, but did not proceed due to poor weather conditions. Notice of a planned outage of the 77 line in conjunction with the 76 line for Monday morning was issued at 7.15pm on Sunday. This advice was cancelled later that evening. At around 9.30am Monday morning, the outage proceeded with no prior warning.

A market notice at 1.35pm on Monday explained that a further outage of the 77 line was about to commence and that interconnectors into New South Wales may be constrained. Constraints to manage the network outage were implemented at the same time. At 5.15pm, NEMMCO advised that work associated with the outage of both the 76 and 77 lines had been completed at 4.30pm.

Changes to network availability. The outages of the 77 line which commenced at around 9.30am and 2pm, led to step reductions of up to 1 000MW on transfers into New South Wales. There were two periods of reduced capability - from 9.35am to 11am and from 2pm to 4.25pm. These changes were not forecast. Figure 2 highlights the step reduction in capability for exports from Snowy into New South Wales, with the target flow violating this limit for a substantial period in the morning and a further shorter period in the afternoon.

Figure 2: Snowy export capability and target flow

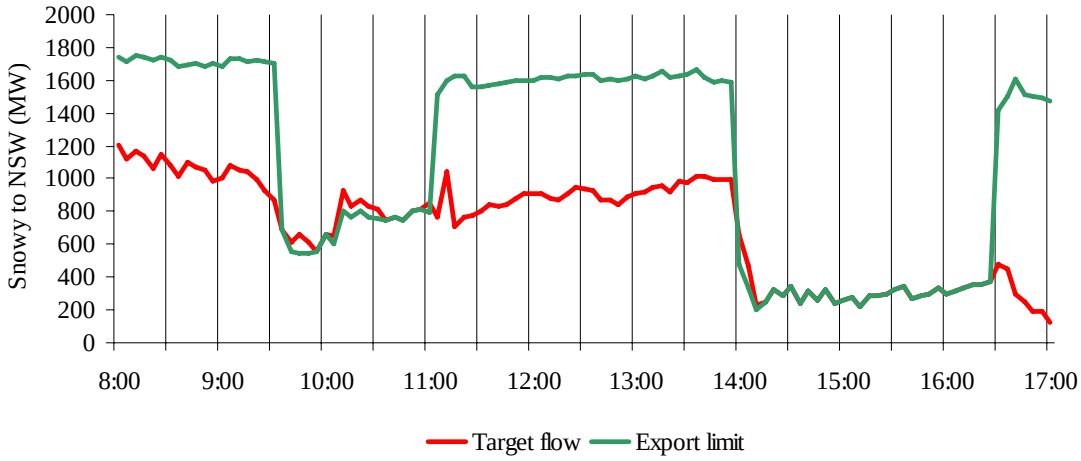
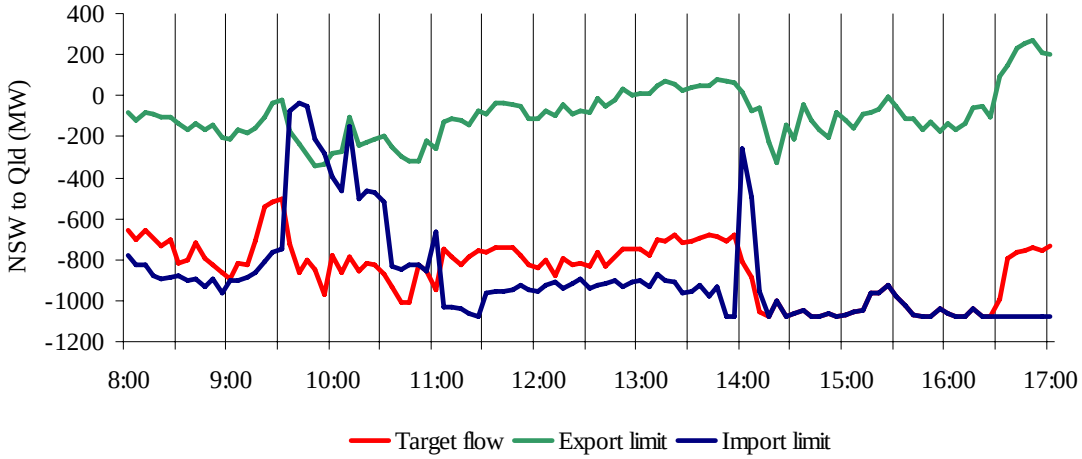


Figure 3 highlights the step changes in capability for flows into New South Wales from Queensland (or imports across QNI). The target flow violated the import limit for most of the morning outage and a further shorter period in the afternoon. Furthermore, the limits on QNI, for the period between 9.35am and 9.55am, were infeasible with the export limit lower than the import limit[1].

Figure 3: QNI capability and target flow



Appendix 2 shows the forecast interconnector capability for a number of forecasts ahead of dispatch, for both the Snowy to New South Wales and QNI interconnectors.

Rebidding. In response to the network outage at around 9.30am, almost 3 000 MW of capacity was rebid to prices below zero by Macquarie Generation and Delta Electricity.

Over the course of the day, Delta Electricity shifted as much as 1 500 MW of capacity to prices of less than zero across its portfolio, and reduced the rate at which generators at Wallerawang and Mount Piper could reduce output. These rebids saw the rate of change reduced to 1MW/min during the period of the network outages. The rebid reasons given included "Line constraints::ROC DN change/Band shift", "Constraint management::Band shift", "Line constraint::ROC change" and "Line constraints::Band shift/ROC change".

Macquarie Generation rebid just under 1 500 MW of capacity to prices of less than zero. The rebid reason given was "constraint management". Later, at 5.57pm, 400MW of capacity was shifted from prices of less than zero to prices around $8 000/MWh. The rebid reason given was "RP/Volume tradeoff – network constraints".

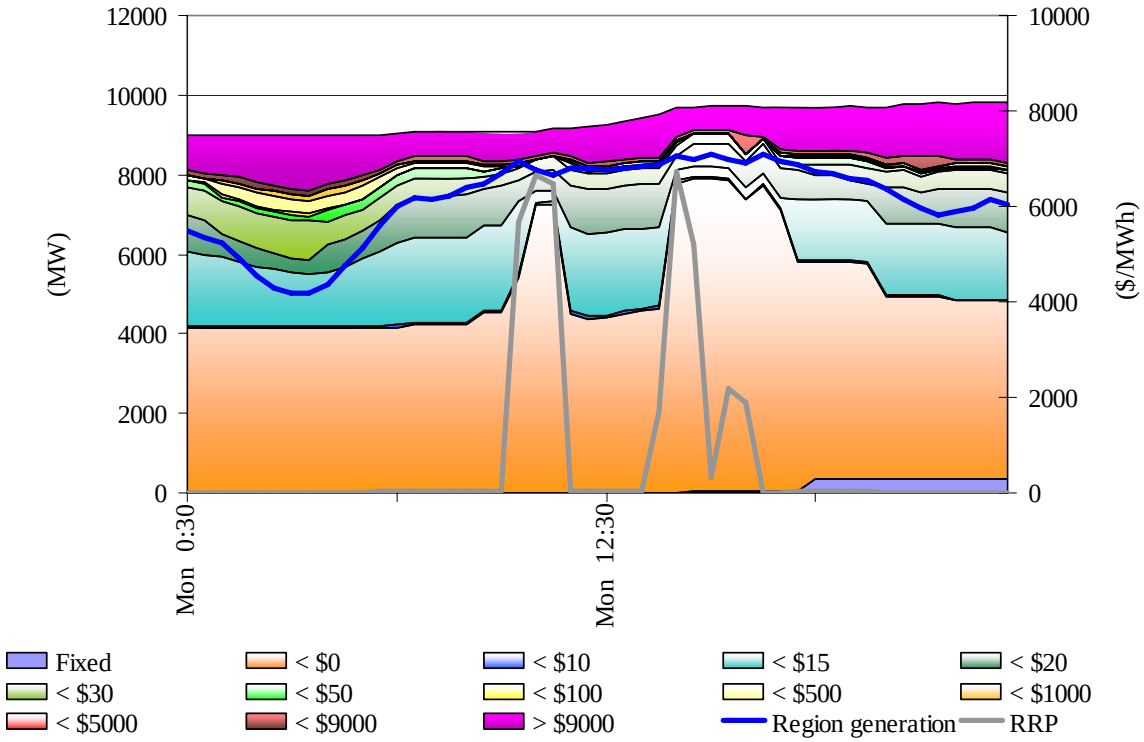
Rebidding did not contribute to the spot price exceeding $5,000/MWh.

[1] At all times the export limit for an interconnector must be greater than the import limit and flows must be between these limits. The limits on QNI, for the period between 9.35am and 9.55am, were infeasible with the export limit falling below the import limit.

Offer prices

Figure 4 presents the capacity offered into the market within a series of price thresholds for New South Wales. Spot price and region generation are overlaid. It highlights the rebidding into negative prices that occurred subsequent to the high price periods. There was no rebidding that affected the capacity presented at prices greater than or equal to $5,000/MWh.

Figure 4: New South Wales closing bid prices, region dispatch and region price.



Australian Energy Regulator
December 2005

APPENDIX 1 - Price setters

The following table identifies for each trading interval in which the spot price exceeded $5,000/MWh, every five-minute despatch interval price and the generating units involved in setting the energy price. This information is published by NEMMCO[2]. 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.

Monday 31 October – New South Wales 10am

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
09:35	$6,279.75	Eraring Energy	humensw	Energy	$0.97	-335.82	-$325.74
		Snowy Hydro	murray	Energy	$19.50	338.74	$6,605.49
09:40	$432.32	Enertrade	oakey1	Energy	$299.85	1.46	$437.46
		Snowy Hydro	murray	Energy	$19.50	-0.26	-$5.14
09:45	$6,403.83	Eraring Energy	humensw	Energy	$0.97	-342.45	-$332.18
		Snowy Hydro	murray	Energy	$19.50	345.44	$6,736.00
09:50	$4,340.68	CS Energy	swan_b_1	Energy	$29.81	0.69	$20.44
			swan_b_4	Energy	$29.81	0.69	$20.44
		Delta Electricity	mp2	Raise 5 min	$5.00	44.12	$220.61
		Macquarie Generation	bw03	Raise 5 min	$0.40	-46.38	-$18.55
			bw03	Energy	$9,828.79	46.38	$455,865
			bw04	Raise reg	$0.04	-2.26	-$0.09
			bw04	Raise 5 min	$1.80	2.26	$4.07
			ld01	Raise reg	$0.01	2.26	$0.02
			ld01	Energy	$9,996.83	-45.19	-$451,770
		Eraring Energy	shpump	Load	$0.00	1.32	$0.00
		Snowy Hydro	murray	Energy	$19.50	-0.06	-$1.14
09:55	**$10,457.19 *(capped to $10 000)***	CS Energy	swan_b_1	Raise 5 min	$1.00	-10.70	-$10.70
			swan_b_1	Energy	$98.00	10.70	$1,048.62
			swan_b_1	Raise 60 sec	$0.20	-4.10	-$0.82
			swan_b_1	Raise 6 sec	$0.20	-4.09	-$0.82
		Delta Electricity	mp1	Raise 5 min	$5.00	10.70	$53.50
			mp2	Raise 6 sec	$2.90	4.09	$11.86
		Macquarie Generation	bw02	Raise 60 sec	$1.20	4.10	$4.92
			ld04	Energy	-$999.16	-9.41	$9,405.91
		Eraring Energy	shpump	Load	$0.00	-4.23	$0.00
		Snowy Hydro	murray	Energy	$19.50	-2.84	-$55.29
10:00	$6,605.93	CS Energy	call_b_2	Raise reg	$3.75	0.73	$2.75
		Eraring Energy	er02	Energy	$9,000.00	0.73	$6,599.50
			er02	Raise reg	$0.07	-0.73	-$0.05
		Snowy Hydro	murray	Energy	$19.50	-0.07	-$1.35
		Tarong	tarong#3	Energy	$13.28	0.38	$5.07
Spot price	**$5 677.08**						

[2] 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

Monday 31 October – New South Wales 10.30am

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
10:05	$6,663.47	CS Energy	swan_b_3	Raise 5 min	$1.20	-0.38	-$0.46
			swan_b_3	Energy	$98.00	0.38	$37.69
			swan_b_3	Raise 6 sec	$0.01	-0.15	$0.00
			swan_b_3	Raise 60 sec	$0.01	-0.15	$0.00
		Eraring Energy	er02	Raise reg	$0.07	-0.74	-$0.05
			er02	Energy	$9,000.00	0.74	$6,623.58
		Snowy Hydro	murray	Energy	$0.04	-0.07	$0.00
		Tarong	w/hoe#1	Raise 5 min	$4.00	0.38	$1.54
		Tru Energy (SA)	torrb2	Raise 6 sec	$2.00	0.15	$0.29
			torrb2	Raise 60 sec	$1.00	0.15	$0.15
			torrb3	Raise reg	$1.00	0.74	$0.74
10:10	$6,702.87	International Power	hwps2	Energy	$4.03	-0.06	-$0.25
		Eraring Energy	er02	Raise reg	$0.07	-0.73	-$0.05
			er02	Energy	$9,000.00	0.73	$6,588.12
		Enertrade	gstone1	Raise reg	$1.00	0.73	$0.73
			oakey1	Energy	$299.85	0.38	$114.33
10:15	$6,731.17	LYMMCO	lya3	Energy	$8.13	0.67	$5.47
			lya4	Raise reg	$0.30	0.74	$0.22
			lya4	Energy	$8.11	-0.74	-$5.96
		Eraring Energy	er02	Raise reg	$0.07	-0.74	-$0.05
			er02	Energy	$9,000.00	0.74	$6,616.32
		Enertrade	oakey1	Energy	$299.85	0.38	$115.17
10:20	$6,605.51	International Power	loyyb2	Energy	$8.19	0.67	$5.49
		LYMMCO	lya4	Raise reg	$0.30	0.73	$0.22
			lya4	Energy	$8.11	-0.73	-$5.95
		Eraring Energy	er02	Raise reg	$0.07	-0.73	-$0.05
			er02	Energy	$9,000.00	0.73	$6,601.09
		Tarong	tarong#2	Energy	$12.31	0.38	$4.71
10:25	$6,609.99	International Power	loyyb2	Energy	$8.19	0.67	$5.50
		LYMMCO	lya3	Energy	$8.13	-0.73	-$5.97
			lya3	Raise reg	$0.30	0.73	$0.22
		Eraring Energy	er02	Raise reg	$0.07	-0.73	-$0.05
			er02	Energy	$9,000.00	0.73	$6,605.20
		Tarong	tarong#3	Energy	$13.28	0.38	$5.09
10:30	$6,655.52	CS Energy	swan_b_3	Raise 6 sec	$0.40	-0.15	-$0.06
			swan_b_3	Energy	$98.00	0.38	$37.64
			swan_b_3	Raise 60 sec	$0.40	-0.15	-$0.06
			swan_b_3	Raise 5 min	$1.20	-0.38	-$0.46
		Delta Electricity	mp1	Raise 5 min	$5.00	0.38	$1.92
		LYMMCO	lya1	Raise reg	$0.30	0.74	$0.22
			lya3	Energy	$8.13	-0.06	-$0.51
		Eraring Energy	er02	Raise reg	$0.07	-0.74	-$0.05
			er02	Energy	$9,000.00	0.74	$6,616.46
		Tarong	tarong#3	Raise 60 sec	$0.80	0.15	$0.12
		Tru Energy (SA)	torrb2	Raise 6 sec	$2.00	0.15	$0.29
Spot price	**$6 661.42**						

APPENDIX 1 - Price setters

Monday 31 October – New South Wales 11am

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
10:35	**$16,782.78 *(capped to $10 000)***	CS Energy	swan_b_1	Energy	$549.67	11.31	$6,215.48
			swan_b_1	Raise 5 min	$1.00	-11.31	-$11.31
			swan_b_1	Raise 60 sec	$0.01	-4.33	-$0.04
			swan_b_1	Raise 6 sec	$0.01	-4.32	-$0.04
		LYMMCO	lya1	Energy	$8.12	-2.72	-$22.07
		Macquarie Generation	bw01	Raise 60 sec	$0.80	4.33	$3.46
			bw01	Raise 5 min	$6.80	11.31	$76.89
			bw03	Energy	-$999.79	-5.26	$5,255.87
			bw04	Energy	-$999.79	-5.26	$5,255.87
		Eraring Energy	shpump	Load	$0.00	-4.90	$0.00
		Tru Energy (SA)	torrb3	Raise 6 sec	$2.00	4.32	$8.65
10:40	$7,808.34	Delta Electricity	mm4	Energy	$9,995.02	0.77	$7,705.04
		LYMMCO	lya3	Energy	$8.13	-0.06	-$0.45
		Enertrade	oakey1	Energy	$299.85	0.35	$103.75
10:45	$7,809.45	Delta Electricity	mm4	Energy	$9,995.02	0.77	$7,706.12
		International Power	loyyb2	Energy	$8.19	-0.06	-$0.45
		Enertrade	oakey1	Energy	$299.85	0.35	$103.78
10:50	$6,605.25	CS Energy	swan_e	Energy	$0.00	0.38	$0.00
		LYMMCO	lya2	Raise reg	$0.30	0.51	$0.15
			lya2	Energy	$8.10	-0.06	-$0.50
			lya2	Raise 60 sec	$0.40	0.03	$0.01
			lya2	Raise 6 sec	$0.50	0.02	$0.01
		Macquarie Generation	bw01	Raise 60 sec	$0.80	-0.03	-$0.02
		Eraring Energy	er01	Raise reg	$0.07	-0.51	-$0.04
			er01	Energy	$9,000.00	0.73	$6,605.67
		Tru Energy (SA)	torrb2	Raise 6 sec	$2.00	-0.02	-$0.04
10:55	$6,622.36	International Power	loyyb2	Energy	$8.25	-0.06	-$0.51
		Eraring Energy	er01	Energy	$9,000.00	0.74	$6,617.80
		Tarong	tarong#1	Energy	$13.18	0.38	$5.06
11:00	$91.44	International Power	loyyb2	Energy	$8.25	-0.24	-$1.98
		Enertrade	oakey1	Energy	$62.62	1.49	$93.42
Spot price	**$6 489.47**						

APPENDIX 1 - Price setters

Monday 31 October – New South Wales 2.30pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
14:05	**$18,672.64 *(capped to $10 000)***	Snowy Hydro	murray	Energy	$19.50	-0.60	-$11.75
		Tarong	w/hoe#1	Energy	$10,000.00	1.87	$18,684
14:10	**$20,055.58 *(capped to $10 000)***	Southern Hydro	wkiewa1	Raise 60 sec	$0.68	0.62	$0.42
			wkiewa1	Raise 6 sec	$1.69	0.62	$1.04
			wkiewa1	Energy	$11.05	-0.62	-$6.82
		Stanwell	stan-1	Raise 6 sec	$2.28	-0.62	-$1.41
		Tarong	w/hoe#1	Energy	$10,000.00	2.01	$20,062
		Tru Energy (SA)	torrb3	Raise 60 sec	$1.00	-0.62	-$0.62
14:15	**$15,972.21 *(capped to $10 000)***	CS Energy	call_b_2	Raise 60 sec	$1.10	0.15	$0.16
		LYMMCO	lya1	Raise 60 sec	$0.40	-0.15	-$0.06
			lya1	Raise 6 sec	$0.50	-0.10	-$0.05
			lya1	Energy	$14.26	0.34	$4.90
		Macquarie Generation	ld04	Energy	-$999.16	-1.03	$1,027.04
		Eraring Energy	er01	Energy	$9,000.00	0.55	$4,980.01
			er02	Energy	$9,000.00	1.11	$9,960.01
		Tru Energy (SA)	torrb3	Raise 6 sec	$2.00	0.10	$0.20
14:20	**$16,007.00 *(capped to $10 000)***	Macquarie Generation	ld04	Energy	-$999.16	-1.03	$1,029.02
		Eraring Energy	er02	Raise reg	$0.07	-1.66	-$0.12
			er02	Energy	$9,000.00	1.66	$14,968
		Snowy Hydro	murray	Energy	$19.50	0.36	$6.98
		Tarong	tarong#2	Raise reg	$1.40	1.66	$2.33
14:25	$324.09	Delta Electricity	ww8	Energy	-$1,000.00	-0.29	$294.78
		Eraring Energy	er01	Energy	$24.00	0.47	$11.28
			er02	Energy	$24.00	0.47	$11.28
		Snowy Hydro	murray	Energy	$19.50	0.35	$6.75
14:30	$20.40	DirectLink	n-q-mnsp1	Energy	$20.00	1.49	$29.85
		Snowy Hydro	murray	Energy	$19.50	-0.48	-$9.45
		Tarong	tnps1	Energy	$0.00	1.60	$0.00
Spot price	**$6 724.08**						

APPENDIX 1 - Price setters

Monday 31 October – New South Wales 3pm

Time	Dispatch price	Participant	unit	Service	Offer	Marginal change	Portion
14:35	$321.71	Delta Electricity	ww7	Energy	-$1,000.00	-0.15	$150.13
			ww8	Energy	-$1,000.00	-0.14	$144.13
		Eraring Energy	er01	Lower reg	$0.07	0.47	$0.03
			er01	Energy	$24.00	0.47	$11.26
			er02	Lower reg	$0.07	0.47	$0.03
			er02	Energy	$24.00	0.47	$11.26
		Snowy Hydro	murray	Energy	$19.50	0.35	$6.73
		Tarong	tarong#2	Lower reg	$2.00	-0.94	-$1.88
14:40	$7,880.31	Eraring Energy	er01	Energy	$24.00	-0.07	-$1.70
			er02	Energy	$24.00	-0.07	-$1.70
			shgen	Energy	$9,900.01	0.80	$7,877.12
		Snowy Hydro	murray	Energy	$19.50	0.34	$6.59
14:45	$7,866.05	Eraring Energy	er01	Energy	$24.00	-0.07	-$1.70
			er02	Energy	$24.00	-0.07	-$1.70
			shgen	Energy	$9,900.01	0.79	$7,862.88
		Snowy Hydro	murray	Energy	$19.50	0.34	$6.57
14:50	$7,872.99	Eraring Energy	er01	Lower reg	$0.07	-0.07	$0.00
			er01	Energy	$24.00	-0.07	-$1.70
			er02	Lower reg	$0.07	-0.07	$0.00
			er02	Energy	$24.00	-0.07	-$1.70
			shgen	Energy	$9,900.01	0.80	$7,876.05
		Snowy Hydro	murray	Energy	$0.04	0.34	$0.01
		Tarong	tarong#2	Lower reg	$2.40	0.14	$0.34
14:55	$306.23	Delta Electricity	mp1	Energy	-$1,000.00	-0.14	$143.02
			mp2	Energy	-$1,000.00	-0.14	$143.02
		Eraring Energy	er01	Lower reg	$0.07	0.47	$0.03
			er01	Energy	$24.00	0.47	$11.17
			er02	Lower reg	$0.07	0.47	$0.03
			er02	Energy	$24.00	0.47	$11.17
		Snowy Hydro	murray	Energy	$0.04	0.34	$0.01
		Stanwell	stan-2	Lower reg	$2.39	-0.93	-$2.22
15:00	$6,888.54	Eraring Energy	Shgen	Energy	$9,900.01	0.70	$6,888.53
		Snowy Hydro	Murray	Energy	$0.04	0.30	$0.01
Spot price	**$5 189.30**						

APPENDIX 2 – Interconnector capability

The following tables show for each trading interval in which the spot price exceeded $5,000/MWh, the New South Wales to Queensland (QNI) and Snowy interconnector scheduled flows and limits.

The tables show actual flows for every dispatch interval within the trading interval together with the constraint identified in the market systems as responsible for those limits.

The table also shows for every predispatch run the forecast scheduled flows and limits together with the constraint identified in the market systems as responsible for that limit.

These forecasts are published every 30 minutes by NEMMCO, covering out to the next day.