Spot prices greater than \$5000/MWh

South Australia, Victoria 26 January 2006

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 \$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;

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- 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.

Description of the circumstances

At 3 pm on Thursday 26 January, the Australia Day public holiday, spot prices reached around \$7400/MWh in Victoria and \$7750/MWh in South Australia. Despite the holiday, combined demand across the two regions reached 10 265 MW at 4 pm. This extreme demand was the fifth highest for the summer to that time and was driven by temperatures in Melbourne and Adelaide of around 40 degrees.

Around 1000 MW of typically low priced capacity was unavailable for much of the week. Two units at Yallourn in Victoria and one at Northern power station in South Australia were out of service as a result of plant problems. One Yallourn unit was returned to service late in the day.

From 1 pm, flows into Victoria from Snowy were reduced from 1600 MW to 1100 MW by NEMMCO to manage network conditions in the Snowy region. This discretionary constraint was revoked at 2.50pm. Constraints related to the CSC/CSP trial were determining the limits for flows from Snowy into Victoria for all but 11 dispatch intervals throughout the afternoon.

At 1.35pm, a \$7440/MWh price spike in the Snowy region, combined with the constraints on the interconnector into Victoria which saw flows forced south, saw one dispatch interval of counter price flows across that interconnector. At 2.55pm the discretionary constraint for flows into Victoria was removed. This saw a further dispatch interval of counter price flows. These were the only counter price flows across that interconnector for the day.

At 3 pm a series of new constraints were implemented by NEMMCO to manage the negative residues. This had the effect of re-orienting the constraints in such a way as to no longer control the Snowy to Victoria interconnector, but instead control the Murray generator. This saw the limit on flows into Victoria restored to around 1600 MW and, relieve the constraint on the interconnector. The re-orientation, however, resulted in significant counter-price flows on the Snowy to New South Wales interconnector. This arrangement, which had only ever been used on two prior occasions, remained in place until 7 pm.

Five-minute dispatch prices in South Australia rose to a high of \$9683/MWh at 2.35 pm, and more than \$7600/MWh for the following three intervals. Dispatch prices for 2.55 pm and 3pm were around \$6900/MWh. Prices in Victoria during this period were similar.

The marginal scheduled generating units involved in setting spot prices above \$5000/MWh in Victoria and South Australia and how those prices were determined by the market systems are detailed in Appendix 1.

Prices above \$5000/MWh

Prices were aligned between Victoria and South Australia all day, with the Heywood interconnector at close to zero for the peak demand periods. The spot price was greater than \$5000/MWh in Victoria and South Australia for the half hour trading interval ending 3 pm, peaking at \$7416/MWh and \$7758/MWh respectively. The Snowy to Victoria interconnector was unconstrained for 2.55pm to 3.50pm, with prices aligned across all three regions for that period.

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 1 shows, for the 3pm trading interval in Victoria, actual price, demand and available capacity and compares it with that forecast 4 and 12 hours ahead of dispatch. Figure 2 presents similar information for South Australia.

Figure 1: Victoria actual and forecast information

3pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	7416.16	9274.45	250.39
Demand (MW)	7834	7808	7568
Available capacity (MW)	7612	7607	7935

Actual conditions were close to those forecast four hours ahead. The temperature in Melbourne reached 39.2 degrees, which was slightly higher than the 38 degrees forecast the day before. During the 3pm trading interval there was less than 400 MW of generation capacity priced between \$100/MWh and \$5000/MWh in Victoria, which is slightly lower than was forecast 12 hours ahead. Demand in Victoria was high for a public holiday and around 300 MW higher than forecast 12 hours ahead. Available capacity on the same basis was around 300 MW lower than forecast.

Figure 2: South Australia actual and forecast information

3pm	Actual	4 hr forecast	12 hr forecast
Price (\$/MWh)	7758.08	9688.35	278.79
Demand (MW)	2326	2277	2107
Available capacity (MW)	2590	2594	2536

Actual conditions were close to those forecast four hours ahead. In Adelaide, the temperature reached 40 degrees, also slightly higher than forecast. Prices in South Australia were aligned with Victoria throughout the day. There was as little as 124 MW of capacity in South Australia priced between \$200/MWh and \$5000/MWh, down from the 283 MW of capacity forecast 12 hours ahead. Demand was around 200 MW higher than forecast 12 hours ahead with availability as forecast.

Changes to network availability. From 12.55 pm to 2.50 pm, NEMMCO invoked discretionary constraints to limit flows from Snowy into Victoria. Those constraints reduced import capability from Snowy, limiting flows into Victoria from around 1600 MW to 1100 MW.

Constraints classified as those related to the CSC/CSP trial were determining the limits for flows from Snowy into Victoria (and into New South Wales generally counter price) for all but 11 dispatch intervals throughout the afternoon.

At 3 pm a series of new constraints were implemented by NEMMCO to manage the accumulation of negative residues on flows from Snowy to Victoria. These constraints had the effect of re-orienting the intra-regional constraint away from Murray to Dederang in Victoria, replacing the Victoria to Snowy interconnector by generation at Murray and Guthega as control variables in a number of the constraint equations in the Snowy region. As a result, the limit on flows into Victoria rose to around 1600 MW with no further counter priced flows into Victoria occurring. This arrangement remained in place until 7pm, and represented only the third time such constraints had been implemented. As a result for most of the trading interval, flows south were around 150 MW lower than forecast four hours ahead.

Flows into South Australia from Victoria remained under 100 MW during the period with prices aligned across the regions. The limit across MurrayLink into South Australia was zero from 2.40 pm. Flows were restricted by a combination of network limitations in South Australia and by the constraint re-orientation in Snowy.

Figures 3-6 show the target flows and limits on the Victoria to Snowy, Victoria to South Australia, Murraylink and the Snowy to New South Wales interconnectors respectively between 12pm and 8pm on Thursday 26 January.





Figure 4:Vic-SA interconnector target flows including import and export limits



Figure 5 Murraylink interconnector target flows including import and export limits







Rebidding – Victoria.

From 6 am on Thursday 26 January, AGL shifted 150 MW of capacity at Somerton from prices above \$9000/MWh to zero. The rebid reason given was "Predispatch: forecast price increase::Commit".

At 9.49 am, LYMMCO shifted 105 MW of capacity from prices around \$245/MWh to around \$4110/MWh. The rebid reason given was "Change in demand FC".

At around 10.20 am, International Power shifted 520 MW of capacity at Loy Yang B and Hazelwood mostly from prices of less than \$100/MWh to prices above \$8000/MWh. The rebid reason given was "Change in SA/VIC PD demand price".

At around 10.30 am, TRU Energy reduced the availability at Yallourn by 80 MW. All of this capacity was priced at less than \$10/MWh. The rebid reason given was "Vacuum limit:::Reduce availability". At 11.12 am, effective immediately, Yallourn unit 3 was returned to service. This resulted in an increase of 300 MW of capacity priced at less than \$20/MWh four hours ahead. The rebid reason given was "Outage complete::increased availability". Further rebids at 12.12 pm and 1.24 pm reduced the availability for the trading interval to 100 MW. The rebid reasons given were "Delayed return to service::Plant issues".

At midday, LYMMCO rebid Loy Yang A unit 2 as fixed load at 480 MW. 20 MW of this capacity had previously been priced at around \$4000/MWh. The rebid reason given was "Init temp control – man agc issues".

Close to dispatch, there was a small increase in available capacity at low prices across the region, seeing prices lower than forecast four hours ahead across the two regions.

There was no other significant rebidding.

Rebidding – South Australia.

From 6am, AGL shifted 100 MW of capacity at Hallet from prices above \$9000/MWh to zero. The rebid reason given was "Predispatch: forecast price increase: bid generation to market to cover position". At 10.15am a further 40 MW was shifted from prices above \$9000/MWh to \$320/MWh. The rebid reason given was "Predispatch:forecast price increase".

At 6.44am, TRU Energy shifted 200 MW of capacity at Torrens Island from prices of more than \$300/MWh to \$55/MWh or less. The rebid reason given was "Market conditions – Gen response to PD Conditions".

There was no other significant rebidding.

Rebidding - Snowy

For the period between 10 am and 7 pm through its day-ahead offer, Snowy Hydro priced all capacity at Murray at around \$7500/MWh. More than 2000 MW or most of the capacity at Upper and Lower Tumut was priced at less than \$100/MWh. Early forecasts for the Victoria to Snowy interconnector showed flows south of more than 1200 MW. These flows were often forced south through constraints involved in the CSC/CSP trial.

Assessment

A combination of temperature driven high demands in both Victoria and South Australia, rebidding by International Power and the reduced availability of typically low priced capacity at TRU Energy's Yallourn and NRG Flinders' Northern power stations contributed to the price exceeding \$5000/MWh.

Issues related to the management of negative settlement residues, and the formulation of network constraints in general, which significantly influenced the outcomes on the day, are currently the subject of a broader review by the AEMC.

Offer prices. Figures 7 to 13 represent the capacity offered into the market within a series of price thresholds by participants with capacity at prices greater than \$5000/MWh in Victoria and South Australia. Those participants are: International Power (for its Synergen, Loy Yang B and Hazelwood plant), LYMMCO and Snowy (for generation at Valley Power, Murray, Upper Tumut and Lower Tumut). These figures compare capacity offered into the market, when the spot price was above \$5000/MWh, with other periods of the day. Spot price and dispatched generation are overlaid.



Figure 7: International Power - Synergen closing bid prices, dispatch and region price.



Figure 8: International Power - Loy Yang B closing bid prices, dispatch and region price.

Figure 9: International Power - Hazelwood closing bid prices, dispatch and region price.



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Figure 10: LYMMCO closing bid prices, dispatch and region price.

Figure 11: Snowy Hydro – Valley Power closing bid prices, dispatch and region price.



Figure 12: Snowy Hydro - Murray closing bid prices, dispatch and region price.



Figure 13: Snowy Hydro – Upper Tumut and Lower Tumut closing bid prices, dispatch and region price.



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Appendix 1

The following tables identify for each trading interval in which the spot price exceeded 5000/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 NEMMCO¹. 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/MWh are capped. The 30-minute spot price is the time weighted average of the six dispatch interval prices.

Time	Dispatch	Participant	Unit	Service	Offer	Marginal	Portion
	price(\$/MWh)				(\$/MWh)	change	(\$/MWh)
14:35	\$9,274.45	Int. Power	LOYYB2	Energy	\$9,274.45	1.00	\$9,274.45
14:40	\$7,250.49	LYMMCO	LYA4	Energy	\$7,250.49	1.00	\$7,250.49
14:45	\$7,251.49	LYMMCO	LYA3	Energy	\$7,251.49	1.00	\$7,251.49
14:50	\$7,251.49	LYMMCO	LYA3	Energy	\$7,251.49	1.00	\$7,251.49
14:55	\$6,715.05	Snowy Hydro	UPPTUMUT	Energy	\$0.00	-0.59	\$0.00
			TUMUT3	Energy	\$0.00	0.80	\$0.00
			MURRAY	Energy	\$7,440.00	0.90	\$6,715.05
15:00	\$6,753.99	Snowy Hydro	UPPTUMUT	Energy	\$0.00	0.01	\$0.00
			TUMUT3	Energy	\$0.00	0.19	\$0.00
			MURRAY	Energy	\$7,440.00	0.91	\$6,753.99
Spot	\$7416.16/MWh						

Thursday 26 January – Victoria 3pm

price

Thursday 26 January – South Australia 3pm

Time	Dispatch price(\$/MWh)	Participant	Unit	Service	Offer (\$/MWh)	Marginal change	Portion (\$/MWh)
14:35	\$9,683.31	Int. Power	LOYYB2	Energy	\$9,274.45	1.04	\$9,683.31
14:40	\$7,650.14	LYMMCO	LYA4	Energy	\$7,250.49	1.06	\$7,650.14
14:45	\$7,686.83	LYMMCO	LYA3	Energy	\$7,251.49	1.06	\$7,686.83
14:50	\$7,645.98	Snowy Hydro	LYA3	Energy	\$7,251.49	1.05	\$7,645.98
14:55	\$6,973.18	Snowy Hydro	UPPTUMUT	Energy	\$0.00	-0.61	\$0.00
			TUMUT3	Energy	\$0.00	0.83	\$0.00
			MURRAY	Energy	\$7,440.00	0.94	\$6,973.18
15:00	\$6,909.03	Snowy Hydro	UPPTUMUT	Energy	\$0.00	0.01	\$0.00
			TUMUT3	Energy	\$0.00	0.19	\$0.00
			MURRAY	Energy	\$7,440.00	0.93	\$6,909.03
Spot price	\$7758.08/MWh						

¹ 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