Electricity spot prices *above $5000/MWh*

9 November
New South Wales

AUSTRALIAN ENERGY REGULATOR

Introduction

The AER is required to publish a report whenever the electricity spot price exceeds $5000/MWh.[1] 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 9 November, the spot price in New South Wales reached $6498/MWh for the 3.30 pm trading interval, significantly higher than forecast.

Temperatures in Sydney exceeded 30 degrees for the fourth consecutive day, which saw demand reach 11 519 MW at 3.30 pm. Actual demand was more than 500 MW higher than forecast.

A planned outage of the South Sydney to Dapto 330 kV line commenced in the early hours of the morning. Early in the afternoon, TRUenergy reduced the available capacity of one of its Mount Piper units by 400 MW due to technical issues. This caused the constraint managing the planned network outage to bind, reducing flows from Victoria and constraining off generation at Uranquinty and Upper Tumut.

In response, Origin Energy (at Uranquinty) and Snowy Hydro (at Tumut and Upper Tumut) rebid significant capacity into negative prices, resulting in increased generation from these units. However, with the Sydney South to Dapto line out of service, flows were forced south, (counter-price) into Victoria, eventually resulting in negative settlement residues across the Vic-NSW interconnector of around $1.64 million.

When Macquarie Generation rebid 500 MW of available capacity at Bayswater and Liddell close to the price cap, the dispatch price reached the price cap for two dispatch intervals, resulting in the spot price reaching $6498/MWh for the 3.30 pm trading interval.

The events in New South Wales had flow on effects in Queensland, where the spot price reached $3608/MWh for the same trading interval.[2]

[1] This requirement is set out in clause 3.13.7 (d) of the National Electricity Rules.
[2] A detailed explanation of the events in Queensland on this day is contained in the *Electricity Weekly report* covering the week 6 to 12 November, available at www.aer.gov.au.

Actual and forecast demand

Figure 1 compares the actual demand, available capacity and spot price in New South Wales with that forecast by AEMO 4 and 12 hours ahead of dispatch.

For the fourth consecutive day the temperature in Sydney exceeded 30 degrees. Demand was around 500 MW higher than forecast 4 and 12 hours ahead and 320 MW higher than forecast half an hour ahead. Available capacity was 502 MW lower than forecast 4 hours ahead. Figure 1 shows that the actual spot price was significantly higher than forecast.

Figure 1: Actual and forecast demand, spot price and available capacity

3.30 pm	Actual	4 hr forecast	12 hr forecast
Demand (MW)	11519	11012	11077
Spot Price ($MW/h)	6498	36	37
Available capacity (MW)	12320	12822	12744

Generator offers and rebidding

Over several rebids from 1.13 pm, Snowy Hydro rebid all but 3 MW of its (combined) 2093 MW of capacity at Tumut three and Upper Tumut to prices close to the price floor (the majority of this capacity was previously priced above $100/MWh). The reasons given were "13:15 A Vic-NSW: Act flow 701 lwr thn 30mpd 13:15@12:32", "13:50 A NSW: Act dem 137 hgr thn 30mpd 13:50@13:02", "14:10 A Vic-NSW: act flow 145 lwr thn 30mpd 14:10@13:32 SL", "14:50 A NSW: act price $304.23 hgr thn 30mpd 14:50@14:02", 14:26 A mng unfcast N>>N-DTSS_20 binding on QNI".

As discussed under *Network Availability*, on the day, a constraint used to manage the planned outage of the Dapto to Sydney South 330 kV line (which runs between the Snowy Hydro generators at the Tumut stations and Sydney) was limiting imports into New South Wales from Victoria and constraining off generation at Upper Tumut and Uranquinty. When Snowy Hydro rebid capacity into lower prices at these stations, their dispatch increased from 1031 MW at 1.20 pm to 2090 MW by 3 pm, 1598 MW greater than forecast four hours ahead.

Over two rebids at 1.30 pm and 2.20 pm TRUenergy reduced the available capacity of Mt Piper unit two by a total of 400 MW, the majority of which was priced below $30/MWh. The reasons given for the rebids related to turbine oil seal issues.

At 2.50 pm, effective from 3 pm, Origin Energy rebid 664 MW of capacity at Uranquinty to close to the price floor (332 MW of which was priced above $300/MWh). The reasons given were "1445A Constraint Management N>>N-DTSS_20_SL". When Origin Energy rebid capacity into lower prices at Uranquinty its dispatch increased from 310 MW at 2.55 pm to 664 MW by 3.20 pm. Uranquinty was not forecast to be generating four hours ahead.

As explained under *Network Availability*, the combined increased generation at Tumut and Uranquinty led to flows being forced from New South Wales to Victoria across the Vic-NSW interconnector.

At 2.57 pm, effective from 3.05 pm, Macquarie Generation rebid 500 MW of available capacity at Bayswater and Liddell from prices below $31/MWh to above $11 400/MWh. The reason given was "1430A unforecast constraint binding in NSW". The 5 minute price increased from $96/MWh at 3 pm to $339/MWh at 3.05 pm and then to the price cap at 3.10 pm and 3.15 pm.

In response to the high prices, at 3.11 pm, effective from 3.20 pm, Delta Electricity rebid 163 MW of capacity at Colongra unit two from prices above $12 300/MWh to close to the price floor, committing the unit. The reason given was "1508A Price at VOLL". However,

the unit failed to start, so Delta Electricity rebid the unit's capacity of 175 MW unavailable at 3.21 pm, effective from 3.30 pm. The reason given was "1520P Start failure". This resulted in the 5 minute price reaching the price cap at 3.30 pm.[3]

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 New South Wales with capacity priced at or above $5000/MWh for the high-price periods are presented in **Appendix B**.

Network Availability

Figure 2 shows the difference between actual and forecast limits and flows, 4 and 12 hours ahead of dispatch on the Vic-NSW interconnector.

Figure 2: Actual and forecast limits and flows Vic-NSW interconnector (MW)

3.30 pm	Actual	4 hr forecast	12 hr forecast
Export	-518	1268	1283
Import limit	-1310	-369	-354
Flows into NSW	-518	971	1073

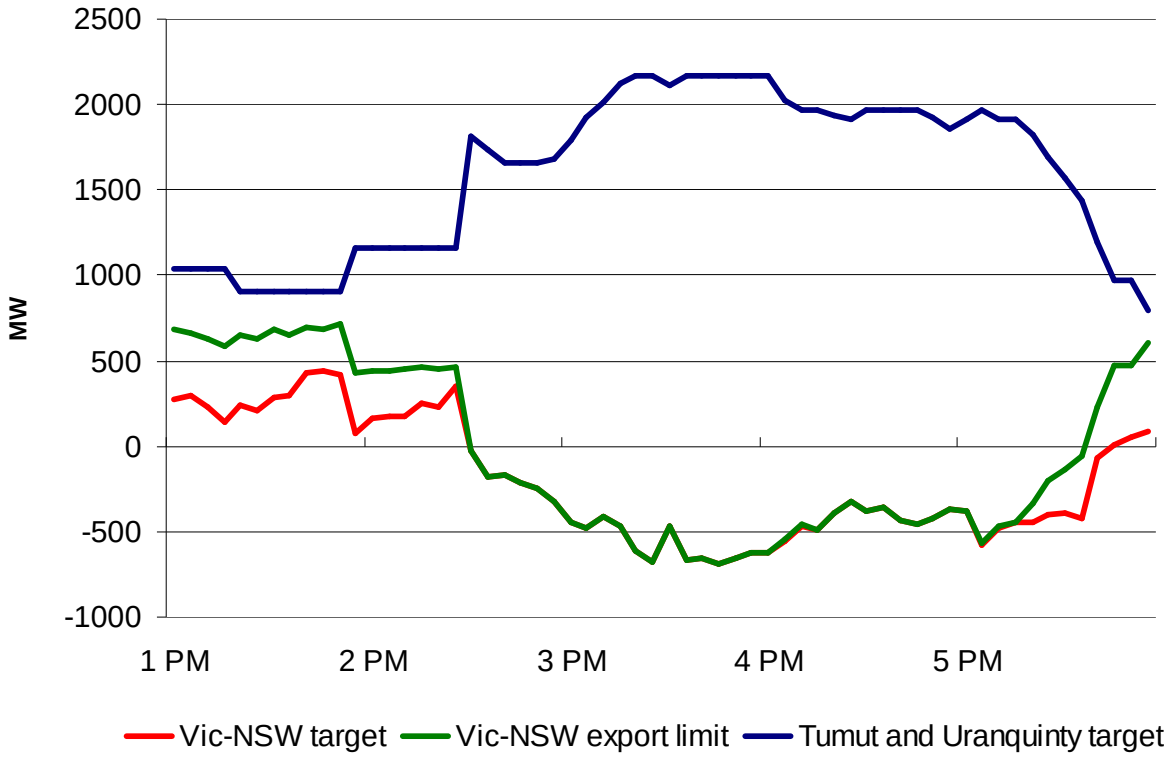
As shown in figure 2, four hours ahead the export limit for the 3.30 pm trading interval across the Vic-NSW interconnector was forecast to be flowing at 1268 MW into New South Wales.

The Dapto to Sydney South 330 kV line was planned to be out of service from 4.30 am. As discussed above, when TRUenergy reduced the available capacity of one of its Mt Piper units due to plant issues, the constraint invoked to manage the outage bound. The constraint bound for all but two dispatch intervals between 2.30 pm and 5 pm[4]. This constraint affects all generation in New South Wales as well as the three New South Wales connected interconnectors. Flows across the Vic-NSW interconnector and generation at Tumut and Uranquinty had the biggest effect on the constraint.

The relationship between combined generation from Tumut and Uranquinty power stations and flows across the Vic-NSW interconnector on the day is shown in figure 3. Figure 3 shows that when combined generation from these stations (as shown by the blue line) increased from around 2.30 pm, the export limit changed, forcing flows on the Vic-NSW interconnector (shown by the green and red lines respectively) into Victoria. This is because the outage of the Sydney South to Dapto line meant that all of the low-priced generation at Uranquinty and Tumut was not able to flow towards the load centre in Sydney and instead was forced south into Victoria. The spot price in Victoria at the time was $29/MWh, so these flows were counter-price. Flows were at the export limit and reached 518 MW at 3.30 pm, compared to 971 MW flow from Victoria to New South Wales forecast four hours ahead.

[3] The 5 minute price was $1100/MWh at 3.20 pm and $37/MWh at 3.25 pm.
[4] The constraint did not bind for the 4.05 pm and 4.10 pm dispatch intervals.

Figure 3: Actual export limit and flows on Vic-NSW interconnector and Tumut and Uranquinty generation



As combined generation output increased, flows into Victoria (counter-price) also increased, resulting in around $1.64 million of negative settlement residues accruing across the Vic to NSW interconnector between 3 pm and 5 pm.

Australian Energy Regulator
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Appendix A – Price setters for 9 November 2011

The following table identifies for the trading interval 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[5]. Also shown is the energy or FCAS 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 – 3.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
15:05	$338.60	Eraring Energy	ER03	Energy	$299.79	1.13	$339.96
		International Power	PPCCGT	Energy	$29.69	-0.12	-$3.57
		Hydro Tasmania	GORDON	Raise 5 min	$1.90	1.13	$2.15
		Hydro Tasmania	MEADOWBK	Raise 5 min	$0.01	-1.13	-$0.01
		Eraring Energy	ER03	Raise reg	$2.00	-1.13	-$2.27
		Hydro Tasmania	MEADOWBK	Raise reg	$0.01	1.13	$0.01
		AGL (SA)	TORRB3	Raise 60 sec	$0.89	1.87	$1.67
		Hydro Tasmania	MEADOWBK	Raise 60 sec	$0.01	-1.87	-$0.02
		TRUenergy	MP2	Raise 6 sec	$0.96	0.71	$0.68
		Hydro Tasmania	MEADOWBK	Raise 6 sec	$0.01	-0.71	-$0.01
15:10	$12 500.00*	CS Energy	W/HOE#1	Energy	$10 900.51	0.77	$8393.39
		CS Energy	W/HOE#2	Energy	$10 900.51	0.77	$8393.39
		International Power	PPCCGT	Energy	$29.69	-0.36	-$10.57
15:15	$12 500.00*	Macquarie Generation	BW02	Energy	$12 006.00	1.40	$16 754.37
		International Power	PPCCGT	Energy	$34.98	-0.35	-$12.32
		AGL (SA)	TORRB3	Lower reg	$1.50	-1.40	-$2.09
		Macquarie Generation	BW02	Lower reg	$0.80	1.40	$1.12
15:20	$1110.90	Delta Electricity	CG4	Energy	$1004.38	1.10	$1107.23
		Gunning	GUNNING1	Energy	-$35.99	-0.10	$3.69
15:25	$37.07	Macquarie Generation	BW03	Energy	$30.72	0.95	$29.28
		Macquarie Generation	BW04	Energy	$30.72	0.71	$21.96
		LYMMCO	LYA1	Energy	$24.10	-0.59	-$14.18
15:30	$12 500.00*	Macquarie Generation	BW02	Energy	$12 006.00	1.40	$16 775.98
		Origin Energy	OSB-AG	Energy	$34.99	-0.36	-$12.72
Spot price		**$6498/MWh**					

* Dispatch price capped at $12 500/MWh

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

Appendix B – Closing bids

Figures B1 – B11 highlight the half hour closing bids for participants in New South Wales 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 B1: Delta Electricity closing bid prices, dispatch and spot price

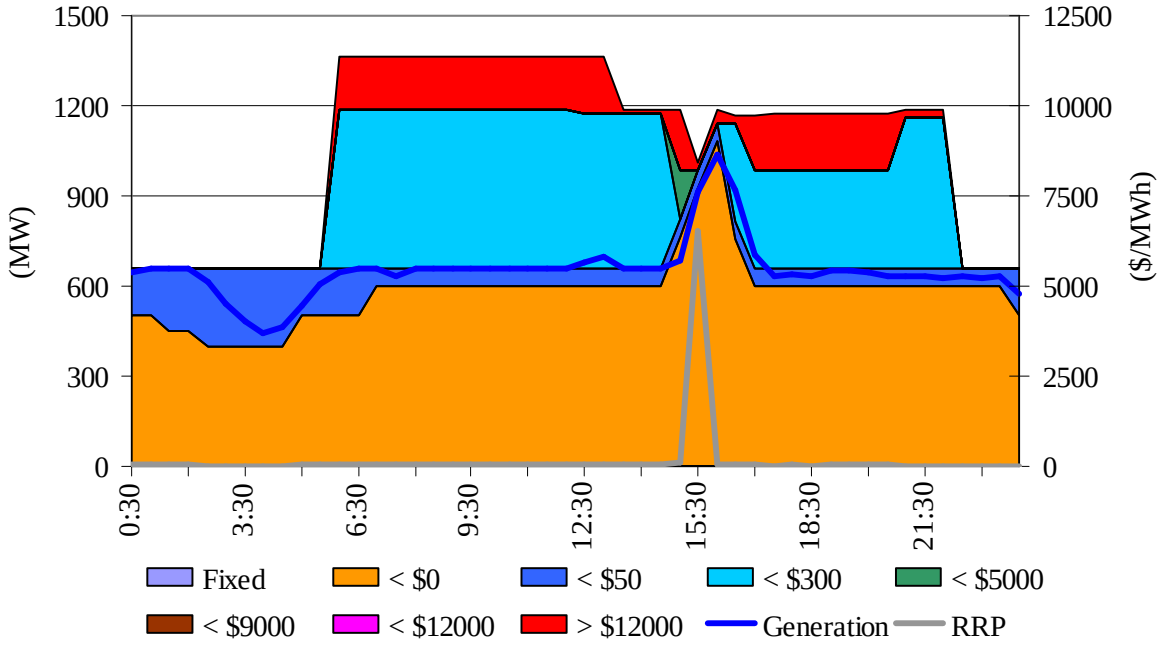

Figure B2: Macquarie Generation closing bid prices, dispatch and spot price

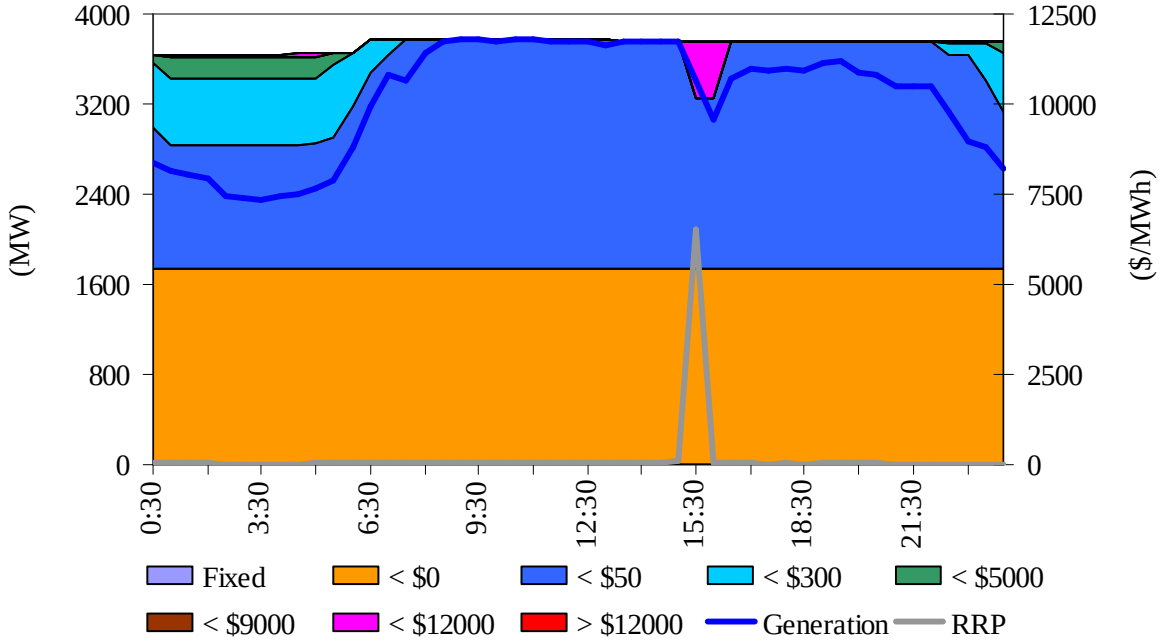

Figure B3: TRUenergy closing bid prices, dispatch and spot price