Spot prices greater than $5000/MWh

AUSTRALIAN ENERGY REGULATOR

Snowy region 26 January 2008

Introduction

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

- describe the 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.

This report examines the factors that can contribute to the spot price exceeding $5000/MWh including: generator offers and rebidding (including changes to generation capacity); and changes to network availability.

Summary

On Saturday 26 January, the spot price in Snowy reached $5099/MWh at 1 pm.

Between 6.15 am and 1.30 pm, a planned network outage in Victoria forced very large flows from Snowy into Victoria. The impact of this network outage was not accurately predicted. The direction of flow was counter to the spot prices in those regions at the time of high prices.

Rebidding by Snowy Hydro, to reallocate generation between its stations, resulted in three 5-minute dispatch prices of $9999/MWh. NEMMCO recalled the transmission line to service three hours earlier than forecast, to assist in managing the security of the power system.

Network availability

An outage of a 220kV transmission line between Keilor and Geelong in Victoria was originally scheduled to occur from 6 am to 4.30 pm. Less than three days notice of this outage was provided by SP Ausnet[1]. This outage had a significant impact on flows from the Snowy region into Victoria. Forecasts did not accurately reflect this impact with southward flows significantly higher than forecast between 11 am and 2 pm. In particular, at 1 pm when the price exceeded $5000/MWh, flows south into Victoria were 500 MW higher than forecast one hour ahead and 1000 MW higher than forecast four hours ahead.

As a result of this outage network security violations were reported intermittently from 10.30 am and continuously from 12.10 pm. Market forecasts did not, however, indicate any system security concerns. At 12.21 pm, as a result of the continuing violations, NEMMCO requested to SPAusnet to return the line to service and to make customer load available for interrupting in the event of a network contingency to manage any overloads. The Keilor to Geelong line was restored at 1.30 pm.

[1] Notice of the outage was provided to NEMMCO on the afternoon of Wednesday 23 January.

Details of the network outage and its impact on inter-regional transfers are presented in Appendix C.

Generation availability

Anglesea Power Station, which is located close to Geelong, was scheduled to return to service[2] and to generate 150MW from 7 am. Anglesea significantly assists with managing flows on the Keilor to Geelong line. The return of this generator was delayed at around 7pm the previous evening. This delay reduced the ability to manage the outage, as evidenced by violations of the relevant network constraints during the outage.

By 11.05 am, generation at Snowy Hydro's Murray station was dispatched to almost 900MW. All earlier forecasts, however, indicated generation dispatch of less than 100MW for most of the day. At 11.35 am, Snowy Hydro made a rebid to shift around 440 MW of lower-priced capacity from its Murray stations to Lower Tumut. The rebid was effective from 11.45 am until 5 pm. The reason given was "M:Dispatch & Sny/VIC flow higher frcast: reallocate gen". The effect of this rebid was to redistribute the dispatch of generation from Murray (on the southern side of the Snowy), to Lower Tumut (on the northern side of the region).

At 12.33pm a second rebid by Snowy Hydro shifted 410 MW of capacity at Murray from $300/MWh to $9999/MWh. The rebid reason given was "12.30: M SN-NSW & SN-V flow higher than forecast: Band shift up" reflecting that flows on the New South Wales to Snowy and Snowy to Victoria interconnectors were higher than forecast and capacity was being repriced higher. With flows from New South Wales and Tumut across the Snowy region into Victoria at the limit, around 30 MW of capacity at Murray that was priced at $9999/MWh was dispatched. This resulted in three consecutive five-minute dispatch intervals at that price.

The generators involved in setting the spot price during the 1 pm trading interval, and how that price was determined by the market systems are detailed in Appendix A.

The closing bids for Snowy Hydro's capacity priced at or above $5000/MWh during this period are presented in Appendix B.

Conclusion

A short notice planned outage of a Geelong to Keilor line, combined with the late return of the Anglesea Power Station and discrepancies in the modelling of the network, resulted in significantly higher than forecast dispatch from Snowy Hydro's Murray generator and flows from Snowy into the Victorian region.

As a result Snowy Hydro rebid capacity over two steps into prices of $9999/MWh at Murray and set price in the Snowy region for three dispatch intervals.

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[2] Anglesea Power Station shutdown unexpectedly on Thursday 24 April at around 3.30 pm. It was scheduled to return on Friday morning and then on Saturday morning, but was delayed and eventually returned to service on Saturday afternoon.

Appendix A – Price setters for the 1 pm 26 January 2008 trading interval

The following table identifies for the 1 pm trading interval each five minute dispatch interval price and the generating units involved in setting the energy price, as published in the market systems. This information is published by NEMMCO[3]. Also shown is the energy offer price involved in determining the dispatch price together with the contribution to the total energy price. The 30-minute spot price is the time weighted average of the six dispatch interval prices.

Saturday 26 January – Snowy – 1 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
12:35	$300.00	Snowy Hydro	MURRAY	Energy	$300.00	1.00	$300.00
12:40	$9,999.00	Snowy Hydro	MURRAY	Energy	$9,999.00	1.00	$9,999.00
12:45	$9,999.00	Snowy Hydro	MURRAY	Energy	$9,999.00	1.00	$9,999.00
12:50	$9,999.00	Snowy Hydro	MURRAY	Energy	$9,999.00	1.00	$9,999.00
12:55	$150.00	Snowy Hydro	MURRAY	Energy	$150.00	1.00	$150.00
13:00	$150.00	Snowy Hydro	MURRAY	Energy	$150.00	1.00	$150.00
Spot price				**$5099/MWh**			

[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 B – Closing bids

Figures B1 and B2 show the half hour closing bids for Snowy Hydro and highlight the capacity priced at or above $5000/MWh during the trading interval in which the spot price exceeded $5000/MWh. It also shows the output of the stations and the spot price.

Figure B1: Snowy Hydro's closing bid prices, dispatch and spot price for Murray power station

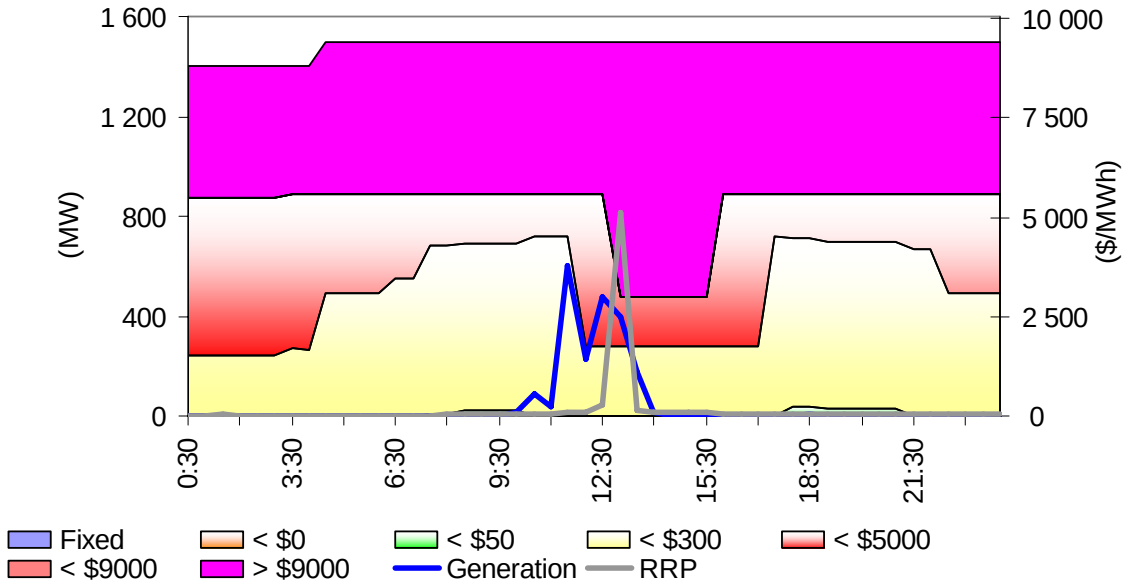
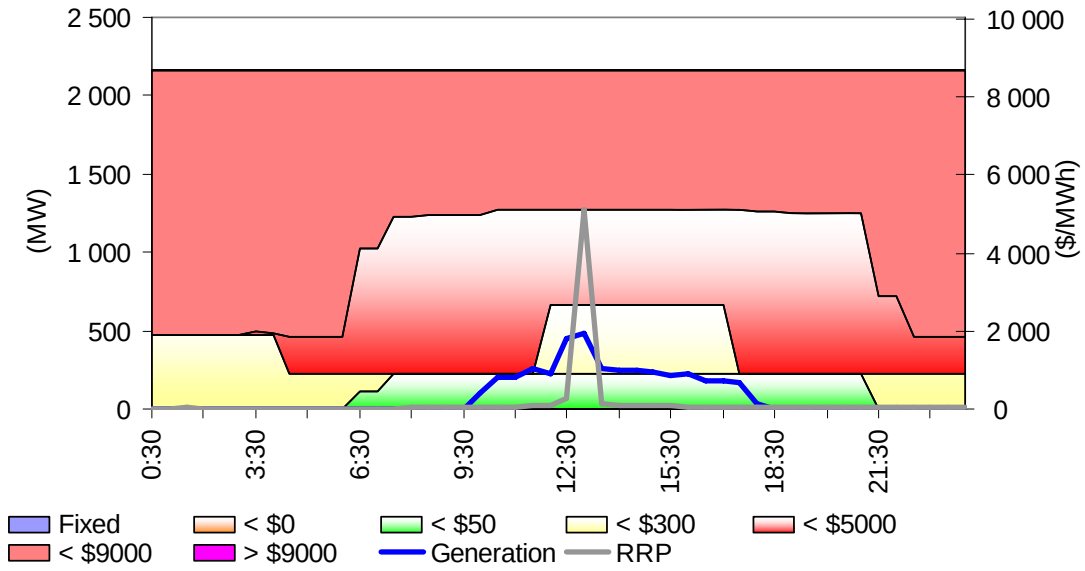


Figure B2: Snowy Hydro's closing bid prices, dispatch and spot price for Upper and Lower Tumut stations combined



Appendix C – Keilor to Geelong network outage on 26 January 2008.

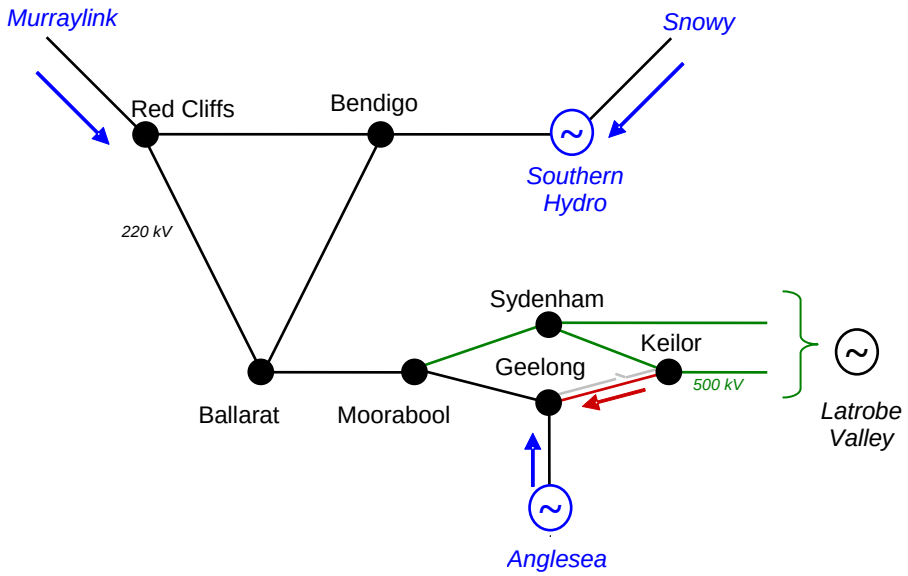
On 26 January, a planned outage of a Keilor to Geelong 220 kV line in Victoria significantly effected dispatch in the market.

The critical contingency for the network configuration (with this outage) is the loss of the 500kV injection at Moorabool, which overloads the remaining Keilor to Geelong lines. Figure C1 is a representation of the 220 kV network in western Victoria. It highlights the location of reduced network capability in red and alternative sources of supply in blue.

The network constraints used to manage this outage attempt to limit the flows from Keilor to Geelong in the event of the most critical contingency - loss of the 500 kV injection (in green) at Moorabool. This requires a reliance on supplies through the 220 kV network from a combination of the following sources ranked in order of preference:

- Anglesea power station, which feeds directly into Geelong; and
- Murraylink, AGL's Southern Hydro generators, and the Snowy interconnector - all via the 220kV state grid.

Figure C1: Simplified western Victoria 220 kV network



Anglesea Power Station shutdown unexpectedly on Thursday 24 April at around 3.30 pm. It was originally scheduled to return on Friday morning. Offers on Friday afternoon saw Anglesea power station scheduled to return to service at 4 am on the morning of 26 January, and be dispatched to 150MW from 7 am. A rebid around 7pm on Friday evening delayed its return to service by 12 hours making it unavailable during the network outage. This generator has the most significant influence on managing the network outage.

Market forecasts, which took into account the lack of availability at Anglesea, did not indicate any network security concerns for an outage of the Keilor to Geelong 220 kV line. As a result, NEMMCO gave permission to proceed with the network outage. These market forecasts model generation dispatch and network flows for the generator offers and the forecast demand and network topology. A critical element of this modelling is the forecast demand in northern Victoria. The model for the demand in northern Victoria uses a fixed percentage of the Victorian demand, which is the average for that sub-region. On the day the

actual demand in northern Victoria was significantly higher than that modelled, which contributed to the market forecast errors.

From 10 am Southern Hydro generation was being constrained on at McKay and West Kiewa[4]. A number of rebids reduced the availability of the units, requiring additional dispatch from the remaining sources: Murraylink and Snowy.

Flows from South Australia across Murraylink were limited to between 100 MW and 150 MW into Victoria by system normal constraints managing the 132 kV network in South Australia.

As a result of the lack of availability of Anglesea and reductions at Southern Hydro, dispatch across the Victoria to Snowy interconnector changed from flows north of 270 MW at 7.25 am - when the outage constraints first began to affect dispatch - to around 1750 MW south into Victoria for the 1 pm trading interval. For much of the duration of the outage, flows were counter to the prevailing market conditions, or counter price, and caused negative settlement residues to accrue.

At 10.20 am NEMMCO reduced flows into Victoria from Snowy to attempt to reduce the accumulation of negative settlement residues. From 10.25 am, however, these reduced flows were insufficient to manage network security and at 11 am NEMMCO ceased this reduction to flows and negative settlement residues continued to accumulate.

Between midday and 1 pm, the outage was attempting to force flows as high as 2600 MW into Victoria across the Snowy interconnector. This was in violation of the maximum capability of the interconnector of around 1900 MW. Other network limitations prevented flows from exceeding 1760 MW south.

The constraints to manage this outage were violated intermittently from 10.30 am and continuously from 12.10 pm. At 12.21 pm, as a result of the continuing violations, NEMMCO requested SPAusnet to return the line to service and to make customer load available for interrupting in the event of a network contingency to manage any overloads. The Keilor to Geelong line was restored at 1.30 pm.

[4] Dartmouth was unavailable on the day.