

Spot prices greater than \$5000/MWh



AUSTRALIAN ENERGY
REGULATOR

Queensland 30 Jan & 7 Feb 2008

Introduction

The AER is required to publish a report covering the circumstances 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;
- 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: changes in demand (compared to that forecast by NEMMCO); generator offers and rebidding (including changes to generation capacity); and changes to network availability.

Summary

On Wednesday 30 January and Thursday 7 February, the spot price in Queensland exceeded \$5000/MWh.

On Wednesday 30 January, lightning resulted in the reclassifications of the loss of the double circuit Tarong to Calvale lines and then the Tarong to Braemar lines as credible, from 3.35 pm and 3.55 pm respectively. This reduced the supply of generation to the Brisbane load centre. Generation in central and north Queensland was constrained off whilst generation in the south west was dispatched into New South Wales across the QNI interconnector counter-price. A number of generators close to Brisbane, which had significant capacity offered at prices above \$5000/MWh, were dispatched and as a result the spot price in Queensland reached \$9921/MWh for the 4.30 pm trading interval.

On Thursday 7 February, lightning led to the reclassification of the Calvale to Tarong lines. At 3.45 pm NEMMCO invoked a constraint that simultaneously constrained off all generation in Queensland and limited flows from New South Wales. A similar reclassification occurred on 30 January, although different constraints were used to manage the event on that day. The constraints used on 7 February were inappropriate for the conditions. The spot price in Queensland reached \$6622/MWh for the 4.30 pm trading interval. At 4.35 pm the incorrect constraints were replaced. The new constraints did not have a significant impact on dispatch and prices returned to below \$50/MWh. The lines were returned to normal operation at 4.50 pm.

Actual and forecast demand

On 30 January, demand in Queensland peaked at 7400 MW. This is around 1200 MW lower than the record of around 8600 MW. At 4.30 pm, when the spot price exceeded \$5000/MWh the demand was 7156 MW, 330 MW below that forecast four and 12 hours ahead.

On 7 February demand in Queensland peaked at 7730 MW. At 4.30 pm, when the spot price exceeded \$5000/MWh, demand was 7600 MW, 1000 MW below record levels. Demand was close to forecast for the day.

Demand did not significantly contribute to the high prices on the day.

Changes to network availability - 30 January

On 30 January, at 3.35 pm lightning in the vicinity of transmission lines between Tarong and Calvale led to the coincident loss of the double circuit 275 kV lines to be reclassified as a credible contingency. A constraint was invoked to manage the reduced network capability, which restricted the ability of generators north of Tarong to supply the Brisbane load centre. This generation comprises a total of around 5700 MW of installed capacity, with 5240 MW bid available on the day. The output from these generators was restricted to 3940 MW for the 4.30 pm trading interval.

At 3.55 pm, the coincident loss of the double circuit Tarong to Braemar 275 kV lines was also reclassified as a result of lightning. The constraint invoked to manage the reclassifications reduced the combined capability for flows into the Brisbane load centre from generation in south west Queensland and from New South Wales across QNI¹. As a result flows were forced from south west Queensland into New South Wales². These flows were counter to the prevailing market price with the New South Wales price being significantly lower than the Queensland price at the time.³

Around 3200 MW of generation capacity close to Brisbane (the Tarong, Wivenhoe, and Swanbank power stations) was not affected by the reduced transmission capability. On the day, 1900 MW of this capacity was priced at less than \$100/MWh. Almost 1300 MW of the capacity offered by Tarong Energy was priced above \$5000/MWh. To meet demand around Brisbane at the time, all of this lower priced capacity was fully dispatched, with around 300 MW of higher priced capacity dispatched during the 4.30 pm trading interval.

Flows across the Terranora interconnector were highly volatile, fluctuating from around 20 MW north to 100 MW south (counter-priced). The constraint setting the limits was managing a system normal limit to prevent overloads on the 132 kV network in northern New South Wales in the event of the loss of the 330 kV line between Armidale and Coffs Harbour (the 87 line). This constraint was forcing flow out of the Brisbane load centre which increased the requirement for the dispatch of higher priced capacity around Brisbane.

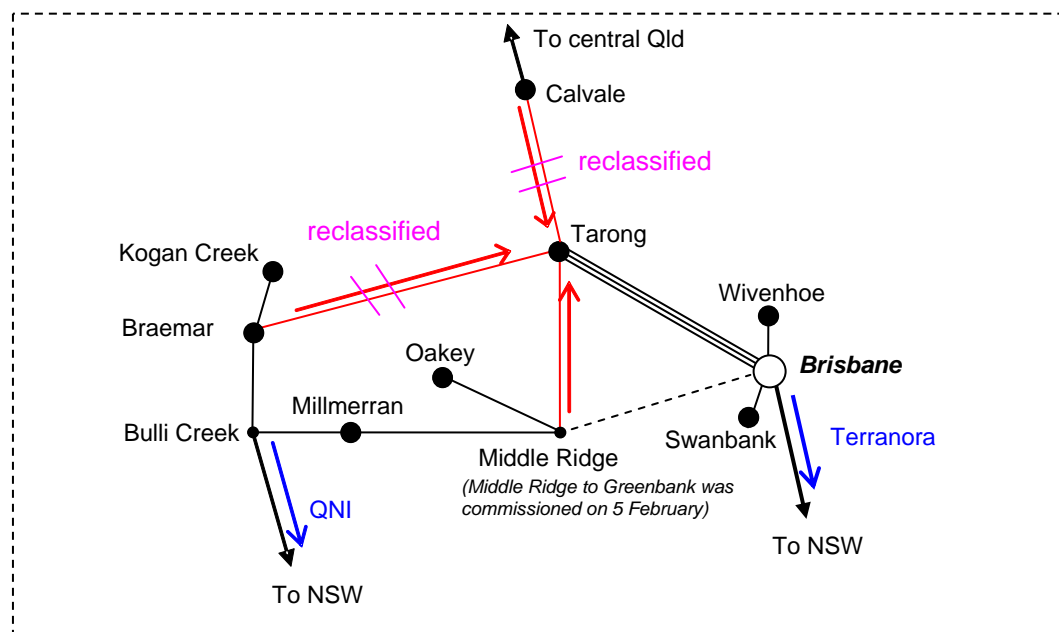
Figure 2 shows a simplified diagram of the transmission network around the Brisbane load centre. It highlights in red the lines that were operating at their limit. It also shows the location of generation (large dots).

¹ This constraint reduced the combined capability for flows into the Brisbane load centre from generation in south west Queensland (around 2380 MW of capacity, 2260 MW bid available) and from New South Wales across QNI (700 MW nominal capability) to around 1050 MW.

² For the trading interval ending 4.30 pm, flows south averaged 580 MW and peaked at 700 MW.

³ At 4.25 pm NEMMCO intervened with additional constraints to reduce the counter price flows to 600 MW. From 5 pm over a number of steps the flow was reduced further to around 360 MW. This did not affect the supply of energy into Brisbane and had no impact on the price in Queensland. \$4.8 million in negative settlement residues accrued across the QNI interconnector during this reclassification.

Figure 2: Flow paths around the Brisbane load centre



Changes to network availability - 7 February

On 7 February, at 3.45 pm lightning in the vicinity of transmission lines between Tarong and Calvale led to the coincident loss of the double circuit 275 kV lines to be reclassified as a credible contingency. Although a similar reclassification occurred on 30 January, different constraints were initially invoked on 7 February to manage the reduced network capability. This constrained off all generation in Queensland as well as limiting imports across both interconnectors from New South Wales⁴. The constraints bound from 3.55 pm to 4.30 pm. At 4.35 pm NEMMCO replaced the constraints with the same constraints that were used on 30 January. The new set of constraints only restricted generation north of Tarong and price returned to normal levels. NEMMCO is investigating the circumstances of the overly conservative constraints being invoked and will publish a report on its findings.

Generator offers and rebidding

For the trading interval ending 4.30 pm on 30 January there were no significant rebids that caused prices to exceed \$5000/MWh. There was around 10 800 MW of available generation capacity in Queensland at the time. Around 7600 MW of this capacity was directly affected by the reduced network capability. 3200 MW of capacity in Queensland was not affected by the reduction in network capability. Of this, 2350 MW was offered by Tarong Energy at Wivenhoe, Tarong and Tarong North power stations and 830 MW was at CS Energy's Swanbank power station. Tarong Energy had offered, through its day ahead bids, 1285 MW or 55 per cent of its capacity above \$5000/MWh. Tarong and Wivenhoe set price at close to the price cap during the trading interval. All of the capacity at Swanbank was offered at less than \$100/MWh at the time of the high prices.

For the trading interval ending 4.30 pm on 7 February there were no significant rebids that caused prices to exceed \$5000/MWh.

The generators involved in setting the spot prices for the 4.30 pm trading intervals on 30 January and 7 February are detailed in **Appendix A**.

The closing bids for all participants in Queensland with capacity priced at or above \$5000/MWh during this period are presented in **Appendix B**.

⁴ This constraint was designed to manage the network during lower demand conditions, typically during shoulder seasons and operated the network to a more conservative rating.

Assessment

On Wednesday 30 January lightning led to the reclassification of the Tarong to Braemar lines and the Calvale to Tarong lines, which restricted the dispatch of lower priced generation from south west and central Queensland reaching the Brisbane load centre. This required the dispatch of high priced capacity at Tarong Energy's Wivenhoe and Tarong power stations.

On Thursday 7 February lightning led to the reclassification of the Calvale to Tarong lines. The constraints that were invoked unnecessarily restricted the dispatch of generation and imports from New South Wales. NEMMCO is investigating the circumstances of the overly conservative constraints being invoked and will be publishing a report on its findings.

Australian Energy Regulator

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Appendix A – Price setters for 4.30 pm on 30 January and 7 February

The following table identifies the trading intervals in which the spot price exceeded \$5000/MWh. Each five minute dispatch interval price and the generating units involved in setting the energy price, as published in the market systems are shown. This information is published by NEMMCO⁵. Also shown is the energy or ancillary service 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 time weighted average of the six dispatch interval prices.

Wednesday 30 January – Queensland – 4.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
16:05	\$10,000.00	Tarong	W/HOE#1	Energy	\$10,000.00	1.00	\$10,000.00
16:10	\$10,000.00	Tarong	W/HOE#1	Energy	\$10,000.00	1.00	\$10,000.00
16:15	\$9,826.09	Tarong	TARONG#3	Energy	\$9,826.09	1.00	\$9,826.09
16:20	\$9,899.95	Tarong	W/HOE#2	Energy	\$9,899.95	1.00	\$9,899.95
16:25	\$9,899.95	Tarong	W/HOE#2	Energy	\$9,899.95	1.00	\$9,899.95
16:30	\$9,899.95	Tarong	W/HOE#2	Energy	\$9,899.95	1.00	\$9,899.95
Spot price		\$9921/MWh					

Thursday 7 February – Queensland – 4.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution		
16:05	\$6,679.61	AGL	OAKEY1	Energy	\$3,490.79	0.96	\$3,356.46		
		AGL	OAKEY2	Energy	\$3,490.79	0.96	\$3,356.46		
		Stanwell	STAN-1	Energy	\$36.11	-0.92	-\$33.33		
16:10	\$6,718.35	Stanwell	BARRON-1	Energy	\$0.00	-0.27	\$0.00		
		Stanwell	BARRON-2	Energy	\$0.00	-0.27	\$0.00		
		Stanwell	KAREEYA3	Energy	\$0.00	-0.20	\$0.00		
		Stanwell	KAREEYA4	Energy	\$0.00	-0.20	\$0.00		
		AGL	OAKEY1	Energy	\$3,490.79	0.96	\$3,359.19		
		AGL	OAKEY2	Energy	\$3,490.79	0.96	\$3,359.19		
16:15	\$10,000.00 (capped)	Origin Energy	MSTUART1	Energy	-\$1,000.00	-0.30	\$303.07		
		Origin Energy	MSTUART2	Energy	-\$1,000.00	-0.30	\$303.07		
		Tarong	TARONG#3	Energy	\$4,991.85	0.96	\$4,803.66		
		Tarong	TARONG#4	Energy	\$4,991.85	0.96	\$4,803.66		
		AGL	YABULU	Energy	-\$1,000.00	-0.32	\$318.45		
16:20	\$7,642.94	Stanwell	BARRON-1	Energy	-\$1,000.00	-0.07	\$72.99		
		Stanwell	BARRON-2	Energy	-\$1,000.00	-0.07	\$72.99		
		Stanwell	KAREEYA3	Energy	-\$1,000.00	-0.05	\$53.53		
		Stanwell	KAREEYA4	Energy	-\$1,000.00	-0.05	\$53.53		
		Origin Energy	MSTUART1	Energy	-\$1,000.00	-0.34	\$335.77		
		Origin Energy	MSTUART2	Energy	-\$1,000.00	-0.34	\$335.77		
		AGL	OAKEY1	Energy	\$3,490.79	0.96	\$3,359.19		
		AGL	OAKEY2	Energy	\$3,490.79	0.96	\$3,359.19		
		AGL	YABULU	Energy	-\$1,000.00	-0.26	\$255.36		
16:25	\$7,642.94	Stanwell	BARRON-1	Energy	-\$1,000.00	-0.05	\$52.83		
		Stanwell	BARRON-2	Energy	-\$1,000.00	-0.05	\$52.83		
		Stanwell	KAREEYA3	Energy	-\$1,000.00	-0.04	\$38.74		
		Stanwell	KAREEYA4	Energy	-\$1,000.00	-0.04	\$38.74		
		Origin Energy	MSTUART1	Energy	-\$1,000.00	-0.24	\$243.04		
		Origin Energy	MSTUART2	Energy	-\$1,000.00	-0.24	\$243.04		
		AGL	OAKEY1	Energy	\$3,490.79	0.96	\$3,359.19		
		AGL	OAKEY2	Energy	\$3,490.79	0.96	\$3,359.19		
		AGL	YABULU	Energy	-\$1,000.00	-0.26	\$255.36		
		16:30	\$1,049.60	Stanwell	BARRON-1	Energy	-\$1,000.00	-0.07	\$72.99
Stanwell	BARRON-2			Energy	-\$1,000.00	-0.07	\$72.99		
Stanwell	KAREEYA3			Energy	-\$1,000.00	-0.05	\$53.53		
Stanwell	KAREEYA4			Energy	-\$1,000.00	-0.05	\$53.53		
Origin Energy	MSTUART1			Energy	-\$1,000.00	-0.34	\$335.77		
Origin Energy	MSTUART2			Energy	-\$1,000.00	-0.34	\$335.77		
Tarong	TARONG#1			Energy	\$64.95	0.96	\$62.50		
Tarong	TARONG#2			Energy	\$64.95	0.96	\$62.50		
Spot price				\$6622/MWh					

⁵ 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 to B2 highlight the half hour closing bids for Tarong Energy on Wednesday 30 January and Thursday 7 February and Millmerran on Thursday 7 February. These were the only participants with significant capacity priced above \$5000/MWh on the two days. It also shows the generation output and the spot price.

Figure B1: Tarong Energy closing bid prices, dispatch and spot price for 30 January

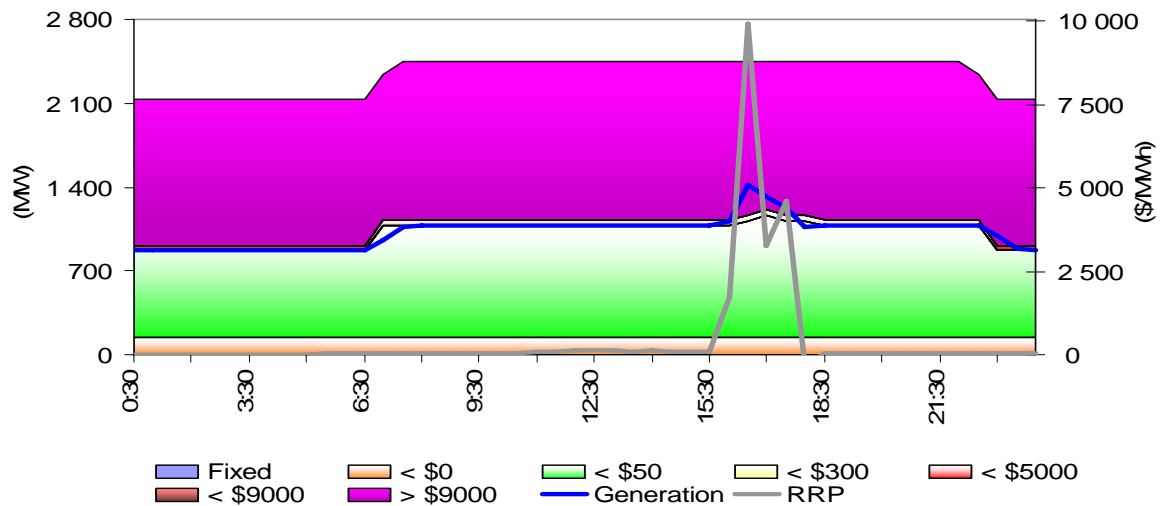


Figure B2: Tarong closing bid prices, dispatch and spot price for 7 February

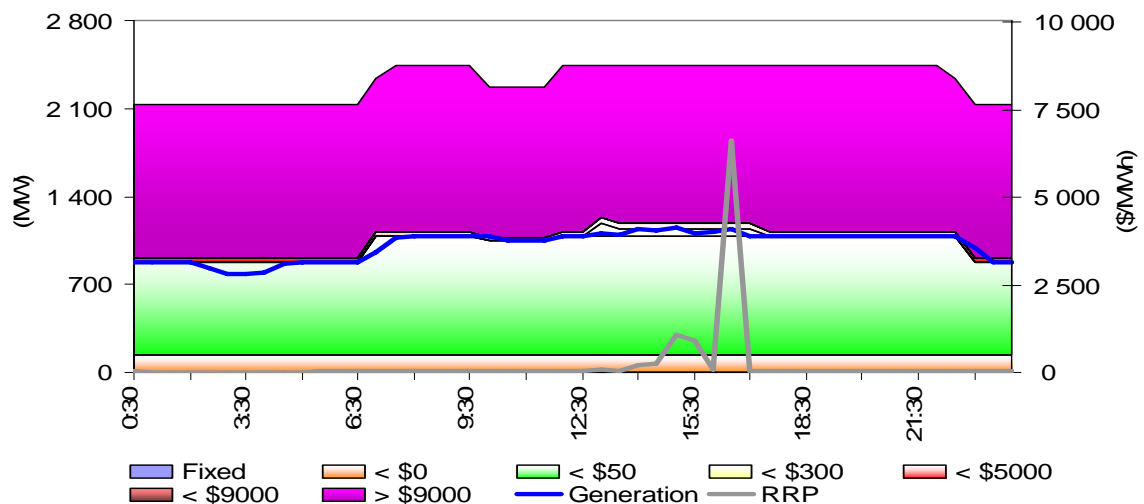


Figure B3: Millmerran closing bid prices, dispatch and spot price for 7 February

