

Spot prices greater than \$5000/MWh



AUSTRALIAN ENERGY
REGULATOR

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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 24 January, the spot price in Queensland exceeded \$5000/MWh for one trading interval, reaching \$6261/MWh at 11 am. High prices continued throughout the day, with a new record demand of 8340 MW at 3 pm. Conditions on this day were similar to those of the previous day when prices also exceeded \$5000/MWh.

A planned network outage at Tarong resulted in flows between Tarong and Brisbane approaching secure limits. NEMMCO managed flows on the Tarong to Brisbane path by invoking constraints, as part of an agreed management strategy with Powerlink, from around 9 am to limit flows on the three flow paths into Tarong. The constraints restricted the dispatch of cheaper generation in South West and Central Queensland by more than 1000 MW, significantly increasing the Queensland price. The constraints invoked by NEMMCO restricted flows from New South Wales by a further 400 MW.

Actual and forecast demand

On 24 January demand in Queensland reached a new record of 8340 MW at 3 pm¹. At 11 am demand was 7874 MW and was close to forecast both four and twelve hours ahead.

Figure 1 compares the actual demand in Queensland with that forecast by NEMMCO four and twelve hours ahead of dispatch. A comparison of actual and forecast spot price is also included.

¹ The peak demand on the day was around 1330 MW lower than the extreme 10% probability of exceedance summer forecast of 9 675 MW published in the 2006 Statement of Opportunities. Demand surpassed this level five days later in Queensland, reaching 8386 MW on Monday 29 January.

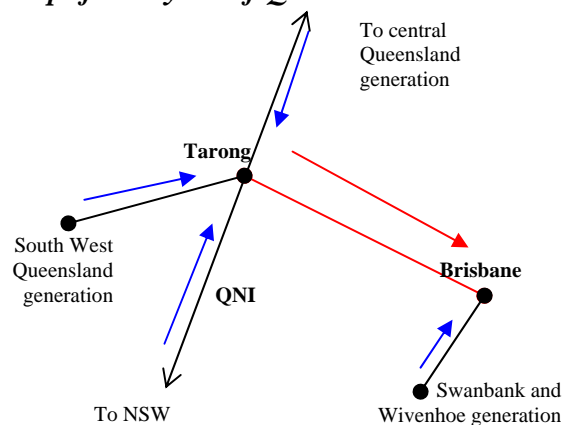
Figure 1: Actual and forecast demand and spot price in Queensland

Wednesday 11:00 am	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7874	7851	7920
Spot price (\$/MWh)	6260.76	77.96	86.11

Changes to network availability

Network equipment at Tarong substation was out of service on the day for planned upgrades associated with the commissioning of Kogan Creek. Advice of this outage, which was scheduled to occur from 21 January to 31 January, was first provided to NEMMCO by Powerlink on 5 January. On the previous day (23 January), this network outage, combined with the loss of a 120 MW Swanbank unit, caused system security issues for flows from Tarong towards Brisbane. Figure 2 shows a simplified layout of the transmission network in southern Queensland, highlighting the three flow paths that contributed to the congestion between Tarong and Brisbane.

Figure 2: simplified layout of Queensland transmission network



Following the outcomes from the previous day, NEMMCO and Powerlink agreed to a strategy, which saw NEMMCO invoke a network constraint from 8.40 am on 24 January. This began impacting on market outcomes from 10.15 am, reducing flows from Central Queensland, South West Queensland and from New South Wales across QNI. The constraint restricted the output of all generators in Queensland except for Swanbank and Wivenhoe. Around 9250 MWh of the 10 500 MWh of generating capacity in Queensland was affected. The constraint also forced flow south into New South Wales counter-priced at 10.15 am. As a result, at 10.30 am, NEMMCO invoked further constraints, to restrict the accumulation of negative residues on the interconnector, by limiting flows to zero. This further restricted the dispatch of cheaper Queensland generation capacity, by a total of more than 1000 MW. The five-minute dispatch price subsequently increased from \$54/MWh at 10.25 am to \$10 000/MWh at 10.30 am. The price remained at around the price cap until 10.55 am, when NEMMCO removed the constraint managing the negative residues, and the price returned to \$54/MWh. At around the same time, Powerlink advised NEMMCO of an increase in the limit for flows from Tarong to Brisbane from 2850 MW to 2900 MW.

At times during the afternoon this network limit (for flows from Tarong to Brisbane) impacted on market outcomes. Powerlink advised NEMMCO of changes to the limit, to as high as 3100MW in four steps over the remainder of the day. This was based on the agreed strategy, with dynamic recalculations of network capability at the time. This process continued for the remainder of the outage² and there were no further market impacts.

² The outage commenced on 21 January and was completed on 31 January.

Figure 3 compares the half hour average flow and limits across QNI for the 11 am trading interval with that forecast four and twelve hours ahead of dispatch.

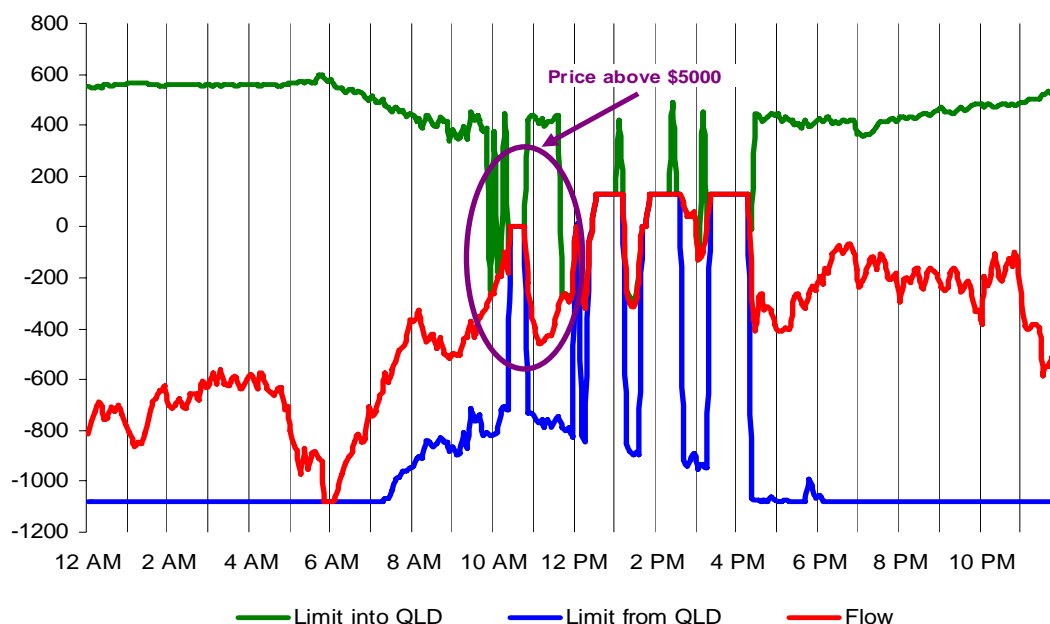
Figure 3: Actual and forecast flow and limits across QNI (MW)

Wednesday 11:00 am	Actual	4 hr forecast	12 hr forecast
Limit into Qld	144	449	366
Flows into Qld	-92	-212	-141
Limit from Qld	-243	-780	-1008

From 10.15 am a system normal constraint forced flow south on the Terranora interconnector at around 110 MW. Flow remained counter price until around 4.30 pm. This limitation was, however, forecast from the previous day.

Figure 4 shows the 5-minute flow and limits on QNI for the day. The period where the spot price was greater than \$5000/MWh is highlighted.

Figure 4: Actual 5-minute flow and limits across QNI (MW)



Generator offers and rebidding

The summer capability of the installed generation in Queensland is 10 500 MW³. On 24 January, there was up to 290 MW not presented to the market during the high priced period. Constraints invoked to manage the network outage around Tarong limited access to low priced generation capacity in central and south west Queensland by more than 1000 MW. Figure 5 details the significant generation capacity that was not presented on that day.

³ Based on the 2006 Statement of Opportunities.

Figure 5: Queensland generation capacity not presented

Participant	Capacity (MW)	Comment
Enertrade		
Collinsville unit 4	37	Four day outage, commenced the previous night.
Collinsville unit 5	37	Four day outage, commenced the previous night.
Gladstone unit 2	80	The unit was returning from a long term outage.
Millmerran Energy Trader		
Millmerran unit 2	113	Returning from a two week outage
other	24	
Capacity not presented	292	(3 per cent of installed capacity)

Figure 6 shows, for the trading interval where the spot price was greater than \$5000/MWh, the actual generating capacity presented. The figure compares this with the amount of available capacity forecast four and twelve hours ahead of dispatch. The change in the amount of capacity offered at prices less than the forecast price calculated four hours ahead of dispatch is also included and shows a significant increase in capacity offered at less than the forecast price made four hours ahead. The network constraints within Queensland led to a series of rebids, which saw up to 440 MW of generation capacity shifted into lower prices. There was no other significant rebidding.

Figure 6: Actual and forecast capacity and spot price for Queensland

Wednesday 11:00 am	Actual	4 hr forecast	12 hr forecast
Capacity (MW)			
available	10180	10114	10154
priced at less than \$77.96	8555	8118	
Spot price (\$/MWh)	6260.76	77.96	

The generators involved in setting the spot price during the 11 am trading interval, and how that price was determined by the market systems 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**.

Assessment

On Wednesday 24 January demand reached a new record in Queensland. For the second consecutive day, a planned network outage at Tarong, restricted power flows from Tarong into Brisbane. To manage the situation, NEMMCO invoked network constraints which restricted the dispatch of generation in central and south west Queensland and reduced imports from New South Wales. Queensland prices subsequently reached \$6261/MWh for the 11 am trading interval.

Rebidding by generators did not contribute to the spot price exceeding \$5000/MWh.

The AER understands that the network outage was taken by Powerlink to allow maintenance of a circuit breaker, as part of an upgrade program related to Kogan Creek. The timing of the outage in the peak summer period had a major impact on price. Powerlink has responsibilities for the timing and planning of outages. NEMMCO has the role of assessing planned network outages for their impacts on power system security.

The Rules do not specify when network outages can be taken and neither Powerlink nor NEMMCO breached the Rules. However, the incident highlights the impact that planned outages can have on the market. The AER is developing a new service standards incentive scheme which aims to link the impact of outages to the transmission service providers' revenues. The AER will commence its consultation process in the second quarter of this year, with a view to finalising the new incentive scheme by the end of this year.

The AER believes that this incident also highlights the importance of effective constraints to both the management of the power system and to facilitate efficient market responses through accurate market forecasts. At the request of the AER, NEMMCO is reviewing its use of constraints, including for planned network outages. Following this incident and similar conditions the day before, the AER will write to NEMMCO requesting that NEMMCO assess this network outage as part of that review.

Appendix A – price setters for the 4 pm trading interval

The following table identifies 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, as published in the market systems are shown. This information is published by NEMMCO⁴. 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 24 January – Queensland 11 am

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
10:35	\$10 000.00	CS Energy	SWAN_B_4	Energy	\$10 000.00	1.00	\$10 000.00
		CS Energy	SWAN_B_4	Raise 5 min	\$1.30	-1.00	-\$1.30
		Enertrade	GSTONE4	Raise 5 min	\$5.00	1.00	\$5.00
		CS Energy	SWAN_B_4	Raise 6 sec	\$0.01	-0.38	\$0.00
		LYMMCO	LYA3	Raise 6 sec	\$0.50	0.38	\$0.19
		CS Energy	SWAN_B_4	Raise 60 sec	\$0.01	-0.38	\$0.00
		LYMMCO	LYA2	Raise 60 sec	\$0.40	0.38	\$0.15
10:40	\$7 458.93	Tarong Energy	W/HOE#1	Energy	\$7 458.93	1.00	\$7 458.93
10:45	\$10 000.00	Tarong Energy	W/HOE#2	Energy	\$10 000.00	1.00	\$10 000.00
10:50	\$10 000.00	Tarong Energy	W/HOE#2	Energy	\$10 000.00	1.00	\$10 000.00
10:55	\$53.68	Snowy Hydro	UPPTUMUT	Energy	\$51.04	1.05	\$53.68
11:00	\$51.98	Snowy Hydro	UPPTUMUT	Energy	\$51.04	1.02	\$51.98
Spot price		\$6260.77/MWh					

⁴ 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 highlights the half hour closing bids for all participants in Queensland with capacity priced at or above \$5000/MWh during the trading intervals in which the spot price exceeded \$5000/MWh, for each trading interval of the day. It also shows the generation output of that participant and the spot price exceeding \$5000/MWh.

Figure B1: CallidePower Trading closing bid prices, dispatch and spot price.

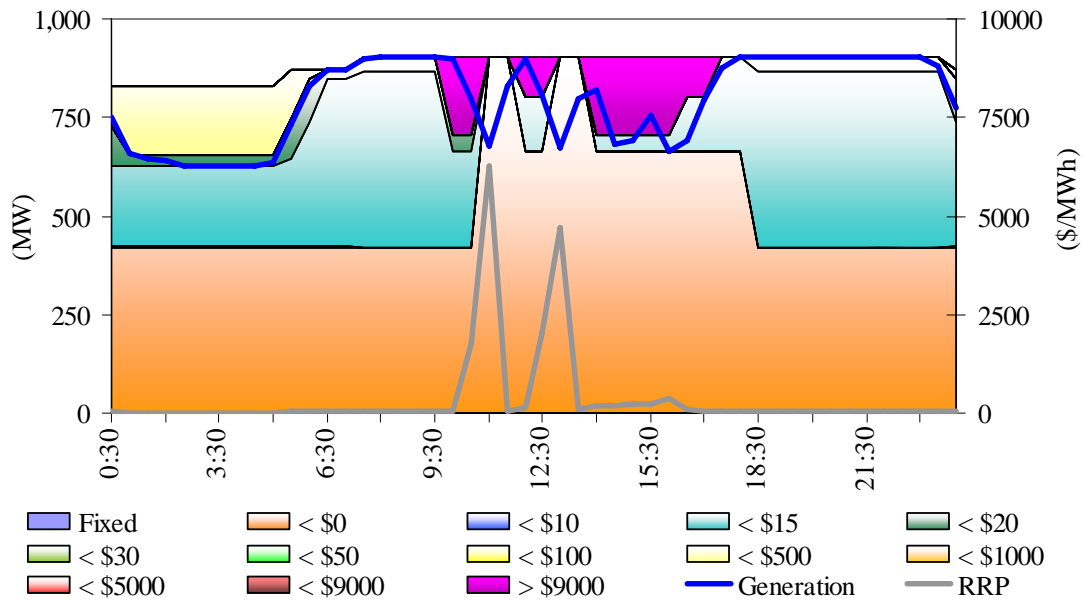


Figure B2: CS Energy closing bid prices, dispatch and spot price.

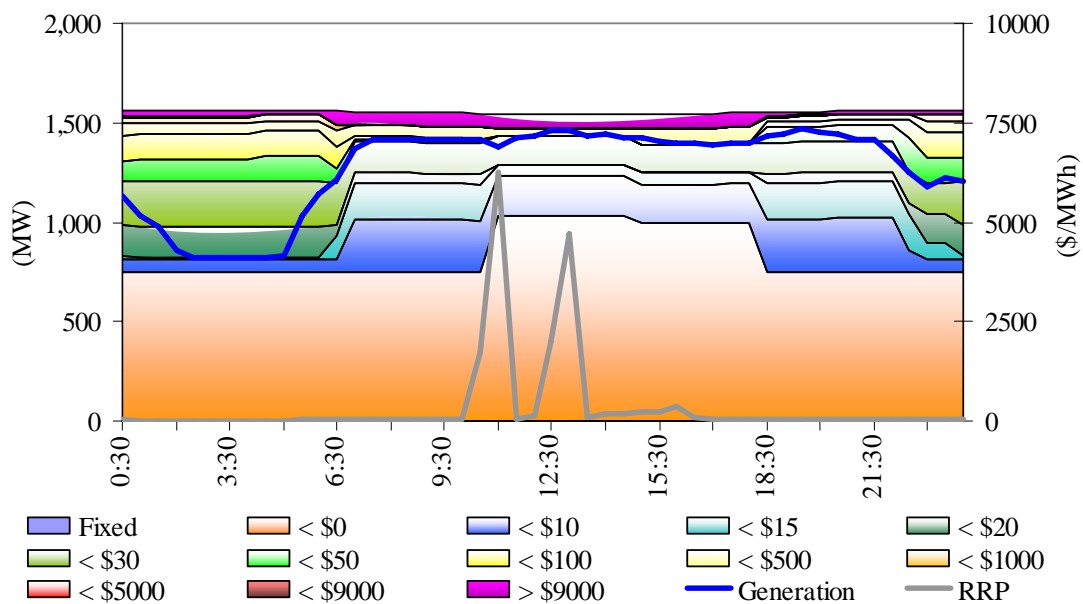


Figure B3: Enertrade closing bid prices, dispatch and spot price.

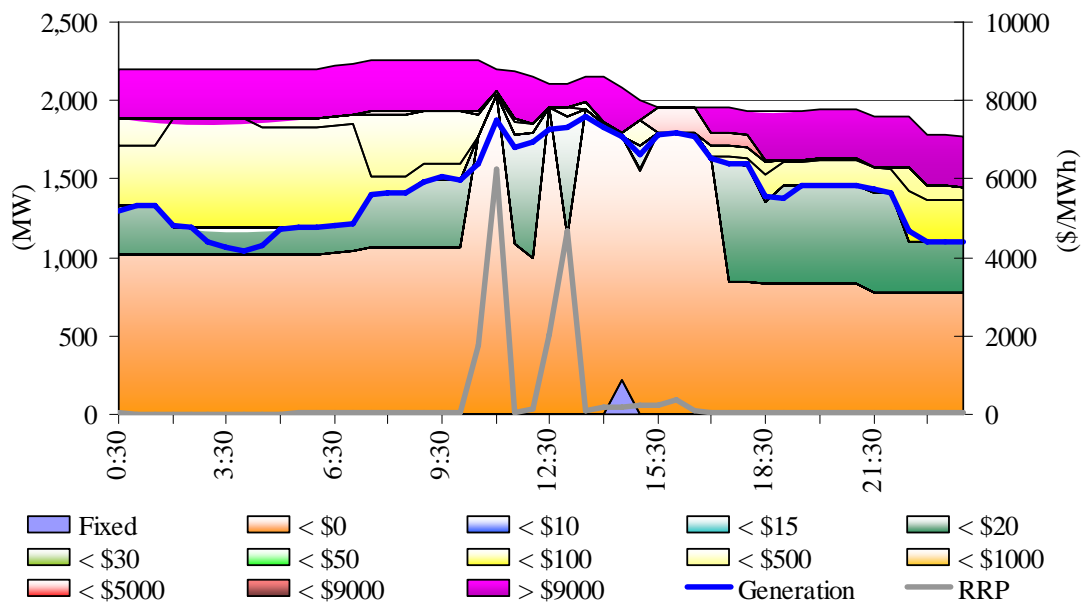


Figure B4: Stanwell Corporation closing bid prices, dispatch and spot price.

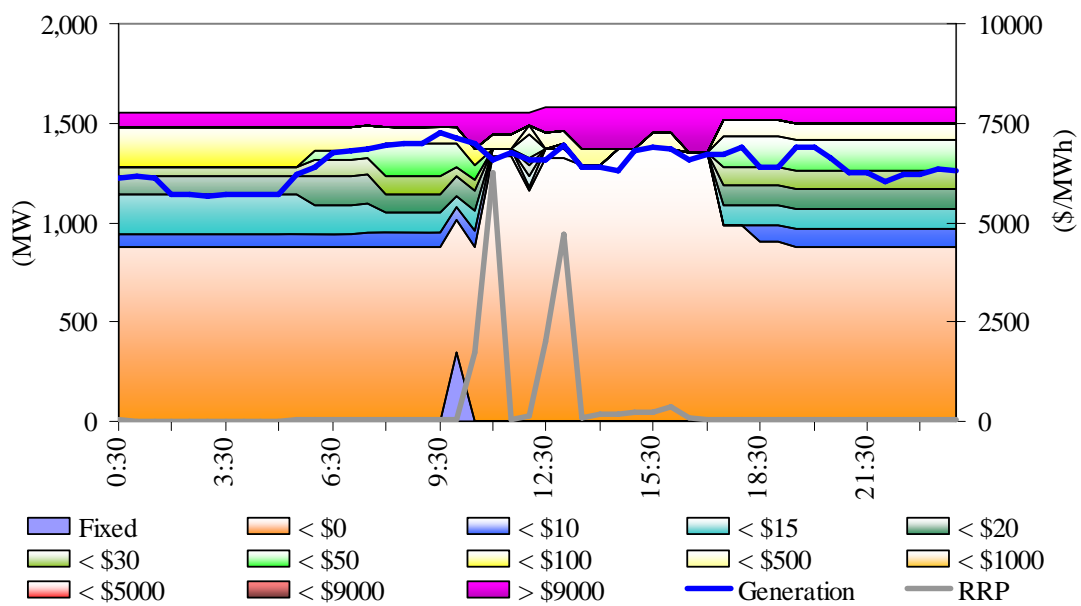


Figure B5: Tarong Energy closing bid prices, dispatch and spot price.

