Electricity spot prices above $5000/MWh

29 January 2013

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 29 January 2013 the spot price in Queensland exceeded $5000/MWh at 5 pm, reaching $6299/MWh. As well as analysing the 5 pm high spot price, the report includes analysis of other high spot prices (although under $5000/MWh) between 2 pm and 7.30 pm. The five-minute dispatch price exceeded $7200/MWh 11 times during this period.[2]

Higher than expected temperatures in Brisbane saw demand in Queensland reach 7809 MW at 5 pm. Actual demand for the 5 pm interval was 287 MW higher than forecast four hours ahead but close to that forecast 12 hours ahead. The demand was, however, well below historical peak demand, with peaks of around 8700 MW or higher in the 2008-09 to 2011-12 summers and around 8500 MW for 2012-13.

Generation capacity was around 1000 MW lower than forecast. This reduction in available capacity included the unplanned loss of two Braemar A units (300 MW in total) around midday, wet coal at some coal units (that affects fuel quality) and the late return to service of Gladstone unit 5.

The combination of lower than forecast generation availability and higher demand led to low generation reserves in Queensland, with lack of reserve level 1 (LOR1) conditions occurring from 1.45 pm until 8.20 pm and lack of reserve level 2 (LOR2) conditions between 4.15 pm and 5.30 pm[3].

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1 This requirement is set out in clause 3.13.7 (d) of the National Electricity Rules.

2 Further analysis is provided in the 27 January to 2 February Electricity weekly report on the AER website.

3 If reserves are below the capacity of the two largest generating units, a lack of reserve level 1 (LOR1) condition is declared. If reserves are below the capacity of the largest generating unit, a lack of reserve level 2 (LOR2) condition is declared.

Analysis

The AER considers that the key contributor to the high spot prices observed in Queensland on 29 January 2013 was the tight supply/demand conditions on the day.

Tight supply/demand conditions

Actual and forecast demand

Tuesday 29 January saw the demand peaking at 7809 MW for the 5 pm trading interval. Demand was generally above 7500 MW for the majority of the afternoon. The temperature in Brisbane reached nearly 35 degrees. Table 1 compares, for the seven trading intervals between 2 pm and 7.30 pm where spot prices exceeded $800/MWh, the actual demand, available capacity and spot price in Queensland with that forecast by AEMO four hours and 12 hours ahead of dispatch.[4]

Table 1 shows that demand was lower than forecast 12 hours ahead for the early afternoon and higher than forecast for the start of the evening (by up to 150 MW). Demand, however, was generally higher than that forecast four hours ahead.

Table 1: Actual and forecast demand, spot price and available capacity in Queensland

Tuesday 2:00 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7298	7299	7660
Spot Price ($MW/h)	827	195	578
Available capacity (MW)	8209	9032	9172
Tuesday 2:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Demand (MW)	7399	7416	7725
Spot Price ($MW/h)	1449	300	578
Available capacity (MW)	8164	8551	9172
Tuesday 4:00 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Demand (MW)	7601	7455	7833
Spot Price ($MW/h)	3100	300	10100
Available capacity (MW)	8229	8556	9152
Tuesday 4:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Demand (MW)	7709	7475	7857
Spot Price ($MW/h)	3167	440	10100
Available capacity (MW)	8210	8543	9152
Tuesday 5:00 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Demand (MW)	7809	7522	7898
Spot Price ($MW/h)	6299	490	10100
Available capacity (MW)	8184	8301	9152

[4] Six of the listed seven trading intervals had prices lower than $5000/MWh but are included in this analysis for completeness.

Table 1: Actual and forecast demand, spot price and available capacity in Queensland (cont)

Tuesday 6:30 PM	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7525	7292	7458
Spot Price ($MW/h)	1324	440	440
Available capacity (MW)	8205	8292	9157
Tuesday 7:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Demand (MW)	7639	7459	7489
Spot Price ($MW/h)	1592	560	490
Available capacity (MW)	8340	8338	9147

Available generation capacity was up to 1000 MW less than that forecast 12 hours ahead and up to 750 MW less than that forecast four hours ahead. This was due to the delay of Gladstone unit 5 returning to service, wet coal and technical issues at a number of Gladstone units and the trip of Braemar A units 2 and 3 from around midday.

Price outcomes also diverged from that forecast, with prices higher than those forecast 12 hours ahead for the early afternoon and evening, and lower than forecast in the late afternoon. Prices were, however, higher than that forecast four hours ahead for all seven trading intervals.

Generator offers and rebidding

Day ahead forecast prices for the high-priced period were close to $500/MWh. Day ahead offers saw only a small amount of capacity priced between $500/MWh and $7500/MWh. Accordingly, small changes in available generation capacity or demand led to volatile price outcomes.

During the high priced period available capacity was around 1000 MW lower than forecast 12 hours ahead:

- Over a number of rebids throughout the morning, CS Energy delayed the return to service of Gladstone unit 5, which had been out of service since December. At 12 hours ahead, the unit was forecast to be available for 280 MW for the 2 pm to 7.30 pm trading intervals, but during this period only had up to a maximum of 90 MW available. The majority of the capacity that was to be available had been priced at less than $55/MWh. The reasons given were “Unit RTS revised –SL” and “unit ramping rebid to match – SL”.

- Over two rebids at 8.38 am and 11.38 am, effective from 10.05 am and 11.45 am respectively, CS Energy reduced the available capacity at Gladstone unit 1 by up to 80 MW (30 MW of which was priced below $55/MWh). The reasons given were “0838P Mill limit – wet coal – SL” and “1137P Unit limit – wet coal –SL”.

- At 9.48 am, effective from 12.05 pm, CS Energy reduced the available capacity at Gladstone units 3, 4 and 6 by a total of 330 MW (290 MW of which was priced below $55/MWh). The reason given was “0946P Mill limit – wet coal - SL”.

- Over seven rebids between 12.33 pm and 3.25 pm, CS Energy reduced the available capacity of Callide B unit 1 by 70 MW (all of which was priced at zero). The reason given was “Emission limit – SL”

- At around 12.10 pm, Alinta's Braemar A unit 2 tripped and unit 3 tripped on start up—a combined total of 300 MW (all of which was priced close to the price floor). Braemar A unit 2 remained offline until 8 pm. Unit 3 did not generate for the remainder of the day.

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 Queensland with capacity priced at or above $5000/MWh for the high-price periods are set out in **Appendix B**.

Reserves

A tight supply/demand condition is illustrated by low levels of reserve generation in a region. The amount of reserve generation in a region is equal to supply availability (region generation plus imports) minus demand. AEMO publishes market notices if reserves are forecast to be below (or actually fall below) certain levels. If reserves are below the capacity of the two largest generating units, a lack of reserve level 1 (LOR1) condition is declared. If reserves are below the capacity of the largest generating unit, a lack of reserve level 2 (LOR2) condition is declared.

The higher than forecast demand and the lower than forecast generator availability led to low reserves in Queensland on 29 January. Both LOR1 and LOR2 conditions were declared on the day.

At 1.52 pm AEMO notified the market of a LOR1 condition, advising there were insufficient short term capacity reserves in Queensland from 1.45 pm and this was forecast to continue until 9 pm. At 4.15 pm the reserve condition worsened and AEMO declared a LOR2 condition for the period of 4.15 pm to 5.30 pm. The reserve required (the largest generator) was between 690 MW and 700 MW, with the minimum reserve reaching as low as 331 MW for the 5.25 pm dispatch interval (a deficit of 369 MW). The LOR2 condition was officially cancelled by AEMO at 6.05 pm but the LOR1 condition remained until 8.20 pm.

The low reserves in Queensland coincided with an unplanned reduction in available generation due to a number of units tripping on the day and others experiencing plant issues. Another contributing factor was that 1593 MW of generation (Callide units 3 and 4, Tarong North and Wivenhoe unit 1) was out of service on the day.

Network Availability

Import limits into Queensland across the Queensland to New South Wales (QNI) interconnector were around 250 MW during the relevant period, slightly higher than forecast. Imports were limited due to a transmission constraint that manages the potential loss of Kogan Creek. Due to the constraint equation, when generation at Kogan Creek exceeds a threshold, the greater the generation at Kogan Creek the less the import capability across QNI. For the majority of the day, Kogan Creek was generating at around 700 MW.

On 28 January, there was an unplanned outage of one of the Directlink cables, which coincided with the planned outage of the other two. The cables (which form part of the Terranora interconnector) did not return to service until 31 January. As a result, on 29 January, flows across Terranora were forced into New South Wales at low levels to meet local load, ranging from 50 MW to 70 MW across the day. There were no imports available from New South Wales across the Terranora interconnector.

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A Price setters for 29 January 2013

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] The 30-minute spot price is the average of the six dispatch interval prices.

Queensland – 5 pm

Time	Dispatch Price	Participant	Unit	Service	Offer price	Marginal Change	Contribution
16:35	$2100.00	ERM Power & Arrow	BRAEMAR7	Energy	$2100.00	1.00	$2100.00
16:40	$7201.93	CS Energy	W/HOE#2	Energy	$7200.98	1.00	$7200.98
16:45	$7201.95	CS Energy	W/HOE#2	Energy	$7200.98	1.00	$7200.98
16:50	$7202.07	CS Energy	W/HOE#2	Energy	$7200.98	1.00	$7200.98
		Eraring Energy	ER03	Energy	$49.85	0.89	$44.31
		International Power	LOYYB1	Energy	$43.69	-0.49	-$21.52
		International Power	LOYYB2	Energy	$43.69	-0.51	-$22.17
16:55	$12 085.83	AGL Hydro	OAKEY2	Energy	$12 085.83	0.50	$6042.92
		AGL Hydro	OAKEY1	Energy	$12 085.83	0.50	$6042.92
17:00	$2000.00	Stanwell	STAN-3	Energy	$2000.00	0.33	$666.60
		Stanwell	STAN-2	Energy	$2000.00	0.33	$666.60
		Stanwell	STAN-1	Energy	$2000.00	0.33	$666.60
Spot Price		**$6299/MWh**					

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

B Closing bids for 29 January 2013

Figures B1 to B5 highlight the half hour closing bids for participants in Queensland 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 B.1 Origin Energy (Darling Downs, Mt Stuart and Roma) closing bid prices, dispatch and spot price

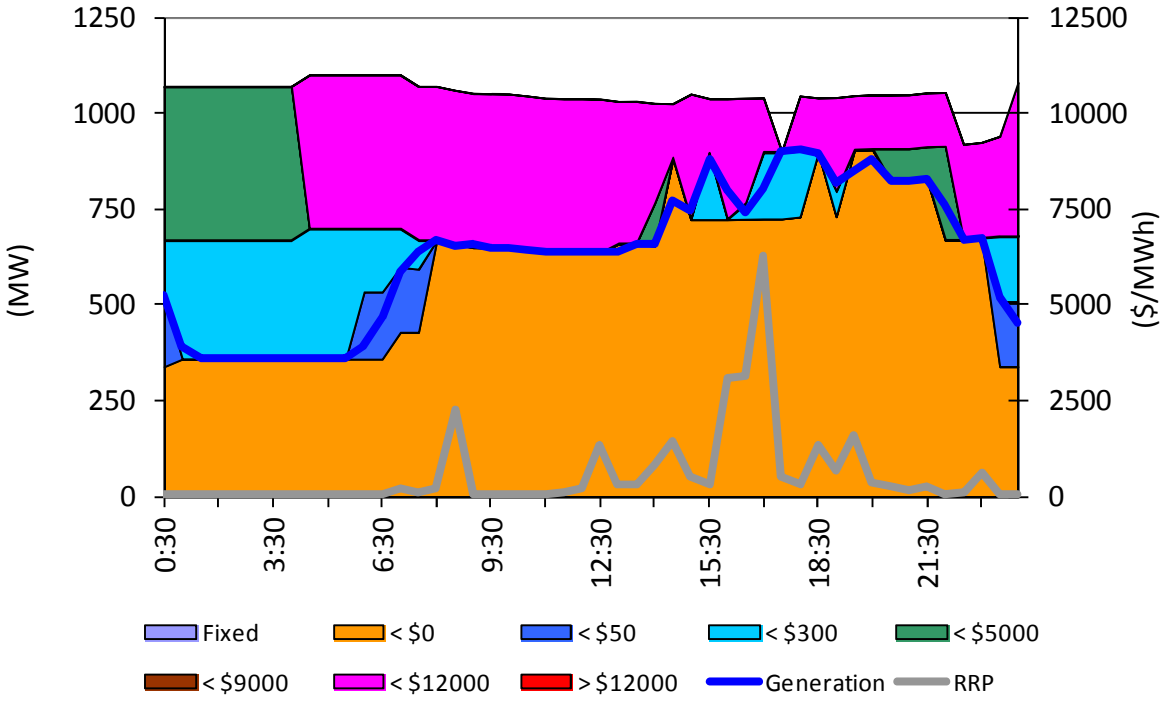

Figure B.2 Stanwell Corporation (Stanwell, Tarong, Mackay, Kareeya, Barron Gorge) closing bid prices, dispatch and spot price

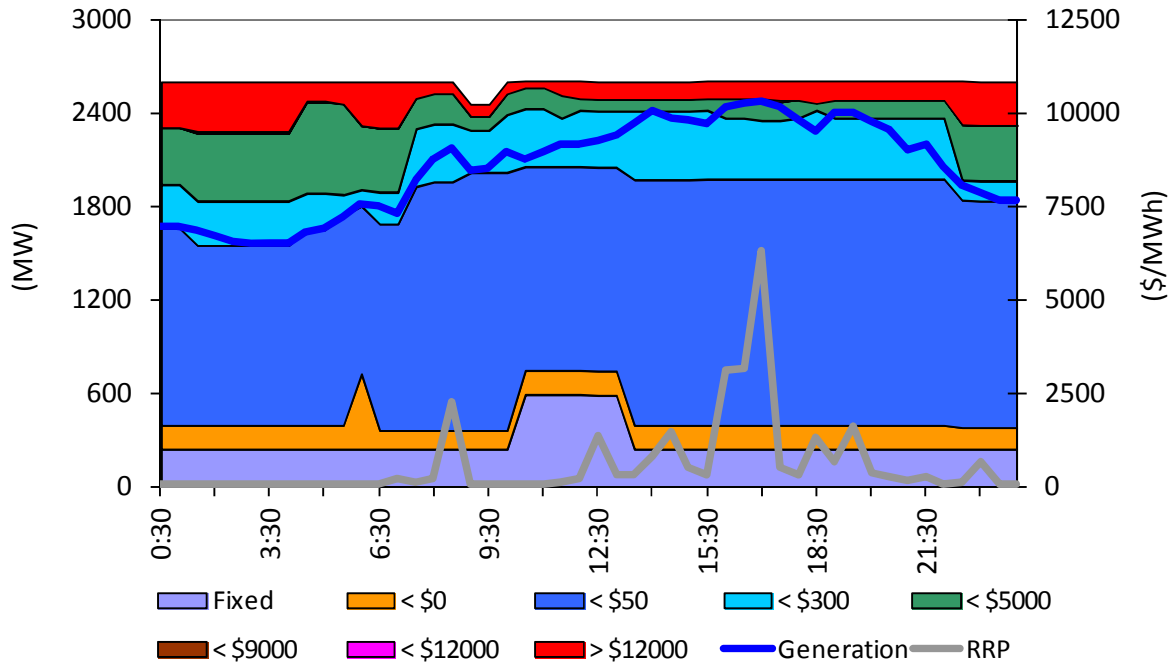

Figure B.3 AGL (Oakey and Yabulu) closing bid prices, dispatch and spot price