

Electricity spot prices above \$5000/MWh

8 January 2010
South Australia



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 factors such as 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 Friday 8 January 2010, the spot price in South Australia exceeded \$5000/MWh for three trading intervals from 3.30 pm to 4.30 pm inclusive. All of these prices were higher than forecast four hours ahead but were close to the forecast made 12 hours ahead.

The temperature reached 41°C in Adelaide with demand reaching 2817 MW at 5.30 pm, which was close to that forecast four and 12 hours ahead.

A constraint used to manage a short notice outage of the Bungama to Para line resulted in around 240 MW of low-priced generation in northern South Australia being 'constrained-off'².

System normal constraints reduced the import capability from Victoria across both the Heywood and Murraylink interconnectors by more than 200 MW and 'constrained-off' around 100 MW of low-priced generation in the south east of South Australia. These impacts were not forecast.

Day-ahead bidding by AGL significantly contributed to the spot prices exceeding \$5000/MWh. AGL was the only participant with significant offers above \$5000/MWh. Around two-thirds of its capacity at Torrens Island Power Station was priced close to the price cap. Dispatch of this capacity set the price at all times when the dispatch price was greater than \$5000/MWh during this period.

Rebidding did not contribute to the prices exceeding \$5000/MWh.

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

² Network constraints can cause generators to be dispatched at a price that is lower than its offer price (constrained-on) or generators to not be dispatched even though its offer price is lower than the regional price (constrained-off).

Actual and forecast demand

Figure 1 compares the actual demand, spot price and available capacity in South Australia during the high-priced period with that forecast by AEMO four and 12 hours ahead of dispatch.

Conditions at the time saw demand and available capacity close to that forecast four and 12 hours ahead. Prices were close to that forecast 12 hours ahead but higher than that forecast four hour ahead. Demand reached a maximum of 2817 MW at 5.30 pm.

Figure 1: South Australia demand³, spot price and available capacity

Friday 3:30 PM	Actual	4 hr forecast	12 hr forecast
Demand	2752	2775	2749
Spot price (\$MW/h)	10 000	147	9000
Available capacity	3068	2890	2921
Friday 4:00 PM	Actual	4 hr forecast	12 hr forecast
Demand	2792	2785	2759
Spot price (\$MW/h)	10 000	175	9000
Available capacity	3022	2887	2916
Friday 4:30 PM	Actual	4 hr forecast	12 hr forecast
Demand	2794	2798	2778
Spot price (\$MW/h)	10 000	169	9000
Available capacity	3023	2921	2987

Generator offers and rebidding

Up to 3068 MW of generation capacity was available in South Australia at the time of the high prices, with around 2450 MW of capacity priced below \$40/MWh and the remaining 575 MW priced above \$9581/MWh.

Almost all of the capacity in South Australia priced above \$5000/MWh was offered to the market the day-ahead by AGL at Torrens Island and Angaston power stations. The closing bids for all participants in South Australia with capacity priced at or above \$5000/MWh for the high-price period are presented in **Appendix A**.

Throughout this period, AGL set the price in all dispatch intervals at close to the price cap. Details regarding the generators involved in setting the price during the high-price period, and how that price was determined by the market systems are presented in **Appendix B**.

At 8.57 am Origin Energy rebid 180 MW of available capacity at Quarantine from prices above \$9000/MWh to below zero. The reason given was “0845 (N) change in PDS”. This led to a significant reduction in the forecast prices for this period and explains the four hour ahead forecast prices in Figure 1.

From around 2.30 pm, as a result of the outage of the Bungama to Para line⁴, International Power’s Mintaro and Port Lincoln units were ramped down, eventually to below their technical minimum generation levels. As a result, over two rebids at 2.39 pm and 2.51 pm, International Power reduced the ‘ramp down rates’ of these units to zero. The reasons given

³ With the advent of significant non-scheduled generation, AEMO commenced determining “native demand” which is the demand supplied by scheduled, semi-scheduled or significant non-scheduled generators (South Australia has a large amount of non-scheduled wind generation). The native demand less the non-scheduled generation is the demand that is met by scheduled and semi-scheduled generators in the dispatch process – the “scheduled demand”. The forecast of significant non-scheduled generation was close to actual and therefore did not impact on the accuracy of the “scheduled demand”, which we analyse in this report.

⁴ See the “Changes to network availability” section for an explanation of this network constraint.

related to the generators reaching the technical minimum generation levels. Rebidding to zero ‘rate down ramp’ when a generator reaches its technical minimum generation level is consistent with the AER’s recently published *Rebidding and Technical Parameters Guideline*⁵.

From 2.45 pm, Flinders Power’s Playford station was constrained-off from around 160 MW to 120 MW by 3.10 pm. As the unit reached its technical minimum generation level, at 3.19 pm (effective from 3.25 pm until 4 pm) Flinders Power reduced the available capacity of Playford by 40 MW (all of which was priced below zero)⁶. The reason given was “15.28P Playford boiler off due transmission constraint @15:28”.

There was no other significant rebidding.

Changes to network availability

During the time of high prices, the overall import capability into South Australia from Victoria was lower than that forecast four hours ahead by up to 329 MW.

Murraylink was being limited to around 120 MW into South Australia as a result of the constraint used to manage the NSW Murraylink runback scheme⁷. This was 80 MW less than that forecast four hours ahead.

To manage a short notice outage of the Bungama to Para line, a constraint was invoked at 1.30 pm to commence from 2.35 pm. This required a reduction in the output of low-priced generation in northern South Australia (at Mintaro, Port Lincoln, Hallet wind farm, Northern power station and Playford) by up to a total of 240 MW. High-priced generation had to be dispatched in its place. The line was returned to service and the constraint was revoked at 7 pm.

A number of system normal constraints (that manage flows from the Victorian border to Adelaide) reduced imports into South Australia across the Heywood interconnector and generation in the south east of South Australia. Imports were limited to around 280 MW during the high-priced period. This was up to 250 MW lower than that forecast four hours ahead. Around 90 MW of low-priced generation (at Snuggery, Ladbroke and Lake Bonny) was ‘constrained-off’.

Figure 3 compares the actual import limit and flow into South Australia with that forecast four and 12 hours ahead during the high-priced period.

Figure 3: Actual and 4 hour ahead forecast import limits into South Australia

	Actual (MW)	4 hr forecast (MW)	12 hr forecast(MW)
3.30 pm	366	618	532
4.00 pm	401	613	531
4.30 pm	407	609	537

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⁵ Refer to the AER Rebidding and Technical Parameters Guideline for more information at www.aer.gov.au

⁶ Unlike the majority of coal fired generators in the NEM, Playford consists of a range of smaller boilers that can supply steam to any combination of the generators. Most other generators have one boiler supplying steam to one generator. In this instance one boiler was shut down to reduce the availability of the whole station.

⁷ This constraint limits flows across Murraylink to avoid voltage collapse for the loss of the Darlington Point to Buronga 220kV line in New South Wales.

Appendix A – Closing bids

Figures A1 and A2 highlight the half hour closing bids for participants in South Australia with capacity priced at or above \$5000/MWh during the trading intervals in which the spot price exceeded \$5000/MWh. It also shows the generation output of that participant and the spot price.

Figure A1: AGL (Torrens Island) closing bid prices, dispatch and spot price

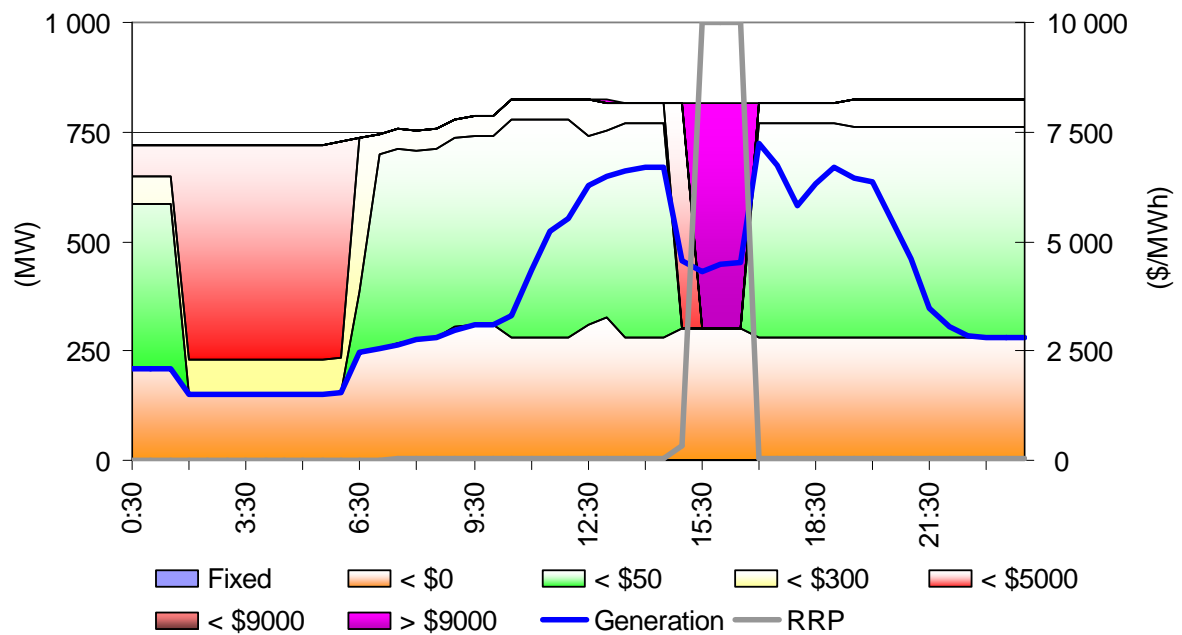
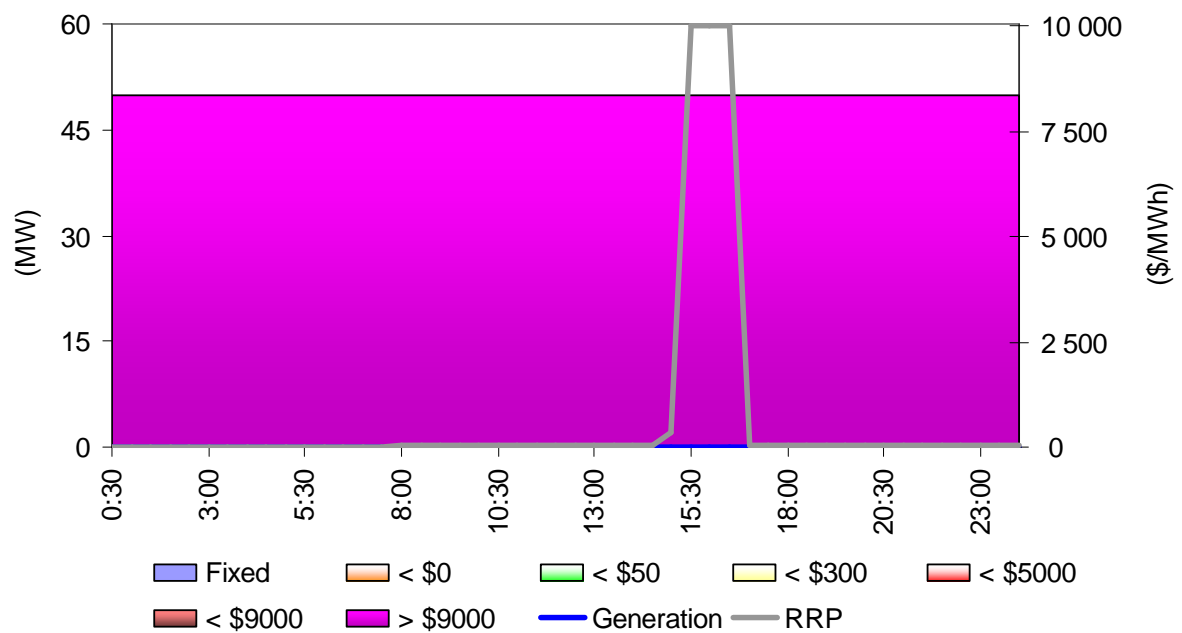
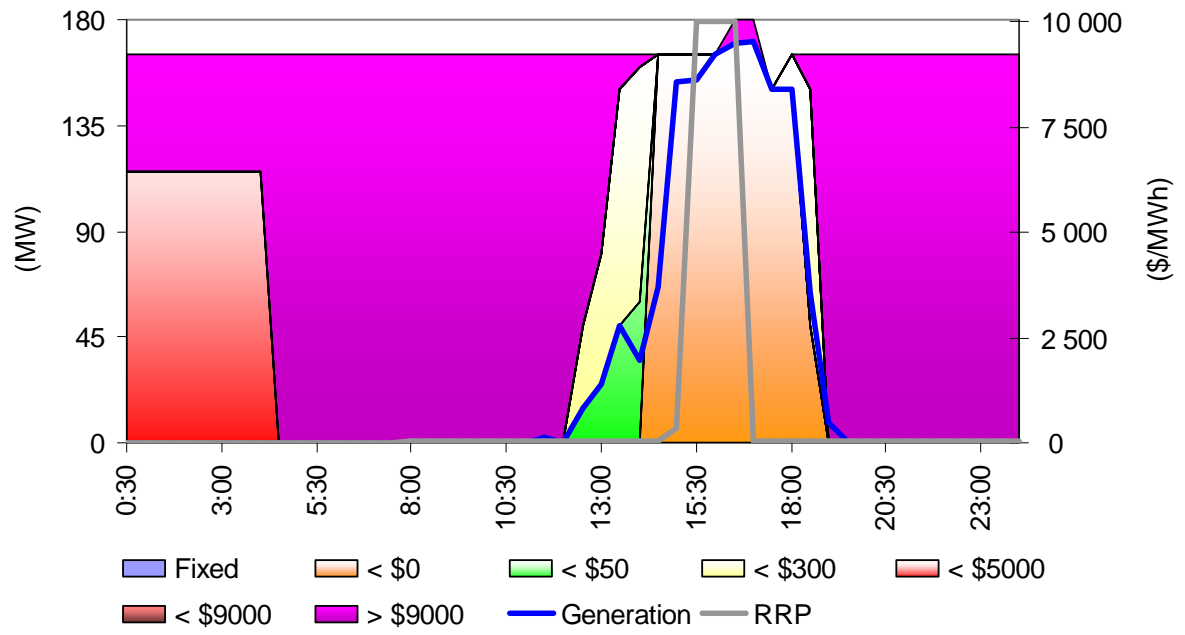


Figure A2: AGL (Angaston) closing bid prices, dispatch and spot price



Note Angaston was not dispatched

Figure A3: TRUenergy (Hallett) closing bid prices, dispatch and spot price



Appendix B – Price setters for Friday 8 January 2010

The following tables identify 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 AEMO⁸. 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.

South Australia - Friday 3.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
15:05	\$9999.71	AGL SA	TORRA2	Energy	\$9999.71	0.50	\$4999.86
		AGL SA	TORRA1	Energy	\$9999.71	0.50	\$4999.86
15:10	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
15:15	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	0.24	\$0.19
		AGL SA	TORRB3	Lower reg	\$0.80	0.24	\$0.19
		AGL SA	TORRB2	Lower reg	\$0.80	-0.47	-\$0.38
15:20	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.50	\$4999.86
		AGL SA	TORRA2	Energy	\$9999.71	0.50	\$4999.86
15:25	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	-0.24	-\$0.19
		AGL SA	TORRB3	Lower reg	\$0.80	0.24	\$0.19
15:30	\$9999.71	AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
Spot price		\$9999.71/MWh					

⁸ Details on how the price is determined can be found at www.aemo.com.au

South Australia - Friday 4 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
15:35	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.50	\$4999.86
		AGL SA	TORRA2	Energy	\$9999.71	0.50	\$4999.86
15:40	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
15:45	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	-0.24	-\$0.19
		AGL SA	TORRB3	Lower reg	\$0.80	0.24	\$0.19
15:50	\$9999.71	AGL SA	TORRA2	Energy	\$9999.71	0.26	\$2580.53
		AGL SA	TORRA1	Energy	\$9999.71	0.26	\$2580.53
		AGL SA	TORRB2	Energy	\$9999.71	0.48	\$4838.56
15:55	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
16:00	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
Spot price		\$9999.71/MWh					

South Australia - Friday 4.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
16:05	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
16:10	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	-0.24	-\$0.19
		AGL SA	TORRB3	Lower reg	\$0.80	0.24	\$0.19
16:15	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	0.24	\$0.19
		AGL SA	TORRB3	Lower reg	\$0.80	-0.24	-\$0.19
16:20	\$9999.71	AGL SA	TORRA1	Energy	\$9999.71	0.50	\$4999.86
		AGL SA	TORRA2	Energy	\$9999.71	0.50	\$4999.86
16:25	\$9999.71	AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRB2	Energy	\$9999.71	0.25	\$2542.33
		AGL SA	TORRB4	Lower reg	\$0.80	0.24	\$0.19
16:30	\$9999.71	AGL SA	TORRB3	Lower reg	\$0.80	-0.24	-\$0.19
		AGL SA	TORRB4	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRB3	Energy	\$9999.71	0.24	\$2372.83
		AGL SA	TORRA2	Energy	\$9999.71	0.14	\$1355.86
		AGL SA	TORRA1	Energy	\$9999.71	0.14	\$1355.86
Spot price		\$9999.71/MWh					