



Electricity spot prices above \$5000/MWh

Queensland, 2 February 2017

03 April 2017

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1 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.

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

2 Summary

On 2 February 2017 spot prices in Queensland were volatile from early afternoon to late evening, reaching \$6456/MWh at 5 pm and \$13 400/MWh at 5.30 pm.

Temperatures in Queensland were high for several days in the lead up to the high price events. On the day, the maximum temperature in Brisbane reached 33 degrees, resulting in high demand for electricity.

Forecasts prepared by the market operator (AEMO) predicted there would be sufficient supplies of electricity available to comfortably meet demand. AEMO's forecasts also indicated that spot prices would exceed \$13 400/MWh for extended periods from mid to late afternoon. This was because cheaper imports of electricity from neighbouring states were predicted to be limited and high priced supply would need to be used to meet the high demand for electricity.

Many of the predicted high prices did not occur because demand for electricity was lower than anticipated and generators shifted their offers into low prices. Rebidding of capacity by generators during the day from low to high prices (which can put upward pressure on prices), did not contribute to the spot price exceeding \$5000/MWh on this occasion.

3 Analysis

AEMO collates information about expected or forecast demand, network capability and offers from market generators that comprise mega-watt (MW) capacities, in a series of price bands and what they can generate in total (availability), to calculate dispatch instructions for every five minute dispatch interval. AEMO publishes aggregated dispatch information with varying degrees of granularity, including five minute and 30 minute updates, to enable market participants to adjust their positions as market conditions change.

AEMO publishes regular forecasts of market outcomes including its own assessment of the demand for electricity in each region of the market. At a half hourly resolution, these forecasts provide participants with regional spot prices, demand and total available generation for the remainder of the day. On this occasion, forecasts for Queensland, four and 12 hours prior, over-estimated the regional demand by around 300MW. It also shows that spot prices were anticipated to be much higher than that which actually occurred and could be quite variable. Notably, only the 5 pm and 5.30 pm spot prices exceeded \$5000/MWh and the 5.30 pm spot price was close to its forecast.

Table 1 shows for Queensland, the actual and forecast wholesale price, known as the spot price, electricity demand and generator availability for each trading interval from 1.30 pm to 7.30 pm. The spot price exceeded \$5000/MWh, which is the threshold for the AER to produce this report, for the 5 pm and 5.30 pm trading interval (in bold) reaching \$6456/MWh and \$13 400/MWh respectively. The analysis extends to other trading intervals as they are relevant to the conditions that occurred in the afternoon of 2 February 2017 and how these conditions resulted in periods of sustained high prices.

In the 5 pm and 5.30 pm intervals, available capacity was up to 200 MW lower than forecast four hours ahead with a majority of this capacity priced below \$100/MWh.

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

Trading interval	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
1.30 pm	1733	2150	421	8178	8491	8485	10842	11027	11122
2 pm	164	2150	2150	8340	8602	8619	10706	11002	11122
2.30 pm	102	2150	2150	8515	8740	8758	10872	11057	11042
3 pm	121	2150	2150	8593	8845	8842	10643	11037	11042
3.30 pm	2376	13 400	13 400	8657	8963	8959	10 672	11 006	11 041
4 pm	190	13 641	13 641	8714	9110	9102	10 620	10 982	11 042
4.30 pm	2315	14 000	14 000	8871	9233	9209	10 850	10 964	11 047
5 pm	6456	14 000	14 000	8996	9290	9285	10 855	10 989	11 047

Trading interval	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
5.30 pm	13 400	13 400	14 000	8971	9238	9244	10 758	10 961	11 017
6 pm	2191	13 400	13 900	8868	9164	9203	10 769	10 828	11 023
6.30 pm	694	103	13 641	8804	8970	9105	10 763	10 892	11 032
7 pm	2184	150	13 641	8845	9027	9152	10 793	10 882	11 027
7.30 pm	1785	13 400	13 900	8800	9120	9183	10 817	10 875	11 026

3.1 Supply and Demand

Participants in the National Electricity Market (NEM) are free to choose the amount of electricity or capacity (MW) they offer for each of their generators for dispatch into the market and the price they are prepared to accept (\$/MWh) for the energy produced. A participant's offer comprises 10 MW and price pairs. AEMO aggregates all generator offers from lowest price to highest price and dispatches that generation in order to meet its own forecast of the demand for electricity in a region every 5 minute of the day, taking into account the transfer capability of the network.

This section discusses changes to the offered prices, capacity. It also shows how accurately AEMO predicted the demand conditions relevant to the high price periods.

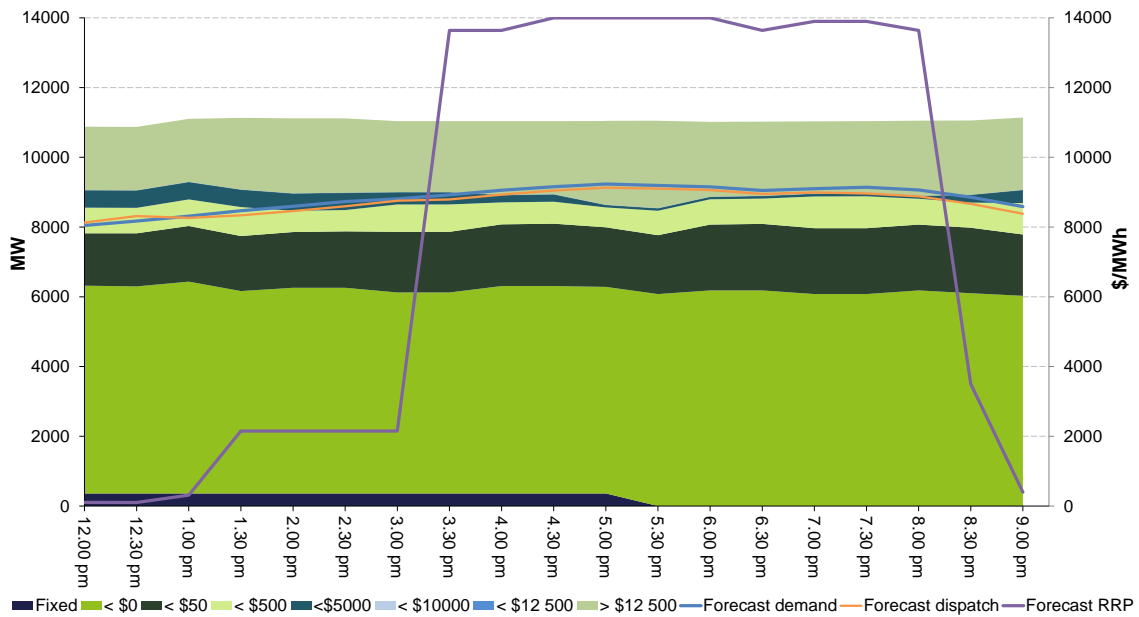
3.1.1 Forecast and actual closing bids and supply

This section examines the forecast information that was available four and 12 hours in advance of the events versus the actual generator offers at the time of dispatch (closing bids) and, demand, dispatch and prices.

A trading interval is defined as the 30 minutes preceding the quoted time. Every half hour, AEMO provides a 30 minute resolution forecast, for the remainder of the day, which provides participants with an indicator of their expected generation and the forecast spot price against forecast demand. Actual market dispatch occurs on a five minute basis and consequently five minute dispatch prices, generation levels and demand are reported. All actual 30 minute data for a trading interval, including pricing and generation are calculated from the average of six five minute dispatch intervals.

Each generator is obliged to provide an initial offer to AEMO by midday the preceding day. Figure 1 shows the cumulative initial offers for generators in Queensland aggregated by price against the conditions forecast at the time. The figure provides an overall picture, looking 12 hours ahead, of the forecast market outcomes across the day. Specifically, it shows the aggregated initial offers for Queensland generators (stacked area), the total Queensland generator dispatch (orange line) and spot price (purple line) that would have occurred to satisfy the forecast demand (blue line)

Figure 1: 12 hours ahead forecast generator offers, spot prices, dispatch and demand

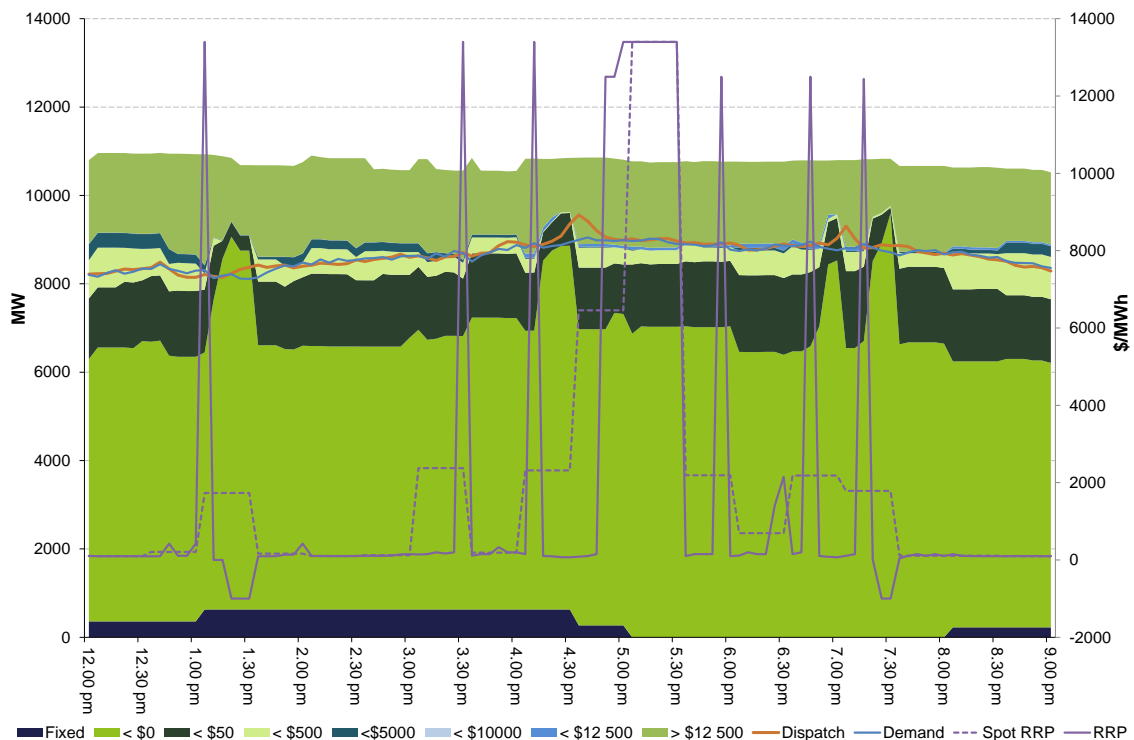


The spot price forecast in Queensland in Figure 1 was close to \$14 000/MWh from 3 pm to 8 pm because the dispatch system anticipated that generators with offer prices greater than \$12 500 would be required to satisfy the level of forecast demand.

From 5 pm to 8 pm the initial offers show that there was almost no capacity priced between \$500/MWh and \$5000/MWh (the narrow dark blue region of the area chart) and no capacity priced between \$5000/MWh and \$12 500/MWh.

Figure 2 shows the cumulative offers for generators in Queensland that were in place at the time of actual dispatch, also known as closing bids, at a five minute resolution. Generators may change their offers to suit their changing economic or physical position as the day unfolds. Generators change their offers by submitting rebids. The figure shows, for Queensland, the dispatch price (purple line), demand (blue line), total local generation dispatch (orange line) and the 30 minute spot price (dashed purple line).

Figure 2: Closing bids, prices, dispatch and demand



By comparing Figure 1 and Figure 2, the actual spot price was lower than the forecast spot price, 12 hours ahead, in all intervals from 3 pm to 8 pm although the spot price for 5 pm and 5.30 pm trading intervals still exceeded \$5000/MWh. Rebidding reduced the amount of capacity priced between \$500/MWh and \$12 500/MWh such that, depending on circumstances, the price could change significantly in response to minor changes to demand or supply.

A range of factors contributed to spot prices being lower than forecast:

- Actual demand was lower than forecast (see section 3.1.2).
- In a majority of those trading intervals where high dispatch prices occurred within the first three dispatch intervals, participants in Queensland rebid significant capacity from high to low prices (increase in bottom green section after a price spike), lowering dispatch prices and hence lowering the trading interval price. On occasions this saw the price fall to the price floor. (see section 3.2).

Electricity demand, during the 5 pm trading interval was lower than forecast 12 hours ahead. The marginal unit (the unit that was setting the price) increased its output to its maximum during the 4.45 pm dispatch interval and could not set price. Under these circumstances output from the next cheapest unlimited generator will set the price, and this resulted in the price increasing to \$12 499/MWh and above for the remaining three dispatch intervals in the trading period. There was no significant rebidding of capacity from high to low prices by other participants. It is not unusual for generators to not respond when high prices occur late in a trading interval. Time delays in both lodging and processing rebids into new dispatch instructions may mean that their changes are not effectively recognised in the dispatch process before the end of the trading interval.

For the 5.30 pm trading interval generators did not rebid their capacity to lower prices and the resulting price was close to the high forecast price.

Appendix A contains all significant rebids.

Appendix B details the generators involved in setting the price during the high-price periods, and how that price was determined by the market systems.

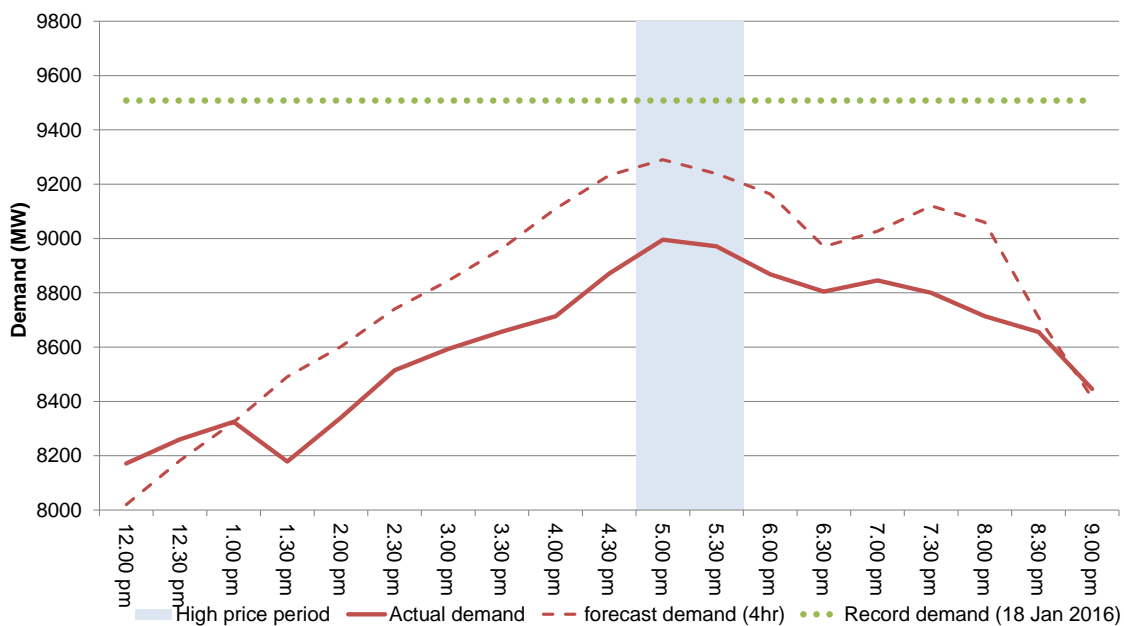
The closing bids for all participants in Queensland with capacity priced at or above \$5000/MWh for the high-price periods are set out in Appendix C.

3.1.2 Demand

The maximum temperature in Brisbane reached around 33 degrees as forecast. This was the fourth consecutive day of temperatures above 30 degrees. Maximum total demand for the day reached 8996 MW. This was around 300 MW lower than AEMO anticipated four hours before dispatch. The lower than expected demand contributed to the actual lower than forecast price.

Figure 3 shows actual total demand (red line) and forecast total demand (red dashed line), four hours before dispatch. The graph also shows the highest recorded total demand (green line).²

Figure 3: Actual and forecast total demand



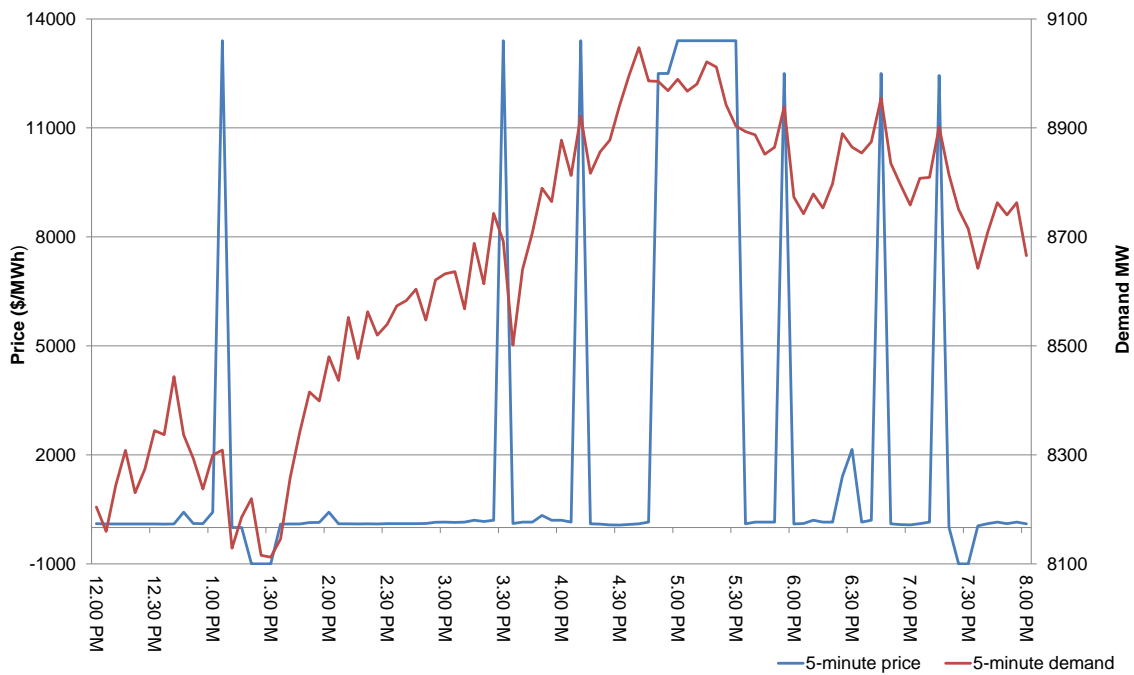
The light shaded section of the graph for the 5 pm and 5.30 pm trading intervals highlights where the spot price was above \$5000/MWh. As can be seen, actual total

² Total Demand is the level of demand used in the National electricity market dispatch engine with generator bids and network constraints to set dispatch prices, dispatch targets and interconnector flows.
https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/2016/Demand-terms-in-EMMS-Data-Model_Final.pdf

demand was significantly lower than forecast demand 4 hours ahead, leading to lower than forecast high prices.

Figure 4 shows 5-minute demand and price over the high price period. The figure shows that, with such a tight supply and demand curve, small increases in 5-minute demand coincided with increases in price. There was some customer response in reducing demand as a result of the published actual dispatch price, however demand side responses are not captured as part of the dispatch system.

Figure 4: Queensland 5-minute price and demand graph



3.1.3 Network Availability

Queensland is connected to the rest of the NEM via two transmission connections (interconnectors). The Queensland – New South Wales Interconnector (QNI) consists of two high voltage AC transmission lines between Armidale, in New South Wales and Bulli Creek in Queensland. A second underground DC link (Terranora) allows energy to be transferred from Mullumbimby, New South Wales north to Queensland along the coast. It is through these interconnectors that Queensland can import and or export generation into New South Wales. Limits on the interconnectors are often in place to preserve voltage stability in the power system, these are known as constraints.

Table 2 shows the net import limit and the actual imports into Queensland from New South Wales over the Queensland to New South Wales (QNI) and the Terranora interconnectors.

Table 2: Net actual and forecast network capability

Trading interval	Imports (MW)			Import limit (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
1.30 pm	-34	163	143	191	163	143
2 pm	43	172	141	142	172	141
2.30 pm	104	177	141	140	177	141
3 pm	34	147	123	133	147	123
3.30 pm	90	110	104	109	110	104
4.00 pm	-15	111	103	85	111	103
4.30 pm	-157	106	103	102	106	103
5.00 pm	37	99	102	88	99	102
5.30 pm	107	86	96	107	86	96
6.00 pm	88	89	92	115	89	92
6.30 pm	127	106	106	130	106	106
7.00 pm	-23	118	115	138	118	115
7.30 pm	55	193	133	160	193	133

The transfer of electricity across the QNI interconnector was limited by constraints to around 200 MW. These network constraints are designed to manage the overloading of the Liddell to Muswellbrook line on the trip of the Liddell to Tamworth line and to avoid voltage collapse in northern New South Wales on the loss of the single largest generation unit in Queensland, Kogan Creek Power Station. These conditions were forecast well in advance.

Constraints on Terranora were forcing around 100 MW of flow into New South Wales for the duration of trading intervals priced above \$5000/MWh, slightly higher than forecast.

During the time of the high prices, imports into Queensland on these interconnectors were limited to a maximum of around 100 MW. The ability to transfer electricity from neighbouring regions of the NEM was significantly constrained due to limitations in the network. These limitations prevented other cheaper sources of electricity from competing with generation in Queensland and remaining local demand had to be met by local generation.

3.2 Pricing observations

Table 3 below examines the trading intervals with at least one 5-minute dispatch interval priced above \$10 000/MWh. It shows the opening amount of capacity offered by participants priced less than \$5000/MWh in each trading interval, the change in available low priced capacity due to rebidding within the trading interval, the change in demand and the net change in imports into Queensland over the interconnectors.

Table 3: Changes in capacity, demand and imports by trading interval priced above \$10 000/MWh

Trading interval	Dispatch interval	Spot Price (\$/MWh)	Dispatch price (\$/MWh)	Opening capacity priced < \$5000/MWh (MW)	Change in available capacity priced < \$5000/MWh (MW)	Change in demand (MW)	Net change in imports (MW)
1.30 pm	1.05 pm	1733	13 400	8420	-364	9	35
	1.10 pm		0		632	-180	-174
	1.15 pm		-1		-70	57	10
	1.20 pm		-1000		434	34	-15
	1.25 pm		-1000		-315	-104	-130
	1.30 pm		-1000		0	-3	-51
3.30 pm	3.05 pm	2376	141	8918	0	4	36
	3.10 pm		150		-226	-68	29
	3.15 pm		199		25	120	-8
	3.20 pm		167		-25	-74	-60
	3.25 pm		199		-15	129	72
	3.30 pm		13 400		-134	-51	3
4.30 pm	4.05 pm	2315	150	8591	0	-65	15
	4.10 pm		13 400		5	109	-8
	4.15 pm		104		590	-105	-122
	4.20 pm		95		227	40	-111
	4.25 pm		71		207	22	-302
	4.30 pm		70		8	63	-58
5.00 pm	4.35 pm	6456	86	8838	0	57	372
	4.40 pm		101		4	50	136
	4.45 pm		150		0	-61	62
	4.50 pm		12 499		0	-1	8
	4.55 pm		12 499		-15	-17	19
	5.00 pm		13 400		-25	21	-14
5.30 pm	5.05 pm	13 400	13 400	8780	-180	-22	9
	5.10 pm		13 400		0	13	1
	5.15 pm		13 400		-28	41	37
	5.20 pm		13 400		10	-10	-12
	5.25 pm		13 400		0	-69	-27
	5.30 pm		13 400		0	-39	-8
6.00 pm	5.35 pm	2191	101	8922	50	-10	-33
	5.40 pm		150		-20	-6	35
	5.45 pm		150		-60	-36	25
	5.50 pm		150		0	13	8
	5.55 pm		12 499		-10	74	-7
	6.00 pm		98		0	-166	-81
7.00 pm	6.35 pm	2184	150	8914	6	-11	-5
	6.40 pm		199		-75	21	-18
	6.45 pm		12 499		-46	80	28
	6.50 pm		103		0	-120	-91
	6.55 pm		82		680	-39	-212
	7.00 pm		71		102	-38	-271
7.30 pm	7.05 pm	1785	106	8744	0	49	447

Trading interval	Dispatch interval	Spot Price (\$/MWh)	Dispatch price (\$/MWh)	Opening capacity priced < \$5000/MWh (MW)	Change in available capacity priced < \$5000/MWh (MW)	Change in demand (MW)	Net change in imports (MW)
	7.10 pm		150		0	2	121
	7.15 pm		12 442		20	93	19
	7.20 pm		14		752	-88	-156
	7.25 pm		-1000		90	-64	-3
	7.30 pm		-1000		160	-36	0

From Table 3, we observe changes in a range of factors that affected dispatch prices. Examples of these are discussed below:

1. Rebidding capacity from low to high prices - This behaviour steepens the supply curve and can often mean that higher priced capacity is required to be dispatched in order to meet demand. The high price of the 1.05 pm dispatch interval can be attributed to this behaviour, where Callide and Alinta rebid 364 MW of generation capacity to \$13 400/MWh and above.
2. Rebidding of capacity from high to low priced bands in response to a high dispatch price - It is not unusual for generators to seek to increase revenue by rebidding capacity to low price bands to facilitate higher dispatch levels during the high priced trading interval, for example in the 1.30 pm trading interval. The 1.05 pm dispatch price reached \$13 400/MWh, meaning the 1.30 pm spot price was guaranteed to be at least \$1400/MWh. By the second dispatch interval, 632 MW of capacity was moved by eight participants from high to low prices, this can be seen in Figure 2 by the increase in the bottom green section after a price spike. See Appendix A for details on these rebids.
3. An increase in demand - At 4.10 pm demand increased by 109 MW, without a significant increase in imports from neighbouring regions or in low priced generation, the price reached \$13 400/MWh for one dispatch interval.
4. A decrease in demand – At 6 pm demand decreased by 166 MW, following a high price of \$12 499/MWh, most likely due to a demand side response. These types of demand side responses are not captured as part of the dispatch system. There was no rebidding of capacity and the price fell to \$98/MWh.
5. Failure to respond – At 4.50 pm the dispatch price reached \$12 499/MWh following this price there was little capacity rebid from high to low prices by Queensland participants. There was also no significant decrease in demand or increase in imports into Queensland. Consequently, the price remained above \$12 500/MWh for nine dispatch intervals. It was these consecutive high priced dispatch intervals that led to the spot price exceeding \$5000/MWh for two trading intervals.

Australian Energy Regulator

April 2017

Appendix A: Significant Rebids

The rebidding tables highlight the relevant rebids submitted by generators that impacted on market outcomes during the time of high prices. It details the time the rebid was submitted and used by the dispatch process, the capacity involved, the change in the price of the capacity was being offered and the rebid reason.

Significant rebids for 1.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
12.58 pm	1.05 pm	Callide Power Trading	Callide C	226	-1000	14 000	1257A DISPATCH PRICE 420 ABOVE P5MIN RRP SL
12.58 pm	1.05 pm	Alinta	Braemar A	138	45	13 400	1255~A~CHANGE IN 5PD \$2150 V \$395.69~
1.01 pm	1.10 pm	Alinta	Braemar A	137	13 400	-1000	1300~A~DISPATCH \$13400 ~
1.01 pm	1.10 pm	Millmerran Energy Trader	Millmerran	55	14 000	-1000	13:05 A QLD RRP DS DI 13:05 VALUE 13400 VS P5 RUN 12:55 DI 13:05 VALUE 2150 SL
1.02 pm	1.10 pm	Origin Energy	Mt Stuart	70	13 450	-1000	1300A UNFORECAST PRICE SPIKE \$13.399.91 @ 1305 DI SL
1.02 pm	1.10 pm	Arrow Energy	Braemar 2	395	<14 000	-1000	1302A QLD PRICE HIGHER THAN FORECAST SL
1.03 pm	1.10 pm	Callide Power Trading	Callide C	226	14 000	-1000	1302A QLD RRP DS DI 13:05 VS P5 RUN 12:55 DI 13:05 SL
1.11 pm	1.20 pm	Stanwell	Stanwell and Tarong	470	14 000	-1000	1310A PRICE HIGHER THAN FORECAST - SL

1.12 pm	1.30 pm	AGL	Yabulu	11	-992	n/a	1310~P~020 REDUCTION IN AVAIL CAP~206 UNEXP AMBIENT TEMP EFFECTS
1.14 pm	1.25 pm	RTA Yarwun	Yarwun	155	-990	n/a	GAS SUPPLY LIMITATIONS
1.16 pm	1.25 pm	Origin	Darling Downs	10	-1000	n/a	1315P CHANGE IN AVAIL - HIGH BACK PRESSURE SL
1.18 pm	1.25 pm	Stanwell	Tarong	150	-1000	>13 900	1317F AVOID MARGINAL DISPATCH AT TPS AND MGT DUE TO HIGH PRICES SL

Significant rebids for 3.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
3.03 pm	3.10 pm	Callide Power Trading	Callide C	226	-1000	14 000	1503A QLD RRP P5 RUN 15:00 DI 15:30 VS P5 RUN 14:55 DI 15:30 SL
3.21 pm	3.30 pm	Alinta Energy	Braemar A	134	45	13 400	1510~A~CHANGE IN PRICE 5PD AT DI 15:25: \$167.32 VS \$2,150.30

Significant rebids for 4.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
4.06 pm	4.15 pm	Stanwell	Stanwell, Tarong	590	>13 400	-1000	1606A QLD RRP SL
4.12 pm	4.20 pm	Callide Power Trading	Callide C	226	14 000	-1000	1612A QLD RRP DS DI 16:15 104 VS P5 RUN 16:05 13400 SL

4.18 pm	4.25 pm	CS Energy	Gladstone	100	14 000	45	1617P PORTFOLIO REARRANGEMEN T DUE TO- CALLIDE RESTRICTIONS- SL
4.18 pm	4.25 pm	Origin	Darling Downs	5	n/a	70	1615P CHANGE IN AVAIL - AMBIENT CONDITIONS SL
4.18 pm	4.25 pm	Origin	Mt Stuart	92	12 499	-1000	1617A CONSTRAINT MANAGEMENT - N>>N- NIL__3_OPENED SL

Significant rebids for 5 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
1.05 pm		Millmerran Energy Trader	Millmerran	-30	-1000	N/A	13:04 P: condensate polisher inlet temperature
1.11 pm		Millmerran Energy Trader	Millmerran	-15	-1000	N/A	13:10 P: condensate polisher inlet temperature
1.12 pm		AGL Energy	Yabulu	-11	<150	N/A	1310~P~020 reduction in avail cap~206 unexp ambient temp effects
1.16 pm		Origin Energy	Darling Downs	-10	70	N/A	1315P change in avail - high back pressure sl
1.47 pm		Millmerran Energy Trader	Millmerran	-15	-1000	N/A	13:43 p: condensate polisher inlet temperature
1.49 pm		Millmerran Energy Trader	Millmerran	-25	-1000	N/A	13:49 P: condensate polisher inlet temperature

1.55 pm	CS Energy	Kogan Creek	-10	14	N/A	1354P ambient conditions-sl
2.04 pm	Origin Energy	Darling Downs	-15	70	N/A	1403P change in avail - ambient conditions sl
2.41 pm	CS Energy	Callide B	-20	17	N/A	1441P condenser vacuum limits-
2.47 pm	Origin Energy	Darling Downs	-10	70	N/A	1445P change in avail - ambient conditions sl
3.12 pm	Millmerran Energy Trader	Millmerran	-15	-1000	N/A	15:12 P: condensate polisher inlet temperature
3.17 pm	CS Energy	Kogan Creek	-15	14	N/A	1517 P technical issues-id fan limits-sl
3.45 pm	Origin Energy	Darling Downs	-10	70	N/A	1545P change in avail - ambient conditions SL
4.12 pm	Callide Power Trading	Callide C	100	-1000	14 000	1612A Qld RRP DS DI 16:15 104 vs P5 run 16:05 13400 sl
4.18 pm	CS Energy	Gladstone	100	14 000	<45	1617P portfolio rearrangement due to-callide restrictions-sl

Significant rebids for 5.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	rebid reason
1.55 pm		CS Energy	Kogan Creek	-10	14	N/A	1354P ambient conditions-sl
1.59 pm		CS Energy	Gladstone	30	N/A	-1000	1357P unit offline revised-updated unit ramp down schedule-sl

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	rebid reason
2.04 pm		Origin Energy	Darling Downs	-15	70	N/A	1403P change in avail - ambient conditions sl
2.47 pm		Origin Energy	Darling Downs	-10	70	N/A	1445P change in avail - ambient conditions sl
3.03 pm		Callide Power Trading	Callide C	226	-1000	14 000	1503A Qld RRP P5 RUN 15:00 DI 15:30 VS P5 run 14:55 DI 15:30 SL
4.12 pm		Callide Power Trading	Callide C	126	14 000	-1000	1612A Qld RRP DS DI 16:15 104 VS P5 run 16:05 13400 sl
4.16 pm		Millmerran Energy Trader	Millmerran	-40	-1000	N/A	16:16 P: condensate polisher inlet temperature
4.19 pm		Millmerran Energy Trader	Millmerran	-55	-1000	N/A	16:19 P: condensate polisher inlet temperature
4.54 pm	5.05 pm	CS Energy	Gladstone	180	<99	14 000	1653P portfolio rearrangement due to-gps2 ramp down to outage-sl
5.06 pm	5.15 pm	CS Energy	Kogan Creek	-20	14	N/A	1705P technical issues-id fan issues-sl

Significant rebids for 7 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
6.32 pm	6.40 pm	CS Energy	Gladstone	80	60	14 000	1831A DISPATCH PRICE \$149 LOWER THAN 5MIN PD \$1,405-SL
6.37 pm	6.45 pm	Millmerran	Millmerran	20	-1000	14 000	18:40 A QNI export limit ds di 18:40 value 122 vs pd run 18:30 ti 19:00 value

							162 sl
6.37 pm	6.45 pm	Callide Power Trading	Callide C	26	-1000	14 000	1837A north limit QNI decrease not inp5min sl
6.46 pm	6.55 pm	Stanwell	Stanwell, Tarong	600	>13 400	-1000	1844A QLD RRP FOR DI1845 \$12499.02 / QNI TRANSMISSION CONSTRAINT
6.47 pm	6.55 pm	Callide Power Trading	Callide C	80	14 000	-1000	1844A Q RRP DS DI 18:45 VS P5 RUN 18:35 DI 18:45 SL
6.50 pm	7 pm	Origin Energy	Darling Downs	10	N/A	70	1850P CHANGE IN AVAIL - AMBIENT CONDITIONS SL
6.52 pm	7 pm	Origin Energy	Mt Stuart	92	12 499	-1000	1852A CONSTRAINT MANAGEMENT - N^Q_NIL_B1 SL

Significant rebids for 7.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
7.12 pm	7.20 pm	Origin Energy	Darling Downs	92	12 499	-1000	1910A CONSTRAINT MANAGEMENT - N^Q_NIL_B1 SL
7.13 pm	7.20 pm	Stanwell	Stanwell, Tarong	660	>13 400	-1000	1913A QLD RRP FOR DI1915 @ \$12441.92
7.15 pm	7.25 pm	Callide Power Trading	Callide C	80	14 000	-1000	1913A A QLD RRP DS DI 19:15 VS P5 RUN 19:05 DI 19:15 SL
7.20 pm	7.30 pm	CS Energy	Gladstone	160	14 000	-1000	1917A DISPATCH PRICE LOWER THAN 30MIN FORECAST-RRP \$13.80 P30 \$13399.95-SL

Appendix B: Price setter

The following table identifies for 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. This information is published by AEMO.³ The 30-minute spot price is the average of the six dispatch interval prices.

5 pm trading interval

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
4:35 pm	\$85.86	Origin	MORTLK12	Energy	\$75.98	1.13	\$85.86
4:40 pm	\$100.64	Snowy	MURRAY	Energy	\$84.50	1.19	\$100.56
4:45 pm	\$149.99	AGL Hydro	YABULU	Energy	\$149.99	0.79	\$118.49
		AGL Hydro	YABULU2	Energy	\$149.99	0.21	\$31.50
4:50 pm	\$12 499.02	Origin	MSTUART1	Energy	\$12 499.02	0.50	\$6249.51
		Origin	MSTUART2	Energy	\$12 499.02	0.50	\$6249.51
4:55 pm	\$12 499.02	Origin	MSTUART1	Energy	\$12 499.02	0.50	\$6249.51
		Origin	MSTUART2	Energy	\$12 499.02	0.50	\$6249.51
5:00 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.20	\$2679.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.20	\$2679.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.20	\$2679.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.20	\$2679.99
		Stanwell	TARONG#3	Energy	\$13 399.95	0.20	\$2679.99
Spot Price		\$6456/MWh					

5.30 pm trading interval

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
5:05 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.33	\$4421.98
		Stanwell	STAN-2	Energy	\$13 399.95	0.33	\$4421.98
		Stanwell	STAN-3	Energy	\$13 399.95	0.33	\$4421.98
5:10 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-4	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#3	Energy	\$13399.95	0.17	\$2277.99

³ Details on how the price is determined can be found at www.aemo.com.au

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
5:15 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-4	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#3	Energy	\$13 399.95	0.17	\$2277.99
5:20 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-4	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#3	Energy	\$13 399.95	0.17	\$2277.99
5:25 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-4	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#3	Energy	\$13 399.95	0.17	\$2277.99
5:30 pm	\$13 399.95	Stanwell	STAN-1	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-3	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	STAN-4	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#2	Energy	\$13 399.95	0.17	\$2277.99
		Stanwell	TARONG#3	Energy	\$13 399.95	0.17	\$2277.99
Spot Price		\$13 400/MWh					

Appendix C: Closing bids

Figures C1 to C5 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 C1 – CS Energy (Callide B, Gladstone, Kogan Creek, Wivenhoe) closing bid prices, dispatch and spot price

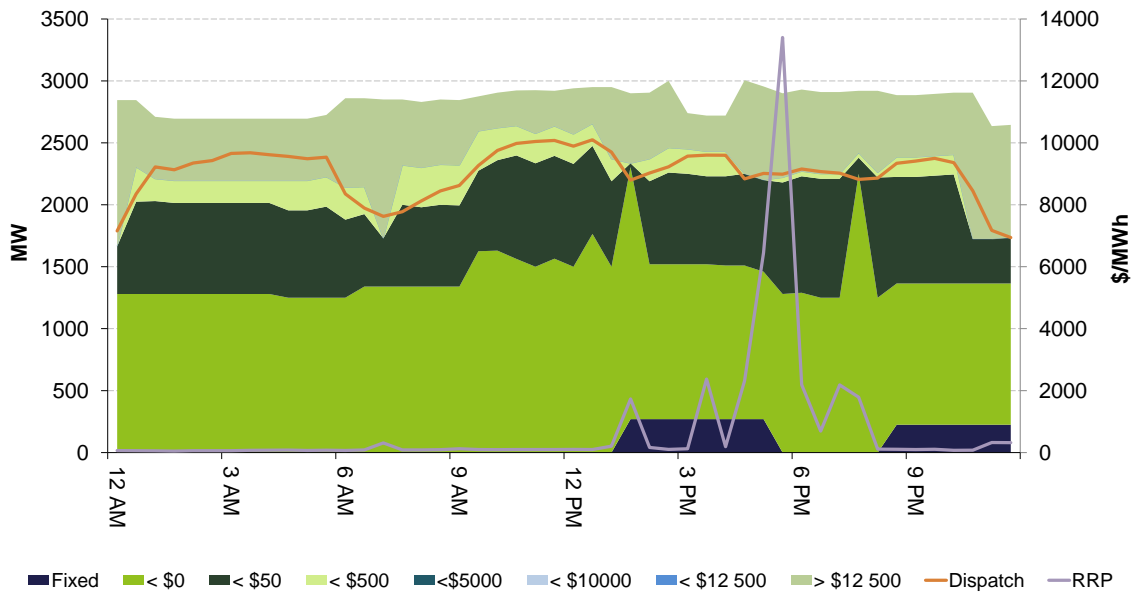


Figure C2 - Stanwell (Barron Gorge, Kareeya, Mackay, Stanwell, Tarong, Tarong North) closing bid prices, dispatch and spot price

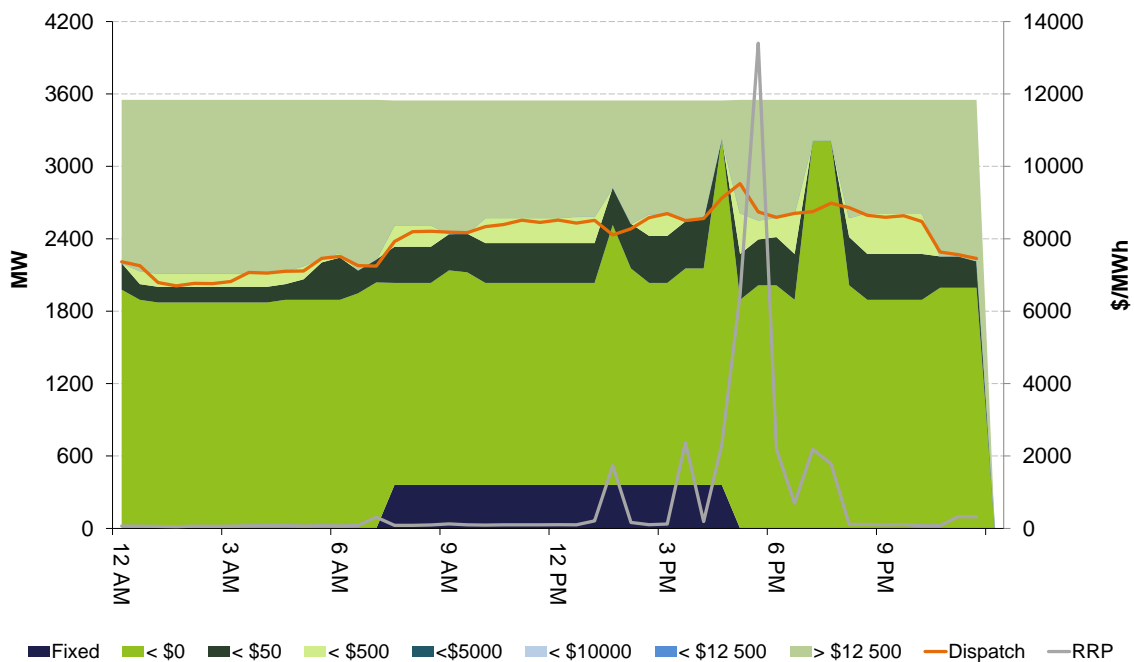


Figure C3 – Callide Power Trading (Callide C) closing bid prices, dispatch and spot price

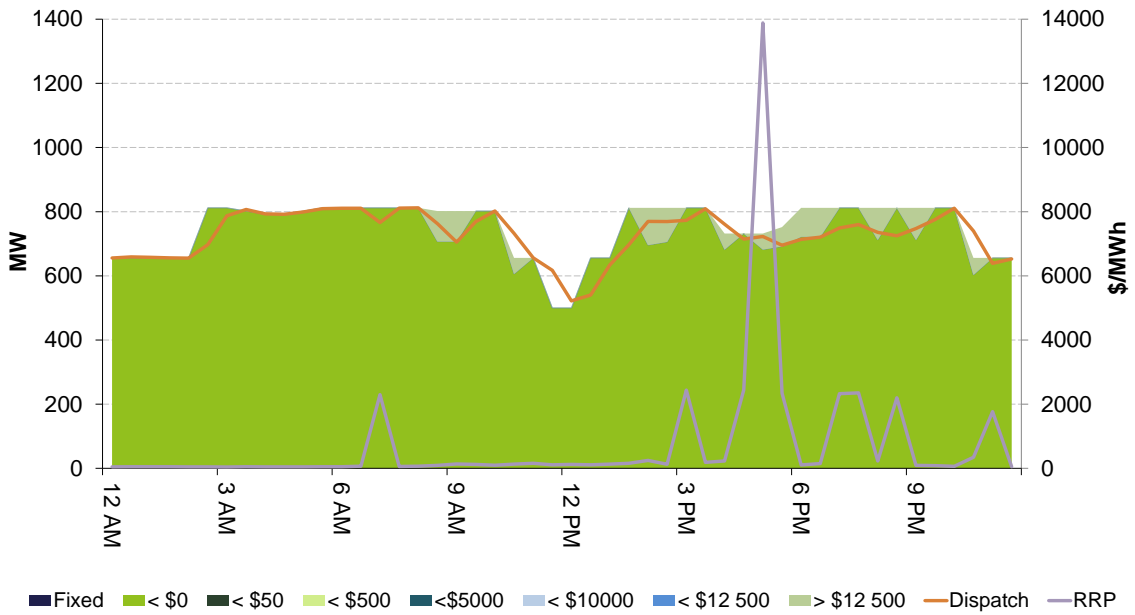


Figure C4 – Arrow Energy (Braemar 2) closing bid prices, dispatch and spot price

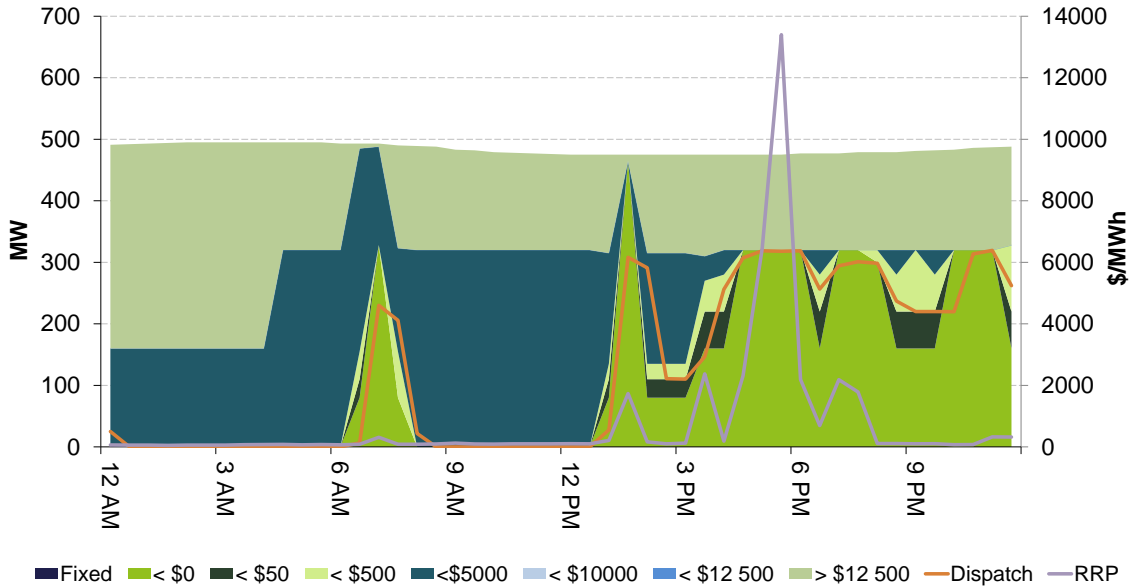


Figure C5 – Origin Energy (Darling Downs, Mount Stuart, Roma) closing bid prices, dispatch and spot price

