



# **Electricity spot prices above \$5000/MWh**

**Queensland, 11 February 2017**

12 May 2017

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# 1 Obligation

The Australian Energy Regulator regulates energy markets and networks under national legislation and rules in eastern and southern Australia, as well as networks in the Northern Territory. Its functions include:

- monitoring wholesale electricity and gas markets to ensure energy businesses comply with the legislation and rules, and taking enforcement action where necessary;
- setting the amount of revenue that network businesses can recover from customers for using networks (electricity poles and wires and gas pipelines) that transport energy;
- regulating retail energy markets in Queensland, New South Wales, South Australia, Tasmania (electricity only), and the ACT;
- operating the Energy Made Easy website, which provides a retail price comparator and other information for energy consumers;
- publishing information on energy markets, including the annual State of the energy market report, to assist participants and the wider community.

The AER is required to publish a report whenever the electricity spot price exceeds \$5000/MWh in accordance with clause 3.13.7 (d) the National Electricity Rules.

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.

These reports are designed to examine market events and circumstances that contributed to particular wholesale market price outcomes and are not necessarily an indicator of potential enforcement action.

## 2 Summary

Wholesale electricity spot prices on the afternoon of 11 February 2017 in Queensland, reached \$7628/MWh, \$8569/MWh and \$8372/MWh for the 4.30 to 5.30 pm trading intervals.

High prices occurred in Queensland because of high demand and network outages in northern New South Wales.

The temperature in Brisbane reached 37 degrees, as forecast by the Bureau of Meteorology. These hot conditions resulted in high forecast and actual demand for electricity.

The network outages, one planned and one unplanned resulted in the market operator (AEMO) applying network limitations to manage these outages. The effect of these limitations meant customer load in northern New South Wales had limited access to the major New South Wales generators in other parts of the state. As a result, electricity was forced from Queensland into northern New South Wales.

Generation priced above \$5000/MWh from Queensland was required to meet local and northern New South Wales demand.

Rebidding of capacity from low to high prices did not contribute to the high price outcomes.

### 3 Analysis

The Australian Energy Market Operator (AEMO) makes regular assessments of expected demand for electricity in each region, based on inputs including forecast temperature, season and the day of the week. AEMO issues “targets” to generators to generate electricity to meet this demand, taking into account network capability and generator offers. Generator offers comprise the mega-watt (MW) capacities generators are willing to supply at a price and the amount the generator can generate in total (generator availability).

To inform market participants about market conditions, AEMO publishes forecasts of price, network capability and demand, updated and published in five minute and 30 minute timeframes. These forecasts form the basis for AEMO’s assessments of interconnector capacity, transfers between regions, reserves and conditions that relate to power system security.

The following sections examine why the high spot prices occurred.

#### 3.1 Overview of actual and expected conditions

Table 1 shows for the high price trading intervals, actual and expected spot prices, demand for, and local generator supply (availability) of, electricity for Queensland. Demand and supply conditions are discussed in detail in section 3.3.

Table 1 shows:

- Actual demand was close to forecast and generator availability was around 250 MW lower than forecast four hours ahead.
- Four hours ahead of the high price events, spot prices were expected to reach \$13 300/MWh. Actual spot prices were significantly lower than forecast, but still well above \$5000/MWh.

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

Trading interval	Spot Price (\$/MWh)			Demand (MW)			Generator Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
4.30 pm	7628	13 300	13 333	8627	8550	8588	10 489	10 743	10 909
5 pm	8569	13 300	13 900	8691	8764	8687	10 485	10 733	10 919
5.30 pm	8372	13 300	12 431	8752	8652	8646	10 491	10 743	10 934

#### 3.2 Network Availability

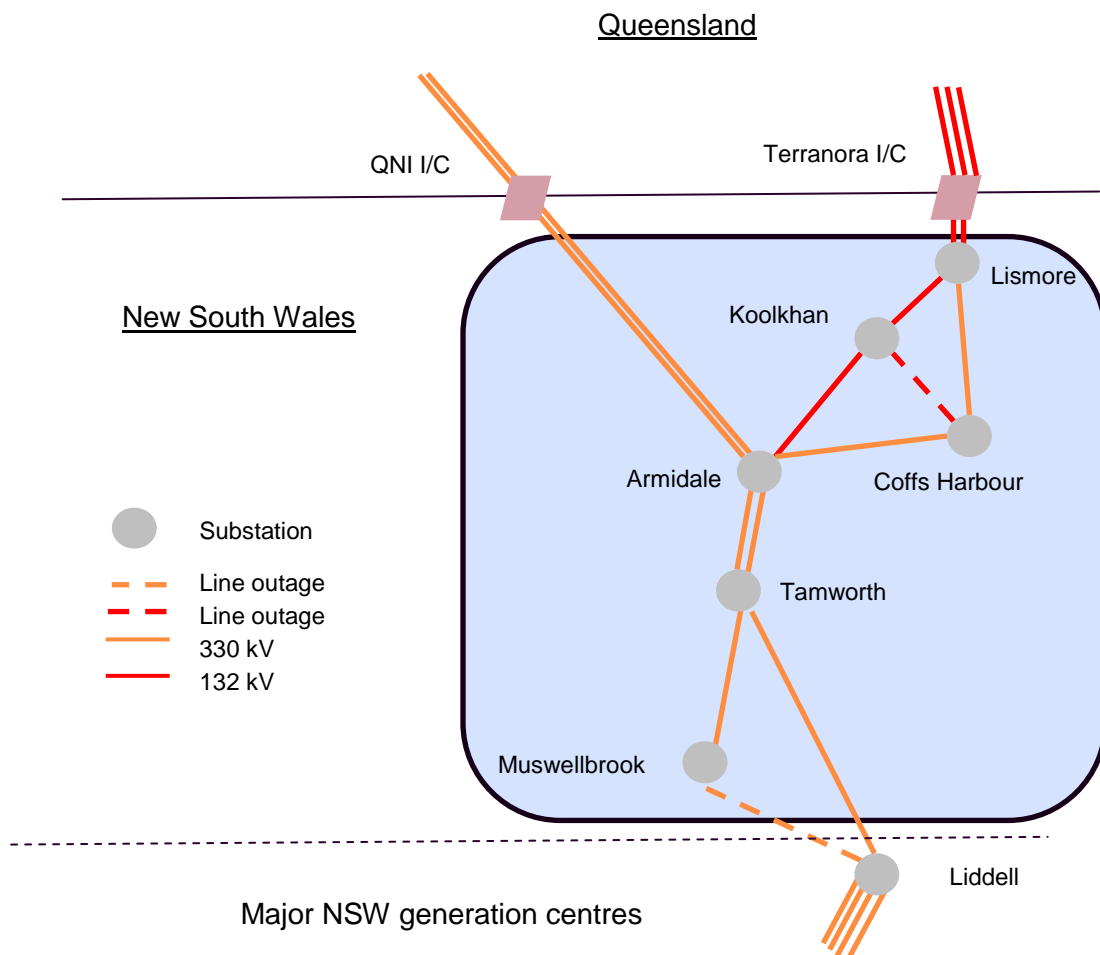
Electricity is transferred between National Electricity Market (NEM) regions via high voltage interconnectors. Queensland is connected to New South Wales via two

interconnectors: the Queensland – New South Wales Interconnector (QNI) and a DC link through Terranora. Import and export limits control the maximum amount of electricity that can flow between regions.

Network outages in northern New South Wales contributed to the high prices. AEMO manages outages using constraints to ensure that system security is maintained. Constraints are mathematical equations that determine the optimal output of generators based on their offers to manage or “limit” flows on specific transmission lines (including interconnectors) for each five minute interval.

Figure 1 helps to explain the effect of the network outages. It shows the northern New South Wales load centre (blue shaded area), major substations (grey dots) and the transmission lines linking them. All significant New South Wales generation is south of Liddell (below the dotted line).

**Figure 1: Network diagram of transmission line outages**



An unplanned network outage occurred at 7.25 am on the Liddell to Muswellbrook 330 kV line in New South Wales. AEMO invoked a constraint to prevent the overloading of the Liddell to Tamworth 330 kV line. With the constraint limiting supply from the major New South Wales generation centres, south of Liddell, supply to the northern New South Wales load centre was sourced from Queensland via QNI. The line outage is indicated by the dotted orange line.

A planned outage on the Coffs Harbour to Koolkhan 132kV line was still in effect from the previous day (dashed red line). To manage this outage, AEMO invoked a constraint to prevent the Armidale to Koolkhan line being overloaded in the event of the failure of the Coffs Harbour to Lismore line. Again, this limited the ability to source supply for northern New South Wales from the major New South Wales generation centres. As a result, supply was sourced from Queensland via the Terranora interconnector.

The constraints used to manage the outages forced electricity (flows), from higher-priced Queensland to lower priced New South Wales, “counter-price”. Under normal circumstances, electricity flows from low-priced regions to high-priced regions to achieve the lowest possible price outcome.

Figure 2 shows the combined Queensland import limit and flows. This figure shows that as soon as the outage on the Liddell to Muswellbrook line occurred (at 7.25 am), the import limit into Queensland, indicated by the blue line, immediately reduced. By 8 am, the import limit had fallen below zero. As the import limit was negative, flows (indicated by the red line) were forced from Queensland into New South Wales. From around 1.30 pm to 5.30 pm, flows were being set by the (negative) import limit.

**Figure 2: Combined Queensland import limit and flows**

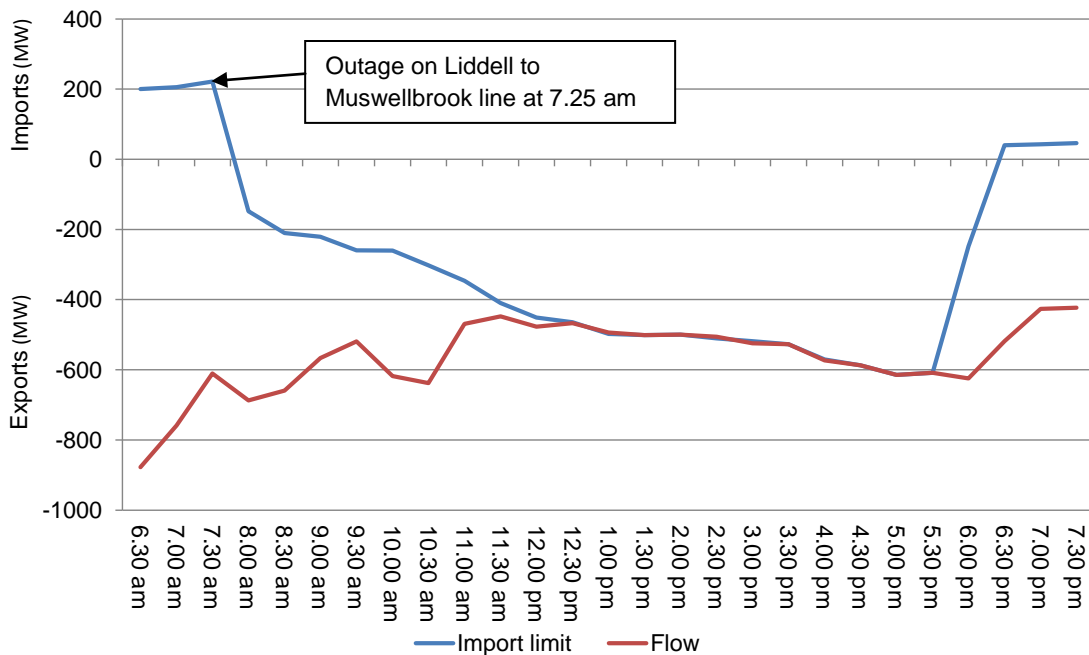


Table 2 shows net actual and forecast imports (flow) and import limits across the QNI and Terranora interconnectors. Negative values indicate flows and import limits from Queensland into New South Wales.



**Table 2: Net actual and forecast interconnector import capabilities into Queensland**

Trading interval	Imports (MW)			Import limit (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
4.30 pm	-587	-651	-633	-587	-410	2
5 pm	-614	-653	-747	-614	-420	-2
5.30 pm	-608	-653	-697	-608	-423	0

The network outage affecting QNI was factored into forecasts prepared by AEMO four hours in advance. Table 2 shows that at the time of high prices, around 600 MW of electricity was being forced by the constraints from Queensland into New South Wales.

Table 2 shows it was expected that Queensland would be supplying electricity to New South Wales up to twelve hours in advance of the high priced periods. This was because spot prices were forecast to be higher in New South Wales than in Queensland. The planned outage affecting Terranora was already factored into the 12 hour forecasts. Actual demand for electricity in New South Wales was lower than expected and New South Wales participants rebid around 2000 MW of capacity into low price bands; as a result, predicted high spot prices in New South Wales did not eventuate.

### 3.3 Demand and Supply

Participants determine the amount of electricity or capacity (MW) they offer and the price they are prepared to receive (\$/MWh) in ten price - quantity (MW) pairs. AEMO aggregates these offers from lowest to highest price to meet forecast regional demand. Every 5 minutes AEMO “dispatches” generation in ascending price order, taking into account network transfer capability.

The following sections analyse demand and supply conditions relevant to the high priced periods.

#### 3.3.1 Demand

The maximum temperature in Brisbane reached 37 degrees, resulting in very high demand for electricity. Maximum demand reached 8752 MW at 5.30 pm, around 600 MW lower than the Queensland record. As shown in Table 1, actual demand for electricity was close to AEMO’s forecasts. With the temperature expected to be high, demand and spot prices were also expected to be very high.

#### 3.3.2 Supply

This section examines the role generator offers played during the high priced periods.

### 3.3.2.1 Generator offers

Figure 3 shows the cumulative generator offers in Queensland. Also known as closing bids, the figure shows the capacity offered by generators, including amendments to their offers throughout the day to match changes to their own financial and/or physical positions (known as “rebidding”). To put Figure 3 in context, installed (summer) capacity in Queensland is around 11 500 MW. The 5-minute (or dispatch) price (purple line), local demand (blue line) and local dispatch (orange line) are also shown on Figure 3.

**Figure 3: Closing bids, dispatch prices, dispatch and demand**

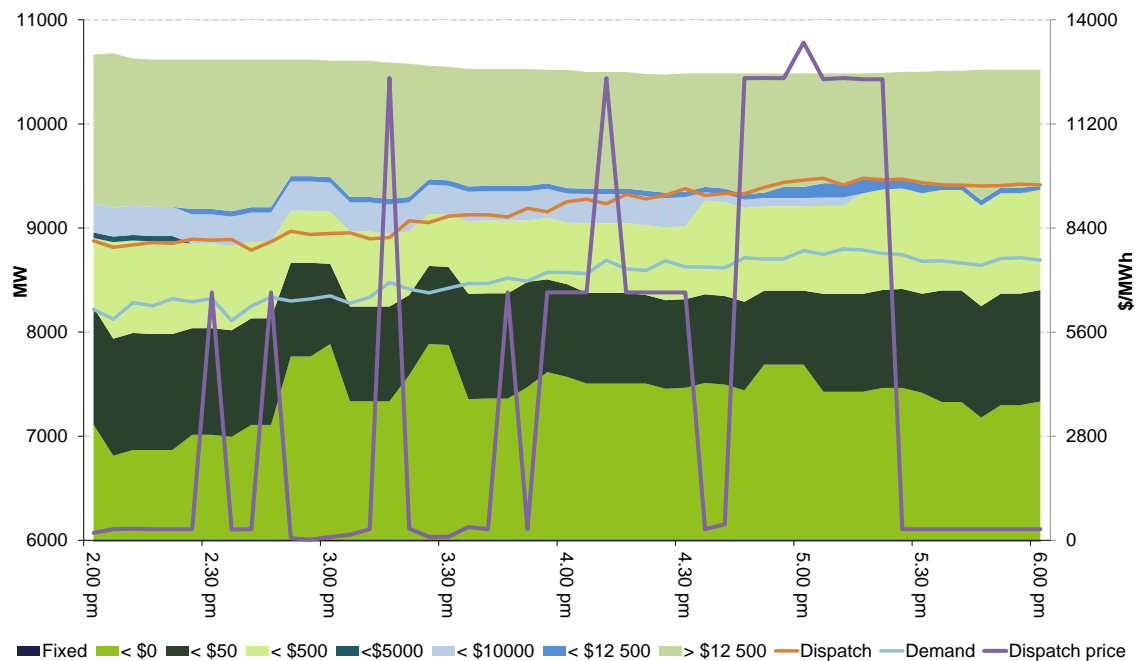


Figure 3 shows the Queensland dispatch price (purple line) was volatile leading up to the start of the 4.30 pm trading interval. The orange line shows that Queensland generators were being dispatched in the highest price band (light green, priced above \$12 500/MWh) from 4.30 pm to 5.30 pm, coinciding with the highest demand period of the day (shown by the light blue line).

As can be seen in Figure 3, local Queensland generation (orange line) was being dispatched at around 600 MW higher than local Queensland demand (light blue line). As discussed in the Network Availability section, this was because constraints to manage the outages in New South Wales forced electricity to flow, counter-price, from Queensland to New South Wales.

As shown in Table 1, actual spot prices were lower than forecast. This was because Queensland participants rebid local supply from high to low prices, increasing the volume of low-priced supply. The reasons for the rebids included, but were not limited to, portfolio rearrangement, increase in Queensland demand and constraint management. A full list of the relevant rebids is contained in Appendix A. Rebidding of capacity from low to high prices did not contribute to the high price outcomes.

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 during the high-priced periods are set out in Appendix C.

**Australian Energy Regulator**

**May 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 4.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
1.05 pm		Callide Power Trading	Callide C	66	>13 333	-1000	1303A 13:00 DS QNI exp lim di 13:05 vs 12:55 p5 di 13:05 sl
1.15 pm		Millmerran Energy Trader	Millmerran	-40	-1000	N/A	13:14 P: plant limitations from ambient temperature
1.51 pm		Millmerran Energy Trader	Millmerran	-25	-1000	N/A	13:51 P: condensate polisher inlet temperature
1.59 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	13:59 P: condensate polisher inlet temperature
2.01 pm		Origin Energy	Mt Stuart	267	13 300	-1000	1357A inc in Qld dem - 5PD 8373MW > 30PD 8239MW @ 1430 sl
2.21 pm		Origin Energy	Darling Downs	-40	70	N/A	1420P change in avail - backpressure issues sl
2.29 pm		Alinta Energy	Braemar A	39	14 000	-1000	1425~A~Qld spot price \$6,667 vs 5pd \$299.00 sl~

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.41 pm		ERM Power	Oakey	17	13 441	0	A 1441 1440 increase in Qld rrp for 1445: \$6,666.66 dispatch@1440 vs \$149.99 pd5@1430
2.53 pm		CS Energy	Kogan Creek	-10	14	N/A	1452P ambient conditions-sl
3.08 pm		Origin Energy	Darling Downs	-20	70	N/A	1505P change in avail - high oil temps sl
3.13 pm		Millmerran Energy Trader	Millmerran	-10	-1000	N/A	15:13 P: condensate polisher inlet temperature
3.16 pm		CS Energy	Callide B	-20	17	N/A	1514P condenser vacuum limits-sl
3.21 pm		Millmerran Energy Trader	Millmerran	-20	-1000	N/A	15:21 P: condensate polisher inlet temperature
3.45 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	15:45 P: condensate polisher inlet temperature
3.56 pm	4.05 pm	CS Energy	Callide B	-20	17	N/A	1555P condenser vacuum limits-sl
3.57 pm	4.05 pm	ERM Power	Oakey	26	13 441	-1000	A 1556 1555 increase in Qld rrp 5m pd 1605 \$6,666.66
3.58 pm	4.05 pm	CS Energy	Gladstone	60	14 000	<295	1557P portfolio rearrangement due to-callide b restrictions-sl

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
4.13 pm	4.20 pm	CS Energy	Callide B	-20	17	N/A	1612P condenser vacuum limits-sl
4.15 pm	4.25 pm	CS Energy	Gladstone	30	14 000	<295	1614P portfolio rearrangement due to-callide b restrictions-sl
4.20 pm	4.30 pm	Millmerran Energy Trader	Millmerran	10	N/A	-1000	16:20 P: plant limitation on condensate resolved

### 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		Callide Power Trading	Callide C	66	>13 333	-1000	1303A 13:00 ds QNI exp lim di 13:05 vs 12:55 p5 di 13:05 sl
1.15 pm		Millmerran Energy Trader	Millmerran	-40	-1000	N/A	13:14 P: plant limitations from ambient temperature
1.42 pm		Origin Energy	Darling Downs	60	14 000	70	1340A material change in Qld dem sl
1.51 pm		Millmerran Energy Trader	Millmerran	-25	-1000	N/A	13:51 P: condensate polisher inlet temperature
1.59 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	13:59 P: condensate polisher inlet temperature

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.01 pm		Origin Energy	Mt Stuart	267	13 300	-1000	1357A INC IN Qld dem - 5pd 8373MW > 30pd 8239MW @ 1430 sl
2.21 pm		Origin Energy	Darling Downs	-40	70	N/A	1420P change in avail - backpressure issues sl
2.29 pm		Alinta Energy	Braemar A	39	14 000	-1000	1425~A~Qld spot price \$6,667 vs 5pd \$299.00 sl~
2.41 pm		ERM Power	Oakey	17	13 441	0	A 1441 1440 increase in Qld rrp for 1445: \$6,666.66 dispatch@1440 vs \$149.99 pd5@1430
2.53 pm		CS Energy	Kogan Creek	-10	14	N/A	1452P ambient conditions-sl
3.08 pm		Origin Energy	Darling Downs	-20	70	N/A	1505P change in avail - high oil temps sl
3.13 pm		Millmerran Energy Trader	Millmerran	-10	-1000	N/A	15:13 P: condensate polisher inlet temperature
3.16 pm		CS Energy	Callide B	-20	17	N/A	1514P condenser vacuum limits-sl
3.21 pm		Millmerran Energy Trader	Millmerran	-20	-1000	N/A	15:21 P: condensate polisher inlet temperature
3.45 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	15:45 P: condensate polisher inlet temperature
3.56 pm		CS Energy	Callide B	-20	17	N/A	1555P condenser vacuum limits-sl

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
3.58 pm		CS Energy	Gladstone	60	14 000	<295	1557P portfolio rearrangement due to-callide b restrictions-sl
4.13 pm		CS Energy	Callide B	-20	17	N/A	1612P condenser vacuum limits-sl
4.15 pm		CS Energy	Gladstone	30	14 000	<295	1614P portfolio rearrangement due to-callide b restrictions-sl
4.15 pm		ERM Power	Oakey	26	13 441	-1000	A 1614 1610 increase in Qld demand for 1640: 8,786MW pd5@1610 vs 8,645MW pd5@1545
4.20 pm		Millmerran Energy Trader	Millmerran	10	N/A	-1000	16:20 P: plant limitation on condensate resolved
4.25 pm	4.35 pm	Stanwell Corporation	Stanwell	80	6667	<299	1624A manage qni constraints - NRM_QLD1_NSW1/liddell-to-muswellbrook line outage + p5min demand above 30min predispach



Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
4.25 pm	4.35 pm	Stanwell Corporation	Tarong	120	6667	<290	1624A manage QNI constraints - NRM_QLD1_NSW1/liddell-to-muswellbrook line outage + p5min demand above 30min predispach
4.28 pm	4.35 pm	Callide Power Trading	Callide C	46	13 333	-1000	1626A 16:25 P5 Q rrp di 17:00 vs 16:20 p5 di 17:00 sl
4.41 pm	4.50 pm	ERM Power	Oakey	20	13 441	-1000	A 1640 1640 increase in Qld rrp for 1645: \$12,432.00 dispatch@1640 vs \$299.05 pd5@1635

### Significant rebids for 5.30 pm

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
1.42 pm		Origin Energy	Darling Downs	100	14 000	70	1340A material change in qld dem sl
1.51 pm		Millmerran Energy Trader	Millmerran	-25	-1000	N/A	13:51 P: condensate polisher inlet temperature
1.59 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	13:59 P: condensate polisher inlet temperature
2.01 pm		Origin Energy	Mt Stuart	267	13 300	-1000	1357A inc in Qld dem - 5pd 8373MW > 30pd 8239MW @ 1430 sl
2.21 pm		Origin Energy	Darling Downs	-50	70	N/A	1420P change in avail - backpressure issues sl

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.29 pm		Alinta Energy	Braemar A	37	14 000	-1000	1425~A~Qld spot price \$6,667 vs 5pd \$299.00 sl~
2.41 pm		ERM Power	Oakey	17	13 441	0	A 1441 1440 increase in Qld rrp for 1445: \$6,666.66 dispatch@1440 vs \$149.99 pd5@1430
2.53 pm		CS Energy	Kogan Creek	-10	14	N/A	1452P ambient conditions-sl
3.08 pm		Origin Energy	Darling Downs	-20	70	N/A	1505P change in avail - high oil temps sl
3.13 pm		Millmerran Energy Trader	Millmerran	-10	-1000	N/A	15:13 P: condensate polisher inlet temperature
3.16 pm		CS Energy	Callide B	-20	17	N/A	1514P condenser vacuum limits-sl
3.21 pm		Millmerran Energy Trader	Millmerran	-20	-1000	N/A	15:21 P: condensate polisher inlet temperature
3.45 pm		Millmerran Energy Trader	Millmerran	-5	-1000	N/A	15:45 P: condensate polisher inlet temperature
3.56 pm		CS Energy	Callide B	-20	17	N/A	1555P condenser vacuum limits-sl
4.13 pm		CS Energy	Callide B	-20	17	N/A	1612P condenser vacuum limits-sl
4.20 pm		Millmerran Energy Trader	Millmerran	10	N/A	-1000	16:20 P: plant limitation on condensate resolved

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
4.53 pm		ERM Power	Oakey	22	13 441	-1000	A 1652 1650 increase in Qld rrp 5m pd 1705 \$6,666.66
5.05 pm	5.15 pm	Stanwell Corporation	Tarong	40	13 400	<299	1703A manage QNI constraints - NRM_QLD1_ NSW1 + p5min demand above 30min forecast @ 1700hrs
5.12 pm	5.20 pm	Arrow Energy	Braemar 2	32	>12 431	-1000	1712A Qld price higher than forecast sl
5.16 pm	5.25 pm	CS Energy	Callide B	10	N/A	17	1715P condenser vacuum limits-improved-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.<sup>1</sup> The 30-minute spot price is the average of the six dispatch interval prices.

### 4.30 pm

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
4:05 pm	\$6666.66	Stanwell	STAN-1	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-2	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-3	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-4	Energy	\$6666.66	0.07	\$466.67
		Stanwell	TARONG#1	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#2	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#3	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#4	Energy	\$6666.66	0.18	\$1200.00
4:10 pm	\$12 432.00	ERMPower	BRAEMAR6	Energy	\$12 432.00	1.00	\$12 432.00
4:15 pm	\$6666.66	Stanwell	STAN-1	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-2	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-3	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-4	Energy	\$6666.66	0.07	\$466.67
		Stanwell	TARONG#1	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#2	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#3	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#4	Energy	\$6666.66	0.18	\$1200.00
4:20 pm	\$6666.66	Stanwell	STAN-1	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-2	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-3	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-4	Energy	\$6666.66	0.07	\$466.67
		Stanwell	TARONG#1	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#2	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#3	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#4	Energy	\$6666.66	0.18	\$1200.00
4:25 pm	\$6666.66	Stanwell	STAN-1	Energy	\$6666.66	0.09	\$600.00
		Stanwell	STAN-2	Energy	\$6666.66	0.09	\$600.00
		Stanwell	STAN-3	Energy	\$6666.66	0.09	\$600.00
		Stanwell	STAN-4	Energy	\$6666.66	0.09	\$600.00
		Stanwell	TARONG#1	Energy	\$6666.66	0.22	\$1466.67

<sup>1</sup> Details on how the price is determined can be found at [www.aemo.com.au](http://www.aemo.com.au)

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
		Stanwell	TARONG#3	Energy	\$6666.66	0.22	\$1466.67
		Stanwell	TARONG#4	Energy	\$6666.66	0.22	\$1466.67
4:30 pm	\$6666.66	Stanwell	STAN-1	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-2	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-3	Energy	\$6666.66	0.07	\$466.67
		Stanwell	STAN-4	Energy	\$6666.66	0.07	\$466.67
		Stanwell	TARONG#1	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#2	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#3	Energy	\$6666.66	0.18	\$1200.00
		Stanwell	TARONG#4	Energy	\$6666.66	0.18	\$1200.00
<b>Spot Price</b>		<b>\$7628/MWh</b>					

### 5 pm

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
4:35 pm	\$299.05	Stanwell	TARONG#1	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#2	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#3	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#4	Energy	\$299.05	0.25	\$74.76
4:40 pm	\$431.34	Snowy Hydro	TUMUT3	Energy	\$449.80	0.96	\$431.81
4:45 pm	\$12 432.00	ERMPower and Arrow	BRAEMAR6	Energy	\$12 432.00	1.00	\$12 432.00
4:50 pm	\$12 433.00	ERMPower and Arrow	BRAEMAR7	Energy	\$12 433.00	1.00	\$12 433.00
4:55 pm	\$12 431.00	ERMPower and Arrow	BRAEMAR5	Energy	\$12 431.00	1.00	\$12 431.00
5:00 pm	\$13 387.00	ERMPower and Arrow	BRAEMAR5	Energy	\$13 387.00	1.00	\$13 387.00
<b>Spot Price</b>		<b>\$8569/MWh</b>					

### 5.30 pm

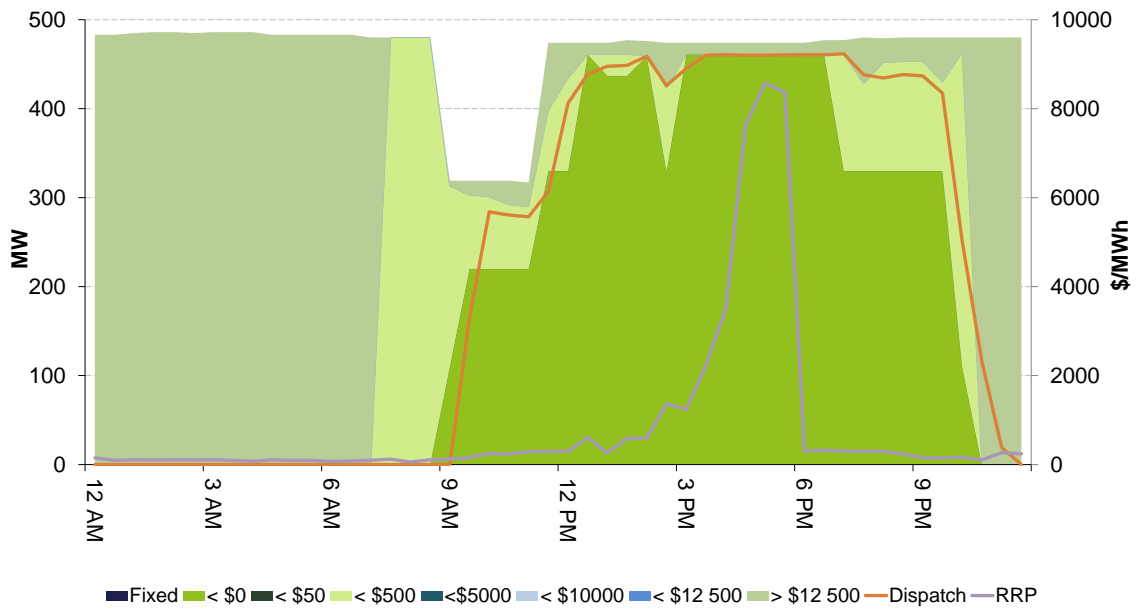
DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
5:05 pm	\$12 400.03	Origin Energy	MSTUART1	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART2	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART3	Energy	\$12 400.03	0.31	\$3844.01

DI	Dispatch Price (\$/MWh)	Participant	Unit	Service	Offer price (\$/MWh)	Marginal change	Contribution
5:10 pm	\$12 433.00	ERMPower and Arrow	BRAEMAR7	Energy	\$12 433.00	1.00	\$12 433.00
5:15 pm	\$12 400.03	Origin Energy	MSTUART1	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART2	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART3	Energy	\$12 400.03	0.31	\$3844.01
5:20 pm	\$12 400.03	Origin Energy	MSTUART1	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART2	Energy	\$12 400.03	0.34	\$4216.01
		Origin Energy	MSTUART3	Energy	\$12 400.03	0.31	\$3844.01
5:25 pm	\$299.05	Stanwell	TARONG#1	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#2	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#3	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#4	Energy	\$299.05	0.25	\$74.76
5:30 pm	\$299.05	Stanwell	TARONG#1	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#2	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#3	Energy	\$299.05	0.25	\$74.76
		Stanwell	TARONG#4	Energy	\$299.05	0.25	\$74.76
<b>Spot Price</b>		<b>\$8372/MWh</b>					

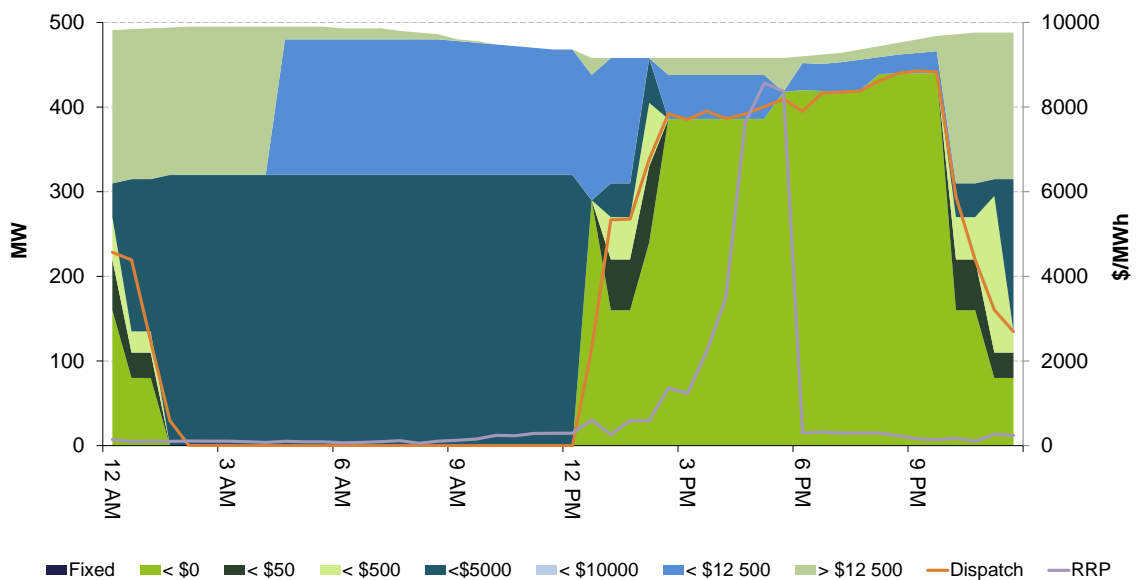
## Appendix C Closing bids

Figures C1 to C6 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.

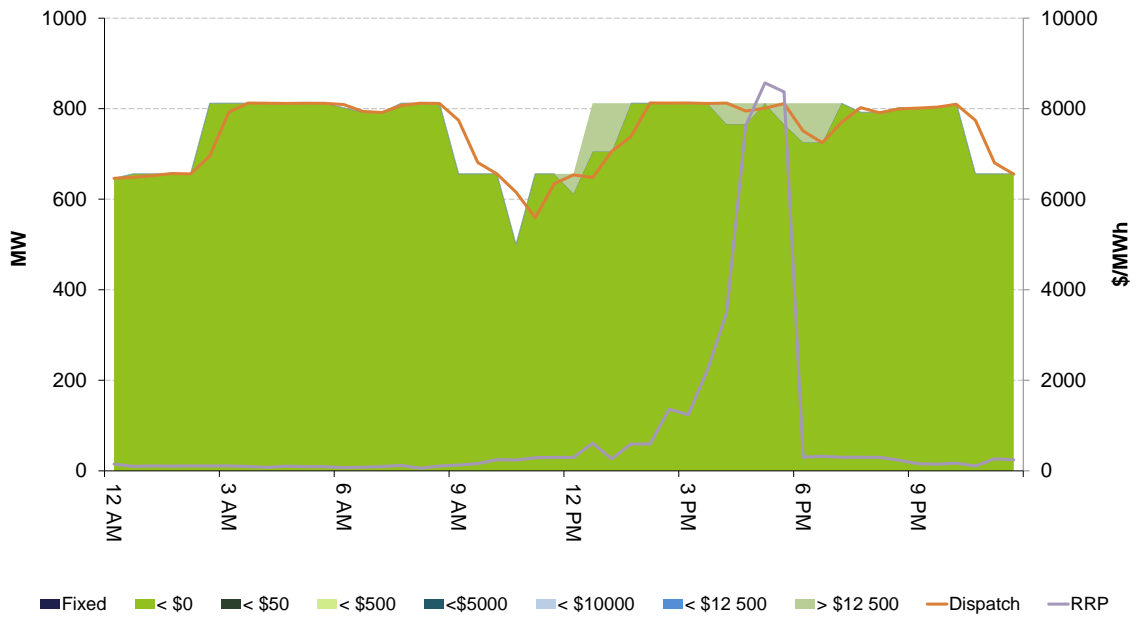
**Figure C1 – Alinta Energy (Braemar A) closing bid prices, dispatch and spot price**



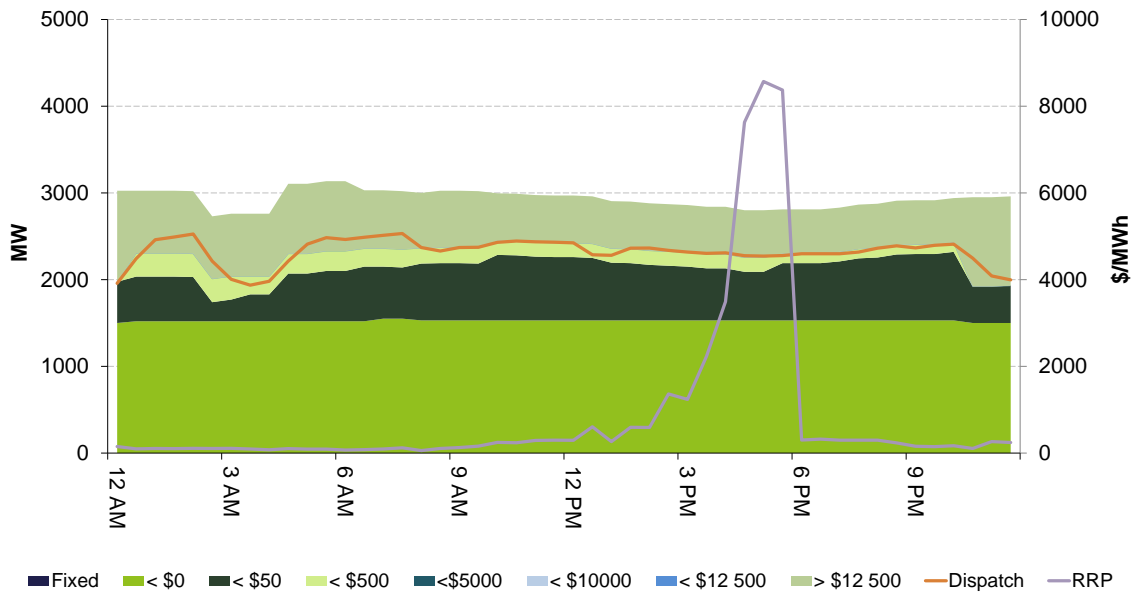
**Figure C2 – Arrow Energy (Braemar 2) closing bid prices, dispatch and spot price**



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

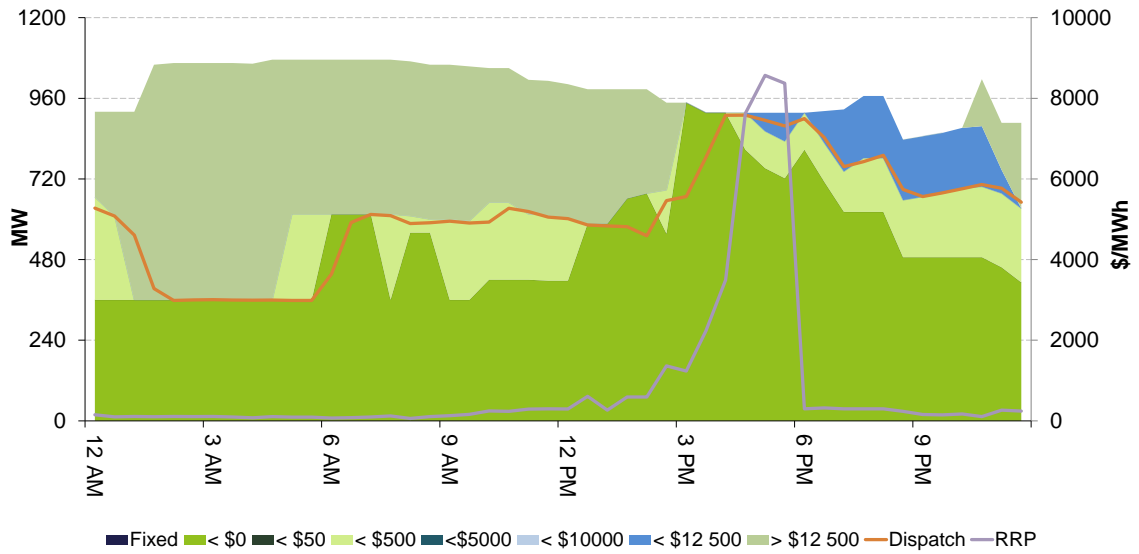


**Figure C4 – CS Energy (Callide B, Gladstone, Kogan Creek, Wivenhoe) closing bid prices, dispatch and spot price**





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



**Figure C6 – Stanwell Corporation (Barron Gorge, Kareeya, Mackay, Stanwell, Tarong, Tarong North) closing bid prices, dispatch and spot price**

