

# Electricity prices above \$5,000/MWh

Queensland,  
20 October 2021

December 2021

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# 1 Obligation

The Australian Energy Regulator (AER) regulates energy markets and networks under national legislation and rules in eastern and southern Australia (known as the National Energy Market), 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 the performance of energy markets, including the annual State of the energy market report and biennial effective competition report, to assist stakeholders and the wider community.

The AER is required to publish a report whenever the electricity 30-minute price<sup>1</sup> exceeds \$5,000 per megawatt hour (\$/MWh) in accordance with clause 3.13.7(d) of the National Electricity Rules.

The report:

- describes the significant factors contributing to the 30-minute price exceeding \$5,000/MWh, including withdrawal of generation capacity and network availability;
- assesses whether rebidding contributed to the 30-minute price exceeding \$5,000/MWh;
- identifies the marginal scheduled generating units; and
- identifies all units with offers for the trading intervals equal to or greater than \$5,000/MWh and compares these dispatch offers to relevant dispatch offers in previous trading intervals.

<sup>1</sup> From 1 October 2021, clause 3.13.7 of the NER was amended for 5 minute settlement. Under 5 minute settlement, a trading interval is now comprised of a 5 minute period and the spot price is the price for a trading interval. The 30-minute price is the average of 6 trading intervals and is calculated the same way as previously under 30 minute settlement.

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

## 2 Summary

On 20 October 2021 the 30-minute price in Queensland reached \$5,234/MWh for the 5.30 am 30-minute period. This price was not forecast until just before dispatch.

The main drivers for the high price were:

- Limited access to low-priced capacity due to generator outages and reduced generator availability.
  - There was over 1,500 MW of baseload capacity on planned outages.
  - InterGen removed 435 MW of capacity priced below \$13/MWh at Millmerran following a tube leak overnight.
  - CS Energy removed 100 MW of capacity from Callide B unit 2 priced below \$37/MWh as it was returning the generator to service after tripping the day prior.
  - Upgrades to the Queensland-New South Wales Interconnector (QNI) requiring network outages in New South Wales limited access to cheap generation into Queensland.
- Rebidding of capacity from low to high prices contributed to prices above \$5,000/MWh.
  - CS Energy rebid 360 MW at Gladstone from prices below \$401/MWh to above \$5,000/MWh.
  - Origin Energy rebid 40 MW at Darling Downs power station from the price floor to the cap.
- Limited generator ability to ramp up or come on within 5 minutes meant there was around 700 MW of low-priced capacity unable to make it to market. While the dispatch engine treats submitted ramp rates as technical limits, market participants are not currently required to base them on technical characteristics and may set them based on commercial strategies. We have seen some participants change these settings for their plant following the introduction of 5 minute settlement, as highlighted in our quarterly wholesale market report for Q3 2021.

At the time, 2,170 MW of capacity in Queensland was offered above \$5,000/MWh out of over 8,200 MW offered. Up to 32 MW of high priced capacity was required to meet demand. This helps identify the significant rebids during this period as it shows small shifts in capacity could significantly impact price.

These reports are designed to examine market events and circumstances that contributed to wholesale market price outcomes and are not an indicator of potential compliance issues or enforcement action. We are separately making enquiries around participant behaviour on the day.

## 3 Analysis

### 3.1 Overview of actual and expected conditions

The Queensland 30-minute price for 5.30 am on 20 October 2021 was \$5,234/MWh. This high price was not forecast until just before dispatch. Table 1 compares actual and forecast 30-minute prices, demand and availability:

- A high 30-minute price was not forecast. While the first and last 5-minute prices were at the cap, the other 5-minute intervals were below \$301/MWh.
- The forecast 30-minute price increased to \$300/MWh 1 hour before dispatch, after removal of a Millmerran unit from 2.20 am (see section 3.2.1).
- Demand for the 30-minute period was 87 MW lower than forecast both 1 and 4 hours prior.
- Availability for the 30-minute period was 522 MW lower than forecast 4 hours prior due to removal of a Millmerran unit (see section 3.2.1).

**Table 1: Actual and forecast 30-minute price, demand and available capacity**

30 minute period	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	1 hr forecast	4 hr forecast	Actual	1 hr forecast	4 hr forecast	Actual	1 hr forecast	4 hr forecast
5.30 am	5,234	300	71	5,503	5,588	5,590	8,217	8,292	8,739

### 3.2 Reduced access to low-priced capacity

#### 3.2.1 Some baseload capacity in Queensland was not fully available

Over 2,000 MW of baseload capacity was unavailable on the day. Almost three quarters of this was planned i.e. set up the day prior or earlier. The remainder came from unplanned removal of capacity from Millmerran and Callide B power stations (Table 2).

InterGen removed all 435 MW of available capacity, all priced below \$13/MWh, at Millmerran unit 1 for the 5.30 am 30-minute period in a rebid made at 2.20 am. The reason was due to a tube leak. Following this, the forecast 30-minute price for the 5.30 am jumped from \$70/MWh to \$300/MWh.

CS Energy had been returning Callide B unit 2 to service that morning, after it had tripped the day prior. It had initially offered 350 MW of capacity priced mostly below \$37/MWh. Over 2 rebids at 4.48 am and 4.51 am, 100 MW of this capacity was removed from prices below \$37/MWh due to technical issues. Following this, the forecast 30-minute price for 5.30 am jumped up to \$400/MWh. Further information on significant rebids is contained in *Appendix A: Significant rebids*.

**Table 2: Unavailable baseload generation**

Participant	Station	Unit	Registered capacity (MW)	Max avail 5.30 am (MW)	Unavailable (MW)	Reason
Callide Power Trading	Callide C	CPP_4	420	0	-420	Planned - Offline since significant failure on 25 May 2021
CS Energy	Callide B	CALL_B_2	350	250	-100	Unplanned - ramping back up after tripping the day prior
	Gladstone	GSTONE1	280	0	-280	Planned - Offline since 15 July
		GSTONE4	280	0	-280	Planned - Offline since 1 October
InterGen	Millmerran	MPP_1	426	0	-426	Unplanned - Went to 0 MW availability from 2.50 am due to technical issues.
Stanwell Corporation	Stanwell	STAN-1	365	270	-95	Planned – Offers set up day prior and remained unchanged
		STAN-2	365	270	-95	Planned - Offers set up the day prior and remained unchanged
		STAN-3	365	0	-365	Planned - Offline since 21 August 2021
<b>Total</b>					<b>-2,061</b>	

### 3.2.2 Planned network outages reduced access to low-priced capacity from other regions

There were planned outages to network equipment in New South Wales due to the upgrade of the Queensland-New South Wales interconnector (QNI) which limited access to cheaper generation from New South Wales.

In northern New South Wales there was a planned outage of the Armidale Static Var Compensator as part of the upgrade to the QNI. This limited imports over QNI from New South Wales to 134 MW for the 5.30 am 30-minute period out of a usual 300-600 MW nominal limit.<sup>2</sup>

<sup>2</sup> See AEMO's Interconnector capabilities document [https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security\\_and\\_Reliability/Congestion-Information/2017/Interconnector-Capabilities.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Congestion-Information/2017/Interconnector-Capabilities.pdf)



### 3.3 Rebidding capacity to higher prices contributed to the high price

Rebidding of capacity to higher prices by CS Energy and Origin Energy contributed to the high 30-minute price.

CS Energy rebid 360 MW of capacity from prices below \$401/MWh to the price cap at Gladstone power station over several rebids between 4.48 am to 4.50 am. The reason given was due to portfolio rearrangement with Callide B unit 2's return to service. CS Energy has provided additional information to assist our understanding of these events.

For the 5.05 am and 5.30 am intervals, Origin Energy rebid 40 MW at Darling Downs power station from the price floor to the cap in response to changes in forecast demand. Further information on significant rebids is contained in *Appendix A: Significant rebids*.

There were also other participants which offered capacity above \$5,000/MWh for the high priced intervals (Table 3). These offers were mostly set up the day prior and did not change. The offers for participants with high priced capacity are set out in *Appendix B: Offers greater than \$5,000/MWh*.

**Table 3: Capacity offered above \$5,000/MWh, at 5.05 am and 5.30 am**

Participant	Station	Fuel type	MW above \$5,000/MWh
Alinta Energy	Braemar A	Gas	10
Arrow Energy	Braemar 2	Gas	347
CS Energy	Gladstone	Black coal	600
Shell	Oakey	Gas	169
Origin Energy	Darling Downs	Gas	40
	Mt Stuart	Liquid	257
	Roma	Gas	71
Stanwell Corporation	Stanwell	Black coal	250
	Tarong	Black coal	385
	Tarong North	Black coal	43
<b>Total</b>			<b>2,172</b>

### 3.4 High priced trading intervals, 5.05 am and 5.30 am

Around 72% of capacity was offered below \$5,000/MWh for the 5.30 am 30-minute period.

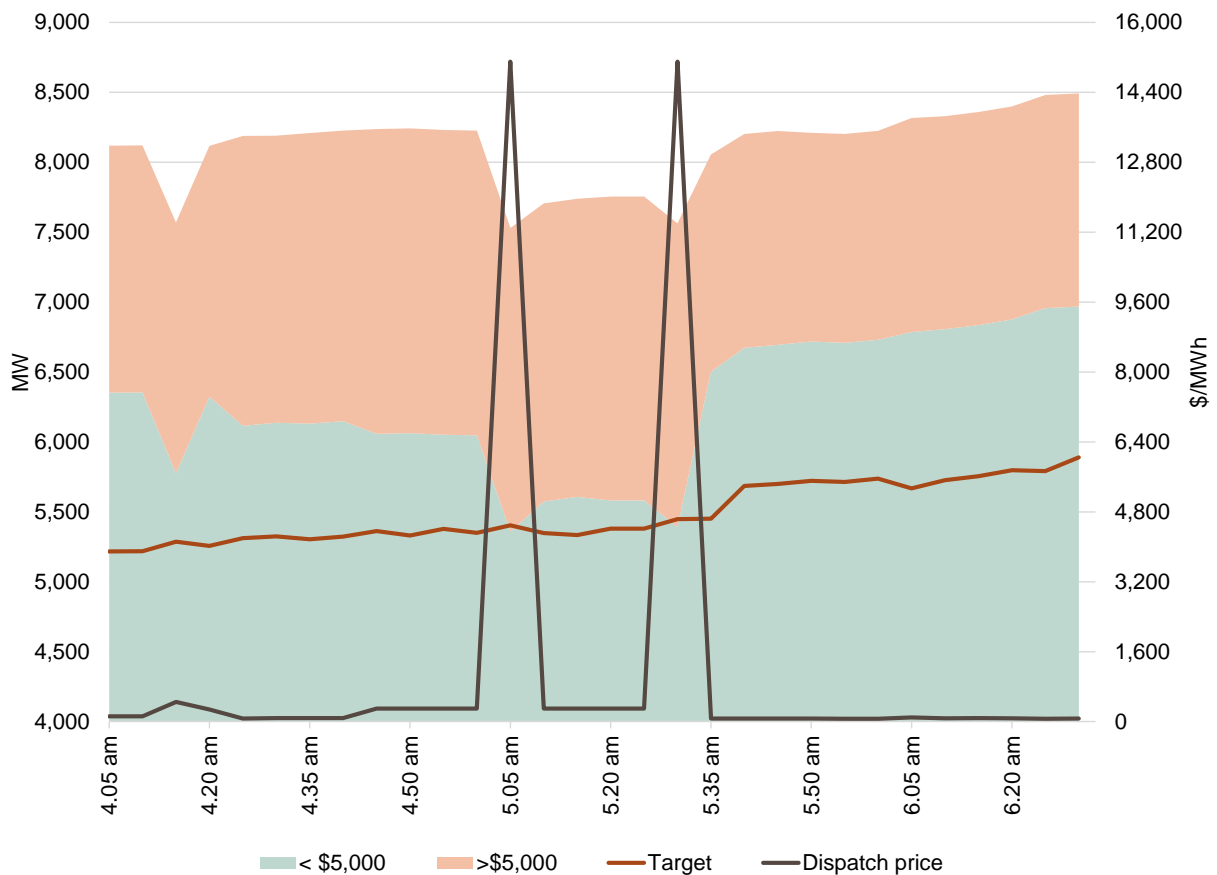
Demand increased by 55 MW at 5.05 am and 68 MW at 5.30 am. At the time there was almost 700 MW of capacity offered between \$300/MWh and \$5,000/MWh. However, this capacity could not be dispatched or was only partially dispatched due

to ramp up limitations or generators being unable to come on within 5 minutes. To show what was effectively available, Figure 1 has been adjusted to remove any capacity that could not be dispatched.

To meet the increase in demand, up to 32 MW of capacity priced above \$5,000/MWh was required to be dispatched. As a result, price was at the cap of \$15,100/MWh for both the 5.05 am and 5.30 am trading intervals.

The generators involved in setting price during the high-price periods and how that price was determined by the market systems are detailed in *Appendix C: Price Setter*.

**Figure 1: Closing availability, target and price**



## Appendix A: Significant rebids

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

**Table A1: Significant rebids for 5.05 am trading interval**

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.20 am		InterGen	Millmerran	-435	<13	N/A	Unit 1 Tube Leak
4.43 am	4.50 am	Origin Energy	Darling Downs	40	-1,000	15,100	Dec QLD dem 5pd 5549mw < 30pd 5586mw @0505 sl
4.48 am	4.55 am	CS Energy	Callide B	-80	37	N/A	Technical issues-CW Pump-SL
4.48 am	4.55 am	CS Energy	Gladstone	85	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.49 am	5.00 am	CS Energy	Gladstone	170	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.50 am	5.00 am	CS Energy	Gladstone	105	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.51 am	5.00 am	CS Energy	Callide B	-20	30	N/A	Technical issues-CW Pump-sl

**Table A2: Significant rebids for 5.30 am trading interval**

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.20 am		InterGen	Millmerran	-435	<13	N/A	Unit 1 Tube Leak
4.48 am		CS Energy	Callide B	-80	37	N/A	Technical issues-CW Pump-sl
4.48 am		CS Energy	Gladstone	85	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.49 am		CS Energy	Gladstone	170	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.50 am		CS Energy	Gladstone	105	<401	15,100	Portfolio rearrangement due to- Callide B2 rts-sl
4.51 am		CS Energy	Callide B	-20	30	N/A	Technical issues-CW Pump-sl
5.10 am	5.20 am	Origin Energy	Darling Downs	40	-1,000	15,100	Dec QLD dem 5pd 5617mw < 30pd 5586mw @0530 sl
5.22 am	5.30 am	InterGen	Millmerran	-10	-1,000	N/A	Fuel/Mill/CV Limitation

## Appendix B: Closing bids

Figures B1 to B6 highlight the 5 minute offers for participants in Queensland with capacity priced at or above \$5,000/MWh during the periods in which the 5-minute price exceeded \$5,000/MWh. They also show generation output and the 5-minute price.

**Figure B1: Alinta Energy (Braemar A, Collinsville Solar PV, Rugby Run solar farm) offers, dispatch and dispatch price**

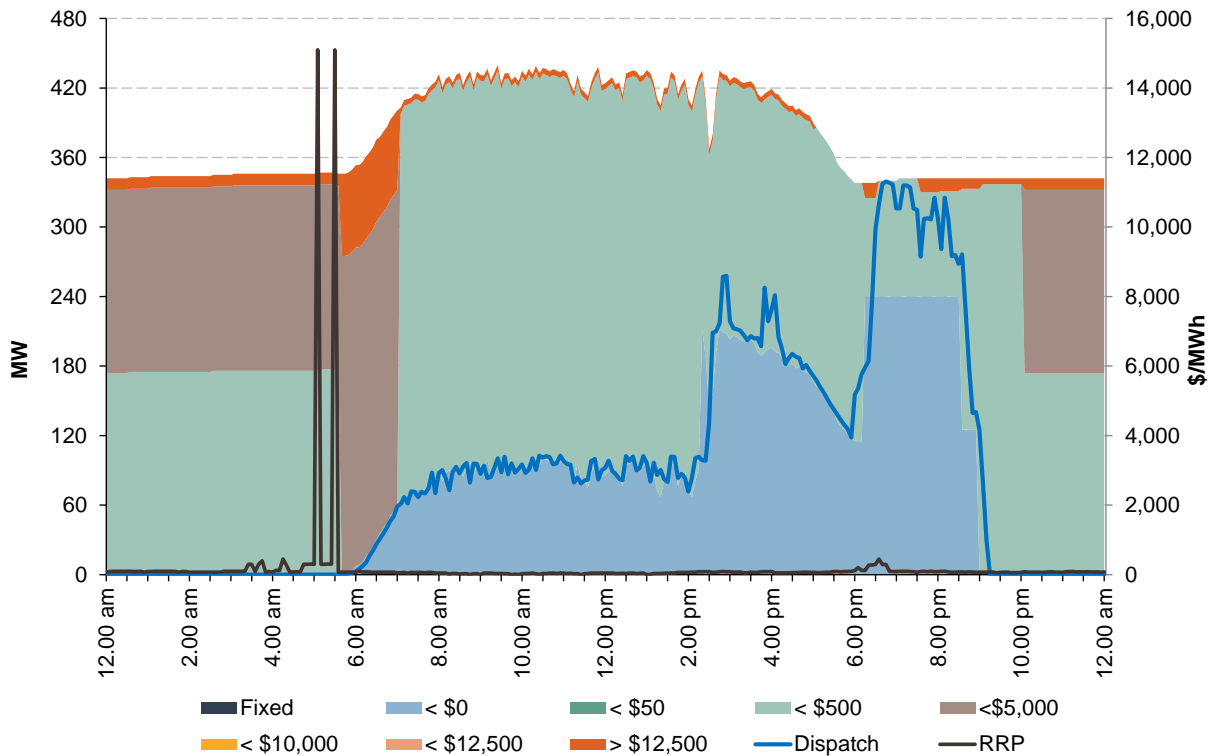


Figure B2: Arrow Energy (Braemar 2) offers, dispatch and dispatch price

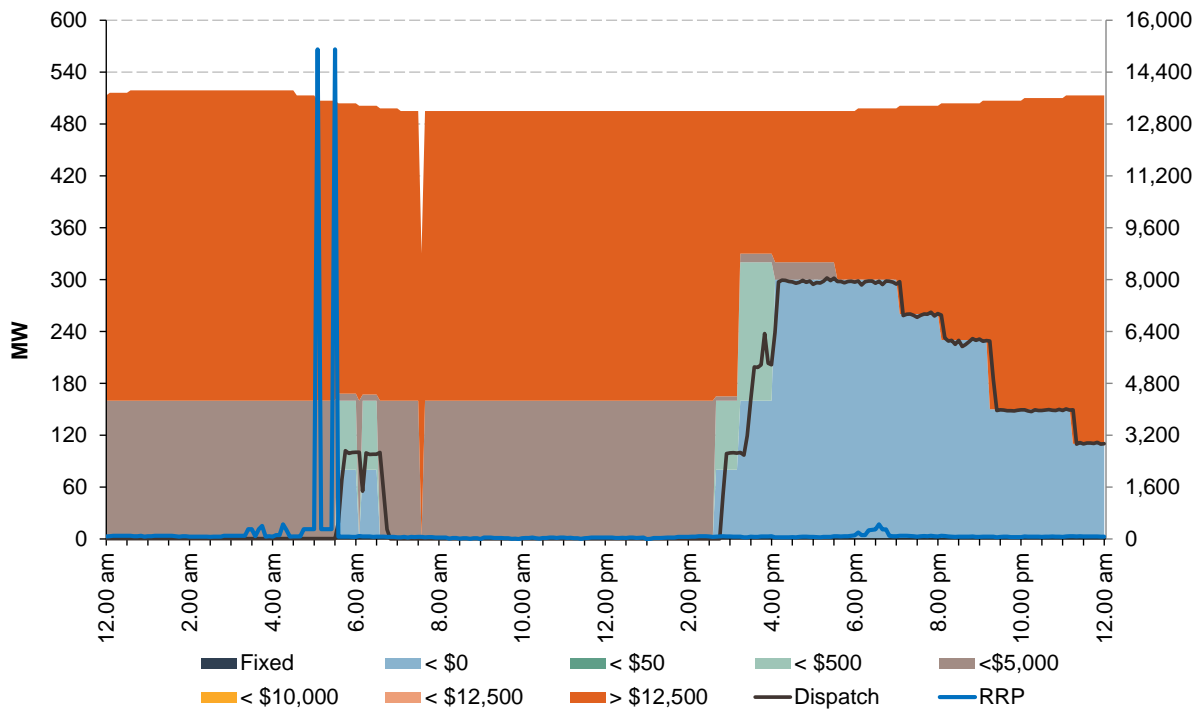


Figure B3: CS Energy (Callide B, Gladstone, Kogan Creek) offers, dispatch and dispatch price

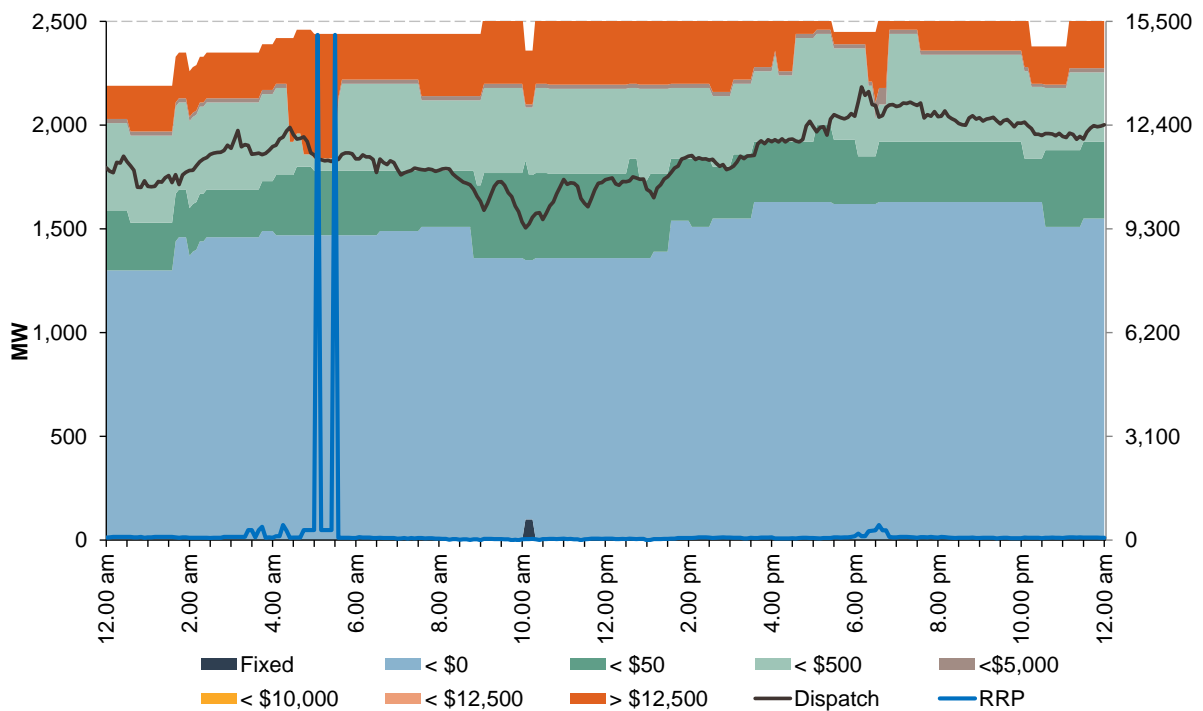


Figure B4: Shell (Oakey power station) offers, dispatch and dispatch price

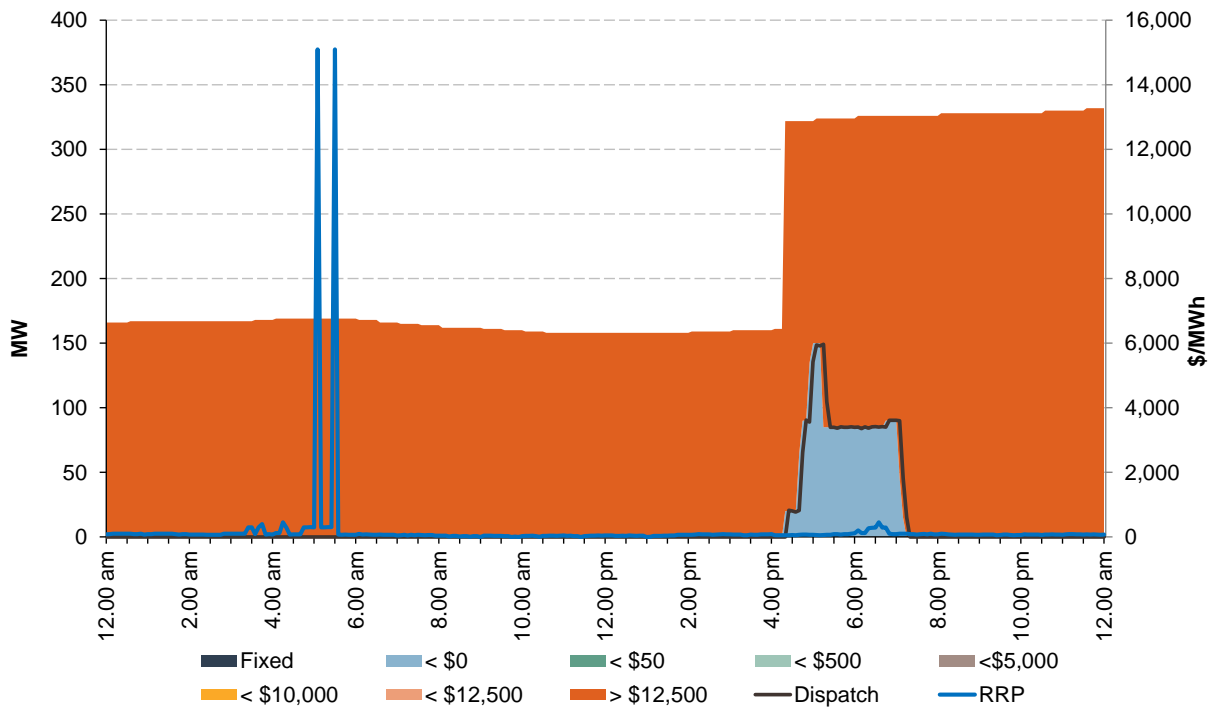
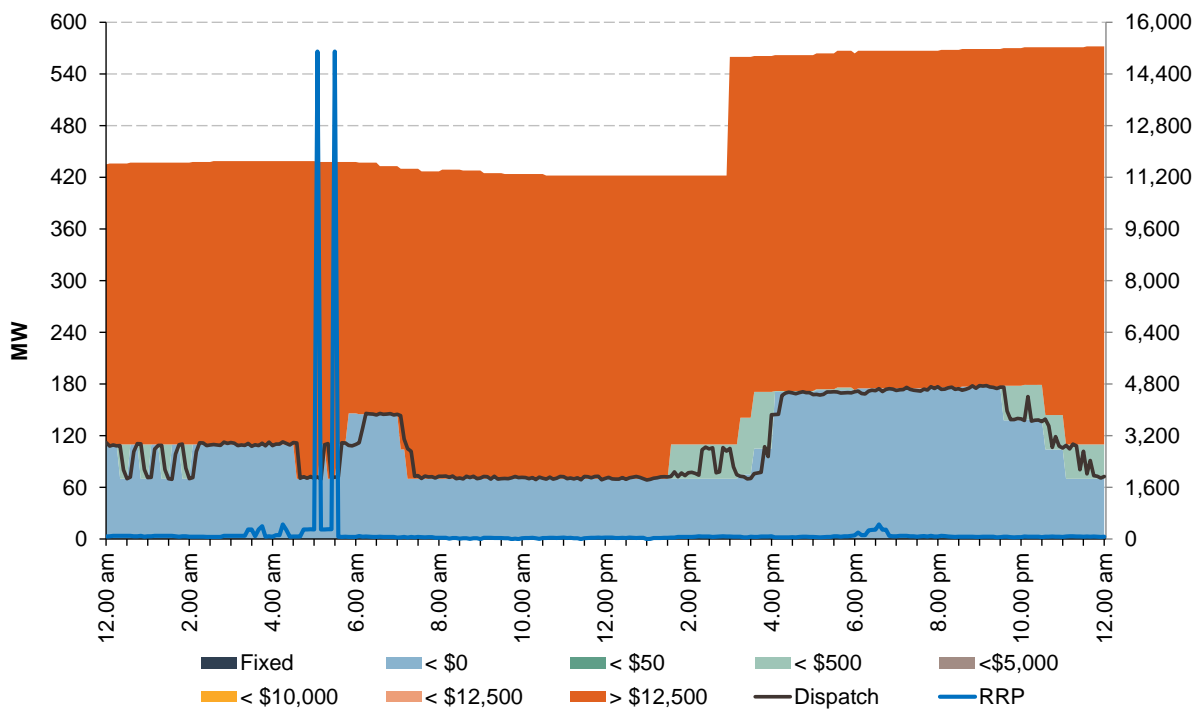
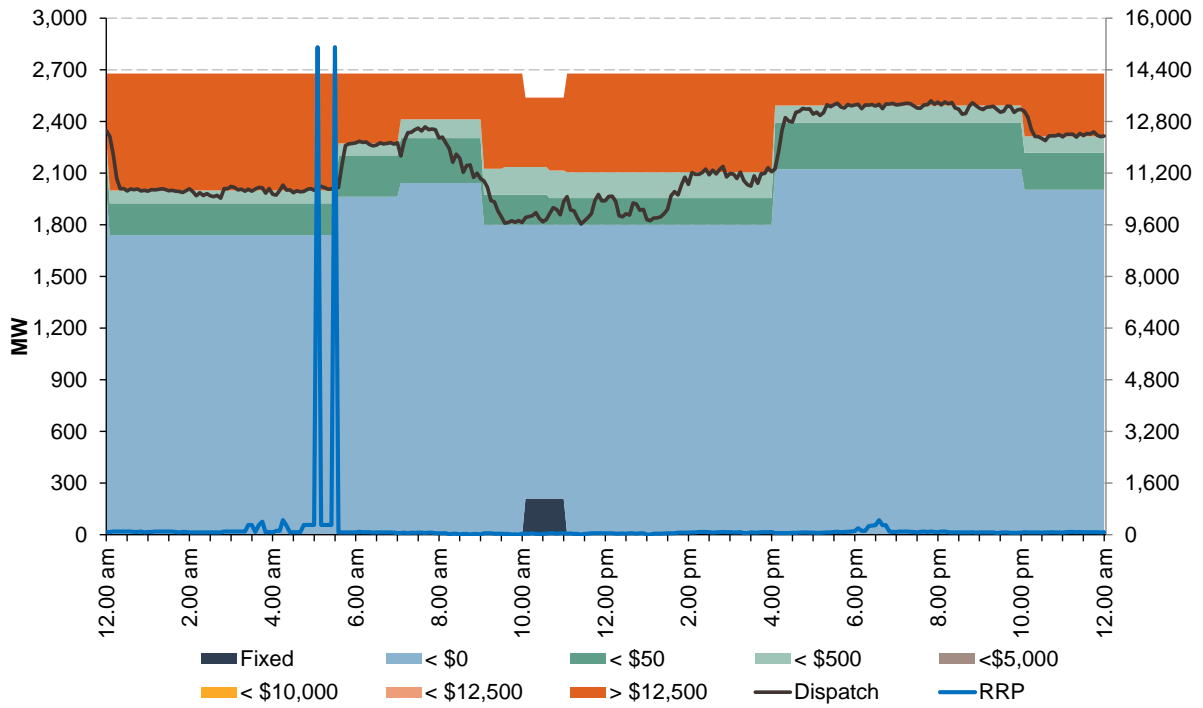


Figure B5: Origin Energy (Darling Downs power station, Mt Stuart, Roma) offers, dispatch and dispatch price



**Figure B6: Stanwell Corporation (Stanwell, Tarong, Tarong North) offers, dispatch and dispatch price**



## Appendix C: Price setter

The following table identifies for the 5.30 am 30-minute period, each 5-minute price and the generating units involved in setting the energy price. This information is published by AEMO.<sup>3</sup> The 30-minute price is the average of the 6 5-minute intervals. The prices that are in italics are capped at the price cap of \$15,100/MWh when published by AEMO.

**Table C1: Price setter**

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
05:05	\$15,100	Origin Energy	DDPS1	Energy	\$15,100	0.28	\$4,228
		CS Energy	GSTONE2	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE3	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE5	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE6	Energy	\$15,100	0.07	\$1,057
		Stanwell	STAN-1	Energy	\$15,100	0.08	\$1,208
		Stanwell	STAN-2	Energy	\$15,100	0.08	\$1,208
		Stanwell	TARONG#1	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#2	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#3	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#4	Energy	\$15,100	0.07	\$1,057
05:10	\$300	CleanCo	W/HOE#2	Energy	\$300	1.00	\$300
05:15	\$300	CleanCo	W/HOE#2	Energy	\$300	1.00	\$300
05:20	\$301	CleanCo	W/HOE#2	Energy	\$300	1.00	\$300
		Snowy Hydro	TUMUT3	Raise 5 min	\$1	1.00	\$1
		CleanCo	W/HOE#2	Raise 5 min	\$0	-1.00	\$0
05:25	\$301	CleanCo	W/HOE#2	Energy	\$300	1.00	\$300
		Snowy Hydro	TUMUT3	Raise 5 min	\$1	1.00	\$1
		CleanCo	W/HOE#2	Raise 5 min	\$0	-1.00	\$0
05:30	\$15,100	Origin Energy	DDPS1	Energy	\$15,100	0.28	\$4,228
		CS Energy	GSTONE2	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE3	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE5	Energy	\$15,100	0.07	\$1,057
		CS Energy	GSTONE6	Energy	\$15,100	0.07	\$1,057
		Stanwell	STAN-1	Energy	\$15,100	0.08	\$1,208
		Stanwell	STAN-2	Energy	\$15,100	0.08	\$1,208
		Stanwell	TARONG#1	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#2	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#3	Energy	\$15,100	0.07	\$1,057
		Stanwell	TARONG#4	Energy	\$15,100	0.07	\$1,057
<b>30 minute price</b>		<b>\$5,234/MWh</b>					

<sup>3</sup> Details on how the price is determined can be found at [www.aemo.com.au](http://www.aemo.com.au)