

Electricity prices above \$5,000/MWh

Queensland,
9 December 2021

February 2022

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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 price¹ 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

¹ 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.

- 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.

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 9 December 2021 the wholesale price of electricity in Queensland reached \$7,118/MWh and \$11,538/MWh for the 6.30 and 7 pm 30-minute periods, respectively. Prices were forecast to be above \$5,000/MWh from the first price forecast the day before.

The main drivers of the high price were:

- High demand, which peaked at 8,477 MW– the highest up to that point this summer. During the high price period, demand was around 8,400 MW.
- Limited access to low-priced capacity due to generator outages and reduced generator availability:
 - 1,406 MW of baseload generation capacity was unavailable
 - Other baseload generators were operating below their registered capacity, leading to a further 1,588 MW of baseload being unavailable.
- A system normal constraint limited imports from NSW on the Queensland-New South Wales Interconnector (QNI), further limiting Queensland's access to low-priced generation.

While only around 10% of available generation capacity was priced above \$5,000/MWh some of this capacity was required to be dispatched.

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

3 Analysis

3.1 Overview of actual and expected conditions

The Queensland 30-minute price for 6.30 pm and 7 pm on 9 December 2021 reached \$7,118/MWh and \$11,538/MWh respectively. Table 1 compares actual and forecast 30-minute prices, demand and availability:

- Prices above \$5,000/MWh were forecast to occur for 5 consecutive 30-minute intervals, from 6 pm to 8 pm but only eventuated at 6.30 pm and 7.30 pm.
- Availability dropped from the 4 hour forecast, partly due to CS Energy removing 170 MW of capacity priced below \$5,000/MWh at Callide B.
- While demand was high, actual demand at 6.30 pm and 7 pm was slightly lower than forecast one hour before.
- Lack of reserve (LOR) levels 1 and 2 were forecast, but only the LOR1 eventuated.

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
6 pm	3,693	15,100	15,100	8,466	8,454	8,328	9,254	9,194	9,597
6.30 pm	7,118	15,100	15,100	8,343	8,432	8,328	9,097	9,074	9,414
7 pm	11,538	15,100	15,100	8,385	8,477	8,374	9,086	8,883	9,258
7.30 pm	2,080	13,495	15,100	8,148	8,392	8,349	9,222	8,974	9,298
8 pm	202	12,898	13,495	7,924	8,246	8,272	9,230	8,959	9,280

3.2 High demand

Queensland demand was the highest up to that point during the summer, reaching 8,477 MW. This was driven by warm temperatures, which reached 32°C in Brisbane² – the highest since 4 October 2021 in what had been a mild summer.³

At the time of the high-priced 30 minute intervals, demand had fallen 100 MW under the 8,450 MW that was forecast.

² Bureau of Meteorology, daily weather observations

<http://www.bom.gov.au/climate/dwo/202112/html/IDCJDW4019.202112.shtml>

³ Bureau of Meteorology, 'Greater Brisbane in November 2021: a very wet month; cooler than usual days overall', <http://www.bom.gov.au/climate/current/month/qld/archive/202111.brisbane.shtml>

3.3 Reduced access to low-priced capacity

Nearly 3,000 MW of baseload capacity was unavailable on the evening of the 9 December. This included about 1,400 MW of outages, while a further 1,600 MW was unavailable due to generators offering less than their registered capacity.

Most of the reduced capacity was planned, that is set up prior. In particular, Stanwell's Tarong units were offered at reduced capacity due to 'coal management'.

However, in some cases, available capacity was removed on the day. For example:

- Milmerran unit 1 removed 115 MW of capacity from 5.35 am. 30 MW was removed within 4 hours pre-dispatch.
- CS Energy's Callide B unit 1 removed 170 MW of capacity at 4.35 pm due to 'technical issues – flame stability'. Unit 2 removed 10 MW at about the same time due to 'Emissions limit'.
- Stanwell Corporation's Stanwell units 1 and 3 between them removed 50 MW of capacity in the 4 hours pre-dispatch due to 'reduced coal quality'.

Most of this capacity was priced below \$5,000/MWh.

The table below shows all units with more than 50 MW of capacity unavailable at 6.30 pm. 7 pm baseload capacity and unavailability largely mirrored that of 6.30 pm.

Table 2: Unavailable baseload generation

Participant	Station	Unit	Registered capacity (MW)	Max avail 6.30 pm (MW)	Unavailable (MW)	Reason
Callide Power Trading	Callide C	CPP_4	420	0	420	Known – offline since significant failure on 25 May 2021.
CS Energy	Callide B	Call_B_1	350	186	164	Unplanned - rebid at 4.35 pm reducing availability by 170 MW due to 'technical issues - flame stability'.
CS Energy	Callide B	Call_B_2	350	180	170	Known – availability was reduced due to 'Emissions limit'
CS Energy	Gladstone	GSTONE1	280	0	280	Known – offline since 15 July due to an unplanned outage.

Electricity 30-minute prices above \$5,000/MWh

Participant	Station	Unit	Registered capacity (MW)	Max avail 6.30 pm (MW)	Unavailable (MW)	Reason
CS Energy	Gladstone	GSTONE3	280	0	280	Known – offline since 20 Nov due to planned outage.
InterGen	Millmerran	MPP_1	426	320	106	Unplanned - rebid to remove 115 MW of capacity between 3.28 am and 2.02 pm due to various fuel related issues.
InterGen	Millmerran	MPP_2	426	0	426	Known – Offline since the previous day due to tube leak.
Stanwell Corporation	Tarong	Tarong#1	350	195	155	Known – reduced capacity due to coal management.
Stanwell Corporation	Tarong	Tarong#2	350	195	155	Known – reduced capacity due to coal management.
Stanwell Corporation	Tarong	Tarong#3	350	195	155	Known – reduced capacity due to coal management.
Stanwell Corporation	Tarong	Tarong#4	350	195	155	Known – reduced capacity due to coal management.
Stanwell Corporation	Tarong North	TNSP1	443	320	123	Known – reduced capacity due to technical issues.
Total					2,995	Note: total includes units with less than 50 MW unavailable.

3.4 Reduced access to low-priced imports from NSW

A system normal constraint limited access to cheap imports from NSW at the time of the high price event in Queensland. System normal constraints reflect network limits when there are no outages. They are always in place but their impact on transfer capacity may fluctuate according to system conditions.

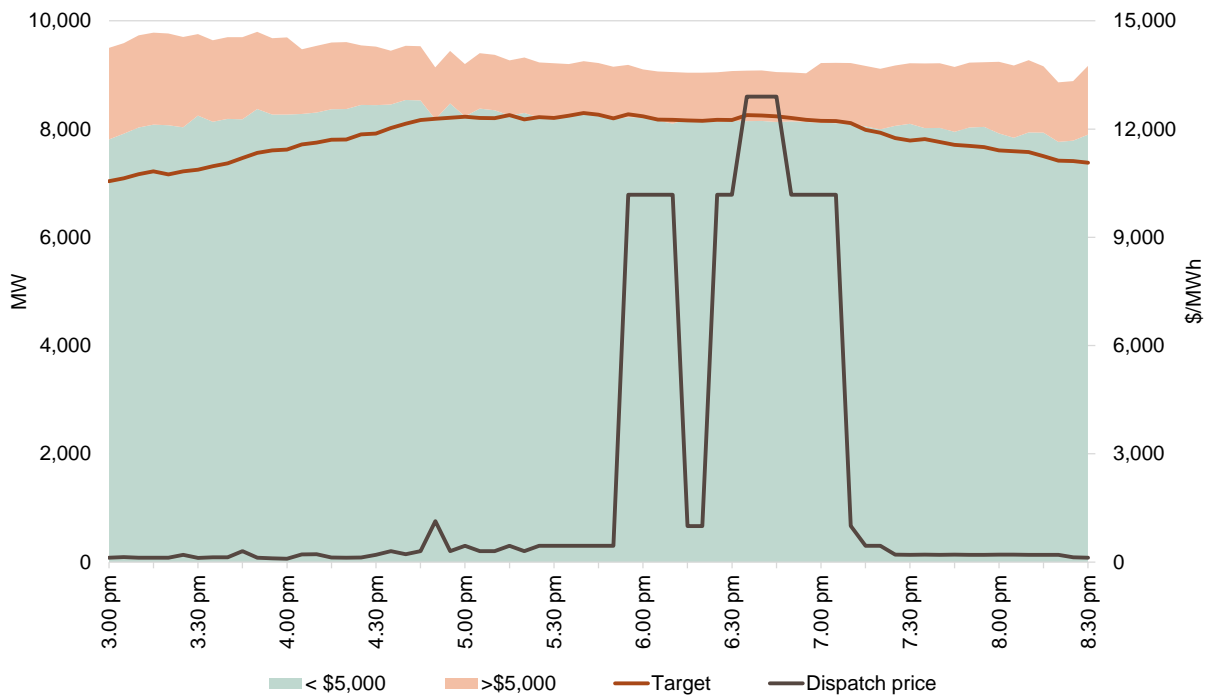
A system normal constraint limited cheap imports from NSW to around 160 MW. The nominal capacity of QNI is 300 to 600 MW. The constraint manages flows across

QNI so that were the largest unit available in Queensland to trip, the voltage disturbance would be manageable.⁴

3.5 10% of available capacity priced over \$5,000/MWh

Approximately 900 MW, or about 10% of available capacity was priced over \$5,000/MWh during the time of the high price event. Much of this capacity was offered by gas peaking plant.

Figure 3: Queensland capacity offered above and below \$5,000/MWh



Note: adjusted for constrained capacity

Given the high demand, lack of generator availability and limited imports from NSW, some of this high priced capacity was required to be dispatched. This led to prices above \$5,000/MWh for the 6.30 and 7 pm 30-minute prices.

Rebidding of capacity from low to high prices did not contribute to prices above \$5,000/MWh.

⁴ p. 3, 'Interconnector Capabilities', AEMO, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Congestion-Information/2017/Interconnector-Capabilities.pdf

Appendix A: Closing bids

Figures A1 to A6 highlight the 5 minute offers on 9 December 2021 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 A1: Alinta (Braemar A, Collinsville SF and Rugby Rub SF) offers, dispatch and dispatch price

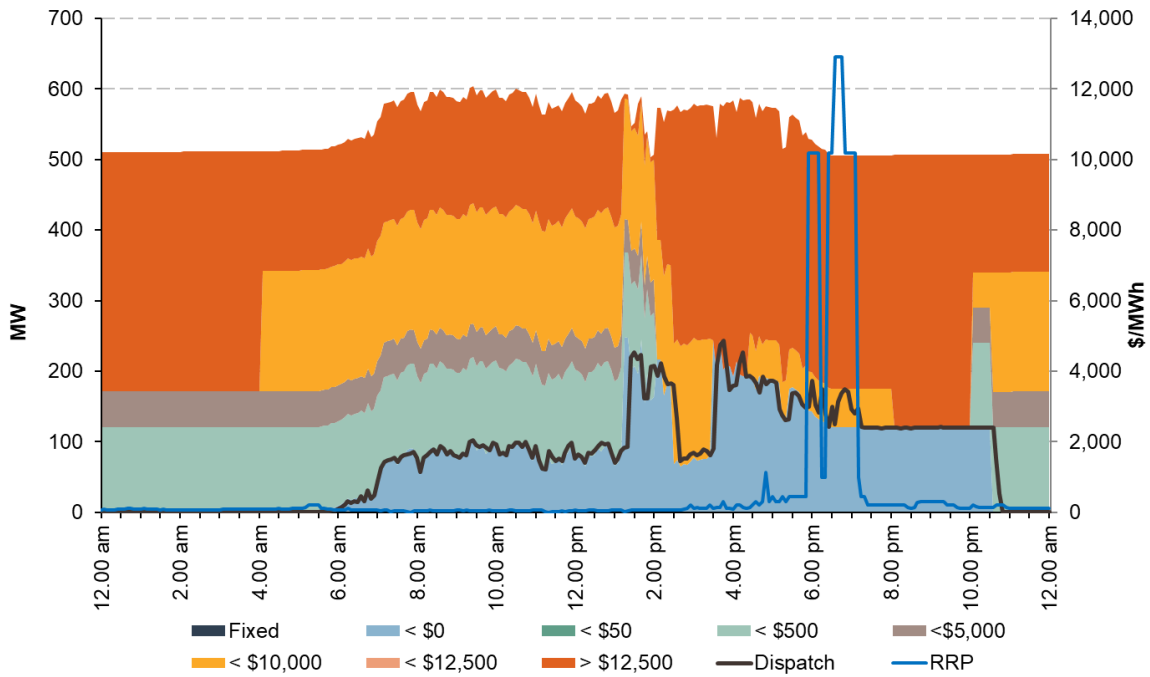


Figure A2: Arrow (Braemar 2)

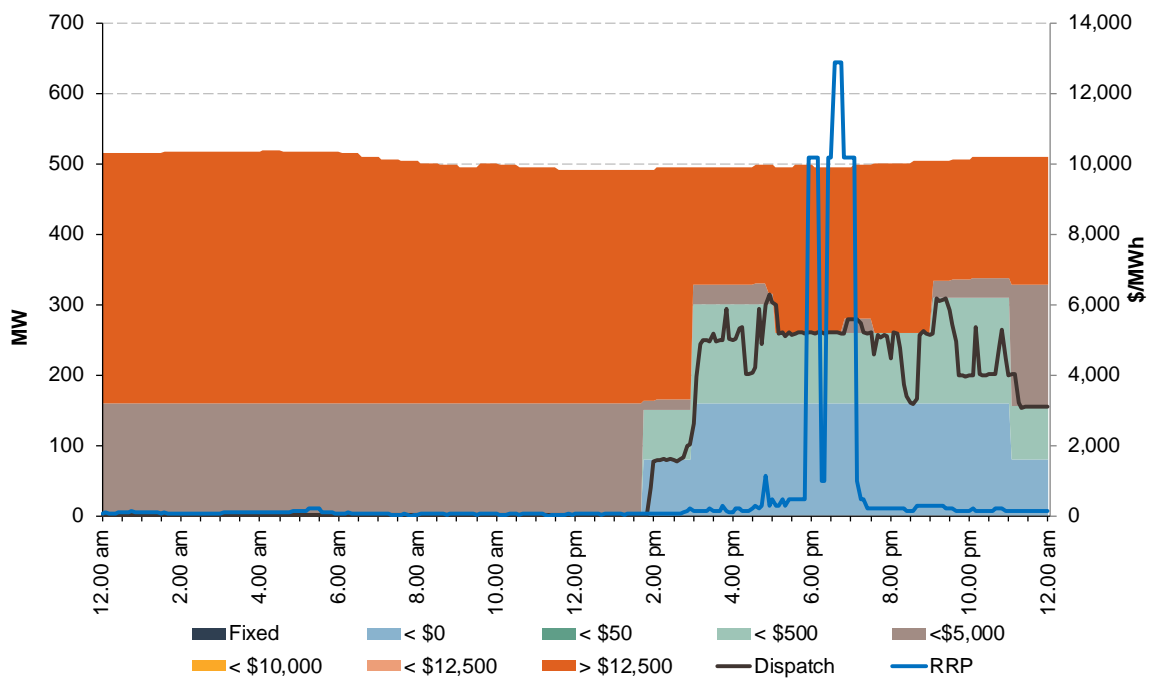


Figure A3: CS Energy (Callide B, Gladstone, Kogan Creek)

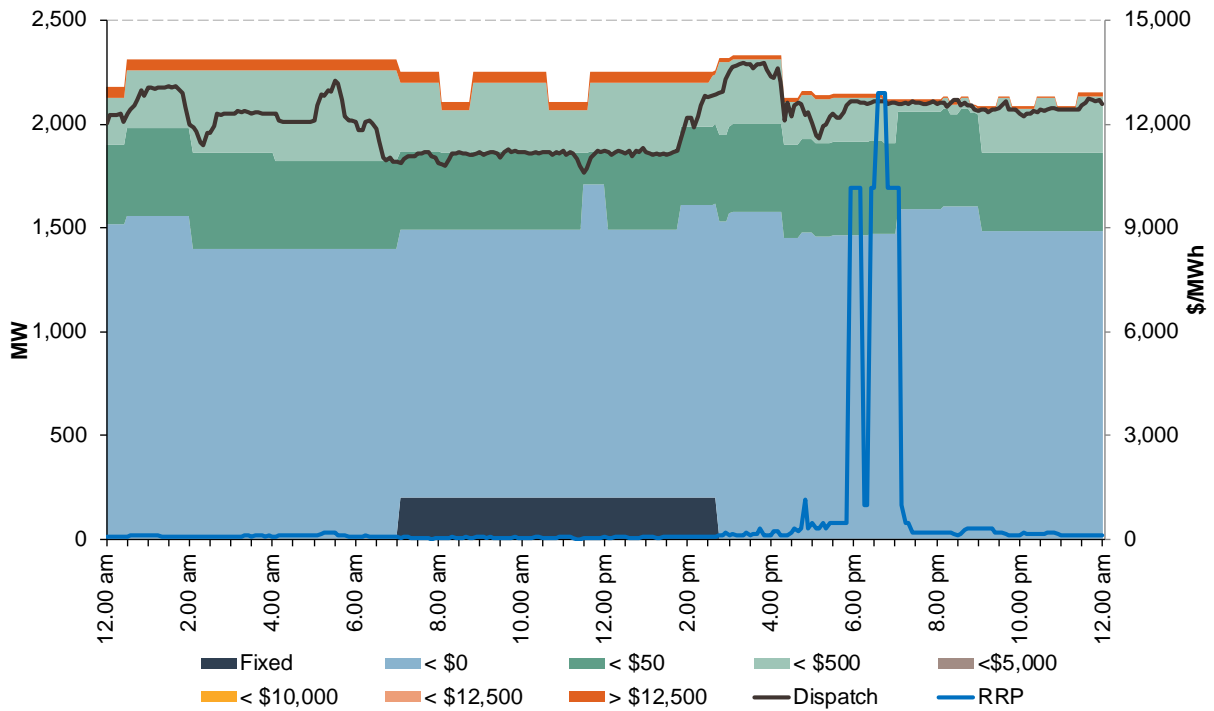


Figure A4: ERM (Oakey)

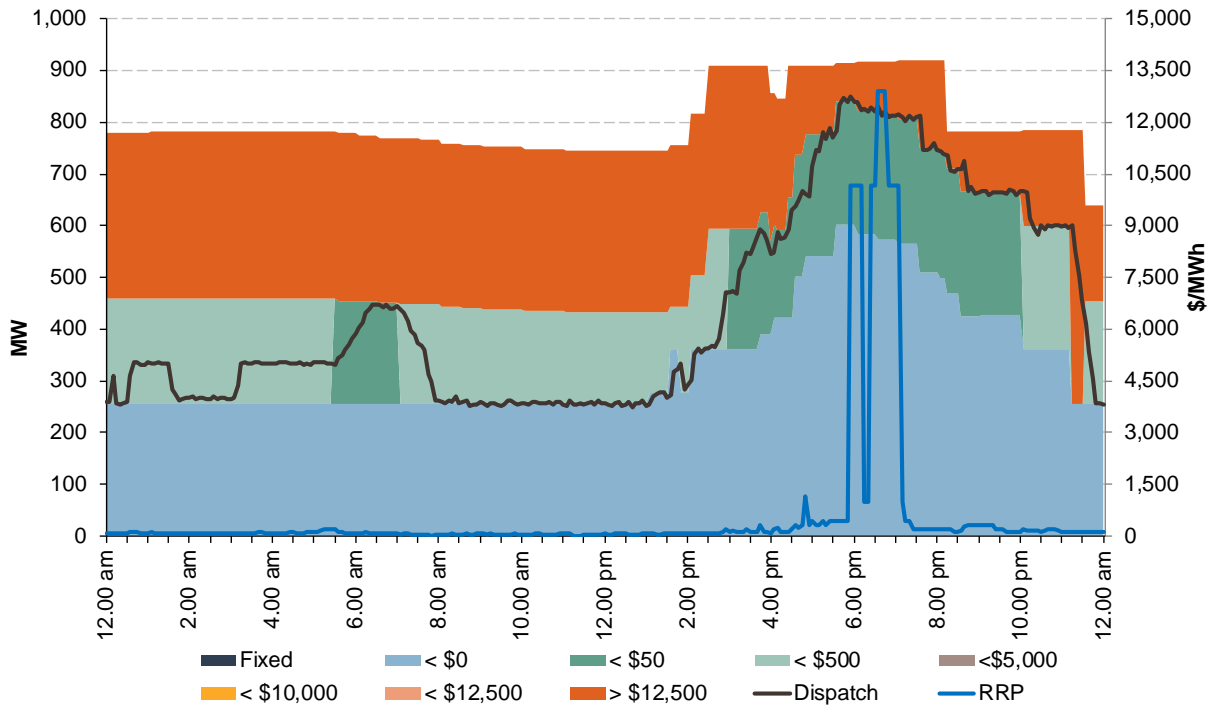


Figure A5: Origin (Darling Downs, Mt Stuart, Roma)

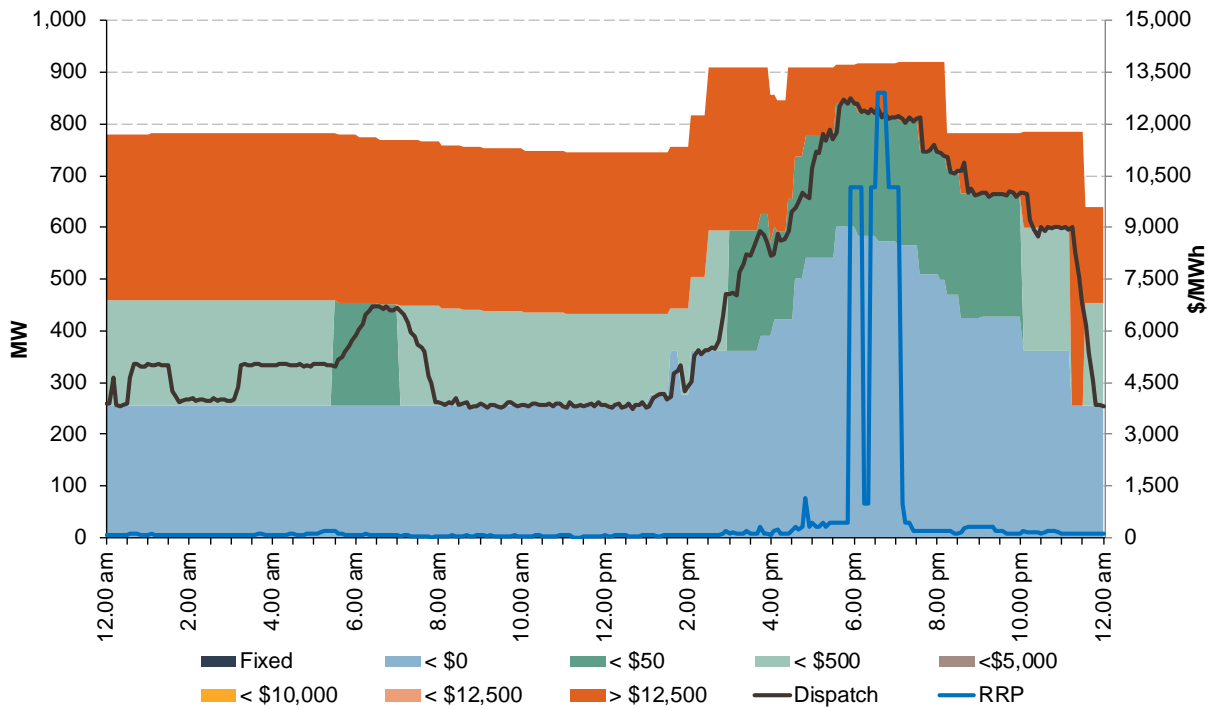
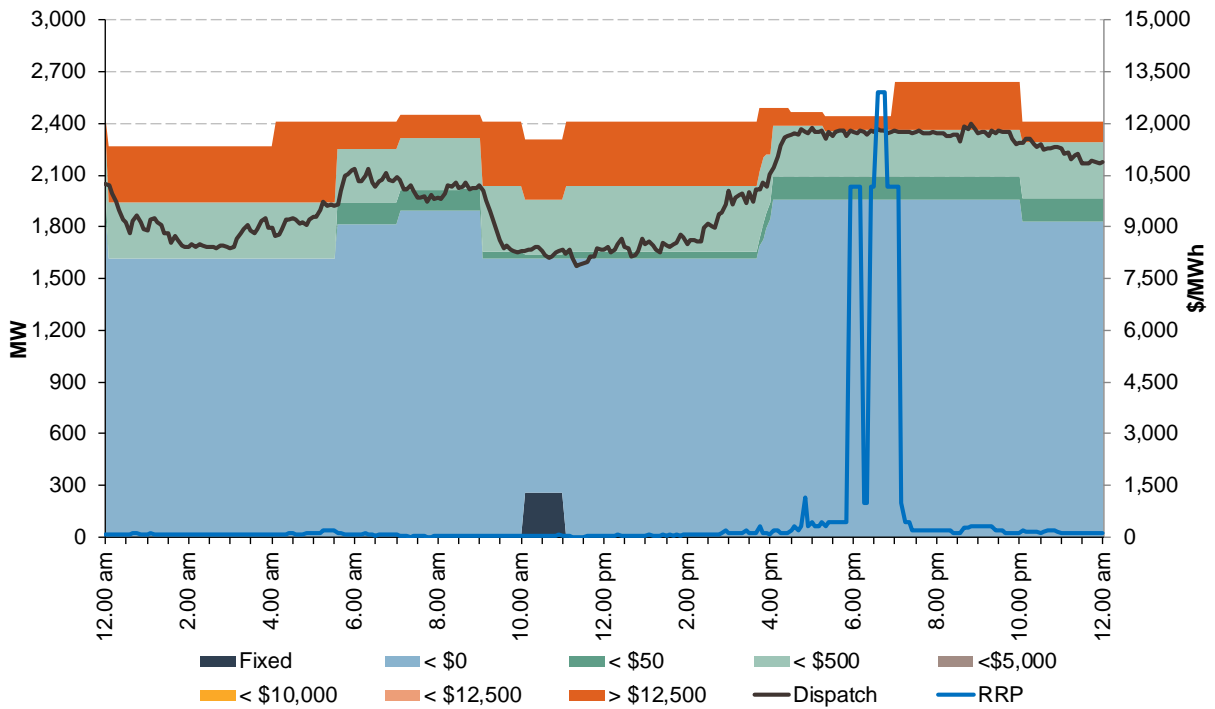


Figure A6: Stanwell (Stanwell, Tarong, Tarong North)



Appendix B: Price setter

The following table identifies for the 6.30 and 7 pm 30-minute periods, each 5-minute price and the generating units involved in setting the energy price. This information is published by AEMO.⁵ The 30-minute price is the average of the six 5-minute intervals.

Table B1: Price setter for 6.30 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
18:05	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
18:10	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
18:15	\$998	ERM Power	OAKY1	Energy	\$998	0.50	\$499
		ERM Power	OAKY2	Energy	\$998	0.50	\$499
18:20	\$998	ERM Power	OAKY1	Energy	\$998	0.50	\$499
		ERM Power	OAKY2	Energy	\$998	0.50	\$499
18:25	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
18:30	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
30-minute price	\$7,117/MWh						

Table B4: Price setter for 7 pm

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
18:35	\$12,898	ERM Power	OAKY1	Energy	\$12,898	0.50	\$6,449
		ERM Power	OAKY2	Energy	\$12,898	0.50	\$6,449
18:40	\$12,898	ERM Power	OAKY1	Energy	\$12,898	0.50	\$6,449
		ERM Power	OAKY2	Energy	\$12,898	0.50	\$6,449
18:45	\$12,898	ERM Power	OAKY1	Energy	\$12,898	0.50	\$6,449
		ERM Power	OAKY2	Energy	\$12,898	0.50	\$6,449
18:50	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
18:55	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
19:00	\$10,178	Braemar Power Projects	BRAEMAR2	Energy	\$10,178	1.00	\$10,178
30-minute price	\$11,538/MWh						

⁵ Details on how the price is determined can be found at https://aemo.com.au/-/media/files/electricity/nem/it-systems-and-change/nemde-queue/nemde_queue_users_guide.pdf?la=en