Electricity prices above $5,000/MWh

Tasmania,

17 February 2022

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AUSTRALIAN ENERGY REGULATOR

Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601
Tel: 1300 585 165
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1	21 April 2022	11

Contents

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[1] 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.

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.

[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.

2 Summary

On 17 February 2022 the wholesale price of electricity reached $7,783/MWh in Tasmania for the 8.30 am 30-minute period. Prices were not forecast to be above $5,000/MWh.

The main drivers of the high price were:

- A constraint managing a planned line outage in Tasmania forced flows into Victoria and meant Tasmania had to supply its own local Frequency Control Ancillary Services (FCAS).
- 700 MW of low-priced capacity was unavailable due to planned generator outages and offers below their registered capacity.
- Significant offered capacity was unable to make it to market due to technical limitations on some generators.
    - Around 480 MW of capacity was unable to be dispatched as generators were unable to ramp up following a planned reduction in availability at 8.05 am.
    - Around 100 MW of capacity was unable to be dispatched as it was needed to provide FCAS.

While no capacity was offered aboved $5,000/MWh for 8.05 am and 8.10 am, what was available was fully dispatched. Scheduled load which offered to reduce its consumption of energy at the price cap set the price.

Rebidding by generators or the Basslink interconnector did not contribute to high prices.

3 Analysis

3.1 Overview of actual and expected conditions

The Tasmanian 30-minute price for 8.30 am on 17 February 2022 reached $7,783/MWh. Table 1 compares actual and forecast 30-minute prices, demand and availability:

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

30 min 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
8.30 am	7,783	91	91	1,215	1,124	1,123	1,990	1,907	1,897

From Table 1 we observe:

- A high 30-minute price was not forecast to occur.
- Availability was higher than forecast because of high wind generation.
- Demand was slightly higher than forecast.

3.2 Prices

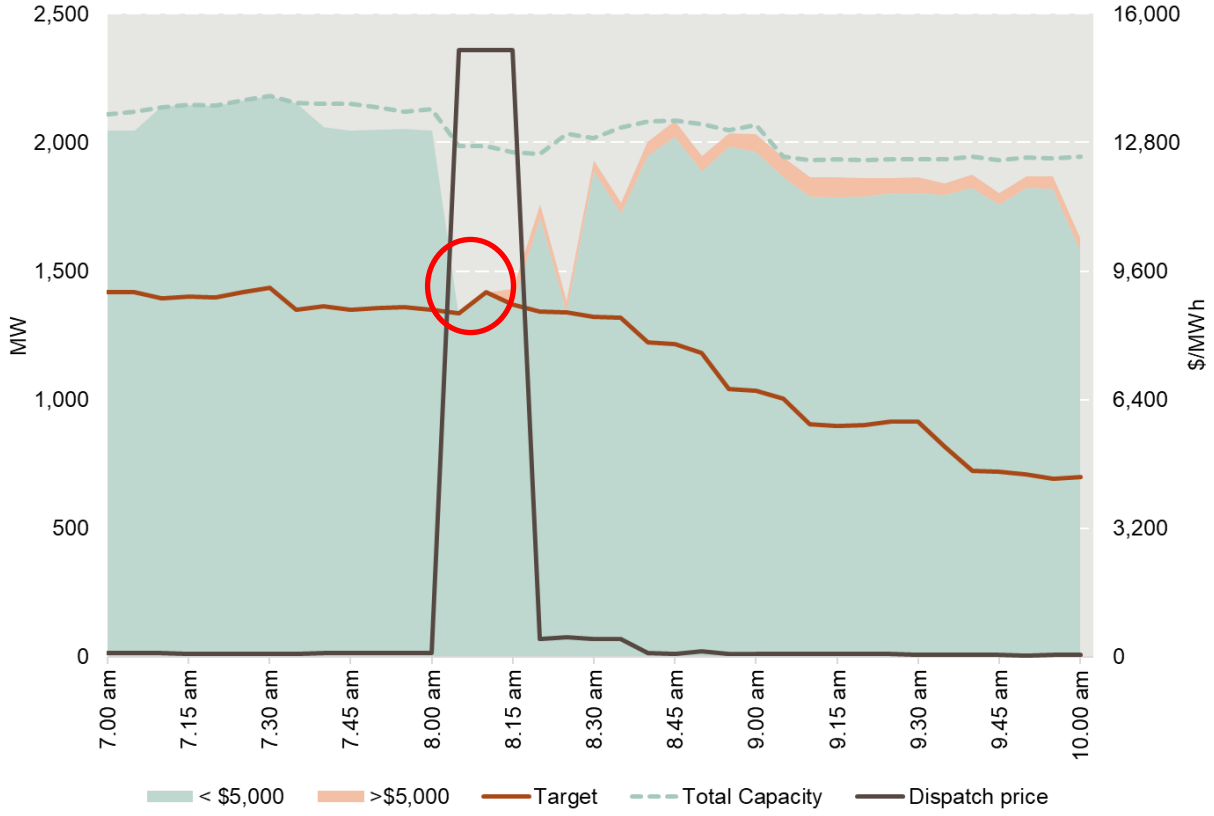
30-minute prices are formed from the average of 6 5-minute prices. Table 2 explores the type of unit that set price for each 5 minute interval. Further information is set out in *Appendix B: Price Setter*.

Table 2: 5 minute prices and type of unit

Time	5 minute price	Type of unit setting price
8.05 am	$15,100	Load
8.10 am	$15,100	Load
8.15 am	$15,100	Load
8.20 am	$450	Generator
8.25 am	$498	Generator
8.30 am	$450	Generator
30-minute price	**$7,783**	

Figure 1 shows the total (dotted line) and effective available capacity (stacked area) in the region priced above and below $5,000/MWh. Further information is set out in *Appendix A: Closing Bids*.

Figure 1: Tasmanian availability (adjusted for constrained capacity)



Source: AER analysis using NEM data
Note: adjusted for constrained capacity

At 8.05 am, there was a 119 MW step change in offers[2] due to a planned outage of Hydro Tasmania's Reece 2 unit. In response, 6 Hydro Tasmania units were given a combined start target of 30 MW by the Australian Energy Market Operator (AEMO), as each unit could only ramp up at 5 MW per 5 minutes. This is in contrast to their max availability of 485 MW. Hydro Tasmania's Meadowbank hydro unit was already generating, but also ramp up limited to 5 MW per 5 minutes. This meant that generation could only ramp up at a total of 35 MW per 5 minutes, leaving 482 MW of capacity unable to make it to market (3.4.1).

As units were constrained at their technical limits and no further generation capacity was available, a scheduled load set price. Typically the next available MW from a generator sets the price in a region, but backing off a load can have the same effect. The load offered 2 MW of capacity in the energy market at the cap. When it reduced its consumption of energy by 13 MW, it set price at $15,100/MWh from 8.05 am until 8.15 am.

The drop in Total Capacity at 8.05 am shows Reece 2's planned outage (Figure 1). However the impact of ramp rates (3.4.1) and the trade-off between the FCAS and energy markets

[2] A step change in offers refers to a significant change in offers, as a result of bids submitted, well in advance of dispatch, meaning the change of availably or price offered was taken into account in forecasts.

(3.4.2) is far more significant as effective availability drops by around 650 MW at 8.05 am to around 1,340 MW.

As part of the introduction of 5 minute settlement the AER are reviewing the effect of ramp rates for the Wholesale Electricity Performance Report, which is due in December 2022.

The price at 8.20 am fell to $450/MWh (highest offered generation capacity) when the units were no longer ramp up constrained and could set price.

Rebidding by generators or the Basslink interconnector did not contribute to high prices. At 8.15 am Hydro Tasmania rebid 88 MW of capacity at Musselroe from -$47/MWh to the cap, citing high FCAS costs. However, this capacity was not required.

3.3 Reduced access to low-priced capacity

3.3.1 Planned line outage and forced flows on the Basslink interconnector

There was a planned line outage of the Chapel Street to Gordon Line from 15-18 February 2022. In response to the line outage, AEMO invoked a constraint to manage the local FCAS requirements in Tasmania. The constraint forced around 160 MW out of Tasmania during the high prices. Forced exports restricted Tasmania's access to lower priced capacity in Victoria and it also placed additional pressure on Tasmanian generators to meet all the local demand for energy and FCAS.

3.3.2 Significant capacity unavailable in Tasmania

Around 700 MW of capacity was unavailable during the high-priced event. All this capacity was planned to be unavailable. Table 3 identifies significant generation (40 MW or more) that was unavailable on 17 February 2022.

Table 3: Significant generation unavailable on the day

Participant	Station	Unit	Registered capacity (MW)	Max avail (MW)	Unavail (MW)	Reason
Hydro Tasmania	Gordon	GORDON	378	247	131	Known – initial offer
Hydro Tasmania	Reece	REECE2	116	0	116	Known – change in outage schedule (16/02/22)
Hydro Tasmania	Mackintosh	MACKNTSH	81	0	81	Known – initial offer
Hydro Tasmania	Tamar Valley GT	TVPP104	58	20	38	Known – initial offer
Hydro Tasmania	Lemtme & Wilmot	LEM_WIL	86	33	53	Known - reduced capacity following plant failure (01/01/22)
Hydro Tasmania	Poatina 220kv	POAT220	228	180	48	Known – initial offer
Hydro Tasmania	Fisher	FISHER	46	0	46	Known – initial offer
Hydro Tasmania	Tamar Valley GT	BBTHREE1	40	0	40	Known – initial offer
Hydro Tasmania	Tamar Valley GT	BBTHREE2	40	0	40	Known – initial offer
				Total	**593**	

3.4 Significant capacity unable to make it to market

3.4.1 Delayed market response due to generator ramp rates

On the morning of 17 February 2022, there was around 480 MW of capacity priced below $5,000/MWh that was not dispatched due to generator ramp up rate limits during the times of the high prices (

Table 4). There was an uptick of ramp constrained generation again at 8.25 am when four units received a start target. Prices were not affected as enough generation that was no longer ramp up limited was available.

Table 4: Capacity unable to make it to market due to ramp up rates

Dispatch Interval	Ramp up limited
8.05 am	482 MW
8.10 am	478 MW
8.15 am	358 MW
8.20 am	12 MW
8.25 am	246 MW
8.30 am	0 MW

3.4.2 Additional capacity unable to be dispatched due to FCAS requirements

The trade-off between the FCAS and energy markets also contributed to the reduction in capacity available. This is because a MW supplied in raise FCAS is a MW foregone in the energy market. Table 5 shows how much capacity was not available in energy due to this trade-off.

Table 5: Capacity unable to make it to market due to FCAS

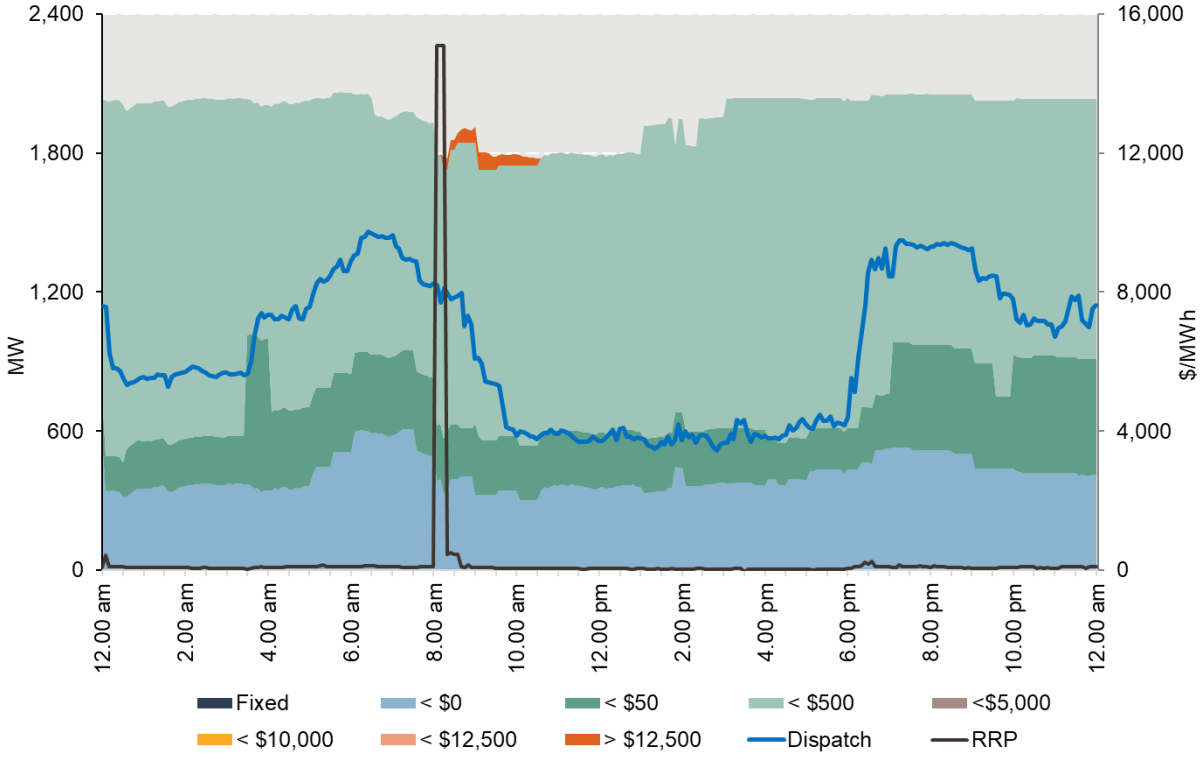
Dispatch Interval	FCAS raise energy trade off
8.05 am	91 MW
8.10 am	13 MW
8.15 am	111 MW
8.20 am	44 MW
8.25 am	164 MW
8.30 am	10 MW

During the high-price intervals, when there were requirements for raise ancillary services, local generation provided raise FCAS which effectively reduced the availability for energy by between 13 MW and 111 MW at the times of the high prices (Table 5).

Appendix A: Closing bids

Figure A1 highlight the 5-minute offers for participants in Tasmania 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: Hydro Tasmania offers, dispatch and dispatch price



Appendix B: Price setter

The following table identifies for the 8.30 am 30-minute periods, each 5-minute price and the generating units involved in setting the energy price. This information is published by AEMO.[3] The 30-minute price is the average of the six 5-minute intervals.

Table B1: Price setter for 8.30 am

Time	Dispatch price	Participant	Unit	Service	Offer price	Marginal change	Contribution
08:05	$15,100	FIRMUSGD	SLDCBLK1	Load	-$15,100	-1.00	$15,100
08:10	$15,100	FIRMUSGD	SLDCBLK1	Load	-$15,100	-1.00	$15,100
08:15	$15,100	FIRMUSGD	SLDCBLK1	Load	-$15,100	-1.00	$15,100
08:20	$450	Hydro Tasmania	BASTYAN	Energy	$450	1.00	$450
08:25	$498	Engie	LOYYB1	Energy	$19	-0.11	-$2
		ENGYAVIC	VSSSE1V1	Raise 5 min	$0	0.12	$0
		Enel X Australia	ASSENC1	Raise 60 sec	$1	0.12	$0
		Hydro Tasmania	CETHANA	Energy	$450	1.12	$504
		Hydro Tasmania	CETHANA	Raise 6 sec	$5	-0.12	-$1
		Hydro Tasmania	GORDON	Lower 60 sec	$1	0.12	$0
		Hydro Tasmania	GORDON	Lower 6 sec	$0	0.12	$0
		Hydro Tasmania	REECE1	Raise 5 min	$28	-0.12	-$3
		Hydro Tasmania	REECE1	Raise 60 sec	$2	-0.12	$0
		AGL Energy	BW02	Lower 6 sec	$1	-0.12	$0
		Origin Energy	ER02	Lower 60 sec	$1	-0.12	$0
		WALGBESS	WALGRVG1	Raise 6 sec	$1	0.12	$0
		Basslink	T-V-MNSP1, VIC1	Energy	$0	0.12	$0
08:30	$450	Hydro Tasmania	MEADOWBK	Energy	$450	1.00	$450
30-minute price		**$7,783/MWh**					

[3] 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