Electricity prices above $5,000 per MWh

January to March 2024

May 2024

AUSTRALIAN ENERGY REGULATOR

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Contents

Obligation

The Australian Energy Regulator (AER) has an obligation under the National Electricity Rules (energy rules) to monitor and report on significant price outcomes in the National Energy Market (NEM). The energy rules require us to produce a guideline for how we report significant price events.[1] Our guideline commits us to reporting whenever the 30-minute price exceeds $5,000 per megawatt hour (MWh).[2]

30-minute prices rarely reach $5,000/MWh, but with a market price cap of $16,600/MWh prices can occasionally exceed this reporting threshold.[3] This reporting framework is intended to pick up these outlier events.

This report describes the significant factors contributing to 30-minute prices exceeding $5,000 per MWh, considering market conditions, available generation capacity, network availability, as well as offer and rebidding behaviour.

The AER also analyses trends in prices and other market events through our quarterly wholesale markets report, available from www.aer.gov.au/wholesale-markets/performance-reporting.

[1] AER, Significant price reporting guidelines, September 2022.

[2] A trading interval is 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.

[3] The market price cap in 2023/24 is $16,600 per MWh.

Summary of high prices, January to March 2024

The wholesale price of electricity exceeded $5,000/MWh for 26 30-minute periods from January to March 2024, compared to 12 in the same period last year. Of these, 15 were in Queensland and NSW (Table S.1). The other 11 occurred in Victoria, Tasmania and South Australia as result of storm damage (Table S.2). There were also high FCAS prices in South Australia on the day of the storm. This report reviews the 15 high prices in Queensland and NSW, as we previously reported on the high prices related to the storm in April.[4]

High prices in Queensland and NSW

High demand coupled with baseload outages meant that market conditions were particularly tight with forecast or actual shortfalls in reserve supply on all the high-priced days. Queensland experienced hot and humid conditions across January and February driving high demand which exceeded the previous all-time record 3 times.[5] NSW also saw hot conditions. On the supply side, generator outages in Queensland on the high-priced days, in addition to the ongoing outages of Callide C, reduced the availability of baseload capacity.[6]

Network congestion limited Queensland and NSW's ability to access lower-priced energy. Congestion in northern NSW reduced Queensland's ability to access lower-priced energy through NSW, while congestion in southern NSW reduced its ability to access lower-priced energy from within the region, as well as from Victoria.

Rebidding also contributed to the high prices. On most occasions, these were for technical reasons, however, we also observed some rebidding for commercial reasons. For example, Genuity rebid capacity at Millmerran power station from low to high prices in response to changing forecast prices, and this contributed to high prices on 3 different days.

Table S.1 Common drivers of high price events in Queensland and NSW

Date and region	High demand	Reduced supply	Network limitations	Technical rebids	Commercial rebids
19 January, Qld	✓	✓	✓	✓	✓
21 January, Qld, NSW	✓	✓	✓	✓	×
27 January, Qld	✓	✓	✓	×	×
29 January, Qld	✓	✓	✓	✓	×
23 February, Qld	✓	✓	✓	✓	✓
26 February, Qld	✓	✓	✓	✓	✓
29 February, Qld, NSW	✓	✓	✓	✓	✓

[4] AER, Prices above $5,000/MWh on 13, 21 and 27 February 2024 in Victoria, Tasmania and SA, April 2024

[5]. AER, Wholesale markets quarterly Q1 2024, April 2024.

[6] A partial return to service of Callide C unit 3 was originally forecast for 7 January. Its return was progressively delayed to 31 March 2024. There were no baseload outages in NSW on the days covered in this report.

High prices in Victoria, Tasmania and South Australia

Extreme weather in Victoria on 13 February saw high temperatures and high demand. In the early afternoon, however, a severe storm caused the collapse of major transmission towers. The sudden loss of the transmission lines resulted in the loss of a significant amount of generation. This and high demand drove high prices in Victoria and Tasmania and also led to involuntary load shedding in Victoria. In addition, there were high FCAS prices in South Australia.

The loss of the transmission towers was still affecting prices in South Australia on 21 and 27 February. South Australia was limited in its ability to import cheaper generation from Victoria during periods of hot weather, high demand and low wind generation.

We reported on these high prices in April 2024.[7]

Table S.2 Common drivers of high price events in Victoria, Tasmania and South Australia

Date and region	High demand	Reduced supply	Network limitations	Technical rebids[8]	Commercial rebids[9]
13 February, Vic, Tas	✓	✓	✓	✓	✓
13 February, FCAS, SA	×	✓	✓	✓	✓
21 February, SA	✓	✓	✓	✓	✓
27 February, SA	✓	✓	✓	✓	×

[7] AER, Prices above $5,000 per MWh on 13, 21 and 27 February 2024 in Victoria, Tasmania and South Australia, April 2024

[8] Technical rebids are those which are categorised as 'P' (plant) as defined in the AER's Rebidding and Technical Parameters Guideline 2019

[9] Commercial rebids are those which are categorised as 'F' (financial) or 'A' (AEMO communications including demand and price forecasts, constraints, and directions).

1 19 January, Queensland

The wholesale price of electricity exceeded $5,000 per MWh for one 30-minute period in Queensland (Table 1.1). The high price was not forecast. While a lack of reserve was not forecast, an actual lack of reserve (LOR1) occurred from 5.30 pm to 8.30 pm.[10] [11]

Table 1.1 Breakdown of the 30-minute high price

Date	Time	5-minute price ($ per MWh)
19 January	6.35 pm	10,389
	6.40 pm	14,936
	6.45 pm	14,928
	6.50 pm	7,449
	6.55 pm	14,928
	7 pm	388
Average 30-minute price		**10,503**

A combination of factors drove these high prices:

- Hot temperatures drove high demand, greater than forecast.
- Network constraints to maintain system security in NSW limited imports into Queensland over both the interconnectors thereby reducing Queensland's access to cheaper generation from NSW.
- Rebidding of capacity for both technical and commercial reasons.

1.1 Market conditions

We compared actual with forecast outcomes an hour prior (Table 1.2):

- The high price was not forecast at any point in the day.
- Actual demand was higher than forecast by 270 MW.
- Actual availability was lower than forecast by 41 MW.

Table 1.2 Queensland actual price, demand and availability compared to forecast

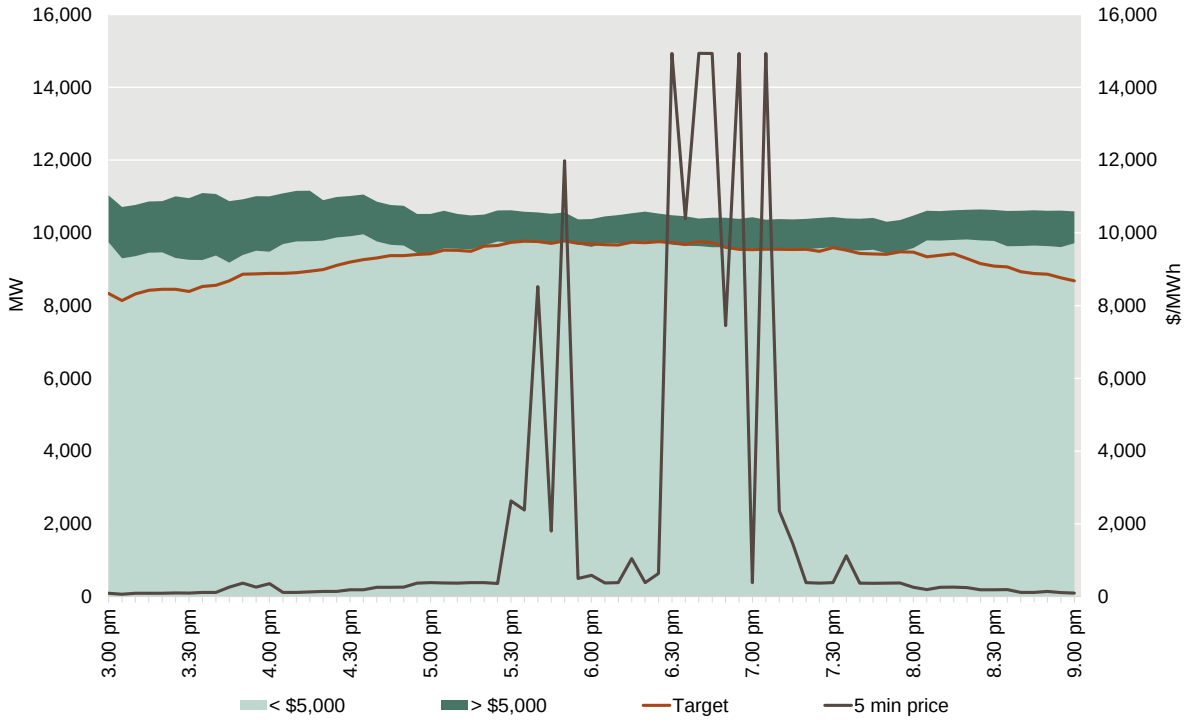
Date	Time	Price ($/MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
19 January, Qld	7 pm	10,503	376	9,871	9,601	10,518	10,559

[10] Australian Energy Market Operator, "LOR Factsheet", AEMO, December 2022

[11] Market notice 113498.

While 92% of capacity in Queensland was offered below $5,000 per MWh, between 26 MW and 128 MW of high-priced capacity was needed to meet demand (Figure 1.1).

Figure 1.1 Capacity offered above and below $5,000 per MWh in Queensland on 19 January



Source: AER analysis using NEM data.
Note: Capacity available below $5,000/MWh refers to effective capacity.

1.2 High temperatures drove high demand

High temperatures in Queensland, with a maximum temperature of 34°C in Brisbane, drove high demand. Demand during the high price was 270 MW higher than forecast, and only 226 MW below the Queensland all-time record.[12]

1.3 Network constraints limited access to cheaper generation through NSW

Network limitations reduced Queensland's ability to access cheaper generation through NSW.

During the high-priced period, the Queensland to NSW interconnector (QNI) was importing an average of 386 MW into Queensland, around half its import capability. These reduced flows were due to a system normal constraint on the Bayswater to Liddell lines to maintain system security in NSW. The constraint limited flows into Queensland as a preventative

[12] Demand one hour prior, at 6 pm, was only 88 MW from the then-record in Queensland. That record was broken three days later, on 22 January, when average 30-minute demand reached 11,055 MW.

measure, to avoid the possible overload of either of the two Bayswater to Liddell lines.[13] The Bayswater to Liddell constraint bound significantly more often from mid-December through to early February, than in previous months, with increased flows north to meet Queensland demand.[14]

Terranora, the other Queensland to NSW interconnector, was constrained by an ongoing outage of the Lismore static VAR compensator in NSW. To maintain system security, flows were forced into NSW, on average by 134 MW, during the high-priced period.

1.4 Outages and plant issues reduced available generation

Outages and plant issues reduced available generation in Queensland.

An unplanned outage at Gladstone unit 2 removed 280 MW of available baseload capacity. In addition, 2 units at Millmerran experienced plant issues the day before and were not fully available. This removed 90 MW of available baseload capacity.

Including the units at Callide C, this increased the unavailable baseload capacity across Queensland to 1,210 MW.

1.5 Rebidding for technical and commercial reasons contributed to the high prices

Rebidding of capacity for technical and commercial reasons contributed to all five of the 5 minute high-price intervals. Between 0 MW[15] and 128 MW of high-priced capacity was needed to meet demand (Appendix A).

- At 5.46 pm, Stanwell withdrew 115 MW of low-priced capacity from Stanwell Power Station due to an ash conveyor issue. It also withdrew a further 30 MW of low-priced capacity at 6.32 pm due to an emission issue. Stanwell's rebids contributed to all of the high-priced intervals.
- At 6.45 pm, AGL rebid 80 MW of capacity at Wandoan Battery from low prices to above $14,000 per MWh due to a change in forecast prices. This contributed to the high price at 6.55 pm.

[13] There are plans in place to triplicate the 33/34 Bayswater to Liddell lines as part of the Hunter Transmission Project. See AEMO Draft 2024 Integrated System Plan.

[14] The Bayswater to Liddell constraint was noted in AEMO's Monthly Constraint Report for January, where it was included in "Top 10 binding interconnector limit setters" and "Top 10 binding impact network constraint equations."

[15] No capacity offered at high prices was dispatched for the 6.50 pm high price in Queensland. The NEM Dispatch Engine formulated that it was cheaper to back-off low-priced generation in NSW (Mt Piper at -$1,000 and Wallgrove BESS at $299), resulting in a price of $7,449 per MWh, than to increase generation in Queensland. This was because the next available megawatt in Queensland was priced at $10,389 per MWh.

2 21 January, Queensland and NSW

The wholesale price of electricity exceeded $5,000 per MWh for two 30-minute periods on 21 January – in Queensland alone at 6.30 pm, and in both Queensland and NSW at 7 pm (Table 2.1). The high prices were forecast the day before. A lack of reserve was also forecast for both regions from the day before and declared that evening.[16]

Table 2.1 30-minute high prices

Date	Time	30-minute Queensland price ($ per MWh)	30-minute NSW price ($ per MWh)
21 January	6.30 pm	12,973	Not a high price
	7 pm	9,527	8,008

A combination of factors drove these high prices:

- Hot temperatures drove very high demand, greater than forecast.
- Network congestion limited flows into Queensland and NSW.
- Rebidding for technical reasons.

As some of the factors contributing to the high prices were different in Queensland and NSW, we analysed the markets separately.

2.1 Market conditions

We compared actual with forecast outcomes an hour prior (Table 2.2):

- The high prices were forecast intermittently from the day before, however the 6.30 pm price in Queensland and the 7 pm price in NSW were not forecast one hour prior.
- Actual demand was much higher than forecast, by 374 MW and 331 MW in Queensland and by 534 MW in NSW.
- Actual availability was slightly lower than forecast for the 6.30 pm price in Queensland but higher than forecast for 7 pm by 211 MW. In NSW, availability was lower than forecast for the 7 pm high price by 163 MW.

Table 2.2 Actual and forecast 30-minute price, demand and availability

Date	Time	Price ($/MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
21 January, Qld	6.30 pm	12,973	441	9,998	9,624	10,820	10,842
	7 pm	9,527	14,936	9,995	9,664	10,710	10,499
21 January, NSW	7 pm	8,008	2,196	12,249	11,715	13,885	14,048

[16] Market notice 113527: forecast LOR1 for Queensland. Market notice 113538: forecast LOR1 for NSW. Market notice 113526: forecast LOR2 for NSW the day prior, which was cancelled later that day (113537).
Market notice 113570: actual LOR1 in Queensland. Market notice 113572: actual LOR1 in NSW.

While 95% of capacity in Queensland was offered below $5,000 per MWh across the high-priced 30-minute intervals, and 91% in NSW, some high-priced capacity was needed to meet the high demand. Up to 159 MW was needed in Queensland (Figure 2.1), and up to 141 MW in NSW (Figure 2.2).

Figure 2.1 Capacity offered above and below $5,000 per MWh in Queensland on January 21

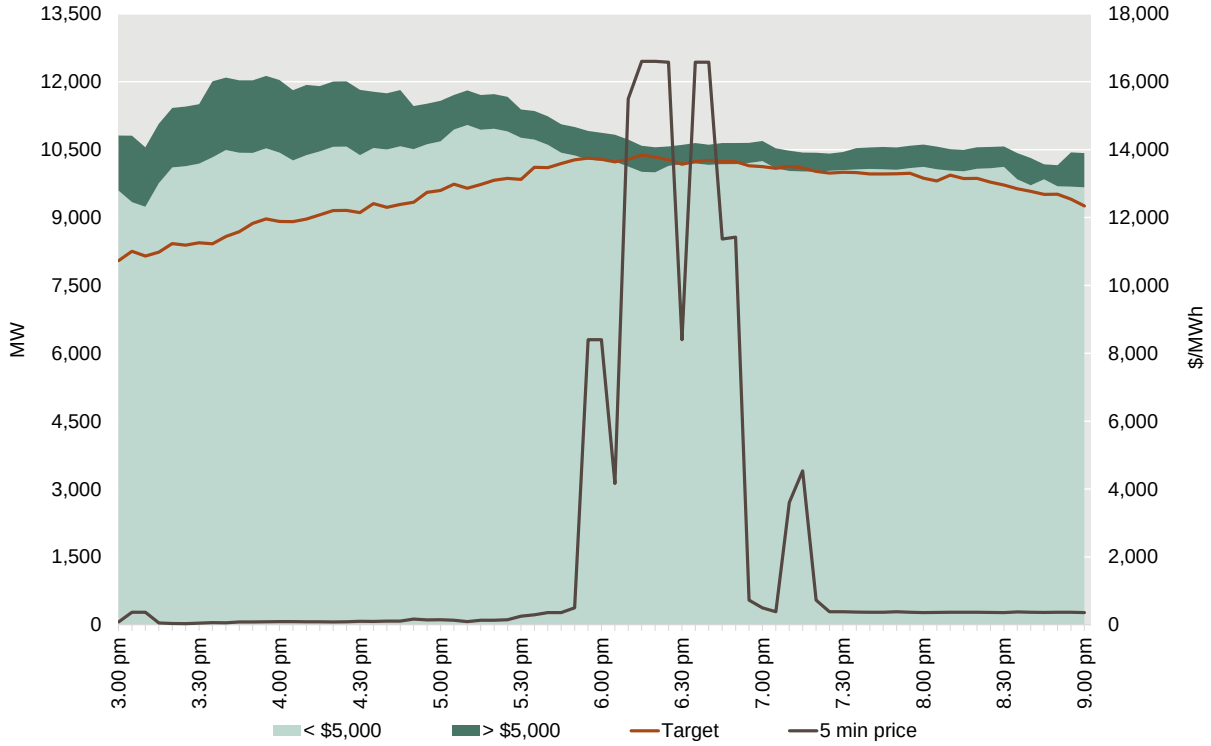
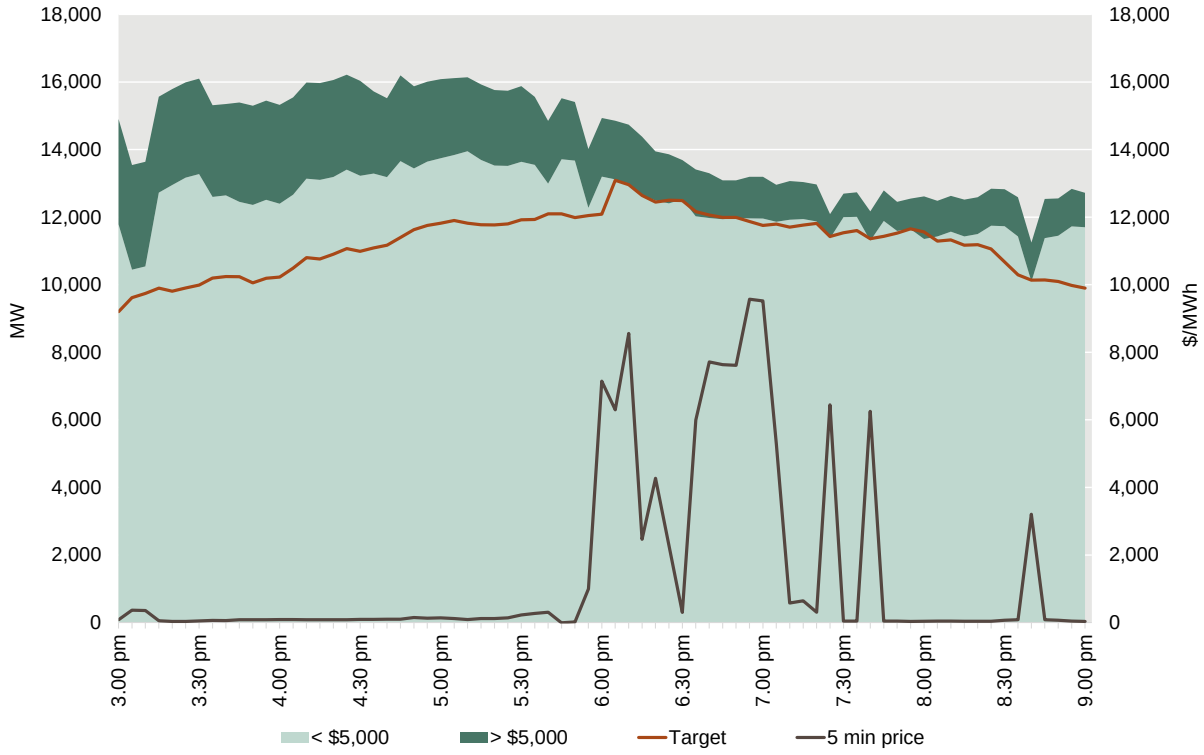


Figure 2.2 Capacity offered above and below $5,000 per MWh in NSW on 21 January



Source: AER analysis using NEM data.
Note: Capacity available below $5,000/MWh refers to effective capacity.

2.2 High temperatures drove high demand

High temperatures in both regions, with a Brisbane maximum of 33.5°C and a Sydney maximum of 33.9°C, drove high demand, which was much higher than forecast. In Queensland, demand was close to the then all-time record.[17]

2.3 Network constraints limited access to cheaper generation

Queensland and NSW were limited in their ability to access lower-priced energy due to network constraints. Network congestion in northern NSW reduced Queensland's ability to access lower-priced energy through NSW. While network congestion in the south of NSW reduced NSW's ability to access lower-priced energy from within the region as well as from Victoria.

2.3.1 Queensland was unable to access cheaper generation through NSW

In Queensland, during the 6.30 pm high price, the Queensland to NSW Interconnector (QNI) was exporting to NSW even though prices were lower in NSW. Flows south were around 300 MW and over 200 MW more than forecast. This was because flows were forced into

[17] This record was broken the following day, 22/1/24, when average 30-minute demand reached 11,055 MW.

NSW to manage a system normal constraint in NSW on the Bayswater to Liddell lines, to avoid a possible overload (section 1.3).

Terranora, the other Queensland to NSW interconnector, was exporting only 4 MW into Queensland, compared to its nominal capacity of 107 MW.[18] Terranora was limited by a system normal constraint in NSW to avoid the possible overloading of the Lismore to Dunoon power lines.

For the 7 pm period, prices were high in both regions. QNI continued exporting to NSW at a similar rate. Flows continued to be affected by the constraint preventing the overload of the Bayswater to Liddell lines. Terranora continued exporting to Queensland at a similar rate.

2.3.2 NSW had reduced access to cheaper generation from within the region and from Victoria

Network constraints in NSW contributed to the high prices because they reduced access to low-priced generation from Victoria and southern NSW.

Flows through southern NSW were limited by a constraint to avoid overloading the Collector to Marulan line. This is a key line linking generation in the south, to load centres to the north, such as Sydney. In NSW, the Victoria to NSW interconnector was importing an average of only 44 MW during the 7 pm high price, around 200 MW less than forecast, and substantially less than its nominal capacity of around 1,500 MW.[19]

These reduced flows did not directly contribute to the high price. They were the result of network congestion combined with a rebid by Snowy Hydro. Snowy Hydro rebid around 2,800 WW of capacity to the price floor (-$1,000 per MWh), mostly at Tumut 3 Power Station. The increase in low priced capacity in southern NSW meant less capacity could be imported from Victoria. Similar conditions occurred during the high price on 29 January (section 6.3).

The output of some wind and solar farms located in the south of NSW was also capped because of the network congestion and Snowy Hydro's rebid.

2.4 Negative residue management contributed to setting the high price in NSW

To manage the network congestion in northern NSW during the high prices (section 2.3.1), flows were being forced out of Queensland into NSW counter-price (from a high-priced to low-priced region) from before 6 pm. As a result, negative settlement residues accrued.[20] To manage the negative settlement residues that accumulated, AEMO invoked a constraint that limited flows out of Queensland, and this contributed to the high price in NSW. This

[18] AEMO Interconnector Capabilities

[19] *AEMO Interconnector Capabilities* reports a nominal capacity of 700-1600 MW. In the month prior to 21/1/24, at times 30-minute flows and export limits (to NSW) were between 1400 and 1500 MW.

[20] Negative settlement residue is the product of the difference in the regional reference price between two regions in the NEM and the quantity of electricity flowing over an interconnector between those two regions. A negative settlements residue arises where there are counter-price flows; that is, electricity flows from a high-priced region to a low-priced region. When the accumulated value of negative settlement residues reaches $100,000, AEMO intervenes (with an NRM constraint) to reduce the counter-price flow of electricity in the affected direction of an interconnector. Management of negative inter-regional settlements residues

constraint was violated to keep the system secure and contributed to setting the high price for the 7 pm period in NSW.[21]

2.5 Outages and plant issues reduced available generation

Baseload outages and plant issues reduced available generation in Queensland.

The day before the high price, Genuity withdrew 85 MW of capacity from its Millmerran station, and a further 40 MW on the day of the high price, due to a tube leak. On the day of the high price, Stanwell Corporation withdrew 85 MW of capacity from its Tarong station due to a tube leak. Including the units at Callide C, this increased the amount of unavailable baseload capacity in Queensland to 1,050 MW.

2.6 Rebidding for technical reasons contributed to the high prices

Rebidding of capacity for technical reasons contributed to the high prices. Up to 159 MW of high-priced capacity was needed to meet demand in Queensland and up to 141 MW in NSW (Appendix B).

In Queensland:

- From 3.46 pm, over several rebids Genuity removed 80 MW net of low-priced capacity at Millmerran power station for technical reasons. This only impacted the 6.10 pm 5-minute interval as Genuity subsequently rebid 80 MW of additional capacity at low prices.
- At 6.08 pm, CS Energy removed 40 MW of low-priced capacity at Gladstone power station due to cooling water system issues. This rebid contributed to the 6.30 pm high price.

In NSW:

- From 3.20 pm, AGL removed 145 MW of low-priced capacity from its Bayswater station due to fan and temperature limits. This impacted all the high 5-minute high prices in NSW.

[21] AEMO's Monthly Constraint Report for January notes the NRM constraint violated at this time as a result of competing requirements on QNI due to the Bayswater to Liddell constraint.

3 27 and 29 January, Queensland

The wholesale price of electricity exceeded $5,000 per MWh for one 30-minute period on 27 January, and three 30-minute periods on 29 January in Queensland (Table 3.1). High prices were forecast for both 27 and 29 January around midday the day prior. A lack of reserve (LOR2) for both days was forecast the day before, and a lack of reserve (LOR1) eventuated during the high-prices.[22]

Table 3.1 30-minute high prices

Date	Time	30-minute price ($ per MWh)
27 January	6.30 pm	12,793
29 January	6 pm	6,565
	6.30 pm	8,562
	7 pm	5,346

A combination of factors drove these high prices:

- Hot temperatures and high humidity drove high demand, greater than forecast.
- Network constraints to maintain system security in NSW reduced Queensland's access to cheaper generation from NSW. There was also an outage of network equipment in NSW that forced flows into NSW.
- Rebidding for technical reasons contributed to the high prices on 29 January.

3.1 Market conditions

We compared actual with forecast outcomes an hour prior (Table 4.2):

- Actual prices were higher than forecast, albeit lower than anticipated for 29 January which had prices forecast to be greater than $15,000 per MWh until 1 pm.
- Actual demand was higher than forecast by around 170 MW on 27 January, and by 200 MW to 300 MW on 29 January.
- Actual availability was lower than forecast by around 140 MW on 27 January and 30 MW to 97 MW on 29 January. The exception was at 6 pm on 29 January, when it was close to forecast.
  - Availability was lower than forecast on 27 January primarily due to less renewable generation.

[22] Market notice 113824: Forecast LOR2 in Qld on 27 Jan. Market notice 113871: Actual LOR1 in Qld on 27 Jan declared at 6pm. Market notice 113892: Actual LOR1 in Qld on 27 Jan cancelled at 8.45 pm.

Market notice 113994: Actual LOR1 in Qld on 29 Jan declared at 6.12 pm. Market notice 113998: Actual LOR1 in Qld on 29 Jan cancelled at 8 pm.

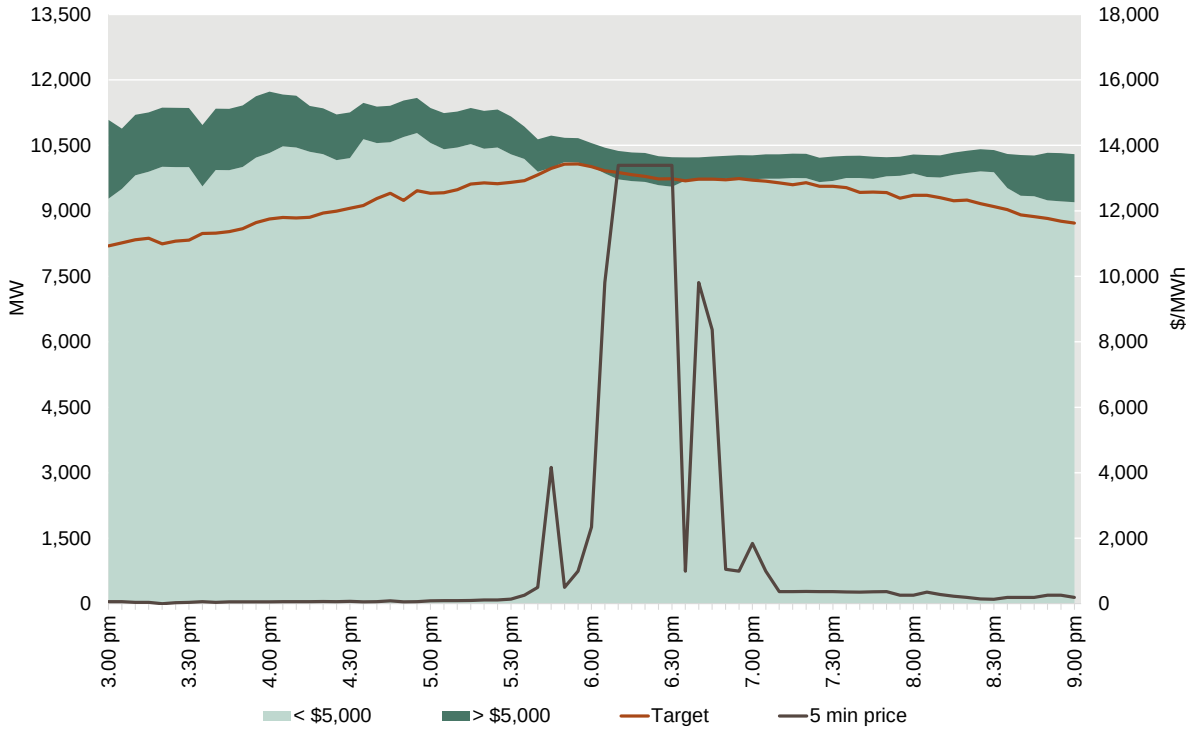
Table 3.2 Actual price, demand and availability compared to the 1 hour forecast

Date	30-min period	Price ($ per MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
27 Jan	6.30 pm	12,793	503	10,165	9,993	10,418	10,562
29 Jan	6 pm	6,565	378	9,972	9,778	10,583	10,574
	6.30 pm	8,562	500	9,912	9,657	10,397	10,428
	7 pm	5,346	372	9,918	9,616	10,337	10,434

While 90% of capacity in Queensland was offered below $5,000 per MWh, some high-priced capacity was needed to meet demand (Figure 3.1 and Figure 3.2):

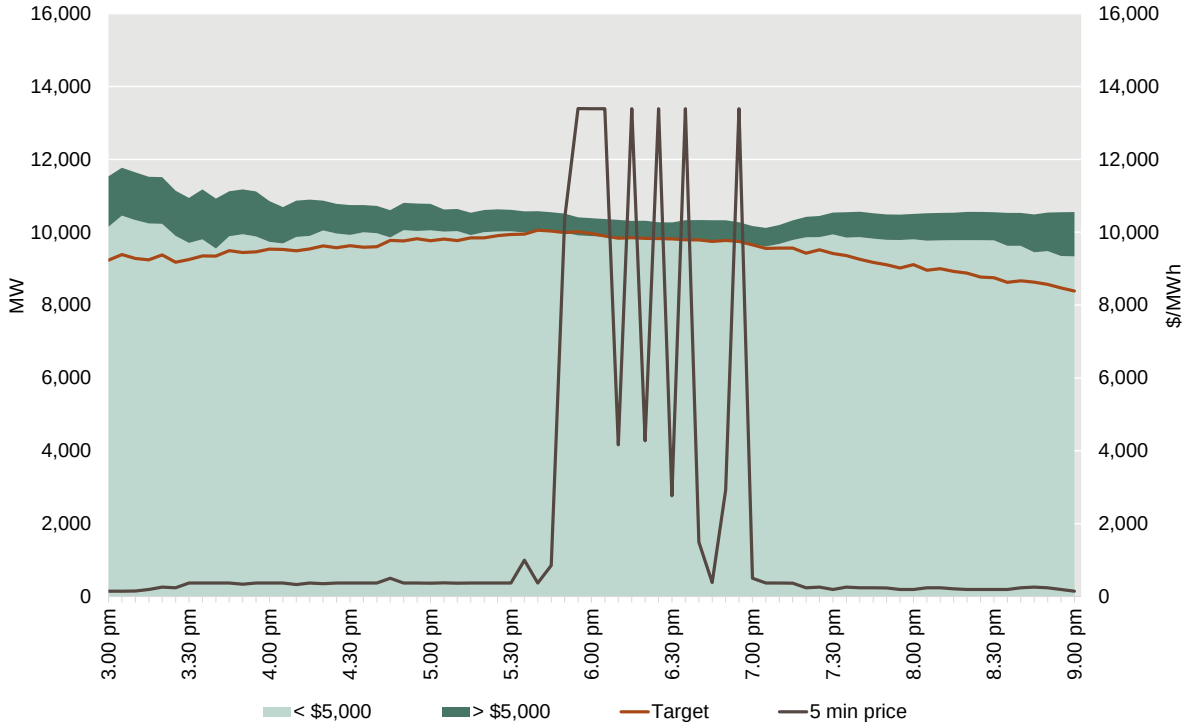
- On 27 January, between 60 MW and 182 MW was needed.
- On 29 January, between 3 MW and 101 MW was needed.

Figure 3.1 Capacity offered above and below $5,000 per MWh on 27 January



Source: AER analysis using NEM data.
Note: Capacity available below $5,000 per MWh refers to effective capacity in Queensland.

Figure 3.2 Capacity offered above and below $5,000 per MWh on 29 January



Source: AER analysis using NEM data.
Note: Capacity available below $5,000 per MWh refers to effective capacity in Queensland.

3.2 High temperatures drove high demand

High temperatures on both days, with Brisbane maximums of 35°C and 31°C respectively, exacerbated by high humidity drove high demand. Demand on 27 January was particularly high, being one of the 3 days in the quarter that exceeded the previous all-time demand record for Queensland. At the time of the high prices, demand reached 10,165 MW.

As a result of the high demand, AEMO forecasted shortfalls in reserve supply. A Lack of Reserve Level 2 (LOR2) was forecast 24 hours prior on both days, and a Lack of Reserve Level 1 (LOR1) eventuated during the high-priced periods.[23]

On the afternoon of 27 January, AEMO entered a Reliability and Emergency Reserve Trader (RERT) contract while the LOR2 was still forecast but did not dispatch the contract and its associated generation.[24] The RERT mechanism allows AEMO to maintain system reliability and system security using reserve contracts.

[23] Australian Energy Market Operator, "LOR Factsheet", AEMO, December 2022, AEMO Market notice 113871 (27 January) and 113994 (29 January).

[24] Australian Energy Market Operator, "Procedure for the exercise of the reliability and emergency reserve trader", AEMO, 24 October 2021, AEMO Market notice 113846.

3.3 Baseload outages reduced available generation

In Queensland, baseload outages contributed to tight market conditions during times of high demand.

Genuity's Millmerran unit 1 and Stanwell Corporation's Tarong unit 2 went on planned outages on 23 and 24 January respectively, removing in total 776 MW of available baseload generation. Including the units at Callide C, this brought the total baseload outages across Queensland to 1,616 MW on the days of the high-priced events.

3.4 Network constraints limited access to cheaper generation through NSW

Network constraints limited Queensland's access to cheaper generation through NSW.

During the high-priced periods, the Queensland to NSW interconnector (QNI) was importing an average of 394 MW into Queensland on 27 January and up to 205 MW on 29 January, around half of its import capability.[25] These reduced flows were due to a constraint on the Bayswater to Liddell lines to maintain system security in NSW. The constraint limited flows into Queensland to prevent overloading the Bayswater to Liddell lines. Flows were also constrained by the outage of network equipment in NSW on 27 January.[26]

Terranora, the other Queensland to NSW interconnector, was primarily affected by a constraint to avoid the possible overload of the Lismore to Dunoon power lines in NSW. It was also impacted by the constraint on the Bayswater to Liddell lines and the outage of network equipment. To maintain system security, flows were forced into NSW on average by 25 MW on 27 January and 10 MW on 29 January.

3.5 Rebidding for technical reasons contributed to the high prices

Rebidding of capacity for technical reasons contributed to the high prices on 29 January but did not contribute on 27 January. Only between 3 MW and 9 MW of high priced capacity in Queensland was needed to meet demand on 29 January (Appendix C).

- At 3.59 pm Alinta Energy rebid capacity at Braemar A power station as hot temperatures reduced the plant's availability. The rebid shifted 7 MW (net) from low prices to above $5,000 per MWh and contributed to the high price at 5.50 pm.
- From 2.06 pm, across multiple rebids, Bouldercombe Battery Project shifted 4 MW (net) of the battery's capacity from low prices to prices above $5,000 per MWh, and this contributed to the high price at 5.50 pm. It subsequently shifted 29 MW from low prices to prices above $5,000 per MWh which then contributed to the high price at 6.35 pm. The rebid reasons provided was a change in its state of charge.

[25] At the time of the high price event, the limit for QNI flows from NSW to Queensland was 700 MW as AEMO was in the process of testing new limits following the upgrade. AEMO Market notice 105482.

[26] The outage of the network equipment was the Lismore static VAR compensator.

4 23 February, Queensland

The wholesale price of electricity exceeded $5,000 per MWh for one 30-minute period on 23 February in Queensland (Table 4.1). The high prices were forecast on the morning of the event. Earlier in the day, a Lack of Reserve Level 1 (LOR1) was forecast to occur during the high-price period but did not ultimately eventuate. [27]

Table 4.1 Breakdown of the 30-minute high price

Date	Time	5-minute price ($ per MWh)
23 February	6.35 pm	1,100
	6.40 pm	1,100
	6.45 pm	2,913
	6.50 pm	14,898
	6.55 pm	1,049
	7.00 pm	11,677
Average 30-minute price		**5,456**

A combination of factors drove these high prices:

- Hot temperatures and high humidity drove high demand, greater than forecast.
- Network constraints to maintain system security in NSW prevented Queensland's access to cheaper generation from NSW. There was also an outage of network equipment in NSW that further forced flows into NSW.
- Wind generation was low and lower than forecast, so less low-priced capacity was available than anticipated.
- Rebidding for technical and commercial reasons.

4.1 Market conditions

We compared actual with forecast outcomes an hour prior (Table 4.2):

- Actual price was not forecast to exceed $5,000 per MWh.
- Actual demand was higher than forecast by 120 MW.
- Actual availability was lower than forecast by 40 MW.

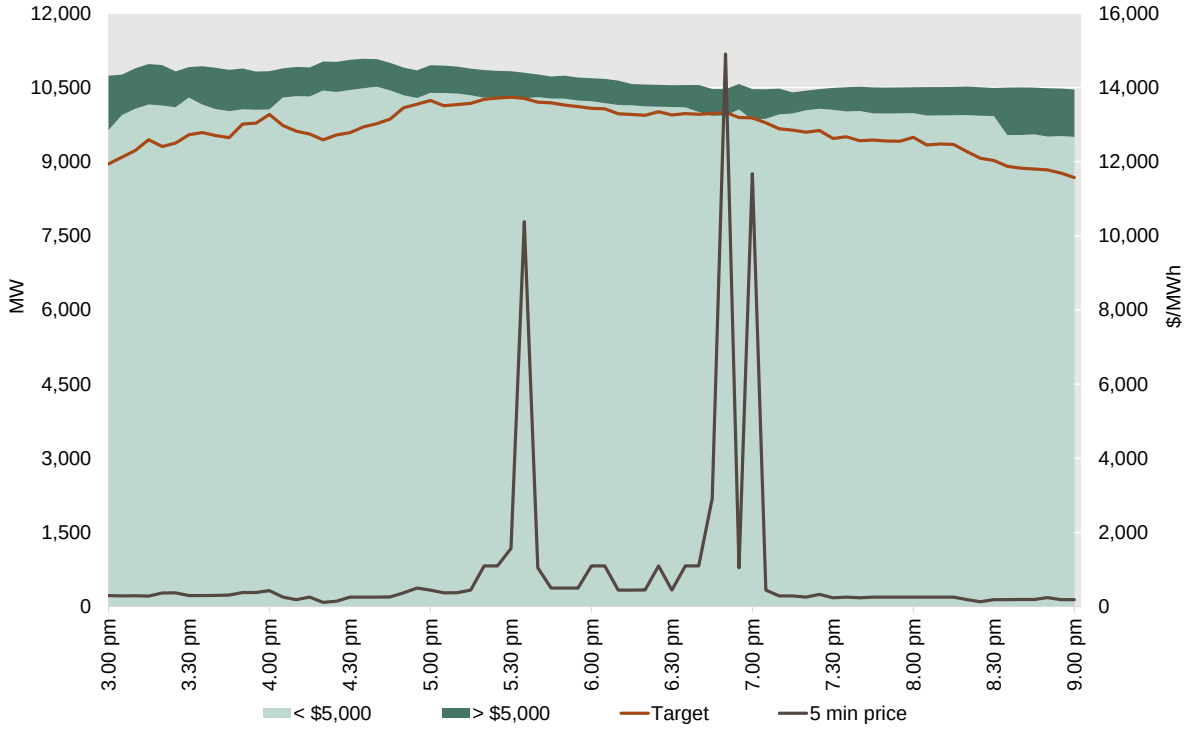
[27] Australian Energy Market Operator, "LOR Factsheet", AEMO, December 2022,.

Table 4.2 Actual price, demand and availability compared to the 1 hour forecast

Date	30-min period	Price ($ per MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
23 Feb	7 pm	5,456	446	9,798	9,678	10,516	10,556

While an average of 95% of capacity in Queensland was offered below $5,000 per MWh, 64 MW and 40 MW of high-priced capacity was needed at 6.50 pm and 7 pm respectively (Figure 4.1).

Figure 4.1 Capacity offered above and below $5,000 per MWh, 23 February



Source: AER analysis using NEM data.
Note: Capacity available below $5,000 per MWh refers to effective capacity in Queensland.

4.2 High temperatures drove high demand

High temperatures, with Brisbane's maximum of 35°C drove high demand. Demand increased by 61 MW and 31 MW at 6.50 pm and 7 pm respectively.

4.3 Network constraints prevented access to cheaper generation through NSW

During the high-priced period, the Queensland to NSW interconnector (QNI) was forcing an average of 8 MW into NSW and thus preventing Queensland from potentially accessing up to

750 MW of cheaper generation from NSW.[28] Flows were forced primarily due to a constraint on the Bayswater to Liddell lines to maintain system security in NSW. The constraint prevented flows into Queensland as a preventative measure, to avoid the possible overload of the two Bayswater to Liddell lines.

Terranora, the other Queensland to NSW interconnector, was constrained by an outage of network equipment in NSW.[29] To maintain system security, flows were forced into NSW on average by 132 MW.

4.4 Wind generation was low and lower than forecast

Average wind output during the high-priced period was 64 MW out of a total of over 1,000 MW of registered wind capacity in Queensland.[30] Wind output was less than forecast an hour earlier by 83 MW. Most wind is offered at negative prices, which would have helped mitigate the high-price event.

4.5 Baseload outages reduced available generation

An unplanned outage at a Gladstone unit contributed to tight market conditions. Gladstone unit 1 went on an unplanned outage from 18 February until 4 March due to a technical issue, removing 280 MW of available baseload generation. Including the units at Callide C, this brought the total baseload outages across Queensland to 1,120 MW.

4.6 Rebidding for technical and commercial reasons contributed to the high prices

Rebidding of capacity for commercial as well as technical reasons contributed to the high prices. In particular, in a late rebid, Genuity removed 92 MW of low-priced capacity from Millmerran for commercial reasons. Between 40 MW and 64 MW was needed to meet demand (Appendix D).

- From around 4 pm, across multiple rebids, AGL energy removed 65 MW net of low-priced capacity at Wandoan battery due to either a change in forecast prices or a change in capability. The removal of low-priced capacity contributed to the high price at 6.50 pm and 7pm.
- From around 4 pm, over several rebids, Origin Energy removed 75 MW net of low-priced capacity at Mt Stuart power station largely due to technical reasons. This was partly offset when it subsequently added 28 MW of low-priced capacity at Darling Downs power station. Origin's net removal of 47 MW of low-priced capacity contributed to the high 5-minute price at 7 pm.
- At 6.33 pm, in a late rebid, Genuity shifted 92 MW at Millmerran power station from the price floor to the price cap ($16,600 per MWh) for commercial reasons and this contributed to the high prices at 6.50 pm and 7 pm.

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[28] At the time of the high price event, the limit for QNI flows from NSW to Queensland was around 750 MW.

[29] An outage of the Lismore static VAR compensator in NSW.

[30] The total maximum capacity of wind generators in Queensland is similar to total registered capacity.

5 26 February, Queensland

The wholesale price of electricity exceeded $5,000 per MWh for two 30-minute periods on 26 February in Queensland (Table 5.1). The 6 pm high price was not forecast, and the 6.30 pm high price was forecast earlier that afternoon.[31] A lack of reserve (LOR1) was also forecast in the afternoon and declared that evening.[32]

Table 5.1 30-minute high prices

Date	Time	30-minute price ($ per MWh)
26 February	6 pm	7,785
	6.30 pm	6,117

A combination of factors drove these high prices:

- Hot temperatures drove high demand. Demand was greater than forecast.
- Network constraints to maintain system security in NSW limited Queensland's access to cheaper generation through NSW.
- Rebidding of capacity for technical and commercial reasons.

5.1 Market conditions

We compared actual outcomes to forecasts an hour prior for both 30-minute high prices (Table 5.2):

- Actual prices were higher than forecast one hour prior, however, the 6.30 pm price had been forecast to be even higher than the actual price 4 hours prior.
- Actual demand was higher than forecast by 132 MW and 42 MW.
- Actual availability was lower than forecast by 297 MW and 13 MW
  - actual availability was lower than forecast for the 6 pm period partly because solar output was 167 MW lower than forecast.

Table 5.2 Queensland actual price, demand and availability compared to forecast

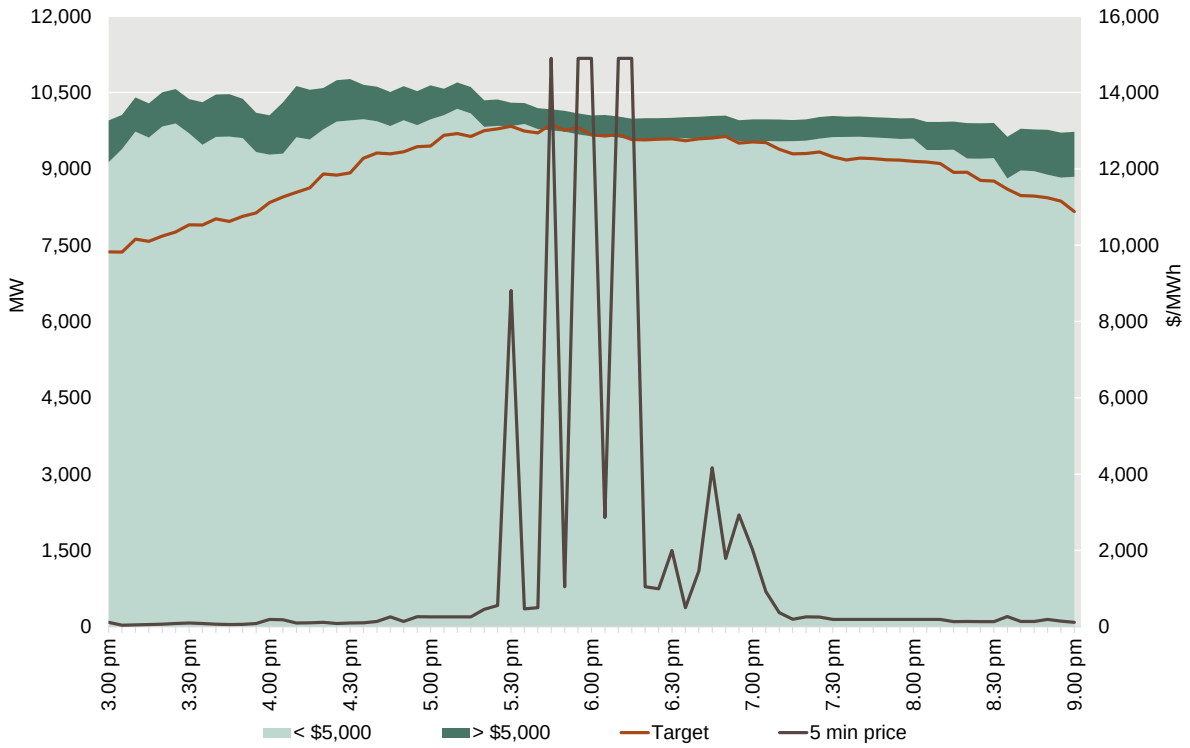
Date	Time	Price ($/MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
26 Feb	6.00 pm	7,785	361	9,703	9,571	10,165	10,463
26 Feb	6.30 pm	6,117	2,516	9,625	9,583	10,019	10,031

[31] The 6.30 pm high price was forecast between 1pm and 4 pm.

[32] Market notice 115148: At 2.47 pm a LOR1 was forecast to occur in Queensland from 6 pm to 7 pm. Market notices 115160: At 5.43 pm an actual LOR1 was declared from 5.30 pm to 8.30 pm. Market notice 115178: At 7.48 pm the LOR1 conditions were cancelled as at 7.40 pm.

While on average 96% of capacity in Queensland was offered below $5,000 per MWh, between 1 MW and 132 MW of high-priced capacity was needed to meet demand (Figure 5.1).

Figure 5.1 Capacity offered above and below $5,000 per MWh, 26 February



Source: AER analysis using NEM data.
Note: Capacity available below $5,000/MWh refers to effective capacity.

5.2 High temperatures drove high demand

High temperatures in Queensland, with a maximum temperature of 32°C in Brisbane, drove high demand. Average demand during the high prices was 132 MW and 42 MW higher than forecast.

5.3 Network constraints limited access to cheaper generation through NSW

Network limitations in NSW reduced Queensland's ability to access cheaper generation through NSW.

During the 30-minutes to 6 pm, average flows over the Queensland to NSW interconnector (QNI) were forced, counter-price, into NSW at 38 MW. During the 30-minutes to 6.30 pm, average flows were from NSW into Queensland but averaged only 38 MW. As with the other high price events covered in this report, these reduced flows were due to a constraint to avoid overloading the Bayswater to Liddell lines.

Terranora, the other Queensland to NSW interconnector, was impacted by a constraint to avoid overloading the Lismore to Dunoon lines in NSW, forcing average flows of around 20 MW out of Queensland.

5.4 Outages reduced available generation

In Queensland, baseload outages contributed to tight market conditions:

- The ongoing outages at Gladstone unit 1 and Callide C brought the total baseload outages across Queensland to 1,120 MW.[33]
- There were also some intermediate units unavailable.
  - Arrow Energy's Braemar unit 6 (153 MW) had been on an unplanned outage since 23 February.
  - Origin Energy's Mt Stuart unit 2 (138 MW) had been out since 23 February.
  - Around midday, Alinta Energy's Braemar unit 3 removed 171 MW due to technical issues.

5.5 Rebidding for technical and commercial reasons contributed to the high prices

Rebidding of capacity for technical and commercial reasons contributed to the high price intervals (Appendix E). Up to 132 MW of high-priced capacity was needed to meet demand.

- At 2.09 pm, CS Energy withdrew 50 MW of low-priced capacity from Callide B Power Station due to a mill trip, which contributed to the 5-minute high price at 6 pm. Even though they subsequently returned 23 MW, the net reduction of 27 MW of low-priced capacity contributed to the 5-minute high price at 6.15 pm.
- Between 2.33 pm and 4.43 pm, Genuity withdrew 75 MW of low-priced capacity at Millmerran power station due to a technical limitation. This contributed to the 6 pm, 6.10 pm and 6.15 pm 5-minute high-priced intervals. In addition to these technical rebids, at 5.22 pm Genuity rebid 20 MW of low-priced capacity at Millmerran power station to high prices for commercial reasons which also contributed to the high prices.
- For the 6.15 pm interval, only 1 MW of high-priced capacity was required. As such, several smaller rebids were also relevant. A total of 60 MW of low-priced capacity was withdrawn by rebids for technical reasons from Cleanco's Swanbank power station, and CS Energy's Gladstone, Callide B and Kogan Creek power stations.

[33] Gladstone unit 1 went on unplanned outage from 18 February until 4 March due to a technical issue, removing 280 MW of baseload capacity.

6 29 February, NSW and Queensland

The wholesale price of electricity exceeded $5,000 per MWh for four 30-minute periods on 29 February: 3 in NSW and 1 in Queensland (Table 6.1). The high prices at 5 pm and 6 pm were forecast intermittently from the day before, consistent with a forecast lack of reserves in both regions. There was an actual LOR1 in NSW during the high prices.

Table 6.1 30-minute high prices

Date	Time	30-minute NSW price ($ per MWh)	30-minute Queensland price ($ per MWh)
29 February	4.30 pm	5,648	Not a high price
	5 pm	13,326	Not a high price
	6 pm	9,607	7,040

A combination of factors drove these high prices:

- Hot temperatures and high humidity drove high demand, greater than forecast.
- Network congestion limited flows through southern NSW.
- Rebidding for technical and commercial reasons.

Prices were generally aligned across Queensland and NSW during the 6 pm high price, so our analysis treats these as one region.

6.1 Market conditions

We compared actual with forecast outcomes an hour prior (Table 6.2):

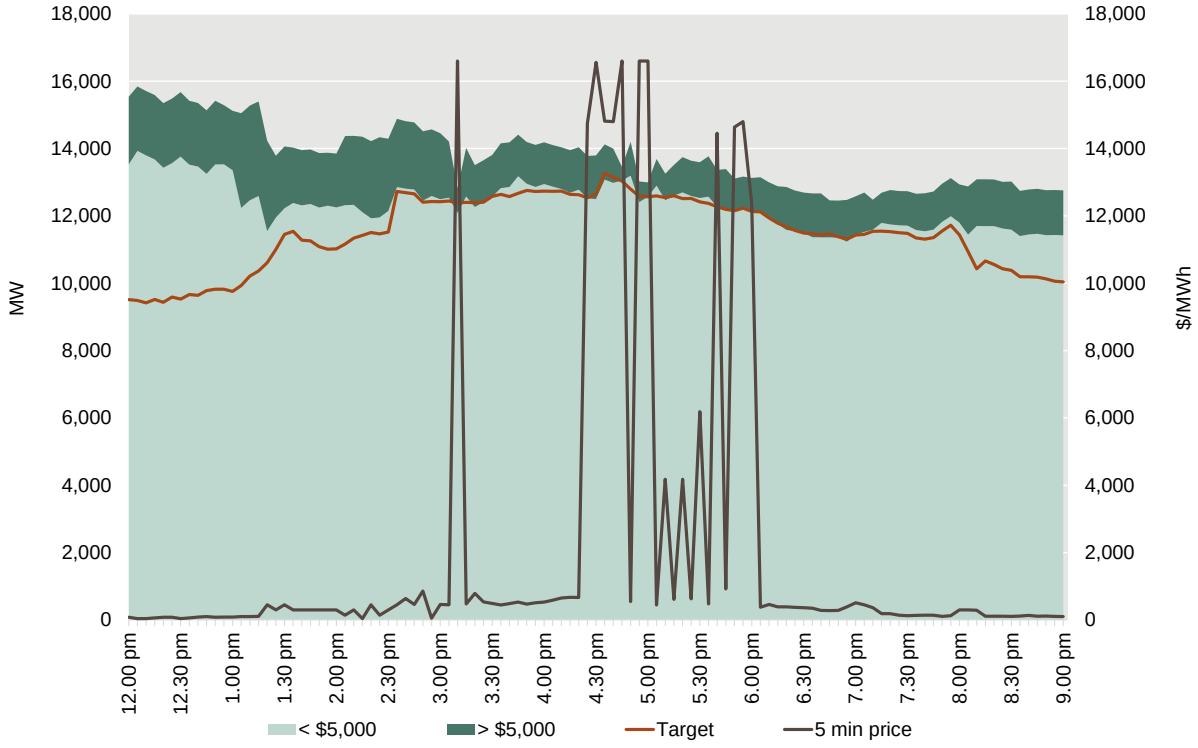
- The high prices at 4.30 pm and 5 pm were not forecast an hour prior, however, the 6 pm prices in both regions were forecast.
- Actual demand was higher than forecast in both regions
  - For 4.30 pm demand was 207 MW higher than forecast, for 5 pm it was 50 MW higher, and for 6 pm it was 104 MW higher in NSW and 79 MW higher in Queensland.
- Actual availability was lower than forecast in both regions
  - For 4.30 pm availability was 112 MW less than forecast, for 5 pm it was 462 MW less, and for 6 pm it was 527 MW less in NSW and 211 MW less in Queensland.
  - Network congestion led to AEMO capping wind and solar farm output in southern NSW at the time of the high prices which contributed to reduced availability in the region.

Table 6.2 Actual and forecast 30-minute price, demand and availability

Date	Time	Price ($/MWh)		Demand (MW)		Availability (MW)	
		Actual	1 hr forecast	Actual	1 hr forecast	Actual	1 hr forecast
29 February, NSW	4.30 pm	5,648	139	13,611	13,404	14,780	14,892
	5 pm	13,326	210	13,716	13,665	14,312	14,774
	6 pm	9,607	13,024	13,356	13,251	13,421	13,948
29 February, QLD	6 pm	7,040	11,984	9,352	9,273	11,021	11,231

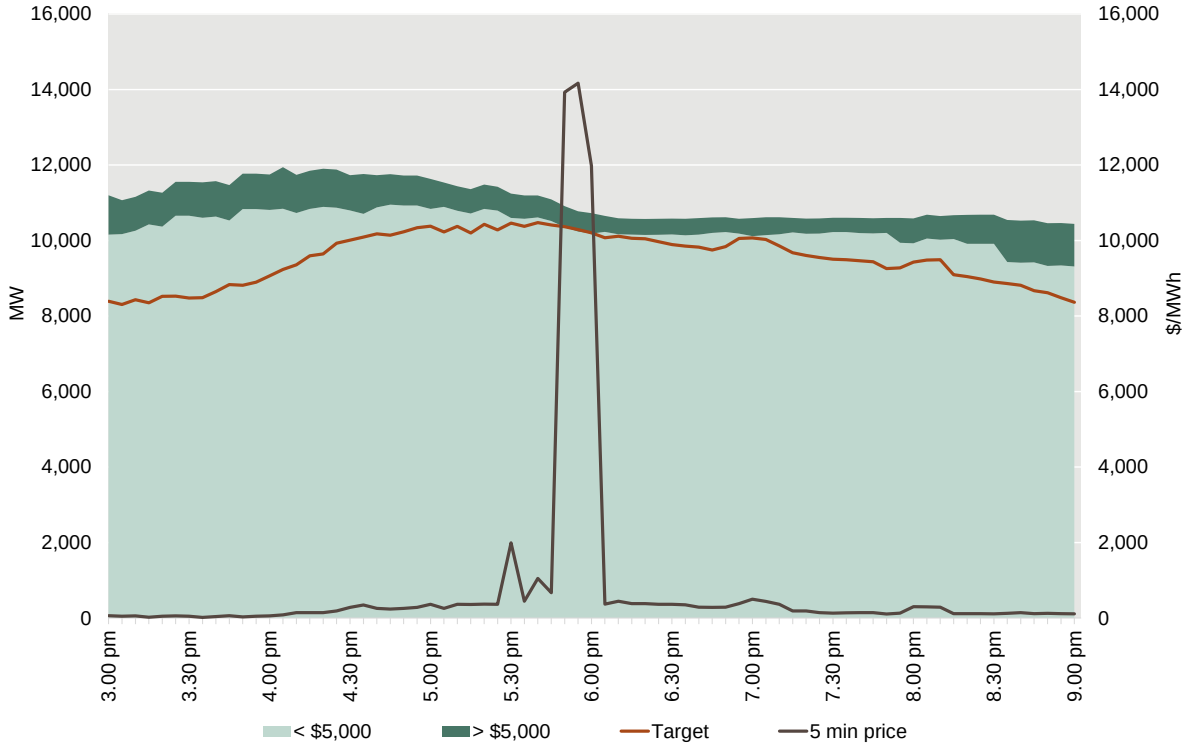
While an average of 90% and 95% of capacity in NSW and Queensland was offered below $5,000 per MWh (Figure 6.1 and Figure 6.2), between 7 MW and 182 MW of high-priced capacity was needed to meet demand.

Figure 6.1 Capacity offered above and below $5,000 per MWh in NSW on 29 February



Source: AER analysis using NEM data.
Note: Capacity available below $5,000/MWh refers to effective capacity.

Figure 6.2 Capacity offered above and below $5,000 per MWh in Queensland on 29 February



Source: AER analysis using NEM data.
Note: Capacity available below $5,000/MWh refers to effective capacity.

6.2 High temperatures drove particularly high demand

High temperatures in both regions, with a maximum temperature of 33°C in Sydney and 31°C in Brisbane, exacerbated by high humidity, drove very high demand which was higher than forecast. During the afternoon, NSW demand reached its highest level for the quarter and was still high during the evening. Queensland demand was also very high during the high prices (Table 6.2).

6.3 Network constraints limited access to cheaper generation

High demand caused significant network stress as low-priced generation in southern NSW and Victoria flowed north towards load centres of Sydney and Brisbane.

Multiple network constraints to manage congestion and to prevent overloading the network contributed to the high prices because they reduced access to low-priced generation from Victoria and southern NSW.

During the high prices, the Victoria to NSW Interconnector allowed very little to flow into NSW or forced flows counter-price out of NSW. The interconnector's capacity for flows into NSW can be around 1,500 MW.[34]

The reduced (and counter-price flows) over the interconnector did not directly contribute to the high price. As on 21 January (section 2.3), they were the result of a network constraint combined with a large volume capacity offered by Snowy Hydro at the price floor (-$1,000 per MWh).[35] The increase in low priced capacity in southern NSW combined with the constraint further north meant some of that low-priced capacity flowed into Victoria.

The output of some wind and solar farms located in the south of NSW was capped because of the network congestion and Snowy Hydro's rebid. Actual wind and solar generation were much less than forecast around the same time.

6.4 Baseload outages reduced available generation

The ongoing outages at Gladstone unit 1 and Callide C brought the total baseload outages across Queensland to 1,120 MW and contributed to tight market conditions.[36]

6.5 Rebidding for technical and commercial reasons contributed to the high prices

Rebidding of capacity contributed to the high prices. Up to 180 MW was needed to meet demand (Appendix F). These rebids were for commercial as well as for technical reasons:

- At 4.35 pm, Iberdrola rebid to remove 111 MW of low-priced capacity at Bodangora Wind Farm for technical reasons. This impacted the high 5-minute prices at 4.45 pm, 5 pm and 5.40 pm.
- At 3.44 pm, 4.50 pm and 5.10 pm, AGL Energy removed up to 115 MW of low-priced generation at Bayswater power station for technical reasons. The removal of low-priced capacity contributed to the high 5-minute prices at 5 pm, 5.40 pm and 5.50 pm.
- At 2.02 pm, Delta Electricity removed 10 MW from low-priced generation at Vales Point power station for technical reasons. This impacted the high 5-minute prices at 5.40 pm and 5.50 pm.
- At 4.31 pm, Genuity moved up to 74 MW of low-priced capacity from its Millmerran power station to high priced capacity for commercial reasons. This impacted the high 5-minute prices at 5.50 pm and 6 pm.
- Between 5.41 pm and 5.46 pm CS Energy removed up to 70 MW of lower-priced capacity from its Gladstone power station due to cooling water systems issues. This impacted the high 5-minute prices at 5.50 pm and 6 pm.

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[34] AEMO, Interconnector Capabilities.

[35] Snowy Hydro offered 1,500 MW of capacity at Tumut 3 power station at the price floor.

[36] Gladstone unit 1 went on unplanned outage from 18 February until 4 March due to a technical issue, removing 280 MW of baseload capacity.

Appendix A – Significant rebids, 19 January

These tables list the rebids that contributed to the high prices on 19 January in Queensland. Only the 5-minute intervals with a high price and where rebidding contributed are included.

6.35 pm (32 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
5.46 pm		Stanwell Corporation	Stanwell	-115	<366	N/A	Ash Conveyor Issue

6.40 pm (128 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
5.46 pm		Stanwell Corporation	Stanwell	-115	<366	N/A	Ash Conveyor Issue
6.32 pm	6.40 pm	Stanwell Corporation	Stanwell	-30	<366	N/A	High Emission

6.45 pm (124 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
5.46 pm		Stanwell Corporation	Stanwell	-115	<366	N/A	Ash Conveyor Issue
6.32 pm	6.40 pm	Stanwell Corporation	Stanwell	-30	<366	N/A	High Emission

6.50 pm (0 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
5.05 pm		CleanCo	Swanbank	-10	98	N/A	Unit availability change
5.46 pm		Stanwell Corporation	Stanwell	-115	<366	N/A	Ash Conveyor Issue
6.32 pm	6.40 pm	Stanwell Corporation	Stanwell	-30	<366	N/A	High Emission

6.55 pm (26 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.01 pm		AGL Energy	Wandoan BESS	35	16,600		
5.46 pm		Stanwell Corporation	Stanwell	-115	<366	N/A	Ash Conveyor Issue
6.45 pm	6.55 pm	AGL Energy	Wandoan BESS	80	<500	>14,936	040 Chg in AEMO DISP~44 Price change vs PD QLD $14928 DISP vs $500.99 30MPD PE 19:00

Appendix B – Significant rebids, 21 January

These tables list the rebids that contributed to the high prices on 21 January in Queensland and NSW. Only the 5-minute intervals with a high price and where rebidding contributed to the high price are included.

Queensland rebids

6.10 pm (x MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.46 pm	6.10 pm	Genuity	Millmerran	-30	-1,000	N/A	P Mill or feeder limitation
4.26 pm	6.10 pm	Genuity	Millmerran	-30	-1,000	N/A	P Mill or feeder limitation
5.04 pm	6.10 pm	Genuity	Millmerran	-30	-1,000	N/A	P Mill or feeder limitation
5.54 pm	6.10 pm	Genuity	Millmerran	10	N/A	-1,000	P Mill or feeder limitation

6.30 pm (0.19 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
6.08 pm	6.15 pm	CS Energy	Gladstone	-40	371	N/A	Cooling Water System-Other

6.35 pm (43 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
6.08 pm	6.15 pm	CS Energy	Gladstone	-40	371	N/A	Cooling Water System-Other

6.45 pm (56 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
6.08 pm	6.15 pm	CS Energy	Gladstone	-40	371	N/A	Cooling Water System-Other

6.50 pm (56 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
6.08 pm	6.15 pm	CS Energy	Gladstone	-40	371	N/A	Cooling Water System-Other

NSW rebids

6.35 pm (141 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

6.40 pm (90 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

6.45 pm (50 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

6.50 pm (20 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.53 pm		Tilt Renewables	Rye Park Renewable Energy	-31	-70	N/A	PLANT ISSUES
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

6.55 pm (0 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.53 pm		Tilt Renewables	Rye Park Renewable Energy	-31	-70	N/A	PLANT ISSUES
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

7.00 pm (0 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.53 pm		Tilt Renewables	Rye Park Renewable Energy	-31	-70	N/A	PLANT ISSUES
3.20 pm		AGL Energy	Bayswater	-105	-1,000	N/A	010 Unexpected/plant limits~101 back end temp Limits
4.18 pm		AGL Energy	Bayswater	-15	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits
4.44 pm		AGL Energy	Bayswater	-25	-1,000	N/A	010 Unexpected/plant limits~101 fan Limits

Appendix C – Significant rebids, 29 January

These tables list rebids that contributed to the high prices on 29 January in Queensland. Rebids did not contribute to the high price on 27 January. Only the 5-minute intervals with a high price and where rebidding contributed to the high price are included.

5.50 pm (3 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.59 pm		Alinta Energy	Braemar A	9	<385	16,600	Revise unit output based on ambient conditions
4.06 pm		Alinta Energy	Braemar A	2	16,600	258	Revise unit output based on ambient conditions
2.06 pm		Bouldercombe Battery Project	Bouldercombe Battery	2	>5,000	4,165	Change in forecast SOC
2.36 pm		Bouldercombe Battery Project	Bouldercombe Battery	6	4,165	>5,000	Change in forecast SOC
2.41 pm		Bouldercombe Battery Project	Bouldercombe Battery	2	>5,000	1,049	Change in forecast SOC
3.06 pm		Bouldercombe Battery Project	Bouldercombe Battery	4	1,049	>5,000	Change in forecast prices
3.11 pm		Bouldercombe Battery Project	Bouldercombe Battery	7	1,049	>5,000	Change in forecast SOC
3.36 pm		Bouldercombe Battery Project	Bouldercombe Battery	1	1,049	>5,000	Change in forecast SOC
3.41 pm		Bouldercombe Battery Project	Bouldercombe Battery	6	>5,000	441	Change in forecast SOC
3.51 pm		Bouldercombe Battery Project	Bouldercombe Battery	3	>5,000	441	Change in forecast prices
3.56 pm		Bouldercombe Battery Project	Bouldercombe Battery	4	441	>5,000	Change in forecast SOC
4.01 pm		Bouldercombe Battery Project	Bouldercombe Battery	9	441	>5,000	Change in forecast SOC
5.36 pm	5.45 pm	Bouldercombe Battery Project	Bouldercombe Battery	17	>5,000	290	Change in forecast SOC
5.41 pm	5.50 pm	Bouldercombe Battery Project	Bouldercombe Battery	3	290	>5,000	Change in forecast SOC

6.35 pm (9 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
6.11 pm	6.20 pm	Bouldercombe Battery Project	Bouldercombe Battery	-3	1,049	N/A	Updated SOC close to limit
6.11 pm	6.20 pm	Bouldercombe Battery Project	Bouldercombe Battery	16	>1,049	10,389	Updated SOC close to limit
6.21 pm	6.30 pm	Bouldercombe Battery Project	Bouldercombe Battery	-4	1,049	N/A	Updated SOC close to limit
6.26 pm	6.35 pm	Bouldercombe Battery Project	Bouldercombe Battery	-6	1,049	N/A	Updated SOC close to limit

Appendix D – Significant rebids, 23 February

These tables detail rebids that contributed to the high prices on 23 February in Queensland. Only the 5-minute intervals with a high price and where rebidding contributed to the high price are included.

6.50 pm (64 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.56 pm		AGL Energy	Wandoan BESS	29	16,600	<11979	040 Chg in AEMO DISP~44 Price change vs PD [QLD] [$9605.40] for PE 1645
6.13 pm		AGL Energy	Wandoan BESS	-15	279	N/A	Capability Change ENERGY, RAISE5MIN, RAISE60SEC, RAISE6SEC, RAISEREG
6.18 pm	6.25 pm	AGL Energy	Wandoan BESS	-79	279	N/A	Capability Change (PD) ENERGY, RAISE5MIN, RAISE60SEC, RAISE6SEC, RAISEREG
6.33 pm	6.40 pm	Genuity	Millmerran	92	-1,000	16,600	QLD1 RRP CHANGE +654 (18:30 DS DI 23/02/24 18:35 VALUE 1100 VS 18:25 P5 DI 23/02/24 18:35 VALUE 446)

7 pm (40 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
3.56 pm		AGL Energy	Wandoan BESS	5	16,600	500	040 Chg in AEMO DISP~44 Price change vs PD [QLD] [$9605.40] for PE 1645
5.17 pm		AGL Energy	Wandoan BESS	24	11,979	500	040 Chg in AEMO DISP~44 Price change vs PD QLD $1100.14 DISP vs $445.75 30MPD PE 17:30
6.13 pm		AGL Energy	Wandoan BESS	-94	279	N/A	Capability Change ENERGY, RAISE5MIN, RAISE60SEC, RAISE6SEC, RAISEREG
6.33 pm	6.40 pm	Genuity	Millmerran	92	-1,000	16,600	QLD1 RRP CHANGE +654 (18:30 DS DI 23/02/24 18:35 VALUE 1100 VS 18:25 P5 DI 23/02/24 18:35 VALUE 446)
3.59 pm		Origin Energy	Mt Stuart	-120	-1,000	N/A	Change in avail - hv feeder trip
4.24 pm		Origin Energy	Darling Downs	25	N/A	-1,000	Change in avail - evaps enabled
4.34 pm		Origin Energy	Mt Stuart	38	16,600	-1,000	INC QLD DEM 5PD 9827 MW > 30PD 9653 MW @ 1700 SL
5.15 pm		Origin Energy	Darling Downs	3	N/A	-1,000	Change in avail - ambient conditions
5.32 pm		Origin Energy	Mt Stuart	14	N/A	-1,000	INC QLD DEM 5PD 10042 MW > 30PD 9901 MW @1800
5.46 pm		Origin Energy	Mt Stuart	-7	<-1,000	N/A	Change in avail - ambient conditions

Appendix E – Significant rebids, 26 February

These tables detail rebids that contributed to the high prices on 26 February in Queensland. Only the 5-minute intervals with a high price and where rebidding by participants contributed to the high price are included.

6.00 pm (29 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.09 pm– 6.09 pm[37]		CS Energy	Callide B	-50	<370	N/A	Mill -Mill Trip
2.33 pm – 4.43 pm [38]		Genuity	Millmerran	-75	-1,000	N/A	Fuel/Mill/CV Limitation
5.22 pm		Genuity	Millmerran	20	-1,000	16,600	A **QLD1 RRP CHANGE +299 (17:20 DS DI 26/02/24 17:25 VALUE 557 VS 17:15 P5 DI 26/02/24 17:25 VALUE 258)**

6.10 pm (56 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.33 pm – 4.43 pm [38]		Genuity	Millmerran	-75	-1,000	N/A	Fuel/Mill/CV Limitation
5.22 pm		Genuity	Millmerran	20	-1,000	16,600	A **QLD1 RRP CHANGE +299 (17:20 DS DI 26/02/24 17:25 VALUE 557 VS 17:15 P5 DI 26/02/24 17:25 VALUE 258)**

6.15 pm (2 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.09 pm – 6.09 pm[37]		CS Energy	Callide B	-27	<370	N/A	Mill -Mill Trip
2.33 pm – 4.43 pm[38]		Genuity	Millmerran	-75	-1,000	N/A	Fuel/Mill/CV Limitation
5.20 pm		CleanCo	Swanbank	-11	133	N/A	P **availability as per ambient conditions**
5.22 pm		Genuity	Millmerran	20	-1,000	16,600	QLD1 RRP CHANGE +299 (17:20 DS DI 26/02/24 17:25 VALUE 557 VS 17:15 P5 DI 26/02/24 17:25 VALUE 258) SL
5.54 pm	6.00 pm	CS Energy	Gladstone	-20*	>371	N/A	Emissions -Sulphur Plant
5.14 pm		CS Energy	KPP	-2	19	N/A	P Ambient Temperature

[37] Note this consolidates three Callide B rebids between 2.09 pm and 6 pm, the net result of which is listed under Capacity Rebid (i.e. 50 MW for the 6 pm interval and 27 MW for the 6.15 pm interval).

[38] Note this consolidates a number Millmerran rebids between 2.09 pm and 4.45 pm, the net result of which was -75 MW of low-priced capacity.

Appendix F – Significant rebids, 29 February

These tables details rebids that contributed to the high prices on 29 February in NSW and Queensland. Only the 5-minute intervals with a high price and rebids that contributed to the high price are included. Where prices in NSW and Queensland were aligned, high-priced capacity that was needed has been combined.

NSW rebids

4.45 pm (54 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
1.50 pm		Origin Energy	Eraring	-20	16,600	N/A	Change in avail - Fabric filter limitation revised
1.56 pm		Origin Energy	Eraring	-10	16,600	N/A	Change in avail - ID fan limit SL
1.58 pm		Origin Energy	Eraring	-10	16,600	N/A	Change in avail - Fabbric filter dP
2.09 pm		Origin Energy	Shoalhaven	80	N/A	16,600	Change in avail - kv3 rts
3.34 pm		Origin Energy	Eraring	-40	-1,000	N/A	Change in avail - ID Fan limitation
3.59 pm		Origin Energy	Shoalhaven	-160	-1,000	N/A	Change in avail - 2xUnit trip - Pipeline guard gate issue
4.35 pm	4.45 pm	Iberdrola	Bodangora Wind Farm	-111	-1,000	N/A	Change in plant availability

5.00 pm (13 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
1.50 pm		Origin Energy	Eraring	-20	16,600	N/A	Change in avail - Fabric filter limitation revised
1.56 pm		Origin Energy	Eraring	-10	16,600	N/A	Change in avail - ID fan limit SL
1.58 pm		Origin Energy	Eraring	-10	16,600	N/A	Change in avail - Fabbric filter dP
2.09 pm		Origin Energy	Shoalhaven	80	N/A	16,600	Change in avail - kv3 rts
3.34 pm		Origin Energy	Eraring	-40	-1,000	N/A	Change in avail - ID Fan limitation
3.44 pm		AGL Energy	Bayswater	-15	-1,000	N/A	020 Reduction in avail cap~201 ID fan limits
3.59 pm		Origin Energy	Shoalhaven	-160	-1,000	N/A	Change in avail - 2xUnit trip - Pipeline guard gate issue
4.35 pm	4.45 pm	Iberdrola	Bodangora Wind Farm	-111	-1,000	N/A	Change in plant availability
4.50 pm	5.00 pm	AGL Energy	Bayswater	-100	-1,000	N/A	010 Unexpected/plant limits~101 fan limitations per Ops

5.40 pm (7 MW of high-priced capacity was needed)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.02 pm		Delta Electricity	Vales Point	-10	139	N/A	Milling/Feeder limit
3.44 pm		AGL Energy	Bayswater	-15	-1,000	N/A	020 Reduction in avail cap~201 ID fan limits
4.35 pm		Iberdrola	Bodangora Wind Farm	-111	-1,000	N/A	Change in plant availability
5.10 pm	5.20 pm	AGL Energy	Bayswater	-30	-1,000	N/A	010 Unexpected/plant limits~101 fan limitations- ROC 2MW/min per Ops

5.50 pm (45 MW of high-priced capacity in NSW and Queensland was needed to meet combined demand)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.02 pm		Delta Electricity	Vales Point	-10	139	N/A	Milling/Feeder limit
3.44 pm		AGL Energy	Bayswater	-15	-1,000	N/A	020 Reduction in avail cap~201 ID fan limits
5.10 pm		AGL Energy	Bayswater	-30	-1,000	N/A	010 Unexpected/plant limits~101 fan limitations- ROC 2MW/min per Ops

Queensland rebids

5.50 pm (45 MW of high-priced capacity in NSW and Queensland was needed to meet combined demand)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.00 pm		Genuity	Millmerran	5	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.08 pm		Genuity	Millmerran	5	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.11 pm		Genuity	Millmerran	3	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.49 pm		Genuity	Millmerran	-16	-1,000	N/A	Condensate Polisher Inlet Temperature Limitation
3.20 pm		CS Energy	Kogan Creek	4	N/A	19	Ambient Temperature-
3.48 pm		Genuity	Millmerran	**-1**	-1,000	N/A	Condensate Polisher Inlet Temperature Limitation
4.31 pm		Genuity	Millmerran	70	-1,000	16,600	QLD1 RRP CHANGE +3793 (16:25 P5 DI 29/02/24 17:25 VALUE 4159 VS 16:00 PD TI 29/02/24 17:30 VALUE 366)
5.41 pm	5.50 pm	CS Energy	Gladstone	-30	371	N/A	Cooling Water System-Delta Temperature
5.44 pm	5.50 pm	CS Energy	Gladstone	-20	371	N/A	Cooling Water System-Delta Temperature

6.00 pm (27 MW of high-priced capacity in NSW and Queensland was needed to meet combined demand)

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MWh)	Price to ($/MWh)	Rebid reason
2.00 pm		Genuity	Millmerran	8	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.08 pm		Genuity	Millmerran	3	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.11 pm		Genuity	Millmerran	1	N/A	-1,000	Condensate Polisher Inlet Temperature Limitation
2.49 pm		Genuity	Millmerran	-16	-1,000	N/A	Condensate Polisher Inlet Temperature Limitation
3.20 pm		CS Energy	Kogan Creek	4	N/A	19	Ambient Temperature-
4.31 pm		Genuity	Millmerran	74	-1,000	16,600	QLD1 RRP CHANGE +3793 (16:25 P5 DI 29/02/24 17:25 VALUE 4159 VS 16:00 PD TI 29/02/24 17:30 VALUE 366) SL
5.41 pm	5.50 pm	CS Energy	Gladstone	-30	371	N/A	Cooling Water System-Delta Temperature
5.44 pm	5.50 pm	CS Energy	Gladstone	-20	371	N/A	Cooling Water System-Delta Temperature
5.46 pm	5.55 pm	CS Energy	Gladstone	-20	371	N/A	Cooling Water System-Delta Temperature