

Wholesale markets quarterly Q1 2023

January – March

April 2023

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Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601
Tel: 1300 585 165

AER reference: 15092588

Changes to our wholesale market reporting

The AER's wholesale markets quarterly report analyses trends in the electricity and gas wholesale markets, focusing on the most recent quarter, and alerts participants and stakeholders to issues of concern. The quarterly reports include discussion of prices, demand, generation, contracts, market outlook and new entry and exit. Starting from this report, quarterly reports will be more concise and made available sooner after the quarter's end to address the need for timely market information, including reporting on the impact of the Federal Government's Energy Price Relief Plan.

A comprehensive data set for each quarter is available on our website, including additional charts not featured in this concise report.

Additional related regular reporting from the AER covers:

- [details of significant high price events](#) when the electricity spot market 30-minute price exceeds \$5,000/MWh and whenever consecutive 30-minute prices exceed \$5,000/MW in FCAS markets,
- the annual [State of the Energy Market report](#) that presents an accessible, consolidated picture of the energy market, and
- the biennial [Wholesale Electricity Market Performance Report](#) that provides longer term and more technical analysis of the performance of markets.

These scheduled reports will be supplemented by detailed special reporting on topics of interest and impact.

Electricity markets at a glance

Q1 2023

Spot prices



NEM prices were lower across most regions, with high-price events caused by heatwaves offsetting other downward pressures

Outlook



Forward prices increased in March but remain well below levels observed in 2022

Demand



Demand increased from record lows in Q4 2022 and was similar to Q1 2022 levels

Generation



Large-scale solar generation reached record levels of output, averaging over 1 800MW through Q1 2023

Coal offers



Black coal generators offered more capacity in the quarter and more at lower prices compared to Q4 2022

Gas markets at a glance

Q1 2023



Spot prices



Spot prices average under \$12/GJ for the first time since Q1 2022

Demand



Lower market demand reduced pressure on gas prices alongside additional gas available due to export train outages

Spot Trade



Industrial customers bought more gas from spot markets while exporters and producers sold more gas through spot markets

Gas Supply Hub and Day Ahead Auction



Upstream trade remains strong, with transportation capacity won at auction again exceeding the previous quarter's record

Gas storage



Southern gas storage refilled to its highest end of Q1 level since reporting began, which will assist with anticipated tightness of gas supply for Winter 2023

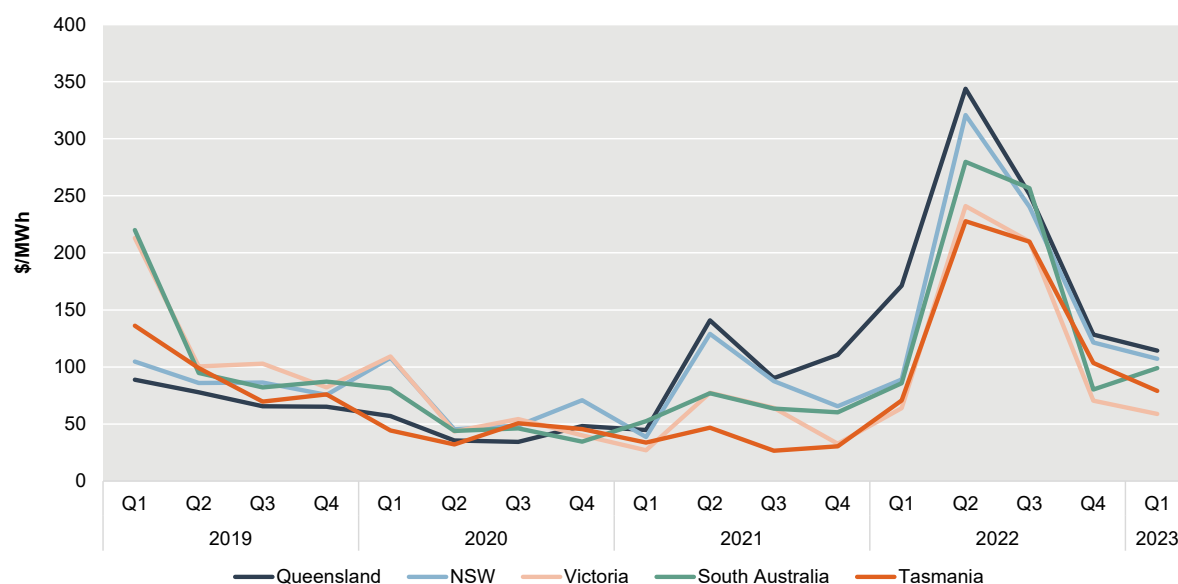
NEM prices were steady outside of heatwave conditions

Average quarterly prices fell in all regions but South Australia

Average NEM prices over Q1 2023 were lower than the preceding quarter across most regions, despite an increase in demand (Figure 1). This was mainly the result of capacity offered into the market at lower prices, particularly by coal, but also by gas and solar generators. Average quarterly prices ranged from \$64/MWh in Victoria to \$114/MWh in Queensland.

Comparisons to prices in Q1 2022 vary by region. Prices were lower in Queensland in Q1 2023, similar in Victoria but higher in NSW, South Australia and Tasmania.

Figure 1 Average quarterly prices in the NEM (VWA)



Source: AER analysis using NEM data.

Note: Volume weighted average quarterly price is weighted against native demand in each region. The AER defines native demand as the sum of initial supply and total intermittent generation in a region.

South Australia's increase in average quarterly prices was mainly driven by heatwaves and high demand in February.

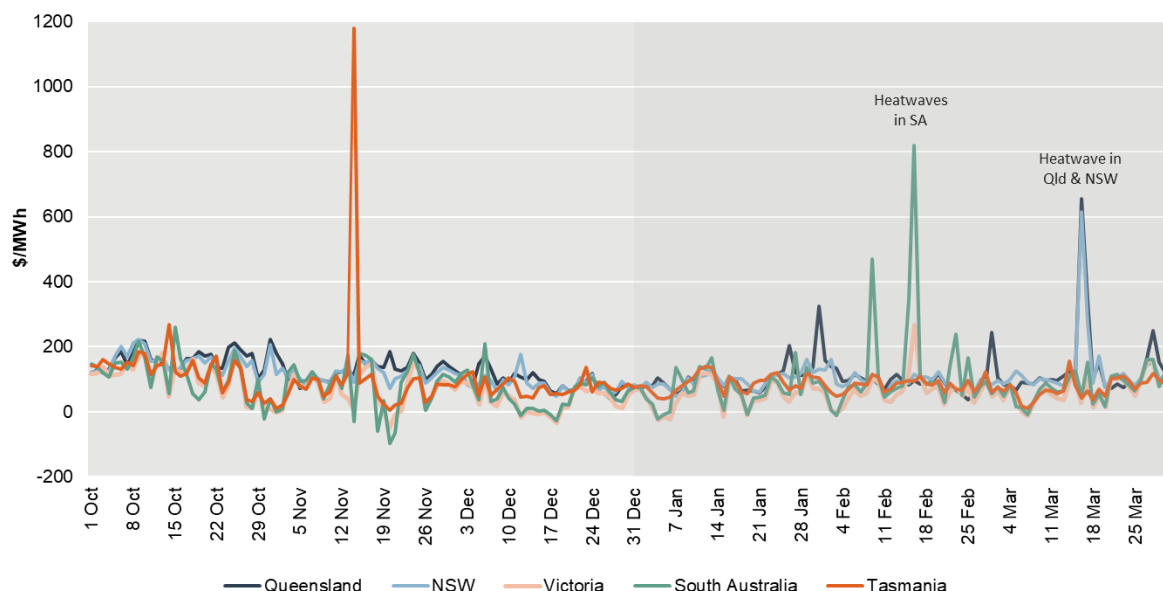
Heatwaves caused high price events

Lower average prices across most regions occurred despite upward price pressures arising from periodic heat wave conditions experienced across several regions this quarter. Heat wave conditions also contributed to higher average prices in South Australia.

Over Q1 2023, prices were relatively steady except for several acute high-price events in Queensland, NSW and South Australia (Figure 2). Prices above \$5000/MWh led to the average quarterly prices being higher than they would have otherwise been by 13% in South Australia, 11% in Queensland and 7% in NSW.

High demand resulting from hot weather was the core driver of all these events. Over the quarter, 30-minute prices exceeded \$5,000/MWh 12 times, compared with 5 times in Q4 2022 and 16 times in Q1 2022.¹

Figure 2 Average daily prices in the NEM from Q4 2022 to Q1 2023 (VWA)



Source: AER analysis using NEM data.

Note: Volume weighted average daily price is weighted against native demand in each region.

These high-price events were concentrated in evening periods where solar output was relatively low. This is consistent with a longer-term trend of deepening separation in market dynamics between periods of solar availability and unavailability which are directly associated with specific times of day.

There were a range of further factors contributing to specific events which we will address in forthcoming significant price event reports.

Less-expensive coal offers put downward pressure on NEM prices

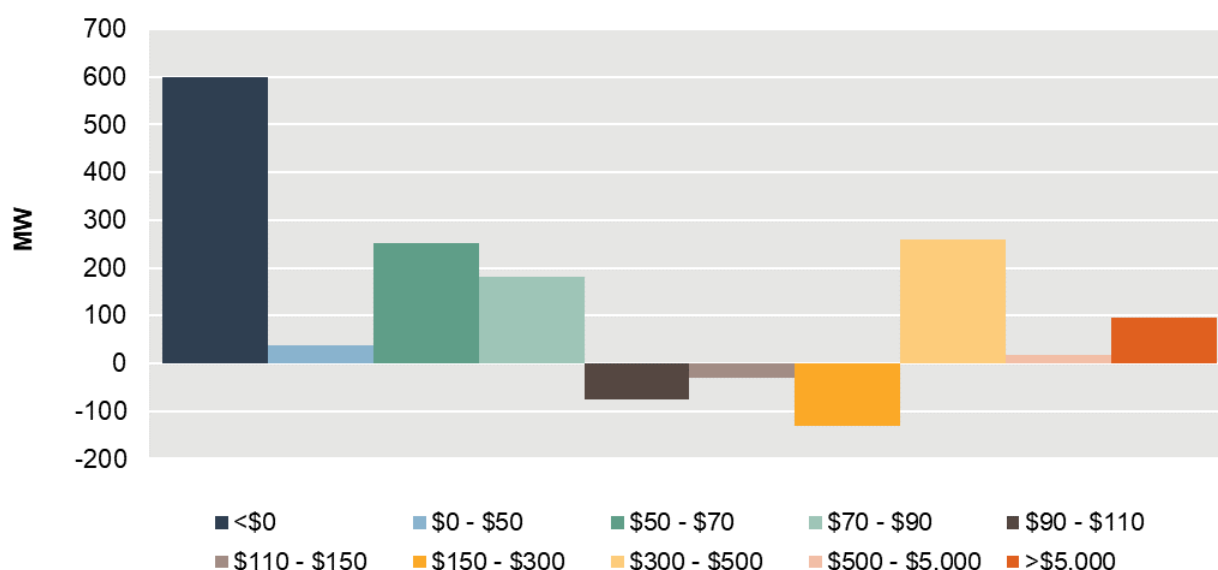
Black and brown coal output rose across the NEM in Q1 2023.² Compared to Q4 2022, black coal generators in NSW and Queensland offered more total capacity into the market, most of which was offered at lower prices including significant increases in offers priced below \$0/MWh. Some additional capacity was also offered at high prices (above \$300/MWh).

Figure 3 illustrates the changes in offers from black coal generators in NSW. Broadly the same pattern was evident in Queensland, where black coal is also the largest source of generation. Charts for other regions are available [on our website](#).

¹ We count simultaneous high prices in 2 regions as 2 occurrences.

² Increases in output were 14% for black coal and 8% for brown coal.

Figure 3 Change in NSW black coal offer bands from Q4 2022 to Q1 2023



Source: AER analysis using NEM data.

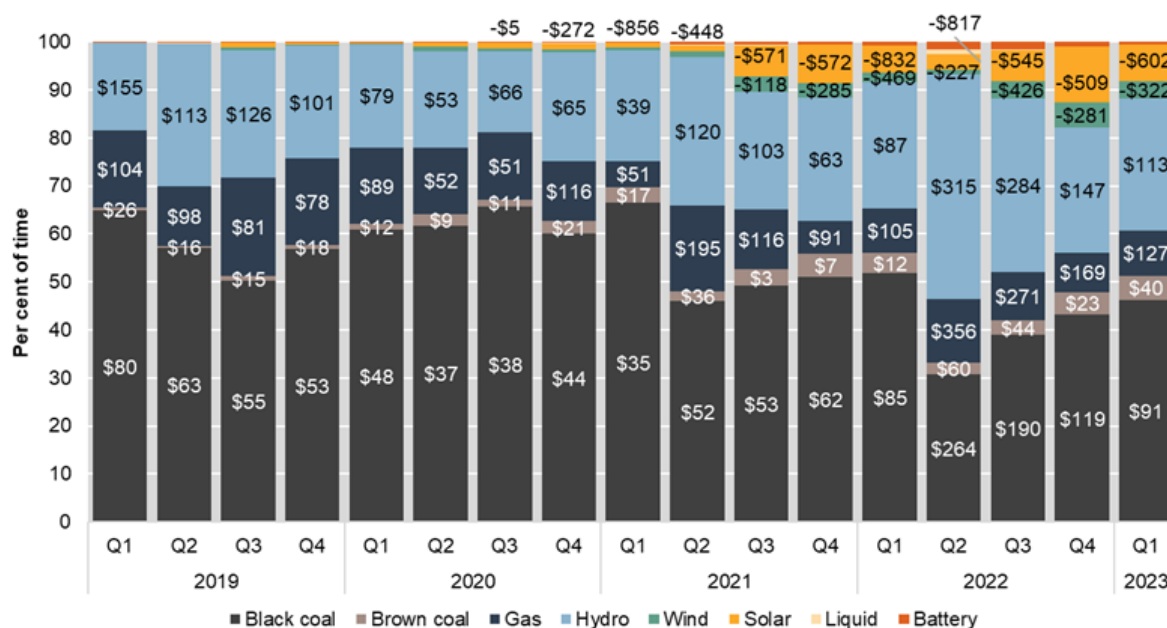
Notes: The pattern in offers was broadly similar in both NSW and Queensland, with material increases in offers at prices below \$70. Charts for other regions are available [online](#).

While Figure 3 indicates that there was an increase in coal capacity at higher price bands, this was driven by a change in offers from 2 coal plants:

- one generator moved capacity down from the >\$5000/MWh band to the \$300/MWh–\$500/MWh bands
- another moved capacity into the >\$5000/MWh band to manage coal supplies.

Overall, these changing offers resulted in black coal setting prices more often and at lower prices. This pattern compared to Q4 2022 was also evident for most fuel types (Figure 4). Brown coal set higher prices than in Q4 2022 in Queensland, NSW and Victoria.

Figure 4 Price setting by generation source- NSW



Source: AER analysis using NEM data.

Notes: The pattern in price setting changes was broadly similar across Queensland, NSW and Victoria. Charts for other regions are available [on our website](#).

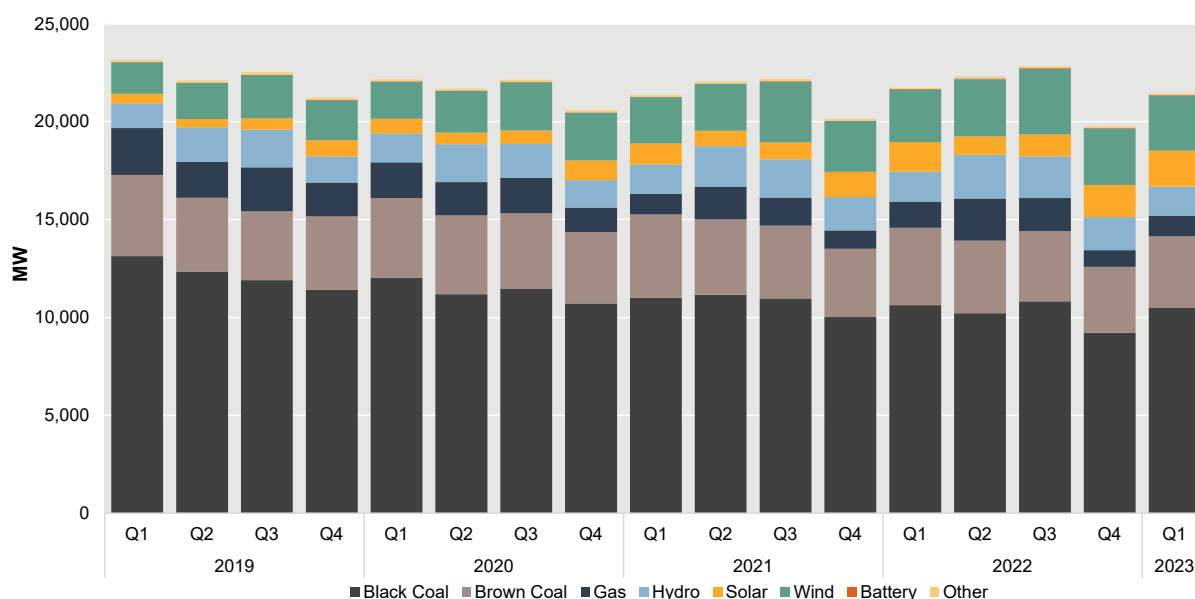
With black coal accounting for roughly half of the NEM's total generation in Q1 2023, availability of lower priced coal offers had a tangible effect on average electricity spot prices.

Government interventions to implement price caps on black coal appear to be impacting coal generation offers and, as a result, applying downward pressure on spot prices supported by other factors such as strong renewable output. In our view, the clearest sign of impacts from the interventions are evident in contract market outcomes. It remains difficult to determine the specific influence of particular factors, but the timing and magnitude of decreases to forward contract prices in late 2022 and early 2023 suggest that the announcement and implementation of price caps have impacted price expectations. We discuss these forward contract prices in more detail below, in discussion of the market outlook over winter.

Increased solar output also put downward pressure on NEM prices

Large-scale solar output increased 11% from its record high in Q4 2022 (Figure 5). This was an increase of 22% from the previous year, reflecting strong investment in solar generation. Rooftop solar also produced record output.

Figure 5 NEM Generation by fuel source



Source: AER analysis using NEM data.

As a result of this strong solar output, Q1 2023 also saw a record number of negative prices for a first quarter, putting downward pressure on overall prices.

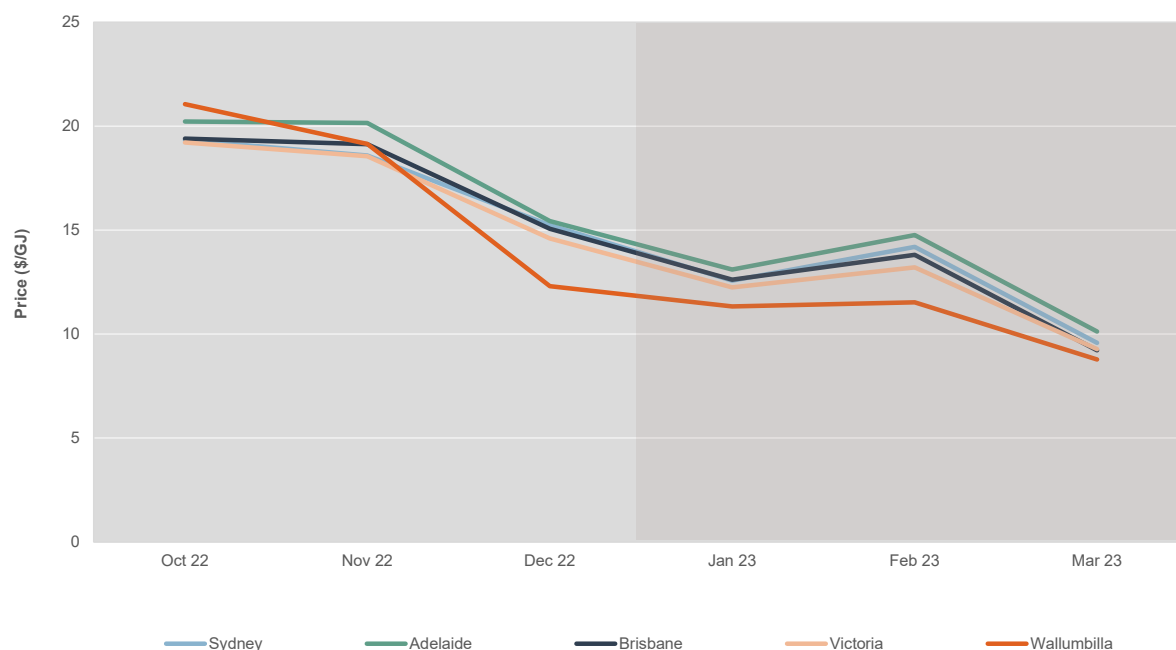
Gas generators offered more total capacity, including more capacity at lower prices in all mainland regions. As a result, gas generators set lower prices and set the price more often than in Q4 2022 and gas output increased (Figure 5).

Gas spot market prices declined amidst substantial short-term trade

Gas spot market prices averaged under \$12/GJ

East coast gas market spot prices all declined through to the end of Q1 2023 after a brief increase through February (Figure 6).

Figure 6 East coast gas market average monthly prices



Source: AER analysis using east coast gas market ECGM data (includes: Victoria, Adelaide, Brisbane and Sydney gas markets).

Notes: The Wallumbilla price is the day-ahead exchange traded price.

In March, each of the spot markets averaged prices below the \$12/GJ cap which applies to gas contracts sold by producers (non-exempted parties) since December 2022. There are a range of factors potentially influencing this price decline, including relatively low gas generation in the NEM over Q1, discussed in preceding sections—gas generators can be significant users of gas spot markets and this demand can put upward pressure on prices.³

Other key factors, discussed below, include:

- reduced international price pressures, with Asian LNG prices declining from over \$40/GJ in December 2022 to less than \$20/GJ in March 2023
- additional gas available through spot markets resulting from several outages on the QCLNG export train during the quarter

These decreases have also occurred alongside record levels of trade across spot markets.

³ While Q1 gas generation increased from Q4, it has remained at overall lower levels than it has been in recent years, sitting slightly below the reduced level of gas generation demand observed in Q1 2021.

We also discuss, below, what we have observed to date about impacts of the \$12/GJ price cap. A summary of the cap is set out in Box 1 below.

Box 1: Regulated gas price cap of \$12/GJ

On 23 December, the Competition and Consumer (Gas Market Emergency Price) Order 2022 came into effect for 12 months.⁴

- The Order introduces a price cap on gas of \$12/GJ (and does not apply in Western Australia).
- Generally, the price cap applies to gas producers and affiliates of gas producers.
- There are several exceptions (including gas to be exported as LNG, retailers that meet certain criteria, trades on the Short Term Trading Markets (STTMs) or Declared Wholesale Gas Market (DWGM), near term (next 3 day) trades and offers on the Gas Supply Hub Exchange).⁵

Separate to the exceptions, the Order also allows the Minister to grant exemptions. The Minister has delegated this power to the ACCC.

Further information on the price cap and the process of applying for an exemption can be found on the ACCC's website.⁶

International price pressures decreased markedly

International LNG spot prices continued to decrease sharply from the record levels of 2022, ending the quarter at around \$20/GJ in both Asia and Europe (Figure 7). The price differential between European and Asian spot prices also closed as European gas inventories increased following a mild winter.⁷

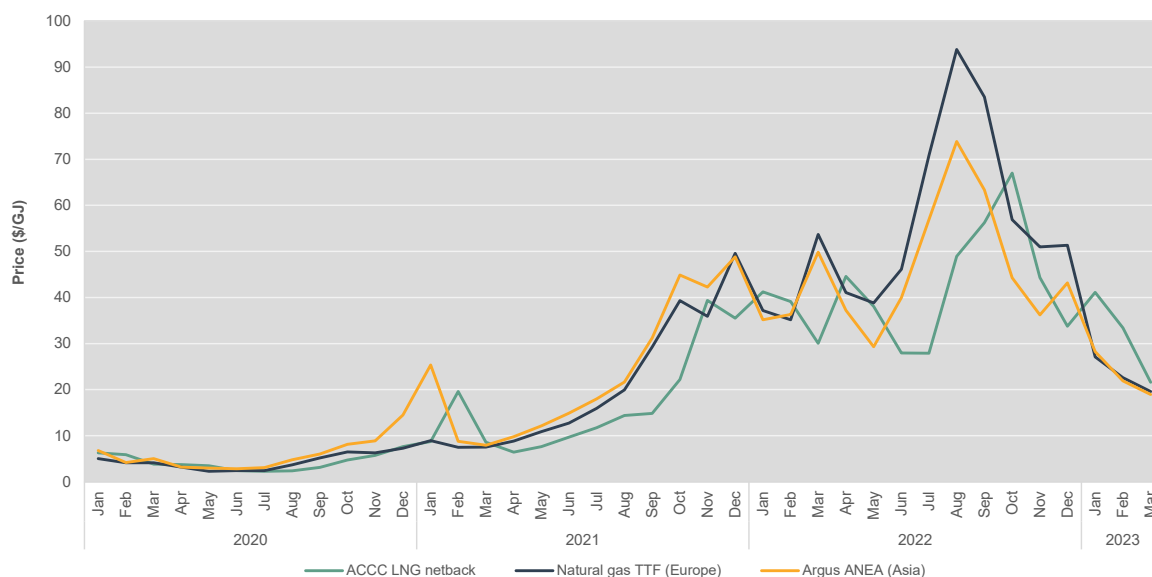
⁴ Australian Government, [Competition and Consumer \(Gas Market Emergency Price\) Order 2022](#), December 2022.

⁵ Over 2022 spot trade in the downstream DWGM and STTM collectively averaged around 16% of the gas traded through the markets.

⁶ ACCC, [Gas cap price exemption](#), December 2022.

⁷ Department of Industry, Science and Resources, [Resources and Energy Quarterly](#), March 2023, p. 83.

Figure 7 International LNG spot prices



Source: AER analysis using Argus Media data.

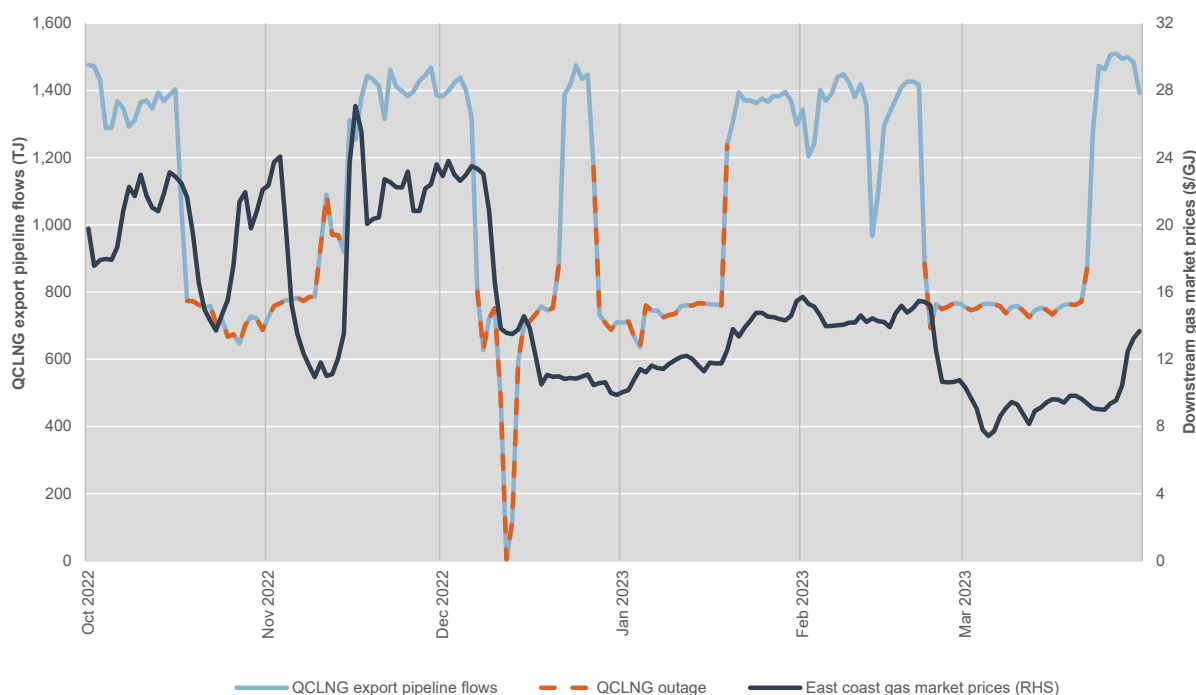
Note: ACCC LNG shipping costs and losses are deducted from the delivered price to give a free on board (FOB) price at Gladstone, which represents the effective price of LNG at the point it is loaded onto the LNG tanker. The Argus natural gas Title Transfer Facility (TTF) price is a month-ahead-delivered-spot price calculated at the TTF in the Netherlands. The Argus LNG des Northeast Asia (ANEA) price is a physical spot price assessment representing cargoes delivered ex-ship (des) to ports in Japan, South Korea, Taiwan and China, trading 4–12 weeks before the date of delivery. The AER obtains confidential proprietary data from Argus Media under license, from which data the AER conducts and publishes its own calculations and forms its own opinions. Argus Media does not make or give any warranty, express or implied, as to the accuracy, currency, adequacy, or completeness of its data and it shall not be liable for any loss or damage arising from any party's reliance on, or use of, the data provided or the AER's calculations.

Periods of low gas spot prices coincided with outages on the QCLNG export train

Over recent months there have been several outages on the QCLNG export train. East coast gas market prices appeared to respond to these outages (Figure 8). In particular, prices decreased sharply following the commencement of another QCLNG maintenance outage from 22 February which was then extended out to 22 March.

This, combined with lower demand in the gas markets, saw more gas available on a short-term basis. This contributed to prices averaging under \$10/GJ across the last month of the quarter, dropping as low as \$7/GJ in Brisbane and Victorian markets.

Figure 8 QCLNG maintenance outages and average east coast gas market prices



Source: AER analysis using Gas Bulletin Board and market price data (STTM and DWGM).

Market participants appeared to capitalise on the availability of this extra gas:

- Exporters and producers offered record volumes of gas into the gas supply hub and supplied record Q1 volumes in downstream markets
- Traders bought record volumes (2.6 PJ) of gas through the gas supply hub
- At the same time, traders also sold record volumes of gas into downstream markets (2.64 PJ) at higher prices than the hub purchases, suggesting the gas was being on-sold from the hub to metropolitan markets.

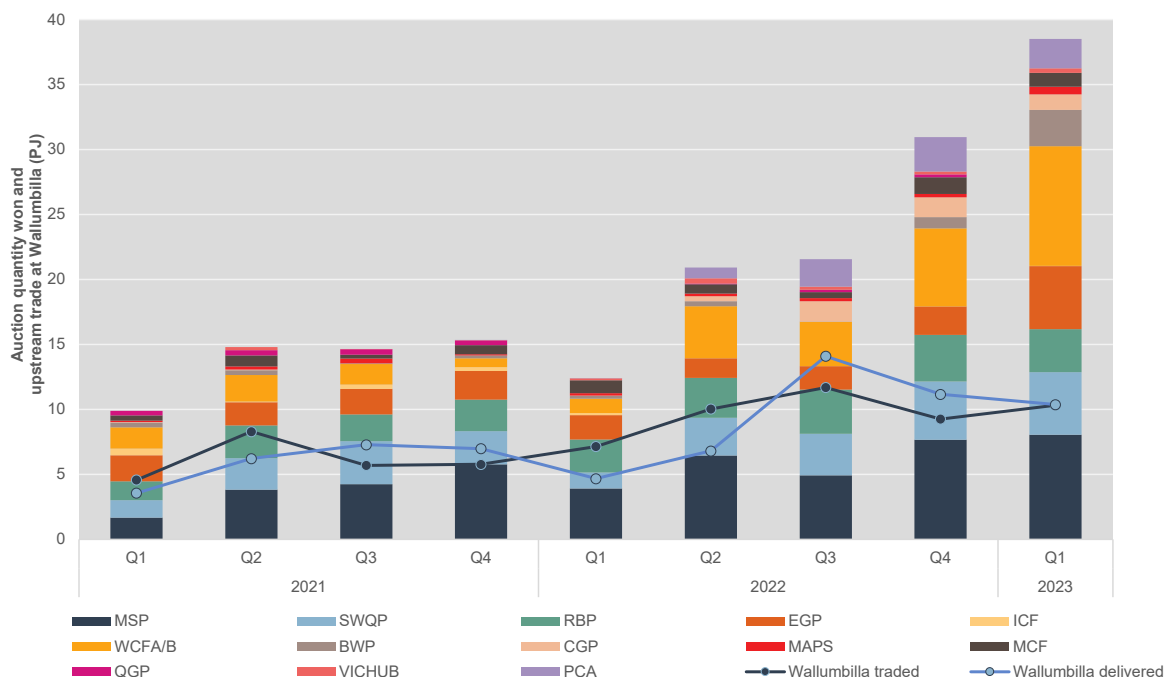
Trade in gas commodity and transportation markets set records, with forward trade increasing later in the quarter

We also observed strong trade across gas commodity and transportation markets, including (Figures 9 and 10):

- increased short-term trades in the upstream gas supply hub
- record Q1 deliveries at Wallumbilla
- an increase in forward trading at the end of March, with the volumes traded concentrated for delivery over winter months
- record transportation capacity acquired through the day ahead auction—more than three times the volume of trade compared to any previous Q1.

This is consistent with the availability of additional gas at short notice.

Figure 9 Day ahead auction transportation capacity won and gas supply hub trades



Source: AER analysis using gas supply hub trades and day ahead auction data.

Through the quarter, most commodity trade was short-term and exempt from \$12/GJ price cap (Box 1). This trade, particularly in January and March, was dominated by sales by Exporter/Producers, reflecting outages announced with short notice at the QCLNG facility.

However, during March, non-exempt forward trade picked-up substantially. These higher forward trade quantities for delivery in winter appear to be consistent with participants starting to prepare for winter peaking gas demand.

Higher volumes of monthly product trades also occurred in Q1 2023. All sales were by GPG gentailers and traders (not producers captured by the price cap) at an average price of \$14.67/GJ. However, producers did sell gas for \$12 – at the price cap – for delivery over winter via gas contracts outside AEMO facilitated markets.⁸ These two observations taken together suggest the amount of gas on offer at \$12 by producers to date may have been insufficient for the winter months and therefore some buyers have instead chosen to purchase gas from entities not covered by the price order at higher prices.

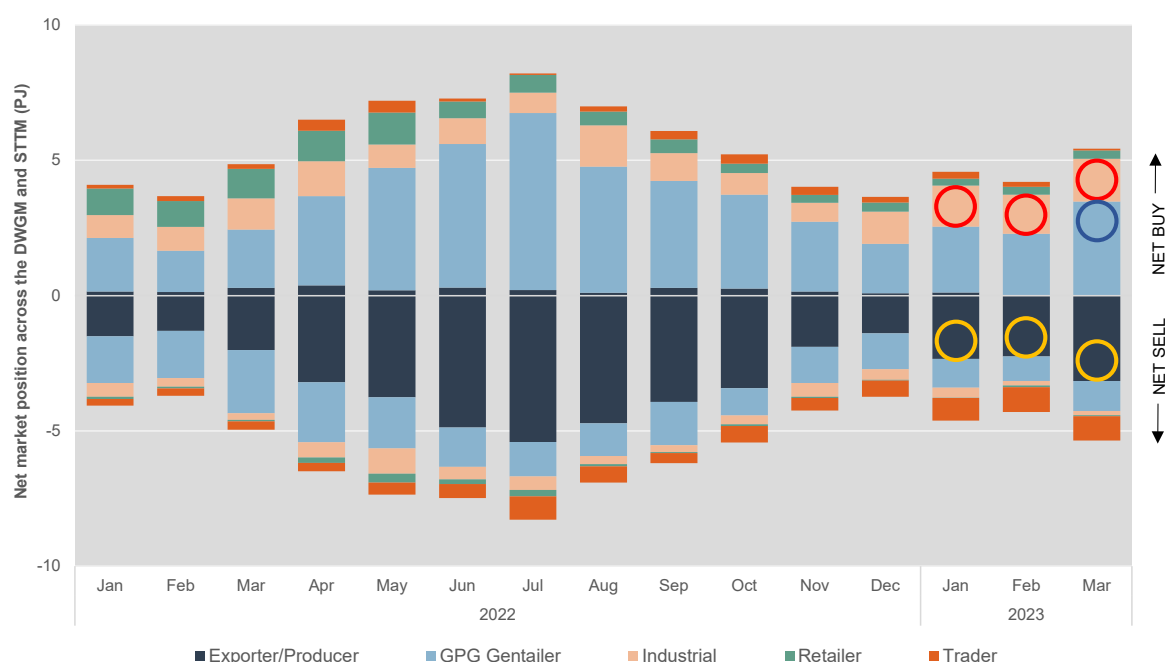
Industrial customers purchased more gas through spot markets

Over Q1 2023 (points circled below in Figure 10):

- industrial customers bought record volumes from downstream gas spot markets (indicated by the red circles in Figure 10)
- exporters also sold more gas into spot markets (indicated by the yellow circles in Figure 10).

⁸ New gas market transparency measures which commenced in March 2023 mean we now have additional insight into a broader range of wholesale gas market transactions through the Gas Bulletin Board..

Figure 10 Net trade quantities in downstream gas markets



Source: AER analysis using DWGM and STTM data.

Notes: Trade in the Victorian DWGM and Sydney, Adelaide and Brisbane STTMs has been estimated netting scheduled buy and sell quantities for each trading participant.

There are several factors which may have influenced these changing patterns of trade. Consistent higher industrial trading over the quarter could suggest these customers were buying more spot gas in the absence of being able to secure long-term contract volumes. The increase in net sales of gas by exporters and producers may reflect the impacts of the QCLNG train outage.

There was also a material increase in net purchases from GPG gentailers over March (indicated by the blue circle in Figure 10),⁹ compared to earlier in the quarter, which coincides with heatwaves and high-price events in Queensland and NSW.

The gas price cap appears to be influencing forward trade over winter months

We consider that at this stage the impact of the \$12/GJ cap on spot gas prices is unclear, noting that:

- a relatively high proportion of trade, especially over January and February, was exempt from the price cap
- there were several other downward pressures on spot market prices, discussed above
- Q1 is typically not a quarter in which gas spot prices face significant upward pressure—to illustrate, we have observed non-exempt trade at prices well below the \$12/GJ cap suggesting that other market dynamics may have had the primary impacts.

⁹ For the purposes of our reporting, 'GPG gentailers' includes market participants with generation and retail presences, including AGL, Alinta Energy, CleanCo, Energy Australia, Engie, Hydro Tasmania, Origin, Shell Retail and Snowy Hydro.

Nonetheless, we have observed recent forward trades suggesting that gas covered by the price cap is being traded over winter months at \$12/GJ, where exempt forward trade over the same period is trading at prices above the cap. Holding other factors constant, this suggests that the cap is imposing downward pressure on the trade to which it applies. It may also suggest that the volume of gas offered under the cap over winter is not yet sufficient to meet demand, so buyers are opting to purchase further gas through exempt trade at prices over the \$12/GJ cap.

Market outlook approaching winter

Electricity forward prices increased in Q1 2023

Generators and retailers enter forward contracts to fix the price of gas or electricity in future. This is done to protect both parties against price fluctuations in the spot market.

Forward base futures prices, which illustrate price expectations for electricity in future quarters, initially stabilised in January and February after a period of sharp reductions in Q4 2022, but rose sharply again in March (Figure 11). Despite these increases, future prices remain well-below the highs observed in mid-2022.

Figure 11 Finalised and forward base futures prices



Source: AER analysis using ASX data.

Base futures prices increased in Queensland, NSW and Victoria across the quarter. Price increases for the remaining quarters in 2023 ranged from \$23/MWh to \$35/MWh in Queensland, \$22/MWh to \$38/MWh in NSW and \$17/MWh to \$22/MWh in Victoria.

Increases which occurred, mainly in March, could reflect a range of drivers, including but not limited to:

- high-price events driven by heatwaves in most regions
- the announcement on 8 March by Callide of a delay in the return to service of the Callide C3 and C4 units, with combined capacity of 848 MW—where those units were previously scheduled to return for Q3, they are now scheduled for a staged return to service commencing from 30 September 2023.¹⁰

As well as being an indicator of participants' outlook for market prices, forward futures prices are an important input to setting the default market offer (DMO). Our analysis suggests that, to end March, the volume weighted average price remains relatively stable. This is because contract costs in the DMO are based on a portfolio of contracts acquired over time, so the impact of any one specific month is mitigated. Also, March contract prices are at a similar level to VWA prices. As a result the increase in base contract prices does not appear to be having an impact on likely DMO outcomes at this stage.

Liddell coal station will soon exit the NEM

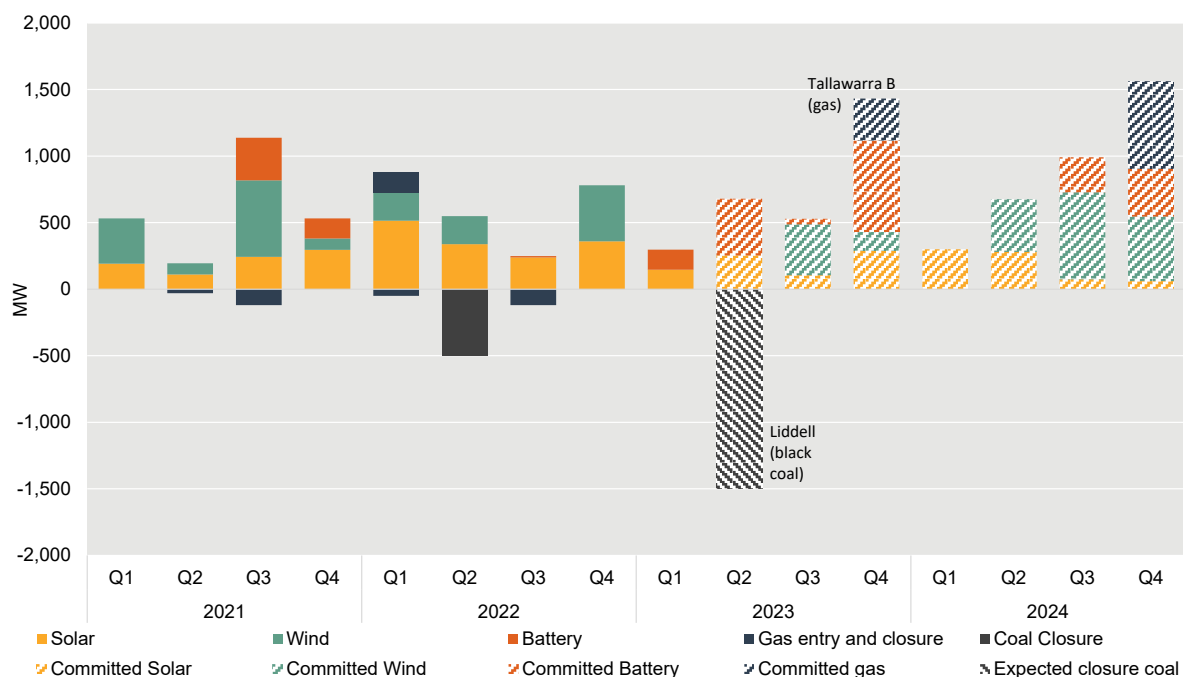
Edenvale solar farm in Queensland and the Hazelwood battery in Victoria entered the NEM during Q1 2023 (Figure 12). There were no generator exits in the quarter.

The long-expected closure of the 1500 MW¹¹ Liddell coal station in April will remove significant dispatchable capacity from the NEM. It is scheduled to close its three remaining generation units over April 19, 25 and 29. This will tighten the supply-demand balance, especially in evening periods when solar output is low.

¹⁰ CS Energy, [Updated return to service dates for Callide C generating units](#), 8 March 2023.

¹¹ 1500 MW refers to Liddell's registered capacity, which can be understood as its maximum output. Throughout Q1 2023 Liddell's total output ranged from 600 to 950 MW.

Figure 12 Entry and exit



Source: AER analysis using [AEMO Generator Information](#).

Note: We record new entry using registered capacity, except for solar and batteries where we use maximum capacity. The new entry date is taken as the first day the station produces energy. Solar is large scale solar and does not include rooftop solar.

The remaining 3 units of Liddell have a registered capacity of 1,500 MW but have not been producing at full capacity over Q1 2023.

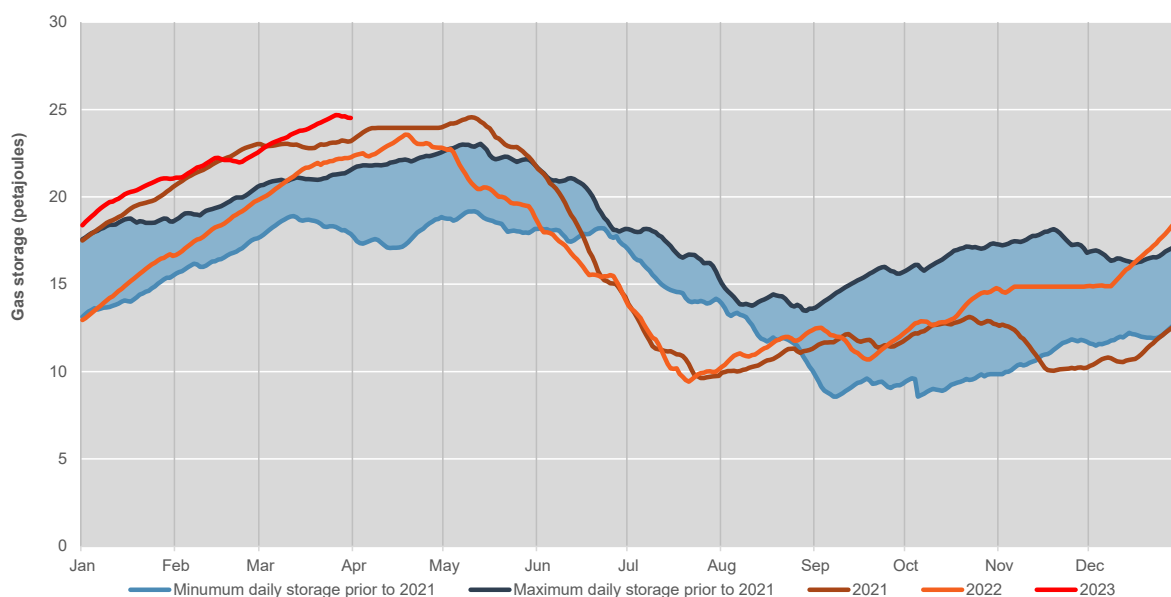
Over the remainder of 2023, the majority of committed investments in dispatchable capacity are in batteries. These committed batteries are scheduled to come online in tranches, particularly in Q2 and Q4 2024.

Iona storage filled to its highest-ever end of Q1 level

The lower gas prices, apparent in both upstream and downstream markets, also saw Iona storage inventories replenished in Victoria, refilling above the facility's recently upgraded 24 PJ nameplate capacity (Figure 13).¹² This is the highest storage level seen since nameplate was reduced to 23.5 PJ in May 2020 and occurred much earlier in the year than 2021's high, reached in early May.

¹² Iona's nameplate capacity increased to 24 PJ on 1 January 2023.

Figure 13 Iona underground gas storage levels in Victoria



Source: AER analysis using Gas Bulletin Board data.

This places Victoria in a better position to mitigate supply risks well ahead of the coming winter and is important, noting AEMO in its recent 2023 Gas Statement of Opportunities forecast a risk of peak-day shortfalls in Southern states under scenarios of very high demand.¹³ Shortfalls have implications both for gas users and for the NEM if gas generators are required in the NEM as they were significantly during winter 2022.

Most of Victoria's gas supply comes from the Longford production facility which provided around 70-90% of the gas produced in the state over 2022.¹⁴ Victoria's second largest source of supply capacity is the Iona underground storage facility, which now has a daily supply capacity of 558 TJ following recent upgrades to the facility. Transmission pipeline upgrades being made to the Western Outer Ring Main (WORM) are currently on track to improve the amount of gas that can be supplied from Iona in the coming winter. These improvements will help mitigate the risk of supply shortfalls on high demand days as supply sourced from the Gippsland basin continues to decline. While the connection of new offshore Thylacine wells (Victoria) to the Otway Gas Plant in Port Campbell have been delayed, this is expected to come online in July 2023 which should also assist in supplying higher southern demand in winter.¹⁵

¹³ AEMO, [2023 Gas Statement of Opportunities for central and eastern Australia](#), March 2023, p. 4.

¹⁴ Longford could produce around 1 PJ of gas in a day supplying both local and interstate demand. However, depleting wells in the Gippsland basin have seen forecast daily production from the Gippsland basin reduce to 915 TJ, with further reductions expected in 2024. AEMO, *2023 gas statement of opportunities*, March 2022 p.49

¹⁵ COVID delays pushed out expected completion in January 2023 and reduced projected supply by 37 PJ for 2023. This has delayed the facility's expected supply capability increasing from 84 TJ/day to 205 TJ/day. *ibid*