FY2023 ANNUAL MARKET PERFORMANCE REVIEW

FINAL REPORT

27 JUNE 2024

RELIABILITY PANEL AEMC

Inquiries
Reliability Panel
Australian Energy Market Commission
Level 15, 60 Castlereagh Street
Sydney NSW 2000
E aemc@aemc.gov.au
T (02) 8296 7800

Reference: REL0090

About the Reliability Panel
The Reliability Panel (the Panel) is a specialist body within the Australian Energy Market Commission (AEMC), and it comprises AEMO, industry and consumer representatives. It is responsible for monitoring, reviewing and reporting on the reliability, security and safety of the national electricity system, and advising the AEMC on these matters. The Panel's responsibilities are specified in section 38 of the National Electricity Law.

Acknowledgement of Country
The AEMC acknowledges and shows respect for the traditional custodians of the many different lands across Australia on which we all live and work. We pay respect to all Elders past and present and the continuing connection of Aboriginal and Torres Strait Islander peoples to Country. The AEMC office is located on the land traditionally owned by the Gadigal people of the Eora nation.

Citation
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EXECUTIVE SUMMARY

SUMMARY OF KEY FINDINGS

The annual market performance report (AMPR) is prepared annually by the Reliability Panel (the Panel). This FY2023 AMPR covers the period 1 July 2022 to 30 June 2023. It found the reliability, security and safety performance of the National Electricity Market (NEM) was generally acceptable. There are risks to the outlook, with several trends forecast to worsen, without investment in the right mix of power system resources.

Generation capacity and the investment pipeline remain healthy

- The reliability standard was not breached during this review period.
- The investment pipeline also remains healthy, with FY2023 experiencing a significant number of off-shore wind announcements.
- However, the rate at which announced projects move to the commissioning stage is low and poses a threat to future reliability of the system.
- Furthermore, current 10-year reliability forecasts, from the ESOO, indicate medium to long-term reliability risks.
- Investment certainty will be important to ensure the future reliability of the system.

There were no identified safety incidents in the NEM in FY23

Reserve level variability drove an increase in market notices

- The uptake of distributed solar and battery resources is accelerating.
- The increase in weather dependant generation capacity makes it more difficult to forecast reserve levels.
- There was an increase in LOR issuances in FY2023, even accounting for market volatility over June-July 2022, which may be driven by more volatile reserve levels.

System security performance was largely acceptable

- System security performance was largely acceptable in FY2023.
- Security directions and reclassifications are trending upwards.
- Increased climate variability could lead to more market events and pose system security risks in future.
- The ISF rule change should support system security.

Wholesale market prices increased 8%

- The average price in all NEM regions rose 8% from FY2022 to FY2023.
- While much of the increase was driven by high prices in the period following the market suspension events in June-July 2022, the weighted average price in FY2023 increased in all NEM regions except QLD.

System operating costs were steady

- System costs were steady in FY2023, with fewer RERT activations, and stable NSCAS and SRAS procurement costs.
- The reduction in RERT usage, and reliability directions issued, likely reflects other market arrangements were effective in FY2023.
- AEMO revenue requirements increased to support additional transitional arrangements.
- FCAS costs fell in FY2023, supported by the introduction of the fast frequency response markets in October 2023.

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INTRODUCTION

1.1. THE RELIABILITY PANEL ANNUALLY REVIEWS THE PERFORMANCE OF THE NEM AND IS SEEKING FEEDBACK ON THE REVISED FORMAT FOR FY2023

This report has been prepared as part of the Reliability Panel's (the Panel) Annual Market Performance Review (AMPR) of the National Electricity Market (NEM). It covers the 2022-23 financial year (FY2023).

Under the National Electricity Rules (NER or the Rules), the Panel must undertake this review annually. The Panel also updates a companion document to the AMPR final report: "The Reliability, Security and Safety Frameworks in the NEM — an explanatory statement for the 2023 AMPR" (explanatory statement). The explanatory statement sets out the:

- Role of the Panel and AMPR process
- Frameworks used to deliver power system reliability, security and safety in the NEM
- Set of metrics used by the Panel to monitor and report on reliability, security and safety outcomes in the NEM for the purposes of AMPR reporting.

The explanatory statement is intended to be a companion document and should be read in conjunction with the AMPR final report. It also serves as an explanatory report for those interested in understanding more about the current frameworks.[1]

The Panel has revised the format for the FY2023 AMPR to provide a more visually impactful and easily digestible report. The AMPR is designed to provide an ex-post review of the NEM for the previous financial year. This brief report style intends to clearly and easily communicate key messages to stakeholders.

The Panel is interested in stakeholder feedback on the reporting format for FY2023 AMPR. While there is no dedicated consultation period for this report, stakeholders are welcome to provide feedback via email to panel@aemc.gov.au by **5PM 30 September 2024**.

For more information or to request a one-on-one discussion, please contact the project leader:

- **Project leader:** Neythirun Sivanesan
- **Email:** neythirun.sivanesan@aemc.gov.au
- **Telephone:** (02) 8296 0647

1. For more information see: https://www.aemc.gov.au/market-reviews-advice/annual-market-performance-review-fy2023

1.2. BACKGROUND AND PURPOSE OF THIS REPORT

The functions and powers of the Panel are set out in section 38 of the National Electricity Law (NEL). Among other things, the Panel is required to:

- Monitor, review, and report on, in accordance with the Rules, the safety, security and reliability of the national electricity system
- At the request of the AEMC, provide advice in relation to the safety, security, and reliability of the national electricity system
- Undertake any other functions and powers conferred on it under the NEL and the NER.

Consistent with these functions, clause 8.8.3(b) of the NER requires the Panel to conduct a review of the performance of certain aspects of the market, at least once every financial year and at others such times as the AEMC may request.

The Panel must conclude each annual review no later than the financial year following the financial year to which the review relates. The Panel must conduct its annual review in terms of:

- Reliability of the power system
- Power system security and reliability standards
- The system restart standard
- The guidelines referred to in clause 8.8.1(a)(3) of the NER[2]
- The policies and guidelines referred to in clause 8.8.1(a)(4) of the NER[3]
- The guidelines referred to in clause 8.8.1(a)(9) of the NER[4]

The AEMC may provide the Panel with standing terms of reference in relation to the AMPR.[5,6]

2. The guidelines referred to in clause 8.8.1(a)(3) of the NER govern how AEMO exercises its power to issue direction in connection with maintaining or re-establishing the power system in a reliable operating state.
3. The policies and guidelines referred to in clause 8.8.1(a)(4) of the NER govern how AEMO exercises its power to enter into contracts for the provision of reserves.
4. The polices and guidelines referred to in clause 8.8.1(a)(9) of the NER identify, or provide for the identification of, operating incidents and other incidents that are of significance for the purposes of the definition of 'reviewable operating incident' in clause 4.8.15 of the NER.
5. The current terms of reference from the AEMC in relation to this review can be found at https://www.aemc.gov.au/market-reviews-advice/annual-market-performance-review-fy2023
6. Clause 8.8.3(c1) of the NER.

1.3. SCOPE OF THE FY2023 AMPR

As noted, the Panel has undertaken this review in accordance with the requirements in the NER and the terms of reference issued by the AEMC. The AEMC requested that the Panel review the performance of the market in terms of reliability, security, and safety of the power system.

In this report the Panel has considered the following definitions of reliability and security in relation to the power system:

- **Reliability** — There is enough capacity (generation, demand response and networks) to supply customers
- **Security** — It is able to operate within defined technical limits, even if there is an incident such as the loss of a major transmission line or large generator.

For more exhaustive definitions of the above, please refer to the explanatory statement. This report is divided into four main chapters, which consider:

- **Reliability**: The Panel has reviewed the reliability performance of generation and bulk transmission (i.e. interconnection), including:
    - Current and historic NEM reliability performance
    - Forward-looking reliability risks
    - NEM Reserve level events and constraint impacts
    - AEMO interventions for reliability and RERT
    - Market price signals and investment incentives.
- **Security**: The Panel has reviewed the performance of the power system against the relevant technical standards. In particular, the Panel has had regard to:
    - Power system security incidents/risk management
    - Management of power system security risks
    - Frequency performance
    - AEMO interventions for security
    - System services procurement and use.
- **Safety**: The NEL and NER set out the functions and powers of the Reliability Panel, which include a function to monitor and report on safety in accordance with the Rules. The NER does not specify additional requirements in relation to safety performance monitoring. However, the Panel can provide advice in relation to the safety of the national electricity system, at the request of the AEMC.
- **Key events**: The Panel has considered key events relevant to FY2023.

Taken together, this final report provides key insights and observations on the reliability, safety and security of the power system throughout the reporting period.

1.4 WE SEEK FEEDBACK ON THE FORMAT AND CONTENT OF FUTURE AMPR'S

The AMPR has significant overlap and duplication with other publications, and is not timely

- Much of the information presented in the AMPR is available from similar publications, such as the AER's annual State of the Energy Market Report, and AEMO's Quarterly Energy Dynamics reports.[7,8]
- AEMO also releases a range of reports in response to market incidents or developments.
- The AMPR is less timely than these overlapping sources of information. There can be a lag of up to two years' in the AMPR's analysis of data, given the lag between the period covered and its publication date.
- The Panel's view is that the core value of the AMPR is providing relevant, targeted and accessible analysis of the reliability and security of the market.

This years' AMPR has been released as a chart pack with targeted commentary

- We have revised the format and content of the FY2023 AMPR report.
- This slide pack is focused on the highest-impact visuals, and targeted commentary, that address the key reliability, security and safety developments in the market.
- Given the audience for AMPR is more likely to be technically-minded, in our view, this is an efficient way of presenting relevant information.
- It is also supported by an explanatory statement which aids readers less familiar with the NEM.
- This approach could also allow future AMPR's to be delivered more quickly.

We'd like to hear your suggestions about the format and content of future AMPR publications

We are asking stakeholders the following questions:

1. *What value do you get from the AMPR?*
2. *Do you have any feedback on the new format for the FY2023 AMPR?*
3. *What improvements would you like to see in future AMPR's, and what would be the benefits of such improvements?*

The Panel is interested in stakeholder feedback on the reporting format for FY2023 AMPR. While there is no dedicated consultation period for this report, stakeholders are welcome to provide feedback on the above questions via email to panel@aemc.gov.au **by 5PM 30 September 2024.**

7. AER state of the energy market report 2023 can be found at https://www.aer.gov.au/publications/reports/performance/state-energy-market-2023
8. AEMO quarterly energy dynamics reports can be found at https://aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed

2

RELIABILITY PERFORMANCE

SECTION 2.1

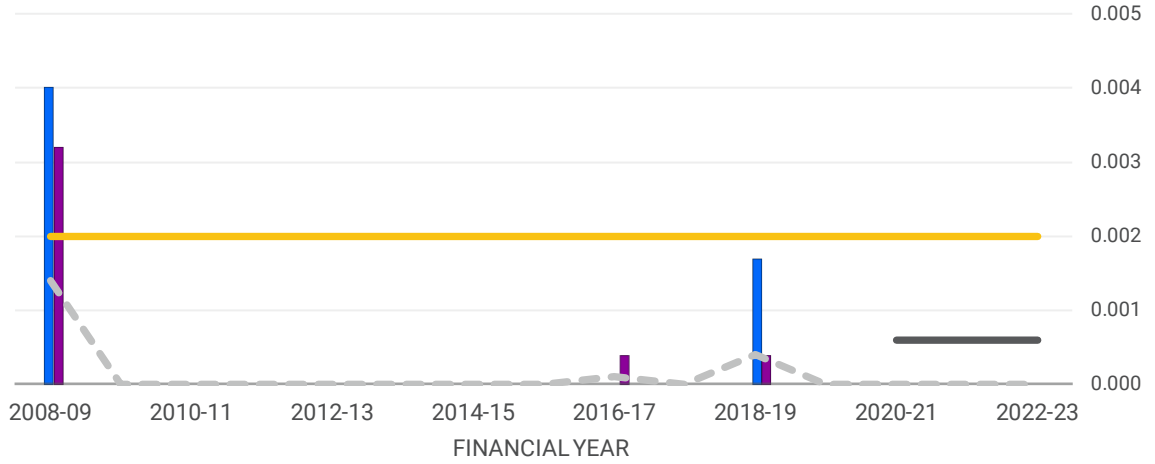
INVESTMENT TRENDS AND IMPLICATIONS FOR RELIABILITY

- There was no breach in either the reliability standard or the interim reliability measure for FY2023.
- Distributed solar and battery uptake is accelerating.
- The investment pipeline remains healthy, however the transition from anticipated projects to committed projects remains slow.

THERE WAS NO UNSERVED ENERGY IN THE NEM OVER FY2023, ALTHOUGH AEMO'S FORECASTS HIGHLIGHT FUTURE RELIABILITY RISKS

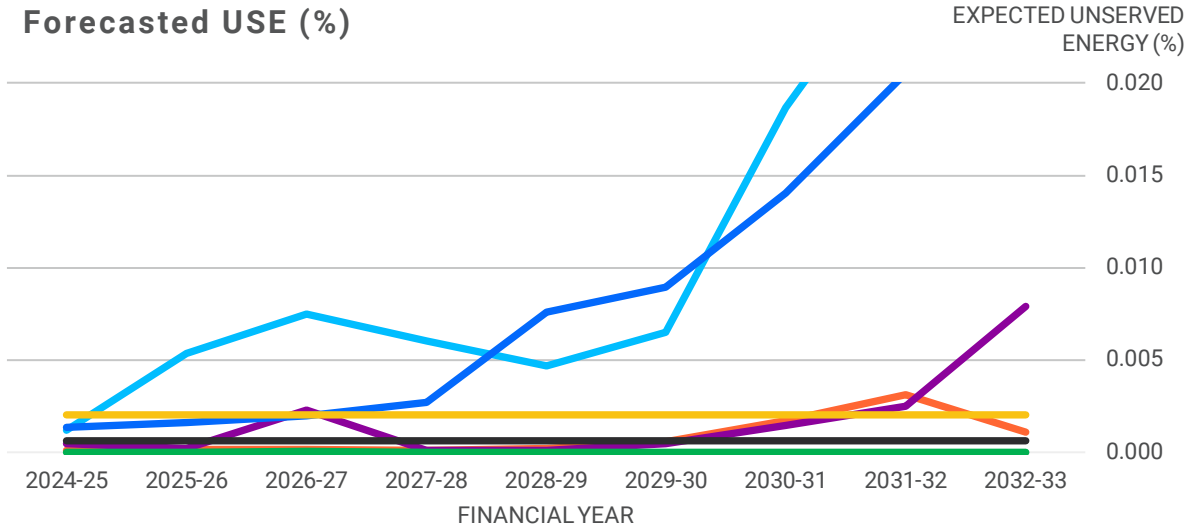
- The NEM's historically high levels of reliability continued in FY2023. No actual unserved energy (USE) was recorded in the NEM over FY2023, as it withstood multiple reliability-related events, and a tight supply/demand balance through July and August following the June 2022 market suspension.
- The last recorded USE in the NEM prior to FY2023, was in FY2019 in Victoria (VIC) and South Australia (SA), and FY2009 is the only year since the NEM started, in which the reliability standard for USE was breached.[9]
- However, AEMO's latest ESOO forecasts that reliability gaps could emerge over the next 10 years in all mainland NEM regions, if the NEM is not supported by new generation, transmission, orchestrated consumer investments and demand flexibility.[10]
- The Panel notes the May 2024 update to the 2023 ESOO – which the charts below are based on – excludes the recent announcement by the NSW government to extend the operation of Eraring power station to 2027, which will impact future reliability projections.

Mean load forecasting errors (%)

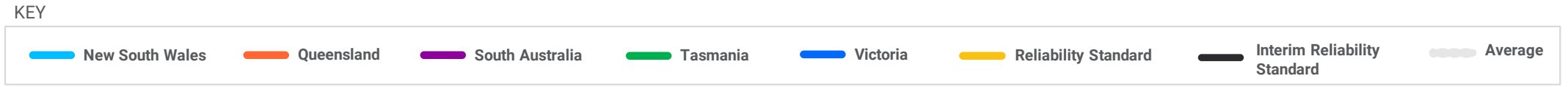


Source: Panel analysis of AEMO data.

Forecasted USE (%)



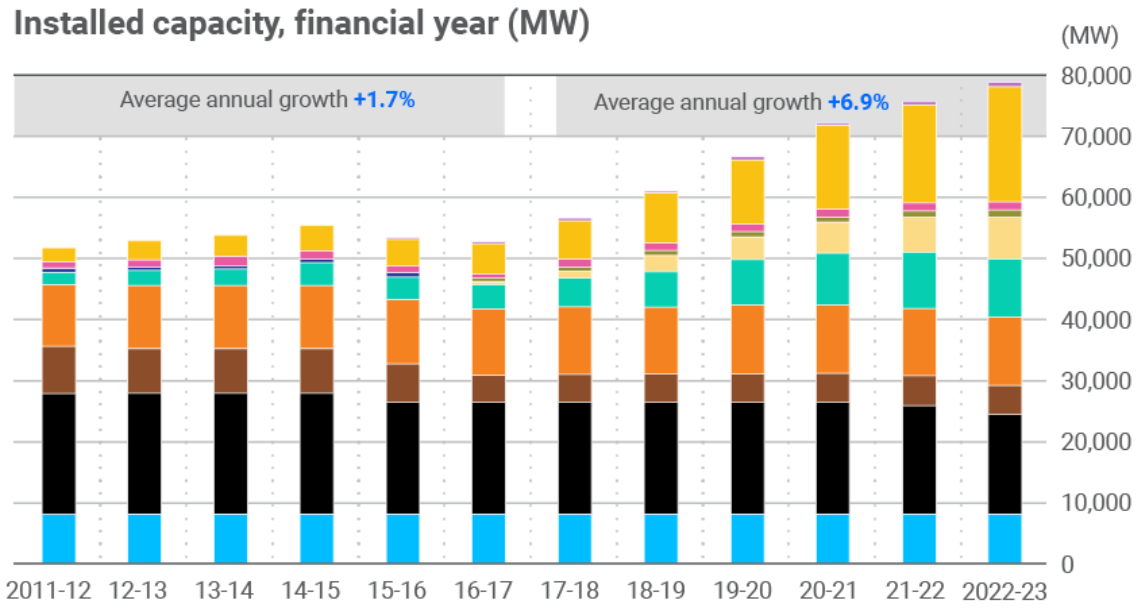
Source: May 2024 update to the 2023 ESOO, figure 2.

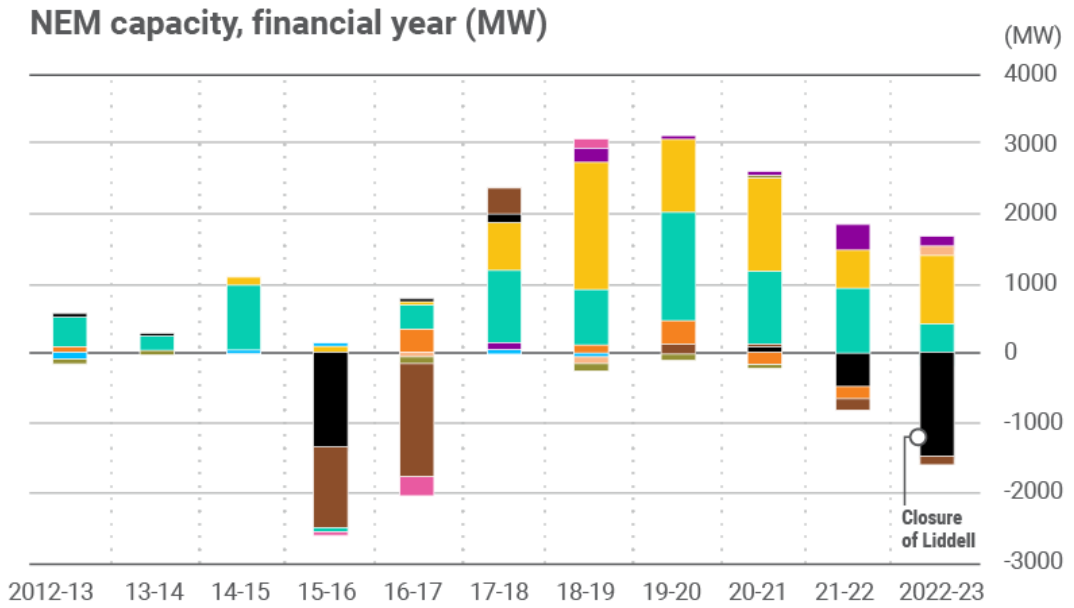


9. The Panel notes that there was USE due to a systems security event involving the trip of the Moorabool – Sydenham 500 kV No.1 and No. 2 lines on 13 February 2024. This will be reported in further detail in next years' AMPR. AEMO has published a preliminary report on the incident, available at: https://aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/power_system_incident_reports/2024/preliminary-report
10. AEMO, May 2024 Update to the 2023 ESOO, https://aemo.com.au

GENERATION CAPACITY CONTINUED TO GROW STEADILY IN FY2023 DRIVEN BY DISTRIBUTED SOLAR

- While the rate of new utility-scale generation declined from a peak in FY2020, installed capacity growth continued to grow steadily, driven by distributed solar installations.
- The closure of Liddell in April 2023 saw the exit of 1.5MW of coal generation in FY2023.





KEY

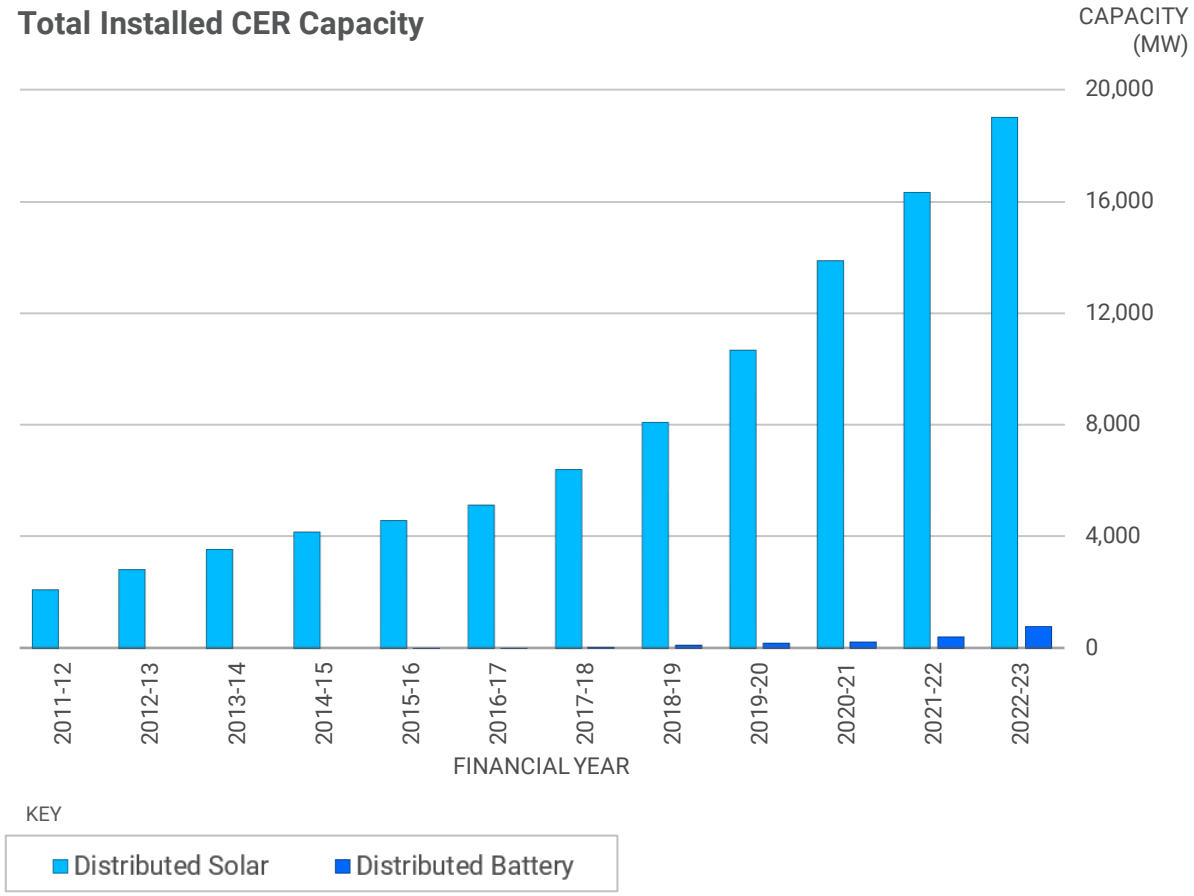
Black Coal | Brown Coal | Gas | Biogas | Other | Biomass | Hydro | Wind | Distributed solar | Solar | Battery | Distributed battery

Source: Panel analysis of AEMO data.

DER CAPACITY IS GROWING WITH AN UPTICK IN DISTRIBUTED BATTERY INSTALLATIONS IN FY2023

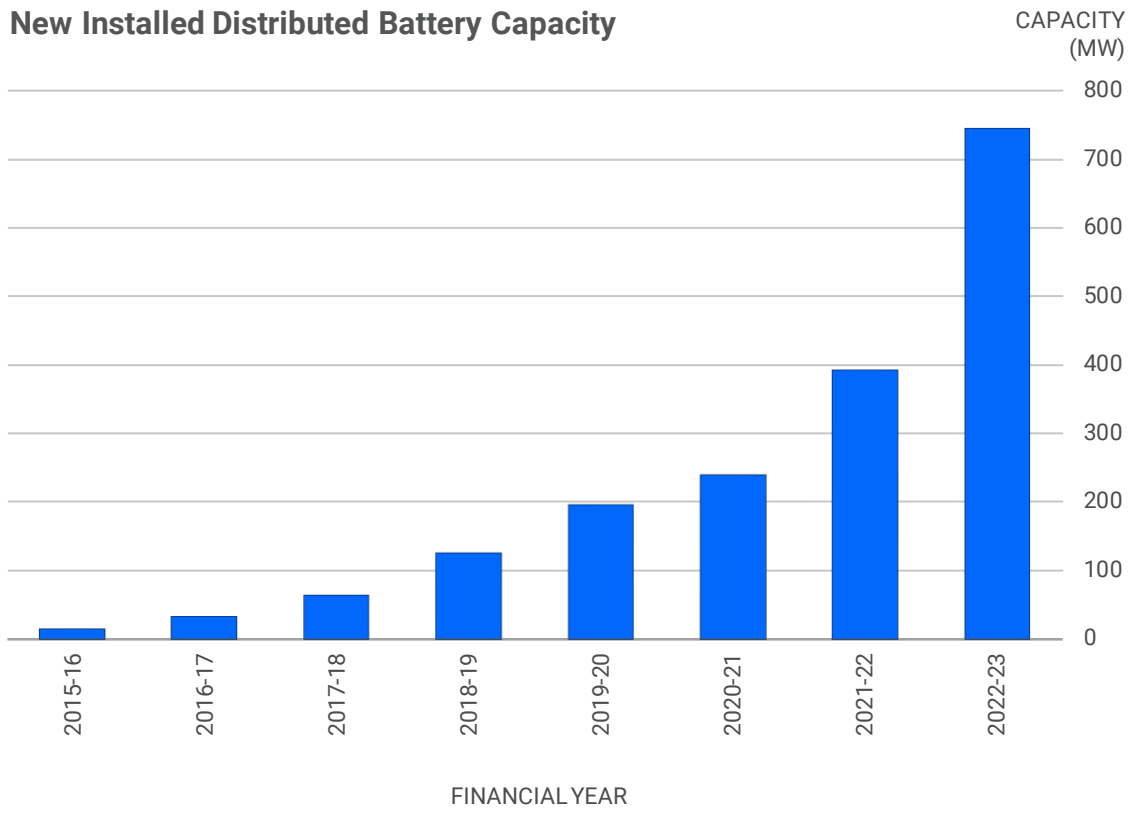
- Distributed Energy Resource (DER) capacity continues to grow, increasing by 18% in FY2023.
- Battery uptake accelerated in FY2023, albeit from a much lower base.
- Increasing battery capacity in the NEM is important to help flatten the steepening 'duck curve'.[11] This is further explored in Section 2.2.

Total Installed CER Capacity



Source: Panel analysis of CER data.

New Installed Distributed Battery Capacity



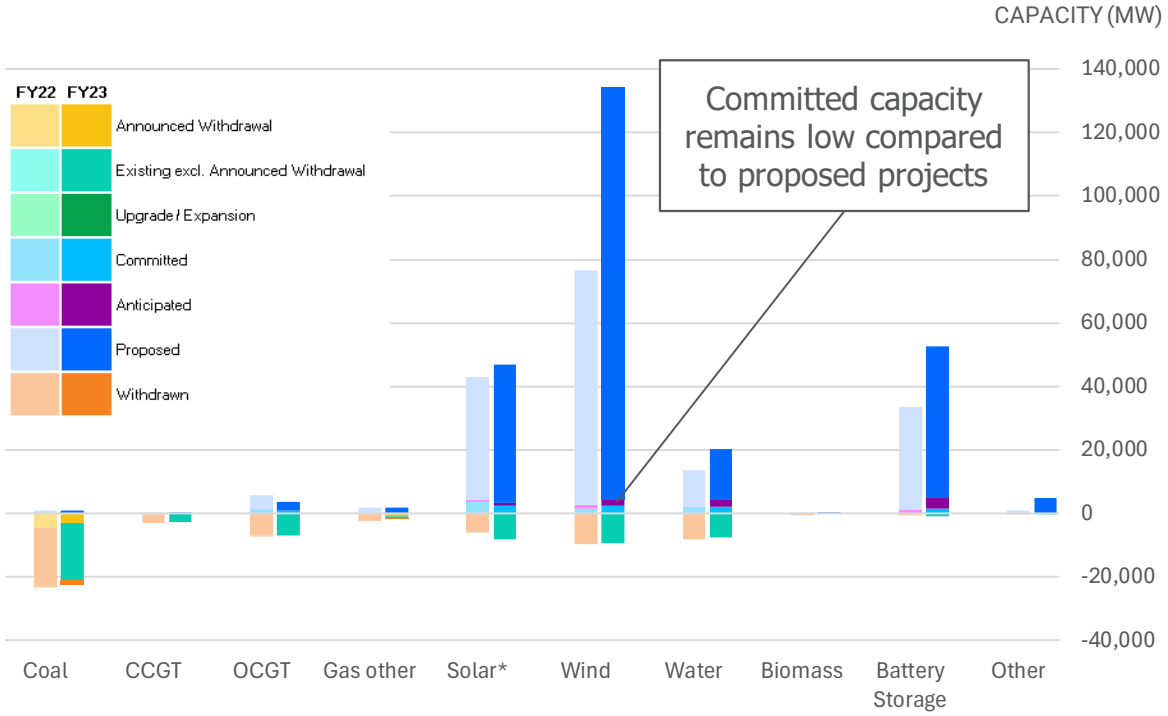
Source: Panel analysis of CER data.
Note: Distributed battery capacity was 0MW prior to FY16.

11. Essential energy, Breaking the duck curve, available at: https://www.essentialenergy.com.au/media-centre/newsletter/newsletter-3-breaking-the-duck-curve

THE FUTURE INVESTMENT PIPELINE REMAINS HEALTHY HOWEVER THE TRANSITION FROM ANTICIPATED TO COMMITTED STAGES IS SLOW

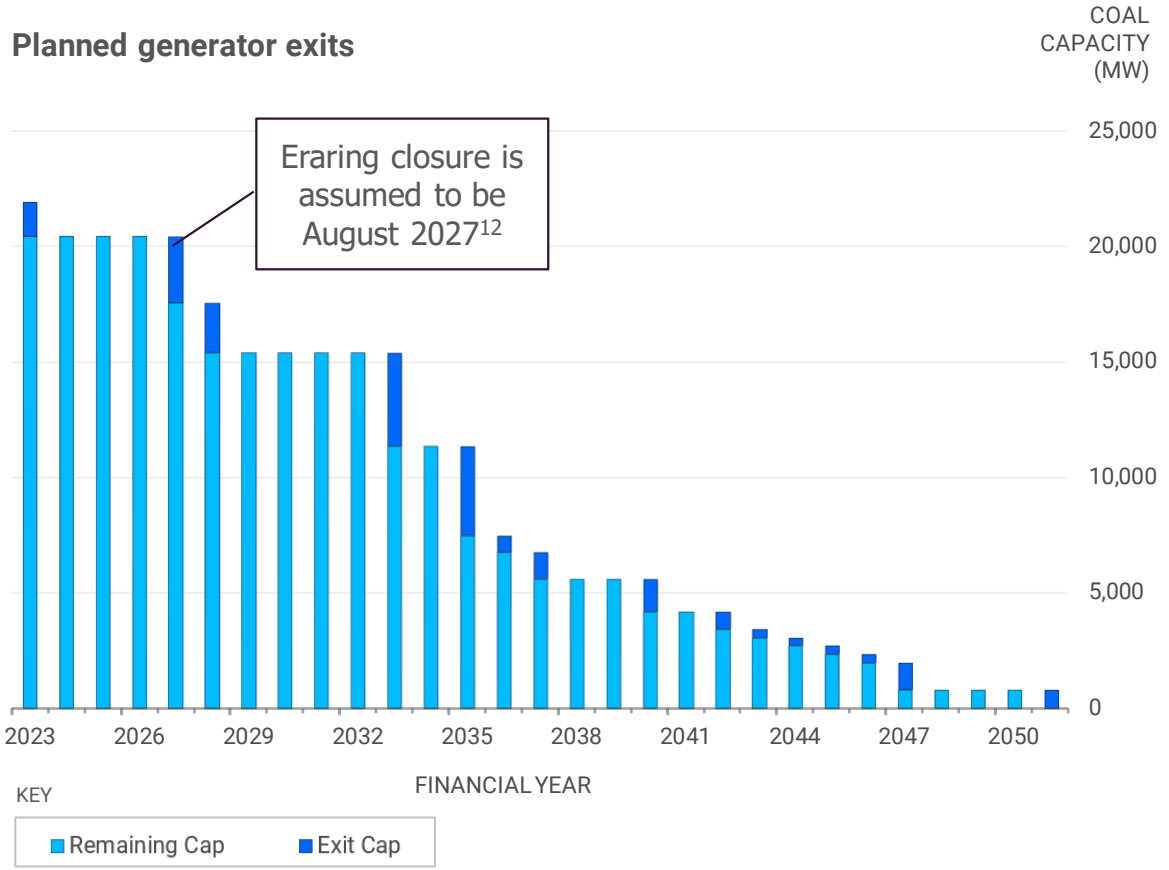
- Proposed wind developments have grown significantly from FY2022, driven by 75,840MW of off-shore wind generation projects that were proposed, in the NEM, over FY2023.
- Despite a 1.2MW increase in committed capacity in FY2023 from FY2022, connection levels continue to remain low.
- The Panel will continue to monitor the rate at which projects transition from anticipated to committed projects in future AMPRs, as well as the future generation pipeline including the impact of the Capacity Investment Scheme (CIS).

Changes in capacity at various project stages



Source: Panel analysis of AEMO data.
* Solar excludes rooftop PV.

Planned generator exits



Source: Panel analysis of AEMO data.

12. NSW Government, 2024. Available at: https://www.environment.nsw.gov.au/news/nsw-government-secures-2-year-extension-to-eraring-power-station

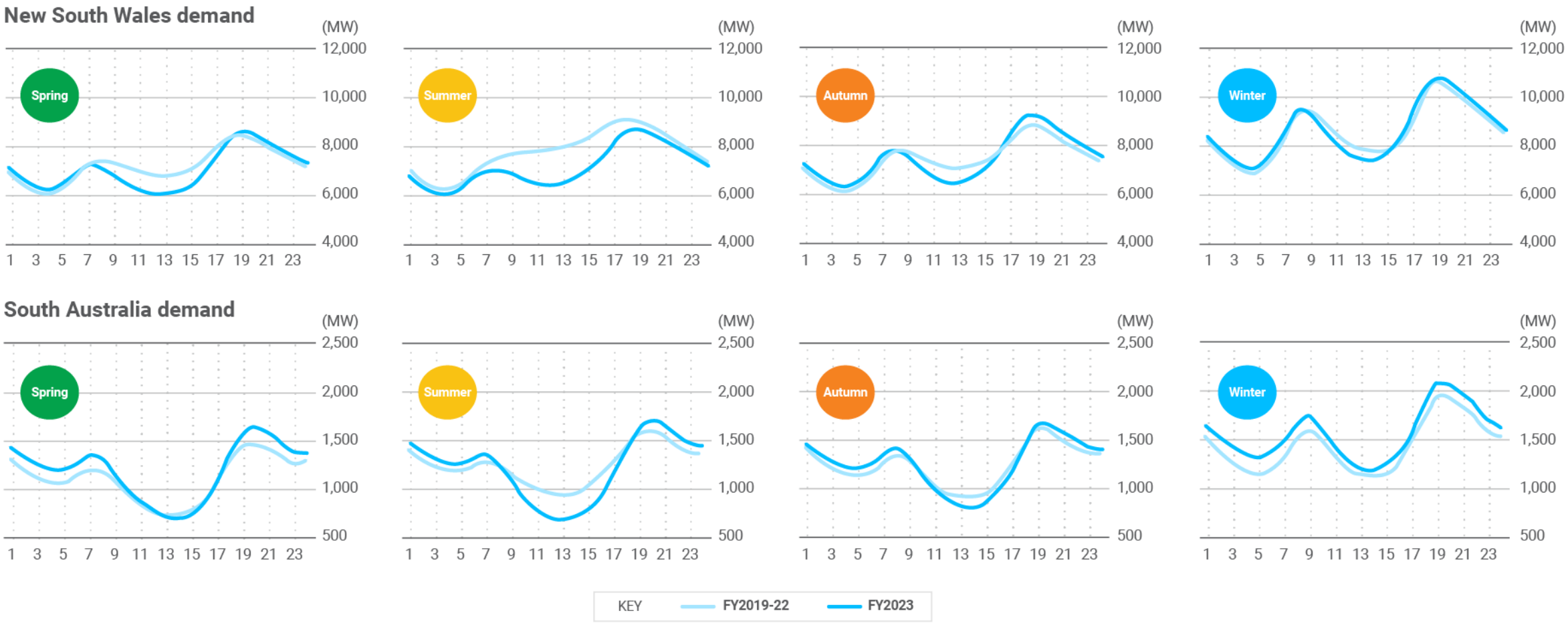
SECTION 2.2

DEMAND SIDE TRENDS AND FORECASTING ACCURACY

- The duck curve continued to steepen in FY2023, as the uptake of distributed solar increased.
- Load forecasting errors were similar to the previous year. The accuracy of AEMO's wind and solar were comparable to generators' self-forecasts
- Climate factors, and increased Consumer Energy Resources (CER), are driving higher summer but lower spring demand.

THE DUCK CURVE CONTINUES TO STEEPEN IN NEW SOUTH WALES AND SOUTH AUSTRALIA WITH INCREASED UPTAKE OF DISTRIBUTED SOLAR

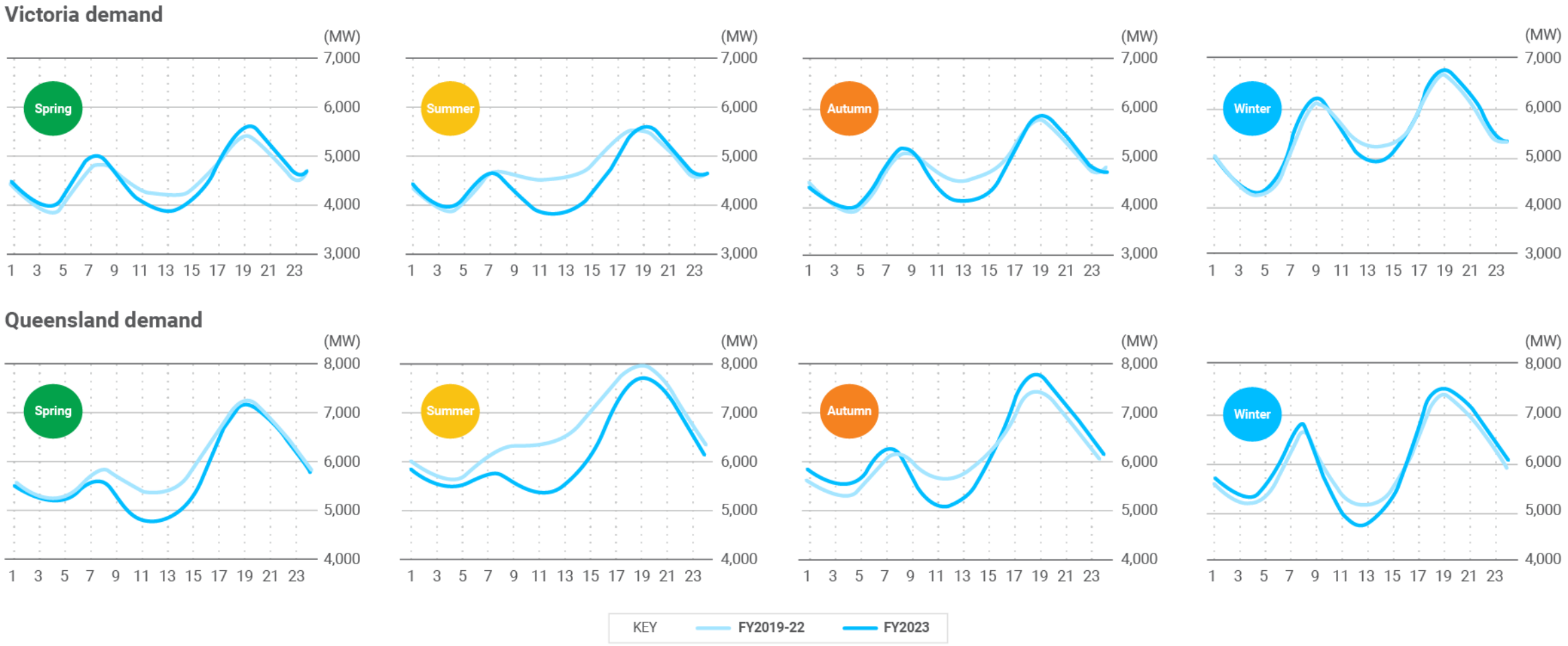
- Higher distributed solar installations contributed to a noticeable drop in summer demand, during the day, in New South Wales (NSW) and South Australia (SA) in FY2023, when compared to the FY2019-2022 average.
- For NSW, lower demand during the day was also apparent in spring and autumn.



Source: Panel analysis of AEMO MMS data via NEOPoint.

THE DUCK CURVE CONTINUES TO STEEPEN IN VICTORIA AND QUEENSLAND WITH INCREASED UPTAKE OF DISTRIBUTED SOLAR

- Victoria (VIC) and Queensland (QLD) have also shown pronounced drops in summer day demand, similar to NSW and SA.
- That said, this trend may temporarily reverse in QLD over the 2024 summer, following particularly severe summer heatwaves.

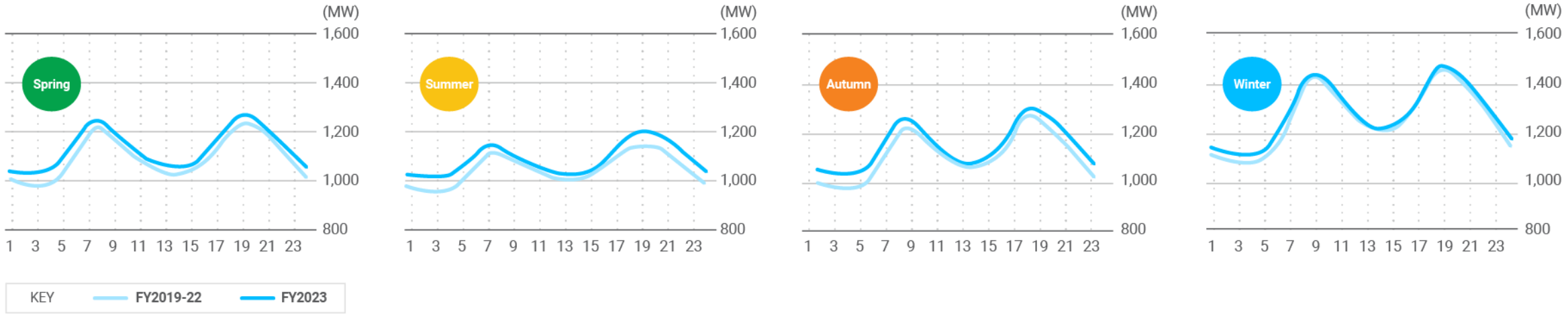


Source: Panel analysis of AEMO MMS data via NEOPoint.

DEMAND WAS STABLE IN TASMANIA, REFLECTING A LOWER UPTAKE OF SOLAR

- The Tasmanian (TAS) load profile remained similar in FY2023 compared to the FY2019-2022 average. TAS has the lowest uptake of solar installations in all NEM regions, which contributes to a flatter duck curve when compared to mainland regions. TAS generation is predominantly provided by hydro.

Tasmania demand

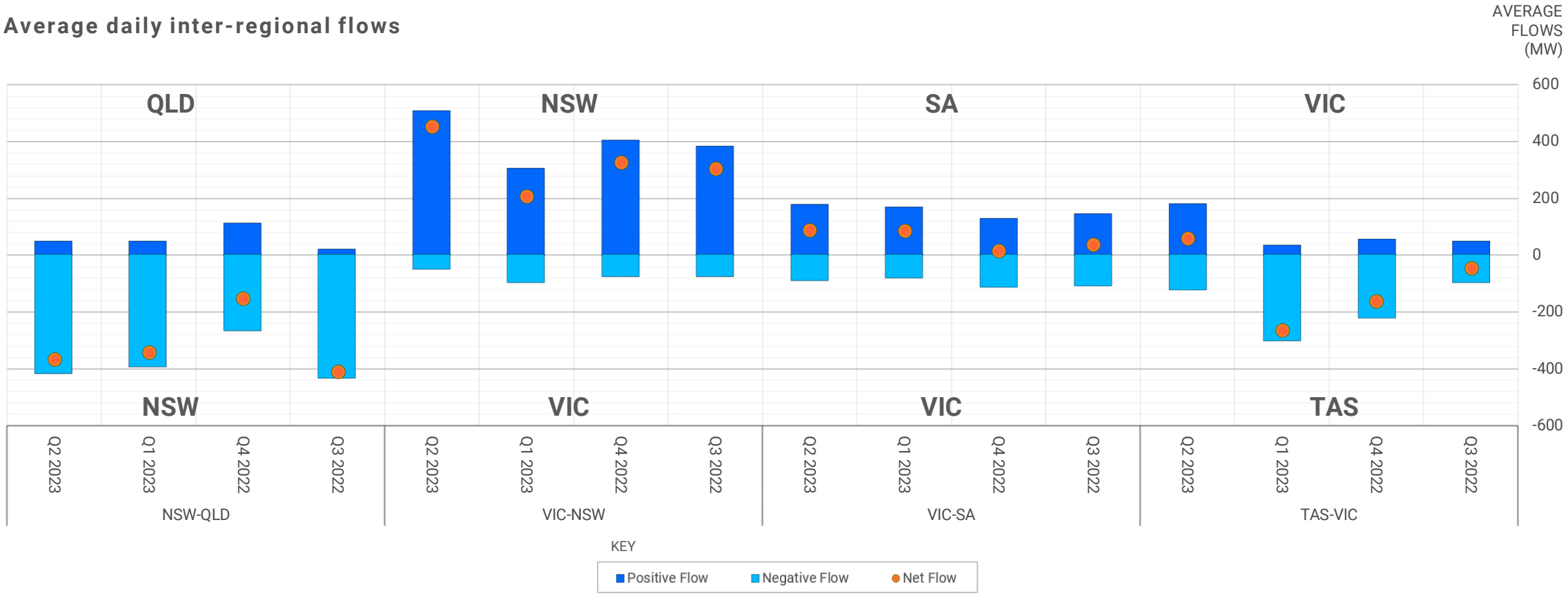


Source: Panel analysis of AEMO MMS data via NEOPoint.

NSW IMPORTED 10% OF ITS ENERGY FROM QLD AND VIC. FOLLOWING STAGE TWO, PEC SHOULD SUPPORT INTER-REGIONAL TRADE AND RELIABILITY

- NSW imported 3GW of energy from QLD and VIC over FY2023, which was about 10% of NSW total energy demand over FY2023.
- The volume of inter-regional trade is limited (constrained) by the amount and size of interconnectors between regions. Such constraints can lead to higher prices and create reliability risks.
- The Panel notes the construction of Project Energy Connect (PEC), the NSW-SA interconnector, should encourage inter-regional trade and reduce reliability risks in the medium- to long-term.

Average daily inter-regional flows



Source: Panel analysis of AEMO data.

LOAD FORECASTING ERRORS WERE MIXED IN FY2023

- With the exception of SA, load forecasting errors were marginally higher in FY2023 compared to FY2022.
- In contrast, SA had an overall average improvement of 2.3% in load forecast error across all forecasting periods. This reflects improvements in both solar and wind forecasts. In absolute terms, SA generally experiences larger forecasting errors, because it has a higher level of renewables (including rooftop PV) compared to other NEM regions.

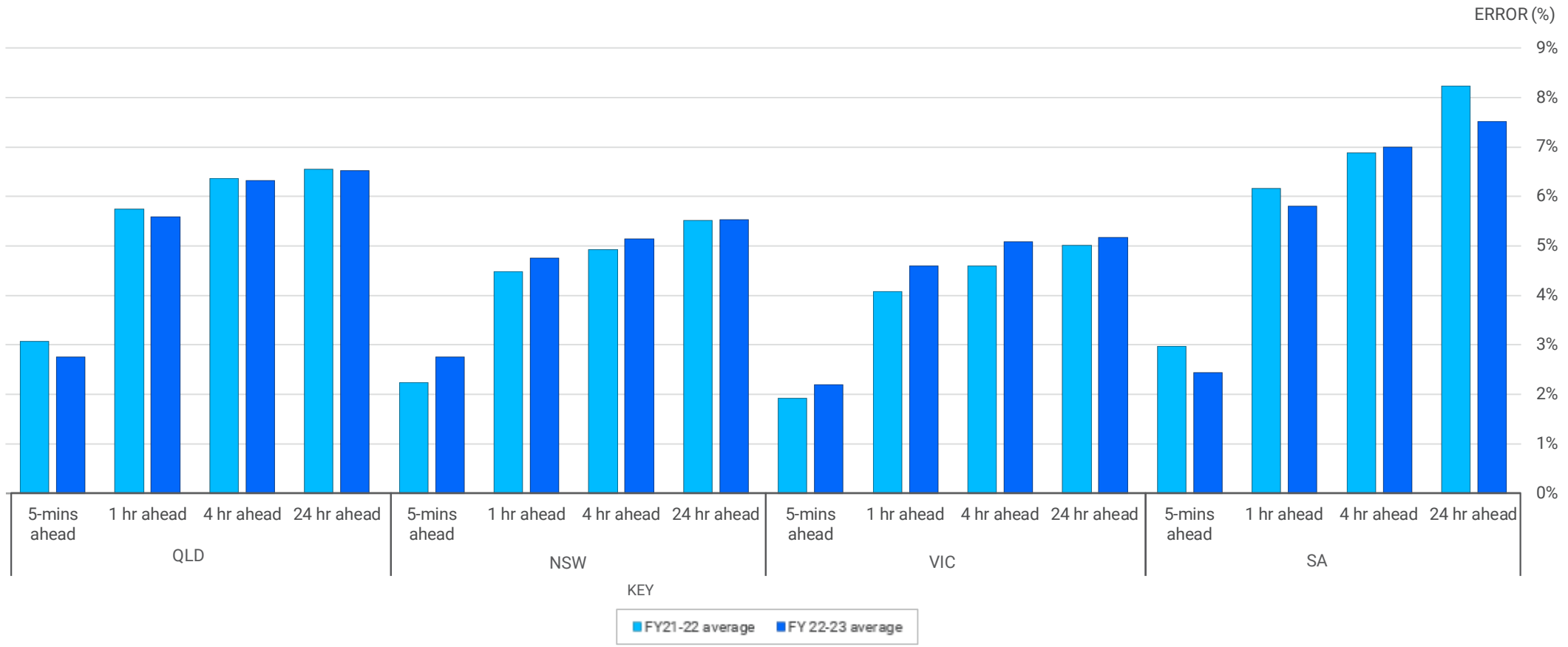
Mean load forecasting errors (%)

Source: Panel analysis of AEMO data.

SOLAR FORECASTING IMPROVED SLIGHTLY IN SA BUT WERE OTHERWISE STABLE

- SA saw a small reduction in average solar mean forecasting errors (ASEFS) for the 5-mins ahead, 1-hr ahead and 24-hr ahead periods, although they remained slightly elevated when compared to other NEM regions.
- For other states, there is no clear trend when comparing forecasts for FY2022 to FY2023.

Comparison of FY2022 to FY2023 ASEFS mean errors for solar generation

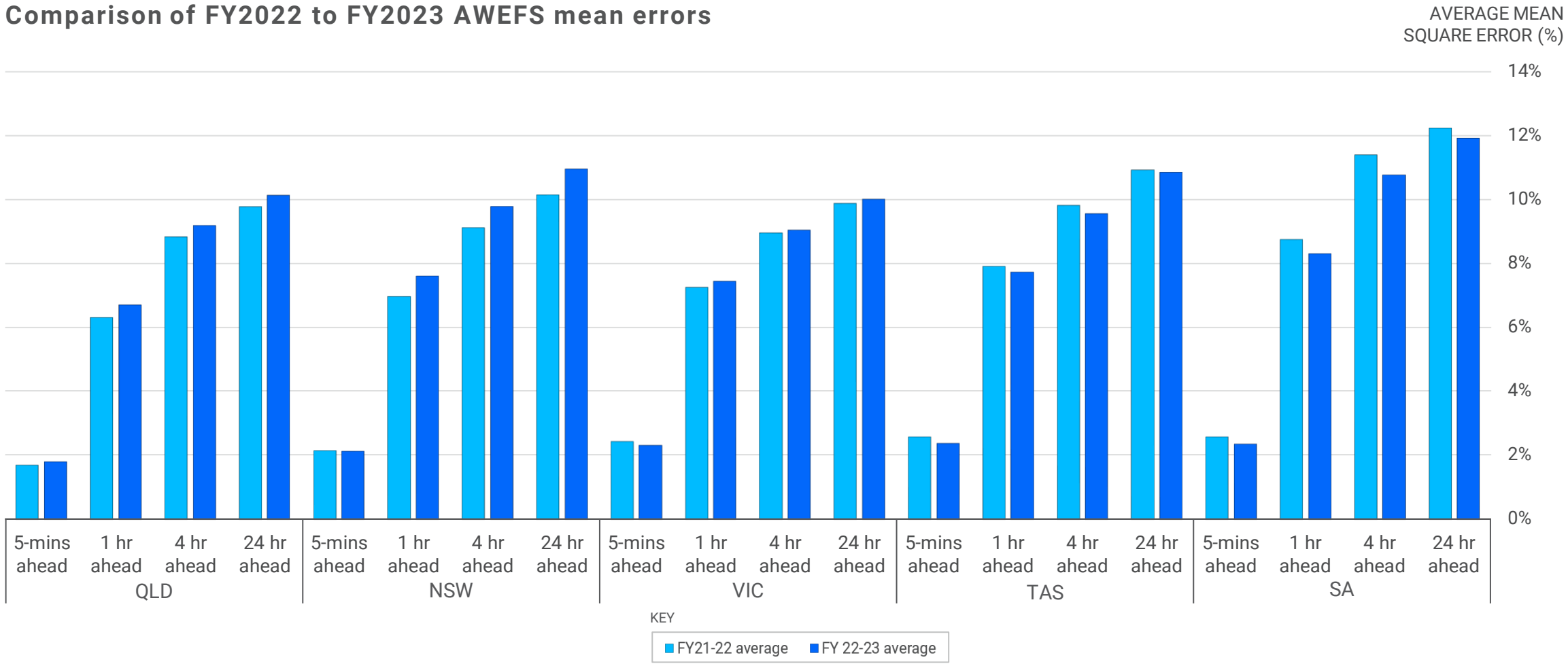


Source: Panel analysis of AEMO data.

WIND FORECAST ERRORS SLIGHTLY INCREASED IN ALL NEM REGIONS EXCEPT SA

- Average wind mean forecasting errors (AWEFS) marginally increased from FY2022 to FY2023 in all NEM regions, except SA, which saw a slight improvement in forecasts.

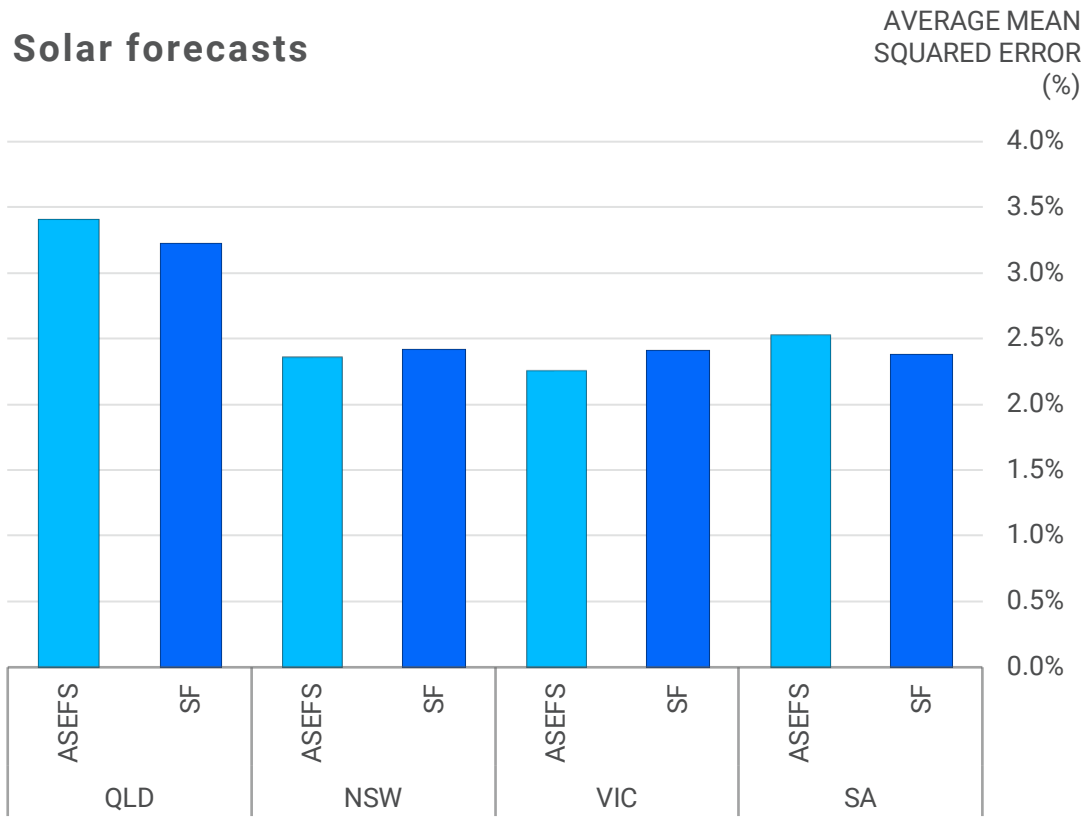
Comparison of FY2022 to FY2023 AWEFS mean errors



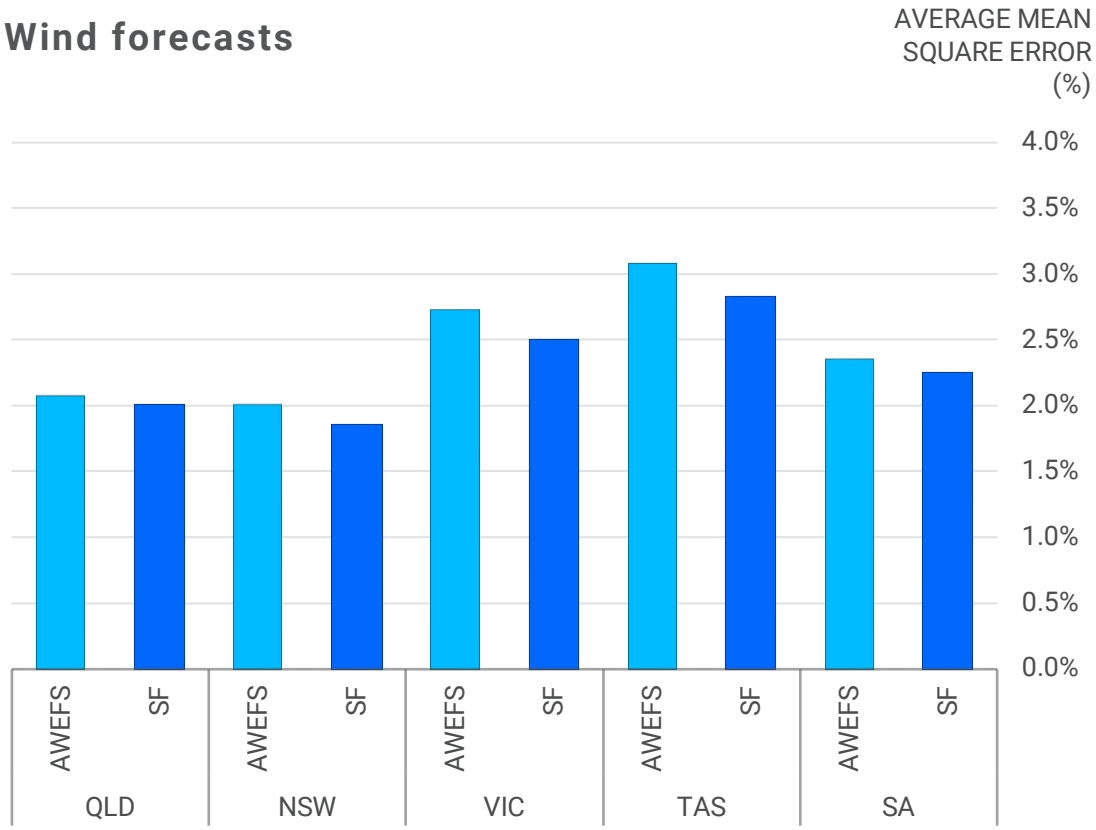
Source: Panel analysis of AEMO data.

SELF FORECASTS ARE COMPARABLE TO AEMO'S WIND AND SOLAR FORECASTS

- Market participants can choose to provide self-forecasts of the unconstrained intermittent generation from their semi-scheduled generating units, for the next five minute dispatch interval.
- These forecasts are only subject to technical factors and do not reflect market intentions.
- In FY2023, the self-forecasts (SF) produced marginally lower mean errors compared to AEMO's solar (ASEFS) and wind (AWEFS) forecasts.



Source: Panel analysis of AEMO data.

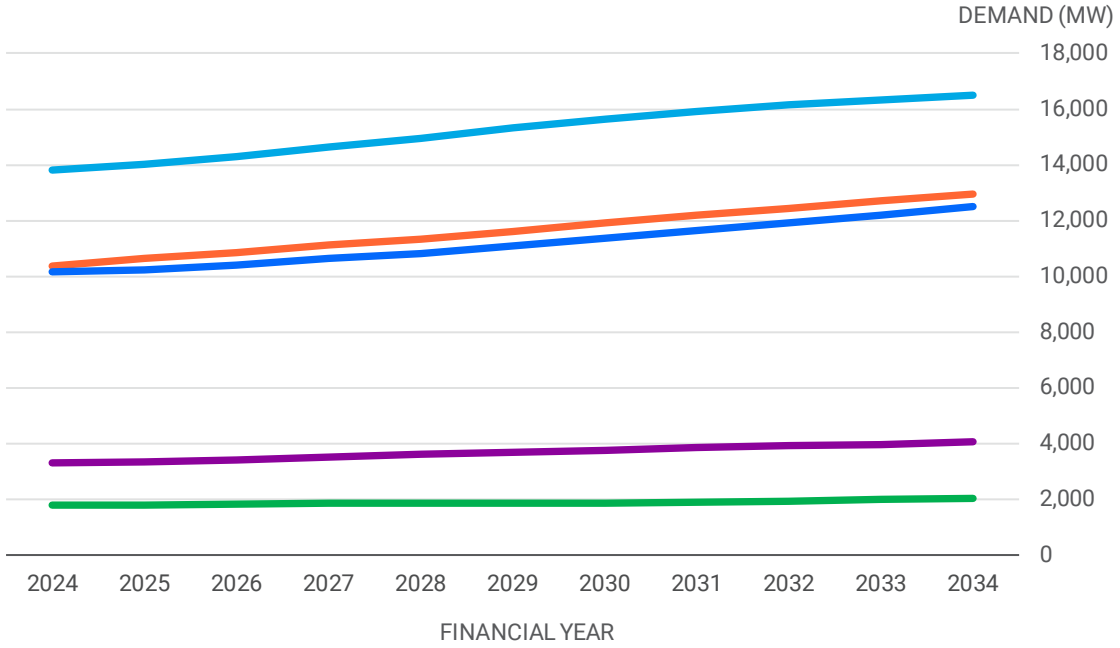


Source: Panel analysis of AEMO data.

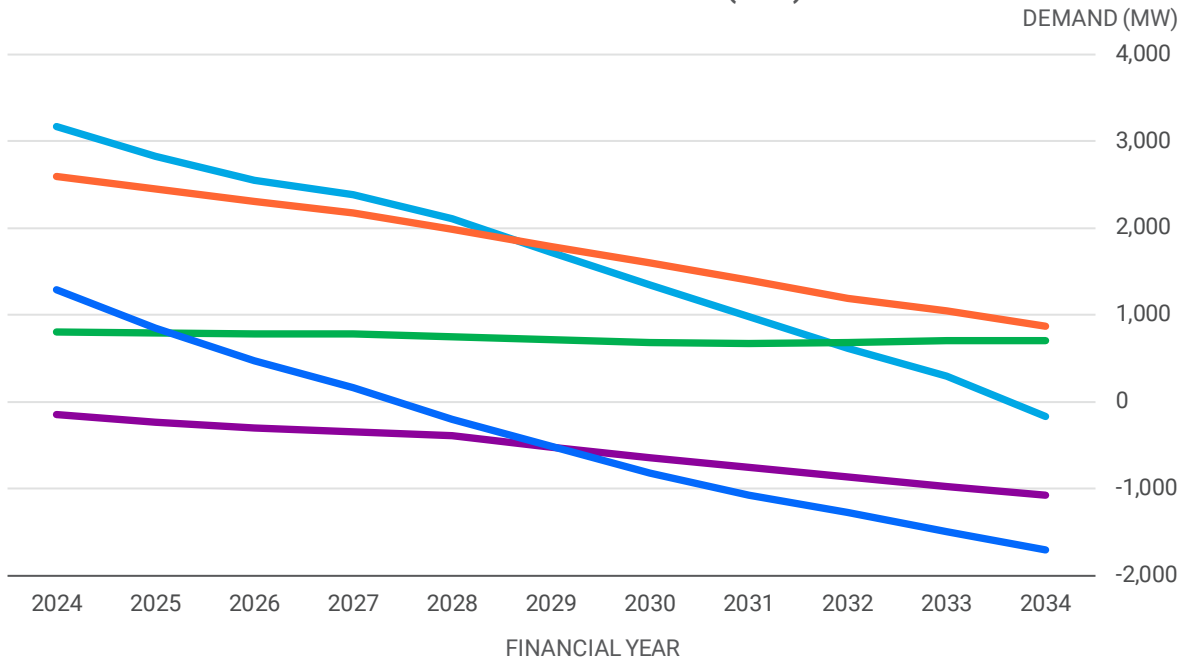
MINIMUM AND MAXIMUM OPERATIONAL DEMAND FORECASTS CONTINUE TO SEPARATE

- Minimum operational demand is often measured by a "POE90" forecast – the daily level of demand that would be exceeded 90% of the time. Conversely, a "POE10" forecast measures maximum demand – the daily demand that would be exceeded 10% of the time.
- The charts below show the global maximum and minimum demand forecasts provided in the 2023 ESOO.
- Minimum demand forecasts are expected to fall faster than maximum demand forecasts rise.
- Whilst SA is already experiencing 0MW demand days, VIC is expected to have minimum demands that fall below 0MW from FY2028.

ESOO maximum demand forecast POE10 scenario (MW)



ESOO minimum demand forecast POE90 scenario (MW)



Source: Panel analysis of AEMO data.

THE NEM MAY EXPERIENCE MINIMUM DEMAND PERIODS AT DIFFERENT POINTS OF THE YEAR

- In all NEM regions except TAS, maximum demand is forecast to occur during summer months. TAS is forecast to experience maximum demand periods during winter, when cooler weather drives the use of heating in the region.
- On the other hand, the lowest levels of demand are forecast to occur during autumn and spring in NSW and TAS, but will occur across the other seasons in other NEM regions. VIC expects to experience minimum demand levels during its summer months, whereas QLD is forecast to experience such levels in winter from FY2024 to FY2029, then in spring and autumn thereafter.

Season in which max demand occurs (POE10 scenario)

Year	NSW	QLD	SA	TAS	VIC
2024	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2025	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2026	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2027	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2028	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2029	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2030	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2031	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2032	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2033	SUMMER	SUMMER	SUMMER	WINTER	SUMMER
2034	SUMMER	SUMMER	SUMMER	WINTER	SUMMER

Source: Panel analysis of AEMO data.

Season in which min demand occurs (POE90 scenario)

Year	NSW	QLD	SA	TAS	VIC
2024	SHOULDER	WINTER	SHOULDER	SHOULDER	SUMMER
2025	SHOULDER	WINTER	SHOULDER	SHOULDER	SUMMER
2026	SHOULDER	WINTER	SHOULDER	SHOULDER	SUMMER
2027	SHOULDER	WINTER	SHOULDER	SHOULDER	SUMMER
2028	SHOULDER	WINTER	SUMMER	SHOULDER	SUMMER
2029	SHOULDER	WINTER	SHOULDER	SHOULDER	SUMMER
2030	SHOULDER	SHOULDER	SUMMER	SHOULDER	SUMMER
2031	SHOULDER	SHOULDER	SUMMER	SHOULDER	SUMMER
2032	SHOULDER	SHOULDER	SUMMER	SHOULDER	SUMMER
2033	SHOULDER	SHOULDER	SUMMER	SHOULDER	SUMMER
2034	SHOULDER	SHOULDER	SUMMER	SHOULDER	SUMMER

Source: Panel analysis of AEMO data.

SECTION 2.3

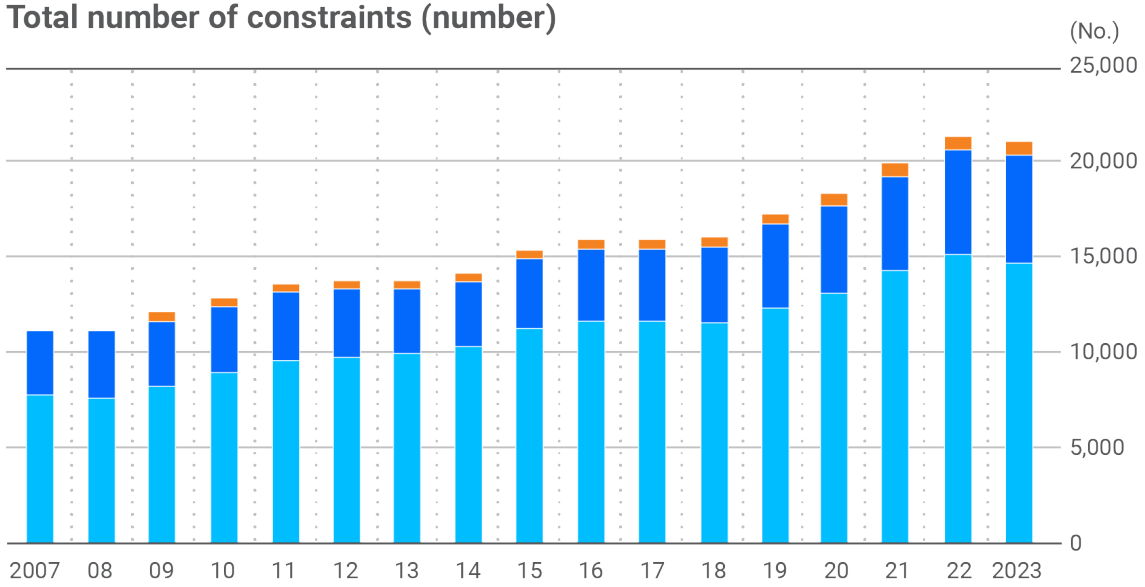
RELIABILITY EVENTS AND MARKET INTERVENTIONS

- While constraint changes remain stable from FY2022, there is an overall upward trend over the past decade.
- There is an increasing trend in LOR issuances which may be driven by increased volatility in reserve levels.
- RERT activations and reliability directions in FY2023 are low and have fallen to pre-FY2022 levels.

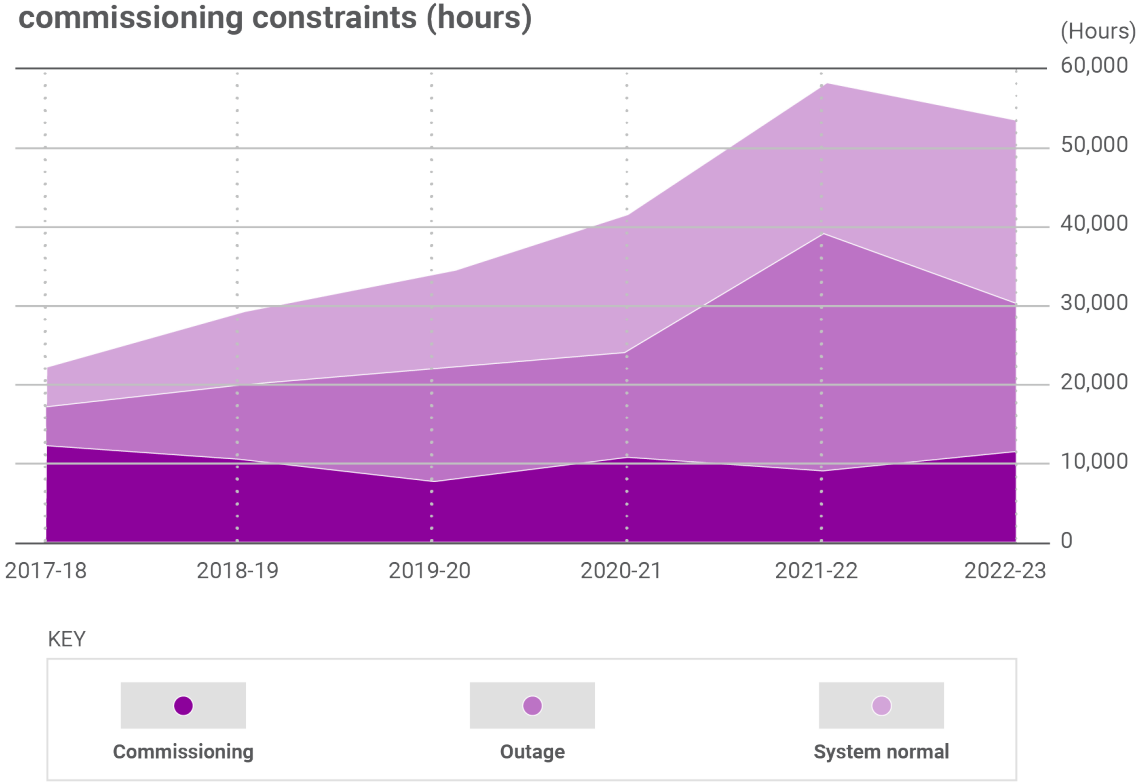
CONSTRAINT CHANGES WERE STABLE IN FY2022, BUT THERE IS STILL A CLEAR UPWARD TREND IN CONSTRAINTS OVER THE LAST DECADE

- The number of binding constraint hours in the NEM has fallen in FY2023.
- However, the total number of constraint changes and binding constraint hours has increased over the last decade. This increase reflects an increasingly complex NEM, with more inverter-based resources connecting to weaker parts of the network.
- There is work currently underway to consider reforms to transmission access in the NEM. AEMO has also recently published their first enhanced locational information report.[13]

Total number of constraints (number)



Binding hours of system normal, outage and commissioning constraints (hours)



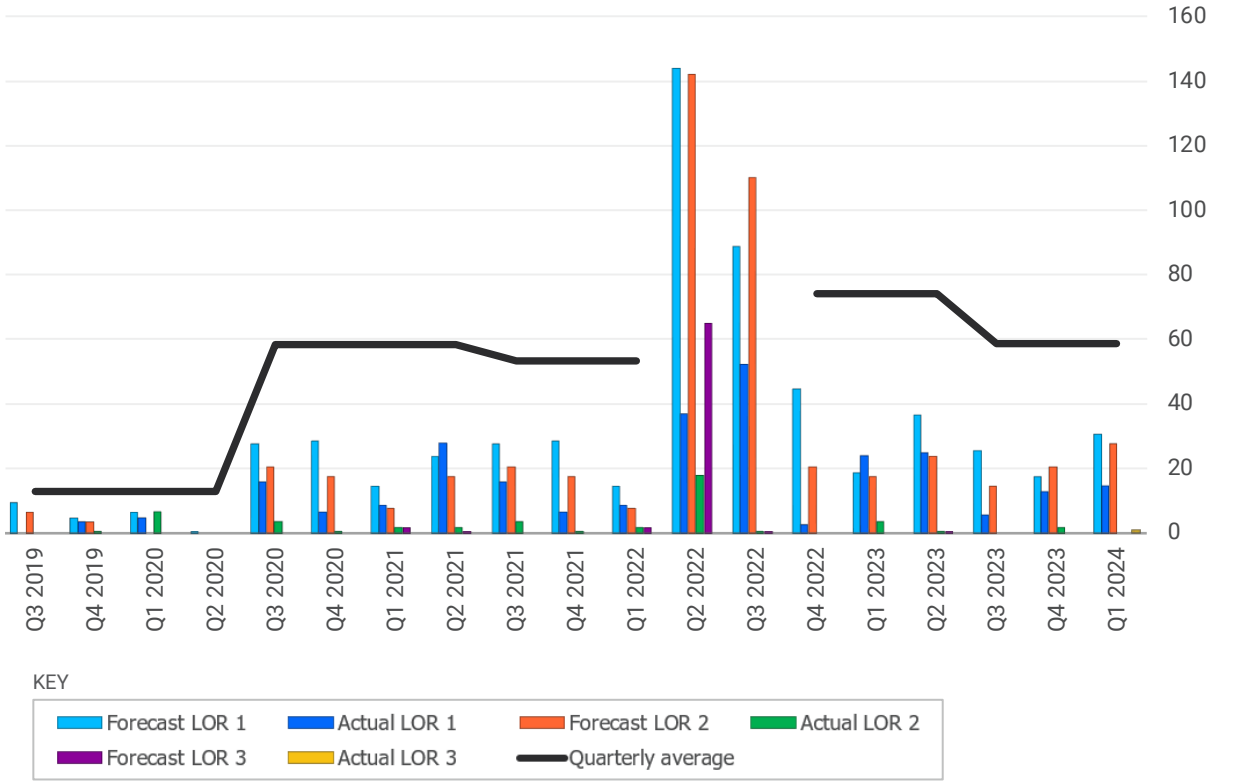
Source: Panel analysis of AEMO data.

13. 2024 enhanced locational information report. Available at: https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/enhanced-locational-information/2024-eli-report.pdf?la=en

WHILE LACK OF RESERVES NOTICES INCREASED, IT IS UNCLEAR IF THIS IS DUE TO INCREASED VOLATILITY IN OPERATIONAL SUPPLY OR DEMAND

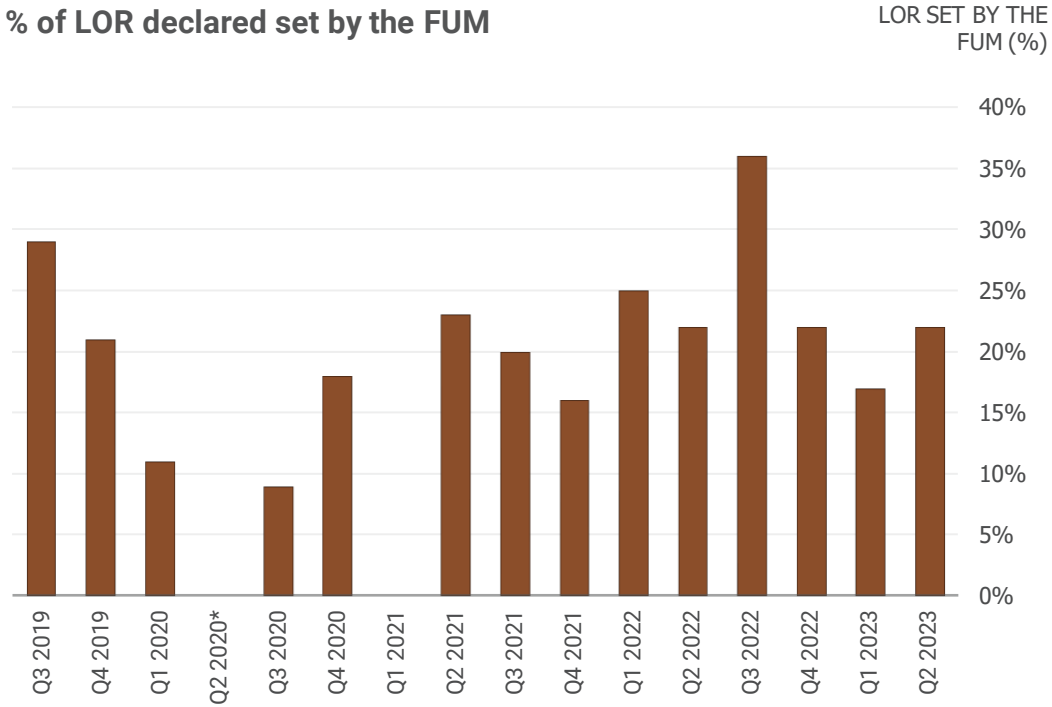
- Lack of reserve (LOR) declarations increased in FY2023, with an upward trend evident even when excluding the June 2022 market event.
- LOR1 and LOR2s are issued if reserve levels fall below the higher of: the largest credible contingency; or forecast uncertainty measure (FUM).
- LORs were driven by forecast reserve levels falling below the largest credible contingency thresholds, instead of the FUM.
- AEMO has recently updated its reserve level declaration guidelines, which includes an update to how its FUM operates.[14]
- We note that LOR declarations over FY2024-to-date reduced compared to FY2023.

LOR by quarter



Source: Panel analysis of AEMO data.

% of LOR declared set by the FUM



Source: Panel analysis of AEMO data.

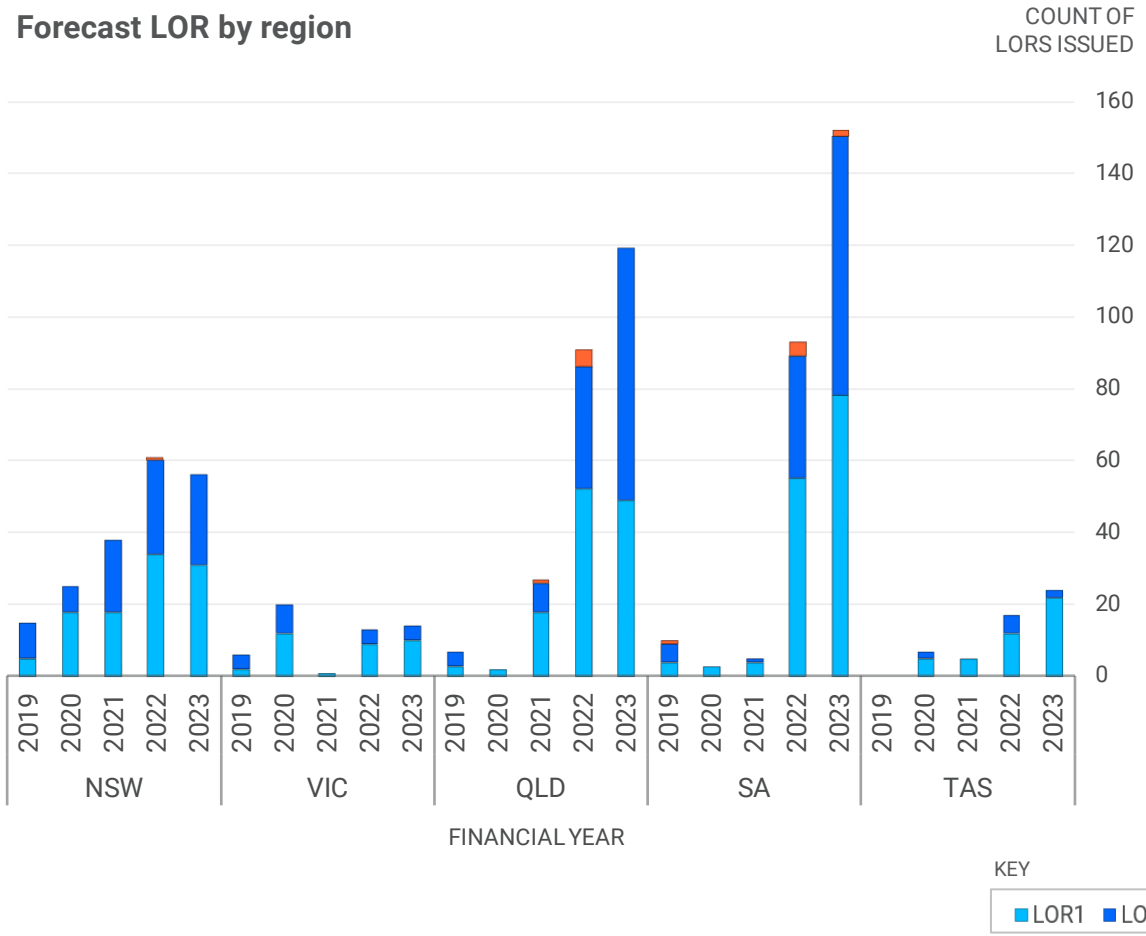
*In Q2 2020 there was only one LOR declared, which was set by the FUM. This has been excluded from the chart as it would skew the results.

14. For further information on the update to the reserve level declaration guidelines, https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/changes-to-reserve-level-declaration-guidelines/

ALL NEM REGIONS EXCEPT VIC HAVE EXPERIENCED AN UPWARD TREND IN LOR DECLARATIONS

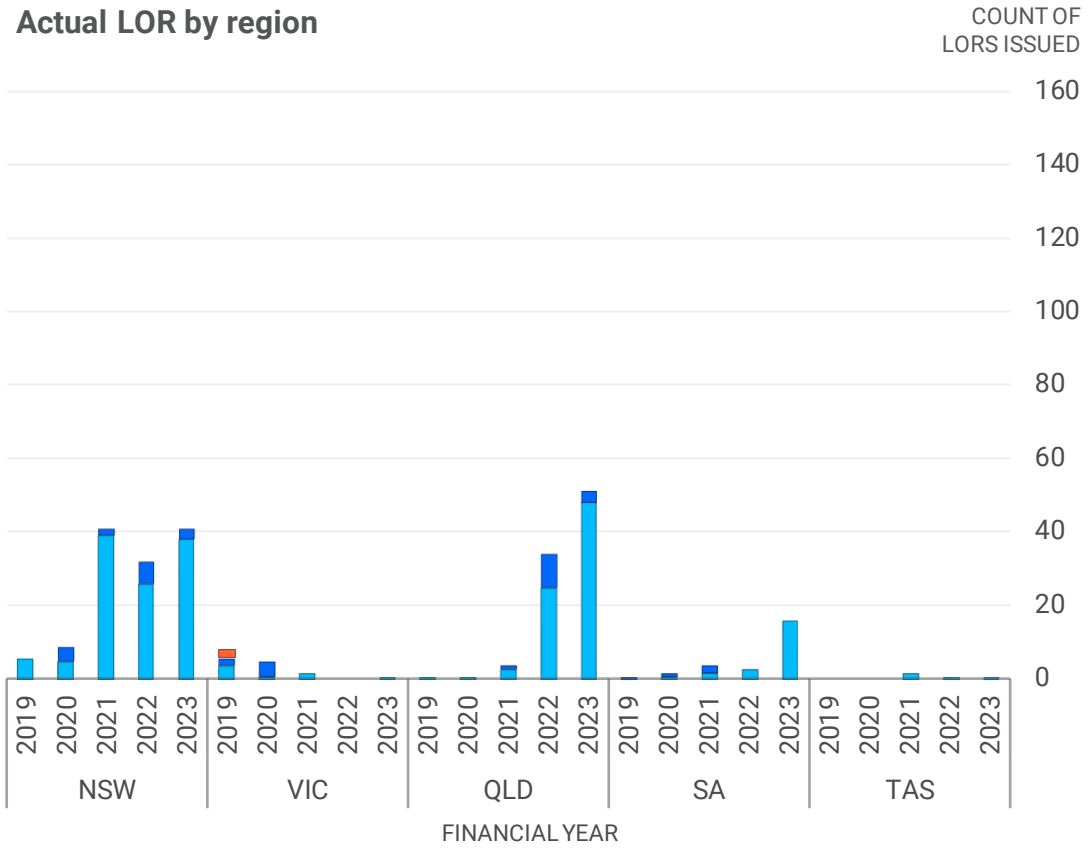
- There is an upward trend of LOR declaration issued in all NEM regions except VIC.
- The issuance of LOR notices has grown most in QLD and SA from FY2022 to FY2023.
- As noted in the previous slide, the sudden increase in LOR notices in FY2022 and FY2023 was due to the need for AEMO to intervene in the market in the lead-up to and following the 2022 June APC event.

Forecast LOR by region



Source: Panel analysis of AEMO data.

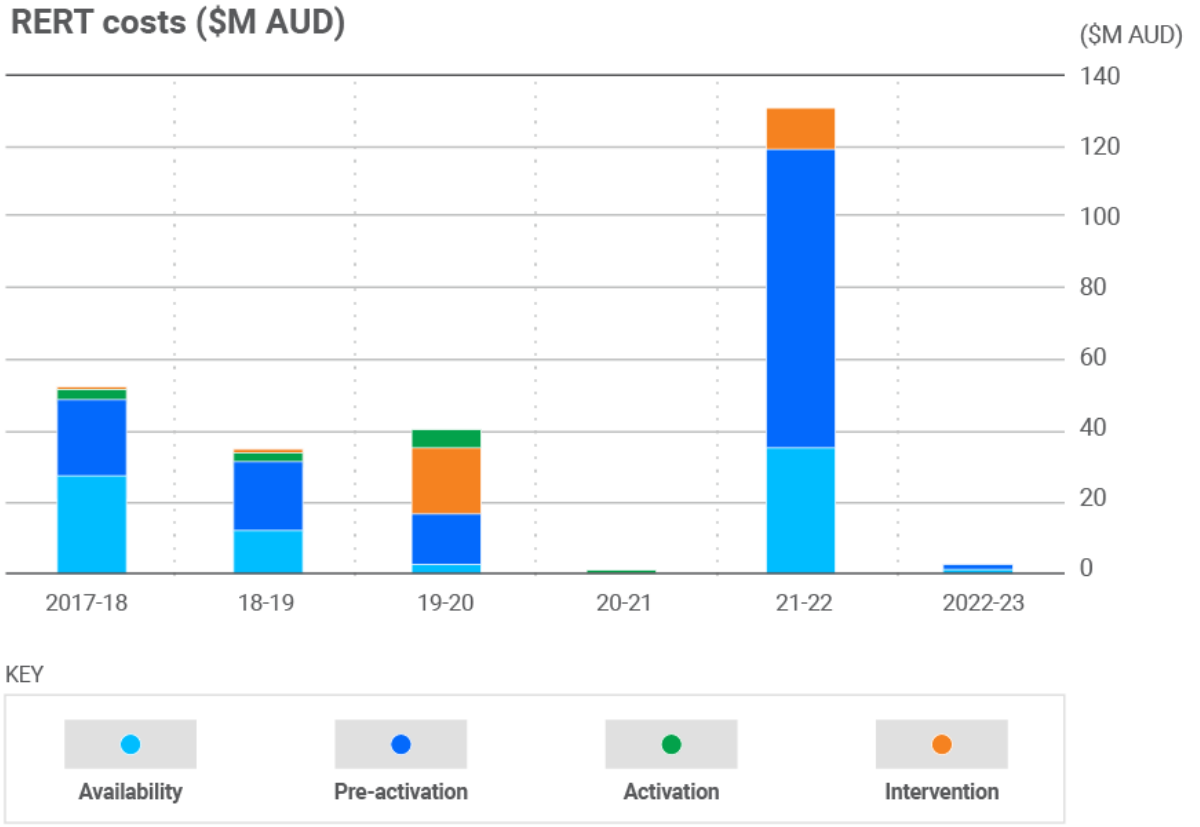
Actual LOR by region

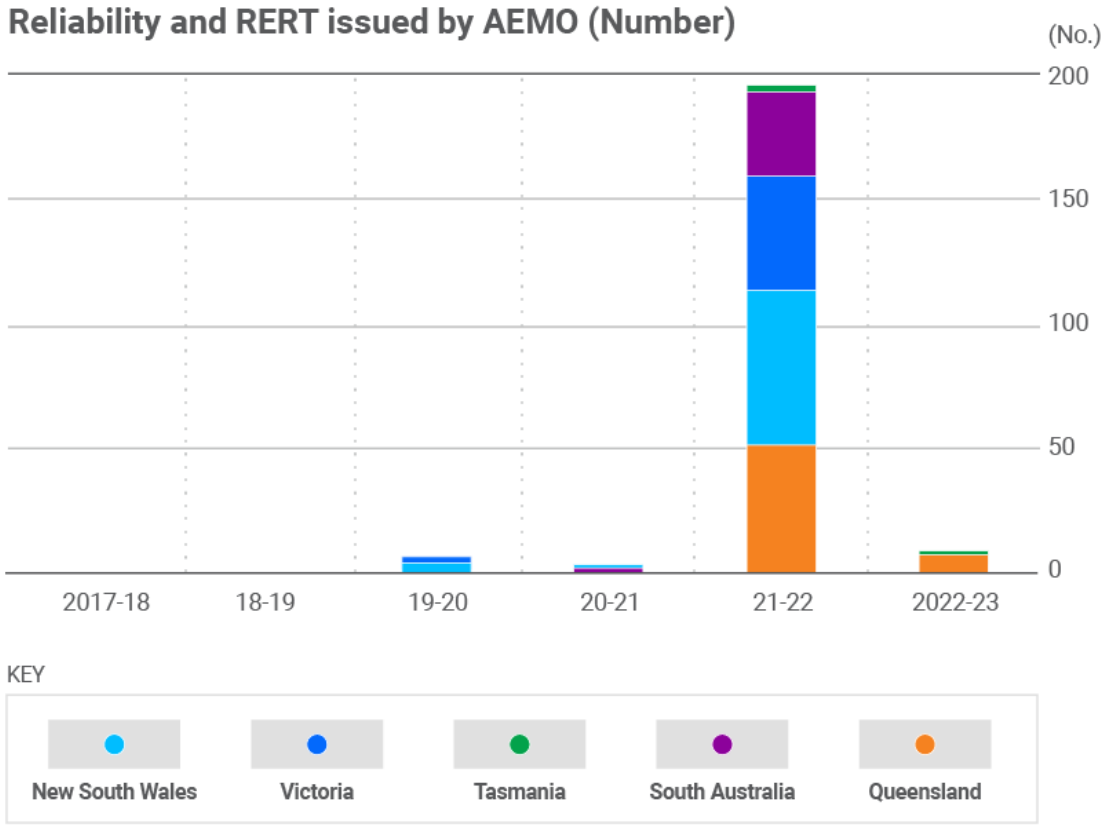


Source: Panel analysis of AEMO data.

RERT ACTIVATIONS AND RELIABILITY DIRECTIONS RETURNED TO PRE-FY2022 LEVELS

- Reliability and emergency reserve trader (RERT) costs and reliability directions have fallen significantly from FY2022, and were also low compared with recent years. There were only two RERT activations in FY2023.[15] This suggests that other market signals and intervention mechanisms were effective.
- FY2022 was an abnormally high year for RERT activations and reliability directions due to the June 2022 administered pricing event.





Source: Panel analysis of AEMO data.

15. For further information on the RERT activations see https://aemo.com.au/-/media/files/electricity/nem/emergency_management/rert/2023/rert-end-of-financial-year-report-2022-23.pdf?la=en

SECTION 2.4

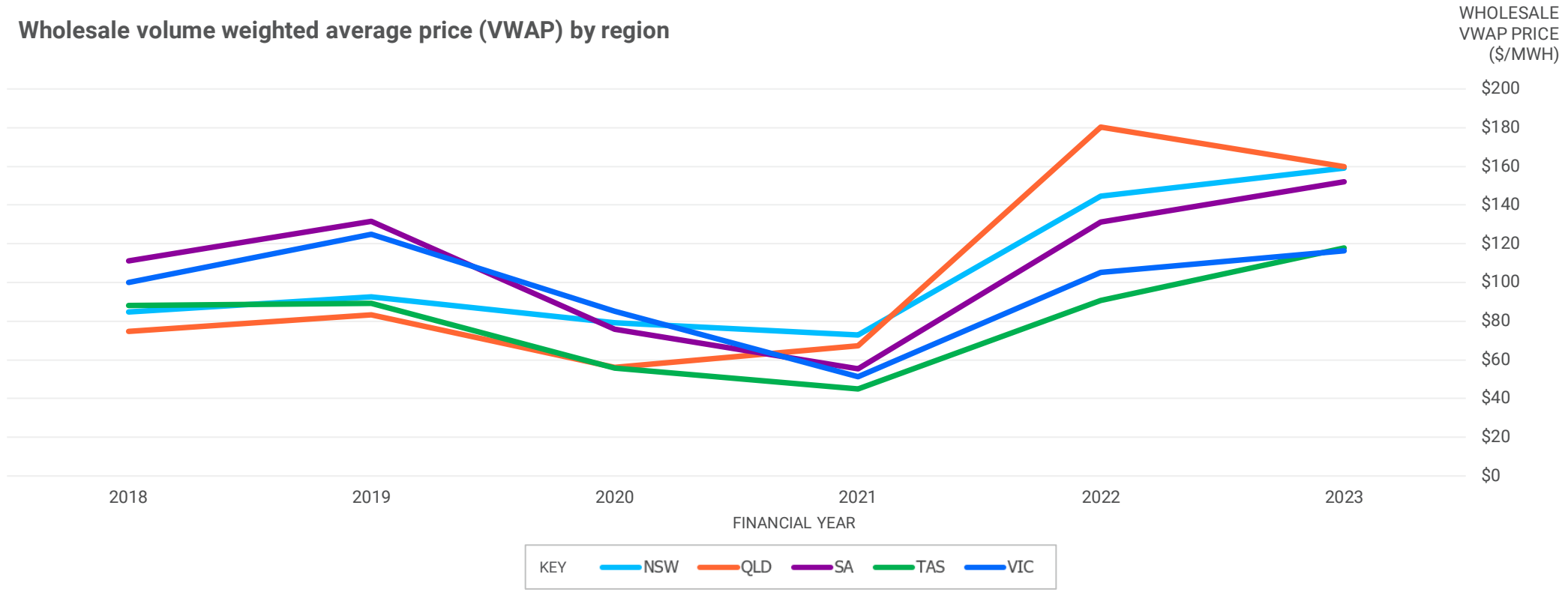
MARKET PRICE SIGNAL AND INVESTMENT INCENTIVES

- Wholesale electricity prices increased in all NEM regions besides QLD.
- The number of market price cap and market price floor events declined.
- The proportion of negative prices is growing with higher levels of renewables.
- Distributed Network Service Providers' (DNSPs) responses to network outages continued to improve.

WHOLESALE PRICES INCREASED OVER FY2023, PARTLY DUE TO THE FLOW-ON IMPACTS OF THE JUNE-2022 MARKET SUSPENSION

- Wholesale market prices have risen by 35% across all NEM regions since 2019, on a volume-weighted basis.
- The steepest increase over this period was over FY2022, where geopolitical conditions gave rise to high energy prices, resulting in an administered price period (APP) in June 2022. The June 2022 APC is explored in more detail in the FY2022 AMPR.[16]
- The flow-on impacts of the APC period carried into early FY2023, before prices returned to pre-FY2022 levels in the final two quarters of FY2023.
- While wholesale prices were 11% lower in QLD in FY2023, this reflects that QLD saw the largest increase in prices in FY2022.
- Prices were 10-20% higher in FY2023 across other NEM regions.

Wholesale volume weighted average price (VWAP) by region

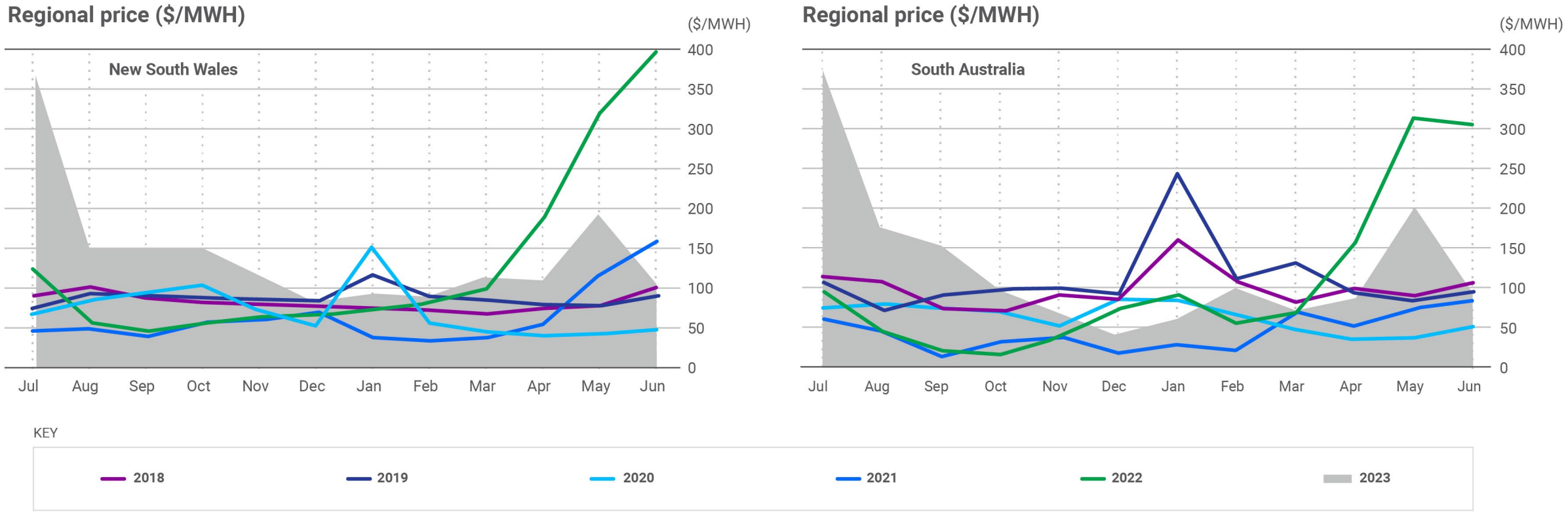


Source: Panel analysis of AEMO MMS data via NEOPoint.

16. AEMC, 2022. AMPR final report. https://www.aemc.gov.au/sites/default/files/2023-03/2022%20Annual%20Market%20Performance%20Review%20%28Clean%29.pdf

WHOLESALE PRICES WERE HIGHER IN NSW AND SA OVER FY2023

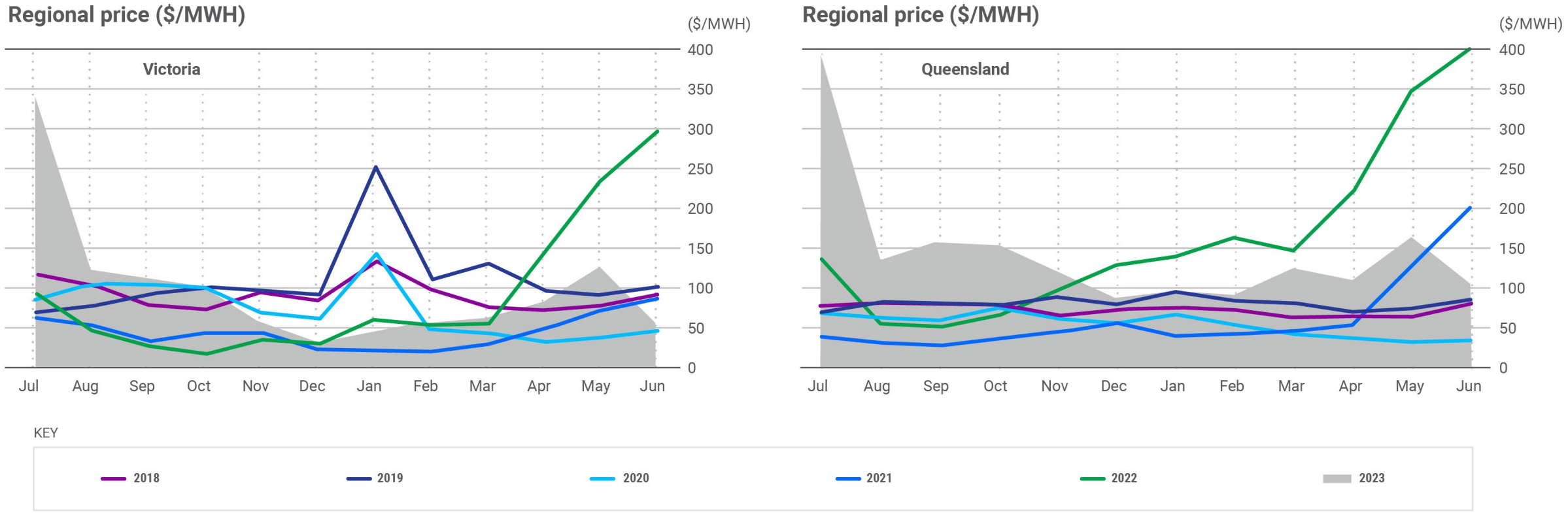
- NSW prices saw a 10% weighted average growth in prices across FY2023 from FY2022. This in part was driven by the fallout from the June 2022 market suspension which increased prices in July 2022.
- SA prices showed similar trends, rising 16% on average from FY2022.



Source: Panel analysis of AEMO MMS data via NEOPoint.

WHOLESALE PRICES WERE HIGHER IN VIC

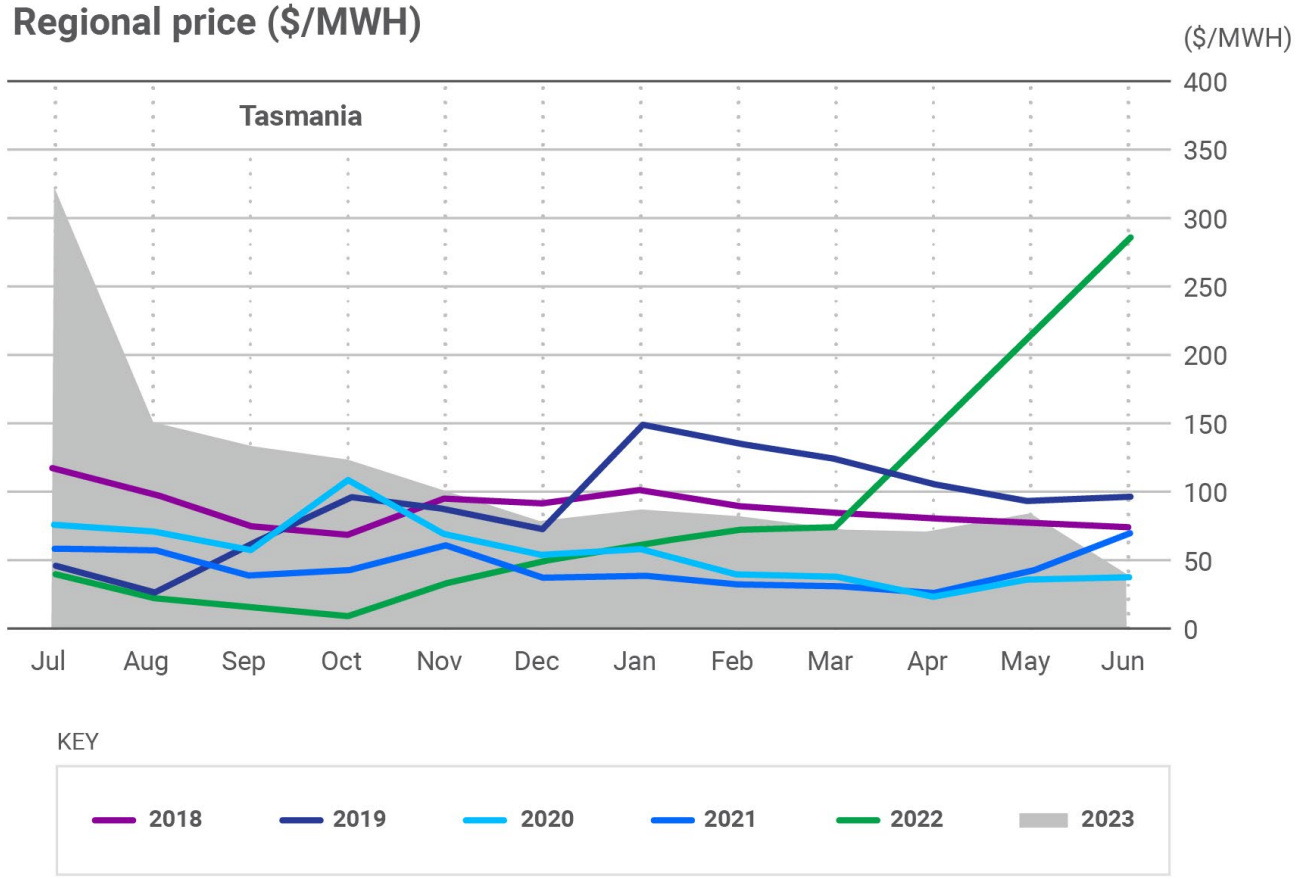
- VIC prices saw a 11% average growth in prices across FY2023 from FY2022, similar to NSW and SA.
- While QLD prices, fell 11% on average from FY2022, this reflects that it had the largest increase in prices in FY2022.



Source: Panel analysis of AEMO MMS data via NEOPoint.

WHOLESALE PRICES WERE HIGHER IN TAS, BUT TRENDED DOWN OVER FY2023

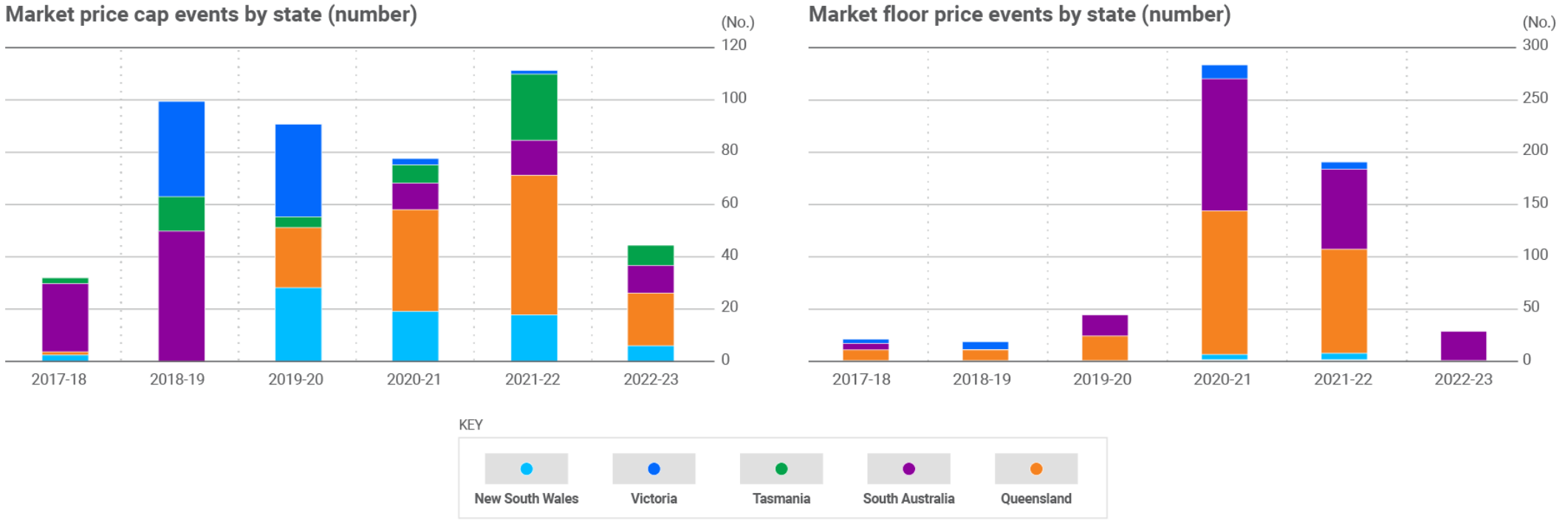
- TAS prices saw the largest increase in regional price, up 30% from FY2022, having experienced a smaller-than-average increase in prices over FY2022.
- The impacts of the June 2022 event were observed in market prices from April 2022 until December 2022.



Source: Panel analysis of AEMO MMS data via NEOPoint.

MARKET PRICE EVENTS FELL OVER FY2023 TO PRE-2021 LEVELS AS VOLATILITY REDUCED

- Market price cap and market floor price events have significantly fallen in FY2023, from previous financial years, as the impact of market volatility over June 2022 dissipated.
- The market cap is indexed annually (was $15,500/MWh in FY2023 and $16,600/MWh in FY2024). The market floor price is not indexed and remained at -$1,000 in FY2023. Following the June 2022 market event, the AEMC made a final rule to increase the APC from $300/MWh to $600/MWh, from 1 December 2022 to 30 June 2025. The APC is scheduled to revert to $300/MWh thereafter.
- The AEMC then made a final rule in December 2023 to amend the market price settings from 1 July 2025 to 30 June 2028 such that the market price cap (MPC) and cumulative price threshold (CPT) progressively increase over time.[17] This final rule also maintained the APC at $600/MWh.



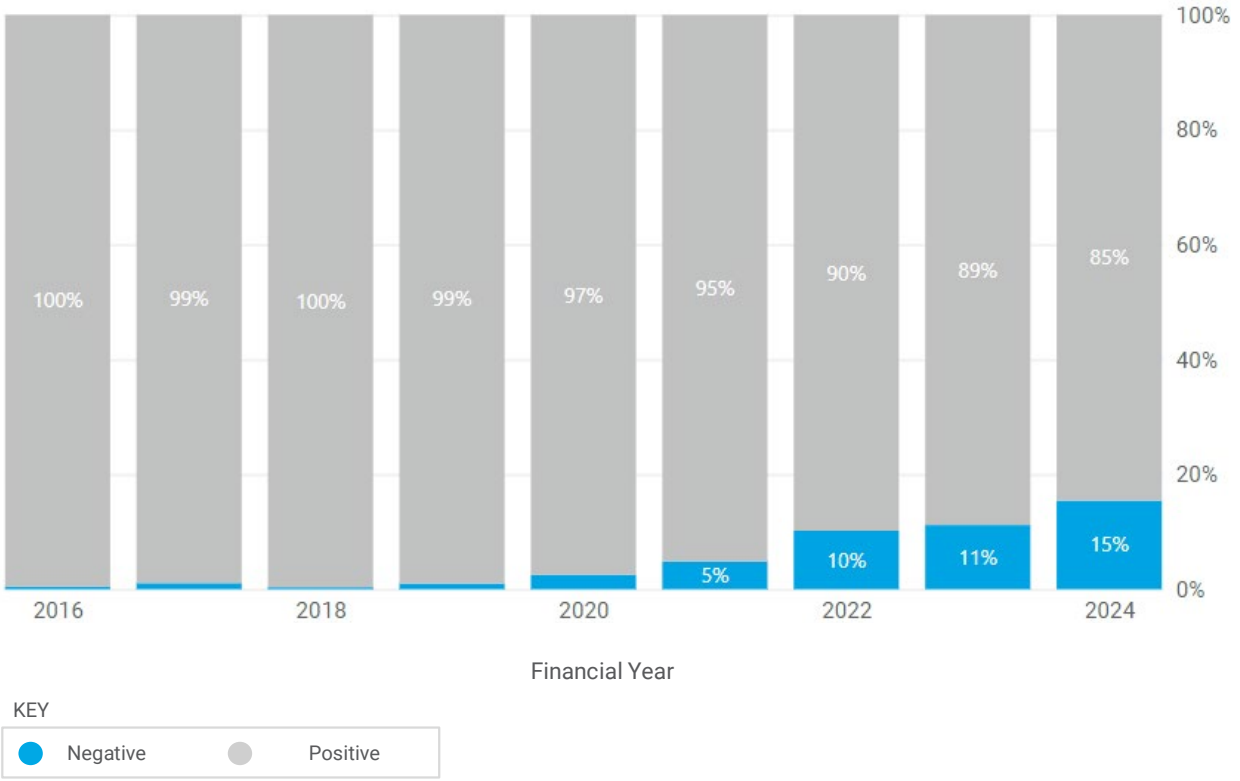
Source: Panel analysis of AEMO MMS data via NEOPoint.

17. For further information on the final rule see: https://www.aemc.gov.au/rule-changes/amendment-market-price-cap-cumulative-price-threshold-and-administered-price-cap.

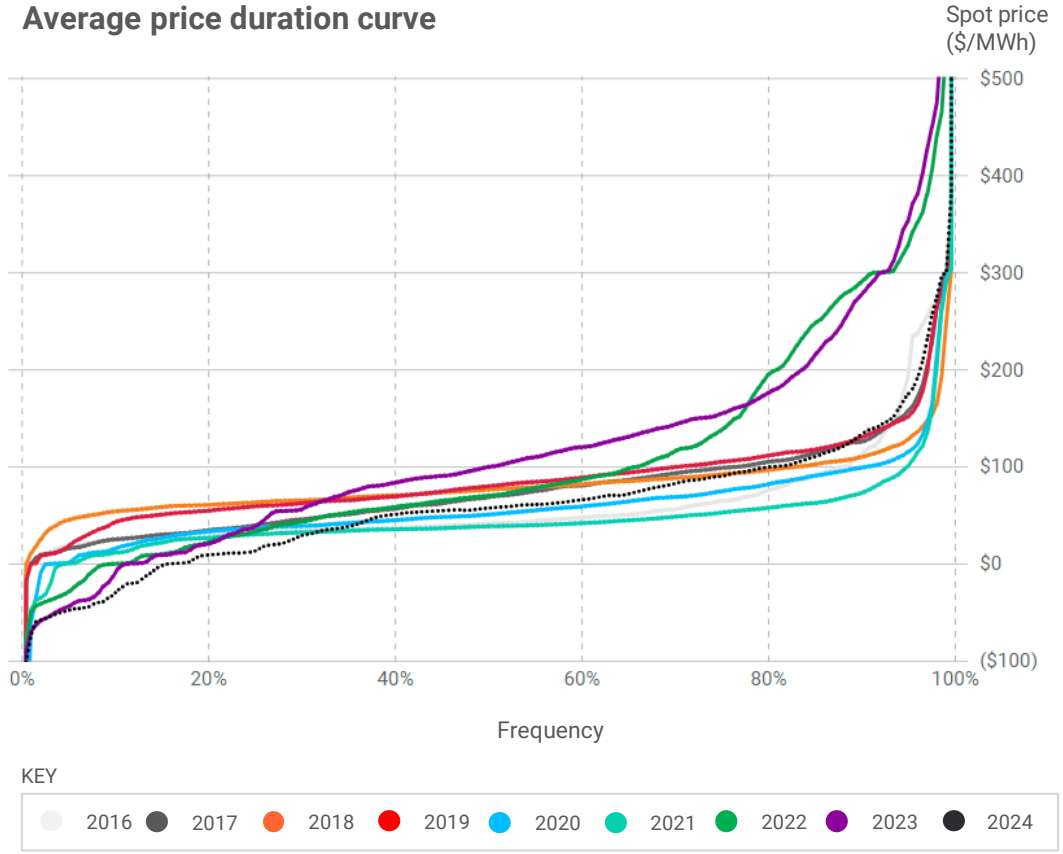
THE PROPORTION OF NEGATIVE PRICE PERIODS CONTINUED TO INCREASE

- The proportion of negative prices in the NEM increased over FY2023, with negative prices occurring in 11% of all dispatch periods.
- This reflects increased renewable generation and rooftop PV in the NEM, with the trend continuing over FY2024-to-date.

Percentage of intervals at negative prices across the NEM (%)



Average price duration curve

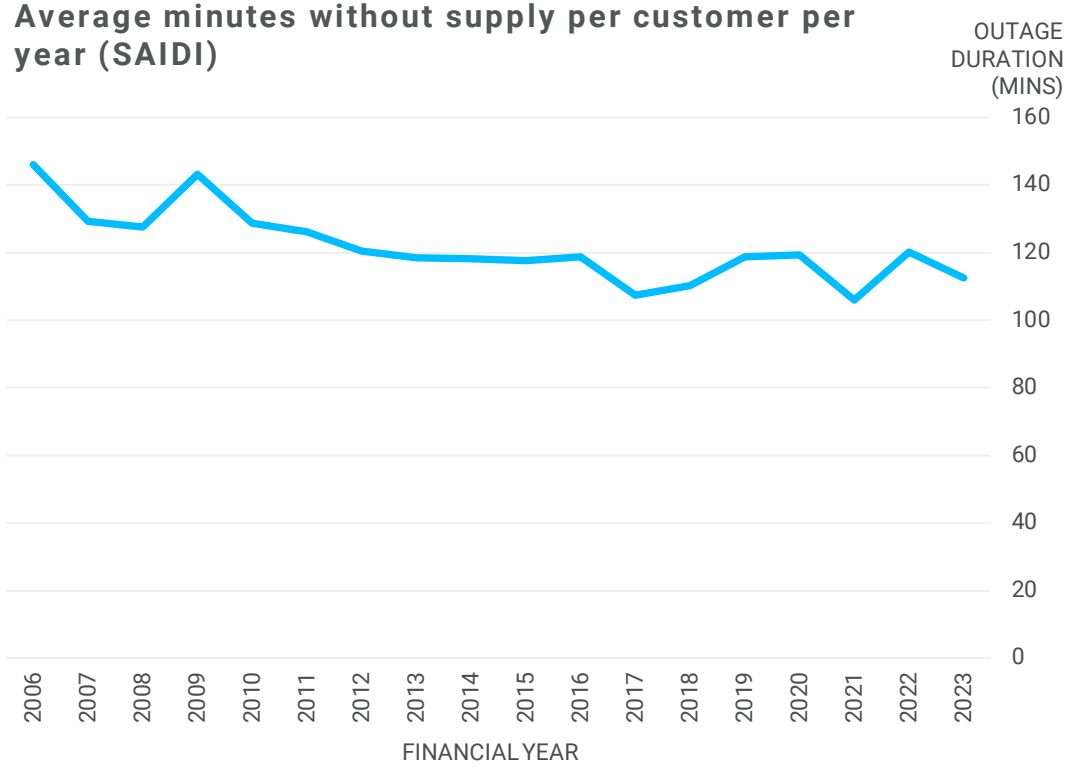


Source: Panel analysis of AEMO MMS data via NEOPoint.

DNSP PERFORMANCE CONTINUES TO IMPROVE WITH SAIDI AND SAIFI FALLING OVER TIME

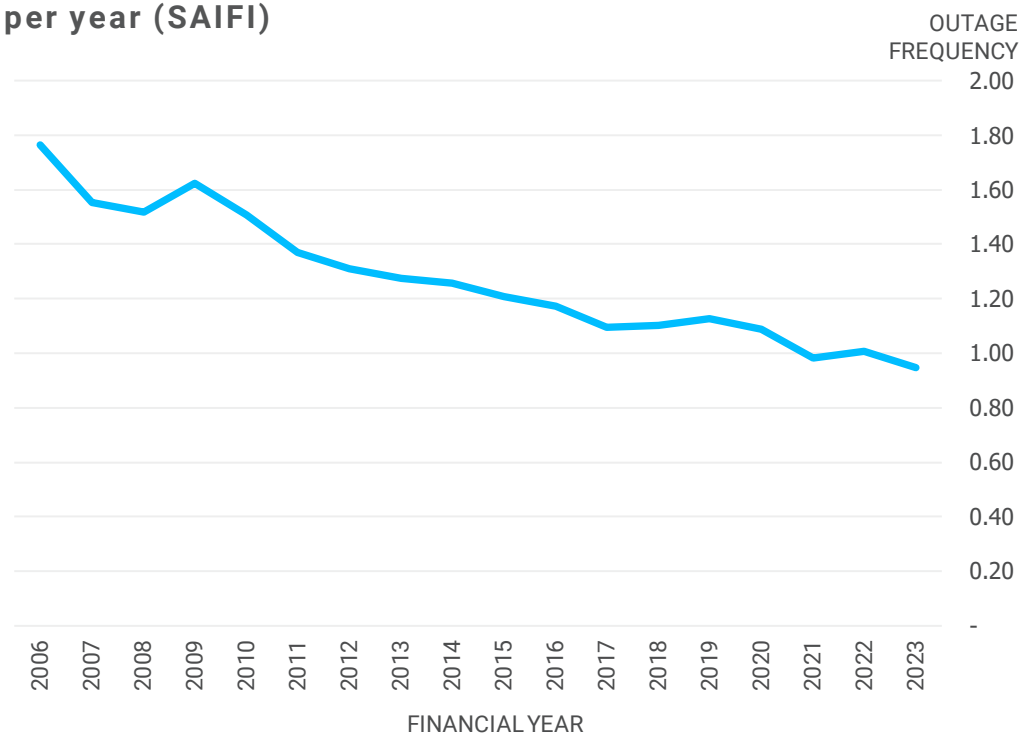
- System average interruption duration index (SAIDI) and system average interruption frequency index (SAIFI) are two important indicators of distribution network reliability.
- SAIDI indicates the average number of minutes of outages that each customer served by the DNSP experiences while SAIFI indicates the average number of outages for each customer served by the DNSP.
- The Panel noted DNSPs with more consumers trended down at a slower rate over time for both SAIDI and SAIFI, compared to DNSPs with fewer consumers.

Average minutes without supply per customer per year (SAIDI)



Source: Panel analysis of AER data.

Average number of interruptions per customer per year (SAIFI)



Source: Panel analysis of AER data.

THE CAPACITY INVESTMENT SCHEME AND ENSURING LONG TERM RELIABILITY OF THE POWER SYSTEM

While system reliability performance was largely acceptable in FY2023, there are a number of trends suggesting a need to ensure the right mix of assets are available to effectively ensure system reliability outcomes as the system transitions.

The Capacity Investment Scheme (CIS) provides a national framework to encourage new investment in renewable capacity, such as wind and solar, as well as clean dispatchable capacity, such as battery storage.[18]

The Australian Government will provide revenue underwriting for successful CIS tender projects, with an agreed revenue 'floor' and 'ceiling'. This will provide a long-term revenue safety-net that decreases financial risks for investors and encourages more investment when and where it is needed.

On 23 November 2023, the Australian Government announced an expansion of the Capacity Investment Scheme to target a total of 32 GW of new capacity nationally, made up of:

- 23 GW of renewable capacity representing $52 billion in investment
- 9 GW of clean dispatchable capacity representing $15 billion in investment (an additional 7.9 GW to the 1.1 GW already in progress through the first stage of the CIS).

18. For more information on the CIS, refer to https://www.dcceew.gov.au/energy/renewable/capacity-investment-scheme

3

SECURITY PERFORMANCE

SECTION 3.1

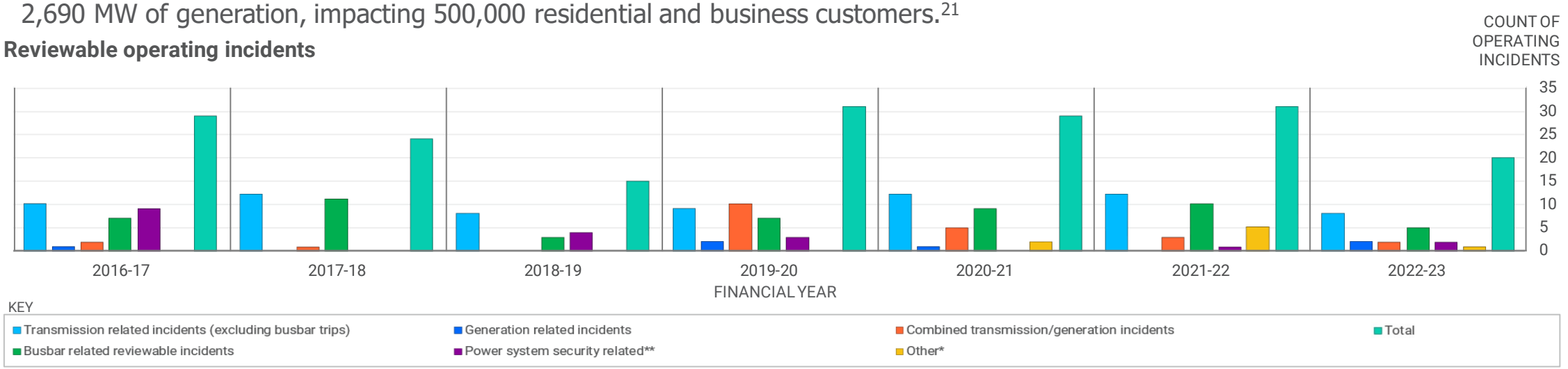
POWER SYSTEM SECURITY INCIDENTS AND RISK MANAGEMENT

- The number of system incidents remained steady over FY2023.
- Reviewable operating incidents fell slightly in FY2023; but this trend may reverse with an increasing frequency of severe weather events.

REVIEWABLE OPERATING INCIDENTS FELL IN FY2023, BUT THIS MAY BE A TEMPORARY TREND

- The total number of reviewable operating incident fell from FY2022 to FY2023. There was a fall across all categories, except 'generation related incidents' which included two incidents – the trip of New England Solar Farm transformers and the Newport 220kV bus trip.[19,20] However, AEMO updated the reviewable operating incident guidelines on 29 September 2022, which impacts the classification of events between pre-FY2022 to FY2023.
- The major security event in the NEM in FY2023 was the SA separation event. The loss of transmission lines during a major weather event resulted in SA and parts of Western Victoria being separated from the NEM.
- It is expected severe weather events will continue to increase in frequency and severity, increasing the likelihood of security incidents.
- More recently, on 13 February 2024, strong wind conditions resulted in the collapse of six 500kV towers in Victoria, resulting in the loss of 2,690 MW of generation, impacting 500,000 residential and business customers.[21]

Reviewable operating incidents



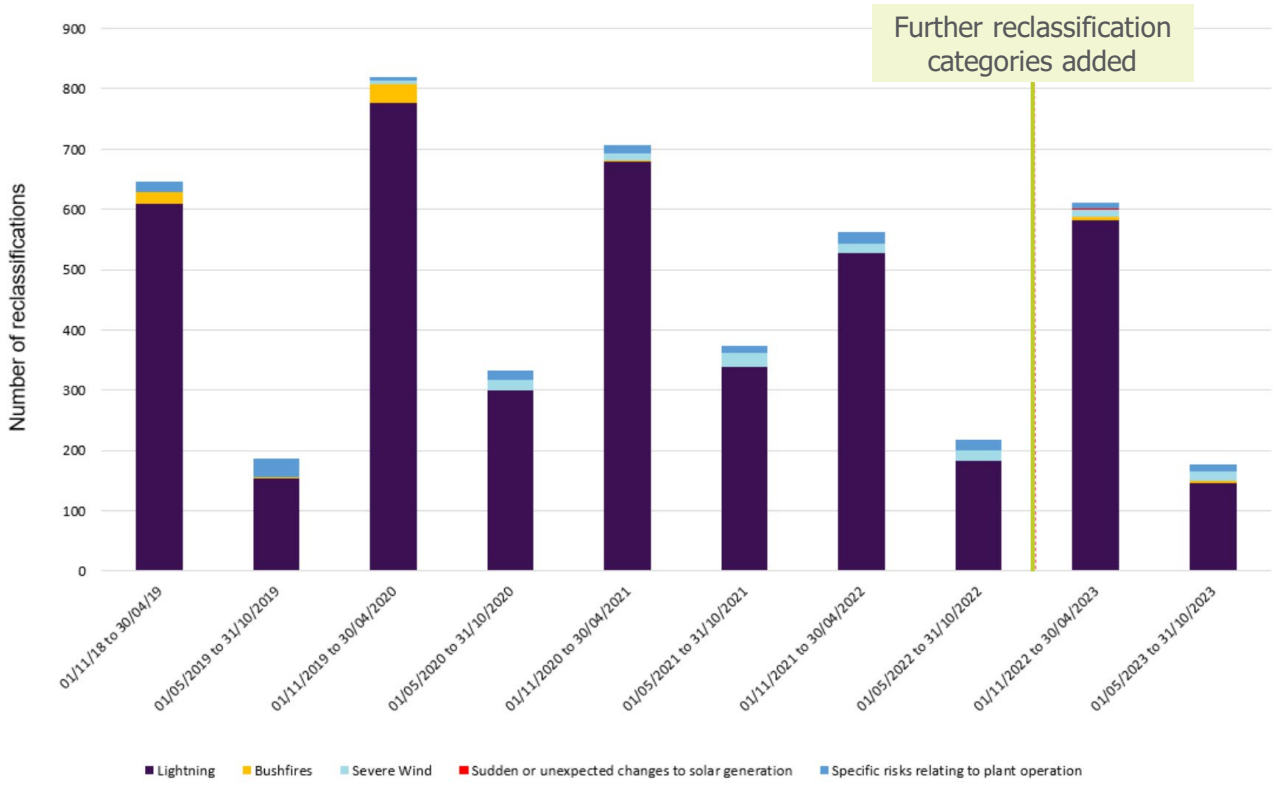
Source: Panel analysis of AEMO data.
*Events where the system was not in a secure operating state for greater than 30 minutes.
**The power system security category is not mutually exclusive with other categories, a total cannot be derived by summing the number of events in each category.
Note: AEMO updated the reviewable operating incident guidelines on 29 September 2022.

19. For further information on the New England Solar Farm transformer trip incident, see: https://aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/power_system_incident_reports/2022/trip-of-new-england-sf-transformers-1-and-2-on-05-october-2022.pdf?la=en.
20. AEMO publishes its incident reports on its website. See: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-events-and-reports/power-system-operating-incident-reports#:~:text=AEMO%20conducts%20investigations%20of%20'unusual,as%20%22credible%20contingency%20events%22.
21. For further information on this incident, see: https://aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/power_system_incident_reports/2024/preliminary-report---loss-of-moorabool---sydenham-500-kv-lines-on-13-feb-2024.pdf?la=en

WINTER SAW A SIGNIFICANT REDUCTION IN RECLASSIFIED EVENTS, WITH LIGHTNING CONTINUING TO DRIVE THE TOTAL NUMBER OF RECLASSIFICATIONS

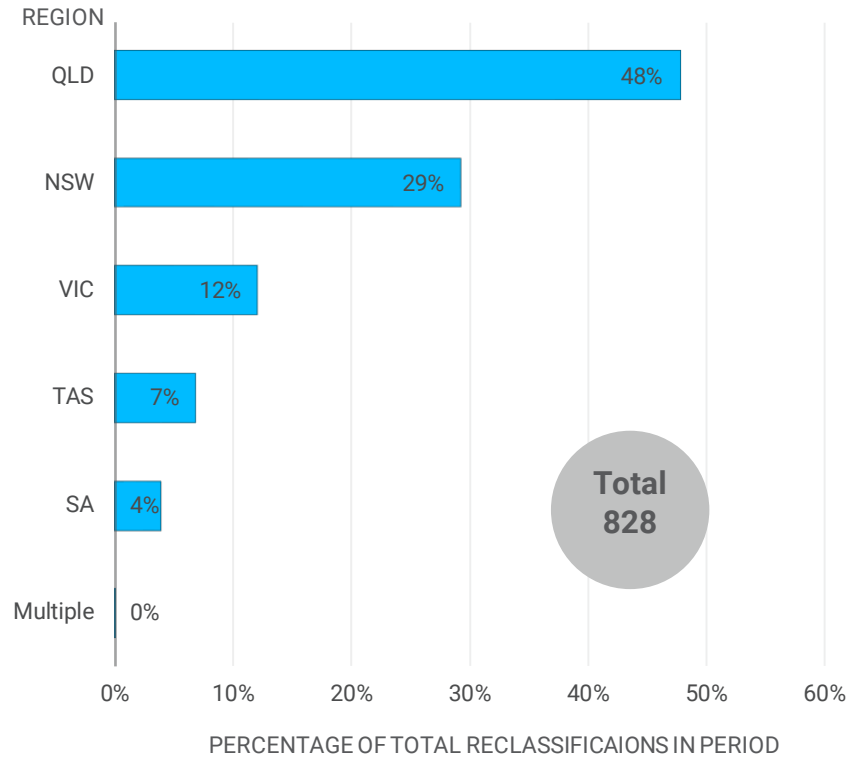
- From 1 May 2022 to 30 April 2023, there were a total of 828 reclassified events, most of which were caused by lightning (763), and a smaller number caused by severe weather (32).[22]
- From 9 March 2023, further reclassification categories were included into the reclassification criteria.
- While lightning dominates the number of reclassifications, the Panel does not consider trends in the number of lightning-related reclassifications to materially indicate changes in the NEM's power system security risk profile.

Number of reclassification events



Source: AEMO, Review of Power System Reclassifications – 1 May 2023 to 31 October 2023.

Reclassifications per region



Source: Panel analysis of AEMO Review of Power System Reclassifications – 1 May 2022 to 30 April 2023 data

22. AEMO's reporting period for reclassification events differs from the Panel's review year.

SECTION 3.2

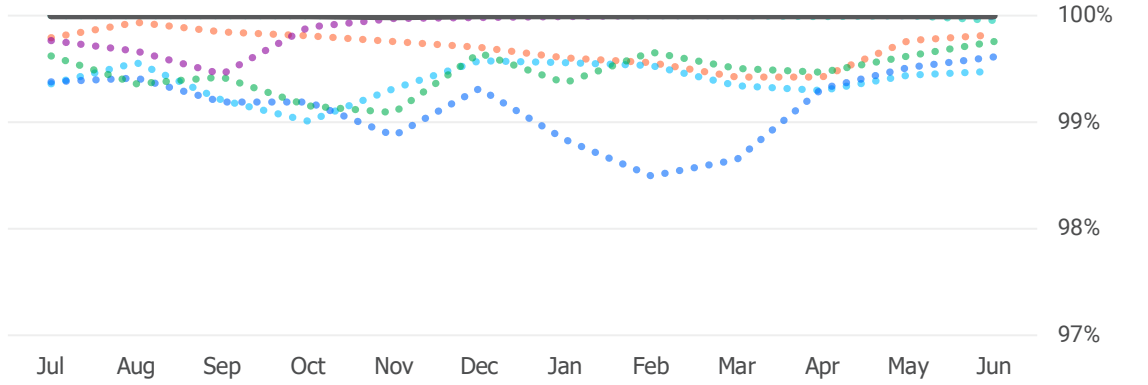
FREQUENCY PERFORMANCE

- Frequency continued to operate within the frequency operating standard (FOS) in mainland regions, with frequency stability improving marginally from FY2022.
- TAS operated 43.5 hours outside the NOFB in FY2023.

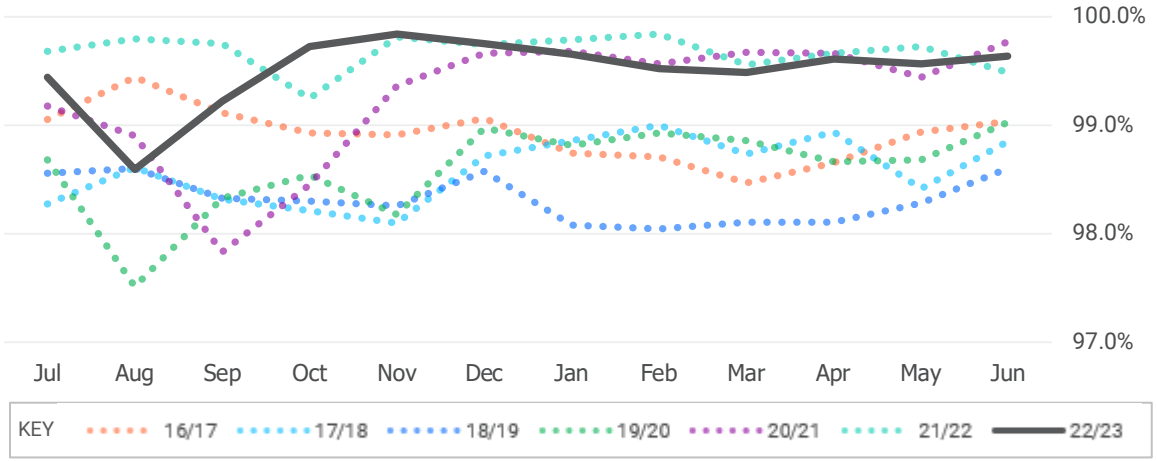
FREQUENCY CONTINUED TO OPERATE WITHIN THE FOS IN MAINLAND REGIONS THROUGHOUT FY2023

- Mainland frequency continued to operate within the normal operating frequency band (NOFB) throughout FY2023.
- Tasmania saw a substantial increase in NOFEB without an associated contingency event from Q4 2022 to Q1 2023. Most instances were linked to Basslink operating at its import limit of 450MW, or in its 'no-go zone' of operation between 50MW import and 50MW of export
- The Reliability Panel revised the frequency operating standard (FOS) last year, with the updated standard taking effect on 9 October 2023

Mainland

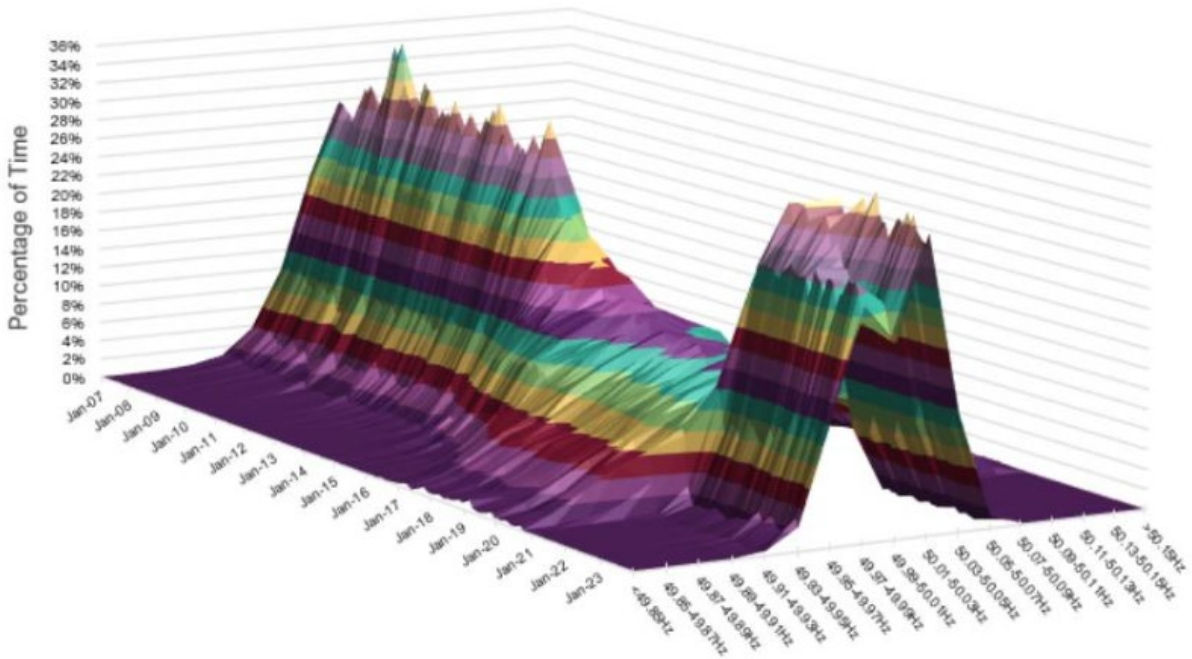


Tasmania



Source: Panel analysis of AEMO data.

Monthly mainland frequency distribution



Source: AEMO Frequency and Time Error Monitoring – Quarter 1 2024

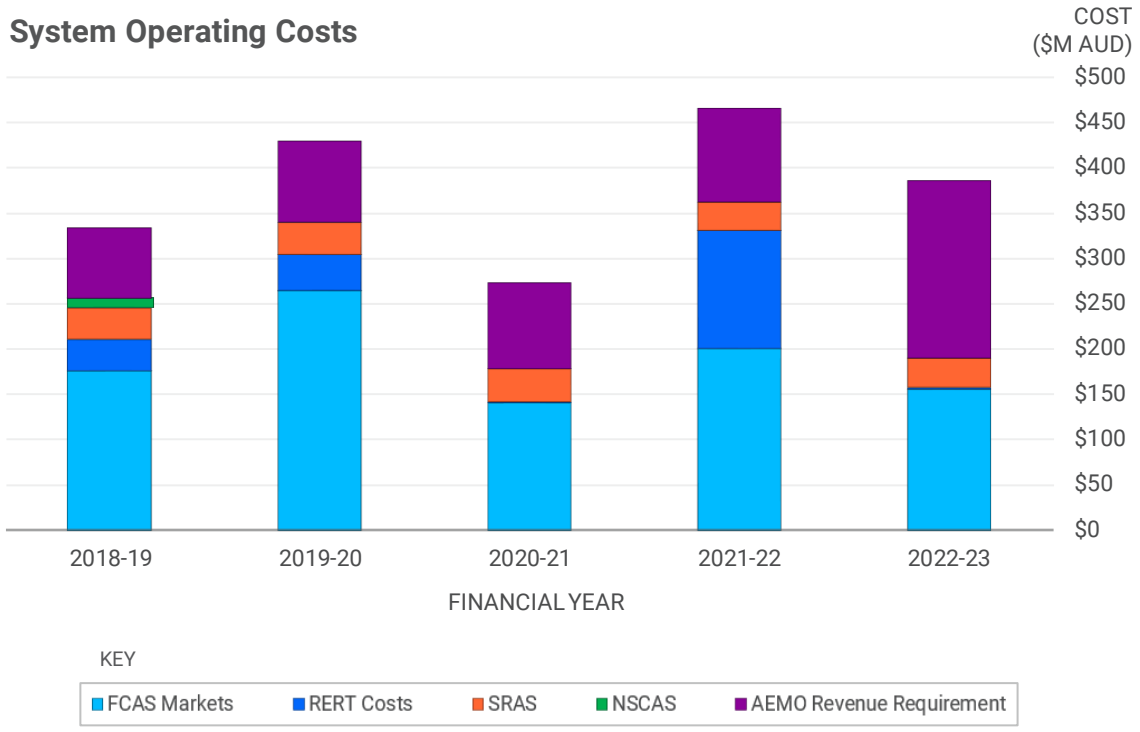
SECTION 3.3

SYSTEM SERVICES PROCUREMENT AND USE

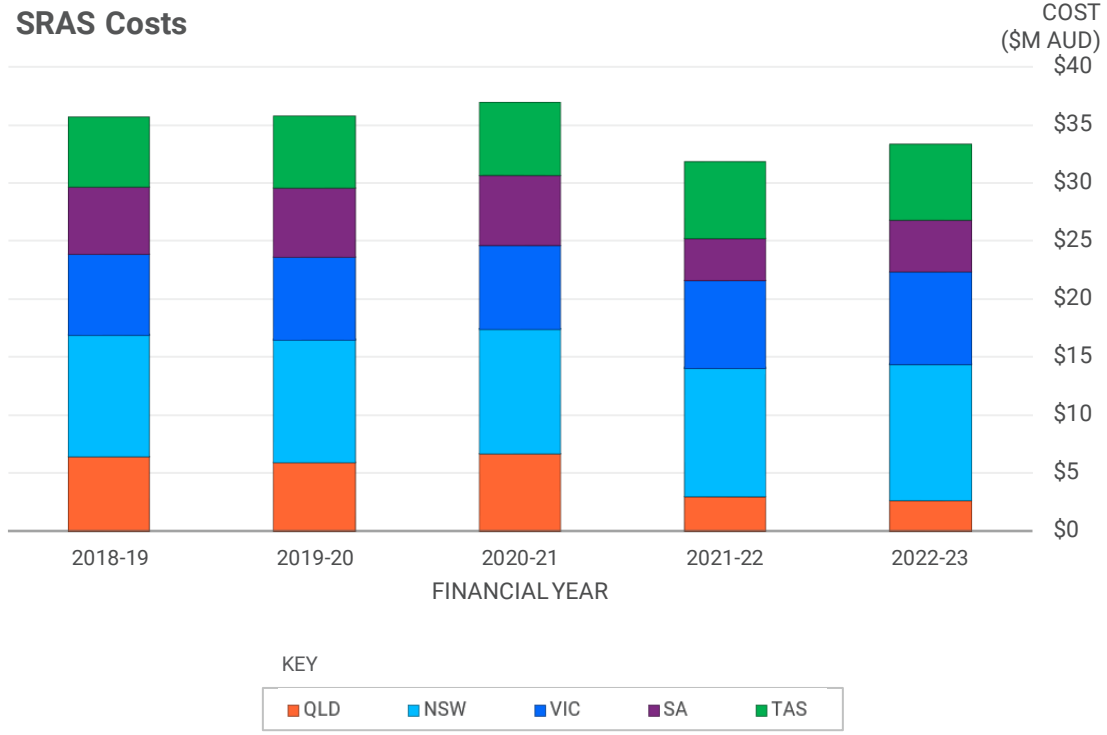
- System service costs remain stable in FY2023 from FY2022.
- While SRAS, NSCAS and RERT costs in FY2023 were low, AEMO's revenue requirement has increased.
- The introduction of the FFR market in October 2023 shows early signs of lowering FCAS costs.

SYSTEM OPERATING COSTS REMAINED STEADY, ALTHOUGH THERE WAS MOVEMENT IN DIFFERENT COST COMPONENTS

- System operating costs have reduced by $80m to $387m in FY2023. This was driven by a significant reduction in RERT costs (see slide 33).
- This was offset by a $92m increase in AEMO revenue requirements. The increase in AEMO's revenue requirement was primarily driven by a $52.2m increase in operating expenditure, reflecting costs of reform and change activity to support the energy transition which include developing a new engineering framework, strengthening operational tools and capabilities, enhanced reform planning, system design and digital support capabilities.[23]
- System restart ancillary service (SRAS) and network support and control ancillary services (NSCAS) costs remained relatively stable while frequency control ancillary service (FCAS) costs were reduced by $45m.



Source: Panel analysis of AEMO data.



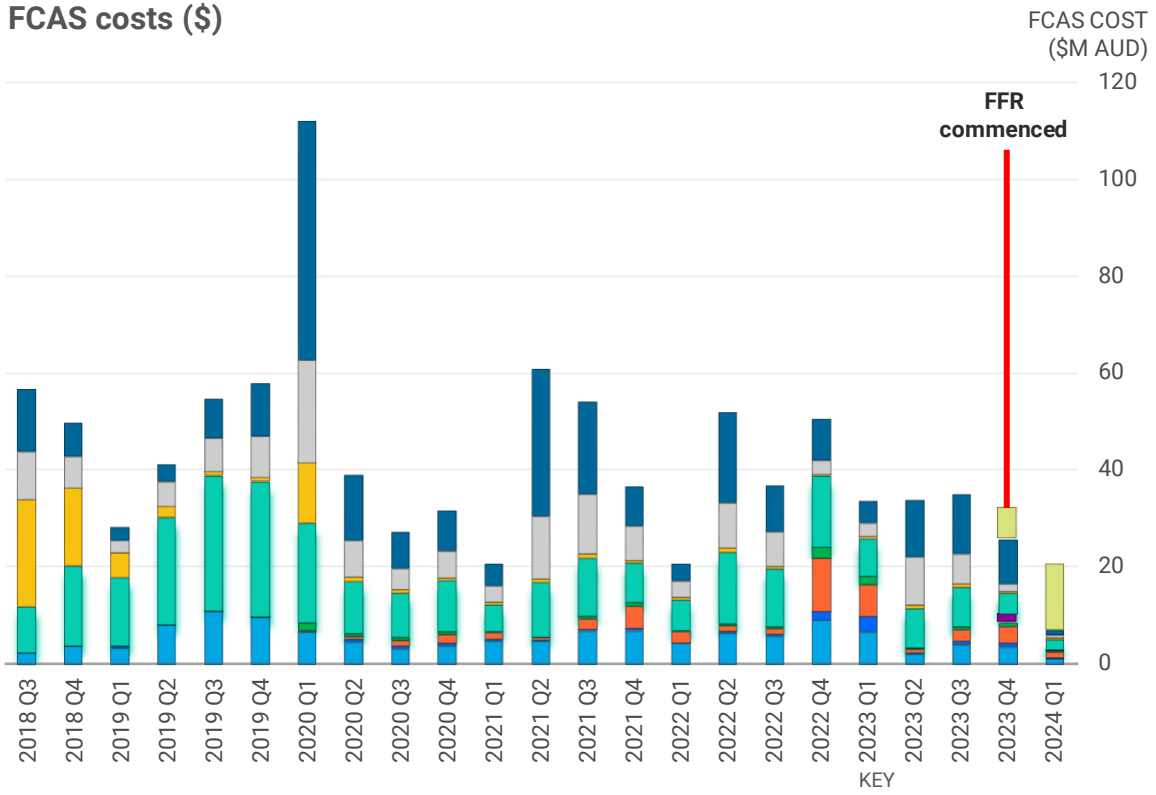
Source: Panel analysis of AEMO data.

23. For further information on AEMO's revenue requirements see: https://aemo.com.au/-/media/files/about_aemo/energy_market_budget_and_fees/2022/2022-23-aemo-budget-and-fees.pdf?la=en

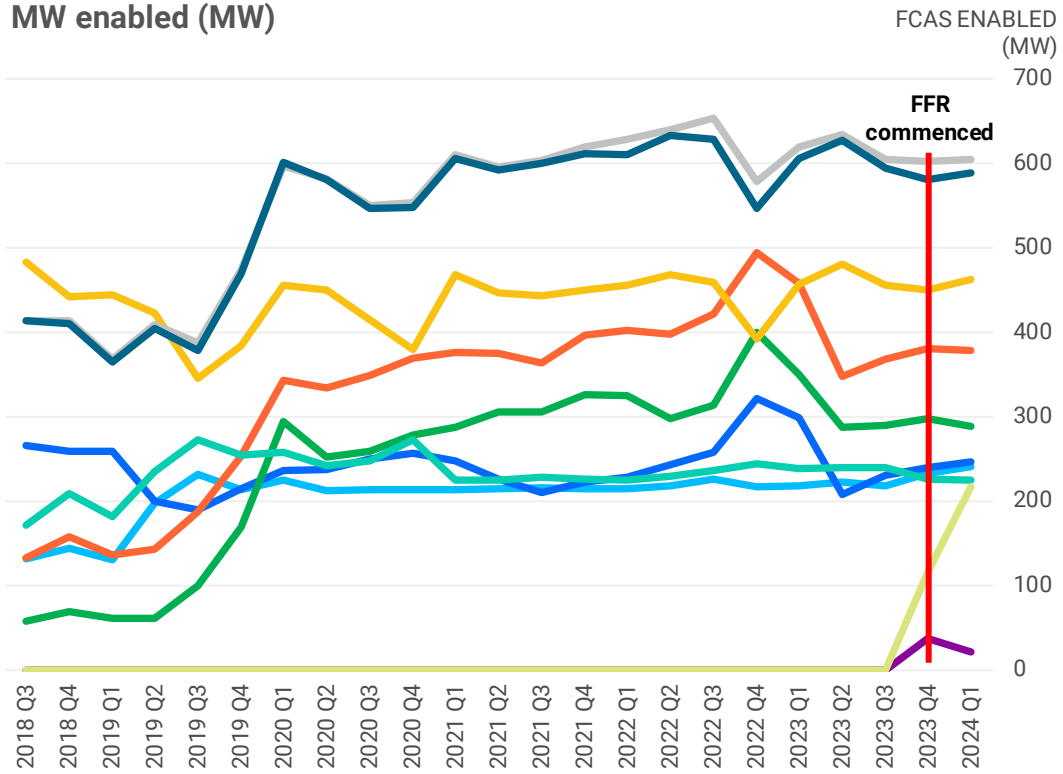
THE INTRODUCTION OF 1-SECOND FCAS MARKETS COINCIDED WITH A REDUCTION IN FCAS COSTS

- FCAS costs have fallen significantly since the introduction of the 1-second lower and raise markets in October 2023, despite the FCAS demand remaining relatively consistent over the last few financial years.
- The reduction in FCAS costs could be attributed to increased competition from grid-scale batteries, which had a combined market share of 57% across the NEMs 10 FCAS markets and are a significant participant in the very fast FCAS services.[24]
- The quantity of FCAS enabled remains steady, so the reduction in costs is driven by a fall in prices.

FCAS costs ($)



MW enabled (MW)



Source: Panel analysis of AEMO data.

24. AEMO, 2024. Quarterly Energy Dynamics Report Q1 2024. https://aemo.com.au/-/media/files/major-publications/qed/2024/qed-q1-2024.pdf?la=en

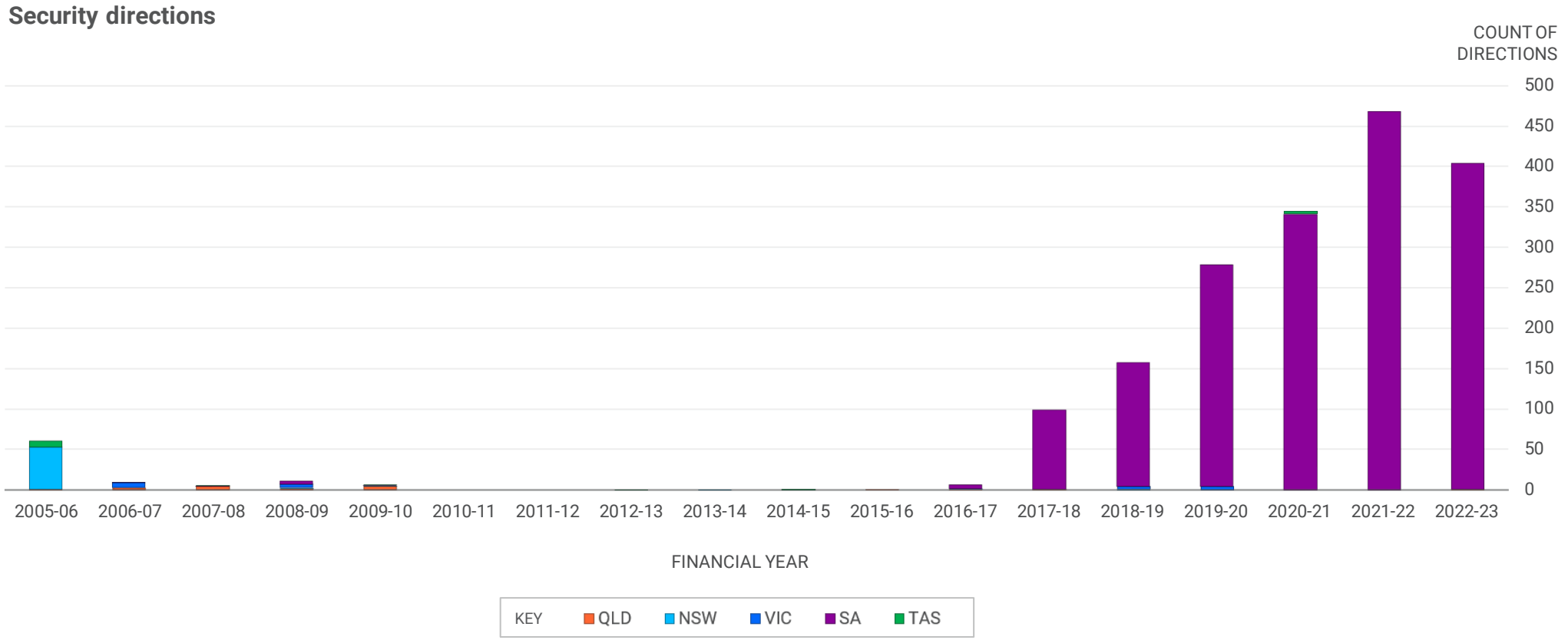
SECTION 3.4

AEMO INTERVENTIONS FOR SECURITY

- There continues to be an increase in security directions issued in the NEM.
- This reflect the transitional nature of the power system.
- The capacity investment scheme and recently updated transitional security frameworks may help improve security in the NEM both during the transition and in the long term.

SECURITY DIRECTIONS HAVE FALLEN SLIGHTLY FROM FY22 BUT REMAIN ELEVATED

- Aside from one security direction in QLD, all security directions issued in FY2023 were for SA.
- A total of 402 security directions were issued for SA, which is a decrease of 65 security directions from FY2022. Just over half of the security directions (57%) issued occurred in the second half of FY2023 (i.e. from 1 Jan – 30 Jun 2023).



Source: Panel analysis of AEMO data.

ADDRESSING LONG TERM SECURITY OF THE POWER SYSTEM THROUGH THE IMPROVING SECURITY FRAMEWORKS RULE CHANGE

While system security performance was largely acceptable in FY2023, there is a need to ensure the right arrangements are in place to ensure long-term security of the power system is maintained during the transition. The improving security frameworks and security transitional arrangements rule change aims to address this requirement.[25]

On 28 March 2024, the Australian Energy Market Commission (AEMC) made a final determination and more preferable final rule to improve market arrangements for security services.

Essential system services (ESS) are critical to maintaining overall power system security by meeting core power system requirements. As such, the final rule builds on existing tools in the power system to enhance system security procurement frameworks.

It provides the Australian Energy Market Operator (AEMO) with new tools to manage system security. This will address system security issues through the transition, reduce the regular and inefficient use of directions, and provide better incentives for participants to invest in providing system security in the longer-term. It also increases transparency on current system security needs and understanding, and how AEMO plans to manage system security as we transition to a secure net-zero emissions power system.

The final rule:

- aligns the existing inertia and system strength frameworks procurement timeframes
- removes the exclusion to procuring inertia network services and system strength in the NSCAS framework
- adjusts TNSP cost recovery procedures for non-network security options to support efficient contracting arrangements and minimise volatility for electricity consumers
- creates a new transitional non market ancillary services framework for AEMO to procure security services necessary for the energy transition and to trial new sources of security services
- empowers AEMO to enable security services with a whole of NEM perspective
- improves directions transparency
- introduces a new annual reporting requirement on AEMO, known as the 'transition plan for system security'.

25. For more information on the improving security frameworks for the energy transition rule change, refer to https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition

4

SAFETY PERFORMANCE

THE PANEL IS NOT AWARE OF ANY SAFETY INCIDENTS DURING FY2023

Overview of safety

The safety of the power system and associated equipment, power system personnel and the public is covered in general terms under the NEL.

However, there is no national safety regulator specifically for electricity. Instead, state and territory legislation governs safety generally, which includes the safe supply of electricity and the broader safety requirements associated with electricity use in households and businesses.

As discussed in the accompanying explanatory statement, the Panel's role in relation to safety for the purposes of the AMPR is narrow and relates primarily to the operation of assets and equipment within their technical limits and not to the broader safety requirements governed by jurisdictional legislation.

Safety performance of the power system in FY2023

The Panel has reviewed AEMO's power system incident reports and consulted with AEMO to understand if there were any instances where actions to maintain the power system within relevant standards and technical limits resulted in technical safety issues.

The Panel is not aware of any incidents during the FY2023 reporting period where AEMO's management of power system security has resulted in a safety issue.

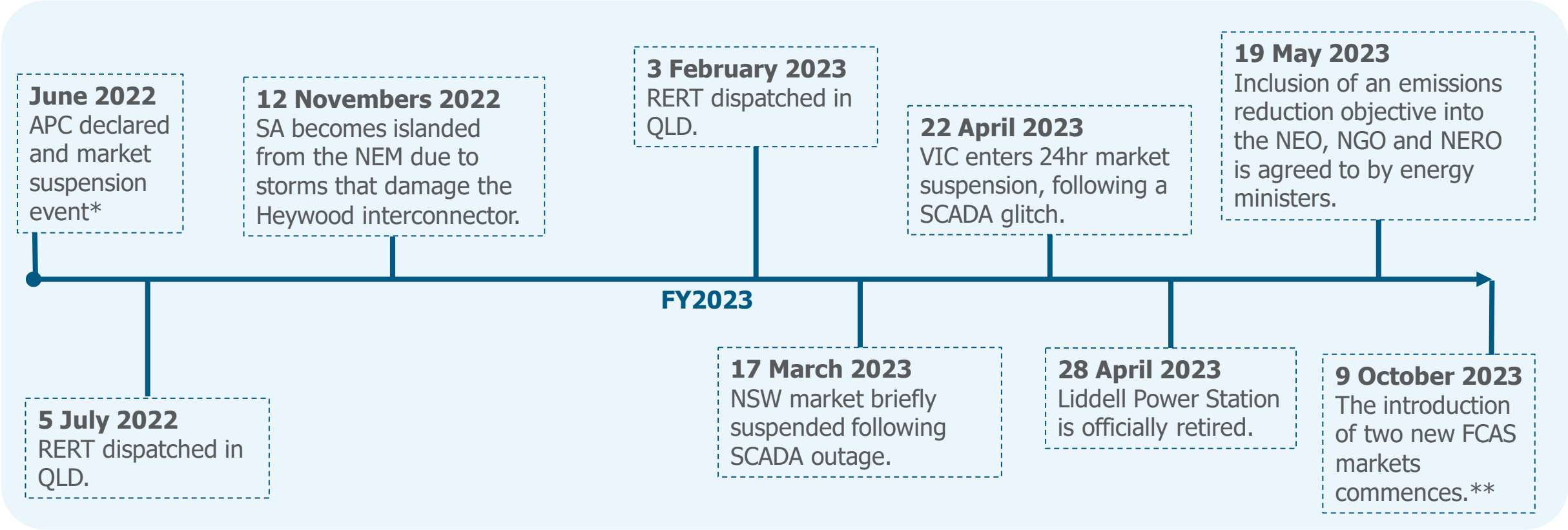
The Panel also notes that there were no instances in FY2023 where AEMO issued a direction and the directed participant did not comply on the grounds that complying with the direction would be a hazard to public safety, or materially risk damaging equipment or contravene any other law.

5

NEM EVENTS

TIMELINE OF KEY NEM EVENTS IN FY2023

- While FY2023 experienced fewer shocks than FY2022, there were a number of key events in the reporting period.
- The events discussed in this section have been reported on in other publications.
- Therefore, this section highlights key findings from relevant publications. For further information on specific incidents please refer to the published reporting on AEMO's website.



* The events of June 2022 were reported on in FY2022 AMPR, https://www.aemc.gov.au/market-reviews-advice/annual-market-performance-review-2022

** While the introduction of the two new FCAS markets are outside the reporting period of AMPR, the Panel considered it to be a key evolution in the operation of the NEM and therefore worthwhile discussing in FY2023 AMPR.

SCADA FAILURES LED TO MARKET SUSPENSIONS IN NSW AND VIC

- Two major Supervisory Control and Data Acquisition (SCADA) related outages in FY2023 on 17 March 2023 and 28 April 2023 resulted in market suspensions in NSW and VIC.
- Since January 2021, there have been five SCADA failures that had significant market impacts on the market and power system operation.
- AEMO plans to discuss the SCADA incidents through the Power System Security Working Group (PSSWG). AEMO also recommends all NSPs review their critical information technology systems, and consider any improvements to ensure high reliability of systems and effective, timely responses to system issues.[26,27]

March spot market suspension for NSW

On 17 March 2023, the inter-control centre communications protocol (ICCP) link between Transgrid and AEMO failed due to human error during system testing.

This failure led to the loss of SCADA visibility from Transgrid for the NSW region.

AEMO subsequently suspended the market from 2015 hrs to 2110 hrs on 17 March 2023 during which market suspension schedule pricing was applied.

Compensation was awarded to market participants impacted by the market suspension. This is detailed in AEMO's final report on this incident.

April spot market suspension for Victoria

On 22 April 2023, multiple pieces of network equipment at AusNet's primary and secondary data centre failed due to a firmware issue.

This failure led to the loss of SCADA across all Victorian electricity transmission assets and AusNet's electricity distribution network in Victoria.

AEMO suspended the market from 1620 hrs on 22 April 2023 to 1700 hrs on 23 April 2023, during which market suspension schedule pricing was applied.

Compensation was awarded to market participants impacted by the market suspension. This is detailed in AEMO's final report on this incident.

26. For more information on the March SCADA incident, refer to https://aemo.com.au/preliminary-suspension-nsw and https://aemo.com.au/final-report
27. For more information on the April SCADA incident, refer to https://aemo.com.au/preliminary-report-vic-market-suspension and https://aemo.com.au/final-report---victoria-market-suspension-on-22-april-2023

OTHER MARKET EVENTS – SA ISLANDING EVENT AND INTRODUCTION OF FAST FREQUENCY RESPONSE

SA islanding event [28]

On 12 November 2022, the non-credible contingency of multiple transmission lines caused the synchronous separation of a major part of the SA power system from the rest of the NEM. SA was islanded for a total of 7 days from the NEM.

Severe weather events caused the tower failure of both South East – Tailem Bend 275 kV lines (No. 1 and No. 2 lines) and the trip of The Keith – Tailem Bend 132 kV line tripped at the Tailem Bend end.

In response to the trip, the SA system frequency increased to a peak of approximately 50.53 Hz, before reducing below 50.2 Hz in less than two minutes.

FCAS prices experienced significant volatility, with all FCAS markets, except the Lower 60-second market, reaching the MPC of $15,500 MWh at various trading intervals between 12 and 14 November 2022.

The CPT for the FCAS markets was triggered at 1300 hrs on 14 November 2022 and the MPC of $300/MWh was applied.

AEMO also directed gas units in SA to provide FCAS services during this period to maintain the power system in a secure operating state.

Fast frequency response markets [29]

On 9 October 2023, AEMO opened the very fast raise and very fast lower FCAS markets.

This followed the AEMC's final determination and final rule which required the introduction of two new FCAS markets to ensure stable frequency, provide incentives to foster faster responding technologies and deliver lower costs for consumers.

The new markets include:

- Very fast raise (1 second raise): 1 second response to arrest a major drop in frequency following a contingency event
- Very fast lower (1 second lower): 1 second response to arrest a major rise in frequency following a contingency event

Section 3.3 in this report extends the reporting period of AMPR to show the impact of the introduction of these new markets on price and usage.

28. For more information on the SA islanding event, refer to https://aemo.com.au/preliminary-report--trip-of-south-east-tailem-bend.pdf
29. For more information on the fast-frequency response ancillary service rule change, refer to: https://www.aemc.gov.au/rule-changes/fast-frequency-response-market-ancillary-service

Abbreviations

TABLE OF ABBREVIATIONS (SLIDE 1 OF 3)

ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
APC	Administered Price Cap
APP	Administered Price Period
ARENA	Australian Renewable Energy Agency
ASX	Australian Securities Exchange
CEC	Clean Energy Council
CER	Consumer Energy Resources
CIS	Capacity investment scheme
Commission	See AEMC
CPT	Cumulative Price Threshold

DNSP	Distribution Network Service Provider
DPV	Distributed PV
ESOO	Electricity Statement of Opportunities
FCAS	Frequency Control Ancillary Services
FFR	Fast Frequency Response
FOS	Frequency Operating Standard
FUM	Forecast Uncertainty Measure
GPSRR	General Power System Risk Review
IBR	Inverter Based Resources
ICCP	Inter-control centre communications protocol
IRM	Interim Reliability Measure
ISP	Integrated System Plan
LNG	Liquified Natural Gas
LOR	Lack of Reserve

TABLE OF ABBREVIATIONS (SLIDE 2 OF 3)

MFP	Market Floor Price
MPC	Market Price Cap
MPFR	Mandatory Primary Frequency Response
MSPS	Market Suspension Pricing Schedule
MT-PASA	Medium Term-Projected Assessment of System Adequacy
NEL	National Electricity Law
NEMDE	NEM Dispatch Engine
NEO	National Electricity Objective
NER	National Energy Rules
NERL	National Energy Retail Law
NERO	National Energy Retail Pbjective
NGL	National Gas Law
NGO	National Gas Objective
NOFB	Normal Operating Frequency Band
NSCAS	Network Support and Control Ancillary Services

NSW	New South Wales
NT	Northern Territory
PEC	Project Energy Connect
PFR	Primary Frequency Response
PSFRR	Power System Frequency Risk Review
PSSWG	Power System Security Working Group
PV	Photovoltaics
QED	Quarterly Energy Dynamics
QLD	Queensland
QNI	Queensland - New South Wales Interconnector
RERT	Reliability and Emergency Reserve Trader
RET	Renewable Energy Target
SA	South Australia
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index

TABLE OF ABBREVIATIONS (SLIDE 3 OF 3)

SCADA	Supervisory Control and Data Acquisition
SRAS	System Restart Ancillary Services
ST-PASA	Short Term-Projected Assessment of System Adequacy
TAS	Tasmania
TNSP	Transmission Network Service Provider
USE	Unserved Energy
VCR	Value of Customer Reliability
VIC	Victoria
VNI	Victoria - New South Wales Interconnector
VPP	Virtual Power Plant
VRE	Variable Renewable Energy
WA	Western Australia

RELIABILITY PANEL AEMC

Office address
Level 15, 60 Castlereagh Street
Sydney NSW 2000

ABN: 49 236 270 144

T (02) 8296 7800