

NEM Winter Readiness 2023

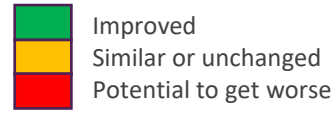
Industry Briefing – May 2023











Agenda

- Winter outlook
- Weather and climate
- Generation availability
- Operational demand
- Gas supply adequacy
- Network outages and augmentations
- Reliability emergency reserves (RERT)
- Risks / plant issues

Winter Outlook



Impact		Comparison to last winter	
	Extreme cold snaps	●	Drier and warmer conditions expected but potential for extreme cold snaps still exists.
	Widespread flooding	●	Lower than average rainfall expected reducing risk of flooding.
	Extreme peak demand	●	Similar for electricity, historically winter demands are higher in NSW region. Potential for gas shortfalls during coincident peak gas consumption and GPG demands in the NEM.
	Generation availability	●	More VRE/BESS capacity and available scheduled generation expected in the NEM.
	Network outages	●	Less scheduled electricity High Impact Outages (HIOs). No major outages of gas system plant.
	Reliability	●	Similar unserved energy (USE) and loss of load probability (LOLP) forecast. Potential for unplanned plant outages to degrade electricity/gas system reliability.
	Fuel supply	●	Similar. Improved coal stockpiles. Gas storage levels are generally at high levels while Vic gas production capacity has decreased, increasing the amount of gas required from Qld. Operational restrictions for some hydro power stations.
	Health of markets	●	Improved financial position, prudential risks are comparably lower than for winter 2022.

Note: It should be noted that climate model accuracy is typically low at this time of year and scheduled information on generation and transmission is subject to change.

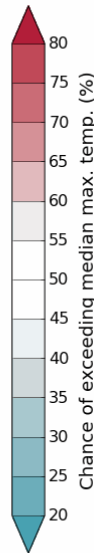
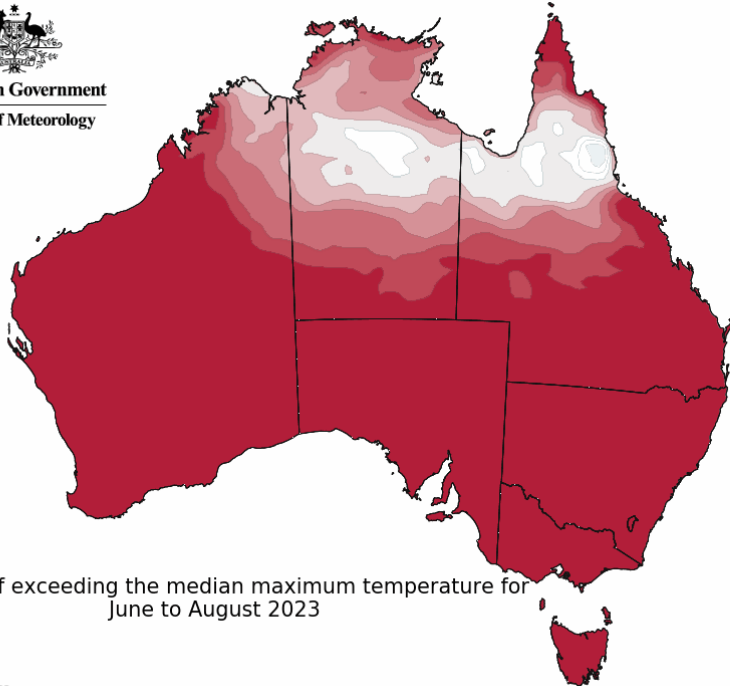
June to August 2023: Climate Outlook

Maximum temperatures

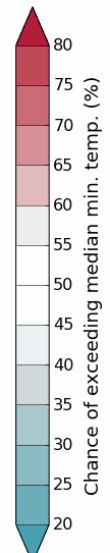
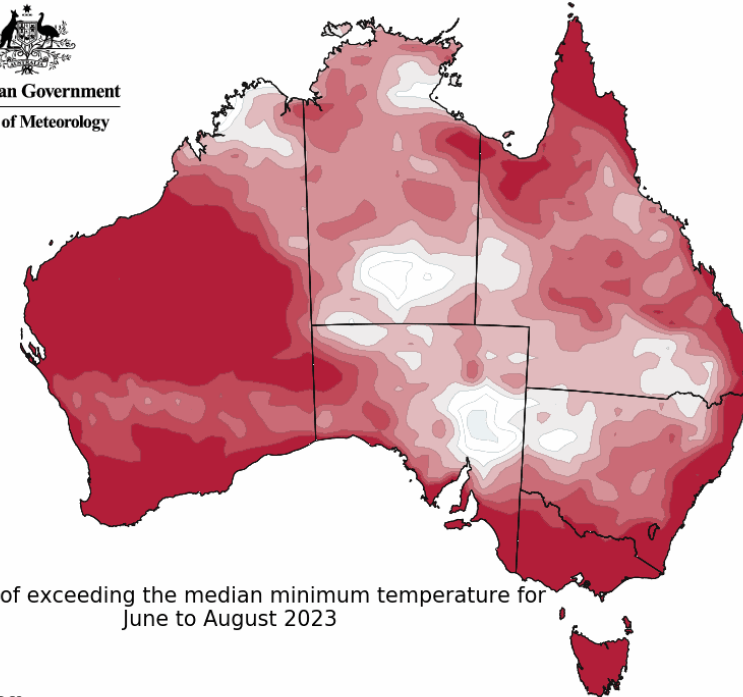
27 April 2023

Minimum temperatures


Australian Government
Bureau of Meteorology




Australian Government
Bureau of Meteorology



Chance of exceeding the median maximum temperature for June to August 2023

Model: ACCESS-S2
Base period: 1981-2018

Model run: 24/04/2023
Issued: 27/04/2023

Chance of exceeding the median minimum temperature for June to August 2023

Model: ACCESS-S2
Base period: 1981-2018

Model run: 24/04/2023
Issued: 27/04/2023

Maximum temperatures are likely to be above median for majority of the country.

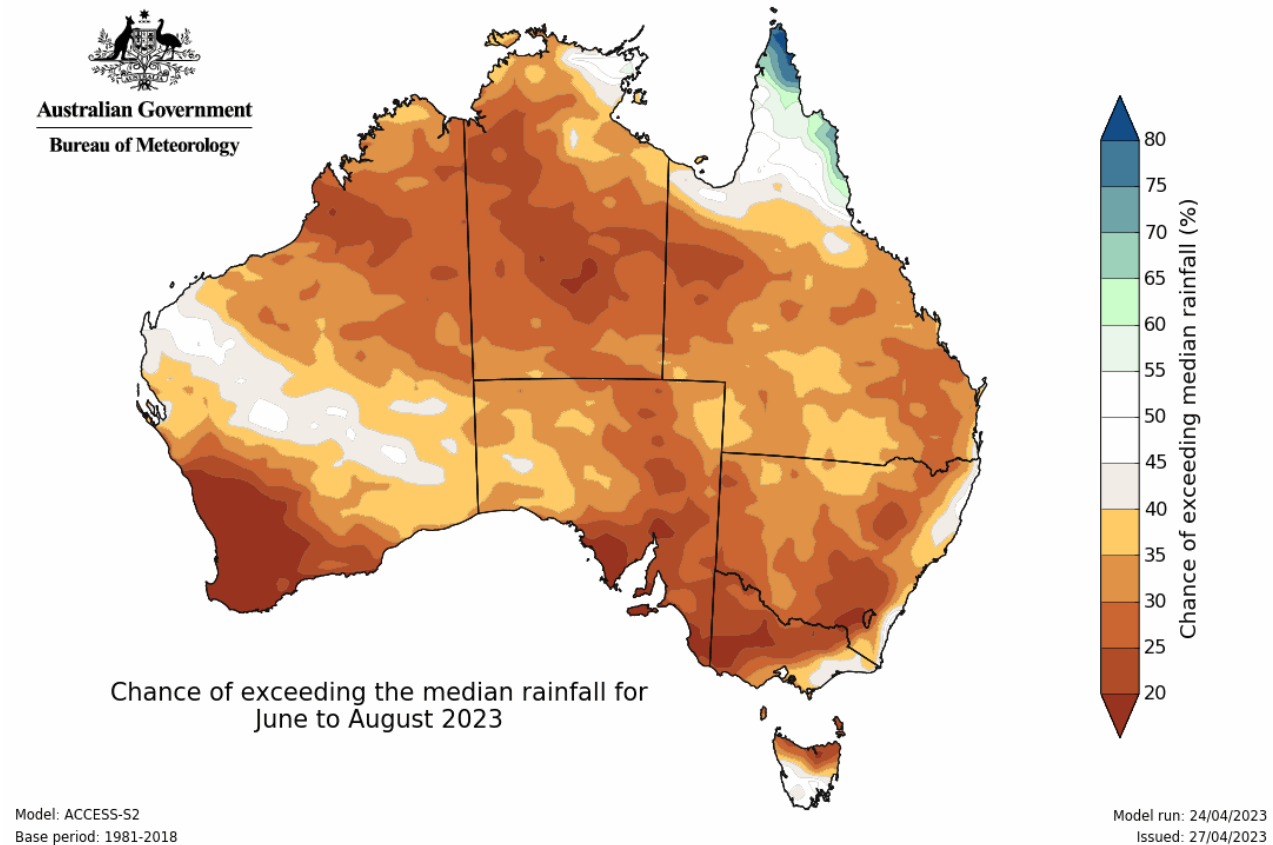
Minimum temperatures are generally likely to be warmer for WA, Vic and Tas and for coastal areas around the country.

Although maximum temperatures are generally expected to be warmer than average during El Niño year, decreased cloud cover often leads to cooler-than-average night-time temperatures during winter–spring, particularly across eastern Australia. For example, regions of southern New South Wales and northern Victoria can experience 15–30% more frost days during El Niño than the historical average.

June to August 2023: Climate Outlook

Rainfall (27 April 2023)

- Median to above-median rainfall likely for northern Australia, coastal areas of NSW, southern Tas and parts of WA.
- Below-median rainfall likely for majority of the eastern states and south-west WA.



Regional hazards: May – August 2023

Fire danger

- Moving into peak bushfire period for northern Australia
- High fuel loads following good wet season rainfall
- Watchpoints: Top End (NT), N WA, central E QLD

Drought

- Low rainfall recent months
- Dry outlook until at least spring
- Watchpoints: SE QLD, W TAS, SW WA

East Coast Low

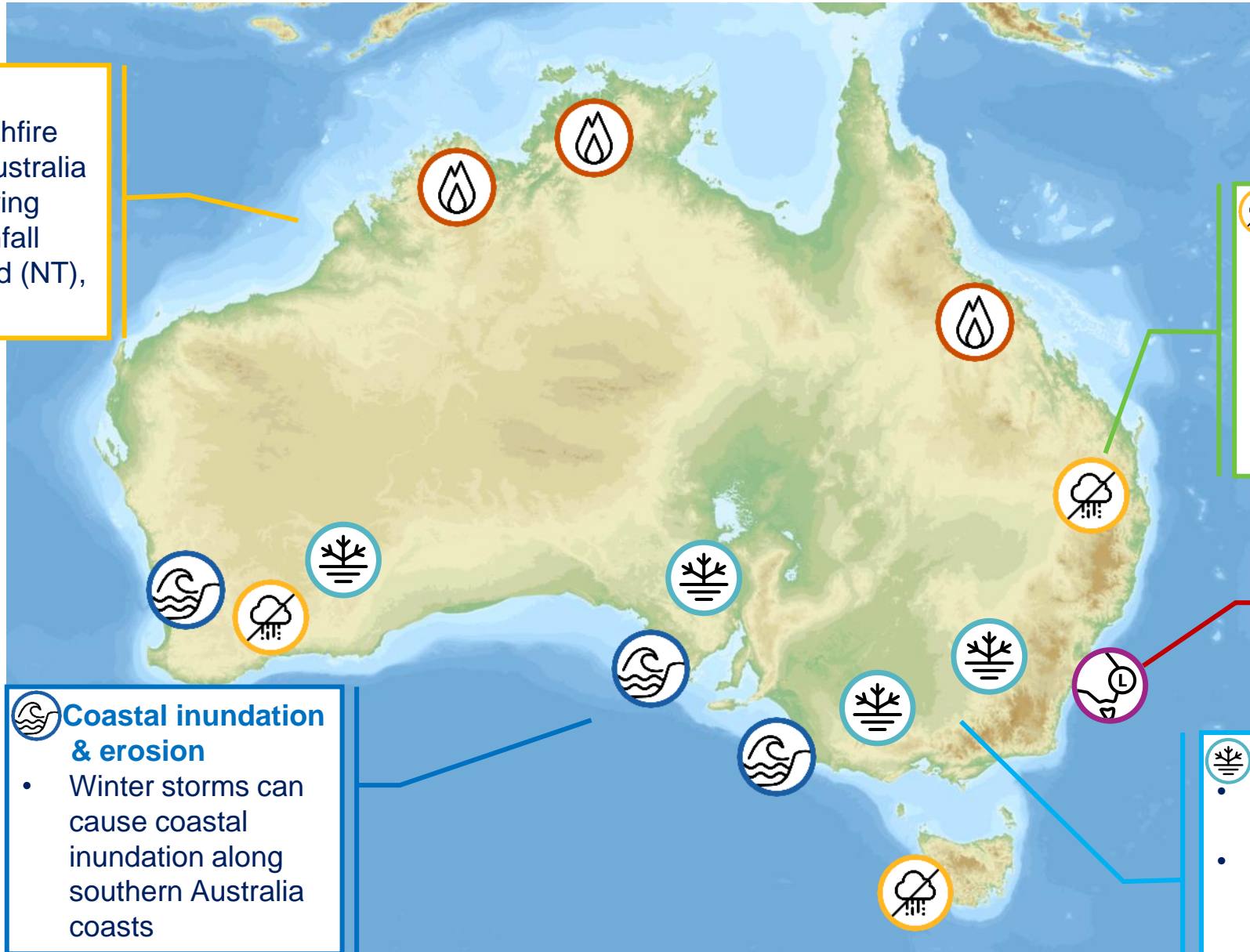
- Winter to early spring is peak risk period for East Coast Lows

Coastal inundation & erosion

- Winter storms can cause coastal inundation along southern Australia coasts

Frost

- Dry outlook suggests increased frost risk
- Watchpoints: Grain-cropping regions across southern Australia



Generation Availability

- Approximately 2200 MW of additional VRE / BESS capacity is expected to be operationally available in the NEM compared to winter 2022. Note: solar capacity factor is significantly lower during winter months.
- On average, additional 2300 MW of scheduled generation is PASA available in the NEM compared to winter 2022.
- Hydro generation:
 - Limited by water licence, dam levels, available airspace, and riverbank capacity
- Coal generation:
 - Heavy rainfalls in eastern states have the potential to impact coal quality/deliveries
 - Coal stockpiles have improved as the major generators rebuild stockpile levels.
 - Several major generating units are taking planned outages during winter:
 - QLD, Gladstone 5 and Wivenhoe 2
 - NSW, Bayswater 1
 - VIC, Yallourn 3 and 4
 - SA, Torrens Island B2
- Gas/diesel generation:
 - No constraints on gas usage, potential shortfalls on coincident peak consumption days

Significant generation capacity changes (since winter 2022) are shown in tables below, increase in renewable resources and BESS will help manage overall reduction in dispatchable capacity. On balance additional 971 MW of generation is expected in the NEM.

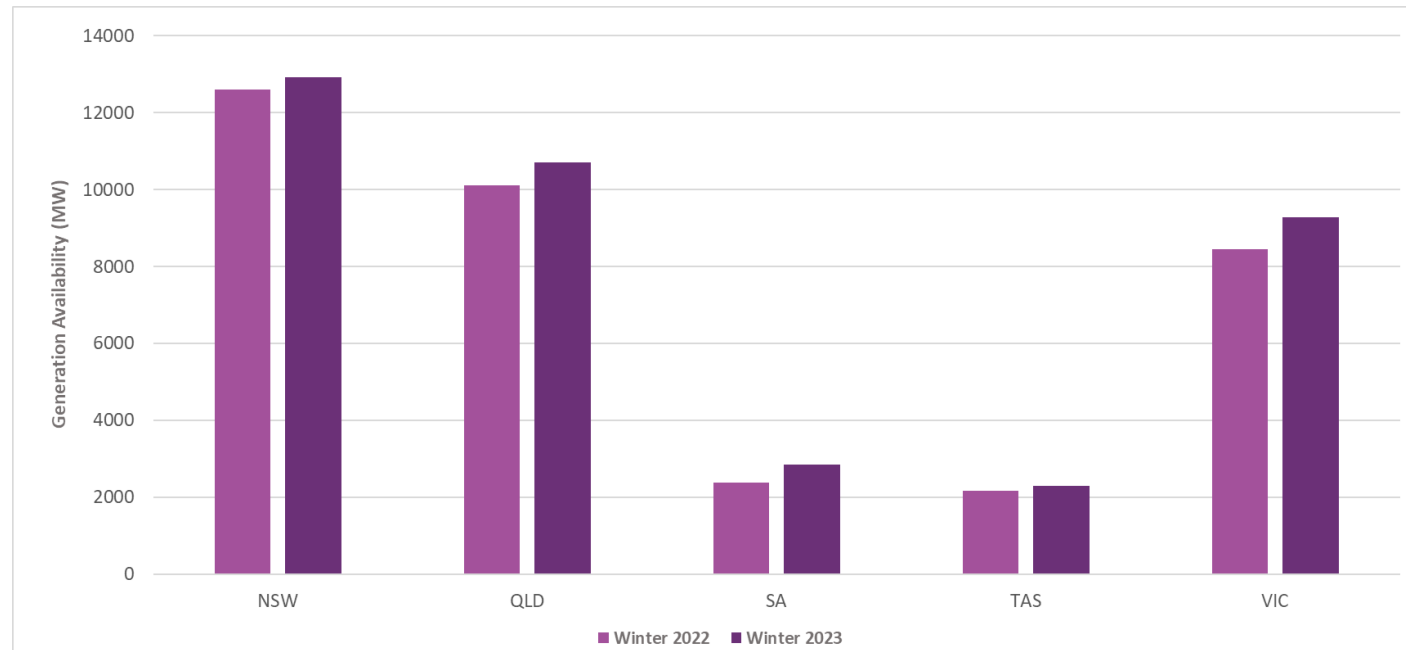
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Region	Capacity (MW)
NEM	2200 MW – Wind/Solar/BESS
SA	Bolivar (127 MW), Mintaro (75 MW)
QLD	Swanbank E (365 MW)

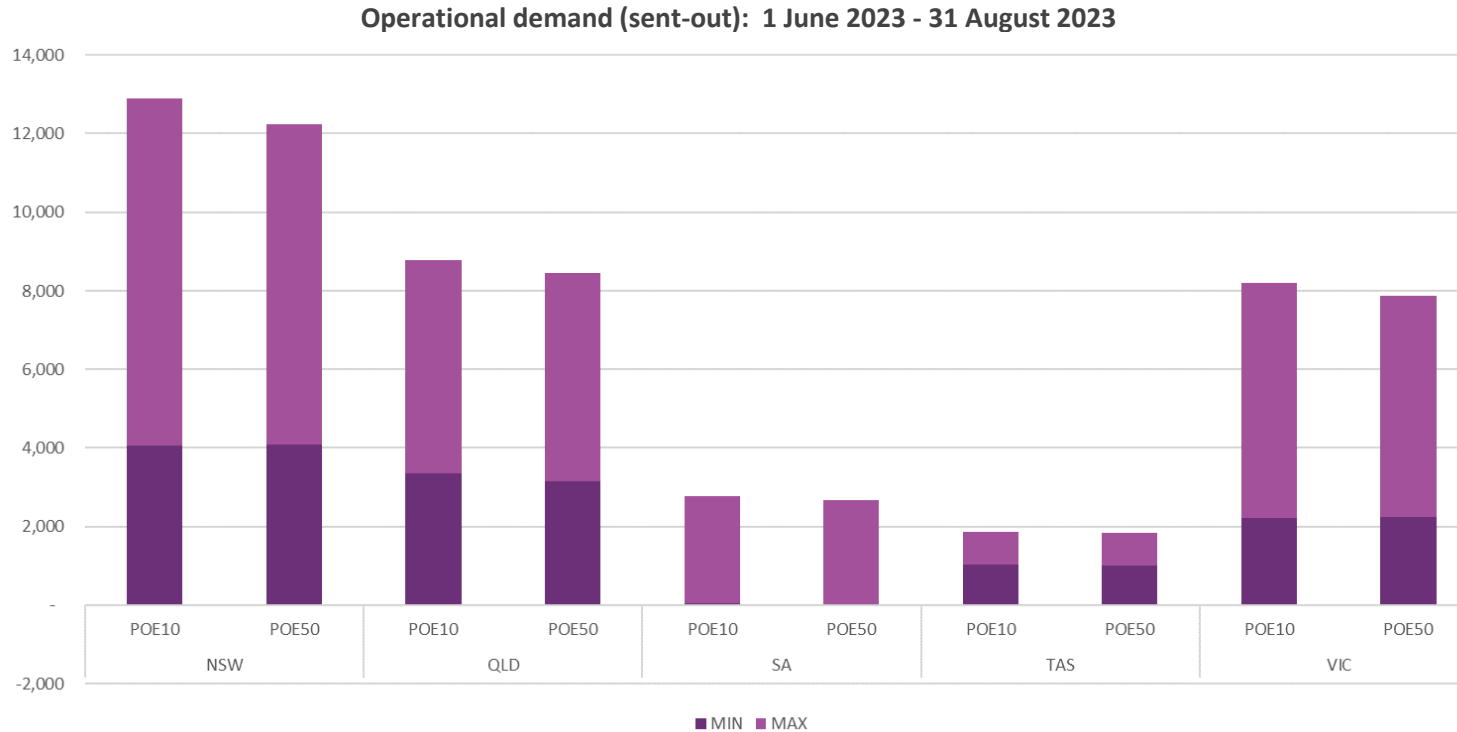
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Region	Capacity (MW)
NSW	Liddell (1260 MW) – retired
VIC	Jeeralang B1 (70 MW)
QLD	Callide C3 (466 MW)

Scheduled generation availability (MTPASA - 6 April 2023) chart shows increased dispatchable generation availability in the NEM (2300 MW) compared to winter 2022. Generating units impacted by outages / coal supply issues in the NEM during winter 2022 are bidding available with sufficient fuel supplies for winter 2023.



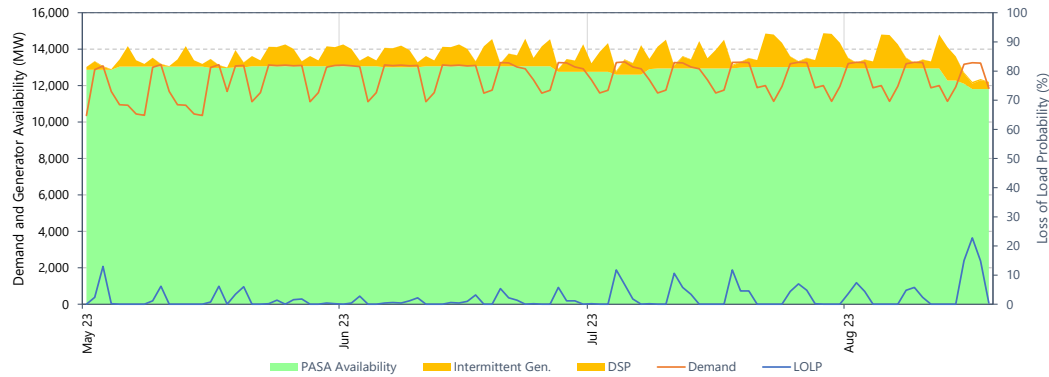
Operational Demand



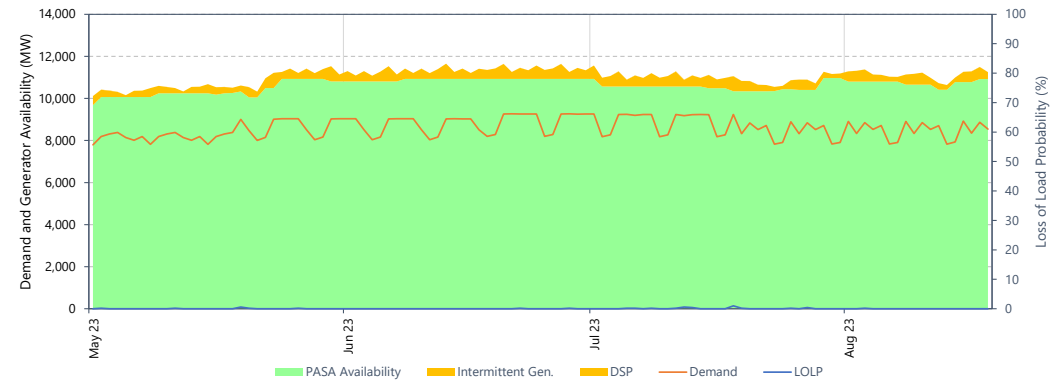
- Forecast USE is within both the interim and reliability standards for all NEM regions during winter 2023. Risk of load shedding remains where high demand days combine with low VRE availability and or scheduled generation and network outages, however risk of load shedding is low as indicated by LOLP studies.
- Historically NSW region recorded high electricity demand during winter months due to high heating load.
- Historically minimum record demands occurred during shoulder seasons. Low demand periods during winter are more likely to occur during weekends and public holidays.

Loss of Load Probability Study

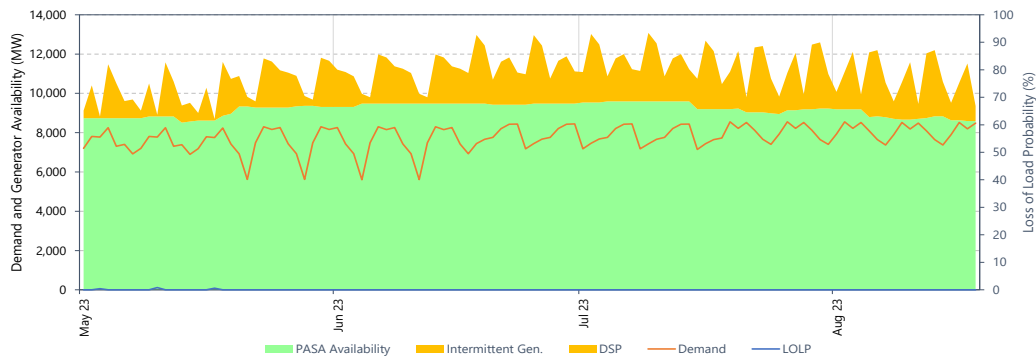
NSW



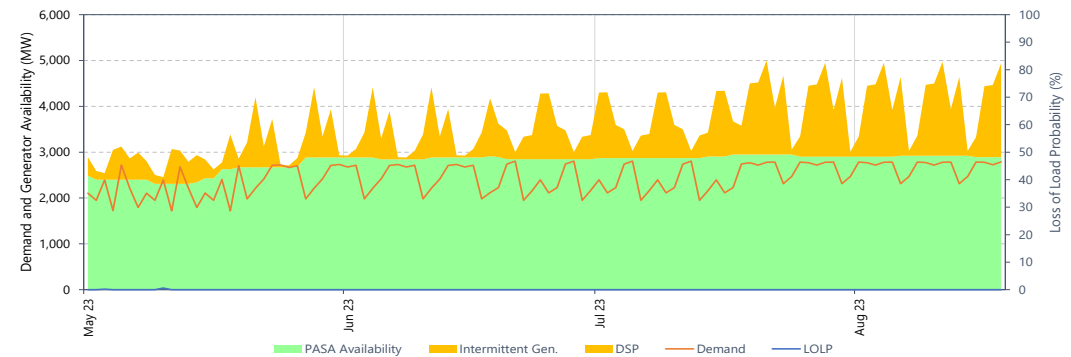
Queensland



Victoria



SA



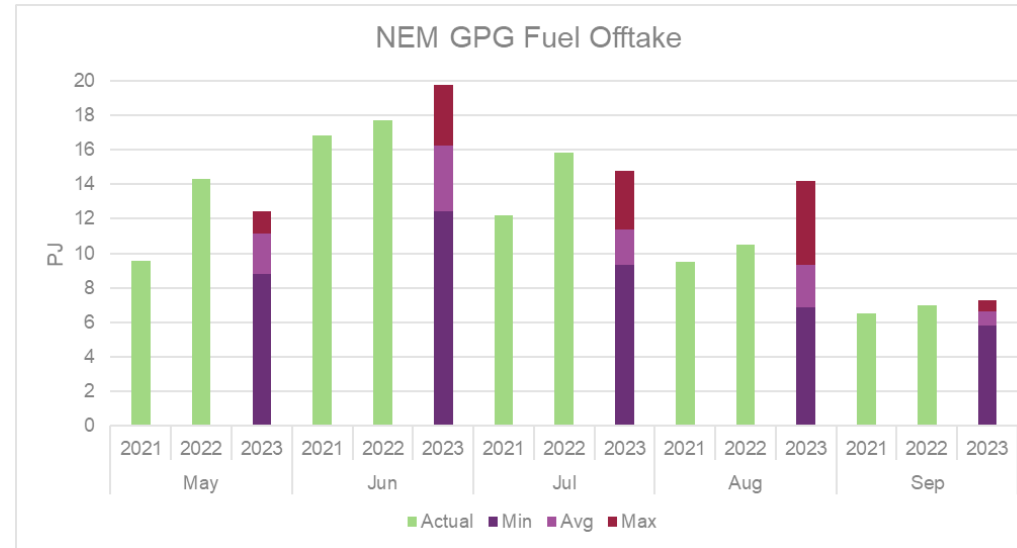
LOLP is low during winter in NSW region. All other regions have very low LOLP. Tasmania has no LOLP periods during winter and for that reason no chart is provided.

Note: MTPASA run 655 (11 April 2023), period shown is 15 May 2023 to 31 August 2023.

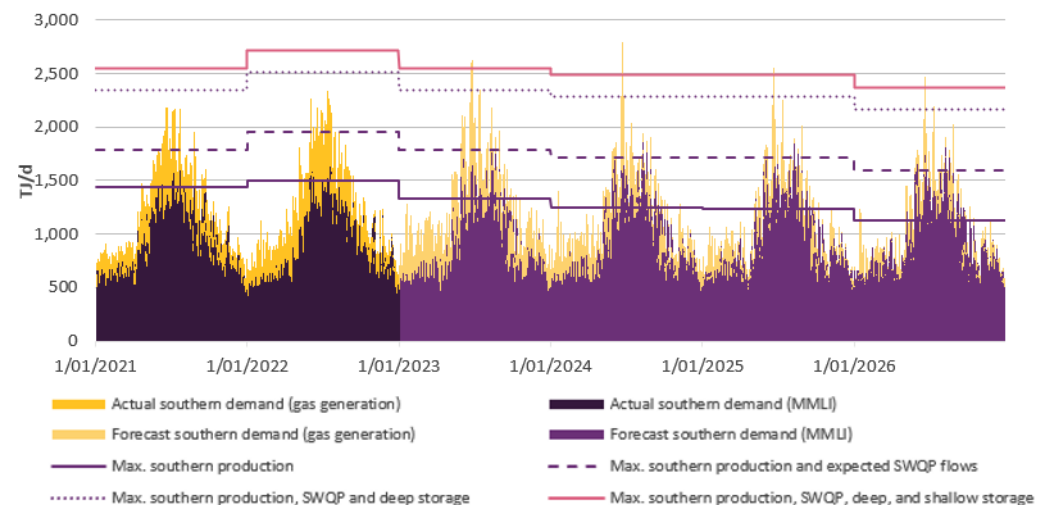
GPG Supply Adequacy – East Coast

- Forecasts show potential for similar or slightly higher NEM Gas-Fired Power Generation (GPG) fuel offtake levels compared to actuals recorded in 2021 and 2022.
- GPG demands during winter months are increasing (traditionally being highest in summer), as consumers electrify heating loads, winter gas generation peak demand will increase in magnitude and peakiness within the next five years.
- Gas storage is currently at high levels. There are no major outages impacting gas production leading into winter however Longford production levels have reduced by 20% from last winter, increasing the reliance on winter gas supply from Queensland.
- Despite falling annual gas consumption, the value of GPG in firming the NEM remains critical.
- Peak day shortfalls are forecast from 2023 under extreme peak days with high regional coincidence (including gas generation needs).
- Deep (Iona) and shallow (Dandenong and Newcastle LNG) storages are critical to meet peak day demand.
- Northern gas (Qld) must be made available to southern consumers (NSW, Vic, SA and Tas) at pipeline capacity to mitigate shortfall risks.

Source: AEMO NEM GPG Forecasts using Step Change scenario with NEM demand & VRE generation following reference years 2014, 2015, 2017 and 2019.



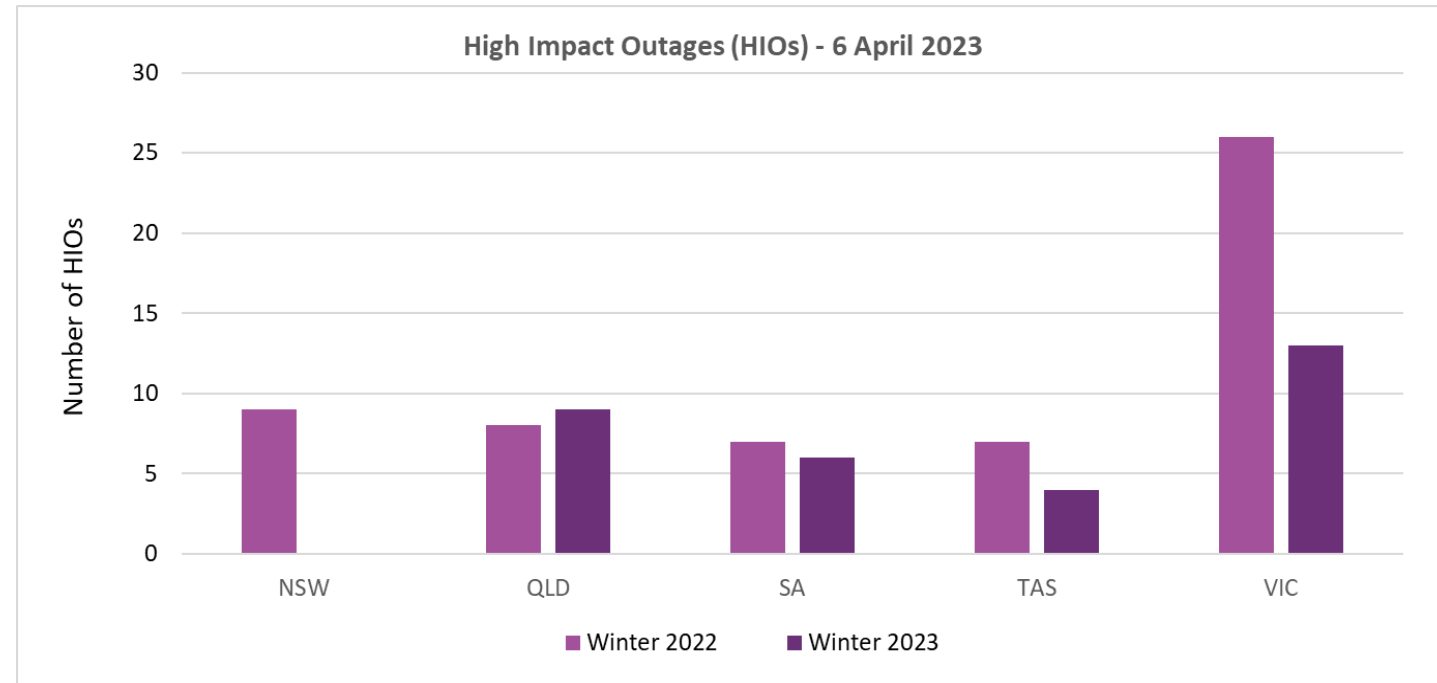
Reference year 2019 - high coincidence of southern demand and NEM gas consumption



High Impact Outages & Augmentations

- Number of planned HIOs have decreased for most regions.
- QLD outages relate to maintenance/commissioning of Ross No. 3 275 kV transformer and 275 kV feeders out of Nebo/Strathmore.
- VIC outages relate to maintenance works on 500 kV lines out of Moorabool.
- Multiple VIC-NSW and VIC-SA interconnector related outages are scheduled in June/July.
- SA outages relate to maintenance activities on South-East to Heywood and Tungkillo to Tailem Bend 275 kV lines.
- TAS outages relate to maintenance on Gordon to Chapel Street 220 kV lines.

Note: HIOs are allowed to proceed if there are no identified system security issues.



Inter-regional augmentations:

- QNI transfer capacity increases:
 - Additional 150 MW NSW to QLD capacity compared to winter 2022.
 - Possible 100 MW QLD to NSW capacity increase during winter 2023.

Note: QNI capacity increases are dependent on completion of the commissioning tests influenced by prevailing market conditions.

Reliability Emergency Reserve Trader (RERT)

- To mitigate any potential reliability risks AEMO maintains a panel of suppliers that can provide / contract reserves at short notice – the short notice RERT panel.
- Short notice RERT costs are only incurred if reserves are pre-activated or activated, as such reserves are not guaranteed to be available.
- Typically, short notice RERT panel agreements were designed to cover the summer months only, however AEMO is now encouraging 12-month panel membership with extension options.
- Last winter the NEM experienced coal and gas limitations which resulted in supply scarcity. AEMO used short notice RERT to manage the supply scarcity and the risk of credible contingencies causing involuntary manual load shedding.

Network and Generation Risks

Risks	Mitigation
Network and generation forced outages exceeding limits historically observed.	<ul style="list-style-type: none"> • Overall scheduled generation availability has improved compared to winter 2022 in the NEM. • AEMO is monitoring generation availability across all regions. • RERT Panel.
Network and generation maintenance / commissioning activities extending beyond target completion dates.	<ul style="list-style-type: none"> • AEMO is working closely with TNSPs and Generators to understand delays/modifications to planned maintenance due to resourcing issues, sourcing of replacement parts or other reasons. • Risk managed through ACCC interim authorisation maintenance co-ordination for QLD, NSW and VIC (expired in April, new application being sought).
Storms and flooding impacting coal supply and transmission in the NEM.	<ul style="list-style-type: none"> • Contracting coal from diverse sources and building up coal stock. • Monitor coal generation availability and stockpile levels. • Monitor risks with asset owners.
Bushfires/grassland fires impacting fuel supplies (coal or gas production), generation or network assets.	<ul style="list-style-type: none"> • Monitor risks with asset owners. • Contingency plans in place.
Unplanned network events including during high/low demand periods.	<ul style="list-style-type: none"> • Minimum Demand Framework and contingency plans in place.

Existing Plant Issues

Issues	Impacted Region(s)	Impact
QNI capacity increase - commissioning tests dependent on market conditions.	Qld, NSW	Potential delays to QNI capacity increases.
Hydro generation environmental constraints.	NSW	NEM reserves.
Callide C units return to service delayed due to technical issues: <ul style="list-style-type: none"> Callide C3 staged return to service commencing 07/01/2024 (233 MW) with full capacity of 466 MW from 18/02/2024. Callide C4 staged return to service commencing 19/05/2024 (210 MW), and 420 MW from 06/07/2024. 	Qld	NEM reserves.
Jeeralang B1 (70 MW) is on extended outage due to technical issue. There is a possibility of this outage extending beyond 01/01/2024 due to difficulty in sourcing replacement parts.	Vic	NEM reserves.
Para 2 275 kV SVC is out of service until September 2023.	SA, Vic	Constraint on Heywood interconnector.
Lismore 1 132 kV SVC is out of service until 5 June 2023.	NSW, Qld	Constraint on Terranora interconnector.



For more information visit

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