

2023/24 Summer Readiness – Overview

13 November 2023



Agenda

2023/24 Summer Readiness :

- Weather and Climate
- Electricity System Readiness
- Gas System Readiness
- Key Risks

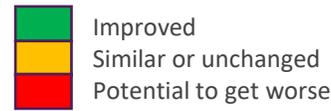


Summer Outlook

1 November 2023 – 31 March 2024



Summer Outlook



Impact	West/East	Comparison to last summer
Extreme heat / heatwaves		An El Niño and a positive Indian Ocean Dipole (IOD) are underway. Hotter and drier summer for WEM and NEM.
Bushfire risk		More likely due to hotter and drier outlook.
Widespread flooding		Below average rainfall expected for majority of the country reducing risk of flooding. Increased risk in Qld during cyclone season however early signs suggest below average cyclone activity.
Extreme peak demand		Possible due to increased likelihood of extreme heat. Potential for increased reliance on limited energy storage facilities including Gas-Fired Power Generation (GPG), batteries and pumped storage during peak electricity demand periods or unplanned generation outages. Potential for 10% POE demand combined with low VRE could lead to reserve shortfalls. Potential for coincident 10% POE demands in interconnected regions could lead to reserve shortfalls in multiple regions.
Generation availability		Increased levels of scheduled generation availability across most regions with some notable increases expected in Qld and NSW. Additional renewable resource capacity across mainland NEM regions. Monitoring the potential for delayed return to service of generators on extended outages (Bayswater 1, Eraring 2 and Colongra 3 in NSW, Callide B2, C3, C4, Gladstone 2 and Tarong 4 in Qld and Jeeralang B1 and Yallourn 2 in Vic) and potential commissioning delays at Tallawarra B in NSW. WEM generation capacity increased by 46MW.
Network outages		High impact outages are at similar or reduced levels for most regions. Planned gas production facility and pipeline maintenance outages will reduce supply capacity but overall gas demand during summer is lower.
Reliability		Expected Unserved Energy (USE) is forecast to be above the Interim Reliability Measure (IRM, 0.0006%) in Victoria and South Australia. Potential for unplanned electricity/gas plant outages to degrade electricity/gas system reliability in all regions.
Fuel supply		Coal storage levels are at normal levels, monitoring possible supply restrictions at Mt Piper. Environmental restrictions for some hydro stations. Gas storage levels are high, however, any increased drawdown to support peak electricity demand will need to be replenished during summer and autumn for winter 2024. Potential refilling disruptions due to gas production facility and pipeline maintenance, and GPG, need to be managed.
Health of markets		Whilst default and suspension events are still possible due to the unpredictability and volatility of the market, AEMO is relatively better placed for the 2023/24 summer season than at the same time leading into summer 2022/23.

Notes: Summer is defined as 1 Nov 23 to 31 Mar 24. November is considered summer as part of this assessment due to potential for elevated risk of early declaration of fire danger period and early heatwaves driving high demands. Similarly, towards the end of the season, heatwaves and bushfire risk can extend into March, particularly in the northern parts of the country. It should be noted that climate model accuracy improves closer to the start of the season, particularly bushfire risk assessment. Information on scheduled generation availability and plant outages are subject to change.



Weather and Climate

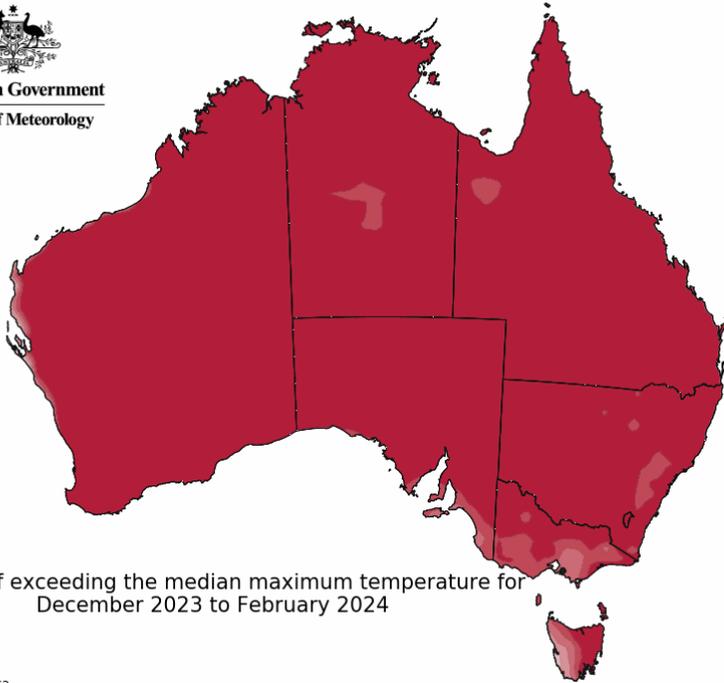


Climate Outlook

December 2023 to February 2024

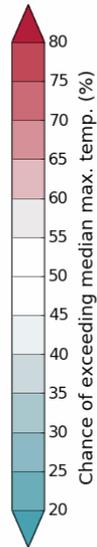
Maximum temperatures


Australian Government
Bureau of Meteorology



Chance of exceeding the median maximum temperature for December 2023 to February 2024

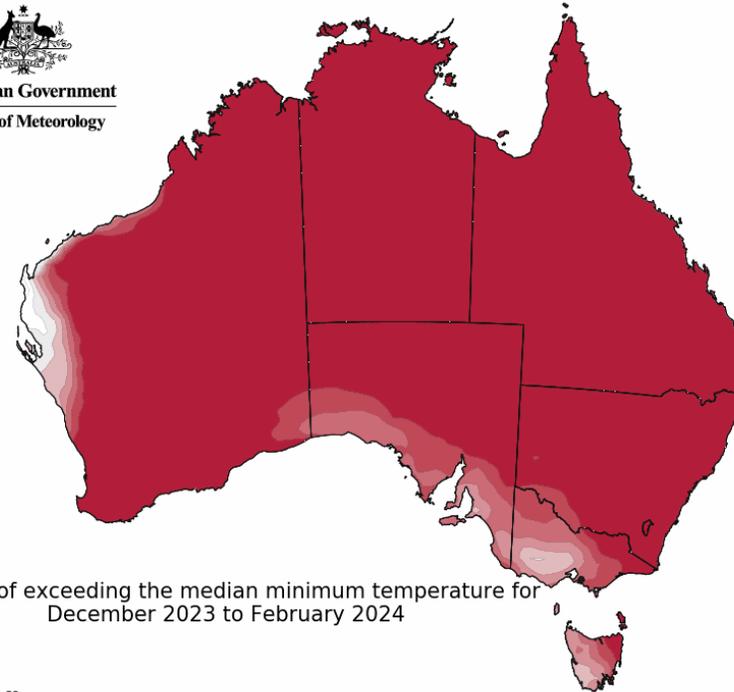
Model: ACCESS-S2
Base period: 1981-2018



Model run: 30/10/2023
Issued: 02/11/2023

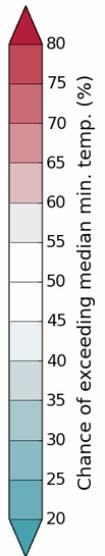
Minimum temperatures


Australian Government
Bureau of Meteorology



Chance of exceeding the median minimum temperature for December 2023 to February 2024

Model: ACCESS-S2
Base period: 1981-2018



Model run: 30/10/2023
Issued: 02/11/2023

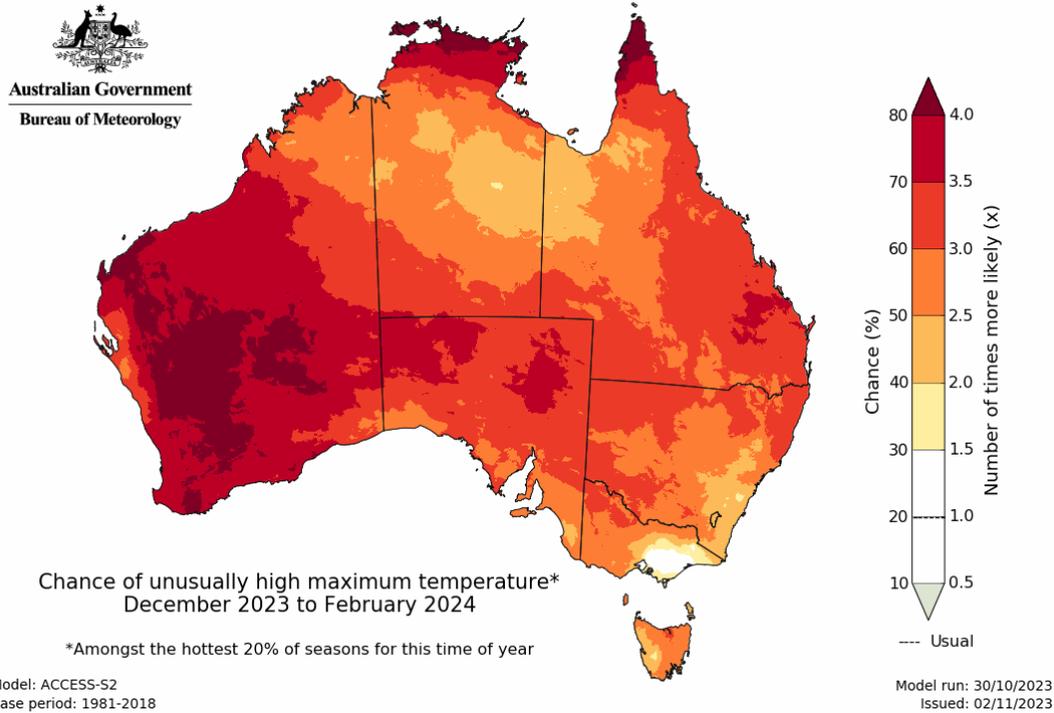
High chance of maximum temperatures being above median for all of the country.

High chance of minimum temperatures being above median for majority of the country.

Climate Outlook

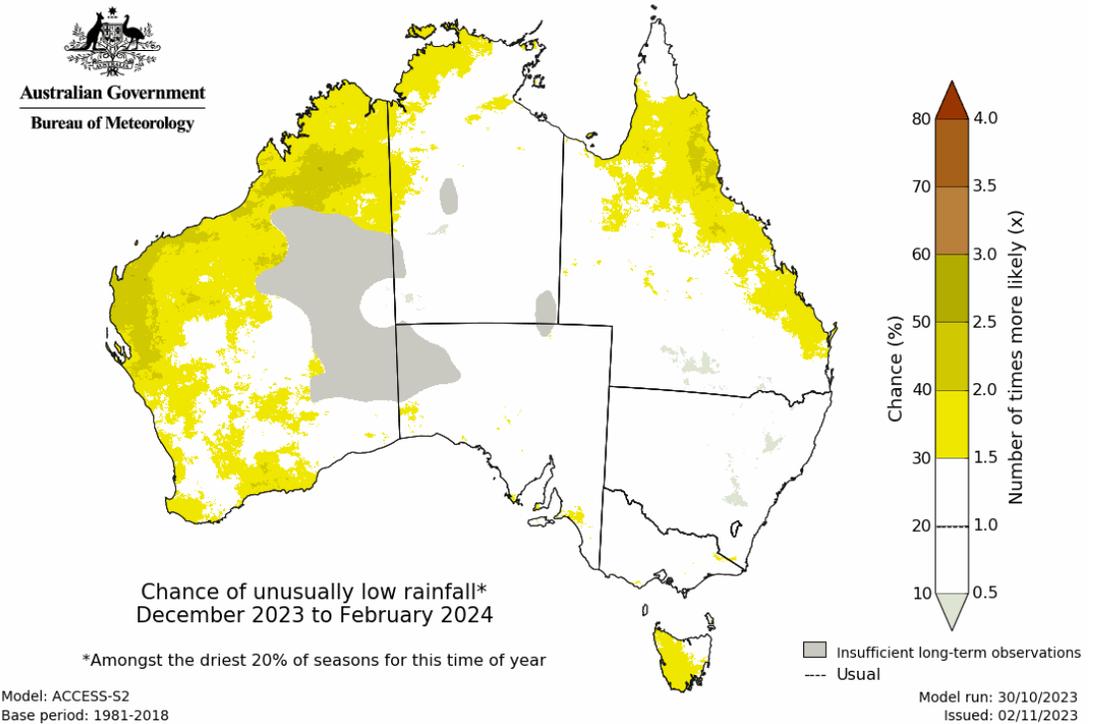
December 2023 to February 2024

Chance of unusually warm



High likelihood of unusually warm conditions across the country particularly for WA and northern parts of Australia.

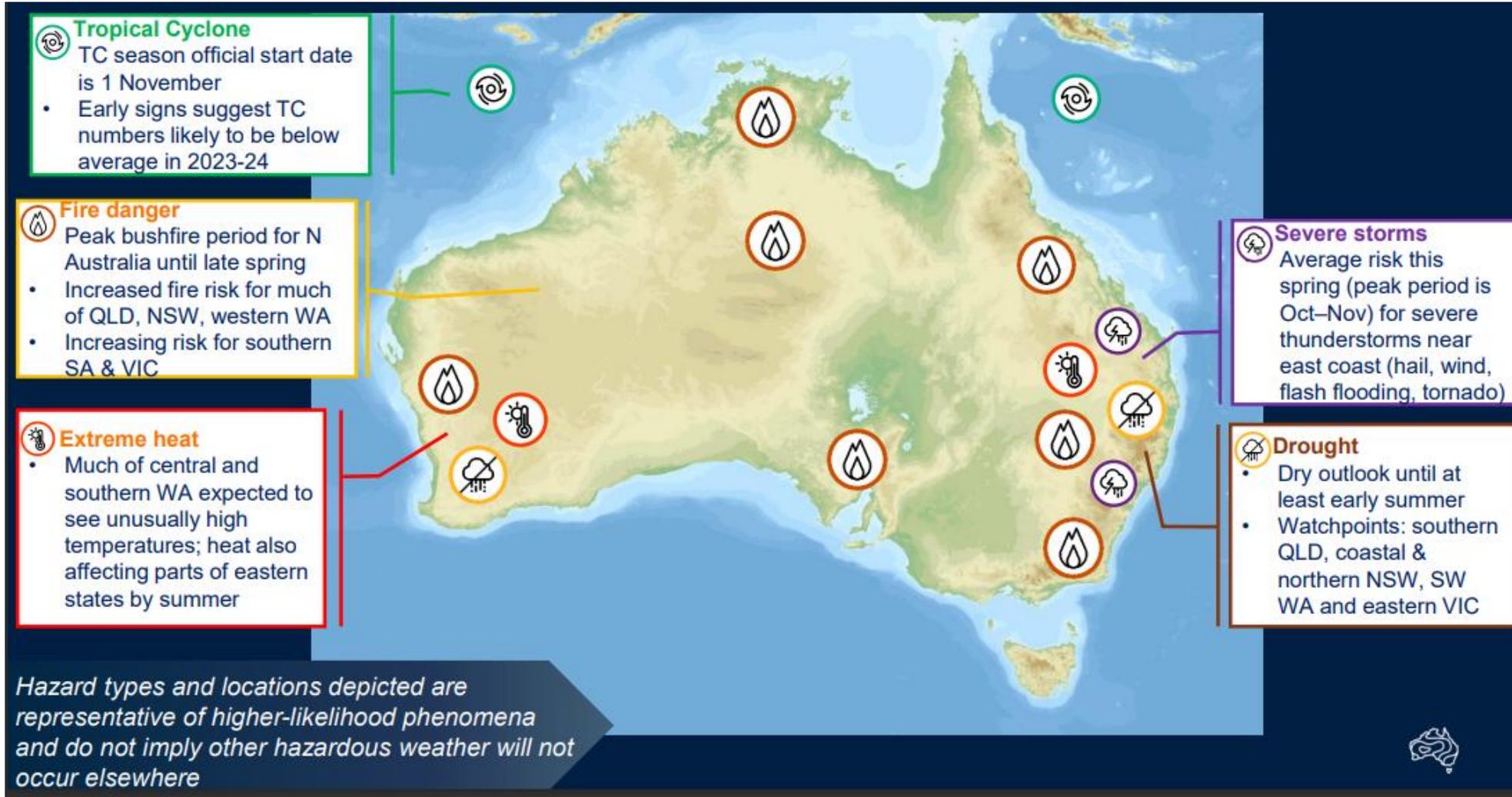
Chance of unusually dry



High likelihood of unusually dry conditions for large parts of WA, eastern Queensland and western Tasmania.

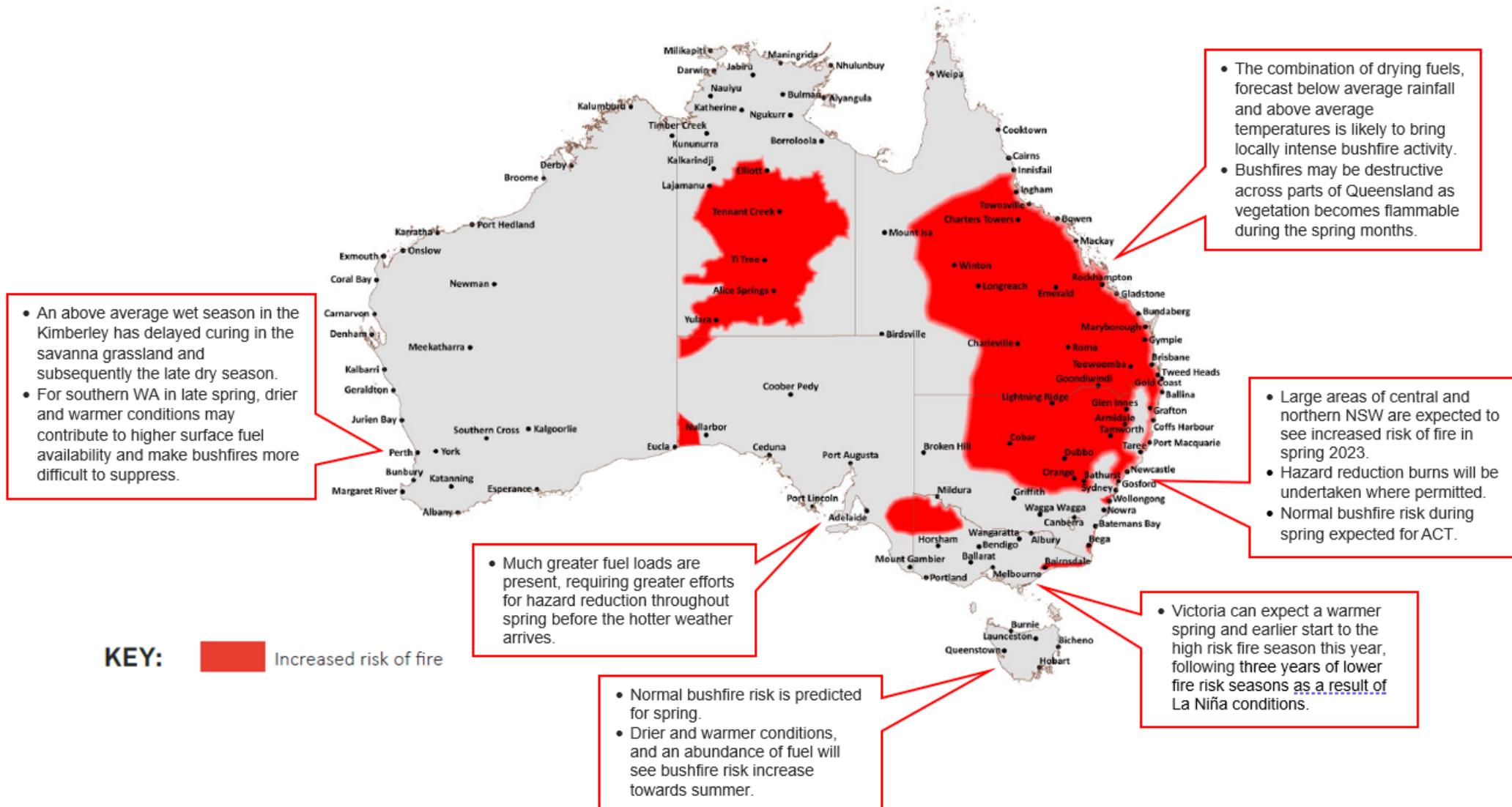
November 2023 to January 2024:

Regional Hazard Risk



Source: Bureau of Meteorology (2 Nov 2023)

Bushfire Risk Map – Spring 2023



Electricity System Readiness



Generation Availability

On average, additional 1500 MW of scheduled generation is expected to be available in the NEM compared to summer 2022/23, mainly attributable to Queensland and NSW regions. In the WEM, additional 46 MW of scheduled generation is PASA available compared to summer 2022/23.

• Hydro generation

- Limited by water licence, dam levels, available airspace, and riverbank capacity. Generation outages/reductions include:

VIC: Murray at reduced capacity by up to 600 MW during mid Nov 23 to mid Dec 23 and by up to 400 MW from mid Dec 23 to mid Feb 24.

TAS: John Butters and Tribute

• Coal generation

- Coal stockpiles in the NEM and WEM are returning to normal levels.
- Several large generating units are on longer term outages mostly in Nov-Dec period:

QLD: Callide B1/B2,C3/C4, Gladstone 1/2 and Tarong 4

NSW: Bayswater 1, Eraring 2

VIC: Loy Yang A2, Newport, Yallourn 2

WA: Bluewater U2

• Gas/diesel generation

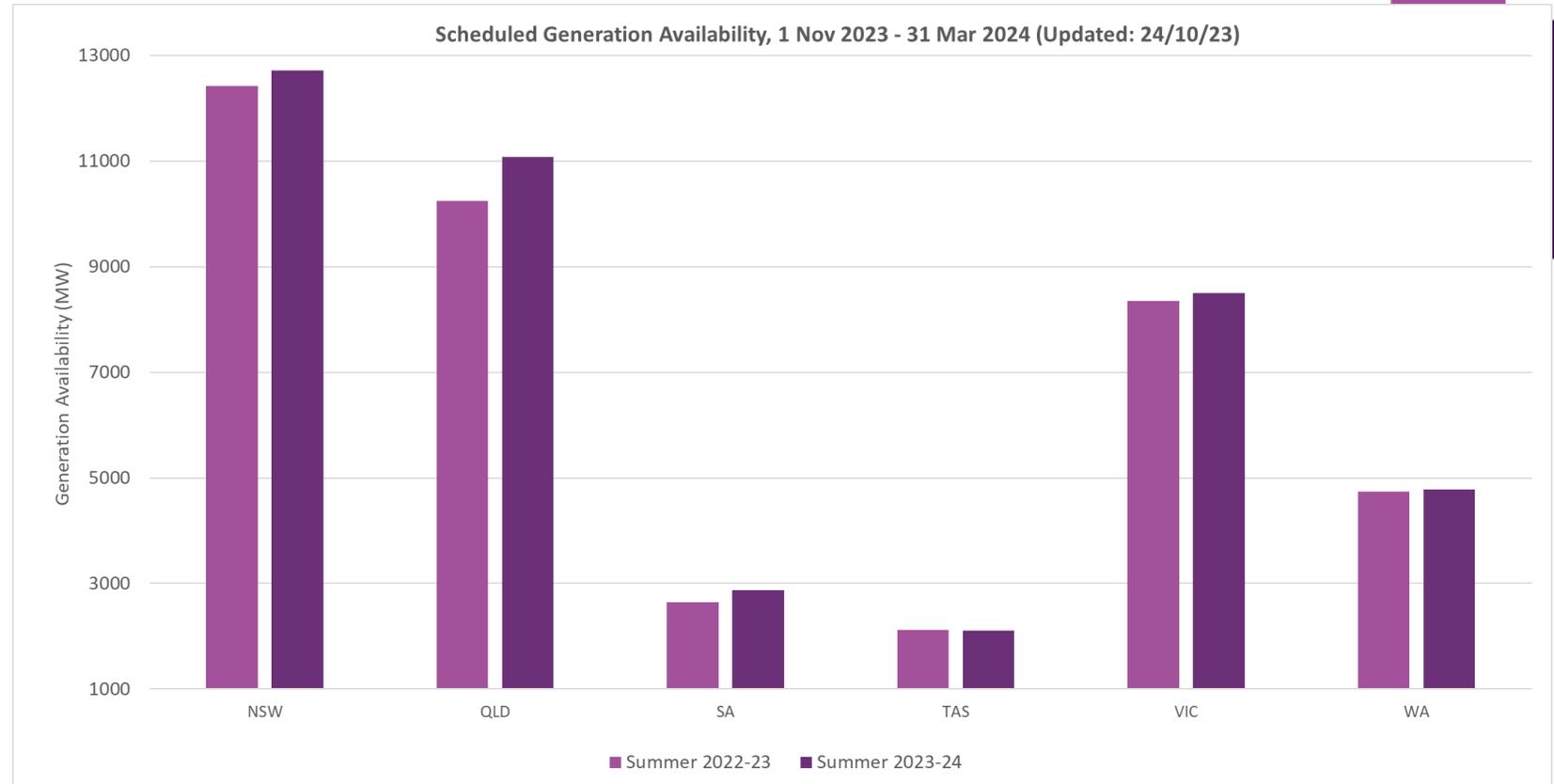
- East Coast gas usage will need to be monitored. Supply from Queensland may be required due to gas production maintenance outages. Generation outages include:

NSW: Colongra 3

VIC: Newport, Jeeralang B1

SA: Torrens Island B2, B3 and B4 (staggered)

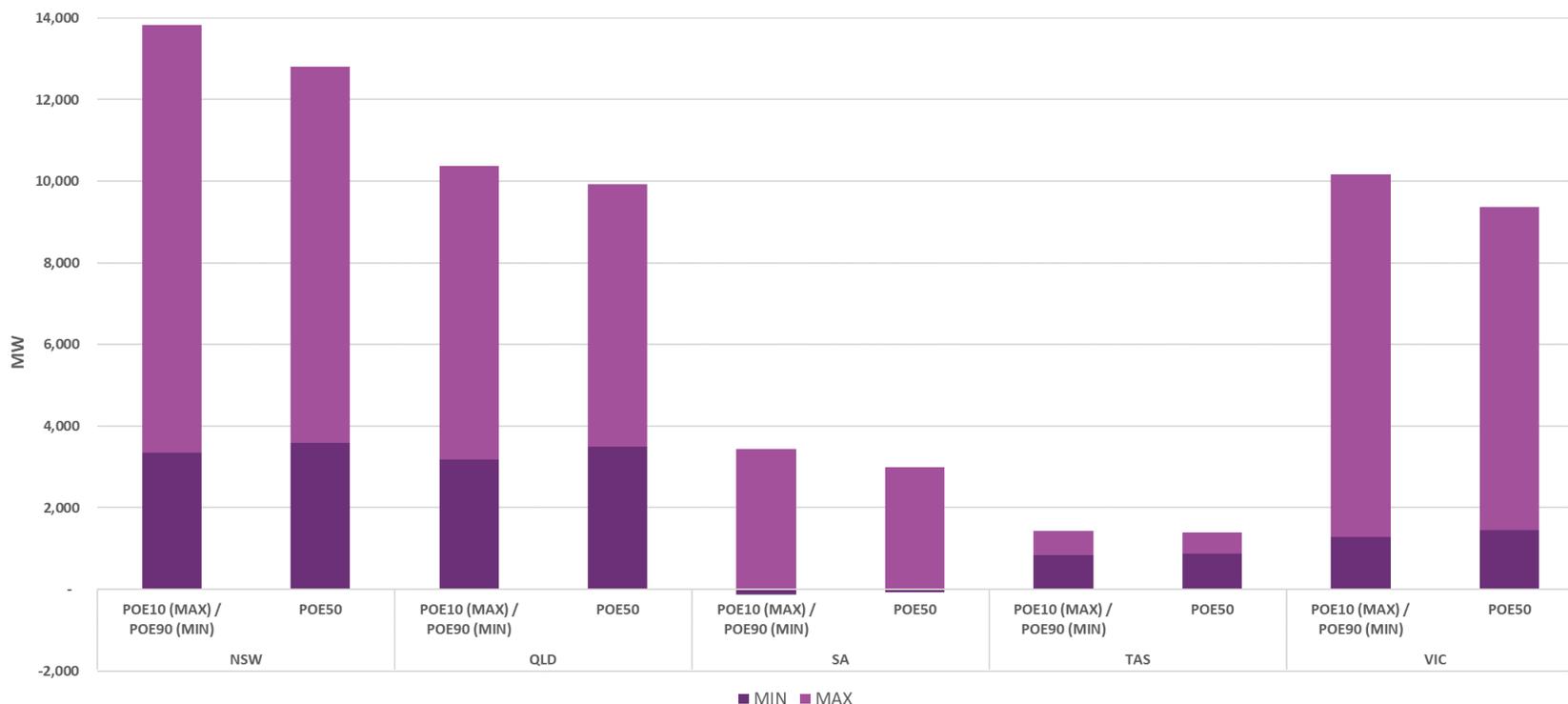
WA: Alinta Wagerup U2, Newgen Neerabup GT



In the NEM, its estimated that additional 1500 MW (on average) of dispatchable generation is expected to be available for summer 2023/24, mainly attributable to NSW and Queensland regions. Analysis includes planned generator outages and already operational / committed scheduled generator capacities including Tallawarra B (320 MW) gas turbine, and energy storage facilities at Torrens Island (250 MW), Hazelwood (150 MW), Riverina (150 MW) and Capital (100 MW). There is additional 46 MW of scheduled generation considered in WA which includes Kwinana (100 MW) energy storage facility.

Operational Demand

Operational demand (sent-out): 1 November 2023 - 31 March 2024

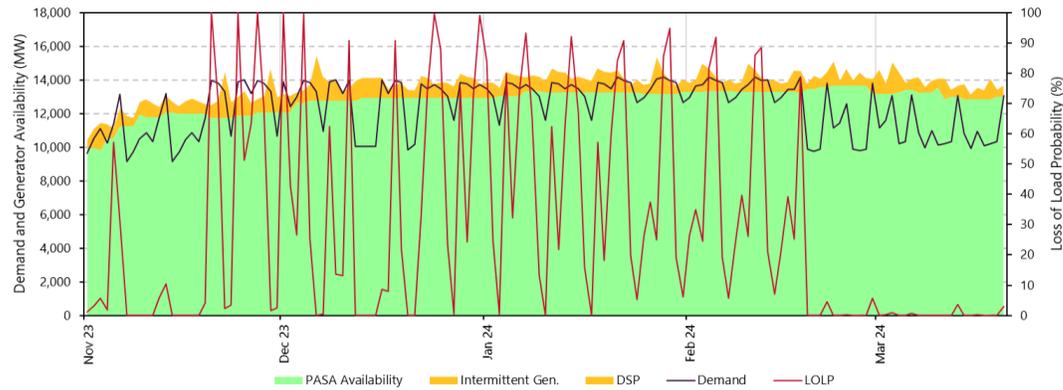


Region	Record Maximum Demand (MW)	Record Minimum Demand (MW)
NEM	35,796 (29/01/09)	11,009 (29/10/23)
NSW	14,744 (01/02/11)	3,719 (29/10/23)
QLD	10,070 (17/03/23)	3,131 (1/10/23)
SA	3,399 (31/01/11)	5 (1/10/23)
VIC	10,576 (29/01/09)	1,915 (29/10/23)
TAS	1,790 (21/07/08)	732 (21/03/13)
WA	4,006 (08/02/16)	595 (25/09/2023)

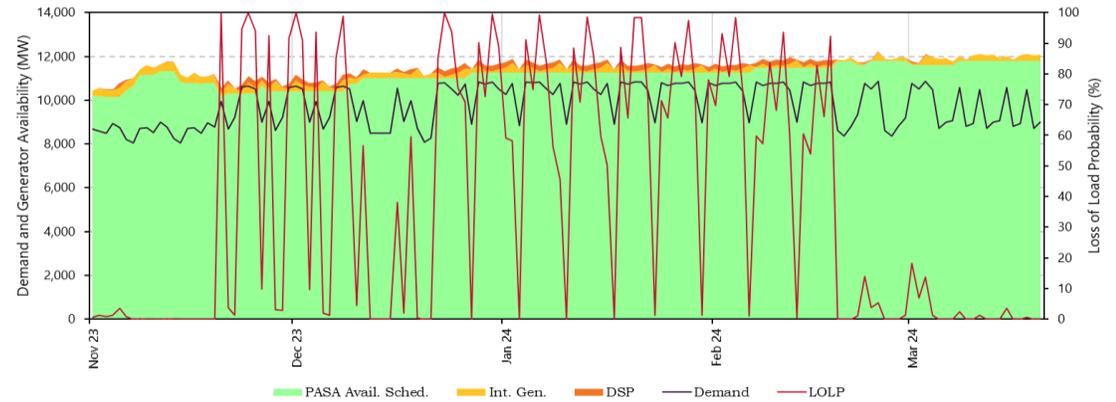
- Hotter and drier outlook suggests an increased likelihood of 1 in 10-year maximum demand levels (10% POE - Probability of Exceedance) in the NEM and WEM.
- Expected Unserved Energy (USE) is forecast to be higher than the Interim Reliability Measure (IRM, 0.0006%) in Victoria and South Australia. Risk of load shedding remains in all regions where high demand days combine with low VRE availability and or scheduled generation and network outages as indicated by Loss of Load Probability Study.
- Historically minimum record demands occurred during shoulder seasons. Low demand periods during summer are more likely to occur during weekends and public holidays.

Loss of Load Probability Study

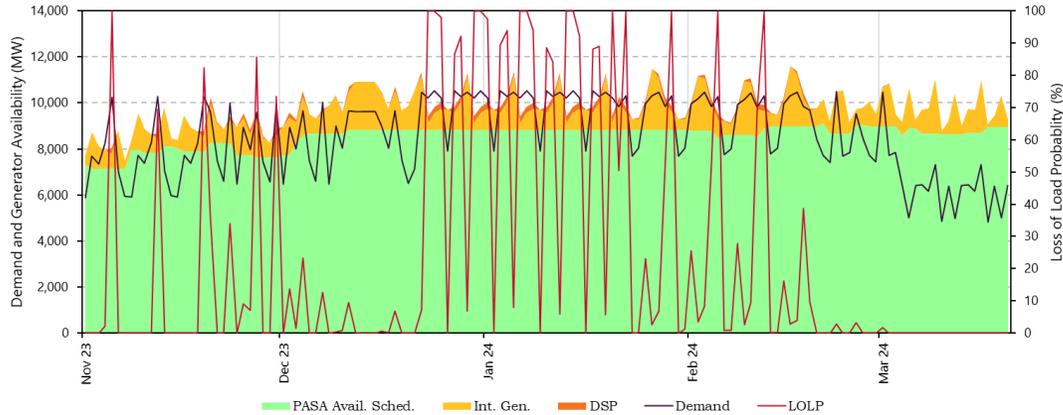
NSW



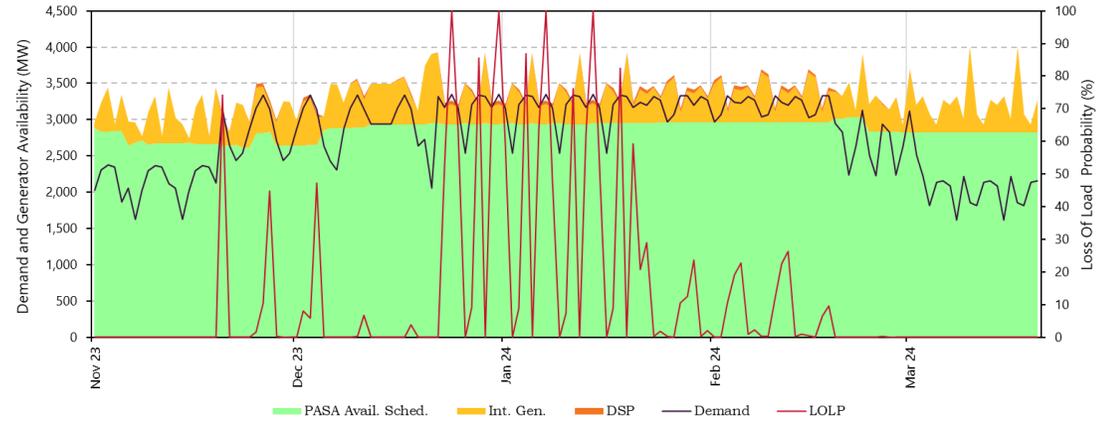
Queensland



Victoria



SA

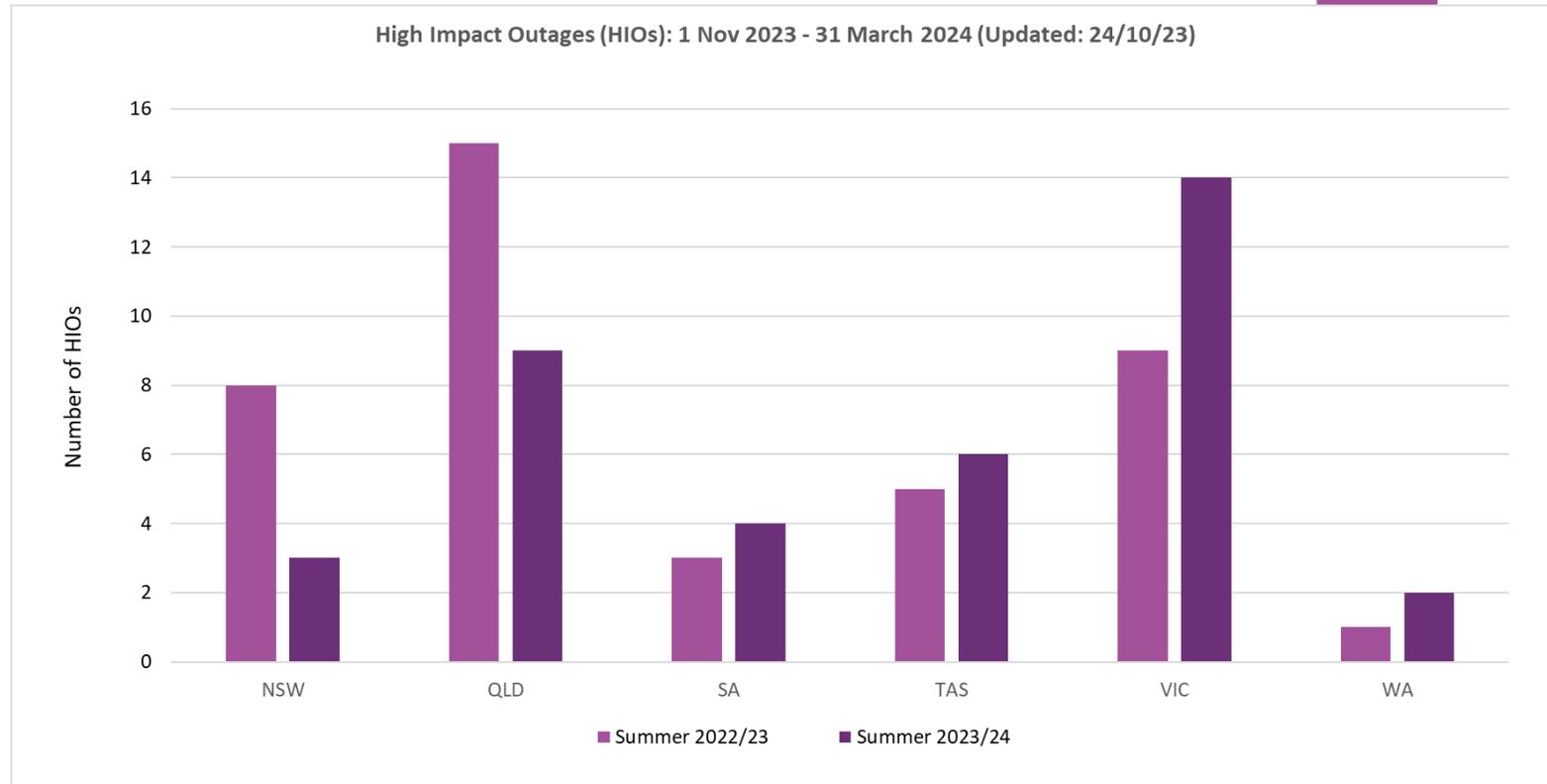


The study shows significant number of days with high LOLP in all NEM mainland regions. Tasmania has no LOLP periods during summer and for that reason no chart is provided.

Note: MTPASA run 736 (7 Nov 2023), period shown is 1 Nov 2023 to 31 Mar 2024.

High Impact Outages and Augmentations

- Number of planned HIOs are at similar or reduced levels (compared to previous summer) for most regions, however Victoria is showing noticeable increase.
- QLD: maintenance/commissioning of 275kV feeders out of Nebo, Broadsound and Strathmore.
- NSW: maintenance of Wagga - Jinderra 330kV and Balranald - Buronga 220kV lines.
- VIC: maintenance works Heywood – Mortlake and Keilor – South Morang 500kV lines and project works at Red Cliffs (March 2024).
- Multiple VIC-NSW interconnector related outages are scheduled in February and March 2024.
- SA: maintenance activities on South-East to Heywood and South-East to Tailem Bend 275kV lines.
- TAS: maintenance on Gordon to Chapel Street and Sheffield – Farrell 220kV lines.
- WA: Muja BTT1 and Muja 132kV Busbar short outages



Inter-regional augmentations:

- QNI transfer capacity increases:
 - Additional 150 MW NSW to QLD capacity compared to summer 2022/23.
 - Possible 100 MW QLD to NSW capacity increase during summer 2023/24.

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

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

WEM - Supplementary Reserve Capacity (SRC)

- AEMO identified a 326 MW shortfall for 2023-24 Summer (1 December 2023 to 31 March 2024) due to a combination of factors:
 - Voluntary capacity reductions
 - Potential for 10% POE peak demand forecast
 - Increase in contingency reserves to account for increasing risks to the reliability of supply in the SWIS
- Tender evaluation is continuing with estimated commencement date of 1 December 2023.

Reliability Emergency Reserve Trader (RERT) Short Notice 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.
- It should also be noted that these quantities may reduce as part of the IRR procurement process (discussed next slide).

Reliability Emergency Reserve Trader (RERT) Interim Reliability Reserves

- The latest Electricity Statement of Opportunities (ESOO) published on 31 August 2023 has determined that the forecast reliability of supply in South Australia and Victoria exceeds the interim reliability measure in the Financial Year 2023-24.
- As a result, AEMO opened up a tender for the procurement of Interim Reliability Reserves (IRR) on 1 September.
- IRR differs from SN RERT in that AEMO can pay availability payments for Interim Reliability Reserves to firm up the reserves and have them contractually available.
- Reserves contracted in the IRR program cannot also be offered in the SN RERT program.
- The amount of IRR that AEMO can procure is the amount required to fill the reliability gap identified in the latest ESOO (118MW and 120MW in SA and Vic respectively).

Summer Response Capability

1. Prepared resources
 - Generation availability, including fuel
 - Transmission availability
 - RERT/IRR
 - Supplementary Reserve Capacity (SRC WEM)
 - East Coast Gas Supply function

2. Operational Improvements
 - Training
 - Lessons Learnt
 - Processes Improvements

3. Contingency Planning and Emergency Management

4. Communications and Stakeholder Engagement

Operations Summer Readiness Training Program Overview

Control Room Training will deliver the following programs of training over the summer period. An indication of topics is provided:

GAS

Training Program 2023:

- Modified training program to focus on training and testing for new gas control room including the business continuity plan
- Operations training on Abnormal Scheduling, Directions and Curtailment to support GPG
- East Coast Gas Supply threat processes and Contingency Gas

WEM

Training Program 2023:

- WEM Reform
- Low reserve conditions
- Minimum Demand management including NCESS, DPV, Battery or Motoring
- Bushfire reclassification

NEM

3 x 1-day Seasonal Readiness 2023-24:

- Regional updates on networks augmentation and generation outlook
- Forecast demand and weather outlook
- NSW System Restart (SRAS) training
- Bushfire Reclassification
- Reserve Shortfall Conditions (LORs)
- RERT Update

3 x 3-day Training Program 2023:

- FCAS Directions
- Load Shedding
- High Impact Outages
- Violating Constraints
- System Restart

NEM Support

- RERT Support Team scenario based simulation training



Contingency Planning and Emergency Management

- Crisis and Emergency Management Framework, Crisis Management Plan and Emergency Management Plan updated.
- Online training for Responsible Officers, Jurisdictional System Security Coordinators and Jurisdictional Designated Officers provided.
- Internal Crisis and Emergency Management training provided.
- External emergency exercise with National Electricity Market Emergency Management Forum (NEMEMF) and National Gas Emergency Response Advisory Committee (NGERAC) held on 27 October 2023.
- External WEM summer readiness simulation planned for first week in December.
- Various emergency exercises with TNSPs occurred during October 2023.

Communications and Stakeholder Engagement (WEM)

Pre Summer

- Targeted Parts of Industry
 - Network Operator (Western Power)/Generators
- Jurisdictional Engagement
 - Weekly seasonal readiness meetings with Energy Policy WA (Coordinator of Energy) and WA Govt-owned entities (Western Power and Synergy)
 - September/October/November outlook and readiness updates for WA Minister ahead of Energy Ministers Meeting in Perth late November
- Whole of Industry
 - Summer Outlook and Readiness Briefing at next WA Electricity Consultative Forum (27 November).

During Summer

- Planned weekly briefings – jurisdictional and industry
- Use of digital platforms, Media engagement

Communications and Stakeholder Engagement (NEM)

Pre Summer

- Targeted Parts of Industry
 - TNSPs/Generators through ACCC interim authorisation
- Jurisdictional Engagement
 - NEMEMF/NGERAC briefing for all jurisdictions held on 26 October 2023
 - Emergency Exercise held on 27 October 2023
 - Targeted briefings
- Whole of Industry
 - Industry briefing scheduled for 13 November 2023.
 - Consumer forum briefing scheduled for 29 November 2023.
- Energy Ministers Meeting scheduled for 24 November 2023.

During Summer

- Planned weekly briefings – jurisdictional
- Use of digital platforms, Media engagement

Gas System Readiness



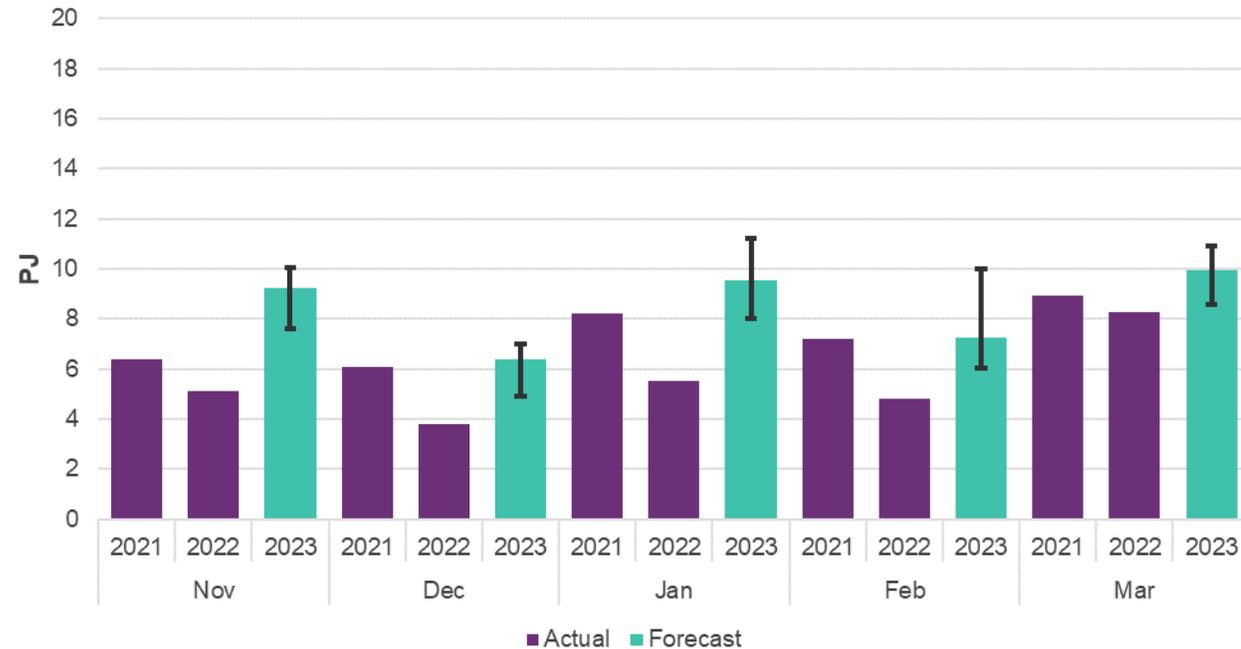
East Coast Gas

- The Longford Gas Plant (the largest gas production facility) undertakes maintenance outages outside of the winter peak demand period, with production down to 350 TJ/d (40% of winter 2023 capacity) from mid-January to early February.
- The main Victorian gas supply pipeline, Longford to Melbourne Pipeline (LMP), will also have to be operated at reduced pressure and capacity throughout spring and summer for urgent dig-up, inspection, and possible repair works. The lower pressure operation will reduce the capability to support un-forecasted GPG demand – AEMO market intervention could be required.
- Regular summer dig-up and inspection maintenance on the Moomba to Sydney Pipeline reduces supply capacity from Queensland during this period. This maintenance can also impact Newcastle LNG storage filling.
- Possible high Queensland spot gas supply prices (due to northern hemisphere winter) may result in market participants preferring to use Iona storage gas during periods of reduced Longford production and high GPG demand.

GPG Supply Adequacy

- GPG will provide important peak generation capacity this summer.
- Following a mild winter, gas storage levels are adequate for GPG however refilling remains a risk.
- New big batteries may reduce or replace GPG load depending on how they are operated.

NEM GPG Fuel Offtake

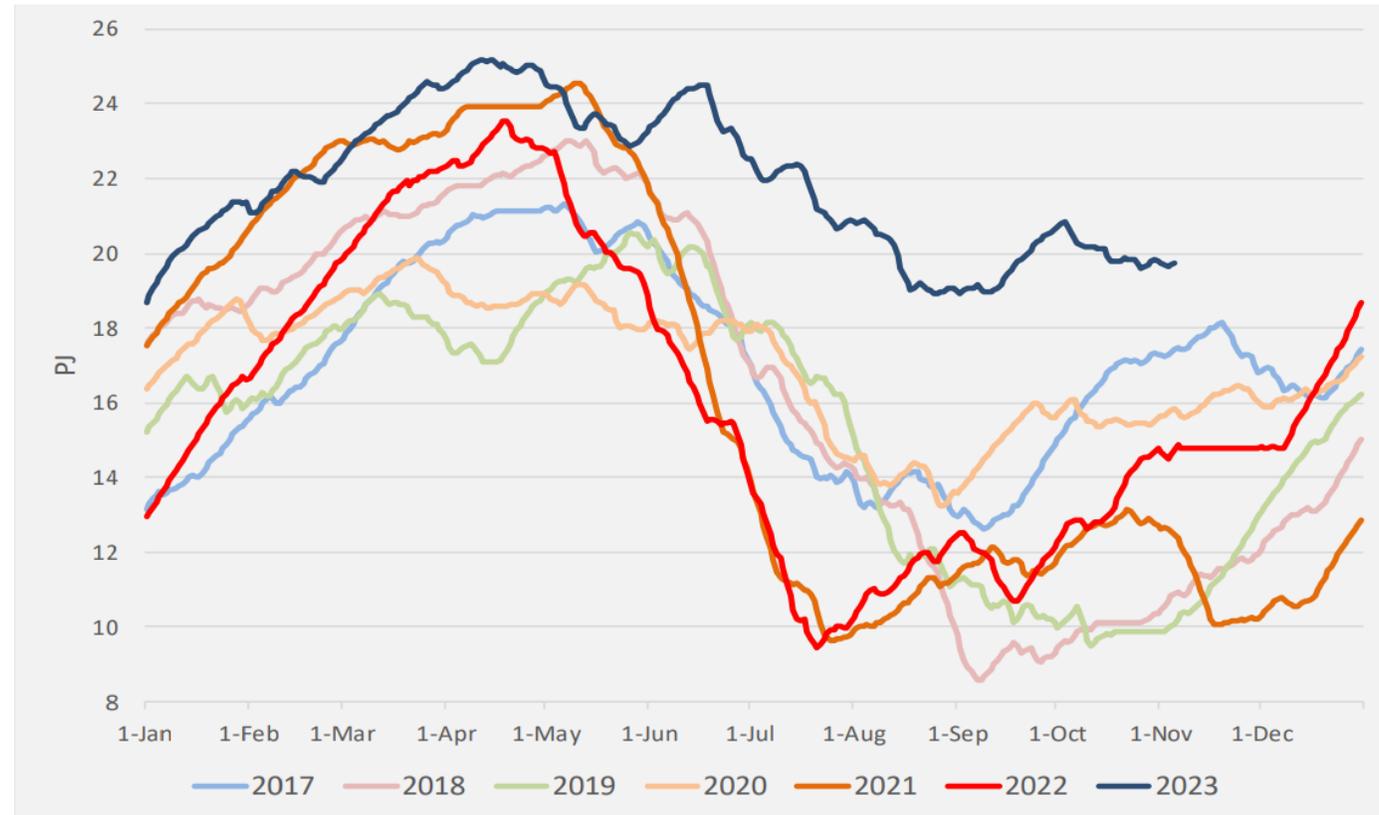


Source: AEMO NEM GPG Forecasts using 2022 ISP Step Change scenario with NEM demand & VRE generation following reference years 2014, 2015, 2017 and 2019. Forecasts developed using inputs as at December 2022.

Note: These forecasts do not include new inputs consistent with the 2023 ESOO - demand forecasts, updated understanding of wind resource availability and new and committed projects (Generation Information). New draft GPG forecasts may be available in Q4 2023.

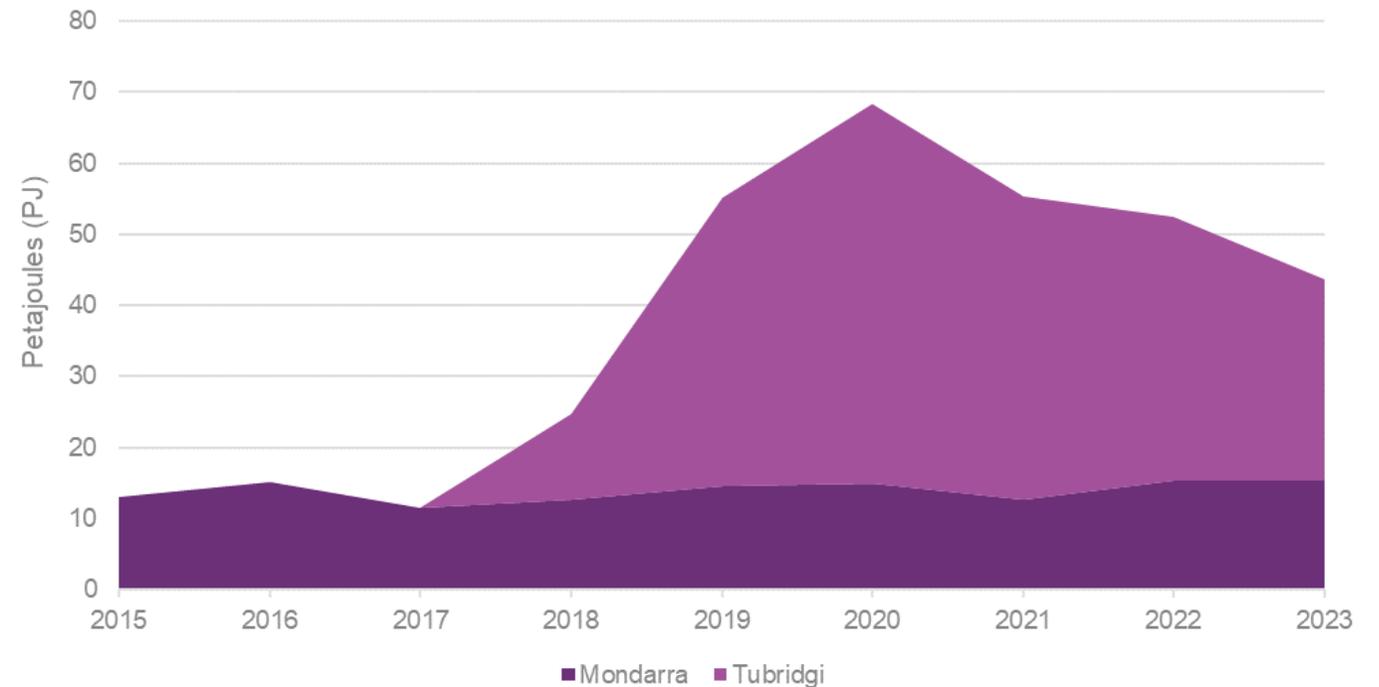
Iona Storage

- Iona storage is at high level for this time of the year. Refilling has commenced with inventory at around 20 PJ.
- Supply from Queensland reduced since the start of September with heating demand also reducing.
- Iona refilling will need to be monitored during summer due to reduced Longford gas production and forecast high gas generation demand - existing processes are in place for managing this.



West Coast Gas – 2023 GSOO Early Insights

- The WA 2023 Gas Statement of Opportunities will be published on 14 December 2023.
- Since the 2022 WA GSOO, the WA domestic gas market is projected to tighten further between 2024 and 2029.
- Continuing tight market conditions since 2020 are further highlighted by reduction in stored gas in WA gas storage facilities, which have been estimated from GBB records.



Key Risks



Network and Generation Risks

Risks	Mitigation
Network and generation forced outages exceeding limits historically observed.	<ul style="list-style-type: none"> • Similar levels of scheduled generation availability across most regions with some notable increases expected in QLD and NSW. Additional renewable resources / energy storage systems capacity across mainland NEM regions. • RERT Panel: Short Notice RERT and Interim Reliability Reserves. • WEM's SRC is available for summer 2023/24. • AEMO is monitoring generation availability across all regions. • Aerial imagery and thermographic scanning of network assets to identify "hot-spots".
Bushfires/grassland fires impacting fuel supplies (coal or gas production), generation or network assets.	<ul style="list-style-type: none"> • Vegetation management by asset owners. • Monitor risks with asset owners. • Contingency plans in place.
Plant cut-out / capacity derating due to extreme heat.	<ul style="list-style-type: none"> • TNSP plant ratings account for summer conditions. • Revision and update of local temperature alerts for generation centres. Market notices issued in advance of extreme temperature days. • PASA availability adjusted based on weather conditions / market notice advice. • Monitoring of wind cut-out potential.
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, parts sourcing or other reasons. • Risk managed through ACCC interim authorisation maintenance co-ordination for QLD, NSW, SA and VIC. • New MT PASA interface with information on generating unit status and recall times.
Storms / flash flooding impacting coal supply and transmission, particularly in Qld during cyclone season.	<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.
Unplanned network events including during high/low demand periods.	<ul style="list-style-type: none"> • Contingency plans in place. • Minimum Demand Framework.

Existing Generation Issues/ Limitations

Issues with potential to impact system reliability	Impacted Region(s)
<p>Potential delays to return to service of generators on extended outages:</p> <p>Callide B1, 25/11/23 – 20/12/23</p> <p>Callide B2, 2/9/23 – 19/11/23</p> <p>Callide C3, out of service until 07/01/24 (234 MW) with full capacity of 466 MW from 18/2/24.</p> <p>Callide C4, out of service throughout summer</p> <p>Gladstone 2, 23/10/23 – 17/11/23</p> <p>Tarong 4, 10/9/23 – 1/12/23</p>	Qld
<p>Tallawarra B commissioning date extended beyond November 2023. Commercial operation possible around the end-Jan 2024 period. Monitor commissioning activities.</p>	NSW
<p>Potential delays to return to service of generators on extended outages:</p> <ul style="list-style-type: none"> • Bayswater 1, 26/8/23 – 14/12/23 • Colongra 3, 15/9/23 – 16/12/23 • Eraring 2, 2/9/23 – 17/11/23 	NSW
<p>Possible shortfall in coal supply to Mt Piper Power Station due to dewatering issues impacting mining operations.</p>	NSW
<p>Bendeela 1 and Kangaroo Valley 3 & 4 on planned outage (200 MW). Expected completion 4 December 2023 and 23 December 2023 respectively. There is a risk that Kangaroo Valley outage may be extended further due to an interdependency with concurrent third party works (being monitored).</p>	NSW

Existing Generation Issues/ Limitations

Issues with potential to impact system reliability	Impacted Region(s)
Murray Power Station will be operating at reduced capacity by up to 600 MW from mid-Nov 2023 to mid-Dec 2024 and by up to 400 MW reduction from mid-Dec 2023 to mid-Feb 2024.	NSW, Vic
Jeeralang B1 (70 MW) is on extended outage due to difficulty of sourcing replacement transformer. There is a potential of extended outage beyond the current return to service date of 01/03/24.	Vic
Potential for delayed return to service of generating units on planned outages, monitor status with asset owners: <ul style="list-style-type: none"> • Loy Yang A2, 5/12/23 - 15/12/23 • Newport, 10/11/23 – 1/12/23 • Yallourn 2, out of service until 3/11/23 – 15/12/23 	Vic

Existing Network Issues

Issues	Impacted Region(s)	Impact
QNI and Heywood interconnector capacity increases dependent on market conditions.	Qld, NSW SA, VIC	NEM reserves.
Lismore 1 132 kV SVC is out of service until 30/11/23.	NSW, Qld	Constraint on Qld – NSW interconnector.



For more information visit

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