Summer Readiness Industry Briefing

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Friday 16 November 2018

Welcome

Shonal Dessmann
Manager, Emergency Preparedness

Agenda

Welcome and introductions

Weatherzone briefing

Overview of AEMO's Summer Readiness program

Enacting of RERT

Market communications and expectations

Public communications and expectations

SUMMER OUTLOOK

NEM Summer Briefing | November 2018

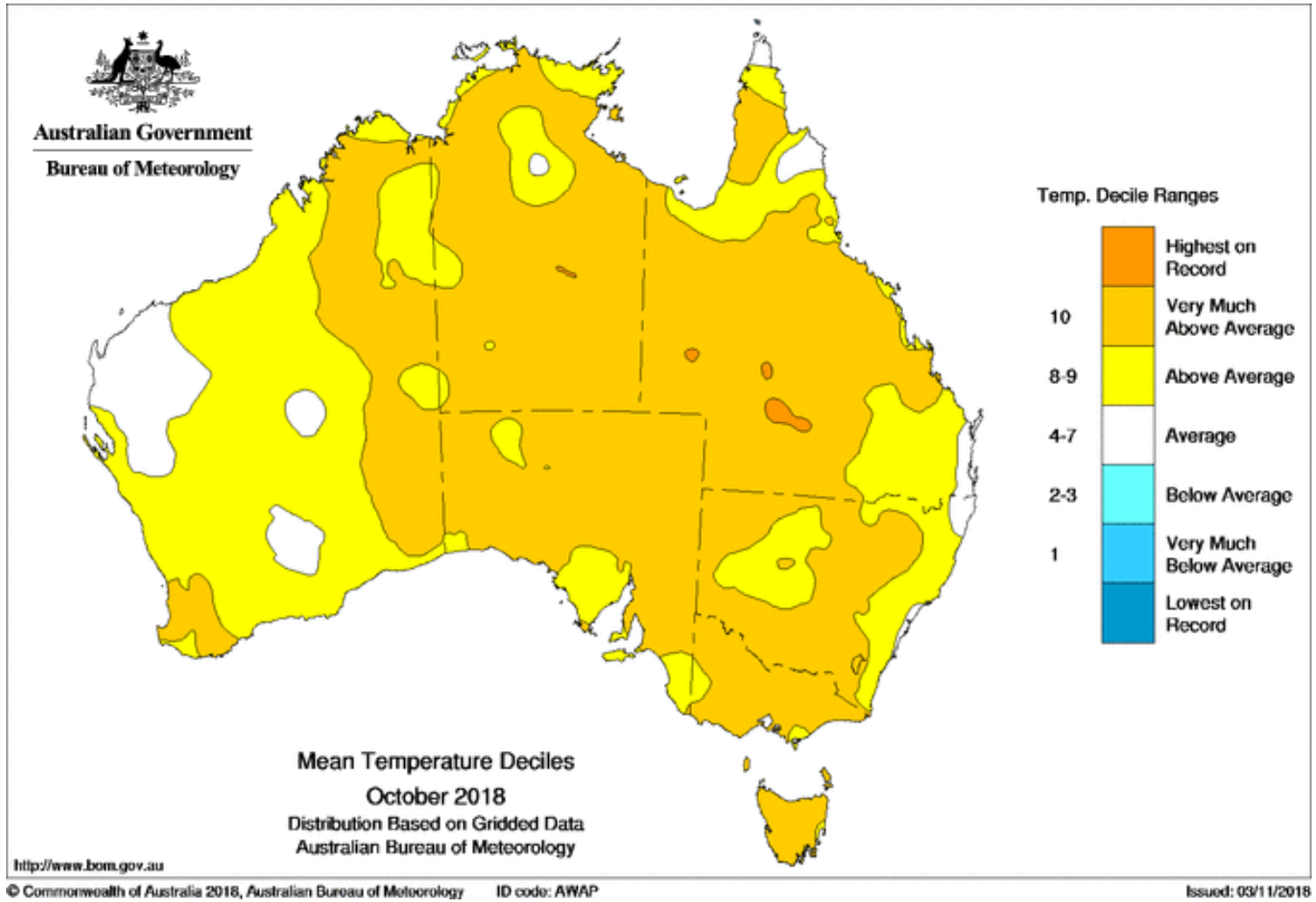
Josh Fisher – Account Manager/Meteorologist

- **Analysis of October 2018**
- State of the climate
- Outlook

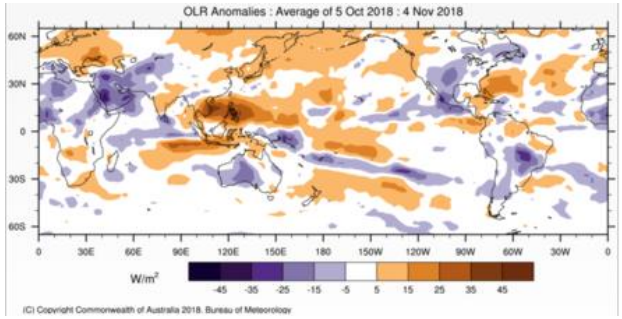
Jacaranda

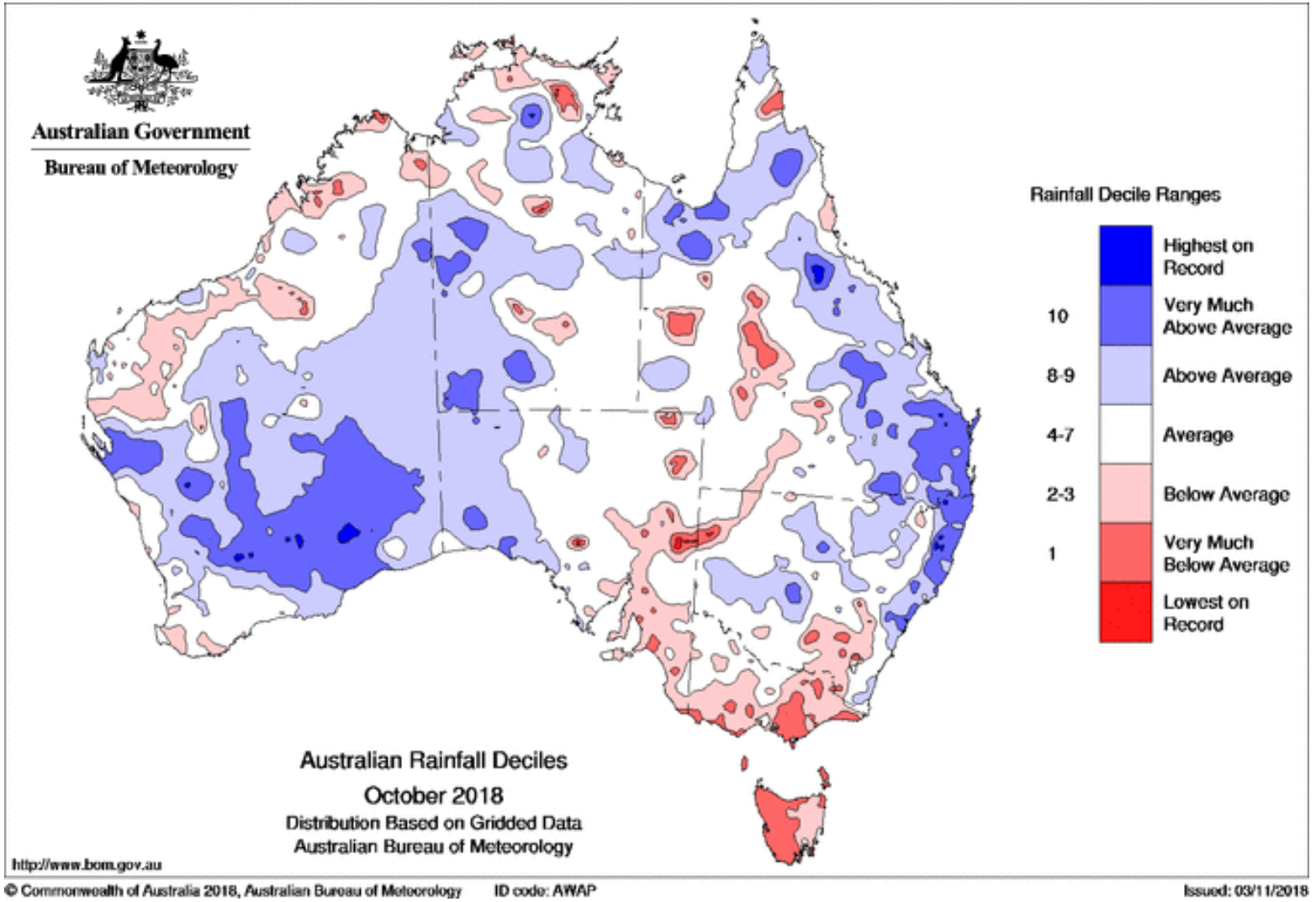
OCTOBER 2018 – Mean Temperature

weatherzone



OCTOBER 2018 - Rainfall

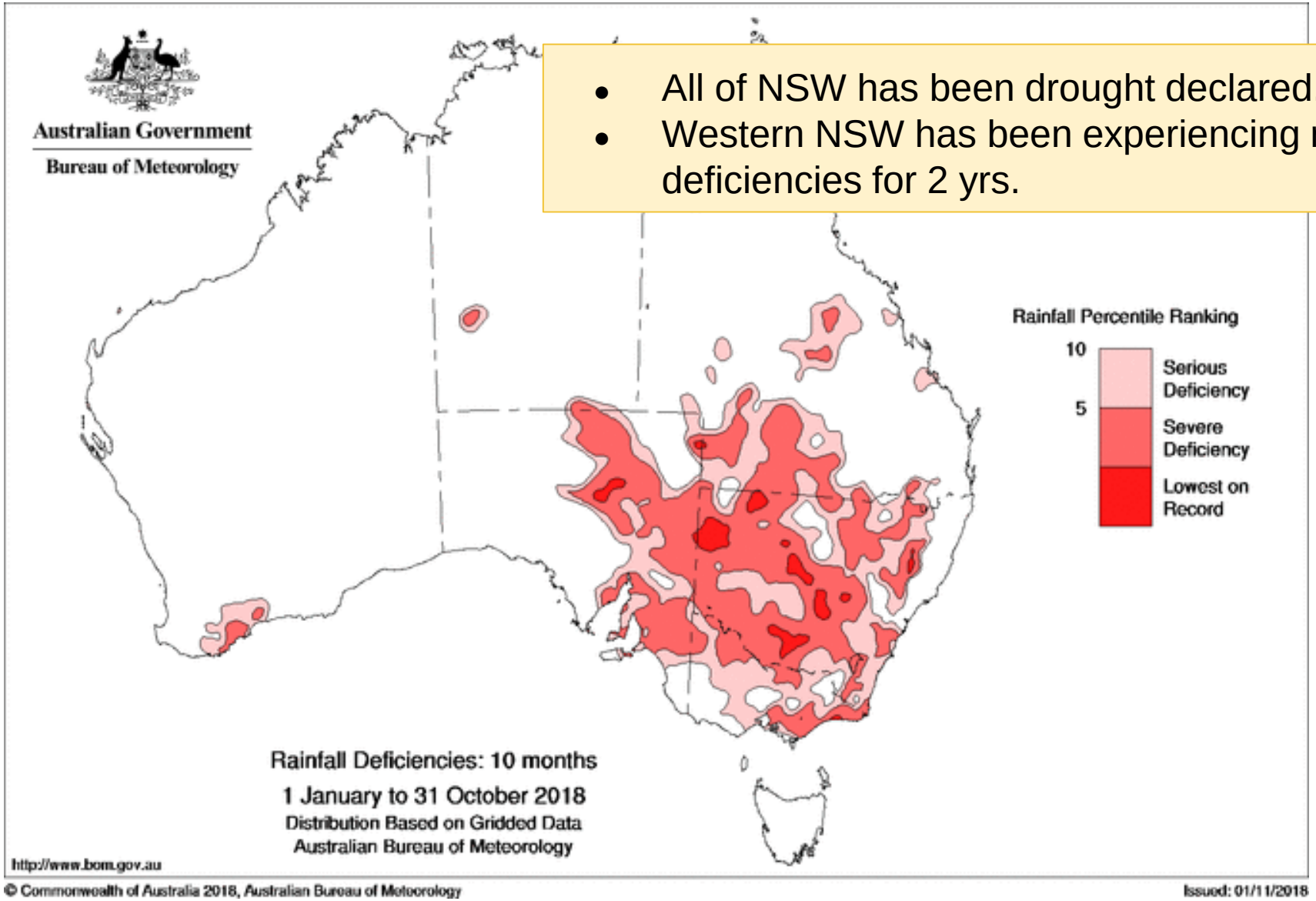




2018 Rainfall Deficiencies

weatherzone

- All of NSW has been drought declared.
- Western NSW has been experiencing rainfall deficiencies for 2 yrs.

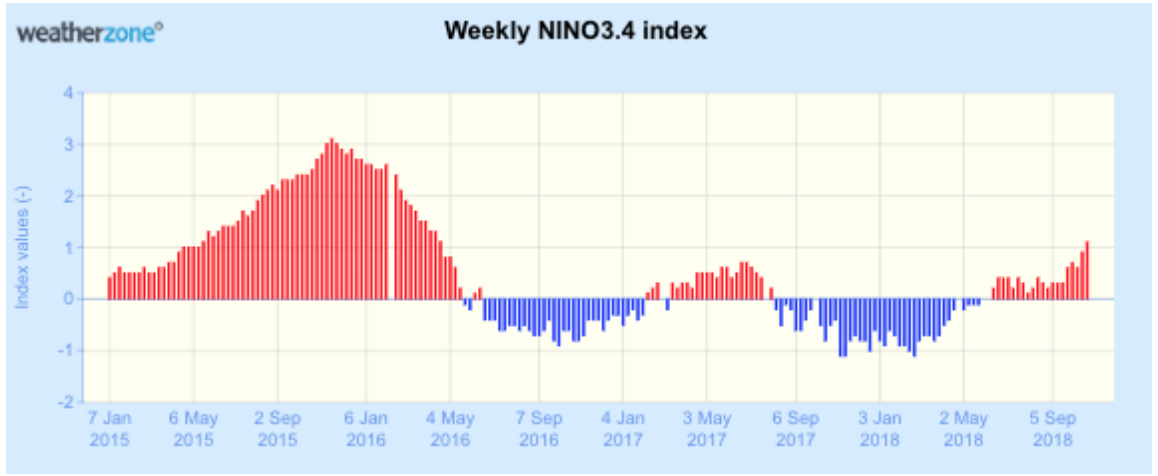


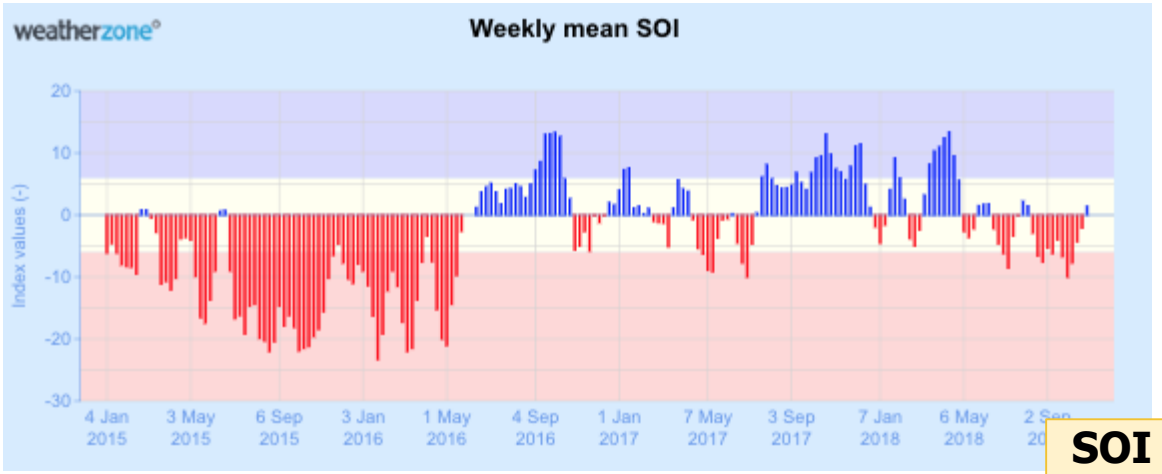
- Analysis of October 2018
- **State of the climate**
- Outlook

Jacaranda

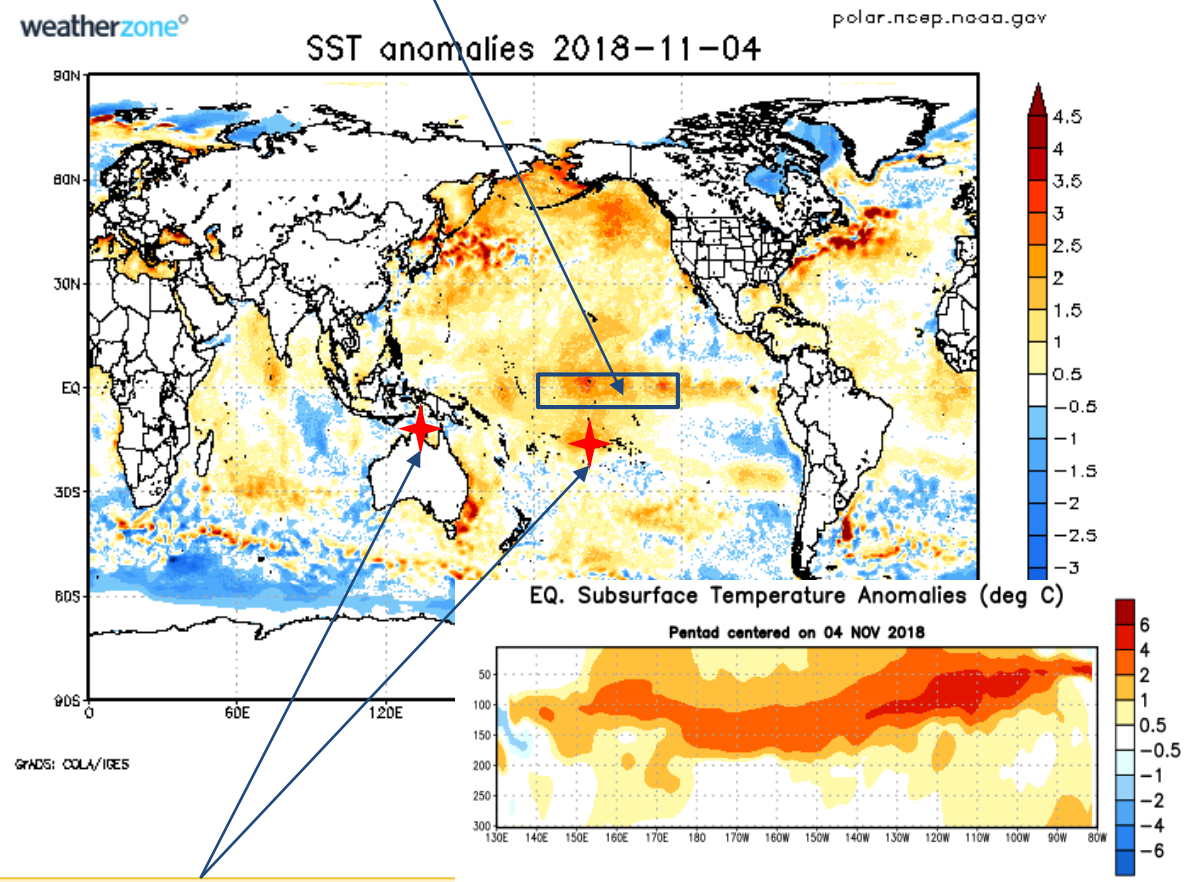
ENSO Indices

weatherzone



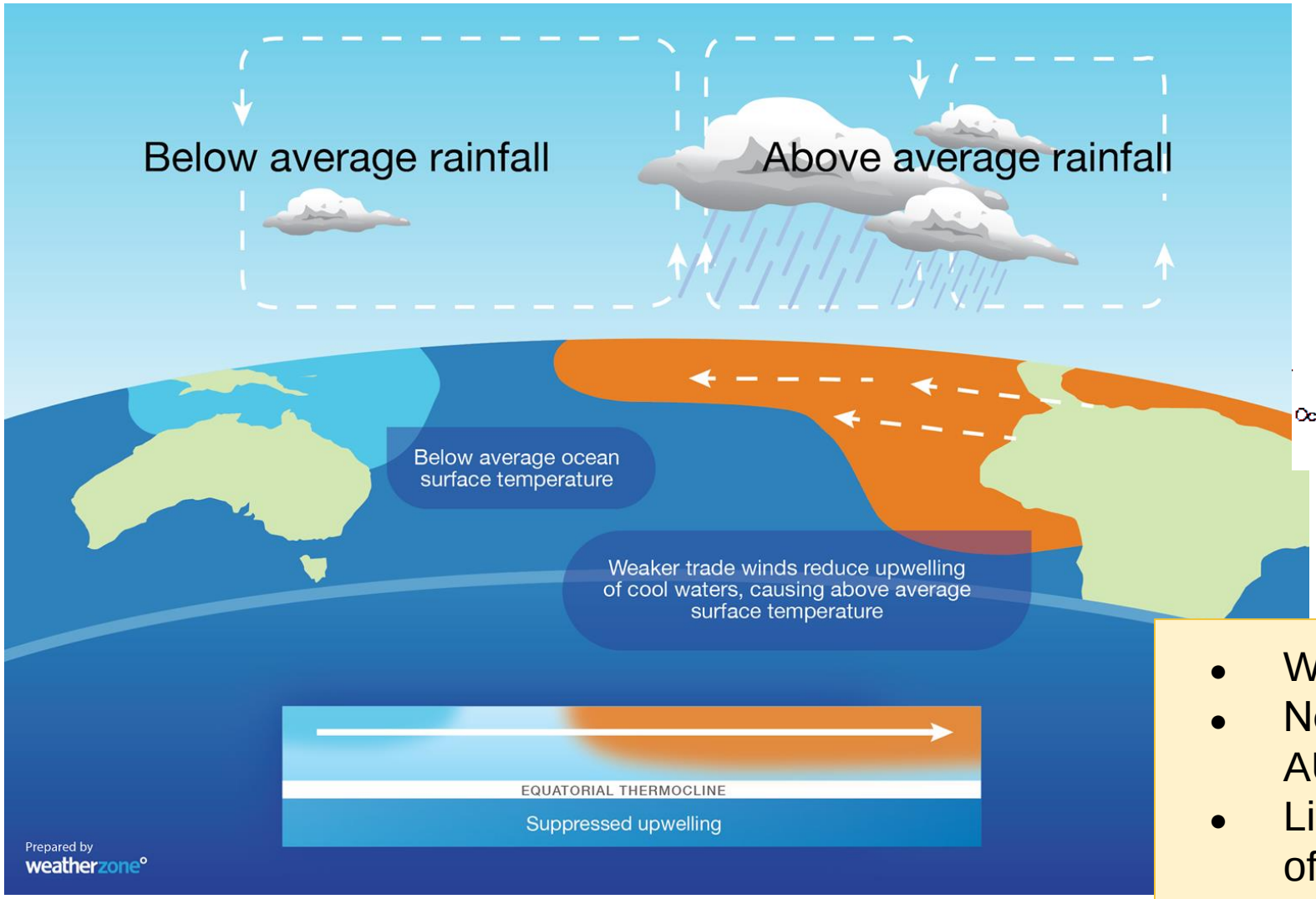


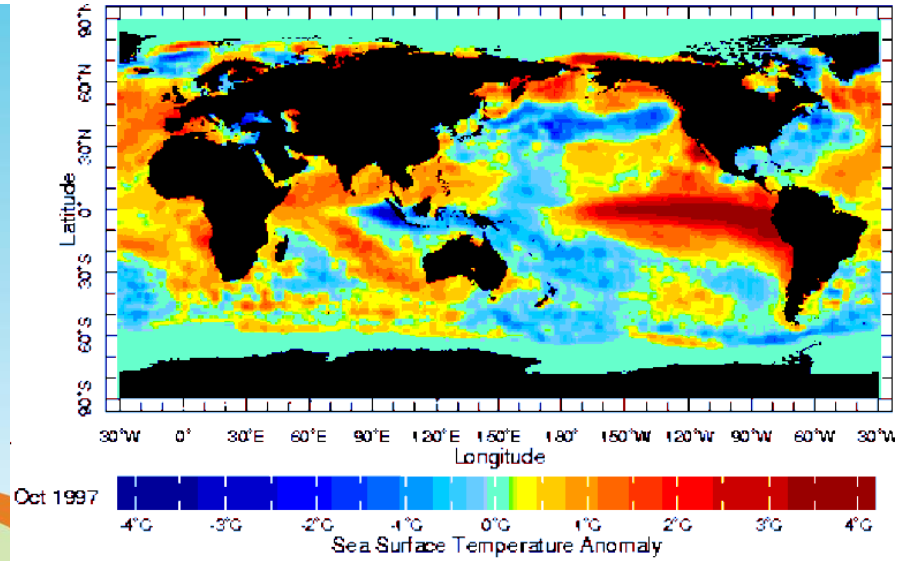
NINO3.4 Index = Average SSTs across the 3.4 region



SOI = Atmospheric pressure difference between Darwin and Tahiti

El Nino - Southern Oscillation (ENSO)



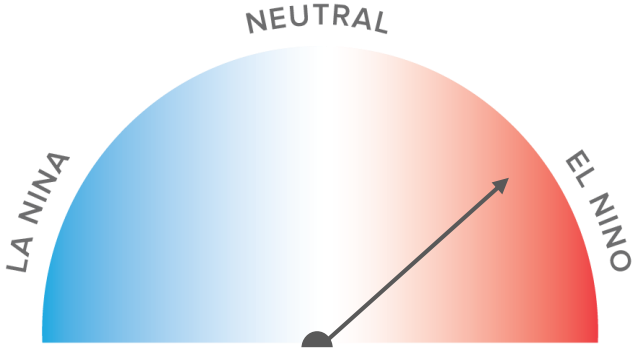


- Weaker Trade winds.
- No “piling” of water across northern AUS.
- Little to no upwelling of colder seas off S. America
- No every El Nino is the same

EL NINO

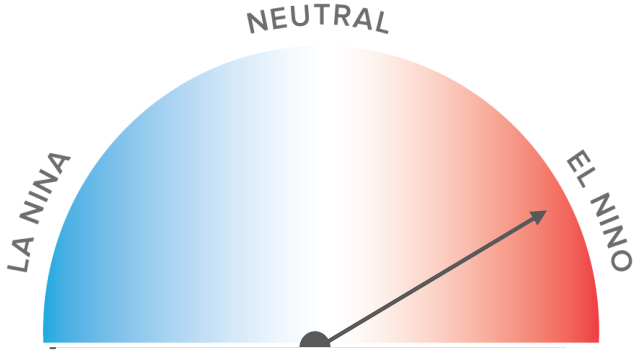
ENSO Outlook - NINO3.4 Index

Current International Consensus



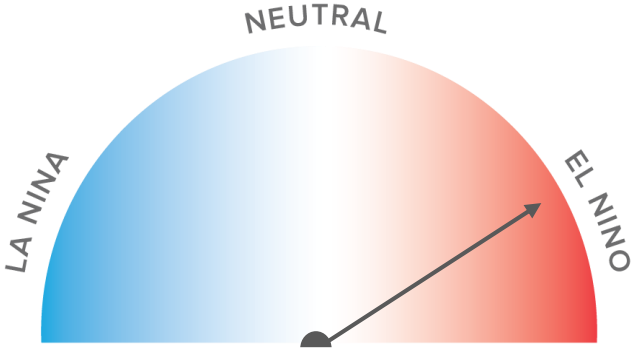
November

NINO3.4 Index: 0.9



January

NINO3.4 Index: 1.0

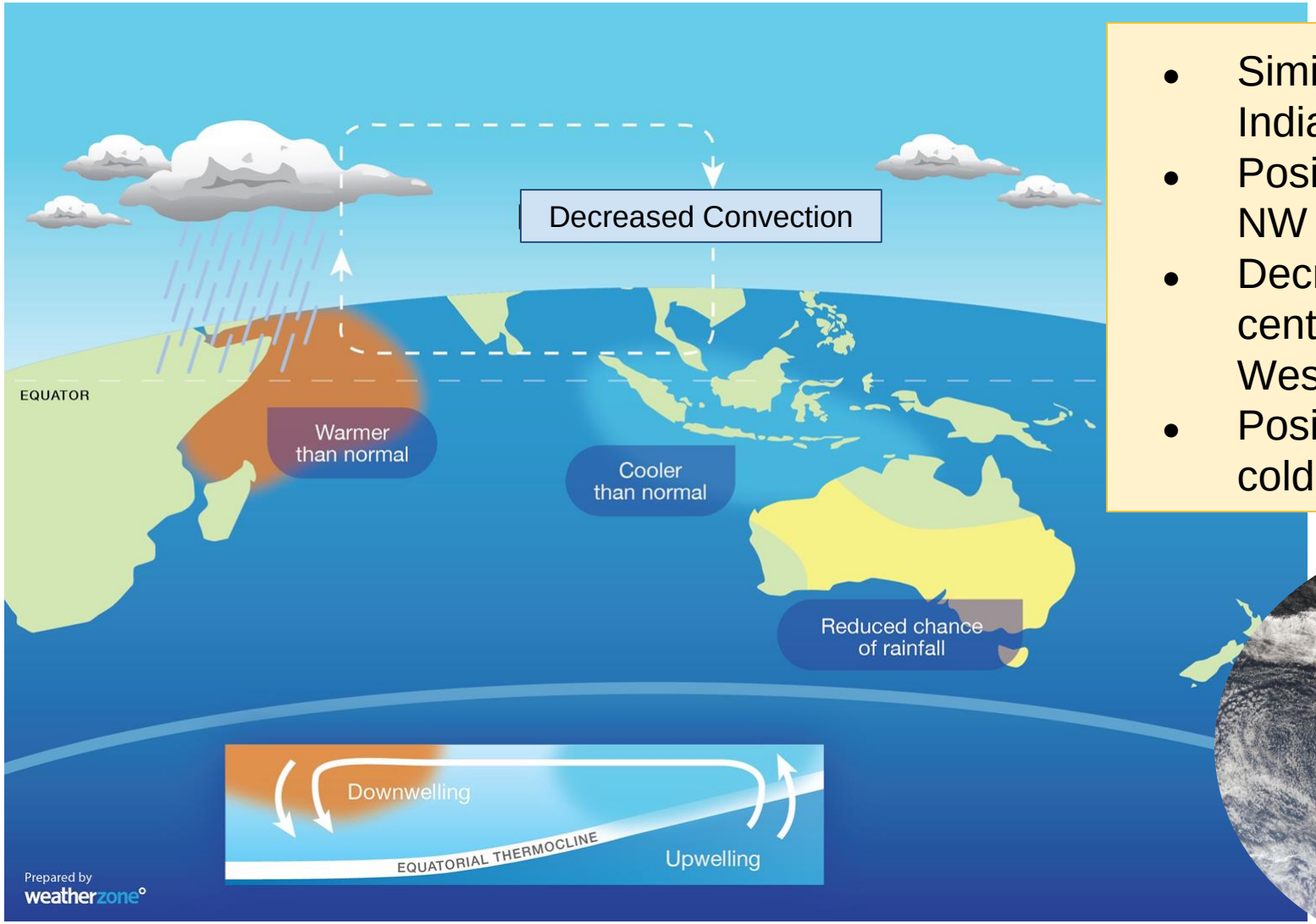


March

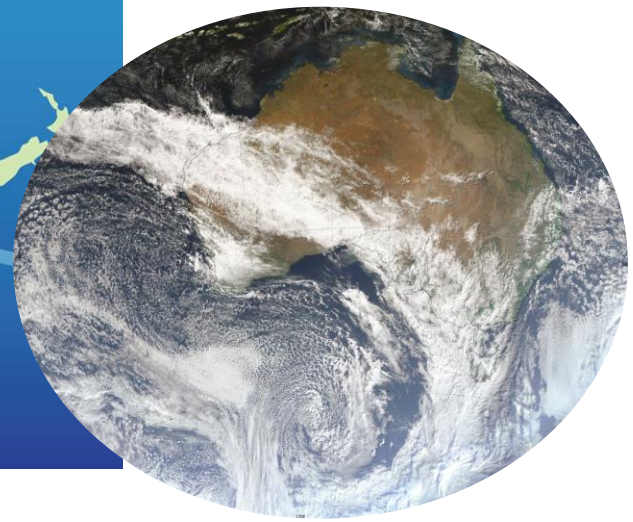
NINO3.4 Index: 1.0

*"For a **La Nina (-0.8)/El Nino (+0.8)** to be declared, thresholds need to be met for at least 3 consecutive months"*

Indian Ocean Dipole (IOD)

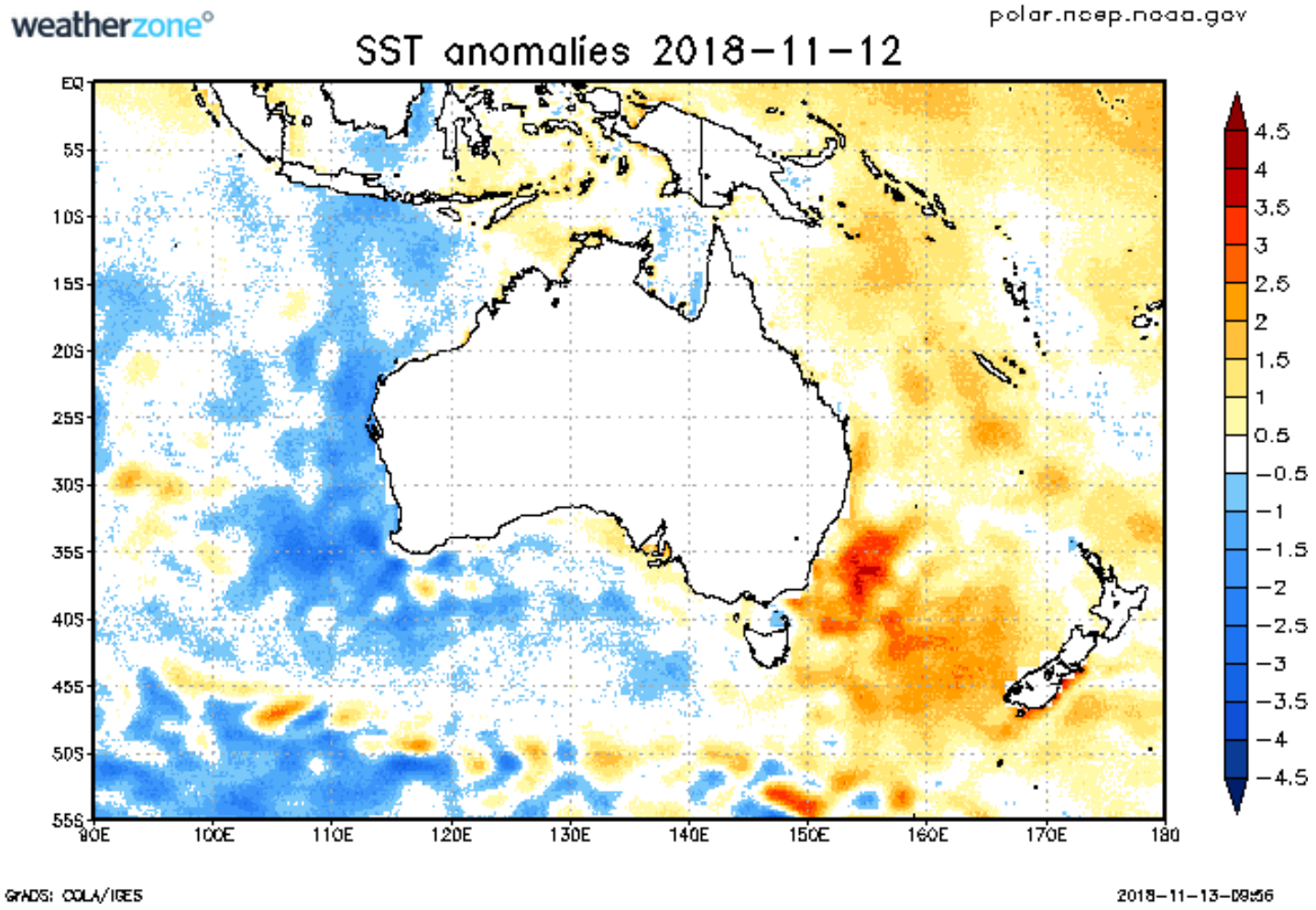


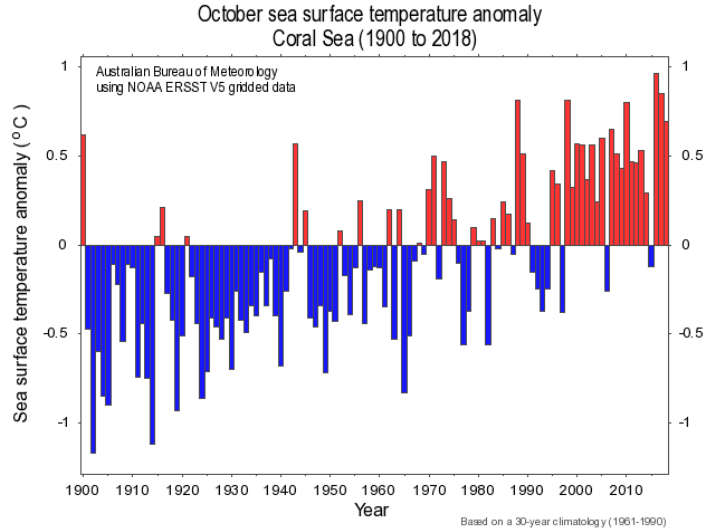
- Similar system to ENSO in the Indian Ocean.
- Positive IOD brings cooler SSTs to NW AUS.
- Decreasing moisture advection to central and SE AUS through North West Cloudbands.
- Positive IOD also tends to favour colder nights and warmer days.

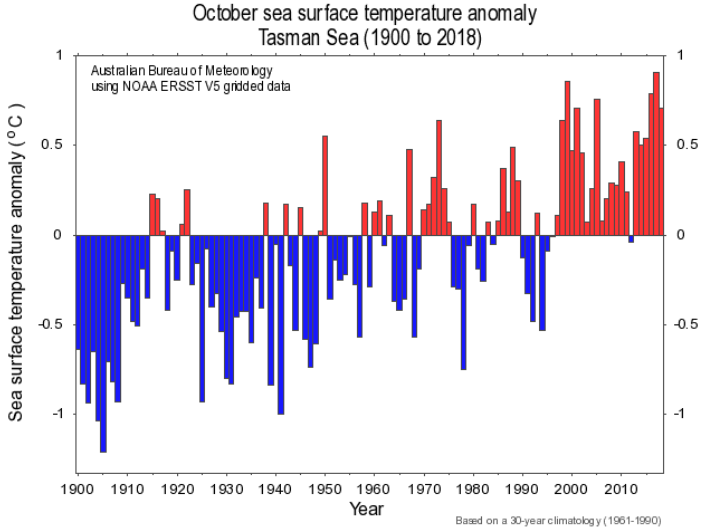


Sea Surface Temperatures (SSTs)

weatherzone°

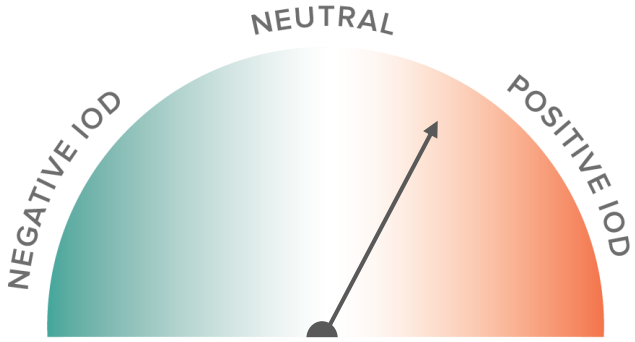






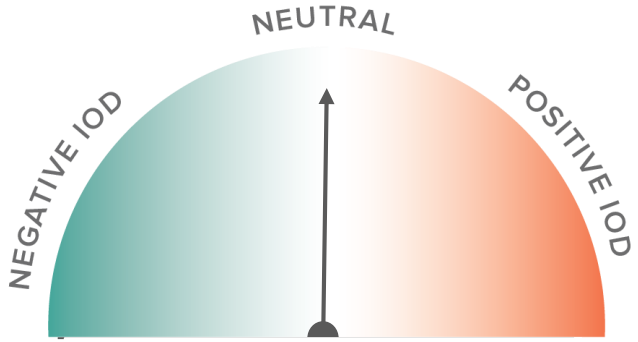
IOD Outlook - DMI

Current International Consensus



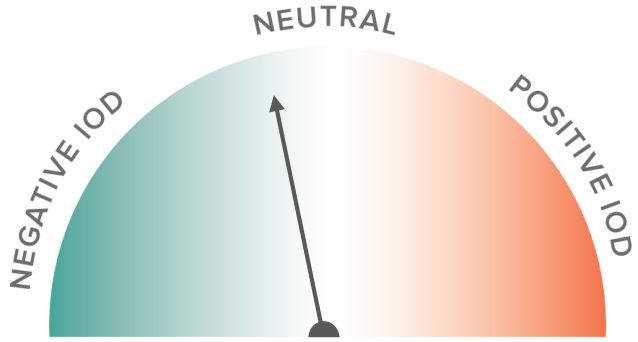
November

DMI Index: 0.2



December

DMI Index: 0.0

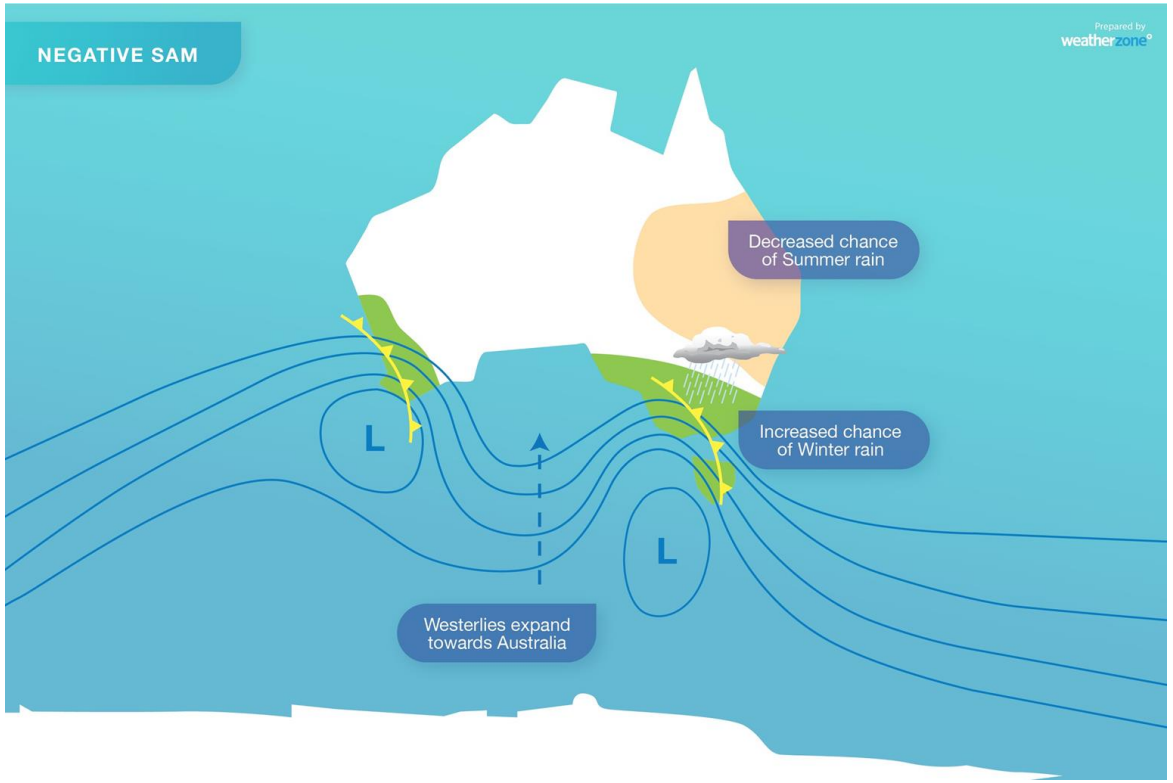


February

DMI Index: -0.1

*"For a **Negative / Positive event** to be declared, thresholds need to be met for at least 3 consecutive months"*

Southern Annular Mode - SAM

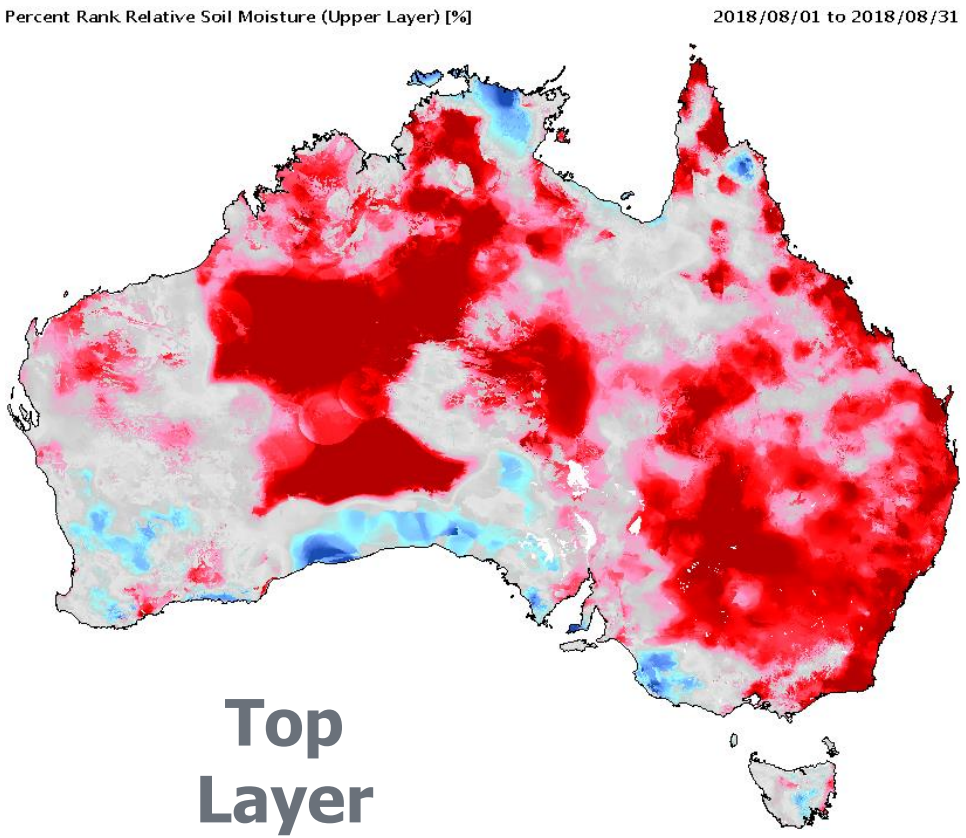


- El Nino tends to promote higher prevalence of Negative SAM events

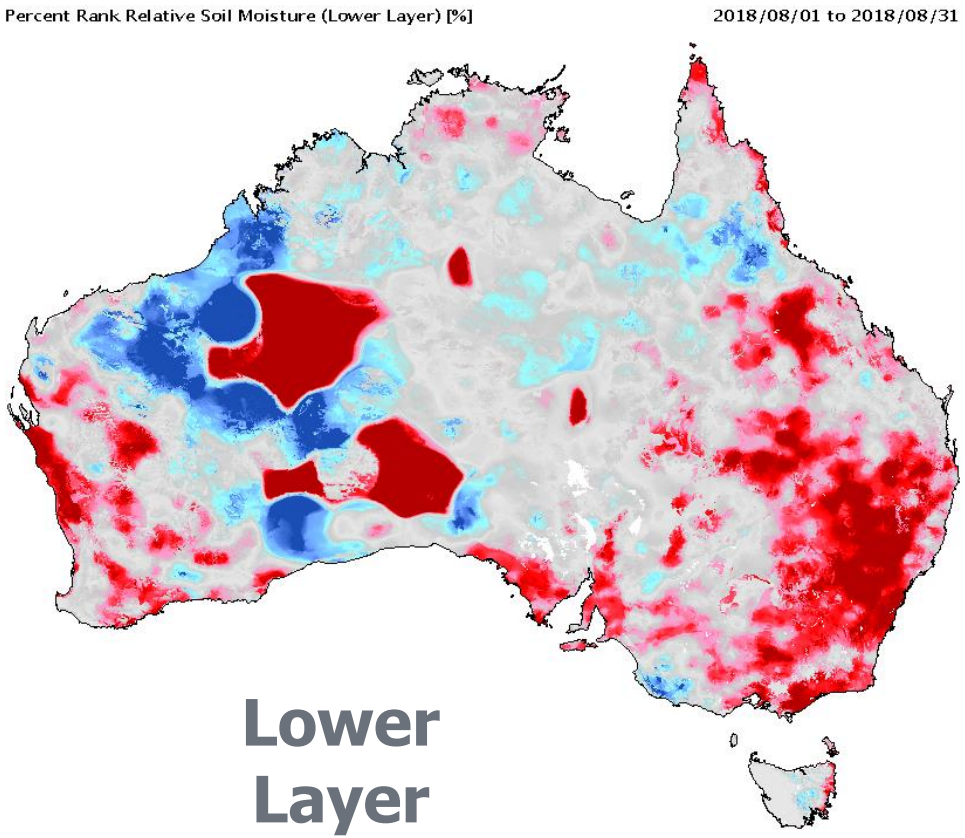
Soil Moisture

weatherzone

August 2018



Top Layer



Lower Layer

"Top Layer: Top 20 cm / Bottom Layer: 0.2 to 1.5 m "

Very dry soils across central and southeastern AUS Increase risk of Heat Waves early in the season

Climate Summary

ENSO conditions = Neutral (El Nino Alert)

IOD = Positive IOD gradually decaying

SAM = Negative favoured for summer

SSTs = Significant warming off the east coast

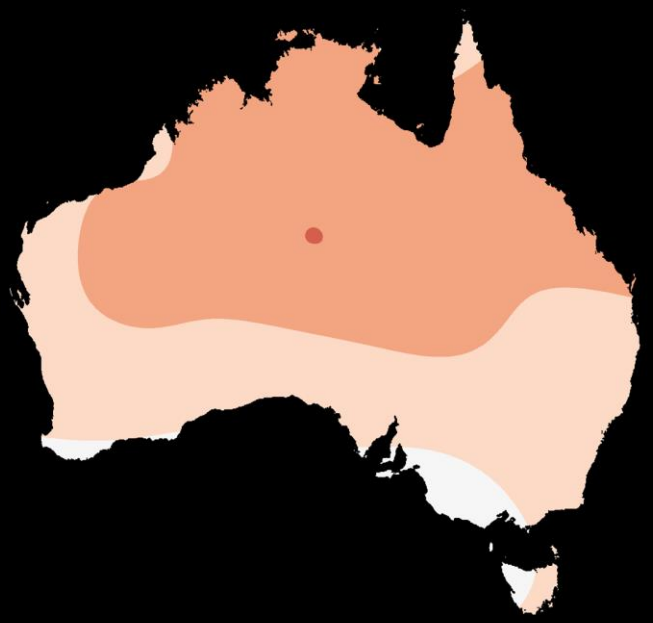
Most models are favouring an El Nino by the start of summer


• Analysis of October 2018
• State of the climate
• **Outlook**
Jacaranda

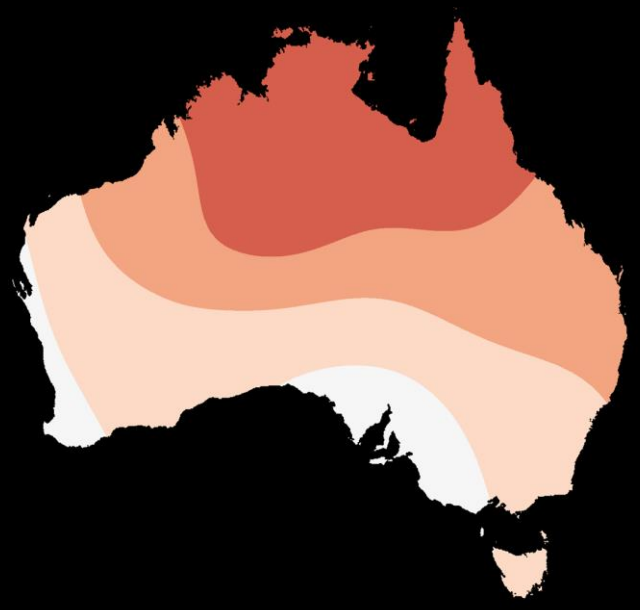
National Outlook - SUMMER

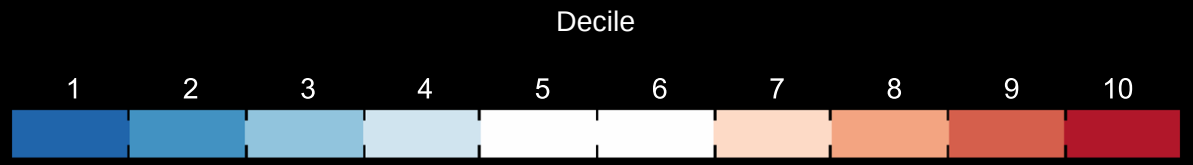
weatherzone

Maximum



Minimum

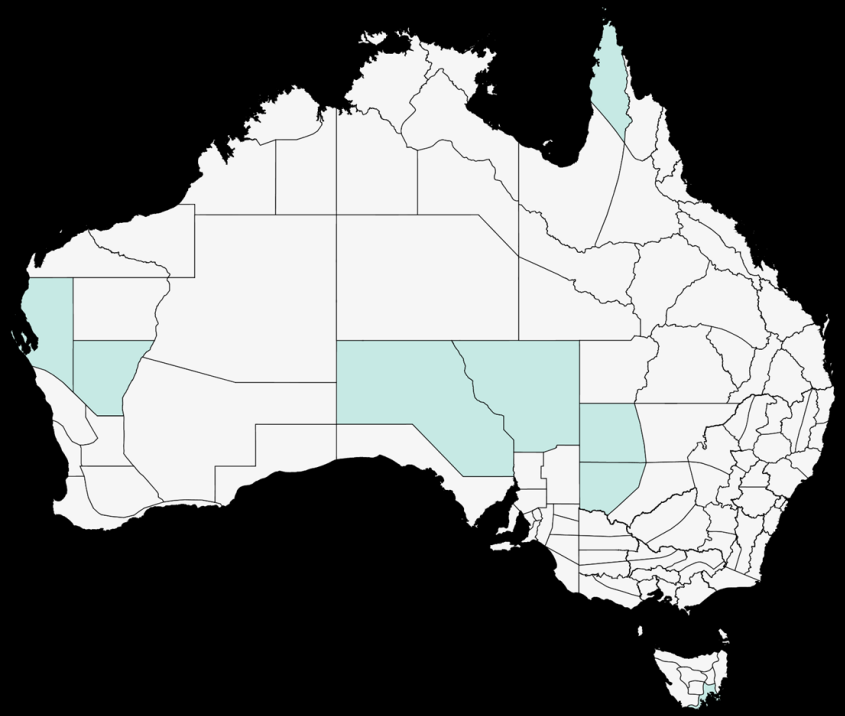


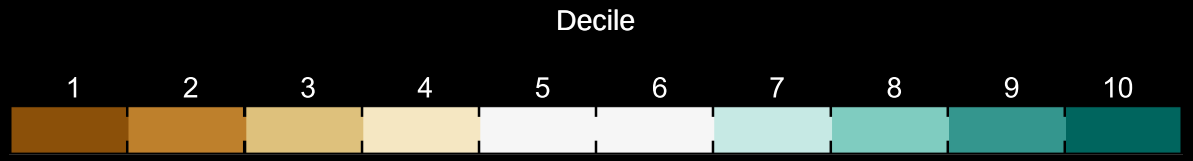


National Outlook - SUMMER

weatherzone

Rainfall

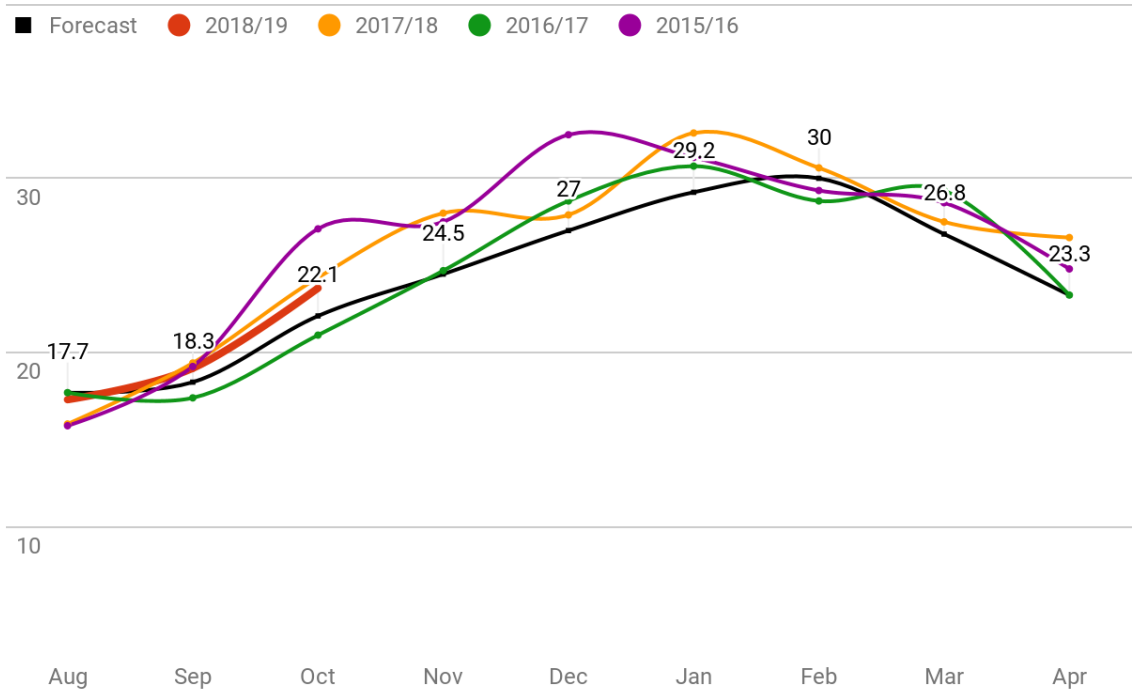




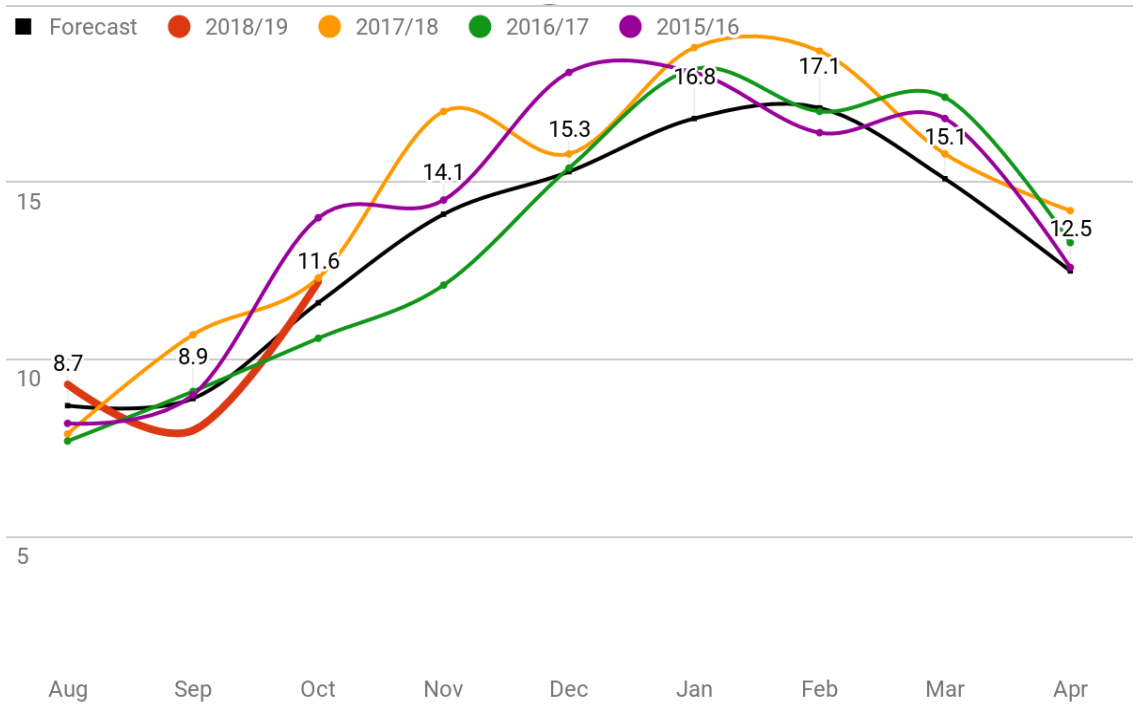
ADELAIDE

weatherzone

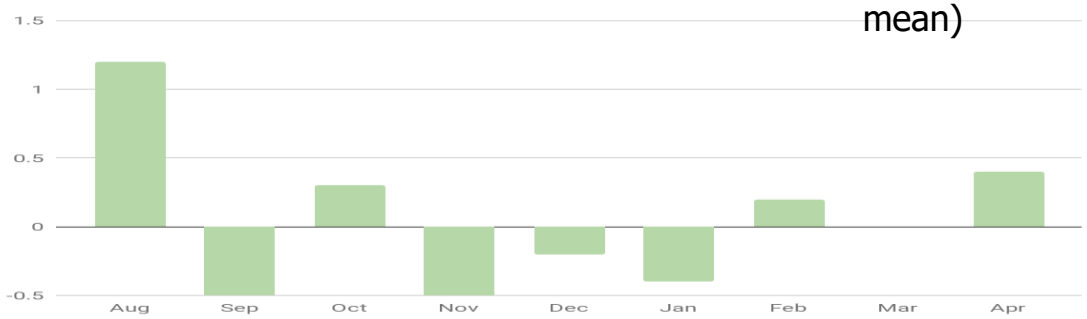
Maximums

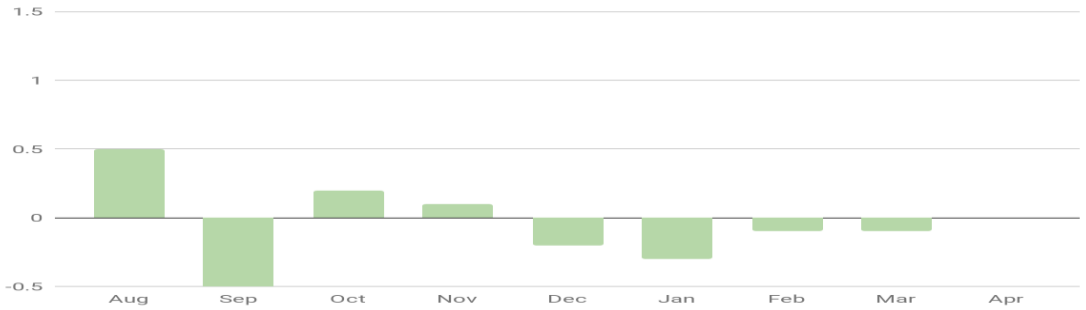


Minimum



Forecast Anomaly (1981-2010 mean)

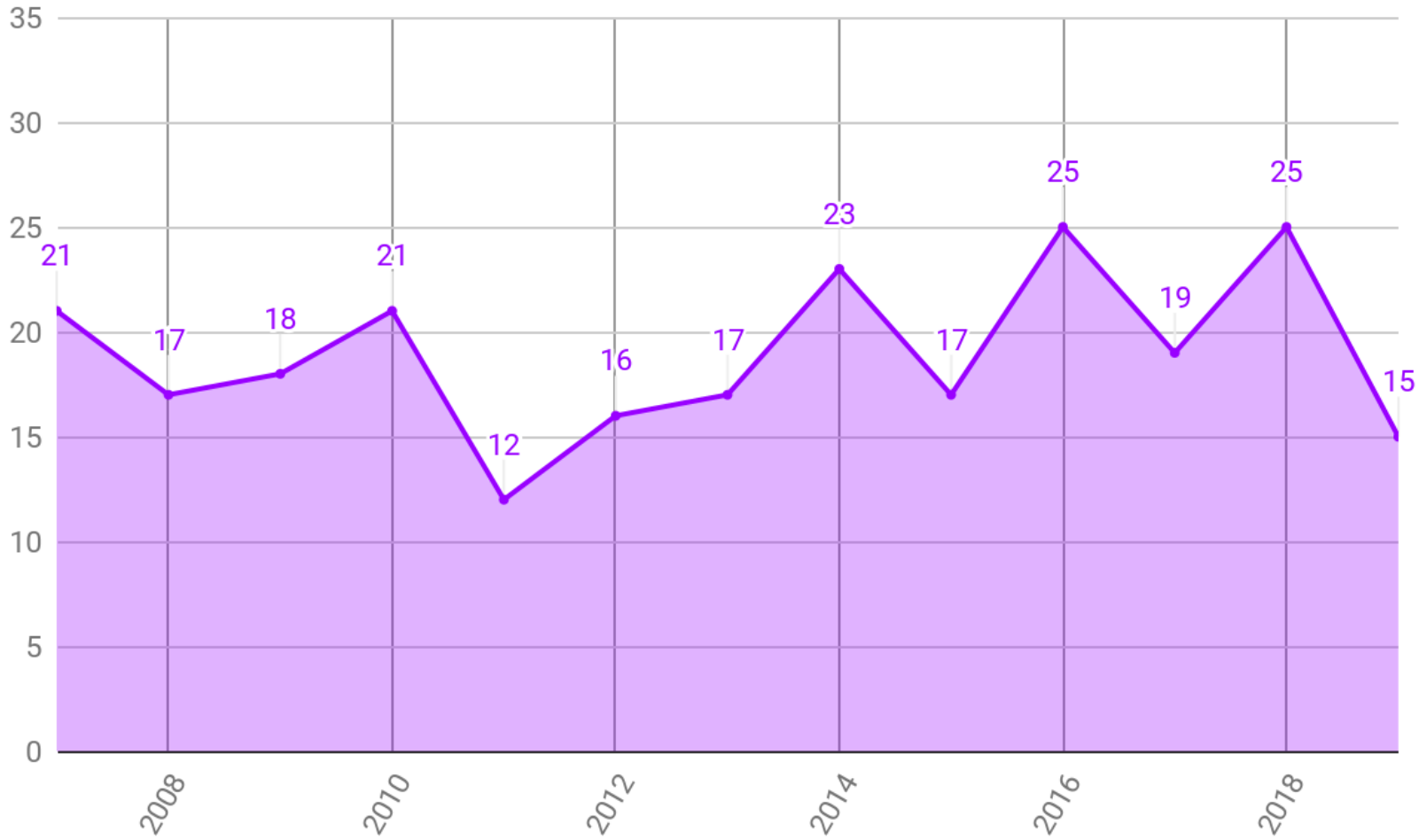




ADELAIDE - Hot Days

weatherzone

Days >35 DJF

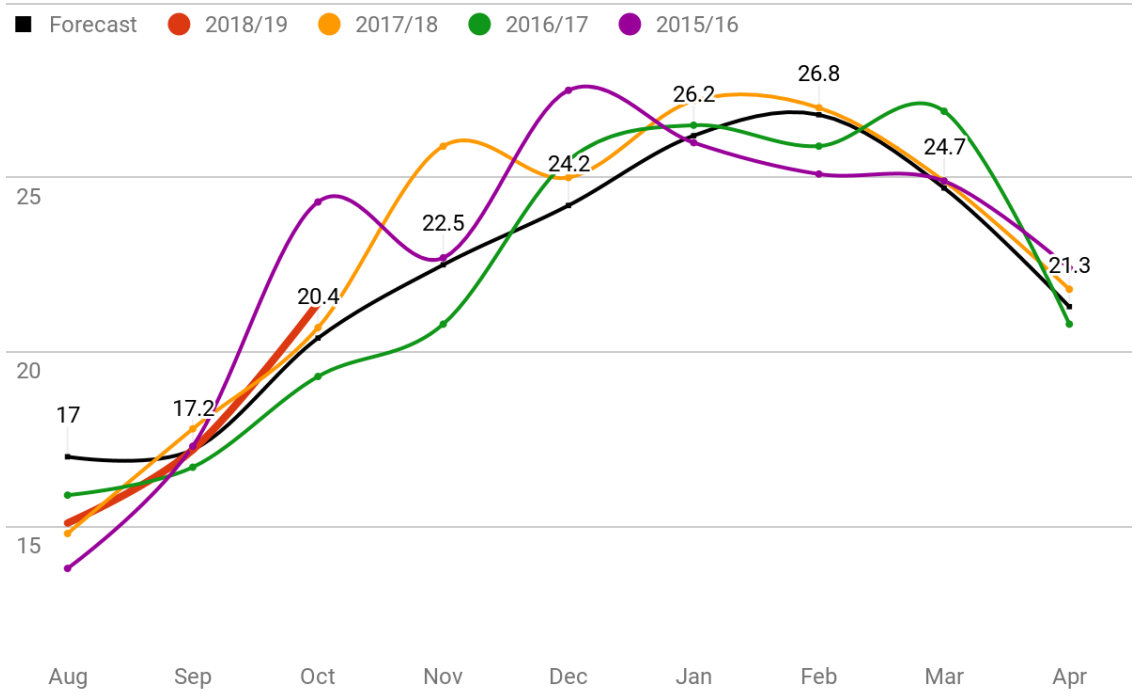


Forecast
14-16

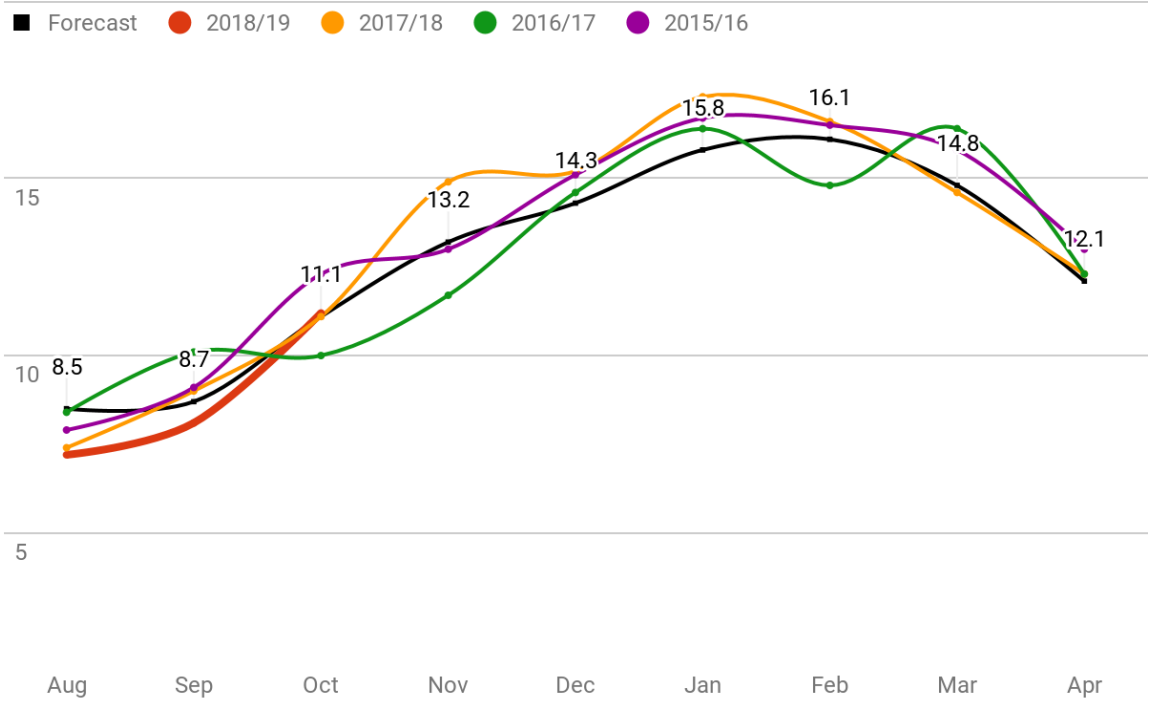
MELBOURNE

weatherzone

Maximums



Minimum



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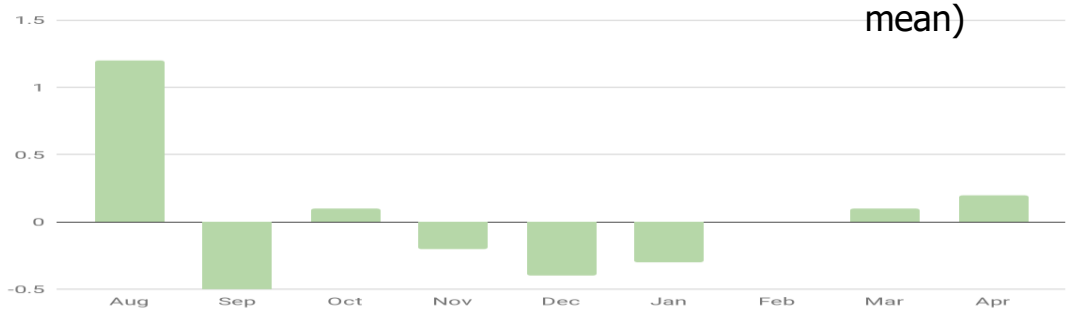
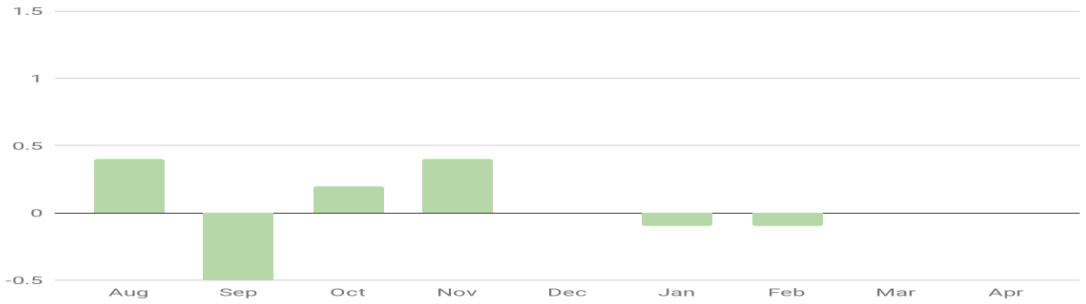
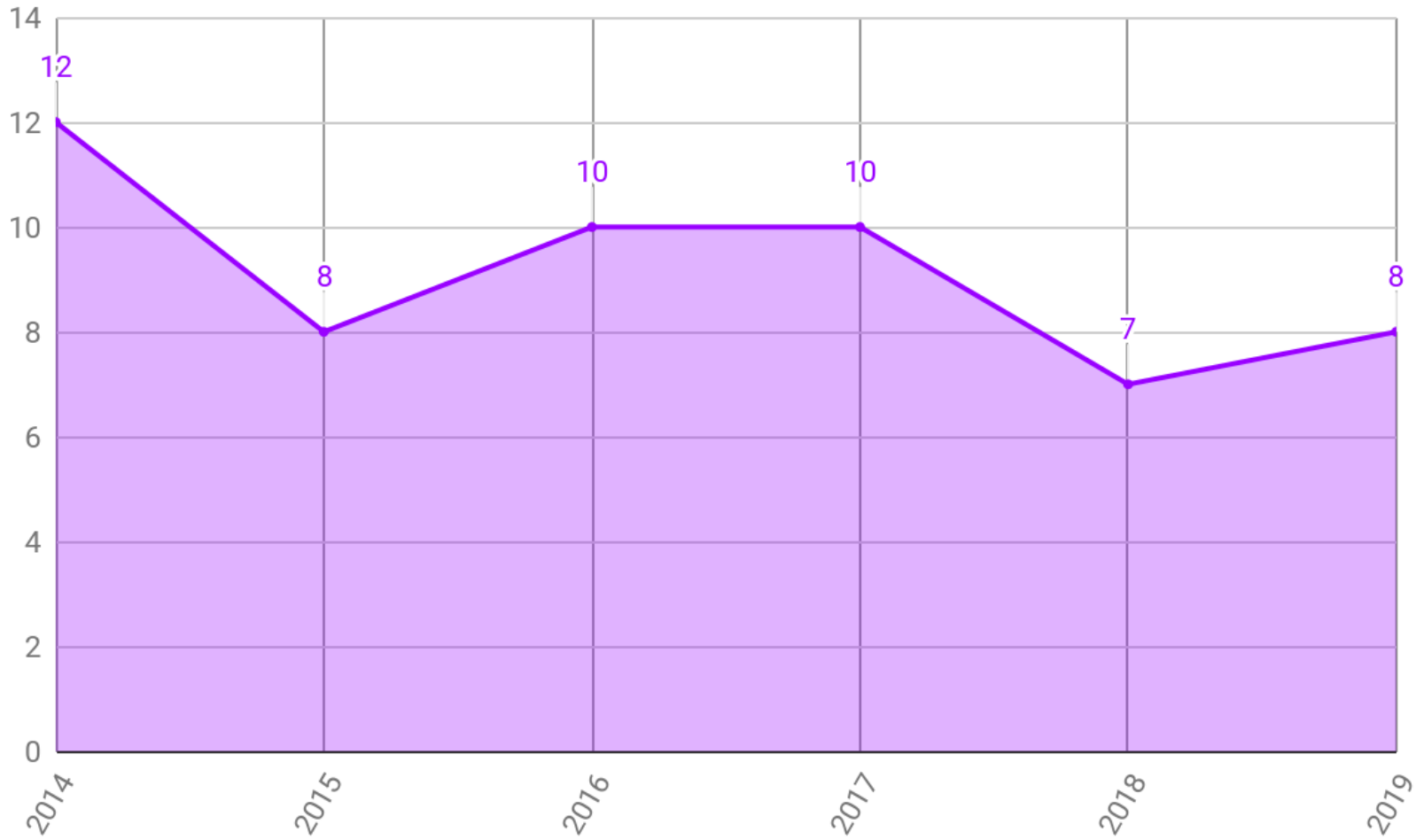




MELBOURNE - Hot Days

weatherzone

Days >35 DJF

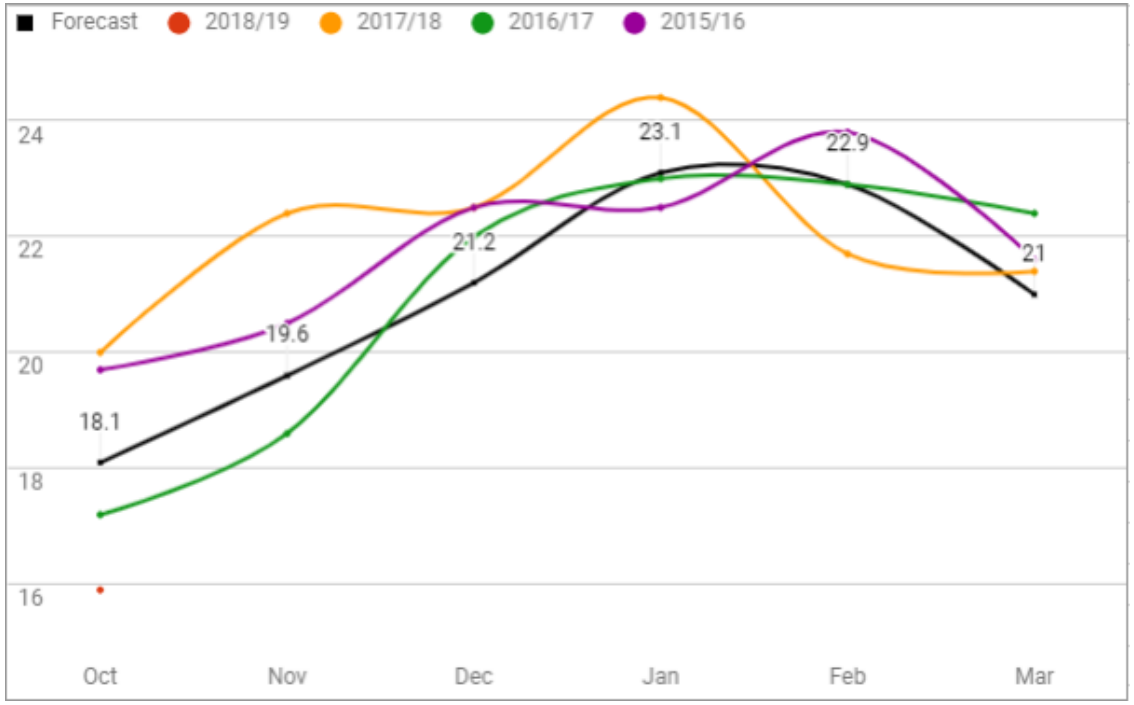


Forecast
8-10

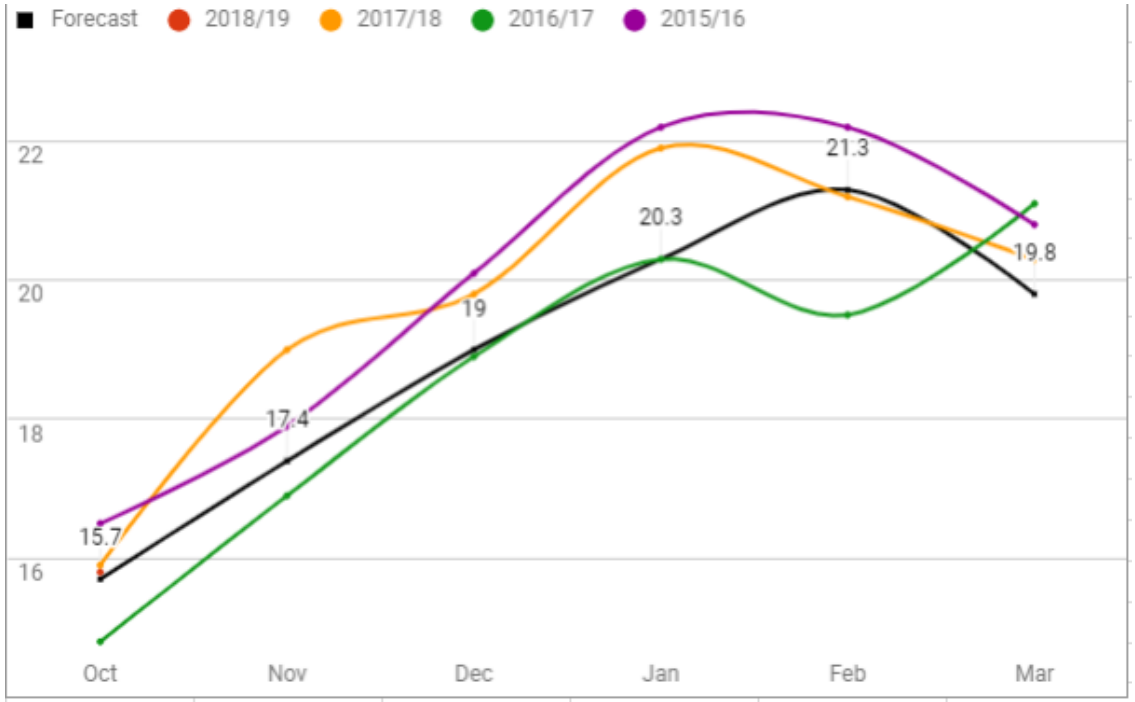
Tasmania

weatherzone

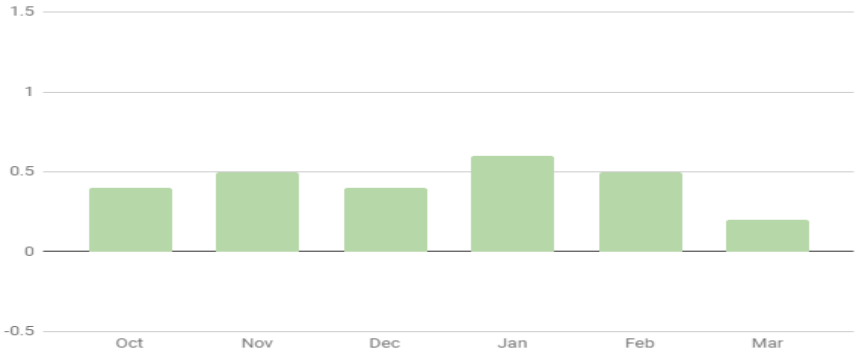
Hobart

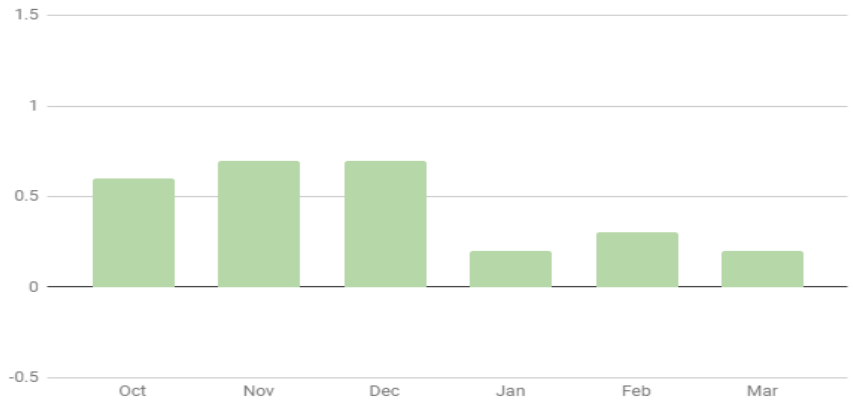


Low Head



Forecast Anomaly (1981-2010 mean)

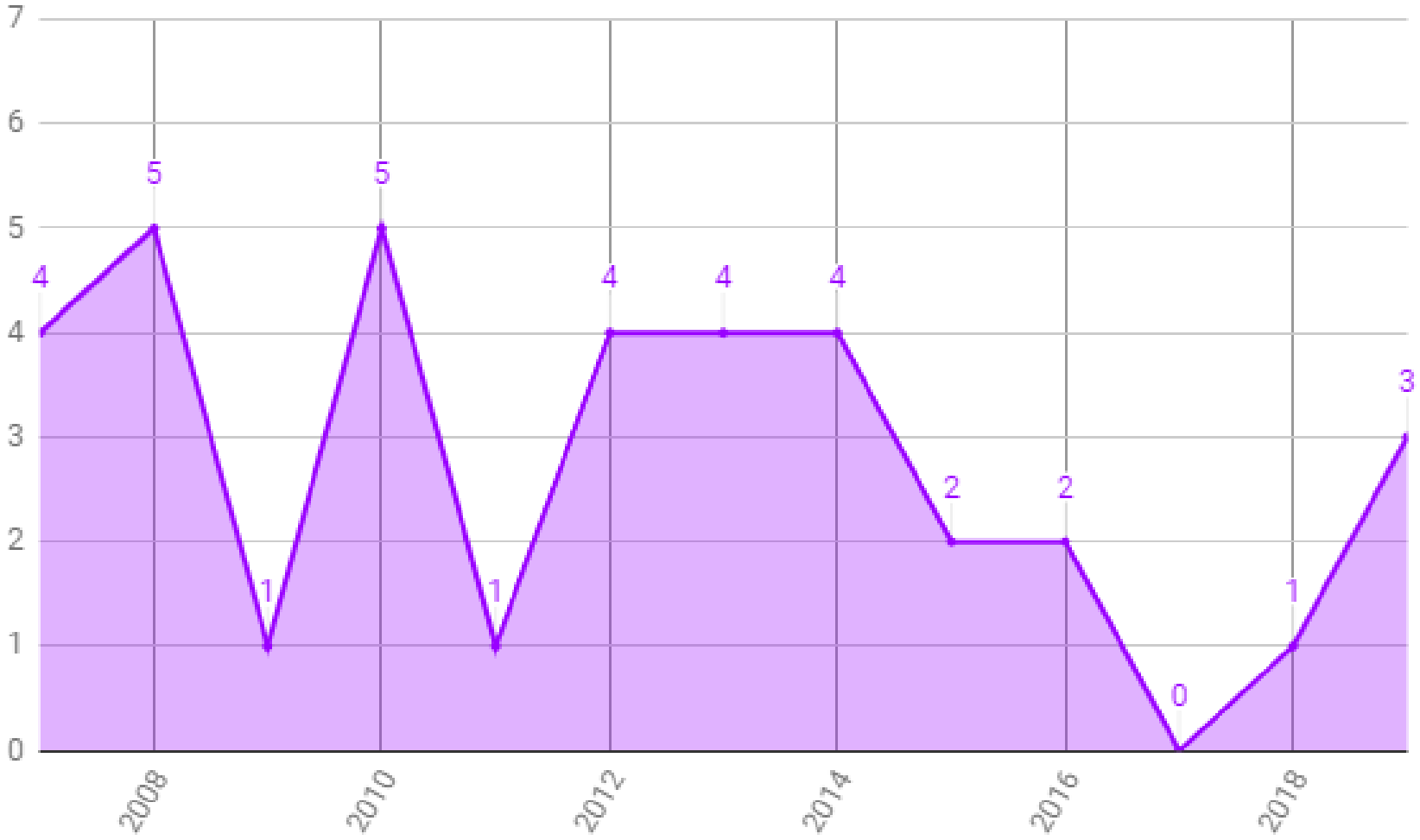




HOBART - Hot Days

weatherzone

Days >33 DJF



Forecast
2-3

Summer Outlook SA, VIC and TAS

Climate Background:

- **A**ffects of Positive IOD decaying
- **F**ar south not affected by ENSO as it is by a Negative SAM.
- **I**ncreased frontal activity for SA and VIC

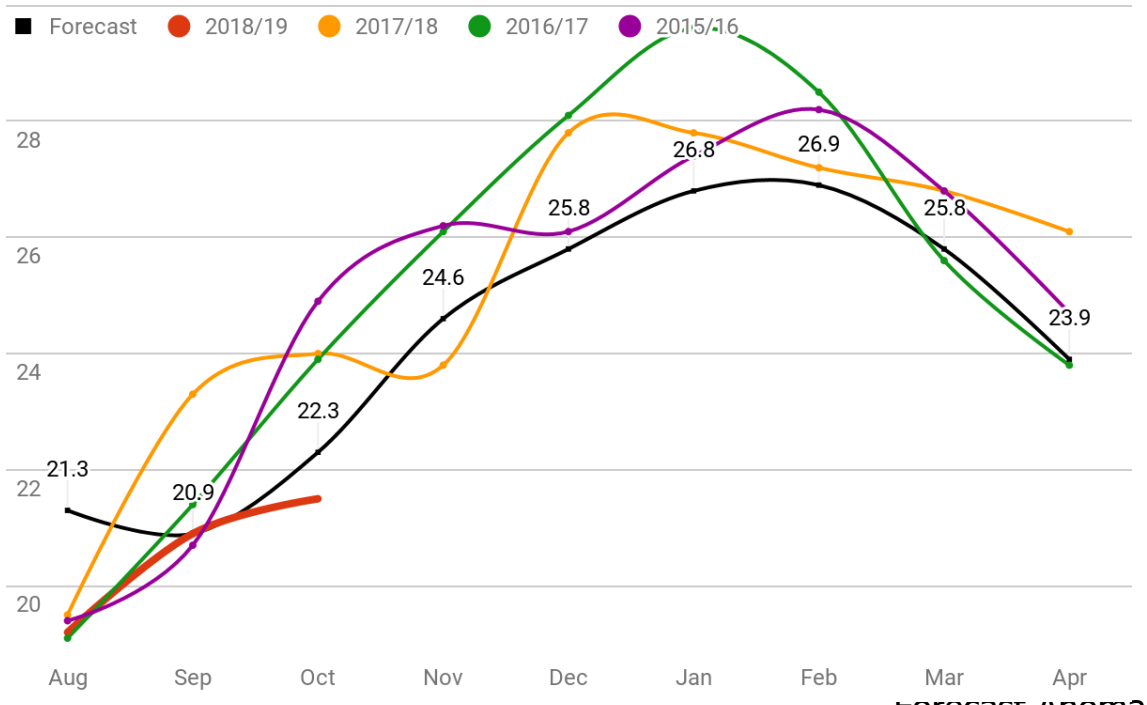
Summer Features:

- **A**verage to below average rainfall is expected for southeast Australia
- **O**verall, temperatures close to or below average for summer
- **I**ncreased risk of short duration, more intense extreme heat events
- **S**harp contrast between hot and cool days.
- **P**otential for stronger winds during heat events

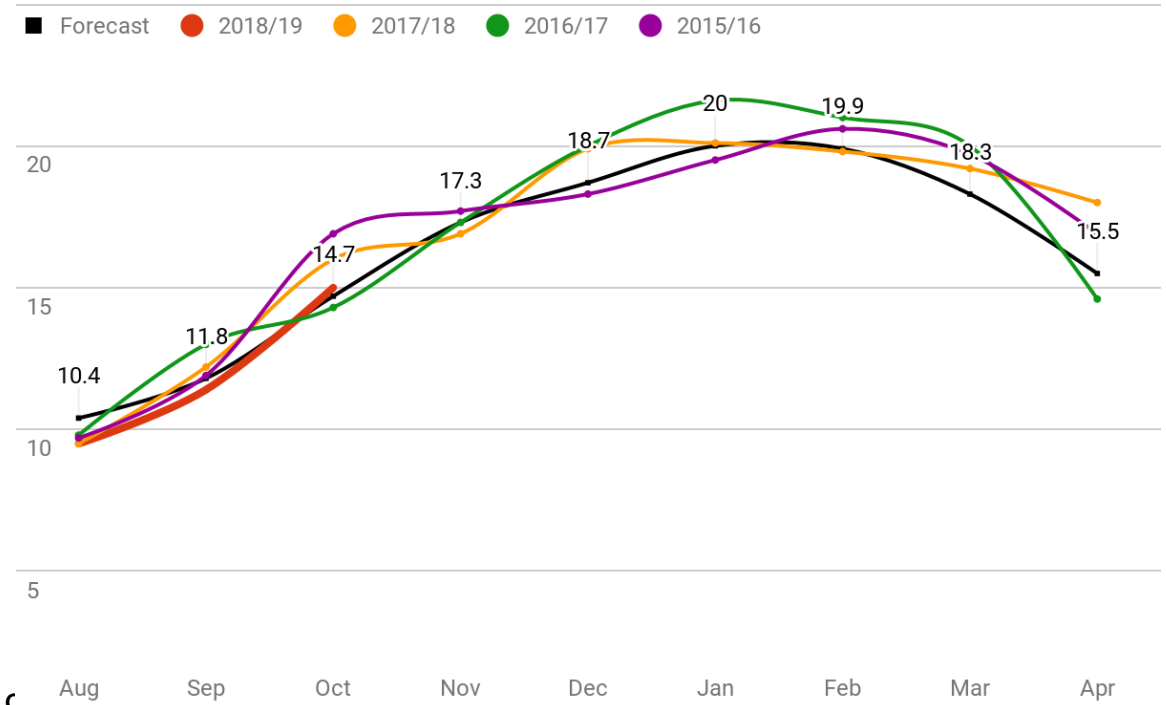
SYDNEY

weatherzone

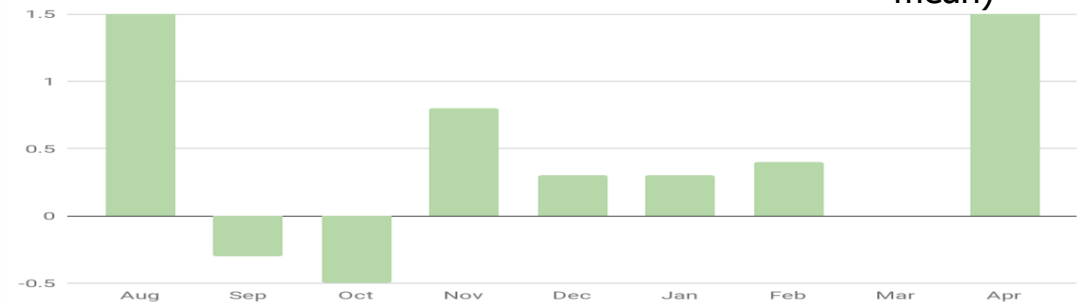
Maximums

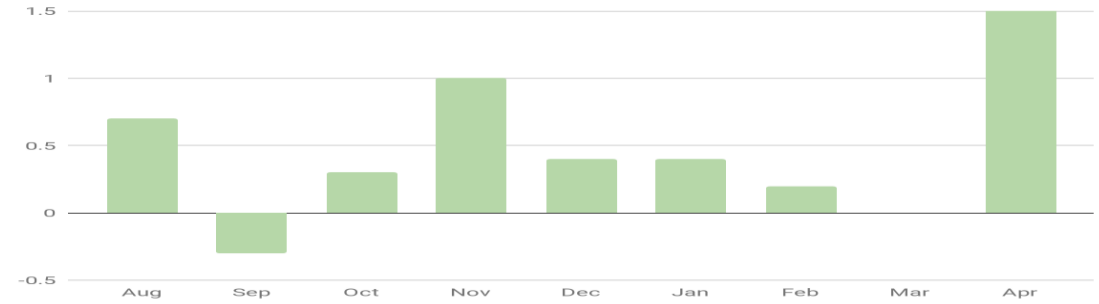


Minimum



Forecast Anomaly (1961-2010 mean)

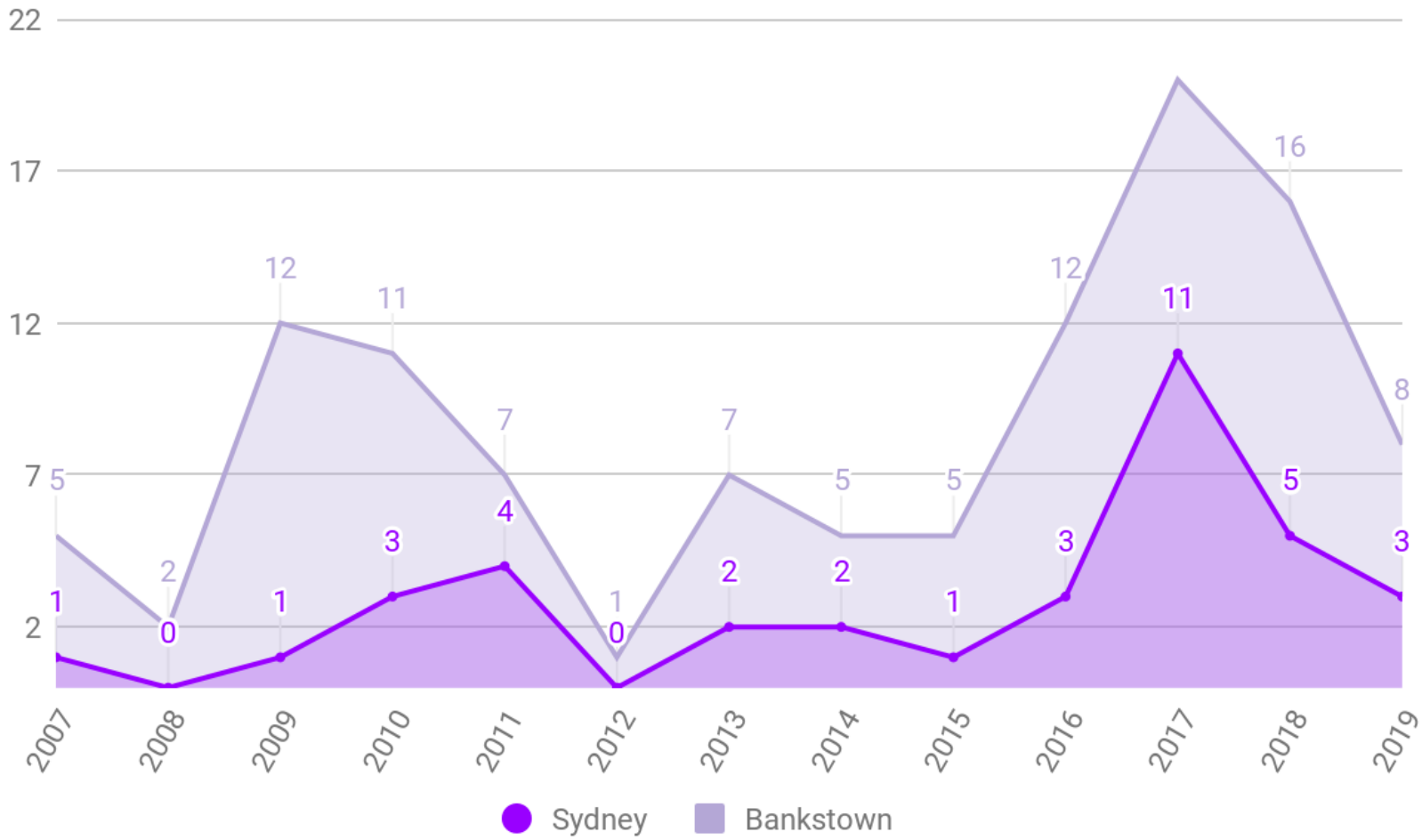




SYDNEY - Hot Days

weatherzone

Days >35 DJF

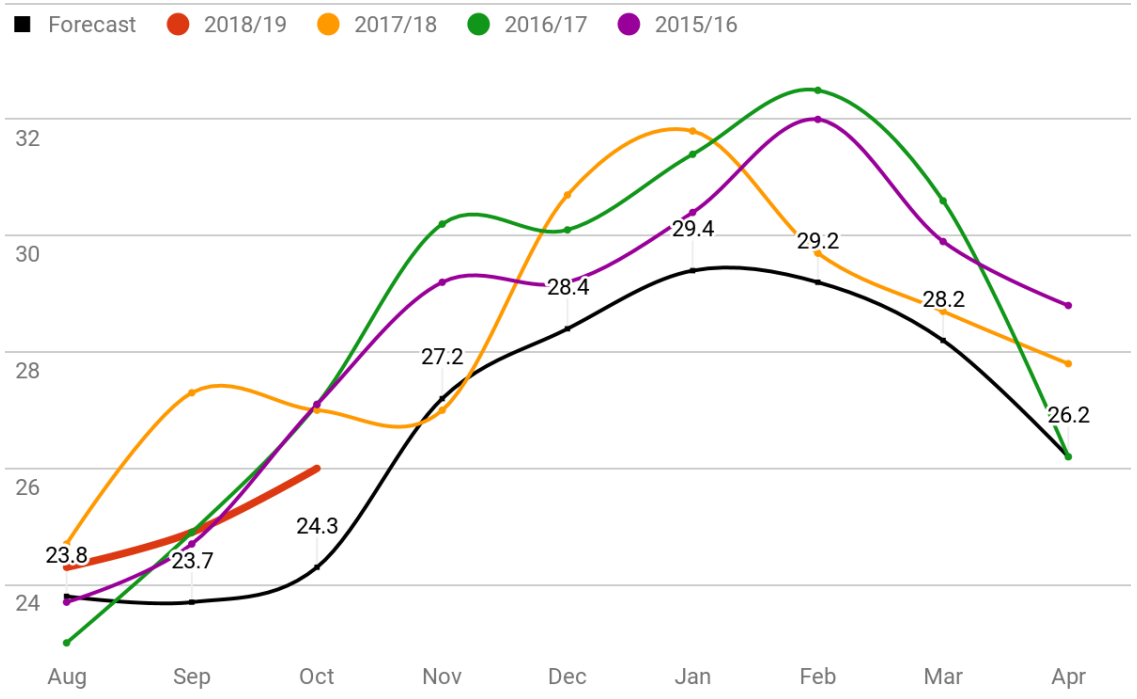


Forecast
3-5
*8-10 Bankstown

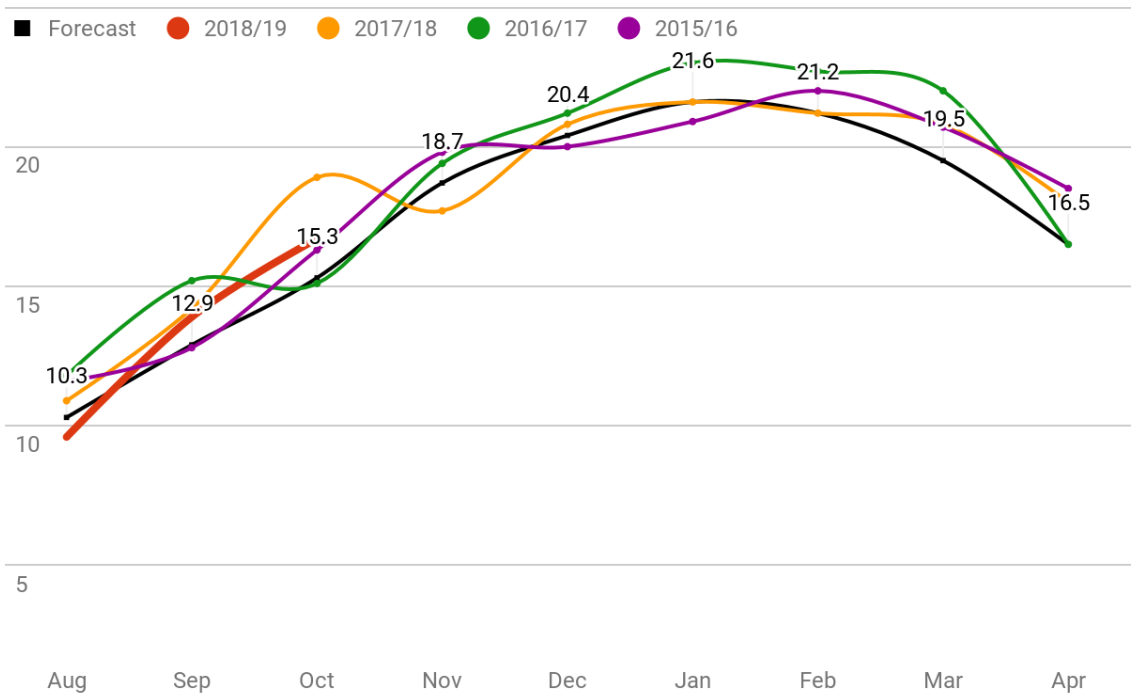
BRISBANE

weatherzone

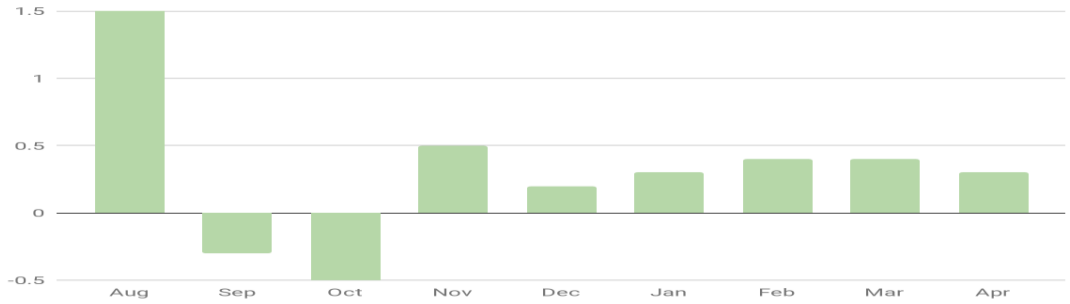
Maximums

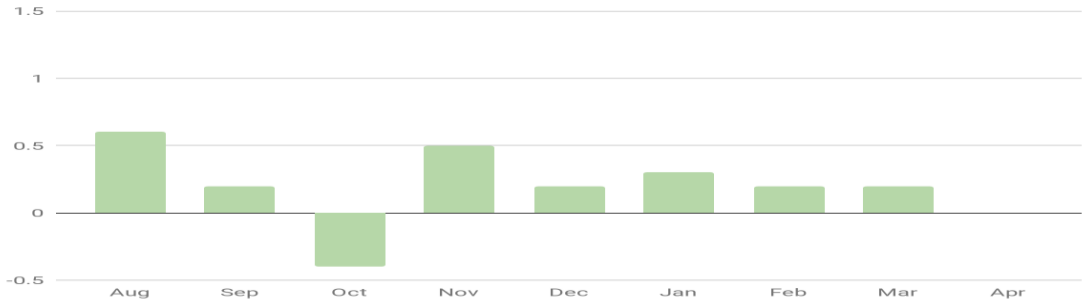


Minimum



Forecast Anomaly (1981-2010 mean)

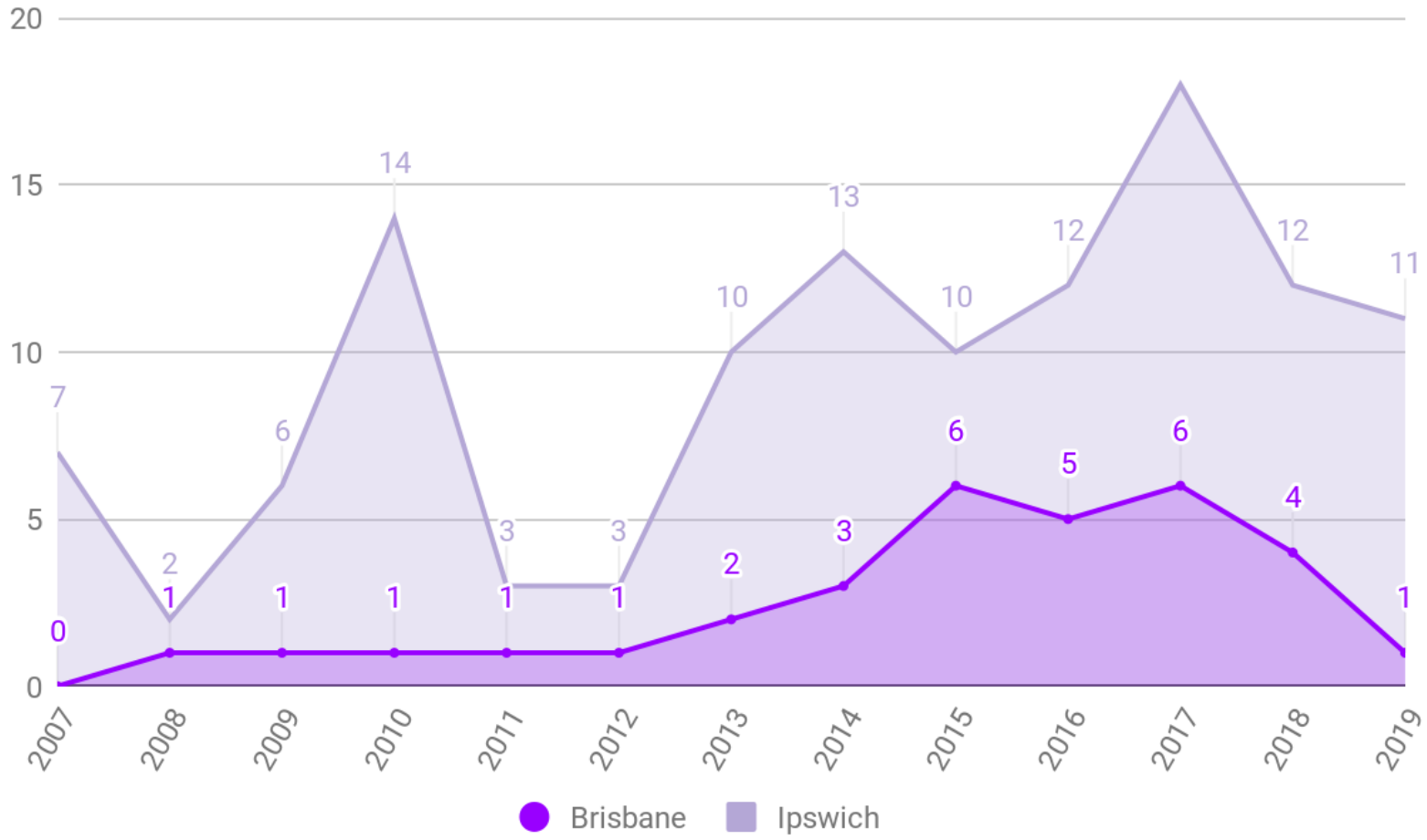




BRISBANE - Hot Days

weatherzone

Days >35 DJF



Forecast
1-3
*10-12 Ipswich

Summer Outlook NSW and QLD

Climate Background:

- **W**eak El Nino pattern likely
- **U**nderlying heat with very dry soils
- **I**ncreased frontal activity to the south, maintaining warm airflow in the east

Summer Features:

- **O**verall, warmer than average
- **H**ot days (peak intensity) reduced but increased risk of extended hot periods
- **S**eabreezes likely to play a significant factor early in the season
- **P**otential for higher humidity levels, particularly towards the second half of warm season
- **W**armer than average nights

Questions?

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Overview of AEMO's Summer Readiness program

Damien Sanford
Executive General Manager, Operations

Predicted 2018/19 summer conditions

Revised view taking in early 2019 to be provided later this year and readiness plans amended if required.

What does this mean for AEMO?

Bushfire activity	Heatwave	Widespread flooding
▲	▲	▼

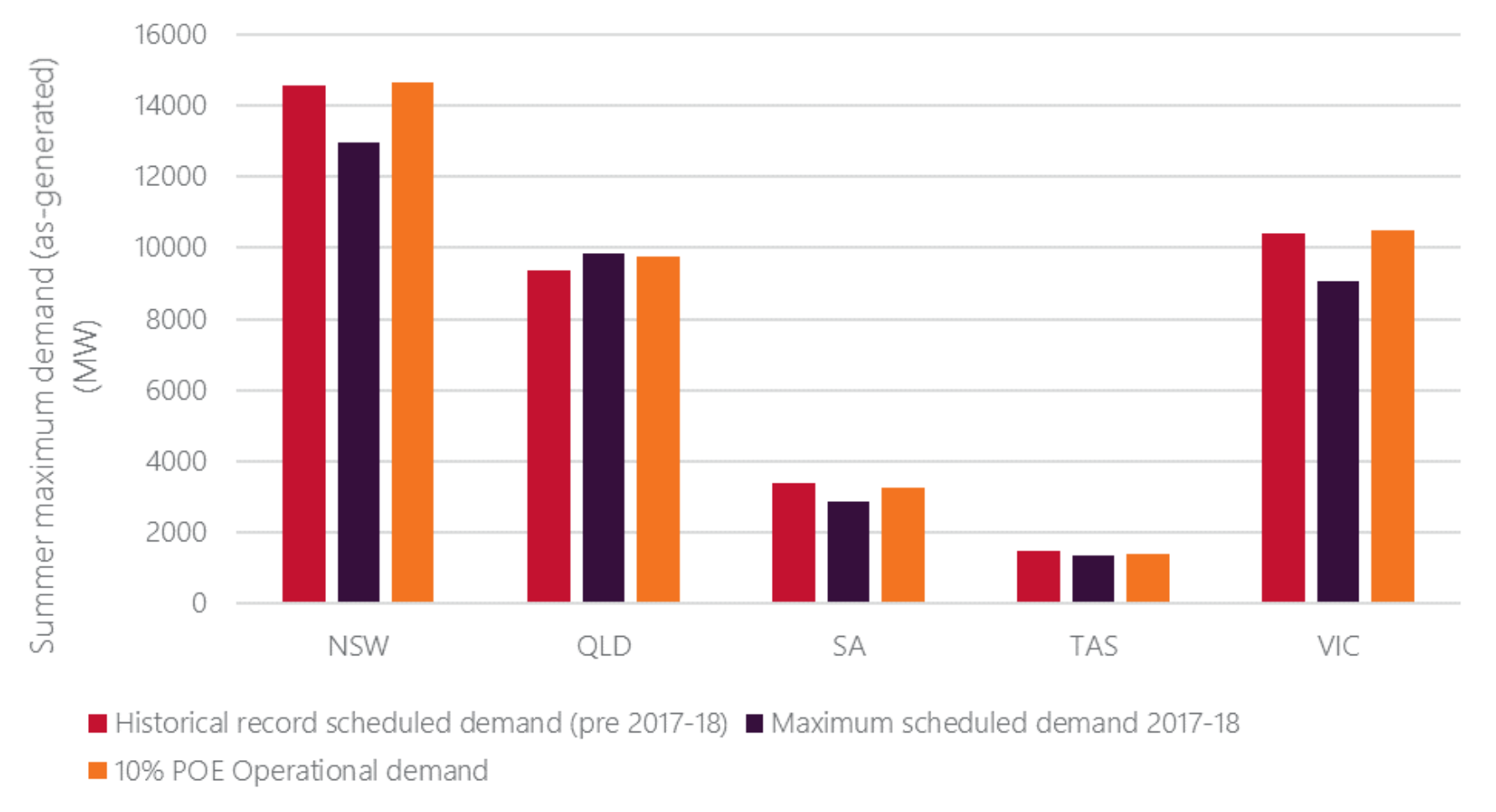
Drought	Increased solar less cloud	Severe storms
▲	▲	–

NEM 2018 ESOO Reliability Assessment

	Weighted USE ≤ 0.002% (MW)		10% POE USE ≤ 0.002% (MW)	
	South Australia/Victoria	New South Wales	South Australia/Victoria	New South Wales
2018-19	0	0	380	0
2019-20	0	0	130	0
2020-21	0	0	190	0
2021-22	40	0	483	0
2022-23	40	0	460	380
2023-24	200	150	650	640
2024-25	340	310	790	810
2025-26	330	380	835	885
2026-27	260	620	755	1,130
2027-28	460	700	985	1,220

QLD, Tas and NSW on a weighted probability show no USE for this year in ESOO modelling.

NEM jurisdictional summary

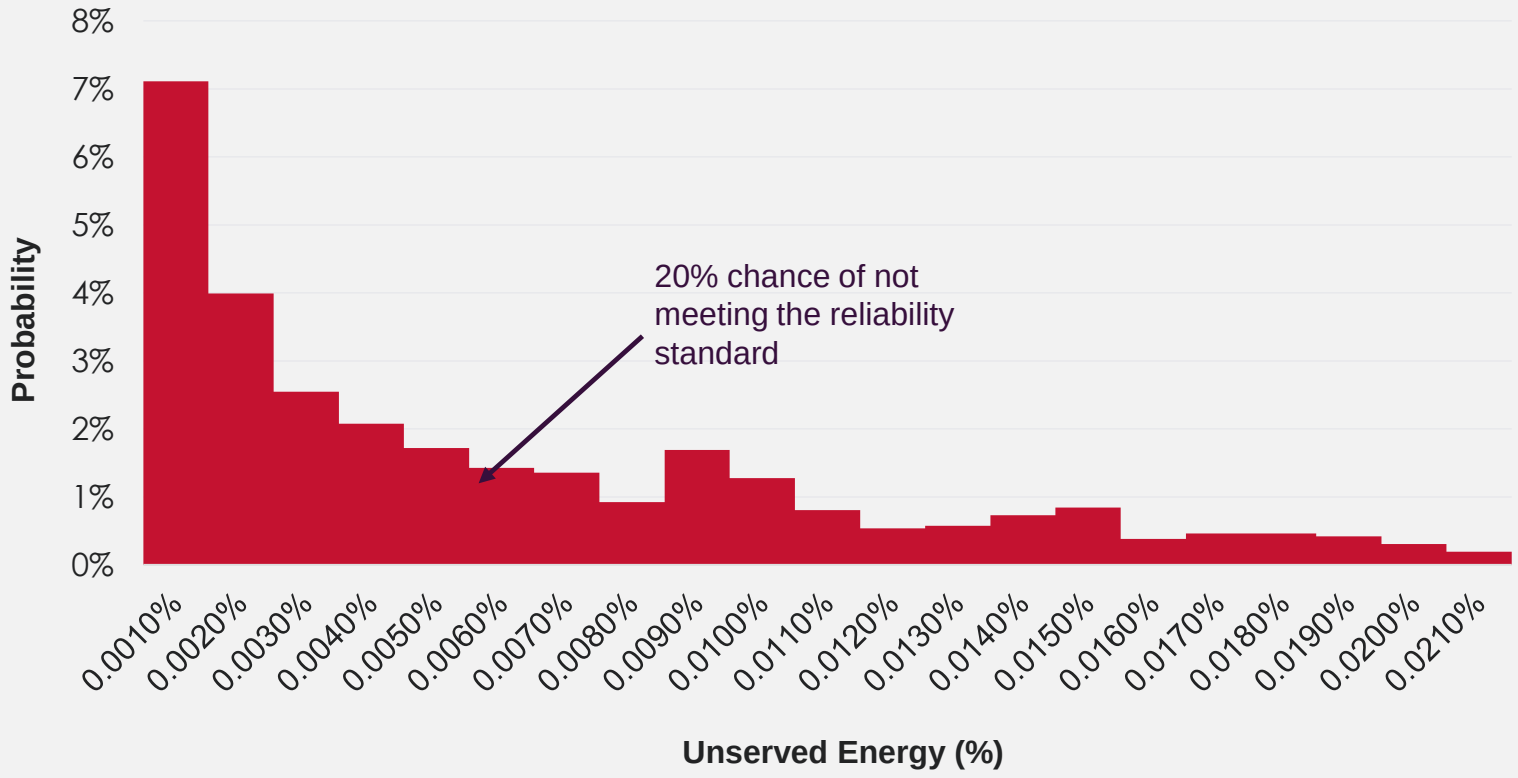


Key risks - heatwaves, bushfires, forced outages, fuel supply disruptions.

Scarcity risks this summer

- There is a heightened risk of loss of load in Victoria this summer, if additional reserves are not procured
- Expected USE just below the reliability standard (0.0019%)
- Most load shedding projected to occur under 10% POE demand conditions

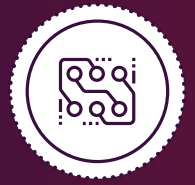
Significant tail risk of high USE



Key focus areas for summer 2018/19

Increased capacity available

- RERT
- Maximise generator availability
- Fuel capacity
- Transmission network
- Increased resources both customer and grid



Operational Improvements

- Forecasting
- Training
- Information

Contingency Planning

- Emergencies / Bushfires
- Exercises

Collaboration and communication

- Engagement
- Briefings

What is RERT

- Reserve: additional generation or load curtailment
- Must be able to respond on request from AEMO
- Not available to the market including through any agreement or arrangement, including demand side management agreement
- Amount procured to ensure AEMO meets the reliability standard in all regions

RERT strategy for Summer 2018-10

- AEMO forecasts electricity supply in Victoria will be tight this summer under very high demand conditions.
- Credible measures have been developed to mitigate the risks.

Supply and demand in Victoria

AEMO's 2018 Electricity Statement of Opportunities and Medium Term Projected Assessment of System Adequacy identify that expected USE in Victoria over summer may exceed the reliability standard.

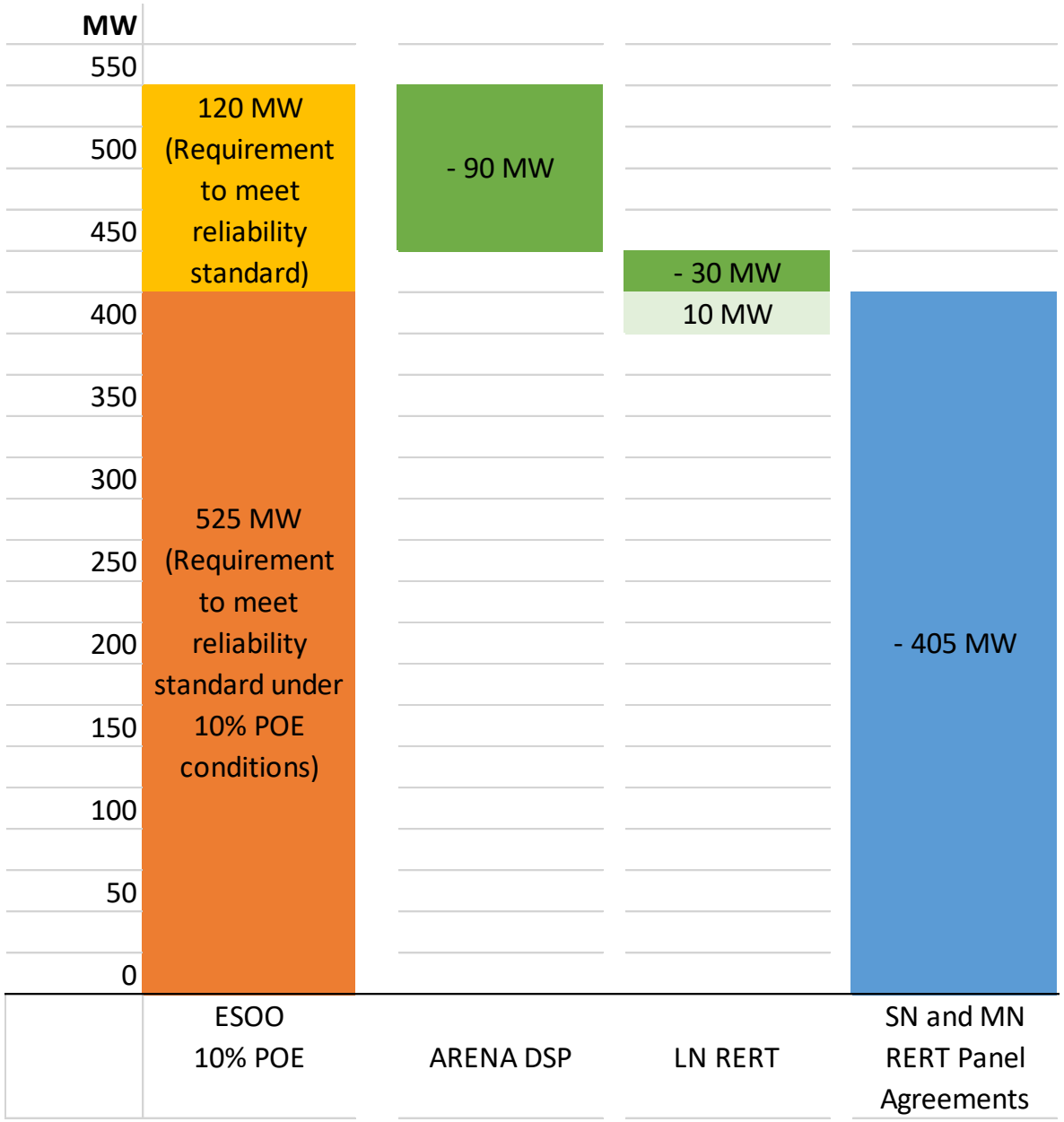
- To address the weighted risk of exceeding the standard, 120 MW of reserve is required from Victoria and South Australia combined
- To address the risk of exceeding the standard in a 10% POE year, 525 MW of reserve is required from Victoria and South Australia combined

A combination of Long Notice (commitment up front) and Medium and Short Notice RERT (no commitment up front) will be used to address the identified risk

AEMO will not enter into any agreements where the costs exceeds the value of customer reliability

How AEMO will address the Reserve Shortfall

- LN RERT will be used to make up the balance of the 120 MW requirement
- ARENA DSP values subject to change following testing
- An additional 10 MW of LN RERT is procured to ensure availability of resources is maintained
- Aiming to source at least 405 MW MN and SN RERT



Enacting RERT

James Lindley
Manager, Systems Performance and Commercial

How RERT works - overview

Operation of the RERT is divided into two stages:

Stage 1
Procurement - when AEMO is determining whether to enter into reserve contracts

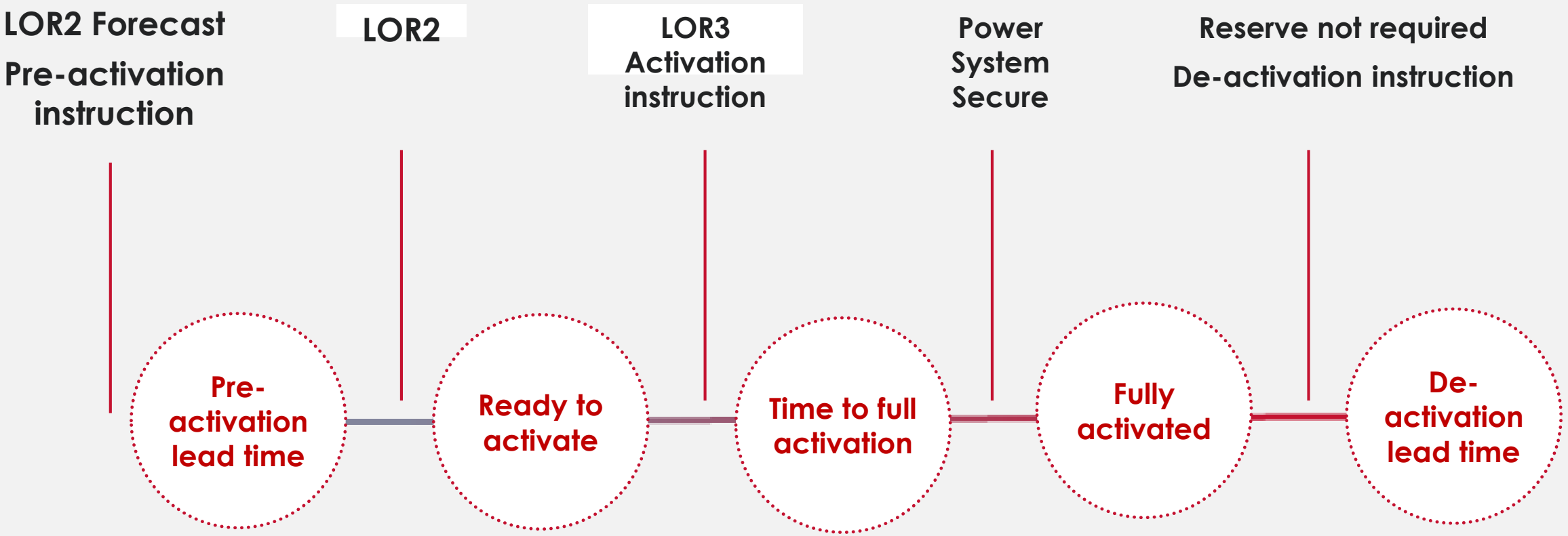
Stage 2
Activation/Dispatch - when AEMO is considering whether to dispatch scheduled reserves or activate unscheduled reserves

How RERT works

Stage 2 - Activation/Dispatch

- Short term PASA and pre-dispatch
- Other information identified by AEMO
- Select RERT contracts to minimise cost

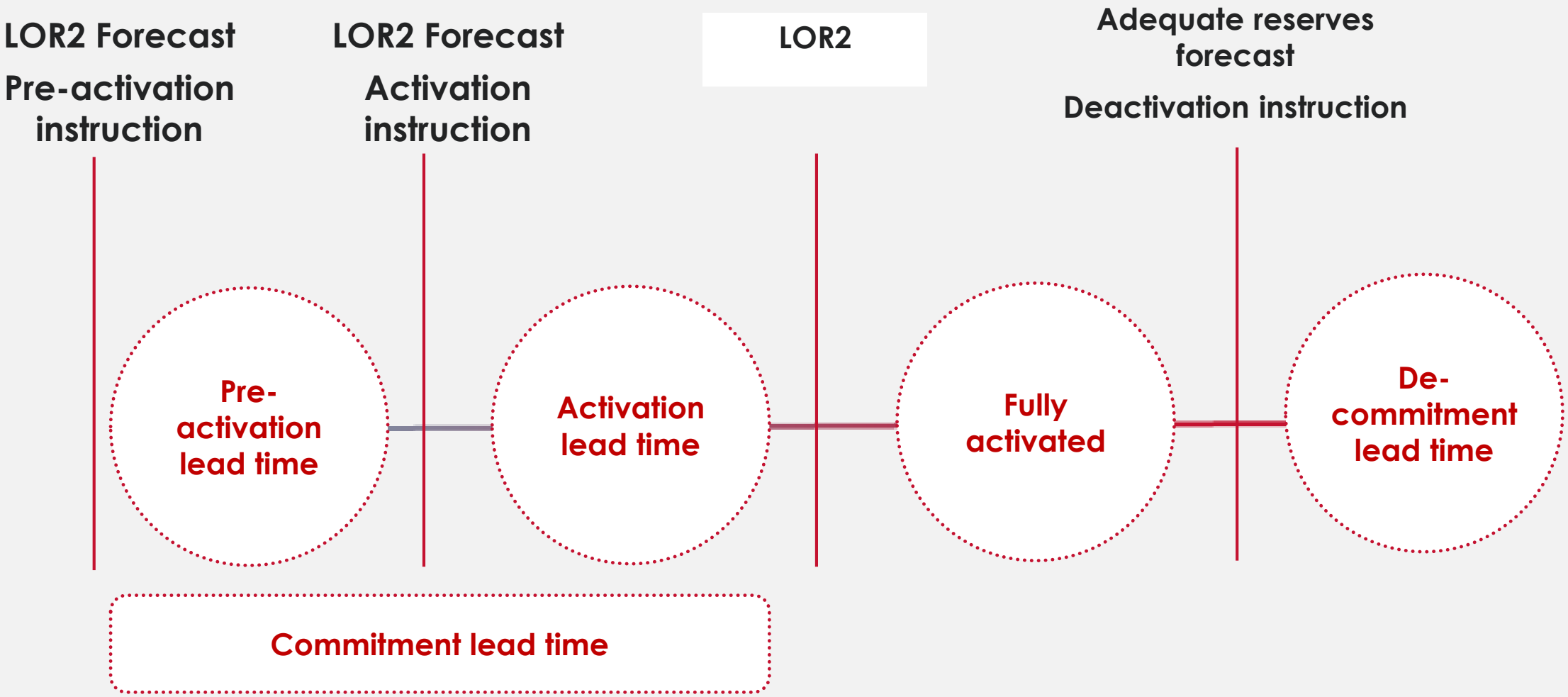
How RERT works - fast activation example



For illustration only

*NB RERT can also be used for security issues

How RERT works - slow activation example



*NB RERT can also be used for security issues

For illustration only

Market communications and expectations

Steve Frimston
Operations Specialist

Operational Communication Facilities

- Clause 4.11.3 of the NER requires participants to nominate, provide and continually update contact details
- Registered participants must provide two independent telephone communication systems
- If telephone communications experience issues they must be investigated within 4 hours and repaired promptly
- A form of electronic mail facility must be established and maintained

Accurate and Timely Information

- The provision of accurate and timely information is essential for operating the power system
- The Electricity Rules contain obligations for the provision of information
- Information to AEMO can be communicated in two ways:
  - Electronically
  - Verbally
- However, a friendly **For Your Information** phone call is always best

Electronic Communication

- The Electricity Rules have a number of key obligations that require electronic communication
- Electronic communication with AEMO is generally through participant bids
- The main areas we would like to focus on regarding electronic communications are:
  - Available capacity
  - PASA availability
  - Daily energy availability for energy constrained plant

Electronic Communication

Available Capacity

- Clause 3.7.3(e)(1)-Available capacity
- AEMO uses this information in reserve calculations

Key points:

–Available capacity is submitted based on current intentions and best estimates

–Based on forecast ambient conditions has the available capacity been profiled throughout the day

–It represents the MW the participant intends to make available for dispatch or commercial availability

Electronic Communication

PASA Availability

- Clause 3.7.3(e)(2)-PASA availability
- To contrast with available capacity, this represents what your plant can technically do if needed

Key points:

- Does it represent physical availability if given 24 hours notice
- Is there a reasonable expectation fuel delivered to the station can be sourced with 24 hour's notice
- Availability profiled based on forecast temperatures

Electronic Communication

Daily Energy Limits

- Clause 3.7.3(e)(4)-Daily energy availability for energy constrained plant
- Daily energy limits are an important input into reserve calculations

Key points:

- Are daily energy limits based on current intentions and best estimates.
- If multiple units source fuel from common delivery mechanisms ensure it is reasonably allocated.
- Do not only focus on D+1 energy limits but ensure reasonable estimates are entered for STPASA timeframes.

Verbal Communication

- We have briefly touched on the key electronic communication which occurs between AEMO and participants
- However, there is a great deal of verbal communication that occurs
- We will focus on two key areas of verbal communication or what I like to call "Good Industry Practice":
  - Personnel to receive and immediately act upon dispatch instructions
  - Advising of threats to the secure operation of the power system

Verbal Communication

Receiving & acting on dispatch instructions

Clause 4.9.2(d)-Personnel to receive and immediately act upon dispatch instructions

Scheduled and semi-scheduled generators must ensure staff are available at all times to receive and act on dispatch instructions.

Key points:

- Resources available to control and direct units to their targets.
- Are actually contactable.
- Relevant response plans in place if units experience technical issues.

Verbal Communication

Threats to secure operation of the power system

Clause 4.8.1-Advising AEMO of threats to the secure operation of the power system.

Participants must promptly advise of any situation which may affect secure operation of the system.

Key points:

- Have any identified risks been promptly communicated to AEMO.
- If a de-committed unit is known to potentially impact secure operations, advise AEMO via a quick call.
- This allows AEMO to carry out any contingency planning.

Verbal Communication

Examples

This particular Clause is quite important especially when it involves system security

For example:

- It is known your unit is needed to maintain system security in a region
- You become aware of some potential threats which may impact system security such as: weather-related reductions, fuel supply issues, industrial action or urgent maintenance
- It is imperative that you notify the control room as soon as you are aware of these impacts or your actions which may impact system security

Hybrid Communication

- So far we have talked about the key types of electronic and verbal communications.
- However, there are a number of situations which where communication with AEMO is a hybrid of both electronic and verbal communication.
- The hybrid type communication are some of the most important as they can directly impact secure operation of the power system.
- The key hybrid communications that I will touch on today are:
  - Scheduled generator plant changes
  - Informing AEMO of self-commitment and de-commitment decisions

Hybrid Communication

Scheduled generator plant changes

Clause 4.9.9-Scheduled Generator Plant Changes

Without delay a scheduled generator must immediately notify AEMO of changes or likely changes to operational availability.

Key points:

- Delay of notification could impact secure operations.
- Has any event such as fuel constraints etc changed the operational availability.
- Lack of notification links up with Clause 4.8.1 of possible threat to secure operation of power system.

Hybrid Communication

Informing of self commit and de-commitment decisions

Clauses 3.8.17, 3.8.18, 4.9.7(a) & 4.9.7(b).

Giving required notice especially for de-commitment avoids possible impacts to secure operations.

Key points:

- Confirmation of commitment/de-commitment with at least 1 hours notice.
- Has commitment/de-commitment advise been updated & notified to AEMO 5 minutes prior
- Lack of notification particularly when a unit impacts system security also links with Clause 4.8.1 of possible threat to secure operation of power system.

Examples

- You have been notified of some potential upstream, storage or pipeline limitations
- These limitations may impact operational availabilities and/or daily energy limits.
  - This needs to be communicated because it may impact system security
- Similarly, for coal fired generators you are advised of some conveyor or riser issues from the mine to the station
- This may impact operational availability because it now restricts the amount of coal supply to the station
  - Therefore, it is prudent that this information is communicated to the control room for assessment

Examples

- Regarding impacts to secure operations of the power system
- Despite the fact that de-commitment requires 1 hour notice via an electronic bid
- If you know your de-commitment may pose a threat to system security as a result of your de-commitment AEMO is required to be notified
- Some examples of scenarios where this may be applicable are:
  - System Strength Inputs
  - Low Reserve Situations

Public communications and expectations

Stuart Allott
Group Manager, Public Affairs

Key messages

Broadly on AEMO's Summer Readiness plan

- AEMO's commitment is to secure efficient energy supply for all Australians.
- AEMO plans for extreme conditions, and has therefore designed a proactive summer readiness plan.
- We know unexpected events can still occur which will impact the power system over the summer.
- AEMO has secured over 800 megawatts of off-market reserves through the Reliability and Emergency Trader (RERT) mechanism to enable AEMO to have sufficient resources to manage potential high risk scenarios that typically occur in summer, such as extreme or extended heatwaves, bushfires and/or unplanned infrastructure outages.
- We believe the action plan we have achieved addresses most foreseeable events and provided ourselves, governments and the energy industry with contingency arrangements to address unforeseen events quickly and effectively.

Key messages

Pre-event

typically when we are on the cusp of declaring an actual LOR2 condition and issuing a Market Notice

AEMO can confirm that at this stage, we are forecasting LOR2 conditions in [time frame]. The Market Notice has been sent out to notify market participants that there is an opportunity to provide additional reserves.

AEMO has additional reserves, secured through the Reliability and Emergency Reserve Trader (RERT) that we can call upon, should the need arise.

AEMO is working closely with industry to manage the situation but at this stage there is no threat to system security.

We will continue to monitor the situation and provide updates as they arise.

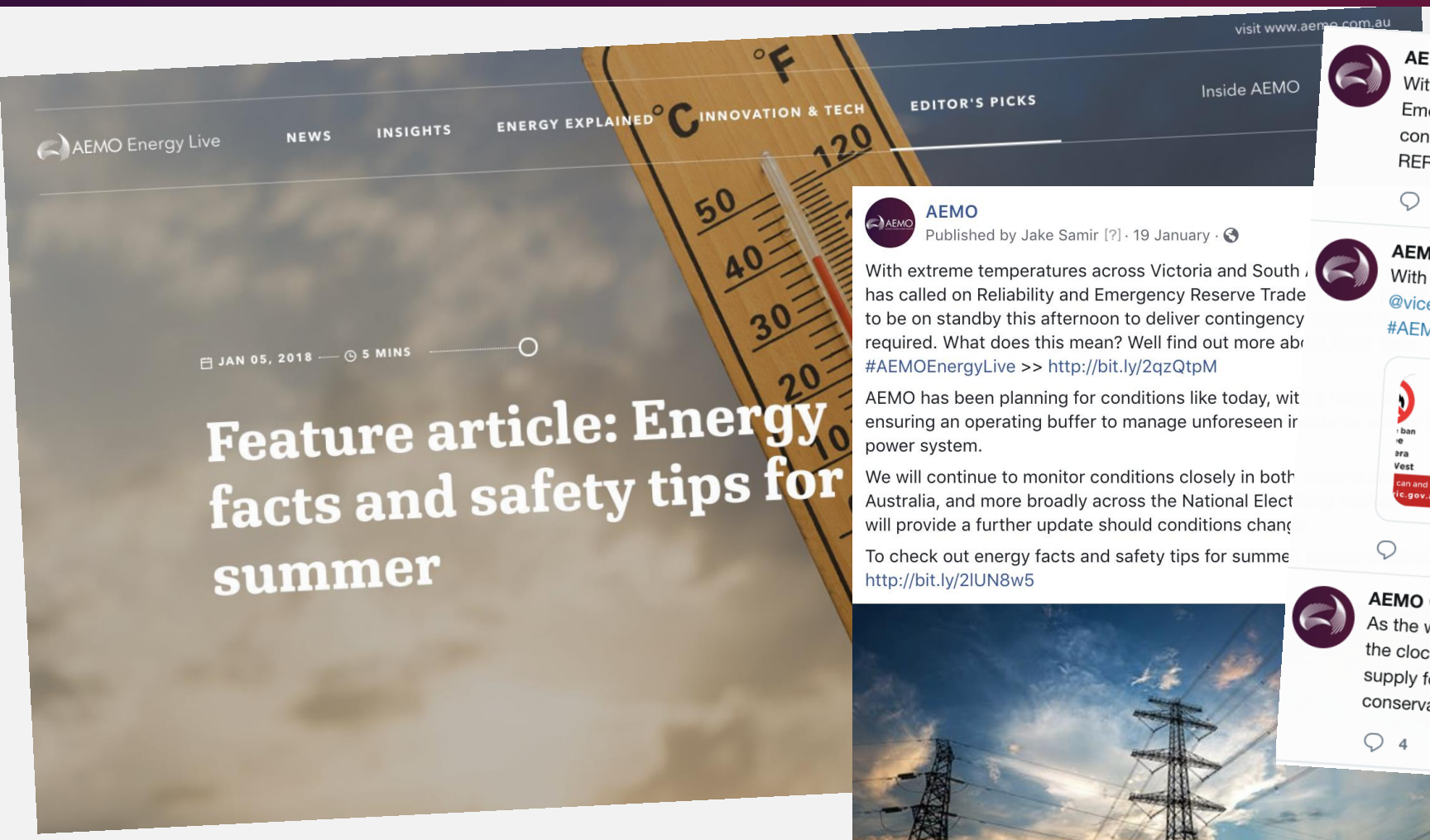
Key messages

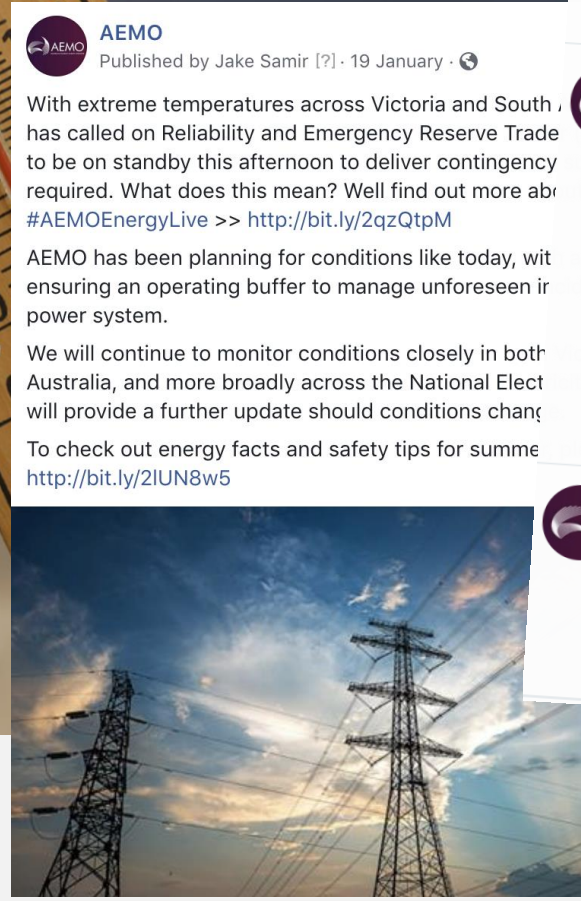
Pre-event

Directed at consumers – circulated via AEMO's social media channels

- Australian consumers can play a major role by being aware of power consumption during high demand periods.
- The power system is most at risk during **high demand days between 4PM to 7PM**, most commonly during periods of extreme heat (38 degrees plus).
- For every one degree over 38C, AEMO estimates an additional 125 MW of demand on the system.
  On an **average summer day**, the lowest demand period during daylight hours is between **11AM and 2PM**.
- Using electrical appliances that can be programed during this period puts the least amount of strain on the power system during a heatwave, especially if you have solar PV installed on your roof.
- A running pool pump uses **approximately 1.5 KW per hour**. If **100,000 consumers** can temporarily switch off their pool pumps during high demand, this can reduce **approximately 150 MW** from an already strained power system.

Communications channels





Key messages

Pre-event
Forecast LOR3 condition

AEMO views load shedding as a last resort to manage periods of supply scarcity.

If load shedding is required, AEMO will issue directions requiring the relevant network business to shed load to balance supply and demand.

Load shedding is required for <<insert timing>> hours between <<insert timing>> and will impact approximately <<insert number of customers>>.

Actions

Event and post-event
Actual LOR3 condition

- Develop media release, publish on website and share via social media.
- Push media release to relevant media contacts and newswires
- Share media release with Federal and relevant State jurisdictional government (ministerial and departments) and jurisdictional network businesses.
- Provide summary explanatory story outlining ‘what’, ‘why’, ‘how’ of the event on EnergyLive.

Collaboration is key

MEDIA RELEASE

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

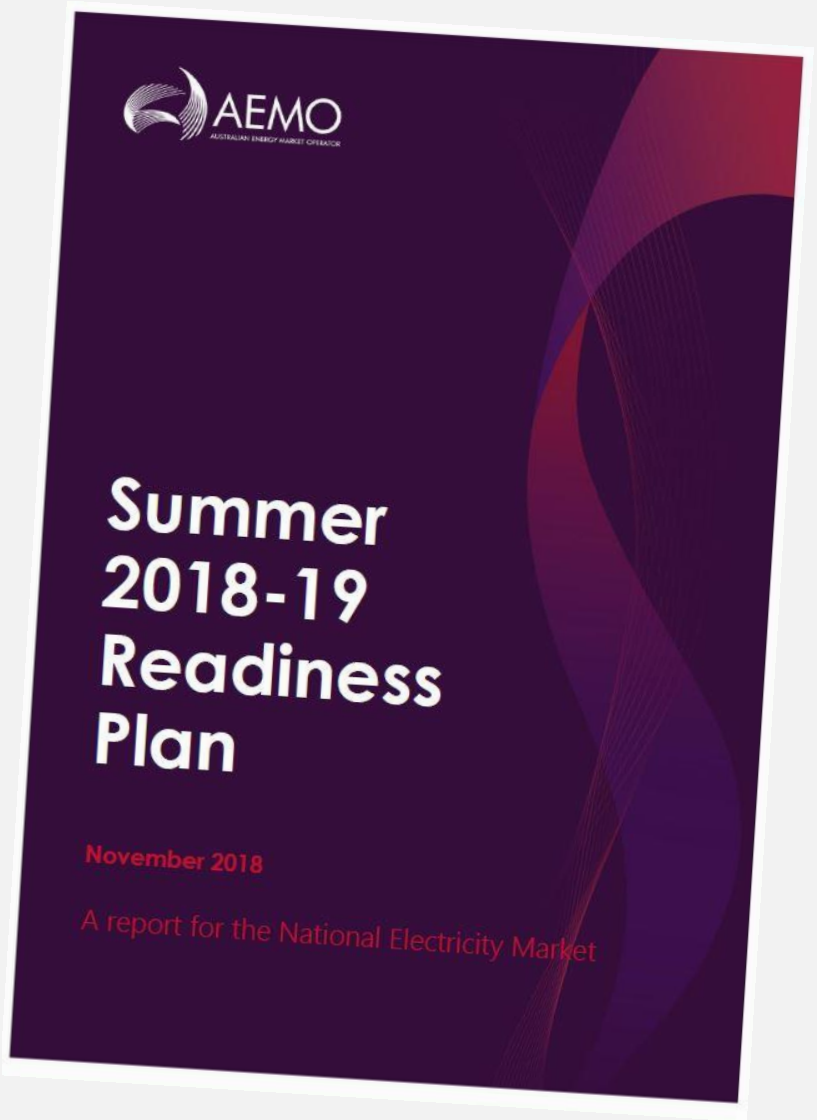
AEMO's summer energy outlook report

The Australian Energy Market Operator (AEMO) has today released its 2018/19 summer readiness report which highlights the plans and actions both AEMO and the industry have taken to prepare Australia's power system for the summer ahead.

"Findings from AEMO's 2018 Electricity Statement of Opportunities (ESOO) projected a heightened risk of involuntary load shedding in Victoria and South Australia for the upcoming summer, in the absence of further action. Our summer readiness plan outlines the actions we have taken to achieve our objective of delivering reliable, secure and affordable energy to all Australians," said AEMO Managing Director and Chief Executive Officer Audrey Zibelman.

"The Bureau of Meteorology is forecasting a hotter and drier summer which, coupled with other risks we have identified, suggest we have a challenging summer awaiting us. But while we know that unexpected events can and do happen, particularly when the power system is under pressure and most prone to failure, AEMO is confident the plans we have made and the targeted actions we have taken in collaboration with the wider energy industry and governments, have appropriately equipped us to tackle any unforeseeable events the upcoming summer might bring," said Ms Zibelman.

These actions have led to the sourcing of up to 930 megawatts of off-market reserves through the Reliability and Emergency Trader (RERT) mechanism. This initiative enables AEMO to have sufficient resources to manage potential high risk scenarios that typically occur in summer, such as extreme or extended heatwaves, bushfires and/or unplanned infrastructure outages.



Questions?