

WA Electricity Consultative Forum



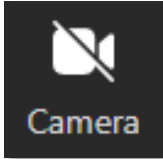
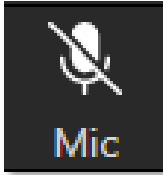
27 November 2023



We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay respect to Elders past and present.

Online housekeeping



- Please mute your microphone during the presentation.
- Please leave your camera off as well, but we'd love to see you during Q&A.
- We will pause regularly to give you time to comment in the chat or raise your hand to ask a question.
- We have a Q&A session at the end of today's session. Some questions may be saved for this session.
- A copy of the presentation will be published on our forum webpage: [WA Electricity Consultative Forum \(WA-ECF\)](#)
- We welcome feedback via WAElectricityForum@aemo.com.au

Agenda

Item #	Time (approx.)	Topic	Speaker
1	10.00 am – 10.05 am	Welcome and Minutes	Teresa Smit
2.	10.05 am – 10.20 am	Power system update – summer outlook	Michael Dalton
3.	10.20 am – 11.05 am	Year in Review: <ul style="list-style-type: none">• New WEM• Operations• Market Development• WA Future System Design	AEMO
4.	11.05 am – 11.20 am	Look ahead to 2024	Kate Ryan
5.	11.20am – 11.40 am	Q&A session	All
6.	11.40 am – 11.45am	Any other business	Teresa Smit
7.	11.45am	Close	Teresa Smit

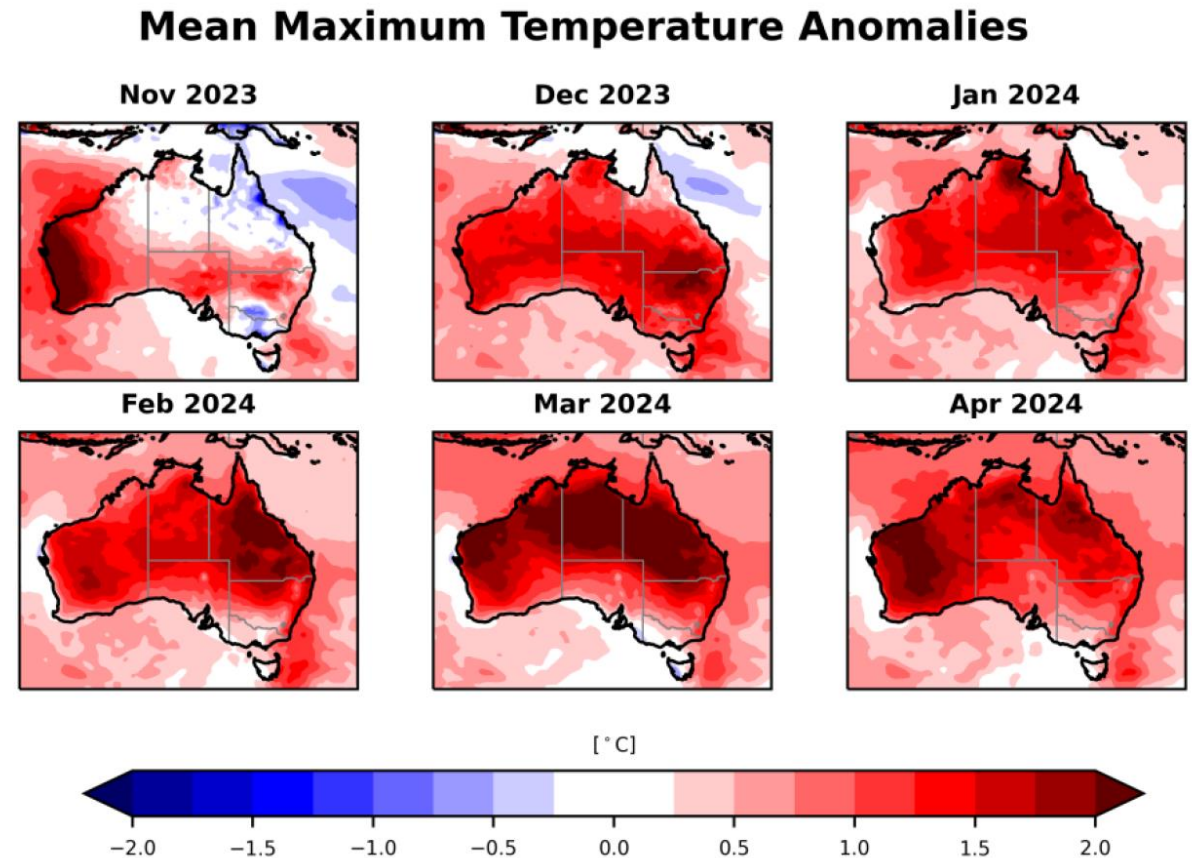
Power system update – summer readiness

Weather Outlook and Power System Preparations

A decorative graphic consisting of several overlapping purple rectangular blocks of varying sizes and shades, located in the bottom right corner of the slide.

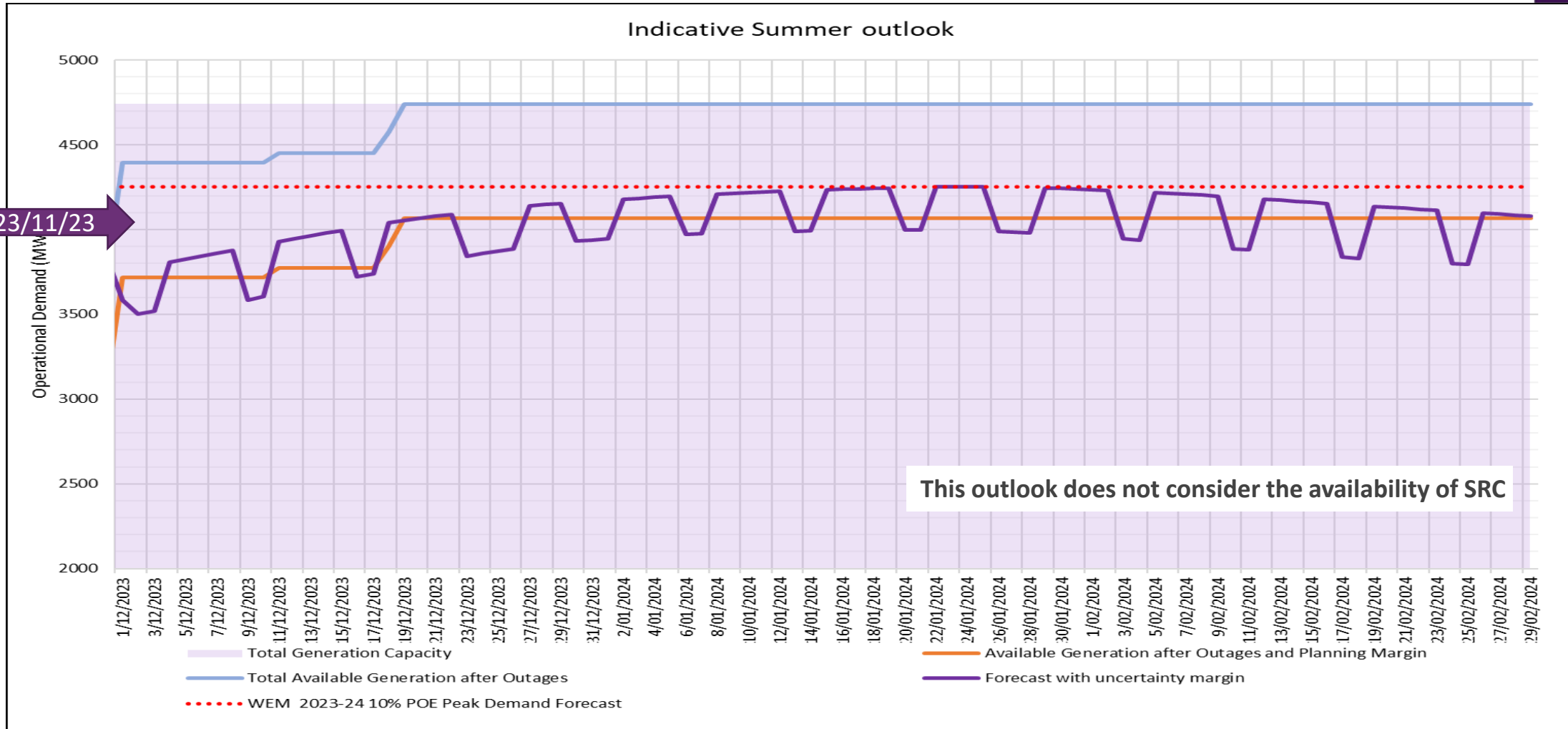
Current international consensus on El Niño impacts

- Vast majority of models expect El Niño to develop and linger until at least the end of summer.
- Maximum and minimum temperatures are expected to exceed historical minimums and maximums putting additional stress on power systems across the country.
- Increased high temp extremes and above average bushfire risk exist across Western Australia.



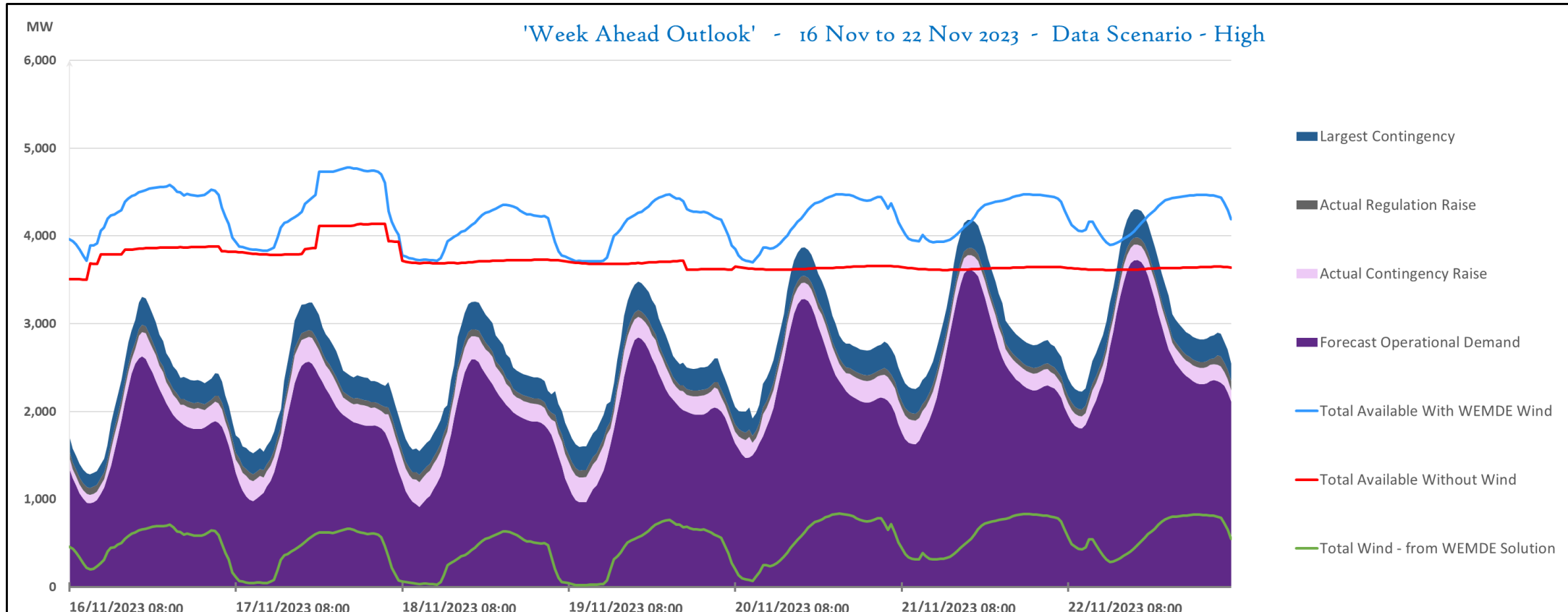
Source: Weatherzone

Indicative 2023-24 summer outlook



- Apart from some minor Forced Outages, the entire SWIS fleet is expected to be available for dispatch over the hot season.
- As the chart indicates, with no planned generator outages the system is still forecast to be short on reserves during this period.

Planning in the hot season

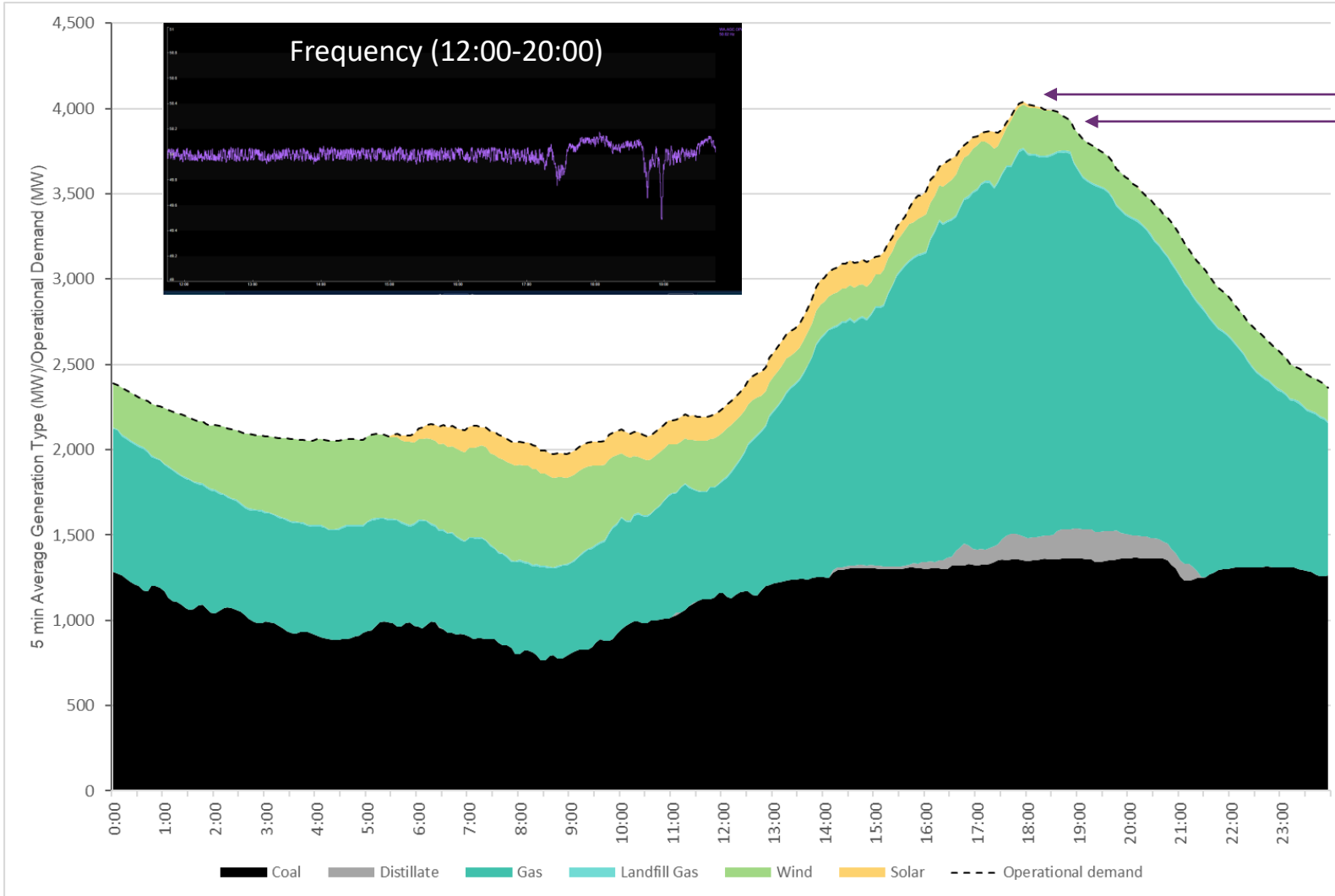


- As more accurate weather information becomes available closer to the time, this increases the accuracy of the load forecast as well as the contribution from wind and solar facilities.
- Where possible, short duration urgent outages may be considered, or Planned Outages may need to be recalled to ensure supply can meet demand.

Tight load operations - LOR

- It is expected that there will be times this summer where the system will experience and declare Low Reserve Conditions (LRC) via Market Advisories. These will be in accordance with the Lack of Reserve (LOR) framework.
- In extremely tight load conditions AEMO will:
 - Dispatch all available market generation, including DSP and available SRC.
 - Work with Western Power and other participants to access non-registered capacity or reductions in consumption.
 - As a last resort, instruct Western Power to reduce load if required.
- AEMO works closely with the Coordinator of Energy during tight operating conditions to ensure alignment of the industry and that all possible mitigation has been considered.

Review of 23 November



Peak demand around 18:00

Loss of ~ 330 MW synchronous generation and ~ 100 MW reduction in wind from about 18:43
 Frequency dropped to 49.49 Hz, before restoring to the Normal Operating Frequency Band.

- Intense heatwave experienced across the SWIS.
- A number of generator outages were cancelled in advance of the week.
- There was significant engagement and support across the industry.
- Low Reserve Condition notification was sent out.
- On the day, temperatures maintained between 37 and 38 degrees from 15:00 – 18:00 resulting in a record demand.
- All available capacity was dispatched, including that for which an Emergency Operating State was required.

Year in review





New Wholesale Electricity Market

Andrew Smith, Program Director – WEM Reform

Commencement of new WEM

The new Wholesale Electricity Market (WEM) commenced operating with new capabilities developed to support the state's energy transformation on 1 October 2023.



Benefits of new WEM

The new WEM is an essential foundation to enable the transition to a low emissions power system, while ensuring secure and reliable supply and minimising costs for consumers.

The new market design will help meet the future needs of the power system, helping maintain the secure and reliable electricity supply alongside growing renewable energy output.



Working with industry

AEMO engaged with Rule Participants throughout the process, including trials, regular forums and working groups.

A huge thanks to everyone for being so engaged and collaborative in a pressured and fast paced environment.



53 WRIGs,
74 ITFs,
>100 newsletters,
thousands of emails
and countless phone
calls!

Overview of new WEM

AEMO and Industry had prepared for a bumpy start, however two months in, systems and the new market are stable.



New WEM

The dispatch engine is solving reliably, and incident levels are lower than expected.

AEMO and Industry are learning and working together to refine the new WEM, with forums in place to support participants and share market insights.



Issues resolution

Shortfall Pricing issue: EPWA, AEMO and participants collaborated to identify and rapidly implement rule and system changes to address unintended spikes in ESS prices.

Settlement: AEMO delayed Settlement by three weeks to avoid large payments for ESS which would subsequently be reversed but has now returned to normal schedule.



Completion

Work is underway to deliver the remainder of the Program by March 2024.

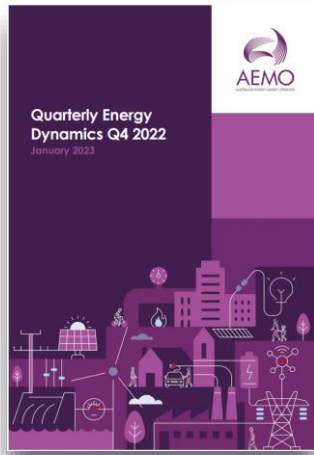


Operations

Teresa Smit, Group Manager – WA Operations

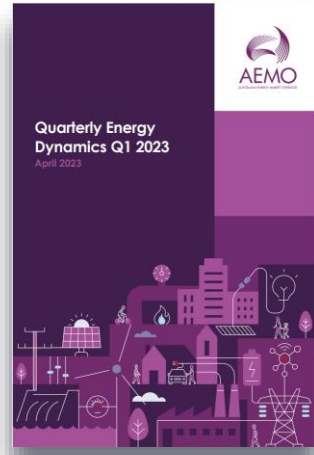
Quarterly Energy Dynamics summary

Q4 2022



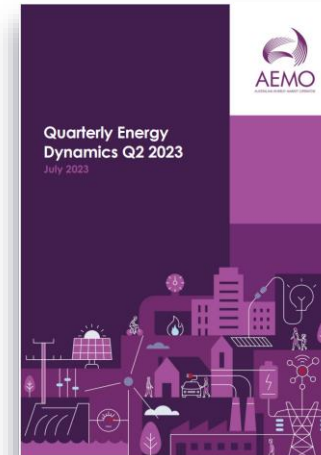
- “Gas supplying 37.4% of underlying demand, primary fuel type”
- “Increasing renewable contribution leads to record renewable penetration”

Q1 2023



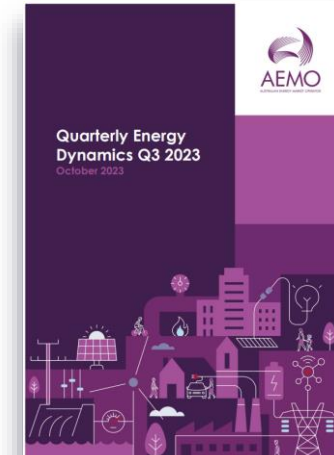
- “Coal preservation measures required over summer”
- “AEMO WA activated Supplementary Reserve Capacity for the first time”

Q2 2023



- “All-time record high Balancing price and Q2 STEM price”
- “Record low Q2 coal fired generation, whilst gas set a record Q2 high”

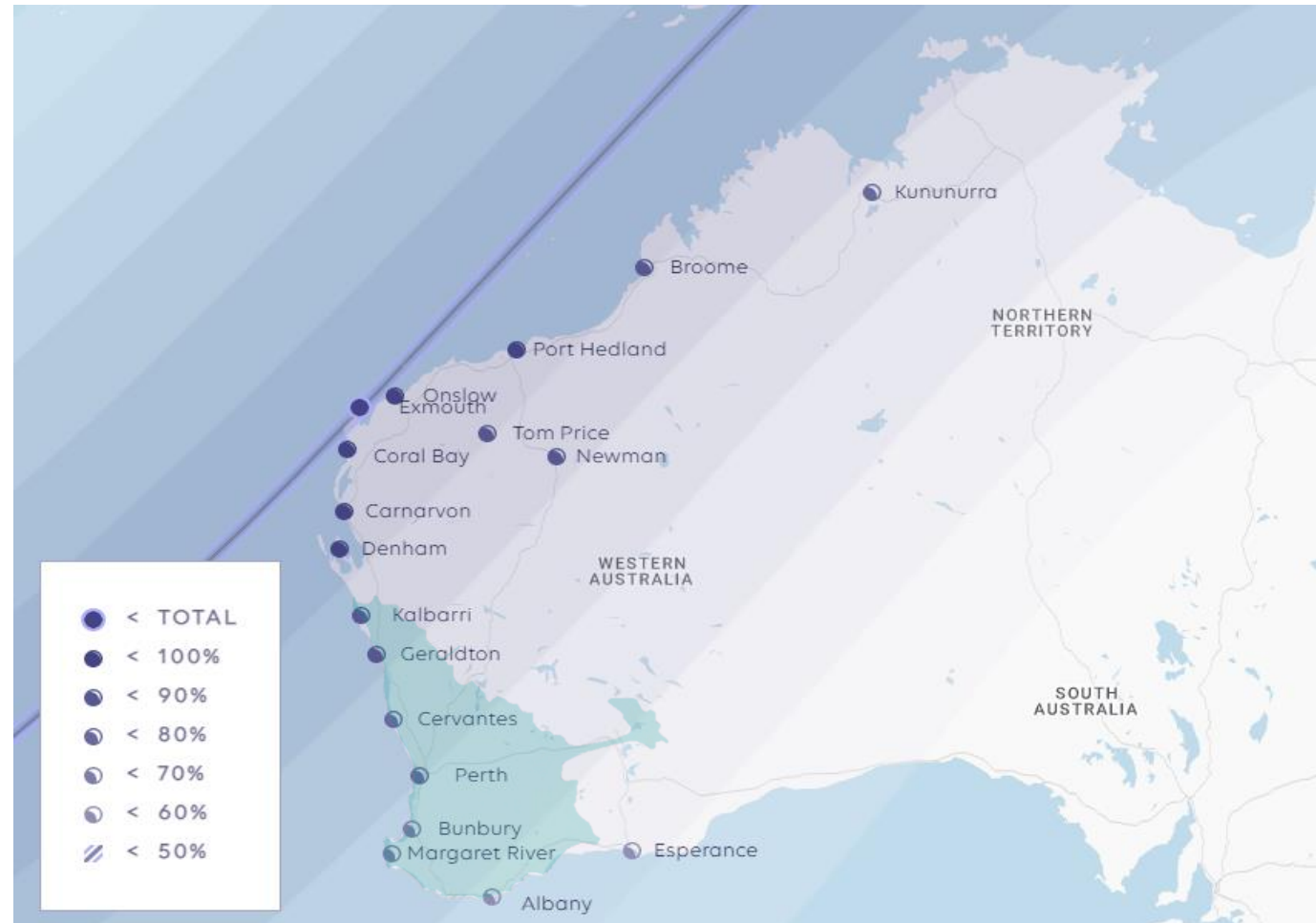
Q3 2023



- “Balancing and Load Following Ancillary Service Markets concluded”
- “Gas generation decreases, coal generation increases”
- “Minimum operational demand and maximum distributed PV output record”

Power system challenges 2023

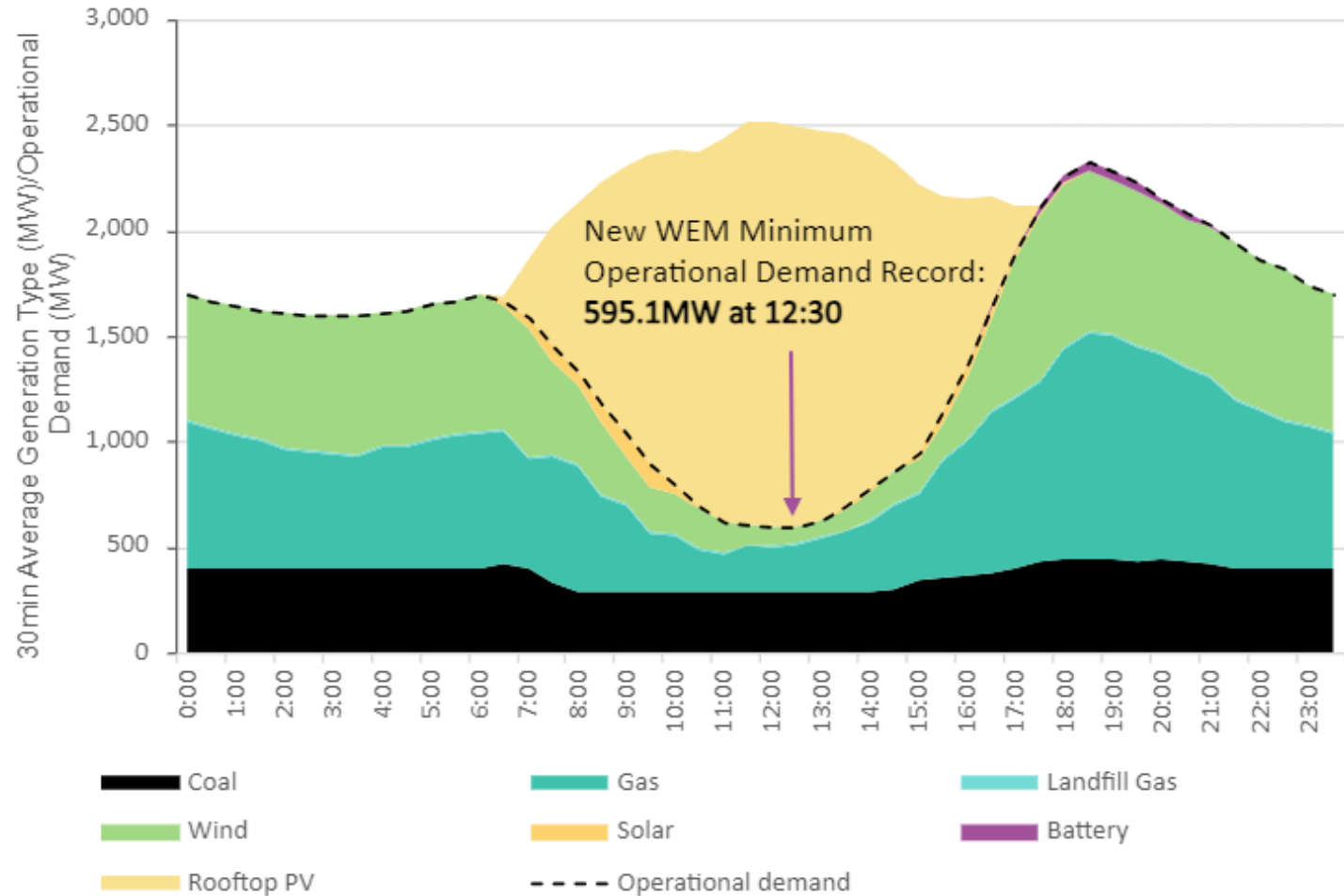
- Gas supply disruption in January. Unplanned outage at the Wheatstone Facility resulted in ~20% reduction of total production.
- Exmouth solar eclipse 20 April 2023.
- Tower collapse and network outages in the north country.
- First grid scale battery connected to the SWIS.
- Record June load 3800MW.
- Very tight operating conditions throughout June.



Minimum Operational Demand

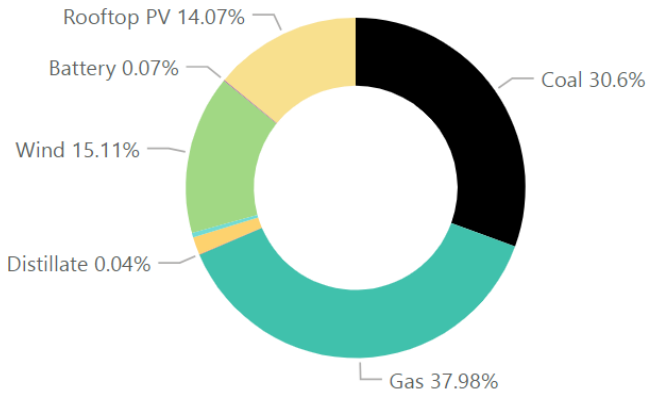
Minimum Operational Demand (MW) – 25/09/2023, 12:30 interval

- **595.1 MW**
- Previous record was 626.3 MW on the 16/10/2022, 12:30 interval
- The 10 lowest minimum demand days had all occurred in the previous 13 months
- Based on non loss-adjusted sent out SCADA data

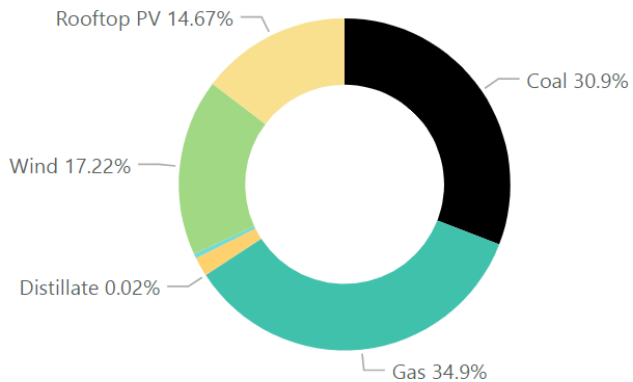


Fuel mix

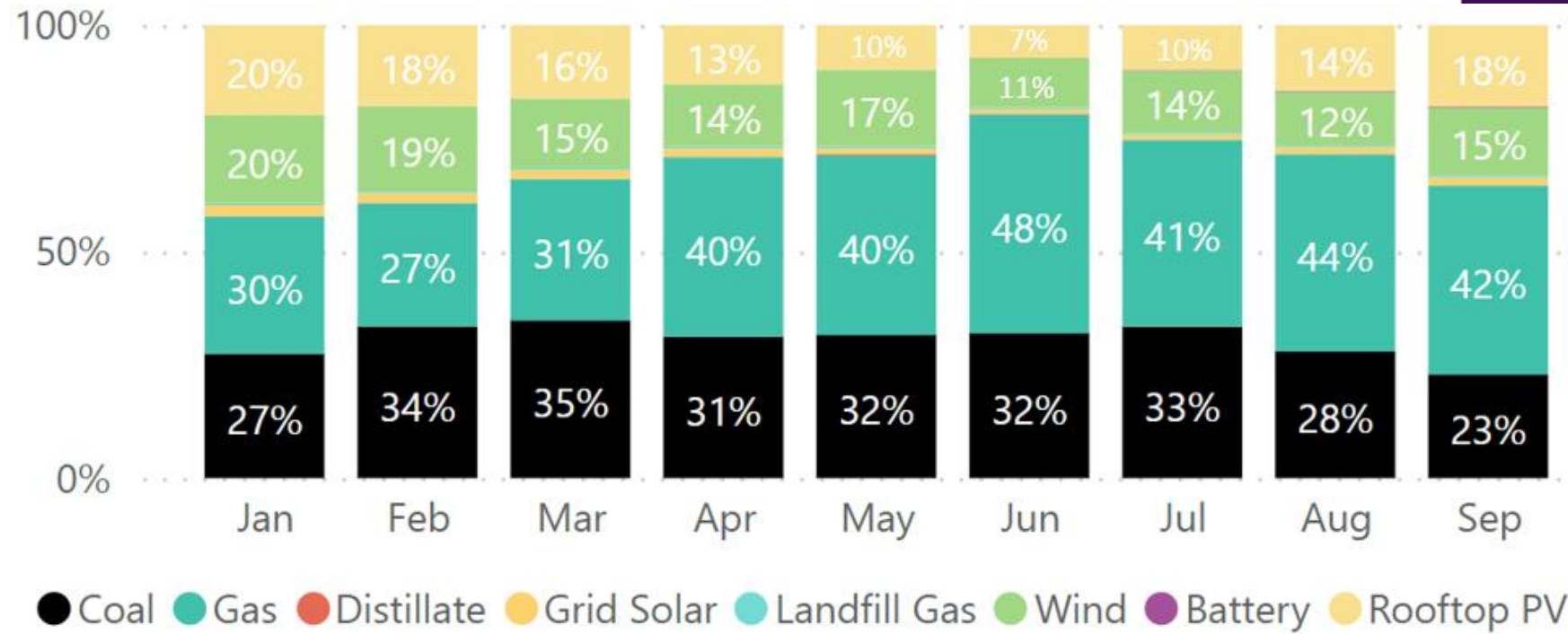
Fuel mix 2023 – 1 October 2023



Fuel mix 2022



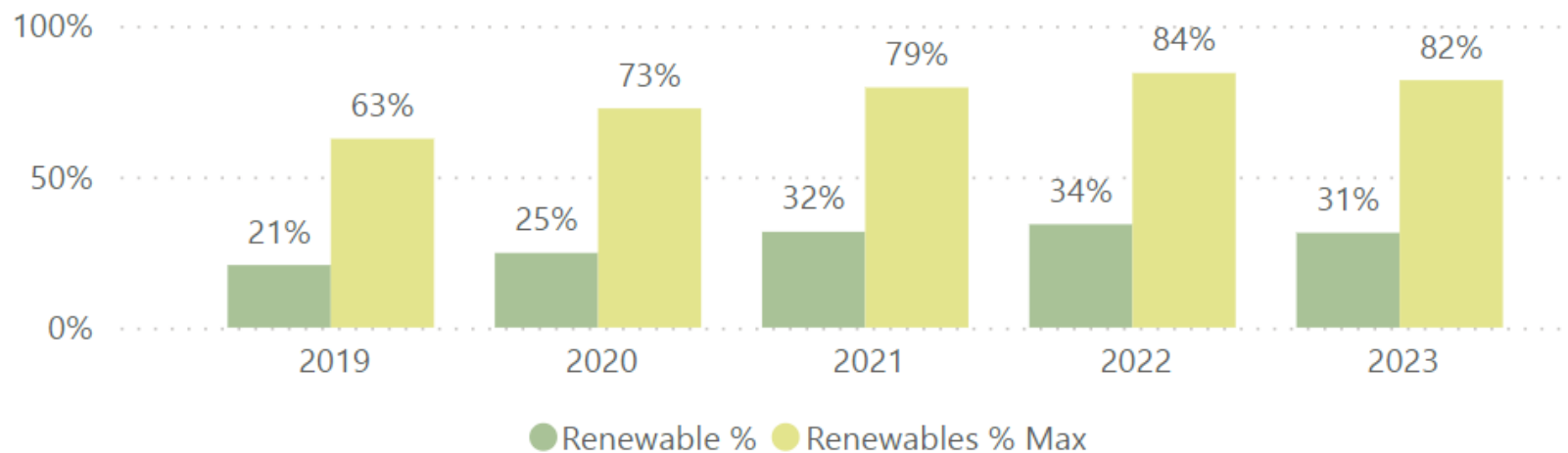
Fuel mix trend 2023 – 1 January 2023 to 1 October 2023



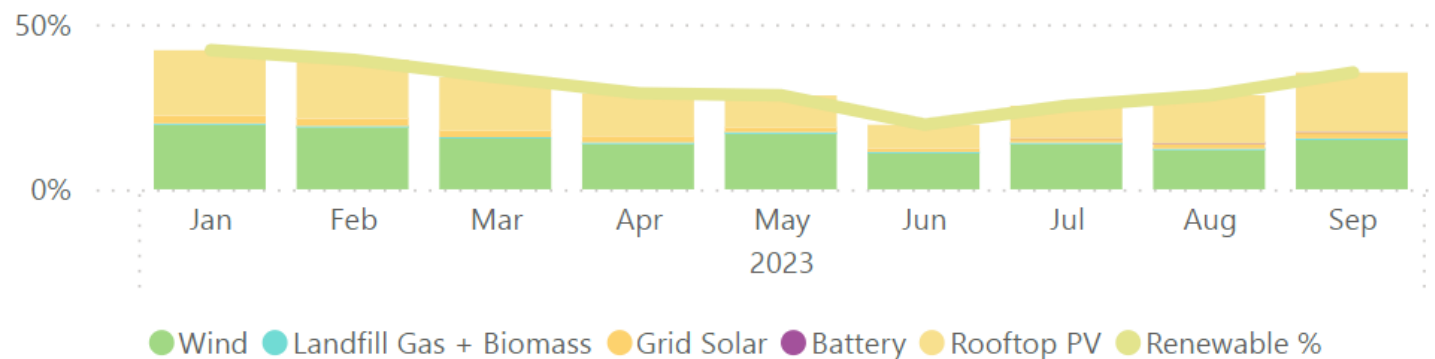
Renewable penetration

- Similar to 2022, renewable penetration remains high with a 31% to total generation (including rooftop PV) for 2023 so far.
- The all-time maximum for renewable penetration – 84.3% – was set on 12 December 2022 at the 11:00 interval.
- Maximum estimated DPV Generation 76.3% on 25 September 2023.

Renewables % (Year on Year)

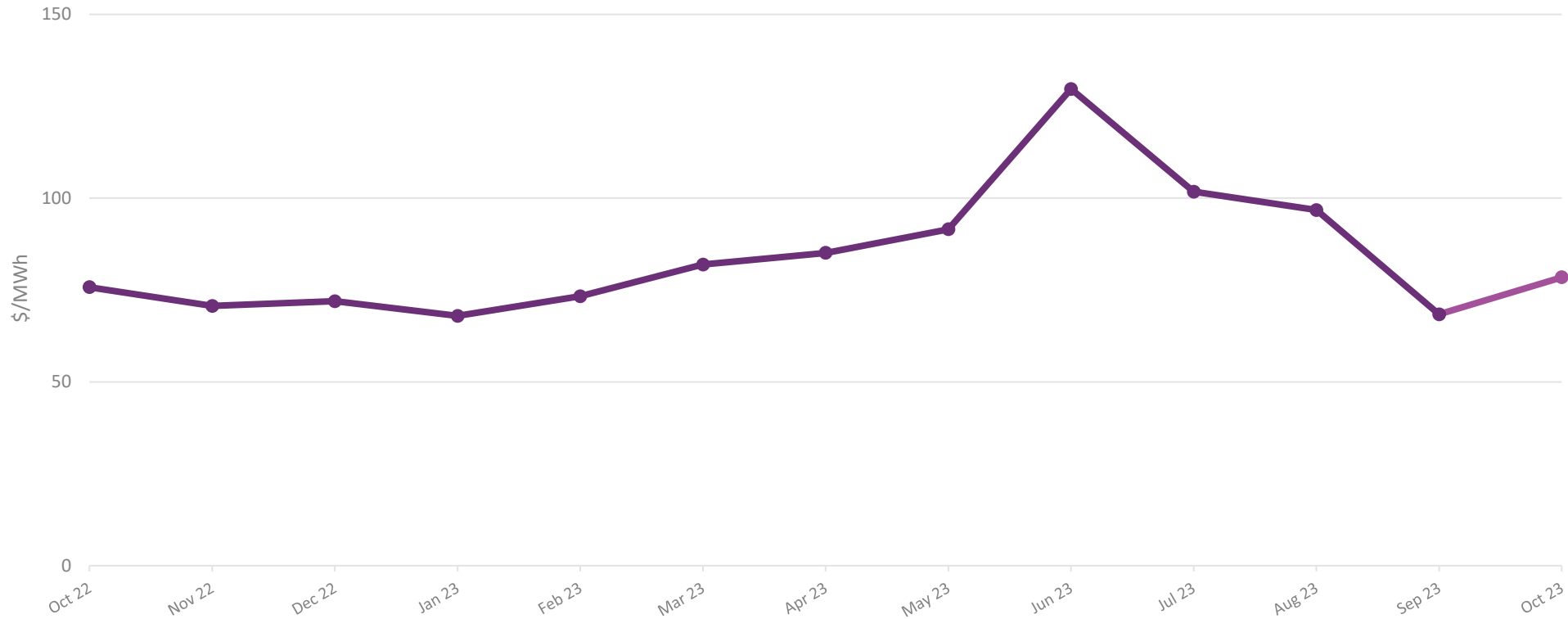


Renewables % 2023 (Contributions)



Balancing and Real Time Energy Prices

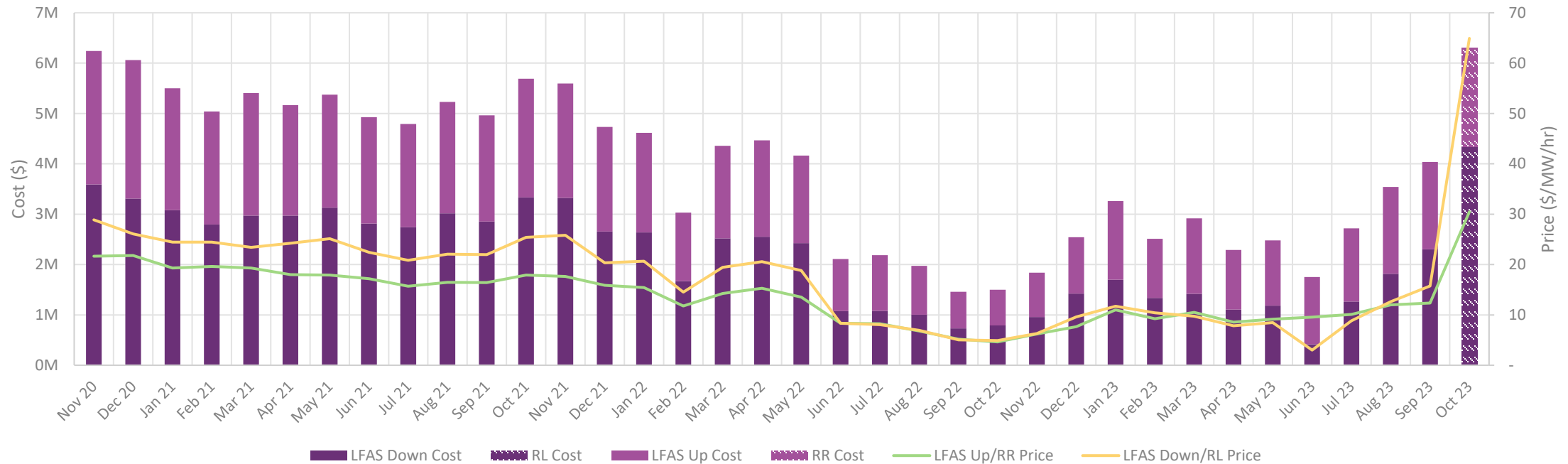
Monthly Balancing Price



- Average Balancing Price peaked around June 2023, with a maximum price of \$805/MWh, driven by tight conditions in the system as a result of high outages and higher than normal winter demand.
- The average Final Reference Trading Price was 78.45/MWh in October 2023, an increase of \$10.07/MWh compared to Balancing Prices in September 2023 but comparable to October 2022 Balancing Prices.

Regulation (LFAS)

Monthly costs & prices



- Total cost of Regulation rose compared to LFAS in recent months, however this is consistent with trends in the LFAS market since June 2023.
- While the monthly cost of Regulation is high compared to recent months, it is similar 2020/2021, despite prices being notably higher. This appears to be mainly driven by different price-quantity dynamics in the new market. Lower average procured quantities in the new market and the addition of backup LFAS payments (which are not reflected transparently in price outcomes) in the total cost in the old market also contributed, though less so.
- Note that FCESS Uplift costs are excluded from the above costs.

Supplementary Reserve Capacity

Annual Costs

AEMO procured SRC in the Hot Season of 2022-23



Up to 96.1MW of service procured



Service activated twice



Total cost of \$3.8M

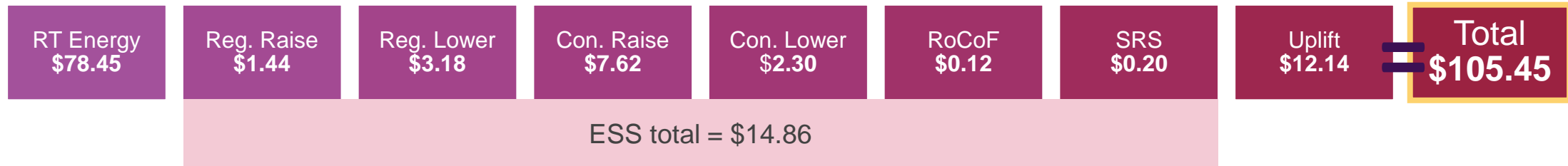


Cost offset by \$1.3M in Reserve Capacity
Security retained

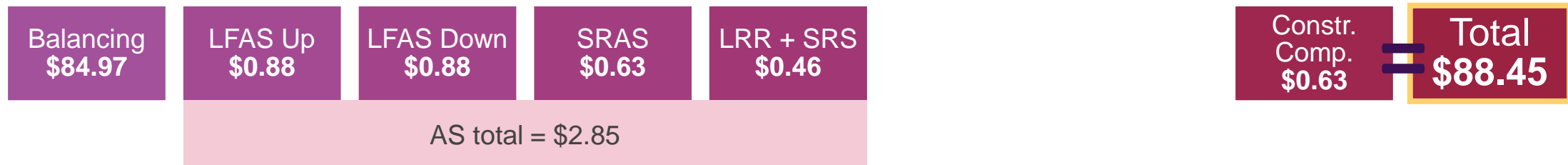
Old vs New Market comparison

On a \$/MWh of Energy basis

New Market (Oct 2023)

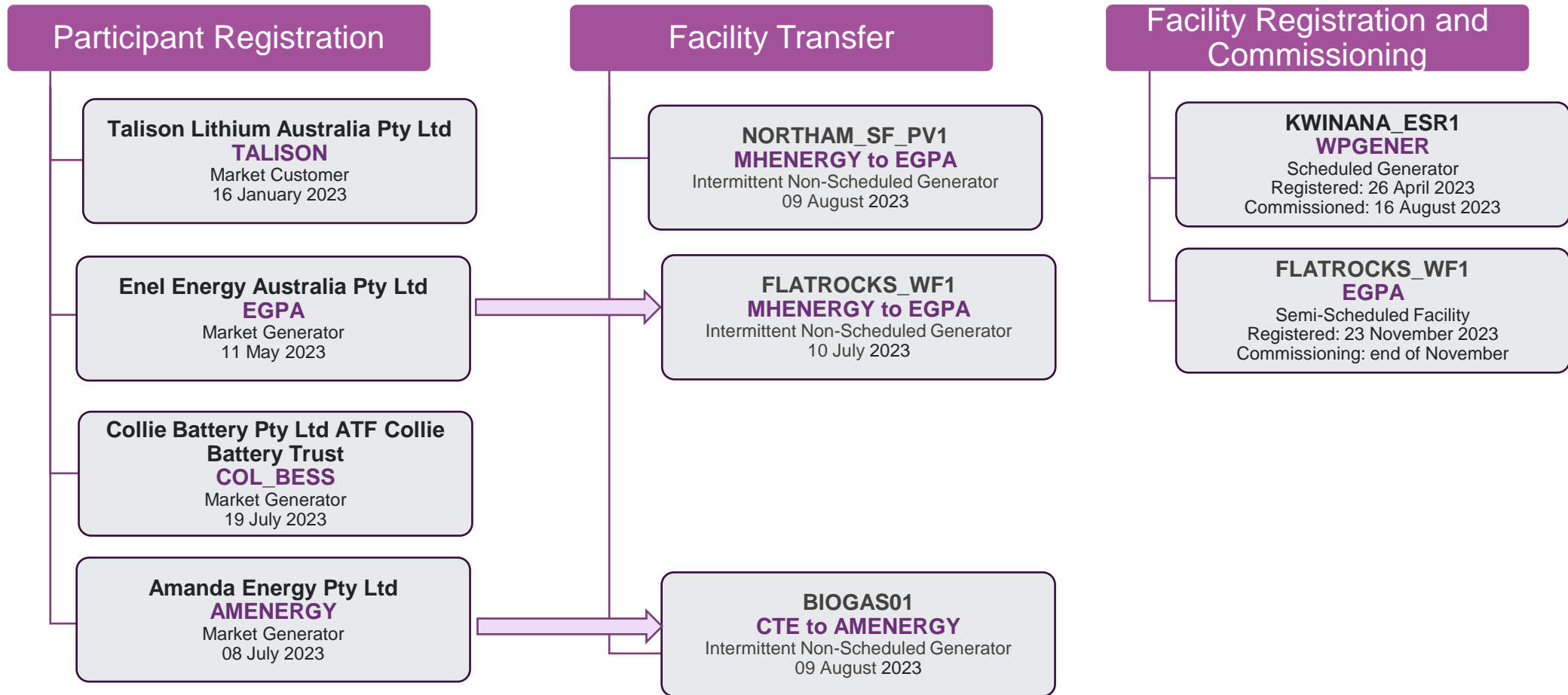


Old Market (12-month average to Sep 2023)

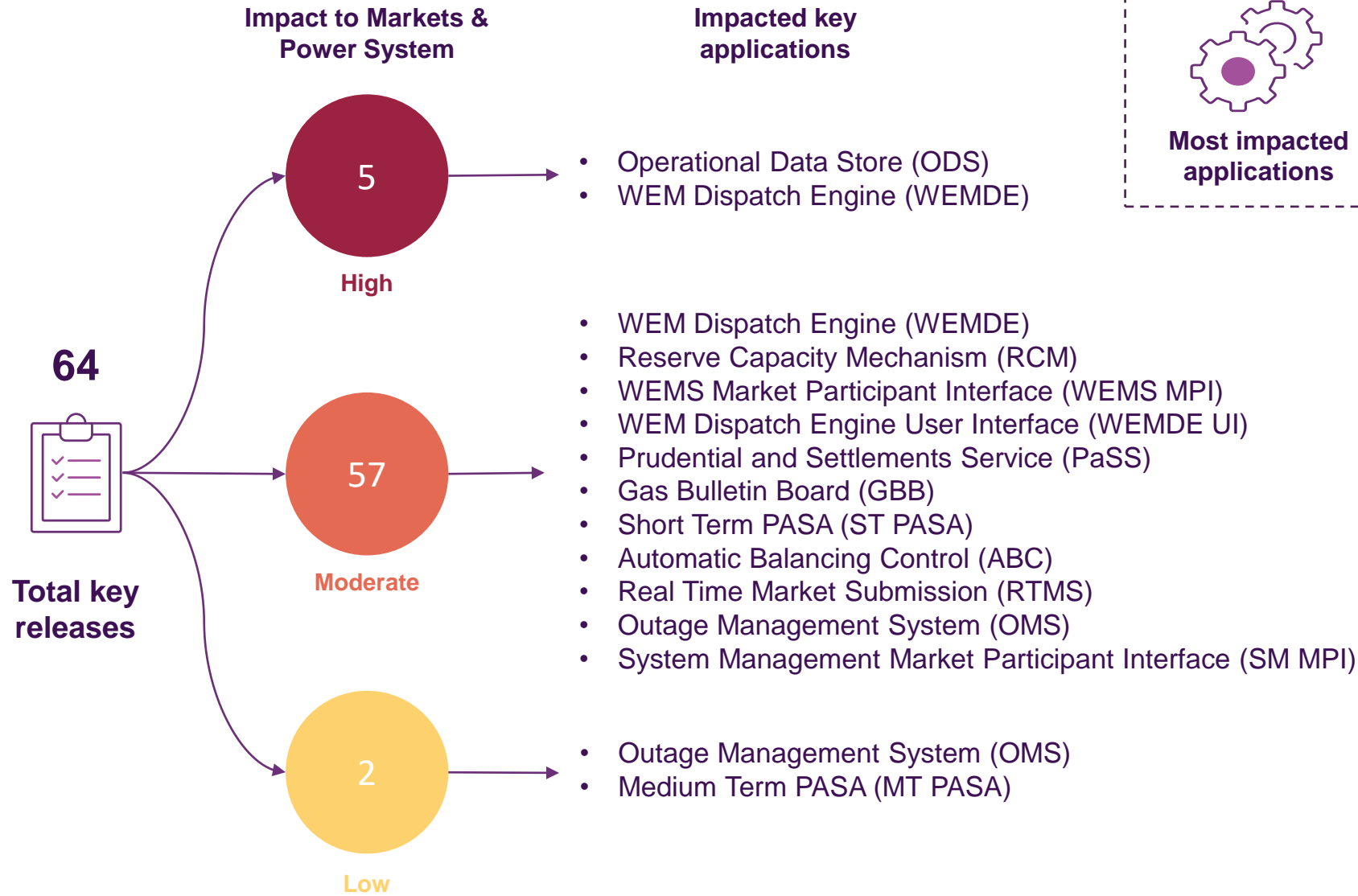


- This compares the cost of the Real-Time Market (Energy and ESS) vs the old Balancing market and Ancillary Services, normalised by energy consumed. Capacity costs are excluded.
- To calculate a dollar per MWh of energy consumed, AEMO divided the total segment cost by total gross consumption in the WEM, calculated as:
 - For the new market: the sum of CCQ_P_I
 - For the old market: the sum of (MSNDL_P_I - ABSLOAD_P_I)/2 + min(MS_F_I of Registered Facilities, 0)


Registrations



IT system releases



WEMDE, RCM & WEMS MPI



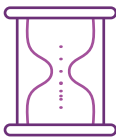
Most impacted applications

7



No. of outages for most impacted applications

3 hours



Average outage duration, excluding site transfers

Market Development

Martin Maticka, Group Manager – WA Market
Development

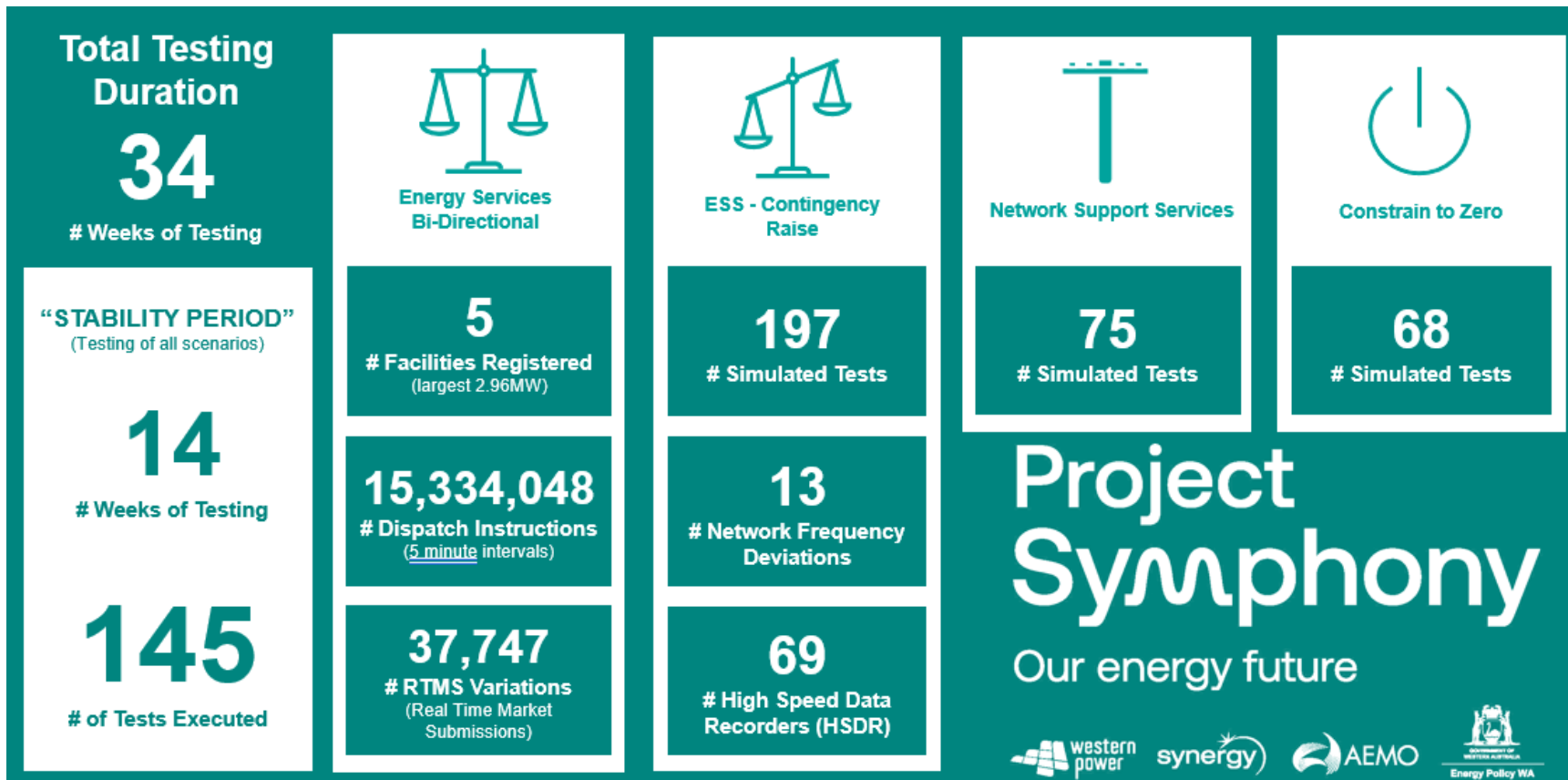
Working closely with the EPWA, ERA and industry supporting reforms

Working closely with stakeholders and government, we influence and deliver outcomes that evolve and transform the WEM and GSI to provide affordable, safe and reliable energy for SWIS customers, whilst developing and leading AEMO's capability to enable the energy transition in the SWIS.

- WEM Reform development and implementation:
 - Supporting EPWA in the preparation of rule amendments
 - Completed the development or amendment of 39 WEM Procedures.
 - Updated WEM Design Paper, supporting industry in understanding the new market arrangements.
- Supporting the RCM Review, Cost Allocation Review, Demand Side Response Review, and WEM Investment Certainty Review.
- MAC and GAB participation.
- 15 submissions made to industry consultation papers.
- Submission of the first in-period proposal under AEMO's 6th Allowable Revenue period.

Distributed Energy Resources reforms

Project Symphony demonstrated the successful integration of technology platforms to support the orchestration of DER assets into a future energy market.



Highlights include:

- Project Symphony Pilot.
- DER Register to enable visibility of Electric Vehicle chargers.
- Operational enhancements to Emergency Solar Management.
- Unregistered equipment including DER participating in NCESS and SRC.
- To hear more, join us at the WA DER Market Participation Forum 13 December 2023.



WA System Design & Transformation

Neetika Kapani, Acting Group Manager – WA System Design & Transformation

Key activities

Planning and procuring for a secure and reliable SWIS

Successfully ran the 2022 and 2023 Reserve Capacity Cycle Activities in parallel. Implemented the NAQ for the first time for the 2022 RC Cycle.

Capacity Credits for the 2023 RC Cycle assigned on 20 November. View our webpage [here](#) : 4,717 MW of CC assigned against RCR of 5,543 for the 2025-26 Capacity Year, with 290 MW (6%) of CC assigned to ESR.

2023 WEM ESOO published on 17 August - the report highlights a need for significant investment in capacity to supply the SWIS over the 10-year outlook period.

The SRC process was triggered to procure additional capacity for the 2023-24 Hot Season.

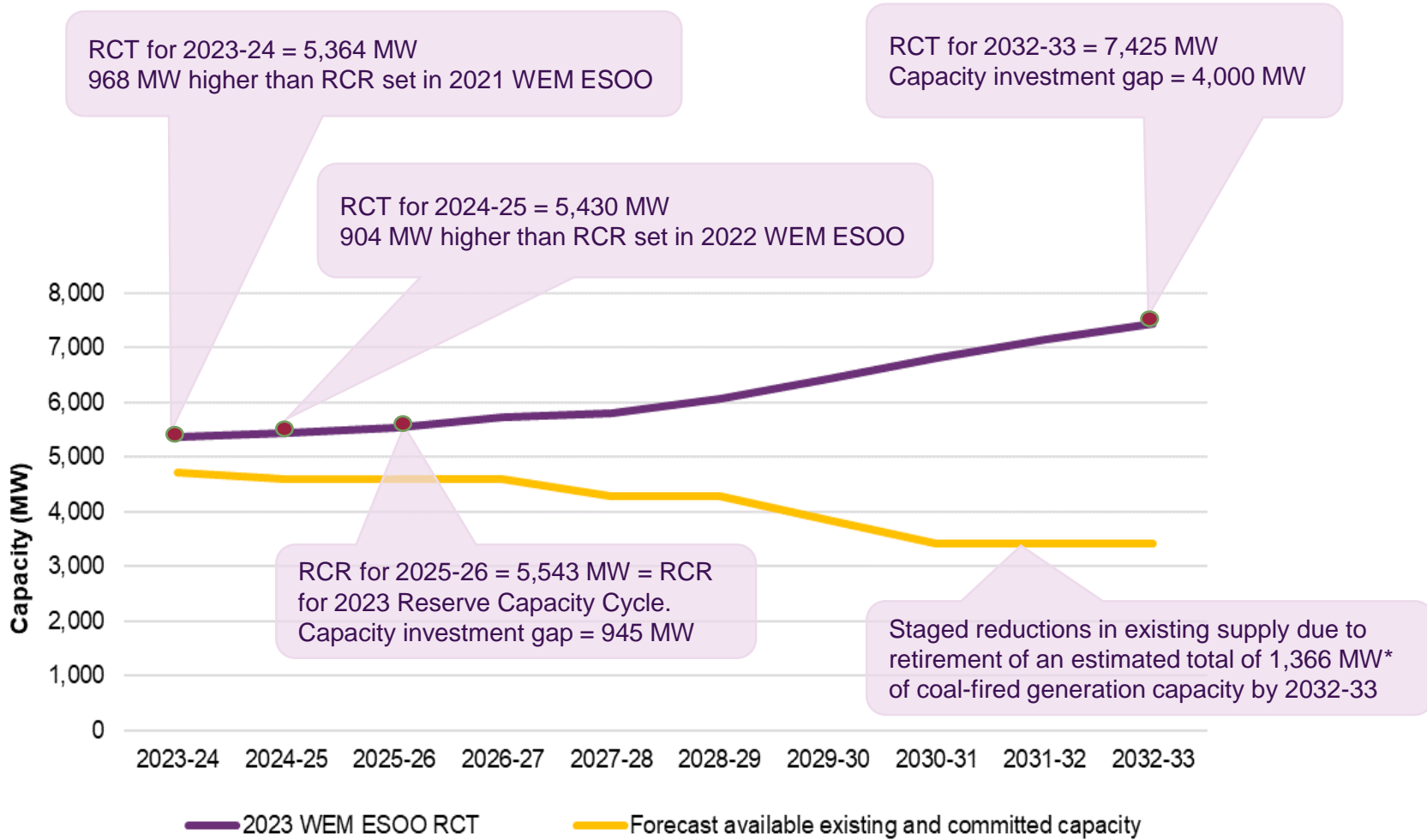
NCESS processes to maintain system reliability and security - Minimum Demand Service for 2023-24 (complete); Peak and Minimum Demand for 2024-26 (complete); and Peak Demand for 2025-27 (in-progress).

Completion of Essential System Service (ESS) accreditation of the existing facilities for the reformed WEM.

Development of an AI-based tool for calculation of Regulation Raise/Lower Requirements Quantities.

2023 WEM ESOO

Capacity investment gap



10% POE peak demand is forecast to increase at an average annual rate of 4.4%.

RCT forecast to grow at an average annual rate of 3.7% compared to 0.8% reported in 2022 WEM ESOO.

Procurements are underway to address near-term need for additional capacity:

- **SRC** for the 2023-24 Hot Season
- Peak Demand **NCESS** for 2025-27, along with a six month delay to retirement of Muja 6

* Estimated total reduction of coal-fired generation include all publicly announced state-owned generators as well as the Bluewater Power Station which AEMO assumed, for the purposes of the modelling, to exit the WEM from 2030-31.

SRC and NCESS procurement

2023-24 NCESS for min demand service

- Contracts signed for 84 MW of service in 2023-2024.
- Services currently being made available to dispatch and for AEMO's activation:
 - Synergy KBESS and Alinta Pinjarra GT's offering to withdraw energy.
 - Synergy provision of services from Unregistered Equipment through curtailment of Distributed PV and charging of distributed energy storage.

2023-24 SRC

- AEMO activated the SRC process to procure up to 326 MW for 2023-24.
- AEMO received more than 150 MW of potential SRC proposals, with several contracts in the final stage of being executed.
- The formal tender process has closed and AEMO has entered into direct negotiations with SRC providers.

2024-26 NCESS for Reliability

- Contracts signed for 630 MW of peak capacity, supporting entry of new energy storage projects including:
 - Neoen Collie BESS
 - Alinta Wagerup BESS
 - Cunderdin Hybrid Solar PV/BESS
 - Synergy KBESS Second Phase
- Alongside upgrades of Alinta's Wagerup GT's and Demand Side Response provided by EnelX.
- NCESS Contract payments are adjusted in each Capacity Year to reflect expected Capacity Credit payments.

2025-27 NCESS for Reliability

- AEMO requested the Coordinator to trigger an NCESS for a peak demand service for 2025-27.
- The Expressions of Interest consultation stage has commenced, seeking 354 MW.
- Expressions of Interest close 30 November 2023.
- Call for NCESS Submissions (Tender Phase) expected in late December early January.



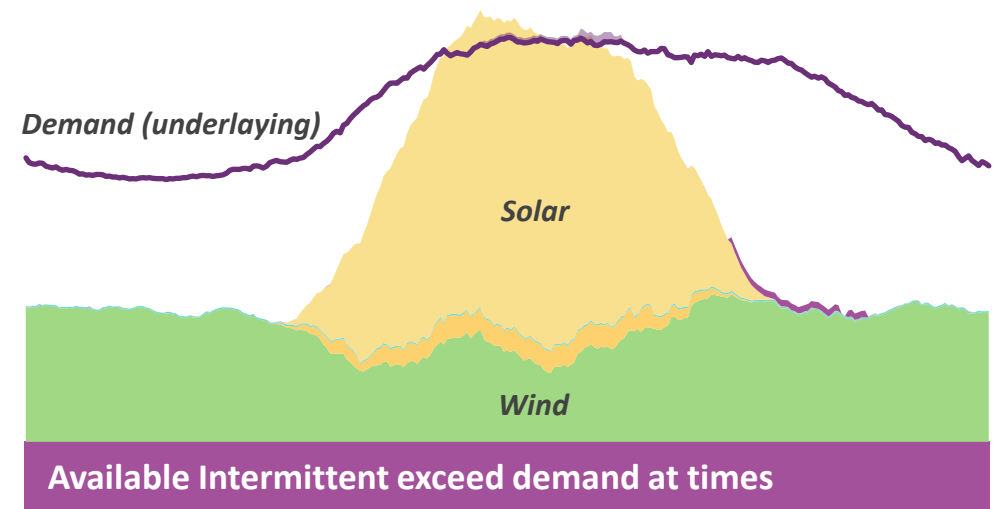
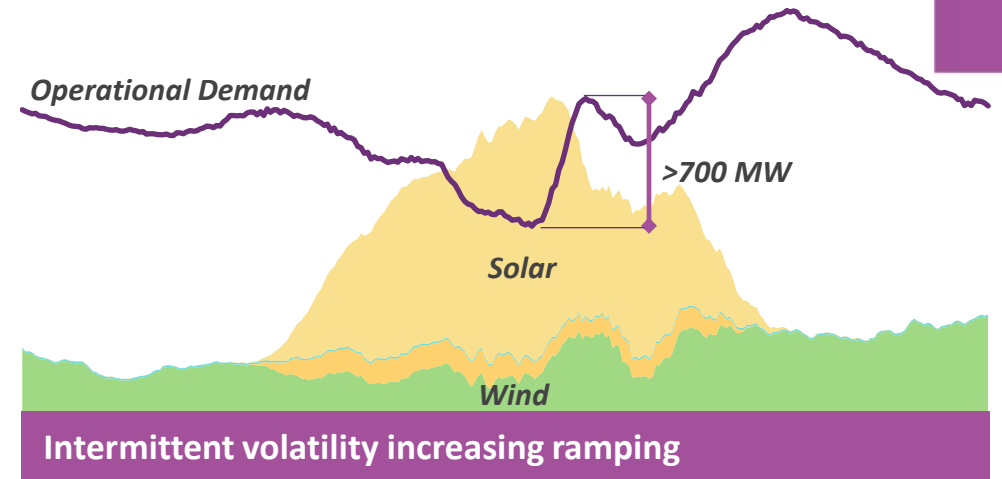
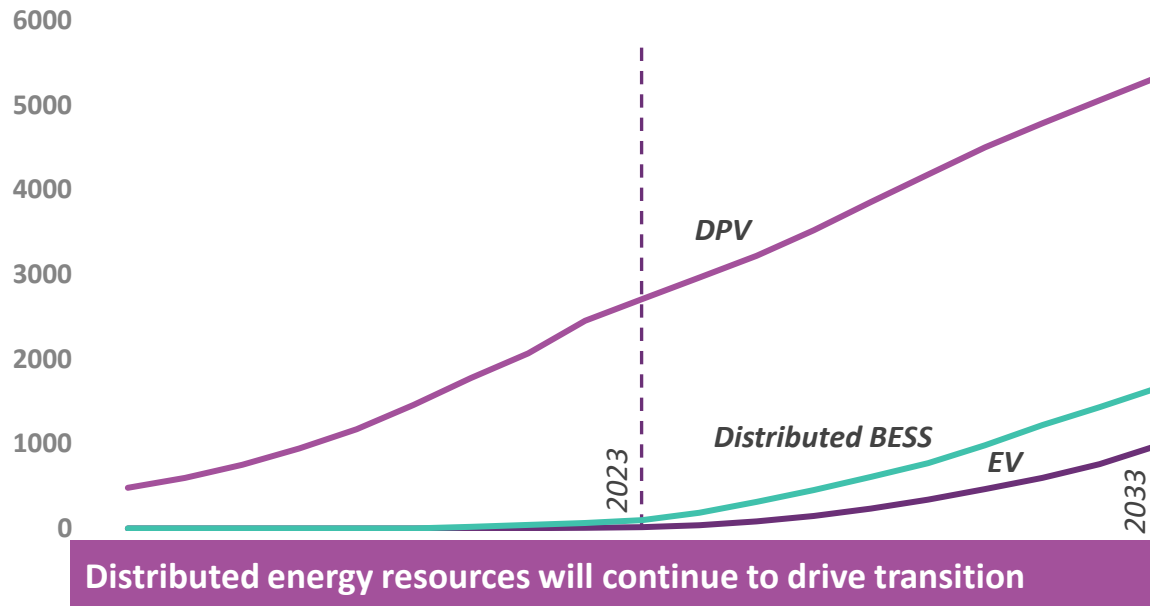
2024 Outlook

Kate Ryan, Executive General Manager WA & Strategy

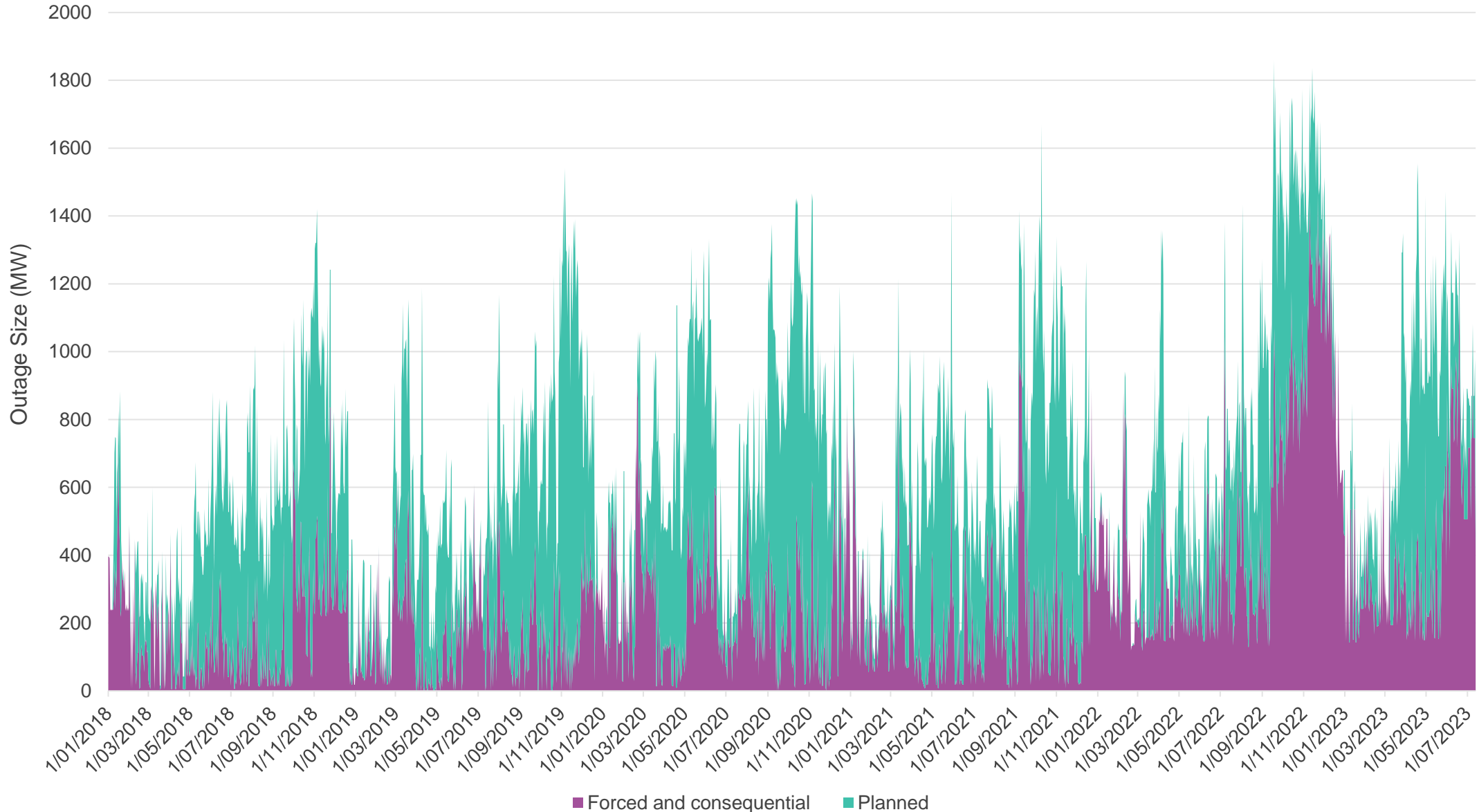


The SWIS transition continues

- Renewables and storage rapidly replacing thermal generation.
- Challenges in minimum demand and operational ramping are worsening.
- Continued investments in DER present opportunities for participation alongside system impacts which must be managed.



Ageing fleet and changed operational conditions are placing pressure on the power system



Significant and sustained investment is required



Source: SWIS Demand Assessment

- 2023 WEM ESOO identifies need for significant and sustained investment in capacity
- ~4GW of additional [certified] capacity required by 2032 to meet growing demand and replace retiring generation
- **Renewables**, connected with **transmission** and **firmed with storage and gas**, is the lowest cost supply mix for this stage of the transition
- Investment in new gas supplies is also required to meet demand and replace declining sources

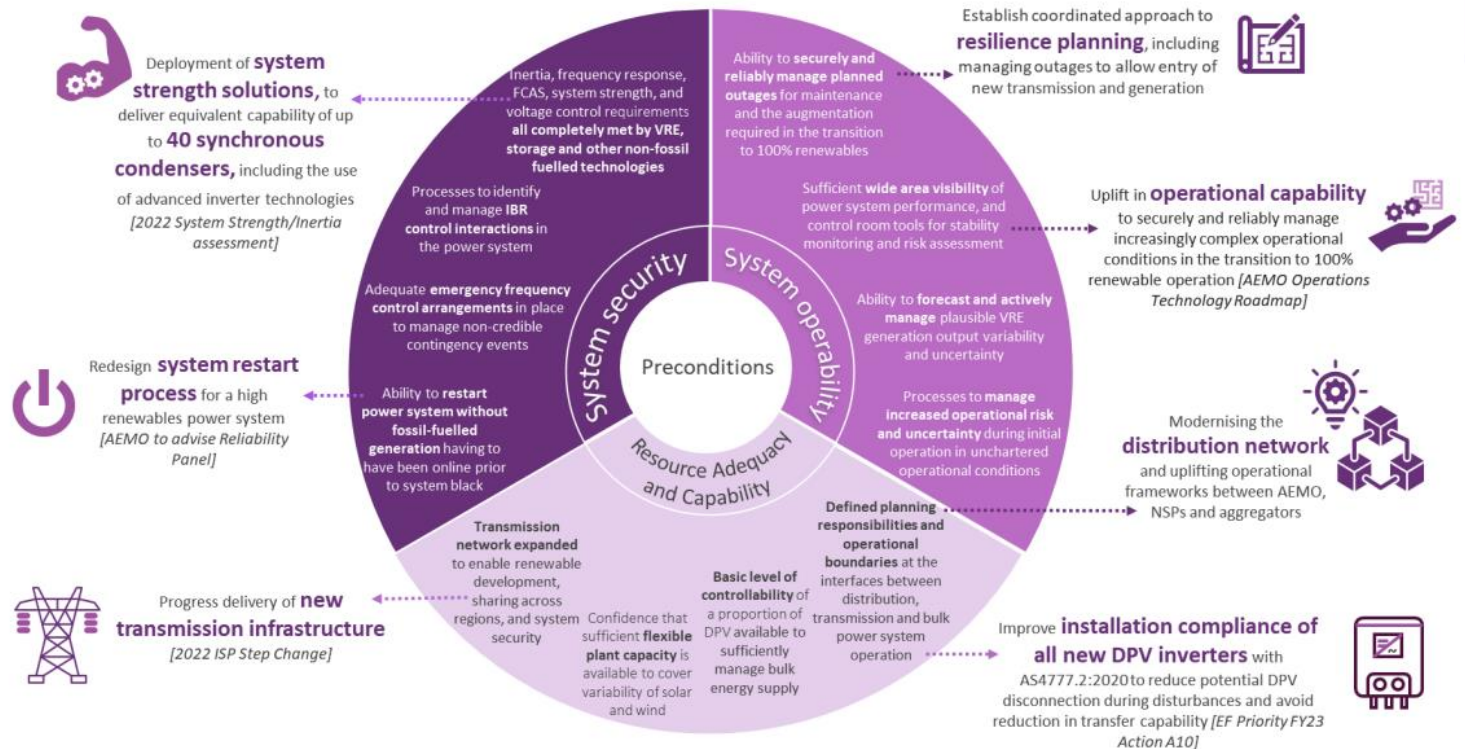
Project delays pose a key risk to the future reliability outlook

Engineering the power system to operate at high levels of renewables

Roadmap purpose

“
To tackle the question of *what needs to be done*, from an engineering perspective, to enable Western Australia’s main interconnected power system to run *securely and reliably* and through the energy transition
”

- Our **SWIS Roadmap** is under development
- Planning for release in first half of 2024



Draws on work done for AEMO’s NEM Roadmap →

Relevant acronyms

DPV: Distributed photovoltaics; EF: Engineering Framework; FCAS: Frequency control ancillary service; VRE: Variable Renewable Energy

Energy Transformation Strategy reforms continue



Our priorities as we enter 2024

Operating today's energy systems and markets

Peak demand, minimum demand, variability from solar and wind...and everything else the energy transition brings!

Operationalising and maturing new WEM systems and processes

Operating aggregated DER via SRC and NCESS

Enabling the energy transition

Development and implementation of reforms

Electricity and Gas Statements of Opportunities

SWIS Roadmap

2025-27 NCESS for peak demand

Uplifting planning and connections processes

Engaging our stakeholders

Second in-period submission for opex and capex
Preparing for Allowable Revenue 7

Continuing to improve our stakeholder engagement and advocacy – especially in relation to system operations and planning

Evolving the way we work

Setting up for the next phase of reform and energy transition

Enterprise-wide improvement programs, including cyber and corporate systems

Advancing diversity, equity and inclusion

Q&A session

- Kate Ryan, Executive General Manger – WA & Strategy
- Andrew Smith, Program Director – WEM Reform
- Martin Maticka, Group Manager – WA Market Development
- Teresa Smit, Group Manager – WA Operations
- Neetika Kapani, Acting Group Manager – WA System Design & Transformation

Upcoming forums and publications

Calendar

6 December 2023	WEM End of Year Celebration to acknowledge new WEM (Market Participants only)
Mid December 2023	Publication of the 2023 Gas Statement of Opportunities
13 December 2023	WA DER Market Participation Forum (quarterly forum)
15 December 2023	WA Gas Consultative Forum
February	WA Electricity Consultative Forum commences for 2024
First half 2024	Publication of the SWIS Roadmap AEMO second in-period submission

Thank you

We welcome your feedback to improve our forums in 2024.
Please keep an eye on your inbox for a brief survey to complete.



For more information visit

aemo.com.au