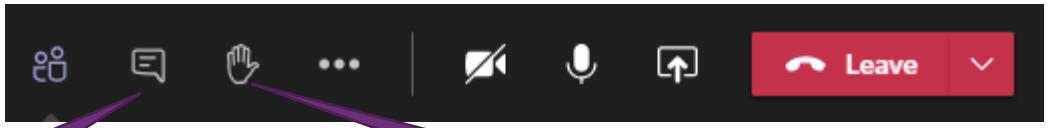
WA Electricity Consultative Forum

3 May 2023

We acknowledge that this meeting is being held on Aboriginal land, the land of the Whadjuk people of the Noongar Nation.

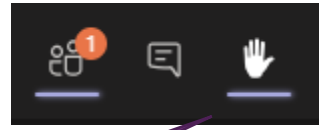
We pay respect to their Elders past, present and emerging.

Join the Discussion and Teams

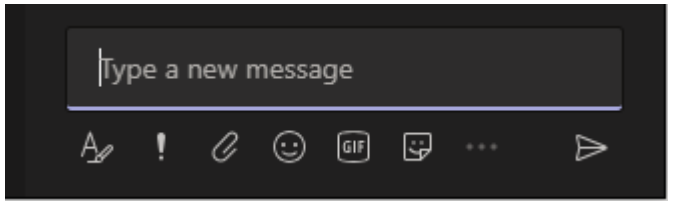


1. Click the chat icon to open the chat window

1. Click the hand icon to raise your hand



2. Type your question in the chat window



2. Keep your hand raised until you're called upon

3. Lower your hand after

Agenda

Item	Time	Item	Speaker
1.	10:00am – 10:05am	Welcome and Minutes (22 February 2023)	Chair
2.	10:05am – 11:00am	AEMO Operational Updates	
		2.1 Power System Update - Operational forecasting	David Weinholz (AEMO)
		2.2 Reserve Capacity update	Neetika Kapani (AEMO)
		2.3 Supplementary Reserve Capacity (SRC) update	Neetika Kapani and Nicholas Nielsen (AEMO)
		2.4 Quarterly Energy Dynamic Report (QED) insights	Adrian Pearce (AEMO)
3.	11:00am – 11:20am	AEMO Project Updates	
		3.1 AEMO WA DER Roadmap update	Tom Butler (AEMO)
		3.2 WEM Reform Program update	Andrew Smith (AEMO)
4.	11:20am – 11:35am	Allowable Revenue and Forecast Capital Expenditure (AR6) in-period submission update	Martin Maticka (AEMO)
6.	11:35am – 11:40am	Other Business	
7.	11:40am	Next Meeting – 21 June 2023	Chair

***Please note this meeting will be recorded for minute production**

Power System Update - Operational Forecasting

Presented to WA Electricity Consultative Forum

By David Weinholz, Senior Engineering Analyst

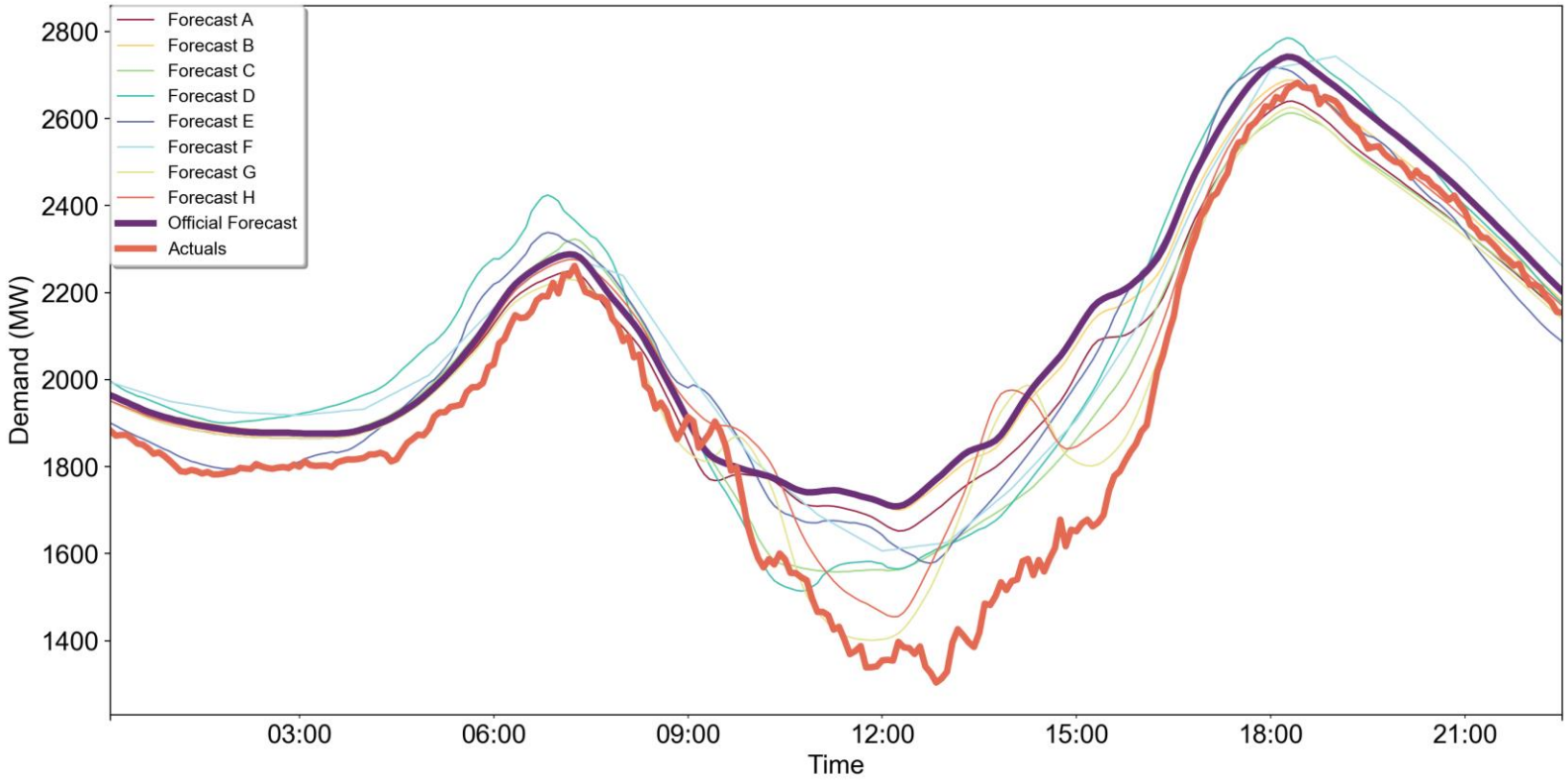
3 May 2023

Operational Forecasting Overview

- Operational Forecasting
  - Horizon (now-7 days)
  - Use cases
    - Planning
    - Outage approval
    - Dispatch
    - Situational awareness
    - Market forecasts
- Multiple weather forecasts
  - Irradiance
  - Temperature
  - Humidity
  - DPV output
- Multiple models
  - Internal
  - External

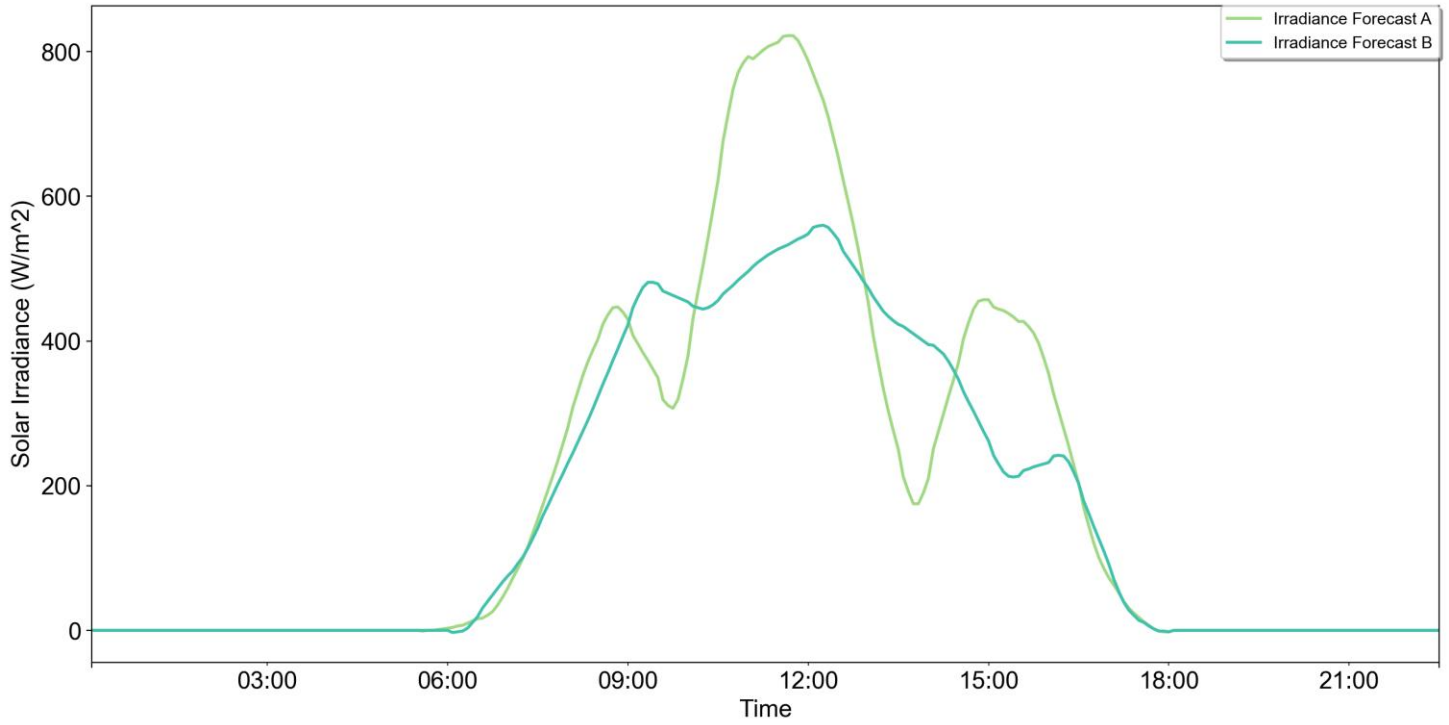
Forecasting Tools and Processes

- Multiple providers and models that are possible outcomes to the real time load outcome.
- These forecasts can be used for situational awareness and real time decision making.

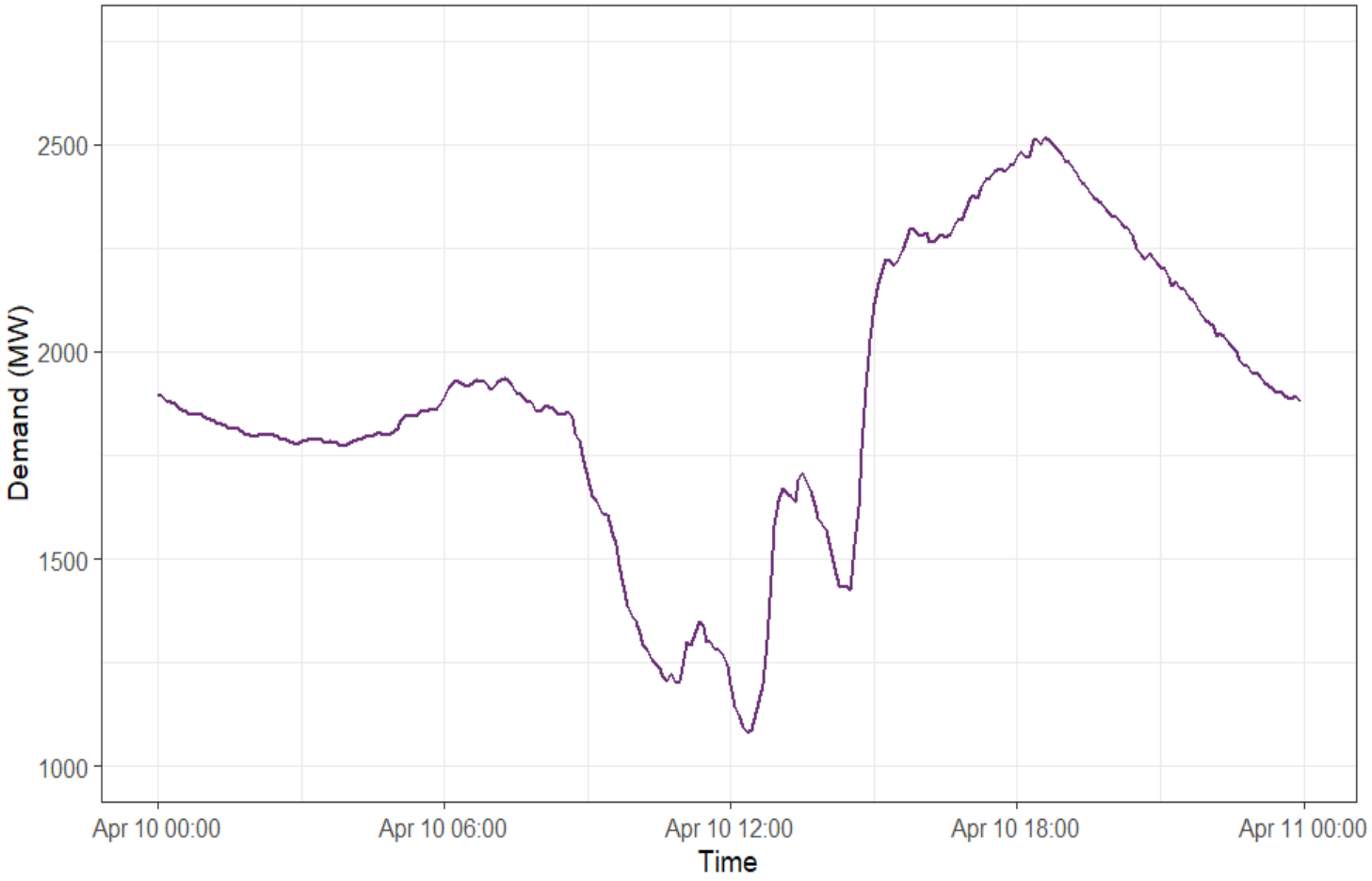


Irradiance overlay forecast

- Comparison from two separate irradiance forecast providers.
- At times forecasts do not align so operationally a decision needs to be made on which forecast(s) to prepare for.

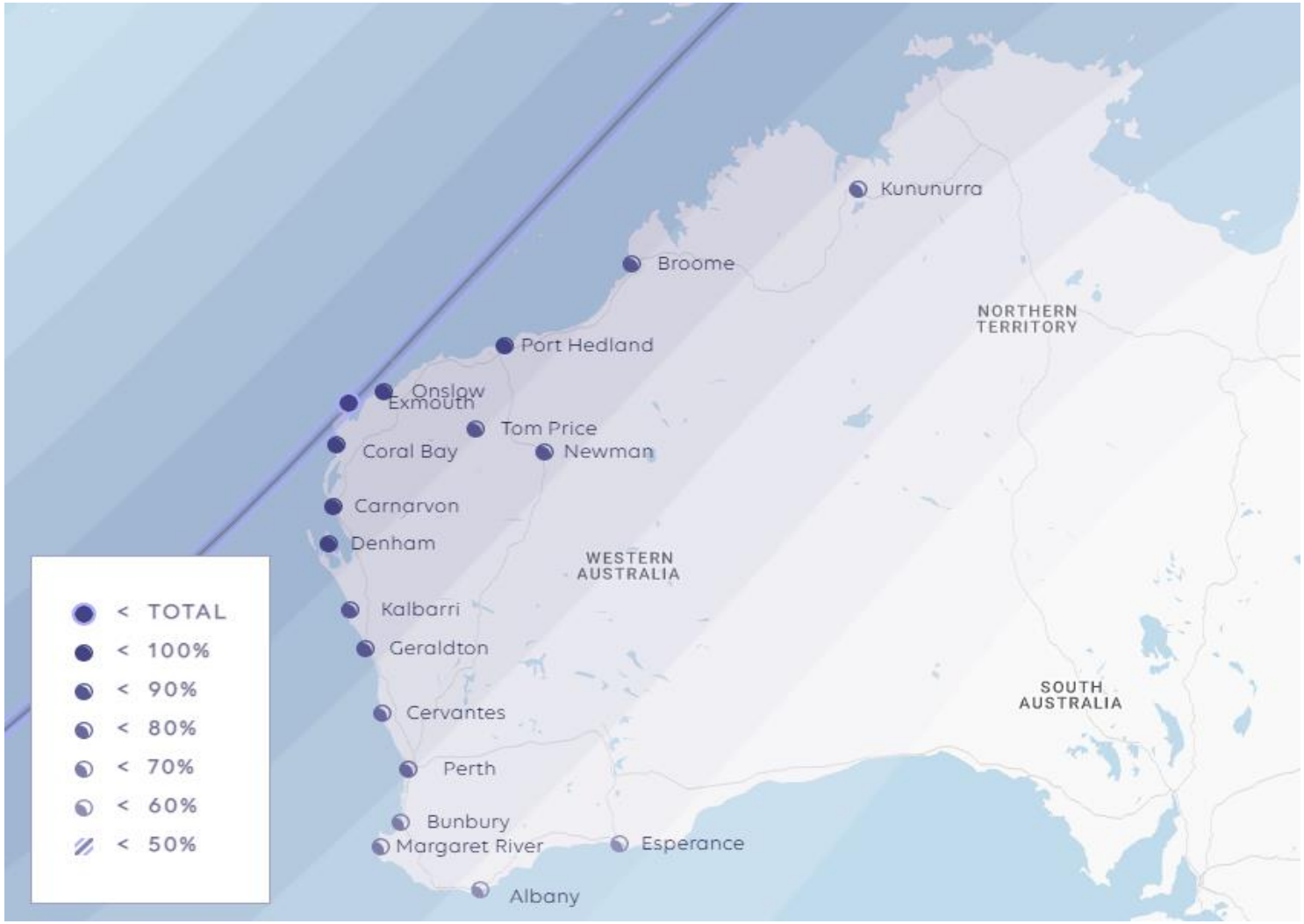


Fastest Cloud Ramp over 30 minutes.



- 10 April 2023 Observed approximately 700MW of demand increase over 30 minutes.
- Observed ramp rates over separate time frames for the event.
  - 30 Minutes
    - Ramp: 23 MW/Min
    - Quantity: 689 MW
  - 5-Minutes
    - Ramp: 31 MW/Min
    - Quantity: 157 MW

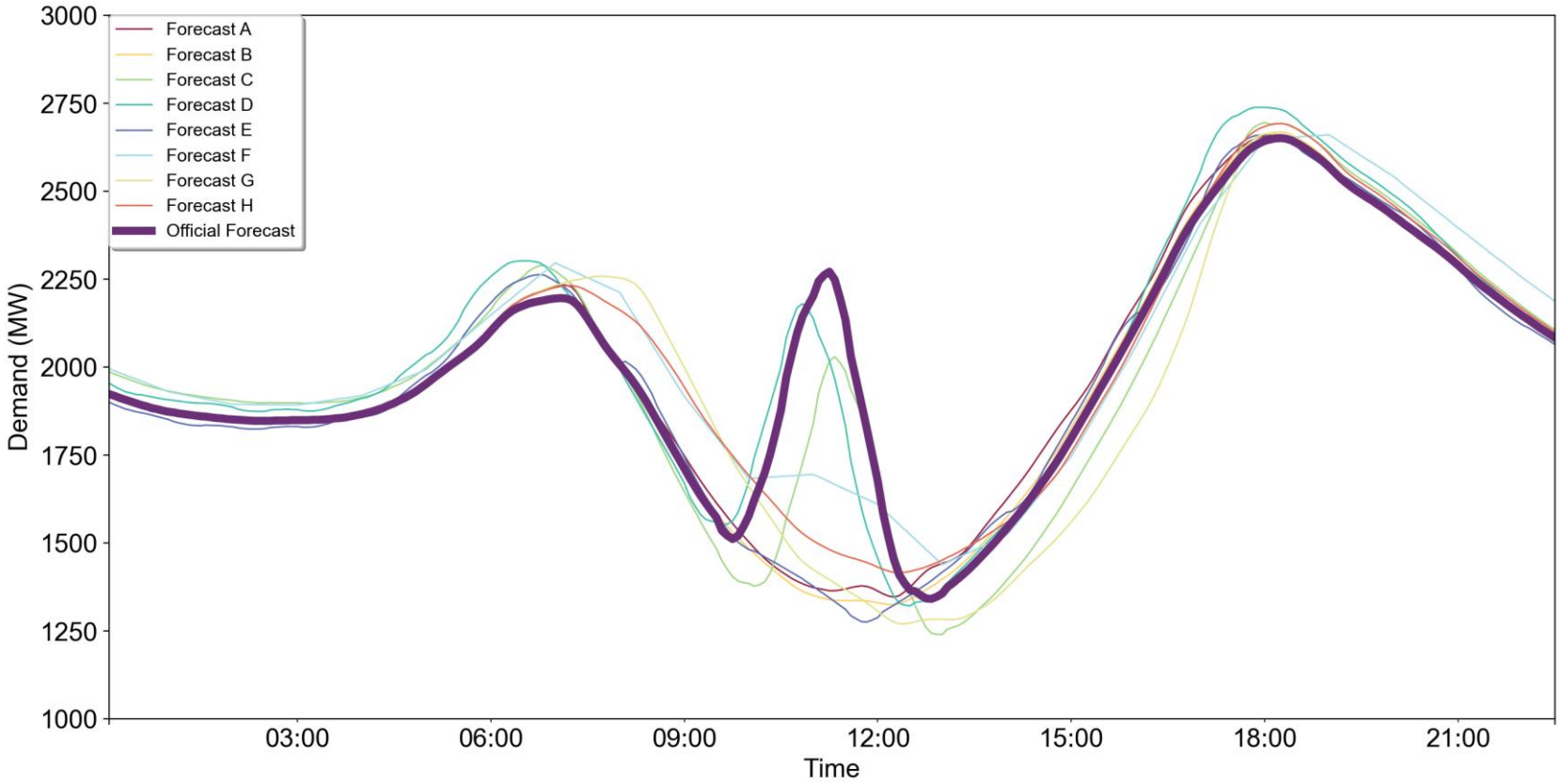
Eclipse Planning



- Event and path of the eclipse was known in advance.
- Forecasting team modeled the eclipse to simulate the impact on DER and consequently on demand in the SWIS.
- The SWIS was expected to experience on average 70% of the eclipse impact.

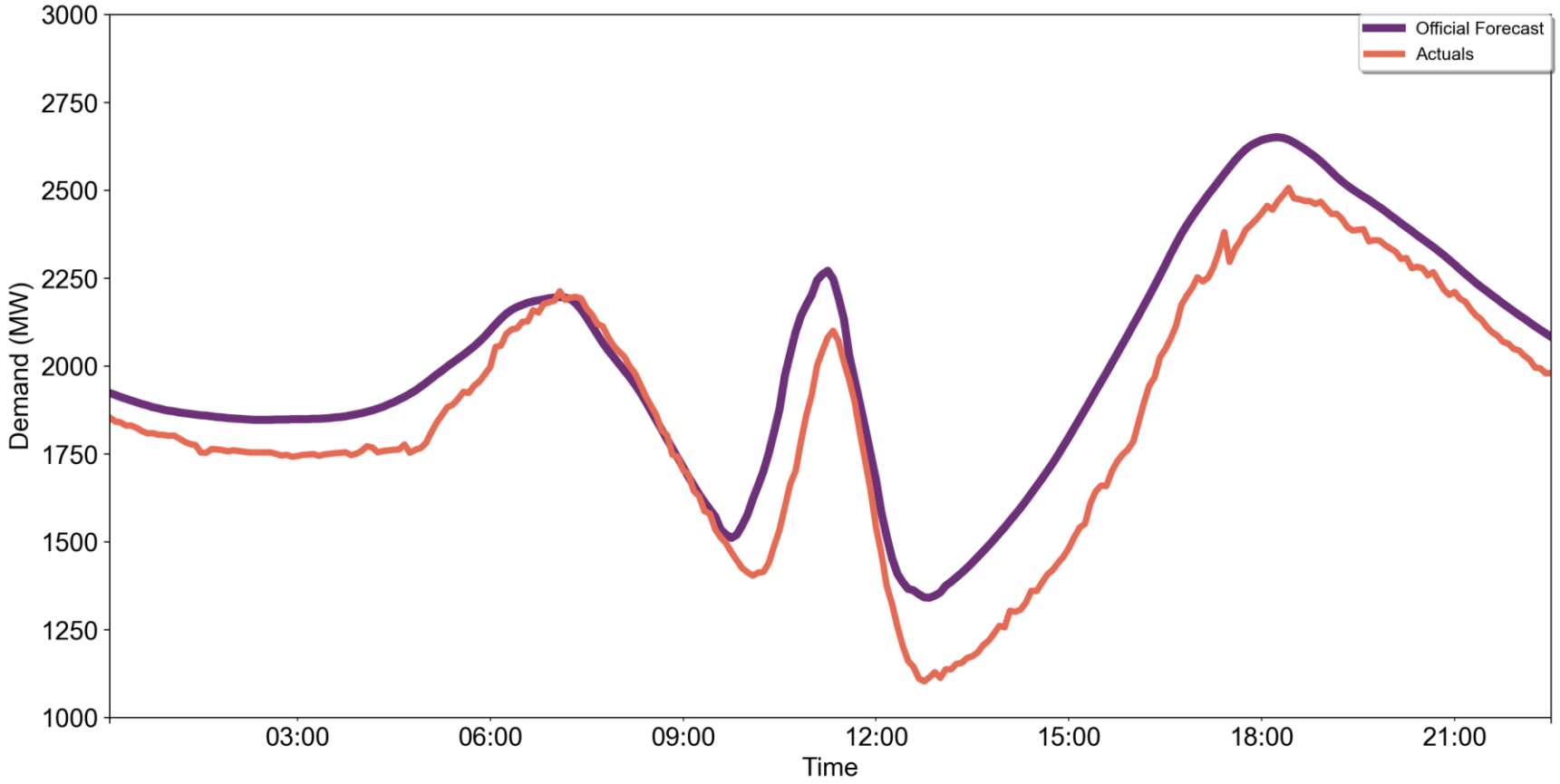
Eclipse Forecast

- As at 5pm the day before.



Eclipse Actuals

- Actual load profile from the day.



Eclipse Overview

- The difference between the actuals and forecast was largely due to unexpected load loss.
- Windfarm forecasts trending down reflected by what was available on the day.
- Event was similar to a weather event, but AEMO was able to plan and forecast with certainty.
- Forcastability improves outcomes with regards to System Security.

Questions and Feedback

wa.sm.operations@aemo.com.au

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please visit www.aemo.com.au

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Reserve Capacity Update

Presented to WA Electricity Consultative Forum

by Neetika Kapani, Manager, Reserve Capacity (WA) AEMO

3 May 2023

Announcements & reminders

2022 Reserve Capacity Cycle

14 April

- AEMO notified Market Participants of the CRC assignments for their respective facilities for the 2022 RC Cycle.

28 April

- Trade declaration window closed.

- Between now and end of June
  - AEMO will publish CRC for each Facility, assign Capacity Credits and Network Access Quantities.

2023 Reserve Capacity Cycle – deferred timetable

14 April

- The 2023 CRC window opened at 9:00 am.
- Participants are encouraged to engage with the RC team for any CRC related queries.

19 May

- AEMO publishes information from Western Power and Preliminary RCM Constraint Equations.

Announcements & reminders cont.

The 2023 WEM Electricity Statement of Opportunities (ESOO) activities are on track for publication on 10 July.

- Draft demand and consumption forecasts along with the reliability assessment inputs, assumptions, and methodology were presented at the 13 April WEM ESOO Forecasting Reference Group (FRG) session.
- Feedback is being considered in the final demand forecasts with the aim to host a 2nd FRG session in Mid-May to discuss draft reliability assessment results.
- Board review to be sought in June.

Other items to note for the 2022-23 Capacity Year

- Winter RC testing process has commenced.
- Amendments to the Supplementary Reserve Capacity (SRC) WEM Procedure is underway with an effective date of 1 July 2023.

Based on early indications from the 2023 WEM ESOO draft demand forecasts, AEMO expects that a process to procure SRC will be triggered for the 2023-24 Capacity Year.

Questions and Feedback

wa.capacity@aemo.com.au

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please visit www.aemo.com.au

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2022-23 Supplementary Reserve Capacity (SRC) update

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Presented to WA Electricity Consultative Forum

by

Manus Higgins, Principal Analyst, Reserve Capacity (WA)

3 May 2023

SRC context and procurement process

- A standard component of the RCM which ensures reliability of supply.
- The SRC process can be activated no more than six months prior to the start of a Capacity Year if AEMO identifies a capacity shortfall for that Capacity Year in the period between the assignment of Capacity Credits for, and the commencement of, the relevant Capacity Year.
- The SRC process was activated for the 2022-23 Capacity Year in light of an identified shortfall of up to 174 MW for the Dec 2022-Mar 2023 period
- AEMO ran a comprehensive tender process as part of this procurement process for the 2022-23 summer and procured 96.1 MW.

Procured Services

11 Agreements

96.1 MW

Demand Side Response (inc DER)
8 Agreements
37.4 MW

Generation
3 Agreements
58.7 MW

Compensation Structure

Providers Receive:

Availability Payments

Every interval, for making their service available

Activation Payments

When activated, for quantity actually delivered

Providers Pay:

Non-Availability Refunds

For periods when the service is not available

SRC Activations

Date	30 January	20 February
Providers	4	6
Max Quantity	67.4 MW	60.8 MW
Time	4 hr	3 hr
Activation Costs	$255k	$205k

SRC Total Cost

Net Availability Costs	$3.39M
Activation Costs	$0.46M
Total	**$3.85M**

Looking Forward

- EPWA's SRC Review is ongoing
  - AEMO is actively feeding back learnings from our experiences

- AEMO expects SRC to be required in the 2023-24 Hot Season, but is not yet able to provide a quantity.

Questions and Feedback

wa.capacity@aemo.com.au

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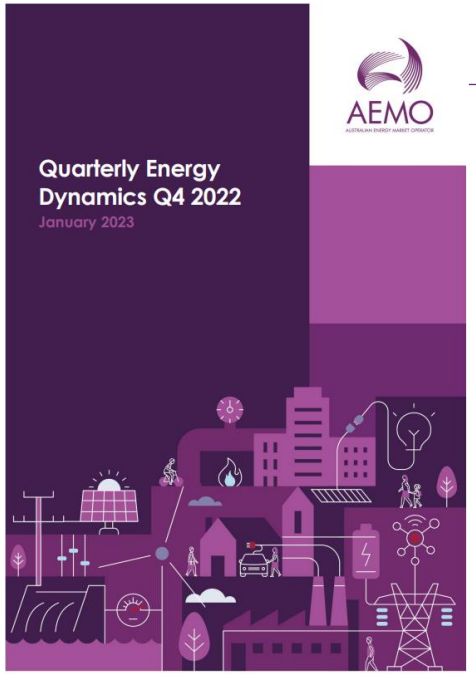
Quarterly Energy Dynamic (QED) Report – Q1 2023

Presented to WA Electricity Consultative Forum

By Adrian Pearce, Analyst, WA Market Operations & Support

3 May 2023

Overview



The Q1 2023 QED was published on 28 April 2023. Key insights include:

- Cooler temperatures than Q1 2022 flowed through to reduced operational demand

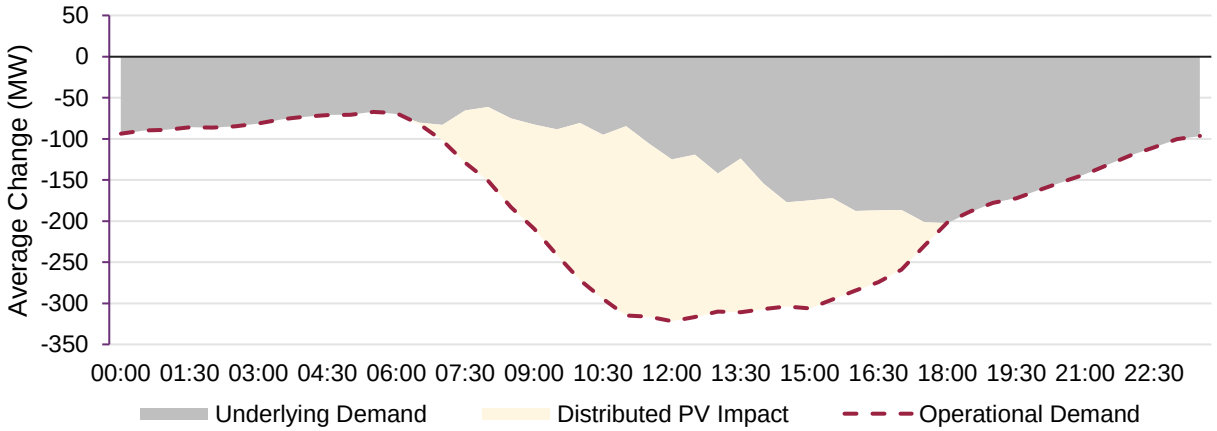
- Coal preservation program ended mid-way through the quarter, impacting the fuel mix

- Balancing price and STEM price still elevated despite regression from record highs

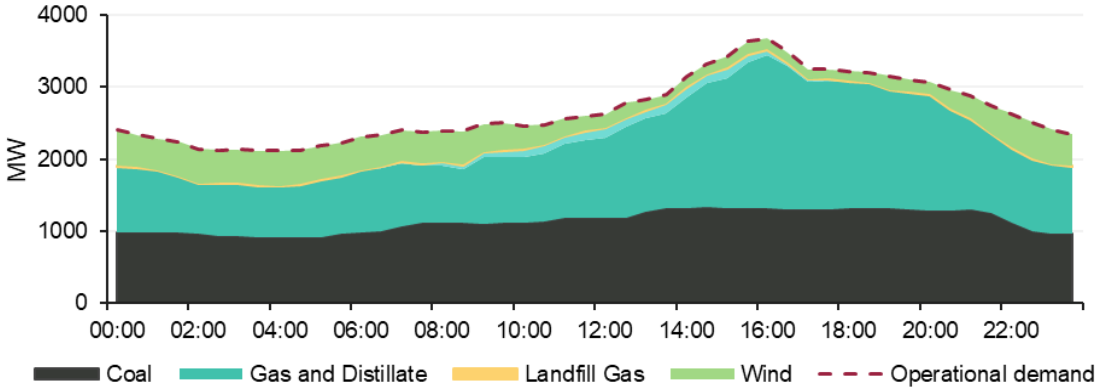
- Outages from multiple major gas producers impacted the Q1 WA gas market dynamics

Electricity demand

Change in average WEM demand components by time of day – Q1 2022 vs Q1 2023



Fuel mix and operational demand on 02 March 2023



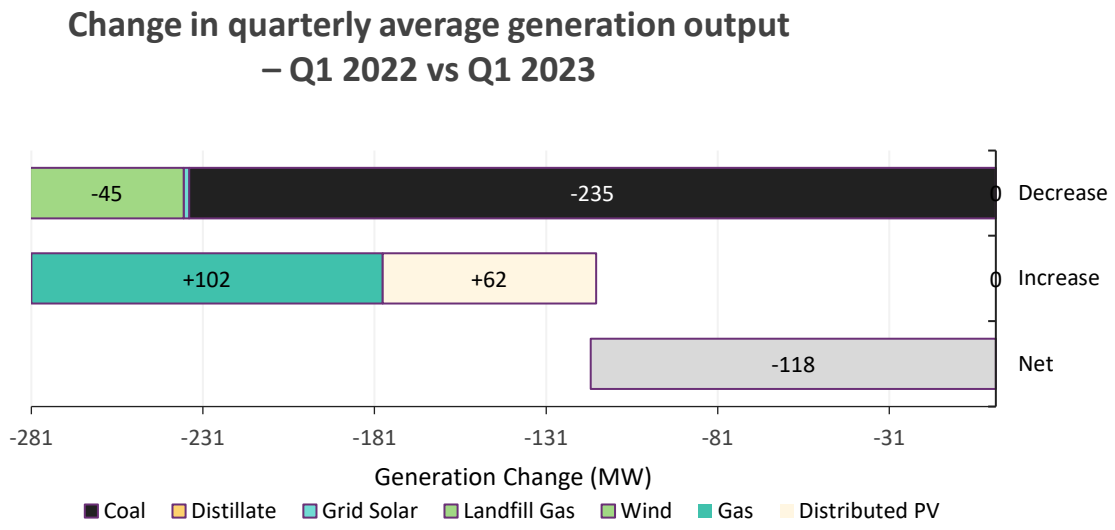
A The WEM's average operational demand was 2,060 MW in this quarter, down 179 MW (-8.0%) compared to Q1 2022.

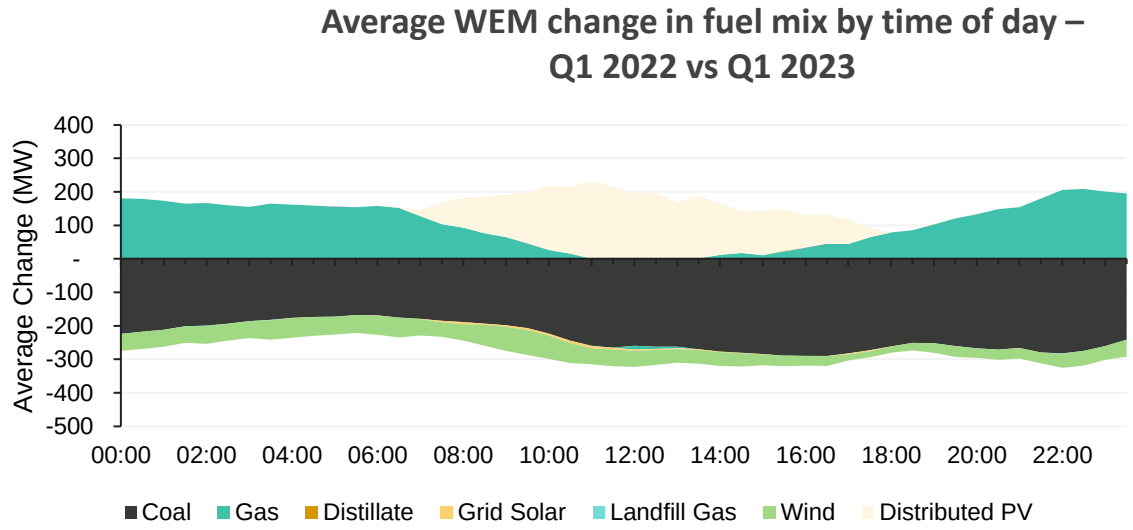
B Milder temperatures across the quarter caused a reduction in cooling consumption which resulted in a lower underlying demand*.

C Maximum operational demand of 3,676 MW occurred on 2 March 2023 on a hot day with high cloud coverage.

*Underlying demand is an estimated measurement of the total load on the SWIS, including behind-the-meter demand. Underlying demand is measured as operational demand adjusted to remove the impact of distributed PV output.

Change in generation



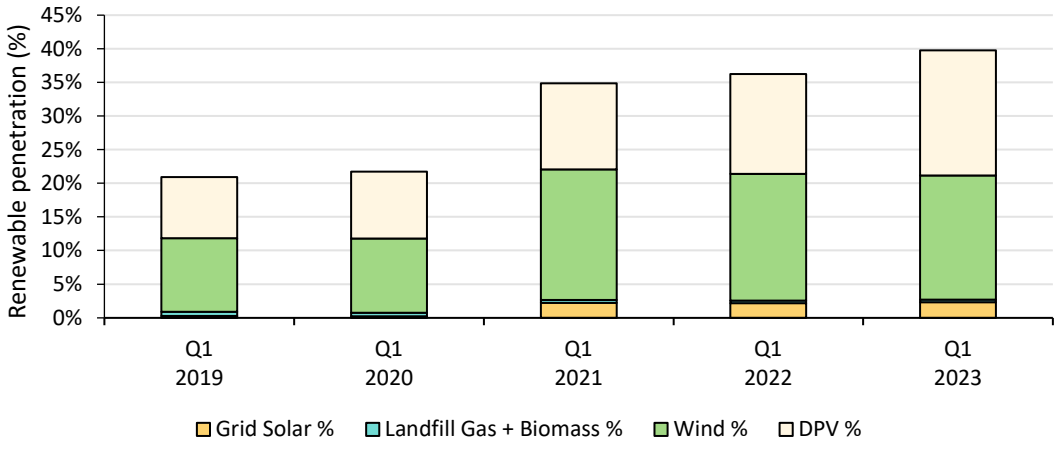


A Average coal-fired generation obtained a record Q1-low of 799 MW, a decrease of 235 MW (-23%) on the same quarter last year. Conversely, average coal-fired generation was up 361 MW (+83%) on Q4 2022 due to the end of the coal preservation program - which operated throughout Q4 2022 .

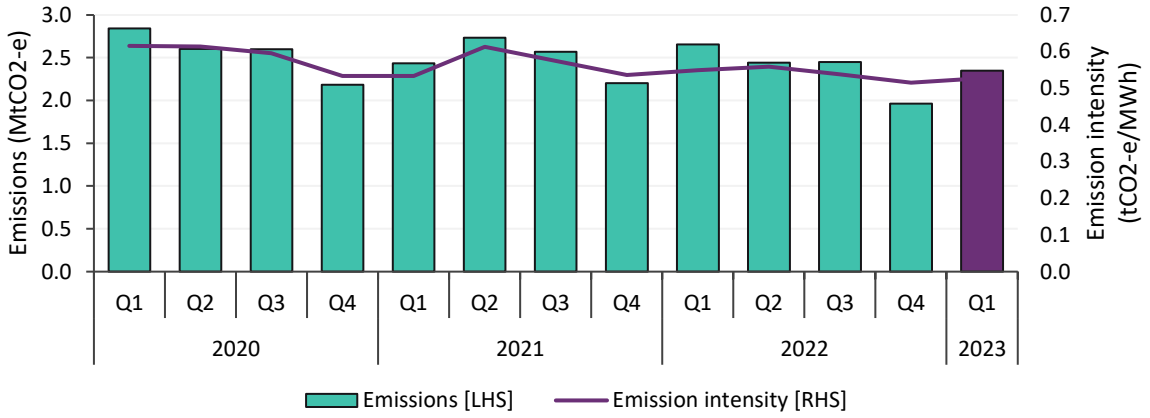
B Gas-fired generation increased by an average of 102 MW (+16%) compared to Q1 2022. This increase occurred at almost all times of day and was a consequence of lower coal-fired generation availability.

Renewable penetration & emissions

Renewable penetration components – Q1s



Quarterly WEM emissions and emission intensity – Q1 2020 to Q1 2023



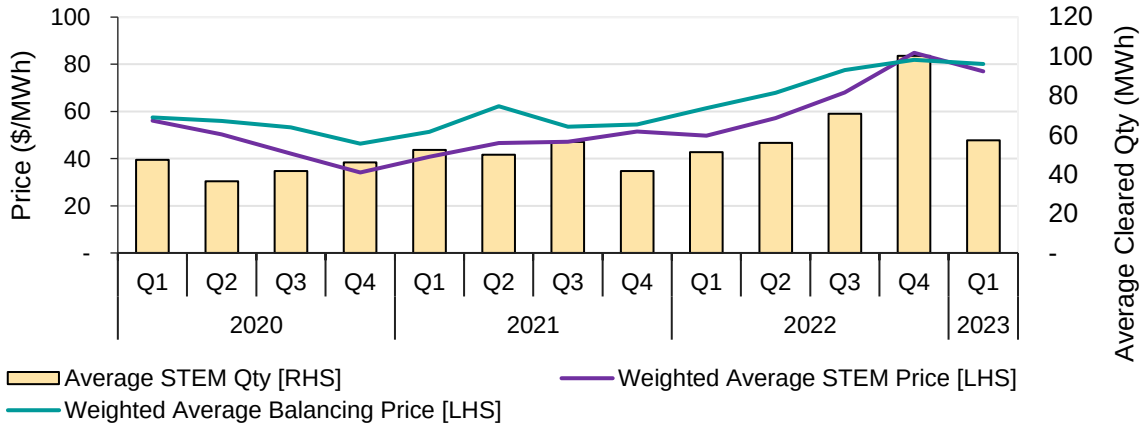
A Highest Q1 average renewable energy penetration of 38.6%, +2.3 percentage points on Q1 2022. Driven by continued uptake of distributed PV (rather than grid scale investments) with approx. +290 MW additional capacity installed 12 months to end of Q1 2023.

B Total emissions reduction of 17% between Q1 2022 and Q1 2023. Emission intensity marginally lower, down 4%. Driven by cooler temperatures and increase in use of gas over coal in the fuel mix.

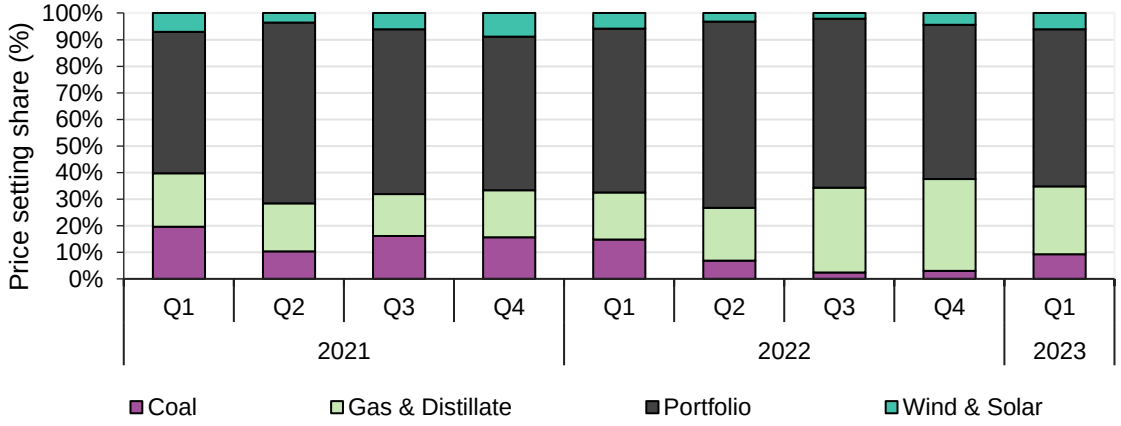
Renewable penetration is calculated using the WEM renewable generation share of total generation (including distributed PV). Renewable generation includes grid-scale wind and solar, landfill gas, biomass and distributed PV. Total generation = WEM generation + estimated distributed PV generation.

Price dynamics

WEM weighted average Balancing Price, STEM Price and quantity cleared in STEM – Q4 2018 to Q4 2022



Price-setting by the Balancing Portfolio and fuel-type of non-Balancing Portfolio Facilities – Q1 2021 to Q1 2023



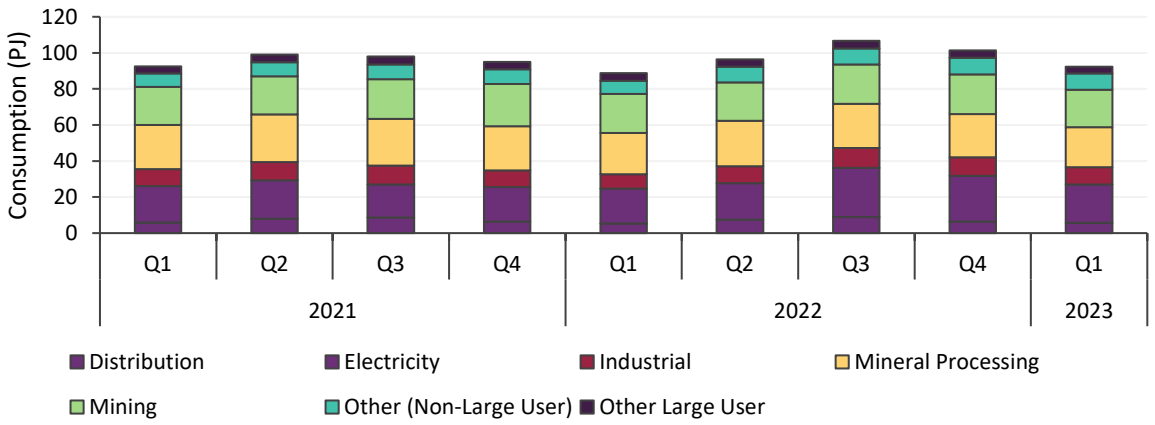
A The weighted average Balancing Price in the WEM has pulled back from the record high traded in Q4 2022 to average $81.30/MWh from $81.80/MWh

B The weighted average STEM price was a Q1 record high, +56% to $77.48 on Q1 2022. However, in tracking to the Balancing Price, reduced on Q4 2022 numbers. Quantity traded in STEM has reduced in-line with increased stability in the Balancing Price.

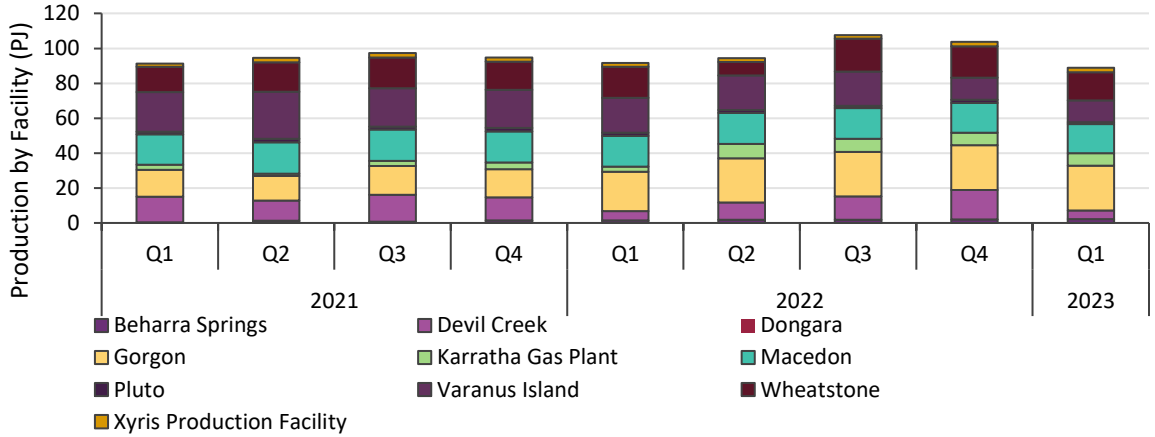
C Independent gas generation increased its share of price setting (18% to 25%) on Q1 2022 levels as independent coal was down from 15% to 9%.

WA gas

WA quarterly gas consumption by sector – Q1 2021 to Q3 2023



WA quarterly gas production by facility – Q1 2021 to Q1 2023

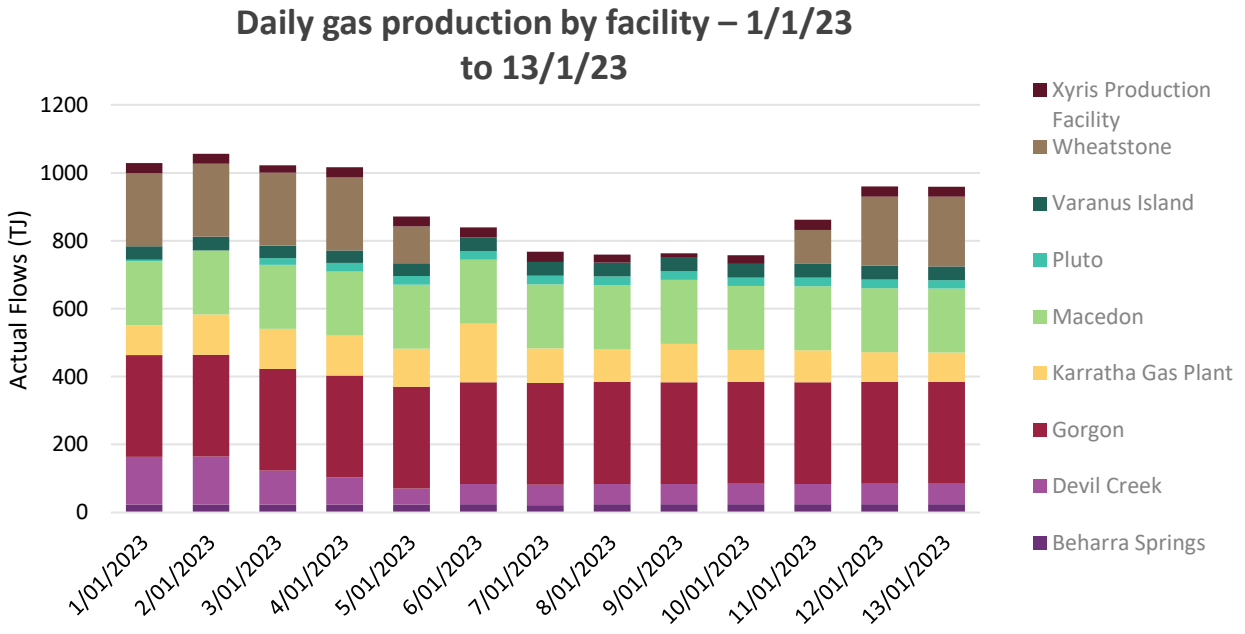


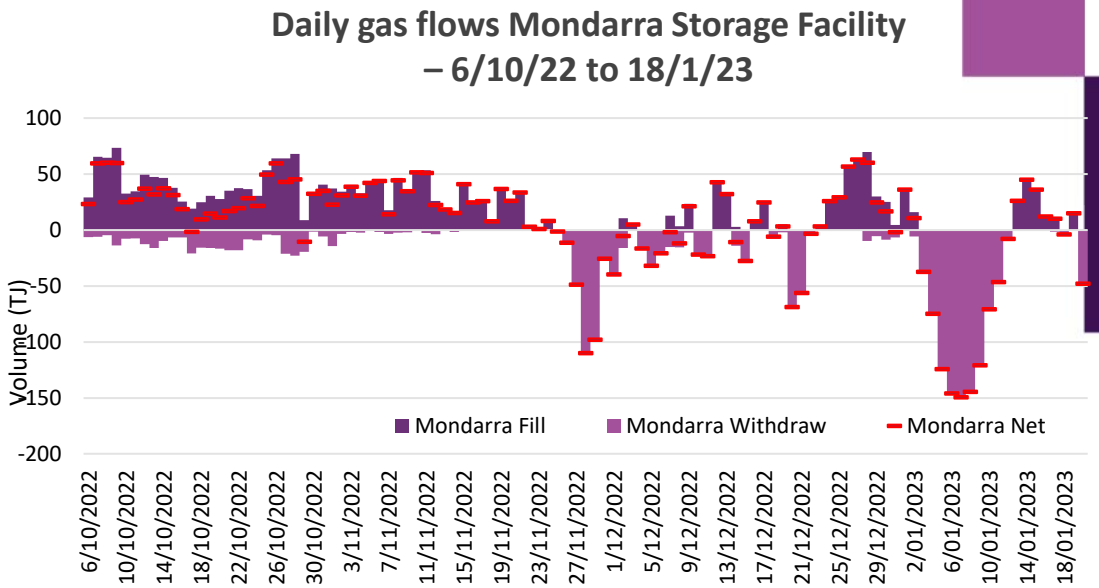
A Gas consumption in the WA domestic gas market was +4% from Q1 2022, but -9% from Q4 2022.

B Gas production was relatively low and on-par with Q1 2022, where both quarters experienced major outages.

C Major outages were experienced at Wheatstone and Devil Creek.

Gas supply disruption event





A Event: Wheatstone facility experienced unplanned outage, removing approx. 215 TJ/day out of the WA market.

B Response: Karratha Gas Plant increased production on initial outage day, Yara Pilbara Liquid Ammonia Plant decreased consumption.

C Storage: Mondarra facility withdrawals increased to max rate (150 TJ/day) between 6-8 Jan 2023.

Questions and Feedback

wa.operations@aemo.com.au

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WA DER Program Update

Presented to WA Electricity Consultative Forum

Tom Butler, Manager WA Distributed Markets

3 May 2023

WA Distributed Markets
May 2023

Enabling distributed energy resources and new technologies to be an integral part of the SWIS through the WEM by supporting security and reliability, as we move towards a 100% instantaneous renewable energy power system.

Program Status

The program is on track per DER Roadmap Actions, with some delays holding the program status at amber. Key achievements include publication of the DER Register Information Procedure, and entering the market service testing phase in Project Symphony with promising early results.

Key Activities This Period

- **Stakeholder engagement:** WA DER Market Participation Forum held on 5 April.
- **Project Symphony**
  - Platform integration and build completed.
  - Market service stability now commenced, with analysis of test results underway.
- **Technology Integration**
  - Completed handover of enhanced dynamic models for DER and Load for the SWIS.
  - Developed comprehensive report on inverter compliance enhancements, risks and recommendations at a national level.
  - Progressed research into potential roles for DER in the system restart process.
- **WEM DER Register**
  - Publication of revised procedure and report to prepare for Electric Vehicle charger information.
  - Commenced technical specification review.

Focus For Next Period

- **Stakeholder engagement:** Next WA DER Market Participation Forum set for 14 June, with follow-up engagement ongoing since the last.
- **Project Symphony**
  - Testing continues through to June.
  - AEMO commencing development of WEM integration concepts and recommendations to inform policy and rule development following the pilot.
- **Technology Integration**
  - Publication of national Inverter Compliance Report.
  - Completion of DER Roles in System Restart report.
  - Engagement with EPWA on the phase two of the DER Orchestration Roles and Responsibilities policy development.
- **WEM DER Register**
  - Finalise draft technical specification and engage with the Network Operator.
  - API and system changes to commence with targeted go-live of 2 October.

Next WA DER Market Participation Forum: 14 June
Register your interest: WADERProgram@aemo.com.au | Access previous presentations: WA DER Market Participation Forum

Questions and Feedback

WADERProgram@aemo.com.au

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please visit www.aemo.com.au

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WEM Reform Program Update

Presented to WA Electricity Consultative Forum

By Andrew Smith, Program Director, WEM Reform, WA

3 May 2023

WEM Reform Program Status Update | April 2023

Overall Status

The program remains on track for new market commencement on 1 October 2023. The RCM NAQ framework was implemented on schedule and market trials have now commenced. Following board approval of revised budget the status has improved but remains **amber** to reflect the tight schedule and level of risk.

Key Activities This Period

- **Procedures:** Presented/consulted on Meter Data Submissions; Transitional Registration; Reserve Capacity Security.
- **System Development**: Highlights include:
  - **RCM:** Completed deployment of RCM Phase 2 NAQ into production (5 April).
  - **RTMS**: Completed release to MPT
  - **Outage Management:** Released User Interface to RFM environment. Cancelled MPT release in favour of RFM release.
  - **Forecast Integration:** Progressing internal/Parallel run testing
  - **STEM**: Completed STEM development and commenced internal testing
  - **Settlements**: Shared Settlements Reform Market Test Plan (MPT)
  - **System integration**: Progressing testing of second RFM release (Outages APIs, Commissioning Test Plans)
- **Market Readiness Reporting:** Completed Market Readiness Survey No.8
- **Market Trial & Transition**:
  - Commenced Coordinated Market Trial in new RFM environment. Systems now working as intended following resolution of technical environment issues
  - Regular Industry Testing Forum meetings to manage participant queries and updates on RFM.

Focus For Next Period

- **Procedures:** Present on Facility Dispatch Process; Reliability; GPS Compliance Tests and Generator Monitoring Plans; Consult on Power System Security; Notices and Communications.
- **System Development**: Progress work including:
  - **Outage Management**: Release OMS including APIs into RFM environment with guidelines to support interface testing without interfering with Trials
  - **Forecast Integration:** Complete deployment for Metrix
  - **STEM**: Complete STEM internal testing, update STEM documentation
  - **System integration**: Plan third RFM Integrated Release (to include STEM)
- **Market Readiness Reporting:** Release Market Readiness Report No.8 (early May) and Survey No.9 (late May)
- **Market Trial & Transition:**
  - Liaise with participants to replan Coordinated Market Trial schedule (extending into July/August)
  - Seek AEMO endorsement of risk management approach for Go Live Decision Framework
  - Consult with external stakeholders on Go Live Decision Framework, Transition Schedule and the Cutover Plan
- **Financial:** Complete 'in-period' submission to ERA to seek additional funding (late April).

Stakeholder Engagement

WRIG Meeting 27 April	**Industry Testing Forum (ITF)** 28 April	**Market Readiness Report 8** Early May	**ETCG Meeting** 2 May	**Industry Testing Forum (ITF)** 5 May	**WRIG Meeting** 11 May

Questions and Feedback

wa.ets@aemo.com.au

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AEMO's 2022-2025 Forecast Capital Expenditure proposal

Presented to WA Electricity Consultative Forum

By Martin Maticka, Group Manager, WA Market Development

3 May 2023

Agenda

1. Purpose of today
2. AEMO's Capex Adjustment Proposal
3. WEM Reform
    1. Governance
    2. Labour Costs
    3. Contingency
4. WEM sustaining capex
5. GSI sustaining capex
6. Impact on market fees
7. Timelines

Purpose of today

- AEMO has submitted its proposal to the ERA. At today's information session we will:
  - Provide an overview of our proposal.
  - Share our approach to governance, forecasting, labour and contingency costs for WEM Reform.
  - Provide an opportunity for questions.
  - Respond to queries and take on board stakeholder feedback*.

*Please note, the ERA has advised that it will undertake a formal consultation process.

AEMO's Capex Adjustment Proposal

AEMO is seeking $47.11 million in additional funding in the AR6 period (1 July 2022 to 30 June 2025) for:

- WEM reform implementation program ($45.02M additional) from $44.02M to $89.04M
- WEM sustaining capex projects ($1.95M additional) from $12.6M to $14.55M
- GSI sustaining capex projects ($0.14M additional) from $0.34M to $0.48M

- Approx. a 37% increase to the overall WEM Reform capex budget: from $93.3M to $128.6M (these numbers exclude opex).

Key Points

- AEMO forecasts capex funding will be exhausted by the end of 2023, leaving insufficient capital to support existing and new projects.
- Despite actions taken to improve delivery efficiency, and ensure solutions are fit-for-purpose, AEMO's estimate of the funding required to complete the WEM Reform Program has increased due to:
  - Significant under-estimation of the scope and scale of effort required
  - Delays and additional effort due to staff attrition and labour market tightness affecting recruitment
  - Input cost inflation including services contracts, wages and borrowing costs
  - Incorrect planning assumptions about the maturity of technology platforms and
  - Evolving scope and some rework arising from progressive development of WEM rule changes.
- Substantial effort is required to implement the new market and power system arrangements and unlock the benefits of the new market to industry and consumers.
- AEMO now has strong program governance in place and an effective delivery model for the work to be completed and is committed to the 1 October 2023 go-live date.

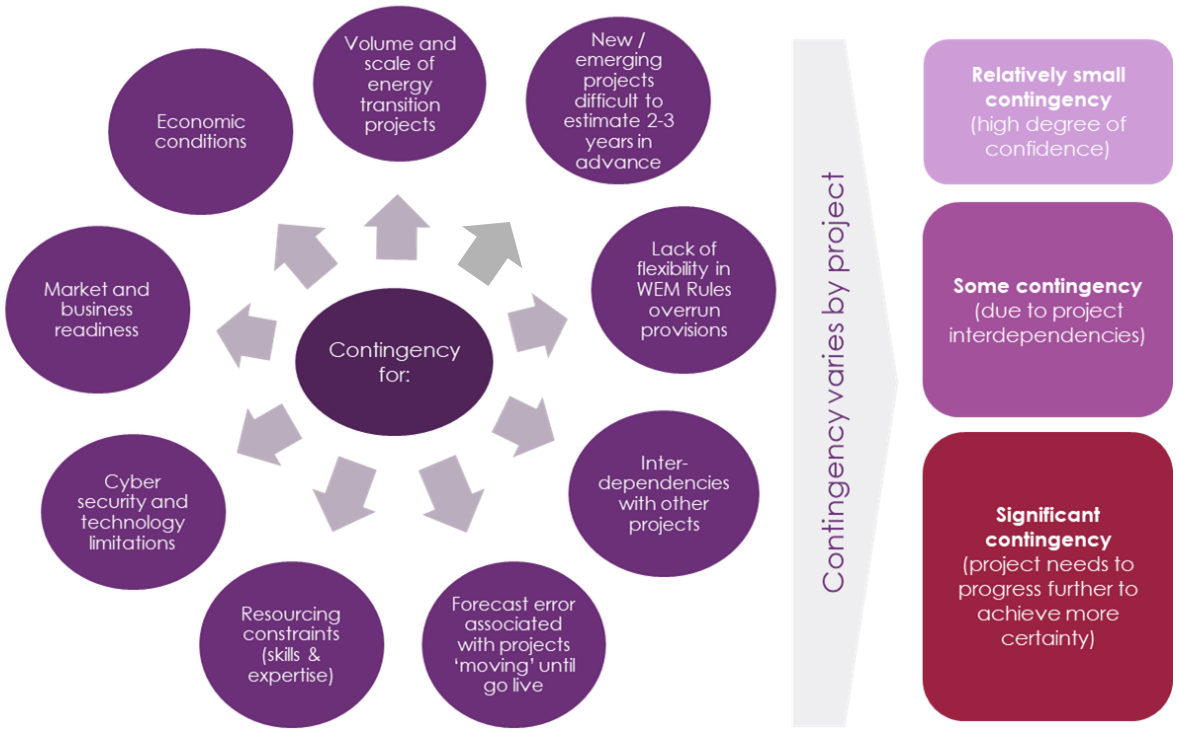
WEM Reform Governance

- In response to stakeholder feedback from previous AR6 process, AEMO has:
  - Improved internal verification processes for all financial inputs
  - Established Enterprise Portfolio Office to provide greater oversight
  - Implemented a panel of suppliers for digital/IT delivery services
  - Embedded an assurance partner in WEM Reform implementation program
  - Strengthened program leadership and increased transparent reporting to AEMO Board

Labour Costs

- For AEMO's proposal, labour (incl consultants) represents approximately 73% of the WEM Reform costs and 72% costs overall
- The majority of labour costs relate to the design, build, testing and implementation of new systems. AR6 forecasts significantly underestimated the effort required and the program has needed to both scale up the size of the team and run the program longer.
- Estimated split of internal/external resources assumed for AR6 forecast was 73/27. In practice, it has been approximately 32/68, which has increased labour costs.
- With the need for a bigger team and the longer timeframes, AEMO also has had to rely heavily on external resources due to the specialist nature of market systems and the current tight labour market.

Factors affecting contingency estimates



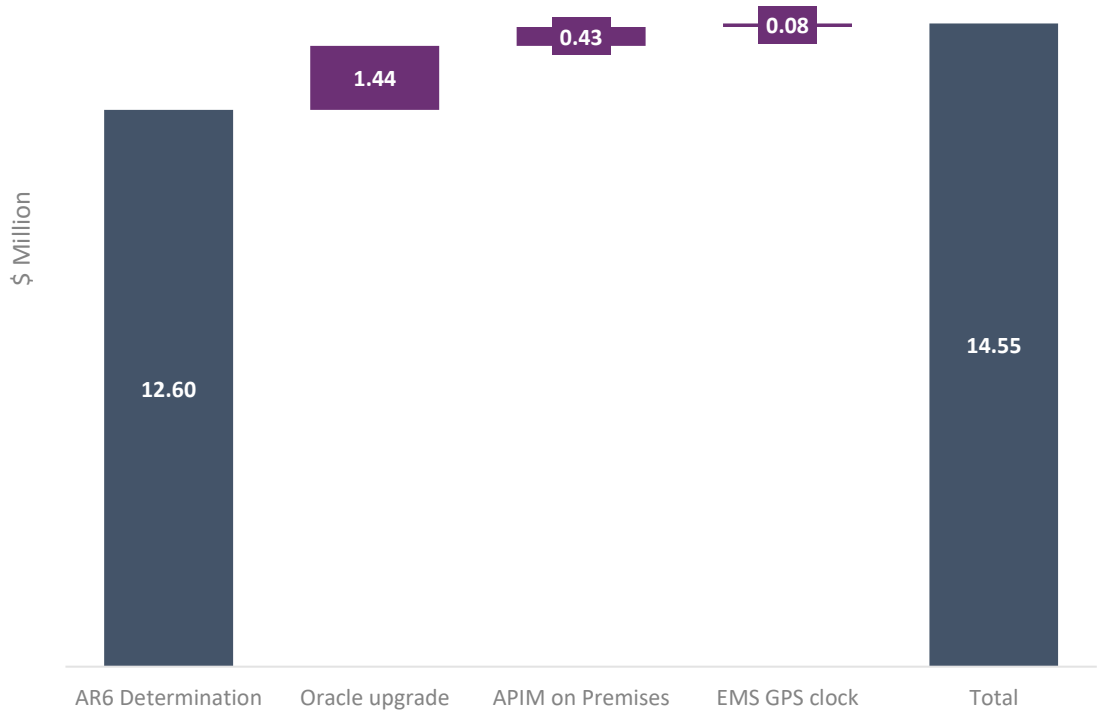
- AEMO now has greater understanding of technical specifications, user requirements and Rules. This has allowed AEMO to identify costs that were underestimated or omitted from previous forecasts, which has changed contingency costs.
- Considerable remaining risk relating to issues likely to emerge during system testing and market trials, compressed schedule and hard go-live date, and on-going emerging complexity, combine to warrant a contingency provision higher than typical at this stage of a program.
- Contingency funding is a reserve and AEMO's intent is to not use contingency where possible. Any contingency drawdown decisions will require Steering Committee approval.

For this proposal, contingency allowance is $12.45m.

WEM Sustaining Capex

- WA Technology upgrades – WEM specific IT replacements/upgrades
- Enterprise Systems – national systems/projects implemented by AEMO with AEMO WA uses.
- Three new projects are required:
  - EMS GPS
  - APIM on-premises
  - Oracle upgrade

Figure: Revised WEM Sustaining Capex ($ million nominal)

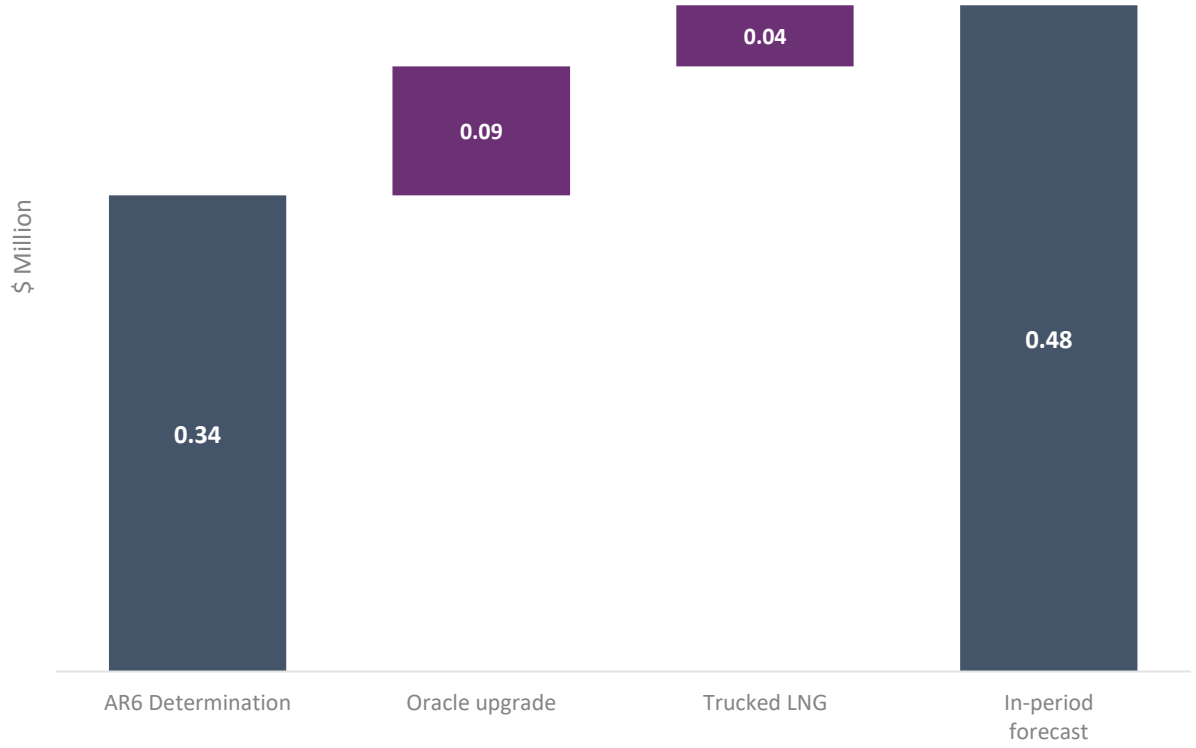


GSI Sustaining Capex

Proposed changes are due to:

- A GSI Rule change relating to trucked liquified natural gas (LNG) requiring additional expenditure on the Gas Bulletin Board
- GSI allocation of expenditure on upgrades to enterprise (AEMO wide) systems used by or to support the GSI function.

Figure: Revised GSI Sustaining Capex ($ million nominal)



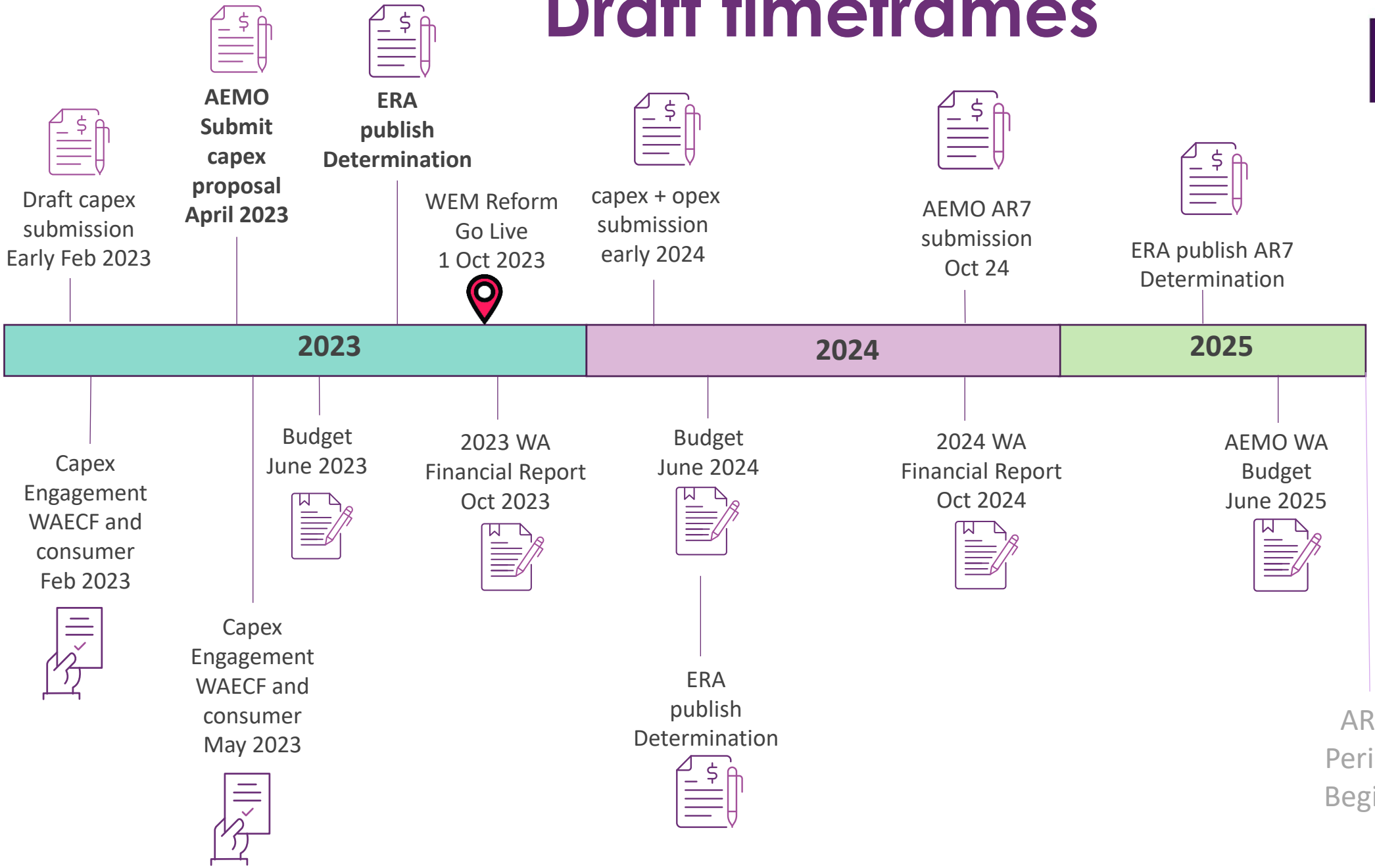
Impact on WEM and GSI fees

AEMO recovers capex via depreciation and amortisation of assets commencing during the year following project completion and/or assets being placed in service.

The timing of the recovery of this expenditure means there will be small impact on WEM and GSI fees during the AR6 period.

Market fees for this capex adjustment will not be updated until 30 June 2024 with an estimated increase of ~$0.30MWh for FY25.

Draft timeframes



Questions and Feedback

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For more information
please visit www.aemo.com.au

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Upcoming Forums and Working Groups

Industry Testing Forum
5 May 2023

WEM Reform Implementation Group (WRIG)
11 May 2023

WA DER Market Participation Forum
14 June 2023

WA Electricity Consultative Forum (WAECF)
21 June 2023

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