AEMO Procedure Change Working Group (APCWG)

13 November 2024

Ground rules and recording

Keep questions on topic

Mute when not speaking

Identify yourself

WA.MarketDevelopment@aemo.com.au for other questions

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Recording our meetings

This meeting will be recorded by AEMO for minute taking purposes.

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No other recording of the meeting is permitted.

We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have delivered its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation - a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Read our RAP

* This meeting is being recorded

Agenda

1. Welcome
2. **Discussion Item:** WEM Procedure – Reliability Standard Implementation
3. **Discussion Item:** WEM Procedure – Real-Time Market Suspension
4. **Discussion Item:** WEM Procedure – Dispatch Algorithm
5. **Discussion Item:** WEM Procedure – Determination of Market Schedules
6. **Discussion Item:** WEM Procedure – Minimum Eligibility Requirements for Flexible Certification of Reserve Capacity
7. Upcoming Procedures
8. Other Business

WEM Procedure: Reliability Standard Implementation

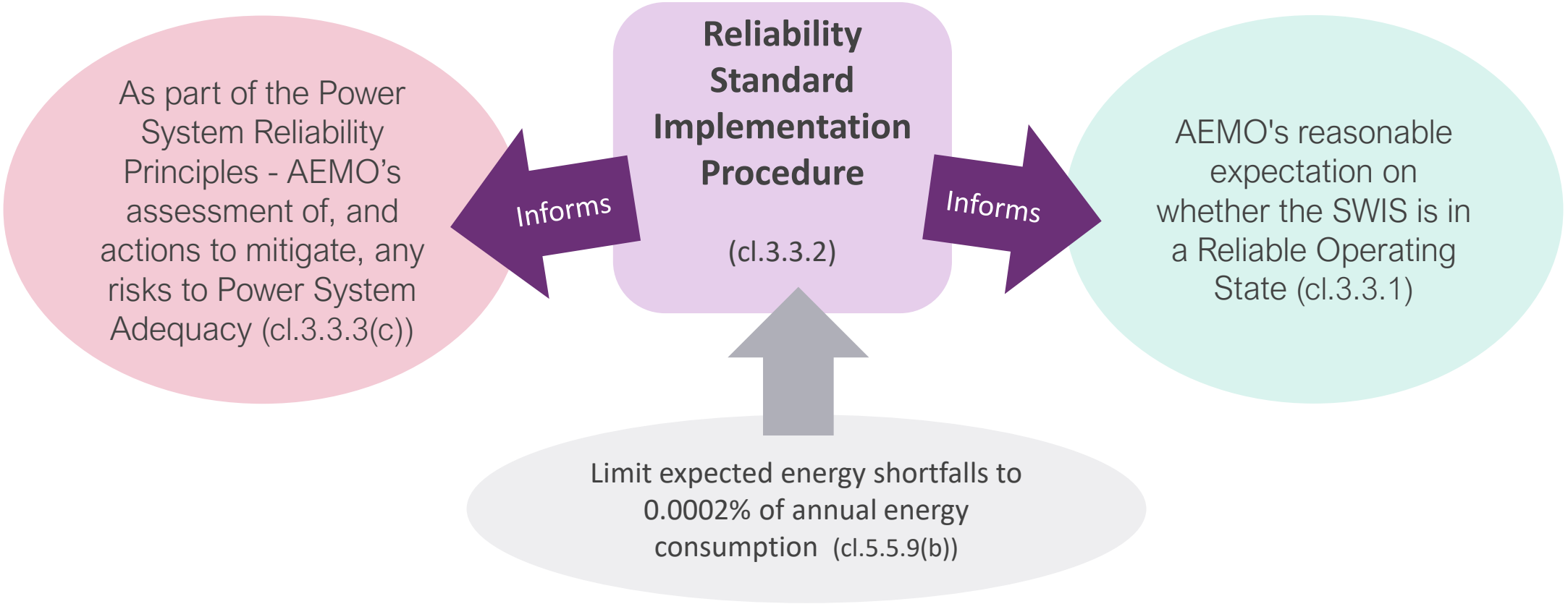
Michael Dalton

Background

As part of WEM Reforms to Power System Security and Reliability arrangements:

- Tranche 1 Amending Rules -
  - The SWIS operating states framework was revised, resulting in the separate treatment of ‘reliability’ and ‘security’.
  - A new reliability framework was developed:
    - Under the new Reliability Framework, a new ‘Reliable Operating State’ was introduced, along with supporting ‘Power System Reliability Principles’.
- Tranche 2 and 3 Amending Rules (commencing 1 October 2023) now -
  - Clarify requirements on AEMO to identify and mitigate risks to Power System Adequacy.
  - Provide a Head of Power (cl.3.3.2) for a new WEM Procedure that sets-out how AEMO assesses reliability i.e. to inform whether the SWIS is in a Reliable Operating State.

The **Reliability Standard** is fundamental to the new Power System Reliability framework



- To achieve a Reliable Operating State, AEMO must plan for 'adequate' equipment to be available so operational demand can be satisfied in real time.
- Typically, a reliability assessment comprises an assessment of risks to Power System Adequacy, which takes different factors into consideration (as relevant) over different timeframes to ensure that the SWIS can supply demand (allowing for outages) in real time:
  - Power System Adequacy risks are quantified by expected Energy Shortfalls of forecast annual energy consumption (as a percentage).
  - Unserved Energy Events are events that could result in an energy shortfall; the measure over an annual period is the level of Unserved Energy.
  - the acceptable level of annual energy consumption (including transmission losses) is 0.0002%.

Proposed amendments

The procedure made under cl.3.3.2 of the WEM Rules :

- Sets out how AEMO assesses reliability in relation to:
  - the Long Term PASA.
  - the Medium Term PASA.
  - the Short Term PASA.
  - Pre-Dispatch Intervals and Dispatch Intervals.
  - Outage assessment and approval.
- It does this by specifying ‘planning criteria’ for the various planning horizons to inform assessments of risks to adequacy.

Proposed amendments

- As part of AEMO's reliability assessment, the Procedure:
  - Identifies the power system conditions and other factors to be taken into consideration as part of the assessment of risks to adequacy.
  - Sets-out the matters AEMO will take into account when assessing risks to adequacy as part of Outage assessment and approval.
  - Describes the events that are included or not included in measuring Unserved Energy in relation to maintaining Power System Reliability and Power System Adequacy.

Questions

Questions regarding the proposed amendments

- Are there any questions regarding the proposed amendments?

Questions outside of APCWG

- Any questions regarding proposed amendments should be sent to WA.MarketDevelopment@aemo.com.au, allowing enough time for a response prior to the closure of the consultation period.

Next Steps

- Consultation on the proposed amendments to WEM Procedure: Reliability Standard Implementation is currently scheduled to close on 22 November 2024.
- The expected commencement date is Monday, 2 December 2024.
- All submissions should be submitted to WA.MarketDevelopment@aemo.com.au by COB on the date of closure.

WEM Procedure: Real–Time Market Suspension

Brent Glover

Background

- The Wholesale Electricity Market Amendment (Market Suspension) Rules 2023 (Amending Rules) were gazetted on 19 September 2023.
- When these Amending Rules were published for consultation, the intent was summarised as “enabling settlement in the event AEMO suspends the Real-Time Market or fails to use the Dispatch Algorithm for the Central Dispatch Process.”
- The Amending Rules also introduced an obligation on AEMO to document the processes that AEMO and Market Participants must follow during and after a Real-Time Market suspension in a Procedure.

Reasons for Real-Time Market Suspension

Under clause 7.11D.1, AEMO may suspend the Real-Time Market:

- In the event of system shutdown or major supply disruption.
- When AEMO has been requested by the Minister.
- When actions undertaken to maintain PSSR are significantly impacting market settlement due to:
  - A failure of AEMO's IT systems.
  - A loss of communications or control systems required to maintain Power System Security.
  - Any other reason identified in the Procedure.

Other Reasons for Suspension

In accordance with clause 7.11D.1(c)(iii), AEMO has identified the following other reasons for suspension:

- The perceived or actual threat or occurrence of a cyber attack.
- AEMO being unable to receive Real-Time Market Submissions from Market Participants.
- Any other circumstance in which AEMO reasonably considers its ability to operate the Real-Time Market is significantly impacted.

Procedure – key requirements

The new Procedure defines:

- AEMO's processes for determining to suspend:
  - This includes – if within 2 hours of identifying an event that may require suspension of the Real-Time Market, AEMO cannot determine the root cause or does not consider the issue can be resolved in a reasonable timeframe, AEMO will suspend.
- AEMO's processes during Real-Time Market Suspension:
  - This includes the circumstances in which AEMO will determine a Manual Dispatch Schedule, and how AEMO will communicate with Market Participants during a suspension.

Procedure – key requirements

- Market Participant obligations during Real-Time Market Suspension:
  - This includes the need for Market Participants to comply with directions from AEMO, and the steps that should be followed where WEMDE and automated Dispatch Instructions are not available.
- Processes for Resuming the Real-Time Market for AEMO and Market Participants:
  - This includes the conditions that must be satisfied for AEMO to resume the Real-Time Market, and requirements on Market Participants (e.g. providing valid data to update submissions).

Questions

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Questions outside of APCWG

- Any questions regarding proposed amendments should be sent to WA.MarketDevelopment@aemo.com.au, allowing enough time for a response prior to the closure of the consultation period.

Next Steps

- Consultation on the proposed amendments to WEM Procedure: Real-Time Market Suspension is currently scheduled to close on 28 November 2024.
- The expected commencement date is 13 December 2024.
- All submissions should be submitted to WA.MarketDevelopment@aemo.com.au by COB on the date of closure.

WEM Procedure: Dispatch Algorithm

Chris Wilson

Summary of Changes

1. Changes to enable new Tiebreaking method as per WEM Rule clauses 7.5.15-18.
2. Minor typographical and formatting fixes.

Tiebreaking

- Previous paragraphs 2.4.33-34 removed, to be replaced by new Tiebreaking approach.
- New approach consists of:
  - New Sets:
    - Price-Tied Set.
    - Price-Tied Tranche Set.
  - New Parameter:
    - Priority Order.
  - New Constraints:
    - Paragraphs 2.4.45-48, with Constraint Equations covering all Market Services.
  - New Appendix G, detailing the method for determining the Facility Tiebreak Number and Priority Order.
- This only affects solutions which would otherwise be degenerate. Facilities may be price-tied but may be preferred for other economic reasons in orders that do not match 7.5.15(a).
  - For example, if two Facilities have LFAOP of $10.00, but one has a greater impact in relieving a binding constraint, it'll be preferred.

Tiebreaking – New Sets

- Price-Tied Set: representing all occurrences of Price-Quantity pairs with price ties, for a given Market Service.

2.1.12. ***Price-Tied Set:*** For a Market Service, each occurance where the absolute value of the difference between the Loss-Factor Adjusted Prices of two or more Price-Quantity Pairs is less than 1e-6

$$S_m \; where \; card(S_m) \geq 0$$

$$for \; m \; in \; M$$

- Price-Tied Tranche Set: For each occurrence of a price tie, the Price-Quantity pairs that are part of this price-tie.

2.1.13. ***Price-Tied Tranche Set:*** For each member of the Price-Tied Set (described in paragraph 2.1.12), the set of all Tranche Quantities (described in paragraph 2.3.1) associated with the relevant Price-Quantity Pairs.

$$K_s \; where \; card(K_s) \geq 2$$

$$for \; s \; in \; S$$

Tiebreaking – Priority Order

- An integer parameter assigned to each Price-Quantity Pair that forms part of a Price-Tied Tranche Set, which determines the order of dispatch when the solution would otherwise be degenerate.
- This is different from Facility Tiebreak Number, as per examples later in this presentation.

2.2.43. ***Priority Order:*** The order in which Registered Facilities must be dispatched to meet the tie-breaking requirements of clause 7.5.15 of the WEM Rules, where a lower number indicates a higher priority. Appendix G details the methodology for determining Priority Order.

$$PO_{f,m,k}$$

$$for\ f\ in\ \boldsymbol{F}, for\ m\ in\ \boldsymbol{M}$$

$$for\ k\ in\ \boldsymbol{K}_i$$

$$where\ PO_{f,m,k} \in \mathbb{Z} \geq 1$$

Tiebreaking – Determination of Facility Tiebreak Numbers

- As per new Appendix G:

  G.1.1 To determine Facility Tiebreak Numbers, a pseudorandom sequence of Registered Facilities is generated, using the current Trade Date as the seed. Each Registered Facility's order in this sequence forms its Facility Tiebreak Number.

Tiebreaking – Determination of Priority Order - Energy

- Place Facilities in ascending order based on Facility Tiebreak Number.
- For example:

	Facility A	Facility B	Facility C
Loss Factor Adjusted Offer Price	$10.00	$10.00	$10.00
Facility Tiebreak Number	7	34	20
Priority Order	1	3	2

Tiebreaking – Determination of Priority Order - FCESS

- Place Facilities in the following order:
  - Interruptible Loads in ascending order based on Facility Tiebreak Number.
  - Facilities with E_min <= 0 in ascending order based on Facility Tiebreak Number.
  - Remaining Facilities in ascending order based the EstDispatchCost equation in clause 7.5.16, and if still tied, in ascending order based on Facility Tiebreak Number.
- For example, for Regulation Raise:

	Facility A (SF)	Facility B (SF)	Facility C (SF)
RREG Offer Price	$10.00	$10.00	$10.00
Facility Tiebreak Number	7	34	20
Priority Order	1	3	2

Tiebreaking – Determination of Priority Order – CRR Example

	Facility A	Facility B	Facility C	Facility D	Facility E
Facility Type	SF	SF	SSF	IML	SF
Enablement Minimum	15	10	-10	N/A	20
EstDispatchCost	1200	1200	0	N/A	950
CRR Offer Price	$0.00	$0.00	$0.00	$0.00	$0.00
Facility Tiebreak Number	7	34	20	23	44
Priority Order	4	5	2	1	3

Tiebreaking – Constraint Equations - Energy

- The effect of this equation is that Facilities with lower Priority Orders are preferred for dispatch to minimise the size of variable TBSlack1.

2.4.45. Tie-Breaking Constraint - Energy:

$$TBSlack1_{s\boldsymbol{K_s}} = \sum_{k \in \boldsymbol{K_s}, f \in \boldsymbol{F_k}} \left(PO_{f,k} * TrancheQuantity_{f,m,k} \right)$$

$$for\ s\ in\ \boldsymbol{S_m}$$

$$where\ m = energy$$

$$where\ \boldsymbol{F_k}\ is\ the\ set\ of\ Registered\ Facilities\ with\ Tranche\ Quantities\ associated\ with\ \boldsymbol{K_s}$$

Tiebreaking – Constraint Equations – CRL, REGR, REGL

- Note that this does not include Contingency Reserve Raise (CRR), which needs its own equation due to the impact of Performance Factors.
- The effect of this equation is that Facilities with lower Priority Orders are preferred for dispatch to minimise the size of variable TBSlack2.

2.4.46. Tie-Breaking Constraint - FCESS:

$$TBSlack2_{s\boldsymbol{K_s}} = \sum_{k \in \boldsymbol{K_s}, f \in \boldsymbol{F_k}} \left(PO_{f,k} * TrancheQuantity_{f,m,k} \right)$$

$$for\ s\ in\ \boldsymbol{S_m}$$

$$for\ m\ in\ \boldsymbol{M}, where\ m\ \notin \{energy, contingency\_raise, rocof\}$$

$$where\ \boldsymbol{F_k}\ is\ the\ set\ of\ Registered\ Facilities\ with\ Tranche\ Quantities\ associated\ with\ \boldsymbol{K_s}$$

Tiebreaking – Constraint Equations - CRR

- Special Constraint Equation required due to Performance Factors.
- Otherwise, effect is the same; Facilities with lower Priority Orders are preferred for dispatch to minimise the size of variable TBSlack3.

2.4.47. Tie-Breaking Constraint – Contingency Reserve Raise:

Indicator:

$$DFCMBinary_{l,h} = 1$$

Indicated Constraint:

$$TBSlack3_{s\boldsymbol{K}} \geq \sum_{k \in \boldsymbol{K}_s, f \in \boldsymbol{F}_k} \left(PO_{f,k} * ContingencyRaisePF_{h,l,f} * TrancheQuantity_{f,m,k}\right)$$

$$for\ s\ in\ \boldsymbol{S}_m$$

$$for\ l\ in\ \boldsymbol{L}, for\ h\ in\ \boldsymbol{H}$$

$$where\ m = contingency\_raise$$

$$where\ \boldsymbol{F}_k\ is\ the\ set\ of\ Registered\ Facilities\ with\ Tranche\ Quantities\ associated\ with\ \boldsymbol{K}_{sm}$$

Tiebreaking – Constraint Equations - RoCoF

2.4.48. Tie-Breaking Constraint – RoCoF Control Service:

$$TBSlack4_s = \sum_{k \in K_s, f \in F_k} \left(\frac{-1}{PO_{f,k}} * TrancheQuantity_{f,m,k} \right)$$

$$for\ s\ in\ S_m$$

$$where\ m = rocof$$

$$where\ F_k\ is\ the\ set\ of\ Registered\ Facilities\ with\ Tranche\ Quantities\ associated\ with\ K_s$$

Tiebreaking – Constraint Equations - RoCoF

- This constraint has a different impact; Facilities with lower Priority Orders are still preferred for dispatch, but the aim is to maximise the size of TBSlack4.
- That is, maximise RoCoF dispatch where it otherwise does not have an impact on the Objective Function.
- This is because at $0.00 cost for CRR, Performance Factors have no impact on the Objective Function. However, more CRR would need to be dispatched, which would lead to more FCESS Uplift being paid.
- Maximising RoCoF improves Performance Factors to the best possible for the given solution, which all else being equal, minimises FCESS Uplift payments for CRR for the given solution.

System Implementation Details

- AEMO will publish Facility Tiebreak Number in the Solution File.
- Updates to relevant APIs will be discussed in an upcoming forum.
- AEMO will not publish Priority Order, however it is constructable based on the information within the Case and Solution Files.

Questions

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Questions outside of APCWG

- Any questions regarding proposed amendments should be sent to WA.MarketDevelopment@aemo.com.au, allowing enough time for a response prior to the closure of the consultation period.

Next Steps

- Consultation on the proposed amendments to WEM Procedure: Dispatch Algorithm Formulation currently scheduled to close on 28 November 2024.
- The expected commencement date is 5 December 2024.
- All submissions should be submitted to WA.MarketDevelopment@aemo.com.au by COB on the date of closure.

WEM Procedure: Determination of Market Schedules

Chris Wilson

Summary

- Update of Scenarios and rule references to match the rules as result of the FCESS Cost Review.
- Update to include AEMO's use of Underlying System Load in determining system conditions for CRR dispatch.

New Schedule Definitions

	Reference	Available Capacity	Forecast Low	Forecast High
Dispatch	In-Service Capacity Only	Available Capacity	Not run	Not run
Pre-Dispatch	In-Service Capacity Only	Available Capacity	In-Service Capacity Only	In-Service Capacity Only
Week-Ahead	In-Service Capacity Only	Available Capacity	Available Capacity	Available Capacity

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Next Steps

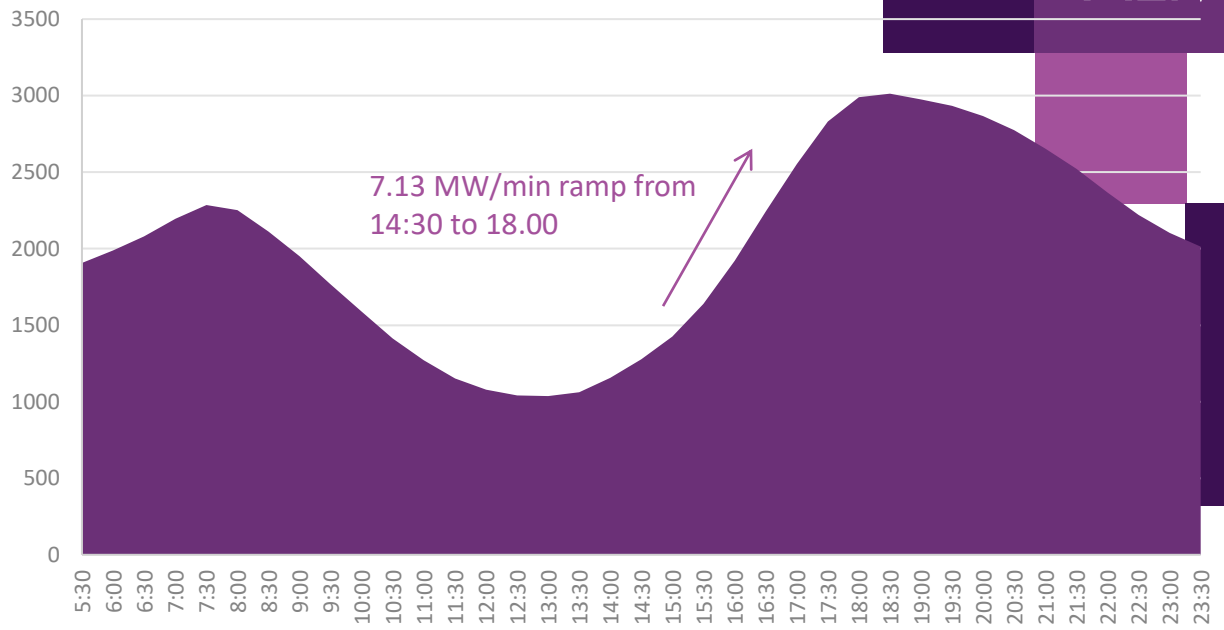
- Consultation on the proposed amendments to WEM Procedure: Determination of Market Schedules currently scheduled to close on 28 November 2024.
- The expected commencement date is 5 December 2024.
- All submissions should be submitted to WA.MarketDevelopment@aemo.com.au by COB on the date of closure.

WEM Procedure: Minimum Eligibility Requirements for Flexible Certified Reserve Capacity

Matthew Fairclough

Flexible Capacity

- The RCM Review Rules (gazetted in 2023) introduced Flexible Capacity to incentivise capacity that can start, stop, and ramp quickly.
- The key parameter is the magnitude, slope, and duration of the 4-hour ramp up from minimum demand to the evening peak (particularly in winter).
- Flexible Capacity Facilities must meet the minimum eligibility requirements determined by AEMO.



Jan 2025

AEMO will publish the minimum eligibility requirements

April - June 2025

Market Participants apply for Flexible Certified Reserve Capacity

June 2025

AEMO will publish the Flexible Reserve Capacity Requirement in the WEM ESOO

Sept 2025

AEMO to assign Flexible Capacity Credits

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What are the Flexible Capacity minimum eligibility requirements (MER)?

- AEMO must determine the MER set under proposed WEM Rule 4.10.1A(a), which include:
  - Minimum ramp up and ramp down rates.
  - Maximum allowed minimum stable loading levels.
  - Maximum time allowed between receiving a Dispatch Instruction when in a particular state and operating in a specific way.
- The Facility (excluding a DSP) must be a Fast Start Facility meaning it can:
  - Change its level of injection or withdrawal from 0 MW to its minimum stable loading level within 30 mins of receiving a Dispatch Instruction.
  - Shut down within 60 minutes from the time the Dispatch Instruction to synchronise was issued.
- Note that EPWA intends to revise the definition of Fast Start Facility to include Energy Storage Resources and Intermittent Generators.

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Consultation for MER and WEM Procedure

- WEM Rule 4.10.1A(c) requires AEMO to consult with Market Participants on the proposed MER for receiving Flexible Certified Reserve Capacity before publishing them, except if AEMO does not propose changes
    - AEMO will consult on the first proposed MER at the same time at this Procedure Change Proposal
- WEM Rule 4.10.1A(e) requires AEMO to document in a WEM Procedure the processes to be followed by AEMO for:
    - Determining the MER
    - Consulting with Market Participants
    - Publishing the MER

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WEMP contents: Determining the minimum eligibility requirements

- The factors that AEMO will consider when reviewing the MER include:
  - A change to the Benchmark Flexible Capacity Provider.
  - A change to the technical parameters of the Benchmark Flexible Capacity Provider.
  - A change to the Performance Requirements of any relevant FCESS.
  - A material change to the most recent forecast Four-Hour Demand Increase.
  - The highest Four-Hour Demand Increase from the previous Cold Season.
  - Any other factors AEMO considers relevant.
- AEMO may consider the following factors in proposing and determining the MER:
  - The requirements of a Dispatch Inflexibility Profile for a Fast Start Facility.
  - Most recent forecast Four-Hour Demand Increase.
  - The capabilities of the current fleet of Fast Start Facilities.
  - Submissions received from Market Participants during consultation.

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WEMP contents: Consulting with Market Participants and publishing the MER

- Where AEMO proposes to vary the MER, AEMO must publish on the WEM Website at least 35 Business Days prior to the date specified in WEM Rule 4.1.4 for the relevant Reserve Capacity Cycle, the:
  - Proposed MER and a call for submissions from Market Participants.
    - Due date for submissions not less than 15 Business Days.
  - Reason for changes and how the MER meets the Wholesale Market Objectives.
  - Technical parameters associated with the Benchmark Flexible Capacity Provider used in the determination of the proposed MER.
- AEMO will publish the MER on the WEM Website prior to the date specified in WEM Rule 4.1.4 for the relevant Reserve Capacity Cycle.
- Where AEMO has consulted, AEMO will also publish:
  - The call for submissions and consultation details above.
  - Summary of submissions received.

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Questions

Questions regarding the proposed amendments

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Questions outside of APCWG

- Any questions regarding proposed amendments should be sent to WA.MarketDevelopment@aemo.com.au, allowing enough time for a response prior to the closure of the consultation period.

Next Steps

- Consultation on the proposed amendments to WEM Procedure: Minimum eligibility requirements for Flexible CRC is currently scheduled to close on 4 December 2024.
- All submissions should be submitted to WA.MarketDevelopment@aemo.com.au by COB on the date of closure.

Upcoming Procedures

Procedure Name	New/ Amendment	Proposed Timing for Consultation Release*
Credible Contingency Events	Amendment	November 2024
Outage Intention Plan	Amendment	November 2024
Facility Sub-Metering	Amendment	November 2024

*Proposed consultation dates are subject to change

Any Other business?

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AUSTRALIAN ENERGY MARKET OPERATOR

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