Economic Regulation Authority

Frequency co-optimised essential system services offer price ceiling determination

Final report

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Economic Regulation Authority

Level 4, Albert Facey House

469 Wellington Street, Perth WA 6000

Telephone 08 6557 7900

Email info@erawa.com.au

Website www.erawa.com.au

This document can also be made available in alternative formats on request.

National Relay Service TTY: 13 36 77

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Executive summary

From the commencement of the new Wholesale Electricity Market (WEM), some of the current ancillary services arrangements that apply in the WEM will cease to exist and will be replaced with essential system services.[1] Five Frequency Co-optimised Essential System Services (FCESS) have been defined for the management of system frequency. These FCESS will be procured through markets.[2] The new FCESS are:

- Regulation Raise and Lower, which replace the Upwards and Downwards Load Following ancillary services respectively.
- Contingency Reserve Raise and Lower, which replace the Spinning Reserve and Load Rejection Reserve ancillary services respectively.
- Rate of Change of Frequency (RoCoF) Control Service, which is a new service in the WEM.[3]

The Economic Regulation Authority determines FCESS Offer Price Ceiling values for each of the five FCESS markets, setting the maximum price at which market participants can offer in any of the FCESS markets. The co-optimisation of energy and FCESS will determine the clearing prices in each of the FCESS markets, and the clearing prices can rise above the offer price ceilings.

This first determination sets the FCESS Offer Price Ceilings that will apply from the New WEM Commencement Day. The ERA must determine all five values, however, the WEM Rules require that over the first five months of the new WEM, the offer price ceiling value for all five FCESS markets must be a single identical price.[4]

This is the first time the ERA has determined FCESS Offer Price Ceilings for the new FCESS markets. The WEM Rules clause 2.26.2B (a) requires that the ERA determines the offer price ceilings by:

> '… estimating, consistently with the Offer Construction Guideline as it applies to the highest cost Facility providing the relevant Frequency Co-optimised Essential System Service in the SWIS, the variable costs of providing the Frequency Co-optimised Essential System Service that are not compensated through other market mechanisms in the Wholesale Electricity Market.'

The ERA's determination is based on the costs of facilities that are accredited to provide the five FCESS from the New WEM Commencement Day. The ERA consulted with owners and operators of accredited facilities to collect information on their costs. The highest of these costs sets the FCESS Offer Price Ceiling for each market.[5]

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1 Under the current arrangements, ancillary services consist of load following, spinning reserve, load rejection reserve and system restart. In the new WEM, essential system services encompass frequency control services, system restart and non-cooptimised essential system services.

2 Under the current arrangements, load following ancillary service is procured through a market, while the remaining are subject to administrative arrangements and contracts.

3 The RoCoF Control Service will be provided from the physical inertia of rotating generators. This service is currently received as a by-product of energy production and is not procured through a market mechanism.

4 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 1.60.5, (online).

5 Consistent with clause 2.26.2B(b) of the WEM Rules, these values are rounded up to the nearest multiple of $50 per megawatt per hour for the Contingency Reserve and Regulation FCESS, and $50 per megawatt seconds per hour for the RoCoF Control Service.

On 18 July 2023, the ERA published the draft determination on the FCESS Offer Price Ceilings for public consultation and received four submissions. The matters raised and the ERA's responses are summarised in Appendix 3 of this final report.

Stakeholders raised a concern that setting the offer price ceiling for the RoCoF Control Service at zero will remove incentives for participation in that market. Stakeholders did not provide any evidence of costs they incur to provide the RoCoF Control Service in addition to the costs they incur to provide the energy service. Offers to the energy market will cover market participants' costs. If in the future market participants provide any evidence of costs for the provision of the RoCoF Control Service, the ERA will evaluate and, if warranted, make necessary revisions to the offer price ceiling.

Since its draft determination, the ERA has explored different indexation methods suitable to adjust the offer price ceilings to reflect changes in the underlying cost of service provision over time.

The ERA has determined an indexation approach based on two cost components of the FCESS Offer Price Ceilings: a fuel component, which will be indexed monthly using the Perth diesel terminal gate prices (net of goods and services tax and excise), and a non-fuel component, which will be indexed quarterly using the Australian Bureau of Statistics Consumer Price Index (all goods, weighted average of eight capital cities).

Determination

The ERA has determined the FCESS Offer Price Ceiling values as follows:

- From the start of the New WEM Commencement Day, the FCESS Offer Price Ceiling values will be $300 per megawatt per hour for the Regulation and Contingency Reserve services, and $300 per megawatt second per hour for the RoCoF Control Service.[6]
- The ERA will adjust the FCESS Offer Price Ceilings by escalating the fuel component on a monthly basis from 1 November 2023, and by escalating the non-fuel component on a quarterly basis from 1 January 2024, as per the indexation formula explained in section 4.3 of this report.
- From the trading interval starting at 8:00 AM on 1 March 2024, the FCESS Offer Price Ceiling for the RoCoF Control Service will be zero dollar per megawatt second per hour.

[6] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 1.60.5, (online).

1. Introduction

The new WEM design includes the determination and application of market price limits. The market price limits are intended to serve as a backstop for other elements of the market power mitigation framework by controlling the maximum price that can be submitted in the Real-Time Market.[7] The Energy Offer Price Floor and Energy Offer Price Ceiling are the market price limits that will apply to offers submitted in the Real-Time Market for energy. The Frequency Co-optimised Essential System Services (FCESS) Offer Price Ceilings will apply as the price limits to offers submitted in the five FCESS markets.

The ERA will review the market price limits triennially and may nominate an indexation for escalation between the triennial reviews to allow the market price limits to reflect prevalent economic conditions.[8]

The market price limits that will apply from New WEM Commencement Day are:

- A single cost-based Energy Offer Price Ceiling, which will be set at the highest reasonable operating cost plus a margin. The current alternative maximum STEM price will apply from 1 October 2023 until the ERA's first review of the Energy Offer Price Ceiling, which must be completed by 1 June 2024.[9]
- The current minimum STEM price will continue to apply from 1 October 2023 as the Energy Offer Price Floor until the ERA's first review, which must be completed by 1 June 2025.[10]
- The five FCESS Offer Price Ceilings determined in this final report will apply from the New WEM Commencement Day. The ERA must complete the first review of the FCESS Offer Price Ceilings by 1 June 2026.[11]

This report is the ERA's final determination on the FCESS Offer Price Ceilings that will apply from the New WEM Commencement Day. Section 1 of this report outlines the ERA obligations and issues identified. Section 2 includes the ERA determination of the FCESS Offer Price Ceilings and the dates from when these will take effect. Section 3 describes the FCESS and section 4 outlines the ERA's calculation approach, assumptions and indexation process. Summary of stakeholder submissions and the ERA's responses to issues raised in those is included in Appendix 3 to this report.

1.1 The ERA's obligations under the WEM Rules

The WEM Rules outline that the ERA must determine the value of each FCESS Offer Price Ceiling by:

a. estimating, consistently with the Offer Construction Guideline as it applies to the highest cost Facility providing the relevant Frequency Co-optimised Essential System Service in the SWIS, the variable costs of providing the Frequency Co-optimised Essential System Service that are not compensated through other market mechanisms in the Wholesale Electricity Market;

7 Energy Policy WA, November 2022, *Market Power Mitigation Strategy Information Paper*, pp. 14-16, (online).

8 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clauses 2.26.2(c), 2.26.2B(c) and 2.26.2F(c), (online).

9 Ibid, clauses 1.61.2 and 1.61.6.

10 Ibid, clauses 1.61.4 and 1.61.5.

11 Ibid, clause 1.61.3.

b. rounding up its determination of the value of the FCESS Offer Price Ceiling to the nearest multiple of $50 per MW per hour or $50 per MWs per hour, as applicable; and

c. determining whether an indexation process should apply to the FCESS Offer Price Ceiling to reflect movements in input costs and, if so, determining the formula for the indexation calculation and the frequency at which indexation will apply.[12]

The WEM Rules also require the publication of a draft report and a request for submissions. The ERA published the draft report on FCESS Offer Price Ceiling determination on 18 July 2023 and called for submissions by 15 August 2023. The ERA also conducted a public forum on its draft determination on 8 August 2023.

The WEM Rules set out what the ERA must include in the final report on the FCESS Offer Price Ceiling determination, which is to be published on the website at least five business days before the offer price ceiling values take effect. These matters are:

a. the issues identified by the Economic Regulation Authority;

b. the assumptions made by the Economic Regulation Authority in undertaking the review;

c. the Economic Regulation Authority's determination of the relevant Market Price Limit, which is to include, where applicable:

   i. the revised value of the relevant Market Price Limit;

   ii. the Trading Day from which the revised value of the relevant Market Price Limit will take effect, which must be at least five Business Days after the date the final report is published; and

   iii. any indexation process in the value of the relevant Market Price Limit and the associated times each indexed value will apply from;

d. how the Economic Regulation Authority determined the revised value of the relevant Market Price Limit, including any analysis and calculation parameters used in its determination;

e. a summary of any submissions received by the Economic Regulation Authority on the draft report published under clause 2.26.2L that were received within the time specified, and any late submissions the Economic Regulation Authority has decided, in its discretion, to take into account;

f. the Economic Regulation Authority's responses to the issues raised in those submissions;

g. any other matters the Economic Regulation Authority considers relevant to the review.[13]

[12] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.26.2B, (online)

[13] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.26.2M, (online).

1.2 Information used for this final determination

There are three types of facilities that are expected to provide FCESS: scheduled facilities, semi-scheduled facilities and interruptible loads. These facilities include thermal generators, electric storage resources and large loads that can automatically curtail their consumption in response to a change in system frequency.[14] Scheduled and semi-scheduled facilities can provide any of the five FCESS, whereas interruptible loads can only provide Contingency Reserve Raise. Different facility types incur different types of costs.

For the calculation of the FCESS Offer Price Ceilings, the ERA collected cost information for facilities accredited to provide FCESS. An initial data request was sent in May 2023, following one-on-one meetings with market participants that own and operate FCESS accredited facilities. The ERA also consulted with the Australian Energy Market Operator and Energy Policy WA.

At the time of this initial data request, market participants were still developing their cost structures for FCESS provision. The ERA was also developing the Offer Construction Guideline, which provided information on cost components valid for inclusion in FCESS offers.[15]

Following the publication of the draft report, the ERA issued another data request for market participants to update previously provided cost information, considering the additional clarity available from the draft Offer Construction Guideline.[16] This data request was sent to all owners and operators of accredited and non-accredited conventional facilities.

This data request has a dual purpose to inform this final determination and to support the development of the ERA's market monitoring systems for the new Real-Time Market.

The ERA examined all costs provided by market participants, tested them for consistency with the Offer Construction Guideline, which identifies allowable cost components, and developed a calculation method to assess the most expensive provider for each FCESS. Chapter 4 describes the ERA's process and calculation method.

1.3 Stakeholder consultation

The ERA undertook public consultation between 18 July 2023 and 15 August 2023 on the FCESS Offer Price Ceiling draft determination. The ERA received four submissions from Alinta Energy, the Australian Energy Council, AEMO and Synergy. The submissions are published on the ERA's website.[17]

The public submissions raised three main issues:

- Interested parties are concerned about market participants' ability to ensure their offers are compliant with the guidelines published by the ERA, given they will be published close to market start and asked the ERA to adopt an amnesty period to allow market participants time to adjust to the new obligations.

[14] No electric storage facility is accredited at the time this final report is published, and one interruptible load is accredited.

[15] The WEM Rules require that the ERA set the FCESS Offer Price Ceilings consistent with the guidance on what costs can validly be included in FCESS offers provided in the Offer Construction Guideline.

[16] Economic Regulation Authority, June 2023, *Offer Construction Guideline – Draft for consultation*, (online).

[17] Public submissions in response to the *FCESS Offer Price Ceiling determination – draft report*, (online).

- Market participants are seeking the inclusion of cost components in FCESS offers that are disallowed or not considered in the draft report and in the draft Offer Construction Guideline, such as the value of large-scale generation certificates, or costs related to a market participant's energy contractual arrangements.
- Interested parties are concerned about potential lack of participation in the RoCoF Control Service market after the six months where participation is compulsory, due to the offer price ceiling determined at $0/MWs per hour.

The ERA has published a summary of the issues raised in stakeholder submissions and its responses to these as part of this final report in Appendix 3.

1.4 Changes since the ERA's draft report

For this final determination, the ERA requested and received updated information from owners and operators of accredited facilities, which was used to calculate the final FCESS Offer Price Ceiling values (section 2).

No changes were made to the calculation method itself. However, the updated cost data received from market participants has resulted in the rounded up FCESS Offer Price Ceiling values to increase from $250/MW/h in the draft determination to $300/MW/h for the Regulation and Contingency Reserve services. The Offer Price Ceiling for the RoCoF Control Service – to apply from 1 March 2024 – remains unchanged from the draft report at zero dollar per megawatt second per hour.

In its draft determination, the ERA stated that it will consider suitable indexation to apply to the FCESS Offer Price Ceiling values noting the length of time between triennial reviews of these values.[18]

The FCESS Offer Price Ceiling values for the Regulation and Contingency Reserve services in this final determination are set by a distillate-fuelled facility. To reflect the effect of fuel price fluctuations on the offer price ceilings, the ERA will apply an indexation process to the fuel component, which will escalate this component monthly using the Perth terminal gate price for distillate (net of goods and services tax and excise).

The ERA will also apply an indexation process to the non-fuel cost component of the offer price ceilings to ensure it remains aligned with prevalent economic conditions. The ERA will index the non-fuel component quarterly, using the Consumer Price Index issued by the Australian Bureau of Statistics.[19]

[18] Economic Regulation Authority, July 2023, *Frequency co-optimised essential system service offer price ceiling determination – draft report*, (online).

[19] Consumer Price Index, all groups, weighted average of eight capital cities, Australian Bureau of Statistics website, (online).

2. The ERA determination

From the start of the New WEM Commencement Day, the FCESS Offer Price Ceiling values will be $300 per megawatt per hour for the Regulation and Contingency Reserve services, and $300 per megawatt second per hour for the RoCoF Control Service.

The ERA has determined that an indexation will apply to the FCESS Offer Price Ceiling values. The ERA will adjust the FCESS Offer Price Ceilings, from 1 November 2023, by adjusting the fuel component on a monthly basis, and from 1 January 2024, by adjusting the non-fuel component on a quarterly basis, as per the indexation formula explained in section 4.3 of this report. The indexation process will result in an updated value, which will then be rounded up to the nearest multiple of $50 to set the FCESS Offer Price Ceiling.

Until the end of the trading interval starting at 7:30 AM on 1 March 2024, the requirement to apply a single identical offer price ceiling value will mean that the indexation process may also escalate the RoCoF Control Service Offer Price Ceiling.

From the trading interval starting at 8:00 AM on 1 March 2024, the FCESS Offer Price Ceiling for the RoCoF Control Service will be zero dollar per megawatt second per hour.

3. The frequency co-optimised essential system services

In the new WEM, FCESS will replace the existing load following, spinning reserve and load rejection reserve ancillary services. Together with a newly defined RoCoF Control Service, the FCESS will maintain security and reliability in the power system. These services are used to regulate frequency in real time and in response to contingency events by increasing or reducing output to control imbalances between supply and demand.[20] AEMO must procure adequate quantities of FCESS to meet the Essential System Service Standards set out in the WEM Rules.[21] AEMO will procure the required FCESS quantities through the five FCESS markets.

3.1 Requirements for facilities to provide FCESS

The WEM Rules require that all facilities that provide any ancillary services in the existing WEM must become accredited and offer the equivalent services in the new FCESS markets.[22,] The WEM Rules have specific obligations for Synergy to consult with AEMO and to accredit all its facilities capable of providing any of the FCESS.[23]

In addition to the requirement to become accredited, over the first six months of the new market, each accredited facility must offer up to its maximum accredited capacity in all FCESS markets it is accredited for. Afterwards, from 1 April 2024, participation will become voluntary.

3.2 Regulation

The Regulation service is used to continuously balance supply and demand to maintain power system frequency within the normal operating bands and is procured through Regulation Raise and Regulation Lower markets.

Regulation services are provided by a facility adjusting its injection or withdrawal following relatively small fluctuations of demand or supply to ensure the system remains within the normal frequency operating band. Regulation Raise operates to raise the system frequency and Regulation Lower operates to lower the system frequency. Regulation services can be provided by a generator or an electric storage resource.

3.3 Contingency Reserve

The Contingency Reserve service holds capacity in reserve to rapidly adjust output up or down to maintain frequency within operating standards after a contingency event and is procured through Contingency Reserve Raise and Lower markets.

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20 Contingency events can occur when there is an unplanned and sudden loss of a generating facility, a network element, or a large load, which is outside of AEMO's control.

21 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 3.10, (online).

22 This requirement refers to facilities currently providing load following ancillary services, spinning reserve and load rejection reserve ancillary services, and does not cover the provision of system restart ancillary services.

23 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clauses 1.49.1 to 1.49.5, (online).

Contingency Reserve Raise requires a facility to increase output in response to under-frequency on the system following the loss of supply.[24] This might occur when a generator or a network asset trip or fail, and the system frequency decreases.

The Contingency Reserve services must be sustained for at least 15 minutes following a contingency event on the system.[25] This service can be provided by a generator, an electric storge resource, or an interruptible load. Contingency Reserve Raise can be provided by an interruptible load in block response or in a continuous manner.[26]

Contingency Reserve Lower requires a facility to reduce output in response to over-frequency on the system following the loss of demand. This might occur when a network outage disconnects consumers. This service can be provided by a generator or an electric storge resource.

3.4 Rate of change of frequency control service

The Rate of Change of Frequency Control Service (RoCoF Control Service) is a new service in the WEM and procures inertia from synchronised generators that must comply with specific requirements.[27,28] The service is measured in megawatt seconds (MWs) and has two functions:

1. Restrict the rate of change of frequency below a defined maximum level.

2. Ensure that minimum frequency requirements are maintained in accordance with the frequency operating standards, reducing the contingency raise requirement.[29]

The WEM Rules define inertia as “the kinetic energy (at nominal frequency) that is extracted from the rotating mass of a machine coupled to the power system to compensate an imbalance in the system frequency.” It will be provided as a by-product from the physical rotation of conventional generator turbines. As currently defined in the WEM Rules, inertia cannot be provided by an electric storage resource.

[24] For demand side provision, a load would rapidly reduce withdrawal.

[25] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 7.10.18, (online).

[26] Ibid, 2.34A.6 (d)(ii).

[27] Australian Energy Market Operator, October 2021, *WEM Procedure: Frequency co-optimised essential system services accreditation*, section 4.3, p. 24, (online).

[28] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 3.9.7, (online).

[29] Australian Energy Market Operator website, ‘Summary of Frequency Co-optimised Essential System Services’, (online).

4. Determining the highest cost FCESS provider

This section steps out the method the ERA has developed to calculate the FCESS Offer Price Ceilings. The ERA must do this by:

- Estimating, consistently with the Offer Construction Guideline as it applies to the highest cost facility providing the relevant FCESS, the variable costs of providing the FCESS that are not compensated through other market mechanisms in the WEM.
- Rounding up the value of the FCESS Offer Price Ceiling to the nearest multiple of $50 per MW per hour or $50 per MWs per hour, as applicable.
- Determining whether an indexation process should apply to the FCESS Offer Price Ceiling to reflect movements in input costs and, if so, determining the formula for the indexation calculation and the frequency at which indexation will apply.[30]

The ERA has taken the approach of calculating the first set of FCESS Offer Price Ceilings for the new WEM using the costs of facilities currently accredited to provide FCESS, as opposed to costs of potential new entrants. This is reasonable due to the newness of the FCESS markets and the likelihood that potential new entrants will seek to observe market outcomes before making decisions to participate in the FCESS markets.

At the time this final determination is published, multiple generators have been accredited to provide FCESS.[31] No electric storage resource is accredited at this stage, so potential costs of an electric storage resource are not considered in this final determination.

The RoCoF Control Service can be provided by conventional generators in a synchronous condenser mode.[32] However, at the time of this final report, no facility has been accredited to provide RoCoF Control Service in this mode and, therefore, costs of providing this service in this mode are unknown.

The costs of all accredited facilities have been used to calculate the FCESS Offer Price Ceilings for this final determination.

4.1 Consistency with the Offer Construction Guideline

The Offer Construction Guideline provides guidance to market participants on costs that may be included in energy and FCESS offers to be compliant with the requirements of the WEM Rules. The ERA's final determination on the FCESS Offer Price Ceilings is consistent with the Offer Construction Guideline, published on 11 September 2023.[33]

In the new WEM, market participants are expected to include only costs in their Real-Time Market Submissions that a market participant without market power would include in its profit-maximising offers.[34] This principle guides the offers submitted into any of the energy or FCESS markets.

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30 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.26.2B, (online)

31 An interruptible load is accredited to provide Contingency Reserve Raise.

32 In a synchronous condenser mode, a spinning turbine spins freely to provide inertia without providing any real power.

33 Economic Regulation Authority, September 2023, *Offer Construction Guideline*, (online).

34 Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.16A.1, (online).

Table 1 in the Offer Construction Guideline lists efficient variable cost components that may be included in Real-Time Market offers.[35] The efficient variable costs, related to producing the relevant electricity, include variable costs that vary with the level of production, as well as avoidable fixed costs that do not vary with the level of production, but are incurred only when a facility operates for providing a market service.

The incremental efficient variable cost is the change in efficient variable costs that a facility incurs for increasing its production by one unit in a single dispatch interval. The Offer Construction Guideline allows for calculating average operating costs, which are the incremental efficient variable cost calculated over a series of dispatch intervals.[36] This method allows a facility to recover its costs, including start-up costs, over a series of dispatch intervals.[37]

The Offer Construction Guideline explains how average operating costs can be calculated when constructing FCESS offers.[38]

Market participants may not include the following costs in Real-Time Market Submissions for FCESS:

- **Opportunity costs of being dispatched for providing FCESS**

When making offers in the Real-Time Market, market participants ensure costs at each level of production reflect the true costs of providing any market service. By doing so, a facility is dispatched when the market price is above (or at) its offer prices in most circumstances, ensuring costs are recovered. By offering at cost at all levels of production, the facility would recover its costs and, therefore, be indifferent to being dispatched for energy or FCESS.

- **Contractual arrangements**

In the existing market, market participants may not pass on the costs of contractual arrangements for energy in balancing market offer prices or load following market offer prices. The same principle applies to the Real-Time Market offer prices for energy and FCESS. Such costs are, therefore, not allowable costs in FCESS offers.[39] The WEM Rules make an exception by allowing the inclusion of long-term take-or-pay fuel contract costs in Real-Time Market offers.[40]

4.2 Calculation method

The ERA consulted through the draft report on the FCESS Offer Price Ceiling determination and received no comments on the proposed calculation method from market participants. The ERA has not made any changes to the calculation method.

The method below shows the calculation of costs for generators that must participate in the FCESS markets for the first six months. The ERA has reviewed the data provided by the

35 Economic Regulation Authority, September 2023, *Offer Construction Guideline*, pp. 10-11, (online).

36 Ibid, p.15.

37 The WEM Rules require that the ERA determine the FCESS Offer Price Ceilings consistent with the Offer Construction Guideline (WEM Rules clause 2.26.6B (a)). There are different approaches a facility can use to derive its costs and construct its price-quantity pairs. This final determination has used the same approach as applied in the Offer Construction Guideline.

38 Economic Regulation Authority, September 2023, *Offer Construction Guideline*, pp. 47-49, (online)..

39 Ibid, p. 10.

40 Companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.16D.1 (a)(iii), (online).

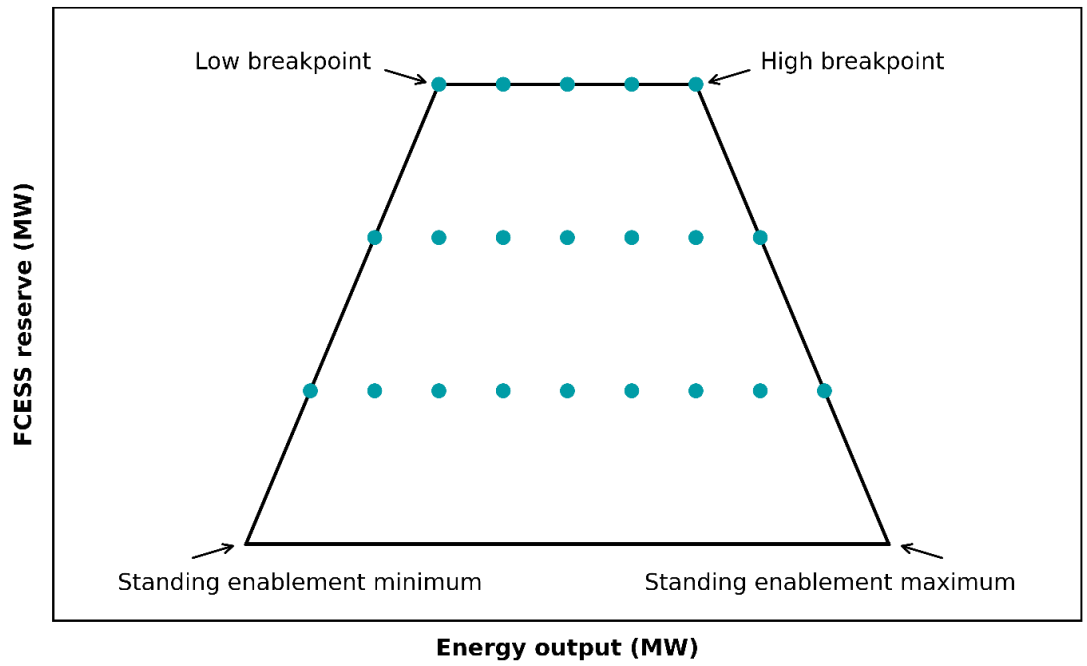
interruptible load facility and concluded it is not the highest cost provider in its respective FCESS market.[41]

The FCESS Offer Price Ceiling values should be set high enough to allow market participants to recover a facility's efficient variable costs of providing a FCESS, but also not set too high that defeats the purpose of the offer ceiling price.

Each facility has a 'trapezium'' (Figure 1) within which it can provide each FCESS, where the height is the maximum FCESS capacity, and the width are the start and end points of the possible provision along its output curve. The low and high break points define the boundary of the area within which the facility can provide the maximum accredited capacity of the FCESS.

These parameters are used to determine the cost of providing FCESS anywhere within the trapezium. The ERA calculation method considers the largest of the costs of the facility with the highest cost for each FCESS, and the offer price ceiling is then equal to the highest of all the facility costs.

Figure 1. Example of a FCESS trapezium



Source: ERA model

When calculating each FCESS Offer Price Ceiling, the ERA model has constructed FCESS offers that account for costs consistent with the Offer Construction Guideline. These include:

- Costs associated with change in fuel consumption
- Start-up costs
- Other avoidable fixed costs
- Additional wear and tear costs (Regulation services only).

[41] The load is accredited to provide Contingency reserve raise.

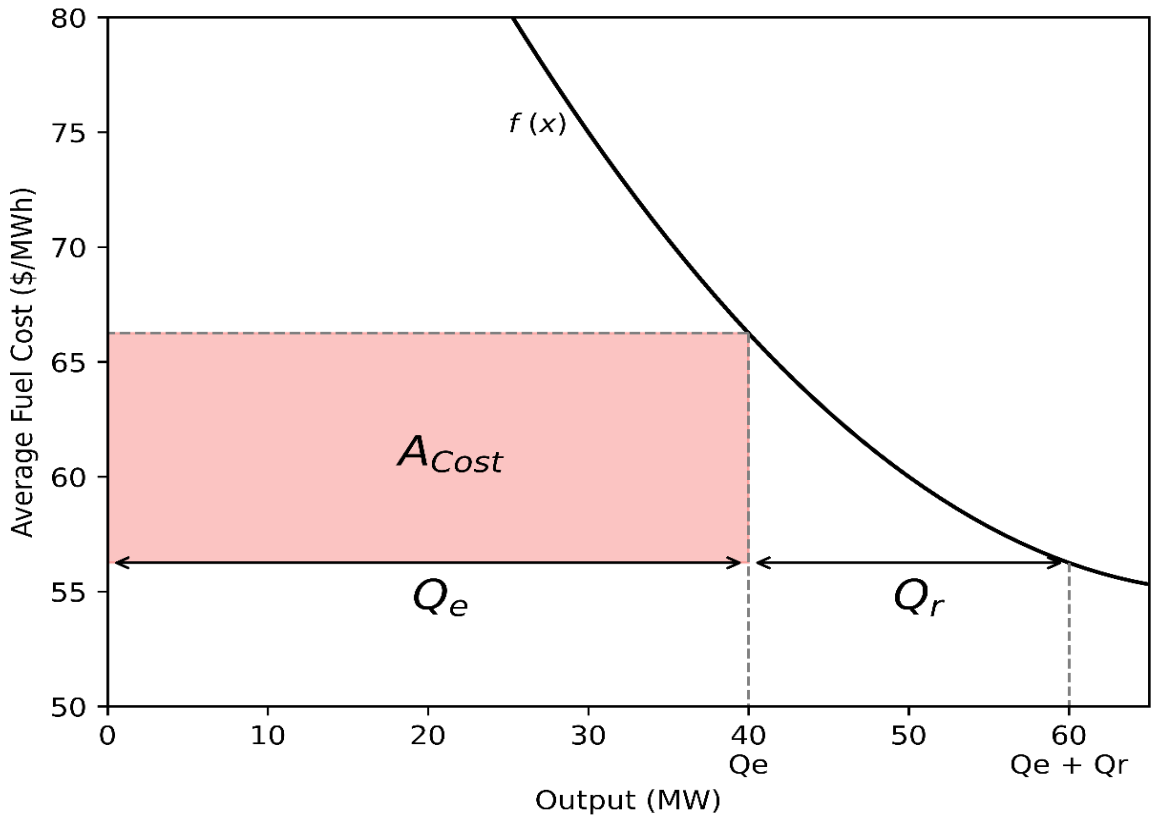
4.2.1 Change in fuel costs

A change in fuel costs can occur when a facility must generate at a lower level to have sufficient head room to provide FCESS. Fuel costs increase when moving to a less efficient point on a facility's output curve, where the facility consumes more fuel to produce energy. While this additional, higher fuel cost cannot be included in the facility's energy offer, it may be recovered through an FCESS offer.[42]

Figure 2 shows the average fuel cost for each MW of output (f(x)), where:

average fuel costs ($/MWh) = heat rate (GJ/MWh) * fuel price ($/GJ) / output (MW)

Figure 2. Change in average fuel cost



Source: ERA model

Figure 2 shows the additional fuel costs that a facility can incur from holding back output to provide a raise service. The area labelled A_{Cost} represents the total additional fuel cost from lowering the facility's output from 60MW to 40MW. If the facility did not provide FCESS and ran at 60MW, the fuel costs per megawatt hour would be lower. The facility is entitled to get compensation for this change in fuel costs for the 40MW of output it could be constrained down to.

Q_e = energy quantity (MW).

[42] At a lower level of production, the facility is typically less efficient and avoidable fixed costs are spread over a smaller quantity. Therefore, its production costs are higher. This contrasts with the requirement of the WEM Rules to offer energy and/or FCESS in a monotonically increasing manner.

The energy quantity is the amount of energy a facility has cleared for in the energy market, that is not reserved for FCESS.

Q_r = reserve quantity (MW).

The reserve quantity is the amount of energy a facility has cleared to provide in the FCESS market.

For example, a facility might be at a starting output of 100MW with 20MW reserved to provide Regulation Raise. In this example the facility's dispatch would be:

Q_e = 80MW and Q_r = 20MW.

If the facility was reserving a quantity to provide Regulation Lower instead, its dispatch would be:

Q_e = 100MW and Q_r = 20MW

$avg\ fuel\ cost(Q_e)$ is the average fuel cost for each MWh as described above, at a specific output level of Q_e

Change in average fuel costs may be calculated as shown below:

Equation 1:

This equation shows how to calculate the area of A_{Cost} displayed in Figure 2, which is the total increase in fuel costs for an output of Q_e MW and a reserve of Q_r.

$$A_{Cost}(Q_e, Q_r) = (avg\ fuel\ cost(Q_e) - avg\ fuel\ cost(Q_e + Q_r)\ ) * Q_e$$

Equation 2:

The total change in fuel costs per MW of reserve is:

$$C = \frac{A_{Cost}}{Q_r}$$

This is the amount that will compensate total change in fuel costs if included in the FCESS offer.

The A_{Cost} in Equation 1 is the highest possible total increase in fuel costs incurred by the facility when providing Q_r MW of reserve.

C in Equation 2 is the highest cost possible that a facility may incur, averaged for each MW of reserve provided, and is used in cost recovery. During settlement, the facility is paid the FCESS clearing price multiplied by the quantity of reserve provided.

4.2.2 Start-up costs

The start-up costs used in this FCESS Offer Price Ceiling final determination are derived from information provided by market participants in the latest data collection, which the ERA undertook during the consultation period of its draft determination.

Start-up costs are 'smeared' over short runtimes, which are based on AEMO's SCADA data over a three-year period. The SCADA data is used to construct a distribution of historical facility dispatch cycle run times, where a 5% quantile (from the left) from the runtime distribution is used as the facility's short runtime.

Start-up costs are calculated by dividing the static start-up cost of a facility by its short runtime and output Q_e (MW), in other words, the total amount of MWh the facility outputs during a short runtime.

4.2.3 Other avoidable fixed costs

Other avoidable fixed costs consist of non-sunk costs that are only incurred when a facility is running and are independent of the size of the load. The cost per hour is then divided by the output Q_e (MW).

4.2.4 Wear and tear costs

Wear and tear costs are a static cost provided by a facility. These costs are only applied for Regulation services. Costs for wear and tear are a reasonable inclusion for facilities providing Regulation services, because the facility is required to vary its output to follow the load.[43]

The Contingency Reserve services are enablement services, where the likelihood of a facility being dispatched to respond to contingency events is low and the facility is unlikely to incur additional wear and tear costs.

4.2.5 Applied calculation method

The calculation method used to calculate the FCESS Offer Price Ceiling values for this final determination uses each facility's trapezium for each FCESS to find the highest costs when providing the respective FCESS.[44]

In Figure 1 there are multiple points on the trapezium. These points were considered for the offer price ceilings, where each point in the trapezium has a calculated aggregated cost, which includes the change in average fuel costs, start-up costs, avoidable fixed costs and wear and tear costs.

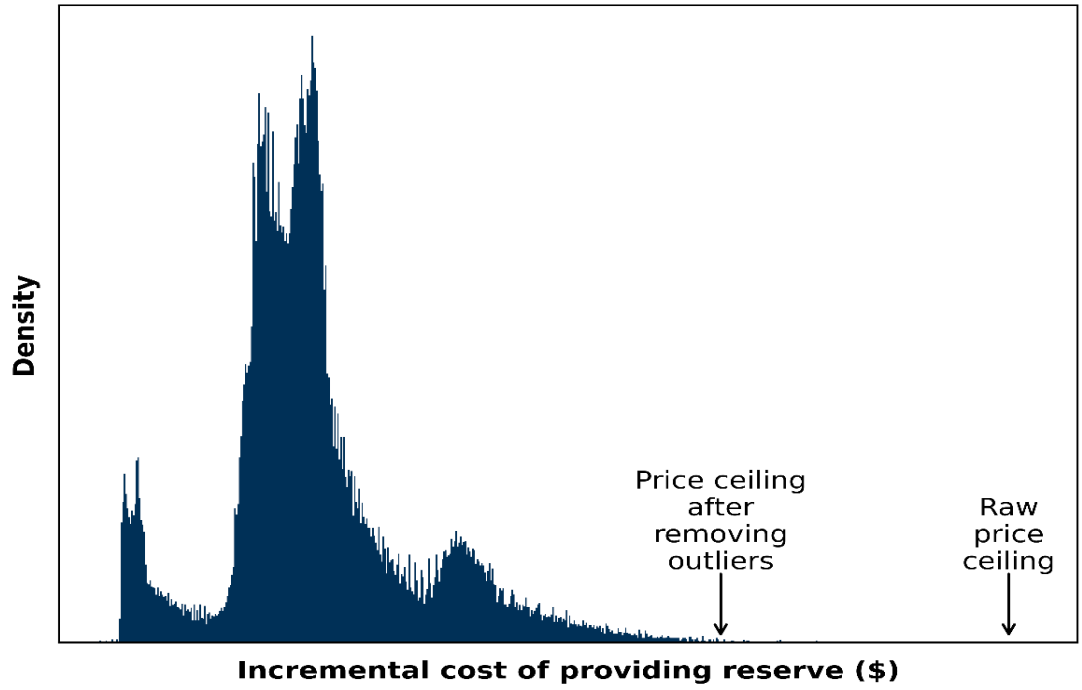
These points give an array of potential costs a facility may incur when providing the relevant FCESS. From this array, 0.3% of the highest costs are removed to deal with outlying data points that may skew the offer price ceiling calculation (Figure 3). The maximum cost in the

[43] For emphasis, the inclusion of a cost component related to the degradation of efficiency is plausible given the use of average operating cost approach when constructing offers. In practice, a market participant must consider whether its conversion method for producing monotonically increasing price-quantity pairs in the Real-Time Market for energy provides for the recovery of its costs given its expected dispatch in the FCESS markets.

[44] A facility can provide up to five different FCESS, which could result in it having up to five different trapezia.

new array is the facility's highest cost point. The highest cost of all facilities is then used to set the FCESS Offer Price Ceilings for Regulation and Contingency Reserve services.

Figure 3. Frequency distribution of facility costs for reserve



Source: ERA model

When providing RoCoF Control Service, a generator must already be dispatched for energy, as RoCoF Control Service is the inertia output of a generator while it is producing energy. A facility providing energy is, therefore, not expected to incur any additional costs when providing RoCoF Control Service and would be expected to recover any costs through its energy offers.

4.3 Indexation

The WEM Rules provide that ERA must determine whether an indexation should apply to the FCESS Offer Price Ceilings, and if the ERA determines to use an indexation, the ERA must determine the formula for the calculation and the frequency at which indexation will apply.[45]

The indexation process will allow updating the offer price ceilings at regular time intervals, to reflect changes in input costs that drive market participants' FCESS offers, without the need to review the offer price ceilings more frequently than every three years.

If the ERA applies an indexation to any of the market price limits, the ERA must calculate each indexed value, publish the indexed value and the Trading Day from which it will take effect on its website and notify AEMO at least five business days before the indexed value will take effect.[46]

[45] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.26.2B (c), (online).

[46] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.26.2U, (online).

The offer price ceilings for Regulation and Contingency Reserve services, calculated as described in section 4.2 are driven by costs that can be separated into fuel and non-fuel components. The division of these cost components enables the application of the indexation method (outlined below) to suitably capture the distinct fluctuations in each of these two cost elements.

Monthly indexation of the fuel component

The fuel component is dependent on the distillate fuel price, which is subject to fluctuations in world oil prices, exchange rates and refining margins. The ERA has determined that this component should be indexed monthly to reflect the impact of those fluctuations. The ERA will use the following approach to derive the diesel price for the monthly indexation process:

1. Derive the average daily Perth terminal gate prices over the preceding three months.[47]

2. Remove GST and diesel excise that would not be paid by local generators.[48]

3. Convert the cost of diesel from Australian cents per litre (ACPL) to $/GJ based on the calorific content of diesel, the conversion factor which is currently 38.6 GJ/kL.[49]

$$Indexed\ fuel\ component(\$/MW/h) = fuel\ component\ (GJ/MW/h)\ \text{x}\ \{net\ ex\text{-}terminal\ gate\ price(\$/kL)\ /\ conversion\ factor(GJ/kL)\}$$

The fuel component will be indexed monthly commencing 1 November 2023.

Quarterly indexation of the non-fuel component

The non-fuel component is not subject to the same level of volatility, however, due to the length of time between triennial reviews, the ERA has determined that the non-fuel component should be indexed to reflect prevalent economic conditions. The ERA has determined that the non-fuel component will be indexed quarterly using the Consumer Price Index (all goods, weighted average of eight capital cities), as published by the Australian Bureau of Statistics.[50,51]

The non-fuel component will be indexed quarterly as follows:

$$Indexed\ non\text{-}fuel\ component(\$/MW/h) = non\text{-}fuel\ component\ (\$/MW/h) \times (current\ CPI\ /\ base\ CPI)$$

where the current CPI is the CPI published by ABS for the most recent quarter, and the base CPI is the CPI published by ABS for the preceding quarter.

The non-fuel component will be indexed quarterly commencing 1 January 2024.[52]

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47 Australian Institute of Petroleum website, 2023, Historical UPL and Diesel TGP Data, [retrieved on 5 September 2023], (online).

48 Australian Taxation Office website, 2023, Excise duty rates for fuel and petroleum products, Table 1 Liquid fuels, [retrieved on 5 September 2023], (online).

49 Department of Climate Change, Energy, the Environment and Water, 2023, *Australian National Greenhouse Accounts Factors*, Table 8, Diesel oil, (online).

50 Australian Bureau of Statistics website, Consumer Price Index, [retrieved on 5 September 2023], (online).

51 The ERA explored other indices, for example the Producer Price Index, however, none of the existing indices appropriately reflected the input material costs for a generator's non-fuel component.

52 The CPI used in the indexation process will be the most recently published quarterly CPI data from ABS. The ERA will undertake the quarterly indexation upon the release of the preceding quarter's CPI value.

Indexed offer price ceiling

The indexation will apply to the offer price ceilings prior to them being rounded up to the nearest multiple of $50.

$$FCESS\ Offer\ Price\ Ceiling = rounding\text{-}up\ factor + indexed\ non\text{-}fuel\ component + indexed\ fuel\text{-}component$$

Until the end of the trading interval starting at 7:30 AM on 1 March 2024, the requirement to apply a single identical offer price ceiling value will mean that the indexation process may also escalate the RoCoF Control Service Offer Price Ceiling. However, from the trading interval starting at 8:00 AM on 1 March 2024, the RoCoF Control Service Offer Price Ceiling will become zero dollar per megawatt second per hour and no index will need to be applied. The offer price ceilings for Regulation and Contingency Reserve services will continue to be indexed.

Appendix 1 List of Tables

Appendix 2 List of Figures

Appendix 3 Summary of stakeholder feedback

The ERA published the FCESS Offer Price Ceiling draft report on 18 July 2023 for consultation. The draft report did not ask any specific questions, but sought market participants' feedback on any matters relating to FCESS Offer Price Ceiling.

The ERA received four public submissions, available on the ERA's website.[53]

Table 1 summarises the issues raised by market participants and interested parties in their submissions and the ERA's responses to these issues.[54]

[53] Economic Regulation Authority website, Frequency Co-optimised Essential System Services Offer Price Ceiling, public submissions, (online).

[54] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clauses 2.26.2M (e) and (f), (online).

Table 1: Summary of stakeholder responses to the draft report on the FCESS Offer Price Ceiling determination

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
Timing and compliance					
Australian Energy Council	Timing	With the final Offer Construction Guideline being published around one month ahead of market start, and the FCESS Offer Price Ceiling final determination following, market participants have a very short period, just few weeks, to adjust to the new requirements. There is a precedent for amnesty periods.	ERA to adopt an amnesty period, given that documents are finalised and published close to new market start.	There is no such amnesty period allowed in the WEM Rules. In practice, the ERA considers the relevant circumstances applicable to each breach when determining the appropriate enforcement action for that breach. During consultation on the WEM Rules, Energy Policy WA noted that an amnesty period is not necessary, and expressed concern with the potential impact an amnesty period could have on the effectiveness and efficiency of the new WEM.[55]	No change
Synergy	Implementation considerations	Limited time for market participants to adjust their systems between new WEM start and the publications of the final Offer Construction Guideline, Trading Conduct Guideline and FCESS Offer Price Ceiling determination - final report. Further, as market trials are still ongoing, this puts additional pressure on market participants' staff to set systems and processes for the new market start to be compliant.	ERA to adopt a transitional period of at least 90 days to allow market participants to adjust to the new compliance regime.		No change

[55] Government of Western Australia, Energy Policy WA, *Response to Stakeholder Submissions*, 3 April 2023, pp. 16-17, (online).

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
Consideration of the FCESS framework					
Synergy	Inability to fully consider the FCESS framework	Market participants cannot fully consider whether the proposed FCESS Offer Price Ceilings will allow them to recover their costs, until the final Offer Construction Guideline is published. The final Offer Construction Guideline can impact the appropriateness of the proposed FCESS Offer Price Ceiling values.	ERA undertake a review of the FCESS Offer Price Ceilings under 2.26.2A of the WEM Rules after ERA publishes the final Offer Construction Guideline and seek submissions.	The FCESS Offer Price Ceiling determination has been developed alongside and in alignment with the Offer Construction Guideline. The two documents were published in close succession, allowing market participants time to consider them in parallel. Following the consultation period, no material changes have been included in the Offer Construction Guideline that would imply any inaccuracy in the FCESS Offer Price Ceiling determination. Additionally, clause 2.26.2O of the WEM Rules allows market participants to request the ERA to review a Market Price Limit six months after its most recent determination on that market price limit, if sufficient justification is provided on the inappropriateness of the Market Price Limit.[56]	No change
Interactions with the Offer Construction Guideline					
Alinta	Market participants must not include contractual costs in their Real-Time Market offers.	The draft WEM Rules explicitly permit participants to recover their contractual fuel costs. While more relevant to the offer construction guideline than the FCESS offer price ceiling, Alinta also note that Large Scale	ERA to reconsider	The WEM Rules and the Offer Construction Guideline permit the recovery of costs incurred under long-term take-or-pay fuel contracts, related to producing the relevant electricity.[57]	No change

[56] The seven Market Price Limits are the five FCESS Offer Price Ceilings, the Energy Offer Price Ceiling and the Energy Offer Price Floor.

[57] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, clause 2.16D.1 (a)(iii), (online).

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
		Generation Certificates (LGC) can be valued differently based on characteristics including their technology, location and vintage, meaning it would not be appropriate to require all renewable generators to value their LGCs at the spot rate in constructing their offers.		The FCESS Offer Price Ceiling draft and final determinations are consistent with these documents and do not prohibit the recovery of long-term take-or-pay fuel contract costs. The draft determination on the FCESS Offer Price Ceilings disallows the inclusion of costs related to a facility's forward energy sale contracts. The final Offer Construction Guideline has been updated to include guidance on this matter in section 4.1 of the final Offer Construction Guideline: "A Market Participant's EVC of generating electricity in the Real-Time Market is not affected by its contract position for electricity sales (for example, by prices agreed under power purchase agreements), long-term contract prices for Large-Scale Generation certificates, its STEM sales or its Net Contract Position."[58] LGCs are traded in an open market where the market price determines the value.	
Australian Energy Council	Accounting for Large-Scale Generation Certificates	How renewable generators should construct their offers to account for LGCs.	ERA to provide guidance.		No change
Australian Energy Council	Inconsistency with the Offer Construction Guideline	The final Offer Construction Guideline will be published around one month before market start and it is difficult for market participants to provide feedback.	ERA to outline in the Offer Construction Guideline how renewable generators should construct their offers, taking into	The Offer Construction Guideline has been updated to include: "A Market Participant's EVC of generating electricity in the Real-Time Market is not affected by its contract position for electricity	No change

[58] Economic Regulation Authority, September 2023, *Offer Construction Guideline*, p. 10, (online).

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
		The FCESS Offer Price Ceiling determination – draft report states that contractual arrangements for energy cannot be included in FCESS offers, while the draft Offer Construction Guideline is silent on that matter. There may be inconsistency between both documents.	account their power purchase agreements and commercial arrangements related to large-scale generation certificates.	sales (for example, by prices agreed under power purchase agreements), long-term contract prices for Large-Scale Generation certificates, its STEM sales or its Net Contract Position."[59]	
Include wear and tear costs into Contingency Reserve service					
Alinta	Include wear and tear costs into contingency reserve service	May arise from the facility operating at a specific level	ERA to reconsider	As outlined in the draft report, costs for wear and tear are reasonable to assume facilities will incur when providing Regulation services, where the facility is required to vary its output to follow the load. The Contingency Reserve services are enablement services, where the likelihood of a facility being dispatched to respond to contingency events is low and the facility is unlikely to incur additional wear and tear costs. Market Participants have not provided evidence of wear and tear costs arising from Contingency Reserve provision. Where evidence of such costs is provided in future, the ERA will consider the inclusion of such costs in future offer price ceiling determinations for Contingency Reserve services.	No change

[59] Economic Regulation Authority, September 2023, *Offer Construction Guideline*, p. 10, (online).

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
Recovery of opportunity costs for participation in FCESS markets					
Alinta	Uncertainty of whether the FCESS clearing price will compensate for provision of FCESS instead of energy	The incremental cost of an additional FCESS unit that will determine the FCESS clearing price may not reflect the opportunity cost between the FCESS and the energy markets, where the energy price is substantially higher than the incremental cost to provide FCESS.	Work with ERA and AEMO to test a scenario	The WEM Rules require AEMO to calculate the clearing prices for each of the FCESS markets as part of the dispatch algorithm. Energy Policy WA papers state that the opportunity costs of providing FCESS will be considered in the calculation of the FCESS market clearing prices. The ERA has developed the FCESS Offer Price Ceiling calculation method to be consistent with the WEM Rules and Offer Construction Guideline. The ERA has determined the initial FCESS Offer Price Ceilings to apply from 1 October 2023. Where market participants request a review with sufficient justification under clause 2.26.2O of the WEM Rules, the ERA will reconsider the FCESS Offer Price Ceiling values.	No change
Synergy	Expectation that WEMDE dispatch will fully compensate FCESS providers for the opportunity costs of providing FCESS vs. actual compensation	The policy intent and based on it, ERA's Offer Construction Guideline and FCESS Offer Price Ceiling determination, indicate that market participants providing FCESS will be fully compensated for the opportunity costs of providing FCESS. However, this has not been tested yet, so it is not certain that the WEMDE solution will fully compensate market participants as expected.	ERA to initiate a review of the FCESS Offer Price Ceilings as soon as possible, potentially before 1 October 2023, should WEMDE outcomes differ from the policy intent/ expectations.		No change
Rate of Change of Frequency Control Service Offer Price Ceiling set at $0/MWs per hour after 1 March 2024					
Australian Energy Market Operator	Tiebreaking and lack of economic trade off with Contingency Reserve Raise	When all offers in the RoCoF Control Service markets are $0/MWs per hour, AEMO expects that all 'In-Service' tranches will be cleared simultaneously. AEMO advised that it has not undertaken	The ERA to apply a small, but non-zero RoCoF Control Service Offer Price Ceiling and potentially to undertake a review prior to 1 March 2024.	Based on information provided to the ERA, the costs of providing RoCoF Control Service from the currently accredited facilities are nil. The ERA makes a determination only based on provided cost evidence.	No change

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
		testing on this issue to check for unintended consequences. AEMO built the dispatch engine under the premise that there is a secure limit for RoCoF Control Service and an economic trade-off with Contingency Reserve Raise. When RoCoF Control Service is always offered at $0/MWs per hour, the dispatch engine will consider it to be a 'free' service, removing the economic trade-off. This can cause distortions in the forward schedules, as offline but 'Available' capacity must be considered, which can result in unintended consequences for the dispatch process.		Further, market participants' offers will not necessarily be differentiated when the offer price ceiling is set different from $0/MWs per hour and set at an arbitrary level, because to comply with the trading conduct obligations they will offer their service at the incremental cost of the service – which is nil. The RoCoF Control Service will be scheduled in a combination with Contingency Reserve Raise. The combined requirement of both services will be an input into the dispatch engine. While RoCoF Control Service may be considered a 'free' service, its provision is dependent on the energy price offer of the facility providing it. When allocating facilities to provide services across energy and the FCESS markets, the dispatch engine will seek to arrive at a dispatch solution that would minimise costs across all markets and facilities. The WEM Rules include provisions that deal with tie-breaking and AEMO can also override the Dispatch Algorithm where necessary.	
Synergy	No clear merit order and tiebreaking resulting having undesired consequences	With all RoCoF providers having to bid at $0/MWs there will be no clear differentiation between the RoCoF offers and it is unclear how the market will decide a tiebreak. This could result in facilities being turned in and out of merit arbitrarily from interval to interval.	Tiebreak method used for FCESS provision is consistent with the energy market and consider a whole trading day instead using an interval basis. The ERA to clarify how this will be managed.		No change
Australian Energy Market Operator	Incentives	Several market participants have successfully tested to provide RoCoF Control Service as synchronous condensers. There is	The ERA to apply a small, but non-zero RoCoF Control Service Offer Price Ceiling and	The FCESS Offer Price Ceilings are not the mechanism by which new technologies can be incentivised to enter the market. The ERA must set them in a way that will allow the highest	No change

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
		no incentive for these facilities to offer to provide RoCoF Control Service in this mode, limiting AEMO's options to manage low load events.	potentially to undertake a review prior to 1 March 2024.	cost providing facility to recover its costs when providing the service. None of the accredited facilities have provided cost evidence for the RoCoF Control Service. Where a facility was to accredit to provide RoCoF Control Service, for example as a synchronous condenser with non-zero costs, the market participant responsible for this facility can provide cost evidence to the ERA and use the process allowed in the WEM Rules (clause 2.26.2N or 2.26.2NA) to request the ERA to review the appropriateness of the RoCoF Control Service Offer Price Ceiling considering the added mode of providing of that service. WEM Rule 9.10 describes the Settlement Calculations for the Essential System Services.[60] The FCESS Uplift Payment amount for each dispatch interval is the maximum of the enablement losses calculated for the different FCESS.	
Synergy	No incentive for new technologies	$0/MWs does not provide an incentive for new technologies, such as synchronous condensers, to enter the RoCoF Control Service market.	ERA to review and ensure that incentivises new entrants into the RoCoF Control Service market.		No change
Synergy	Costs to market due to large Uplift payments	Market will incur additional costs, via the FCESS Uplift Payments, when facilities are turned on only to provide RoCoF Control Service, as it will be deemed 'free' by the dispatch engine.	Clarity of how FCESS Uplift payments will be allocated to the FCESS services		No change
Australian Energy Market Operator	Obligatory participation	Accredited facilities must provide RoCoF Control Service over the first six months. There is no obligation for participation thereafter. Without financial incentives, it is likely that market participants may withdraw from this market. AEMO will have to direct	The ERA to apply a small, but non-zero RoCoF Control Service Offer Price Ceiling and potentially to undertake a review prior to 1 March 2024.	The FCESS Offer Price Ceilings are part of a broader market power mitigation framework and provide a back stop for other elements of this framework. They are set in a way that allow for the highest cost providing facility to recover its costs.	No change

[60] Consolidated companion version of the *Wholesale Electricity Market Rules (WA)*, 22 July 2023, rule 9.10, (online).

Raised by	Sub-Issues	Description of issue	Request/ Suggestion	ERA response	Change
		facilities to prevent shortfalls, which is an inefficient outcome.		In the case of shortages, the WEM Rules provide for other mechanisms, including AEMO having the ability to direct facilities to provide services or to trigger the supplementary essential system services mechanism due to lack of participation. As stated earlier in this table, the FCESS Offer Price Ceilings do not have the function to incentivise participation in markets, but to allow for facilities to recover their costs when providing these services.	