Economic Regulation Authority

Frequency Co-optimised Essential System Services Offer Price Ceiling determination

Draft report

23 March 2026

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Invitation to make submissions

Submissions are due by 4:00pm WST, Tuesday, 21 April 2026

The ERA invites comment on this paper and encourages all interested parties to provide comment on the matters discussed in this paper and any other issues or concerns not already raised in this paper.

We would prefer to receive your comments via our online submission form https://www.erawa.com.au/consultation.

You can also send comments through:

Email: publicsubmissions@erawa.com.au
Post: Level 4, Albert Facey House, 469 Wellington Street, Perth WA 6000

Please note that submissions provided electronically do not need to be provided separately in hard copy.

All submissions will be made available on our website unless arrangements are made in advance between the author and the ERA. This is because it is preferable that all submissions be publicly available to facilitate an informed and transparent consultative process. Parties wishing to submit confidential information are requested to contact us at info@erawa.com.au.

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Executive summary

There are currently five Frequency Co-optimised Essential System Services (FCESS) markets supporting the Wholesale Electricity Market (WEM). These markets are:

- Contingency Raise and Contingency Lower.[1]

- Regulation Raise and Regulation Lower.[2]

- Rate of Change of Frequency Control Service (RoCoF).[3]

In the Real-Time Market (RTM), energy and FCESS are dispatched in a co-optimised manner under security constrained economic dispatch to ensure supply and demand are met for each five-minute dispatch interval, subject to system conditions and constraints. The co-optimisation dispatch process determines the clearing prices in all individual markets, which is used to compensate Market Participants for the provision of energy and FCESS.[4] Whilst Facilities are dispatched over a five-minute interval, settlement occurs over 30-minute intervals.

The Economic Regulation Authority determines FCESS Offer Price Ceiling (OPC) values for each of the five FCESS markets, setting the maximum price at which Market Participants can offer in those markets. It is worth noting however, that due to co-optimisation between FCESS and RTM, settlement outcomes in FCESS markets can be at a price greater than the FCESS OPC.

The Electricity System and Market (ESM) Rules require us to determine a new FCESS OPC by 1 June 2026.[5] This rule was introduced as part of the 20 November 2024 rule changes to the FCESS rule provisions.

The ESM Rules require that the ERA set the OPCs 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.[6]

The ERA has consulted with owners and/or operators of accredited Facilities and collected their expected costs of providing FCESS. We sent an information request to Market Participants in December 2025 and received the requested information at the end of January 2026. Using a combination of this information and actual WEM operational data, we

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[1] The contingency raise and lower price ceilings replaced the previous spinning reserve and load rejection reserve ancillary services. See Economic Regulation Authority, 18 July 2023, *Frequency co-optimised essential system services offer price ceiling determination: Draft report*, p. ii, (online).

[2] The regulation raise and lower price ceilings replaced the previous load following upward and downward ancillary services. See Economic Regulation Authority, 18 July 2023, *Frequency co-optimised essential system services offer price ceiling determination: Draft report*, p. ii, (online).

[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] Compensation for energy will use a 30-minute reference trading price that averages the six five-minute energy market clearing prices over the trading interval. Compensation for FCESS will use the five-minute FCESS market clearing price unless it is higher than the FCESS clearing price ceiling.

[5] Electricity System and Market Rules (WA), 26 February 2026, clause 1.61.3, (online).

[6] Ibid, clause 2.26.2B(a), (online).

have determined the highest cost that a Facility may incur in providing FCESS. The highest of these costs sets the FCESS OPC for each market.

Consistent with clause 2.26.2B(b) of the ESM Rules, the raw values for each price ceiling are rounded up to the nearest multiple of $50 per Megawatt (MW) per hour for the contingency and regulation services, and $50 per MW seconds per hour for the RoCoF Control Service.[7]

The ERA's proposed FCESS OPC values are stated in Table 1, along with the price ceilings from the previous final determination (published in September 2023) for comparison, and the relevant change in the value of the price ceilings.[8]

As part of the market power mitigation strategy in the WEM, OPCs must be applied to offers submitted in the five FCESS markets.[9] The FCESS OPCs are intended to serve as a backstop for other elements of the market power mitigation framework and are to be set at a level high enough to allow Market Participants to recover their efficient costs.[10]

For this draft determination, we used the actual data from our highest cost Facilities to calculate the FCESS OPCs (as opposed to simulated data for our previous determination in 2023). We used actual data from November 2024 to November 2025. This is because the FCESS markets have existed for over two years (at the time of this determination). The previous determination was made prior to the commencement of the new WEM, so there was no actual market data available. The previous determination calculated the FCESS OPC using Facility information provided by Market Participants at that time and simulated the hypothetical highest costs in each FCESS market. Overall, our approach this time more accurately reflects real market conditions experienced by Market Participants to set the price ceilings.

Consistent with ESM Rule 2.26.2B(a), our calculation model accounted for those variable costs that are not compensated through other WEM market mechanisms to determine the highest cost Facility of providing FCESS in the South West Interconnected System (SWIS).[11] These variable costs are consistent with our Offer Construction Guideline, and are outlined below:

- Costs associated with the change in fuel consumption (includes fuel costs, heat rate and output).

- Portion of Start-up and shutdown costs not recovered in energy offers due to FCESS provision.

- Other avoidable fixed costs (costs that are incurred over time while the facility is running rather than dependant on the amount of energy generated).

- Additional wear & tear costs (for regulation services only). [12]

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[7]   Each of the FCESS are explained on page ii of the Executive Summary.

[8]   Economic Regulation Authority, 21 September 2023, *Frequency co-optimised essential system services offer price ceiling determination: Final report*, (online).

[9]   Energy Policy WA, 10 November 2022, *Market Power Mitigation Strategy Information Paper*, pp. 26-27, (online).

[10]   Ibid, pp. 14-16, (online).

[11]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(a), (online).

[12]   The Contingency Reserve service is an availability service, i.e., Facilities are held at a specified output level to provide a raise or lower service, if a contingency event occurs. Therefore, the calculation method does not consider additional wear and tear costs for these services.

The results of our calculations are that the Regulation Raise and Contingency Raise price ceilings have decreased by 17 per cent from the previous determination, by $50 MW per hour to $250 per MW per hour.

The Contingency Lower price ceiling decreased significantly by $250/MW/h or 83 per cent to just $50/MW/h. This is due to the limited number of frequency deviation events that would have required generators to lower their load point. Contingency Lower has reasonably low price offers, so that a Facility can recover the costs of the sparse number of frequency deviation events that occur meaning that a high price ceiling is not needed.

The Regulation Lower price ceiling remains unchanged at $300MW/h.

For the RoCoF Control Service price ceiling, we propose to continue to set this ceiling at zero, in line with our previous determination.[13] This is because the marginal cost of providing RoCoF once a synchronous Facility is already generating is zero. No information from Market Participants has been provided that there is a cost not compensated through other markets for the provision of this service.

Table 1: **FCESS Offer Price Ceilings in this draft determination and the previously determined price ceilings**

FCESS Market	Price Ceiling in this determination	Previously determined Price Ceiling	Change	Indexed price ceilings (March 2026)
Regulation Raise ($/MW/h)	250	300	(50) (17%)	250
Regulation Lower ($/MW/h)	300	300	-	250
Contingency Raise ($/MW/h)	250	300	(50) (17%)	250
Contingency Lower ($/MW/h)	50	300	(250) (83%)	250
Rate of Change of Frequency control service ($/MWs per hour)	0	0	-	0

Source: ERA analysis of Market Participant data and Economic Regulation Authority, 2023, *Frequency co-optimised essential system services offer price ceiling determination: Final report*, (online).

ERA indexation of the FCESS offer price ceilings, Economic Regulation Authority, *Frequency Co-optimised Essential System Services Offer Price Ceiling Indexed Values*, (online).

The ERA invites Market Participants and other interested parties to provide feedback and relevant evidence on any aspect of this draft determination.

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13   Economic Regulation Authority, 21 September 2023, *Frequency co-optimised essential system services offer price ceiling determination: Final report*, pp. iv and 4, (online).

1.   Introduction

As part of the market power mitigation strategy in the WEM, offer price ceilings apply to offers submitted in the five FCESS markets. The FCESS Offer Price Ceilings are intended to serve as a backstop for other elements of the market power mitigation framework and are to be set at a level high enough to allow Market Participants to recover their efficient costs.[14]

The five FCESS markets are: Regulation Raise, Regulation Lower, Contingency Raise, Contingency Lower and RoCoF control service. The ERA determines the OPC for these five FCESS markets. The OPC for each FCESS market represent the maximum offer price that a Market Participant may include in a Real-Time Market Submission or a Standing Real-Time Market Submission for the provision of FCESS from a Facility accredited to provide such service. However, the market clearing prices for each of the FCESS markets will be determined through co-optimisation with energy in the dispatch engine and is not constrained by the offer price ceilings.[15]

As outlined in the ERA's Offer Construction Guideline, FCESS offer prices should include only incremental efficient variable costs that Market Participants expect to incur when providing a specific FCESS that will not be reimbursed through any other market-based compensation mechanism, including the FCESS Uplift Payment.[16,17]

The ERA generally reviews the FCESS Offer Price Ceilings at least once every three years. This current review is required to be completed by 1 June 2026. As the FCESS OPC are determined for a three-year period, an indexation process can be determined to apply to each ceiling.[18]

1.1   The ERA's approach

This is the second time that the ERA has determined the FCESS Offer Price Ceilings. The ERA has published this draft report for public consultation and will publish a final report by 1 June 2026.[19]

1.1.1   Consultation

The consultation for this draft determination involved formal data requests to owners/operators of accredited Facilities to provide FCESS cost information. The ERA's consultation focused on the information that informs what costs Market Participants can expect to incur for the accredited Facilities to provide FCESS.

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 interruptible loads. Scheduled and semi-scheduled Facilities

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[14]   Energy Policy WA, 10 November 2022, *Market Power Mitigation Strategy Information Paper*, pp. 14-16, (online).

[15]   Co-optimisation enables generators to offer their full capacity into energy and FCESS markets while remaining commercially indifferent as to which services they are dispatched to provide. This is because the co optimisation process will, in most cases, consider the opportunity costs of providing FCESS. See Energy Transformation Taskforce, 1 December 2019, *Essential System Services: Scheduling and Dispatch*, section 3.2, (online).

[16]   Economic Regulation Authority, 1 February 2025, 'Offer Construction Guideline', (online).

[17]   Electricity System and Market Rules (WA), 26 February 2026, clause 9.10.3B, (online).

[18]   Ibid, clause 2.26.2B(c).

[19]   Ibid, clause 1.61.3.

can provide any of the five FCESS, whereas interruptible loads will only provide Contingency Reserve Raise. Different Facility types incur different types of costs.

1.1.2 Cost evaluation

The ERA examined all costs provided by Market Participants in response to our data request and developed a calculation method to assess the highest cost provider for each FCESS. Chapter 3 sets out the ERA's process and calculation method.

Once the highest cost provider for each service was identified, the ERA determined the proposed offer price ceiling for the respective FCESS market. The ESM Rules require that each determined FCESS Offer Price Ceiling value is rounded up to the next $50/MW per hour or $50/MWs per hour.[20]

1.1.3 Draft determination

This report sets out the ERA's draft determination of the FCESS OPC and commences the public stage of the consultation process.

The ERA's Secretariat staff are available to consult with interested parties and Market Participants on the proposed FCESS OPC throughout the consultation period.

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[20]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(b), (online).

2. Frequency Co-optimised Essential System Services

FCESS are needed to maintain security and reliability in the power system. They regulate frequency in real time and in response to contingency events by increasing or reducing output in response to minor and major imbalances between supply and demand.[21] AEMO must procure adequate quantities of FCESS to meet the Essential System Service Standards set out in clause 3.10 of the ESM Rules. AEMO procures the required FCESS quantities through the five FCESS markets.

2.1 Requirements for Facilities to provide FCESS

Accreditation for FCESS includes requirements for Facilities to meet specific technical arrangements outlined by AEMO in its FCESS Accreditation WEM Procedure.[22] This Procedure describes the performance parameters, communication capabilities, and other requirements a Facility must fulfill to become accredited to provide FCESS. Each accredited Facility has a FCESS trapezium which is made up of the minimum and maximum enablement levels and the low and high break points. The minimum and maximum enablement levels define the range of the Facility's heat rate curve, where the Facility is able to provide the relevant FCESS. The low and high break points define the range within the trapezium, where the Facility can provide its full accredited FCESS quantity.

2.2 Regulation services

The Regulation service is used to continuously balance supply and demand to maintain frequency within the normal operating bands.

Regulation services include increasing or reducing output to manage frequency and are procured through the Regulation Raise and Regulation Lower markets, respectively. Regulation services are provided by a Facility adjusting its injection or withdrawal following relatively small fluctuations of demand 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.

AEMO will determine the quantity of Regulation Raise and Regulation Lower to be procured in each dispatch interval by taking into account various factors such as the variability of demand, variability of intermittent sources, inherent error in dispatch, and the damping effects from droop and system inertia.[23] The Regulation Raise and Regulation Lower quantities are set as input variables into the dispatch algorithm, ensuring that the required quantities are procured from the respective Regulation Raise and Regulation Lower markets to be included in the dispatch algorithm. FCESS providers will make offers for Regulation Raise and Regulation Lower markets through Real-Time Market Submissions. The dispatch engine will determine which Facility is chosen to provide the relevant service based on the offers, system conditions such as constraints, requirements, and other factors.

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[21] 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.

[22] Australian Energy Market Operator, 1 April 2024, *WEM Procedure: Frequency Co-optimised Essential System Services Accreditation*, (online).

[23] Energy Transformation Taskforce, August 2019, *Frequency Control Technical Arrangements – Information Paper*, (online).

If there is a shortfall of total quantity offered such that the required Regulation Raise or Regulation Lower quantity cannot be procured from the market, AEMO may issue directions to accredited participants to offer accredited capacity.[24]

AEMO's FCESS Accreditation WEM Procedure requires that offers in the Regulation markets are made at a minimum of 10 MW.

2.3   Contingency reserve service

The contingency reserve service is separated into Raise and Lower components. The service holds capacity in reserve to rapidly adjust output up or down to maintain frequency within operating standards after a contingency event.

Contingency Raise requires a Facility to increase output in response to under frequency on the system following the loss of supply.[25] This might occur when a generator or a network asset trips or fails, and the system frequency decreases. Contingency Reserve Raise can be provided by an interruptible load in block response.[26]

Contingency Lower requires a Facility to reduce output in response to over-frequency on the system, for example, following the loss of demand. This might occur when a network outage disconnects consumers.

The contingency reserve services must be sustained for at least 15 minutes following a contingency event on the system.[27]

The dispatch engine uses a Dynamic Frequency Control Model to calculate the Contingency Reserve Raise requirement relative to the quantity of Rate of Change of Frequency (RoCoF) Control Service to allow AEMO to maintain system frequency within the credible contingency event frequency band.[28]

AEMO models system frequency based on different configurations (set of inputs) of the system and includes a matrix that will be used to determine the Contingency raise or lower requirement relative to demand level, the largest contingency, and the level of system inertia.

From the output of the model, for each dispatch interval or pre-dispatch interval, AEMO will calculate a Contingency Reserve Raise and Contingency Reserve Lower Offset, which is a MW value that increases or decreases the largest supply and load contingency requirement.[29] At this stage, the dispatch algorithm has been formulated to treat Contingency Lower Offset as zero. Therefore, this parameter has no impact on dispatch outcomes.[30] The contingency requirement is then calculated as the largest contingency less the offset.

The requirements for the Contingency Reserve Raise and RoCoF Control Service will be set as the lowest cost combination of Facilities, including limiting the dispatch of Facilities to reduce the requirement. AEMO publishes a set of essential systems services system

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24   Electricity System and Market Rules (WA), 26 February 2026, clause 3.11.2, (online).

25   For demand side provision, a load would rapidly reduce demand.

26   Electricity System and Market Rules (WA), 26 February 2026, clause 2.34A.6 (d), (online).

27   Ibid, clause 7.10.18.

28   Energy Transformation Taskforce, 1 December 2019, *Essential System Services: Scheduling and Dispatch – Information Paper*, (online).

29   Electricity System and Market Rules (WA), 26 February 2026, clause 7.5.11, (online).

30   Australian Energy Market Operator, 6 January 2025, *WEM Procedure: Dispatch algorithm formulation,* section 2.2.14, p. 14, (online).

configurations and the associated combination Contingency Reserve Raise and RoCoF Control Service quantities on its website.[31]

The requirement for Contingency Reserve Lower is set outside the dispatch algorithm and is an input to determining whether security standards are being met.[32]

AEMO's WEM procedure requires that contingency reserve providers offer the services in a minimum of five MW, while block responses must be of a maximum size of 65 MW.[33]

2.4   Rate of Change of Frequency control service

1.   The RoCoF control service provides inertia to instantaneously slow down the rate of change of the SWIS Frequency.[34] The service is measured in megawatt seconds (MWs) and has two functions: 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.[35]

The ESM 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.[36] It is conventionally provided as a by-product from the physical rotation of conventional generator turbines.

AEMO must schedule and dispatch sufficient Contingency Reserve Raise and RoCoF Control Service to ensure that following a contingency, the frequency is maintained within the relevant frequency bands and the RoCoF Safe Limit. The RoCoF Safe Limit is 0.75 Hz/s over any 500 milliseconds period.[37] On 26 February 2026, in accordance with Schedule 1A of the Electricity System and Market Amendment (Tranche 9) Rules 2025, the RoCoF Safe Limit was amended from 0.25 Hz over any 500 millisecond period to 0.75 Hz/s measured over any 500 millisecond period. Additionally, the corresponding unit has also been adjusted to be Hz/s measured over any 500 millisecond period. The amendment to the Safe Limit is intended to maintain a secure SWIS in a more economically efficient manner. The key outcomes from this amendment are larger allowable contingencies and fewer interventions by the AEMO control room.[38] The RoCoF Control Service requirement is determined in the Dynamic Frequency Control Model together with the Contingency Reserve Raise requirement.

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[31]   Australian Energy Market Operator, *Procedures, Policies and Guides*, (online).

[32]   Electricity System and Market Rules (WA), 26 February 2026, clause 3.9.7, (online).

[33]   Australian Energy Market Operator, 'Summary of Frequency Co-optimised Essential System Services', (online) [accessed 6 March 2026].

[34]   Electricity System and Market Rules (WA), 26 February 2026, clause 3.9.7, (online).

[35]   Australian Energy Market Operator, 'Summary of Frequency Co-optimised Essential System Services', (online) [accessed 6 March 2026].

[36]   Electricity System and Market Rules (WA), 26 February 2026, chapter 11, (online).

[37]   Australian Energy Market Operator, 'Current FCESS and RoCoF Ride-Through Accreditation Parameters' (online) [accessed 6 March 2026].

[38]   Australian Energy Market Operator, 'Real Time Market Insights Forum', (10 February 2026), (online) [accessed 9 March 2026].

3. Determining the highest cost FCESS provider

This section steps out the method the ERA has developed to calculate the FCESS OPCs. 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 OPC 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 OPC to reflect movements in input costs and, if so, determining the formula for the indexation calculation and the frequency at which indexation will apply.[39]

The ERA calculates the FCESS OPCs for the WEM using the costs of Facilities currently accredited to provide FCESS.

3.1 Data collection for this draft determination

The ERA has used data collected from Market Participants in January 2026 to support the calculation of the FCESS Offer Price Ceilings.[40]

3.2 Consistency with the Offer Construction Guideline

The Offer Construction Guideline provides guidance to Market Participants on the costs that may be included in their FCESS and energy offers to comply with the ESM Rules.[41] The ERA's draft determination on the FCESS Offer Price Ceilings is consistent with the Offer Construction Guideline.

A Market Participant may make an Economic Price Offer which is a price offered by a Market Participant, in its Portfolio Supply Curve or in a Real-Time Market Submission, which is not greater than the Market Participant's reasonable expectation (based on the information available at the time the offer was made) of the sum of all efficient variable costs for the provision of the relevant Market Service.[42]

In the WEM, a Market Participant must not make an Irregular Price Offer (for the FCESS or energy markets) that results in an inefficient market outcome.[43]

The Offer Construction Guideline provides guidance on what costs are considered efficient variable costs that a Market Participant is expected to include in its offers. Table 11 in the Offer Construction Guideline lists the efficient variable costs components that may be included in Real-Time Market offers.[44]

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[39]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B, (online).

[40]   Ibid, clauses 2.16.6 and 2.26.2R.

[41]   Economic Regulation Authority, 1 February 2025, *Offer Construction Guideline*, (online).

[42]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.16C.6A., (online).

[43]   Ibid, clause 2.16C.5, (online).

[44]   Economic Regulation Authority, 1 February 2025, *Offer Construction Guideline*, pp. 10-11, (online).

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 is the incremental efficient variable cost calculated over a dispatch cycle that is not necessarily equal to a dispatch interval. This method allows a Facility to recover its costs, including start-up costs, over a series of dispatch intervals. The Offer Construction Guideline explains how average operating costs may be included when constructing FCESS offers.[45]

Opportunity costs

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

Contractual arrangements

For all costs incurred under long-term take or pay fuel contracts, the ESM Rules allow Market Participants to make Economic Price Offers. This refers to a price offered by a Market Participant, in its Portfolio Supply Curve or in a Real-Time Market Submission, which is not greater than the Market Participant's reasonable expectation (based on the information available at the time the offer was made) of the sum of all efficient variable costs for the provision of the relevant Market Service.[46]

3.3   Calculation method

The ERA has considered each accredited Facility when calculating the OPC for each FCESS market. The method below shows the calculation of costs for generators that participate in the FCESS markets.

The FCESS OPC values should be set high enough to allow Market Participants to recover the efficient variable cost of providing FCESS for the relevant Facility. Each Facility has a "trapezium", within which it can provide each FCESS, where the height is the FCESS quantity, and the width is the start and end points of the possible provision along its heat rate curve. The low and high break points restrict the area within which the Facility can provide the maximum accredited capacity of the FCESS (Figure 1). These points provide an array of potential costs that a Facility may incur when providing the relevant FCESS.

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.

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[45]   Economic Regulation Authority, 1 February 2025, *Offer Construction Guideline*, pp. 16-17, ([online](#)).

[46]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.16C.6A., ([online](#)).

Figure 1:   Example of a FCESS trapezium
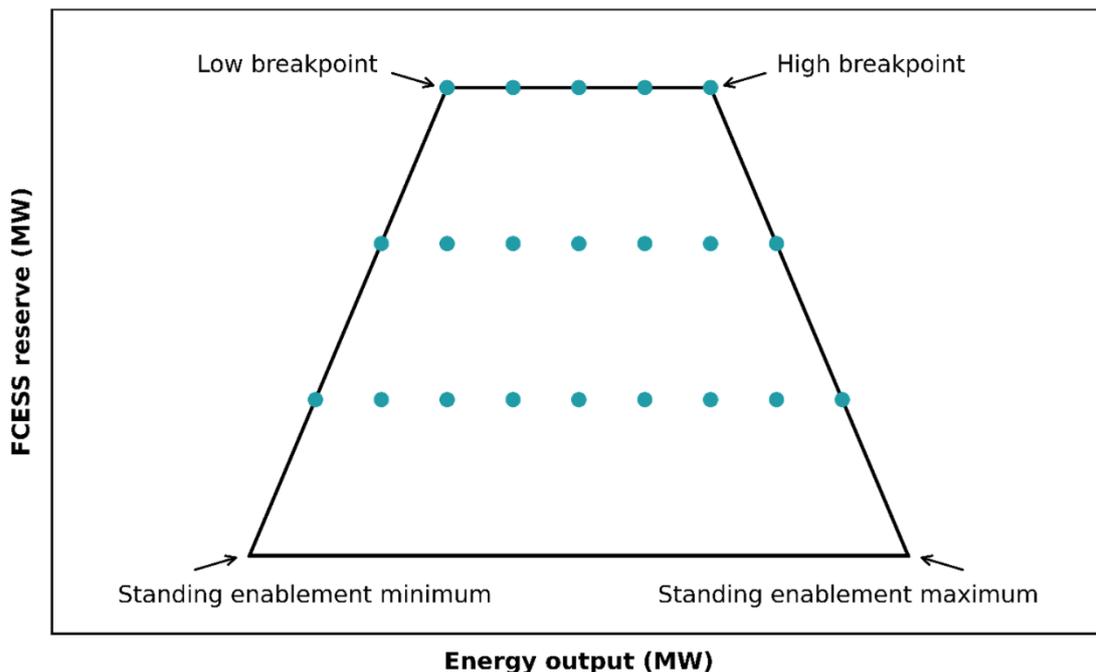
For this draft determination, we used the actual data from the highest cost Facilities for the period 20 November 2024 to 20 November 2025 to calculate the FCESS Offer Price Ceilings (as opposed to simulated data for the previous determination in 2023). Given the FCESS markets have been in place for over two years (at the time of this determination), we are able to rely on real data, rather than simulated data for this determination. Our calculation method uses each Facility's trapezium for each FCESS to find the highest costs when providing the respective FCESS.[47] We also used the actual run times and scheduled quantities of the Facilities to conduct the calculations. The one-year time period from November 2024 was chosen because of changes in the WEM and a large overhaul of the ESM Rules before this time. We consider that a full year of data is sufficient to determine the price ceilings.

Total FCESS costs are calculated on a per dispatch interval basis because an FCESS schedule can shift significantly between two different dispatch intervals with very little change to the operations of a Facility. This is unlike the calculation of the Energy Offer Price Ceiling, where Facilities need to ramp up or down if an energy schedule shifts.

Consistent with ESM Rule 2.26.2B(a), our model accounted for those variable costs that are not compensated through other WEM market mechanisms to determine the highest cost Facility of providing FCESS in the SWIS. [48] These variable costs are consistent with our Offer Construction Guideline, and are explained below:

- Costs associated with the change in fuel consumption (includes fuel costs, heat rate and output).

- Portion of Start-up and shutdown costs not recovered in energy offers due to FCESS provision.

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

[48]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(a), ([online](#)).

- Other avoidable fixed costs (costs that are incurred over time while the facility is running rather than dependant on the amount of energy generated).

- Additional wear & tear costs (for regulation services only).[49]

3.3.1 Change in fuel costs

A change in fuel costs can occur when a Facility must generate at a lower level of output at the actual load point to have sufficient head room to provide FCESS, instead of generating at the full possible amount (opportunistic load point). Fuel costs increase, when moving to a less efficient point on a Facility's heat rate curve, where the Facility consumes more fuel to produce energy. A Facility operating at a lower efficiency due to FCESS can incorporate those costs into either their energy offer or their FCESS offer (but not both offers).

The average fuel costs ($/MWh) are calculated using the formula:

$$\frac{heat\ rate\ \times\ fuel\ price}{output}$$

Where the units for each component are:

- Heat rate: GJ/MWh

- Fuel price: $/GJ

- Output: MW

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[49] The Contingency Reserve service is an availability service, i.e., Facilities are held at a specified output level to provide a raise or lower service, if a contingency event occurs. Therefore, the calculation method does not consider additional wear and tear costs for these services.

Figure 2:   Change in average fuel cost
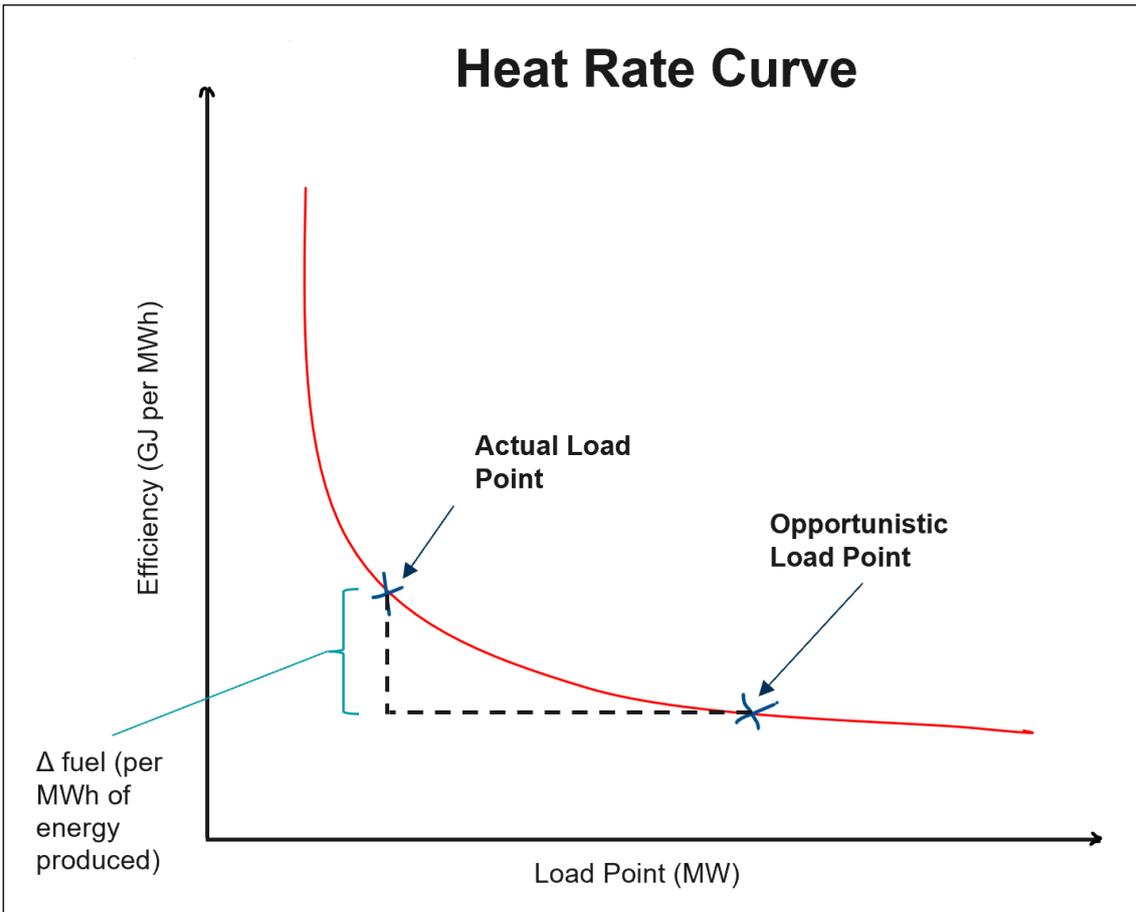
Source: ERA analysis graph

Figure 3:   FCESS load points and energy costs
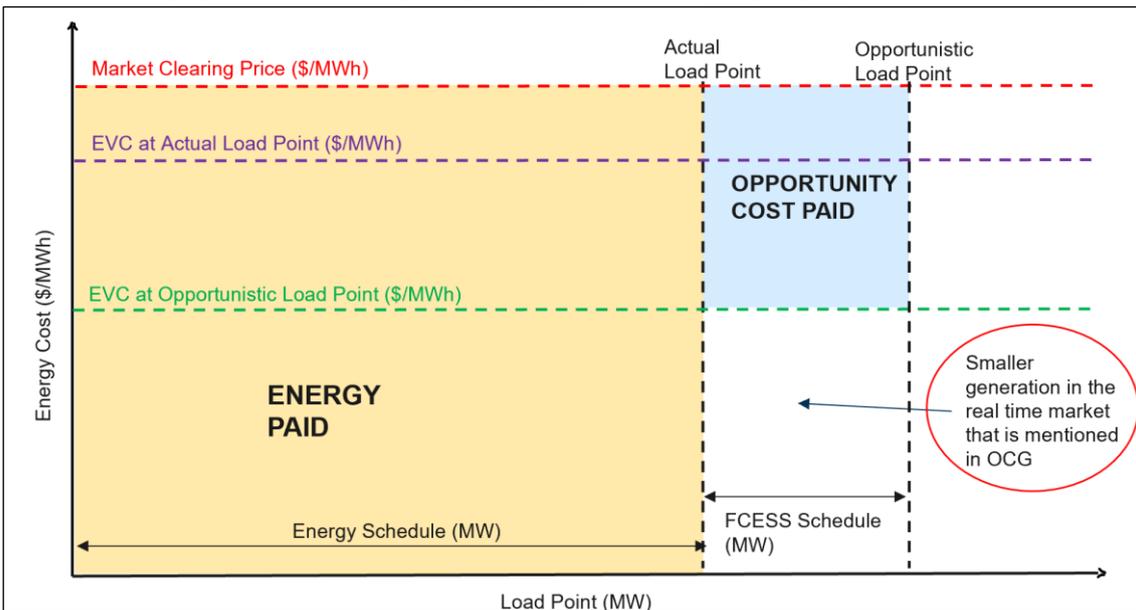
Source: ERA analysis

3.3.2 Start-up and shut down costs

The start-up and shut down costs (SUSDC) used in this FCESS Offer Price Ceiling draft determination are derived from information provided by Market Participants through the ERA's data collection.

The SUSDCs for energy are calculated by dividing the output (MW) of a Facility by its runtime. The added start-up cost from providing FCESS is from the effect of allocating its start-up cost to smaller generation in the Real-Time market for energy dispatch. This is shown in Figure .

3.3.3 Additional maintenance costs

The additional maintenance cost is a static $ per MW per hour number that the Market Participants provide to the ERA and added directly onto the other costs of FCESS provision.

3.3.4 Other avoidable fixed costs

For FCESS provision, the avoidable fixed costs are conceptually similar and mathematically the same as additional SUSDCs in that they are allowing recovery of smaller generation in the energy market, except that avoidable fixed costs are calculated per dispatch interval instead of per run. The ERA's Offer Construction Guideline provides further information on this cost element.[50]

3.3.5 Application of our calculation method

Our FCESS calculation used data from 20 November 2024 to 20 November 2025. The methodology for calculation is summarised below:

1. Using data provided by market participants we calculated the time between the Facility runs to determine the operating state of the Facility (e.g. hot, warm cold) and allocate the appropriate SUSDCs for each run.

2. We used the SUSDCs, run length, and scheduled quantities for FCESS services and we determined the cost per run for SUSDCs ($ per MW per hour).

3. For each dispatch interval, we used the Facilities' schedule to get the load points and using the Facilities heat rate curve calculated the lost fuel efficiency cost ($ per MW per hour).

4. For each dispatch interval, we calculated the added avoidable fixed costs for providing each FCESS service (based on the schedule) in $ per MW per hour.

5. We add the additional maintenance cost provided to us (if any) that is incurred for the Regulation services.

We have determined the highest cost Facilities by using the data from Market Participants to conduct our calculations. For the contingency lower offer, regulation raise and regulation lower offer price ceilings, the highest cost Facility was PINJAR_GT9. For the contingency raise offer price ceiling, the highest cost Facility was Alinta_PNJ_U2. Appendix 3 provides graphs which detail the cost distributions for the highest cost Facilities that we have identified.

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[50] Economic Regulation Authority, 1 February 2025, *Offer Construction Guideline*, pp. 32-33, ([online](#)).

We assumed a highest cost scenario for each of the regulation and contingency raise services, given the actual service quantities in each scenario. This is because both regulation services are continually being used. For contingency raise, the highest cost is incurred when the Facilities are not called upon to provide energy and are sitting at a low point on their heat rate curve, running at an inefficient level.

In contrast to the other services, the contingency lower service requires that the scheduled Facility sits at a higher point on its heat rate curve, such that it is generally running at an efficient level. This is because the Facility can lower its output if a large load goes off-line.

We have excluded the outlying data points that would skew the price ceiling and promote inefficient provision of FCESS. The maximum cost from the remaining scheduled intervals for any one Facility is that Facility's highest cost point. For each of the Regulation and Contingency Reserve services, the Facility with the highest cost is then used to set each of the FCESS Offer Price Ceilings.

Unlike energy, the FCESS contingency schedules do not have a minimum enablement quantity, meaning that the schedules can be a fraction of 1 MW. Our analysis did not consider such schedules (that are below 1 MW) because the costs in $ per MW per hour can increase significantly as the schedule approaches zero, while the cost in $ of the same provision is extremely low.

Finally, as required by the ESM Rules, we rounded up the raw price ceiling to the nearest multiple of $50/MW/hr.[51]

Figure 4:   Hypothetical example of a frequency distribution of Facility costs
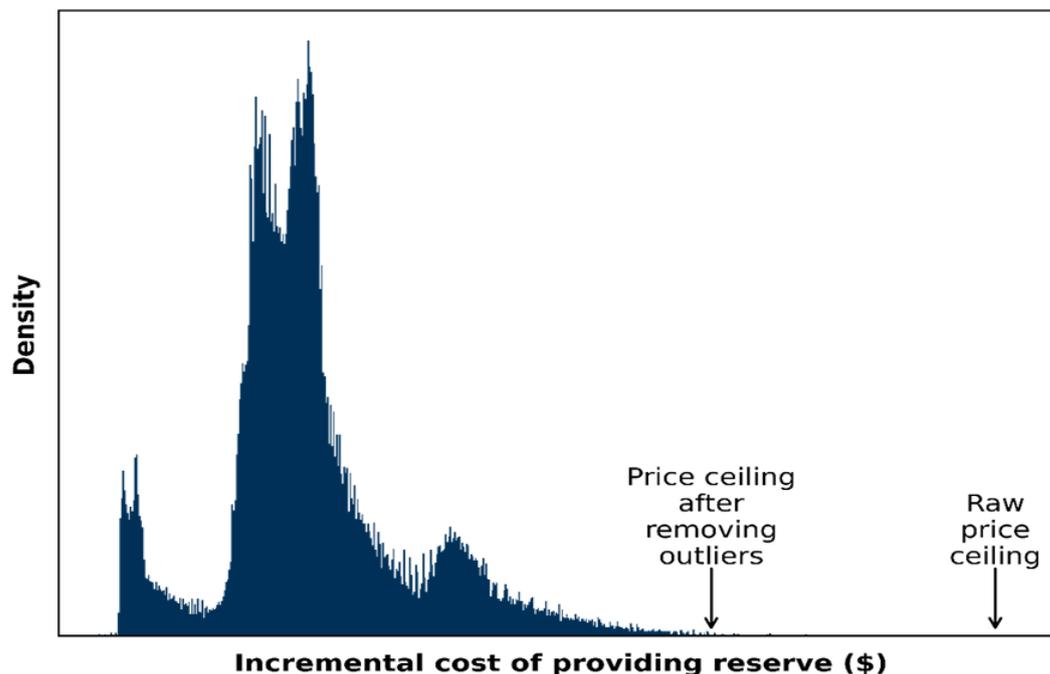
Source: ERA model

When providing RoCoF control service, a generator needs to be already 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

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[51]   Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(b), ([online](#)).

when providing RoCoF control service and would be expected to recover any costs through its energy offers.

3.4 Indexation

The ESM Rules require us to consider whether an indexation should apply to the FCESS Offer Price Ceilings to reflect movements in input costs, and if so, to determine the formula for the indexation calculation and the frequency at which indexation will apply.[52]

The indexation process would allow updating the offer price ceilings at regular time intervals, to adjust input costs to reflect various factors driving Market Participants' FCESS offers, without the need to review the offer price ceilings more frequently than every three years, subject to no material changes in market circumstances.

The ERA currently indexes the FCESS Offer Price Ceilings to changes in diesel prices on a monthly basis and to changes in the Consumer Price Index (CPI) for Perth on a quarterly basis. As part of our indexation, we use any changes in diesel fuel costs including with reference to Terminal Gate Prices.[53] We refer to the CPI which is published quarterly by the Australian Bureau of Statistics.[54] The CPI measures price increases in a basket of goods and services purchased by households and generally represents price shifts in the economy that is expected to impact Market Participants.

The ERA proposes that following the publication of the final determination by 1 June 2026, the rounding up of the indexed FCESS offer price ceilings will be to the nearest dollar per megawatt hour, instead of rounding up to the nearest $50/MW per hour. We have currently been rounding up the indexed price ceiling to the nearest $50/MW per hour each month in accordance with our previous determination in 2023.[55] However, we propose to change this because rounding up to the nearest $50/MW per hour unnecessarily inflates the price ceilings. The ESM Rules only require rounding up to the nearest $50/MW per hour as part of the determination of the FCESS offer price ceilings, and do not require rounding up as part of the indexation of these price ceilings.[56]

Where there are material changes in market circumstances, such as a new technology entering any of the FCESS markets, the ERA may decide to review any or all of the FCESS Offer Price Ceilings to ensure they continue to represent the costs of the highest-cost FCESS provider. Additionally, Market Participants may request the ERA to review an FCESS Offer Price Ceiling, if they consider that material changes in market circumstances have occurred.[57]

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[52] Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(c), (online).

[53] Australian Institute of Petroleum, Historical ULP and Diesel TGP Data, (online) [accessed 9 March 2026].

[54] Australian Bureau of Statistics, Consumer Price Index, Australia, (online) [accessed 6 March 2026].

[55] Economic Regulation Authority, 21 September 2023, *Frequency co-optimised essential system services offer price ceiling determination: Final report*, pp. 14-16, (online).

[56] Electricity System and Market Rules (WA), 26 February 2026, clause 2.26.2B(b), (online).

[57] Ibid, clause 2.26.2N and 2.26.2NA, (online).

4.   Draft determination

This section provides the ERA's values for the draft determination of the FCESS Offer Price Ceilings. The ERA determines the FCESS Offer Price Ceilings for all five FCESS markets, being Contingency Reserve Raise and Lower, Regulation Raise and Lower and the RoCoF control service. These price ceilings are intended to apply from 1 July 2026, although the price ceilings could be amended based on stakeholder feedback during consultation.

The ERA used the calculation method described in section 3.3 of this determination to determine the highest costs that a Facility providing FCESS can be expected to incur. Extreme outliers were excluded to be in line with the market power mitigation framework.

Table 2:   FCESS Offer Price Ceilings sets out the ERA's proposed FCESS Offer Price Ceilings, the previously determined price ceilings (from the September 2023 final determination), the current price ceilings due to indexation, and a comparison of any changes between the determination.

Table 2:   FCESS Offer Price Ceilings

FCESS Market	Price Ceiling in this determination	Previously determined Price Ceiling	Change	Indexed price ceiling (March 2026)
Regulation Raise ($/MW per hour)	250	300	(50) (17%)	250
Regulation Lower ($/MW per hour)	300	300	-	250
Contingency Raise ($/MW per hour)	250	300	(50) (17%)	250
Contingency Lower ($/MW per hour)	50	300	(250) (83%)	250
Rate of Change of Frequency control service ($/MWs per hour)	0	0	-	0

Source: ERA analysis of Market Participant data and Economic Regulation Authority, 2023, *Frequency co-optimised essential system services offer price ceiling determination: Final report*, (online).

ERA indexation of the FCESS offer price ceilings, Economic Regulation Authority, *Frequency Co-optimised Essential System Services Offer Price Ceiling Indexed Values*, (online).

Most of the proposed FCESS Offer Price Ceilings are similar to the previously determined price ceilings, as shown in Table 2:   FCESS Offer Price Ceilings. The exception is the contingency lower offer ceiling price which has been significantly lowered due to the extremely limited number of frequency deviation events. Information from AEMO indicates that there have only been seven frequency deviation events since October 2023 that would have required generators to lower their load point.

In contrast to the other services, the contingency lower service requires that the scheduled Facility sit at a higher point on its heat rate curve, such that it is running at a more efficient level. This is so that the Facility can lower its output if a large load goes off-line. Due to co-optimisation and "reasonably low" price offers, a Facility can comfortably recover the costs of the sparse number of frequency deviation events that occur meaning that a high ceiling is not needed.

Given the low number of frequency deviation events, it is not reasonable to cost a facility on the highest-cost load point (that a Facility has lowered its full schedule), and thus a weighting to the schedule for the worst-case scenario load point was added (based on the seven frequency deviations and then rounded to the nearest 10 per cent), which substantially lowered the price ceiling for contingency lower. The low price ceiling reflects the fact that Facilities providing this service only need to recover the costs of very rare activation events for this service, in our case, seven activations in one year.

However, if the amount of frequency deviation events significantly increases, then the ERA can reassess the contingency lower and other FCESS price ceilings prior to the next expected ceiling determination.

Appendix 1 List of Tables

Appendix 2 List of Figures

Appendix 3 Cost distributions for the highest cost Facilities

The charts below show the cost distributions for the highest cost Facilities in each of the FCESS markets (before removing the outliers). PINJAR_GT9 was identified as the highest cost Facility for Regulation Raise and Lower and Contingency Lower. ALINTA_PNJ_U2 was identified as the highest cost Facility for Contingency Raise.

All of the above costs (except contingency lower) are working under the assumption that a Facility can reasonably expect to be at the most expensive load point given their schedule.

The reason an exception was made for contingency lower is because the highest cost scenario for that service is for the Facility to be called upon to lower its energy output. However, we have been informed by AEMO that there have only been seven instances of frequency deviation events that would require a contingency lower provider to respond to since the market start. Given the extreme unlikelihood of a Facility incurring their highest possible cost, a weight was added to the load points used to calculate the contingency lower costs.

This weight was decided by assessing the amount of frequency deviations in the year as a percentage of days and rounding up to the nearest ten percent, giving us a weight of 0.1 to apply to the contingency lower scheduled quantities. The impact is that the calculated per unit cost of contingency lower provision is substantially lowered.

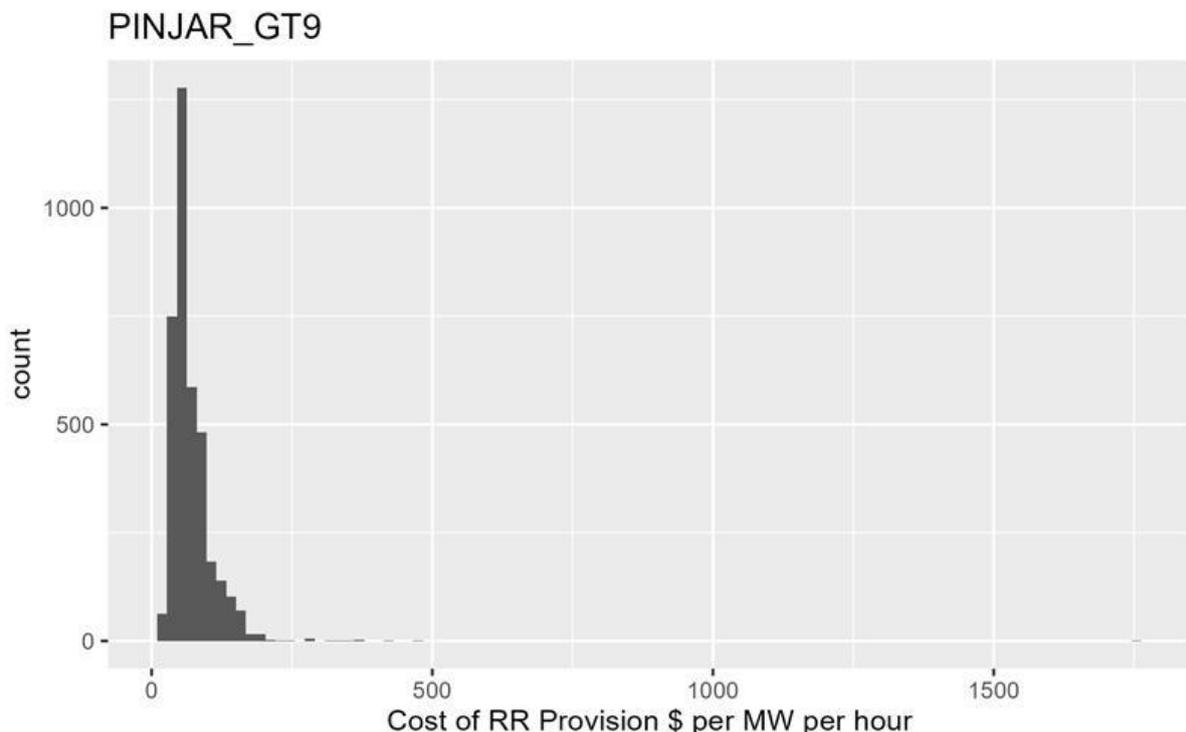**Figure 5: Cost distribution of PINJAR_GT9 as the highest cost Facility for Regulation Raise**

Figure 6: Cost distribution of PINJAR_GT9 as the highest cost Facility for Regulation Lower
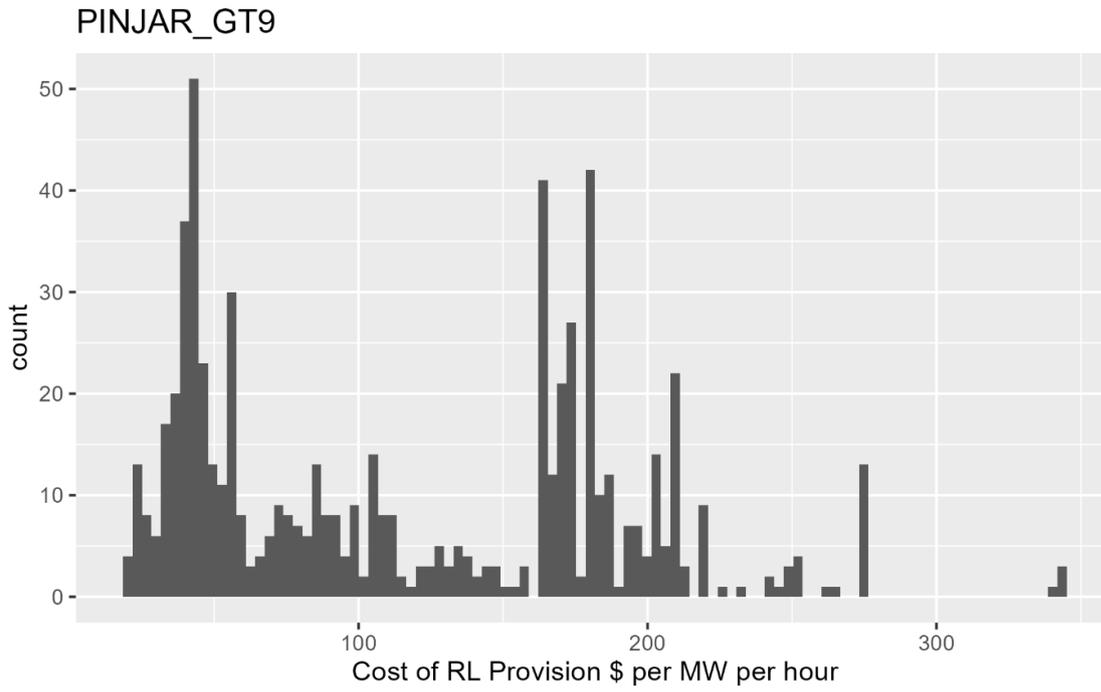

PINJAR_GT9

Figure 7: Cost distribution of ALINTA_PNJ_U2 as the highest cost Facility for Contingency Raise
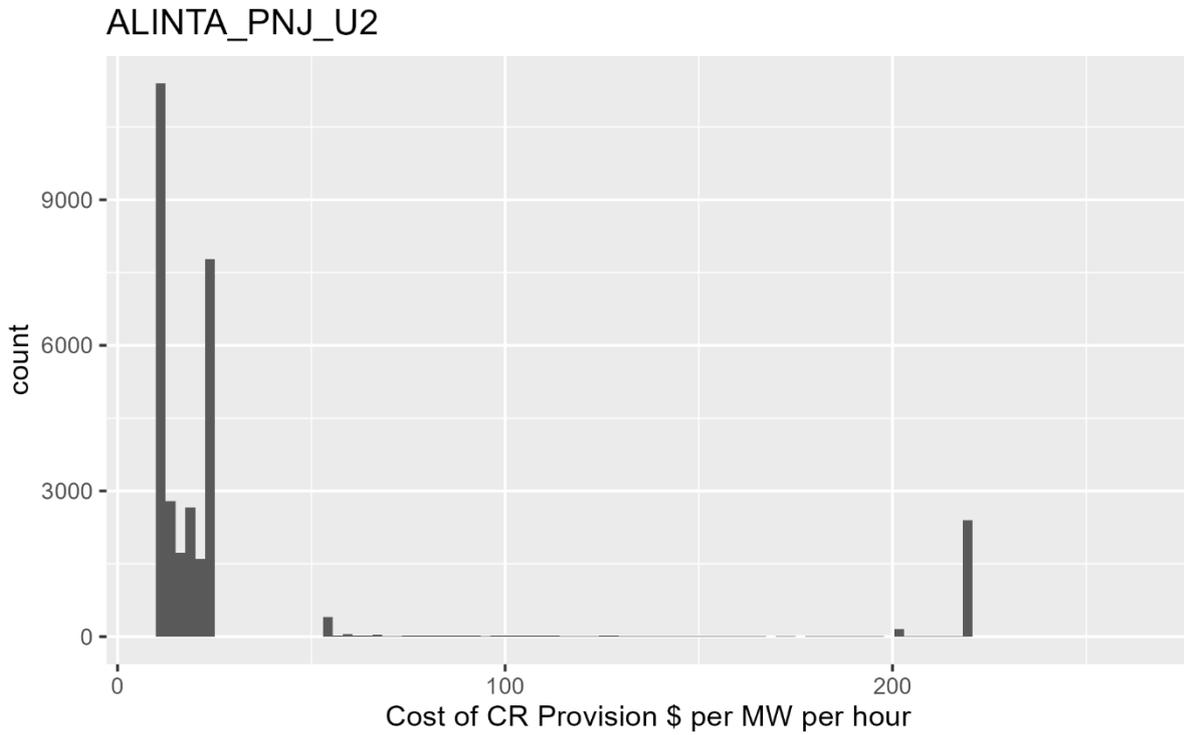

Figure 8: Cost distribution of PINJAR_GT9 as the highest cost Facility for Contingency Lower