Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

Meeting Agenda

Meeting Title:	Essential System Services Framework Review Working Group (ESSFRWG)
Date:	Thursday 24 July 2025
Time:	10:00 AM – 11:30 AM
Location:	On-line

Item	Responsibility	Type
Welcome and Agenda • Conflicts of interest • Competition Law	Chair	Noting
Meeting Apologies/Attendance	Chair	Noting
Economic performance review of Frequency Co-optimised Essential System Services (FCESS)	GHD	Noting
FCESS case studies	GHD / AEMO	Noting
ESSFRWG feedback to managing synthetic inertia	GHD	Noting
Working Group discussion	Chair / GHD	Discussion
Next meeting: TBA		

Please note, this meeting will be recorded for the purposes of taking minutes.

Competition and Consumer Law Obligations

Members of the Essential System Services Framework Review Working Group (**Members**) note their obligations under the *Competition and Consumer Act 2010* (**CCA**).

If a Member has a concern regarding the competition law implications of any issue being discussed at any meeting, please bring the matter to the immediate attention of the Chairperson.

Part IV of the CCA (titled "Restrictive Trade Practices") contains several prohibitions (rules) targeting anti-competitive conduct. These include:

(a) **cartel conduct**: cartel conduct is an arrangement or understanding between competitors to fix prices; restrict the supply or acquisition of goods or services by parties to the arrangement; allocate customers or territories; and or rig bids.

(b) **concerted practices**: a concerted practice can be conceived of as involving cooperation between competitors which has the purpose, effect or likely effect of substantially lessening competition, in particular, sharing Competitively Sensitive Information with competitors such as future pricing intentions and this end:

- a concerted practice, according to the ACCC, involves a lower threshold between parties than a contract arrangement or understanding; and accordingly; and
- a forum like the MAC is capable being a place where such cooperation could occur.

(c) **anti-competitive contracts, arrangements understandings**: any contract, arrangement or understanding which has the purpose, effect or likely effect of substantially lessening competition.

(d) **anti-competitive conduct (market power)**: any conduct by a company with market power which has the purpose, effect or likely effect of substantially lessening competition.

(e) **collective boycotts**: where a group of competitors agree not to acquire goods or services from, or not to supply goods or services to, a business with whom the group is negotiating, unless the business accepts the terms and conditions offered by the group.

A contravention of the CCA could result in a significant fine (up to $500,000 for individuals and more than $10 million for companies). Cartel conduct may also result in criminal sanctions, including gaol terms for individuals.

Sensitive Information means and includes:

(a) commercially sensitive information belonging to a Member's organisation or business (in this document such bodies are referred to as an Industry Stakeholder); and

(b) information which, if disclosed, would breach an Industry Stakeholder's obligations of confidence to third parties, be against laws or regulations (including competition laws), would waive legal professional privilege, or cause unreasonable prejudice to the Coordinator of Energy or the State of Western Australia).

Guiding Principle – what not to discuss

In any circumstance in which Industry Stakeholders are or are likely to be in competition with one another a Member must not discuss or exchange with any of the other Members information that is not otherwise in the public domain about commercially sensitive matters, including without limitation the following:

(a) the rates or prices (including any discounts or rebates) for the goods produced or the services produced by the Industry Stakeholders that are paid by or offered to third parties;

(b) the confidential details regarding a customer or supplier of an Industry Stakeholder;

(c) any strategies employed by an Industry Stakeholder to further any business that is or is likely to be in competition with a business of another Industry Stakeholder, (including, without limitation, any strategy related to an Industry Stakeholder's approach to bilateral contracting or bidding in the energy or ancillary/essential system services markets);

(d) the prices paid or offered to be paid (including any aspects of a transaction) by an Industry Stakeholder to acquire goods or services from third parties; and

(e) the confidential particulars of a third party supplier of goods or services to an Industry Stakeholder, including any circumstances in which an Industry Stakeholder has refused to or would refuse to acquire goods or services from a third party supplier or class of third party supplier.

Compliance Procedures for Meetings

If any of the matters listed above is raised for discussion, or information is sought to be exchanged in relation to the matter, the relevant Member must object to the matter being discussed. If, despite the objection, discussion of the relevant matter continues, then the relevant Member should advise the Chairperson and cease participation in the meeting/discussion and the relevant events must be recorded in the minutes for the meeting, including the time at which the relevant Member ceased to participate.

Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

Essential System Services (ESS) Framework Review

Economic analysis summary

24 July 2025

Working together for a **brighter** energy future.

Agenda

Item 1: Economic performance review of Frequency Co-optimised Essential System Services (FCESS)

Purpose of the review in accordance with the Electricity System and Market (ESM) Rules and complexity of assessing market sensitivities

Item 2: FCESS case studies

Review of three cases studies that consider in turn: changes to the Rate of Change of Frequency (RoCoF) Safe Limit, impact of Mandatory Primary Frequency Control, and synthetic inertia

Item 3: ESSFRWG feedback to managing synthetic inertia

Item 4: ESSFRWG discussion

Economic assessment

Aim of economic analysis

What question are we looking to answer

[ESM Rules clause 3.15.1C] A review conducted pursuant to clause 3.15.1A or clause 3.15.1B must include:

b) economic analyses determining the relationship between technical parameters (including, without limitation, frequency operating bands and Oscillation Control Constraint Equation parameters) and overall cost of supply of energy and Essential System Services;

c) a cost-benefit study on the effects on the Network and Market Participants of providing and using higher or lower levels of each Essential System Service;

d) identification of the costs and benefits of changing technical parameters, including the potential for increasing or decreasing the overall cost to supply energy and Essential System Services;

The review has considered:

- ***Establishing relationships between technical parameters and cost of essential services***
- ***Case studies investigating the impact of:***
  - ***i. changes to technical parameters on the cost of essential services***
  - ***ii. exploiting the presence of mandatory essential services***
  - ***iii. introducing new sources of inertia***
- ***Recommendations for future investigations***

Frequency Operating Standards (FOS) technical parameters – RoCoF review

FCESS costs in the new market during 2024-2025

	FCESS costs ($m)				
Month	CRR	CRL	RL	RR	RCS
Feb 2024	$15.13	$2.51	$3.46	$2.98	$10.16
Mar 2024	$12.85	$2.98	$3.53	$3.20	$5.98
Apr 2024	$14.97	$4.15	$5.22	$4.25	$8.17
May 2024	$11.72	$3.35	$5.65	$4.61	$8.96
Jun 2024	$12.29	$4.45	$6.95	$3.04	$18.97
Jul 2024	$12.07	$2.76	$4.97	$2.75	$16.66
Aug 2024	$12.24	$1.92	$3.97	$2.92	$10.89
Sep 2024	$18.84	$3.29	$4.95	$3.65	$17.93
Oct 2024	$20.67	$4.82	$4.60	$4.38	$15.05
Nov 2024	$15.91	$3.41	$4.42	$3.01	$9.58*
Dec 2024	$7.57	$1.08	$1.74	$1.18	$0.00**
Jan 2025	$5.42	$0.77	$1.22	$0.97	$0.00**
Feb 2025	$5.98	$1.19	$1.52	$1.02	$0.00**

Comparison of costs since new market commencement is challenging due to market mechanism adjustments and price changes applied:

- **Contingency Reserve Raise (CRR) and RoCoF Control Service (RCS) unit prices have changed since new market introduction**
- **FCESS Clearing Price Ceiling applied**
- **Uplift payments for RCS have been removed and replaced with Energy Uplift Payments**

Sensitivity analysis

Sensitivity analysis

Relationship between technical parameters and Energy & ESS Costs

Technical parameters:

- **Define the requirements for ESS to comply with the FOS.**
- **Can comprise:**
  - **a) inputs to quantification of ESS**
  - **b) variables that are part of constraint equations and cause limits to bind**
  - **c) frequency operating bands**

Objectives of the analysis as per clause 3.15.1C:

b) Determine the relationship between technical parameters and the overall energy/ESS cost

c) Assess costs and benefits of providing higher or lower levels of ESS services

d) Identify the economic impacts of changing technical parameters, with a view to decreasing the overall cost of energy/ESS

Relationship between the technical parameters and the overall cost ESS

Economic analysis

There are challenges with determining relationships in a changing market. Ability to do regression analysis to meet the requirements of 3.15.1C(b) in this review has been impacted by:

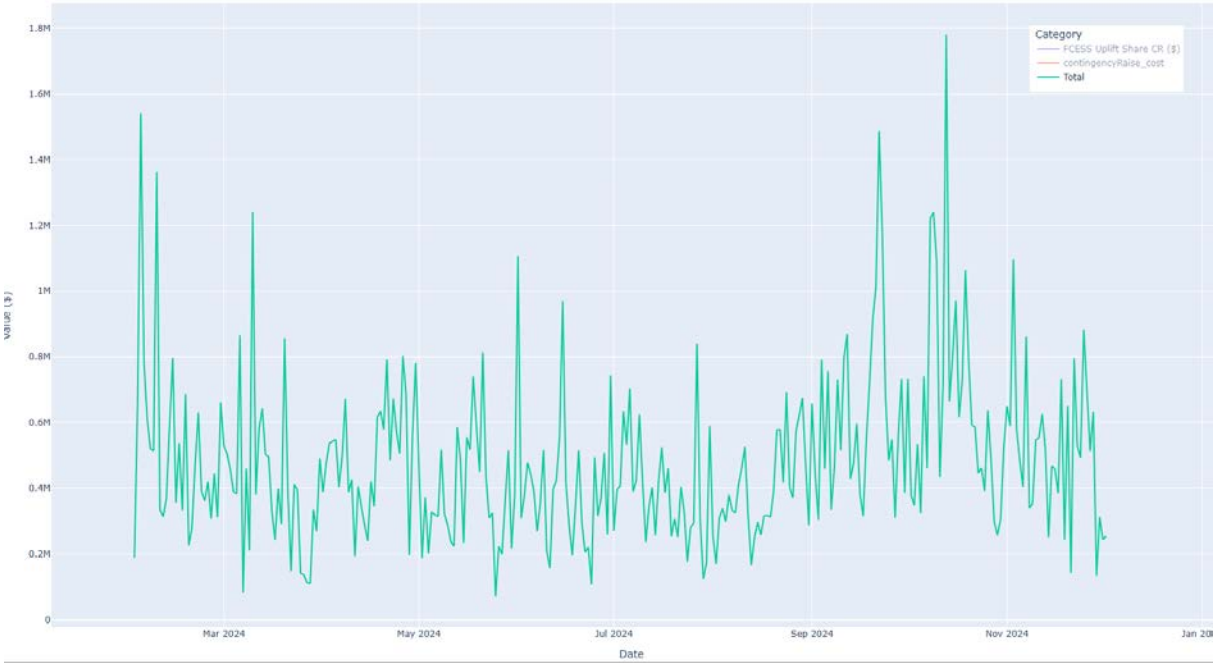
- The limited time frame period
- Seasonal variations; and
- Several Rule/market changes within the period of interest.

Additionally:

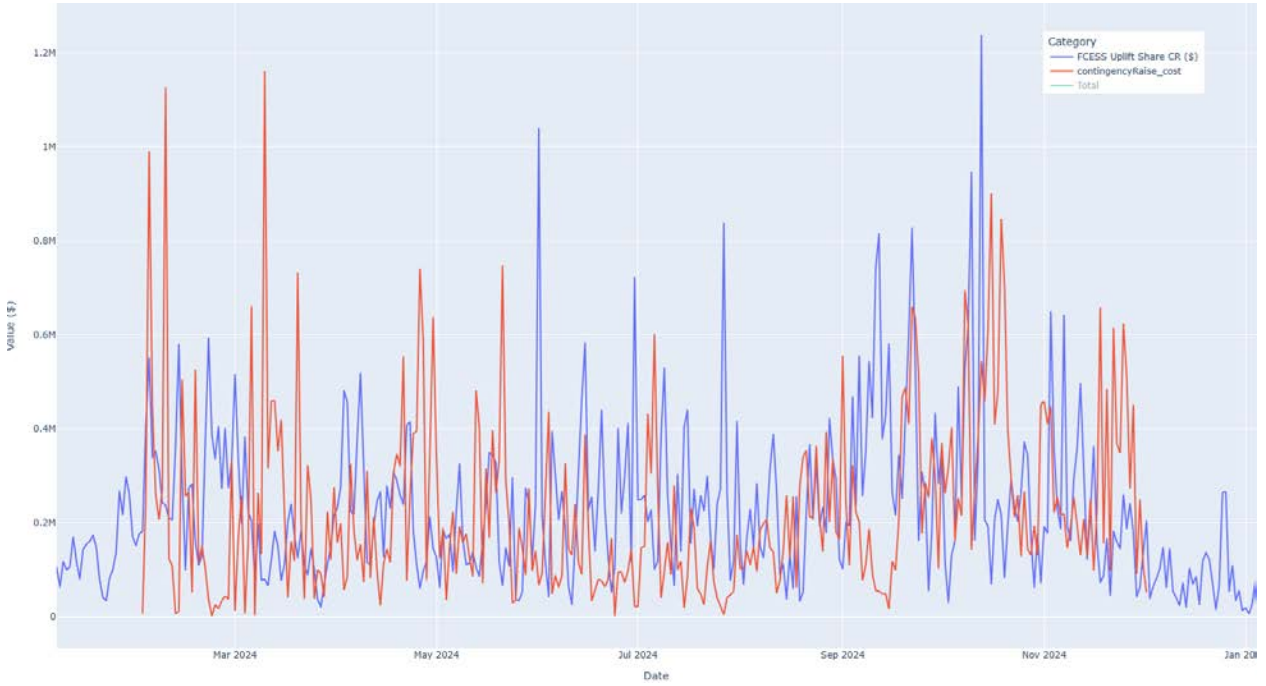
- quantifying sensitivities would require access to the full Dynamic Frequency Control Model (DFCM); and
- regression analysis relies on interdependence of the input variables to determine the true sensitivity of the dependent variable to each input individually. This means the accuracy of individual sensitivities could be influenced to some extent by their interdependence.

Sensitivity Analysis

Challenges with linearising non-linear process



Total cost of Contingency Reserve Raise



Break down of post of Contingency Reserve Raise
FCESS Uplift and Market price

Case studies for economic assessment

Sensitivity analysis and economic benefits potential of changing technical parameters

Issue	Finding/significance	Proposed action/s
Conservatism in technical parameters for RoCoF This may result in over procurement, artificial shortfalls, and unnecessary market interventions.	Common level of RoCoF set in other jurisdictions 1 Hz/sec. Levels were set conservatively in the WEM with the intent to increase these pending future investigation.	Reassess the appropriate value for the RoCoF Safe Limit. • AEMO is currently reviewing the RoCoF Safe Limit and the settings for the Minimum RoCoF requirements. • Findings from these reviews will be included in Consultation Paper.
Clarity regarding the contribution of mandatory PFR to frequency management	All generating systems must be equipped with (droop based) primary frequency control and must adjust active power output in response to frequency deviations. The response from non-accredited facilities and facilities not enabled in the FCESS market is not considered in ESS quantity calculations. This may lead to procurement of more frequency regulation services than required, as well as ignoring the additionally available support to manage contingencies.	Analysis to establish general PFR headroom from unaccredited ESS facilities and impact on system frequency if they were considered. Inclusion of this additional PFR would have to account for its dynamically changing quantities.
Consideration of new technologies in the provision of FCESS	Virtual inertia from BESS is not considered increasing risk of shortfalls and need for direction.	Analysis to assess the potential contribution of BESS and other technologies as inertia providers. Considering how synthetic inertia can participate in ESS.

Approach to the economic and cost/benefit analysis

Further quantitative analysis is underway to investigate three of the technical issues to be consulted on as part of this review.

Task A - RoCoF Safe Limit

Aim: assess the impact of higher RoCoF Safe Limit

Task B- Accounting for mandatory primary frequency response (MPFR)

Aim: determine reasonably available MPFR headroom of all available unaccredited or not ESS dispatched facilities headroom. Assess the reduction in CRR requirement if a MPFR offset is applied.

Task C - Synthetic Inertia

Aim: assess the displacement of inertia and RoCoF directions to synchronous generators by BESS, on days with directions and/or shortfalls.

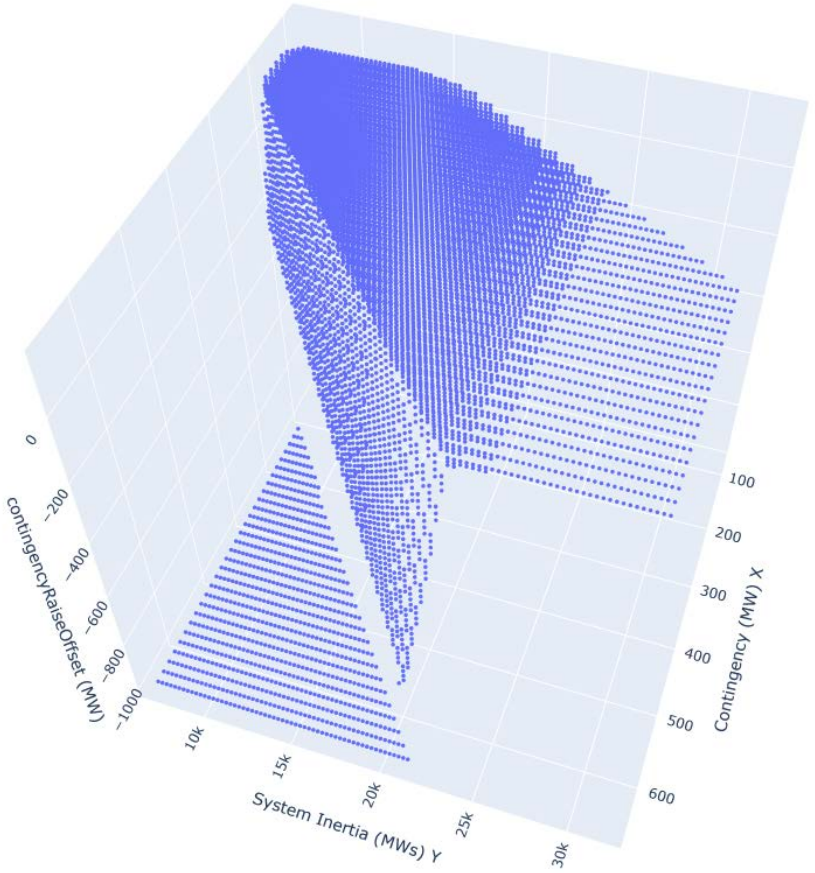
While the veracity and accuracy of outcomes based on only 10 market intervals may not be comprehensive or definitive, it will allow a comparison to the counterfactual. This work will not produce precise, quantitative cost or benefit associated with the change but will provide an indication of the materiality to guide further work.

Changing the RoCoF Safe Limit

Case Study 1 – Changing the RoCoF Safe Limit

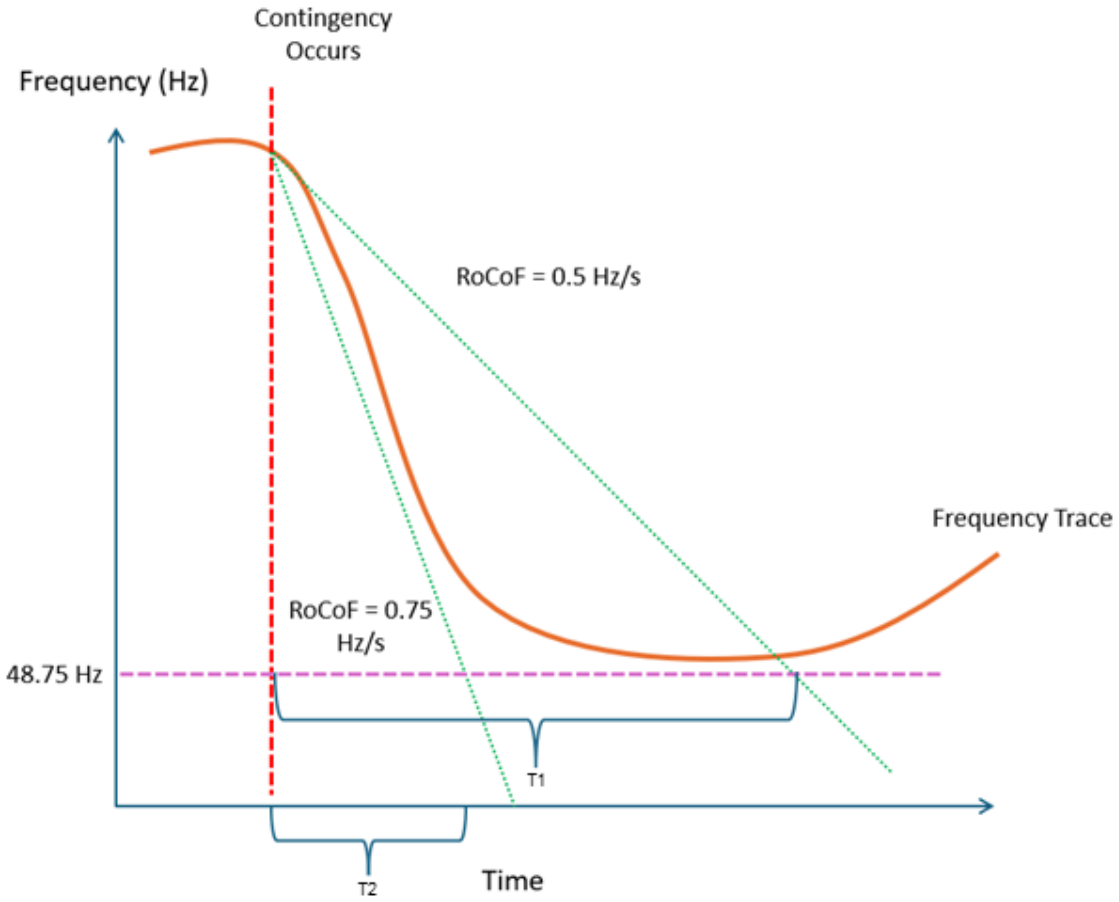
Economic impact of RoCoF Safe Limit relaxation

- **The current RoCoF Safe Limit is conservatively set at 0.25 Hz per 0.5 seconds, based on known generating system capability and historical contingency events.**
- **DFCM output can generate a zero Facility Performance Factors for slow generator when system inertia is low and/or the Largest Credible Supply Contingency (LCSC) is large due to potential breaches of the RoCoF Safe Limit or the frequency nadir breaching the lower emergency frequency band.**
- **When dispatch results in a non-secure state due to shortfalls in RCS, AEMO must intervene.**
- **RCS shortfalls and ensuring the RoCoF Safe Limit is maintained are the main reasons for AEMO interventions, and a major contributor to FCESS costs (90 directions in past 6 months).**



Changing the RoCoF Safe Limit

More contributions from all generators at lower inertia



System Inertia	Performance Factor (0.65 Hz/s)	Performance Factor (0.75 Hz/s)
7000.0	0	0
7250.0	0	0
7500.0	0	0.583
7750.0	0	0.596
8000.0	0	0.609
8250.0	0	0.623
8500.0	0	0.635
8750.0	0.647	0.647
9000.0	0.660	0.660

tau factor = 3.0 (reasonably fast responding facilities) for system inertia 12,500 MW.s

Changing the RoCoF Safe Limit

Impact on CRR_offset

0.65 Hz/s	LCSC				
System Inertia	285	300	315	330	345
8750	-999	-999	-999	-999	-999
9000	-239.634	-999	-999	-999	-999
9250	-162.817	-999	-999	-999	-999
9500	-81.548	-254.224	-999	-999	-999
9750	4.036	-177.246	-999	-999	-999
10000	93.585	-95.947	-268.819	-999	-999
10250	94.907	-10.84	-191.646	-999	-999
10500	94.907	78.52	-110.435	-283.433	-999

0.75 Hz/s	LCSC				
System Inertia	285	300	315	330	345
8750	94.907	17.285	-129.507	-264.58	-999
9000	94.907	94.995	-52.141	-193.843	-324.448
9250	94.907	94.995	29.608	-119.158	-256.392
9500	94.907	94.995	94.9	-40.525	-184.292
9750	94.907	94.995	94.9	41.975	-108.444
10000	94.907	94.995	94.9	94.907	-28.806
10250	94.907	94.995	94.9	94.907	54.622
10500	94.907	94.995	94.9	94.907	95.031

- The tables above compare the Contingency Raise Offset between 0.65 Hz/s and 0.75 Hz/s for a small slice of the total tables.
- Note that Offset is subtracted, and so a positive number means a smaller requirement for given conditions, and a negative number means a larger requirement.
- Values of -999 mean the solution cannot be secure, and is used to ensure WEMDE does not dispatch in these regions.
- These tables show the same pattern as the Contingency Raise Performance Factors – a higher RoCoF Safe Limit allows a greater operating range over both System Inertia and LCSC size.
- Note that at certain sizes of System Inertia (or LCSC), the values converge, as RoCoF no longer becomes the operational limit, and so similar CR Offset values are observed. As such, there is no detriment to CR Offset with the higher RoCoF limit, only increased range of possible dispatch outcomes.

Changing the RoCoF Safe Limit

Conclusions of AEMO's technical assessment and the economic analysis

Increasing the RoCoF Safe Limit to 0.75 Hz per second and conducting a week-long Real Time Frequency Stability (RTFS) tool study shows:

- The counterfactual showed 308 Dispatch Intervals (DI) where directions for RCS occurred. The alternate scenario resulted in 37 intervals for which RoCoF was > 0.75 Hz per second.
- Value of Energy Uplifts incurred during the counterfactual was $199,110.30. The alternate was $103,678.48 (-48%).

Based on the technical feasibility and economic benefit assessment carried out, AEMO recommends to:

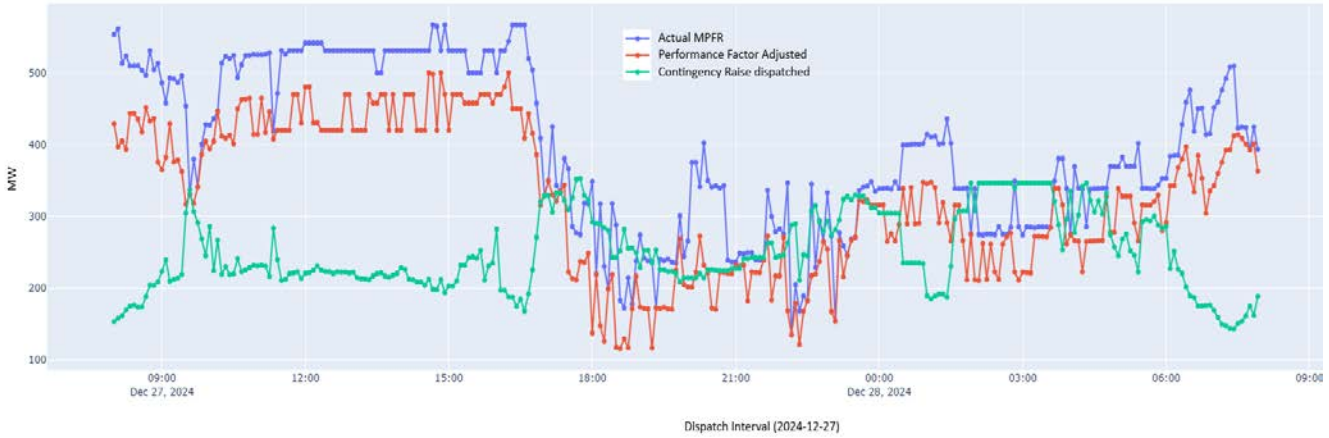
- Set the safe limit at 0.75 Hz per second measured over 500 ms.
- Review the limit periodically and adjust it to suit the power system at the time.
- Consult on the appropriate mechanism to manage facilities that fall below the Cost Recovery Limit following an increase to the RoCoF Safe Limit.
- Investigate the new stability limits with higher RoCoF and uplift operational and market dispatch tools.

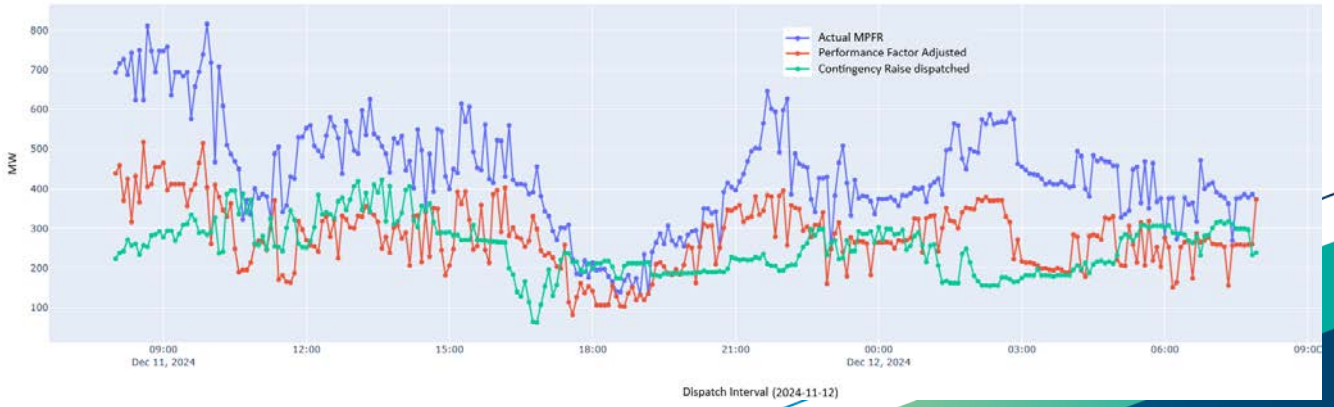
Mandatory Primary Frequency Response

Case Study 2 – Mandatory Primary Frequency Control

Offsetting Contingency Reserve Raise FCESS

- Primary frequency response (PFR) is a mandatory requirement of the ESM Rules that all (>30 MW) generating systems must comply with.
- MPFR is a droop response equal to CRR (or CRL) but is limited by available head- and foot room.
- PFR must be sustained for three or more dispatch intervals for AEMO to be able to use it to manage system security.
- SWIS synchronous generation often remains synchronised but at low outputs throughout the day, suggesting headroom is available.
- Review of select days indicates MPFR adjusted for performance factor could be from 80 – 500 MW throughout the day.
- In other jurisdictions MPFR is recognised as supporting CRR and RR (or equivalent), but it is not included in economic dispatch.





Mandatory Primary Frequency Response

Conservative estimation of system support from ESM Rules requirements

Days and market intervals considered:

1. 18:15 on 17 February 2025
2. 03:00 on 12 February 2025
3. 18:30 on 20 January 2025 (peak demand, no solar)
4. 11:15 on 18 January 2025
5. 01:00 on 27 December 2024
6. 18:25 on 11 December 2024
7. 14:25 on 11 December 2024
8. 13:00 on 23 November 2024 (min demand, with solar)

Boundary conditions for quantifying MPFR headroom:

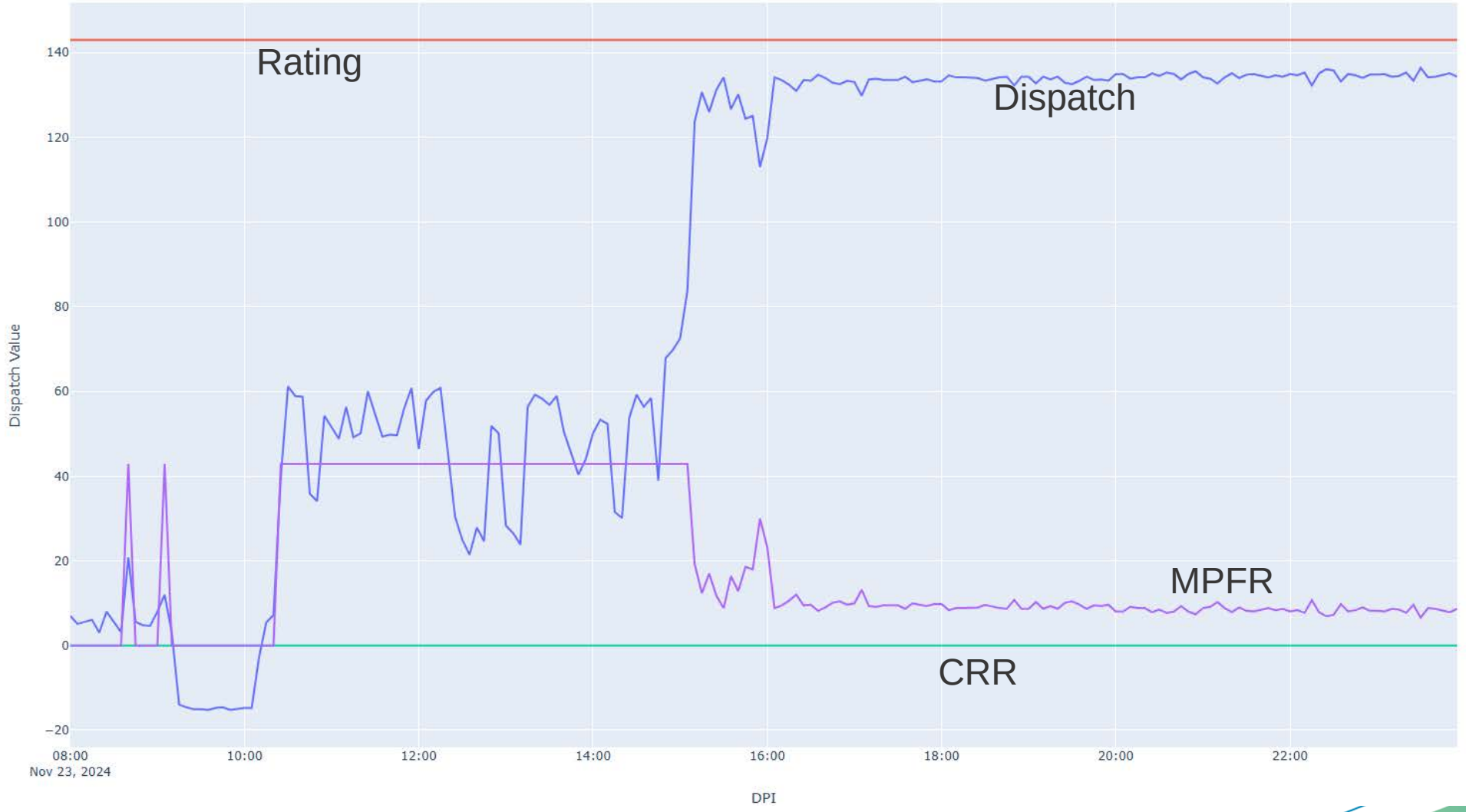
- If the generating facility is a solar- or wind farm, then MPFR is zero.
- If the generating facility is unsynchronised then MPFR is zero.
- If the generating facility is synchronised and dispatched for CRR then MPFR is zero
- If the generating facility is not a solar- or wind farm, not an energy storage resource i.e., a BESS, synchronised, and not dispatched for CRR, then the amount of MPFR is calculated as the lesser of 30 percent of the generating unit or system rating or the difference in rating and dispatch:

$$\text{MPFR} = \min(30\%\text{UnitRating}, \text{UnitRating} - \text{MW dispatch})$$

- If the Generating unit is an energy storage resource (BESS systems), not dispatched for CRR, and the BESS is charging, then the MPFR is calculated as the lesser of 50 percent of the BESS rating or the difference in BESS rated output and dispatch:

$$\text{MPFR} = \min(50\%\text{UnitRating}, \text{UnitRating} - \text{Energy dispatch})$$

Mandatory Primary Frequency Response



Mandatory Primary Frequency Response

Mandatory Primary Frequency Response

Potential impact on market outcomes

Key observations from the overall results of the MPFR assessment for the selected days include:

- **The observed performance adjusted MPFR is between 82 MW to 515 MW indicating that MPFR contributions can be significant.**
- **Excluding BESS entirely from MPFR contributions could significantly reduce headroom. However, for the days examined the units are dispatched for CRR during peak demand and generally not dispatched for the remainder. These peak demand periods set the minimum MPFR levels and with these quantities provided solely from synchronous generation.**
- **At times of minimum demand in the middle of the day or at nighttime, CRR prices are often zero. In such instances the addition of MPFR has no impact.**
- **Consideration of MPFR during evening peaks generally shows a reduction in costs to both CRR as well as RR**
- **One instance of increasing RL prices was observed for an early morning DI. However, the same DI saw significant reductions in CRR, RR, and energy prices for an overall positive impact.**

Dispatch interval	CRR (AUD)		RR (AUD)		RL (AUD)		Energy (AUD)	
	No MPFR	MPFR = 82	No MPFR	MPFR = 82	No MPFR	MPFR = 82	No MPFR	MPFR = 82
23/11/24 - 13:00	0.00	0.00	0.00	0.00	154.7	154.7	-61.74	-61.74
11/12/24 – 14:25	60.06	60.06	16.01	16.01	0.00	0.00	149.75	149.75
11/12/24 – 18:25	473.9	60.06	473.9	278.46	0.00	0.00	738.00	728.28
27/12/24 – 01:00	0.00	0.00	0.00	0.00	0.53	0.53	92.09	92.09
18/01/25 – 11:15	60.79	0.00	0.00	0.00	60.00	60.00	-61.19	-61.19
20/01/25 – 18:30	735.18	100.2	733.71	727.74	0.00	0.00	883.00	883.00
12/02/25 – 03:00	60.06	0.00	23.3	0.00	1.75	1.95	121.65	93.41
17/02/25 – 18:15	0.00	0.00	0.00	0.00	0.00	0.00	119.2	119.2

Mandatory Primary Frequency Response

Conclusions

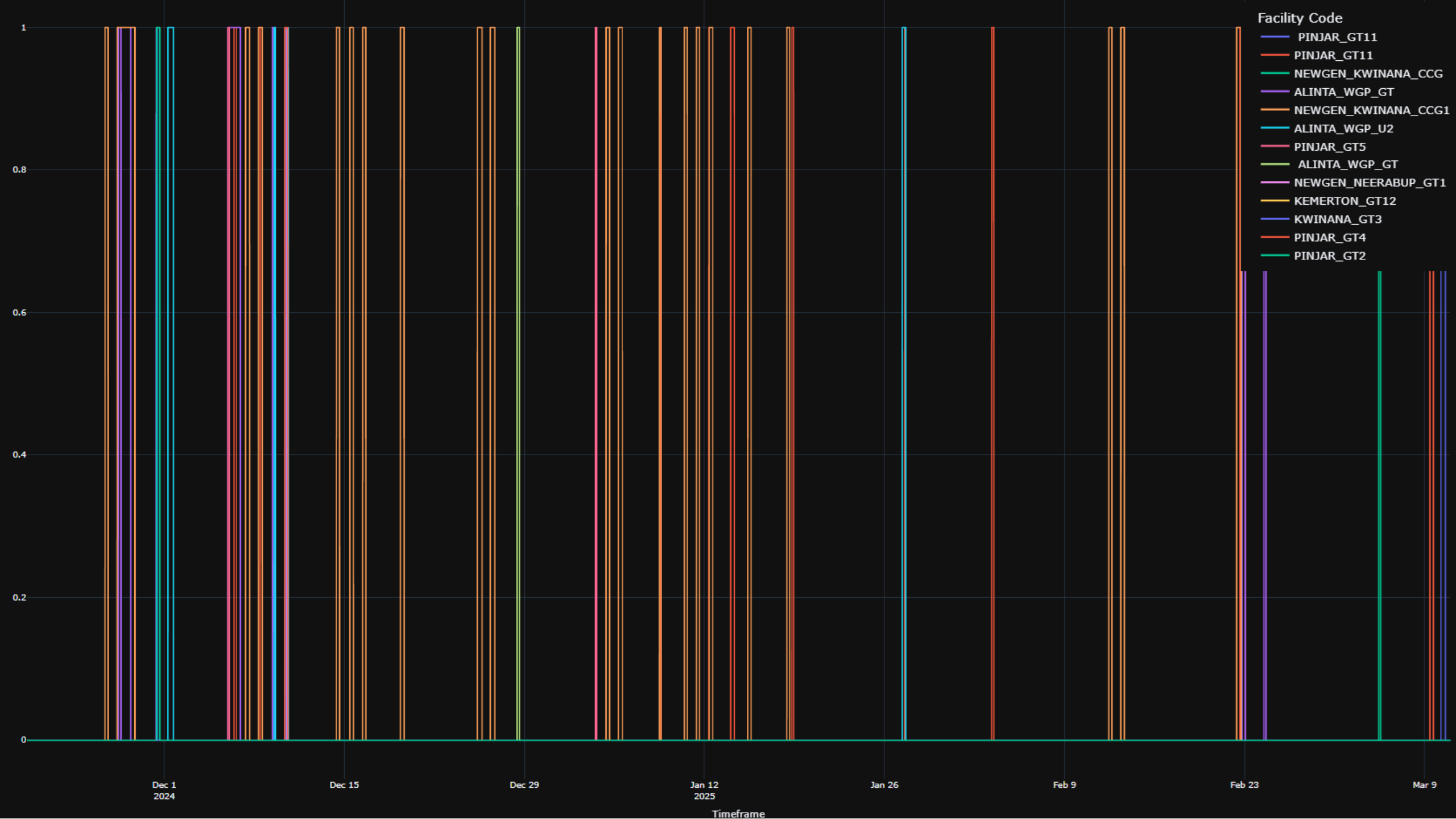
1. **MPFR from synchronous generators (and BESS) fluctuates throughout the day, varying from 82 MW to over 450 MW (adjusted for performance factor).**
2. **MPFR could significantly impact the required CRR quantities that have to be dispatched by WEMDE.**
3. **Reduced CRR FCESS can reduce costs.**
4. **More information of MPFR availability throughout the day and the year is required.**
5. **Commence a twelve-month MPFR headroom monitoring program that:**
   a) tracks the performance factor adjusted MPFR available from online and non-CRR dispatched facilities.
   b) on conclusion of the monitoring program AEMO and the Coordinator are to review outcomes and, if warranted, recommend appropriate changes to CRR procurement.

Synthetic inertia

Case Study 3 – Synthetic inertia

Avoiding directions

- **Synthetic inertia refers to the rapid injection of energy from grid-forming BESS when a frequency imbalance is detected.**
- **Synthetic inertia can be very fast, but it is not instantaneous in response, unlike that provided by a synchronous generator.**
- **No energy markets currently use virtual inertia as a substitute for synchronous inertia:**
  - The UK is one of the few which has considered technical requirements for synthetic inertia although no contract was awarded to a BESS under National Grid's Pathfinder 3 program.
  - ARENA has supported trials in the National Electricity Market (NEM) to test BESS performance in providing virtual inertia
  - AEMO has published several documents on the treatment of synthetic inertia in the NEM.
- **Lack of inertia in the WEM has been the key driver of AEMO having to direct, which has at a significant cost to the market.**
- **The projected installation of grid forming BESS in the WEM is set to at least double within the next two years**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0.8
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0
Dec 1
2024
Dec 15
Dec 29
Jan 12
2025
Jan 26
Feb 9
Feb 23
Mar 9
Timeframe

Synthetic inertia

Breaking down the WEM's lack of inertia

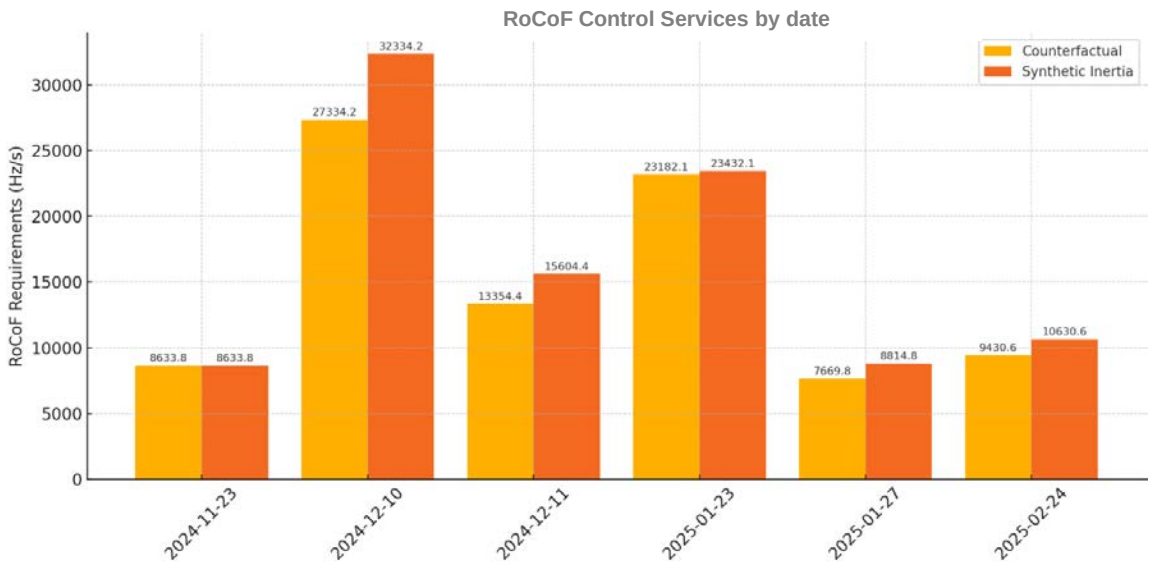
Item	Observation	Quantity
#1	Total number of directions	90
#2	Number of days on which directions were issued	56
#3	Minimum inertia dispatched on a single day of direction (MW.s)	988
#4	Maximum inertia dispatched on a single day of direction	4,908
#5	Number of days on which more than 2,400 MW.s of inertia was directed	30
#6	Number of directions that could have been avoided by adding 2,400 MW.s of virtual inertia	55
#7	Number of days on which no directions would have occurred if 2,400 MW.s of inertia was included	21

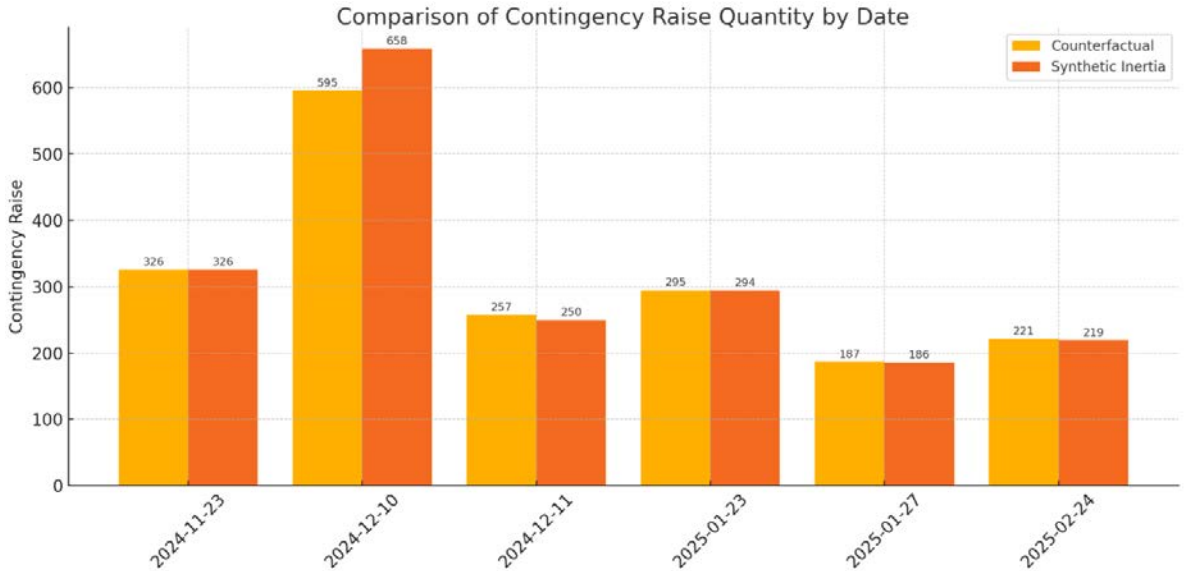
DIs considered for WEMDE alternative scenarios:

1. **18:15 on 17 February 2025**
2. **03:00 on 12 February 2025**
3. **18:30 on 20 January 2025 (peak demand, no solar)**
4. **11:15 on 18 January 2025**
5. **01:00 on 27 December 2024**
6. **18:25 on 11 December 2024**
7. **4:25 on 11 December 2024**
8. **13:00 on 23 November 2024 (min demand, with solar)**

Synthetic inertia

Changes affected by adding 2,400 MW.s of inertia to the WEMDE assessment





RoCoF Control Requirements and CRR extracted from WEMDE outputs for counterfactual and alternative scenarios

Based on ARENA funded trials of the Hornsdale Power Reserve and AEMO advice of synthetic inertia assessment have applied a 1,200 MW.s inertial response for a 200 MW BESS (operating at below 40% rated output).

Considering CBESS and KBESS as case studies provides 2,400 MW.s of inertia to the WEM that does not require direction

ESSFRWG member feedback on synthetic inertia in power systems

Industry noted challenges and incentivisation needs for BESS-Supplied Synthetic Inertia

Challenges for BESS in Providing Synthetic Inertia

The WEM currently assigns $0/MW.s value to inertia, treating it as a by-product of synchronous generation.

For BESS, providing synthetic inertia incurs real costs, including:

- Capital upgrades to convert grid-following to grid-forming BESS.
- Higher upfront costs for new grid-forming systems.
- Complex and costly commissioning and testing requirements.
- Lost market revenue due to reserving active power headroom, limiting participation in energy, FCESS, and Reserve Capacity Mechanism.
- Shorter operational life (5–10 years) from intensive cycling to deliver inertia.

Incentivisation Needs Identified by ESSFRWG

- Recognise synthetic inertia as equivalent to synchronous inertia for RCS.
- Consider compensation mechanisms for:
  - Maintaining state of charge.
  - Lost market revenue from power headroom reservation.
- Improve market signals through:
  - Publication of AEMO's indicative future inertia shortfalls.
  - Long-term contracts to provide investment certainty.
- Update performance standards to allow effective tuning of grid-forming BESS.
- Acknowledgement of costs: Tesla's submission to the AEMC direction paper provided cost estimates for synthetic inertia - highlighting the need for valuation within the market.
- Balanced sourcing is essential - ESSFRWG supportive of combining synchronous and synthetic inertia, with compensation for both.
- Verification is key: AEMO is developing a framework (due H2 2025) to assess the capability of facilities (including BESS) to provide synthetic inertia.

ESSFRWG Discussion

Economic benefits from changes to FCESS

Outcomes and recommendations

Case studies show potential economic benefits of:

1. **Increasing the RoCoF safe limit to 0.75 Hz per second measured over 500 ms**
2. **Including CRR offsets from online MPFR**
3. **Inclusion of synthetic inertia from BESS in dispatch**

Based on the outcomes of this review, it is recommended to:

1. **Increase the RoCoF Safe Limit to 0.75 Hz per second, as supported by AEMO's technical analysis.**
2. **Commence a twelve-month MPFR headroom monitoring program that:**
   - (i) tracks the performance factor adjusted MPFR available from online and non-CRR dispatched facilities.
   - (ii) on conclusion of the monitoring program AEMO and the Coordinator are to review outcomes and, if warranted, recommend appropriate changes to CRR procurement.
3. **Initiate an investigation into the provision of synthetic inertia from BESS, to establish:**
   - (i) potential effectiveness through power system analysis and field tests; and
   - (ii) suitable incentivisation frameworks for BESS operators to offer these services.

Thank You