Service Commencement Plan

P2267 Fast Frequency Response (FFR)

11 May 2023

Important Notice

Purpose

AEMO has prepared this document to provide information about Fast Frequency Response Rule commencement, as at the date of publication.

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Background

- The AEMC has made a final rule to introduce two new services to help control frequency as the inertia of the power system reduces.
  - The services will provide “very fast” contingency response, alongside the existing fast, slow and delayed services.
  - The AEMC considers the introduction of these services will also foster innovation in faster responding technologies, which become more important to support the energy transition.
- The new very fast services will come into effect from 9 October 2023, at which time AEMO will implement a requirement for the services and FCAS providers will be enabled through dispatch processes.
- This service commencement plan has been developed to ensure stakeholders are aware of AEMO’s approach to implementing the new very fast services.

Purpose

The Service Commencement Plan:

1. Outlines the approach to facilitating registration of eligible FCAS providers prior to market start.
2. Describes AEMO's approach to determine the amount of each service required under different power system conditions to maintain security (consistent with the Frequency Operating Standard).
3. Describes how AEMO intends to transition from current Contingency FCAS market arrangements to the new arrangements.

Glossary

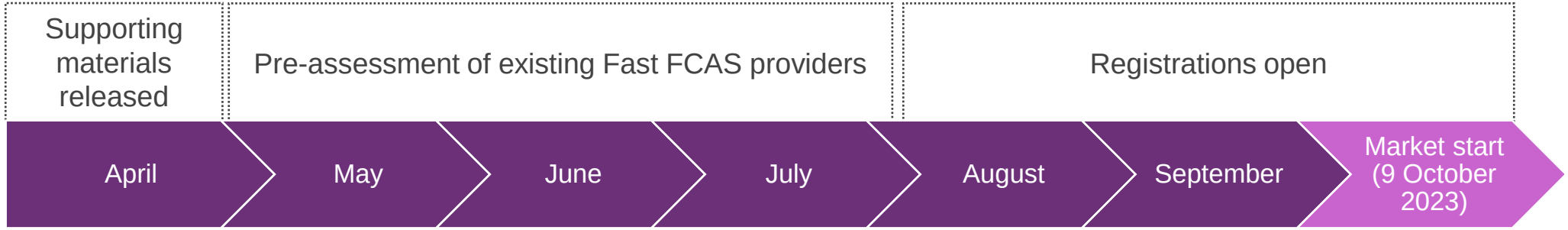
Term	Definition
AEMC	Australian Energy Market Commission
Contingency FCAS	A term used to refer to very fast raise service, very fast lower services, fast raise service, fast lower service, slow raise service, slow lower service, delayed raise service and delayed lower service collectively.
FCAS	Frequency control ancillary services, used by AEMO to maintain the frequency on the electrical system, at any point in time, close to 50 Hz.
FCAS Facility	An ancillary service generating unit or ancillary service load used to deliver FCAS – includes an aggregated FCAS Facility unless the context requires otherwise.
FCAS Provider	An Ancillary Service Provider. The term can be combined with ‘Regulation’, ‘Delayed’, ‘Raise’, ‘Lower’, ‘Very Fast’, ‘Fast’, ‘Slow’ or ‘Contingency’ or a combination of these to indicate an FCAS Provider providing a particular type of FCAS.
FFR	Fast Frequency Response
FOS	Frequency Operating Standard
MASS	Market Ancillary Services Specification, made under clause 3.11.2(b) of the National Electricity Rules (NER).
RoCoF	Rate of change of frequency, the speed at which the frequency deviates from 50 Hz following a contingency.
VF FCAS	Very Fast FCAS, including very fast raise services and very fast lower services.

Facilitating registration

Registration activities

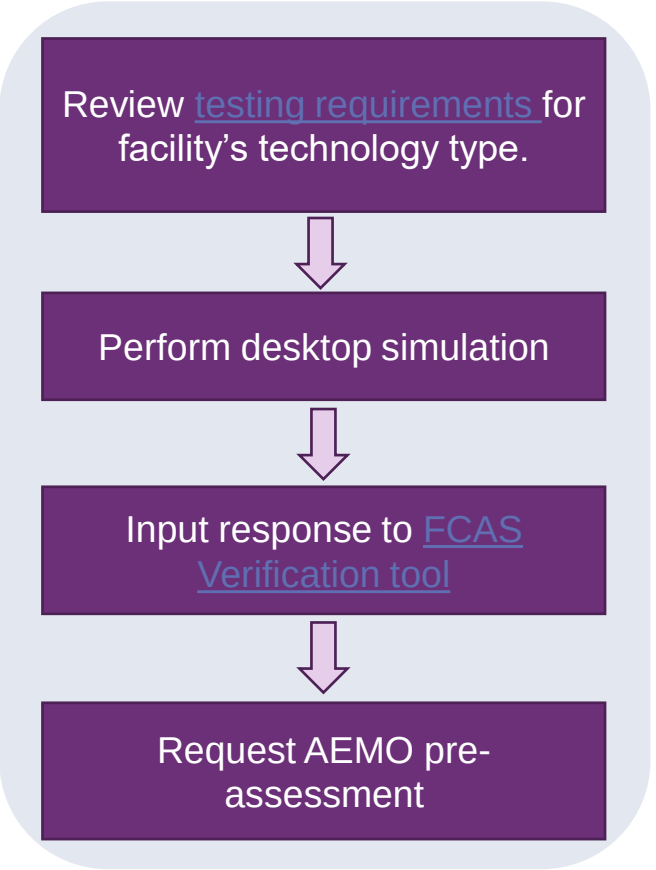
AEMO has participant readiness arrangements in place to allow appropriate time and opportunity to register for Very Fast FCAS services in time for market commencement, with high level timeframes as follows:

- Supporting materials were published in April to assist potential providers in assessing their capability for Very Fast FCAS.
- AEMO will engage with existing Fast FCAS providers who wish to provisionally confirm their Very Fast FCAS maximum capacity, prior to the formal registration application being submitted.
- Registrations formally open on 9 August, from which date providers can submit registration applications.



Pre-assessment for existing Fast FCAS providers

- Eligible facilities* that currently provide Fast FCAS (R6 and L6) services, and require no changes to the settings of the FCAS controller:
  - Will generally be able to demonstrate their capability for Very Fast FCAS (R1 and L1) by completing a desktop simulation; and
  - Will **generally not** be required to demonstrate FCAS ability through onsite testing.
- This will enable existing Fast FCAS providers to verify their capability to deliver VF FCAS early, pre-empting the assessment usually done once a registration form is submitted.
- Providers can initiate this pre-assessment with AEMO via the Support Hub.



*Eligible facilities are those able to meet the specifications for Very Fast FCAS service provision as set out in the MASS.

FCAS registration amendments for select providers

- Version 8 of AEMO's MASS becomes effective from 9 October 2023 and incorporates a removal of the multiplier effect that currently applies for selected FCAS providers.
- This change ensures that the amount of FCAS enabled is more reflective of the change in active power from an FCAS Facility.
- AEMO has identified a number of participants (mostly Fast FCAS providers) who will undergo such a revision.
- AEMO will contact the identified providers between May and July to ensure awareness of this revision:
  - Participants will need to either submit a Schedule 3.1 bid and offer validation data notification form or use the Portfolio Management System (PMS) to have their maximum market ancillary service capacity amended before 9 October 2023.
  - The revision of the registered maximum market ancillary service capacity is a fee-free AEMO process.

Participants who are unsure whether their registrations will be impacted by this change are encouraged to contact AEMO via the Support Hub.

Registrations applications

- Registration applications for Very Fast FCAS can be made from 9 August 2023, in preparation for Rule commencement.
- On 9 October 2023, Very Fast FCAS registration (and if applicable, amended Fast FCAS registration) becomes effective.

Participant type	How to apply
Market customer – Scheduled loads	Registration application forms, available at AEMO | Registration
Market generator - Scheduled & semi-scheduled generating units	
DRSP, market customer, SGA – non-scheduled loads	Portfolio Management System

How long will an application take to process?
All applications will be initially assessed by AEMO within 5 business days, to determine if further information is required to process the application. The time taken to finalise an application depends on whether further information is required, and how soon this information is provided to AEMO by the applicant.

What is the cost to apply for very fast FCAS?
Fees are outlined in AEMO's latest fee schedule at AEMO | Energy market fees and charges.

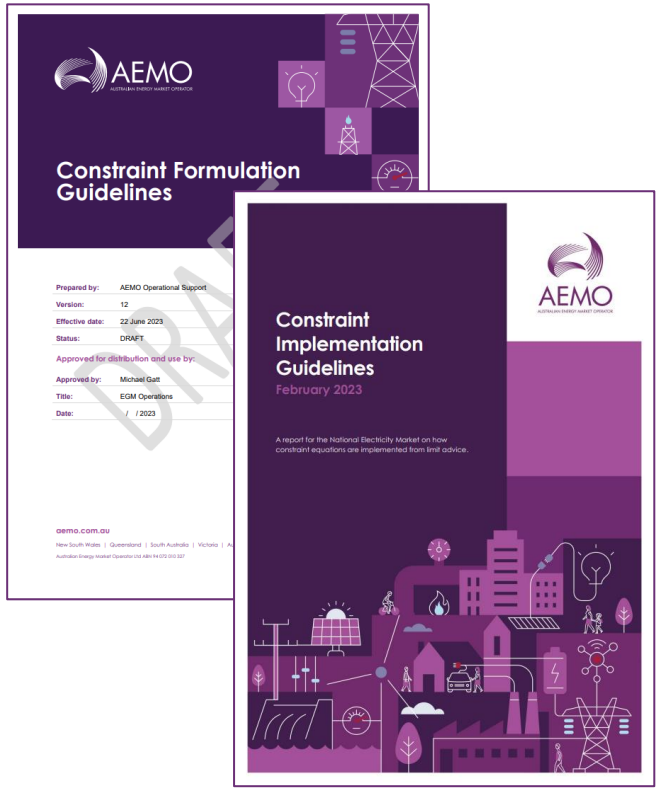
Determining the required amount of service

An aligned approach

AEMO developed an approach towards determining the quantity of very fast FCAS (R1 and L1) required to maintain frequency within the FOS.

This approach applies the FFR policy objectives, and the changes to the MASS that were consulted on during 2022.

Updates to the Constraint Formulation Guidelines and the Constraints Implementation Guidelines are being made accordingly to implement the approach in AEMO's dispatch processes.



Policy direction

Policy direction supports setting a non-zero requirement for FFR across both system normal and islanded conditions that is inertia-aware.

Recognising very fast response

- The AEMC concluded that FFR should be acquired through competitive spot market arrangements, for efficient dispatch and explicit pricing.
- Introducing FFR services aims to reduce long-term costs of power system operation by providing a more efficient mix of FCAS products.
- FFR services will be introduced alongside the existing fast, slow and delayed FCAS services with the same always-on market arrangements, including determining a requirement at each dispatch interval.
- FFR services are for managing frequency containment under system intact conditions.

Inertia awareness

- The FFR Rule was introduced so the power system could be efficiently managed following contingency events, particularly during low inertia conditions.
- At lower operating levels of inertia, increased volumes of FFR are required to arrest and stabilise system frequency in accordance with the FOS.
- An inertia-dependent approach is needed to determine the amount of FFR required.

Recognising very fast response

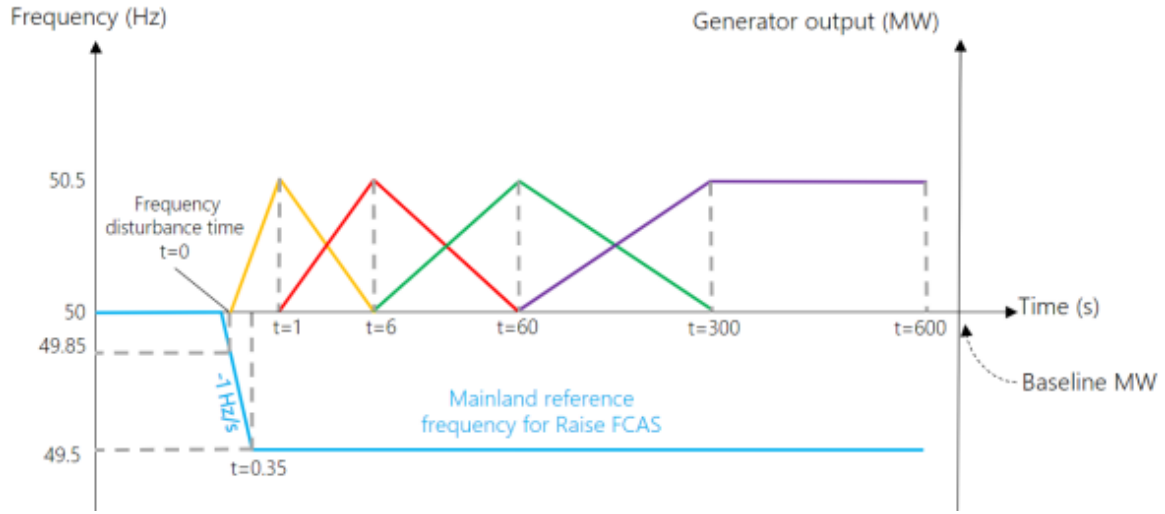
Version 8 of the MASS introduces separate measurement of FFR, or VF FCAS response.

- Procurement of VF FCAS will occur for each dispatch interval as a separate, ‘always-on’ contingency FCAS service.
- VF FCAS response will be measured separately and alongside other Contingency FCAS services.
- Eligible providers can be registered and enabled for VF FCAS as well as being registered and enabled for Fast and other Contingency FCAS services.
- No changes are being made to the approach for setting the R6 and L6 requirements.

There are several existing fast FCAS providers that can respond more quickly to frequency deviations than the current fast (6 second) measurement timeframes require.

From market commencement, these providers (once registered) can be enabled in the VF FCAS markets.

Figure 8 Measurement timeframes for Raise Contingency FCAS for the Mainland and Tasmania



	Current (MASS Version 7)	Future (MASS Version 8)
Fast service	• 6 second response • Measured from t=0 to t=6s	• 6 second response • Measured from t=1 to t=6s
Very fast service	Implicitly provided via 6 second service enablement	• 1 second response • Measured from t=0 to t=1s

Inertia awareness

The amount of inertia in the power system will, in part, determine the amount of VF FCAS required.

- When there are lower amounts of synchronous inertia in the power system, the RoCoF following contingency events increases, increasing the need for very fast frequency response to meet the requirements of the FOS.
- The approach developed is designed such that, when there is less inertia in the system, there will be an increase in the volume of VF FCAS required.
- Conversely, at times of higher system inertia, the amount of VF FCAS procured will be lower.
- The calculation of required VF FCAS will be made dynamically, on a dispatch interval basis, and based on a range of system conditions including operating inertia levels.

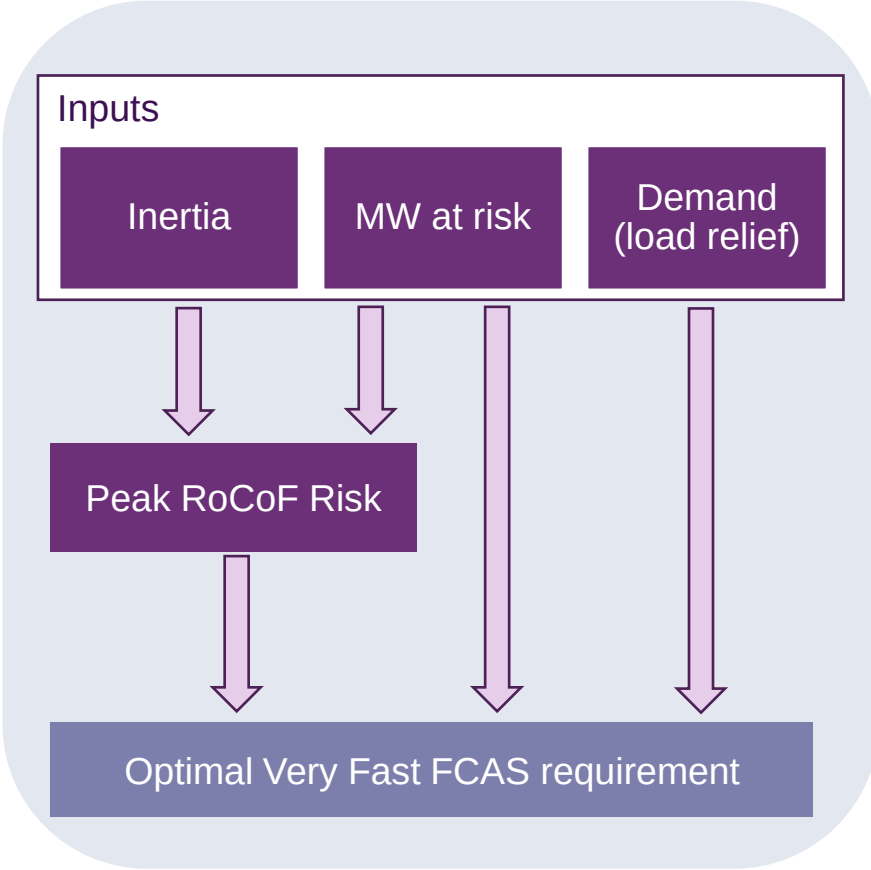
The rate of change of frequency (**RoCoF**) is the speed at which the frequency deviates from 50 Hz following a contingency (an event on the power system). When RoCoF is too high, frequency can move outside of the allowed range before mitigating measures have time to respond.

To align with the approach for determining the amount of FFR required, the measured amounts of FCAS do not include inertia response.

That is, inertia will not be treated as VF FCAS.

Methodology for calculating the requirement

- To calculate the VF FCAS requirement, MW at risk and inertia levels determine a peak RoCoF Risk.
- A requirement equation is then applied to determine the optimal VF FCAS requirement, based on the peak RoCoF Risk, demand and MW at risk.



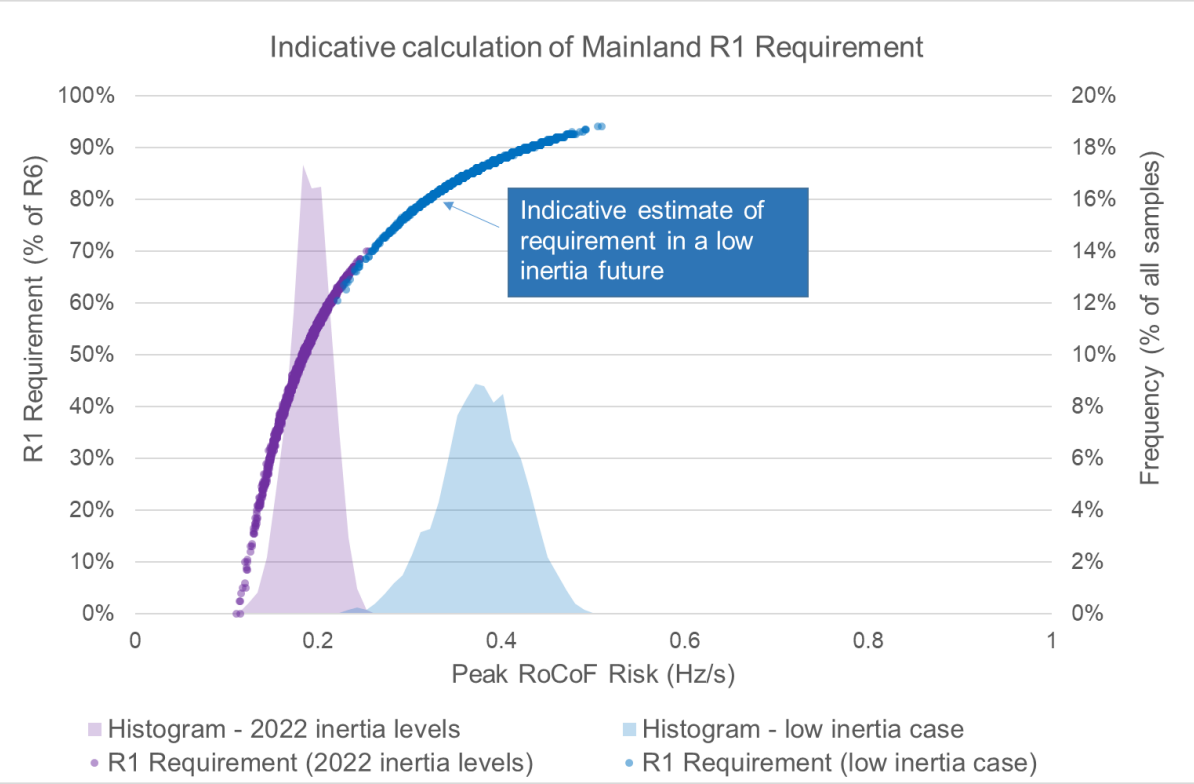
Recognising very fast response

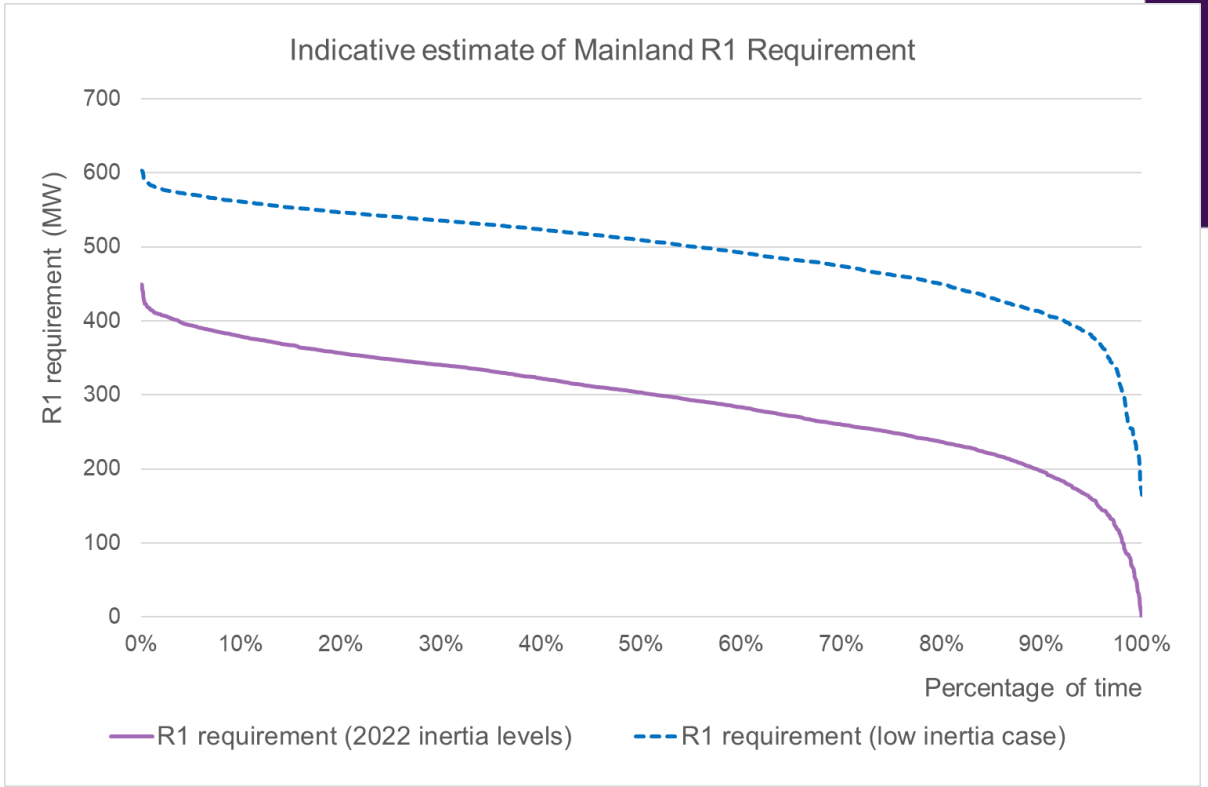
Using a power swing model, a piece-wise linear equation is selected that minimises the amount of VF FCAS volume required to meet the FOS for a single credible contingency, across a range of historical and/or simulated case study samples.

The equation will enable AEMO to implement the VF FCAS calculation in constraints, with the requirement expressed as a ratio of the Fast FCAS requirement as defined in the Constraints Implementation Guidelines.

Indicative R1 requirement

The R1 FCAS requirement for mainland NEM system normal conditions is non-zero and expected to increase as inertia declines.





The presented figures provide an early, indicative view of the mainland NEM R1 requirement. Constraint equations will be designed and implemented to represent the final calculated requirement.

Implementing the requirement

Constraint equations are used to procure FCAS, by specifying the total capacity to be dispatched for each FCAS service for one region or a group of regions.

Arrangements for implementing the requirement follow a similar approach as for other Contingency FCAS services.

Constraint equations for VF FCAS will be implemented, as is the case for other FCAS constraints, to cover various system operating conditions, including:

- Both raise and lower service requirements
- System normal conditions
- Outages, reclassifications, and risk of and/or actual separation events between regions
- Cases when Basslink is unable or restricted in the amount of FCAS it can transfer for contingency events.

AEMO will determine VF FCAS requirements for each scenario, considering the requirements outlined in the Frequency Operating Standards. This may include co-optimisation of FCAS requirements with contingency risks, as appropriate.

See AEMO | Constraints Formulation Guidelines and Schedule of Constraint Violation Penalty Factor for more detail.

Transitioning to new market arrangements

Transitional approach

- When the final rule was set, AEMO flagged that there would be a progressive transition from existing Contingency FCAS arrangements to the future model with 8 Contingency FCAS services.
- This transition will generally follow a similar process to recent changes made to Contingency FCAS requirements due to the revision of the assumed value for load relief (see right).

Arrangements for the revision of load relief

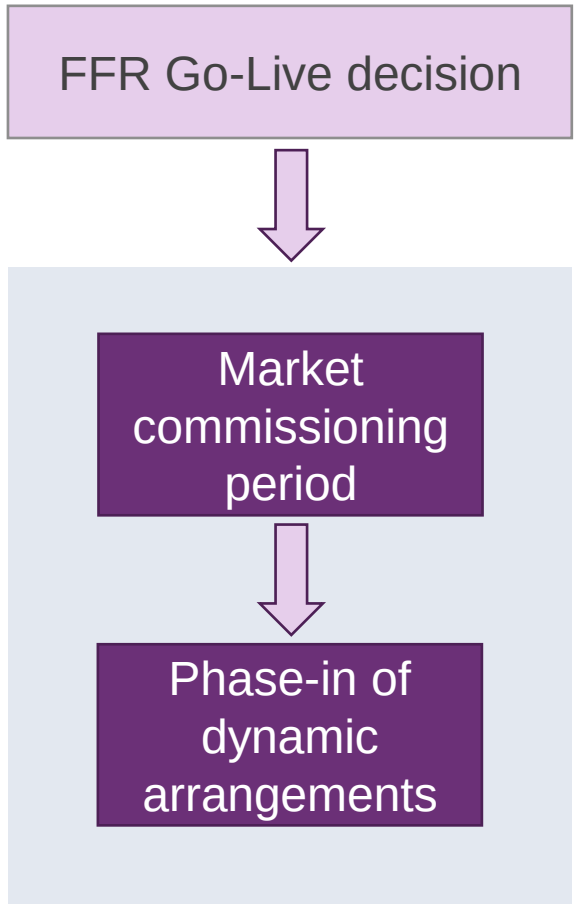
- From September 2019, AEMO reduced the assumed mainland load relief in determining required FCAS volumes.
- This increased the required volumes of all Contingency FCAS products.
- Given the materiality of volume change, a progressive transition took place across a 5-month period.
- Increases were made in set increments each fortnight.
- AEMO regularly monitored Contingency FCAS performance.

See Changes to Contingency FCAS volumes for further information.

Transitional approach

AEMO plans to introduce the VF FCAS markets as a two-stage process:

1. Commencing market operation with a system normal mainland NEM requirement for each of Raise and Lower Very Fast FCAS services at a static, nominal commissioning volume of 50 MW for an initial period of 2 weeks.
   - The purpose of this commissioning period is to establish market operations and allow AEMO to respond if issues arise.
   - Commencing this stage is subject to the FFR Go-Live decision, including confirmation of participant registration and commitment to provide FFR.*
2. Phasing in the dynamic calculation of VF FCAS requirements, progressively increasing allowed requirement volumes while ensuring that sufficient capacity is registered and committed for VF FCAS market participation, with the objective of avoiding extended periods of supply shortage.



*AEMO's FFR Go-Live Plan, scheduled for release in July 2023, will specify criteria for the FFR Go-Live decision and will be communicated via AEMO's Implementation forum. See AEMO's FFR Readiness Approach for further context.

Phase-in of dynamic arrangements

A progressive transition is being planned primarily to manage uncertainty around the timing and rate of transition of existing FFR-capable providers, from participation in the Fast FCAS markets to registration and participation in both Fast and Very Fast FCAS markets.

- The intention is to progressively increase VF FCAS requirements at regular, fortnightly intervals.
- The size of increments and length of transition period will be dependent on the level of registered capacity and participant commitment to participation in the VF FCAS services. Both registrations information and market (pre-dispatch) information will be used in these assessments.
- Increments to the amounts required across groups of regions will be made separately, recognising that the volume of VF FCAS registered to support local versus global requirements may differ. As a consequence, the length of transition period may differ.
- AEMO will regularly monitor Contingency FCAS performance throughout the transition and may revise these plans if any unexpected outcomes are noted.

Participants will be notified of VF FCAS requirement increments via AEMO Market Notices.

System security during the transition

Power system security requirements will continue to be met throughout the transition.

- In the short term, AEMO does not expect a physical change to the power system. Inertia, primary frequency response and other power system characteristics should remain materially unchanged, and changes to Fast FCAS control systems are not expected immediately following market start.
- The power system is currently operating within boundaries specified in the FOS, both for normal conditions and following contingencies. This indicates a degree of resilience to frequency disturbances, beyond the minimum level ensured by the FCAS markets.
- AEMO therefore believes a staged approach to introducing changes to FCAS procurement levels is feasible and prudent.
- AEMO will increment the allowed requirement volumes, towards ultimate requirements, once confidence in market operation is established and sufficient VF FCAS-capable facilities register to participate in VF FCAS markets.

AEMO continues to assess the effectiveness of its frequency management practices on an ongoing basis and as the power system evolves.

For more information visit

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