



Frequency Control Work Plan

March 2021

Update

Important notice

PURPOSE

This publication is to provide an update on the power system frequency control related work that is being planned and progressed by AEMO.

This publication has been prepared by AEMO using information available at the time of publication. Information made available after this date may have been included in this publication where practical.

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VERSION CONTROL

Version	Release date	Changes
1.0	29/03/2021	Initial publication

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1. Introduction

This report provides an update to AEMO's Frequency Control Work Plan¹, which was released in September 2020.

The frequency control work plan forms a key component of AEMO's ongoing work to prepare and support the changing NEM power system. The development of AEMO's frequency control work plan aims to facilitate effective communication of technical issues, prioritising the most urgent issues, and allowing them to be addressed in a cohesive way across industry.

Frequency control activities that are listed in the activity list (section 2.1) and schedule (section 2.2) are grouped under 5 workstreams, as shown in Table 1, below.

Table 1 Workstream objectives and outcomes

Objective	Workstream	Outcome
Secure and resilient frequency control under changing system conditions	Primary Frequency Response	<ul style="list-style-type: none">• Implement broad-based primary frequency control.
	Inertia/ RoCoF/ EFCS	<ul style="list-style-type: none">• Extended existing provisions to cover expected operating conditions for system security.
Efficient service procurement under lower inertia	Fast Frequency Response	<ul style="list-style-type: none">• Efficient procurement of frequency related services.
Efficient and effective Frequency Control Ancillary Services (FCAS) services	Frequency Control Ancillary Services	<ul style="list-style-type: none">• Adapting existing Contingency and Regulation FCAS services for current and emerging operating conditions.
Plan and manage system performance	AEMO frequency management tools	<ul style="list-style-type: none">• Ability to model, plan, and operate the power system under expected and plausible operating conditions.

¹ See <https://aemo.com.au/-/media/files/electricity/nem/system-operations/ancillary-services/frequency-control-work-plan/external-frequency-control-work-plan.pdf?la=en>

2. Activities and Work Plan

2.1 Activity List

The following table provides a current list of frequency control related work that is being planned and progressed across AEMO. These activities are also illustrated in the Activity Schedule in Section 2.2.

ID	Task	Description	Deliverable	Status ^{2,3}	Update
Primary Frequency Response					
1	Mandatory PFR Rule implementation	Facilitate implementation of Mandatory PFR Rule.	Facilitate implementation.	In Progress	<p>All information and documentation relating to the implementation of the Mandatory PFR rule, including updates on the rollout are on the AEMO website.</p> <p>Tranch 1 (> 200 MW DUIDs): Implementation settings commenced from late September 2020 and are complete for ~28.6 GW (as of February 2021).</p> <p>Tranch 2 (80 – 200 MW DUIDs): Self assessments were due by 19 November 2020. Implementation of setting changes has now been completed for around 1 GW of Tranche 2 installed capacity (as of February 2021).</p> <p>Tranch 3 (< 80 MW DUIDs): Self assessments were due by 17 February 2021. AEMO is currently working through these assessments.</p>
2	Technical input on PFR Incentivisation Rule Change (ERC0263)	<p>Technical input into PFR incentivisation regulatory process:</p> <ul style="list-style-type: none"> PFR materiality and need for enduring requirements. 	<p>2a) Data gathering and assessment of PFR rollout.</p> <p>2b) PFR Incentivisation feasibility report</p> <p>2c) Frequency Operating</p>	<p>2a) Ongoing with interim output in March 2021.</p> <p>2b) AEMC briefing - Complete; Technical report – June 2021</p>	<p>2a) All information relating to the PFR rollout is available on the AEMO website.</p> <p>2b & 2c) AEMO have provided briefings and interim advice to the AEMC on the PFR incentivisation feasibility report and FOS criteria options analysis. Technical reports will be published in June to the AEMC website.</p>

² Indicative dates are calendar year. For example, Q2 2021 refers to April – June 2021.

³ This publication has been prepared by AEMO using information available at the time of publication. Any changes to indicative dates following publication of this document will be communicated through appropriate channels.

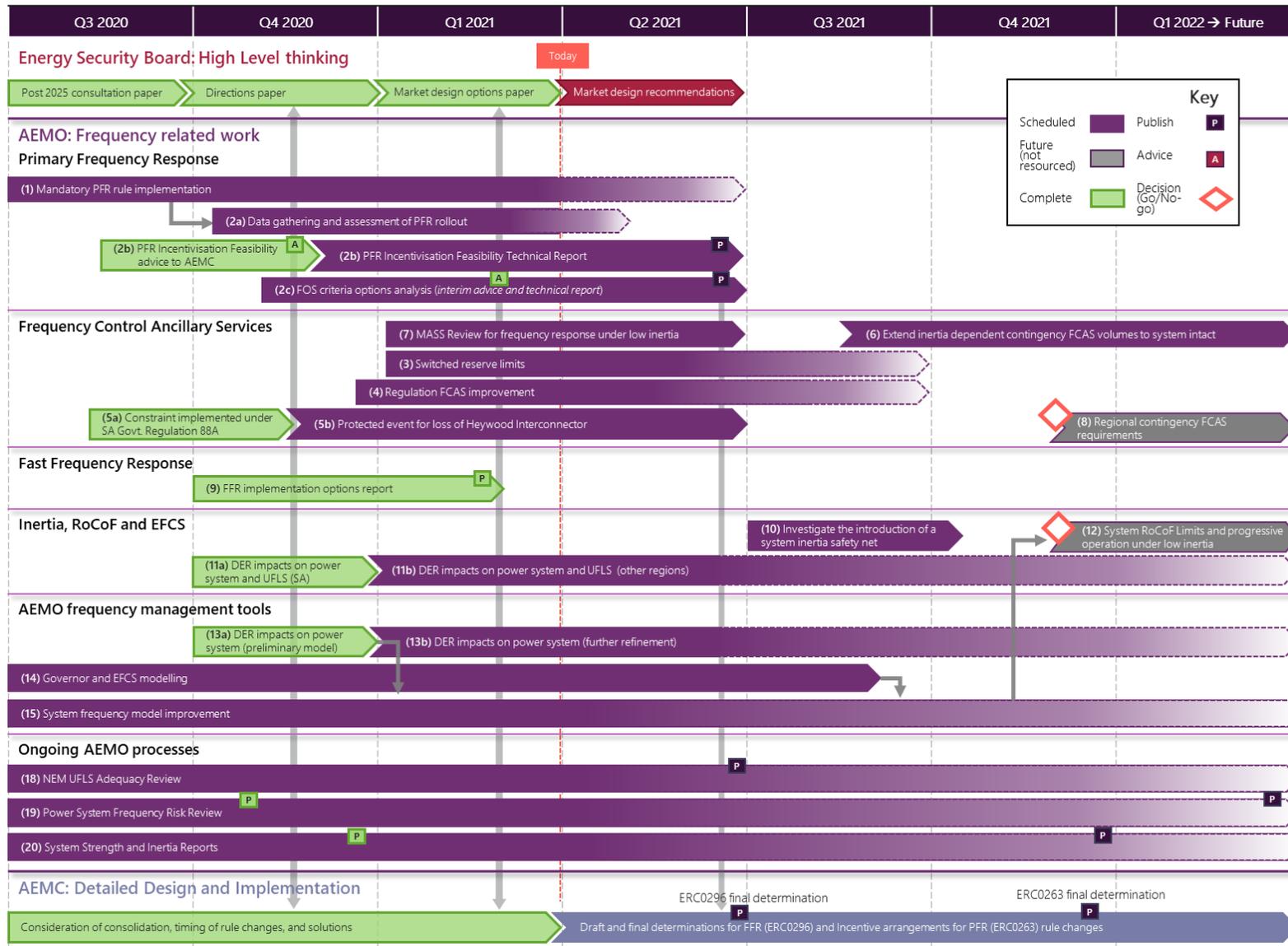
ID	Task	Description	Deliverable	Status ^{2,3}	Update
		<ul style="list-style-type: none"> Incentivisation options review for small deviations. Causer pays incentivisation feasibility. 	Standard (FOS) Criteria Options Analysis.	2c) Interim advice - Complete ; Technical report – June 2021	
Frequency Control Ancillary Services (FCAS)					
3	Switched Reserve Limits	Applying appropriate limits to the total proportion of switched reserve, this is needed to ensure there is a minimum amount of dynamic frequency control.	Potential application of limit/constraint.	In Progress Final MASS determination June 2021	The Frequency responsiveness of FCAS is under consideration as part of the 2021 General MASS Review. All documentation relating to the MASS review are on our dedicated webpage . Depending on the outcomes of the MASS Review, implementation of limits may require further work and consultation, such as on the Constraint Formulation Guidelines. AEMO also wishes to engage with industry through a suitable forum to progress this matter.
4	Regulation FCAS improvement	Regulation FCAS improvements including minimum technical requirements.	Operational improvements (requirements would be reflected in the Market Ancillary Service Specification [MASS]). Additional work may follow, including further tuning of Automatic Generation Control (AGC) after system upgrade and consideration of regional Regulation FCAS requirements.	In Progress Final MASS determination June 2021	AEMO conducted AGC tuning in December 2020 that improved usage of Regulation services in light of the significantly changed frequency distribution associated with rollout of the Mandatory PFR rule. The requirements for participation in Regulation FCAS are under consideration as part of the 2021 General MASS Review. All documentation relating to the MASS review are on our dedicated webpage .
5	Constraint for Heywood Interconnector to manage UFLS inadequacy	Management of South Australia for loss of interconnector in periods where UFLS is insufficient to prevent cascading failure.	5a) Constraint implemented under SA Government Regulation 88A. 5b) Protected event for loss of Heywood interconnector.	5a) Complete 5b) In Progress . Submission to reliability panel anticipated mid-2021.	Initial constraint implemented on 9 October 2020, under Regulation 88A. Further information on the Heywood UFLS constraint can be found in this fact sheet . Analysis on protected event in progress.

ID	Task	Description	Deliverable	Status ^{2,3}	Update
6	Extend inertia dependent contingency FCAS to system intact	FCAS constraints for inertia dependent contingency FCAS volumes for system intact.	FCAS constraints.	To commence from Q3/Q4 2021	N/A
7	MASS Review for Frequency response under low inertia	Examine how changing the definition of fast contingency FCAS services may impact the availability and performance of frequency control.	Deliverables and outcomes pending FFR Rule Change.	Monitoring Pending outcome of FFR Rule Change	Further action on Task 7 will be determined based on outcomes from the AEMC's fast frequency response market ancillary service rule change. The draft determination for this rule change is anticipated on 22 April 2020. All information can be found on the AEMC website . A future MASS Review will most likely be required following the Rule Change to progress implementation.
8	Regional contingency FCAS requirements	Consideration of appropriate regional contingency FCAS requirements for South Australia and Queensland	Potential future work leading off from current activities.	TBC Prospective future task.	The application of regional contingency FCAS requirements for non-credible events is problematic under the NER. AEMO will continue to review FCAS dispatch requirements, including through the Power System Frequency Risk Review . AEMO is looking to engage with industry through a suitable forum to progress this issue.
Fast Frequency Response					
9	FFR Implementation options report (Technical Report)	Technical input into Rule Change (ERC0296)	Technical investigation and implementation options for FFR for Contingency management (system intact).	Complete	The AEMC has published the FFR implementation options report to its website .
Inertia, RoCoF and EFCS					
10	System inertia safety net investigation	Investigate the introduction of a system inertia safety net for the mainland NEM, under system intact conditions.	Analysis to inform AEMO inertia publications.	To commence from July 2021. Publication date TBC.	N/A
11	DER impacts on Under Frequency load Shedding (UFLS)	DER penetration into UFLS	DER penetration into UFLS, 11a) South Australia/South Australia Power Networks.	11a) Complete 11b) In progress	11a) Further information on DER impacts on UFLS in South Australia are available in Appendix A of the PSFRR . 11b) UFLS data collection from NSPs now complete for Victoria, close to complete for New South Wales and Queensland. Analysis underway.

ID	Task	Description	Deliverable	Status ^{2,3}	Update
			11b) Other NEM regions		
12	System RoCoF Limits and progressive operation under low inertia	Specify a set of system RoCoF limits (in addition to generator requirements) and other operational requirements for operation under progressively lower inertia. Assessment of Emergency Frequency Control Schemes (EFCS), including UFLS.	Potential future work leading off from current activities. Communicated for visibility only.	TBC Prospective future task.	N/A
AEMO frequency management tools					
13	Distributed Energy Resources (DER) impacts on power system	DER and load modelling (internal AEMO modelling improvement task).	13a) Preliminary model versions 13b) Ongoing refinement of models	13a) Complete 13b) Ongoing	Ongoing updates provided on AEMO's website .
14	Governor and Emergency Frequency Control Schemes (EFCS) modelling	Power System Frequency Risk Review (PSFRR) report including protected event recommendations	Governor and EFCS modelling for PSFRR.	Ongoing	Governor and EFCS modelling for 2020 PSFRR complete. Ongoing work is required in collaboration with NSPs, including for delivery of the proposed General Power System Risk Review (GPSRR). Information on the GPSRR rule change can be found on the AEMC website .
15	System frequency model development	Updating existing system frequency model to be able to predict post-contingent frequency outcomes based on generating unit dispatch.	Base model and process for continual maintenance and improvement.	Ongoing	N/A
WEM					
16	Wholesale Electricity Market (WEM) Reform: Essential System Services	Reform of Ancillary Services provision in the WEM to new Essential System Services framework.	Rule changes, frequency control model, facility accreditation process and markets inputs for co-optimised	In Progress	Go Live October 2022.

ID	Task	Description	Deliverable	Status ^{2,3}	Update
			Regulation, Contingency Reserve and Rate of Change of Frequency (RoCoF) Control (inertia) services.		
17	South West Interconnected System (SWIS) Real-time Frequency Stability Tool (WEM)	Online inertia monitoring and contingency simulation for control room	Operation tool, control room support and training.	Complete	Tool now in production.
Ongoing AEMO processes					
18	NEM UFLS Adequacy Review	Biannual Review	UFLS Adequacy Review	Ongoing Draft NEM UFLS review report will be published mid-year.	NSPs datasets are being collected and analysed in preparation for the UFLS model and analysis.
19	Power System Frequency Risk Review	PSFRR report including protected event recommendations	2020 PSFRR Stage 1 and Stage 2 reports	2020 reports complete Next report planned for 2022	The 2020 PSFRR Stage 1 and Stage 2 reports are published on AEMO's website . The next PSFRR planned for delivery in 2022. Depending upon the outcome of the GPSRR rule change (final determination expected in April) this may be an expanded review covering other events, conditions and risks.
20	Minimum inertia requirements and any shortfalls	Inertia requirements and any shortfalls for each region of the NEM when islanded, which need to be published in the annual Inertia Report or via ad hoc updates where justified.	Shortfalls publication(s)	2020 Inertia Report complete . Ongoing shortfalls publications.	The 2020 Inertia Report is published on AEMO's website . Ongoing shortfall notices are also published to this webpage . The next Inertia Report is planned for 2021.
21	Technology Trials	Facilitate trials in VPP, Inertia Measurement and Advanced Inverter applications.	Trial facilitation and post-trial activities	Ongoing	The requirements for DER participation in FCAS are under consideration as part of the 2021 DER MASS Review. All documentation relating to the MASS review are on our dedicated webpage . Information relating to the VPP demonstrations, including knowledge sharing reports, is available on AEMO's website .

2.2 Activity Schedule



Note: WEM and some ongoing tasks displayed in the activity list (section 2.1) are not shown in this diagram