



## Minutes

### Transformation Design and Operation Working Group – Meeting 34

**Time:** 9.30am – 12.05pm  
**Date:** 23 March 2021  
**Venue:** Online meeting via teams

#### Attendees:

Name	Organisation	Name	Organisation
Aditi Varma	ETIU	Kang Chew	AEMO
Adnan Hayat	RCP Support	Kei Sukmadjaja	Western Power
Alex Gillespie	AEMO	Kylie O’Keeffe	MinterEllison
Alireza Fereidouni	AEMO	Lafras Lamont	South 32
Benjamin Hammer	Western Power	Laura Koziol	ERA
Bobby Ditric	Lantau Group	Liz Aitken	Aitken Energy
Brad Huppatz	Synergy	Manuel Arapis	ERA
Christopher Wilson	AEMO	Mark McKinnon	Western Power
Claire Edwards	Enel X	Mark Riley	AGL
Clayton James	AEMO	Matthew Veryard	Western Power
Dale Waterson	Merredin Energy	Megan Ward	Neoen
Dean Sharafi	AEMO	Mike Hales	AEMO
Dimitri Lorenzo	Bluewaters	Natalia Kostecki	AEMO
Donna Tedesco	ERA	Natalie Robins	RCP Support
Dora Guzeleva	ETIU	Nathan Kirby	Western Power
Elizabeth Walters	ERA	Noel Schubert	Independent
Emma Forrest	ERA	Oscar Carlberg	Alinta Energy
Erdem Oz		Oye Akindele Obe	Collgar Wind Farm
Erin Stone	Point Global	Patrick Peake	Perth Energy
Gavin White	ERA	Paul Arias	Bluewaters
Gian Garttan	Synergy	Paul Johnson	Vista Energy
Glen Carruthers	Western Power	Peter Huxtable	Water Corporation
Greg Ruthven	AEMO	Rajat Sarawat	ERA
Harry Street	Entego Energy	Rebecca White	ETIU
Harsh Grover	Grover Projects	Rhiannon Bedola	Synergy
Ignatius Chin	Energy Market Consulting	Richard Pepler	Western Power
Irina Stankov	ERA	Rob Chandler	Western Power
Jake Flynn	ERA	Sarah Rankin	Moonies Hill Energy
Jas Bhandal	AEMO	Sarah Silbert	AGL
Jason Hart	AEMO	Shrey Kant Shroff	
Jean-Philippe Montandon	AEMO	Simon Middleton	AEMO
Jing Zhang	AEMO	Stephen Eliot	ERA
Jo-Anne Chan	Synergy	Steven Kane	ETIU
Jo Pownall	Consultant	Sue Paul	RBP
Judy Hunter	Western Power	Sumeet Kaur	Shell Australia

<b>Teresa Smit</b>	AEMO	<b>Tom Glyde</b>	AEMO
<b>Tim Robinson</b>	RBP	<b>Victor Francisco</b>	PSC
<b>Toby Price</b>	AEMO	<b>Wendy NG</b>	ERM Power
<b>Tom Butler</b>	AEMO	<b>Wesley Medrana</b>	Synergy
<b>Tom Froad</b>	Bright Energy Investments		

Meeting minutes should be read in conjunction with meeting slides.

Item No.	Issue
<b>1.</b>	<b>Transitional arrangements for ESS accreditation – Aditi Varma (ETIU) and Toby Price (AEMO)</b>
<b>Slide 4</b>	<ul style="list-style-type: none"> <li>• Aditi Varma (AV) said in the Amending Rules gazetted in December 2020, clause 2.34A outlines Essential System Service (ESS) accreditation. There are obligations for Market Participants and the Australian Energy Market Operator (AEMO) to undertake processes for Frequency Co-optimised ESS (FCESS) accreditation. Two items have not been included in Gazetted version: <ul style="list-style-type: none"> <li>○ AEMO to develop Rate of Change of Frequency (RoCoF) ride-through capability limits. This will require further amendments to clause 2.34A.</li> <li>○ New clause 2.34B sets out the transitional provisions for existing Ancillary Services (AS) accredited facilities to seek FCESS accreditation prior to Market Start. This implements the Taskforce decision in the Supplementary ESS Mechanism (SESSM) Information Paper that existing AS accredited facilities must become accredited. ESS accreditation is optional for other Market Participants.</li> </ul> </li> <li>• Draft Amending Rules will be released for stakeholder comment shortly. AV requested stakeholders focus on the new amendments rather than those already Gazetted.</li> </ul>
<b>Slide 6</b>	<ul style="list-style-type: none"> <li>• Toby Price (TP) presented on RoCoF ride-through capability. <ul style="list-style-type: none"> <li>○ RoCoF Ride-Through Cost Recovery Limit has been added as a defined term that will be used to determine which facilities and loads are liable for RoCoF Control Service costs.</li> <li>○ TP explained the diagram on the slide – a facility that has a ride-through capability between the RoCoF Ride-Through Cost Recovery Limit and the RoCoF Safe Limit will be liable for RoCoF costs.</li> </ul> </li> </ul>
<b>Slide 7</b>	<ul style="list-style-type: none"> <li>• TP outlined the obligations for generators, loads, the Network Operator and AEMO (see slide).</li> <li>• Loads are challenging to assess for RoCoF Ride-Through Capability and therefore AEMO will prioritise accreditation of energy producing systems prior to loads – applications for loads will not be processed until 12 months after Market Start.</li> <li>• The RoCoF Safe Limit has been set by the FOS at 0.25Hz/500ms, the RoCoF Ride-Through Cost Recovery Limit will be &gt;0.25Hz/500ms above the Safe Limit.</li> </ul>
<b>Slide 9</b>	<ul style="list-style-type: none"> <li>• TP said all facilities accredited for Ancillary Services in the 2020 capacity year must accredit for the equivalent FCESS for market start.</li> <li>• In addition, Synergy is required to accredit all capable facilities for FCESS. AEMO will work with Synergy to determine which facilities can provide FCESS.</li> <li>• AEMO will commence the accreditation process on 1 October 2021.</li> <li>• Market Participants must offer the maximum accredited quantity in FCESS for the first 6 months of the new market.</li> <li>• Patrick Peake (PP) asked whether all loads will be required to be accredited for FCESS. <ul style="list-style-type: none"> <li>○ TP said no, it is at the discretion of loads, however AEMO would like the loads accredited for a higher RoCoF Ride-Through as it would enable the FOS to be</li> </ul> </li> </ul>

	adjusted with a higher Safe Limit (reducing quantity of RoCoF control service required).
<b>Slide 10</b>	<ul style="list-style-type: none"> <li>• Accreditation for regulation <ul style="list-style-type: none"> <li>○ TP said the process and requirements should not change significantly from the existing accreditation process (see slide).</li> <li>○ AEMO will use information it already has to make the transition as simple as possible for Market Participants.</li> </ul> </li> </ul>
<b>Slide 11</b>	<ul style="list-style-type: none"> <li>• Accreditation for Contingency Reserve <ul style="list-style-type: none"> <li>○ TP said all contracted Spinning Reserve Facilities will be required to be accredited for Contingency Reserve.</li> <li>○ Responses to real events are preferred over frequency injection testing as it is more reflective of capability.</li> </ul> </li> </ul>
<b>Slide 12</b>	<ul style="list-style-type: none"> <li>• Accreditation for RoCoF Control Service <ul style="list-style-type: none"> <li>○ Values will be based on observed performance where available, otherwise modelled data.</li> </ul> </li> <li>• Oscar Carlberg (OC) asked how generators will be accredited for RoCoF Ride-through? <ul style="list-style-type: none"> <li>○ TP said it will take some interaction between AEMO and Market Participants to determine this capability framework. The framework will need to be flexible and appropriate for various facility types.</li> <li>○ TP also noted that the Generator Performance Standards (GPS) framework has some obligations regarding ride-through capability.</li> </ul> </li> </ul>
<b>Slide 14</b>	<ul style="list-style-type: none"> <li>• New facilities <ul style="list-style-type: none"> <li>○ The process to accredit new facilities will be outlined in a Market Procedure.</li> <li>○ AEMO would like to allow project developers visibility for quantities they will likely be accredited for.</li> </ul> </li> </ul>
<b>Slide 15</b>	<ul style="list-style-type: none"> <li>• AV said the draft Amending Rules will be released for consultation. Feedback can be provided via email or phone call.</li> <li>• Subject to Ministerial approval, the Amending Rules will be Gazetted and commenced by early May 2021 so the obligations are in place and facilities can work with AEMO to develop its processes for accreditation.</li> <li>• The processes for accreditation will be developed and consulted on through the WRIG.</li> </ul>
<b>2.</b>	<b>PSSR framework – Sabina Roshan</b>
<b>Slide 16</b>	<ul style="list-style-type: none"> <li>• Sabina Roshan (SR) outlined the deficiencies in the current Power System Security and Reliability (PSSR) standards framework. <ul style="list-style-type: none"> <li>○ The standards are spread across many instruments, including the Technical and WEM Rules.</li> <li>○ There is no common objective across the different instruments. The framework should be clear and aligned across instruments.</li> <li>○ There is not a single party that governs the PSSR standards. A central body is needed to govern the standards.</li> <li>○ There is a lack of guidance on how the standards are to be operationalised.</li> <li>○ There is not a framework for customer consultation to understand their views on reliability.</li> <li>○ There is not a complete end-to-end reliability standard.</li> </ul> </li> </ul>
<b>Slide 17</b>	<ul style="list-style-type: none"> <li>• Some of the PSSR standards have been looked at through the Technical Rules change management and GPS workstreams. This project is required to bring that work together.</li> <li>• The purpose of this project is to identify gaps and overlaps in the framework (see diagram on slide).</li> </ul>

<p><b>Slide 18</b></p>	<ul style="list-style-type: none"> <li>• SR outlined the regulatory instruments that contain PSSR standards (see diagram on slide).</li> <li>• Each regulatory instrument has its own governance (for example, Minister/Coordinator/ERA approval).</li> <li>• The different governance arrangements make it difficult to make changes, hold parties accountable or understand the requirements/obligations.</li> </ul>
<p><b>Slide 19</b></p>	<ul style="list-style-type: none"> <li>• The PSSR standards are applied across a long timeframe – from real time to 10 years (see table on slide).</li> <li>• There is no alignment between WP and AEMO planning as they use their own load forecasts and studies.</li> <li>• Dean Sharafi (DS) asked whether there has been consideration of Power System Resiliency in the new framework. <ul style="list-style-type: none"> <li>○ SR said yes.</li> <li>○ DS said it is distinct from reliability – it is focused on high impact, low probability events. There is a very large body of work being undertaken on how to integrate these concepts into the rules.</li> <li>○ AV said the objective of the project is to have a centralised framework starting with the current set of PSSR standards, but good to know there are emerging requirements we may want to consider.</li> </ul> </li> </ul>
<p><b>Slide 21</b></p>	<ul style="list-style-type: none"> <li>• SR said it would be best to have a centralised framework – for example, a unified SWIS PSSR Code that is governed by a central body and supported by a panel of experts.</li> <li>• There has been no decision on who the central body would be – this is a matter for further consideration.</li> <li>• The Code would be end-to-end from planning to real time, would bring in requirements for overall SWIS security and reliability and would include consultation with customers.</li> <li>• SR said that although it is the ideal solution it has some implementation challenges (as outlined on the next slide).</li> </ul>
<p><b>Slide 22</b></p>	<ul style="list-style-type: none"> <li>• The <i>Electricity Industry Act 2004</i> (EI Act) provides a head of power for relevant regulatory instruments, including the WEM Regulations, Network Quality and Reliability of Supply (NQRS) Code, the Electricity Networks Access Code (ENAC) and the Technical Rules (the Access Arrangement sit under the ENAC). See slide for details.</li> <li>• SR said amendments to the EI Act are required to implement changes to the governance of the instruments above. This would take at least 1.5-2 years.</li> <li>• Given the timing and risk of delay, interim measures are required to ensure PSSR is maintained.</li> </ul>
<p><b>Slide 23</b></p>	<ul style="list-style-type: none"> <li>• SR outlined the key issues to be resolved in the interim period (see slide). This includes provisions are needed to: <ul style="list-style-type: none"> <li>○ Require AEMO and WP to consult with each other (and take that consultation into consideration).</li> <li>○ Have a head of power to require WP to develop a WP/AEMO protocol. WP is working with ETIU to develop this.</li> </ul> </li> </ul>
<p><b>Slide 24</b></p>	<ul style="list-style-type: none"> <li>• SR said that under a Joint Agreement Framework AEMO and WP will be required to consult each other and reach agreement. The framework will cover the PSSR items outlined on the slide.</li> <li>• The processes between the organisations will be captured under the WP-AEMO protocol.</li> <li>• PP said that if we follow South Australia and have the system operator able to interrupt solar PV generation through the invertors, the WEM Rules would need to be tied to these standards. <ul style="list-style-type: none"> <li>○ SP said yes, that this is being investigated.</li> <li>○ Mark Riley (MR) said that similarly there are issues with behind the meter procedures needing to be considered.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ AV said yes – we are not that far advanced in considering control by the Distribution Network Operator at this point in time, but there is work on inverter standards being undertaken now and over a period of time as they are replaced the new standard will hold, which includes some local frequency protection. This issue is on the agenda but not deeply explored yet.</li> <li>○ MR said interruption also need to feed into the market rules for scheduling/dispatch issues.</li> <li>● AV said yes, this will be considered.</li> </ul>
<b>Slide 25</b>	<ul style="list-style-type: none"> <li>● Amending Rules for system restart were consulted on in 2020.</li> <li>● The next tranche of Amending Rules will likely be consulted on in April or May 2021.</li> </ul>
<b>3.</b>	<b>UFLS Scheme update – Nathan Kirby</b>
<b>WP slide pack. Slide 2</b>	<ul style="list-style-type: none"> <li>● Nathan Kirby (NK) said Western Power is undertaking a review of the Under Frequency Load Shedding (UFLS) scheme in response to DER Roadmap action 10.</li> </ul>
<b>Slide 3</b>	<ul style="list-style-type: none"> <li>● The Technical Rules outline requirements for UFLS (see slide).</li> <li>● UFLS seeks to maintain system security in the event there are multiple contingency events.</li> </ul>
<b>Slide 4</b>	<ul style="list-style-type: none"> <li>● UFLS is needed for scenarios such as the one outlined on the slide showing peak load on 8 January 2021. The Technical Rules were developed to ensure peak demand is met.</li> </ul>
<b>Slide 5</b>	<ul style="list-style-type: none"> <li>● NK said that there is not a requirement to ensure minimum loads can be met. For example, on 14 March demand from the one sub stations was vastly reduced to 400MW.</li> </ul>
<b>Slide 6</b>	<ul style="list-style-type: none"> <li>● NK said increase in number of zone substations that have reverse flows is largely due to distribution connected solar – see red boxes on slide. This is increasing year on year.</li> <li>● UFLS ensures there is sufficient load shedding capability when frequency hits certain thresholds. This is becoming challenging because shedding a feeder in this situation could trip a generator which would make the issue worse.</li> </ul>
<b>Slide 7</b>	<ul style="list-style-type: none"> <li>● DER roadmap action is to determine what the appropriate mix of load shedding is and also what the load shedding requirement ought to be to make sure it is fit for high DER environment (but also to revisit the peak load requirement).</li> </ul>
<b>Slide 8</b>	<ul style="list-style-type: none"> <li>● Western Power has been working with AEMO on how the roles and responsibilities could be captured in the future Joint Agreement Framework (see diagram on slide).</li> </ul>
<b>Slide 10</b>	<ul style="list-style-type: none"> <li>● Sam Ristovski (SR) presented on the UFLS project (see slide).</li> <li>● The project will assess whether the UFLS framework is fit for purpose, identify gaps/short falls and outline how these can be addressed.</li> <li>● There are four work packages to do this (undertaken in collaboration with AEMO): <ul style="list-style-type: none"> <li>○ Development of models, assessment method and performance criteria.</li> <li>○ A review (by GHD) of national and international UFLS best practice and identification of solutions that would be suitable for the SWIS.</li> <li>○ Modelling to review the performance of the existing UFLS system.</li> <li>○ Proposed improvements to the UFLS framework.</li> </ul> </li> </ul>
<b>Slide 11</b>	<ul style="list-style-type: none"> <li>● The first two work packages are complete.</li> <li>● Western Power is now undertaking work package three, which is progressing well.</li> </ul>
<b>Slide 12</b>	<ul style="list-style-type: none"> <li>● SR outlined the work package one scope – see slide.</li> <li>● The working group has established what the deliverables will be for the other work packages.</li> </ul>

<p><b>Slide 13</b></p>	<ul style="list-style-type: none"> <li>• SR outlined the work package two scope – see slide.</li> </ul>
<p><b>Slide 14</b></p>	<ul style="list-style-type: none"> <li>• SR outlined the work package two findings. <ul style="list-style-type: none"> <li>○ There are similar issues across jurisdictions, in particular relating to reduced load shedding capability.</li> <li>○ The key strategies being implemented are: <ul style="list-style-type: none"> <li>▪ More regular review periods (every one to two years rather than five years)</li> <li>▪ Greater load shedding discrimination (feeder level as Western Power currently does).</li> <li>▪ Growing consensus to use reverse blocking.</li> <li>▪ RoCoF triggers – due to decreased inertia there is a faster rate of frequency decline, so the traditional settings are not fast enough to reduce the load shedding requirements.</li> <li>▪ High speed data recorders are being used to review performance and calibrate models, and for real time monitoring.</li> <li>▪ Dynamic arming of feeders using high DER output – changing the sequence of feeders that are tripping under the UFLS system to maintain the requirements in the first few blocks.</li> </ul> </li> <li>○ A lot of jurisdictions have static settings, and therefore the effectiveness of the UFLS system is reducing. Jurisdiction are working to enhance settings as outlined above.</li> <li>○ WP is considering dynamic UFLS. In the longer term, there should be an adaptive system where the UFLS settings are changing based on changing system parameters. This is a much more complex design and will take many years to implement.</li> <li>○ Short term strategies include a new standard for new feeders installed.</li> <li>○ In the longer term there is focus on real time monitoring capability of UFLS to better inform real time actions undertaken by AEMO operators.</li> <li>○ Western Power is also looking to trial Wide Area Monitoring, which is a high speed monitoring and protection scheme</li> <li>○ Batteries can also be used for enhanced frequency control.</li> </ul> </li> </ul>
<p><b>Slide 15</b></p>	<ul style="list-style-type: none"> <li>• Work package three scope – see slide.</li> <li>• The work package has been broken into two sub-packages: <ul style="list-style-type: none"> <li>○ Sub-package A: Frequency stability</li> <li>○ Sub-package B: Voltage stability</li> </ul> </li> <li>• A stochastic approach is being used to model operating conditions. This includes using hundreds of scenarios of different generator dispatches and demand levels, including future demand growth and reductions in minimum load.</li> <li>• Sensitive analysis is being undertaken, including rooftop PV disconnection rates, planned generator retirements, large scale connected batteries, cascading generator tripping and optimising UFLS settings.</li> <li>• MR asked whether use of AMI data for network monitoring has been considered. <ul style="list-style-type: none"> <li>○ NK said Western Power is considering the best way to use AMI data.</li> </ul> </li> </ul>
<p><b>Slide 16</b></p>	<ul style="list-style-type: none"> <li>• Work package four <ul style="list-style-type: none"> <li>○ This work package brings together findings from the other work packages to consider how the resilience of UFLS can be improved.</li> <li>○ MR said it would be worth discussing with CitiPower in Victoria how it integrated UFLS and DER into load and network management (eg load studies, customisation of outages, managing PV installation effectively).</li> <li>○ NK said that this is one of the matters Western Power is discussing with Distribution Network Service Providers, including those in Victoria.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"><li>○ TP said it would be worth considering (post DER Roadmap implementation) any DER enabled for frequency ESS on any UFLS feeder (associated with the risk of losing another Frequency keeping capability).</li><li>○ NK said presumably this is providing fast frequency response service.</li><li>○ TP said yes, if a facility is enabled for Contingency Raise then the feeder may not be exporting at that time but there may be batteries enabled to inject if needed.</li><li>○ MR said this is one of the issues that came up in South Australia when it shed PVs - load shedding has not been integrated into the market so when they provide frequency control and other services there is a disconnect between the two processes. There is a lot of integration required.</li><li>○ AV said it is an interesting point – there is a question as to whether there is a baseline level of stability services that all connected equipment, including DER, should provide to the system. The point of integrating with the market was noted for future consideration.</li><li>○ MR said there could even be issues with VPPs not being able to meet their market obligations if they are disconnected.</li><li>○ Dora Guzeleva (DG) said there is a large body of work considering how DER should be integrated into the market and all the issues raised by MR would have to be considered in that workstream.</li></ul>
<b>4.</b>	<b>Forward planning for Amending Rules development – Aditi Varma</b>
<b>Slide 26</b>	<ul style="list-style-type: none"><li>• AV outlined the forward schedule (see slide)</li></ul>