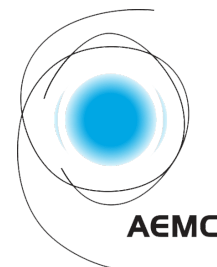


Reserves Rule Changes (ERC0295 and ERC0307)



Rule change – deep-dive workshop 1

22 April 2021

The technical working group meeting was held virtually on 22 April 2021.

The deep dive working group was formed by the Energy Security Board (ESB) to assist with the consideration of the Essential System Services (ESS) workstream of the post-2025 market design project.

The Australian Energy Market Commission (AEMC) convened this deep-dive session to act as its technical working group to provide technical advice and input into its consideration of the reserve services rule changes. All enquiries on this project should be addressed to Dominic Adams (02) 8296 7899 or at Dominic.Adams@aemc.gov.au.

The members of the technical working group are listed below.

Member	Organisation
Martin Hemphill	RES Group
Allison Demaria	CS Energy
Bradley Woods	Energy Australia
Tony Callan	Delta Energy
Jon Sibley	ARENA
Alastair Andrews	Powerlink
Ben Skinner	AEC
Simon Brooker	CEFC
Steve Frimston	AGL
Maria Ade	CS Energy
Joel Gilmore	Infigen
Sonja Lekovic	Citipower-Powercor
Verity Watson	ENA
Bridgette Carter	Bluescope Steel
Lesley Silverwood	Rio Tinto
Niraj Lal	AEMO
Trent Morrow	AEMO
Frank Montiel	AEMO
Nicole Dodd	AEMO
Joe Witters	ESB
Suzanne Falvi	ESB
Claire Richards	Enel X
Mark Grenning	EUAA
Rhys Albanese	Tilt Renewables

Craig Memery	PIAC
Gavin Duffy	Vinnies
Bruce Mountain	Victoria University

The AEMC's project team for operating reserves is listed below.

Name	Position
Victoria Mollard	Executive General Manager – Security & Reliability
Sebastien Henry	Director – Security & Reliability
Greg Williams	Senior Economist
Dominic Adams	Senior Adviser – Security & Reliability
Alex Staples	Senior Lawyer
Emily Banks	Adviser – Security & Reliability
Ben Kroll	Graduate Adviser – Security & Reliability

The meeting focussed on power system modelling that AEMC commissioned, from Endgame Economics, to assist with consideration of the reserve services rule changes. The meeting agenda included:

- Welcome and context
- Presentation of the draft modelling results
- Discussion on flexibility issues
- Discussion on energy adequacy issues
- Implications for the NEM

Welcome and context

- Welcome to participants and explain this work relates to both the ESB's post-2025 market design project and the AEMC's two reserve services rule change requests.
- AEMC Draft Determination on reserve services rule change requests due 24 June 2021. This technical working group / deep-dive is an essential part of the AEMC's rule change process.
- AEMO and AER are participating in this technical working group principally as stakeholders in the rule change process, but also as members of the ESB's working group on essential system services.
- This deep-dive fulfils a commitment made at an ESB led deep-dive in February to further investigate the circumstances in which an operating reserve would be of value to consumers.

Draft modelling results

- The AEMC commissioned Endgame Economics to conduct power system modelling to support its consideration of the reserve services rule changes.
- The modelling investigates the circumstances in which an operating reserve service may be of value to consumers. Circumstances in which current market frameworks may be insufficient to incentivise capacity to be available when needed to meet unexpected shocks or events on the power system.

- The model takes a range of possible future capacity mixes for a single region power system and exposes them to simulated severe shocks and events. The resulting outputs from the modelling show how the modelled power system would respond.
- The modelling has several limitations. It is a cost-based model, producing optimal participant behaviour based on costs. Participant behaviour is assumed to be rational. It does not model or capture prices or risk management practices, which are based on bidding and operating behaviour. The events are synthetic and differ from what could be expected in the real world. The model is also a simplification and does not model the interactions between regions in the interconnected NEM.
- An objective of the deep dive session is to gain an understanding from stakeholders of how to best interpret the modelling results in light of these limitations. The AEMC is particularly interested in:
 - Understanding these limitations and how the modelled world results differ from what could be expected in the real world NEM, and
 - Understanding what conclusions can and can't be made based on the modelling results

Stakeholder views on modelling approach, inputs and assumptions

- **Battery duration and behaviour:** Assumed 2-hour battery duration may be too short. Market likely to move to 4-hour batteries over time, shifting away from the saturated FCAS market to focus on energy arbitrage. The assumption of zero charge at the beginning of the day and modelled behaviour of batteries does not reflect likely real-world outcomes (which are likely to have some charge at the beginning of the day and involve better risk management decisions)
- **Interconnection:** considering interconnection in the model would make a big difference to the results. Need to consider Project Energy Connect and VNI West. This should help overcome lack of diversity of supply.
- **FCAS:** the model does not account for FCAS response. FCAS response should be factored into the interpretation of results.
- **Demand response:** the model does not account for demand response. Outcomes would likely be different if demand response were included
- **Probability and severity of events:**
 - events modelled are highly unlikely and very severe. One stakeholder noted experience of loss of 300 MW of solar PV over 15 minutes in the Brisbane area
 - Need to consider probability of events when interpreting the model outputs. If probable, then existing market arrangements should address that by participants responding to the risk. If not probable, then a strategic reserve should be considered.
 - The model does not capture price outcomes and does not model less severe events occurring, and as a result it does not provide significant insight into whether an operating reserve would result in efficiencies for ordinary operating conditions or less severe events.
- **Foresight in the model:** the model assumes forecasts do not change and then suddenly change. In real life, they shift more gradually, allowing participants to respond more appropriately.
- **Ramp rates:** some stakeholders considered the ramp rates in the model to be conservative, while others considered they are above the rates you can expect to see in the real world,

even under extreme circumstances. One stakeholder noted a particular coal generator's ordinary ramp rates are significantly below the technical limits (set out in the ISP modelling inputs) that this modelling is based upon.

- **Gas:** the model assumed the closure of a significant amount of gas in the high battery and pumped hydro future, without being replaced by new gas. Stakeholders considered this assumption to be unrealistic, with the more likely outcome being the continued but less frequent operation of those plant. The impact of this assumption on the modelling outcomes was significant. A large volume of lost load in the model results (particularly the energy gaps over longer durations) may be avoided with a change to this assumption.
- **Hydro:** given it is a single region model based on the Victorian region, the level of Hydro modelled may be too high. However, this should be considered in light of the comments on interconnection
- **Outage situations:** the modelling does not account for outcomes under outage situations (including planned outages) and constraints within a region

Stakeholder views on modelling results, implications and interpretation

- Most stakeholders' view is that the modelling results provide sufficient evidence that an operating reserve service is unlikely to be needed. Stakeholders are confident despite the modelling limitations noted above. The events modelled are catastrophic and larger in scale than could reasonably be expected on the power system. Furthermore, in the majority of cases, the system appears to be capable of responding appropriately to the event.
- Stakeholders raised the link between an operating reserve service and the resource adequacy mechanisms (RAMs) workstream of the ESB's post-20205 project. Some stakeholders considered an operating reserve service may not provide sufficient certainty to governments or the private sector to drive investments in the timeframes critical to the RAMs work.
- Stakeholders also generally considered that the modelling results show the potential for other issues to arise. Stakeholders considered the modelling highlights that the system may be vulnerable during extended uncertain events or "energy drought" scenarios, due to a lack of energy storage. This however should also be considered in light of the limitations of the modelling, including interconnection, storage assumptions and gas assumptions. It was noted an operating reserve service was not an appropriate tool to address this issue.
- Stakeholders participated in an interactive session to capture the results of discussions, including capturing views on the signposts or indicators that would suggest a flexibility or energy duration issue may or may not arise.
- Several potential solutions to the issues discussed were raised, including:
 - Strategic reserve for uncertain events that are not probable
 - More conservative operation of interconnectors to create greater reserves
 - Better enabling the demand side to act as reserves in the energy market
 - Allowing the bidding of different ramp rates to unlock greater flexibility in supply
 - Making state of charge information more transparent to the market to allow participants to better manage risks

Wrap up and close of working group

- AEMC committed to updating the modelling where appropriate to account for the limitations that should be addressed within the model, and to interpret the results in light of the limitations that speak to matters outside the scope of the model.
- A further technical working group may be convened to discuss AEMC's proposed approach to the draft rule determination