

25 September 2017

Mr John Pierce  
Chairman  
Australian Energy Market Commission  
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FROM THE OFFICE OF THE  
CHIEF EXECUTIVE OFFICER

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By electronic submission

Dear Mr Pierce

### **Reliability Frameworks Review: Issues Paper**

The Australian Energy Market Operator welcomes the opportunity to contribute to the Commissions review of the NEM's reliability frameworks.

AEMO agrees that a review of the framework that is separate and additional to the review of the reliability standards and settings is timely. Reliability services that have historically been inherent to conventional plant are unable to be optimised under the current framework, meaning the framework will need to expand to fully describe the range of services required. This would provide the system operator with the transparency it needs to deliver reliability at the lowest cost.

AEMO considers the framework will need multiple reliability standards to address reliability for planning and for operation of the system. This is consistent with the approach taken with the power system security framework where new services have been established.

In the attached submission, AEMO has described in some detail the issues we have identified with the current reliability framework and have provided responses to questions raised in the AEMC's issues paper.

If you would like to discuss the contents of this submission further, please do not hesitate to contact Brian Nelson on 02 9239 9132.

Yours sincerely

Audrey Zibelman  
**Managing Director and Chief Executive Officer**

## ATTACHMENT

### AEMO SUBMISSION ON RELIABILITY FRAMEWORKS ISSUES PAPER

The role of the market operator is to dispatch resources in the order in which they meet demand at the most economical price. This requires system optimisation. Historically, energy price signals have achieved this because of the nature of the resources at the market's disposal. However, as the nature of the resources change, the market signals will no longer deliver the right resources to provide the services needed.

The AEMC have scoped the review to consider what changes to existing regulatory and market frameworks are necessary to provide an adequate amount of dispatchable capacity in the NEM to meet the reliability standard. Recent history and expectation for the upcoming summer show that this review is timely. Like power system security, reliability is a key service to the system and involves a range of resources provided across planning and operational timeframes, using a range of technologies at different locations.

The NEM's concept of reliability is measured in terms of adequate investment in generation capacity to meet demand. AEMO is seeking to broaden the concept of reliability as a key service to the system in the same way as power system security.

#### 1. THE TREND FOR MORE GRANULAR MARKET REQUIREMENTS AND PRICING

Different types of resources and requirements are needed to meet demand: fast responding, slow responding, contingency reserves and black start reserves. Specifying these requirements becomes more critical when resources that don't inherently provide the services needed enter the market. Optimal outcomes will be delivered when prices accurately value a resource that delivers security and reliability to the system.

AEMO's advice to the Commonwealth Government on dispatchable capability<sup>1</sup> included a review<sup>2</sup> of the energy-only markets in Belgium, Texas and Alberta that are augmented by reliability and security products. That review also identified that existing capacity markets are also pursuing next-generation designs to address new power system dynamics. The Australian Energy Market Commission's recent determinations on inertia, system strength and five-minute settlement similarly suggest a trend toward more granularity in market design.

Rather than a single standard, AEMO suggests the NEM needs multiple reliability standards to address planning and operational reliability, in addition to the services already in place (such as frequency control, network control, system restart) or being considered. The framework would also clarify the responsible party for ensuring customer reliability needs are met.

Although widely thought of as an energy-only design, the NEM design includes eight frequency control ancillary services spot markets, and separate "non-market" arrangements for other ancillary and security services. Reliability services (usually expressed as reserves) are valued through the volatility in the spot price.

Some services have, and still are, provided for "free" – that is, costs for those services are recovered through the energy market price. These services are required for security and reliability, and include inertia and system strength (noting the AEMC has recently determined

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<sup>1</sup> AEMO 2017. *Advice to Commonwealth Government on Dispatchable Capability*. Department of the Environment and Energy, Australian Government. <http://www.environment.gov.au/energy/publications/advice-commonwealth-government-dispatchable-capability>

<sup>2</sup> The Brattle Group, August 2017. *Near-Term Reliability Auctions in the NEM: Lessons from International Jurisdictions*. Ibid.

new rules for these services), governor response, ramping, flexibility and dispatchability. This leads to a level of “missing money” in the market, which leads to insufficient service provision and increasing reliance on interventions by AEMO to maintain reliability and security. The costs arising are suboptimal and have the potential to escalate quickly.

## 2. DRIVERS FOR CHANGE

The AEMC have correctly set out that the NEM reliability framework can be described as market-based mechanism with limited interventions in place to account for market limitations. The reliability settings (principally the market price cap) are geared to driving investment and operational outcomes to achieve the reliability standard.

However, limited intervention mechanisms do not bridge the gap between the reliability standard and an expectation that a reliable operating state (that is, no unserved energy) needs to be maintained (as much as practicable and reasonable) in real-time by AEMO. This is consistent with consumer expectations of a reliable supply at reasonable cost.

### 2.1. Reliability Standard

The reliability standard is currently set at 0.002% unserved energy (USE) and is the basis on which the reliability settings are determined. It is seen as an efficient trade-off between the cost of supply required to meet the standard, and the value of customer reliability (VCR) of \$30,000/MWh.<sup>3</sup>

However, there is an expectation on jurisdictions and the NEM institutions to consider all viable options to actively balance demand and supply. The diverse make-up of stakeholders used to determine VCR, and the fact that VCR is above the market price cap, suggests an opportunity to provide value to customers in the face of high spot prices.

### 2.2. Unusual physical outcomes

Low-probability events, such as coincidental high demand, dispatchable plant failures and low variable renewable energy, could see an additional 1,000 MW requirement above the expected (that is, 50% probability of exceedance) requirement.<sup>4</sup> There is also a higher proportion of variable renewable energy (VRE) in the supply mix, meaning that unusual events will be increasingly more likely over time. Such events are harder to manage when the tools are design for emergencies and used as a last resort. The reliability framework needs to provide for orderly management of unusual events.

### 2.3. Intervention

The reliability standard is aimed at delivering investment to meet the expected demand over the long term – effectively the 50% probability of exceedance demand. This leaves intervention as the operational mechanism attempting to maintain reliability.

As more reliability services are incorporated in the NEM framework, there would be a distinction between reserves obtained through intervention and operating reserves that are priced into the market (that are currently also interventions). Nonetheless, there are also issues with the current intervention framework that require review.

<sup>3</sup> Reliability Panel, page 25. *Final Report: Reliability Standard and Reliability Settings Review 2014*. July 2014. <http://www.aemc.gov.au/Markets-Reviews-Advice/Reliability-Standard-and-Settings-Review-2014>

<sup>4</sup> Conversely, 1,000 MW more load shedding than is contemplated by the reliability standard.

AEMO's intervention powers are the reliability and emergency reserve trader (RERT), and directions or instructions under clause 4.8.9 of the NER. Although in practice, operationally AEMO takes every opportunity to manage shortfalls, issues arise here:

- RERT is linked to the reliability standard<sup>5</sup>, which is a planning standard that is unclear as to its use for operating reserves.
- Powers to direct under clause 4.8.9 of the Rules are linked to the Reliable Operating State, which appear to encourage AEMO to intervene to avoid involuntary load shedding.

Both these mechanisms operate in the same operational timeframe but with different triggers. To the extent that intervention can't be avoided, the trigger should be consistent and the objectives of interventions should be clearly defined as part of the design of the market intervention mechanism. The current framework is deficient in this regard.

#### 2.4. Management of involuntary load shedding

Involuntary load-shedding is a blunt instrument, exercised at zone substations with little or no notice to customers or discrimination between them. Consumers that are looking to have more control over their energy supply options haven't been considered in potential commercial schemes that substitute involuntary load-shedding with voluntary load reduction.

Customers with load exposed to spot price would presumably be candidates for participation in such arrangements.

### 3. IMPLICATIONS FOR THE REVIEW

#### 3.1. Reliability Standard

AEMO has advised the Commonwealth Government that the current NEM reliability standard is at the lower end of international standards, and considerably lower than in some OECD countries. The standard is a planning standard, designed to deliver an efficient market outcome that has an implicit acceptance of loading shedding of up to 4,000 MWh of load shedding across the NEM in a year. AEMO's analysis for the Electricity Statement of Opportunities<sup>6</sup> shows a heightened risk that the reliability standard will not be met in some regions over the outlook period.

Even though a change to the standard might drive a more investment in generation, it would produce a higher market price cap to increase the price risk traded in the market. The price cap increase is amplified by variability in demand and supply, which reduces the number of high-priced periods available to drive sufficient investment. This would need to be carefully considered because it may not drive characteristics such as diversity, flexibility or integration of demand that a more granular market design can achieve.

AEMO considers reviewing the standard alone would be unlikely to be a substantive solution and may have downsides as a result of the likely price outcomes.

#### 3.2. Interconnection

Investment in transmission allows locational diversity to be optimised, while also increasing the resilience and responsiveness of the system. The review could examine the existing

<sup>5</sup> Refer clause 3.20.3(b) of the Rules and the RERT Guidelines.

<sup>6</sup> Australian Energy Market Operator. *NEM Electricity Statement of Opportunities*. July 2017. <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities>

transmission investment framework to identify potential improvements in the way transmission investment to support reliability is valued.

### 3.3. Contract markets

AEMO has advised the Commonwealth Government that with the retirement of baseload generation, there is evidence of a reduction in liquidity in the derivative market, which would seem to be at least partly responsible for the recent increase in wholesale prices. There are also specific areas where a lack of liquidity has long been a problem, such as in South Australia. AEMO also noted:

- There is little certainty to be derived from the forward market for investors in new dispatchable generation.
- For gas powered generation, problems are compounded by the absence of a robust forward market and a contract market that is opaque and illiquid.
- A reduction in baseload generation is likely to lead to a reduction in the volume of swaps being offered to the wholesale market and an increase in their price. Changes in load shapes are likely to reduce demand for swaps but increase demand for caps.

Figure 1 shows ASX cleared volumes which show a lower level of trading recently compared to peak volumes in 2010 and 2011.

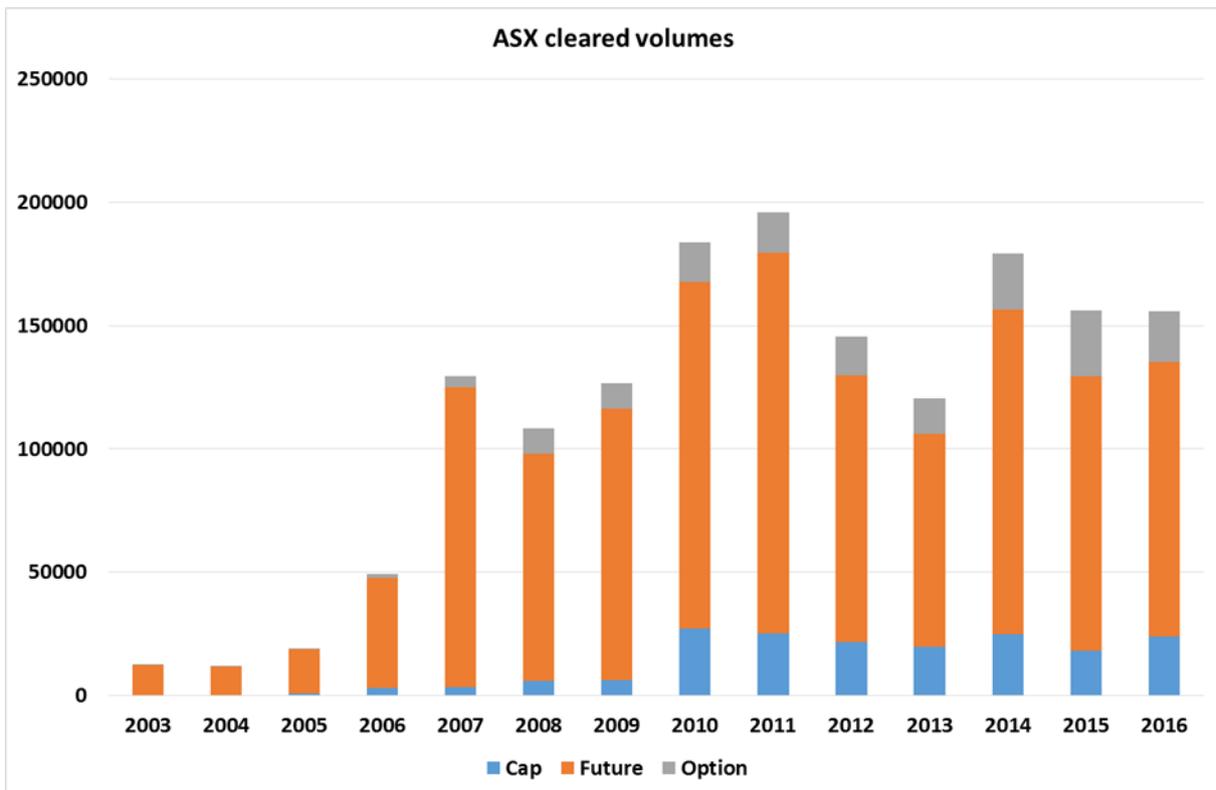


Figure 1 ASX Cleared Volumes 2003-2016

While preparing its advice, AEMO consulted with stakeholders, primarily through representative organisations. A number of electricity users also raised concerns about structural issues impacting on contract market liquidity.

In retail markets, AEMO is concerned about anecdotal evidence of consumers being advised to accept spot price pass-through contracts. A customer that is fully or partly exposed to the spot price would not be part of a retailer's risk profile, leading to a reduction in contracting and lower investment in the long term. However, the market has very little visibility of these arrangements and it is not clear whether the reliability standard should be attempting to provide reliability to this part of the market.

#### 3.4. Day-ahead market and commitment of reliability plant

Contract markets can provide hedges, but they do not provide the necessary transparency to the system operator to operate a secure and reliable system, while ensuring the optimal amount of reserves are procured. In addition, contract markets will not provide hedging or reliability for spot-price exposed customers.

The Finkel review identified a day-ahead market as a way of providing forward transparency to contribute to short-term reliability. This would help reduce the costs associated with market interventions. Increasing transparency and certainty for the operator has the potential to reduce the margin of error and allow the system to be operated less conservatively.

The Texas market is an energy-only market that uses a day-ahead market (DAM)<sup>7</sup> to provide a platform to hedge congestion costs and instruments to mitigate the risk of price volatility in real-time. It matches willing buyers of sellers whereby energy is co-optimised with ancillary services and congestion rights. The market itself is voluntary, but is financially binding. Ancillary services in Texas cover regulation, non-spinning reserve and responsive reserve, which appears to be broader than the concept of the NEM's market ancillary services.

Day-ahead markets also have the potential to promote demand side participation. By making system requirements more transparent, customers have more time to prepare and put alternative arrangements in place.

#### 3.5. Forecasting

The NER obliges AEMO to produce and use its own forecasts of intermittent generation. Wind participants are exposed to AEMO's forecast variances through AEMO's unconstrained intermittent generation forecast (UIGF) and through the regulation ancillary service causer pays process.

AEMO has a program of improvements to existing approaches and new modelling approaches currently underway. This includes a program with participants and the Australian Renewable Energy Agency to develop an alternative to central AEMO forecasts (a Market Participant 5-minute Forecast, or MP5F) that recognises participants are possibly best placed to produce their own UIGF.

However, AEMO is also working with participants to incorporate forecast variances into more sophisticated risk management practices. To this end, AEMO is developing tools to change our categorical forecast to probability-based approaches that provide more quantitative information on risk and uncertainty.

VRE is driven by weather systems, which are by their nature chaotic. Weather is the new fuel for the NEM, with 52% of energy in South Australia supplied by weather.

AEMO's rule change proposal that seeks to change the approach to managing lack of reserve conditions is part of this modified approach.

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<sup>7</sup> ERCOT. *Day-Ahead Market*. <http://www.ercot.com/mktinfo/dam>

### 3.6. Generator reliability obligation

The proposed generator reliability obligation for VRE is a recommendation of the Finkel review, imposed on new VRE generators aimed at ensuring reliability is maintained.

Based on current technology trends and investments, AEMO agrees with the Finkel review conclusion that there will need to be increased investment in both dispatchable generation and grid-scale storage to manage VRE. This would include gas-fired generation, batteries and pumped-storage.

AEMO has undertaken to begin development of a longer-term approach to retain and incentivise investment in dispatchable capability, which includes covering approaches to compensate for dispatch flexibility that would include the articulation of a Generator Reliability Obligation.

A feature of this articulation would be in establishing specific flexibility services relating to different operational timeframes. For instance, the services could relate to dispatchable response available within 5 minutes, 15 minutes and 1 hour.

### 3.7. Strategic Reserves

In its advice to the Commonwealth Government, AEMO has described a potential strategic reserve, similar to the existing RERT and AEMO/ARENA demand response mechanism. It would use demand response and peaking generation that would be enabled during periods of scarcity pricing.

They are procured outside of the market and are not activated outside of a shortage event, preserving existing private investment signals from the energy market. Operation of strategic reserves would also be considered unserved energy for the purposes of reporting against the relevant reliability standard. Strategic reserves would also be likely to replace RERT with:

- An operational trigger based on achieving a reliable operating state rather than the reliability standard, but also minimising the gap between unserved energy under the standard and zero.
- Generalised procurement to be permanent rather than triggered and sized to meet operational rather than planning requirements.
- Providing for recovery of some initial capital expenditure, and a commercial approach that allows some involuntary load shedding to be converted into a service.
- An extension of the AEMO/ARENA initiative.

### 3.8. Rule framework

AEMO suggests the current rules framework be reviewed. The concepts of reliable operating state, reliability standard, RERT, directions and clause 4.8.9 instructions imply a mix of planning and operational objectives that do not come together into a comprehensive framework that can meet consumer expectations of supply reliability.

In particular, the role of the reliability standard as a planning standard and the expectation that a reliable operating state should be maintained in real time should be clarified. AEMO has identified some circularity in the definitions as well that should be addressed.

AEMO's powers of intervention should be aimed at achieving a reliable operating state rather than the current mix of achieving the standard and the reliable operating state.