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### **ERC0339 – Efficient Provision of Inertia**

The Australian Energy Council ('AEC') welcomes the opportunity to make a submission to the Australian Energy Market Commission's ('AEMC') *Efficient Provision of Inertia* Consultation Paper, in response to the AEC's rule change proposed in 2021.

The Australian Energy Council is the peak industry body for electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. AEC members generate and sell energy to over 10 million homes and businesses and are major investors in renewable energy generation. The AEC supports reaching net-zero by 2050 as well as a 55 per cent emissions reduction target by 2035 and is committed to delivering the energy transition for the benefit of consumers.

The AEC thanks the AEMC for its consultation paper that largely captures the main issues pertinent to considering the AEC's proposed inertia spot market and some alternatives. The AEC is pleased the AEMC has heard the overwhelming feedback provided to its June 2022 AEMC/AEMO paper that the AEC's rule change should be progressed concurrently with other Essential Security Services (ESS) reforms underway and started now.

Importantly, that feedback was not averse to procuring an ESS such as inertia via a spot market, as opposed to, say, contractual procurement or provision from monopoly networks. This is not surprising because, after 25 years of the NEM, the industry is most familiar with spot market mechanisms, and, thanks to its open access and transparency, the approach in which it has the most faith.

#### **Question 1: Technical Information**

Our rule change fully acknowledged that there remains challenging electrical engineering work ahead of us in:

- Fully describing the power system requirements for inertia; and
- Determining the technical quality and comparability of different inertia sources.

However, our rule change repeatedly pointed out that this work is in no way a dependency on the choice of an inertia spot market. These two very challenging tasks must be completed in any power system undergoing transition to Inverter Based Resources (IBR), regardless of what markets, if any, are operating on that power system.

Some of the 2021 feedback, and this consultation paper itself, appears to have misunderstood that these tasks are consequential on a decision to procure inertia through a spot market. The AEC repeats its view that this is not the case. A spot market will not oblige the market operator to perform any more analysis of the power system's characteristics than would have been required anyway to ensure security and dispatch efficiency.

Once this fundamental point is understood, the AEMC's task in contemplating the introduction of a spot market against its alternatives is greatly simplified. The AEMC may assume these two critical inputs as given, and that inertia requirements and supply will already be commoditized by AEMO. This

means the costs and benefits of the style of its procurement may be contemplated as if it were any other commodity.

The Consultation Paper has added to the confusion with its Question 1 asking stakeholders to identify additional technical information required to assess the challenges and long-term system requirements beyond what AEMO is doing. This is a highly important question, but it is extraneous to the consideration of AEC's rule change. By asking it here, it perpetuates a misunderstanding that it is the form of procurement, rather than the transition of the power system, that is creating the need for the technical information.

### Question 2: Inertia Procurement and Allocation in Real-Time

In this section, the Consultation Paper has correctly captured the AEC's arguments in favour of a spot market to procure this ESS. These are that:

- The current approach of AEMO setting a shortfall quantity to TNSPs to acquire is likely to be inefficient because:
  - TNSPs must acquire inertia ahead of time, so they must acquire for the worst possible circumstance and therefore over-buy for the majority of the time;
  - Long-term contracting arrangements or assets built within the regulated monopoly regime are unlikely to be as efficient as competitive spot markets;
  - Spot markets create greater opportunity for individual innovation than long-term contracting or regulated network investment;
- Spot markets readily integrate within the existing dispatch process for energy and FCAS, permitting inertia to be co-optimised with them as recommended by the ESB; and
- A spot market is more immediately responsive to AEMO's technical understanding as it evolves with respect to:
  - The system requirements for inertia; and
  - The eligibility of different technologies in providing inertia.

The AEC raises another advantage in that the industry is most familiar with spot markets as the way in which AEMO mostly engages with it. The structure, from forecasting to bidding and settlement, as proposed in our rule change, was intended to look as close as possible to the existing energy and FCAS markets. The AEC anticipates that participants' spot trading operations would readily integrate their inertia offers and dispatch with their existing energy and FCAS operations.

This familiarity implies lower implementation costs for industry.

### 3 Question 3: Investment Signals for Inertia

The Paper has largely correctly reproduced the AEC's arguments that this rule change will provide an investment signal by:

- Creating a familiar remuneration structure where none exists now, even if in the short-term oversupply leads to near zero spot prices;
- Setting a clear marginal price of the true value of this product;
- Being more transparent than long-term contracts.

The AEC also proposed that the inertia spot market would come with the same forms of forecasting information as applies to other spot markets to assist long-term investment signals, as well as medium-term and short-term operational readiness. This includes material whose presentation is very familiar to the industry, such as Statements of Opportunities and low reserve notices.

At page 16 the Paper correctly relates the AEC's example of IBR being incentivized to invest in grid-forming capability where it is efficient to do so. However, the Paper then mischaracterises the AEC's

acknowledgement of the challenging technical work of determining eligibility as being a dependency of this rule change. As stated earlier and in the rule change proposal itself, this work must occur regardless of the way inertia is sourced, and when considering the merits of a spot market, should be assumed as having occurred.

#### Question 4: Will the AEC's Proposed Solution Best Address the Problems Raised?

The description of the AEC's proposal in section 3.1 is broadly correct. The AEC does not agree with the last two matters suggested by the AEMC.

##### *Development of a derivative contracting market*

A common clearing price spot market is the only form of market that can support a secondary derivative contracting market should participants choose to engage in one. This is certainly a potential benefit of our proposal because if one arises it would be very useful in providing a transparent investment signal and to manage participant risk.

The AEMC however goes further and appears to consider that a derivative market is “necessary” with respect to the introduction of a spot market. The AEC disagrees and suggests that spot markets can still be very effective even if there is no obvious derivative market. The FCAS spot markets have been very successful despite having no widely traded secondary products. Having said that, it is not unusual for participants to transfer FCAS exposures with bespoke contracts<sup>1</sup>. This is only possible because of the common-clearing and transparent nature of those FCAS markets.

The Paper appears to have given the AEC rule change an impossible hurdle: that a derivatives market is a pre-requisite of a spot market. However, a secondary market cannot possibly arise until a primary market exists, and only after it has produced a material risk that justifies managing.

##### *Excluding monopoly assets*

The Paper suggests that the AEC's rule change excludes monopoly assets from provision of inertia even where they are the most efficient source. This is a misunderstanding of the proposal.

The design proposes that existing monopoly assets that provide inertia and are part of the regulated asset base would be considered in the spot market by reducing the quantity of inertia purchased from the market. Also, AEMO would retain its ability to specify an inertia requirement to TNSPs in the planning timeframe, but this function would naturally revert to a “last resort” when AEMO considered the spot market was not delivering sufficient supply. This was not intended to mean that monopoly networks were in some way barred from building inertia providing assets where they are an efficient option.

Networks will still be able to build efficient assets that provide inertia:

- As part of their normal regulated capex spend where they can demonstrate to the regulator that it is a more efficient source than other providers, for example through the Regulatory Investment Test for Transmission; or
- As a competitive provider in the AEC's spot market itself via a ring-fenced subsidiary using assets that are not funded or cross-subsidised from the Regulated Asset Base.

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<sup>1</sup> An example of a bespoke FCAS risk transfer agreement can be found here:

[https://www.economicregulator.tas.gov.au/electricity/pricing/wholesale-pricing/frequency-control-ancillary-services-fcas/2010-frequency-control-ancillary-services-\(fcas\)-investigation](https://www.economicregulator.tas.gov.au/electricity/pricing/wholesale-pricing/frequency-control-ancillary-services-fcas/2010-frequency-control-ancillary-services-(fcas)-investigation)

## Question 5: Alternative Options

### *Operational Security Mechanism*

The AEC feels it is incorrect to describe the Operational Security Mechanism (OSM) as an “alternative” to a spot market. The OSM proposal is designed to permit AEMO to commit assets where:

- An ESS is required for the power system but no market has yet been unbundled for it; or
- Where an ESS has been procured via a contract that requires day to day commitment decisions from AEMO.

The OSM is therefore intended to be used as part of, or as a safety net in the journey towards, explicitly unbundled ESS. It is not intended to be used as an alternative to unbundled ESS.

The OSM is also incapable of performing realtime co-optimisation of the acquisition of inertia with FCAS and energy. It can only perform trade-offs in the predispach timeframe and is unable to adapt as power system conditions change quickly from dispatch interval to dispatch interval. Many inertia sources will be “fast-start”, e.g. grid-forming batteries and hydro units operating in synchronous condenser mode, which can be readily activated with 5 minutes notice. The OSM, being designed to make commitment decisions hours ahead of real-time, cannot take advantage of the inherent flexibility of these sources.

A real-time spot market, however, when supported with a predispach that assists slow-start self-commitment decisions, has access to all resources at their full levels of flexibility, both fast and slow-start<sup>2</sup>.

The AEC disagrees that OSM implementation may be relatively simpler and less costly than a spot market for inertia. The OSM is a very novel concept for the NEM, a mechanism based on inter-temporal commitment offers from participants, which AEMO optimize with integer programming techniques in the predispach timeframe. This is computationally hard for AEMO and conceptually hard for participants. Participant traders will have entirely new problems to solve in operating between their existing self-commitment mechanisms and AEMO’s new central commitment process.

In terms of the AEC’s proposal, the AEMC may have misunderstood its similarities to existing energy and FCAS markets. The adjustment to the dispatch engine, and the extension of participant bidding data, is very incremental and consistent with the current design. In terms of systems build and conceptual understanding, the reform is quite similar in scale to the recent introduction of very fast frequency services.

### *Shadow Pricing*

This design is potentially an efficient way to purchase ESS, and AEC members have previously proposed variations of shadow pricing for various services. The AEC does not object to it being considered as an alternative.

In theory, shadow pricing has many of the benefits of a spot market in terms of co-optimisation with the energy market and common-clearing pricing.

It is however quite different in structure to the existing energy and FCAS markets and less conceptually intuitive for existing participants. The AEC suggests that the AEMC is likely to find that its outcomes

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<sup>2</sup> A detailed explanation of how a spot market, supported by predispach, leads to more efficient decentralised commitment decisions as opposed to central commitment, is contained in [this](#) AEC report.

are substantially convergent with the spot market. In this case, it seems simpler to rely on a more widely understood approach.

#### *RoCoF Market*

The AEC's rule change proposed a spot market in "Inertia Ancillary Services" (IAS) and envisaged providers selling inertia using a Megawatt-Second unit. The AEC approached the design from the perspective of inertia providers. The primary purpose of inertia is to slow the post-contingent Rate of Change of Frequency (RoCoF), providing an opportunity for frequency arresting mechanisms to avert a power system collapse.

The AEC is aware of suggestions to repurpose and rename the proposed market as a "RoCoF market". These suggestions however retain the AEC's spot market framework and therefore the AEC is not averse to the suggestion.

The AEC's rule change envisaged that the inertia spot market would equally recognize conventional electromechanical sources of inertia as well as inverter-based sources to the extent that AEMO considered them equivalent. Describing the latter as "inertia" is a reasonable simplification of a market concept, but the AEC concedes the term is not strictly correct in a scientific context. The AEC understands the interest in this name change comes about from a desire to ensure that all assets that assist in slowing RoCoF may participate, whether or not this comes about by something that engineers are comfortable in describing as "inertia".

When considering a renaming of the market, the AEMC should be aware that inertia does have some power system benefits beyond limiting post-contingent RoCoF. The level of inertia is also an input to transient and oscillatory stability equation network limits. Higher system inertia, particularly on the upstream side of the limit, tends to increase network capacity by reducing the expected phase angle deviations during circuit breaker fault clearing time.

The *inertia* market as envisaged by the AEC would enable AEMO to purchase inertia for both RoCoF and stability benefits. As the service is intended to be co-optimised by the dispatch engine, the AEC envisages AEMO purchasing more IAS when the dispatch value of an increased network limit exceeds the cost of the IAS. A renaming of the market should not inhibit AEMO from purchasing inertia for this purpose.

#### *RoCoF Market – cost recovery*

The AEC's rule change anticipated cost recovery being based on the socialized approaches used in the existing contingency services. The AEC does not agree with the paper's suggestion of allocating costs to facilities with a RoCoF capability lower than a benchmark because:

- The purpose of slowing RoCoF is to provide an opportunity for frequency arresting mechanisms to avert a power system collapse. It is not to protect the commercial interests of any particular party by averting a trip. The former may be assisted by averting the latter, but the market's *objective* is the former, not the latter.
- Legacy generators with weak RoCoF withstand capability entered the market in good faith at a time when inertia was plentiful and there was no explicit RoCoF standard. Their connection agreements took those conditions into account and were agreed with networks.
- There is no allocative efficiency argument in now applying a higher charge to legacy sunk assets.
- New connections will be subject to the market's new RoCoF standard, so there is also no need to provide a new entry signal.

### *Structured Procurement*

The AEC considers this approach the most substantive and realistic alternative to a spot market and therefore addressed it in its Rule Change. The Paper reasonably captures the AEC's views on its detractors and others' views on its advantages.

### *Maintain the current framework until technical work informs the best approach*

The Paper reasonably captures elsewhere the AEC's views on why the process towards a future spot market should begin now. The AEC suggests that its design is one of low regrets. Its design, being built on the existing bidding platforms, is intentionally low cost, and, if inertia proves oversupplied in its early years, will clear at a near zero price.

The AEC recollects the AEMC Frequency Control Frameworks Review<sup>3</sup> that concluded in June 2018 recommending that further technical investigation occur before implementing any Primary Frequency Response mechanism. This was followed on 25 August 2018 with a major power system event that led to a sense of great anxiety in the market operator. This anxiety resulted in a hurried rule change to mandate the delivery of Primary Frequency Response without a market mechanism.

By its nature, technical study has no conclusion. The experience of the Frequency Control Frameworks Review provides a salutary lesson in why designers must resist the temptation to defer decision in lieu of further study.

Any questions about this submission should be addressed to Ben Skinner, by email [Ben.Skinner@energycouncil.com.au](mailto:Ben.Skinner@energycouncil.com.au) or 03 9605 3116.

Yours sincerely,



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<sup>3</sup> <https://www.aemc.gov.au/markets-reviews-advice/frequency-control-frameworks-review>