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Anna Collyer
Chair
Australian Energy Market Commission
Sydney NSW 2000

Reference: ERC0339

Dear Ms Collyer,

Draft Rule Determination – Efficient Provision of Inertia

AEMO welcomes the opportunity to comment on the Draft Rule Determination (Draft Determination) for the Rule Change consideration of the Efficient Provision of Inertia. The Draft Determination has collated the considerable body of work conducted by the AEMC, the Technical Working Group and the AEMC's consultants (Houston-Kemp).

AEMO concurs with the principal finding of the Draft Determination that the operational procurement of inertia has conceptual merit, but that there are not material net market benefits at this time.

AEMO supports the AEMC economic analysis approach, which began in mid-2024 that led to that conclusion. This was that minimum inertia requirements should remain sourced from existing frameworks, including as a by-product of the structured purchase of system strength. The role of operational procurement would be limited to obtaining "additional inertia" where it lowers real time total costs through dispatch co-optimisation. This approach enabled Houston-Kemp to reasonably assess benefits and compare to implementation costs.

Houston-Kemp drew on AEMO's documents to forecast a cost-benefit outlook, and AEMO agrees that material market benefits do not exist in the short to medium-term. This conclusion may also extend to the long-term, but AEMO considers that a monitoring role in the Reliability and Security Report (RASR) is proportionate and low-regrets.

AEMO welcomes the AEMC's engagement with submitted critiques of the existing regimes for inertia forecasting, contracting and transitional services. The AEMC closely investigated these processes with a view to improving or introducing new obligations upon AEMO and/or Transmission Network Service Providers (TNSPs). Ultimately the Draft Determination concludes against codifying any new obligations which would risk constraining innovation freedom, noting especially the newness of the structured System Services procurement regime. AEMO supports this conclusion.

Should you wish to discuss any aspect of our submission, please contact Hannah Heath, Group Manager, Strategic Market Reform (Hannah.Heath@aemo.com.au).

Yours sincerely,

Violette Mouchaileh
Executive General Manager, Reform Delivery

ATTACHMENT – Detailed submission

1. NEM Inertia context

Inertia is a critically important system service which, like other system services, is undergoing dramatic supply and demand changes with the transitioning grid. Planning, acquiring and monitoring of inertia services is already a key system security responsibility of AEMO and TNSPs. In that vein it is important to consider least-cost means of securing its acquisition.

Without dismissing its critical importance, there is context that makes the long-term delivery of inertia a lower risk than other services.

Firstly, as Houston-Kemp correctly identified in its analysis, its supply is forecast to decline at a lower rate than other services. Meanwhile, some of the inertia requirements will fall in the medium term with closure of large coal units. Houston-Kemp did postulate growing requirements in the long term due to larger single network contingencies associated with Renewable Energy Zones (REZs), however as AEMO noted in its February submission, these would be expected to be moderated through control schemes.

Secondly, the NEM recently introduced a planning-timeframe framework for the structured acquisition of system services through the Improved Security Frameworks (ISF) and Network Support and Ancillary Services (NSCAS). The ISF is at a critical stage of rollout and industry should be fully focused on its successful delivery. Introduction of an additional system services acquisition mechanism at this time may have distracted that focus.

Thirdly, the provision of system strength is the immediate priority of these structured frameworks. As discussed in the Draft Determination and by Houston-Kemp, provision of inertia as a byproduct of system strength via heavy synchronous condensers provides a promising new source of low incremental cost inertia.

Fourthly, technical work on understanding the application of synthetic inertia from grid forming inverters[1], and from the demand-side[2] at low and zero cost respectively, provides promising signs that these can be used to supply much of the NEM's long-term inertia needs.

This optimistic context was key to the December Discussion Paper's position that structured mechanisms, rather than spot markets, should be relied upon to underpin the *minimum* secure level of inertia. The role of *operational procurement* would then be limited to achieving real-time dispatch efficiencies through the purchase of above-minimum, *additional* inertia. This position was broadly supported in submissions.

2. Operational Procurement

2.1. Role of operational procurement versus minimum secure level

As noted in our February submission (question 5) AEMO supports the earlier finding that structured procurement, in the planning timeframe, is the preferred way to procure *minimum* secure inertia. The finding improves network planning certainty and supports efficiencies through simultaneous delivery of both system strength and inertia through installation of synchronous condensers with flywheels.

This minimum secure level created a floor upon which operational procurement for *additional* inertia could be contemplated. Additional inertia could be procured by a mechanism only when it opportunistically reduced the total cost of dispatch via co-optimisation.

[1] See quantifying-synthetic-inertia-from-gfm-bess.pdf
[2] See https://arena.gov.au/assets/2024/09/Reactive-Technologies-System-Inertia-Measurement-Demonstration-Project-Technical-Knowledge-Sharing-Report.pdf

This approach also provided a good platform for Houston-Kemp to perform a reasonably robust cost-benefit analysis.

2.2. Broad design of the operational procurement mechanism

The Rule change process did not complete a detailed design. The proposal and discussions anticipated a design conceptually replicating the existing contingency Frequency Control Ancillary Services (FCAS) markets, co-optimised with other FCAS and energy markets dispatched by the NEM Dispatch Engine (NEMDE). AEMO agreed with that broad design, noting considerable detailed work and consultation remained. AEMO and some submissions however raised conceptual concerns about the Discussion Paper's alternative suggestion of acquiring inertia through the existing 1-second FCAS market.

To dispatch and co-optimise inertia in real-time, progress would need to be made in:

- Confidence in real-time measurement of synthetic and demand-side inertia; and
- Linearisation of the system requirements for inertia.

AEMO expects progress on these matters will be made over time even without an operational procurement mechanism. AEMO agrees with the Draft Determination's reflections on the above and agrees the existing Transition Plan for System Security (TPSS) could be a useful platform for monitoring progress[3].

2.3. Benefits

As stated in our February submission, AEMO broadly agreed with Houston-Kemp's approach to assessing hypothetical benefits of operational procurement. In our response to Question 1 we cautioned against including benefits from permitting larger contingency sizes, which we considered an unreasonable expectation for an inertia market to perform alone. Instead, it is likely that control schemes would be required to resolve the large single contingency risk, justified for non-inertia reasons. Larger contingency size benefits comprised about one third of Houston-Kemp's assessed benefits.

2.4. Costs

Noting that no detailed design has been completed, for the purpose of this stage of the decision making, AEMO considers that a high-level industry-wide NPV cost of around $30 million[4] is not unreasonable.

2.5. Draft Determination Position

AEMO supports the Draft Determination's key finding that operational procurement of additional inertia has conceptual merit but unfortunately there are insufficient net benefits to progress now. Our view remains that there would need to be substantial and clear net benefits due to contextual challenges, such as:

- The contemporaneous implementation of the ISF procurement of system services in the planning timeframe. TNSPs and Market Participants need to dedicate focus on overcoming the remaining challenges in delivering this framework. Simultaneous design of an operational procurement mechanism risked distraction. AEMO considers the ISF should ideally have some time to bed down before the industry contemplates a parallel procurement mechanism.
- A generally crowded NEM reform agenda with other major reforms, such as Shortened Settlement Cycle and Integrating Price Responsive Resources drawing upon the industry's limited system design resources[5].
- The absence of evident urgency with respect to the inertia supply-demand outlook.

[3] Draft Determination, Section 4.3
[4] Draft Determination, Page 26
[5] See AEMO | NEM Reform Program Initiatives

AEMO agrees that maintaining the existing framework provides regulatory certainty and focus on its delivery whilst preserving flexibility for future reform of the type envisaged by Operational Procurement.

2.6. Reliability Panel Monitoring Request

AEMO's February submission suggested that whilst operational procurement had theoretical merit, the lack of clear net benefits and state of necessary technical capacity suggested it would be best deferred at this time and revisited later in the decade. The Draft Determination has recommended allocating the Reliability Panel a formal role in its annual Reliability and Security Report (RASR)[6] to monitor inertia conditions and report whether they have changed such that operational procurement is likely to deliver material net benefits. This recommendation is an appropriate way to implement AEMO's suggestion.

AEMO also supports the list of system conditions to be monitored by the RASR[7], particularly Rate of Change of Frequency (RoCoF) constraints and improved technical capability to support operational procurement.

3. Improving existing frameworks and readiness for Operational Procurement

3.1. AEMO's technical workstreams

In developing its Draft Determination, the AEMC has appropriately engaged with a broad range of technical information published by AEMO and made many direct enquires. AEMO fully recognises the importance of developing its technical understanding of the transition and reporting regularly and shares the desire of AEMC and industry to maintain this as a very high priority. As the AEMC acknowledges, AEMO is currently progressing a substantial body of work that addresses several concerns raised by stakeholders[8].

Whilst there are rule requirements upon AEMO to deliver various technical reports, their specific contents and structure are, in general, not prescribed. Similarly, AEMO has some discretion to determine technical matters to study and report upon the future needs of the power system[9]. The AEMC considered requests to expedite technical work on inertia by imposing specific study planning requirements, such as an "inertia roadmap". AEMO agrees with the Draft Determination's conclusion that such obligations could be duplicative (inertia being a subset of system security) and at worst counterproductive as it could constrain freedom to adapt its areas of study as the future needs of the power system evolve.

3.2. Visibility of AEMO's technical work

AEMO recognises the Draft Determination's reflections on the prominence of inertia studies in its broader system security reporting. In its inaugural 2024 TPSS[10] inertia was frequently discussed, but within the broader context of security work. AEMO produced a separate dedicated Inertia Report in December 2024[11] which met its obligations to provide 10-year projections.

AEMO notes the Draft Determination commentary suggesting that future TPSS editions could contain a dedicated inertia chapter.

Preparation of the 2025 TPSS is underway. The 2025 TPSS will be a comprehensive document merging previously separate reports regarding Inertia, System Strength and NSCAS. It is also proposed to merge the TPSS with the Engineering Roadmap in 2026. As a result, in the 2025 TPSS, the inertia discussion will be

[6] Formerly known as the Annual Market Performance Review (AMPR)
7 Draft Determination, Page 35
[8] Draft Determination, Page 38
[9] An example of this is AEMO's Technical Note on quantifying synthetic inertia from grid-forming batteries, Sep 2024 quantifying-synthetic-inertia-from-gfm-bess.pdf
[10] aemo-2024-transition-plan-for-system-security.pdf
[11] See https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-inertia-report

more fulsome than the 2024 TPSS, but the chapter structure is not planned to be distinguished by system service.

3.3. Transitional Services Type 2 contracts

AEMO is fully supportive of using Type 2 Transitional Services for supporting innovation within the intent of the regime implemented by the AEMC in 2023. Following submissions expressing disappointment that such contracts were not more widely used, AEMC discussed at length with AEMO the role for, and progress towards, Type 2 contracts. AEMO agrees that submitted suggestions of volume quotas for various technologies would run counter to the technical research intent of the scheme.

AEMO also agrees that the cut-off date of 28 March 2024 is not a barrier to Type 2 synthetic inertia trials despite synthetic inertia being demonstrated in the NEM prior to that date. The cutoff refers to new *applications* of a technology for the management of power system security, and there are many potential applications of synthetic inertia yet to be demonstrated.

AEMO continues to investigate opportunities for Type 2 contracting, for example in its recent System Restart Technical Advice to the Reliability Panel, AEMO suggested it may be used to demonstrate system restoration from new technology[12].

4. Other matters

AEMO notes that Box 2 of the Draft Determination includes a discussion of the 2025 Iberian Peninsula system black event, stating that it highlights the importance of system security. The discussion is an accurate summary of the information currently available, and AEMO agrees that such events are a sobering reminder of the criticality of managing system security through the transition. AEMO however understands that event was caused by insufficient and inappropriate voltage control – which the discussion acknowledges – and that a lack of inertia was not a key factor. Recognising that the example was purely illustrative, to avoid misunderstanding it may be better to present examples demonstrating unmanageable Rates of Change of Frequency.

[12] Page 5 https://aemo.com.au/-/media/files/initiatives/engineering-framework/2025/system-restart-technical-advice.pdf?la=en