AEMC

INFORMATION

Efficient provision of inertia

The AEMC released a Directions Paper outlining the economic assessment of operational procurement of inertia

The Australian Energy Market Commission (AEMC) has published a Directions Paper seeking stakeholder feedback on the economic case for operational procurement of inertia in the National Electricity Market (NEM).

The paper examines the suitability of operational procurement mechanisms, such as a spot market, for providing both 'minimum' inertia required for system security and 'additional' inertia that could deliver broader efficiency benefits. It also considers the potential benefits these mechanisms could offer in complementing existing frameworks.

Stakeholder feedback is sought on the benefits, challenges, and implementation considerations for operational procurement mechanisms. Submissions are due by 6 February 2025, and this feedback will inform the Commission's Draft Determination, due on 27 June 2025.

As a first step in progressing the rule change, the AEMC is focusing on assessing the economic case

The AEMC's Directions Paper focuses on assessing the economic case for operational procurement of inertia as a first step, acknowledging the need for further technical analysis to address implementation and feasibility. This approach ensures efforts are targeted and aligned with the National Electricity Objective (NEO). The economic analysis evaluates whether inertia has the characteristics necessary for operational procurement and examines potential cost savings and efficiency gains which could benefit consumers.

The AEMC engaged HoustonKemp to analyse inertia supply and demand and develop a two-stage economic test to evaluate operational procurement options. The first stage assessed whether minimum and additional inertia align with efficient operational procurement. The second stage quantified benefits, including reduced fast frequency response costs and alleviating generator constraints, and considered implementation costs.

The findings suggest potential benefits but highlight the need to resolve key questions before determining which approach is in the best interests of consumers.

Feedback to this paper will inform the Commission's analysis in the next stage of this rule change, and our plan for progressing the areas identified above.

Inertia demand and supply characteristics underpin the economic analysis

The Commission has assessed how inertia supply and demand in the NEM will evolve during the energy transition. Inertia is vital for system stability, and understanding its future supply and demand is key to effective procurement. Demand for inertia is expected to decline as inverter-based resources, which can better withstand high rates of change of frequency (RoCoF), replace synchronous generators. However, large-scale renewable projects like offshore wind farms may increase demand depending on their network connections and contingency management needs. Mitigating measures, such as protection schemes, could reduce these effects.

On the supply side, retiring synchronous generators will shift the landscape, with synchronous condensers and grid-forming inverters playing a growing role. Approximately 36 new synchronous condensers are planned for installation by Transmission Network Service Providers (TNSPs) over the next nine years. These investments should provide

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stable inertia but face uncertainties in timelines and technical specifications. Emerging technologies, such as synthetic inertia from battery storage and load-side inertia from industrial motors or household batteries, also show promise. Synthetic inertia costs are projected to decline significantly by 2030, though challenges remain with integrating and measuring load-side contributions.

The Commission seeks stakeholder feedback on future inertia supply, costs, and deployment timelines to refine its assessment and support effective procurement solutions.

The findings suggest there is an economic case for further considering operational procurement for additional inertia

The Commission's analysis found that while long-term procurement remains the most effective mechanism for minimum inertia, operational procurement shows potential for additional inertia under specific conditions.

Minimum inertia is essential for system security, ensuring the NEM can withstand disturbances without risking blackouts. While it has some characteristics aligning with operational procurement, the high risks and costs of undersupply make it unsuitable as a primary mechanism at the current time. Long-term procurement frameworks provide the investment certainty needed to secure minimum inertia reliably.

Additional inertia offers flexibility and cost benefits, making it more suitable for operational procurement. It reduces frequency management costs, improves dispatch efficiency, and could be co-optimised with fast frequency response, lowering overall system costs. HoustonKemp's modelling estimates annual benefits ranging from $0.9 million to $30 million by 2033 from procurement of additional inertia. Operational procurement could also alleviate inertia constraints in regions like Tasmania and South Australia, enabling more efficient generation dispatch.

The Commission seeks stakeholder feedback on these findings, particularly on the practicalities of operational procurement for additional inertia and how it could complement long-term frameworks to optimise system costs and security.

There are important implementation considerations to operationally procuring inertia

The Commission has examined implementation considerations for operational procurement of inertia in the NEM, including procurement models, technical and policy challenges, costs, and timing. Two procurement models are explored: a standalone inertia spot market, operating like FCAS markets, and integrating inertia valuation into 1-second FCAS markets to reduce implementation costs. Both would dynamically co-optimise inertia with other system services while complementing the existing long-term procurement framework.

Estimated annual benefits for procuring additional inertia vary, depending on implementation costs and supply-demand uncertainties. Therefore, the Commission considers we need to resolve key questions before determining which approach is in the best interests of consumers. These include:

- whether we can reduce the uncertainties in the inertia supply, demand, and benefits analysis,
- any technical barriers to operational procurement of additional inertia (for example, locational versus global needs), and potential policy design approaches to overcome these barriers,
- the implementation costs of each option, including information and views from AEMO,
- policy design issues such as cost allocation, managing synchronous unit lead times, integration with long-term frameworks, and how to stage implementation.

Stakeholder feedback on the directions paper will inform the Commission's next steps.

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