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From: Hydrostor
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Re: **Hydrostor submission to the AEMC's Discussion Paper – Efficient Provision of Inertia**

Hydrostor welcomes the opportunity to engage with the AEMC on the efficient provision of inertia. As a participant in a RIT-T for system strength, Hydrostor appreciates the analysis required to balance the network through the procurement of both minimum and additional inertia. With the energy transition well underway, the retirement of existing synchronous generation provided by coal and gas plants provides a significant reliability concern for grid operators. The market signals to produce services to replace these assets are evolving, and the rule change on Improving Security Frameworks for the Energy Transition was a foundational step in this evolution of the market. Hydrostor commends the AEMC on the change, as it created a commercial pathway for innovation in system services.

In this submission, Hydrostor will provide feedback and commentary on:

- The inputs and assumptions in the analysis,
- The importance of long-term procurement model for minimum inertia on investment, and
- And that an inertia spot market is the preferred option for operational procurement of additional inertia.

About Hydrostor

Hydrostor, a private company founded in 2010 in Canada and backed globally by Goldman Sachs and Canadian Pension Plan, using its proprietary Advanced Compressed Air Energy Storage technology (A-CAES). The company has operational facilities in Ontario, Canada, and is in late-stage development for projects in California, USA and NSW with Australian operations based in Melbourne.

A-CAES is based on the proven (since the 1970s) compressed air technology but solves the two main constraints of traditional compressed air energy storage by storing and using heat, eliminating the need for natural gas, and constructing optimised sub-surface caverns instead of exclusively salt caverns. The resource is a 100% emission free solution that can be strategically and flexibly located where needed. A-CAES also benefits from being intentionally designed around existing supply chains that are proven for directly analogous applications which are widely deployed in the conventional energy industry. This means that A-CAES can be commercially deployed today and is already being deployed in multiple markets globally.

A-CAES has unique advantages as a long-duration energy storage solution. It can be constructed in places where other forms of large-scale synchronous generator-based storage cannot (like pumped hydro and traditional-CAES). Unlike battery storage technology, A-CAES is cost-effective at long durations (6 hours+), has an exceptionally long service life of over 50 years without degradation and without any requirements for augmentation. It also provides numerous grid benefits like synchronous inertia, frequency response, and managing minimum demand. These benefits could translate well into multiple non-network options in RIT-T processes from a single facility.

Inputs and Assumptions

While AEMC lists out the estimated cost of inertia supply for Existing Synchronous Generation, Synchronous condensers and Synthetic Inertia in Table 6.1 of the Discussion Paper, it is missing the cost of new synchronous generation that will enter the NEM. Non-emitting Synchronous Generation coming from long-duration energy storage technologies such as A-CAES should be considered in AEMC's analysis and rule considerations. The HoustenKemp report included a review the of Transgrid's System Strength PADR, the GenCost report and the 2024 ISP, however, new Synchronous Genration were still not included in their analysis. In the case of the PADR – Hydrostor's ACAES facility is set out as the preferred option for the Broken Hill region. Further, costs of A-CAES are considered in the GenCost report, along with cost of pumped hydro. If these facilities are in late-stage development, and even considered committed or anticipated in the ISP, their omission is concerning as this analysis is future looking. As the system strength rule change opens new revenue streams for synchronous long duration energy storage providers, bankability of these projects improves, and are likely, therefore, to be able to provide more network support and system security as a service.

[redacted]h to meet minimum levels

[redacted]ong-term procurement models are currently the most suitable to meet minimum inertia levels. As the analysis sets out, there are high upfront costs of new facilities which can provide inertia. Therefore, longer term contracting/procurement enables financing for facilities which may be able to provide more than one network service (such as new A-CAES, PHES or BESS with grid forming inverters). The efficiency gains within this model allows for the economic comparison of network (synchronous condensers) and non-network options to create competitive tension and allows for innovation.

Operational procurement for additional inertia

As discussed in the paper, synchronous condensers will "always be switch on". Also, their procurement by TNSPs will be as regulated network assets, therefore not able to participate in any operational procurement for additional inertia. It is worth ensuring that this point is made clear.

The Discussion Paper sets out that intention of creating operational procurement of additional inertia is to create competitive tension, and therefore minimising costs of frequency management. If the intent is a balance between costs, the costs need to be compared on a level playing field, allowing for market signals to create efficiencies. Therefore, Hydrostor supports the operational procurement of additional inertia through a spot market, modelled on the existing FCAS market. This way decisions are based on a like-for-like comparison, and the practicalities of building a market will have some efficiency gains from having already been through the FCAS market building process.

Reforming the existing frequency markets to include inertia demonstrates the issue identified in the inputs and assumptions. Additional inertia will not only be provided by BESS providers but could also be provided by new synchronous LDES facilities. These technology types are able to provide inertia without being able to provide Fast Frequency Response. As the future is uncertain, this pathway may limit the potential solutions. For a simpler solution, the AEMC may want to consider the approach of ensuring a simple "capacity" price for inertia as demonstrated in other markets.

Transitioning the market along with the energy mix is an iterative and complex process. Sending the right signals to ensure needs are met through investment requires a delicate balance. Hydrostor supports the continued focus on system security as a service as it enables innovation and investment in a time of uncertainty.

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