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Date: 11 April 2023

Ms Anna Collyer
Chair – Australian Energy Market Commission
[REDACTED]
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Dear Ms Collyer,

2023 Efficient provision of inertia – consultation paper

The Australian Energy Regulator (**AER**) welcomes the opportunity to comment on the recent consultation paper released by the Australian Energy Market Commission (**AEMC**) regarding the efficient provision of inertia.

The current procurement framework for inertia requires transmission network service providers (TNSPs) to procure additional inertia only when shortfalls have been identified by the Australian Energy Market Operator (**AEMO**). This rule change, submitted by the Australian Energy Council (**AEC**), proposes to create a spot market for inertia. The AEC consider that this approach is likely to lead to a more efficient procurement of inertia, as opposed to the status quo where TNSPs are required to provide a set level of inertia at all times.

The AER considers that it is worthwhile considering the potential of this approach to interact with other frequency control and system services (such as system strength), with a view to aligning the frameworks for services which are often procured simultaneously, or which are partially substitutable for one another.

Interplay between inertia and other frequency mechanisms

As noted by the AEMC, the proposed inertia market would take place within a regulatory context in which there are already existing markets for frequency control and ancillary services (FCAS). This is important because the provision of inertia is intrinsically linked with the ability to control the frequency performance of the power system, while at the same time not being completely interchangeable.

The AEMC has determined to introduce markets for fast frequency response services, which take the form of contingency FCAS markets. The new Very Fast FCAS markets, which comes into effect on 9 October 2023, will procure services to raise and lower grid frequency within a timeframe of 1 second.

The procurement of additional inertia will have an impact on fast frequency response markets, given that inertia acts to decrease the rate of change of frequency (RoCoF), while RoCoF limits determine the amount of fast frequency response procured via the Very Fast

FCAS markets. On the other hand, we note that in different circumstances fast frequency response can also act as a partial alternative to inertia, as it already has in South Australia.¹

As such, it will be important to clarify and review the relationship between inertia and fast frequency response. Efficient procurement mechanisms should be developed in the context of AEMO's Engineering Framework, in line with improving technology and knowledge of power system operation with increasing inverter-based generation resources.

Clarifying minimum and additional levels of inertia

In the AEMC's consultation paper, a distinction is drawn between "non-discretionary inertia demand," which is the minimum level required for power system security, and "discretionary inertia demand". The discretionary inertia demand would be determined by AEMO, through forecasting the lowest cost combination of inertia and other frequency control services.

The question of what level of inertia should be considered to be the minimum is an important one. Currently, AEMO's Inertia Requirements Methodology determine the minimum level of inertia required for each region of the NEM, and TNSPs are required to meet this level. While we are open to an evolved framework which may increase the efficiency of procurement, we note that one advantage of the existing framework is that it provides a high level of certainty that a minimum level of inertia—that is, the level required for operation of the power system—is available in the system. The AEMC will need to give careful consideration as to whether real time dispatch provides sufficient certainty that the minimum requirements of the power system are being met at all times, and whether the minimum levels under the current framework represent the real technical limits.

If inertia was procured by a market, this procurement would ideally be co-optimised along with FCAS, and other related services. The AER considers that further investigation by AEMO is needed to define the quantity of inertia that should be considered minimum, given that an additional amount of inertia would still be required to achieve the co-optimised dispatch. If there are two different procurement mechanisms for each, this would need to be justified as the ultimate cost of these mechanisms are passed onto consumers.

Technology neutrality

The proposed inertia spot market would facilitate inertia procurement from synchronous sources, as well as grid-forming inverters, to the extent that AEMO determines them to be capable.

The AER considers that any market should be technologically neutral – that it should allow any two technologies which provide equal value to the grid to be treated equally. To the extent that grid-forming inverters are able to provide services equivalent to inertia, an inertia market should treat them equally to synchronous sources providing an equivalent amount of physical inertia. This equal treatment would improve competition and create conditions to bring about more favourable outcomes for consumers. However, we note that a substantial amount of work needs to be done to understand the operation of these grid-forming inverters in the NEM, so it will be important to ensure this rule change is able to accommodate these resources as they develop, and we note that this is a high priority task in AEMO's Engineering Framework.

One alternative to a market mechanism for inertia is structured procurement as a regulated network option. An advantage of this type of procurement is that it would guarantee that the desired level of inertia would always be provided. The AER notes that a structured procurement process could be considered as an alternative to spot markets, to guarantee

¹ AEMO (2022), 2022 Inertia Report <https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/system-security-planning>

that these services are supplied – particularly for a non-discretionary amount of inertia. Additionally, given that it is expected that a large amount of synchronous condensers will be required to meet system strength requirements, it may prove to be more cost effective to have these regulated assets built to provide inertia. We would support the AEMC exploring this option further, as part of the rule change process.

The AER notes that grid-forming inverters are currently being trialled through various projects, several of which are listed in ARENA's previous submission² to the consultation. The results of these trials will be crucial to understanding the role that grid-forming inverters could play in providing alternatives to inertia, or other system services.

Aligning the procurement of inertia and system strength

As mentioned in the AER's previous submission³ to the consultation, the AER would like to emphasise the importance of harmonising the procurement frameworks for system strength and inertia.

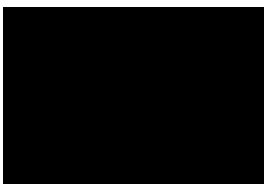
As mentioned above, synchronous condensers – and potentially grid-forming inverters - are expected to be options for regulated networks to meet their system strength requirements under the new system strength framework. We note that synchronous condensers are also able to provide inertia if they are fitted with a flywheel (and likewise grid-forming inverters could also provide inertia if designed and configured appropriately) – however, under the current framework, the cost of this additional capability cannot be recovered by the network unless triggered by a shortfall declaration from AEMO. While these synchronous condensers could be retrofitted with a flywheel in order to provide inertia (or grid-forming inverters altered), this may prove to be more costly than designing with this in mind in the first place. We therefore consider that it may be beneficial to develop an inertia framework that is forward-focused in the same way as the new system strength framework in order to achieve increased efficiencies for the provision of inertia.

Further work

The AER notes that the draft rule and determination is currently scheduled for 24 February 2024, nearly a year away. The AER acknowledges the significant amount of work that needs to be done to progress this rule change, and welcomes the opportunity to provide further feedback or participate in working groups to assist the AEMC in defining the best procurement framework for inertia.

We thank the Commission for the opportunity to provide input to this consultation. If you have any questions about our submission, please contact Chris Ridings on [REDACTED].

Yours sincerely,



Mark Feather
General Manager, Strategic Policy and Energy Systems Innovation
Australian Energy Regulator

² ARENA's submission <https://www.aemc.gov.au/sites/default/files/2022-07/ARENA.pdf>

³ AER's submission <https://www.aemc.gov.au/sites/default/files/2022-07/AER.pdf>