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John Kim
Australian Energy Market Commission
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**Consultation feedback on the Directions Paper on Efficient Provision of Inertia**

Dear Mr Kim,

Thank you for the opportunity to provide feedback on the Australian Energy Market Commission (AEMC) Directions Paper on Efficient Provision of Inertia.

SMA is a global inverter manufacturer with headquarters in Germany and an installed inverter capacity of more than 132 GW in almost every country in the world and more than 9GW inverter capacity in the Australian market. Our product range spans the consumer energy resources sector, commercial and industrial applications, and large grid-scale applications.

SMA supports the enhancements made to the inertia framework that were introduced through the Improving Security Frameworks rule change. We concur with the AEMC's conclusion that minimum inertia is unsuitable for operational procurement due to its critical role in system security and the high costs of undersupply. We agree that long-term procurement frameworks, which provide investment certainty, are currently the most appropriate mechanism to secure minimum inertia.

SMA supports the proposal to move toward operational procurement of additional inertia, subject to an assessment of the technological readiness of the National Electricity Market (NEM) and the development of a technology roadmap to enable implementation. A technology roadmap to enable operational procurement would likely identify other 'no regrets' benefits for enablement of system stability services.

The Directions Paper highlights an issue that could be the subject of low cost, no-regrets reform – namely, ensuring that the Market Ancillary Service Specification (MASS) and existing Frequency Control Ancillary Services (FCAS) arrangements can efficiently incorporate and value beneficial grid-forming responses that can contribute to frequency management. As noted in the Directions Paper, the current FCAS arrangements do not differentiate between grid-following and grid forming responses from inverter-based plant. Amending the MASS and relevant FCAS constraints should be considered as a no-regrets precursor to other changes to regulation and markets for inertia.

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We urge the AEMC and the Australian Energy Market Operator (AEMO) to consider proceeding with these changes to the MASS and FCAS arrangements as a priority and regardless of whether the development of a real-time spot market for inertia proceeds or is put on hold.

I have enclosed a submission, which is in a format suitable for publication on your web site. We look forward to continuing to work with you on this important area for reform.

Best regards,

[redacted]

Darren Gladman
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SMA-Australia

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# SMA-Australia Feedback on the Directions Paper on Efficient Provision of Inertia

SMA-Australia welcomes the opportunity to provide feedback on the Australian Energy Market Commission (AEMC) Directions Paper on Efficient Provision of Inertia.

SMA is a global inverter manufacturer with headquarters in Germany and an installed inverter capacity of more than 132 GW in almost every country in the world and more than 9GW inverter capacity in the Australian market. Our product range spans the consumer energy resources (CER) sector, commercial and industrial applications, and large grid-scale applications.

SMA supports the enhancements made to the inertia framework that were introduced through the Improving Security Frameworks (ISF) rule change and which do not preclude consideration of operational procurement. We concur with the AEMC's conclusion that minimum inertia is unsuitable for operational procurement due to its critical role in system security and the high costs of undersupply. We agree that long-term procurement frameworks, which provide investment certainty, are currently the most appropriate mechanism to secure minimum inertia.

SMA supports the proposal to move toward operational procurement of additional inertia, subject to an assessment of the technological readiness of the National Electricity Market (NEM) and the development of a technology roadmap to enable implementation. The potential benefits of a spot market would include greater transparency and competition. We understand that at this stage, the projected benefit cost ratio is insufficient to warrant prioritisation of this initiative. However, a technology roadmap to enable operational procurement would likely identify other 'no regrets' benefits for enablement of system stability services.

Battery energy storage systems (BESS) with grid forming (GFM) inverters will play a significant role in the future provision of inertia. As the ability of GFM BESS to provide system strength becomes more widely recognised and embedded within testing regimes and regulatory frameworks, there will be scope for dynamic co-optimisation of inertia and system strength services. As knowledge and operational understanding of provision of co-optimised inertia and system strength develops, understanding of the potential merits and risks of a real-time spot market will become clearer.

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As noted in the Directions Paper, the benefits of a real-time spot market for inertia would be low in early years and the potential benefits in later years would be affected by future prices in Frequency Control Ancillary Services (FCAS) markets, how inertia constraints evolve with the commissioning of Project Energy Connect Stage 2 and Marinus Link, and how the Australian Energy Market Operator (AEMO) treats contingency size with respect to renewable energy zones (REZs) and off shore wind farms. Considering these uncertainties, SMA recommends that resources be directed toward better understanding of the technological barriers to operational procurement of additional inertia, and the steps needed to overcome those barriers.

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## Responses to questions raised in the Directions Paper

1. **Do stakeholders expect that the NEM will have smaller or larger credible contingencies in the future? What will drive trends in contingency sizes?**

We agree with the AEMC's analysis, that contingencies will likely be smaller as synchronous generators retire. However, we also agree that this depends on how the system develops in future. The developments of REZs and offshore wind farms could contribute to large contingency risks in future, depending on how they are connected to the rest of the transmission network. If nuclear power plants are built, this would also affect the size of credible contingencies in future.

2. **Do stakeholders expect that synchronous condensers for system strength are likely to provide most of the NEM's minimum inertia needs? What would influence the uptake of synchronous condensers in the NEM?**

We do not have sufficient information to confidently predict the likely capacity of synchronous condensers to provide inertia and system strength in future. We do not have sufficient insight into timelines and supply chain risks to understand whether contracts to supply synchronous condensers will be met on time. It is also possible that some orders for synchronous condensers might not proceed to completion, depending on how the regulatory and market frameworks for provision of essential system services by GFM inverters develops, and the relative costs of provision by synchronous condensers versus provision by BESS with GFM inverters.

Uptake of synchronous condensers will be most strongly affected by the availability and supply chain issues, and by the anticipated fall in prices for BESS, which is expected to make inertia provision by BESS with GFM inverters cheaper than synchronous condensers.

3. **What do stakeholders consider to be the potential role of grid forming inverters in future inertia provision? We would be interested in thoughts on technical and economic challenges, opportunities for co-optimisation with other system services, and the conditions necessary for scaling their deployment effectively.**

We anticipate that BESS with GFM inverters will play a significant role in the future provision of inertia. There is very strong demand for GFM inverters in the NEM. Investment in BESS with GFM capabilities is driven by a range of considerations, and market

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opportunities. The versatility of GFM BESS compared with synchronous condensers leads to the expectation that as GFM BESS become more common, the level of investment by transmission network services providers (TNSPs) in synchronous condensers will decline.

The Directions Paper notes that uncertainties remain regarding the use of BESS with GFM inverters for provision of inertia, including the operational challenges of maintaining sufficient headroom or footroom for effective inertial responses. SMA's *Current Boost*™ technology has been designed to overcome the challenges of maintaining headroom and footroom. The uptake of technology like SMA's *Current Boost*™ is expected to grow as its value is recognised by investors, testing procedures are developed, and contracts and regulatory frameworks are revised to take account of recognised and independently verified capabilities.

**4. Do stakeholders have any further information about the fixed and variable cost estimates of future inertia supply?**

We agree with the Houston Kemp analysis which shows that the fixed and variable costs of providing synthetic inertia are already below the corresponding costs of provision using a newly built synchronous condenser with a flywheel. The cost of synthetic inertia will continue to fall as the price of batteries decreases.

There is a risk that if more synchronous condensers are procured in the short to medium term than will be needed in the long term, they will displace provision of inertia that would otherwise have been provided more cheaply by GFM BESS. Exacerbating this risk is the high capital cost and low operating cost of synchronous condensers. This highlights the need for oversight of TNSP investment in synchronous condensers by the Australian Energy Regulator (AER) to ensure that overinvestment in more expensive synchronous condensers does not occur and capital expenditure in expensive synchronous condensers is not permitted to inefficiently displace more economical service provision by GFM BESS.

**5. Do stakeholders agree that long-term procurement models are currently most suitable to meet minimum levels – given the high cost to the system if minimum inertia requirements are not met?**

SMA agrees that long term procurement models are currently most suitable to meet minimum levels of inertia.

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SMA supports the proposal to move toward operational procurement of additional inertia. However, the technological readiness of the NEM for this change requires further consideration. Implementation costs should be a key consideration.

We are still in the relatively early stages of implementing the ISF reforms. The new framework introduced through the ISF reforms took effect only a few months ago (in December 2024) and the parts of the ISF Rule that facilitate real-time enablement of inertia contracts will not commence until December 2025. The Security Enablement Procedures will not be published until August 2025. Following implementation of the ISF reforms, policy makers will be better placed to consider establishing a real-time spot market for additional inertia. There would also be greater clarity regarding the availability of synchronous condensers and the relative costs and availability of additional inertia from GFM inverters.

The reform process could also consider the risks, benefits and costs of a real time spot market for inertia against the merits of a rate of change of frequency (RoCoF) control service. A RoCoF control service could align better with evolving system needs. The scope for greater participation from inverter-based resources in a RoCoF control service would reduce costs by increasing competition in provision of system services.

**6. Are there other potential benefits from operational procurement that stakeholders consider we should include in our analysis? If so, can stakeholders provide further information about how these could be modelled and/or the quantum of such benefits?**

The capability of GFM BESS to provide inertia is relatively well understood. Demonstrating the capability of GFM BESS to provide system strength services remains a high priority for SMA. When the capability of GFM BESS to provide system strength is better recognised and testing regimes for the capability have been agreed and demonstrated, there will be an opportunity to consider co-optimisation of inertia and system strength services. This will provide a better foundation for understanding how GFM BESS will compete against synchronous condensers and enable the retirement of synchronous generators.

We anticipate that HoustonKemp may have underestimated investment in GFM BESS. As an original equipment manufacturer (OEM) of GFM BESS, SMA has insights into the leading indicators.

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**7. Do stakeholders have suggestions on implementation considerations that should be taken into account? For example, how can we mitigate regulatory uncertainty?**

At this stage, the best ways to mitigate regulatory uncertainty would involve a combination of:

- allowing further time for policy makers and industry to become familiar with the new regulatory frameworks, which will not become fully operational until December 2025,
- supporting demonstration of the capability of GFM BESS to provide system strength services,
- reforming system strength frameworks to take advantage of the capabilities of GFM BESS, and
- understanding the potential for co-optimisation of system stability services.

The Directions Paper highlights an issue that could be the subject of low cost, no-regrets reform – namely, ensuring that the Market Ancillary Service Specification (MASS) and existing FCAS arrangements can efficiently incorporate and value beneficial grid-forming responses that can contribute to frequency management. As noted in the Directions Paper, the current FCAS arrangements do not differentiate between grid-following and GFM responses from inverter-based plant. Amending the MASS and relevant FCAS constraints should be considered as a no-regrets precursor to other changes to regulation and markets for inertia. We urge the AEMC and AEMO to consider proceeding with these changes to the MASS and FCAS arrangements as a priority and regardless of whether the development of a real-time spot market for inertia proceeds or is put on hold.