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Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

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Integrating Energy Storage Systems into the NEM

Snowy Hydro Limited welcomes the opportunity to comment on matters raised in the Consultation paper from the Australian Energy Market Commission (the Commission) on Integrating Energy Storage Systems into the NEM.

Snowy Hydro understands the intent of the proposed definition for all storage technologies to improve the understanding of storage through clear National Electricity Rules (NER) obligations, fees, charges and non energy recovery however we are concerned that there is still a significant amount of work that needs to be undertaken to achieve this. The current environment may not be appropriate to implement a new registration category.

Technologies are ever changing however the proposed definition is focused on small batteries and new hybrid technologies rather than pumped hydro energy storage which already provides a significant amount of the information required under the category. Pump Hydro Energy Storage has been connected to the grid since NEM start, providing energy and system support services, and will continue to play a critical role in meeting the challenges arising from the increased take-up of intermittent renewables.

With the current development of the Energy Security Board's (ESB)'s post-2025 National Electricity Market ("NEM") design programme, which includes scheduling requirements under the Two-Sided Market Design initiative, and AEMO's cost of $8-10m to implement the change the value of implementing the proposed rule change will be limited for Snowy Hydro. Instead we encourage the Commission to consider aspects of this proposal in the broader reforms through the ESB Post 2025 Market Design process.

Should the new definition proceed however then grandfathering rights need to be implemented on existing pumped hydro, batteries and hybrid facilities that are already registered participants, avoiding unnecessary additional time and cost to transition to the new registration minimising any potential impact on the NEM. To improve investor certainty and operational efficiency we support the Australian Energy Market Operator (AEMO)'s solution is to provide clarity to battery proponents by establishing that transmission use of system (TUOS) would not apply. Snowy Hydro believes that energy storage must be exempt from paying TUOS

Pumped Hydro Energy Storage

Snowy Hydro welcomes AEMO's focus on potential strategic improvements to the NEM and how to better integrate grid-scale energy storage systems into the NEM. Pumped hydro energy storage has been connected to the grid since the commencement of the

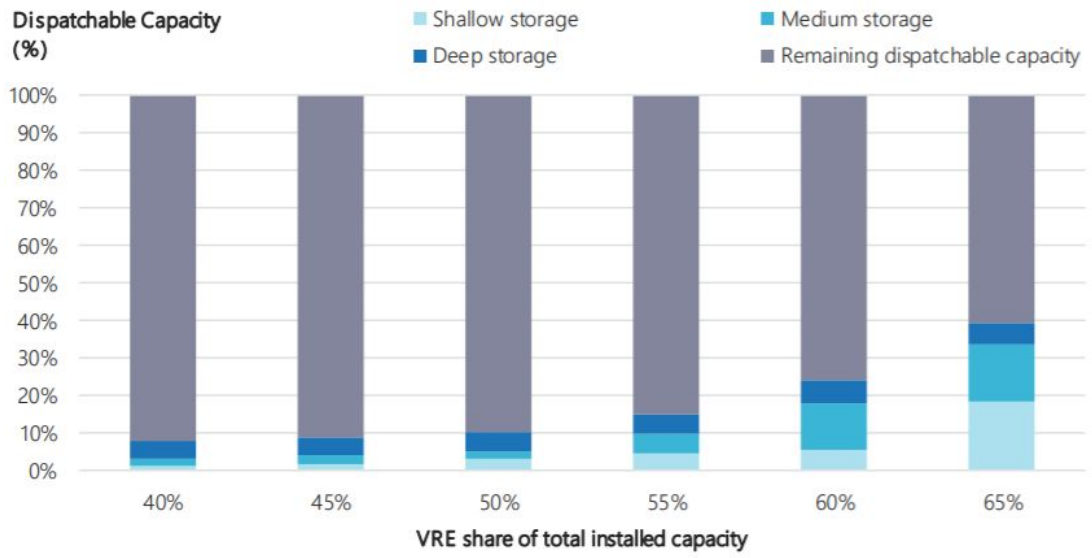
NEM. The need for storage will increase given the growth of variable renewable energy capacity in the power system.

A variety of energy storage technologies will need to be deployed in Australia. Pumped hydro and battery storage technologies however are the two most common and viable technologies in the NEM. The proposed Snowy 2.0 scheme would consist of 2,000 MW of pumped-hydro storage that can supply energy over seven consecutive days without the need to pump water.

More storage is needed to manage the increasing penetration of wind and solar energy energy in the power system. This will help stabilise the power grid, lower consumer prices and firming intermittent generation, supporting the economics of existing coal-fired generation, and enhancing competition in the electricity value chain.

The recent 2020 AEMO Integrated System Plan (ISP) highlighted that overtime a mix of storage duration will be required to firm the growing share of renewable supply as existing thermal capacity exits[1]. The figure below highlights that shallow 1- to 2-hour storage is needed to provide firming capacity and intra-day energy shifting. However, as more coal-fired generation retires, medium and deep 4- to 100-hour storage comes into play to shift energy over longer time scales. The dark blue bands of deep pumped hydro represent Snowy 2.0 and other committed projects[2].

Figure 1: Mix of dispatchable storage durations selected to firm renewables[3]



Is a definition needed for Energy Storage System (ESS) in the current environment?

The Australian Energy Market Operator (AEMO) is facing complexities in including new and different combinations of technologies however we believe the definition proposal still requires a greater understanding of certain technologies. Pumped hydro has efficiently and effectively participated in the NEM and there is no indication there should

[1] AEMO 2020 ISP, << https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en >> pp 51

[2] ibid

[3] AEMO 2020 ISP, << https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en >> pp 51

be a change to what is being undertaken in the current environment to participate in the NEM now and into the future as there have not been any material issues.

Snowy Hydro understands AEMO's proposed definition for ESS will improve understanding through clear NER obligations, fees, charges and non energy recovery. We agree that it reduces the risk of dispatching both generating unit and load and allows for more improved market information for better decision-making. However we are concerned that there is still a significant amount of work that needs to be undertaken to achieve this and the current environment may not be appropriate to implement a new registration category.

Pumped hydro energy storage has not been classified as an "end-user" of electricity instead playing a critical role in meeting the challenges arising from the increased take-up of intermittent renewables. Our concern with a new definition for storage is that in the current environment it is not appropriate to group all storage technologies.

The storage definition would need to be future proof as it could easily become outdated causing unintended consequences for existing technologies. Snowy Hydro believes a number of technologies are trying to find their position in the market and understanding the flexibility they can provide. For example, pumped hydro energy storage and battery storage have very different characteristics and will have complementary roles in the future mix of flexibility assets. Both can provide a range of benefits including improved system operability, reduced network congestion costs, reduced CO2 emissions and improved security of supply. Pumped hydro energy storage however as a mature technology can be deployed at scale, has a long operating life and is particularly well suited to applications requiring longer discharge times.

Under the proposed rule, a participant with a new pumped hydro plant would register as a bi-directional resource provider and would need to classify it is able to operate its load with the same degree of control as its generation. Snowy Hydro's concerns regarding this classification is that it is targeted towards a small battery which can ramp linearly. This is not the case for a large pump mode for a pumped hydro unit which currently cannot control the load other than a quick 15 to 20 second ramp to full load.

AEMO's rule change request as part of the new participant category would bid differently from other participants. This scheduled bi-directional resource participant would have 10 price bands to bid for both export and consumption, less than the 20 price bands currently accessible to scheduled storage. Snowy Hydro however is concerned that reducing the price bands to 10 could also lead to complexities and the preference is to instead increase the price bands to 50-100 prices bands.

The Commision should identify the benefits alongside the costs associated with implementing the new participant category. Snowy Hydro suggests that should this proposal proceed consideration should also be given to amending the existing generator or customer category to include a classification for energy storage as it could avoid the $8-10m cost to AEMO of making the changes, predominantly system, application, procedure and guideline changes.

Grandfathered rights

Pumped Hydro Energy Storage provides essential support to the NEM with all stations registered participants in the market. Snowy Hydro supports a condition that grandfather

existing pumped hydro, batteries and hybrid facilities should the storage definition by AEMO proceed to a rule change. The grandfathering rights will avoid the need for generators who are already registered to re-register adding unnecessary costs and requiring changes to the current processes at a time when these generators are implementing other procedure changes.

Snowy Hydro believes the grandfathering rights would avoid the unnecessary additional time to transition to the new registration and minimise any potential impact on the NEM.

Storage and Transmission Charging Arrangements (TUOS)

AEMO noted their concerns around the uncertainty regarding the application of fees, recovery, TUOS, and non-energy recovery as a key issue for storage proponents. Snowy Hydro agrees that a scheduled resource that can be constrained off should not be required to pay TUOS charges and that a permanent approach is needed for TUOS charging arrangements for storage. It is for this reason we welcome AEMO's efforts in clarifying these arrangements which would improve investor certainty and operational efficiency

The current cost recovery regime for prescribed and common transmission services collectively TUOS was put in place on the basis that application of sunk costs to consumers is unlikely to impact consumption and utilisation of the network whereas the same charge applied to upstream market participants would distort efficient energy consumption and dispatch. Upstream market participants include all entities engaged in the wholesale electricity market including generators, and pump hydro energy storage.

Imposing TUOS charges to pump storage hydro generators will likely distort regional spot prices and give economically incorrect signals to market participants. Snowy Hydro argues that the likely result of requiring pump storage generators to pay for the sunk network would be that the costs there would be a distortion on the uptake of pump storage hydro investment, if an investment is made then there would be potential distortions on the level of pumping, and finally any TUOS costs imposed on PHES would be passed through to customers via higher spot prices. Hence the recovery of sunk network costs from pump storage hydro generators can potentially lead to distortions in investment/retirement decisions and generation dispatch. The recovery of these TUOS costs from end use customers was found to least distort decisions with respect to network use.

Given that storage and generators are not end users of electricity, and are connected to the network primarily for the purposes of providing flexibility and energy services, there is no rationale for them to contribute to both the generator connection costs and shared network TUOS charges.

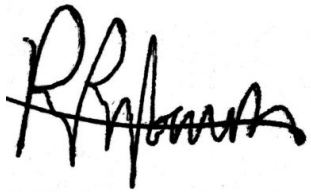
About the Snowy Hydro Group

Snowy Hydro Limited is a producer, supplier, trader and retailer of energy in the National Electricity Market (NEM) and a leading provider of risk management financial hedge contracts. We are an integrated energy company with more than 5,500 megawatts (MW) of generating capacity. We are one of Australia's largest renewable generators, the third largest generator by capacity and the fourth largest retailer in the NEM through our award-winning retail energy companies - Red Energy and Lumo Energy. Collectively,

they retail gas and electricity in South Australia, Victoria, New South Wales, Queensland and the ACT to over 1 million customers.

Snowy Hydro appreciates the opportunity to respond to the Commision on the Consultation Paper on the Integrating Energy Storage Systems into the NEM and any questions about this submission should be addressed to panos.priftakis@snowyhydro.com.au.

Yours sincerely,



Panos Priftakis
Head of Wholesale Regulation
Snowy Hydro