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Australian Energy Market Commission

Submitted via AEMC Webportal

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Dear Achinct

ERC0393: Improving the NEM access standards – Package 1 Draft Determination

Akaysha Energy (Akaysha) appreciates the opportunity to provide the Australian Energy Market Commission (AEMC) with a response to the Draft Determination on the Australian Energy Market Operator (AEMO) led rule change on “Improving the NEM access standards – Package 1”. Akaysha is one of the largest developers of utility scale battery storage systems (bi-directional units (BDUs)) registered in the National Electricity Markets (NEM). We work with several original equipment manufacturers (OEMs) and have experience in grid connections both for grid-forming and grid following. We view this Rule Change as a critical step in improving the grid connection process for inverter-based resources in the NEM.

We appreciate the large, multi-phased, work program that AEMO had previously undertaken in consulting with industry to inform the recommendations and specific rule changes proposed in the Draft Determination and Draft Rule. The fast-tracked rule change highlights the need to adapt the rules to enable the efficient connection of renewable generation and emerging technologies such as grid-forming inverters. However, the AEMC must take careful consideration to ensure that no unintended changes are introduced – many industry participants cautioned against a fast-tracked Rule Change process during the AEMO consultation for this reason. AEMO has proposed a significant number of changes and while they have been collaborative with industry to inform the best intended outcomes, some proposed changes have not been fully consulted.

Akaysha is generally supportive of the reforms and specific rule changes proposed by AEMO. We note that there have been some changes to the Rules published by AEMO with the “AEMO review of technical requirements for connection - Update Report” published in July 2023. These seem to have taken into account some feedback from stakeholders in response to the Update Report, as well as some of the commentary included by AEMO in the Final Report.

There are still several changes that Akaysha thinks warrant further review by the AEMC. These are discussed in more detail in our table of feedback below. We look forward to continuing to

work with the AEMC on this important review. For more information on this submission please contact Emma Fagan at emma.fagan@akayshaenergy.com.

Kind regards

Emma Fagan

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Akaysha Energy

NER Clause	Relevant change	Akaysha feedback
S5.2.5.1	Reduction of the voltage range for full reactive power requirements (a1)	Akaysha is supportive of these amendments noting these concepts will lead to greater utilisation of the installed assets while delivering the reactive power to the power system's needs. We also note this will require significantly more computational analysis during the connection phases and greater complexity in the OEM implementation. It would be helpful for AEMO to produce an example report on an example project to show how the testing of these new voltage ranges are applies. This will provide industry with some comfort on how exactly these requirements will be modelled.
	Amending reactive power capability requirements considering temperature derating (a1)	While Akaysha does not necessarily have a concern with the proposed wording as it provides guidance and consideration of temperature derating to inform the system operators, we would note that the "below 50 degrees Celsius" temperature derating limit proposed, cannot be met by a number of OEMs operating in Australia. From a first principles perspective, the automatic access standards (AAS) should be applied to the bulk of plant being installed – with negotiated access standards only for a smaller subset of connections. Our concern is that this requirement would result in inverse percentages. Defining a high temperature will also require additional investigation of the extensive balance of plant (BoP) and auxiliary plant equipment as to its ambient temperature rating. We would recommend that AEMC directly consult with OEMs in market – including those not providing a response to the Draft Determination, to determine a more achievable temperature derating that can be met by a reasonable number of OEMs. The techno-economic analysis will naturally determine the equipment rating of the plant design. Derating of the active power generation will have a greater impact to the project's revenue, and we do not believe the AEMO or the NSPs will be in a position to negotiate for higher performance. Depending on the outcome of these discussions; if the current drafting remains, we recommend that it is a clause for the AEMC to monitor. If it results in too many connections needing to go through the negotiated access standards process, then the AEMC may want to consider reforms in future – i.e. implementing a geographical heat map that defines the location where assets need to comply with temperature rating requirements – similar to the approach taken in Western Australia.

	Compensation of reactive power when units are out of service (a2)	This additional clause requires the connected plant to not change the voltage compared to when the plant is not electrically connected. This AAS requirement will be impossible to achieve as the connection of any HV/MV equipment (transmission line, cable, transformer etc) will have some draw on the power system and result in a voltage change. Either some voltage tolerance should be given or a time limit imposed to allow shut down, maintenance or testing of plant.
	Proportional derating of active and reactive power (d1)	The active/reactive power derating of some OEM primary equipment cannot be controlled in a proportional way. This subsection should be drafted to require the performance standard to detail how the derating occurs to remove any impediments.
	Reduced number of production units in service (e1)	The output of a BESS production unit may be limited based on the battery state of charge. With reduced number of BDU in service, a unit's output may be limited. It is unclear if this meets the requirements of the subsection, and it may need to be revised.
S5.2.5.2	Reference to superseded Australian standard	No comments
S5.2.5.4	Voltage in the range of 90-80% of nominal (a)(7)	The subclause should read "below 90% down to and including 80% nominal voltage for a period of at least 10 seconds after T(uv);"
	Allowing the point of application for overvoltage requirements to be negotiated for medium and low voltage connections	No comments
	Bound requirements for over-voltages above 130% and introduce obligations to minimise recurring switching surges	Akaysha is supportive of these changes however the wording "at least marginally exceeding" introduces ambiguity and we recommend a clear definitive value is specified to aid in the design of plant.
	Clarify the meaning of continuous uninterrupted operation for moderate	We support the inclusion of the CUO definition in the normal system voltage range into the NER. We encourage the definition to be in-line and consistent with the current expectations.

	voltage disturbance requirements (e1 e2 e3)	
S5.2.5.5	Defining end of disturbance for multiple fault ride through	Akaysha is supportive of these changes
	Refining compliance requirements for multiple fault ride through.	Akaysha and a number of other stakeholders raised concerns with AEMO during their targeted consultation process on the application of this requirement, and the risks of it resulting in multiple rounds of modelling requests by network service providers (NSPs) for all possible variations of fault scenarios. We do not think that the updated wording proposed by AEMO in the draft Rule fully mitigates these concerns. As outlined by the AEMC in the Draft Determination, the intent of the new clause S5.2.5.5(r2) is to "include, where agreed by the NSP and AEMO, a specified plant limitation for which the plant is not required to remain in continuous uninterrupted operation for a specified combination of power system disturbances or associated conditions. The required response of the plant for such combinations of power system disturbances or associated conditions must also be specified, to be as close to continuous uninterrupted operation as reasonably practicable." Our interpretation of this text in the Draft Determination, as well as the drafting in the Draft Rule, is that AEMO and the NSPs will determine limits for when the plant is not required to remain in continuous uninterrupted operation; while still determining a range of scenarios where continuous uninterrupted operation is expected. Our concern is with the latter. The current wording risks: • NSPs developing myriad scenarios – with OEMs being unwilling or unable to round multiple rounds of tests for scenarios that may be extremely fringe. • Connection standards being delayed by months or years to account for modelling a larger range of scenarios. An alternative would be for S5.2.5.5(r2) to just require NSPs and AEMO to establish the scenarios in which continuous uninterrupted operation would not be required and assume that in all other scenarios it would be required.
	Relaxation of the continuous uninterrupted operation requirement for fault level below minimum for which the plant is tuned	The requirement for continuous uninterrupted operation entails that 5.2 plant meets all other performance obligations of the Performance Standard. OEMs and plant designers are reluctant to provide this certainty of performance for the number of faults events and the resulting system conditions. It would be simpler to refocus the MFRT requirements for the plant to not trip because of multiple faults than to define the system conditions for which it must remain in operation.

		Furthermore, turning of control parameters to meet performance for extremely rare multi-fault system scenarios (that have near zero chance of occurring) with result in sub-optimal normal performance.
New clause S5.2.5.5A	Amended requirements for active power recovery after a fault (f)(3)	Akaysha supports the deviation of active power attributed to frequency events/measurements following a contingency event, being detailed in the NER
	Amending rise-time, settling time, and commencement time requirements for reactive current injection (g)(2)	(g)(2): Akaysha supports the clarifications being detailed in the NER regarding clearer expectations of initiating conditions, adequately controlled and description around the step-like voltage profile. These aspects will aid in removing ambiguity and provide clarity to how carry out simulation studies and how due diligence will be performed. (n)(2): Akaysha supports as above and notes that the minimum access provides reasonable flexibility to negotiate with the NSP/AEMO
	Amend arrangements for the commencement of reactive current injection and provides clarity on reactive current injection location (s)(2) (t)	Akaysha supports the flexibility and recognition that the performance parameters are logical and simpler to define other locations within the plant. Providing guidance to what needs to be detailed within the Performance Standard will assist in streamlining the connection process. (t)(7) requires the NSP/AEMO to identify conditions for which reactive current response is required. This may lead to exhaustive descriptions of network scenarios, plant operation or weather conditions which the OEM/plant design performance would have to be confirmed. It is more appropriate that the OEM/plant design detail any conditions for which a response is limited or cannot be provided and allow the NSP/AEMO consideration.
	Clarifying the response requirements for balanced and unbalanced faults and recognise negative sequence current responses	Akaysha supports clarification of the negative sequence requirements but encourages further description of the objectives of negative sequence injection to assist OEMs and designers in appropriate tuning.
S5.2.5.7	Partial load rejection	Akaysha supports these changes
S5.2.5.8	Strengthen and streamline emergency over-frequency response requirements	Akaysha supports these changes, and the guidance and flexibility provide by establishing an AAS and minimum access standard (MAS).

	Require plant protection settings to be set to maximise capability to ride through disturbances	Akaysha supports these changes
	Move the vector shift requirement from clause S5.2.5.16 to S5.2.5.8	Akaysha supports these changes
S5.2.5.10	New requirements for instability detection and response	Akaysha currently installs instability detection equipment at all its sites at significant cost. The equipment has the capability to detect instability and send alarms or trip signals. However, the trip signalling is disabled on all current installations. Akaysha welcomes the insight into providing trigger conditions, thresholds and timeframes as agreed with the NSP/AEMO to fully utilise the functionality of the equipment installed. Akaysha remains concerned with the updated wording provided by AEMO and the proposed approach for instability detection. The proposed requirements including installing a phasor measurement unit (PMU) on site, will still require several steps before disconnection. Our assumption is that the PMU equipment will be additional to the instability detection equipment already installed, but will also provide monitoring services only, with the market participant then needing to intervene when an instability is detected. We are supportive of a move to a more automated process with better integration of detection systems that can manage site disconnections. This will, however, require more work on trials and testing before the best approach is finalised. We would recommend that this specific change is postponed until more testing and trials have been undertaken, and AEMO establishes guidance on interpretation of response requirements to this clause.
S5.2.5.11	Frequency control of schedule 5.2 plant	Akaysha supports the clarifications provided for BDU operation in charge and discharge modes and the application of frequency response implemented at the production unit level.
S5.2.5.13	Voltage and reactive power control modes	Akaysha is supportive of these changes. Focusing the reactive power control on a primary (typically Voltage droop) and secondary (Q control) modes with reduce the considerable simulation effort during the pre-registration phases of power factor mode and its validation in commissioning R2.

	Range of system impedance (m)	Akaysha generally supports the specification of a range of network conditions for which the performance is defined. This will aid in focusing and reducing the simulation requirements and remove the discrepancies found in performance for differing network conditions or interactions with nearby plants.
	Rise and Settling Time (Table S5.2.1)	Akaysha generally supports the clarification of primary mode requirements and the relaxed timing of secondary mode. In practice, guidance on the performance requirements would be beneficial in the design stage and during commissioning having a setpoint change will assist in validating the plant configuration and operation.