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Level 15, 60 Castlereagh St

Sydney, NSW 2000

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ERC0394 - Improving the NEM Access Standards – Package 2

EPEC Group (EPEC) welcomes the opportunity to provide feedback on the Australian Energy Market Commission's (AEMC) consultation paper on Improving the NEM Access Standards – Package 2.

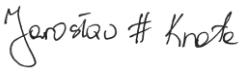
EPEC is a High Voltage (HV) connections specialist providing end-to-end power engineering services including market modelling, connection application, Generator Performance Standards (GPS) negotiations, generation registration, commissioning, Engineering Procurement and Construction for substations, lines, BESS Balance of Plant (BoP) as well as plant testing and compliance services.

Thanks to wide portfolio of projects which encompasses all Australian states and most leading OEMs, EPEC has in-depth experience in identifying and overcoming challenges associated with grid connections. Our promise is certainty, delivered through our knowledge of delivering large scale energy infrastructure project within the existing regulatory environment, and taking a risk-based approach to technical outcomes.

Our mission is to lead the way in connecting the future of Australia's energy supply to renewable power generation sources. Thanks to ongoing collaboration with a range of Inverter Based Resources (IBR) Original Equipment Manufacturers (OEMs) and research projects with Australian universities, EPEC actively contributes to shaping the technology landscape for HV connections, e.g. by leading the industry in implementing the Hardware-in-the-Loop technique in the generation connection process.

EPEC welcomes continuous engagement with the AEMC to support this rule change and future rule changes.

Yours sincerely,



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General comments to the consultation paper

The general comments below refer to issues not explicitly covered or not explicitly asked in the consultation paper but EPEC anticipates will have significant impact on further Rules coming out from Improving the NEM Access Standards work.

Issue	Comment
Issue #1 - Plant-specific EMT models for loads	[note: This comment applies to multiple questions raised by AEMC in their Consultation paper, e.g. Question 4 on SCR requirements or Question 7 on ride-through capability] One of the consequences of introducing new SCR, FRT or similar requirements (even if the requirement is limited only to stating performance rather than aiming at a specific level of performance) will be a need to have dynamic, EMT-compatible models for loads. Importantly, should a requirement for dynamic load models becomes explicit, AEMO's Power System Model Guidelines (PSMG) already provide provision for load models to ensure proper model quality. On top of that, System Strength framework also attempts to capture IBR loads so one can assume that load models are already required through that framework. However, original SSIAG publication as well as subsequent Technical Notes on the subject clearly indicate that considerations for load models are not as mature as they are for generators. So from that perspective, current PSMG and SSIAG modelling requirements for loads can be assumed to be "a placeholder" for discussion that is starting right now with AEMC's Consultation Paper on loads performance standards. The critical question here is whether NEM is ready to introduce and enforce modelling requirements for IBR loads without compromising or de-incentivising investments in that sector. Requiring dynamic models for loads seems to be a logical step forward in making sure the NEM power system is utilised as efficiently as possible, and System Security is maintained. Thus, EPEC does not object this direction. However, it should be acknowledged that site-specific models which can capture details of dynamic performance of Schedule 5.3 plants are not as default or easy to obtain as for Schedule 5.2 plants. Multiple OEMs that supply their equipment for loads (i.e. equipment that impacts dynamic performance) do not have models or models are not of expected quality (e.g. they would not pass AEMO's DMAT requirements). In addition, for IBR-type loads, there is a substantial part of the load to not be an actual IBR (e.g. for hydrogen production plants, a non-IBR component can be expected to be between 15% and 30% of plant's MW capacity). When making future Rule determination, EPEC believes those factors should be considered by AEMC as developing new models for loads may become a costly exercise and as such may create an additional barrier to enter NEM market. So benefits from developing those models need to outweigh the cost. This can be potentially achieved by e.g. limiting the applicability of performance standards (where demonstration typically relies on dynamic studies) to the loads of a sufficient size (standalone or in aggregation).

Question 1: Defining large loads in the context of this rule change request

Question	Comment
Q1.1	EPEC supports the direction proposed by AEMO as large IBR loads may offer performance much more similar to the IBR-based generation rather than non-IBR loads.
Q1.2	EPEC considers that all terms that may create ambiguity in the connection process shall be defined, specifically at the time of substantial load performance developments as covered under Improving the NEM access standards - Package 2.
Q1.3	One definition of large loads would be preferred but the more important than that is a clarity in future definition(s).
Q1.4	AEMO already attempted to define large loads during the Access Standard Review. This piece of work was not accomplished due to limited timeframe for the review but current AEMO's work would benefit from further guidance from AEMC on the subject. Clear definition could be considered the most helpful guidance.

Question 2: Amending the NER to address the influx of large loads

Question	Comment
Q2.1	No further comment at this stage.
Q2.2	Agreed, there is multiple drivers for increased size in IBR load connection, even beyond hydrogen generation or data centers.

Question 3: HVDC links to procure system strength services from third parties

Question	Comment
Q3.1	Any solution that enhances long-term Power System Security should be considered.
Q3.2	Consistency with S5.2.5.15 would be expected but it would be advised that more mature assessment methodology is considered (in contrast to original SSIAG) before the anticipated Rule commences.
Q3.3	No further comment at this stage.
Q3.4	No further comment at this stage.
Q3.5	No further comment at this stage.

Question 4: Limiting short circuit ratio requirements for customer loads to IBR, and introducing flexibility to the access standard

Question	Comment
Q4.1 limit SCR	Yes, EPEC considers SCR requirements should be limited to large loads, i.e. those that may have material impact on system security. No, SSIAG definition does not seem sufficient as it refers to 5MW (or 5 MVA) and not enough consideration is given to loads that partially consists of the IBRs.
Q4.2 limit SCR	At very minimum consideration should be given to IBR load size.
Q4.3 limit SCR	Limiting requirements to large IBR loads seems practical.
Q4.1 flexible min SCR	It is understood that flexibility in minimum SCR levels comes from a need to accommodate different load technologies. However, it would be recommended to bespeak those requirements rather than leaving this to case-by-case NSP/AEMO analysis as this could lead to different performance expectations for different projects.
Q4.2 flexible min SCR	No further comment at this stage.
Q4.3 flexible min SCR	No further comment at this stage.

Question 5: New definitions for protection systems

Question	Comment
Q5.1	EPEC agrees that some definitions are unclear or have become understood to be interpreted outside their usual protection engineering meanings, e.g. “breaker fail protection” being used to also mean backup protection (breaker fail and backup protection are distinct concepts in protection engineering).
Q5.2	EPEC generally agrees with the proposed definitions, and these provide significantly more clarity and alignment with protection engineering concepts. EPEC also proposes the following adjustment to the definition for “breaker fail protection system”, to remove potential association of breaker fail protection to only the independent alternative main protection system (whereas it may be applicable to main, independent main, and backup systems): A protection system that, upon detecting failure of its monitored circuit breaker to clear the fault following operation of an associated protection system, operates to directly open other required circuit breakers to clear the fault independently of any other protection function operation.
Q5.3	No further comments at this stage.

Question 6: Conditions for generator protection systems

Question	Comment
Q6.1	EPEC agrees with Rod Hughes Consulting’s proposed wording, and support removal of paragraph (b), with the below additional clarification/commentary.

Question	Comment
	EPEC believe however that the proposed AEMO/NSP discretion instead be detailed in a "Negotiated Access Standard" section. This would promote a negotiation between a connecting proponent, AEMO and the NSP, and eventual acceptance via the 5.3.4A process.
Q6.2	EPEC agrees that application of the MAS may create risks to power system security due to insufficient redundancy in protection, because faults may remain uncleared for longer or indefinitely in the event of failure of a necessary non-redundant protection element. EPEC agrees that an amount of discretion should be applied by AEMO and the NSP when applying an access standard lower than the AAS. However, EPEC believes that in the event that AEMO or the NSP insist on application of redundancy to a protection system, that reasonable justification should be provided by AEMO or the NSP, to prevent blanket application simply citing "risk to power system security", where this may not reasonably be the case. See Q6.3 re materiality threshold proposal. EPEC also believe that this should be covered as an NAS, with requirements stipulated in a "Negotiated Access Standard" section.
Q6.3	EPEC believes that a materiality threshold should be considered for application of S5.2.5.9, where this is based on genuine, justified and measurable risk to power system security. For example, this materiality threshold could be "a metallic fault that causes connection point voltage to be reduced by 10% at the minimum grid strength condition". A materiality threshold would remove the possibility of: • interpreting a requirement for redundancy for protection against higher-impedance faults within the reticulation systems of sites (e.g. in systems downstream of small transformers, or behind reasonable reticulation impedance), or • Interpreting a requirement for tripping these higher-impedance faults within rapid clearing times (thereby sacrificing discrimination), where the impact to the network is insignificant. The materiality threshold could also be used to require protection redundancy above this threshold, without additional justification (see Q6.2 response).

Question 7: Provision of information on ride-through capability

Question	Comment
Q7.1	EPEC agrees that there is lack of visibility of loads' ride-through capability.
Q7.2	EPEC understands that AEMO's proposed provision for ride-through capability information is proposed to gain visibility that may lead to establishing ride-through requirements in future. In addition, disclosed ride-through capability would also allow AEMO and NSP to assess impact on power system security.
Q7.3	Concerns around modelling requirements as per Issue #1 from the general comments section.

Question 8: Protection settings to maximise ride-through performance

Question	Comment
Q8.1	EPEC agrees with the provided statement and similar approach has been noticed for generator connections – at times protection is set up at the minimum level required by the Rules, not at the actual level to protect the plant.
Q8.2	In general, EPEC would prefer clarity with regards to expected performance, rather than case-by-case negotiations. However, it is understood that cooperation between an NSP and a network user is a measure to allow NSP achieving system standards. Conceptually this sounds reasonable; however, it would be suggested to provide Rules wording so that NSP could not use their dominant position in performance negotiations.
Q8.3	As above.

Question 9: New access standard for detection and response to instability

Question	Comment
Q9.1	Since large IBR loads can participate in instability events in a similar manner as IBR generation, it seems reasonable to include large IBR loads in the considerations for instability detection and response.
Q9.2	EPEC generally supports proposed access standard, subject to concerns expressed in Comment #2 to the question Q9.3.
Q9.3	Comment #1: Performance requirements for generators under S5.2.5.10 silently assume that under normal circumstances, plant's tuning offers stable response to the instabilities. This is commonly achieved by tuning/demonstrating the oscillation rejection capability as specified under AEMO's DMAT. Since this consideration currently does not apply for IBR loads, subject to AEMC decision on the future of load modelling (see Issue #1 from General Comments section), EPEC suggests considering the inclusion of oscillation rejection requirement for IBR loads (even via a subset of model robustness tests).
Q9.3	Comment #2: In their Consultation Paper, AEMC attempted to summarize proposed access standard for detection and response to instability for loads (see Table 4.2 of the Consultation Paper). Importantly, the proposed arrangements are mirrored arrangements from NER S5.2.5.10 already accepted for the generators. Although EPEC supports the general direction, EPEC wishes to highlight that mentioned Table 4.2 may carry a potential misinterpretation of the proposed S5.3.12 MAS (as well as new S5.2.5.10 MAS). The new MAS of S5.2.5.10/S5.3.12 explicitly discusses plant's potential to impact connection point voltage by more than 1%. As discussed by AEMO during Access Standard Review workshops, this replaces old S5.2.5.10 wording that refers to Table 7 of Australian Standard AS/NZS 61000.3.7:2001. The replacement was necessary as old wording was originally intended to be used as a materiality threshold to determine a need for S5.2.5.10 arrangements; but instead, at multiple connection projects the Table 7 of AS/NZS 61000.3.7:2001 was used as a design criterion for

Question	Comment
	plant's performance (and even was included in such way in default GPS wording NSP/AEMO propose to use for this clause). Therefore, it was proposed by AEMO to replace the materiality threshold with plant's potential to impact connection point voltage by more than 1% during plant's operations. I.e. if a plant is sufficiently small that when operates in system normal or planned outage conditions cannot change the connection point voltage by 1% (due to both physical and/or control system limitations), forcing developments and installation of methods/devices to handle instability does not seem to follow NEO's requirement of efficient investment. Thus, such a small plant is expected to apply S5.2.5.10 MAS but with all of the obligations removed (except PMU requirement if requested by AEMO for >100MW plant). On that basis, interpretation provided in Table 4.2 of the Consultation Paper may be misleading as the table seems to suggest that a plant which cannot change voltage at the connection point by more than 1% should still apply AAS of S5.2.5.10/S5.3.12 whereas MAS is stated to be not applicable. EPEC kindly requests clarification whether AEMC has change the intent of 1% voltage impact criterion under S5.2.5.10/S5.3.12.

Question 10: Under-frequency ramp down of large loads

Question	Comment
Q10.1	Since ramp down action is preferred from system security perspective, additional flexibility can only be beneficial for some network users and for the grid.
Q10.2	Yes.
Q10.3	No further comment at this stage.

Question 11: Clarification of credible contingency definition for disturbance ride-through

Question	Comment
Q11.1	Agree, current arrangements lead to potentially unbounded performance obligations. Also, connection projects would benefit from more clarity around the level and type of contingencies that NSP assesses to support the maintenance of their network performance requirements.
Q11.2	Agree.

Question	Comment
Q11.3	Yes.
Q11.4	The Rule wording for inclusion of commonly re-classified events must be very clear. But somewhat concerning is that re-classified events may require specific network conditions. As such, to study re-classified events an additional study burden may be anticipated as network model may have to be modified for each re-classified event separately.

Question 12: Testing and commissioning

Question	Comment
Q12.1	Subject to further details, EPEC supports the idea.
Q12.2	EPEC proposes to consider inclusion of materiality threshold for the proposed change.
Q12.3	Subject to further details, EPEC does not object the idea.
Q12.4	EPEC understands that proposed changes to NER 4.14 and 4.15 are consequential changes following new definition of Schedule 5.2 Participant and Schedule 5.3 Participant. EPEC proposes to discuss unintended consequences of the proposed change during an industry workshop.
Q12.5	No further comments at this stage.

Question 13: Extension of time for complex issues in future access standards reviews

Question	Comment
Q13.1	Partially agree. 12 months period may become too short if the scope of review becomes substantial and if AEMO involves industry to the extent the first Access Standard Review had. Thus, it's not so much about the 12 months period but more about the scope and the review progress.
Q13.2	It would be beneficial for the NEM to have AEMC checking the timeline proposed by AEMO.
Q13.3	Agree
Q13.4	The Rule should ensure the work will be finished in a reasonable timeframe.

Question 14: Assessment framework

Question	Comment
Q14	EPEC considers that an additional criterion should cover whether the change has potential to improve access to the network for network users. With abundance of renewable resources, Australia may have capability to attract IBR loads but the access standards cannot be established at prohibitively high level.