GENERATOR TECHNICAL PERFORMANCE STANDARDS

Response to consultation paper - November 2017

Introduction

Stanwell welcomes the opportunity to provide comment on the Australian Energy Market Commission's (AEMC's) Generator Technical Standards Consultation Paper. While we appreciate that the Australian Energy Market Operator (AEMO) must review and consider tightening its generator technical standards in light of recent events we have some concerns with the proposed standards.

Stanwell will be exposed to the new standards as we upgrade components of our existing power stations and for any new connections we may negotiate. Our current timetable for upgrades means we will have significant potential exposure to the new standards at nearly all of our sites over the next 5 years. Stanwell has also commenced a feasibility study into a hydro electric power station at Burdekin Falls in North Queensland.

Stanwell welcomes the opportunity to discuss further this submission, please contact Jennifer Tarr on (07) 3228 4546 or Jennifer.Tarr@stanwell.com

Grandfathering of existing generators

Existing generators undertaking upgrades under NER 5.3.9 must have access to a mechanism whereby they will be able to continue to operate under their existing technical standards if they cannot meet the new more stringent minimum standards. For example, a generator that wishes to upgrade one major component of the power plant, must not be required to upgrade other major components just to meet the new minimum standards.

An inability to operate under the proposed standards may cause generators to delay plant refurbishment which ultimately undermines reliability, and potentially leads to early and unexpected closure.

Credible contingencies

AEMO must manage the power system with consideration of credible contingencies and protected events. This ensures the risk of load shedding is appropriately balanced with the expense of conservative power system operation. Stanwell expects that the proposed technical standards are consistent with this framework - that is, AEMO is specifying complimentary sets of obligations relevant to network conditions *consistent with those caused by credible and protected events*. Network Service Providers (NSPs) are obliged to maintain certain minimum network conditions, and generators are obliged to behave predictably under those conditions.

Stanwell does not consider that this has been the approach taken by AEMO during this technical standards review process. For example, Figure 1 shows the proposed system standard for power frequency over voltage. AEMO claims the current standard is inadequate because it is inconsistent with observed voltage fluctuations during recent events. It may be that these voltage fluctuations were observed during non-credible contingencies. If this is the case then the proposed standards will result in unnecessary compliance costs, which ultimately flow on to consumers.

On the other hand, if the observed voltage fluctuations were observed during credible contingencies then it is likely that NSPs have not met their voltage management obligations under the rules. This should be addressed directly with NSPs rather than through changes to generator technical standards.

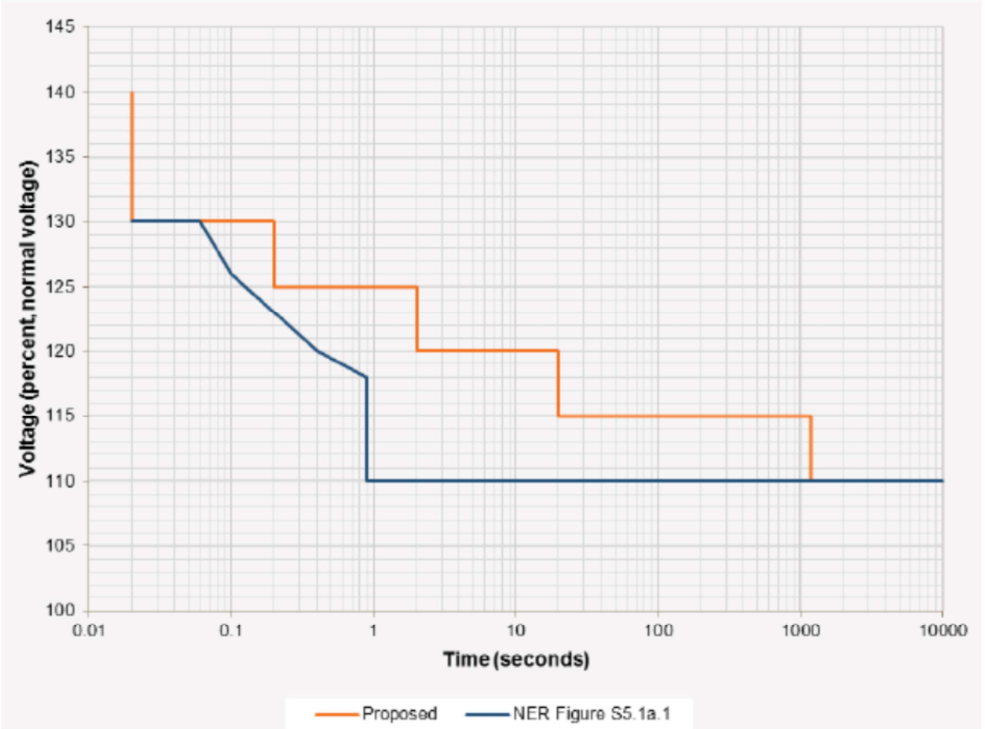

Figure 1: Proposed system standard for power frequency over voltage[1]

Another example of where the technical standards review has proposed standards which are arguably at odds with the management of credible contingency events is the proposed standard around multiple low voltage disturbance ride through. Under the proposed standard, the number of under voltage events in a short duration is beyond what should reasonably be regarded as credible. Mandating compliance with the proposed standard will require design practices which are beyond what is currently considered GEIP.

[1] Page 33, AEMO rule change request

Implications of a national standard on cost to consumers

Stanwell understands the theoretical appeal of nationally consistent standards however the proposals (which are closely aligned with those developed for the unique situation in South Australia) will result in unnecessary costs to consumers in other regions. If the more stringent standards applied only in regions (or sub-regions) to new entrants and to existing generation only when necessary, the extra costs to consumers would be deferred. In Queensland, this may defer significant extra costs for ten or more years. Development of generators is necessarily location and technology specific so region (or sub-region) standards are acceptable from participants' perspective. Similarly, the closing of negotiating margins between the automatic and minimum access standards has the effect of mandating standards in regions where previously they may not have been required. This is in contrast to other aspects of electricity regulations such as the retail law where a nationally consistent framework results in enormous efficiencies to multi-region participants.

Technology specific requirements

AEMO has attempted to make the standards technology neutral however in some cases the standards should not avoid specific requirements for specific technologies. For example the multiple disturbance voltage ride-through requirements are likely to be extremely onerous if not impossible for thermal synchronous generators, yet are readily achievable for other technologies.

Assessing and proving compliance with the standards

Stanwell is concerned that some of the standards (such as the multiple disturbance voltage ride through requirements) are impossible to model accurately. If accurate modelling is impossible, AEMO and generators can not be sure that the generator will behave as desired. In this situation, in the event of a contingency, if the generator does not behave according to the standards, the compliance obligation rests with the generator, even though the generator has limited ability to accurately predict performance.

The AEMC is no doubt aware of the significant cost of assessing and proving compliance with the standards. The cost is almost the same no matter the size of the generator, thereby disadvantaging smaller generators. For example, a recent upgrade at Kareeya Power Station (88MW) generated compliance costs (studies, negotiations, testing) that amounted to around 20% of the total project cost. Compare this with a much more expensive upgrade at Stanwell Power Station (1460MW) where compliance costs were only marginally higher than at Kareeya Power Station, but still represented more than 10% of the total project costs.

Negotiating framework

In negotiating performance standards with NSP's and AEMO, Stanwell has historically aimed for the automatic access standard rather than the minimum access standard, consistent with the proposed approach preferred by AEMO. This approach provides certainty of outcome and avoids the time and expense of repeated negotiations with NSP's and AEMO, extensive re-design work with engineering contractors and delays to the project. Stanwell is concerned that some aspects of the proposed automatic standards will be impossible to meet forcing Stanwell deeper into the uncertainty, delays and cost of negotiations. Greater inclusion of technology specific requirements in the proposed standards and grandfathering of existing provisions would avoid this.

Technical Appendix

S5.2.5.1 Reactive Power Capability

The current automatic standard can be interpreted to require the full leading capability with the system voltage at the minimum permitted and the full lagging capability with the system voltage at the maximum permitted. Compliance with this perverse requirement unnecessarily results in either more expensive plant to achieve compliance or a negotiated and lesser standard. Stanwell submits that the standard should be clarified.

Stanwell also submits that a plant standard should be developed to permit synchronous generators to state the generator reactive capability at the generator terminals rather than the connection point. This would reduce compliance costs for synchronous generators and make more predictable and increased reactive capability available to AEMO, particularly when generators are at low load.

Stanwell further submits that in the case of small generating units connected to strong network nodes, the linkage with S5.2.5.13 created under the minimum standard effectively removes any negotiation capability below automatic.

S5.2.5.4 Generating System Response to Voltage Disturbances

Stanwell is concerned about the ability some plant to ride through the voltage disturbances proscribed in the proposed minimum standard. In particular, the concern is that large auxiliary motors could stall and variable speed drives trip during under voltage disturbances. The inclusion of the 70% voltage requirement in the minimum standard mandates this level of performance, which is likely to beyond the capabilities of typical equipment.

S5.2.5.5 Generating System Response to Disturbances following contingency events

In Stanwell's view, introducing the requirement to ride through multiple contingencies to technologies with the capability to do so is reasonable. However, this requirement should not be extended to synchronous machines where there are significant issues around the capability of these plants to ride through multiple contingencies including:

CT saturation. When a number of contingencies occur in quick succession, the flux in current transformers increases with each contingency to the point that CT's become saturated and protection trips (three Bayswater units tripped off due to this issue after multiple switchyard faults in 2009).

AVR thermal capability to provide field forcing during repeated close in faults without adequate cool down time.

Generator rotor thermal capability to accept field forcing during repeated close in faults without adequate cool down time.

Exposure to repeated close in faults is also known to accelerate the ageing of generator stator windings.

Stanwell also questions the practicality of assessment given the number of study permutations covering the number, type, location, and duration of faults called up by the proposed standards. Stanwell questions the ability to accurately model the plant performance under such conditions.

S5.2.5.13 Voltage and Reactive Power Control

Stanwell submits that the mandating of remotely adjustable and mode changeable voltage control requirements on small embedded generators will add undue cost and complexity with little material benefit to the power system. Such generating systems have inherently limited ability to control network voltage. Switching between voltage and power factor control mode is unlikely.

S5.2.5.15 System Strength

In the proposed standards, Short *Circuit Ratio* is an italicised term, and yet it does not appear in the existing glossary or the proposed amendments there to.

S6.2.6.1 Remote Control and Monitoring

Stanwell submits that the cost impost of providing the mandated level of monitoring and control irrespective of generating unit size provides little material benefit.


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