Generator Technical Performance Standards (GTPS) Rule Change – Submission on behalf of WSP Australia Pty Ltd

WSP (formally Parsons Brinckerhoff / PB Power) is an international consultancy and has an overall interest in the efficient and effective management of the Australian power system and appreciates that this requires careful coordination between both proponents and network service providers / operators.

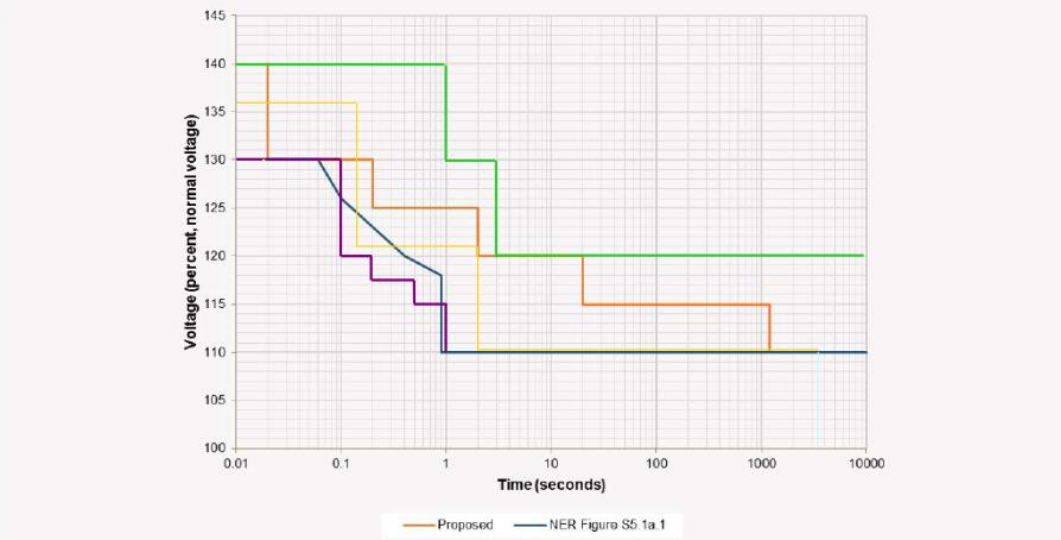
Interconnected power systems are complex in nature and requires careful coordination between all parties in both planning and operating the power system. WSP do not represent any stakeholders or their views whether they be proponents, network service providers / operators and the comments provided below are on this context.

In response to AEMO's proposed changes to the technical obligations of generators as per S5.2.5 of the National Electricity Rules (NER), WSP has provided comments for consideration by the AEMC as per Table 1. The intent of the responses is to provide clarity to all parties to ensure all elements of the National Electricity Objective can be met.

Table 1 Summary of responses to rule change request

Negotiated access standards
AEMO's experience is that many connection applicants aim for the lowest level of performance regardless of the needs of the power system Having dealt with numerous generator connections in various roles, it is our experience that where possible, the Automatic Access Standard (AAS) is what is aimed for as this is more likely to be accepted by the Network Service Provider (NSP) / AEMO. It is likely a minority of connection applicants that aim for the Minimum Access Standard (MAS) and suggest that any approach by minority parties does not restrict or compromise the process for the majority who aim for the AAS. The default position should be the automatic access standard rather than the minimum access standard The negotiated framework is understood to be intended to provide flexibility and discretion in the application of the Rules. In particular, the requirements to be met can vary significantly considering the project size and location in the network it is connecting to. Forcing connection applicants to meet the AAS could result in underutilised assets where there is no immediate need for additional capability over say a Negotiated Access Standard (NAS). A NAS should be acceptable on the basis that the Connection Applicant allows the NSP/AEMO to meet their obligations to other network users. If meeting the AAS is required due to potential future developments, there should be transparency regarding the likelihood of these future developments and the potential schedule. The AEMC should consider a mechanism to ensure efficient investment in electricity services by having the option to differ costs associated with meeting the AAS to a time when the additional capability is required. A good example of this is related to harmonic emissions under S5.2.5.2 where a Registered Participant may not meet the AAS for harmonics, however if the harmonic levels with the Registered Participant connected are well under the planning levels, the participant could be able to connect, however in future may be required to meet the AAS. Thus, allowing for a more efficient investment in electricity services. A connection applicant would need to demonstrate that a higher capability is not required for the power system Interconnected power systems such as the National Electricity Market (NEM) are highly complex and have very different characteristics depending on the location as well as size and nature of the new generation being connected. NSPs / AEMO arguably have the best understanding of the network and what the specific risks are at a particular location and this knowledge is built up over many years of experience. For the Connection Applicant to demonstrate that a higher level of performance is not required requires *both* the Connection Applicant *and* the NSP / AEMO to work together to identify and quantify the risks of not meeting the AAS. It would be very challenging to expect the Connection Applicant solely to demonstrate this and it could result in significant time and cost to the Connection Applicant with no support from the NSP. WSP believes a more collaborative approach would achieve the best outcome. To negotiate effectively would require both the Connection Applicant and the NSP/AEMO to work together during the negotiation phase as opposed to putting the onus solely on the Connection Applicant. There is also a large systems knowledge imbalance between the Connection Applicant and the NSP/AEMO which does not foster a level playing field during negotiations. We believe the best outcomes are achieved when all parties work together and suggest that the wording be revised to reflect this.

Disturbance ride-through: Multiple low voltage disturbance ride-through
Following the SA System Black event on 26 September 2018, AEMO has proposed specifying applicants can ride through multiple faults over a short duration. The events from the SA System Black event were due to extreme weather events and imposing requirements on applicants based on these extreme events could be viewed as too onerous. AEMO has provided some historical data from ElectraNet with regards to previous faults. Exposure to a large number of faults such as this is challenging both from a power system planning as well as operational perspective. Where this is within the capability of standard equipment, WSP see no issues with ensuring that the full capability of the generating units is documented. Care should be given however when planning power systems in order to minimise the impact of such events. Exposing rotating machines such as synchronous generators or synchronous condensers to multiple faults within a short period places significant mechanical stress on generators and turbines. For example, it is not uncommon to limit the number of auto-reclose events in the vicinity of synchronous generators in order to reduce the mechanical stresses on generating units. Furthermore, there is also a risk of loss of synchronism due to multiple faults which should be considered in the rule change (related to disconnection under S5.2.5.10). This would apply not only to synchronous generating systems, but also asynchronous generating systems which comprise of synchronous units. WSP suggest development of a mechanism to allow disconnection under S5.2.5.10 as part of the requirement to ride through multiple faults and where damage to plant or a reduction in the design life of the Generating System can be demonstrated.

Disturbance ride-through: high voltage disturbance ride-through
AEMO has proposed increasing the system standard for High Voltage Ride Through (HVRT) under S5.2.5.4. To the best of our knowledge, AEMO has not provided technical information or evidence to support the need to change the system standard. Following the SA System Black event in South Australia last year, AEMO advised during the stakeholder workshop held in Sydney that a remote part of the South Australian network was exposed to high voltages following this event. WSP understands that this was to an isolated part of the network which does not necessarily warrant changing the system standard. Further technical evidence should be provided and reviewed before these changes are adopted as the final report into the SA System Black event does not provide sufficient detail to asses this. Where isolated parts of the network are exposed to high voltages for short durations of time, this may be better managed by the NSP. AEMO in their submission provided information regarding capability of some suppliers to meet the revised requirements. We understand that some suppliers may not be able to meet this requirement and the following image providers an overlay of three major suppliers (curve in Green, Purple and light orange). WSP believe that further discussion on the reason for increasing the system standard may be warranted.   

Disturbance ride-through: rate of change of frequency withstand capability
AEMO to date has highlighted its technology agnostic approach managing the power system, however there are inherently differing capabilities between synchronous and asynchronous plant, in particular related to Rate of Chance of Frequency (ROCOF) withstand. Consequently, it may not be possible to be technology agnostic when assessing technical capability under S5.2.5 of the Rules. Although asynchronous plant can generally operate over a much larger frequency range (and ROCOF) than synchronous plant, it isn't clear how AEMO intend to apply these requirements for asynchronous generating systems which may have reactive plant consisting of synchronous condensers and this would require clarification. Similarly to hybrid system consisting of synchronous and asynchronous generating units.
System strength
System strength in the form of Short Circuit Ratio and X/R are both required to ensure stable operation of asynchronous generating systems. WSP notes that: - System strength can vary significantly depending on network conditions and clarity is required as to if / what lower level of SCR and X/R compliances is required during various network outage conditions - With regards to asynchronous Generating Systems, where instability can manifest due to low system strength, there may be a requirement to meet the AAS for S5.2.5.10. WSP are not aware of any demonstrated cases of meeting the AAS for S5.2.5.10 for asynchronous Generating Systems and further discussion is required with respect to this clause and its application for such Generating Systems - WSP notes that a SCR of 3.0 at the connection point is specified and that X/R will be defined later. It isn't clear what the impact is if the actual SCR is less than 3.0 for contingencies events and this requires clarification.