

ABN 70 250 995 390
180 Thomas Street, Sydney
PO Box A1000 Sydney South
NSW 1235 Australia
T (02) 9284 3000
F (02) 9284 3456
Friday, 26 August 2022

Australian Energy Market Operator

By email: contact.connections@aemo.com.au

Dear Sir/Madam

NER S5.2.5.10 Guideline Consultation

Transgrid welcomes the opportunity to respond to the Australian Energy Market Operator's (AEMO) proposed S5.2.5.10 guideline. As the jurisdictional planner, operator and manager of the transmission network in NSW and the ACT, Transgrid is eager to assist AEMO in ensuring the requirements of S5.2.5.10 are workable, clear and reasonable. Transgrid is also supportive in solving ongoing challenges for AEMO and NSPs being able to determine which generating systems are causing and/or contributing to oscillations.

Transgrid considers that:

1. the intent of the clause S5.2.5.10 should be clarified; and
2. a workable definition of "Unstable" and "Instability" should be included as either a preamble to S5.2.5.10 or in Chapter 10 – Glossary of the NER in place to the reference to the PSSG.

Transgrid recognises this clause historically (up to version 12 of the NER) was written to prevent pole slipping and conditions leading to pole slipping of synchronous generators. Subsequently, in NER version 13, S5.2.5.10 was updated to accommodate the connection of asynchronous plant which also modified the synchronous requirement to cover for "other conditions...to become unstable". We believe "other conditions" was to cover for failures in the synchronous generators control system such as PSS, Governor, AVR, etc.

With this historical context, we would interpret the intent of this clause was aimed to prevent large disturbances in the network and consequential tripping and damage of other plants in the network or pose a risk to power system security. A principle of the rules and the underlying technical standards is to be technology agnostic, so the intention of the asynchronous automatic access standard is to address an equivalent to pole slipping event of a synchronous generator. As such, we believe that the **Severity** of the impact to the power system would be a key consideration when applying this clause to Asynchronous plant.

As the Automatic Access Standard (AAS) requires a protection system which could promptly disconnect the Generating system (GS), we recommend the tripping of the generator only for severe instability of the GS such as pole slip of a synchronous generator and sustained loss of PLL lock of an asynchronous generator. For less severe instability, it is recommended other actions should be applied, such as alarming, changing of operating point, ramp down of generation, dynamic gain system changes, etc.

It is noted that other clauses in the NER such as S5.2.5.11 and S5.2.5.13 require the generator response to be adequately damped and hence would not be necessary to capture this requirement or assessment within the scope of S5.2.5.10.

The other key issue we have identified is that S5.2.5.10 refers to the Power System Stability Guidelines (PSSG), however, the PSSG does not provide enough guidance or clarity on how to quantify or measure “stability” nor provide definitions for “Instability/Unstable operation”. This guidance would be essential for the development of protection thresholds for settings. Transgrid recommends that this to be clearly defined within clause S5.2.5.10, or in NER chapter 10 (akin the definitions provided for Rise and Settling time assessment) rather than PSSG.

Another issue with the current S5.2.510 is that there is an inconsistency between the Synchronous and Asynchronous clauses for the AAS, where Synchronous specified the protection system to promptly disconnect the generator if it causes instability, while in the Asynchronous this is omitted.

Automatic access standard

(a) *The automatic access standard is a generating system must have:*

- (1) *for its synchronous generating units, a protection system to disconnect it promptly when a condition that would lead to pole slipping is detected, to prevent pole slipping or other conditions where a generating unit causes active power, reactive power or voltage at the connection point to become unstable as assessed in accordance with the power system stability guidelines established under clause 4.3.4(h); and*
- (2) *for its asynchronous generating units, a protection system to disconnect it promptly for conditions where the active power, reactive power or voltage at the connection point becomes unstable as assessed in accordance with the guidelines for power system stability established under clause 4.3.4(h).*

Interpreting the clause as it is currently written, the Asynchronous requirement does not require the cause or party causing to be identified, but disconnect solely based on measurements at the connection point. If applied in its current form, this could lead to asynchronous generators in a wider area of the power system to be indiscriminately disconnected by the protection system due to P,Q,V measurements at the connection point even if the GS is not causing the instability but rather reacting to the network disturbance. This could result in cascading loss of generation and present a risk to power system security.

In summary, we believe the following is required for S5.2.5.10 to be workable, clear and reasonable:

1. clarify the scope and limit its’ application to instability leading to severe impact to the power system consistent with the historical intent of the clause;
2. Protection system to trip only for the (1) above;
3. Less severe instability to be detected and reported by real time oscillation monitoring systems and managed by system operator and automated control system actions; and
4. Provide clear definition within the NER on “unstable” and “instability”.

We look forward to working with AEMO to further improvement of S5.2.5.10. Transgrid considers that the upcoming 5 yearly review of the technical standards may present an opportunity to address the issues raised in this submission. If you require any further information or clarification, please feel free to contact Jahan Peiris, Manager Network Connections, at Jahan.Peiris@transgrid.com.au.

Yours faithfully



Kasia Kulbacka
General Manager of Network Planning

Appendix A

Extract NER version 12

S5.2.5.10 Asynchronous operation of synchronous generating units

- (a) The *automatic access standard* is: Each *synchronous generating unit* must have a *protection system* to promptly *disconnect* it in order to prevent pole slipping.
- (b) The *minimum access standard* is: Each *generating unit* must not cause a *voltage* disturbance due to pole slipping of more than the maximum level specified in Table 7 of *Australian Standard AS/NZS 61000.3.7:2001*.
- (c) The actual settings of protection installed on a *generating unit* to satisfy the requirements of clause S5.2.5.10(a) must be approved by the *Network Service Provider*.

Extract NER version 13

S5.2.5.10 Protection to trip plant for unstable operation

Automatic access standard

- (a) The *automatic access standard* is:
 - (1) a *synchronous generating unit* must have a *protection system* to *disconnect* it promptly when a condition that would lead to pole slipping is detected in order to prevent pole slipping or other conditions where a *generating unit* causes *active power, reactive power* or *voltage* at the *connection point* to become unstable as assessed in accordance with the *power system* stability guidelines established under clause 4.3.4(h); and
 - (2) an *asynchronous generating unit* must have a *protection system* to *disconnect* it promptly for conditions where the *active power, reactive*

power or *voltage* at the *connection point* becomes unstable as assessed in accordance with the guidelines for *power system* stability established under clause 4.3.4(h).