

# NER S5.2.5.10 - Asynchronous generating units and dynamic reactive plant

## Initial summary guide

Through working with Network Service Providers (NSPs) and market participants, AEMO has found that there is uncertainty on the requirements of clause S5.2.5.10 “Protection to trip for unstable operation” of the National Electricity Rules (NER) and relating the requirements to the Power System Stability Guidelines (PSSG). As such, AEMO has identified an opportunity to establish a consistent understanding and approach for the technical requirements under, and compliance with, S5.2.5.10 for asynchronous generating systems and reactive plant such as Static Var Compensators (SVCs) and Static Synchronous Compensators (STATCOMs).

This initial summary guide seeks to give a broad range of stakeholders a summary perspective on some of the challenges to date, an overview of a proposed S5.2.5.10 guideline, and an opportunity to provide input to the development of the said guideline.

### What are the issues?

AEMO and Network Service Providers (NSPs) have observed a range of unstable operation instances across the National Electricity Market (NEM), with oscillations being caused, followed and contributed to by generating systems, during both commissioning and operation phases of the projects. Particularly in areas with growing volumes of asynchronous generating systems, the system strength of the NEM is expected to decline further, which could exacerbate oscillations resulting from control system interactions.

AEMO has worked with the connecting NSPs and market participants to identify and address the causes of unstable operation to bring the generating systems back into service. This has highlighted that there is uncertainty on the requirements of S5.2.5.10 within the industry, as such there are an increasing number of generating systems without dedicated protection systems to disconnect the plant if it is becoming unstable, in many cases having no mechanism to:

- Detect unstable operation.
- Alarm the generator operator, or the NSP/AEMO.
- Automatically and promptly disconnect or ramp down generating units.

There are ongoing challenges for AEMO and NSPs being able to determine which generating systems are causing and/or contributing to oscillations.

AEMO explored the root cause of the gap between the design and the generator performance standard, and found the main contributing factors were widespread uncertainty and lack of clarity with:

- Directly relating the requirements of S5.2.5.10 with the Power System Stability Guidelines
- The specific conditions that are considered unstable operation of the generating system
- Difficulties in setting the baseline and the ability to distinguish between unstable operation of the generating system and unstable operation of the power system
- Process to develop, agree and implement a suitable protection system with the NSP and AEMO.

### Proposed guideline

AEMO is seeking to establish a common understanding of and approach towards compliance with S5.2.5.10 for asynchronous generating units and dynamic reactive plant. It is proposed that this approach will be set out in a guideline, to be developed and consulted with consideration of feedback provided to this initial summary guide. The guideline is not intended to form a mandatory requirement, AEMO acknowledges that other methods and/or technologies may comply with the intent of S5.2.5.10.

The guideline will aim to set out a practical approach for implementation of the protection system to meet S5.2.5.10 requirements to reduce the overall risk to power system security, including avoiding unnecessary disconnection of generating units that may be assisting in mitigating instability of other generating units. The intent is to include the contribution of each generating unit in to observed instability as a factor when designing the protection system.

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AEMO acknowledges that the technology to identify the source of an oscillation is not fully mature and has undertaken some initial work with NSPs and Original Equipment Manufacturers (OEMs) with respect to the ability to implement both a protection system and protection algorithm. A technical note has been published explaining how the relationship between voltage and reactive power can be used to assess the contribution of a plant to a voltage oscillation measured at its connection point.

### What should be covered in the guideline?

In addition to outlining the guiding objectives and the purpose of the protection system, AEMO proposes to include the following:

- Summary of expectations to meet the access standard levels
- Technical explanation on how the contribution from other generating systems should be considered when designing the protection system
- An explanation of how to set the protection system's thresholds, along with examples
- Commissioning aspects of a S5.2.5.10 compliant protection system
- Frequently asked questions

### Key feedback areas

AEMO is seeking specific feedback from stakeholders on the following:

1. Opportunities and/or challenges that exist for implementing a suitable protection system to meet the S5.2.5.10 access level requirements, for example available technology and areas requiring further development.
2. Clarity of the S5.2.5.10 access standard requirements, including how unstable operation is defined, conditions that are considered unstable and how they are assessed in accordance with the Power System Stability Guidelines.

3. The approach to develop, agree, implement and commission a suitable protection system with the NSP and AEMO, including consideration of nearby plant and their interaction/contribution (desired or undesired) to unstable operation.

### Timeline

The proposed timeline for consultation and development of the S5.2.5.10 guideline is as follows:

- Publish initial summary guide (*this document*) – 27 July 2022
- Submissions on initial summary guide (*this document*) close – 24 August 2022
- Publish draft S5.2.5.10 Guideline for stakeholder feedback – To be advised

### Providing feedback on this initial summary guide

This initial summary guide seeks to initiate stakeholder engagement on building a common understanding of the issues around NER S5.2.5.10 for asynchronous generating systems and dynamic reactive plant.

AEMO is seeking stakeholder feedback to inform the next step, which is the preparation and publication of a draft guideline. The published draft will welcome written submissions.

### Where can I find more information?

For any further enquiries, please contact AEMO's Onboarding and Connections team – [contact.connections@aemo.com.au](mailto:contact.connections@aemo.com.au)