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Dear Mr Henderson

Review of the frequency operating standard, stage 1 – submission on draft determination

Thank you for the opportunity to respond to the Reliability Panel's Draft Determination for Stage 1 of the Review of the Frequency Operating Standards (FOS) dated 12 September 2017. AEMO notes that the following issues are covered by this determination:

- Inclusion of a standard to apply to protected events.
- Amendments to the requirements for multiple contingency events
- Review of the definition of terms in the FOS, including:
 - the definition of a generation event
 - the definitions that relate to island operation in the FOS
- Review of the requirement for accumulated time error in the FOS.

AEMO does not support the inclusion of requirements regarding multiple contingencies in the FOS. We have previously set out our reasons in AEMO's submission to the FOS Stage 1 Issues Paper and further described in AEMO's advice to the Panel on Stage 1 of the FOS Review. While this inclusion is not unworkable, it is unnecessary and introduces potentially conflicting objectives. In the attachment to this letter, AEMO has attempted to articulate these concerns further and its reasons for asserting that AEMO's obligations regarding multiple contingencies are well established in the NER, and are not improved by this proposed inclusion in the FOS.

AEMO supports the Panel's proposed amendments on other FOS matters as set out in the draft determination.

If you have any queries regarding this submission please do not hesitate to contact Matthew Holmes, Principal – Future Energy Systems via matthew.holmes@aemo.com.au or (07) 3347 3039.

Yours sincerely



Cameron Parrotte
Executive Group Manager, Strategy and Innovation

Attachment 1: AEMO submission regarding the Draft Determination

Background

AEMO is the independent market and power system operator of the National Electricity Market (NEM) along the eastern seaboard, and the South West interconnected system (SWIS) in Western Australia. AEMO also operates the wholesale gas markets across the eastern seaboard of Australia.

AEMO is responsible for the secure operation of the interconnected power system, and is currently undertaking a broad program of work to assess and address the technical challenges that are likely to emerge as the generation mix in the NEM continues to change. A key component of this work relates to frequency control, and AEMO's submission draws upon operational experience and analysis derived through carrying out these functions.

Frequency is a core metric of the stability of the power system, representing the supply-demand balance at any instant. If demand is greater than supply the frequency falls from the nominal 50 Hz, and vice versa if supply exceeds demand. Equipment connected to the system is designed to operate at this frequency. While the system can operate outside these bands, it can only do so for certain scale of deviation and duration without impacting efficiency or potentially damaging plant. The FOS specifies the bounds within which AEMO must manage the power system frequency with different obligations for normal operating conditions, and credible and non-credible contingency events. The definitions of credible and non-credible events are set out in the National Electricity Rules (NER).

Subsequently, operational decisions, tools and standards are derived with the FOS in mind, including:

- The amount and types of Frequency Control Ancillary Services (FCAS) that AEMO procures.
- The design of systems such as the Automatic Generation Control (AGC) which is one of the mechanisms utilised to operate the grid in line with the FOS.
- The nature of technical standards for generation and network equipment.
- The design and operation of emergency frequency control schemes (EFCS) such as under frequency load shedding (UFLS) and other protection mechanisms.

These dependencies mean that any major changes to the FOS cannot be performed in isolation of frequency control mechanisms more broadly, and it is important to not have ambiguity.

1. Inclusion of protected events in the FOS

AEMO supports the proposed revisions to the standard to include protected events.

2. Amendments to the requirements for multiple contingency events

The Draft Determination has included a revised requirement for managing frequency following multiple contingency events, in Part B. This states that:

“following the occurrence of any *non-credible contingency event* or multiple *contingency event* that is not a *protected event*, AEMO should use reasonable endeavours to:

- i. maintain system frequency within the *extreme frequency excursion tolerance limits* and

- ii. avoid the system frequency exceeding the applicable generation and load change band for more than two minutes while there is no contingency event or exceeding the applicable *normal operating frequency band* for more than ten minutes while there is no *contingency event*.”

Prior to publishing the Draft Determination, the Panel requested AEMO to provide formal advice on the matter of including multiple contingencies in the FOS. In response to that request, AEMO advised that there was no reason to include any specific provisions regarding multiple contingencies in the FOS because AEMO’s obligations are already well defined in the NER.¹ AEMO remains of this view. Specifically, AEMO considers that the amendments introduced by the EFCS Rule in March 2017² comprehensively describe the framework for AEMO to manage non-credible contingency events and multiple contingency events. AEMO may only take steps (by imposing constraints or procuring services) to manage the impact of potential credible contingencies or for nominated protected events. The framework also sets out the process by which EFCS (including under-frequency load shedding schemes) can be established to manage a range of more extreme events.

The inclusion of the proposed provisions concerning multiple contingency events in the FOS creates material ambiguity in relation to AEMO’s obligations, and potentially conflicts with the framework established by the EFCS Rule. It is not clear to AEMO what situations these FOS provisions would apply to, or what actions might be expected of AEMO that are not already covered by the relevant rules (as discussed in detail in AEMO’s advice to the Panel dated 18 August 2017³). The Draft Determination does not provide any discussion of how the Panel expects these provisions to apply, beyond the design and operation of EFCS.

Specifically, AEMO’s concerns with the inclusion of these provisions are as follows:

1. Requirements set out in standards such as the FOS create expectations that they can and will be delivered (see NER clause 4.4.1), so there must be a clear understanding of the mechanism for their management and delivery. An EFCS, where appropriate in accordance with the NER, is the only means by which AEMO is permitted to pre-emptively prepare the system for the consequences of non-credible contingencies (other than protected events). The only other possible application of the proposed obligation consistent with the NER is to AEMO’s efforts to restore power system security after the occurrence of the non-credible event. However, the Draft Determination indicates the Panel’s view that its purpose is to create a ‘performance target to guide preparations for non-credible contingencies and multiple contingency events’.
2. The proposed requirement, together with the related FOS bands for multiple contingency events, is potentially inconsistent with the NER. For example, consider that a significant contingency event has just occurred. In accordance with clause 4.2.6(b) of the NER, AEMO must use reasonable endeavours to restore the power system to a secure operating state as soon as possible, and in any event within 30 minutes. Some customer load shedding might be required to achieve this. However, the proposed FOS standard for multiple contingency events requires AEMO to use ‘reasonable endeavours’ to restore the power system frequency back to the normal operating band within 10 minutes. In the case of other similarly worded FOS

¹ <http://www.aemc.gov.au/getattachment/9a79771b-9794-45da-8493-e22842d45275/AEMO-Advice-%E2%80%93-Stage-one.aspx>

² <http://www.aemc.gov.au/Rule-Changes/Emergency-frequency-control-schemes-for-excess-gen>

³ Ibid

provisions, the 10 minute requirement effectively drives the amount of FCAS services AEMO procures for specific events, and in some cases AEMO may also apply constraints in the generation dispatch process. However, these options are not available to AEMO for “any multiple contingency event”, so the proposed FOS provision may well require AEMO to consider interrupting customer load within 10 minutes - significantly earlier than the NER would otherwise require.

In summary, AEMO considers that the proposed FOS provision in relation to multiple contingency events is a remnant from the previous regime, and should be removed or amended to:

- Clarify how AEMO is intended to apply the requirement, for example in the design of any relevant EFCS in accordance with the NER, and otherwise only to the actions AEMO takes after such events occur.
- Be consistent with the NER requirements in terms of the time to restore the power system to the normal (secure) operating band after a contingency event. .

3. Revision of the definition of generation event

AEMO supports the proposed revisions to the standard relating to the definition of generation event.

4. Revision of the definitions in the FOS related to island operation

AEMO supports the proposed revisions to the standard relating to how island operation is defined.

5. The limit for accumulated time error in the FOS

AEMO supports the proposed revisions to the standard related to time error correction, and considers that the phased approach that first relaxes the accumulated time error limit is a reasonable approach.