Mr Neville Henderson
Australian Energy Market Commission
Level 6, 201 Elizabeth Street
Sydney NSW 2000
Lodged via www.aemc.gov.au

Tueaday, 1 August 2017

Dear Mr Henderson,

RE: Review of Frequency Operating Standard (ref REL0065)

ENGIE appreciates the opportunity to comment on the Reliability Panel's issues paper on the frequency operating standards (FOS) that apply to the National Electricity Market (NEM).

The FOS define the range of allowable frequency deviations for the power system under different conditions, including normal operation and following contingency events. The Reliability Panel's review will be carried out in two stages.

Stage one will consider amendments to the FOS in light of the recent emergency frequency control scheme rule change which included the introduction of the new protected event category. Stage two will consider the components of the FOS including the frequency band settings and the time requirements for restoration of frequency.

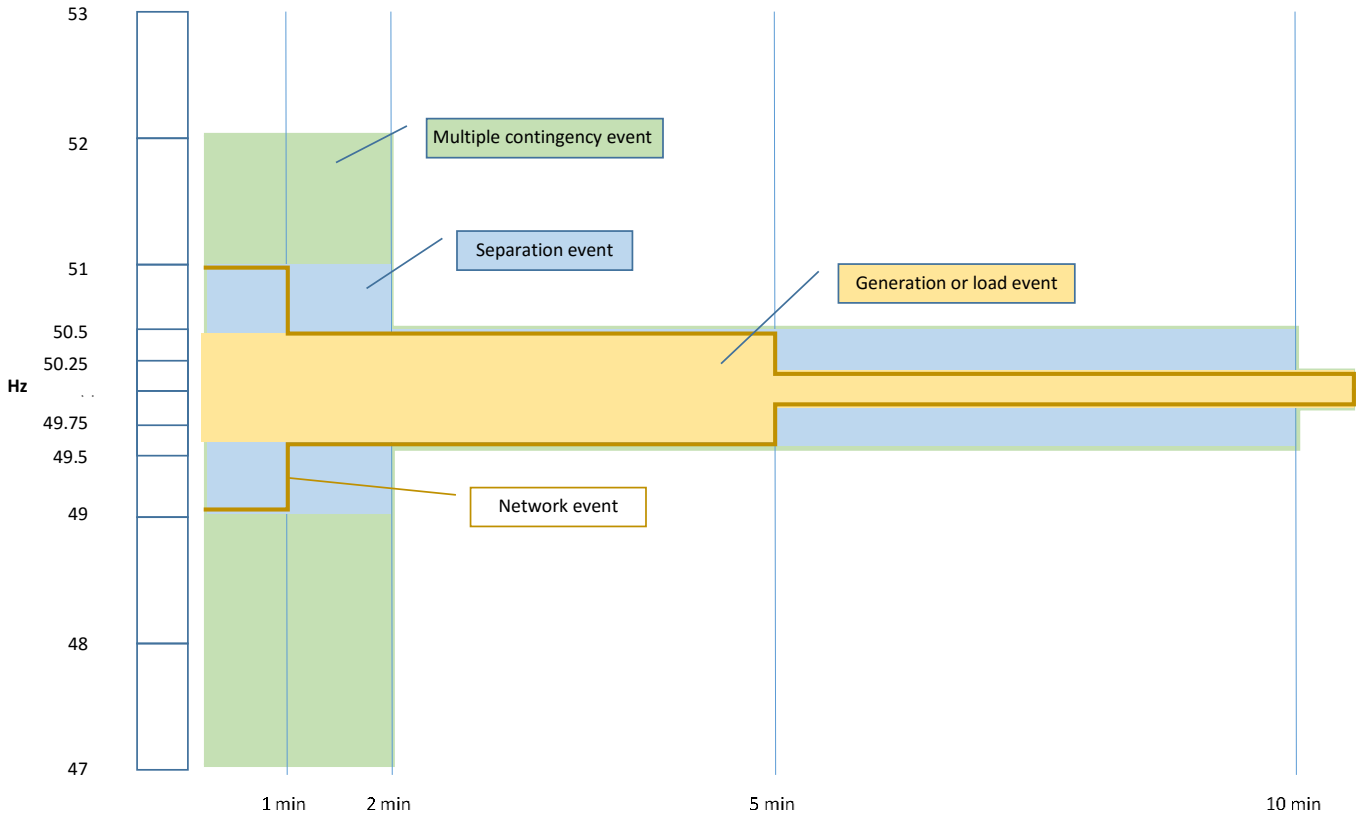
Stage two will commence when the AEMC System Security Market Frameworks review recommendations and AEMO's investigations into frequency performance in the NEM are further progressed. The Reliability Panel anticipates that stage two will be completed before the middle of 2018.

Frequency standard for protected events

When the AEMC made its final determination to introduce the new category of protected events into the NEM, it was required to also establish an interim FOS for the new category. The AEMC decided to set the interim standard for protected events as follows:

> "*For a protected event, system frequency should not exceed the applicable extreme frequency excursion tolerance limits and should not exceed the applicable load change band for more than two minutes while there is no contingency event or the applicable normal operating frequency band for more than 10 minutes while there is no contingency event*."

To assist in consideration of the various FOS bands and conditions, ENGIE has prepared the following diagram which attempts to summarise all contingency events for the NEM mainland.



The AEMC interim standard for protected events is essentially using the existing standard for multiple contingency events. To the extent that the introduction of the protected event category was intended to provide an intermediate setting between credible contingency events and non-credible multiple contingency events, the AEMC interim setting for protected event is too lenient. By allowing the frequency to deviate to the extreme frequency excursion

tolerance limit (47 / 52 Hz) there will be substantial emergency frequency control load / generator shedding following a protected event, meaning that objective of protecting against the contingency has not been achieved.

The current requirement in the FOS that frequency be contained within the extreme frequency excursion tolerance limits for multiple contingency events, creates a difficulty for AEMO as it is not possible to define the amount of service needed for an undefined contingency size. The extreme frequency excursion tolerance limits might no longer be useful as a standard against which AEMO are required to manage multiple contingency events since, as discussed in the issues paper, a multiple contingency event is unbounded and therefore not possible to quantify and assess against a numeric standard.

One option might be to change the extreme frequency excursion tolerance limits (NER defined term) to make them less extreme, and have these limits apply to protected events. However, since the extreme frequency excursion tolerance limits are used to define obligations on networks and generators in the NER, any change to these limits would need to include further work to consider the impact on generator and network obligations in chapter 5 of the NER. For example, NER clauses S5.2.5.3 (generating unit response to frequency disturbances), S5.2.5.8 (protection of generating systems from power system disturbances) and S5.3a.14 (protection of market network services from power system disturbances) all refer to the extreme frequency excursion tolerance limits in defining obligations on generators and networks.

For the reasons set out above, ENGIE does not favour changing the extreme frequency excursion tolerance limits as it would be complex, and may introduce new risks for the security of the power system.

Another possible option would be to apply the island separation band as the frequency standard for protected events. Essentially this would result in the standard for protected events being to maintain frequency within the range of 49 to 51 Hz following the protected contingency event occurring. This would ensure that no post contingency under frequency load shedding would occur, which is set to commence when the frequency falls below 49 Hz.

Whereas the previous option of using the extreme frequency excursion tolerance limit is too lenient, this option of using the island separation band is too severe. It effectively would mean that a protected event would have the same level of protection as a credible contingency that might cause an island. For example, suppose that the island separation band is the standard used for protected events and the Heywood double circuit interconnector is declared to be a protected event. This would mean that AEMO would need to procure sufficient FCAS at all times to ensure the South Australia frequency remained above 49.0 Hz following the loss of the Heywood double circuit interconnector. Now suppose that there is lightning in the vicinity of the Heywood interconnector and it becomes a credible contingency event. If the island separation band standard was already being applied to the Heywood interconnector as a protected event, then declaring the interconnector as a credible contingency event would have no impact.

In other words, using the island separation band as the standard for a protected event would appear to remove the utility of declaring the same event to be a credible contingency.

Based on the above discussion, it seems that none of the existing FOS bands are suitable for use as a standard for the new protected event. Either they are too lenient, meaning the protected event would offer no additional level of

protection than a non-credible contingency, or they are too tight, meaning the protected event would be managed to the same standard as a credible contingency event.

Since a protected event is intended to provide a level of protection somewhere in between credible and non-credible contingency events, a new FOS standard is therefore required.

It is likely that the number of contingency events that are assigned to the category of protected events will be small, and each is likely to have its own specific features and considerations. For example, the Heywood interconnector is an obvious candidate which will need to be considered in the context of the South Australian jurisdictions current special arrangements for procurement of contingency raise services. If in the future there is consideration of say Basslink or the QNI interconnector as candidates for the protected event category, then these are likely to have their own specific and unique considerations, given their locations in the network.

ENGIE therefore suggests that the FOS to apply to a specific protected event be individually specified for that contingency event. This could mean that if say Heywood, Basslink and QNI are assigned to be protected events, there could be slightly different standards applicable to each. This would add slightly to the complexity of the process, but is likely to lead to a more suitable outcome.

If the number of protected events increases to beyond a handful of contingencies, then this approach would need to be reviewed, and a standardised FOS established. ENGIE does not expect this to occur in the foreseeable future.

Treatment of multiple contingencies

As noted in the previous discussion on protected events, it would appear that the FOS for multiple contingency events has little or no utility within the FOS, since the range of potential contingencies under this category are limitless, and therefore the amount of service to protect against them is in theory, infinite. As a result, there is no practical way in which AEMO can respond to this standard, other than to take a very general - ‘best endeavours’ approach.

ENGIE does note however, that the extreme frequency excursion tolerance limit does perform an important function in defining the level at which generators, networks and customer loads can disconnect from the power system in order to protect their equipment from damage in the event of extreme frequency excursions. This is critical in ensuring that power system equipment is protected against major damage during extreme contingency events.

For the reasons outlined, ENGIE would support removing the multiple contingency event condition from the FOS.

Definition of an electrical island

ENGIE has considered the points raised in the issues paper with regard to the definition of electrical islands, and notes that there is potential for considerable complexity to be introduced in striving to achieve a perfect definition that will be suitable to a wide range of circumstances. Linking the FOS definition of electrical islands to other regulatory areas such as system restart and the calculation of inertia has some merit, but runs the risk that in striving for a definition that applies to all of these different regulatory areas, it might not be well suited to any.

ENGIE suggests that rather than have a specific definition of an island, the FOS should rather contain a set of principles that would then be applied by AEMO in determination of whether a section of the NEM should be treated as an island. These principles could be similar to, but not necessarily identical to the principles that are now used to establish electrical sub-networks for the purpose of system restart.

One specific comment on the current definition of an island for the mainland NEM is that it includes the statement "more than half of the generation of each of two regions". This is somewhat unclear as it could be read to mean more than half the generation of either of the two regions, or more than half of the total generation amount for both regions. ENGIE assumes that it is intended to mean more than half of the total generation of the two regions combined.

Maximum accumulated time error in the FOS

ENGIE believes that the maximum accumulated time error can be removed from the FOS as its relevance has diminished for the reasons outlined in the issues paper.

ENGIE believes that there may be an additional benefit in removing the accumulated time error from the FOS related to the manner in which the regulation FCAS causer pays factors are calculated and applied. One criticism that has been identified in relation to the current causer pays calculation is that participants find it hard to reconcile the causer pays calculations, as they are based on both a frequency error and a time error (integral) component. The time error (integral) component is an internal calculation within the AEMO AGC system and therefore difficult for participants to reconcile. Removing this from the causer pays calculation would make that process more transparent and easier to reconcile.

Definition of terms

ENGIE notes the discussion in the issues paper regarding standardisation of terms between Tasmania and the mainland, and that AEMO have apparently raised some concerns regarding this, although the details of the issue are not entirely clear to ENGIE.

In general it is desirable to strive for consistency of terminology across all NEM regions. It is also true however, that in the case of Tasmania there are a number of specific considerations that need to be taken into account which are likely at times to require unique terminology.

ENGIE is not strongly of the view that terminology needs to be standardised, but if AEMO have a specific concern, then that needs to be considered.

A potential approach for stage 2 of the review.

ENGIE is in agreement with the AEMC's overview of the relevant factors that will need to be considered in stage two of the FOS review. As noted in the issues paper, one important consideration will be in ensuring that the rate of change of frequency is managed appropriately, and whether there needs to be a FOS standard for this along with the frequency standards.

ENGIE also notes the current consideration of the effectiveness of governor response in the NEM, and commentary about mandating governor response from synchronous generators. ENGIE supports the investigation

work that is currently being performed to better understand the dynamics of frequency control in the NEM, but in general, does not support mandating provision of services.

If it becomes clear that there is a lack of a particular service in the NEM, then rather than mandate that service, a better approach would be to introduce a commercial value for that service so that a range of technologies can respond. This is more likely to result in efficient delivery of that service.

To the extent that it this is relevant to the FOS, ENGIE would urge the Reliability Panel to ensure that competitive outcomes are encouraged in preference to regulatory interventions.

ENGIE trusts that the comments provided in this response are of assistance to the Reliability Panel in its deliberations. Should you wish to discuss any aspects of this submission, please do not hesitate to contact me on, telephone, 03 9617 8331.

Yours sincerely,

Chris Deague
Wholesale Regulations Manager