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Dr John Tamblyn
Chairman
Australian Energy Market Commission
PO Box H166
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Dear Dr Tamblyn,

AEMC draft determination on Technical Standards for Wind and other Generation

Thank you for the opportunity to make a submission on the draft Rule determination.

The AEMC's draft determination invites specific feedback from stakeholders on the impact that the proposed new definition of the term *"continuous uninterrupted operation"* would be likely to have on an effective compliance and enforcement regime. This follows from the concerns the AER raised in response to the NEMMCO rule change proposal. Our attached submission provides an alternative definition of the term, which the AER considers addresses the compliance and enforcement concerns raised by the earlier definition. In developing this alternative the AER has liaised with NEMMCO and ESIPC.

We remain committed to working with the AEMC and the industry to resolve those issues and arrive at a robust performance standards framework.

Yours sincerely

Michelle Groves
Chief Executive

Technical standards for wind and other generators – draft Rule determination

Overview

This submission comments on the draft Rule determination: "Technical standards for wind and other generators".

The AER's primary concern is with the definition of the term *"continuous uninterrupted operation."* The AEMC's draft determination invites specific feedback from stakeholders on the impact that the definition would be likely to have on an effective compliance and enforcement regime.

The AER offered to provide a further submission with an alternative definition of *continuous uninterrupted operation* in the event that the AEMC wished to consider the issue as part of this review. That alternative definition is provided below. The proposal follows consultation with ESIPC and NEMMCO.

The AER also wishes to comment on frequency disturbance standards.

This rest of this submission discusses each of these issues in more detail.

Specific issues:

1. *Continuous uninterrupted operation*

The major issue raised in the AER submission to the proposed Rule change related to the definition of continuous uninterrupted operation. The AER argued that:

> *"Continuous uninterrupted operation* is a key requirement for system security. Its intention is to ensure that generators ride through disturbances such as sudden frequency and voltage changes in a manner to avoid cascading failures within the power system. The consequences of generators failing to meet *continuous uninterrupted operation* requirements are substantial as this can potentially cause cascading failures and widespread blackouts. Recent experience in South Australia, New South Wales, the US and Italy highlights the potential implications to system security of inadequate safeguards in this area."

The main reasons for the AER's concerns were:

- the definition refers to 'delivering active power and reactive power in accordance with its performance standards'. However, the performance standards registered by generators do not specify the manner in which the generator is required to deliver active and reactive power. Whilst there is a proposed performance standard for "active power control" and a separate requirement for "reactive power capability" neither of these standards relate directly to the obligation under this definition; and
- establishing a requirement "in accordance with performance standards" is likely to be circular since performance standards typically include a reference to the term continuous uninterrupted operation.

The AER offered to provide a further submission with an alternative definition of continuous uninterrupted operation in the event that the AEMC wishes to consider the issue as part of this review.

The definition provided in the draft determination is as follows:

> **continuous uninterrupted operation:** In respect of a *generating system* including all operating *generating units* operating during a *power system* disturbance, not disconnecting from the *power system* and, after clearance of any associated electrical fault, delivering *active power* and *reactive power* in accordance with its *performance standards*, with all essential auxiliary and reactive *plant* remaining in service, so as to not exacerbate or prolong the disturbance for other *connected plant*.

The definition proposed by the AER after consultation with ESIPC and NEMMCO is:

> **continuous uninterrupted operation:** In respect of a *generating system* ~~including all operating~~or *generating unit~~s~~* operating ~~during~~ immediately prior to a *power system* disturbance, not ~~*disconnecting*~~ disconnecting from the *power system* except in accordance with its *performance standards* established under clauses S5.2.5.8 and S5.2.5.9 and, after clearance of any ~~associated~~ electrical fault that caused the disturbance, ~~delivering~~ only substantially varying its *active power* and *reactive power* in accordance with its *performance standards* established under clauses S5.2.5.11, S5.2.5.13 and S5.2.5.14, with all essential auxiliary and reactive *plant* remaining in service, and responding so as to not exacerbate or prolong the disturbance or cause a subsequent disturbance for other *connected plant*.

Changing the text from "during" to "immediately prior to" is to capture generators that disconnect during the fault. The exclusion "except under its performance standards established under clause S5.2.5.8, S5.2.5.9 and S5.2.5.910" is needed so that if the plant trips under conditions permitted under these performance standards, the generator has met its obligations. The words "associated electrical fault" are clarified by reference to "the fault that caused the disturbance". The AER proposed definition recognises that variations of active and reactive power can be required to support the power system, and are permitted in accordance with the obligations under schedules S5.2.5.11, S5.2.5.13 and S5.2.5.14. This approach avoids circular reference to a performance standard.

The intention of schedules 5.2.5.3, 5.2.5.4, 5.2.5.5, 5.2.5.6 and 5.2.5.7 is to ensure that generators ride through disturbances such as sudden frequency and voltage changes in a manner to avoid cascading failures within the power system. The problem with the definition provided in the draft determination is that it limits the obligation on the generator to its impacts on the initial disturbance. A generator may, however, be affected by the initial disturbance but this may not manifest itself for several minutes, which then causes a further different disturbance. The AER's proposed definition is aimed at rectifying this and ensuring that a generator does not substantially change its output in response to a disturbance. While the timeframe is not able to be defined, the crucial point is whether there is a response that exacerbates the event. If a generator coincidentally reduces its output significantly or disconnects after the initial disturbance it should be possible for the generator to provide evidence of the cause of that response. If it is unrelated to the disturbance then the generator has satisfied this obligation.

Further changes to the Rules are necessary to ensure that there is a link between the schedule and the power system disturbance. The re-drafting of schedules 5.2.5.3, 5.2.5.4, 5.2.5.5, 5.2.5.6, and 5.2.5.7 is provided in Appendix A.

2. Frequency disturbance standards

The AER stated in its submission to NEMMCO's proposal on "frequency rates of change" that it was unaware of any justified technical basis for this addition and that the current standards approved by the Reliability Panel do not contemplate such a parameter. The draft Rule determination states that:

> *The Commission wishes to hear submissions on alternatives, for example, requiring as part of the final Rule that the proposed frequency rates of change be referred to the Panel for review within 6 months of the commencement of the Rule.*

The AER supports a review by the AEMC's Reliability Panel.

Appendix A – proposed changes to schedules

S5.2.5.3 Generating unit response to frequency disturbances

(a) For the purposes of this clause S5.2.5.3:

'normal operating frequency band'; 'operational frequency tolerance band'; or **'extreme frequency excursion tolerance limits'** is a reference to the widest range specified for that term for any condition (including an "island" condition) in the *frequency operating standards* that apply to the *region* in which the *generating unit* is located.

'stabilisation time' and **'recovery time'** mean the longest times allowable for *system frequency* to remain outside the *operational frequency tolerance band* and the *normal operating frequency band*, respectively, for any condition (including and "island" condition) in the *frequency operating standards* that apply to the region in which the *generating unit* is located.

'transient frequency limit' and **'transient frequency time'** mean the values of 47.5 Hz and 9 seconds, respectively, or such other values determined by the *Reliability Panel*.

Automatic access standard

(b) The *automatic access standard* is each *generating system* and each of its ~~including all operating~~ *generating units* must be capable of *continuous uninterrupted operation* as a result of any *power system* disturbance during which *frequency* varies within any of ~~*frequencies* in~~ the following ranges:

(1) the lower bound of the *extreme frequency excursion tolerance limits* to the lower bound of the *operational frequency tolerance band* for at least the stabilisation time;

(2) the lower bound of the *operational frequency tolerance band* to the lower bound of the *normal operating frequency band*, for at least the recovery time including any time spent in the range under subparagraph (1);

(3) the *normal operating frequency band* for an indefinite period;

(4) the upper bound of the *normal operating frequency band* to the upper bound of the *operational frequency tolerance band*, for at least the recovery time including any time spent in the range under subparagraph (5); and

(5) the upper bound of the *operational frequency tolerance band* to the upper bound of the *extreme frequency excursion tolerance limits* for at least the stabilisation time,

~~provided that~~unless the rate of change of *frequency* is ~~between~~ outside the range -4 Hz to~~and~~ 4 Hz per second for more than 0.25 seconds.

[**Note:** The automatic access standard is illustrated in the following diagram. To the extent of any inconsistency between the diagram and paragraph (b), paragraph (b) prevails.]

Minimum access standard

(c) The *minimum access standard* is each *generating system* ~~including all~~and each of its ~~operating~~ *generating units* must be capable of *continuous uninterrupted operation*~~,~~ as a result of any *power system* disturbance

during which *frequency* varies within any of ~~*frequencies* in~~ the following ranges, unless the rate of change of *frequency* is ~~between~~ outside the range -1 Hz to~~and~~ 1 Hz per second for more than one second:

(1) the lower bound of the *extreme frequency excursion tolerance limits* to the transient frequency limit for at least the transient frequency time;

(2) the transient frequency limit to the lower bound of the *operational frequency tolerance band* for at least the stabilisation time;

(3) the lower bound of the *operational frequency tolerance band* to the lower bound of the *normal operating frequency band* for at least the recovery time including any time spent in the ranges under subparagraphs (1) and (2);

(4) the *normal operating frequency band* for an indefinite period;

(5) the upper bound of the *normal operating frequency band* to the upper bound of the *operational frequency tolerance band* for at least the recovery time, including any time spent in the ranges under subparagraph (e6), unless the *generating system* has a *protection system* to trip a *generating unit* if the *frequency* exceeds a level agreed with *NEMMCO*; and

~~(d)~~(6) ~~The minimum access standard~~ the upper bound of the *operational frequency tolerance band* to the upper bound of the *extreme frequency excursion tolerance limits* (including islanded conditions) for at least the transient frequency time, in respect of a *generating system* ~~including all operating generating units that~~:

(i) ~~is part of a *generating system* comprised of *generating units* with a combined *nameplate rating*~~ of 30 MW or more; ~~or~~and

(ii) that does not have a *protection system* to trip ~~the~~ a *generating unit* if the *frequency* exceeds a level agreed with *NEMMCO*.

[Note: The minimum access standard is illustrated in the following diagram. To the extent of any inconsistency between the diagram and paragraph (~~d~~c), paragraph (~~d~~c) prevails.]

Negotiated access standard

(de) A *negotiated access standard* can be accepted by the *Network Service Provider* provided that *NEMMCO* and the *Network Service Provider* agree that:

(1) the *negotiated access standard* is as close as practicable to the *automatic access standard* while respecting the need to protect the *plant* from damage, and taking into account *frequency* disturbances (including under 'island' conditions) that could be reasonably expected to occur in the *region* in which the *generating system* is located;

(2) the *frequency* would be unlikely to fall below the lower bound of the *operational frequency tolerance band* as a result of over-frequency tripping of *generating units;* and

(3) there would be no material adverse impact on quality of *supply* to other *Network Users* or on *inter-regional* or *intra-regional power transfer capability*.

(~~f~~e) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.3.

- In S5.2.5.3 (b) and (c), the wording "provided that the rate of change of *frequency* is between -4 Hz and 4 Hz per second for more than 0.25 seconds" does not achieve the intended purpose, which was to allow an exception to the requirement if the rate of change of frequency is outside of the indicated range for more than the indicated time. Alternative wording is proposed that will capture the intended meaning and includes the AEMC's elaboration of the range of frequency rates of change.
- In S5.2.5.3(b) and (c), change the lead in words from "including all operating *generating units*" to "and each of its *generating units*" to be completely clear that the requirement applies to each unit severally and not just the generating system. The term "operating" is not needed because the standard needs to be set for all units, regardless of whether operating or not, and the term *continuous uninterrupted operation* includes the concept of only considering units operating at the time of the disturbance. The access standards also need to refer to a disturbance during which frequency varies.
- The Tasmanian frequency operating standard allows for over-frequency generation shedding for islanded conditions when the frequency is in the range 50-53 Hz. Propose modifying the minimum access standard in line with this, to allow additional flexibility in this range for generating systems to trip in accordance with the over-frequency generation reduction provisions in S5.2.5.8.
- In S5.2.5.3(c) & (d), having "The *minimum access standard* is …" in two separate clauses might be interpreted as either one or the other constitutes the whole requirement. The intention was that both would apply. Propose that these be recombined in one clause, as per original drafting.
- In the paragraph formerly (d) now (c)(6) the clauses should be joined by an 'and' not an 'or'. The intention was to only require this part of the minimum access standard for large generating systems that didn't have an over-frequency generation tripping arrangement with NEMMCO.
- In paragraphs (b)(2) and (c)(6), the missing word "least" needs to be inserted.
- In S5.2.5.3(e), the diagram needs amending for 9 seconds to match change to wording amended by the AEMC in (c). The diagram also needs "(lower limit)" to be removed and the definition of "H" reinstated to refer to the new term rather than 47.5 Hz.
- In S5.2.5.3(e), we suggest additional words to emphasise the need for rate of change of frequency to be consistent with expected rates of change of frequency in the particular region in which the plant is to be connected. The operating conditions in Tasmania are quite different from those on the mainland.

- Clause S5.2.5.3(f) appears to be unnecessary as the negotiated access standard can't be lower than the minimum access standard. (Also paragraph (c) and (d) are not alternatives, but both part of the minimum access standard.)
- It is not clear whether the italicised terms for the bands in the frequency standard should be used here, as the definitions are slightly different from the glossary terms, and the AEMC drafting seems to be using non-italicised terms for local definitions.

S5.2.5.4 Generating system response to voltage disturbances

Automatic access standard

(a) The *automatic access standard* is each *generating system* ~~including all of its operating~~ and each of its *generating units* must be capable of *continuous uninterrupted operation* as a result of any *power system* disturbance during which the ~~occurrence~~ voltage at the *connection point* varies within the ranges of:

(1) over-voltages for the durations permitted under clause S5.1a.4;

(2) 90% to 110% of *normal voltage* continuously;

(3) 80% to 90% of *normal voltage* for a period of at least 10 seconds; and

(4) 70% to 80% of *normal voltage* for a period of at least 2 seconds.

Minimum access standard

(b) The *minimum access standard* is each *generating system* including all operating *generating units* must be capable of *continuous uninterrupted operation* as a result of any *power system* disturbance during which voltage~~s~~ at the *connection point* varies within the range of 90% to 110% of *normal voltage*, provided that the ratio of voltage to *frequency* (as measured at the *connection point* and expressed as percentage of *normal voltage* and a percentage of 50 Hz) does not exceed:

(1) 115% for more than two minutes; or

(2) 110% for more than 10 minutes.

Negotiated access standard

(c) In negotiating a *negotiated access standard*, each *generating system* and ~~including all of its operating~~each of its *generating units* must be capable of *continuous uninterrupted operation* for the ranges of voltages specified in the *automatic access standard* except where *NEMMCO* and the *Network Service Provider* agree that:

(1) the *negotiated access standard* is as close as practicable to the *automatic access standard* while respecting the need to protect the *plant* from damage;

(2) the *generating plant* that would be tripped, as a result of any voltage excursion within levels specified by the *automatic access standard* is not more than 100 MW or a greater limit based on what *NEMMCO* and the *Network Service Provider* both consider to be reasonable in the circumstances; and

(3) there would be no material adverse impact on the quality of *supply* to other *Network Users* or on *inter-regional* or *intra-regional power transfer capability*.

(d) In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.4, *NEMMCO* and the *Network Service Provider* must take into account, without limitation:

(1) the expected performance of existing *networks* and *network* developments that are *considered projects;*

(2) the expected performance of existing *generating plant* and *generation* projects that are *considered projects*, and

(3) any corresponding *performance standard* (or where no *performance standard* has been registered, the *access standard*) that allows *generating plant* to trip for voltage excursions in ranges specified under the *automatic access standards.*

(e) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.4.

General ~~access standard~~requirements

(f) The *access standard* must include any operational arrangements necessary to ensure the *generating system* ~~including all of its operating~~ and each of its *generating units* will meet its agreed performance levels under abnormal ~~network~~ *network* or *generating system* conditions.

- In S5.2.5.4(b) and (c), propose change to lead in words from "including all operating *generating units*" to "and each of its *generating units*" to be completely clear that the requirement applies to each unit severally and not just the generating system. The term "operating" is not needed because the standard needs to be set for all units, regardless of whether operating or not, and the term *continuous uninterrupted operation* includes the concept of operating units. The access standards also need to refer to a disturbance during which voltage varies.
- In paragraph (f), the word 'network' needs to be italicised, as the defined term is appropriate in this context.

S5.2.5.5 Generating system response to disturbances following contingency events

(a) In this clause S5.2.5.5~~:~~

~~(1) a fault includes without limitation:~~

(i) a fault~~*short circuit fault*~~ of the relevant type having a metallic conducting path; and

(ii) a fault of the relevant type resulting from reclosure onto a fault by the operation of *automatic reclose equipment*~~; and~~.

~~(2) **'fault type'** means one or more of the following:~~

~~(i) a three-phase fault;~~

~~(ii) a two phase to ground fault;~~

~~(iii) a phase to phase fault; and~~

~~(iv) a phase to ground fault.~~

Automatic access standard

(b) The *automatic access standard* is:

(1) Eeach *generating system* and each of its *generating units* must remain in *continuous uninterrupted operation* as a result of any *power system* disturbance caused by an event that is:

(i) a *credible contingency event* ~~credible contingency event~~ other than a fault;

(ii) a three phase fault in a *transmission system* cleared by all relevant primary *protection systems;*

(iii) a two phase to ground, phase to phase or phase to ground fault in a *transmission system* cleared in:

(A) the longest time expected to be taken for a relevant *breaker fail protection system* to clear the fault; or

(B) if a *protection system* referred to in subparagraph (A) is not installed, the greater of the time specified in column 4 of Table S5.1a.2 (or if none is specified, 430 milliseconds) and the longest time expected to be taken for all relevant primary *protection systems* to clear the fault; ~~and~~or

(iv) a three phase, two phase to ground, phase to phase or phase to ground fault in a *distribution network* cleared in:

(A) the longest time expected to be taken for the *breaker fail protection system* to clear the fault; or

(B) if a *protection system* referred to in subparagraph (A) is not installed, the greater of 430 milliseconds and the longest time expected to be taken for all relevant primary *protection systems* to clear the fault,

provided that the event is not one that would disconnect the *generating system* or *generating unit* from the *power system* by removing *network elements* from service.~~; and~~

(2) Ssubject to any changed *power system* conditions or energy source availability beyond the *Generator's* reasonable control, each *generating system* and each of its *generating units*, in respect of the ~~fault~~ types of fault described in subparagraphs (1)(ii) to (iv), must deliver to the *network:*

(i) to assist the maintenance of *power system* voltages during the application of the fault, capacitive reactive current of at least the greater of its pre-disturbance reactive current and 4% of the maximum continuous current of the *generating system* including all operating *generating units* (in the absence of a disturbance) for each 1% reduction (from its pre-fault level) of *connection point* voltage during the fault; ~~and~~

(ii) after *disconnection* of the faulted element, *reactive power*

sufficient to ensure that the *connection point* voltage is within the range for *continuous uninterrupted operation* under clause S5.2.5.4; and

(iii) from 100 milliseconds after *disconnection* of the faulted element, *active power* of at least 95% of the level existing just prior to the fault.

Minimum access standard

(c) The *minimum access standard* is:

(1) Eeach *generating system* and each of its *generating units* must remain in *continuous uninterrupted operation* as a result of theany *power system* disturbance caused by an event that is:

(i) a *credible contingency event* credible contingency event other than a fault;

(ii) a single phase to ground, phase to phase or two phase to ground fault in a *transmission system* cleared in the longest time expected to be taken for all relevant primary *protection systems* to clear the fault unless *NEMMCO* and the *Network Service Provider* agree that:

(A) the total reduction of *generation* in the *power system* due to that fault would not exceed 100 MW;

(B) there is unlikely to be an adverse impact on quality of *supply*supply to other *Network Users*; and

(C) there is unlikely to be a material adverse impact on *inter-regional* or *intra-regional power transfer capability*,; or

(iii) a single phase to ground, phase to phase or two phase to ground fault in a *distribution network*, cleared in the longest time expected to be taken for all relevant primary *protection systems* to clear the fault, unless *NEMMCO* and the *Network Service Provid*er agree that:

(A) the total reduction of *generation* in the *power system* due to that fault would not exceed 100 MW;

(B) there is unlikely to be an adverse impact on quality of *supply* to other *Network Users;* and

(C) there is unlikely to be a material adverse impact on *inter-regional* or *intra-regional power transfer capability*,

provided that the event is not one that would disconnect the *generating unit* or *generating system* from the *power system* by removing *network elements* from service.; and

(2) Ssubject to any changed *power system* conditions or energy source availability beyond the *Generator's* reasonable control after *disconnection* of the faulted *element*, each *generating system* must, in respect of the fault types of fault described in

subparagraphs (1)(ii) and (iii), deliver to the *network, active power* and leading or lagging *reactive power* sufficient to ensure that the *connection point* voltage is within the range for *continuous uninterrupted operation* agreed under clause S5.2.5.4.

Negotiated access standard

(d) In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.5, the *Network Service Provider* and *NEMMCO* must take into account, without limitation:

(1) the expected performance of:

(i) existing *networks* and *network* developments that are *considered projects;*

(ii) existing *generating plant* and *generation* projects that are *considered projects;* and

(iii) *control systems* and *protection systems*, including auxiliary systems and *automatic reclose equipment;* and

(2) the expected range of *power system* operating conditions.

(e) A proposed *negotiated access standard* may be accepted if the *connection* of the *plant* at the proposed access level would not cause other generating *plant* or loads to trip as a result of an event, when they would otherwise not have tripped for the same event.

(f) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.5.

General requirements

(g) The *access standard* must include any operational arrangements to ensure the *generating system* including all operating *generating units* will meet its agreed performance levels under abnormal *network* or *generating system* conditions.

(h) The *access standard* must fully document all locations and types of fault and conditions for which the *generating system* will not be capable of remaining in *continuous uninterrupted operation* under paragraphs (c)(ii) and (c)(iii).

Suggestions:

- removing definition of ‘fault type’ in paragraph (a)(2) because the faults covered in each case are described fully in the relevant clause. There is a glossary definition of fault type, which is similar to, but not the same as, usage here. To avoid confusion we suggest changing ‘fault types’ to ‘types of fault’ throughout this clause. Also, use of the defined term “short circuit fault” excludes faults within equipment, which was not intentional, so the key requirement of a metallic conducting path needs to be stated explicitly to include this worst case condition.

Appendix A – proposed changes to schedules

- in S5.2.5.5(b) and (c), changing the lead in words from 'including all operating *generating units*' to 'and each of its *generating units*' to be completely clear that the requirement applies to each unit severally and not just the generating system. The term 'operating' is not needed because the standard needs to be set for all units, regardless of whether operating or not, and the term *continuous uninterrupted operation* includes the concept of operating units.
- adding of ' or generating system' to paragraphs (b) and (c) for consistency with the change described above.
- linking subparagraphs in paragraphs (b)(1) and (c)(1) with "or" rather than "and" so that the event only needs to satisfy one of the specified conditions, not all, as intended.
- italicising 'supply' in a couple of locations.
- making other minor changes to punctuation.

The AEMC has inserted the conditions for which a small generating system may avoid a requirement remaining in continuous uninterrupted operation for a transmission fault. In its proposed drafting NEMMCO had previously allowed this concession only for a distribution fault. While we understand that the AEMC has inserted this additional clause for reasons of consistency between distribution and transmission faults, we have some concerns about whether this will result in greater efficiency for the NEM in the longer term. In the case of a distribution system fault, transmission connected generation is rarely affected, so plant that is unable to withstand a distribution fault would typically be transmission connected. By the nature of distribution systems the scope for more than 100 MW of plant to be connected in any one area is limited, so there is low potential for the concession on distribution fault-ride-through to affect adversely significant amounts of other plant in the future. The case is different for a transmission-connected generating system that cannot ride through a transmission fault. In this case there is much higher potential for other generation to be connected electrically close to the plant for which a concession has been allowed. The impact will generally be to increase the connection cost of connections subsequent to the one for which the concession was allowed. This introduces another type of inter-generational inequity into the Rules. Suggest that the AEMC consider whether allowing concessions on transmission fault ride-through really constitutes an overall benefit to the NEM.

In order to manage cases where a generating system cannot ride through distribution or transmission faults the connection application needs to document the particular fault locations and types of faults (and other conditions, such as prior outage conditions) under which this is permitted to occur. It would be quite unreasonable, for example for a plant in South Australia to be allowed to trip for a fault in Queensland.

Modify (b)(1)(i) and (c)(1)(i) to exclude faults, as these are covered in, and limited by, the subsequent sub-clauses. This is required regardless of the decision on concessions on ride-through of transmission faults, because there is an inconsistency between Schedule 5.1 and clause 4.2.3(b) on whether a three phase fault in a transmission system is to be included as a credible contingency event. In this clause it was intended to include a three phase fault in the automatic access standard and exclude it in the minimum access standard.

In paragraph (c)(2) add the words 'leading or lagging' to clarify that the plant may need to either generate or absorb reactive power in order to ensure that it can remain in continuous uninterrupted operation following clearance of a fault.

S5.2.5.6 Quality of electricity generated and continuous uninterrupted operation

Minimum access standard

~~Each generating *plant* must be capable of *continuous uninterrupted operation* at distortion levels up to the maximum~~The *minimum access standard* is a *generating system*, including each of its *generating units* and its reactive *plant*, must not disconnect from the *power system* as a result of the voltage fluctuation, harmonic voltage distortion ~~and~~or voltage unbalance conditions at the *connection point* varying within the levels outlined in S5.1a.5, S5.1a.6 and S5.1a.7 of the *system standards.*

The use of the term "continuous uninterrupted operation" does not apply in this case because the conditions might arise gradually and not because of a disturbance. The need for reactive plant to remain connected also needs to be recognised, and the connection point needs to be referenced as the point of reference.

Clause references need to be corrected. (S5.1 a5 should be S5.1a.5 etc).

This clause, suggested by the AEMC, is not in the standard automatic/minimum access standard form, and there is no basis for negotiation. We suggest that the requirement at least be expressed as a minimum access standard. Alternatively it could be the automatic access standard and a lower standard set as the minimum for situations where the quality of supply is much better than the system standards.

S5.2.5.7 Partial load rejection

(a) For the purposes of this clause S5.2.5.7, **'minimum load'** means ~~the *generating unit* output level measured in sent out megawatts (MW)~~minimum *sent out generation* for continuous stable operation.

Automatic access standard

(b) The *automatic access standard* is each *generating* ~~*unit*~~ *system* and each of its *generating units* must be capable of *continuous uninterrupted operation* during and following a ~~*loading level* reduction directly imposed from the *power system*~~*power system* load reduction ~~in less than 10~~

~~seconds from a fully or partially loaded condition provided that the *loading level* reduction is less than 30 percent of the *generating unit's nameplate rating* and the~~ of 30 percent from its predisturbance level or equivalent impact from separation of part of the *power system*, provided that the *generating unit's loading level* remains above minimum load.

Minimum access standard

(c) The *minimum access standard* is each *generating system* and each of its *generating units* must be capable of *continuous uninterrupted operation* during and following a ~~*loading level* reduction directly imposed from the *power system* in less than 10 seconds from a fully or partially loaded condition provided that the *load* reduction is less than~~*power system* load reduction of 5 percent or equivalent impact from separation of part of the *power system*, ~~of the *generating unit's nameplate rating* and the~~ provided that the *generating unit's loading level* remains above minimum load.

Negotiated access standard

(d) If, in accordance with clause 5.3.4A ~~of the *Rules*~~, the *Generator* and the *Network Service Provider* determine a *negotiated access standard* is to apply, the *Network Service Provider* must consult *NEMMCO* to ensure that the *negotiated access standard* does not materially adversely affect *system security*.

(e) The *negotiated access standard* must be set at a level that would not prevent *continuous uninterrupted operation* for any *credible contingency event*, nor allow the *plant* to trip for loss of any *interconnector*, taking into account existing *network* and *considered projects*.

General ~~access standard~~requirements

(f) The actual partial load rejection performance must be recorded in the ~~*connection agreement*~~*access standards*.

(g) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.7.

- This clause has been reinstated by the AEMC in its original form, which doesn't work well for asynchronous plant, as they don't respond to loading level reductions imposed from the power system. We suggest alternative wording to make it more applicable to all types of plant.
- In paragraph (e) (now (f) following proposed drafting changes) '*access standard*' should be substituted for '*connection agreement*' to emphasise that actual capability of the plant should form part of the performance standards (not something lower).
- A new definition for 'minimum load' has been suggested as the definition of minimum load is not correct as it currently exists in the Rules.
- A basis for negotiation for this clause is proposed in paragraph (e).
- Consistent with the current Rules, NEMMCO should advise on this matter as if many generating systems trip on loss of a load or an interconnector trip this could lead to a major under-frequency event.