Australian Energy Market Commission

RULE CHANGE

CONSULTATION PAPER

National Electricity Amendment (Definition of Temporary Over-Voltage Limits) Rule 2011

Rule Proponent(s)
Hydro Tasmania

30 June 2011

Inquiries

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

E: aemc@aemc.gov.au
T: (02) 8296 7800
F: (02) 8296 7899

Reference: ERC0120

Citation

AEMC 2011, Definition of Temporary Over-Voltage Limits, Consultation Paper, 30 June 2011, Sydney

About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the MCE.

This work is copyright. The Copyright Act 1968 permits fair dealing for study, research, news reporting, criticism and review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgement of the source is included.

Contents

1 Introduction

On 5 May 2011, Hydro Tasmania (Proponent) submitted a Rule change request to the Australian Energy Market Commission (AEMC or Commission) in relation to the definition of the limit allowed for temporary power frequency voltages at a connection point (Rule Change Request).

This Consultation Paper has been prepared by the staff of the AEMC to facilitate public consultation on the Rule Change Request and does not represent the views of the AEMC or any individual Commissioner of the AEMC.

This paper:

- sets out a summary of, and a background to, the Definition of Temporary Over-Voltage Limits Rule change proposed by the Proponent;
- identifies a number of questions and issues to facilitate the consultation on this Rule change request; and
- outlines the process for making submissions.

2 Background

2.1 Clause S5.1a.4 - Power frequency voltage

Schedule S5.1a of the National Electricity Rules (NER or Rules) sets out the system standards that are, amongst other things, necessary or desirable for the safe and reliable operation of the facilities of Registered Participants and operation of equipment.[1] This Rule Change Request relates to power frequency voltages, one of the system standards. From the power frequency voltage determined in accordance with the Rules, participants can ascertain the minimum required design ratings of high voltage equipment.

Voltage surges, commonly referred to as temporary over-voltages (TOV), may be brief in duration but can be extreme in magnitude. For example, they may cause damage to high-voltage equipment and could compromise the security of the national electricity system.

Clause S5.1a.4 of the Rules outlines the limits on over-voltage level and duration that are imposed as a consequence of a *credible contingency event*.[2] The Rules refer to rises in the voltage of supply rather than over-voltage levels.

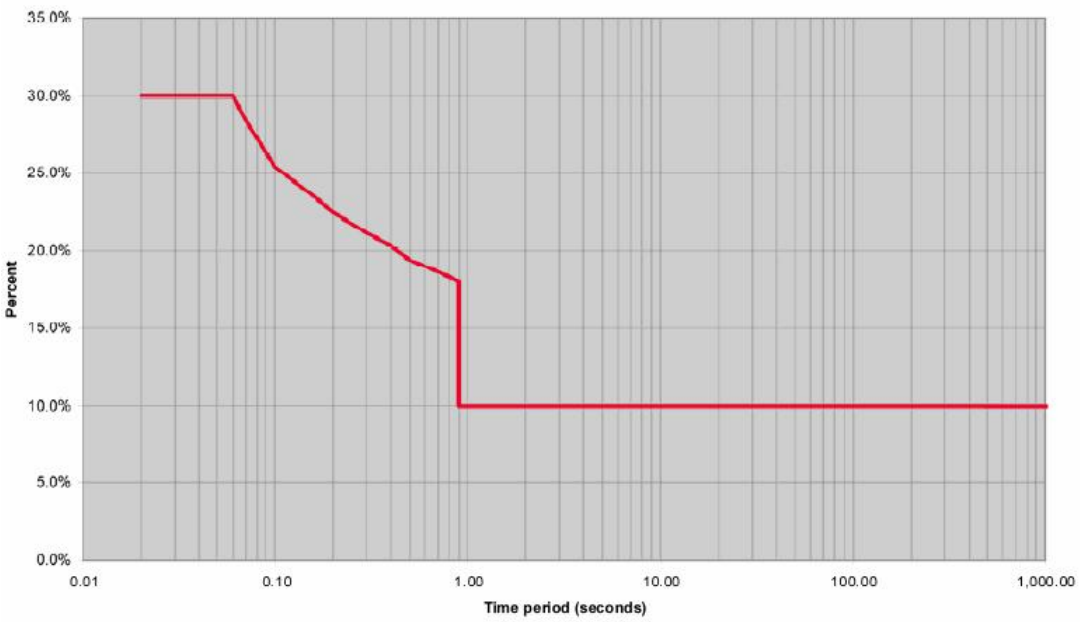
> "As a consequence of a *credible contingency event*, the *voltage* of *supply* at a *connection point* should not rise above its *normal voltage* by more than a given percentage of *normal voltage* for longer than the corresponding period shown in Figure S5.1a.1 for that percentage."

Figure S5.1a.1 (reproduced below in Figure 2.1) outlines the over-voltage limits with reference to the *normal voltage* and sets out the given percentages. These percentages are considered to be the limit of safe operating voltage for all equipment. The limits allow for voltage surges up to 30% above the *normal voltage* level. Voltage surges of this magnitude are only allowed for a brief period due to the extensive damage that can be caused to high-voltage equipment, particularly insulation coordination. The TOV limit represents the range of safe operating voltage levels up to 0.9 seconds. For longer durations, the voltage limit declines to a continuous level of 10% above the *normal voltage*. The continuous limit represents the maximum safe operating voltage beyond 0.9 seconds.

1 Clause S5.1a.1 of the NER

2 A credible contingency event is an event that has a reasonable possibility of occurring and for which AEMO takes into consideration in power system security planning. Examples of a credible contingency event include the unexpected disconnection or unplanned reduction in capacity of one operating generating unit, or the unexpected disconnection of one major item of transmission plant. This is in contrast to a non-credible contingency event which has a low probability of occurring and would be prohibitively arduous for AEMO to take into consideration for the purposes of power system security planning.

Figure 2.1 Percentage Over-Voltage - Figure S5.1a.1 from the Rules



The principal means by which Network Service Providers (NSPs) can regulate the probability of voltage surges occurring is through the provision of constraint advice to the Australian Energy Market Operator (AEMO) to limit the power flow on transmission lines at connection points. Under low fault level conditions, a disconnection of the line with high power flow can cause a sudden surge in voltage.

Under the definition of *normal voltage* in Chapter 10 of the Rules, the NSP can change the level of the *normal voltage* at a connection point.[3] However, such a change must be accompanied by approval from AEMO.

Through the operation of clause S5.1a.4 in its current form, an increase in the *normal voltage* would increase the level of the allowable over-voltage. With a higher limit on over-voltages, the market operator would be able to increase power flow on transmission lines without the risk of exceeding limits.

The concept of *normal voltage* has further application within the Rules beyond clause S5.1a.4. Clause S5.2.5.4 uses the concept of *normal voltage* in consideration of high-voltage equipment design ratings in connection agreements between market participants and NSPs. Under clause S5.2.5.4, the minimum access standard states that "generating units must be capable of continuous uninterrupted operation where a power system disturbance causes the *voltage* at the *connection point* to vary in the range of 90% to 110% of *normal voltage*". If the level of the *normal voltage* is increased by the NSP then new connecting market participants must ensure that new high-voltage equipment is designed to meet this requirement under the connection agreement.

3 Chapter 10 of the Rules defines normal voltage as - "In respect of a connection point, its nominal voltage or such other voltage up to 10% higher or lower than the nominal voltage, as approved by AEMO, for that connection point at the request of the Network Service Provider who provides connection to the power system."

2.2 History of Clause S5.1a.4 as applied to Basslink

While clause S5.1a.4 applies to the whole market, the Proponent is principally concerned with the impact of the Rule on the Basslink interconnector. Under low fault level conditions in Tasmania, Basslink interconnector flow may be constrained in order to reduce the risk of voltage exceeding the TOV limits.

AEMC staff understand that:

- In undertaking system studies, Transend identified that there was a credible risk that the Georgetown 220 kV voltage could breach TOV limits for certain contingency events. Under low fault level conditions in Tasmania, fairly substantial TOVs could be experienced that were associated with Basslink tripping under high export conditions. The tripping of Basslink results in an excess of reactive power in the system, which sees a rapid rise in voltage resulting in a temporary over-voltage.

- In response, Transend provided constraint advice to the then National Electricity Market Management Company (NEMMCO) which had the potential to limit Basslink export under some network conditions. To alleviate the potential for network constraints on Basslink, Transend recommended to NEMMCO to increase the normal voltage at the George Town 220 kV busbar from 220 kV to 231 kV. This change occurred in November 2006, approximately 1 year after the commissioning of Basslink. The increase in the *normal voltage* level allowed for less restricted flow on Basslink and the TOV constraint for Basslink export conditions was subsequently withdrawn on advice from Transend.

Clause S5.1a.4 of the Rules imposes limits on TOV with reference to the *normal voltage* as shown in Figure 2.1. The objective of increasing the normal voltage from 220 kV to 231 kV was therefore to increase the allowable TOV limit thereby reducing the potential for network constraints on Basslink.

In accordance with the definition of *normal voltage* in Chapter 10 of the Rules, the normal voltage at George Town 220 kV can therefore be any value in the range ±10% of nominal voltage, or 198 kV to 242 kV. Therefore, increasing the defined *normal voltage* at George Town to 231 kV was sufficient to make the constraint equations redundant and at the same time did not constitute a breach of the Rules.

The Rule change "Technical Standards for Wind Generation and Other Generator Connections", submitted by NEMMCO and completed by the AEMC in March 2007, extended the use of the *normal voltage* concept into *Schedule S5.2 Conditions for the Connection of Generators*.[4]

AEMC staff understand that:

[4] Prior to this, all references to *normal voltage* were contained in *Schedule S5.1a System Standards* and *Schedule S5.1 Network Performance to be Provided or Coordinated by Network Service Providers.*

- This amendment to the Rules was made after Transend had increased the *normal voltage* at George Town from 220 kV to 231 kV. The nomination of 231 kV *normal voltage* at George Town was effective in removing a potential constraint on Basslink, but with the revision of the Rules, it meant that participants who wished to connect to George Town at 220 kV faced onerous obligations. Participants had to design and build their plant capable of continuous operation at 254 kV (231 kV + 10%), despite the fact that it is not physically possible for the voltage at George Town to rise to this level. This is true of both connecting generation and loads.

- Transend determined that the requirement to limit potential constraints on the Basslink interconnector did not outweigh the increased burden on equipment for new and existing connections. The *normal voltage* at George Town was subsequently rerated back down to 220 kV in October 2009. In addition, it was determined by Transend at the time that the presence of the recently commissioned Aurora Energy Tamar Valley (AETV) power station, whilst in operation, provided a large fault level contribution and acted as a localised "sink" for reactive power thereby limiting the likelihood of over-voltages at the Georgetown 220 kV bus. However, as there was still the possibility of a technical breach of the TOV limits in the Rules, Transend was again obliged to provide AEMO with constraint advice to limit Basslink export to Victoria under some system conditions.

3 Details of the Rule Change Request

In the Rule Change Request, the Proponent is seeking to amend one of the system standards set out in clause S5.1a of the Rules, being the power frequency voltage requirements as a consequence of a *credible contingency event* in clause S5.1a.4. Under the proposal, the Proponent wishes to change the definition of the limit allowed for temporary power frequency voltages at a connection point as a consequence of a *credible contingency event*.

Specifically, the Proponent proposes to:

- separate the regulation of TOV limits from the level of *normal voltage*; and
- set a reference voltage from which TOV limits can be determined while maintaining *normal voltage* at its current level.

The Proponent has proposed new drafting for clause S5.1a.4 of the Rules to create a reference voltage that is independent of *normal voltage* but does not exceed the upper limit previously permitted by the Rule. Looking at the clause in its entirety, based on the Rule Change Request, clause S5.1a.4 would be amended as follows:

> "Except as a consequence of a *contingency event*, the *voltage* of *supply* at a *connection point* should not vary by more than 10 percent above or below its *normal voltage*, provided that the *reactive power* flow and the *power factor* at the *connection point* is within the corresponding limits set out in the *connection agreement*.
>
> As a consequence of a *credible contingency event*, the *voltage* of *supply* at a *connection point* should not rise above ~~its *normal voltage*~~ *the TOV reference level* by more than a given percentage of ~~*normal voltage*~~ *the TOV reference level* for longer than the period shown in Figure S5.1a.1 for that percentage.
>
> As a consequence of a *contingency event*, the *voltage* of *supply* at a *connection point* could fall to zero for any period. "

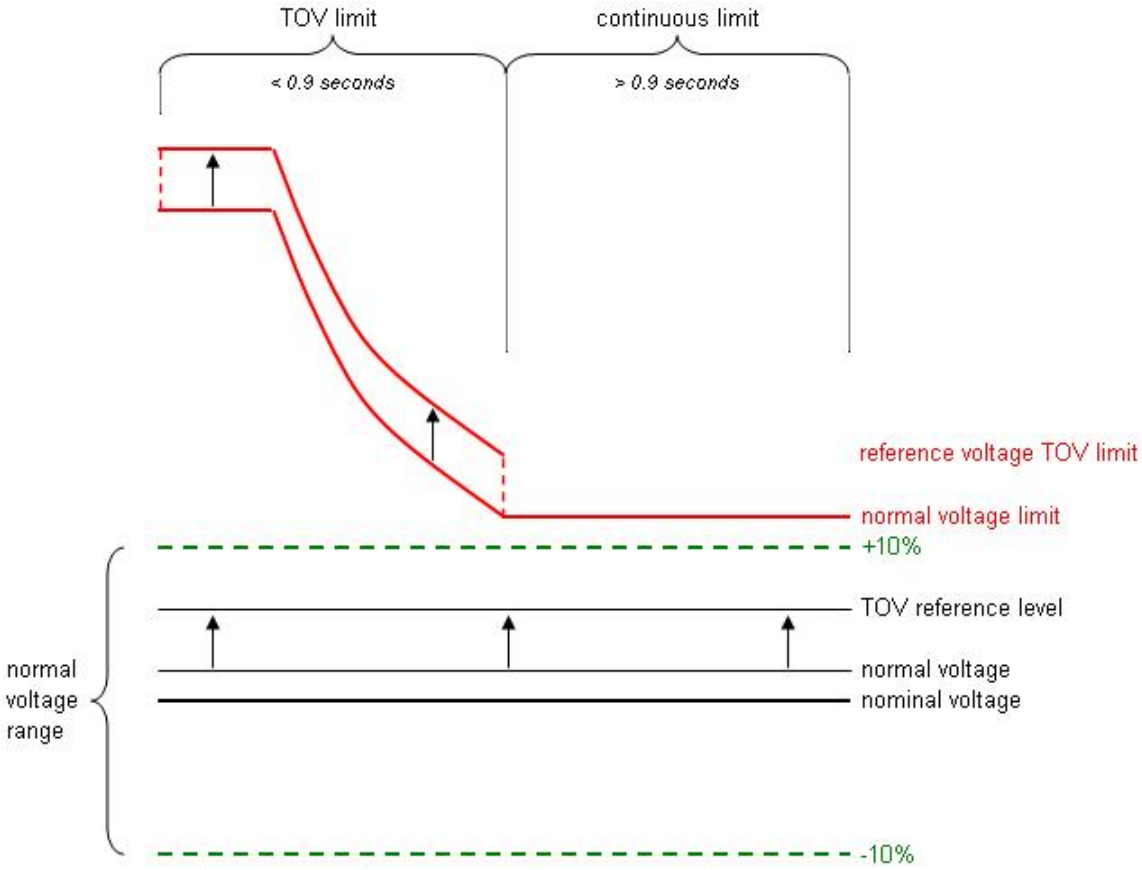
To facilitate this change the following definition of TOV reference level is proposed to be added to Chapter 10: Glossary of the Rules.

TOV reference level: The reference level determined by the NSP and approved by AEMO for the purpose of setting temporary over-voltage limits. The default reference level shall be *normal voltage*.

The intended impact of the proposed Rule change on TOV limits is illustrated in Figure 3.1. The *normal voltage* and the *TOV reference level* have been arbitrarily positioned above the *nominal voltage* with the latter higher than the former. Both the *normal voltage* and the *TOV reference level* are contained within ±10% of the *nominal voltage*, represented by the green dashed lines. The distance between the *normal voltage* and the

TOV reference level is equal to the distance between their respective TOV limits, represented by the red lines.

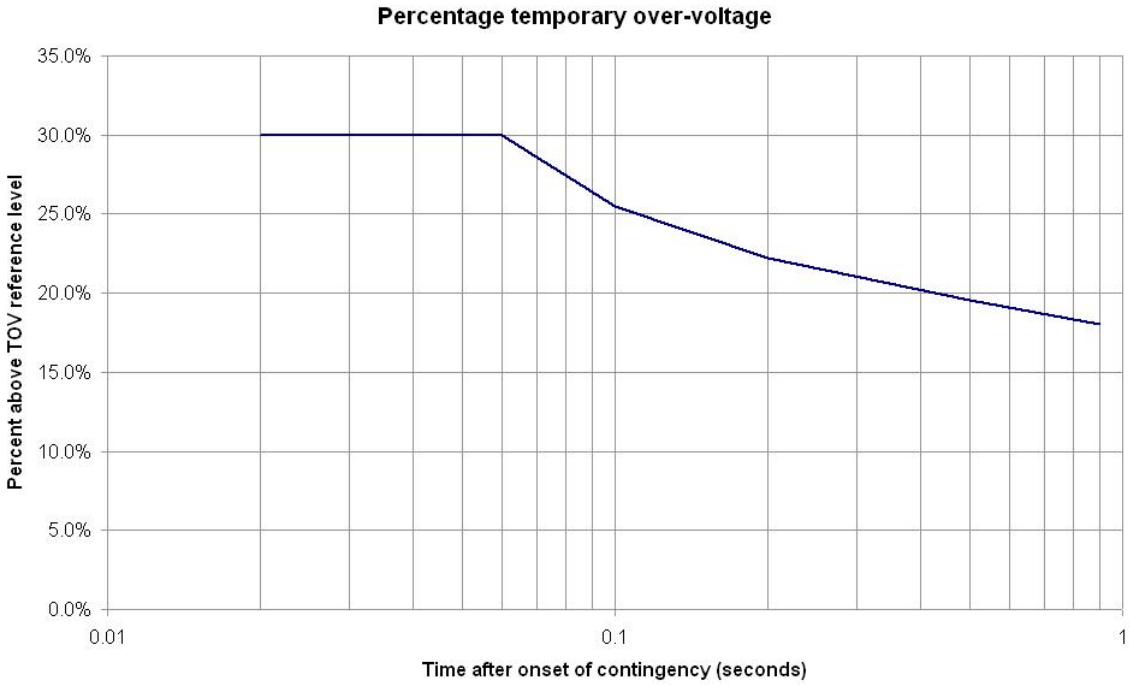
Figure 3.1 Impact of Rule change on TOV limits



The intention of the proposed Rule is to allow for an increase in the TOV limits under clause S5.1a.4 without increasing the continuous voltage limit requirements under clause S5.2.5.4 (where the concept of *normal voltage* is also relevant). This would avoid the need for market participants to invest in more expensive high-voltage equipment with higher capability design ratings.

Clause S5.2.5.4 places obligations on connecting participants to design and build their plant capable of continuous operation at 110% of the level of the *normal voltage*. As such, the Proponent proposes to modify figure S5.1a.1 to remove the continuous limit so as to only represent the TOV limit as a function of the *TOV reference level*. The Proponent proposes to modify figure S5.1a.1 from the Rules (reproduced below in Figure 3.2).

Figure 3.2 Proposed modification to figure S5.1a.1 from the Rules



While the proposed Rule would apply to the whole market, the Proponent is principally concerned with the impact of the Rule change on the Basslink interconnector. The impact of increasing the *normal voltage* on Basslink, and consequently the TOV limit, is that export could be increased on the interconnector at certain times of low fault level in Tasmania.

In its Rule Change Request the Proponent provides its rationale for the Rule change. A number of key points raised by the Proponent are summarised as follows:

- In the application of the Rule change to Basslink as proposed:
  - It is considered that linking the TOV limits to a new set reference voltage, rather than the variable *normal voltage*, will promote more efficient trading between Victoria and Tasmania by reducing the incidence of binding of the Basslink interconnector;
  - The previous reference of 231 kV from a technical (system security) perspective was quite acceptable without any adverse system impact.
- The proposed Rule allows for, but does not oblige, any changes to other connection points in the National Electricity Market (NEM) where the current limits are considered appropriate. In these cases the reference voltage will continue to be equal to *normal voltage* as per the current arrangements.

The Rule Change Request includes a proposed Rule, which is provided as Appendix A to this Consultation Paper.

4 Assessment Framework

The Commission's assessment of this Rule Change Request must consider whether the proposed Rule promotes the National Electricity Objective (NEO) as set out under section 7 of the National Electricity Law (NEL) as follows:

> "The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to:
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system."

This includes an assessment of how the proposed Rule could maximise the capability of the national power system within the objective of maintaining system security.

In the application of the Rule change to Basslink as proposed, the Proponent considers that the proposed Rule will, or is likely to, contribute to the achievement of the NEO through the promotion of efficient trading between NEM regions, by reducing the incidence of premature binding of the Basslink interconnector (and price separation between Tasmania and Victoria). The anticipated higher levels of unconstrained export on Basslink should translate to improved spot market and generation sector efficiency, which are desirable outcomes. A further contribution to the NEO could be an improvement in reliability of supply to Victoria.

By contrast, there are some aspects of the proposed Rule that may impact negatively on some participants and these will be considered as part of the assessment of the Rule Change Request.

First, major energy users and generators may need to upgrade their equipment in order to meet the physical demands of an increase in TOV limits. This aspect will apply at any connection point in the NEM where the TOV limits are increased and is likely to be particularly true for new connecting participants who have not previously operated in an environment where the *normal voltage* is higher than the current rating. In the application of the Rule change to Basslink as proposed, this is likely to apply to participants who connected since October 2009 when the *normal voltage* at the George Town busbar was rated back down to the current rating of 220 kV. An increase in costs of equipment for new network connections could increase overall costs of construction and maintenance and thereby limit the efficiency of investment.

Secondly, the majority of equipment connected to the network has automatic protection systems that disconnect from the power system when the voltage exceeds a certain threshold. A generator that disconnects from the network is likely to exacerbate a power system contingency by forcing the voltage even higher. In such a situation, there is the potential for cascading network impacts. An increase in voltage limits

above design ratings could therefore potentially compromise the safety and security of the national electricity system.

5 Issues for Consultation

Taking into consideration the assessment framework, we have identified a number of issues for consultation that appear to be relevant to this Rule Change Request. They are principally concerned with how the proposed Rule may lead to potential physical network impacts and the ability of the NSP and the market operator to adjust the level of the TOV limits.

These issues outlined below are provided for guidance. Stakeholders are encouraged to comment on these issues as well as any other aspect of the Rule Change Request or this paper including the proposed framework.

While the issues outlined below apply to the connection point at George Town, they may equally apply, with the approval of AEMO, to other connection points in the NEM where the TOV limits are increased by the NSP as a consequence of the Rule change.

5.1 Physical network impacts

Under the Rule change proposal, the proposed TOV reference voltage will replace the *normal voltage* with the same ±10% of nominal voltage restrictions applied. This will only increase the voltage limits for periods less than 0.9 seconds in duration and will have no effect on the continuous limits. The intention will be to set the reference voltage at a level above the existing *normal voltage* in order to increase the TOV limits.

5.1.1 Exposure of equipment to voltages above design ratings

An increase in the TOV limits may pose a risk to equipment connected to the network arising from an exposure to voltage levels above design ratings. Contingency events under low fault level conditions are more likely to lead to large increases in voltage over very brief periods. Under these circumstances, significant damage to high-voltage equipment, particularly insulation coordination, is more likely to occur if voltage exceeds the 30% TOV limit outlined in Figure S5.1a.1.

The Proponent has outlined a number of factors where the proposed Rule may act to limit damage to high-voltage equipment as follows:

- Capping the maximum TOV at a magnitude corresponding to a reference voltage of 10% of nominal voltage;
- Providing flexibility in application of the Rule to choose a pre-fault voltage (the reference voltage) between nominal and 110% of nominal such that parameters used in the limit advice will guarantee TOVs being contained below the capped maximum; and
- Separating TOV from *normal voltage*, thereby ensuring that the reference voltage chosen by the NSP is appropriate for the study case in question.

Question 1 Is there a risk of damage to high-voltage equipment?

1. An increase in the TOV limits has the potential to adversely affect equipment owned by major energy users and generators who are connected to the high voltage network. Is there a significant risk of damage to high-voltage equipment that could arise by increasing the TOV limits by up to 10% above existing levels?

2. Contingency events under low fault level conditions are more likely to lead to large increases in voltage over very brief periods. Given the extreme but brief nature of the voltage increases, is there likely to be specific important equipment that is particularly vulnerable?

5.1.2 Increased costs of network connection

There is a possibility of increased costs of connection to the network due to the potentially more stringent capability requirements of high-voltage equipment. While it is not proposed to be a requirement of the Rules, major energy users and generators may feel the need to upgrade their equipment in order to meet the physical demands of an increase in TOV limits.

In respect of Tasmania, the George Town busbar was previously operated at a *normal voltage* of 231 kV for a period of approximately 3 years. The majority of existing participants therefore have equipment that has already been tested under higher *normal voltage* conditions with minimal problems. However, higher equipment costs may be particularly true for new connecting participants. An increase in costs of equipment for new network connections could increase overall costs of construction and maintenance.

Question 2 Are there increased costs of network connection?

1. An increase in the TOV limits would allow for higher voltage disturbances to be permitted within the Rules. What would be the costs associated with upgrading equipment or purchasing new equipment to meet higher voltage capability requirements? Is it possible to quantify these costs?

2. In the Tasmanian case, new connecting participants have not previously operated in an environment where the *normal voltage* was higher than the current rating of 220 kV. Is there likely to be a significant difference between additional costs imposed on existing participants compared to new connecting participants?

5.1.3 Impact of high-voltage protections on system security

An increase in TOV limits may pose a risk to system security arising from self-protection mechanisms on equipment connected to the network. High voltage network equipment has automatic protection systems that disconnect from the power system when the voltage exceeds a certain threshold. A generator that disconnects from the network is likely to exacerbate a power system contingency by lowering the system fault level and forcing the voltage even higher. In such a situation, there is the potential for cascading network impacts. An increase in voltage limits above design ratings could therefore potentially compromise the safety and security of the national electricity system.

It is worth noting that the previous application of 231 kV as the *normal voltage* at the George Town busbar had no adverse impact from a technical system security perspective despite the fact that equipment had been originally designed around a *normal voltage* of 220 kV. In addition, any change in the reference voltage, and consequently the TOV limits, would require system security approval from the market operator prior to implementation.

Question 3 Is there an increased risk to system security?

1. High voltage network equipment has automatic relay switches that disconnect from the power system when the voltage exceeds a certain threshold. A generator that automatically disconnects from the network, due to the operation of its over-voltage protection, may cause further disconnections by forcing the system voltage to a higher level. Is there an increase in risk to system security arising from an increase in TOV limits?

2. Could an increase in the TOV limits by up to 10% above existing levels allow voltage surges to occur that could trigger self-protection mechanisms on high-voltage equipment?

5.2 NSP and AEMO adjustment of the level of the TOV limits

In its existing form, clause S5.1a.4 provides unambiguous guidelines on the limits allowed for temporary power frequency over-voltages at a connection point. Under the definition of *normal voltage* in Chapter 10 of the Rules, the NSP can adjust the level of the *normal voltage*, and consequently the TOV limits, with the approval of the market operator. However, any adjustment of the *normal voltage* would also increase continuous voltage limits and could lead to more onerous minimum access standards on connecting participants than what is currently required. Consequently, NSPs are

likely to be conservative in their approach to recommending any change to the *normal voltage*.

Under the proposed Rule there would be considerably more freedom for the NSP to adjust the TOV limits to alleviate potential constraints in the network without burdening market participants with more onerous minimum connection standards.

5.2.1 Determination of the reference voltage level

By replacing the use of *normal voltage* with a new reference voltage in clause S5.1a.4, the proposed Rule would allow the NSP to initiate a change to the TOV limits without changing the *normal voltage*. The TOV limits could therefore be allowed to change independently of the continuous voltage limits and therefore not impact the minimum connection standards of participants. This may make it easier for the NSP to recommend changes to TOV limits that could have a different set of commercial implications for each market participant. Rule 4.1.1(b) of the Rules and section 49(1)(e) of the NEL outline the requirements on AEMO to maintain and improve power system security. Any recommendations by the NSP to change the TOV limits would be limited by the requirement for AEMO approval. Technical performance standards under existing connection agreements would be taken into consideration.

Question 4 What are the risks of NSPs adjusting TOV limits?

1. The proposed Rule would allow the NSP to initiate a change to the TOV limits that will not impact the minimum connection standards of participants. Are there any risks associated with the NSP initiating a change to the TOV limits (with the approval of the market operator) at a connection point?

2. Any recommendation by the NSP to change the TOV limits will require approval from the market operator. Are there any changes to the approval process or specific factors that the market operator should take into consideration beyond the principles outlined generally in Rule 5.1 of the Rules? Does Rule 4.1.1(b), in combination with the respective connection agreements, provide sufficient protection to already connected participants?

5.2.2 Participant influence on NSP decisions

It is possible that some market participants may view the proposed Rule as an opportunity to seek to influence their NSP for a more commercially favourable outcome. The process that is currently employed to recommend a change to the level of the *normal voltage* will be the same as that for changing the reference voltage. While participant minimum connection standards will not be impacted by the change, there may be other impacts on costs of connection and system security.

However, it is recognised that there may be benefits to changing the TOV limits without impacting the minimum connection standards of participants. These benefits may be realised if market participants can highlight unnecessary voltage restrictions that are limiting power system transfer capabilities at other connection points in the national electricity system.

Question 5 What are the risks of participant influence on TOV limits?

1. Are there any risks or benefits that might arise from a greater level of market participant influence on TOV limits?

2. Are there any concerns regarding the process for the NSP to initiate a change to the reference voltage?

6 Lodging a Submission

The Commission has published a notice under section 95 of the NEL for this Rule change proposal inviting written submissions. Submissions are to be lodged online or by mail by 12 August 2011 in accordance with the following requirements.

Where practicable, submissions should be prepared in accordance with the Commission's Guidelines for making written submissions on Rule change requests.[5] The Commission publishes all submissions on its website subject to a claim of confidentiality.

All enquiries on this project should be addressed to Sebastien Henry on (02) 8296 7800.

6.1 Lodging a submission electronically

Electronic submissions must be lodged online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code ["ERC0120"]. The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Upon receipt of the electronic submission, the Commission will issue a confirmation email. If this confirmation email is not received within 3 business days, it is the submitter's responsibility to ensure the submission has been delivered successfully.

6.2 Lodging a submission by mail

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The submission should be sent by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Or by Fax to (02) 8296 7899.

The envelope must be clearly marked with the project reference code: ERC0120.

Except in circumstances where the submission has been received electronically, upon receipt of the hardcopy submission the Commission will issue a confirmation letter.

If this confirmation letter is not received within 3 business days, it is the submitter's responsibility to ensure successful delivery of the submission has occurred.

5 This guideline is available on the Commission's website.

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AETV	Aurora Energy Tamar Valley
Commission	See AEMC
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Energy Market Management Company
NEO	National Electricity Objective
NER or Rules	National Electricity Rules
NGA	National Grid Australia
NSPs	Network Service Providers
Proponent	Hydro Tasmania
TOV	temporary over-voltages

A Rule Change

The Proponent proposes that clause S5.1a.4 is modified to read:

> "Except as a consequence of a contingency event, the voltage of supply at a connection point should not vary by more than 10 percent above or below its normal voltage, provided that the reactive power flow and the power factor at the connection point is within the corresponding limits set out in the connection agreement.
>
> As a consequence of a credible contingency event, the voltage of supply at a connection point should not rise above ~~its normal voltage~~ *the TOV reference level* by more than a given percentage of ~~normal voltage~~ *the TOV reference level* for longer than the corresponding period shown in Figure S5.1a.1 for that percentage.
>
> As a consequence of a contingency event, the voltage of supply at a connection point could fall to zero for any period."

The Proponent proposes to add the following definition of TOV reference level to Chapter 10: Glossary:

TOV reference level: The reference level determined by the NSP and approved by AEMO for the purpose of setting temporary over-voltage limits. The default reference level shall be *normal voltage*.

The Proponent proposes to modify figure S5.1a.1 as: