

5 May 2011

Mr John Pierce  
Chairman,  
Australian Energy Market Commission  
PO Box A2449,  
Sydney South NSW 1235  
Submitted on-line via AEMC website

Dear Mr Pierce,

### **Proposed Amendment to Rule Relating to Temporary Over-Voltages**

Hydro Tasmania requests that the AEMC consider making a Rule change under section 91 of the National Electricity Law (NEL). Hydro Tasmania seeks to amend clause S5.1a.4 of the National Electricity Rules (NER) to change the definition of the limit allowed for temporary power frequency voltages at a connection point.

The proposed new wording creates a reference voltage to be applied to the temporary over-voltage period as illustrated in Figure S5.1a.1 (modified) that is independent of **normal voltage** but does not exceed the upper limit previously permitted by the rule nor changes the minimum access standards in terms of continuous overvoltage. The proposed change would remove the unintended consequences of varying normal voltage on TOV constraint equations. Specifically in Tasmania, this will reduce the incidence of premature constraints on 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. Consequently, the proposed change will deliver improved market and efficiency outcomes without posing increased system security risk.

A draft of the proposed Rule is shown in Attachment B. Attachment A includes a description of the proposed Rule, a statement of the issues concerning the existing Rules, and how the proposed Rule addresses those issues consistent with the National Electricity Objective.

Hydro Tasmania asks that the AEMC expedite the making of the proposed Rule change, under sections 95 and 96 of the NEL, on the grounds that it is non-controversial, subject to the absence of written objections.

Hydro Tasmania would be pleased if you could have these matters considered by the AEMC. For further details, please do not hesitate to contact Gerard Flack, Manager Spot Market & Operations, Trading on (03) 6230 5586.

Yours sincerely,

A handwritten signature in black ink that reads "D. Bowker." The signature is written in a cursive style and is underlined with a single horizontal stroke.

David Bowker  
Manager Market Regulation

## **Attachment A**

### **Hydro Tasmania's Proposed Changes to Clause S5.1a.4**

#### **1 Summary**

Hydro Tasmania seeks to amend clause S5.1a.4 and Figure S5.1a.1 of the National Electricity Rules (NER) to amend the definition of the allowable limit for temporary voltages at a connection point.

Hydro Tasmania asks that the AEMC expedite the making of the proposed Rule change, Under sections 95 and 96 of the NEL, on the grounds that it is non-controversial, subject to the receipt of written objections.

#### **2 Background**

High voltage plant and equipment is designed to withstand maximum operating conditions which includes temporary overvoltage (TOV). Chapter 5 of the NER (System Standards), in general, provides clear and unambiguous guidelines and limits for compliance by the TNSP's.

Rule S5.1a.4 was introduced into the NER at the time of commissioning the Victoria-Tasmania HVDC interconnector (Basslink). At that time, the need to manage TOV's in Tasmania associated with Basslink tripping under high export conditions was identified. Studies showed that, particularly under low fault level conditions in Tasmania, fairly substantial TOV's could be experienced and hence the need for inclusion in the NER System Standards. This led to development of Rule S5.1a.4 and Figure S5.1a.1, from a conservative interpretation of international practice as surveyed at the time.

#### **3 Issues with Current Rule**

##### **3.1 General Statement of Issues**

The key issue with the present definition of the TOV limit in Clause S5.1a.4 is that it is referenced to **normal voltage** that has a much broader application under the NER and is subject to change. It is further complicated by linking TOV and continuous overvoltage requirement in a single diagram that is all referenced to normal voltage. In practice there is no strong relationship between **normal voltage** and TOV, so should normal voltage be changed, the effect on TOV limits (with their current definition) is likely to be unintended.

##### **3.2 Current TOV Issues in Tasmania**

The **normal voltage** at George Town has been amended several times and each change has resulted in a need to change the limit advice with the TOV constraint equation becoming either more or less onerous (due to the variability of the reference voltage applied to Figure 5.1a.1).

When Basslink was commissioned in 2005 the George Town "normal" voltage was initially 220 kV (for approximately 1 year) and then changed to 231 kV (largely due to unnecessary binding of the TOV constraint equation). This state remained for approximately three and a half years<sup>1</sup>. More recently (October 2009) the "normal" voltage was changed back to 220 kV due to new connection agreement requirements (due to wider application of **normal voltage** in the NER). Since the most recent change

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<sup>1</sup> The operational oversight at that time was the responsibility of NEMMCO, the predecessor to AEMO.

in **normal voltage**, the TOV constraint equation (T<sup>^</sup>V\_NIL\_BL\_6) has bound for more than 160 dispatch intervals as compared to only occasional events over the previous 3.5 year period.

The physical power system conditions have not changed since the previous TOV constraint equation regime, only the value of normal voltage which the NER S5.1a.4 uses to reference the TOV envelope. The current TOV constraint equation now effectively has a 5% reduced envelope compared to the previous equation and this has resulted in the escalation of binding conditions.

The impact of the binding TOV constraint equation is that Basslink export could now be limited to between 504 to 531MW, depending on George Town busbar fault level and voltage. The previous constraint equation based upon a 5% greater reference voltage would have permitted full Basslink export under the same generation dispatch and system voltage conditions.

In reality it is only the existing NER wording, which links the **normal voltage** to both temporary and continuous overvoltage, which has created a more restrictive limit. The previous reference of 231kV from a technical (system security) perspective was quite acceptable without any adverse system or connected equipment impact. This proposal seeks to address this anomaly.

### 3.3 Description of rule change

It is proposed that Clause S5.1a.4 be 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 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;

#### TOV reference level

The reference level determined by the TNSP and approved by AEMO for the purpose of setting temporary overvoltage limits. The default reference level shall be **normal voltage**.

### 3.4 Implications of Change

It is worth noting that plant design, (insulation coordination in particular), is affected by the actual magnitude of TOV and it is believed that the proposed Rule change provides additional benefits in this regard through:

- 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 TOV's being contained below the capped maximum.
- Disassociating TOV from "normal" voltage hereby ensuring that the reference voltage chosen by the TNSP is appropriate for the study case in question

Steve Jarvis of Transend Networks has discussed this Hydro Tasmania proposal at AEMO's Operations Planning Working Group (OPWG)<sup>2</sup>, where a very similar proposal was discussed. The OPWG provided feedback, which is now incorporated in the rule change proposal. Based on these discussions no further issues are anticipated.

## 4 Request for Proposed Rule

This section provides a description of Hydro Tasmania's right to submit the proposed Rule to the AEMC, and the power that the AEMC has under the National Electricity Law (NEL) to consider this proposed Rule change.

### 4.1 Hydro Tasmania's Right to Submit this Proposal

Hydro Tasmania is requesting that the AEMC make this proposed Rule in accordance with section 91 of the NEL. Hydro Tasmania is registered as a *Generator* in accordance with Section 2.2 of the NEL. Under section 91(1) of the NEL, the AEMC may make a Rule at the request of any person, the MCE or the Reliability Panel. As such, Hydro Tasmania may request that the AEMC make a Rule.

In broader terms, Hydro Tasmania as Australia's leading renewable energy business, with a long-term business horizon, has a continued interest in the development of an efficient market, as evidenced by its many contributions to the AEMC's consultations on market development options. Today, the Hydro Tasmania group includes Momentum, the Victorian specialist electricity retailer. We are also a joint owner of Roaring 40s, which develops and operates wind farms in Australia. Through our consulting arm, Entura, we share our expertise in energy and water with businesses and governments right across the Asia-Pacific region. We believe that these activities have provided us with the background necessary to provide informed comment on market development proposals.

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<sup>2</sup> See <http://www.aemo.com.au/electricityops/0000-0086.pdf>

## 4.2 Power of the AEMC to Make the Proposed Rule

The subject matter about which the AEMC may make Rules is set out in section 34 and Schedule 1 of the NEL.

Hydro Tasmania considers that the proposed Rule falls within the subject matters that the AEMC may make Rules about, as it relates to the activities of persons participating in the NEM.

## 5 How the Proposed Rules Contribute to the National Electricity Objective

Before the AEMC can make a Rule change it must apply the rule making test set out in the NEL, which requires it to assess whether the proposed Rule will or is likely to contribute to the national electricity objective (NEO).

Section 7 of the NEL states the NEO 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, reliability and security of supply of electricity; and*

*(b) the reliability, safety and security of the national electricity system.”*

Hydro Tasmania considers that the proposed Rule is likely to contribute to the NEO because it promotes 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.

More generally, the proposal does not obligate any changes where the current limits are considered appropriate. The reference voltage will simply continue to be equal to **normal voltage** as per the current arrangements.

The proposed rule change does not pose increased system security risk. As shown above, it has the propensity to deliver improved market and efficiency outcomes and hence progresses the NEO.

## 6 Expected Benefits and Costs of the Proposed Rule

### Revised Definition of TOV limits

Hydro Tasmania expects that the proposed Rule change would benefit Market Participants because:

- 1 Constraints would be more reflective of true technical limitations; and
- 2 Increased trade will result; and
- 3 TOV constraint equations should remain unchanged (no on-going administration costs) in future.

The majority of costs associated with implementing the proposed Rule are expected to be incurred through the consultation process itself. The main element of this is expected to be TNSP review of

the revised definition, to verify that it does not impose any unforeseen system security risks or create anomalies. Given that preliminary discussions have already been held with AEMO and TNSPs through the OPWG, it is considered that further TNSP review work will be limited and no problems are anticipated. As a consequence, Hydro Tasmania asks that the AEMC treat this Rule change proposal as non-controversial status, subject to no objections.

Hydro Tasmania does not expect that there will be any changes to market systems, additional compliance, procedural or other costs arising from implementing this proposed Rule change.

In summary, Hydro Tasmania considers that the benefits to the NEO far outweigh the cost of verifying the benign impact of the proposed Rule change.

## 7 Glossary

TERM	EXPLANATION
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
HVDC	High Voltage Direct Current
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company (now AEMO)
NEO	The National Electricity Objective as stated in section 7 of the NEL
NER	National Electricity Rules
nominal voltage	The design <i>voltage</i> level, nominated for a particular location on the <i>power system</i> , such that power lines and circuits that are electrically connected other than through transformers have the same <i>nominal voltage</i> regardless of operating <i>voltage</i> and <i>normal voltage</i> .
normal voltage	In respect of a <i>connection point</i> , its <i>nominal voltage</i> or such other <i>voltage</i> up to 10% higher or lower than <i>nominal voltage</i> , as approved by AEMO, for that <i>connection point</i> at the request of the <i>Network Service Provider</i> who provides <i>connection</i> to the <i>power system</i> .
OPWG	AEMO's Operations Planning Working Group
TNSP	Transmission Network Service Provider
TOV	Temporary Over Voltages
TOV reference level	The TNSP shall determine a TOV reference level no greater than 110% of <i>nominal voltage</i> to be approved by AEMO. The default reference level shall be <i>normal voltage</i> .

## Attachment B

This draft is based on National Electricity Rules Version 39. It is proposed that Clause S5.1a.4 and figure S5.1a.1 be modified to read:

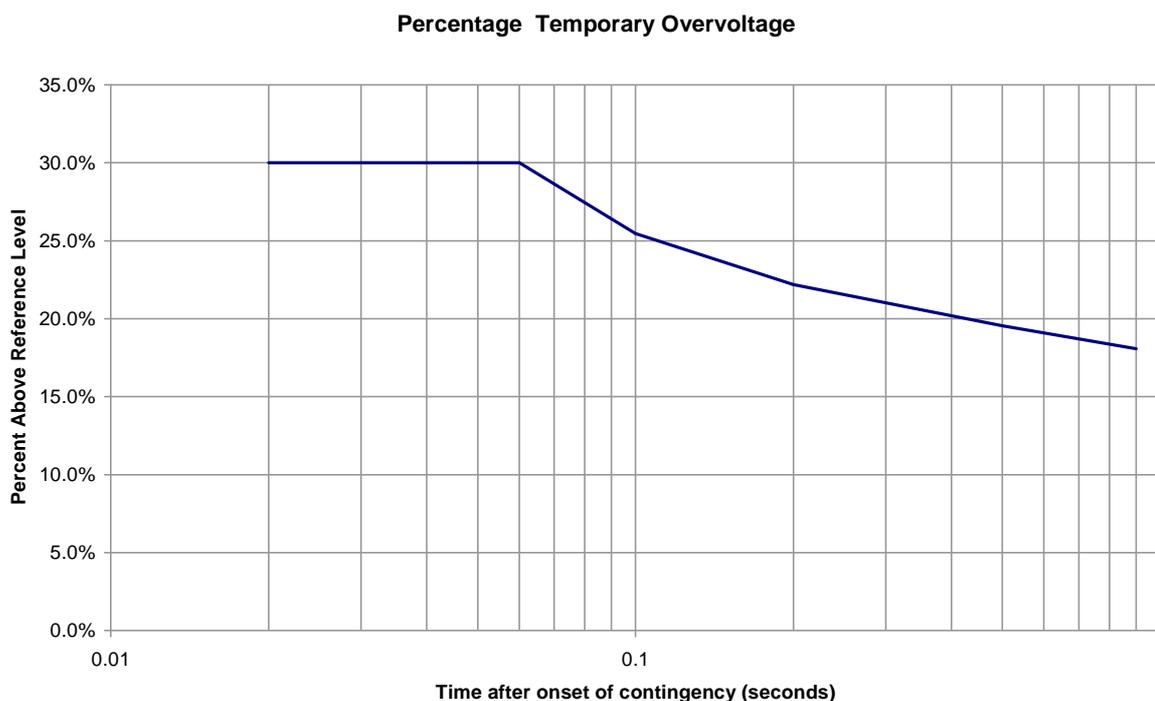
### S5.1a.4 Power frequency voltage

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 supply at a connection point should not rise above the **TOV reference level** by more than a given percentage of 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.

Figure S5.1a.1



## 10. Glossary

### **TOV reference level**

The reference level determined by the TNSP and approved by AEMO for the purpose of setting temporary overvoltage limits. The default reference level shall be **normal voltage**.