



10 August 2011

Mr J Pierce
Chairman Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

Dear Mr Pierce

**NATIONAL ELECTRICITY AMENDMENT – PROJECT ERC0120
DEFINITION OF TEMPORARY OVER-VOLTAGE LIMITS - RULE 2011**

Aurora Energy (Tamar Valley) Pty Ltd (AETV) appreciates the opportunity to provide the following comments on the Hydro Tasmania's proposed Rule change that seeks to basically re-define the basis of maximum Temporary Over-Voltages (ToV) allowable under Rules' clause S5.1a.4 and shown in Figure S5.1a.1.

AETV is a registered participant with generation interests in Victoria and Tasmania; in particular, AETV owns and operates the AETV power station cited in the AEMC's Consultation Paper. This submission questions whether the proposed Rule change is non-controversial and provides comments on the questions posed by the AEMC raising concerns about the application of any Rule change.

In the event that the AEMC considers that a Rule change should be made AETV suggests alternative wording that implements the proposals within the Consultation Paper and clarifies interpretation of any revised Figure S5.1a.1.

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

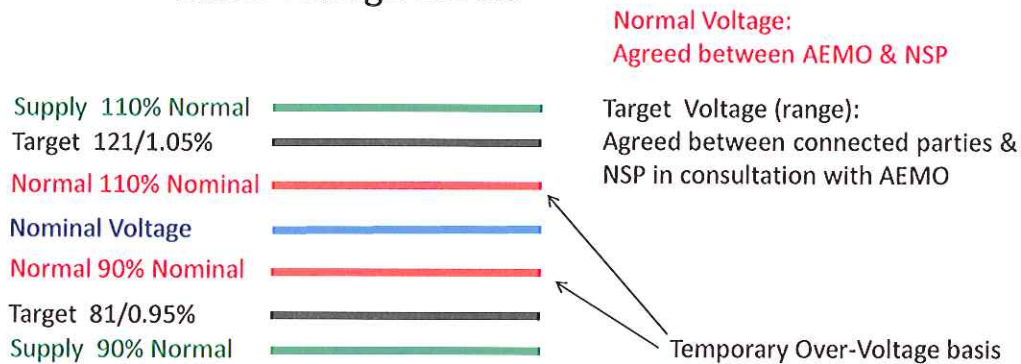
It should be noted that voltage rises at one location can permeate throughout the network and increase voltages down into the distribution network hence the risk of damage extends beyond "high-voltage" equipment. The original application of the ToV limit as provided for in the then "National Electricity Code" related to *nominal* voltage. This was subsequently changed to *normal* voltage apparently assuming that the potential 10% higher voltage would not result in equipment damage.

On this basis, and if the same maximum limits apply, then it should follow that there should not be an increased risk of equipment damage.

Question 2: Are there increased costs of network connection?

The provisions of the Rules in relation to voltages are currently quite complex and can be difficult to interpret. This complexity is illustrated below in Figure 1. It should be noted that it appears that the reference to S5.1a.4 in S5.3a.8 relating to target voltage should be S5.1.4. The introduction of another provision relating to voltage further increases this complexity. In addition, if increased ToVs are permitted above those based on *nominal* voltage there could be equipment design implications. This is expanded upon under Question 3.

Rules Voltage Levels



Voltage	Reference
Nominal	Glossary
Normal: 0.9 to 1.1 Nominal	Glossary
Target Voltage (range): 0.81/0.95 to 1.21/1.05 Nominal	S5.1.4(c)
Supply Voltage: 0.9 to 1.1 Normal (0.81 to 1.21 Nominal)	S5.1.4(c)
Voltage of Supply: 0.95 to 1.05 Target	S5.1.4(b)(2)
Temporary Over-Voltage	Figure S5.1a.1

Figure 1

In addition, the proposed replacement curve for Figure S5.1a.1 terminates at 900 mSeconds raising the question as to what should be the ToV profile beyond that time? This termination was included because in their submission Hydro Tasmania suggests that Figure S5.1a.1 "links ToV and continuous overvoltage requirement in a single diagram". To this point it should be noted that the original Code and Certified Initial Rules both had Figure S5.1a.1 terminating at 600 seconds making it clear that it was only intended to be of a temporary nature whilst providing sufficient time for the voltage to be returned to acceptable continuous levels.

The current curve relating the ToV voltage to *normal* voltage after 900 mSeconds is consistent with the first paragraph of S5.1a.4 that states:

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*.

AETV later suggests additional wording that should clarify the interpretation should the AEMC consider that a Rule change should be made.

Question 3: Is there an increased risk to system security?

The fundamental objective of the proposed Rule change is to permit increased ToV limits where the *normal* voltage is limited to the *nominal* voltage.

In the instance of AETV's combined cycle gas turbine (CCGT) the settings on the gas turbine and the steam turbine transformer protection agreed with Transend Networks (the Tasmanian transmission network service provider) and the manufacturer were determined on the basis that the permitted ToV is based on *nominal* voltage. There is a small margin between the protection operating setting and the allowed ToV and any increase in the allowable ToV would result in a high risk of protection operation and disconnection of the CCGT.

Given that in effect the CCGT shares the same 220 kV George Town connection point with Basslink the most likely cause of ToV seen by the CCGT would be sudden interruption to Basslink flows. Sudden interruption of Basslink initiates operation of the Basslink Frequency Control System Protection Scheme (FCSPS) to maintain excursions in system operating frequency within standards. Should the CCGT disconnect at the same time there would be an increased risk to system security, in particular, interruption to Basslink flow, plus FCSPS action plus simultaneous loss of in excess of 200 MW of CCGT generation and required CCGT Generator Contingency Scheme action would represent a severe Tasmanian power system disturbance.

AETV cannot comment on whether this is a broader issue across the NEM as it is the subject of confidential connection agreements.

Question 4: What are the risks of NSPs adjusting ToV limits?

The response to Question 3 highlights the consequences from AETV's perspective.

In setting either *normal* voltages or in the event that it is introduced *ToV reference level* voltages an NSP would need to take into account existing connection agreements and agreed performance standards and maintaining compliance with associated provisions.

By in effect NSPs changing compliance obligations placed upon them without taking into account impacts on connected parties would appear to provide them with the ability to alter the level of network service unilaterally. This could be avoided in the instance of ToV by requiring that the *ToV reference level* be included in connection agreements similarly to the requirement for *target* voltage. It would be reasonable to assume that NSPs should neither seek to change the effect of agreement provisions without consultation nor without the need for commercial arrangements regarding consequent changes and impacts on connected party operation.

In particular, for George Town it is likely that the *ToV reference level* would need to be defined as *nominal* voltage meaning that the effect of any Rule change on the identified Basslink constraint would be vitiated.

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

Participants as part of either managing or negotiating connection agreements will have a direct influence in setting the *ToV reference level* in exactly the same way as they presently influence the setting of *normal* voltage. It is important to note that the *normal* voltage is agreed between NSPs and AEMO whereas *target* voltage is agreed between connecting parties and NSPs in consultation with AEMO. This was discussed in the response to Question 4.

Alternative to the Rule change:

As indicated above it is likely that the proposed Rule change will not result in the outcomes desired by Hydro Tasmania. As such alternative solutions to the Rule change should be considered to address the key issue raised being constraints on high Basslink export under "low fault" level conditions. Noting that for the 21-month period since October 2009 cited by Hydro Tasmania the constraint bound for 160 dispatch intervals being approximately 0.09% of the time.

AETV analysed the occurrence of constraint (T^V_NIL_BL_6) and noticed that over the period September 2009 to June 2011 it did not bind whenever the Tamar Valley Power Station (TVPS) CCGT was operating. However; with the CCGT out of service the constraint bound even with two TVPS 110kV generation units operating.

The constraint only bound during the months of January & February of 2010 and 2011 with the exception of 3 dispatch intervals in August 2009. There were a number of constraints during July & August of 2009.

The CCGT 220kV connection arrangements are such that the generator transformer must be in service at all times irrespective of the operational status of the CCGT.

As the constraint does not coincide with CCGT generation Hydro Tasmania could provide the necessary fault level, and coincidentally additional inertial support important for Tasmanian frequency control, by synchronising appropriately located generation that had not otherwise been dispatched. As the constraint bound during the summer months at times of low Tasmanian demand Hydro Tasmania should have plant available to support the provision of the required fault level.

With increasing amounts of generation connecting with low inertia and low contribution to fault level these issues could become increasingly important for system security management requiring new approaches to dispatch. The same approaches would reduce the occurrences of binding ToV constraints.

Alternatively, the ToV due to Basslink flow interruption might be able to be better controlled by reviewing the root cause of the ToV and re-considering mitigation measures.

Rule change clarification:

Both Hydro Tasmania's Rule change proposal and the AEMC's Consultation Paper refer to limiting the *normal* voltage and the *ToV reference level* to within $\pm 10\%$ of *nominal* voltage. It would appear that the proposed drafting of the *ToV reference level* does not provide for this limitation. To address this issue an alternative definition for *ToV reference level* is proposed that is in line with the definition of *normal* voltage:

ToV reference level

In respect of a *connection point* the ToV reference level is the *connection point nominal voltage* or such other *voltage* up to 10% higher or lower than *nominal voltage*, determined by the NSP and approved by AEMO for the purposes of setting temporary over-voltage limits.

As mentioned above, the proposed curve for Figure S5.1a.1 terminates at 900 mSeconds raising the question as to what happens after that time? It would appear that the answer to this question lies in Schedule 5.1 Network Performance Requirements to be provided or Co-ordinated by Network Service Providers at clause S5.1.4(c) where determining target voltage is subject to:

provided that at all times the *supply voltage* remains between 90 percent and 110 percent of the normal voltage determined in accordance with clause S5.1a.4 except as a consequence of a *contingency event*.

Unfortunately, this only refers to minimum access standards apparently leaving automatic and negotiated access standards undefined. It also excludes contingency event situations.

This gap would appear to remain within Schedule 5.2, Conditions for Connection of Generators, Schedule 5.3, Conditions for Connection of Customers, and Schedule 5.3a, Conditions for connection of Market Network Services.

To be consistent with the acceptable range of voltage in the absence of a contingency event, as provided for in the first paragraph of S5.1a.4, the "tail" of the curve should be 110% of *normal* voltage. Should the AEMC consider that a Rule change should be made then to accommodate this and the proposed Rule change objective, Figure S5.1a.1 would require two sections, one up to 900 mSeconds and one after 900 mSeconds. The period up to 900mSeconds would relate to the *ToV reference level*, the tail would relate to the *normal* voltage. To affect this, the wording of the second paragraph of S5.1a.4 could be changed to:

As a consequence of a *credible contingency event*, the *voltage of supply* at a *connection point*:

- (a) *for the first 900 mSeconds after the onset of a credible contingency event* should not rise above its *ToV reference level* by more than a given percentage of *ToV reference level* for longer than the corresponding period shown in Figure S5.1a.1 for that percentage, and
- (b) *for the period after 900 mSeconds after the onset of a credible contingency event* should not rise above 110% of its *normal voltage*.

Conclusion:

AETV submits that the proposed Rule change will not provided the desired outcomes sought by Hydro Tasmania and as such a Rule change should not be made.

In addition AETV has demonstrated that should the Rule change be made that there would be an increase in risk to system security. If the management of this increased risk resulted in increased constraints to dispatch of TVPS generation then that would lessen competition in the National Electricity Market and in particular the Tasmanian Region reducing market effectiveness and efficiency.

If you should have in questions in relation to this submission, please contact Mr Shaun O'Loughlin, 03 6237 2542. Or shaun.oloughlin@aetvpower.com.au.

Yours sincerely



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