Better together.

Trustpower Limited
Head Office
Truman Lane
RD 5
Tauranga
Postal Address:
Private Bag 12023
Tauranga Mail Centre
Tauranga 3143
T 07 572 9754
F 07 572 9825
Offices in
Auckland
Wellington
Christchurch
Oamaru
Freephone
0800 87 87 87
trustpower.co.nz

6 October 2015

Submissions
Electricity Authority
Level 7, ASB Bank Tower
2 Hunter Street
P O Box 10041
WELLINGTON

By email: submissions@ea.govt.nz

TRUSTPOWER SUBMISSION: GENERATION FAULT RIDE THROUGH

1 Introduction

1.1.1 Trustpower Limited (Trustpower) thanks the Electricity Authority (Authority) for the opportunity to provide a submission on its paper titled "*Generation Fault Ride Through*" (the Consultation Paper).

2 General comments on the Consultation Paper

2.1.1 Trustpower has significant concerns regarding the content of the Consultation Paper, and the rationale for the proposals contained therein. The degree of engagement the Authority has had with asset owners and suppliers to determine what is possible or feasible is not evident in the Consultation Paper, while at the same time failing to address all the potential issues both current and future.

2.1.2 The Consultation Paper continually references non-synchronous generation – specifically wind generators – but fails to acknowledge that there may be limitations of conventional plant(s) to ride through voltage perturbations. No acknowledgement of the capability of existing wind generation to ride through faults is made anywhere, despite all large wind farms installed in New Zealand since 2006 having some form of fault ride through capability.

2.1.3 The Consultation Paper does not take a forward view to other increasing generation sources, e.g. solar and battery technologies, which have the potential to form an increasing part of the generation mix. The impact these technologies may have is not recognised in any of the forward projections despite increasing levels of penetration within the market.

2.1.4 In the Consultation Paper the Authority identifies a trip of the HVDC link as one of the major risks impacting grid security. While the work may have been undertaken, the Consultation Paper does not indicate that other alternatives, such as but not limited to, the addition of further reactive plant, or constraints etc, to mitigate the impact of a HVDC link trip have been considered.

2.1.5 The Authority now proposes the retrofitting of equipment/functionality to existing assets to achieve a higher standard of compliance, even though little if any analysis has been provided to

show how the existing equipment will actually perform. This would suggest the retrofitting of additional equipment/functionality to achieve a higher level of compliance is premature and unwarranted at this stage.

2.1.6 It is unreasonable to expect asset owners to retrofit equipment/functionality to plant that is already installed and compliant with existing standards. Presumably there will be a requirement to test assets to determine capability, as well as testing to ensure suitable capability once modifications are completed (This assumes retrofitting is in fact a practical option). The additional costs of retrofitting equipment to assets, along with an extensive test programme and ongoing monitoring programme, will be passed onto consumers in the form of increased electricity costs.

2.1.7 Further, we believe that such retrospective application would not necessarily be consistent with best-practice regulatory change management principles[1]. It could increase uncertainty for prospective investors and suppliers about potential (but currently unknown) changes that may impact them in future, and/or introduce a tendency to gold-plate new assets. Both effects would increase costs to consumers in the long-run.

2.1.8 In contrast, Trustpower would consider it reasonable to develop Code amendments for new assets to achieve superior standards. Application only to new assets would be consistent with best practice change management. However, we would like to work with the Authority and other industry participants to develop fit-for-purpose Code requirements and standards.

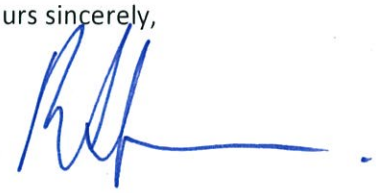
2.1.9 Should the Authority decide to implement Code amendments, Trustpower strongly urges the Authority to consider standards that are already in existence in other jurisdictions, thereby not inhibiting or deterring suppliers from competing in a 'unique' New Zealand market.

2.1.10 Our answers to the specific questions posed in the Consultation Paper are attached in Appendix A.

2.1.11 We would like to request the opportunity to meet in person and discuss the issues raised in the Consultation Paper with the Authority.

2.1.12 For any questions relating to the material in this submission, please contact Peter Litchfield, Trustpower's Lead Operations Engineer, on 07 572 9888.

Yours sincerely,



RICHARD SPEARMAN
OPERATIONS MANAGER

Generator Fault Ride Through_Trustpower_Oct 2015 v0.1.docx

[1] The need for consistency with these principles is something we have submitted on extensively to the Authority in relation to other workstreams. See, for example, our January 2014 submission to the Authority (and supporting report from NERA Economic Consulting) in relation to Avoided Cost of Transmission payments to distributed generation, available online at http://www.ea.govt.nz/development/work-programme/transmission-distribution/transmission-pricing-review/consultations/#c7428

Appendix A: Responses to consultation questions

Question	Response
1. Do you agree the issues the Authority has identified are worthy of attention?	1.1 While Trustpower acknowledges that the Authority's intent is reasonable, there does seem to be unreasonable focus on wind generation along with a change in direction from previous work. 1.2 In the Consultation Paper the Authority has identified two major types of faults as having the greatest effect on the power system – 220kV transmission faults, and HVDC trips. The paper then goes onto implicate nonsynchronous generation, namely wind generators, for degrading grid security. This approach seems unfair and somewhat biased. Much of the thermal plant (~2000MW) and their auxiliary system plant may be susceptible to voltage perturbations that may result in plant tripping from under or over voltage, however this is not identified or mentioned anywhere in the consultation. The Authority assumes that this plant will be able to meet the proposed requirements at "no additional cost". 1.3 Within the Consultation Paper's introduction, the Authority cites lack of information regarding "appropriate performance standards", yet all asset owners are required to submit ACS. 1.4 The key change of approach from the 2011 proposal (which required that any Code changes be applicable to new plant only), to the 2015 stance of retrospective Code requirements, is unacceptable. To attempt to back-fit requirements will likely incur significant cost to asset owners, and hence consumers, providing little, if any, overall benefit in terms of grid security.
2. Do you agree with the objectives of the proposal amendment? If not, why not?	2.1 No. 2.2 We don't agree with the amendments as proposed as it is not clear to us that items such as, but not limited to, those below have been adequately considered in the assessment of the problem; a) The FRT capability of existing (and proposed) windfarms does not appear to have been acknowledged, b) The reasonableness of the pre-fault load flow scenarios appears extreme,

	c) The response and impact of load and distribution systems has not been clearly articulated. 2.3 The objectives fails to recognise the causers of large events on the system and address remedies in these areas first. 2.4 However we do recognise the need for fault ride through requirements as part of a modern grid code, and would support the adoption of a reasonable internationally available standard for new generation plant.
3. Do you agree the benefits of the proposed amendment outweigh its costs?	3.1 No. 3.2 Costs will depend on the degree of ride-through capability mandated by the Authority. There is no rationale provided within the paper for the requirements as laid out in figures 8.1 and 8.2. By adjusting voltage limits and time durations by marginal amounts, significant cost savings may be available. 3.3 As a result, some asset owners may be subject to greater costs than is realistically required or necessary. Ultimately, however, all these costs will be passed onto consumers, who would probably end up paying significantly more than the benefits estimated by the Authority. Further to this we are unsure if the fault ride through capability of existing wind generation in the North Island has been taken into account in the reserves procurement process when estimating the costs.
4. Do you have any suggested market based options that would be easier to implement than option A?	4.1 No.
5. Do you agree that the proposal does not preclude a move to market based arrangements in the future?	5.1 Yes.
6. Do you agree that the Authority's proposed amendment complies with section 32(1) of the Act?	6.1 No. 6.2 Increasing costs on new and existing wind generation will very definitely affect competition in the electricity industry. 6.3 The proposed changes will contribute to an incremental increase in reliability of supply of electricity to consumers however we are unsure whether this benefit will exceed its incremental cost.

7. Comments on specific clauses	**Clause 8.25A** 7.1 The description of "Zero Impedance Fault" is misleading. Reference to "fault" would be better. 7.2 Separating out the under and over voltage figures, Fig 8.1 and 8.2, would provide better clarity and understanding. Currently the figures tend to suggest the fault ride through capability needs to start at 0.9 p.u. and sustain through to 1.2 p.u. (i.e. a 0.3 p.u. change in voltage) rather than the explicit 1.1p.u. precontingent voltage used in the modelling to derive the requirement (i.e. a 0.1 p.u. change in voltage). 7.3 Sustaining 1.2 p.u. voltage for 2 seconds and the 1.15 p.u. for a further 4 seconds is extreme by international standards. The over-voltage requirements with respect to the HVDC appear to have been derived from an unrealistic HVDC flow, generation and load combination. **Clause 8.25B** 7.4 We suggest this clause is reworded. The clause effectively requires maximum active and reactive current simultaneously, which may not be physically possible. Additionally the present wording requires the injection of maximum reactive current for six seconds from a fault, regardless of whether or not the voltage has recovered to its pre-fault value. The Authority may want to prioritise reactive power over active power, and adjust the active and reactive power injected depending on the characteristics of the fault and the post fault recovery characteristics. **Clause 8.25C** 7.5 What about a requirement for HVDC to provide some voltage compensation? **Clause 8.25D** 7.6 No comment. **Clause 8.21** 7.7 No comment. **Clause 8.38** 7.8 No comment.