

11 March 2011

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Dear Sir/Madam

Consultation Paper – Generation Fault Ride Through

Thank you for providing the opportunity to make a submission on proposed changes to the performance obligations for generation fault ride through (FRT). The New Zealand Wind Energy Association's (NZWEA) comments in response to the questions asked in that consultation paper are attached, but in general terms we note that:

- While we generally agree with the conclusion that a FRT standard is required, we believe that the basis for it has changed from that described in the Wind Generation Investigation Project (WGIP) that is one of the major references for the consultation document. Recent additions to the wind generation fleet are already being installed with robust FRT capabilities, and other factors such as demand growth and related capacity constraints are influencing system stability.
- The System Operator's analysis has identified that system voltage stability can vary significantly around different regions and for different network voltages. The proposed envelopes represent a generalised and conservative view of the performance that is required. In some instances delivering the proposed envelope may add unnecessarily to system cost, or may see an opportunity missed for delivering a solution that provides an overall better outcome (for example in the application of reactive power). Consideration should be given for making the envelope a default position where the generator and System Operator can negotiate an alternative outcome where this gives a better overall performance at equal or lesser cost (i.e. the negotiated outcome should be no more costly or more onerous in terms of performance than the default envelope). We understand that such provisions are made available in other markets. (NZWEA's wind turbine manufacturer members may be able to identify suitable references).
- At some parts of the consultation document and in some of the text for the proposed code changes references are made to these standards applying only to wind generators. The standards should apply to any new generating technologies and not just wind (and also to any existing technologies that are upgraded in the future).

Future discussions

NZWEA believes that there would be merit in the Authority engaging further with the generators and the wind turbine manufacturers (together with the System Operator) to consider whether and how these standards can be revised to incorporate an appropriate degree of flexibility while ensuring suitable system performance and at the appropriate cost. The turbine manufacturers could also provide useful insight into approaches used in other markets. NZWEA would be happy to work with the Authority on facilitating these discussions.

NZWEA would like to meet with the Authority to discuss this submission further. Please feel free to contact me to arrange this via the contacts provided below.

NZWEA also notes that while we have sought and received comments from our members on this submission, the views that we have expressed may not necessarily represent the views of each individual member.

Yours sincerely,

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Question No.	Question	NZWEA Response
Q1	Do you agree with the System Operator's modelling assumptions and study methodology?	NZWEA generally agrees with the assumptions and methodology applied. We note however that the System Operator's report advises that their proposal for the North Island " <i>would need to be reviewed once the planned upgrade for</i> <i>additional dynamic plant in the Upper North Island is approved and</i> <i>commissioned</i> " (section 4.8.1, page 17). It appears from related comments that the profile after these upgrades would look more like that for the South Island. Adopting the proposed profile would appear to be a conservative approach, which may ultimately increase compliance costs unnecessarily.
		We also note that a key driver of the profile beyond about 1 second is the ride- through performance of the HVDC system. It is unclear from the report if this reflects the performance of the existing system or the pending system including the new Pole 3. NZWEA is unsure if any change in performance is expected with Pole 3 that might need to be considered in establishing the future generation ride through requirements. As above, an overly conservative approach could ultimately unnecessarily increase generation costs.
		The System Operator report notes at section 2.3 that it assumes in its modeling that all existing wind farms are "unavailable" as they may not remain connected for close-in faults (page 8). Again this would seem to be a very conservative approach (especially when modeling faults in the upper North Island, for example). Much of this plant does have equipment fitted that would allow it to stay connected through at least some fault events (especially Project West Wind, as the report itself identifies).
		The report demonstrates that a wide range of profiles exist, depending on the characteristics of the system in the particular region. Basing the proposed ride through profiles around the "worst case" scenarios may then result in the installation of ride through capability that may not actually be required (while at the same time perhaps also missing out on opportunities to agree specific system performance – in areas such as reactive power – that might actually provide a greater overall benefit to system security in that region).

Question No.	Question	NZWEA Response
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Q2	Should the fault ride through standard apply to generating stations smaller than 30 MW?	NZWEA agrees that this would appear to be a reasonable threshold for specifying this performance standard. Projects below this size are unlikely to have a significant effect on transmission system dynamics.
		We note that projects of this size are likely to be connected within lines networks rather than to the transmission system and the owners of these networks may require certain levels of protection and performance if the wind farms could have a significant impact on network performance.
		The cost of a hardware solution to ensure that the standard is achieved, such as a STATCOM, would add significant cost to a small project of this nature and so is potentially a barrier to market entry.
Q3	Should the fault ride through standard apply to	No.
existing synchronous generating plant?	existing synchronous generating plant?	The standard should not apply to any existing generators (synchronous or non- synchronous). The cost of determining whether these generators comply or not, and of retrofitting any necessary equipment to bring them up to the standard are not likely to outweigh the benefits.
		It is however appropriate that the overall performance of the generation fleet is brought up to the required standards over time where this is practical. In this respect the text in the proposed code changes that requires any replacement generators on existing stations to meet the standard is appropriate.
Q4	Do you agree that a single composite standard for both the North and South Islands is likely to result in increased compliance costs?	Yes.
		As discussed above, even the generic standards for the North and South Islands may increase compliance costs for generators in locations where a specific profile might be more appropriate.
Q5	Do you agree that the WGIP wind generation scenarios are appropriate for the NPV analysis?	The WGIP scenarios were developed in order to test the impact of different levels of wind penetration on different aspects of power system performance. They were not developed as forecasts of potential wind energy development, which is what appears to have occurred here.
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Question No.	Question	NZWEA Response
Q5 (cont.)	Do you agree that the WGIP wind generation scenarios are appropriate for the NPV analysis?	While on the subject of the WGIP analysis, we also note that this analysis was undertaken at a time when most of the existing wind generation fleet used simple induction generators. Since that time all of the new build (for projects of 30 MW+) has used DFIG generators with additional hardware, full converter technology, or synchronous generators so will have a far superior ride through performance to what the WGIP analysis had assumed. The majority of NZ's existing wind fleet now has some fault ride-through capability.
Q6	Do you agree with the Authority's input assumptions for the NPV calculations? If not, please provide alternative input values.	The NPV necessarily includes a number of averages and approximations that make it suitable only for a general consideration of the issue. For example the proposed 1.25% increase in turbine cost for ride through compliance is well within the margin of error in the range of turbine installed costs and will also be turbine and project dependent.
		The analysis also appears to be based on a scenario where the average wind penetration exceeds the largest contingent event (i.e. total NI wind generation exceeds 350 MW, or total SI wind generation exceeds 100 MW). This is unlikely to be a credible scenario unless a new wind farm project is built with a generation capacity in excess of 350 MW, as the geographic distribution – and connection - of wind generation projects means that they will not all experience a fault at the same time. Under this distributed scenario the forecast increase in SIR and FIR costs would not occur until wind penetration reached a much greater level. (We also note that the high costs of SIR and FIR in 2008 will have resulted in "average" costs that are possibly higher than the long-term average that would be applicable over the period of the NPV calculation).
		Having requested and obtained a copy of the NPV calculation from the Authority we note that the analysis is more about whether there are benefits in applying the new standard today rather than at a future date when total wind penetration has increased, as opposed to whether there should be a standard at all. An NPV analysis for the latter scenario would undoubtedly show that applying a FRT standard will provide benefits (and this is the reason why all of the major new build has used technology with FRT capability).

Question	Question	NZWEA Response
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		While we have these doubts about the veracity and application of the NPV calculation we still consider that it is appropriate for the consultation paper to conclude the FRT standards are necessary.
Q7	Do you agree that there is a moderate to high probability of scenario B wind penetration levels being reached in the next 10 years?	New generation build, of any type, will be influenced by a range of factors such as electricity demand growth. However, given that existing NI capacity will reach around 515 MW by the end of 2012 and the level of interest and activity in the wind energy sector at present we would be surprised if the 900 MW of NI wind considered in Scenario B was not achieved within the next 10 years.
		At the end of this year total SI wind will exceed 100 MW, so is also well on the way to achieving the 300 MW considered in Scenario B. Over 1,000 MW of potential wind projects also have or are seeking consent in the SI. However the potential for the larger scale development that would contribute the most to achieving this target is affected by the current HVDC pricing regime.
Q8	Do you agree that there would be benefits in proceeding immediately with proposed fault ride through standards or should the effective date of the proposed standards be triggered at a future date by the level of wind generation penetration?	Yes, we agree that it is appropriate to apply the new standard immediately. As discussed above, we are already seeing that most projects (including all of those above the 30 MW threshold) are installing technology with good ride through capabilities today. This proposed change should not then have a significant effect.
		What is considered to be "immediate" will need some consideration. There may be some projects that have made investment decisions already that are not yet "connected" (as per the text of the proposed code change) or may not be connected by the time the new standard is in place. Where these committed projects have a demonstrated fault ride through capability (which may also have been accepted by the System Operator) it would appear to be inappropriate for this plant to now have to review and/or modify its design to meet this new standard.

Question No.	Question	NZWEA Response
Q9	Do you agree with the Authority's overall assessment that the proposal best meets the objective of the proposal?	NZWEA generally agrees with the proposal. Some of our relevant comments have been provided above, but in general terms we agree with the proposal subject to:
		• Recognition that the need for the change is not being driven by the installation of simple induction generators with limited or no FRT capability increasing system risks and displacing other generation. The significant new wind projects being installed today all feature FRT capability and other factors such as demand growth are potentially creating greater system instability risks.
	• It should be clear that the new standard will apply to all new generation and not just those with non-synchronous generators (for example section 4.6.3 of the paper suggests that "only non-synchronous generatorswill face compliance costs").	
		• Provision should be made for a "negotiated standard" to be applied where an alternative (but not more onerous) envelope is applied, where this can be demonstrated (i.e. via system studies) to provide equivalent or better system performance with equal or lesser cost. NZWEA understands that such provisions exist in the Australian NEM, for example.

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No.		

Proposed Code Changes Changes	As discussed above, the nature of system voltage issues in certain parts of the grid may warrant the use of different (but not more onerous) envelopes. Provision should be made for these to be implemented where the different settings might provide improved system performance over the standard. At 8.20A(3) – perhaps this clause should reference the specified performance of the special protection system, recognising that in some cases the SPS might	
		require specific actions (i.e. a trip of less than 3 seconds, or a partial shedding or ramping of output).
		At 8.20B(1) – is the intention that the unit generates the maximum "possible" or "potential" reactive current? It may not be possible to achieve the maximum rated reactive current if the turbine is operating below full output (this would need to be checked with the turbine manufacturers).
		At 8.20C – the use of additional equipment should apply to "any" generating station, and not just wind (ditto for 8.20C(b)).
		At 8.20D – as discussed above, generation that is committed but not yet connected should also be exempt.
		At 8.20D(3) – Clause 8.20B should also not apply.