From: Philip Wong Too
Sent: Tuesday, 22 February 2011 3:32 a.m.
To: Submissions Mailbox
Subject: Generation Fault Ride Through
Firstly let me say that I wish to submit on behalf of myself, and not on behalf of my employer.

Secondly I would like to comment on a couple of aspects of the consultation paper;

- Section 2.1.3 implies that there are specific requirements within the Code for generators to remain connected during underfrequency and overfrequency events. In my reading of the Code, while the requirements to remain connected during certain underfrequency events is explict within the code, there is no explict requirement to remain connected during an overfrequency event. I would suggest that codifying the requirement to remain connected during overfrequency events could be a subject for the Electricity Authority to consider, if this is important for system security.
- Section 4.1.1(b) "maintain mechanical power output during and following a fault to avoid loss of power generation to the grid". This fails to recognise that active power injection from a generator into the grid inherently reduced during a fault. If mechanical power is maintained, this will result in acceleration of the machine (unless the "surplus" active power is dissapated in another means) which could result in the machine suffering an overspeed trip. Thus, depending on the wind turbine design, it might be necessary to reduce the mechanical (aerodynamic) power output to maintain control of the machine.

Thirdly I would like to comment on the specific proposal and its wording.

- I support the exclusion of generation stations of less than 30 MW. As a recent development, a number of small wind farms are being developed, many of which utlise second hand wind turbines. Modifying these wind turbines to meet the fault ride through standard is likely to be expensive and make many such projects uneconomic.
- 8.20A (1). My interpretation is that the no-trip envelope refers to voltages on the 110 kV and 220 kV grid, not the grid injection point (if this is not at 110 or 220 kV), nor the generator terminals. This could be potentially made clearer by changing the y axis labels from "Grid Voltage" to "110 or 220 kV Grid Voltage".
- 8.20A (1) "remain transiently stable". My understanding is that there are certain parts of the grid where there are limits on power transfers due to transient stability, and that this is due largely to the characteristics of the transmission system, rather than deficiencies in the generation units involved. A possible interpretation is that the generation assets involved would not be compliant under the proposed code. Care may need to be taken to ensure that the proposed changes to the Code does not have unintended consequences in areas such as where flows on the transmission system are limited by transient stability.
- 8.20B (1) "maximum reactive current". Depending on the turbine technology, there may be a limit on the total current able to be produced. Therefore, depending on the active power level, there maybe a tradeoff between the active and reactive current contributions. It is not clear from the clauses which requirement has priority, the active or reactive current contribution.
- 8.20B (2). This clause implies a perfectly linear and instantaneous response between the balanced voltage level and the active power contribution of the machine. Very few generators (wind or otherwise) are likely to have such a perfect response, with damped oscillations of active power output being much more typical in my experience. Further, in order to control drivetrain transients in certain wind turbine configurations, it may be necessary to ramp up power output in a controlled manner. This suggests to me that either dispensations to this clause will need to be made on a very pragmatic basis, or alternatively that this clause is reworded. A possible reword could be along the lines of "within X seconds of fault clearance the active power injection shall recover to Y% of the pre fault levels."
- 8.20D (2). "replacement generating unit". I would urge care in the implementation of this

clause. While I support the intention to enforce fault ride through where a generator is replacing its generation units with improved units (say repowering a wind farm with new wind turbines), I do not consider this should apply where a generating unit is being replaced on a like for like basis. For example, where a single wind turbine requires becomes unservicable, the wind farm owner should be able to replace the turbine on a like for like basis. Preventing this would probably preclude turbine replacement in many circumstances as wind turbines of that model may simply not be available with fault ride through capability and installing equipment at the substation is likely to be prohibitively expensive.

Regards
Philip Wong Too