09 June 2017

Con Carellas
Essential Services Commission
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Submitted online to: escosa@escosa.sa.gov.au

RE: Inquiry into the licensing arrangements for generators in South Australia

Vestas welcomes the opportunity to make a submission to the Essential Services Commission's (ESCOSA)'s inquiry into the additional technical license conditions for generation plant in South Australia.

Vestas is the world's leading supplier of wind power solutions, having installed close to 82 GW of wind turbines in 76 countries across the globe. Vestas is also a member of the Clean Energy Council (CEC).

Vestas is pleased to submit the following comments:

Reference is to AEMO "Recommended Technical Standards for Generator Licensing in South Australia" Advice to ESCOSA published 31 March 2017.

Section 3.3.1 Performance during and subsequent to contingency events

Reactive current injection requirements

The reactive power injection/absorption plot (Figure 5) shows the response requirement up to ±50% change from nominal voltage. It is not clear what is the requirement below 50%. There is a limit beyond which the reactive current injection stops. Typically this is 20% of residual voltage. As for reactive power absorption, it ceases at voltage above 20% of nominal.

Please note that older generators will have more limited capability of reactive current injection and therefore individual generator will need to be consulted on the existing capability prior to imposing a retrospective requirement.

Active power injection requirements

Please note that older generators will have more limited capability of active power recovery time and therefore individual generator will need to be consulted on the existing capability prior to imposing a retrospective requirement.

Multiple low voltage disturbance ride-through

This section describes the multiple low voltage disturbance ride-through requirement. As it stands now, the proposed requirement of withstanding 1800ms regardless of disturbance type, duration,

and residual voltage at the generating unit's terminal is too open ended and beyond the capability of a type 4 WTG. In this proposal, it is also unclear whether the requirement for multiple ride through in addition to S5.2.5.4, means that the generator must survive a long duration shallow voltage disturbance plus the multiple faults immediately after the voltage disturbance. If that is the case, then again this is beyond the capability of a type 4 WTG.

The requirement for multiple ride through based on the total fault duration alone represent only part of the picture of a typical WTG capability. In practice, the capability for multiple ride through is a function of not only the fault duration but also the recovery time. Thus the number of fault ride through and hence the energy used for recovery needs to be considered. In essence, given the same total fault duration, it is more onerous for higher number of faults with shorter duration compared to lower number of faults with longer duration. For example, 1800ms total fault divided by 10 faults of 180ms might be acceptable for a particular WTG, but if divided into 18 faults of 100ms might exceed the capability due to the additional 8 instances of fault recovery.

A clearer requirement should define the maximum fault duration, minimum interval time between faults, lowest residual voltage on the generator terminal, and the number of multiple faults to ride through within a defined window of time.

In addition, the way the requirement is written currently, the reference to the 5-minute moving window must be understood that once activated, the capability for multiple ride-through is not available again until sufficient time has elapsed to cool down the dump load which typically is around 30 minute.

Also please note that older generators will have smaller capabilities of multiple ride through and therefore individual generators will need to be consulted on the existing capability prior to imposing a retrospective requirement.

High voltage disturbance ride-through

Please note that older generators will have more limited capability of high voltage ride through and therefore individual generator will need to be consulted on the existing capability prior to imposing a retrospective requirement.

Section 3.3.3 Frequency disturbance ride-through

Please note that older generators will have more limited capability in response to rate of change of frequencies and therefore individual generator will need to be consulted on the existing capability prior to imposing a retrospective requirement.

Section 5.3.2 Obligations on connecting parties

The proposed requirement for generating system to operate down to SCR of 1.5 and X/R of 2 should not be used as a generic requirement. The performance of the WTG in site specific minimum SCR and X/R is subject to the wind farm solution for that site which may include control system tuning and additional compensation equipment such as STATCOM, synchronous condensers and the like. If a site does not have SCR of 1.5, it is placing an unnecessary burden on the generator to have to configure the generating system to be capable of operating at an SCR and X/R that is not applicable for that site.

Section 6.3.1 Capability for automatic active power response to frequency changes

Older wind farms might not have capability and facilities to implement automatic active power response to frequency changes. Individual generator will need to be consulted on the existing capability prior to imposing a retrospective requirement.

Section 7.3.1 Simulation models

The proposed requirement for models (whether RMS or EMT type) to be pre-validated against actual response with identical control system and settings for the site specific minimum SCR and X/R criteria is not realistic. It is highly unlikely there is another site somewhere else with identical (or even similar) power system characteristics, even though they may have the same SCR.

The performance of the WTG in site specific minimum SCR and X/R is subject to the wind farm solution for that site. The solution may include specific tuning, compensation equipment such as STATCOM, synchronous condensers and the like. Therefore the pre-validation of WTG model alone for the minimum SCR is not robust and not a good indicator that the WTG can or can not connect at that connection point. The site specific SCR and X/R alone should not be heavily relied on to determine the performance of the wind farm as this does not represent accurately the complex behaviour of the power system.

In the case of EMT model, it is often the case that the model code is identical to the code running in the actual WTG. Hence confidence is assured that the EMT model performance is as close as practically possible to the actual WTG performance. The requirements to validate against site-measurement would not add any further confidence on accuracy of the model.

The RMS model can then be validated against the EMT-model and therefore the requirement to validate RMS model against actual performance is unnecessary.

The provision of EMT model will be in an encrypted black-box format and only provided to AEMO.

Vestas acknowledge AEMO's needs for requesting detailed EMT model for some specific power system studies, and currently Vestas provide such model to AEMO under the mutual understanding such model is provided on a need to know basis, it is treated with 100% confidentiality and only accessible by AEMO.

Third parties, including NSPs can have access to Vestas' EMT-type model if the third party request the model from Vestas on a need to know basis (ie., reveal what it is used for), together with NDA or confidentiality agreement /clause signed between Vestas and the third party. Vestas is concerned the model might be distributed to unknown parties to perform reverse engineering, although the model is encrypted, but due the accuracy and detail of the model, it can reveal Vestas competitive solution and capability of the turbine during challenging grid condition, such as weak grid, SSR mitigation, etc.

It is worth noting that the risk of non-compliance with regards to model accuracy rests on the generator and not with AEMO. Therefore, pre-validation of models should not be a requirement as

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proposed by AEMO. In case of non-compliance, the generator will not be allowed to connect to the grid. Therefore there is no risk to the power system.

Section 8.3.2 Ability to assist with system restart

The requirement “Subject to provision of minimum fault level by on-line synchronous machines, it must be possible to operate the non-synchronous generating systems for at least three hours with auxiliary loads only.” Can be met by controlling the active power output from all of the WTGs based on AEMO’s instruction.

However, if this requirement relates to the availability of UPS power to power the auxiliary loads while no power import from the grid is available, then the typical WTG UPS time is 30min. Therefore the requirement for 3 hours of UPS power for auxiliary load is not possible at this time.

Please feel free to contact us should you require further information or other supporting documents.

Yours sincerely,

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