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Dear Greg

Response to Public Consultation

Please find attached the final Draft of SKM's Intermittent Generation Penetration within the Wholesale Electricity Market – Work Package 4 Report. You will find some changes in the report that are in response to the stakeholder comments provided. A detailed summary of SKM's response to the comments received is provided in the table below.

Section	4.8 Communication
Comment	<p>System Management currently has communication and SCADA visibility of all 3 major windfarms in the SWIS and is attempting to secure wind speed, wind direction, air pressure and air temperature at hub height. System Management also has the ability to curtail each of these windfarms.</p> <p>1. The WEM rules should be changed to include an obligation to provide real time data requirements (System Management outcome for this issue is unclear. It appears that there are two recommendations arising from this, agreed, it has to be placed somewhere and it must be enforceable).</p> <p>2. "Changes to the operation of the market will be required to more effectively determine the extent to which intermittent generation should be curtailed. The specification of dispatch communication requirements is highly dependent on the manner in which the market evolves to meet this challenge. In determining these market changes, SKM recommend that consideration be given to the communication requirements of the recommended market solution. " (this is unclear) System Management must be able to issue dispatch instructions for each facility irrespective of the market rules. This can be done by phone or SCADA. Currently each windfarm is unmanned for operational purposes so SCADA control has been provided. This appears to be working correctly.</p>

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SKM Response	SKM agrees that system management must be able to dispatch independent of the market and has taken this as a given. This point was to cover the possibility of a "real time" market as the commercial mechanisms to determine when any intermittent generation curtailment is appropriate. In this case the communication requirements of the market may be beyond the minimum "telephone" requirements stipulated in the Technical Rules and the Market Rules. The use of SCADA for dispatch is currently agreed on a case by case basis.
Report Change	SKM have noted that all of the existing windfarms are currently fitted with SCADA control (although SKM does not have information on the level of curtailment control).
Section	4.5 Ramping Rate
Comment	An observation should be made in regard to the ramping rate requirement explored in section 4.5. A maximum rate of 15% per minute is imposed on the intermittent generator. I believe that limiting the load following requirement is necessary. The issue as described as it is looking at continuous control rather than control during contingencies. Similarity to Ireland is key. System Management faces frequency control issues when an intermittent generator ramps rapidly up on its own accord. This generally happens when a wind front passes through. The front raises the wind speed and causes a rapid shut down of the farm pushing all scheduled generators up. When the front has passed the wind speed lowers to a level that allows the full output of the windfarm to be restored almost immediately, requiring all scheduled generators to be reversed. This proves to be difficult to control.
SKM Response	The requirement for system generation to respond to changes is addressed by the load following requirements of the Market Rules. SKM refers to the work undertaken in Work Package 3 that indicates that the maximum ramp rate is not an effective mechanism to minimise load following requirements.
Report Change	No Change.
Section	4.6 Voltage Excursion – Overvoltage Curve
Comment	The requirement has been revised and new curve produced in the (yet to be released) new revision of the Technical Rules,



	<p>based on the actual protection clearing times. The latest major windfarm project had no difficulties complying with the new curve (the actual plant overvoltage withstand capability is higher than that required by the new curve).</p> <p>Similarly, as mentioned for the voltage fault ride through, the site specific voltage envelope, based on the actual fault clearance times, is determined by simulations, and that curve used instead of the 'default' voltage fault ride through curve. The latest revision of the Technical Rules (yet to be released) has clarified that apparent ambiguity and deficiency. Comprehensive coverage of the topic.</p>
SKM Response	<p>This is consistent with SKM's commentary on the issue. SKM would reiterate that increasing the accuracy / information available through the "automatic" standards can improve the efficiency development process, decreasing uncertainty and cost.</p>
Report Change	<p>No change.</p>
Section	<p>4.6 Voltage Excursion – Overvoltage Curve</p>
Comment	<p>p23. Fault application. It should be noted that the overvoltage limit curve only applies to phase to phase voltage. This is not impacted by the X0/X1 ratio.</p>
SKM Response	<p>Noted.</p>
Report Change	<p>Footnote 7 added.</p>
Section	<p>4.6 Voltage Excursion – Overvoltage Curve</p>
Comment	<p>p24 section 4.6.4. The curve is based on a typical surge diverter protection voltage.</p>
SKM Response	<p>Noted.</p>
Report Change	<p>Discussion in the recommendation has been altered to reflect this.</p>
Section	<p>4.7 Post Fault Voltage Control</p>



Comment	p.28, section 4.7.2, 1st bullet point. Misunderstanding. The design should facilitate the plant performance characteristic. The driving factor is the system issue in that major renewable energy generation is typically located in remote parts of the system where they largely dominate transients in the local network and could bring it down if the response is sluggish or if the network support (through MW and Mvar injection) disappears. Being 'self-sufficient', without relying on the network help to remain connected and supply loads (otherwise supplied by that generator), facilitates mass proliferation of renewable energy generation, equity among generators and, effectively, eliminates the need for, otherwise, cross subsidy.
SKM Response	This dot point was taken from stakeholder feedback and as such represents a view within industry on the requirement of the Technical Rules.
Report Change	No change.
Section	4.7 Post Fault Voltage Control
Comment	p.28, 2nd bullet point. Misunderstanding. The apparent confusion has been clarified in the new (yet to be released) Technical Rules, through, to the effect of, subject to the availability of the primary energy source.
SKM Response	This dot point was taken from stakeholder feedback and as such represents a view within industry on the requirement of the Technical Rules.
Report Change	No change.
Section	4.7 Post Fault Voltage Control
Comment	p.28, 3rd bullet point. Misunderstanding. The requirement is for the generator to generate enough MW & Mvar necessary to remain connected to the grid (i.e. not to rely on the grid support to remain connected). Note, no injection of MW or Mvar into the SWIS is required by this particular clause (which should be read in conjunction with clause 3.3.3.3(h), as a prerequisite).
SKM Response	This dot point was taken from stakeholder feedback and as such represents a view within industry on the requirement of the Technical Rules.



Report Change	No change.
Section	4.7 Post Fault Voltage Control
Comment	p.28 section 4.7.3. first paragraph. This is not strictly true. If it is a new generator causing the issue then the performance of the generator will have to be changed so that it does not cause the issue.
SKM Response	Agreed, this clause assumed generators provide reactive power flexibility not available in other system components.
Report Change	Added clarification "driven by non-generation system components".
Section	4.8 Communication
Comment	p29, Denmark - It is noted that one part of Denmark normally operates in the UCTE interconnection, another (north-eastern, it appears) in the NORDEL interconnection and that the two interconnections may have different connection and plant performance requirements.
SKM Response	Noted.
Report Change	Clarified that these requirements apply to connections to Eltra and Elkraft networks.
Section	4.8 Communication
Comment	p.30, section 4.8.2, 1st bullet point - After nearly six months of operation, the new Telstra's system (IP cloud) does not seem to have shown inferior performance to the old system. Western Power has been monitoring and testing the performance of the new Telstra system for own reasons. The results, so far, have been satisfactory.
SKM Response	Noted.



Report Change	Comment included in the final report as stakeholder feedback.
Section	4.8 Communication
Comment	p.30, section 4.8.2, 2nd bullet point - Disagree with the statement. Operational planning and operation of the distribution network require visibility and knowledge of the MW output of the generator, in order to maintain the reserve capacity in case the generator trips. This does not apply to loads, whose sudden trip cannot overload the distribution network. Hence comparison of generator and loads is not justifiable in this case.
SKM Response	This section provided a stakeholders opinion. SKM notes, in a future with large amounts of embedded generation, a trip of a large load may overload the distribution system with reverse power flow. This discussion leads to the requirement of "smarter" networks over time; this discussion is beyond the scope of this study.
Report Change	No change.
Section	General
Comment	Various typographic issues
SKM Response	Actioned.
Report Change	Changed as required.

Yours sincerely

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