

Grid Code Workgroup Consultation Response Proforma

GC0100 EU Connection Codes GB Implementation – Mod 1

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm on 2 October 2017** to grid.code@nationalgrid.com.

Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Chrissie Brown at Christine.brown1@nationalgrid.com

Respondent:	<i>Isaac Gutierrez</i> <i>Senior Electrical Engineer</i> <i>Telephone number work: 01416143104</i> <i>Mobile: 07761693652</i> <i>Email: igutierrez2@scottishpower.com</i>
Company Name:	<i>Scottishpower Renewable Ltd (UK)</i>
Please express your views regarding the Workgroup Consultation, including rationale. (Please include any issues, suggestions or queries)	<p><i>For reference, the Grid Code objectives are:</i></p> <ul style="list-style-type: none"> i. To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity. Impact of the consultation on this objective is negative specifically with the requirements of FFCI (option 1 and 2) which will not lead to an economical system ii. To facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity). Impact of this consultation on this objective is neutral iii. Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole. Impact of consultation is negative at the moment if FFCI option 1 or 2 are included in the UK Grid Code iv. To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and Impact of this consultation on this objective is negative as National Grid in trying to implement more onerous

	<p>requirement is not complying with European Law</p> <p>v. To promote efficiency in the implementation and administration of the Grid Code arrangements. Impact of consultation is positive on this objective</p>
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Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0100 Original proposal, or any potential alternatives for change that you wish to suggest, better facilitates the Grid Code Objectives?	Yes, to some extent. Please refer to comments on objectives
2	Do you support the proposed implementation approach?	No, timescale are too short which are not allowing current wind farm tenderers to exactly know what grid code requirements they have to meet. The implementation date of 17 May 2018 does not provide enough room for timely decision making in regards to electrical balance of plant and wind turbines electrical specifications. SPR considers that a grace period should be implemented until December 2018 so any contract signed after December 2018 should comply with the Grid Code changes otherwise the implementation date of 17 May 2018 will highly impact developers in particular the requirements of FFCI as they are specifically for wind turbines frequency converters (requirement that will not only impact wind turbine frequency converter but the turbine system as a whole please refer to answer below in question 3)
3	Do you have any other comments?	No
4	Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?	<i>If yes, please complete a WG Consultation Alternative Request form, available on National Grid's website, http://www2.nationalgrid.com/uk/industry-information/electricity-codes/grid-code/modifications/forms-and-guidance/ and return to the Grid Code inbox at grid.code@nationalgrid.com</i>

Specific GC0100 questions

Q	Question	Response
1	Removing More Stringent Requirements' concerns have been expressed by some Workgroup members that applying more stringent requirement on newly connecting parties (that fall within this scope of the EU Network Codes for generation, demand and HVDC systems) maybe incompatible with EU law. Do you have any views on this topic that could assist the Workgroup when they are considering the topic in due course?	Although currently most SPR power generating plant is able to meet the current UK Grid Code requirements, there is certainly opposition from SPR to National Grid applying more stringent requirements than those currently in RfG to new generators as definitively there will be an impact in CAPEX and OPEX. SPR believes that there is incompatibility with European Law as some of the requirements that National Grid is trying to implement are more onerous than those set out in RfG
2	Are you comfortable with using the EU definition of Maximum Capacity instead of the GB definition of "Registered Capacity"?	Yes, as long as there is consistency within the UK Grid Code using this definition
	Fast Fault Current Injection questions	
3	What are your views on options 1, 2 and 3 as set out in paragraph 4.4 for Fast Fault Current Injection and which option (if any) would you prefer?	<p><u>Option 1</u> is not viable in the short term neither in the long term as VSM is a new technology concept that is both undeveloped and untested hence it will take a considerable amount of time for the VSM technology to reach maturity and become commercially viable. In continental Europe none of EU members adhering to the RfG is implementing in their grid codes requirements for VSM. In addition, National Grid is not providing adequate substantiation for the need of VSM.</p> <p><u>Option 2</u> is not viable either from the point of view of CAPEX and OPEX as requiring reactive current priority up to a maximum of 1.25 pu for voltage depression below 0.65 pu will certainly increase the cost of the wind turbines due to the fact that bigger frequency converters will be required to meet this requirement. Not only manufacturers will need to look into the size of converters but also all other electrical and mechanical components within the wind turbine that interact to provide FFCI. In addition, it is not clear what amount of active current is required for voltage depression below 0.65 pu., The modification only states the amount of reactive current required and nothing is said in relation to active current. What shall be done with the active current below 0.65 pu voltage depressions, are we</p>

		<p>allowed to inject zero active current?. Additionally in regards to reactive current is the expectation to inject this amount of current for balance and unbalanced faults?. Is National Grid expecting negative sequence current injection? This might not be possible as for example a Y-delta transformer installed in the nacelle of a wind turbine will tend to block the negative sequence current. Also, it is not clear what should be the active current contribution for voltage depression above 0.65 pu against reactive current contribution i.e. proportion of active current and reactive current.</p> <p><u>Option 3</u> is to certain extent acceptable and this option is preferred by SPR as this will have no impact in CAPEX and OPEX but the requirement will need to be clarified in relation to the amount of active current that is required for voltage depression below 0.65 pu. The modification only states the amount of reactive current required and nothing is said in relation to active current. What shall be done with the active current below 0.65 pu voltage depressions, are we allowed to inject zero active current?. Additionally in regards to reactive current is the expectation to inject this amount of current for balance and unbalanced faults?. Is National Grid expecting negative sequence current injection? This might not be possible as for example a Y-delta transformer installed in the nacelle of a wind turbine will tend to block the negative sequence current. Also, clarifications will be required for active current contribution for voltage depression above 0.65 pu against reactive current contribution i.e. proportion of active current and reactive current.</p>
4	Do you have any alternative fast fault current injection solutions noting that the requirement applies to the Converter not the wider Power System?	<p>A solution applied to the converter to meet FFCI will definitively increase both CAPEX and OPEX for windfarms. As mentioned in SPR answer 3, not only manufacturers will need to look into the size of converters but also all other electrical and mechanical components within the wind turbine that interact to provide FFCI. There should be solutions implemented in the transmission system as well in addition to those that National Grid is seeking to implement on Generators. For example SPT's project Phoenix is an industry initiative that should not be ignored, including the outcome of the work related to the Commercial Model Development for new services essential to Grid Operation. (See slide pack attached from latest Stakeholder Engagement from page 23)</p>

		 <p>Phoenix Stakeholder Event 060717 slide d</p>
5	In considering the three Fast Fault Current Injection options 1, 2 and 3 in paragraph 4.4 do you have any comments in relation to technology readiness, cost implications, and can they be implemented date within the context of product development timescales?	Please refer to comments in question 3. Additionally some manufacturers have intimated to SPR that there will be a negative cost-benefit case for not offering products to the UK market as is not on their interest to meet these new requirements (as their manufacturing cost will increase and the profits will be extremely marginal) which could definitively lead to increased energy cost in the electricity markets due to unavailability of wind turbines options. In this scenario, the developer will be forced to buy (or not) few products available to the UK market as there will not be a choice of wind turbines. This could also push developers to not go ahead with certain projects at all due to the increased investment costs. In absence of financial support from the government on onshore wind for example, wind farm developers are changing their economic/investment models (e.g. subsidies are being replaced for Power Purchase Agreement) on onshore windfarms and technical requirement like FFCI (option 1 and 2) could harm this kind of ventures and definitely affect development of onshore wind.
6	Do you have any evidence to support your views?	SPR had conversation with wind turbines manufactures although exact details cannot be disclosed due to confidentiality issues. SPR prefers this information to be disclosed directly from wind turbine manufacturers to National Grid
7	Do you have any views on the specific costs related to the additional requirements?	Yes, please refer to both answer 3 and 5
8	Is the current proposed wording for the remote end HVDC and DC Connected Power park modules sufficient to facilitate future new technology?	No, there should be explicit statements mentioning that new technologies can be utilised to meet the requirements
	Banding questions	
9	What are the specific costs related to the additional requirements?	Mainly for small generator Type A and B there will be associated cost with meeting FRT requirements
10	Do you have any views on the banding thresholds for the original and those suggest for the possible alternative?	New proposed banding will affect connection in the transmission system in Scotland as SSE and SPT have a different approach to small, medium and large generators. For example Type C generator did not

		have to provide any frequency response now with the new requirements; the generators have to provide frequency response. Although SPR understands why frequency response is required at this level of generation, National Grid should make sure that the current ancillary services market is also implemented for the generator under the RfG requirements that are to be included in the UK Grid Code.
11	Can you provide any feedback/comments on the associated legal text?	Legal text seems ok although there are missing comments made during the legal text revision meeting. A second meeting just for legal text review shall be held
	Fault Ride Through	
12	Do you support the fault ride through voltage against time curves If not please state why you disagree, what alternative you would recommend and your justification for any alternative?	Yes
13	Do you have any specific views about the proposal to modify the stage 2 under voltage protection for distributed generation interface protection?	No,
	Other questions	
14	Does the Legal drafting contained in annex 2 and 3 deliver the intent of the solution outlined in section 3?	No as it is not taking into consideration yet the impact of FFCI. In the consultation document the following is mentioned: <i>“Without FFCI as proposed (does this mean VSM option?), the proposal will need to lower the value of U_{ret} (from 0.1pu to 0.05pu) and even then, this value would only appropriate in the short term before a further review is likely to be required.”</i> . The final legal text will depend on both the consultation responses and defining values like U_{ref} properly under the absence of VSM
15	Do you have any information based on the proposed solution in respect of implementation costs?	No