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:	*Please insert your name and contact details (phone number or email address)*
Company Name:	*Please insert Company Name*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	*For reference, the Grid Code objectives are:* i. To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity 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) 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 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 v. To promote efficiency in the implementation and administration of the Grid Code arrangements

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
2	Do you support the proposed implementation approach?	No
3	Do you have any other comments?	The time frame given for the industry consultation is not sufficient to develop a clear alternative proposal. Proposal is given within comments. If the opportunity arises, a more specific proposal can be developed. The consultations, most of them with very short response times and running through the summer, are not helping stakeholders to consolidate their views in the most constructive way.
4	Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?	*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*

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	The EU Network Codes are in most areas flexibly worded to allow individual members to derive national requirements. Of highest importance is the focus on interconnection requirements rather than new more stringent requirements for individual generators. Current grid code review and other existing panels should be used to discuss and derive the requirement based on cost benefit analysis. NGET as network operator and member of ENTSO-e has significant input into the development of the EU Network Codes and should adhere to GB review and acceptance processes. EU Network Codes in its overall framework are not intended to interfere significantly with national matters and to drive higher

	course?	requirements.
2	Are you comfortable with using the EU definition of Maximum Capacity instead of the GB definition of “Registered Capacity”?	No. Registered Capacity should stay. There could be some issues where the number of turbines exceed the available export capacity (sometimes known as overpowering), this is reasonably common with maximum production restricted to a level below the nameplate rating. In this case a PPM could unfairly end up in a higher band because of the nameplate rating of the equipment being used to determine the Maximum Capacity. It is noted that overpowering when considered with respect to dynamic operation, will be beneficial for the overall performance of the PPM and expected to be beneficial for the grid as well. If Maximum Capacity is legally binding for implementation, then Registered Capacity needs to be included additionally and relationship to Maximum Capacity shown.
	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?	Current grid code wording for zero FRT and maximum reactive current infeed as per technology capability are sufficient. It could be extended to include a definition of response timing and minimum amplitude performance of the fast fault current injection with reference to the voltage characteristic. 1 p.u fast reactive current injection (using nominal machine active current as base at 1pu voltage) is possible at present. Option 1 (VSM Concept). It should not be up to the network operator to drive technology development to a particular concept. VSM is a solution to a requirement and as such not a viable preferred option for a grid code. This is currently based on research only. The estimated/ presented benefits may not be real and applicable to the real wind turbine. It seems premature to make this a binding grid code requirement without substantially further and wider (e.g at European/international level) industry discussion. This position is already reflected in the discussion in the workgroup report. To provide more (Option 2) would require a new

		design of hardware components. Flexible wording of PPM rather than PPU performance and acceptance of project specific options would enable the use of additional equipment and enables project specific cost benefit analysis and remuneration as ancillary service. Wind turbines are capable of riding through a 0 p.u voltage fault at the MV terminals. The preference would be to specify a lower retained voltage and reduce the fast reactive current injection requirement. Therefore our preference would be for implementation of option 3.
4	Do you have any alternative fast fault current injection solutions noting that the requirement applies to the Converter not the wider Power System?	The use of additional equipment within the PPM should not be ruled out. A STATCOM or inverter interfaced storage device could be used to provide additional/faster current injection.
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?	Option 1 (VSM Concept). This is a solution and not a requirement. There are different solutions to the requirement and choosing one concept excludes competitive options and technology development. Option 2 (1.25 p.u fast reactive current) This requirement could be achieved, however requires upgrade and extension of current hardware designs and would need sufficient lead time for the development. Cost consideration to fulfil the requirements include R&D, Certification/Test and Validation. Option 3 (1.0 p.u fast reactive current) This option can be achieved at present, however some R&D effort will be required to adjust to this performance.
6	Do you have any evidence to support your views?	Fault ride through documentation (including tests and models) have been submitted confidentially to NGET for our technology for various projects and for type registration, confirming our technology performance and control.
7	Do you have any views on the specific costs related to the additional requirements?	A Larger LVRT funnel together with fast active power recovery will require additional R&D effort, hardware changes, testing and validation costs. If the time for active power recovery after fault is increased from 0,5s to 1s, as found in the rest of the world, will reduce this unnecessary additional cost for DFIG wind turbines. Full converter technologies will not have issues with the 0,5s. recovery time.
8	Is the current proposed wording for the remote end HVDC and	We require more time to analyse the proposal

	DC Connected Power park modules sufficient to facilitate future new technology?	
	Banding questions	
9	What are the specific costs related to the additional requirements?	
10	Do you have any views on the banding thresholds for the original and those suggest for the possible alternative?	
11	Can you provide any feedback/comments on the associated legal text?	
	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?	We support the revised voltage against time curves, however we would comment that this does make the GB fast active power recovery more difficult to achieve. We have commented in the past that achieving this requirement is technically very challenging for larger rotor turbines (e.g. greater than 120m diameter). For DFIG wind turbines this will increase the technology costs.
13	Do you have any specific views about the proposal to modify the stage 2 under voltage protection for distributed generation interface protection?	
	Other questions	
14	Does the Legal drafting contained in annex 2 and 3 deliver the intent of the solution outlined in section 3?	"The converter of each **Type B**, **Type C** and **Type D Power Park Module…** " Drafting implies that a PPM will only have 1 converter, which is not necessarily the case.
15	Do you have any information based on the proposed solution in respect of implementation costs?	