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:	Alastair Frew
Company Name:	ScottishPower Generation Ltd
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	Yes as it implements European Law.

	that you wish to suggest, better facilitates the Grid Code Objectives?	
2	Do you support the proposed implementation approach?	Yes
3	Do you have any other comments?	No
4	Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?	No

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?	Looking at the third package it consists of a number of directives and regulations, with the two key pieces of legislation relating to requirements on electricity providers being "Directive 2009/72/EC common rules for the internal market in electricity ..." and "Regulation 714/2009 on conditions for access to the network for cross-border exchanges in electricity ...". These two pieces of legislation seem to split requirements into two with 2009/72/EC dealing with the safety and minimum technical requirements, whilst 714/2009 deals with setting cross-border rules on trade, energy flows and charging. In terms of 2009/72/EC this was introduced in 2012 with GB responding indicating its minimum technical requirements were as follows "Article 5: Electricity Safety, Quality and Continuity Regulations 2002, Electricity Transmission Licence, Electricity Distribution Licence, Electricity Interconnector Licence attached. Technical codes including the Grid and Distribution Codes may be found at *http://www.ofgem.gov.uk/Licensing/ElecCodes/Pages/ElecCode.aspx* " Currently this consultation is dealing with the "Regulation 2016/631 Requirements for grid connection of generators" which has been produced as a deliverable from 714/2009. Given the scope of 714/2009 it is surprising that such a technically detailed version of 2016/631(RFG) has been produced on the bases of a three word title in Article 8 paragraph 6 (b) "network connection rules;", however we are where we are. Specifically dealing with no more stringent requirements, this seems to be based on a premise that any technical requirements not included in the connection codes 2016/631(RFG), 2016/1388(DCC) or 2016/1447(HVDC) are more stringent, and hence is not permissible. As previously stated minimum technical requirements are detailed within 2009/72/EC and not 714/2009 which defines the criteria for 2016/631(RFG). This is further emphased in the opening whereas section of 2016/431(RFG) where item (2) second sentence states "..... In addition Article 5 of Directive 2009/72/EC of

		the European Parliament and of the Council (2) requires that Member States or, where Member States have so provided, regulatory authorities ensure, inter alia, that objective technical rules are developed which establish minimum technical design and operational requirements for the connection to the system. ...” . This indicates that 2016/631(RFG) is an addition to any rules set by 2009/72/EC. Moreover it is clear that it was not the indention for the new network codes to remove existing national codes as 714/2009 which defines the requirements for drafting the network codes has in Whereas (7) third sentence “The network codes prepared by the ENTSO for Electricity are not intended to replace the necessary national network codes for non-cross-border issues.” Given the above there does not seem to be any justification for the premise that technical requirements not included in the network codes are more severe and should not be allowed. In summary in GB the current accepted minimum technical standards appear to be the Electricity Safety, Quality and Continuity Regulations 2002, Electricity Transmission Licence, Electricity Distribution Licence, Electricity Interconnector Licence, the Grid and Distribution Codes with additional requirements of the network codes being added as they are enacted. The only issue which may exist is which version of the various documents is currently the approved version. Following the initial submission in 2012 there does not appear to be any clear evidence that the modification process in “Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations” has been followed.
2	Are you comfortable with using the EU definition of Maximum Capacity instead of the GB definition of “Registered Capacity”?	Yes
	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?	Option 1 appears to be a desire from NGET to introduce a Voltage Source Response, however this appears to be based on simulations and assumption of equipment capabilities. NGET indicated during the workgroup that the requested values were based on what the thought they wanted and not on the ability of equipment to achieve these requirements and hence a subsequent workgroup would be required to reset the values. On the bases that the values will need to be reset it is difficult to see the justification to code option 1 into legal text as insufficient work has been done to date and could end up leaving potential new generators with an unachievable requirement. In terms of the other options the preferred option would be option 3.
4	Do you have any alternative fast fault current injection	No

	solutions noting that the requirement applies to the Converter not the wider Power System?	
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?	No
6	Do you have any evidence to support your views?	No
7	Do you have any views on the specific costs related to the additional requirements?	No
8	Is the current proposed wording for the remote end HVDC and DC Connected Power park modules sufficient to facilitate future new technology?	
	Banding questions	
9	What are the specific costs related to the additional requirements?	All new generators down to 10MW will now have additional cost for simulations to prove they are capable of fault ride through. In terms new generators connecting at 11kV to meet the fault ride through requirements, whilst currently would be provided without a generator transformer, going forward to demonstrate all auxiliaries will still function a

		generator transformer will be required to ensure the station auxiliary busbars remain suitably above zero volts. There are also various other potential costs.
10	Do you have any views on the banding thresholds for the original and those suggest for the possible alternative?	**General Intension** The proposer's banding levels appears to be based on a perceived local issue related to local system faults and not cross-border trade issues, which is the propose of 2016/631(RFG). The original intension of 714/2009 is to improve network access and remove obstacles reducing cost. Given this the proposer's banding proposal is reducing the banding levels from highest possible on the bases of a local issue and not a cross-border issue it is going against the original intension of the third package, by forcing smaller parties to increase their investment costs to cover the additional requirements . It is the view of this respondent that adopting the alternative proposal for the high option will not add additional cost to lower level participants and hence better address the original objectives by increasing access and reducing obstacles. **Harmonisation** The proposer's justification for this reduced banding level states in section 3.2 fourth paragraph "The majority of European TSOs for Member States in Continental Europe are proposing generator banding levels lower than the maximum permitted under RfG, many of which, if not being comparable with the proposed GB levels, are lower than that proposed for GB. The proposer therefore believes there is a greater likelihood of harmonisation with Continental European neighbours with a lesser banding level than the maximum (noting that NRA approval is required to set these levels)." This justification is based on potential harmonisation across Europe which is similarly against the intensions of 714/2009 which states in whereas (29) "In particular, the Commission should be empowered to establish or adopt the Guidelines necessary for providing the minimum degree of harmonisation required to achieve the aims of this Regulation." Again it is the view of this respondent that adopting the alternative proposal for the high option will not add additional cost to lower level participants and hence better address the original objectives by increasing access and reducing obstacles. **Frequency Response** The proposer's justification then moves on in section 3.2 paragraph 6 to state "Threshold of 10MW for GB would provide a greater proportion of Generation inherently capable of contributing to frequency response, noting that commercial facilitation is not in the scope of RfG to consider, but a factor when it comes to cost." Whilst it is accepted that if a lower banding level is used by default this must result in more frequency response capacity, however the real question is, will this not just be added to the current large amounts of unused frequency response capacity at additional cost to the generator? This view has been previously stated by this respondent in the previous banding consultation in April 2016 and a revised version using the proposer's latest banding options is repeated below but due to the short timescales is still based on the late 2015 data, but this is still believed to be relevant.

		This analysis initially reviews the existing generation and proposed generation in 5 years' time using data available in the TEC Register dated 16 November 2015, Embedded Register dated 16 November 2015 and 2015 week 24 data plus DNO ED1 allows comparisons between existing and future capacity. Summary tables 1a & b and 2a & b of this data which are referred to are given at the end of this section of text. Looking at the available frequency response if the proposed banding were to be applied to the current generation mix it can be seen in tables 1a & b both options would result in a range of the approximately 77 to 88 GW of plant available to provide response. The difference between the high and proposer's banding options only offers 11% increase or 10,000MW of generating capacity. The additional capacity then only equates to potentially 10% additional frequency response capacity of 1000MW comparing proposed banding to the highest banding option. Similarly looking forward at the potentially available frequency response if the proposed banding were to be applied to the end of 2021 generation mix it can be seen in tables 2a & b both options would result in a range of the approximately 127 to 139 GW of plant available to provide response. The difference between the high and proposed banding options only offers a 7% increase or 12,000MW of generating capacity. The additional capacity then only equates to potentially 10% additional frequency response capacity of 1,200MW comparing proposed banding to the highest banding option. It should also be noted that this has been applied to all generation and not just the generation connected after 2018 and in practice the proposer's banding option may only pick up an additional 2,000MW of generating capacity and not the 17,000MW. Based on the current frequency response average usage levels of Primary 657MW, Secondary 448MW and High 708MW (based on the average hourly usage volumes from December 2013 to September 2015) less than 7.5% of the current total available capacity is being utilised. If the proposers banding option was to be in place today the potential changes would be to reduce the current frequency response capacity usage to 6.6% of the available total. Looking forward 5 years assuming the infeed lose has not changed then the current response requirements should still be applicable in this scenario. Given that the available generation to provide response increases by just approximately 50GW from current levels under the high option with 70% of plant still providing response there should be in 6 years' time still adequate response margins, with utilisation levels even lower. Whilst still agreeing the proposer's banding option would result in an increase in frequency response capacity, its usage this is likely to be limited and is not clear what benefit this would provide. The high option would appear to suffice in terms of response requirements as there appear to be no detrimental cost implications.

Tables 1a & b below summaries the data for current generation available volumes based on the TEC Register dated 16 November 2015, Embedded Register dated 16 November 2015 and DNO week 24 data 2015.

Total Generating capacity in MW in each band from each source				
Data source	Generator size band (MW)			
	0.8kW - 1MW	1 to 49.9	50 to 74.9	>75MW
DNO ED1	2880	14585	7199	0
TEC Register		1380.43	887.85	67702.9
Embedded Resister		1269.77	233.1	75
Total	2880	17235.2	8319.95	67777.9
Generator Banding				
Type A		2880		
Type B		15854.77		
Type C		7432.1		
Type D		70046.18		
Total		96213.05		
Total C + D		77478.28	Percentage	80.5

Table 1a – Analysis of current generating levels against high banding option.

Total Generating capacity in MW in each band from each source				
Data source	Generator size band (MW)			
	0.8kW - 1MW	1 to 9.9	10 to 49.9	>50MW
DNO ED1	2880	5226	9359	7199
TEC Register		0	1380.43	68590.75
Embedded Resister		119.15	1150.62	308.1
Total	2880	5345.15	11890.05	76097.75
Generator Banding				
Type A		2880		
Type B		5345.15		
Type C		10509.62		
Type D		77478.18		
Total		96213.05		
Total C + D		87987.8	Percentage	91.4

Table 1b – Analysis of current generating levels against proposed banding option.

Tables 2a & b below summaries the data for predicted generation available volumes in years' time (i.e. end of 2021) based on the TEC Register dated 16 November 2015, Embedded Register dated 16 November 2015 and DNO week 24 data 2015.

Total Generating capacity in MW in each band from each source				
Data source	Generator size band (MW)			
	0.8kW - 1MW	1 to 49.9	50 to 74.9	>75MW
DNO ED1	25062.4	21378.29	7199	750
TEC Register		3352.13	2669.15	112750.1
Embedded Resister		2336.57	283.1	75
Total	25062.4	27066.99	10151.25	113575.1
Generator Banding				
Type A		25062.4		
Type B		23714.86		
Type C		7482.1		
Type D		119596.4		
Total		175855.7		
Total C + D		127078.5	Percentage	72.2

Table 2a – Analysis of current generating levels against high banding option.

Total Generating capacity in MW in each band from each source				
Data source	Generator size band (MW)			
	0.8kW - 1MW	1 to 9.9	10 to 49.9	>50MW
DNO ED1	25062.4	11150.96	10227.33	7949
TEC Register		43.8	3308.28	115419.3
Embedded Resister		617.5	1719.07	358.1
Total	25062.4	11812.26	15254.68	123726.4
Generator Banding				
Type A		25062.4		
Type B		11768.46		
Type C		11946.4		
Type D		127078.48		
Total		175855.7		
Total C + D		139024.88	Percentage	79.1

Table 2b – Analysis of current generating levels against high banding option.

		Fault Ride Through The proposer justification in section 3.2 paragraph 7 then moves on to fault ride through with a vague statement "There is also a cost of tripping synchronous generation in a higher band (10MW – 50MW) which could result in a potential increase in holding additional reserve costs alone of £9 million / annum". As previously stated the perceived issue the proposer is trying to deal with relates to a need for generators down to 10MW to be capable of withstanding local network faults by providing new fault ride through capabilities which are not a current requirement. The argument seems to be based on the principle if there is a transmission system fault which results in a large 1800MW generator tripping off then the TSO cannot be expected to cover for any other generators tripping off. Given these fault ride through requirements are new it would have been thought that existing generators which currently are without these facilities would be tripping off due to network faults and currently causing issues. To monitor system issues NGET have been producing the Significant System Events Report since 1998 with the most recent version produced in January 2016 (note a 2017 version has not been produced yet). Within this report the largest consequential lose recorded is 400MW in 2011 due to an island being formed in the north of Scotland which then collapsed, equally there is no evidence of significant volumes of secondary generation being disconnected due system events, nor is there any evidence of an increase in this consequential loses as the generation mix has been changing with time. On the bases there appears to be no current issues from generation not having fault ride through capability adopting the high banding option as opposed to the proposer's option would again not impose further cost increases to smaller new generators. **Other Issues** Although the RFG limits the banding levels to only new entrants other Network codes such as the 2017/1485 Transmission System Operation Guidelines (TSOG) have adopted these banding levels and are applying them to both new and existing generators. Hence the actual full the cost implications of these banding levels will not be clear until exact implementation details of the other codes are developed the possible retrospective application to existing generators may require a sudden increase in communication links with unknown costs and other unknowns. **Summary** On the bases that for the next 5 years the high option suffices and as some potential costs implications will not be known until all the Network Codes are complete, applying the high option and then carrying out a further review if required in 3 years' time when all codes are complete appears to be the most pragmatic solution.
11	Can you provide any	Section ECC.3.7 defines existing users, but in sub-section ECC.3.7.2 for demand facilities paragraphs (a), (b) & (c) contain the word "not" which

	feedback/comments on the associated legal text?	means it is actually defining new users so the word “not” needs to be removed from these 3 sentences. The legal text as written appears to be fine for the ECC generation section with possible alternatives just changing the MW levels. An addition section will also be required for the CC section to say it only applies to existing users potentially as follows:- “CC.3.6 The requirements set out in these **Connection Conditions** shall only apply to **Existing Users** as defined in ECC.3.7 all other users should refer to the [**European Connection Conditions].** “
	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?	Seem ok
	Other questions	
14	Does the Legal drafting contained in annex 2 and 3 deliver the intent of the solution outlined in section 3?	Yes, only question about the legal text changes is the text change in ECC.A.4A.2 paragraph 3 which appears to be just a clarification of existing text, should also be applied to CC.A.4A.2 paragraph 3? Looking at the EXXAX2.2 & 3 figures for all 3 options the time axis is not always titled and there are no units, similar for the voltage & current axis. On the example graphs for options 2 & 3 it might be useful if the requirement trace stopped at the point of fault clearance so as not to show parts where the response curve is less than the requirement curve.
15	Do you have any information based on the proposed solution in respect of implementation costs?	No