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:	Rob Wilson Robert.wilson2@nationalgrid.com 07799 656402
Company Name:	National Grid Electricity Transmission plc
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	This workgroup consultation represents the end of a very long development process. There is very little time now left to achieve compliance with the national implementation deadlines for the European Connection Codes (of which the first, RfG, is due on 17 May 2018). This work must now be brought to a timely close and hopefully this consultation will help in gathering any further evidence available and then allowing submission of the proposal(s) to the Panel and Authority without further delay. Noting that legal text for the alternatives is not included in this consultation, we would point out that this is not necessary to allow their progressing to Code Administrator consultation and submission to the Authority. Any further development of alternatives is the responsibility of the parties proposing them or, if they so choose, the workgroup. Given that there is very limited time remaining for compliance and that the principles behind the alternative proposals are complete this consultation should be sufficient to gather any further stakeholder views and evidence and allow the work to proceed. In terms of the legal text, the relevant clauses in the code are GR21.5 which states for the Code Administrator consultation that legal text may not be required if Panel and the Authority agree; and GR 22.1&2 regarding the final report which in GR22.2(g) requires an assessment of the changes only. *GR.21.5 Where the Grid Code Review Panel is of the view that the proposed text to amend the Grid Code for a Grid Code Modification Proposal or Workgroup Alternative Grid Code Modification(s) is not needed in the Grid Code Modification Report, the Grid Code Review Panel shall consult (giving its reasons as to why it is of this view) with the Authority as to whether the Authority would like the Grid Code Modification*

	Report to include the proposed text to amend the Grid Code. If it does not, no text needs to be included. If it does, and no detailed text has yet been prepared, the Code Administrator shall prepare such text to modify the Grid Code in order to give effect to such Grid Code Modification Proposal or Workgroup Alternative Grid Code Modification(s) and shall seek the conclusions of the relevant Workgroup before consulting those identified in GR.21.2. *GR.22.2 The matters to be included in a Grid Code Modification Report shall be the following (in respect of the Grid Code Modification Proposal):* *g) an assessment of:* *(i) the impact of the Grid Code Modification Proposal and any Workgroup Alternative Grid Code Modification(s) on the Core Industry Documents and the STC;* *(ii) the changes which would be required to the Core Industry Documents and the STC in order to give effect to the Grid Code Modification Proposal and any Workgroup Alternative Grid Code Modification(s);* *(iii) the mechanism and likely timescale for the making of the changes referred to in (ii);*

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?	The original proposal for GC0100 better facilitates the Grid Code Objectives. An assessment of the original proposal against the Grid Code objectives is as follows: *i. To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity* Positive. In developing this code modification the task of the workgroup has been to find a balance between the costs that will be incurred by owners of equipment in complying with a more onerous specification and the benefit to the system in avoiding operational costs that would otherwise be incurred in providing support due to the connection of less capable equipment. This is also the aim of the European Network Codes as stated by

		ENTSO-E and is particularly important given the development of the system and the shift in the generation portfolio from larger, centrally despatched units to smaller and embedded renewable generation. *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)* Positive. Ofgem have made clear during the workgroup proceedings that their decisions will be based on evidence in both directions – ie that where choices are made these are based on a tipping point being reached where the costs of choosing more onerous settings is evidenced to outweigh the operational benefit. *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* Positive, as stated above, in making balanced choices for the overall benefit of the end consumer. *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* Positive. This modification is required to implement elements of the 3 European Connection Codes forming part of the suite of European Network Codes resulting from the EU 3rd Package legislation (EC 714/2009). v. *To promote efficiency in the implementation and administration of the Grid Code arrangements* Neutral. Although noting that this is the first comprehensive modification to be taken through Grid Code Open Governance and therefore the first Grid Code modification to go

		through an official workgroup consultation which will be followed on acceptance of the workgroup report by the Grid Code Panel by a Code Administrator consultation. So as noted above, the GC0100 original proposal better facilitates objectives (i)-(iv) and is neutral against objective (v). Providing that this is evidenced, the alternative proposal for the type or banding thresholds fulfils the same objectives. Currently this alternative is however not evidenced and also lacks a solution to the demarcation needed in determining Uret values as referenced below to allow optimum system support but avoid setting values with which sectors of the generation businesses cannot comply. The 'more stringent' alternative fulfils none of the objectives as summarised below. Assessment of the 'more stringent' alternative against the Grid Code objectives: *i. To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity* Negative. The 'more stringent' alternative does not embody the minimum solution as required by Ofgem for implementation of the European Network Codes and so does not permit efficient development. *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)* Negative. The 'more stringent' alternative is not achievable in the time available and proposes striking out of national code requirements without which system security will be compromised and new connections will be unable to proceed under safety rules and due to a lack of clarity over equipment specifications. Further, due to the time that

		solving these issues will take the ability of new entrants to meet their European Connection Code obligations will be compromised as the leadtime that they will have prior to compliance being required will be reduced. *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* Negative. The 'more stringent' alternative will prevent secure connection of new entrants and stifle development of efficient solutions. *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* Negative. The 'more stringent' alternative is not a minimum or efficient solution as required by Ofgem. v. *To promote efficiency in the implementation and administration of the Grid Code arrangements* Negative' The 'more stringent' alternative will require comprehensive and unnecessary modifications to the existing national codes.
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	This argument is not valid, is in contradiction to advice from Ofgem, and its persistent reiteration has wasted a great deal of

	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?	time that could have been more profitably employed in completing implementation and giving developers and manufacturers greater leadtime for compliance. The European Connection Network Codes were intended to consider cross-border issues and to seek harmonisation. However, they were never intended to be a complete solution or to overwrite all national legislation. Ofgem has advised industry in their 2014 decision[1] on how to implement the European Network Codes of the need to adopt a minimum solution; this was explained to mean only bringing forward any new GB Code provisions required by virtue of the EU Connection Codes, and removing any conflicts with existing GB Code provisions. This advice was repeated in Ofgem's decision letter on urgency[2] for modification GC0103. In this letter, and in various other correspondence, Ofgem have also urged stakeholders to bring forward specific examples of where existing code provisions impact cross-border trade such that they can be dealt with through the existing code modification processes. No examples have been forthcoming. It is also worthy of note that article 7.3 of RfG (EU 2016/631; HVDC and DCC codes similar) states that: *'When applying this Regulation, Member States, competent entities and system operators shall: (d) respect the responsibility assigned to the relevant TSO in order to ensure system security, including as required by national legislation.'* To remove all national code provisions outside the scope of the European Codes by the 'more stringent' argument, unless it can be proven that cross-border trade is not impacted, would render the GB electricity system inoperable in contravention of this clause and would prevent any parties from connecting new equipment to the system until a full clause-by-clause review could be completed against both EU Connection Code requirements and the further legislation of other member states. None of the other 27 EU member states implementing the European Connection Codes are considering the 'more stringent' argument as valid. All are adopting a similar minimum approach to GB in implementation. Legal advice from ENTSO-E on this subject is that member states are allowed to introduce or maintain more detailed and in certain cases more stringent requirements.

[1] https://www.ofgem.gov.uk/ofgem-publications/92240/openletteronencimplementationandconsultationonnemodesignation-pdf

[2] https://www.ofgem.gov.uk/publications-and-updates/gc0103-introduction-harmonised-applicable-electrical-standards-gb-ensure-compliance-eu-connection-codes-decision-urgency

		This is as follows: *By virtue of Articles 2 and 4 of the Treaty on the Functioning of the European Union (TFEU), the EU does not have an exclusive but a shared competence on energy matters. According to Article 194 TFEU, Union policy on energy shall aim to ensure notably the functioning of the energy market and promote the interconnection of energy networks. An EU Member State could therefore adopt additional, national legislation to complement the CNCs. Nonetheless, this could only be to complement and render EU law more efficient and, by application of the principles of EU law direct effect and supremacy, could not be in contradiction to EU law, including the CNCs provisions.* *Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003 ("Regulation 714/2009") allows for the adoption of additional provisions at national level under certain conditions:* *- Article 8(7) Regulation 714/2009 states that "the network codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade". The notion of "cross-border trade" is however not defined by Regulation 714/2009. The notion appears however to be interpreted in a broad fashion by the Commission in order not to limit the scope and applicability of the network codes.* *- Article 21 of Regulation 714/2009 allows Member States to maintain or introduce measures that contain more detailed provisions than those set in Regulation 714/2009 also related to cross-border trade issues;* *- The CNCs, in their whereas parts (Whereas (30) RfG, (22) DCC and (18) HVDC), clarifies that the CNCs form an integral part of Regulation 714/2009, so that Article 21 of this Regulation applies to them.* *In application of these considerations, a Member State can adopt at national level:* *• network codes which do not affect cross-border trade and do not contradict EU law. For instance, Article 3(2) RfG enumerates several cases in which the RfG does not apply at national level: in this case Member States are still competent to define requirements applicable at national level. In addition, the RfG does not set rules to determine the voltage level to connection point: it lies within the competence of Member States (see Whereas (10) RfG);* *• more detailed provisions also related to cross-border trade issues than those established in the CNCs provided that, in*

		accordance with the principle of subsidiarity, it is the most relevant level of intervention and they do not contradict the CNCs requirements in order to complement the EU Regulations. *A possible criterion to evaluate the feasibility of national measures in the framework of energy matters could be the TFEU rules. According to the TFEU, it is possible to introduce measures constituting a barrier to trade if these measures are justified on limited grounds such as these foreseen in Articles 36 and 114 of TFEU.* *Applied to the CNCs, the following cases could be considered:* *- Extension of CNCs requirements to an additional category of grid user* *A national measure could apply to type B power generating modules (PGMs) requirements that the RfG only applies to type C PGMs. The RfG harmonises the application of the said requirements to PGMs. The national measure could therefore only be valid provided:* *- it is demonstrated it provides for a wide range of automated dynamic response with greater resilience to operational events defined by whereas (12) RfG;* *- it is allowed by the requirement's aims defined in the CNC's whereas and the specific CNC's requirements; and* *- it is demonstrated it does not affect cross-border trade, unless it is demonstrated the measure at national level merely details requirements of the CNCs.* *For instance :* *- Art. 4 RfG implies that type A and B existing power generating modules are not subject to RfG requirements even in case of substantial modifications. However, Member States can decide to extend the scope of application to such generating modules in order to improve CNCs' application provided the above conditions are met;* *- According to Article 18 of RfG, the U-Q/max profile applies only to type C and D synchronous power generating modules. A national measure can extend its scope of application to type B if compatible with the type B requirements' aims defined in whereas (12) RfG, the requirements' aims (see whereas (24) RfG) and type B requirements relating to voltage stability according to Article 17(2)(a).* *- Introduction of requirements not covered by the CNCs* *The possibility to introduce requirements at national level is feasible in two different cases:* *- not - cross border issues (most cases). The fact that a requirement is not detailed in a CNC could indicate that it is not affecting cross-border trade but this needs to be assessed on a case-by-case basis ;* *- in other cases, to complement EU regulations, provided*

		that they do not contradict EU law. *In case the measure would constitute a barrier to trade, it could still be valid provided it is justified by either Art. 30 TFEU or is considered as reasonable according to EU case law.* *- Wider national ranges of parameters than defined by CNCs* *Several CNCs requirements set ranges within which parameters need to be defined at the national level. It could be considered to define nationally parameters outside of the set range.* *For some requirements, the CNCs expressly authorise to define national parameters beyond the set ranges (e.g. frequency withstand capability for PGM, under Art. 13(2)(b) RfG). National measures doing so are justified as long as they respect the conditions set in the CNCs relevant provisions.* *When the national measures do no respect these conditions or the CNCs do not expressly authorise to define national parameters beyond the set ranges, any deviation would go against the CNCs and is therefore not admissible, unless it is demonstrated the measure does not constitute a trade restriction.* In summary, and in keeping with Ofgem's guidance, the proposals for GB implementation of the European Connection Codes are a minimum solution. Stakeholders are not precluded from identifying areas of further work where 'more stringent' requirements could be a restriction on cross-border trade but these do not have to be addressed now and are not part of the minimum solution for compliance.
2	Are you comfortable with using the EU definition of Maximum Capacity instead of the GB definition of "Registered Capacity"?	Yes. As long as the final report to the Authority makes clear the development and application of 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?	Option 1 sets the longer term direction of travel for equipment. It is valid that it is included to seek views but National Grid do not feel that it can be mandated at the current time. Further development with industry is required with a view to making the necessary code changes to progress this requirement from roughly 2021. Option 2 is in our view potentially the most balanced solution in deriving maximum operational benefit within the bounds of existing technology capability. However, we would welcome submissions from developers and manufacturers on potential costs so these can be taken into account. Option 3 was acknowledged in workgroup discussions to be achievable and represents a baseline.

4	Do you have any alternative fast fault current injection solutions noting that the requirement applies to the Converter not the wider Power System?	No.
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 2 has been agreed and put in the Bilateral Connection Agreement of a recent interconnector project so is technically achievable. Information on costs would help to finalise the selection of these options.
6	Do you have any evidence to support your views?	Benefits set out against the original proposal, other evidence expected from developers/manufacturers.
7	Do you have any views on the specific costs related to the additional requirements?	Benefits set out against the original proposal, other evidence expected from developers/manufacturers.
8	Is the current proposed wording for the remote end HVDC and DC Connected Power park modules sufficient to facilitate future new technology?	Yes.
	Banding questions	
9	What are the specific costs related to the additional requirements?	Benefits set out against the original proposal, other evidence expected from developers/manufacturers. None yet identified other than for market participation which is not a RfG requirement.
10	Do you have any views on the banding thresholds for the original and those suggest for the possible alternative?	The original proposals represent a good balance between cost and benefit delivering the optimum solution to end consumers. No evidence has been provided by developers or manufacturers of significant costs that are incurred in selecting the thresholds set out in the original proposal rather than the alternative (maximum) figures.

The main contentious aspect of the banding thresholds has been the B/C threshold; this represents a move from a 'product standard' base in types A/B to a more interactive requirement for operational support in types C/D. Harmonisation is one of the stated aims of the European Network Codes. Publicly available positions in other member states are currently as follows:

Member State	Type Threshold Proposals			Status
	A/B	B/C	C/D	
BE	250 kW	25 MW	75 MW (25 MW if>110 kV)	Under discussion
CZ	A1: 11 KW A2: 100 KW	B1: 1 MW B2: 30 MW	75 MW	Under discussion
DE	135 KW	36 MW	45 MW	Under discussion
EE	0.5 MW	5 MW	15 MW	Preliminary proposal
ES	100 KW	5 MW	50 MW	Under discussion
FI	1 MW	10 MW	30 MW	Under discussion
FR	1 MW	18 MW	75 MW	Preliminary proposal
HR	500 kW	5 MW	10 MW	Under discussion
HU	200 KW	5 MW	25 MW	Under discussion
IE	100kW	5MW	10MW	Preliminary proposal
LU	135 KW	36 MW	45 MW	Under discussion
NL	1 MW	50 MW	60 MW	Under discussion
NO	1,5 MW	10 MW	30 MW	Under discussion
PL	1MW	50 MW	75MW	Preliminary proposal
PT	1 MW	10 MW	45 MW	Under discussion
RO	1 MW	5 MW	20 MW	Approved
SI	150 kW	5 MW	25 MW	Preliminary proposal
SK	100 KW	5 MW	20 MW	Under discussion

(only public domain positions included – status included correct at Sept 2017 which is mainly under discussion/in workgroup or equivalent)

The original proposal which has a B/C threshold of 10MW is generally aligned well with these positions. The nearest comparators for GB are probably Spain (5MW) and Norway (10MW) in terms of system size and strength. Proposals in the CE block need to be put into context as part of a much larger interconnected area, although it is notable that France are still proposing a B/C threshold of 18MW.

In RfG the maximums allowable for type thresholds are set by synchronous area in relation to the size of that area – so in the CE block for B/C this is 50MW, the Baltic and Nordic states have 10MW and Ireland 5MW. It should be noted that the GB synchronous area had an original maximum in the ENTSO-E draft of RfG of 10MW for the B/C threshold. GB stakeholders argued successfully that for reasons of harmonisation and to ensure evidence was provided this should be increased to match the CE block figure. A consultation was run through the workgroup in summer 2016 on the banding threshold proposals in GB. No

		evidence of costs was received in complying with the technical capabilities described in RfG in lowering the B/C banding threshold to 10MW. Costs were highlighted in participating in the balancing mechanism, which at the moment in GB would also be required to facilitate provision of frequency response, however this market participation is not mandated in RfG. Note also that generators choosing to participate in the BM also derive further revenue streams which are assumed to be positive since some embedded generators have done this voluntarily. The original proposals represent a coordinated and complete solution with fault ride through and fast fault current injection. In brief, and though explained in the report, system modelling and studies have shown that fast fault current injection is required to help support post-fault voltages. If the FFCI proposal as set out is accepted a retained voltage post-fault of 0.10pu will be achievable; without FFCI this will be 0.05pu which many generators will struggle to achieve leading to increased cascade tripping and further operational costs. A Uret (retained voltage) setting of 0.10pu is therefore required to avoid this. Workgroup discussion has highlighted that smaller reciprocating diesel generators cannot however comply with this and have a minimum Uret achievable of 0.30pu using current technology. This is due to a slower speed of controller response and inherent lack of inertia. To balance these technical limitations and the system need, therefore, a B/C threshold of 10MW enables Uret to be set at 0.10pu in type C and 0.30pu in type B which was generally accepted by the workgroup as a good compromise. In conclusion therefore, we continue to support the original proposal. No evidence has been provided to instead choose the maximum figures as in the alternative. This would in any case leave some difficult choices to be made between an increased risk of cascade tripping and attendant operational costs/system security issues (if Uret was relaxed say to 0.30pu), and codifying a requirement that small generators could not meet (if it was not).
11	Can you provide any feedback/comments on the associated legal text?	The legal text throughout is written to be as helpful and user-friendly to GB stakeholders as possible. A new European Connection Conditions section is proposed to be added to the Grid Code which combines European Connection Code and existing GB provisions such that compliance with this will for users satisfy all GB and EU requirements.
	Fault Ride Through	
12	Do you support the fault ride through voltage against time curves If not please state why you disagree, what	Yes. As noted above the FFCI/FRT/banding threshold proposals represent a complete and coordinated solution achieving the best compromise between equipment costs and operational benefit for end consumers based on the evidence available.

	alternative you would recommend and your justification for any alternative?	
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?	Yes.
15	Do you have any information based on the proposed solution in respect of implementation costs?	No.