Guidance for the Process of Implementation of RfG and other Codes into GB Code Structure

Paper for discussion by GC0048 Working Group

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1 Executive Summary

The introduction of the European Network Codes (ENCs) gives rise to a number of challenges in terms of the complexity of the integration with existing and unaffected GB Code requirements, and of the timescale of implementation.

This paper explains the main challenges, including timescales. It explains that to make progress some fairly definite decisions are needed soon on issues such as document structure and banding thresholds, and seeks advice on, or confirmation of, the decisions or other progress that can be made in advance of the RfG and other codes being enacted in European Law.

2 Background

2.1 Purpose of this paper

In order to implement the ENCs in Great Britain, certain decisions need to be taken on the exact structure and drafting approach in incorporating the requirements into the GB Codes and associated documents. This paper seeks guidance on how decisions, supported by stakeholder engagement and public consultation, can be efficiently expedited and confirmation that the outline structures being progressed in implementation are correct within the options that have been considered.

2.2 Current document structure for GB

In GB, the requirements for connection to and use of the Transmission System are contained in the Grid Code, the Connection and Use of System Code (CUSC) and the Balancing and Settlement Code (BSC).

Connection to and use of the Distribution System is covered by the Distribution Code and the Distribution Connection and Use of System Agreement (DCUSA). In addition, the Distribution Code has a suite of user-facing subsidiary documents, of which the most relevant two (G59, G83) relate to the connection requirements and processes for distributed generation across the scale from domestic installations to 100MW+ installations connected at 132kV.

2.3 The Requirements for Generators Code (RfG)

There are ten European Network Codes in development grouped into three areas. These are the connection codes, concerned with the technical requirements placed upon equipment connected to the system, the market codes and the operational codes.

Whilst every ENC affects the GB codes to some extent, the focus of this paper is on the connection codes and the RfG code in particular (the other two connection codes are the Demand Connection and HVDC codes). There are two key reasons for this. Firstly is that the RfG code is the most radical departure from current UK requirements, and secondly that as a group the connection codes are the most developed of the ENCs and are at a stage where the implications for the GB codes can most readily be seen.

2.4 National Implementation

In each of the ENCs, implementation within each member state of the code will be required to follow its entry into force as European Law. As such it will take precedence over any existing national legislation.

The key tasks to be accomplished during national implementation include:

(i) Setting of certain national parameters and writing of methodologies as set out and required in the codes

(ii) Alignment with existing national codes to resolve areas of conflict and present a unified and simple solution to users

2.5 National Implementation

To carry out national implementation of RfG, a joint workgroup has been set-up under the joint governance of the Grid Code and Distribution Code Review Panels. This group has met on a number of occasions since January 2014 and has fulfilled a vital role in helping to feedback GB comments on the code drafting to the Commission and in providing a forum for stakeholder engagement as well as in considering the options for implementation and the technical challenges that will be faced.

3 The challenges

3.1 Timescales for Implementation

In the current draft of RfG, 3 years are allowed for compliance after it has entered into force. The code will be applicable to generators classed as 'new' – which is to say, those that are not currently connected to the system and which are unable to demonstrate that contracts have been let for main generating plant items by two years after the code's entry into force.

As RfG has significant changes for generation equipment; manufacturers and developers need as much lead time as possible to modify the engineering of their products, offerings and services ahead of the compliance deadline. At the smaller end of the market, where arguably there is the most radical engineering changes, manufacturers need time to design against definite GB requirements (including RfG and also the necessary GB implementation of the Codes and other existing GB arrangements), and arrange to have their designs type tested and certified in line with the new requirements in time for the compliance date. These are not trivial tasks, and the industry wants to complete the GB implementation as soon as possible to give manufacturers and developers the maximum possible time to achieve this (it is estimated that national implementation of the code will take about 12 months).

Drafting the RfG and other requirements into accessible user facing documents, and to progress them through the normal consultative governance in GB is not in itself a trivial undertaking either, so this activity needs to start in detail as soon as possible.

3.2 Ease of Use

The majority of Network Licensees and stakeholders agree that GB documentation should be tailored for ease of use by end users, which includes domestic customers and small developers. This implies a GB document structure tailored to the expectations and needs of users, especially smaller users. There are other approaches, as explained below, but so far the majority of stakeholders seem to hold the tailoring to the needs of users paramount.

3.3 Existing Installations

RfG (and the other connection codes) in the main do not apply to existing installations, whereas other ENCs will, especially the operations codes. As a further complication, for the existing installations where RfG does not apply, we need to maintain the GB codes in their current state regarding compliance requirements.

3.4 Other ENCs

The GB codes need to incorporate all ENC requirements in a coherent way so any structural solution needs to be applicable to all. Given the staggered implementation of the ENCs this is a further challenge.

The structural proposals in this paper do address this, but there are options here too.

At a high level, the RfG is split between new and existing users. The DCC does not contain much that is already existing in GB documentation as far as users are concerned and therefore presents less challenges in terms of implementation; for example, it could remain simply as an EU NC without any other specific user facing GB documentation until such time as development of the demand side market requires more detailed GB guidance or rules. The operations codes offer much less change to the existing GB codes and are expected to be accommodated by relatively small changes to the existing GB codes.

3.5 GB legal and process requirements

The ENCs are written to cover only areas where there may be an impact on cross-border trade. Both the Grid and Distribution Codes include a significant number of GB specific details, such as for example detailed protection and earthing requirements, site responsibility schedules and other safety requirements and connection process rules. From a user perspective it appears to be desirable to incorporate all these with the RfG requirements to present a single coherent set of requirements in user-facing GB documents.

3.6 RfG Banding – the boundaries between Type B, Type C and Type D

The RfG code sets out requirements against generators in one of four ‘types’ A-D based on their size and connection voltage. Distinctions are also made for the size of the synchronous area in which they are connected. The actual banding thresholds to be used nationally are required to be justified by the relevant TSO for each member state with those set out in the code being the maximum possible values. This justification, in which effectively the code could be made more onerous, is subject to public consultation and is to be based on societal cost benefit analysis.

Work is currently underway in the GC0048 working group to develop the justifications for the boundary thresholds to be used in GB. More information is included in Appendix A.

4 Implementation Options

4.1 For smaller generators not expected to be within the scope of the GB Grid Code

Several options have been considered for the smaller range of generators, exclusively connected to the distribution network as detailed in Appendix B. It is expected that this will cover Type A, Type B and possibly Type C generators, depending on the upper bound of Type B and C. Once the boundary thresholds have been agreed it will be possible to gain more clarity on the interface between the distribution documentation and the grid documentation. The proposed structure recognises that other ENCs will have an impact on these options. There is nothing in the proposals in this paper that is expected to be a constraint on optimum implementation of other ENCs in GB.

From the stakeholder engagement so far via the DCRP, GC0048 Working Group, and JESG, the emerging preference seems to be for a structure replicating the existing GB structure (Option D3 in Appendix B), although there is some support for a structure based on the ENC types.

The DCRP is expected to be in a position to formally consult on these options in July 2015.

4.2 Larger Generation within the direct scope of the GB Grid Code

'Large' generators, defined in the Grid Code as those over 100MW in size in England and Wales, over 30MW in the SP Transmission TO area and over 10MW in the SHET area, are required to comply with various aspects of the GB Grid Code. Certain more limited requirements within the Grid Code are also placed upon 'medium' generators connected in England and Wales, being those over 50MW in size. All generators of over 50MW are also required to provide frequency response capability and finally, any generators not otherwise covered under the Grid Code but being members of the Balancing Mechanism are also included in Grid Code requirements.

Where generators are caught by the Grid Code, a number of options have been proposed to achieve implementation and alignment of the RfG code while also keeping this as simple as possible in terms of the number and complexity of the documents that need to be consulted on. These options can, by extension, be applied generically to the other ENCs and GB codes.

Appendix C explains these options in more detail.

National Grid, Ofgem and Distribution Network Operators discussed these options in a paper in October 2012 which was also presented at JESG. The conclusions so far have been that the option (G1) that keeps the GB Grid Code as is for existing Generators and starts a new code (or section thereof) aligning with ENC requirements to apply going forwards; or the option (G4) - re-write the GB Code to directly apply ENC requirements, were to be developed further through the use of examples drawn from the RfG code.

This resulted in the current proposals for the Grid Code which are to incorporate all A-D requirements in a new and alternative section 6.3.8 of the Connection Code which covers the overwhelming majority of RfG requirements. This has been discussed in the RfG workgroup and reflects the cumulative nature of the requirements and also the goal to minimise the number of documents so optimising ease of use. It is likely that in conjunction with the workgroup National Grid could be in a position to consult on these proposals in July/August, which it is planned to do at the same time as consulting on the banding thresholds subject to further work on the costs associated with compliance across the generator community.

5 Suggested way forward

The network licensees are seeking guidance on concrete steps that can be taken to develop the GB documents for RfG, with normal stakeholder input and public consultation under the current GB arrangements. This is in terms of the overall and outline structures and the progress that can be made ahead of the entry into force of RfG.

It has previously been discussed and agreed that as far as possible recognised code modification routes should be used to enact the necessary GB code changes to achieve ENC implementation and alignment. Licensees recognise that Ofgem are unable to formally approve any modification proposals until the final version of each ENC in turn becomes European Law. Nevertheless, if the RfG code is considered to have reached a point of stability it should be possible to progress GB code modifications at least through public consultations and licensees would value guidance on what steps can be taken to ensure that

early decisions, such as those on banding and document structures and which will then facilitate the more detailed analysis of other technical requirements, can be taken such that the user community has the maximum time to arrange for compliance.

Appendix A – Banding Structure

Synchronous areas	Limit for maximum capacity threshold from which a power generating module is of type B	Limit for maximum capacity threshold from which a power generating module is of type C	Limit for maximum capacity threshold from which a power generating module is of type D
Continental Europe	1 MW	50 MW	75 MW
Great Britain	1 MW	50 MW	75 MW
Nordic	1.5 MW	10 MW	30 MW
Ireland	0.1 MW	5 MW	10 MW
Baltic	0.5 MW	10 MW	15 MW

Table 1 from RfG: Limits for thresholds for type B, C and D power generating modules. Note that any generator connecting at or above 110 kV is type D.

The requirements within the code apply cumulatively – that is, a type B generator has to comply with all type A requirements as well as those of type B etc. This has implications for the way in which any national code solutions can be achieved, in particular the normal desire to not replicate requirements in more than one document.

For GB, while not the only factor, a key concern is that in band B generators are not required to have frequency response capability while in band C they are. Subject to current work on this progressing it is possible therefore that the TSO will seek to reduce the B-C threshold from its starting point of 50MW. Equally, the C-D threshold could be reduced from 75MW. It is unlikely that the A-B threshold will be changed from 1MW. It is also worth noting that given that the threshold for efficient connection at 132kV is between 30-50MW (in England and Wales – Scotland is somewhat different due to a lower transmission voltage and geographic dispersion) the number of projects affected by decisions on these thresholds may be fairly limited.

Appendix B – Distribution Connected Generation – Code Structure

The following paragraphs outline the key distribution options that have been considered:

Option D1

Modify the existing GB documents to include all the RfG requirements. This would create quite complex documents with many, or even the majority of the clauses being conditional on whether the user's equipment was deemed existing or new under the RfG.

This would be a complex option for both users and code administrators.

Option D2

Create new documents for each Type of generator defined in RfG – and these documents would include operational requirements that are currently in the D Code.

In particular the Type A size range is broad and would present the smallest users with a lot of documentation they do not need to apply.

This option requires maintenance of the pre-existing GB documents for existing installations

Option D3

Mimic the existing split of GB document applicability (ie G83 and G59) and include the relevant RfG requirements in new documents. Operational requirements, such as they are, remain in D Code. There are no Operational requirements for the smallest domestic generators

This option requires maintenance of the pre-existing GB documents for existing installations

Option D4

A single GB RfG document for new installations that takes the RfG text and supplements it with GB requirements for legal compliance and process.

This is expected to be very confusing for all users; small installations would be immersed in a lot of detail that does not apply, and the drafting for larger users would have to recognize the additive nature of the RfG requirements.

This option requires maintenance of the pre-existing GB documents for existing installations

Option D3a

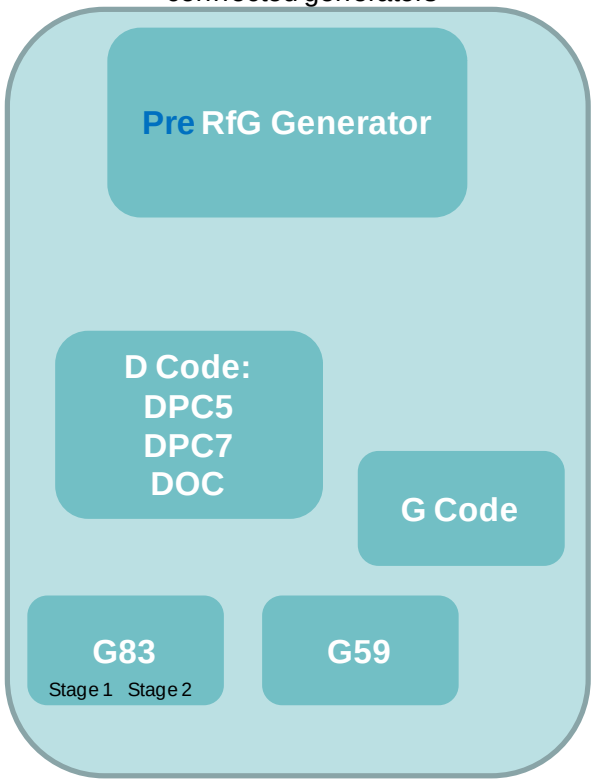
As Option D3, but with the relevant operation clauses from the Operations NCs and the Distribution Code included in the new user-facing documents.

This option requires maintenance of the pre-existing GB documents for existing installations and would result in identical operational requirements being maintained in two separate places.

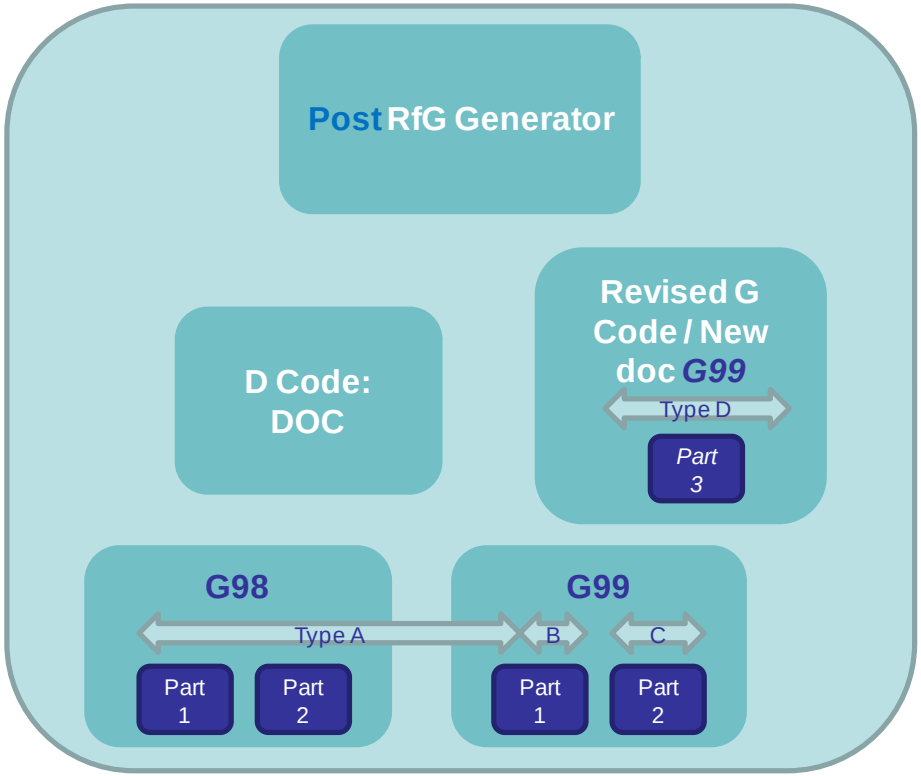
From the stakeholder engagement so far via the DCRP, GC0048 Working Group, and JESG, the emerging preference seems to be for a structure replicating the existing GB structure, although there is some support for a structure based on the ENC types.

The following diagram shows how the current preferred option would appear to users:

Existing documents for distribution connected generators



Proposed documents for distribution connected generators



Appendix C – Grid Connected Generation Document Banding Structure

The following paragraphs outline the key grid connection options that have been considered:

Option G1

Write a new code to cover ENC requirements but retain the existing grid code as well. *The end result of this approach would be two parallel documents to maintain. As a positive point, it would be easier to interpret for both new (captured) and existing (non-captured) users.*

Option G2

Amend the GB Grid Code to include ENC requirements. *This sits between options G1 & G4 but has no separate advantages.*

Option G3

Remove all ENC-related provisions from the GB Grid Code and create a stand-alone EU relevant document. *In terms of the final position this will be similar to option G1 but with a complex realisation.*

Option G4

Rewrite the Grid Code completely ie without leaving a 'frozen' current version. *This is a neater overall solution while being potentially more time-consuming at the start and also making it more difficult to see which requirements will apply to new and existing users.*

Option G5

Combine the GB Grid Code and GB Distribution Code. *Could be used in conjunction with any of the other options.*

Option G6

Amend the GB Grid Code to cross-refer directly to the RfG ENC. *Potentially workable in conjunction with one of the other options although ease of use could be an issue. The advantage of this is in keeping to a minimum solution and avoiding replication but given the required Member State specificity contained within the ENCs application it would be complex.*

In effect Options G1 and G4 are the same in terms of the initial work to be carried out in translating the ENC requirements, and ultimately they will converge once any existing users have moved across to the new version of the code, which will eventually happen as new equipment is commissioned and existing equipment is either decommissioned or modified. Option G1 has the advantage of greater clarity for existing users but produces two parallel code documents; Option G4 while resulting in just one document, which could be easier to manage, will be more complex with lots of conditional clauses given that this will have to apply to new and existing users.

Options G1 and G4 were considered in more detail by working through examples, and particularly to assess the basic structural alternatives within the GB codes. While these are not exhaustive, and a hybrid approach may also be pragmatic, the following were proposed:

(i) Place all the Type A – D RfG requirements in the GB Grid Code

(ii) Place all the Type A – C RfG requirements in the Distribution Code / Engineering Recommendations and all the Type D RfG requirements in the Grid Code

(iii) Place Type A – D RfG requirements in a set of Engineering Recommendations and reference Grid Code and Distribution Code to this

All options assume that the current Codes would need to be frozen for existing Generators.

The current proposals for the Grid Code are to incorporate all A-D requirements in a new and alternative section 6.3.8 of the Connection Code which covers the overwhelming majority of RfG requirements. This has been discussed in the RfG workgroup and reflects the cumulative nature of the requirements and also the goal to minimise the number of documents so optimising ease of use.