

Modification proposal:	Grid Code GC0100: EU Connection Codes GB Implementation – Mod 1		
Decision:	The Authority ¹ directs ² that the proposed modification to the Grid Code be made		
Target audience:	National Grid Electricity Transmission PLC (NGET), the Grid Code Review Panel, Grid Code users and other interested parties		
Date of publication:	15 May 2018	Implementation date:	16 May 2018

Background

The European Third Energy Package came into force on 3 September 2009. The Requirement for Generators (RfG), Demand Connection Code (DCC) and High Voltage Direct Current (HVDC) codes are part of a suite³ of European Regulations developed following implementation of the Third Package.⁴

- COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (RfG) – specifies the technical connection requirements that new generators must abide by.⁵
- COMMISSION REGULATION (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection (DCC)– specifies the technical connection requirements that new distribution networks connecting to the transmission system, new demand users connecting to the transmission system and new customers wanting to provide demand side response services, must abide by.⁶
- COMMISSION REGULATION (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC) – specifies the technical connection requirements that new long distance DC connections, new links between different synchronous areas (eg interconnectors) and new DC-connected generation (eg offshore wind farms) must abide by.⁷

These European Regulations intend to deliver a harmonised set of rules for the operation of the electricity sector in Europe. The European Regulations aim to help ensure security of supply, facilitate the decarbonisation of the energy sector and create a competitive, pan-European market which benefits consumers.

These European Regulations are directly applicable to GB without having to be transposed into our national laws or regulatory frameworks. European Regulations also take precedence in the legal “hierarchy of laws” over domestic law (ie if a domestic law is incompatible with a European Regulation, it is the European law which takes precedence).

¹ References to the “Authority”, “Ofgem”, “we” and “our” are used interchangeably in this document. The Authority refers to GEMA, the Gas and Electricity Markets Authority. The Office of Gas and Electricity Markets (Ofgem) supports GEMA in its day to day work. This decision is made by or on behalf of GEMA.

² This document is notice of the reasons for this decision as required by section 49A of the Electricity Act 1989.

³ Collectively referred to as the European Network Codes (ENCs)

⁴ More information on the European Third Energy Package can be found on our website; [link here](#)

⁵ Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (referred to as the RfG); [link here](#)

⁶ Commission Regulation (EU) 2016/1388 establishing a network code on demand connection; [link here](#)

⁷ Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (referred to as the HVDC); [link here](#)

In GB we already have existing national technical codes and standards for parties that want to connect to the GB electricity transmission system. The Grid Code covers all material technical aspects relating to connections to, and the operation and use of, the national electricity transmission system (NETS). In accordance with our decision to incorporate the new EU requirements within the existing GB regulatory frameworks,⁸ this modification seeks to amend the Grid Code to make it consistent with the European Network Codes. This will provide accessibility and familiarity to GB parties and utilises the existing code governance processes to apply the new requirements in a transparent and proportionate way.

It is important to note that until we formally leave the EU and the terms of the exit are established, we will continue to participate constructively in EU institutions and the European Internal Energy Market (IEM). We will also continue to comply with and implement EU laws.

This decision letter should be read in conjunction with our decisions on GC0101, GC0102, and GC0102/DCRP as together they implement the requirements of the RfG and HVDC codes in the Grid and Distribution Codes.

The modification proposal

GC0100 was raised by NGET and seeks to implement:

- the scope and applicability of the ENCs;
- the generator banding parameters, as set out in RfG and HVDC;
- the fast fault current injection parameters, as set out in the RfG and HVDC; and
- the fault ride through requirements, as set out in the RfG and HVDC.

Detailed code mapping is available in the annex to the modification report. In this decision letter we highlight the key areas of change.

Type (A-D) MW banding levels for GB

The RfG identifies four types of generators – Type 'A', 'B', 'C' and 'D'. The requirements of the RfG depend on the size of the generator and the connection point – the smallest generators (Type A) incur the minimum set of requirements and the requirements gradually build up as the generator size increases. Type D generators are the largest generators that have the most complex requirements. The RfG outlines the maximum possible capacity threshold for each type generator; however the thresholds can be reduced.

The Original Modification proposes a Type B/C threshold of 10MW and Type C/D threshold of 50MW. A Workgroup Alternative Code Modification (WACM1) was raised by Scottish Power Generation Ltd. WACM1 proposes to use the maximum values banding thresholds permitted by RfG. Table 1 outlines these two proposals.

⁸ Implementing the Electricity EU Network Codes, 18 December 2014; [Link here](#)

Table 1: Proposed RfG banding thresholds in the Original modification and WACM1.

	Type	Type A	Type B	Type C	Type D
	Connection Voltage	< 110kV	< 110kV	< 110kV	≥ 110kV or
Original	Unit MW	800W – 0.999MW	1-9.999MW	10-49.999MW	50MW+
WACM1	Unit MW	800W – 0.999MW	1-49.999MW	50-74.999MW	75MW+

GB Fast Fault Current Injection requirements

Fast Fault Current Injection (FFCI) is currently only loosely defined in the GB Grid Code which simply states that the Generating Unit or Power Park Module shall inject maximum fault current without exceeding the transient rating of the Generating Unit or Power Park Module.

For Power Park Modules the RfG defines the parameters for Fast Fault Current Injection, which are being introduced through this modification. In addition, the inherent capability of these types of Generating Units to inject high fault currents when subjected to a disturbance means that there is no need for RfG to specify requirements for Synchronous Generating Units.

GB Fault Ride Through requirements

The RfG defines Fault Ride Through (FRT) principles for Type B to Type D Power Generating Modules with requirements building up from Type B to Type D.

The FRT requirement is defined by a voltage against time profile. This modification introduces these new FRT requirements.

The Grid Code Review Panel (GCRP) recommendation

At the GCRP meeting of 8 February 2018, the GCRP agreed that both the Original modification and WACM1 better facilitate the Grid Code objectives with the majority view that the Original modification is best and should be implemented.

Our decision

We have considered the issues raised by the modification proposal and in the Final Modification Report (FMR) dated 20 February 2018. We have considered and taken into account the responses to the industry consultation on the modification proposal which are included in the Final Report⁹. We have concluded that:

- implementation of the Original modification would better facilitate the achievement of the objectives of the Grid Code compared to the Grid Code baseline and WACM1¹⁰ and
- Approving the Original modification is consistent with our principal objective and statutory duties.¹¹

⁹ Grid Code proposals, final reports and representations can be viewed on NGET's website at: <http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/>

¹⁰ As set out in Standard Condition C14(1)(b) of NGET's Transmission Licence, available at: <https://epr.ofgem.gov.uk/>

¹¹ The Authority's statutory duties are wider than matters which NGET must take into consideration and are detailed mainly in the Electricity Act 1989 as amended.

Reasons for our decision

We consider the Original modification will better facilitate Grid Code objectives (i), (ii), (iii) and (iv) and has a neutral impact on (v). We consider that WACM1 will better facilitate Grid Code objectives (i), (ii), and (iv) and has a neutral impact on (iii) and (v).

The Proposer and the majority of respondents have, during this modification's consultation phases, commented that the modification better facilitates a number of code objectives. We note these comments and are grateful for the work that industry has done to consider this modification. We have assessed this modification against the Relevant Objectives with particular focus on (iv) as the primary driver for the modification and (iii) where we consider the Original modification better facilitates the relevant objective compared to WACM1.

(i) to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity

The scope of these three European Regulations is to harmonise systems across the internal energy market should help make it easier and more efficient to operate the electricity system, by introducing a common, clear set of requirements which every new connection to the electricity network will need to meet.

(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)

Implementation of the RfG should also help facilitate competition in the generation of electricity by improving transparency and consistency of access arrangements across Europe. This removes a potential barrier to entry and creates a transparent, level playing field in terms of connection requirements, thus improving competition in generation.

The RfG should also assist the creation of a pan-European market for power generating module (PGM) technology, by increasing the commonality of PGM requirements. This should help improve competition between manufacturers and make it cheaper to build PGM technology, thus reducing costs for consumers.

The Proposer of WACM1 considers that WACM1 would better facilitate competition in generation by not unduly burdening GB generators with connection obligations that are not commensurate with their plant size. Based on the evidence, we do not consider that we have received sufficient evidence to support the claim that the Original modification unduly burdens GB generators with significant costs when compared with other Member States. We note that the decision on the RfG banding is a decision for each National Regulatory Authority. The Commission therefore allowed for a situation where Member States could adopt different banding thresholds without concern that this would create a barrier to competition. We understand that the majority of Member States are considering implementing thresholds that are below the maximum thresholds outlined in the RfG. The proposal in the Original modification for GB to adopt lower thresholds is therefore consistent with the approaches being adopted in other Member States. We also note that some Member States in Continental Europe (which is a much larger synchronous area than GB) are proposing banding thresholds lower than those proposed by the Original modification. We therefore do not consider that the Original modification will unduly burden GB generators or negatively impact competition in generation.

Overall, we therefore consider that both the Original modification and WACM1 better meet the objective to facilitate competition in the generation and supply 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

As stated above, the ENCs aim to introduce commonality and reduce complexity of arrangements across member states. This should improve the security and efficiency of the system as a whole. This should materialise through increased standardisation of equipment and specifications across the whole of the EU. In turn this should lead to improved economies of scale and increased interconnection driving improved security. We therefore consider that both modifications will promote the security and efficiency of the electricity generation, transmission and distribution systems.

We note that NGET, the System Operator in GB, supports the lower thresholds outlined in the Original modification. The view of NGET is that the Original modification best meets its obligations to promote security and efficiency in the national electricity transmission system operator area as a whole, by providing a reasonable compromise between the needs of the system and any costs experienced by newly connecting generators.

NGET also considers that a Type B and C threshold of 10MW enables synchronous generators derived from reciprocating engines (eg gas or diesel) to meet their Fault Ride Through requirements without presenting system security concerns (synchronous generation driven by reciprocating engines are normally below 10MW in size and unable to ride through voltage dips below 0.3pu). NGET therefore considers that the Original modification balances the system needs and the obligations placed on network users. Since WACM1 is proposing a higher Type B and C banding threshold it would also allow synchronous generators driven by reciprocating engines to meet their Fault Rise Through requirements.

NGET also comment that the Original modification would result in a higher proportion of generators that are technically capable of contributing to frequency response. The proposer of WACM1 considers that this is not a valid reason for supporting the Original modification because there are existing potential sources of frequency response that are not being used. We agree that the proposer's banding option would result in an increase in frequency response capacity, reducing the volume of frequency response the SO would otherwise need to procure, thus delivering security of supply more efficiently. We therefore consider that this has a positive impact on these code objectives.

Evidence was submitted by NGET to the workgroup to demonstrate that implementation of the Original modification would result in lower system operation costs than WACM1. Their evidence suggested that a Type Band C threshold of 50MW instead of 10MW could result in additional reserve costs of £9m per annum to compensate for the reduced capabilities of Type Band C generators to ride through faults. The proposer of WACM1 questions the basis of this value, given that NGET already holds significant reserves. However, we consider that based on the evidence provided by NGET, the Original modification does reduce costs for consumers and deliver a more efficient electricity system.

The proposer of WACM1 considers that lowering the Type B and C and Type C and D thresholds would not promote the efficiency of electricity generation because it would significantly increase costs for generators to cover the additional requirements. The proposer of WACM1 also considers that since the banding thresholds are also used by the Transmission System Operation Guideline (TSOG), the full impact of the Original modification has not been properly assessed. The proposer of WACM1 proposes keeping the maximum thresholds until the impacts can be fully assessed. Whilst we acknowledge

this point, we note that the working group has undertaken an extensive stakeholder engagement process to try and obtain evidence of the impact of the two modification proposals. Based on the evidence provided, we do not consider that we have received sufficient evidence to demonstrate that generators will actually incur significantly higher costs as a result of implementation the Original modification. In particular, we have not received any evidence that the generators could incur costs as a result of the use of the banding thresholds in the TSOG.

We consider that we did receive evidence from NGET to demonstrate that it would incur additional reserve costs as a result of adopting the maximum banding thresholds. We consider that the Original modification reduces the banding thresholds to a level that avoids creating significant costs for synchronous generators. We therefore consider that the Original modification promotes the security and efficiency of the electricity generation, transmission and distribution systems in a 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.

We note that the Panel and the majority of respondents agree that GC0100 better facilitates this relevant objective. The Proposer raised GC100 in response to the requirement to implement the RfG and HVDC. These European Regulations are legally binding and directly applicable within GB. The modification seeks to ensure that the Grid Code is consistent with these European Regulations. We agree that both the Original modification and WACM1 better facilitate this objective.

Other Issues

During the code administrator's consultation, we note that one respondent pointed out potential procedural issues in dealing with existing Users that undergo modernisation or replacement of plant. We do not consider that the proposed wording in the Original modification is inconsistent with the approach outlined in RfG. Under the proposed approach Users will have the right to seek determination from the Authority if they are not satisfied with the SO's assessment of their connection.

We also note that there is an error with the compliance dates proposed by the modification. Article 72 of RfG and Article 86 of HVDC states that "*this Regulation shall apply from three years after publication*", however the dates proposed as part of this modification state that compliance will start three years from entry into force. We therefore encourage industry to raise a housekeeping modification to address this error to ensure that the Grid Code correctly reflects the applicable regulatory and legislative framework at all times.

Decision notice

In accordance with Standard Condition C14 of NGET's Transmission Licence, the Authority hereby directs that Grid Code Original modification proposal, Grid Code GC0100: '*EU Connection Codes GB Implementation – Mod 1*' be made.

Peter Bingham
Chief Engineer

Signed on behalf of the Authority and authorised for that purpose