

Modification proposal:	<b>Grid Code GC0101: EU Connection Codes GB Implementation – Mod 2</b>		
Decision:	The Authority <sup>1</sup> directs <sup>2</sup> 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 2015	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<sup>3</sup> are part of a suite of European Regulations that have been developed following implementation of the Third Package.<sup>4</sup>

- 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.<sup>5</sup>
- 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.<sup>6</sup>
- 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.<sup>7</sup>

These European Regulations intend to deliver a harmonised set of rules for the operation of the gas and 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).

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

<sup>1</sup> 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.

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

<sup>3</sup> Collectively referred to as the European Network Codes (ENCs)

<sup>4</sup> More information on the European Third Energy Package can be found on our website; [link here](#)  
<sup>5</sup> 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](#)

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

<sup>7</sup> 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](#)

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,<sup>8</sup> 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, as well as utilising 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 GC0100, 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**

GC0101 was raised by National Grid Electricity Transmission plc and seeks to implement the voltage and reactive power parameters, as set out in RfG and HVDC, in respect of the connection of HVDC convertors, DC Connected Power Park Modules and Power Generating Modules.

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

During the workgroup stage, a potential alternative modification (a Workgroup Alternative Code Modification (WACM)) was raised by SSE focusing on the removal of current GB code requirements that the proposer considers are more stringent than those required by the RfG and HVDC. We note that the proposed WACM made no specific variations to GC0101 and no legal text was proposed. We also note that the potential WACM was not accepted as a formal alternative by the Workgroup and therefore there are no accepted WACMs for GC0101.

#### Reactive Capability and Voltage Control in respect of HVDC Converters

##### *HVDC Connections (Title II) - Reactive Power Capability*

The HVDC Code requires that the reactive power exchanged with the network at the connection point is limited to values specified by the Relevant System Operator in co-ordination with the relevant Transmission System Operator (TSO). It also specifies that reactive power variation caused by the reactive power control mode operation of the HVDC Converter Station shall not result in a voltage step exceeding the allowed value at the connection point.

The limits on these values and the maximum tolerable voltage step shall be agreed between the Relevant System Operator and the TSO. Therefore HVDC Converters would have to satisfy the requirements of the TSO relating to permissible voltage fluctuations at the Connection Point.

##### *Voltage Control*

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<sup>8</sup> Implementing the Electricity EU Network Codes, 18 December 2014; [link here](#)

HVDC Converters (Title II) are required to be capable of operating in Voltage, Reactive Power or Power Factor control mode. To implement the RfG in GB, implementation of a voltage control mode is provided through this Modification.

#### *Reactive Power Control and Power Factor Control*

These control modes of operation will normally be switched off but provisions have been made in the legal drafting to accommodate them if they are required for system reasons. For reactive power control mode and power factor control modes of operation the tolerance required in achieving target set point values is left to the discretion of the relevant Transmission System Operator.

#### Reactive Capability and Voltage Control in respect of DC Connected Power Park Modules

The RfG states that DC Connected Power Park Modules are required to comply with the requirements that are applicable to Offshore Power Park Modules unless these are superseded by any additional requirements covered in the RfG.

#### *Reactive Power Capability*

For DC Connected Power Park Modules, the principles for reactive capability are the same as those for Onshore HVDC Connections (Title II) and Power Park Modules under RfG.

#### *Voltage Control, Reactive Power Control and Power Factor Control*

The HVDC Code does not specify any specific requirements in relation to voltage control, reactive power control or power factor control in respect of DC Connected Power Park Modules. For this reason, the requirements of the RfG should apply and the GB proposal for RfG Type C and D Power Park Modules is proposed.

#### Reactive Capability and Voltage Control in respect of Remote End HVDC Converters

#### *Reactive Power Capability*

The HVDC Code requirements follow the same requirements including those applied for HVDC Connections (Title II)<sup>9</sup>. It is therefore proposed to adopt the values suggested for HVDC Connections under Title II, which aligns with the RfG requirements for Power Park Modules.

#### *Voltage Control, Reactive Power Control and Power Factor Control*

The HVDC Code does not specify any specific requirements in relation to voltage control, reactive power control or power factor control in respect of DC Connected Power Park Modules, therefore the requirements of RfG should apply and the GB proposal for RfG Type C and D Power Park Modules is proposed.

#### Frequency requirements in GB, as required by RfG and HVDC.

For HVDC the proposal is to adopt the same frequency parameters as those recommended for RfG unless there is good reason not to do so. This may include, for example, where the HVDC Code specifies a different range or value. More detailed settings are available in the Modification Proposal in tabular format and specifies those that apply to Type A users (and up) and those that apply to Type C users (and up).

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<sup>9</sup> The maximum Q/Pmax range being set at 0.95 and the maximum range of steady state voltage being 0.225pu.

Specific parameters for Remote end HVDC Converters<sup>10</sup> HVDC Converters<sup>11</sup> and DC Connected Power Park Modules<sup>12</sup> are available on the National Grid website.

### **The Grid Code Review Panel (GCRP) recommendation**

At the GCRP meeting of 8 February 2018, the GCRP agreed that GC101 better facilitates the Grid Code objectives. The majority of the GCRP consider that GC0101 will better facilitate Grid Code objectives (i), (iii) and (iv).

### **Our decision**

We have considered the issues raised by the modification proposal and in the Final Report 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 Report<sup>13</sup>. We have concluded that:

- implementation of GC0101 will better facilitate the achievement of the objectives of the Grid Code;<sup>14</sup> and
- approving GC0101 is consistent with our principal objective and statutory duties.<sup>15</sup>

### **Reasons for our decision**

We consider this modification proposal will better facilitate Grid Code objectives (i), (ii), (iii) and (iv) and has a neutral impact on (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 appreciative of 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.

#### ***(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 which 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)***

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<sup>10</sup> Annex 5 - Remote end HVDC Converter Frequency Response parameters Title III; [link here](#)

<sup>11</sup> Annex 6 - HVDC Frequency Response Parameters Title II; [link here](#)

<sup>12</sup> Annex 7 - DC Connected Power Park Modules Frequency Response parameters Title III; [link here](#)

<sup>13</sup> 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/>

<sup>14</sup> As set out in Standard Condition C14(1)(b) of NGET's Transmission Licence, available at: <https://epr.ofgem.gov.uk/>

<sup>15</sup> 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.

Implementation of the RfG should also help facilitate competition in the generation of electricity by improving transparency and consistency of access arrangements across Europe and encouraging greater harmonisation between systems. This removes a potential barrier to entry and allows generators to connect in Member States on consistent terms.

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.

***(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 ENC's 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 and encourage further harmonisation thereby providing a clear and predictable framework from which to operate by. This, in turn, should encourage increased standardisation of equipment and specifications across the whole of the EU and lead to improved economies of scale and increased interconnection driving improved security of supply. We therefore consider that the modifications will promote the security and efficiency of the electricity generation, transmission and distribution systems.

***(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 GC0101 better facilitates this relevant objective. The Proposer raised GC101 in response to the requirement to give effect to the requirements of the RfG and HVDC regulations. 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 this modification facilitates the objective by implementing RfG and HVDC

Other issues

We 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 and 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 modification proposal Grid Code GC0101: '*EU Connection Codes GB Implementation – Mod 2*' be made.

**Peter Bingham**  
**Chief Engineer**

Signed on behalf of the Authority and authorised for that purpose