

Grid Code Review Panel
GB determination of the detail of the European Network Codes

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Summary

Proposed drafts of the European Network Codes; such as the Requirement for Generator (RfG) connection code (26th June 2012 version) and the Demand Connection Code (DCC) (27th June 2012 version); have extensive reference to the use of Article 4(3) (of those respective codes) when referring to future detail being produced by TSOs and / or Relevant Network Operators in order to bring the respective codes into practical effect.

At the 21st-22nd August 2012 Demand Connection Code workshop held under the auspices of the Joint European Standing Group reference was made to this detail being developed via the Grid Code Review Panel.

However, its our interpretation of the proposed Article 4 (3) (and the numerous references to it) that this responsibility would rest with the party identified (in the respective codes). This would mean that items currently subject to GB industry code governance in terms of change management would be removed.

Users Impacted

High

Transmission Owners, Small Generators, Medium Generators, Large Generators, System Operator, Distribution Network Operators, Interconnectors etc..

Description & Background

There are within the final version of the RfG submitted by ENTSO-E to ACER in mid July over ninety different items which will be defined etc., at a later date by either the TSO(s) or Relevant Network Operator(s) (or both).

To give a flavour of what these items are we have list below the first fifty items shown in the first ten (of 58) Articles that make up the RfG. For the sake of brevity we have not included here the additional forty plus items.

Many of these 90 (to be defined later) items in the RfG are either (i) covered in the existing GB industry codes (such as the Grid Code or CUSC) or, if they were to be introduced outwith the European Network Code, (ii) would be expected to be introduced into GB via those industry codes (such as the Grid Code or CUSC).

At the 21st-22nd August 2012 Demand Connection Code workshop held under the auspices of the Joint European Standing Group it was the contention of the representative(s) of National Grid that these items would (in the case of GB) be defined by way of the existing industry code change governance arrangements; e.g. the Grid

Code Review Panel or CUSC Party raised changes etc..

In coming to this view the National Grid representative(s) were relying on the second paragraph of Article 4 (3)* namely:-

“The establishment of these terms and conditions or their methodologies shall be performed by entities and based on the legal framework indicated in this Network Code where reference is made to this paragraph, unless the rules of national law at the date of the entry into force of this Network Code assigns this establishment to a different entity and according to a different legal framework.”

In particular there was a reliance on the last part of the paragraph, namely that:-

“...unless the rules of national law at the date of the entry into force of this Network Code assigns this establishment to a different entity and according to a different legal framework”.

This was interpreted to mean, for example, that they would be determined (in the case of Grid Code related items) by the Grid Code Review Panel.

However, it is our contention that the current GB / UK “rules of national law” make no reference to assigning the establishment of these items “to a different entity and according to a different legal framework” as there is nothing in the (GB / UK) national law to assign the establishment of something which has not (until the Network Code enters into force) been defined.

Given this, it is our interpretation that the first part of the paragraph prevails, namely that:-

“The establishment of these terms and conditions or their methodologies shall be performed by entities and based on the legal framework indicated in this Network Code where reference is made to this paragraph....”

This, in our view, means (i) that these items will be determined / defined etc., either by the TSO(s) or Relevant Network Operator(s) (or both) as appropriate and that:-

- a) the Grid Code Review Panel (or, for example, the CUSC Panel) will have no vires to opine on these items; and
- b) Code parties will be unable to raise GB industry code changes to alter those items going forward.

A further complication, in our view, is that as a number of the ninety plus items (in the RfG) are new it could be argued, in the future, that they do not fall under the GB industry code(s) governance.

If this were the case then it would appear to leave such items ‘in limbo’ and, in this situation, the determination of these items would ‘default’ to the wording in the first part of the second paragraph in Article 4 (3) namely that:-

“The establishment of these terms and conditions or their methodologies shall be performed by entities and based on the legal framework indicated in this Network Code

where reference is made to this paragraph....”

It would therefore be helpful for Grid Code (and CUSC) Parties if National Grid could provide a definitive statement on this matter; including a clear reference to the (specific) applicable GB / UK law(s); that ensures that all ninety plus items to be determined (after the RfG enters into force) will only be defined / calculated / established etc., (as applicable) by way of the appropriate GB industry code modification proposal(s) / change request(s) which will then proceed via the appropriate code governance arrangements; including stakeholder consultation, industry code Panel determination / recommendation etc., (as applicable) and Authority approval.

** Article 4 (3). Where reference is made to this paragraph, the determination of the terms and conditions for connection and access to the networks or the methodologies to establish them shall be set in accordance with the national legal framework implementing Article 37(6) (a), (7) and (10) of Directive 2009/72/EC, and with the principles of transparency, proportionality and non-discrimination.*

The establishment of these terms and conditions or their methodologies shall be performed by entities and based on the legal framework indicated in this Network Code where reference is made to this paragraph, unless the rules of national law at the date of the entry into force of this Network Code assigns this establishment to a different entity and according to a different legal framework.

Proposed Solution

That National Grid provide a clearly reasoned statement (with appropriate legal justification) as to why (i) the items to be determined in accordance Article 4 (3) will be subject to GB industry code governance and (ii) industry parties will be able to raise (as now) changes to those items in accordance with the GB industry code governance arrangements

Assessment against Grid Code Objectives

[Will the proposed changes to the Grid Code better facilitate any of the Grid Code Objectives:]

(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;

[neutral]

(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);

[neutral]

(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; and

[neutral]

(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 seek clarification on how the obligations imposed by Article 4 (3) on the Licensee and the Agency will be efficiently discharged.

Impact & Assessment

Impact on the National Electricity Transmission System (NETS)

We are not proposing a change but seek to clarify the potential impacts of Article 4(3) will have on the NETS and how the impacts of items determined under Article 4 (3) as it stands will be assessed under the GCRP.

Impact on Greenhouse Gas Emissions

None

Impact on core industry documents

Not proposing a change but future impacts due to the issue unknown at this stage

Impact on other industry documents

unknown

Supporting Documentation

Have you attached any supporting documentation No, included in the paper
If Yes, please provide the title of the attachment:

Recommendation

The Grid Code Review Panel is invited to:

Consider the issue, provide guidance/clarification and place actions on relevant parties to report to the GCRP at an agreed date

Document Guidance

This proforma is used to raise an issue at the Grid Code Review Panel, as well as providing an initial assessment. An issue can be anything that a party would like to raise and does not have to result in a modification to the Grid Code or creation of a Working Group.

Guidance has been provided in square brackets within the document but please contact National Grid, The Code Administrator, with any questions or queries about the proforma at grid.code@nationalgrid.com.

Illustrative examples (from the first 10 Articles only) of items to be defined / calculated / determined etc., after entry into force of the RfG.

Article 3 (2)

..... The Relevant TSO shall have the right to re-assess, in case of factual change such as the evolution of system requirements (e.g. penetration of renewable energy sources, smart grids, distributed generation, demand response, etc.), the applicability of the requirements set forth by this Network Code to Existing Power Generating Modules regularly, but not more often than every three years and respecting the provisions of **Article 4(3)**.

Article 3 (6) (b)

A Power Generating Module is of Type B if its Connection Point is below 110 kV and its Maximum Capacity is at or above a threshold defined by each Relevant TSO while respecting the provisions of **Article 4(3)**. This threshold shall not be above the threshold for Type B Power Generating Modules according to table 1. The definition of the threshold shall be coordinated with adjacent TSOs and DSOs and shall be reviewed by the National Regulatory Authority. Power Generating Facility Owners shall assist and contribute to this determination of the threshold and provide the relevant data as requested by the Relevant TSO. The Relevant TSO shall have the right to re-assess the determination of the threshold regularly, if relevant circumstances have changed materially, but not more often than every three years and respecting the provisions of **Article 4(3)**. A public consultation shall be conducted in the frame of the procedure for re-assessment. Following any change to thresholds any Power Generating Module that has been moved to a new type will not automatically have to comply retroactively with the additional requirements but will be subject to the same procedure as applied to Existing Power Generating Modules in line with Article 33.

Article 3 (6) (c)

A Power Generating Module is of Type C if its Connection Point is below 110 kV and its Maximum Capacity is at or above a threshold defined by each Relevant TSO while respecting the provisions of **Article 4(3)**. This threshold shall not be above the threshold for Type C Power Generating Modules according to table 1. The definition of the threshold shall be coordinated with adjacent TSOs and DSOs and shall be reviewed by the National Regulatory Authority. Power Generating Facility Owners shall assist and contribute to this determination of the threshold and provide the relevant data as requested by the Relevant TSO. The Relevant TSO shall have the right to re-assess the determination of the threshold regularly, if relevant circumstances have changed materially, but not more often than every three years and respecting the provisions of **Article 4(3)**. A public consultation shall be conducted in the frame of the procedure for re-assessment. Following any change to thresholds any Power Generating Module that has been moved to a new type will not automatically have to comply retroactively with the additional requirements but will be subject to the same procedure as applied to Existing Power Generating Modules in line with Article 33.

Article 3 (6) (c)

A Power Generating Module is of Type D if its Connection Point is at 110 kV or above. A Synchronous Power Generating Module or Power Park Module is of Type D as well if its Connection Point is below 110 kV and its Maximum Capacity is at or above a threshold defined by each Relevant TSO while respecting the provisions of **Article 4(3)**. This threshold shall not be above the threshold for Type D Power Generating Modules according to table 1. The definition of the threshold shall be coordinated with adjacent TSOs and DSOs and shall be reviewed by the National Regulatory Authority. Power Generating Facility Owners shall assist and contribute to

this determination of the threshold and provide the relevant data as requested by the Relevant TSO. The Relevant TSO shall have the right to re-assess the determination of the threshold regularly, if relevant circumstances have changed materially, but not more often than every three years and respecting the provisions of **Article 4(3)**. A public consultation shall be conducted in the frame of the procedure for re-assessment. Following any change to thresholds any Power Generating Module that has been moved to a new type will not automatically have to comply retroactively with the additional requirements but will be subject to the same procedure as applied to Existing Power Generating Modules in line with Article 33.

Article 3 (6) (e)

For offshore connected Synchronous Power Generating Modules the requirements for onshore synchronous Power Generating Modules shall apply unless modified by the Relevant Network Operator while respecting the provisions of **Article 4(3)**.

Article 3 (6) (g)

Without prejudice to the general applicability of the requirements set forth in this Network Code, a Power Generating Facility Owner, the Network Operator of an industrial site and the Relevant Network Operator to whose Network the Network of the industrial site is connected to, shall have the right in coordination with the Relevant TSO, with respect to Power Generation Modules which are embedded in the Networks of industrial sites, to agree while respecting the provisions of **Article 4 (3)** on conditions for disconnection of such Power Generating Modules together with critical loads, which secure production processes, from the Relevant Network Operator's Network.

Article 8 (1) (a) (2)

While respecting the provisions of **Article 4(3)**, wider Frequency ranges or longer minimum times for operation can be agreed between the Relevant Network Operator in coordination with the Relevant TSO and the Power Generating Facility Owner to ensure the best use of the technical capabilities of a Power Generating Module if needed to preserve or to restore system security. If wider Frequency ranges or longer minimum times for operation are economically and technically feasible, the consent of the Power Generating Facility Owner shall not be unreasonably withheld.

Article 8 (1) (a) (3)

While respecting the provisions of Article 8(1) (a) point 1) a Power Generating Module shall be capable of automatic disconnection at specified frequencies, if required by the Relevant Network Operator. While respecting the provisions of **Article 4(3)**, Terms and settings for automatic disconnection shall be agreed between the Relevant Network Operator and the Power Generating Facility Owner.

Article 8 (1) (b)

With regard to the rate of change of Frequency withstand capability, a Power Generating Module shall be capable of staying connected to the Network and operating at rates of change of Frequency up to a value defined by the Relevant TSO while respecting the provisions of **Article 4(3)** other than triggered by rate-of-change-of-Frequency-type of loss of mains protection. This rate-of-change-of-Frequency-type of loss of mains protection will be defined by the Relevant Network Operator in coordination with the Relevant TSO.

Table 2: Minimum time periods for which a Power Generating Module shall be capable of operating for different frequencies deviating from a nominal value without disconnecting from the Network. [GB] Frequency Range 48.5 Hz – 49.0 Hz / Time period for operation To be defined by each TSO while respecting the provisions of **Article 4(3)**, but not less than 90 minutes.....

Article 8 (1) (c) (1)

..... The Power Generating Module shall be capable of either continuing operation at Minimum Regulating Level when reaching it or further decreasing Active Power output in this case, as defined by the Relevant TSO while respecting the provisions of **Article 4(3)**.

Figure 1 [Active Power Frequency Response]

.....Power Park Modules: Prefis the actual Active Power output at the moment the LFSM-O threshold is reached or the Maximum Capacity, as defined by the Relevant TSO, while respecting the provisions of **Article 4(3)**.....

Article 8 (1) (e)

.....Applicability of this reduction is limited to a selection of affected generation technologies and may be subject to further conditions defined by the Relevant TSO while respecting the provisions of **Article 4(3)**.

Figure 2

Maximum power capability reduction with falling Frequency. The diagram represents the boundaries defined by the Relevant TSO while respecting the provisions of **Article 4(3)**.

Article 8 (1) (f)

The Power Generating Module shall be equipped with a logic interface (input port) in order to cease Active Power output within less than 5 seconds following an Instruction from the Relevant Network Operator. The Relevant Network Operator shall have the right to define while respecting the provisions of **Article 4(3)** the requirements for further equipment to make this facility operable remotely.

Article 8 (1) (g)

The Relevant TSO shall define while respecting the provisions of **Article 4(3)** the conditions under which a Power Generating Module shall be capable of connecting automatically to the Network. These conditions shall include:

- Frequency ranges, within which an automatic connection is admissible, and a corresponding delay time
- maximum admissible gradient of increase of Active Power output

Automatic connection is allowed unless determined otherwise by the Relevant Network Operator in coordination with the Relevant TSO.

Article 9 (2) (a)

In order to be able to control Active Power output, the Power Generating Module shall be equipped with a interface (input port) in order to be able to reduce Active Power output as instructed by the Relevant Network Operator and/or the Relevant TSO. The Relevant Network

Operator shall have the right to define while respecting the provisions of **Article 4(3)** the requirements for further equipment to make this facility operable remotely.

Article 9 (3) (a)

With regard to fault-ride-through capability of Power Generating Modules:

1) Each TSO shall define while respecting the provisions of **Article 4(3)** a voltage-against-time-profile according to figure 3 at the Connection Point for fault conditions which describes the conditions in which the Power Generating Module shall be capable of staying connected to the Network and continuing stable operation after the power system has been disturbed by Secured Faults on the Network.

3) Each TSO shall define and make publicly available while respecting the provisions of **Article 4(3)** defining the pre-fault and post-fault conditions for the fault-ride-through capability in terms of:

- conditions for the calculation of the pre-fault minimum short circuit capacity at the Connection Point;
- conditions for pre-fault active and Reactive Power operating point of the Power Generating Module at the Connection Point and Voltage at the Connection Point; and
- conditions for the calculation of the post-fault minimum short circuit capacity at the Connection Point.

7) Fault-ride-through capabilities in case of asymmetrical faults shall be defined by each TSO while respecting the provisions of **Article 4(3)**.

Article 9 (4)

With regard to capability of reconnection after an incidental disconnection due to a Network disturbance, the Relevant TSO shall adopt a decision while respecting the provisions of **Article 4(3)** defining the conditions under which a Power Generating Module shall be capable of reconnecting to the Network after an incidental disconnection has taken place due to a Network disturbance. Installation of automatic reconnection systems shall be subject to prior authorization by the Relevant Network Operator subject to reconnection conditions specified by the Relevant TSO.

Article 9 (5)

Type B Power Generating Modules shall fulfil the following general system management requirements:

a) With regard to control schemes and settings

1) While respecting the provisions of **Article 4(3)**, schemes and settings of the different control devices of the Power Generating Module relevant for transmission system stability and to enable emergency actions shall be coordinated and agreed between the Relevant TSO, the Relevant Network Operator and the Power Generating Facility Owner.

2) While respecting the provisions of **Article 4(3)**, any changes to the schemes and settings of the different control devices of the Power Generating Module, relevant for transmission system stability and to enable emergency actions, shall be coordinated and agreed between the Relevant TSO, the Relevant Network Operator and the Power Generating Facility Owner, especially if they concern the circumstances referred to under Article 9(5) (a) point 1).

b) With regard to electrical protection schemes and settings:

1) The Relevant Network Operator shall define the schemes and settings necessary to protect the Network taking into account the characteristics of the Power Generating Module. While respecting the provisions of **Article 4(3)**, protection schemes relevant for the Power Generating Module and the Network and settings relevant for the Power Generating Module shall be coordinated and agreed between the Relevant Network Operator and the Power Generating Facility Owner.

4) While respecting the provisions of **Article 4(3)**, any changes to the protection schemes relevant for the Power Generating Module and the Network and to the setting relevant for the Power Generating Module shall be agreed between the Network Operator and the Power Generating Facility Owner and be concluded prior to the introduction of changes.

d) With regard to information exchange:

1) Power Generating Facilities shall be capable of exchanging information between the Power Generating Facility Owner and the Relevant Network Operator and/or the Relevant TSO in real time or periodically with time stamping as defined by the Relevant Network Operator and/or the Relevant TSO while respecting the provisions of **Article 4(3)**.

2) The Relevant Network Operator in coordination with the Relevant TSO shall define while respecting the provisions of **Article 4(3)** the contents of information exchanges and the precise list and time of data to be facilitated.

Figure 4: [Active Power Frequency Response]

.... Power Park Modules: Prefers the actual Active Power output at the moment the LFSM-O threshold is reached or the Maximum Capacity, as defined by the Relevant TSO, while respecting the provisions of **Article 4(3)**

Article 10 (2) (c) (5)

.....The initial delay of activation shall be as short as possible and reasonably justified by the Power Generating Facility Owner to the Relevant TSO, by providing technical evidence for why a longer time is needed, if greater than 2 seconds or a shorter time if specified by the Relevant TSO while respecting the provisions of **Article 4(3)** for generation technologies without Inertia.

Table 5: [Parameters for full activation of Active Power Frequency Response resulted from Frequency step change]

.... Maximum admissible initial delay unless justified otherwise for generation technologies without Inertia[Ranges or values] as specified by the Relevant TSO while respecting the provisions of **Article 4(3)**

Article 10 (2) (d)

With regard to Frequency restoration control, the Power Generating Module shall provide functionalities compliant to specifications defined by the Relevant TSO while respecting the provisions of **Article 4(3)**, aiming at restoring Frequency to its nominal value and/ or maintain power exchange flows between control areas at their scheduled values

Article 10 (2) (f) (2)

The Relevant Network Operator and the Relevant TSO shall define while respecting the provisions of **Article 4(3)** additional signals to be provided by the Power Generating Facility for monitoring and/or recording devices in order to verify the performance of the Active Power Frequency Response provision of participating Power Generating Modules.

Article 10 (3) (a)

The Relevant Network Operator in coordination with the Relevant TSO shall have the right to specify while respecting the provisions of **Article 4(3)** Voltages at the Connection Point at which a Power Generating Module shall be capable of automatic disconnection. The terms and settings for this automatic disconnection shall be defined by the Relevant Network Operator in coordination with the Relevant TSO while respecting the provisions of **Article 4(3)**.

Article 10 (5) (a) (2)

A Power Generating Module with a Black Start Capability shall be able to start from shut down within a timeframe decided by the Relevant Network Operator in coordination with the Relevant TSO while respecting the provisions of **Article 4(3)**, without any external energy supply.

Article 10 (5) (b)

With regard to capability to take part in Island Operation:

- 1) The capability to take part in Island Operation, if required by the Relevant Network Operator in coordination with the Relevant TSO while respecting the provisions of **Article 4(3)**, shall be possible within the Frequency limits defined in Article 8(1) and Voltage limits according to Article 10(3) or Article 11(2) where applicable.
- 3) Detection of change from interconnected system operation to Island Operation shall not rely solely on the Network Operator's switchgear position signals. The detection method shall be agreed between the Power Generating Facility Owner and the Relevant Network Operator in coordination with the Relevant TSO while respecting the provisions of **Article 4(3)**.

Article 10 (6) (a)

1) Power Generating Facilities shall be equipped with a facility to provide fault recording and dynamic system behaviour monitoring of the following parameters:

- Voltage;
- Active Power;
- Reactive Power; and
- Frequency.

The Relevant Network Operator shall have the right to define while respecting the provisions of **Article 4(3)** quality of supply parameters to be complied with provided a reasonable prior notice is given.

2) While respecting the provisions of **Article 4 (3)**, the settings of the fault recording equipment, including triggering criteria and the sampling rates shall be agreed between the Power Generating Facility Owner and the Relevant Network Operator in coordination with the Relevant TSO.

4) The facilities for quality of supply and dynamic system behaviour monitoring shall include arrangements for the Power Generating Facility Owner, the Relevant Network Operator and/or the Relevant TSO to access the information. While respecting the provisions of **Article 4 (3)** the communications protocols for recorded data shall be agreed between the Power Generating Facility Owner and the Relevant Network Operator and Relevant TSO.

Article 10 (6) (c)

- 1) The Relevant Network Operator in coordination with the Relevant TSO shall have the right to require while respecting the provisions of **Article 4(3)** the Power Generating Facility Owner to provide simulation models
- 2) Power Generating Module protection models as agreed between the Relevant Network Operator and the Power Generating Facility Owner, while respecting the provisions of **Article 4(3)**
.....
- 4) The Relevant Network Operator or Relevant TSO shall have the right to require while respecting the provisions of **Article 4(3)** Power Generating Module recordings in order to compare the response of the models with these recordings

Article 10 (6) (d)

With regard to the installation of devices for system operation and/or security, if the Relevant Network Operator or the Relevant TSO considers additional devices necessary to be installed in a Power Generating Facility in order to preserve or restore system operation or security, the Relevant Network Operator or Relevant TSO and the Power Generating Facility Owner shall investigate this request and, while respecting the provisions of **Article 4(3)**, agree on an appropriate solution .

Article 10 (6) (e)

The Relevant Network Operator in coordination with the Relevant TSO shall define while respecting the provisions of **Article 4(3)** minimum and maximum limits on rates of change of Active Power output (ramping limits) in both up and down direction for a Power Generating Module taking into consideration the specific characteristics of the prime mover technology.

Article 10 (6) (g)

With regard to changes to, modernization of or replacement of equipment of Power Generating Modules, any Power Generating Facility Owner intending to change plant and equipment of the Power Generating Module that may have an impact on the grid connection and on the interaction, such as turbines, Alternators, converters, high-voltage equipment, protection and control systems (hardware and software), shall notify in advance (in accordance with agreed or decided national timescales) the Relevant Network Operator in case it is reasonable to foresee that these intended changes may be affected by the requirements of this Network Code and shall, while respecting the provisions of **Article 4(3)**, agree on these requirements before the proposals are implemented with the Relevant Network Operator in coordination with the Relevant TSO. In case of modernisation or replacement of equipment in existing Power Generating Modules the new equipment shall comply with the respective requirements which are relevant to the planned work. While respecting the provisions of **Article 4 (3)**, the use of existing spare components that do not comply with the requirements has to be agreed with the Relevant Network Operator in coordination with the Relevant TSO in each case.