

national**grid**ESO

EU NCER: System Restoration Plan (Including Distributed Re-Start)

Issue 4

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EU NCER: System Restoration Plan

1 Version Control

Version	Date	Author	Rationale
Issue 1	Dec 2018	NGESO	By December 2018, each TSO shall notify the regulatory authority of the system restoration plan designed pursuant to Article 23.
Issue 2	July 2019	NGESO	Further detail added to define SGU's and outline the plan review.
Issue 3	December 2019	NGESO	Updates to the SGU list and High Priority SGUs. Updates to glossary and definitions. Updated to reflect compliance requirements for implementation of NCER by December 2019.
Issue 4	March 2022	NGESO	Refresh of document to reflect Grid Code updates (GC0096, GC0125, GC0127, GC0128, GC0144 and GC0147) and approval of SGU list, T&Cs, Test Plan and Distributed Re-Start.

2 Introduction

The European Network Code on Emergency & Restoration¹ (EU NCER) came into force on 18 December 2017 and this document is NGESO's approach to discharging the requirement in that Network Code which requires preparation of a System Restoration Plan. This System Restoration Plan has been developed in consultation with industry stakeholders. This version of the System Restoration Plan also contains the provisions of the Distributed Restart project (an NIA Project) which would fall under the remit of the EU NCER, but does not include the requirements of the Electricity System Restoration Standard (ESRS).

As provided for in the EU NCER Article 23, this System Restoration Plan has been designed in consultation with Stakeholders in the GB synchronous area. GB Parties who will be required to comply with the requirements of the EU NCER are detailed in Appendix A of this System Restoration Plan. In general, the EU NCER applies to the following parties in GB.

- Any Party with a CUSC Contract
- Any Non-CUSC Party with a contract with NGESO to provide a Restoration Service

¹*Network Code on Emergency and Restoration*

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.312.01.0054.01.ENG&toc=OJ:L:2017:312:TOC

- Transmission Licensees
- Distribution Network Operators

This Plan is not intended to replace any provisions currently in place in the GB Industry Codes nor to amend the Operational Security Limits², it is a summary of how the requirements for System Restoration specified in the EU NCER are satisfied in GB. The provisions contained within this System Restoration Plan are already described in the GB national codes (e.g. Grid Code, CUSC, STC, BSC, etc.). For the avoidance of doubt, the mandatory requirements placed on Parties are defined in the industry codes developed through the industry code governance process and not through this System Restoration Plan. For Non-CUSC Parties who have a contract with NGENSO to provide a Restoration Service, a condition of that contract requires them to meet the applicable conditions of the Grid Code and therefore they will comply with the obligations of the EU NCER. The Governance of this System Restoration Plan will be managed through GC16 of the Grid Code General Conditions which provides for a governance framework similar to that of the Relevant Electrical Standards.

This System Restoration Plan will be of interest to all parties identified in Appendix A of this document. The obligations on those parties are detailed in the Grid Code and Industry Codes or through contractual arrangements with National Grid ESO rather than this System Restoration Plan which aims to provide a high level overview of the mechanisms available to National Grid ESO to restore the System following a total or partial shutdown. In complying with the requirements of the Grid Code, System Operator Transmission Owner Code (STC), Distribution Code and Balancing and Settlement Code (BSC) (as applicable), the National Grid Electricity System Operator (NGESO), Transmission Licensees, Distribution Network Operators and CUSC Parties will be satisfying the requirements of EU NCER. It should be noted that the EU NCER applies both to GB Code Users and EU Code Users as defined in Appendix A of this document.

This System Restoration Plan has been developed taking the following into account:

- The behaviour and capabilities of load and generation;
- The specific needs of the high priority SGUs detailed in Appendix B;
- The characteristics of the National Electricity Transmission System and Distribution Network Operators; and
- The ability of Restoration Service Providers (including Black Start Service Providers and Anchor Plant Owners) to contribute to System Restoration, either via a Local Joint Restoration Plan (LJRP) or a Distribution Restoration Zone Plan (DRZP).

² Article 25 System Operations Guideline

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.220.01.0001.01.ENG

3 System Restoration Plan

3.1 Plan Overview

The EU Network Code on Emergency and Restoration (EU NCER) aims to ensure security and continuity of electricity supply across Europe by creating harmonised standards and procedures to be applied in the Emergency, Blackout and Restoration system state(s). This code requires the development of a System Restoration Plan in advance of such an event specifying measures related to information exchange, operational procedures and post-event analysis.

Although the UK has departed from the EU, the majority of the requirements in the EU NCER have been retained in GB law via Statutory Instrument (SI 533 2019). Therefore, unless provided for by exception in SI 533 2019, the requirements of the EU NCER will apply unchanged.

EU NCER sits alongside the Transmission System Operation Guideline³ (SOGI) which sets out harmonised rules on system operation and identifies different critical system states (Normal State, Alert State, Emergency State, Blackout State and Restoration State).

This System Restoration Plan consists of the technical and organisational measures necessary for the restoration of the electricity system in Great Britain from a Partial or Total Shutdown to normal steady state conditions, taking into account the capabilities of the GB parties listed in Table 1 of Appendix A of this document and the operational constraints of the Total System.

The main objectives of this plan include:

1. To achieve the Re-Synchronisation of parts of the Total System which have become Out of Synchronism.
2. To ensure that communication routes and arrangements are available to enable representatives of those parties who fall within the scope of the NCER as identified in Appendix A of this System Restoration Plan are authorised to make binding decisions on their behalf and to communicate with each other when this System Restoration Plan is active.
3. To describe the role that in respect of the GB Parties listed in Appendix A may have in the restoration processes as detailed in the relevant De-Synchronised Island Procedures (DIPs), Local Joint Restoration Plans (LJRPCs) and Distribution Restoration Zone Plans (DRZPs).
4. To identify and address as far as possible the events and processes necessary to enable the restoration of the Total System in GB to a Normal State, after a Total Shutdown or Partial Shutdown. This is likely to require the following key processes to be implemented, typically, but not necessarily, in the order given below:

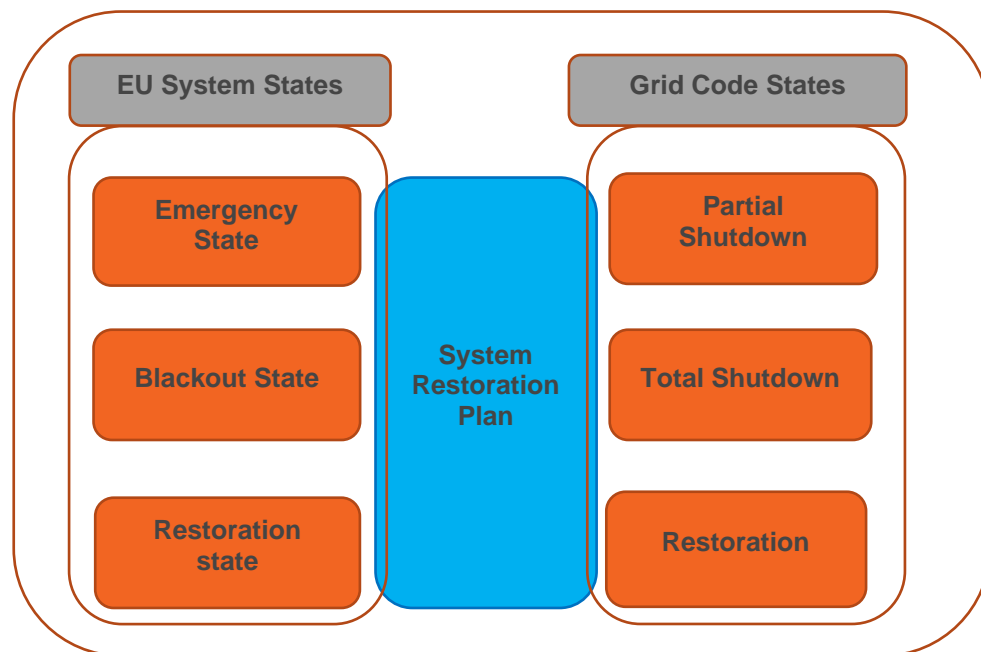
³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R1485&from=EN>

- Selectively implement Local Joint Restoration Plans and Distribution Restoration Zone Plans;
- Expand Distribution Restoration Zones either to adjacent Distribution Restoration Zones or Power Islands established through a Local Joint Restoration Plan;
- Expand Power Islands to supply non Black Start Power Stations;
- Selectively reconnect demand;
- Expand and merge Power Islands leading to Total System energisation;
- Facilitate and co-ordinate returning the Total System back to normal operation; and
- Resumption of the market arrangements if suspended in accordance with the relevant codes.

3.2 Activation of System Restoration Plan

In Accordance with EU NCER Article 25:

- 3.2.1 Procedures in this System Restoration Plan can be activated when the System is in an Emergency State and activated procedures of the System Defence Plan have taken place, or will be activated when the System is in the Blackout State.
- 3.2.2 Procedures in this System Restoration Plan will be activated by the NGESO in coordination with the GB Parties listed in Appendix A of this System Restoration Plan.
- 3.2.3 All instructions issued by the NGESO under this System Restoration Plan must be executed by each GB party falling under the scope of the NCER (as identified in Appendix A of this System Restoration Plan) without undue delay.
- 3.2.4 The NGESO will also manage remedial actions that involve actions from other Transmission Licensees and Externally Interconnected System Operators (EISOs). For Black Start Service Providers, generally connected at Transmission the requirements of a Local Joint Restoration Plan would apply and in the case of Distribution Restoration Zones, the Distribution Network Operator will be responsible for establishing and running the Distribution Restoration Zone once an instruction has been issued by NGESO to establish a Distribution Restoration Zone which shall be run in accordance with the Distribution Restoration Zone Plan.
- 3.2.5 The System Restoration Plan can be activated, and remain active, through the Emergency, Blackout and Restoration States as shown below.



3.2.6 Activation of the System Restoration Plan in GB will occur once the NGESO determines and informs the Balancing and Settlement Code Company (BSCCo) that either a Total Shutdown or a Partial Shutdown exists and subsequent Black Start instructions are required for restoration.

3.2.7 Market Suspension (*EU NCER Article 35 part 1*) occurs in GB

- Automatically in the event of a Total Shutdown (in this case the Market Suspension Threshold is not relevant).
- During a Partial Shutdown and in this case the market is only suspended if the Market Suspension Threshold is met. There are three circumstances in which the threshold is met or deemed to be met.
 - the NGESO determines that the spot time Initial National Demand Out-Turn is equal to or lower than 95% of the baseline forecast (this means that 5% or more of demand has been lost); or
 - No more baseline forecast data is available to the NGESO; or
 - 72 hours have elapsed since the Partial Shutdown commenced.
- The conditions under which the Transmission System is deemed to be under an Emergency State and the potential for the Market to then subsequently be suspended are detailed in BC.2.9.8 of the Grid Code.

- 3.2.8 The trigger threshold for the GB system Blackout State shall be maintained as per the current definition of a Partial or a Total System Shutdown as defined in *Grid Code OC9.4.1*.

4 System Restoration Plan Procedures

Grid Code OC9.4 documents the procedure of recovery from a Total or Partial Shutdown. This allows for a top-down restoration approach (energisation from Black Start Service Providers including other Externally Interconnected System Operators (EISOs)) and a bottom-up energisation approach (energisation from Embedded Generation using Distribution Restoration Zone Plans. In the case of a Distribution Restoration Zone, Distribution Network Operators use Restoration Service Providers (including Anchor Plant Owners) to energise parts of their Network and demand which could as part of a Distribution Restoration Zone Plan also enable re-energisation of parts of the Transmission System). In GB both these processes are detailed in OC9 of the Grid Code and DOC9 of the Distribution Code and reflect the processes detailed in the EU NCER as follows:-

- Re-energisation procedure (*EU NCER Article 26 Section 2*)
- Re-synchronisation procedure (*EU NCER Article 33 Section 4*)
- Frequency management procedure

4.1 Re-energisation procedure

- 4.1.1 The *Grid Code OC9.2* identifies the key processes to be implemented in GB to enable the restoration of the Total System following a Total or Partial Shutdown as:
- Selectively implement Local Joint Restoration Plans and Distribution Restoration Zone Plans;
 - Expand Power Islands
 - Selectively reconnect Demand;
 - Expand and merge Power Islands leading to Total System energisation;
 - Facilitate and co-ordinate returning the Total System back to normal operation; and
 - Resumption of the Balancing Mechanism if suspended in accordance with the provisions of the Balancing and Settlement Code (BSC).
- 4.1.2 In order to deliver this restoration, contractual arrangements for Black Start Service Providers, Restoration Service Providers forming part of a Distribution Restoration Zone (which includes Anchor Plant Owners) and documented restoration plans are in place as permitted through the *Grid Code OC9* provisions.
- 4.1.3 The bilateral procurement of parties providing a Black Start service under a Local Joint Restoration Plan is carried out by the NGESO. For

Restoration enabled through a Distribution Restoration Zone, the procurement of Anchor Plant services and top up services is procured through a trilateral contract between NGESO, the relevant Distribution Network Operator and the Restoration Service Provider. In the case of a Black Start Service Provider where a commercial contract has been established, the NGESO in coordination with relevant Transmission Licensees, Distribution Network Operators and CUSC Parties create, in line with *Grid Code OC9.4.7.6*, a Local Joint Restoration Plan (LJRP). In the case of a Distribution Restoration Zone, commercial contracts will be established with Restoration Service Providers (which includes Anchor Plant Owners). These are trilateral agreements between the NGESO, the relevant Distribution Network Operator and Restoration Service Providers. With these contracts in place, NGESO in coordination with those Restoration Service Providers, Distribution Network Operators and Transmission Licensees (where relevant) will create, in line with *Grid Code OC9.4.7.7*, a Distribution Restoration Zone Plan (DRZP).

- 4.1.4 Operation of LJRPs and DRZPs are detailed in *Grid Code OC9.4.7.6* and *OC9.4.7.7* respectively. Each individual LJRP and DRZP document provides specific details of how individual Restoration Services are to be started and block loaded to create a stable Power Island or Distribution Restoration Zone respectively. In co-ordination with the NGESO, these plans provide guidance to Transmission Licensees and Distribution Network Operators to assess the status of operational equipment and systems, in a shutdown situation, and identify the organisational and processes necessary to enable an effective restoration. They also identify the split in responsibilities between the relevant Transmission Licensees and relevant Distribution Network Operators, together with the appropriate communication channels.
- 4.1.5 The process for making any changes, amendments or the creation of new LJRPs or DRZP's are detailed in *Grid Code OC9.4.7.6* and *OC9.4.7.7* including the exercising of these plans.
- 4.1.6 In the case of restoration through an LJRP voltage and frequency management is overseen by the NGESO unless delegated to the relevant Transmission Licensee in accordance with the provisions of the STC. In Scotland, NGESO directs the relevant transmission licensee to expand the network in line with routes identified in the Skeleton Network. In the case of restoration through a DRZP, voltage and frequency management of the Distributed Restoration Zone is managed by the Distribution Network Operator and overseen by NGESO. In Scotland, NGESO will instruct the relevant Transmission Licensee to instruct the relevant Distribution Network Operator to establish a Distribution Restoration Zone as provided for under STCP 06-1.

- 4.1.7 The Skeleton Network indicates key routes for growing individual Power Islands, once stable and having developed a level of circuit security, to enable supplies to be given to further GB Parties, other Power Islands and subsequently to create a single, synchronous power system.
- 4.1.8 During the re-energisation process the resynchronisation and frequency management procedures detailed within this System Restoration Plan are adhered to.

4.2 Re-synchronisation procedure

- 4.2.1 EU NCER Article 33 Section 4 requires the appointment of a resynchronisation leader. For the purpose of GB National Electricity Transmission System restoration, NGESO takes on the role of resynchronisation leader, as overall coordinator of the restoration procedure unless alternative arrangements are specified (as currently provided for in Scotland under STCP 06-1 - the System Operator Transmission Owner Code Procedure on Black Start). Grid Code OC9.5.6 outlines the requirements for the Re-synchronisation of De-Synchronised Islands following a Total or Partial Shutdown where Re-Synchronisation of Power Islands takes place following the establishment of either an LJRP or DRZPs.
- 4.2.2 Following any shutdown, the re-energisation procedure requires that several Power Islands are created and expanded with the objective of creating the Skeleton Network to grow to reach available generation and demand. The Skeleton Network is then expanded until all demand, generation and appropriate circuits have been restored. It will, therefore, be necessary to interconnect Power Islands. The complexities and uncertainties of recovery from a Total or Partial Shutdown requires that provisions under this section to be flexible, however, the actions taken when Re-synchronising De-synchronised Islands following any Total Shutdown or Partial Shutdown, will include the following: (a) the provision of supplies to appropriate Power Stations to facilitate their synchronisation as soon as practicable; (b) energisation of a skeletal National Electricity Transmission System; (c) energisation of Distribution Restoration Zones and (d) the subsequent strategic restoration of Demand in co-ordination with relevant Distribution Network Operators.
- 4.2.3 Re-synchronisation of a Power Island is performed by arming and closing a synchronising breaker at the substation joining both Power Islands. The Power System Synchroniser setting is in place to ensure safe closure of the open circuit breaker which is live on both sides. This is designed to synchronise two electrically separate systems which are running at slightly different frequencies with the two voltages across the open circuit breaker contacts cyclically passing in and out of phase with each other. This would be equally applicable where a Power Island formed through an LJRP synchronises to a Power Island formed through a DRZP or where two Distribution Restoration Zones are subsequently synchronised together.
- 4.2.4 The requirement for the Power System Synchroniser is to ensure the phase angle between voltages is practically zero and the voltage magnitudes and difference in frequency or slip is within pre-set limits. Once the synchronisation command has been executed, the Power System Synchroniser circuit breaker will remain armed for a period of time to allow system conditions to be suitably altered (one frequency driven towards the other by issuing Target Frequency instructions to generators within one power island) to allow the synchronising relay to close the selected circuit breaker. Should the conditions not be met, then the instruction will time out and circuit breaker re-selection and execution of the instruction must be repeated.

- 4.2.5 The location of Power System Synchroniser circuit breaker facilities on the Transmission System are documented within the relevant TSO's internal procedures and are indicated on NGESO's situational awareness displays at the Electricity National Control Centre. For Distribution Restoration Zones, details of Power System Synchroniser circuit breaker facilities would be included in the DRZP.
- 4.2.6 The setting policy for synchronising relays on the Transmission System is common across all three onshore TSO areas in GB, and are:
- System synchronising slip 0.125Hz
 - System synchronising closing angle 10 degrees
 - Under voltage setting 0.85pu
 - Voltage difference limit as specified in CC/ECC6.1.4 of the Grid Code. For Distribution Restoration Zones, the synchronising relay settings will be specified by the Distribution Network Operator and agreed with NGESO and the relevant Transmission Licensee.
- 4.2.7 During a Total Shutdown or Partial Shutdown and during the subsequent recovery, the (Transmission) Licence Standards may not apply and the Total System may be operated outside normal Voltage and Frequency standards.
- 4.2.8 In a Total Shutdown and during the subsequent recovery, all instructions issued by the NGESO(unless specified otherwise) are deemed to be Emergency Instructions under BC2.9.2.2 (iii) and need not be prefixed with the words "This is an Emergency Instruction".
- 4.2.9 In a Partial Shutdown and during the subsequent recovery, all instructions issued by the NGESO to relevant Transmission Licensees and Distribution Network Operators and relevant GB Parties (as defined in Table A1 of Appendix A of this document) which are part of an invoked LJRP or DRZP (unless specified otherwise) are deemed to be Emergency Instructions under BC2.9.2.2(iii) and need not be prefixed with the words "This is an Emergency Instruction".

4.3 Frequency management procedure

- 4.3.1 EU NCER Section 3 Article 29 requires the appointment of a frequency leader during system restoration when a synchronous area is split in several synchronised regions. For the purpose of GB NETS restoration, NGESO takes on the role of frequency leader except in situations where it is delegated in Scotland in accordance with STCP-06-1 or in the case of Distribution Restoration Zones where the Distribution Network Operator has this role (under the coordination of NGESO) during the establishment and operation of a Distribution Restoration Zone.
- 4.3.2 Frequency management during system restoration falls into two phases: i) the LJRP and DRZP phases and ii) the Skeleton Network

phase. The NGESO remains the frequency leader in both these phases (except where the role, as currently provided for in Scotland, has been delegated to another Transmission Licensee as defined under STCP-06-1 or a Distribution Restoration Zone has been established and the role is undertaken by the relevant Network Operator) and both phases can be in force simultaneously as new LJRP or DRZPs are instructed and form power islands whilst the Skeleton Network is being restored. In Scotland, NGESO delegate the Scottish Transmission Licensee to instruct a Scottish Network Operator to establish and operate a Distribution Restoration Zone.

4.3.3 Frequency Management during the LJRP and DRZP Phase

In the case of an LJRP and during the LJRP phase, NGESO will instruct the implementation of required LJRP. As detailed within the LJRP; demand blocks will be added in line with the requirements of the relevant GB party to establish a power island. During the period when only one GB Party (for example a Power Station or HVDC System Owner) is connected to the Power Island the frequency is controlled by that GB Party in co-ordination with the NGESO, relevant Transmission Licensee and or relevant Distribution Network Operator who will also add or remove demand as the GB Party (eg a Generator or HVDC System Owner) requires to maintain Target Frequency.

During this period, A GB Party (such as a Power Station or HVDC System Owner) will be required to regulate their output in co-ordination with NGESO and the relevant Transmission Licensee and /or relevant Distribution Network Operator to the existing and newly connected demand in the Power Island. NGESO in coordination with the relevant Transmission Licensee and / or relevant Distribution Network Operator will communicate so that demand and generation are matched to maintain (where practicable) the Target Frequency. Demand will be added to the Power Island as more generation becomes available.

In the case of a DZRP and during the DRZP phase, NGESO will instruct the relevant Network Operator to establish a Distribution Restoration Zone in accordance with the Distribution Restoration Zone Plan. The Network Operator will instruct (either manually or with the aid of a Distribution Restoration Zone Controller) Anchor Plant to energise part of the Distribution System and start to restore blocks of demand which may also require the use of top up services from other Restoration Service Providers. During this phase there is a requirement for Anchor Plant and relevant Restoration Service Providers to maintain Target Frequency as detailed within the DRZP. Further demand blocks will be added in line with the requirements of the relevant GB party to establish a power island. The relevant Restoration Service Provider (for example an Anchor Plant Owner) will configure their plant to act in “free governor action” mode to aid in frequency control. During the period when only one Restoration Service Provider (for example an Anchor Plant Owner) is connected to the Power Island the frequency is controlled by that Restoration Service Provider in co-ordination with the relevant Distribution

Network Operator who will also add or remove demand as the Restoration Service Provider controls Target Frequency.

During this period, a Restoration Service Provider (eg an Anchor Plant Owner and top up service) will be required to regulate their output in co-ordination with Distribution Network Operator to the existing and newly connected demand in the Power Island. The relevant Distribution Network Operator will communicate so that demand and generation are matched to maintain (where practicable) the Target Frequency. Demand will be added to the Power Island as more generation becomes available.

4.3.4 Frequency Management during the Skeleton Network Phase

In the case of a Power Island formed from an LJRP, the Skeleton Network phase begins when a second or subsequent GB Party (as defined in Table A1 of Appendix A) are added to the Power Island. NGESO in coordination with the relevant Transmission Licensees and Distribution Network Operators will issue instructions to available Generators, HVDC System Owners, DC Converter Station Owners and Virtual Lead Parties relating to the size of power blocks required to be added or removed from the Power Island to maintain generation stability.

In the case of a Power Island formed from a DRZP the Skeleton Network Phase begins when that Distribution Restoration Zone is connected to another Power Island which has been established through an LJRP.

Power Islands will be synchronised to each other using suitable system synchroniser circuit breakers with the frequency of each Power Island being controlled by NGESO in coordination with relevant Transmission Licensees and where appropriate Distribution Network Operator. Subsequent Power Islands will be synchronised in a similar way.

During this phase, NGESO in coordination with the relevant Transmission Licensee and Distribution Network Operators will determine power block size to be added or removed from the power island to maintain energy balancing and power island frequency. GB Parties defined in Table A1 of Appendix A of this System Restoration Plan who are capable of supplying power to the NETS will be instructed by NGESO unless delegated through STCP 06-1. All Power Stations who resume operation in a Restoration State will remain in Frequency Sensitive Mode until Normal State is achieved or instructed otherwise by NGESO.

5. System Restoration to Normal State operation

- 5.1 In GB, a Black Start restoration will be deemed to be completed according to the rules of the Grid Code and the BSC. In essence, this is as follows:

- If normal market operations have been suspended, then a Black Start restoration will be deemed to be completed when these operations (including the Balancing Mechanism) have resumed – with this point to be determined by the BSC Panel; or
- If normal market operations have not been suspended, then a Black Start restoration will be deemed to be completed when the NGESO determines that the Total System has returned to normal operation.

5.2 *Grid Code OC9.4.7.11* describes the considerations to be made by NGESO before declaring that the Total System could return to normal operation:

- the extent to which the GB NETS is contiguous and energised;
- the integrity and stability of the GB NETS and its ability to operate in accordance with the (Transmission) Licence Standards;
- the impact that returning to a Normal State may have on transmission constraints and the corresponding ability to maximise the Demand connected;
- the volume of Generation or Demand not connected to the GB NETS; and
- the functionality of normal communication systems (ie electronic data communication facilities, Control Telephony, etc.)

5.3 Once NGESO deems that sufficient confidence in the Transmission System, connected generation and demand and appropriate systems are in place to return to normal operation, it will inform the BSCCo of this development.

6. System Restoration Plan Implementation

- 6.1 Article 24 of the EU NCER, provides for the implementation of the System Restoration Plan. In order to implement the System Restoration Plan, NGESO has notified those parties (as identified in Appendix A) that in meeting requirements of the Grid Code (as CUSC Parties or those parties which have contracts with NGESO to provide Restoration Services) they will be bound by the requirements of the EU NCER.

7. Resilience measures to be implemented by the NGESO, Transmission Licensees and Distribution Network Operators (Including Independent Distribution Network Operators)

In Accordance with EU NCER Article 11(4)

- 7.1 NGESO has a list of substations essential for restoration that will be operational in the case of loss of primary power supply for at least 24 hours (EU NCER Article 42) however, due to the sensitivity of this information, it is not possible to share this externally. This information has been shared with the Authority. In the case of Distribution Restoration Zones, substations critical for restoration would be detailed in the Distribution Restoration Zone Plan.
- 7.2 NGESO, Onshore Transmission Licensees and Distribution Network Operators should ensure all plant and apparatus, equipment controlling that plant and apparatus and the necessary personnel with the appropriate skill and knowledge to operate and control that plant and apparatus (for example primary electrical plant, control, protection, metering equipment, computer facilities for the secure operation of the power system (including but not limited to SCADA and state estimator functions) and the availability of staff to operate those systems) are designed to remain available for use for at least 24 hours in the case of a loss of external power (EU NCER Article 42). This includes any remote data centres required to sustain the critical tools and facilities.
- 7.3 Critical tools and facilities for NGESO, Onshore Transmission Licensees Distribution Network Operators, User's and Restoration Service Provider taking part in Black Start include but are not limited to: -
- i) Tools for operating and monitoring the Transmission System including but not limited to state estimation, the Balancing Mechanism, load and System Frequency control, alarms, real time system operation and operational security analysis including off line transmission analysis.
 - ii) The ability to control, protect and monitor transmission assets including switchgear, tap changers and other Transmission System equipment including where available auxiliary equipment

and to ensure the safe operation of Plant and Apparatus and the safety of personnel.

- iii) Control Telephony systems as provided for in CC.6.5.1 – CC.6.5.5 and ECC.6.5.1 – ECC.6.5.5 of the Grid Code
- iv) Operational telephony as provided for in STCP 04-5.
- v) Tools and communications systems to facilitate cross border operations.

In the case of Generators and HVDC System Owners and DC Converter Station Owners

- i) Tools for monitoring their Plant and Apparatus.
- ii) The ability to control, protect and monitor their Plant and Apparatus including as applicable primary Plant, switchgear, tap changers and other auxiliary equipment and to ensure the safe operation of Plant and personnel.
- iii) Control Telephony as provided for in CC.6.5.1 – CC.6.5.5 and ECC.6.5.1 – ECC.6.5.5 of the Grid Code.

In the case of Network Operators

- i) Control room Apparatus and tools for monitoring their System including but not limited to, alarms, real time system operation and operational security analysis including off line network analysis.
- ii) The ability to control, protect and monitor those assets necessary for Black Start including switchgear, tap changers and other network equipment including where available auxiliary equipment and to ensure the safe operation of Plant and personnel.
- iii) Control Telephony as provided for in CC.6.5.1 – CC.6.5.5 and ECC.6.5.1 – ECC.6.5.5 of the Grid Code.

In the case of Non-Embedded Customers

- i) Tools for monitoring their System including but not limited to, alarms and real time system operation.
- ii) The ability to control, protect and monitor assets including switchgear, tap changers and other network equipment including where available auxiliary equipment and to ensure the safe operation of Plant and personnel.
- iii) Control Telephony as provided for in CC.6.5.1 – CC.6.5.5 and ECC.6.5.1 – ECC.6.5.5 of the Grid Code

7.4 In addition to those listed in 7.3 critical tools and facilities for NGESO will include state estimation applications, facilities for load-frequency control, security analysis and the means to facilitate cross-border market operations.

7.5 NGESO and onshore Transmission Licensees must also ensure they have at least one geographically separate control room with backup power supplies for at least 24 hours, in case of loss of primary power supply. They must also have a procedure to transfer functions to the Standby Control Room as quickly as possible but in no longer than 3 hours. For Transmission Licensees these provisions are provided for in the STC.

8. Plan Review

- 8.1 EU NCER Article 51 requires the NGESO to review the measures of the System Restoration Plan using computer simulation tests to assess effectiveness at least every five years. Such a process will be documented and developed through internal NGESO business procedures.
- 8.2 The review will cover:
- Simulating the Skeleton Network using Black Start Service Providers and Distribution Restoration Zones;
 - Demand reconnection process;
 - The process for resynchronisation of Power Islands; and
 - Learning from operational testing as per the testing procedure
- 8.3 Operational testing of the System Restoration Plan will be in line with the Assurance and Compliance Testing requirements within the System Defence Plan.
- 8.4 NGESO will review the System Restoration Plan to assess its effectiveness at least every five years.
- 8.5 NGESO will also review the relevant measures of the System Restoration Plan in advance of a substantial change to the configuration of the National Electricity Transmission System.
- 8.6 Any substantive changes identified in the review of the System Restoration Plan will be developed through the Governance arrangements in GC16 of the Grid Code General Conditions.

Appendix A: GB Parties within the scope of the System Restoration Plan

In accordance with EU NCER, Art 2 defines the SGU's who fall within the scope of the European Emergency and Restoration Code. Table A1 defines the EU Criteria and how this translates to which parties within GB fall within the scope of the EU Emergency and Restoration Code.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plan
Existing and new Power Generating modules classified as Type C and D in accordance with the criteria set out in Article 5 of Commission Regulation (EU) 2016/631	New	Any Generator who is an EU Code User who has a CUSC Contract with the NGESO and owns or operates a Type C or Type D Power Generating Module	<p>Applicable Grid Code requirements: ECC6.1.2, ECC.6.1.4, ECC.6.2.2.2, ECC.6.3, ECC.6.5, ECC.8, ECC.A.3, ECC.A.4, ECC.A.6, ECC.A.7, ECC.A.8 ECP.A.3, ECP.A.5, ECP.A.6 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a black start or Distribution Restoration contract) OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12</p> <p>BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, Generators with a CUSC Contract who own or operate a Type C or Type D Power Generating Module would meet one or more of the requirements of the System Restoration Plan.</p>
		Any Generator who does not have a CUSC Contract (i.e. Embedded) and owns or operates a Power Station comprising one or more Type C or Type D Power Generating Modules	<p>Not applicable.</p> <p>Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own or operate a Type C or Type D Power Generating Module to contribute to the System Restoration Plan.</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plan
	Existing	Any Generator who is a GB Code User who has a CUSC Contract with the NGESO and owns or operates a Power Station comprising one or more Generating Units or Power Park Modules which i) have a maximum output of greater than 10MW but less than 50MW and connected below 110kV (equivalent to a Type C Power Generating Module) or ii) connected at 110kV or above or has a rated power output of 50MW or above (equivalent to a Type D Power Generating Module)	CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.2.2, CC.6.3, CC.6.5, CC.8, CC.A.3, CC.A.4, CC.A.6, CC.A.7 CP.A.3 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a Black Start or Distribution Restoration contract), OC5.A.1, OC.5.A.2, OC5.A.3 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, Generators with a CUSC Contract would meet one or more of the requirements of the System Restoration Plan.
		Any Generator who does not have a CUSC Contract (i.e. Embedded) and owns or operates a Power Station comprising one or more Generating Units or Power Park Modules which i) have a maximum output of greater than 10MW but less than 50MW and connected below 110kV (equivalent to a Type C Power Generating Module) or ii) connected at 110kV or above or has a rated power output of 50MW or above (equivalent to a Type D Power Generating Module)	Not applicable. Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own and operate a Type C or Type D Power Generating Module to contribute to the System Restoration Plan. This however is subject to review and the NGESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Restoration Plan.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
Existing and new power generating modules classified as Type B in accordance with the criteria set out in Article 5 of Regulation (EU) 2016/631, where they are identified as SGU's in accordance with Article 11(4)	New	Any Generator who is a EU Code User and has a CUSC Contract with the ESO and owns or operates a Type B Power Generating Module	<p>Applicable Grid Code requirements: ECC.6.1.2, ECC.6.1.4, ECC.6.2.2.2, ECC.6.3, ECC.6.4.3, ECC.6.5, ECC.8, ECC.A.3, ECC.A.4, ECC.A.6, ECC.A.7, ECC.A.8 ECP.A.3, ECP.A.5, ECP.A.6 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a Black Start or Distribution Restoration contract) OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, Generators with a CUSC Contract who own or operate a Type B Power Generating Module would meet one or more of the requirements of the System Restoration Plan.</p>
		Any Generator who does not have a CUSC Contract (i.e. Embedded) and owns or operates a Power Station comprising one or more Type B Power Generating Modules	<p>Not applicable. Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own and operate a Type C or Type D Power Generating Module to contribute to the System Restoration Plan. This however is subject to review and the NGESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Restoration Plan.</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
	Existing	Any Generator who is a GB Code User who has a CUSC Contract with the ESO and owns or operates a Power Station comprising one or more Generating Units or Power Park Modules which has a maximum output of greater than 1MW but less than 10MW and connected below 110kV (equivalent to a Type B Power Generating Module)	Applicable Grid Code requirements: CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.2.2, CC.6.3, CC.6.5, CC.8, CC.A.3, CC.A.4, CC.A.6, CC.A.7 CP.A.3 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a Black Start or distributed restoration contract), OC.5.A.1, OC.5.A.2, OC5.A.3 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, Generators with a CUSC Contract would meet one or more of the requirements of the System Restoration Plan.
		Any Generator who does not have a CUSC Contract (ie Embedded) and owns or operates a Power Station comprising one or more Generating Units or Power Park Modules which have a maximum output of greater than 1MW but less than 10MW and connected below 110kV (equivalent to a Type B Power Generating Module).	Not applicable. Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own and operate a Type B Power Generating Module to contribute to the System Restoration Plan. This however is subject to review and the NGESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Restoration Plan.
Existing and new Transmission-connected demand facilities	New	Any Non-Embedded Customer who is an EU Code User and who has a CUSC Contract with the NGESO. The requirement of the DRSC would also apply but only when the Demand Response Provider is also a CUSC Party.	Applicable Grid Code requirements: ECC6.1.2, ECC.6.1.4, ECC.6.2.3, ECC.6.5. DRSC ECP.A.8

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
			<p>OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers). , OC6.8 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12</p> <p>BC2 (in particular BC.2.9) In satisfying the above Grid Code requirements, Non-Embedded Customers would meet one or more of the requirements of the System Restoration Plan. All Transmission Connected Demand Facilities would have to be BM and CUSC Parties and hence satisfy the requirements of the Emergency and Restoration Code. There is no concept of an Embedded Non-Embedded Customer.</p>
	Existing	Any Non-Embedded Customer who is a GB Code User and has a CUSC Contract with the ESO	<p>Applicable Grid Code requirements: CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.3, CC.6.5, .</p> <p>OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers). OC6.8 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) In satisfying the above Grid Code requirements, Non-Embedded Customers would meet one or more of the requirements of the System Restoration Plan.</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
			All Transmission Connected Demand Facilities would have to be BM and CUSC Parties and hence satisfy the requirements of the Emergency and Restoration Code. There is no concept of an Embedded Non-Embedded Customer.
Existing and new Transmission Connected Closed Distribution Systems	New	Any Non-Embedded Customer who is an EU Code User and who has a CUSC Contract with the NGESO	<p>Applicable Grid Code requirements: ECC6.1.2, ECC.6.1.4, ECC.6.2.3, ECC.6.5. DRSC ECP.A.8 OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers). OC6.8 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3</p> <p>In satisfying the above Grid Code requirements, Non-Embedded Customers (which would include a Closed Distribution System), would meet one or more of the requirements of the System Restoration Plan.</p> <p>All Transmission Connected Closed Distribution Systems would have to be BM and CUSC Parties and hence satisfy the requirements of the Emergency and Restoration Code. There is no concept of a Transmission Connected Non CUSC Party</p>
	Existing	Any Non-Embedded Customer who is a GB Code User and which has a CUSC Contract with the NGESO	<p>Applicable Grid Code requirements: CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.3, CC.6.5. OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers). OC6.8 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
			<p>OC9 OC10 OC12 BC2 (in particular BC.2.9)</p> <p>In satisfying the above Grid Code requirements, Non-Embedded Customers would meet one or more of the requirements of the System Restoration Plan.</p> <p>All Transmission Connected Demand Facilities would have to be BM and CUSC Parties (which would include Closed Distribution Systems) and hence satisfy the requirements of the Emergency and Restoration Code. There is no concept of an Embedded Non-Embedded Customer.</p>
Providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Regulation 2017/1485	New & Existing	BM Participants including Virtual Lead Parties.	<p>ECC/CC 6.5 only</p> <p>DRSC if they are providing Demand Response Services and their equipment was purchased on or after 7 September 2018 and connected to the System on or after 18 August 2019.</p> <p>BC2 (in particular BC.2.9)</p> <p>BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7 (As applicable but biased towards Generator who are registered as Gensets).</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
Existing and new high voltage direct current (HVDC) Systems and direct current connected Power Park Modules in accordance with the criteria set out in Article 4(1) of commission Regulation (EU) 2016/1447	New	HVDC System Owners and Generators in respect of Transmission DC Converters and/or DC Connected Power Park Modules who are EU Code Users and have a CUSC Contract with the NGESO	Applicable Grid Code requirements: ECC6.1.2, ECC.6.1.4, ECC.6.2.2.2, ECC.6.3, ECC.6.5, ECC.8, ECC.A.3, ECC.A.4, ECC.A.6, ECC.A.7, ECC.A.8 ECP.A.3, ECP.A.7 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a black start or distributed restoration contract) OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, HVDC System Owners with a CUSC Contract who own or operate an HVDC System. DC Power Park Modules would need to satisfy the same Grid Code requirements as those applicable to new Type C and Type D Power Generating Modules listed in the first row of this table.
		Any HVDC System Owner who does not have a CUSC Contract would not be required to satisfy the requirements of the EU Emergency and Restoration Code.	Not applicable. Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own or operate a DC Converter Station to contribute to the System Restoration Plan. An HVDC System does have a specific meaning within the scope of the Grid Code and would therefore be within the scope of EU NCER. This however is subject to review and the NGESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Restoration Plan.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
	Existing	DC Converter Station Owners and Generators in respect of Transmission DC Converters who are GB Code Users and have a CUSC Contract with the NGESO	<p>Applicable Grid Code requirements: CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.2.2, CC.6.3, CC.6.5, CC.8, CC.A.3, ECC.A.4, CC.A.6, CC.A.7, CC.A.8 CP.A.3 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a black start or distribution restoration contract), OC5.A.4 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, In satisfying the above Grid Code requirements, DC Converter Station Owners with a CUSC Contract who own or operate a DC Converter Station would be required to satisfy the requirements of EU NCER. DC Power Park Modules would need to satisfy the same Grid Code requirements as those applicable to Existing Generators listed in the second row of this table.</p>

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
Type A and Type B Power Generating Modules referred to in paragraph 3, demand facilities and closed distribution systems providing demand response may fulfil the requirements of this Regulation either directly or indirectly through a third party under the terms and conditions set out in accordance with Article 4(4)	New and Existing	BM Participants including Virtual Lead Parties	ECC.ECC.6.5 BC1, BC2, (ECC/CC.6.5 applies only)
This Regulation shall apply to energy storage units of a SGU, a defence service provider or restoration service provider which can be used to balance the system,	New	Any EU Code Generator which has a CUSC Contract with the NGESO and which owns and operates Electricity Storage Modules would be classified as a Storage User as defined under the Grid Code.	Applicable Grid Code requirements when acting as a Generator in an exporting mode of operation: ECC6.1.2, ECC.6.1.4, ECC.6.2.2.2, ECC.6.3, ECC.6.5, ECC.8, ECC.A.3, ECC.A.4, ECC.A.6, ECC.A.7 ECP.A.3, ECP.A.5, ECP.A.6 OC5.4, OC5.5, OC5.7 (OC5.7 will only apply if the provider has a Black Start or Distribution restoration contract) OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
provided that they are identified as such in the system defence plans restoration plans or service contract.			OC10 OC12 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, Under the GC0096 proposals, Electricity Storage Modules are treated in the same way as Power Generating Modules. Generators who have a CUSC Contract with the NGESO who own and/or operate Electricity Storage Modules would therefore be within the scope of NCER.
Restoration Service Provider with a legal contract to provide a Restoration service	New	Any non CUSC party which has a contract with NGESO is to provide a Restoration Service would need to satisfy the appropriate requirements of the Grid Code through a contractual mechanism.	Applicable Grid Code requirements as defined contractually: ECC6.1.2, ECC.6.1.4, ECC.6.2.2.2, ECC.6.3, ECC.6.5, ECC.8, ECC.A.3, ECC.A.4, ECC.A.6, ECC.A.7 ECP.A.3, ECP.A.5, ECP.A.6 OC5.4, OC5.5, OC5.7 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC 9 OC10 OC12 BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7,
Restoration Service Provider with a legal contract to provide a Restoration service	Existing	Any non CUSC party which is to provide a Restoration service would need to satisfy the appropriate requirements of the Grid Code through a contractual mechanism.	Applicable Grid Code requirements as defined contractually: CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.2.2, CC.6.3, CC.6.5, CC.8, CC.A.3, CC.A.4, CC.A.6, CC.A.7 CP.A.3 OC5.4, OC5.5, OC5.A.1, OC.5.A.2, OC5.A.3, OC5.7 OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only) OC9 OC10 OC12

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Restoration Plan (GB SGU's)	Measures of the System Restoration Plant
			BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1 BC2 (in particular BC.2.9) BC3.3, BC3.4, BC3.5, BC.3.6, BC.3.7, .

Table A1- GB Parties within the Scope of EU NCER

GB parties falling within the remit of the EU NCER

In GB, those parties who would fall under the requirements of the EU NCER would be:-

CUSC Parties; and

Non-CUSC Parties who have a contractual agreement with NG ESO to provide one or more measures of this System Defence Plan.

The Connection and Use of System Code

The Connection and Use of System Code (CUSC) defines the arrangements for parties connecting to or using the Transmission System including but not limited to, issues such as connection, charging, Mandatory Ancillary Services and Balancing Services.

It is a Mandatory requirement for any party (such as a Generator, HVDC System Owner, Network Operator, Non-Embedded Customer, Aggregator) which: -

Is directly connected to the Transmission System

Owns or operates a Large Power Station (a Large Power Station is defined in the Grid Code)

Owns or operates an HVDC System and whose Connection Point is at 110kV or above

Owns or operates a DC Converter Station and the Installation has a rating of 50MW or more.

Applies for Transmission Entry Capacity

Is a Licensed Supplier

Wishes to participate in the Balancing Mechanism

Owns or operates a Large Power Station and that Large Power Station comprises one or more Electricity Storage Modules

To accede to the CUSC and have an Agreement with NGESO. A condition of signing the CUSC will necessitate the need for that Party to also meet the applicable requirements of the Grid Code. Any one of these parties (in satisfying the requirements of the Grid Code) will satisfy the requirements of EU NCER.

GB parties falling within the remit of the EU NCER

In GB, those parties who would fall under the requirements of the EU NCER would be:-

CUSC Parties; and

Non-CUSC Parties who have a contractual agreement with NG ESO to provide one or more measures of this System Defence Plan.

Non-CUSC Parties

A non CUSC Party would include one of the following categories, unless that Party has opted to sign the CUSC:

A Generator who owns or operates a Licence Exempt Embedded Medium Power Station (LEEMPS)

A Generator who owns or operates an Embedded Small Power Station

A Demand Response Provider who may have a commercial contract with NGESO to provide Commercial Ancillary Services but has not signed the CUSC.

A HVDC System Owner who owns and operates an HVDC System and that HVDC System is Embedded and has a Connection Point below 110kV and has not signed the CUSC.

An DC Converter Station Owner who owns and operates a DC Converter Station and that DC Converter Station is not connected to the Transmission System and has a rating of less than 50MW and has not signed the CUSC.

A Generator who owns or operates an Electricity Storage Module and that Electricity Storage Module is part of an Embedded Medium Power Station or Embedded Small Power Station and that Generator has not signed the CUSC.

Appendix B: High Priority SGUs & Terms of Re-energisation

Within GB, a High Priority Significant Grid User is classified as:

- A Black Start Service Provider

- A Large Power Station connected directly to the National Electricity Transmission System: or

- An Embedded Large Power Station

- An Anchor Plant Owner who is party to a Distribution Restoration Zone Plan

- A Restoration Service Provider

For the purposes of this Appendix, the terms “Embedded” and “Large Power Station” have the same definition as that defined in the Grid Code

Appendix C: List of Transmission Licensees and Distribution Network Operators responsible for Implementing System Restoration Plan Measures

A list of Transmission Licensees, Distribution Network Operators and Independent Distribution Network Operators (IDNOs) are available from Ofgem's website which is available from the following link.

https://www.ofgem.gov.uk/system/files/docs/2019/08/electricity_registered_or_service_addresses_new.pdf

All parties on this list are responsible for ensuring they are able to enact their System Restoration Plan responsibilities.

Appendix D: Glossary

Balancing Mechanism	The mechanism for the making and acceptance of offers and bids pursuant to the arrangements contained in the Balancing and Settlement Code.
Balancing Mechanism Participant	A person who is responsible for and controls one or more BM Units or where a Bilateral Agreement specifies that a User is required to be treated as a BM Participant for the purposes of the Grid Code. For the avoidance of doubt, it does not imply that they must be active in the Balancing Mechanism.
Black Start Service Provider	A User with a legal or contractual obligation to provide a service contributing to one or several measures of the System Restoration Plan .
BEIS	Her Majesty's Government Department for Business, Energy and Industrial Strategy.
CUSC Contract	As defined in the Grid Code is "One or more of the following agreements as envisaged in Standard Condition C1 of The Company's Transmission Licence: (a) the CUSC Framework Agreement; (b) a Bilateral Agreement; (c) a Construction Agreement or a variation to an existing Bilateral Agreement and/or Construction Agreement;
Defence Service	A capability as detailed in this System Defence Plan as required from a CUSC Party, as a condition of that party meeting the requirements of the Grid Code or a capability provided by a party which has a contract with NGESO to provide a Defence Service. A Defence Service is one or more capabilities detailed in this System Defence Plan.
Defence Service Provider	A User with a legal or contractual obligation to provide a service contributing to one or several measures of the System Defence Plan or a party with a contract to meet one or more measures of the System Defence Plan.
Distribution Network Operator	A person with a User System directly connected to the National Electricity Transmission System to which Customers and/or Power Stations (not forming part of the User System) are connected, acting in its capacity as an operator of the User System, but shall not include a person acting in the capacity of an Externally Interconnected System Operator or a Generator in respect of OTSUA. For the avoidance of doubt an Independent Network Operator (IDNO) is considered to have the same meaning and obligations as a Distribution Network Operator.
EU Code User	A User who is any of the following: - (a) A Generator in respect of a Power Generating Module (excluding a DC

	<p>Connected Power Park Module) or OTSDUA (in respect of an AC Offshore Transmission System) whose Main Plant and Apparatus is connected to the System on or after 27 April 2019 and who concluded Purchase Contracts for its Main Plant and Apparatus on or after 17 May 2018</p> <p>(b) A Generator in respect of any Type C or Type D Power Generating Module which is the subject of a Substantial Modification which is effective on or after 27 April 2019.</p> <p>(c) A Generator in respect of any DC Connected Power Park Module whose Main Plant and Apparatus is connected to the System on or after 8 September 2019 and who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 28 September 2018.</p> <p>(d) A Generator in respect of any DC Connected Power Park Module which is the subject of a Substantial Modification which is effective on or after 8 September 2019.</p> <p>(e) An HVDC System Owner or OTSDUA (in respect of a DC Offshore Transmission System including a Transmission DC Converter) whose Main Plant and Apparatus is connected to the System on or after 8 September 2019 and who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 28 September 2018.</p> <p>(f) An HVDC System Owner or OTSDUA (in respect of a DC Offshore Transmission System including a Transmission DC Converter) whose HVDC System or DC Offshore Transmission System including a Transmission DC Converter) is the subject of a Substantial Modification on or after 8 September 2019.</p> <p>(g) A User which the Authority has determined should be considered as an EU Code User.</p>
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	<p>(h) A Network Operator whose entire distribution System was first connected to the National Electricity Transmission System on or after 18 August 2019 and who had placed Purchase Contracts for its Main Plant and Apparatus in respect of its entire distribution System on or after 7 September 2018. For the avoidance of doubt, a Network Operator will be an EU Code User if its entire distribution System is connected to the National Electricity Transmission System at EU Grid Supply Points only.</p> <p>(i) A Non Embedded Customer whose Main Plant and Apparatus at each EU Grid Supply Point was first connected to the National Electricity Transmission System on or after 18 August 2019 and who had placed Purchase Contracts for its Main Plant and Apparatus at each EU Grid Supply Point on or after 7 September 2018 or is the subject of a Substantial Modification on or after 18 August 2019.</p> <p>(j) A Storage User in respect of an Electricity Storage Module whose Main Plant and Apparatus is connected to the System on or after 20 May 2020 and who concluded Purchase Contracts for its Main Plant and Apparatus on or after 20 May 2019.</p>
EU Generator	A Generator or OTSDUA who is also an EU Code User.
European Regulation (EU) 2016/631	Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a Network Code on Requirements of Generators
European Regulation (EU) 2016/1388	Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection
European Regulation (EU) 2016/1447	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
European Regulation (EU) 2017/1485	Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation
European Regulation (EU) 2017/2195	Commission Regulation (EU) 2017/2195 of 17 December 2017 establishing a guideline on electricity balancing

Externally Interconnected System Operator or EISO	Is defined in the Grid Code as “A person who operates an External System which is connected to the National Electricity Transmission System or a User System by an External Interconnection”.
Frequency Sensitive Mode	A Genset, or Type C Power Generating Module or Type D Power Generating Module or DC Connected Power Park Module or HVDC System operating mode which will result in Active Power output changing, in response to a change in System Frequency, in a direction which assists in the recovery to Target Frequency, by operating so as to provide Primary Response and/or Secondary Response and/or High Frequency Response.
GB Code User	<p>A User in respect of:-</p> <ul style="list-style-type: none"> (a) A Generator or OTSDUA whose Main Plant and Apparatus is connected to the System before 27 April 2019, or who had concluded Purchase Contracts for its Main Plant and Apparatus before 17 May 2018, or whose Plant and Apparatus is not the subject of a Substantial Modification which is effective on or after 27 April 2019; or (b) A DC Converter Station owner whose Main Plant and Apparatus is connected to the System before 8 September 2019, or who had concluded Purchase Contracts for its Main Plant and Apparatus before 28 September 2018, or whose Plant and Apparatus is not the subject of a Substantial Modification which is effective on or after 8 September 2019; or (c) A Non Embedded Customer whose Main Plant and Apparatus was connected to the National Electricity Transmission System at a GB Grid Supply Point before 18 August 2019 or who had placed Purchase Contracts for its Main Plant and Apparatus before 7 September 2018 or that Non Embedded Customer is not the subject of a Substantial Modification which is effective on or after 18 August 2019.2018;or (d) A Network Operator whose entire distribution System was connected to the National Electricity Transmission

	<p>System at one or more GB Grid Supply Points before 18 August 2019 or who had placed Purchase Contracts for its Main Plant and Apparatus in respect of its entire distribution System before 7 September 2018 or its entire distribution System is not the subject of a Substantial Modification which is effective on or after 18 August 2019. For the avoidance of doubt, a Network Operator would still be classed as a GB Code User where its entire distribution System was connected to the National Electricity Transmission System at one or more GB Grid Supply Points, even where that entire distribution System may have one or more EU Grid Supply Points but still comprises of GB Grid Supply Points.</p>
GB Generator	As defined in the Grid Code is “A Generator, or OTSDUA, who is also a GB Code User”
GB Synchronous Area	As defined in the Grid Code is “The AC power System in Great Britain which connects Users, Relevant Transmission Licensees whose AC Plant and Apparatus is considered to operate in synchronism with each other at each Connection Point or User System Entry Point and at the same System Frequency”.
HVDC System	An electrical power system which transfers energy in the form of high voltage direct current between two or more alternating current (AC) buses and comprises at least two HVDC Converter Stations with DC Transmission lines or cables between the HVDC Converter Stations.
Local Joint Restoration Plan	As defined in the Grid Code is “A plan produced under OC9.4.7.12 of the Grid Code detailing the agreed method and procedure by which a Genset at a Black Start Station (possibly with other Gensets at that Black Start Station) will energise part of the Total System and meet complementary blocks of local Demand so as to form a Power Island. In Scotland, the plan may also: cover more than one Black Start Station; include Gensets other than those at a Black Start Station and cover the creation of one or more Power Islands”.
GB NETS	Great Britain National Electricity Transmission System

National Electricity Transmission System Security and Quality of Supply Standards or NETS SQSS	The National Electricity Transmission System Security and Quality of Supply Standard as published on The National Grid ESO Website: https://www.nationalgrideso.com/codes/security-and-quality-supply-standards?code-documents
NGESO	The National Electricity Transmission System Operator is responsible for operating the Onshore Transmission System and, where owned by Offshore Transmission Licensees, Offshore Transmission Systems. The NGESO for Great Britain is currently National Grid Electricity System Operator.
Non-Embedded Customer	A Customer in Great Britain, except for a Network Operator acting in its capacity as such, receiving electricity direct from the Onshore Transmission System irrespective of from whom it is supplied.
Partial Shutdown	A Partial Shutdown is the same as a Total Shutdown except that all generation has ceased in a separate part of the Total System and there is no electricity supply from External Interconnections or other parts of the Total System to that part of the Total System. Therefore, that part of the Total System is shutdown with the result that it is not possible for that part of the Total System to begin to function again without TSOs directions relating to a Black Start.
Power Generating Module	Either a Synchronous Power-Generating Module or a Power Park Module owned or operated by an EU Generator or a GB Generator.
Power Island	One or more Power Stations, together with complementary local demand.
Power System Synchroniser	Equipment which synchronises two electrically separate synchronous areas together to create one synchronous area.
Restoration Service	A capability as detailed in the System Restoration Plan as required from a CUSC Party, as a condition of that party meeting the requirements of the Grid Code or a capability provided by a party which has a contract with NGESO to provide a Restoration Service. A Restoration Service is one or more capabilities detailed in the System Restoration Plan.
Restoration Service Provider	A User with a legal or contractual obligation to provide a service contributing to one or several measures of the System Restoration Plan or a party with a contract to meet one or more measures of the System Restoration Plan.

Skeleton Network	The detailed restoration plan for restoring a skeletal GB NETS
System Operator Transmission Owner Code or STC	The System Operator Transmission Owner Code as published on The National Grid ESO Website: https://www.nationalgrideso.com/codes/system-operator-transmission-owner-code?code-documents
Target Frequency	That Frequency determined by The Company, in its reasonable opinion, as the desired operating Frequency of the Total System or Power Island. This will normally be 50.00Hz plus or minus 0.05Hz, except in exceptional circumstances as determined by The Company, in its reasonable opinion when this may be 49.90 or 50.10Hz. An example of exceptional circumstances may be difficulties caused in operating the System during disputes affecting fuel supplies.
Total System	The National Electricity Transmission System and all User Systems in the National Electricity Transmission System Operator Area.
Total Shutdown	A Total Shutdown is the situation existing when all generation has ceased and there is no electricity supply from External Interconnections. Therefore, the Total System has shutdown with the result that it is not possible for the Total System to begin to function again without TSO's directions relating to a Black Start.
TSO	A Transmission System Operator is a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity.
Type C Power Generating Module	A Power-Generating Module with a Grid Entry Point or User System Entry Point below 110 kV and a Maximum Capacity of 10 MW or greater but less than 50 MW.
Type D Power Generating Module	A Power-Generating Module: with a Grid Entry Point or User System Entry Point at, or greater than, 110 kV; or with a Grid Entry Point or User System Entry Point below 110 kV and with Maximum Capacity of 50 MW or greater.
Unacceptable Frequency Conditions	These are conditions defined in the NETS SQSS where:

	<p>i) the steady state frequency falls outside the statutory limits of 49.5Hz to 50.5Hz; or</p> <p>ii) a transient frequency deviation on the MITS persists outside the above statutory limits and does not recover to within 49.5Hz to 50.5Hz within 60 seconds. Transient frequency deviations outside the limits of 49.5Hz and 50.5Hz shall only occur at intervals which ought to reasonably be considered as infrequent. In order to avoid the occurrence of Unacceptable Frequency Conditions: a) The minimum level of loss of power infeed risk which is covered over long periods operationally by frequency response to avoid frequency deviations below 49.5Hz or above 50.5Hz will be the actual loss of power infeed risk present at connections planned in accordance with the normal infeed loss risk criteria;</p> <p>b) The minimum level of loss of power infeed risk which is covered over long periods operationally by frequency response to avoid frequency deviations below 49.5Hz or above 50.5Hz for more than 60 seconds will be the actual loss of power infeed risk present at connections planned in accordance with the infrequent infeed loss risk criteria. It is not possible to be prescriptive with regard to the type of secured event which could lead to transient deviations since this will depend on the extant frequency response characteristics of the system which NGESO adjust from time to time to meet the security and quality requirements of this Standard.</p>
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