nationalgridESO

EU NCER: System Defence Plan

Issue ~~3~~4

~~December 2019~~

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Contents

EU NCER: System Defence Plan

1 ~~INTRODUCTION~~ Version Control

Version	Date	Author	Rationale
Issue 1	Dec 2018	NGESO	By December 2018, each TSO shall notify the regulatory authority of the system defence plan designed pursuant to Article 11.
Issue 2	July 2019	NGESO	Further detail added to define SGU's, outline the procedures to activate the system defence plan and updates made to the system protection schemes of Electricity Storage Modules.
Issue 3	December 2019	NGESO	Updates to the SGU list and High Priority Significant Grid Users. References to SOGL added. Clarification of emergency state and clarification of treatment of storage units and low frequency demand disconnection settings against NCER. Updates to assurance and compliance testing. Updates to glossary and definitions. Updated to reflect compliance requirements for implementation of NCER by December 2019.
Issue 4	Mary 2022	NGESO	Refresh of document to reflect Grid Code updates (GC0096, GC0125, GC0127,GC0128,GC0144, GC0147 and GC0148) and approval of SGU list, T&Cs and Test Plan.

2 Introduction

The *European Network Code on Emergency & Restoration*[1] (***EU NCER***) came into force on 18 December 2017. ~~Pursuant to the provisions in Chapter 2, below~~This document is the ~~proposed~~ GB System Defence Plan ~~on behalf of~~prepared by the GB National Electricity Transmission System Operator. This document does not include the Distributed Re-Start arrangements which are being addressed through the future Electricity System Restoration Standard work.

As provided for in the EU NCER Article 11, this System Defence Plan ~~will be~~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 and this System Defence Plan are detailed in Appendix A of this ~~System Defence Plan. They will be notified in writing once Ofgem has approved all proposals together with the changes which are being introduced through Grid Code modification GC0127 and GC0128.~~document. In general, the ~~NCER~~System Defence Plan will apply to the following parties in GB.

[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

- National Grid ESO
- Any Party with a CUSC Contract;
- Transmission Licensees~~.~~;
- ~~Distribution~~ Network Operators; and
- Any Non-CUSC Party with a contract with NGESO to provide a d~~D~~efence s~~S~~ervice.

This ~~Plan~~plan is not intended to replace any provisions currently in place in the GB ~~Codes~~industry codes nor to amend the Operational Security Limits[2], it is a summary of how the requirements for System Defence specified in EU NCER ~~will be~~are satisfied in GB. ~~Many of~~ All the provisions contained within this System Defence Plan are already described in the GB ~~national~~industry codes (e.g. Grid Code[3], CUSC[4], STC[5], etc~~.).~~.) and therefore obligations specified upon parties be they User's or Transmission Licensees as well as NGESO will be specified in the industry codes and not this System Defence Plan. Where there are new mandatory requirements for GB Parties then these will be included in the relevant GB Codes as appropriate~~.~~ and subject to the full governance process. For the avoidance of doubt, the mandatory requirements placed on parties are defined in the industry codes through the industry code governance process and not through this System Defence Plan. The governance of this System Defence 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 Defence Plan will ~~impact~~be of interest to all parties identified in Appendix A~~, who have code obligations referred to in this plan.~~

of this document.

In complying with the requirements of the Grid Code, System Operator Transmission Owner Code (STC~~) and~~), Distribution Code and Balancing and Settlement Code (BSC) (as applicable), ~~the~~ NGESO, Transmission Licensees, ~~Distribution~~ Network Operators ~~(including Independent Distribution Network Operators) would be considered to satisfy~~and CUSC Parties will be satisfying the requirements of EU NCER. It should ~~also~~ be noted that the EU NCER applies both to GB Code Users and EU Code Users as defined in Appendix A of this document.

[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] Grid Code https://www.nationalgrideso.com/electricity-transmission/document/162271/download

[4] Connection and Use of System Code https://www.nationalgrideso.com/document/141131/download

[5] System Operator Transmission Owner Code https://www.nationalgrideso.com/document/40726/download

This System Defence Plan has been developed taking the following into account~~;~~:

- the operational security limits set out in accordance with Article 25 of Regulation (EU) 2017/1485 {SOGL};
- the behaviour and capabilities of load and generation within the ~~synchronous area~~Synchronous Area;
- the specific needs of the ~~high priority~~High Priority Significant Grid Users listed in Appendix B; and
- the characteristics of the National Electricity Transmission System and ~~Distribution~~ Network Operator's (DNO) systems.

This has been achieved by developing this GB System Defence Plan collaboratively with affected parties through the Energy Emergencies Executive Committee (E3C), Electricity Task Group (ETG), and by collecting feedback during public consultations~~ undertaken in the Summer of 2018 and Summer of 2019.~~ . A requirement of Article 50 (3) of the EU NCER is to regularly review the System Defence Plan to assess its effectiveness. This process will be managed by NGESO through the governance process as provided for in GC16 of the Grid Code General Conditions.

~~In addition, and as required under the EU NCER, the NGESO will notify (in writing, once Ofgem has approved all proposals) those parties who are within the scope of the NCER and any measures they need to take. These parties are defined in Table A1 of Appendix A of this document and would include Transmission Licensees, Distribution Network Operators (including Independent Distribution Network Operators) and CUSC Parties. The additional measures upon CUSC parties are included through Grid Code modification GC0127 and GC0128 with measures upon Transmission Licensees being developed through updates to the System Operator Transmission Owner Code (STC).~~

~~1 PLAN OVERVIEW~~

For the avoidance of doubt there is a separate document – the System Restoration Plan in respect of Restoration Service Providers which is available from the following link:

https://www.nationalgrideso.com/electricity-transmission/industry-information/codes/european-network-codes/other-enc-documents

3 System Defence Plan

3.1 Plan Overview

This ~~Great Britain~~ System Defence Plan (**SDP**) is drafted to conform to *EU NCER* Articles 11 to 22. It ~~is intended to serve~~serves as an umbrella document referencing ~~the~~ more detailed ~~plans for specific parties – therefore, should~~ systems and procedures.

Although the UK has departed from the EU, the majority of the requirements in the EU NCER ~~articles that are referenced be amended, then these articles shall prevail and~~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 Guideline[6] (SOGL) 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 Defence Plan consists of the technical and organisational measures necessary for the defence and resilience of the electricity system in Great Britain 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 ~~document~~ plan are to describe how NGESO, Transmission Licensee's, Network Operators and ~~any subordinate GB~~ those parties listed in Appendix A of this document as required in the industry codes (Grid Code, System Operator Transmission Owner Code (STC) and Distribution Code ~~must also be amended~~have the necessary requirements in place to provide as much resilience to the System as possible to prevent a Total or Partial System shutdown.

~~1.2~~3.2 Activation of System Defence Plan Procedures

~~In Accordance with EU NCER Article 13:~~

3.2.~~1~~.1 This System Defence Plan contains ~~procedures~~the processes and automatic actions available to ~~the~~ NGESO (as provided for in the Grid Code) to prevent the occurrence of an ~~Emergency~~emergency or to manage the System when it is in an Emergency ~~state. Under, SOGL~~State. The System Defence Plan will become active when one or more of the conditions as provided for in *Grid Code BC2.9.8.1* occur. These conditions are consistent with those defined in Article 18(3~~),~~) of the System Operator Guideline (SOGL), which defines that a Transmission System shall be in an Emergency State when operational security analysis requires activation of one of the following measures:

- A situation where there is a violation of one of more criteria as defined under the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS); or
- A situation when Unacceptable Frequency Conditions as defined under the *National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS)* have occurred; or
- At least one measure of the System Defence Plan is activated ~~or~~as provided for in sections 4, 5 and 6 of this document; or
- There is a failure of the computing facilities used to control and operate the Transmission System or unplanned outages of

[6] *https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R1485&from=EN*

Electronic Communication and Computing Facilities as provided for in *Grid Code* *BC2.9.7* or the loss of communication, computing and data facilities with other Transmission Licensees as provided for in STCP 06-4.

3.2.~~1.~~2 Procedures in this System Defence Plan will be activated by ~~the~~ NGESO in coordination with the GB parties within the scope of the EU NCER as defined in Appendix A of this System Defence Plan. For the avoidance of doubt, activation of one or more measures of the System Defence Plan is an action undertaken either automatically (eg Low Frequency Demand Disconnection) or by NGESO depending upon System conditions. Instructions to User's and Transmission Licensees, when one or more measures of the System Defence Plan is to be enacted through instructions, are given through the Grid Code (for example OC7 and BC2.9) or through the STC and STC Procedures.

3.2.~~1.~~3 All instructions issued by ~~the~~ NGESO under this System Defence Plan must be executed by each User (as defined in the Grid Code) without undue delay.

3.2.~~1.~~4 ~~The~~ NGESO will coordinate ~~impacted~~affected Transmission Licensees and Externally Interconnected System Operators where these procedures have a significant cross border impact.

~~2 SYSTEM PROTECTION SCHEMES~~

4 System Protection Schemes

~~2.1~~4.1 Automatic Under Frequency Control Scheme

In Accordance with EU NCER Article 15:

~~3~~4.1.1 Pumped Storage plant synchronised at zero generated output with the capability to rapidly increase generated output at a specified Low Frequency (LF) when armed under a commercial service.

~~3~~4.1.2 HVDC Interconnectors – automatic ramping of HVDC Interconnectors at specified Low Frequencies ~~(LF)~~ when armed under a commercial service.

~~3~~4.1.3 Demand disconnection by LF relay initiation (contracted). A commercial service that disconnects industrial load when armed.

~~3~~4.1.4 Fast Start from standstill - Fast Start via ~~Low Frequency (~~LF~~)~~ relay initiation that can be contracted at any frequency between 49 and 50 Hz (*Grid Code CC6.3.14 & ECC6.3.14*).

~~3~~4.1.5 Article 15(3) and Article 15(4) of EU NCER places requirements on energy storage units acting as a load to automatically switch to generation mode during periods of low System Frequencies. This action would need to take place between 49.5Hz (the threshold associated with LFSM-U) and 48.8Hz (the threshold associated with the first stage of the Low Frequency Demand Disconnection Scheme (LFDD~~).~~)). Under the EU NCER, ~~the~~ NGESO in coordination with Transmission Licensees, is required to set the time limit and active power setpoint for Energy Storage Units to switch from a mode analogous to demand to a mode analogous to generation. Under EU NCER, where the energy storage unit is not capable of switching within the time limit established by ~~the~~ NGESO (in co-ordination with Transmission Licensees) it shall automatically trip when acting as a load. ~~The NGESO propose that the option of tripping Energy Storage Units is preferred and therefore under this System Defence Plan, the NGESO defines the period of time of an Energy Storage Unit to automatically switch from an importing mode of operation (i.e. demand mode) to an exporting mode of operation (i.e. generating mode) to be set to a very low value (e.g. 1µs) so the default option will be for the storage unit to trip under low frequency. The settings will be specified on a case by case basis through the Bilateral Agreement and would be within the range of 49.5Hz – 48.8Hz. This approach would be consistent with that suggested for Storage under the GC0096 proposals, the proposals of the EU Storage Expert Group and the approach used for Pumped Storage. It is however acknowledged that the proposals for GC0096 have yet to be approved into the Grid Code although the consultation process is well advanced. For the avoidance of doubt, this requirement would only apply to Parties owning Electricity Storage Modules which have a CUSC Contract with NGESO. To ensure all Storage Units do not trip off at the same time the trip settings would need to be graded and it is assumed that this would be best achieved through the Bilateral Agreement as provided for in OC6.6 of the Grid Code. In the longer term, it is proposed that the requirement for Electricity Storage Modules to switch from an importing mode of operation to an exporting mode of operation during periods of low system frequency will be considered in the future.~~

~~3.1.6~~4.1.6 In order to satisfy the requirements of Article 15(3) and 15(4) of the EU NCER, owners and operators of Electricity Storage Modules are required to satisfy the requirements of *ECC.6.3.7.2.3* of the Grid Code. This provides for a droop requirement where the plant is required to automatically transition from an import mode of operation to an export mode of operation as system frequency falls, or if the plant is unable to satisfy these requirements, subject to agreement with NGESO, install low frequency relays in accordance with the requirements of *Grid Code OC6.6.6* which would require an Electricity Storage Module to trip prior to the first stage of operation of the Low Frequency Demand Disconnection Scheme. The droop characteristic makes provision for the Electricity Storage Module to operate in an export (generation) mode of operation prior to the first stage of the LFDD Scheme at 48.8Hz. This ensures that Electricity Storage Modules are providing defensive measures to the System well before customer demand is tripped.

4.1.7 Limited Frequency Sensitive Mode – Under frequency (LFSM-U) – EU Code Users who own and operate Type C and D Power Generating Modules connected after 27 April 2019 or HVDC System Owners who own and operate HVDC Systems or Generators who own and operate DC Connected Power Park Modules connected after ~~8th~~8 September 2019 are required to provide an automatic increase in active power at a minimum rate of 2% of output per 0.1 Hz deviation of system frequency below 49.5 Hz.

~~2.2~~4.2 Automatic Low Frequency Demand Disconnection Scheme

In Accordance with EU NCER Article 15:

~~3~~4.2.1 The Annex of EU NCER defines the minimum requirements for Automatic Low Frequency Demand Disconnection schemes for all Synchronous Areas ~~which~~. This Annex is reproduced below as it appears in SI 533 2019. This requires disconnection of at least 50% of Total Load at 48Hz.

ANNEX

Automatic low frequency demand disconnection scheme characteristics:

Parameter	Values SA Continental Europe	Values SA Nordic	Values SA Great Britain	Values SA Ireland	Measuring Unit
Demand disconnection starting mandatory level: Frequency	49	48,7 – 48,8	48,8	48,85	Hz
Demand disconnection starting mandatory level: Demand to be disconnected	5	5	5	6	% of the Total Load at national level
Demand disconnection final mandatory level: Frequency	48	48	48	48,5	Hz
Demand disconnection final mandatory level: Cumulative Demand to be disconnected	45	30	50	60	% of the Total Load at national level
Implementation range	± 7	± 10	± 10	± 7	% of the Total Load at national level, for a given Frequency
Minimum number of steps to reach the final mandatory level	6	2	4	6	Number of steps
Maximum Demand disconnection for each step	10	15	10	12	% of the Total Load at national level, for a given step

~~3~~

Parameter	**Frequency**	**Measuring Unit**

Demand disconnection starting mandatory level: Frequency	48.8	Hz
Demand disconnection starting mandatory level: Demand to be disconnected	5	% of the Total Load at national level
Demand disconnection final mandatory level: Frequency	48	Hz
Demand disconnection final mandatory level: Cumulative Demand to be disconnected	50	% of the Total Load at national level
Implementation range	±10	% of the Total Load at national level, for a given Frequency
Minimum number of steps to reach the final mandatory level	4	Number of steps
Maximum Demand disconnection for each step	10	% of the Total Load at national level, for a given step

4.2.2 In GB, the ~~Technical~~technical requirements for low frequency relays and disconnection of supplies at low frequency including the overall scheme settings are detailed in Appendix 5 of the Connection Conditions and European Connection Conditions. These settings are the same in both the Connection Conditions and European Connection Conditions and reproduced below in Table CC.A.5.5.1a.

Frequency Hz	% **Demand** disconnection for each Network Operator in Transmission Area		
	NGET	SPT	SHETL
48.8	5		
48.75	5		
48.7	10		
48.6	7.5		10
48.5	7.5	10	
48.4	7.5	10	10
48.2	7.5	10	10
48.0	5	10	10
47.8	5		
Total % **Demand**	60	40	40

Table CC.A.5.5.1a

~~3~~

Frequency Hz	% **Demand** disconnection for each Network Operator in Transmission Area		
	NGET	SPT	SHETL
48.8	5		
48.75	5		
48.7	10		
48.6	7.5		10
48.5	7.5	10	
48.4	7.5	10	10
48.2	7.5	10	10
48.0	5	10	10
47.8	5		
Total % **Demand**	60	40	40

Table CC.A.5.5.1a

4.2.3 As can be seen from Table CC.A.5.5.1, 55% of demand in England and Wales will be disconnected at 48Hz with 40% disconnected in Scottish Power's Transmission Area and 40% in Scottish Hydro Electricity's Transmission Area. In GB, the requirements of the NCER will be satisfied on the basis that demand in England and Wales is significantly greater than in Scotland. In England and Wales 55% of demand trips which would equate to approximately 52% of national demand which ~~would satisfy~~satisfies the EU NCER requirements.

4.2.4 In addition to the above requirements, Articles 15(5) – 15(8) of the EU NCER require consideration to be given to netted demand. This is the principle whereby a low frequency demand disconnection relay is configured so as to minimise the disconnection of embedded generation. Under *Grid Code ECC.A.5*, which requires low frequency demand disconnection relays to have a directional component, this requirement is already an inherent capability of the scheme. For Low Frequency Demand Disconnection arrangements which fall under the requirements of Appendix 5 of the Grid Code Connection Conditions, DNOs currently configure the low frequency demand disconnection scheme to minimise, where reasonably practicable, the disconnection of power generating modules.

~~2.3~~4.3 Automatic Over Frequency Control Scheme

In Accordance with EU NCER Article 16:

~~3~~4.3.1 Commercial arrangements are in place to provide static High Frequency Response by ramping HVDC Interconnectors when pre-set frequency levels are reached.

~~3~~4.3.2 High Frequency Response- contracted providers of high frequency response are required to reduce active power in response to an increase in system frequency up to 50.5 Hz as agreed in an Ancillary Services Contract. Above 50.5 Hz this is to be at a minimum rate of 2% of output per 0.1 Hz deviation of frequency above 50.5 Hz *(Grid Code BC3.7.1)*.

~~3~~4.3.3 Limited Frequency Sensitive Mode (LFSM) – existing connections (until 27 April 2019):

Limited Frequency Sensitive Mode – Over frequency (LFSM-O) – new connections (after 27 April 2019):

In both cases the Generating Unit or Power Generating Module is required to provide an automatic reduction in active power export at a minimum rate of 2% of output per 0.1 Hz deviation of system frequency above 50.4 Hz.

4.3.4 If after all such measures have been taken, *Grid Code OC6B and OC7.4.8.8 – OC7.4.8.11* provides for NGESO to issue instructions to Network Operators to disconnect Embedded Generation in order to curtail rising system frequency.

~~2.4~~4.4 Automatic Schemes Against Voltage Collapse

In Accordance with EU NCER Article 17:

~~3~~4.4.1 The fundamental basis of ~~the~~ NGESO's voltage control policy is to operate within the voltage limits defined in the *National Electricity Transmission System Security and Quality of Supply Standard* (*NETS SQSS*) in planning and operational timescales across all transmission and customer interface voltage levels. This is achieved by maintaining dynamic reactive power reserves, both leading and lagging, to further ensure operation within limits for defined contingencies.

~~3~~4.4.2 System studies are performed in all planning and operational timescales to ensure that pre and post fault voltage levels are maintained within levels stated in the *NETS SQSS* and that voltage collapse is avoided both for transient and permanent transmission system faults.

~~3~~4.4.3 The National Electricity Transmission System is designed to use Delayed Auto Reclose systems (DAR**)** to re-energise overhead line circuits following transient and semi-permanent faults, thus minimising the threat of voltage collapse.

~~3~~4.4.4 The National Electricity Transmission System is designed to use Reactive Control Equipment to control transmission system and customer interface voltage levels both pre and post fault. Mechanically Switched Capacitors (MSCs) and Shunt Reactors have been installed at strategic locations to achieve this. Automatic Reactive Control Schemes (ARS) have also been installed to react to changes in transmission system or customer interface voltage levels and automatically switch in/out Mechanically Switched Capacitors/Shunt Reactors accordingly.

~~3~~4.4.5 Static VAr Compensators (SVCs) are used to provide fast acting reactive power response to Transmission System voltage changes. SVCs are connected to either the 400 or 275 kV system and can be set to operate in target voltage or constant reactive modes.

~~3~~4.4.6 There are other geographically specific defence measures which use individual automatic schemes to cater for specific faults. For example, the Anglo-Scottish Auto-Close Scheme (*ASACS*).

~~**Anglo-Scottish Auto Close Scheme (ASACS)**~~

~~The specific requirement for the ASACS arises from the installation of series and shunt compensation at various locations on the Anglo-Scottish interconnector circuits, which facilitate higher transfers across the boundary. This is managed through high-speed post-fault switching of Mechanically Switched Capacitors (**MSC**) to keep post-fault voltages within the limits set by the NETS SQSS.~~

~~The ASACS increases the transient stability limit of the Anglo-Scottish transmission circuits by closing selected MSC circuit breakers, in stability timescales, in response to the loss of selected East Coast or West Coast circuits. For such faults, ASACS may switch in to operation the MSCs at Harker, Blyth, and Stella West in less than a second to maintain generator stability.~~

shunt compensation at various locations on the Anglo-Scottish interconnector circuits, which facilitate higher transfers across the boundary. This is managed through high-speed post-fault switching of Mechanically Switched Capacitors (MSC) to keep post-fault voltages within the limits set by the NETS SQSS.

The ASACS increases the transient stability limit of the Anglo-Scottish transmission circuits by closing selected MSC circuit breakers, in stability timescales, in response to the loss of selected East Coast or West Coast circuits. For such faults, ASACS may switch in to operation the MSCs at Harker, Blyth, and Stella West in less than a second to maintain generator stability.

4.4.7 ~~In GB, a~~A co-ordinated Low Voltage Demand Disconnection Scheme is not implemented across the GB Synchronous Area. However, in a few specific areas, low voltage demand disconnection schemes have been installed to protect specific geographical areas.

~~3~~4.4.8 The measures described above, including the regular security assessment, ensure that there is no need to install on-load tap changer blocking schemes.

~~3 SYSTEM DEFENCE PLAN PROCEDURES~~

5 System Defence Plan Procedures

~~3.1~~5.1 Frequency Deviation Management Procedure

In Accordance with EU NCER Article 18:

~~4~~5.1.1 The frequency limits of the National Electricity Transmission System are set by the System Operations Guideline (SOGL) Article 127, the Electricity Safety, Quality and Continuity Regulations (ESQCR)[7] and the NETS SQSS. As such, and under Normal State, the frequency across the National Electricity Transmission System is maintained within the Standard Frequency range of 50 +/-0.2 Hz to ensure operation within the Maximum Steady State Frequency Deviation of +/- 0.5 Hz.

~~4~~5.1.2 System Frequency across the GB Synchronous Area is controlled by response from contracted generation, demand side and owners and operators of electricity storage ~~providers.~~ modules.

~~4~~5.1.3 ~~Sufficient~~Historically sufficient Frequency Containment Reserves (FCR) are held to ensure that frequency:

- remains within the Standard Frequency range (50 +/- 0.2 Hz) for infeed losses of < 300 MW;
- remains within the Maximum Steady State Frequency Deviation (+/- 0.5 Hz) for infeed losses of < 1000 MW; and
- deviation does not exceed the Maximum Instantaneous Frequency Deviation of 0.8 Hz for the maximum credible infeed loss on the system at any time.

~~4~~ Following the 9th August 2019 incident, these figures were reviewed and are now reflected in the Frequency Risk Control Report (FRCR) which aims to set the frequency limits in a more transparent way and against the background of magnitude, duration and likelihood. The report will be reviewed at least annually with further information being provided via the following link:-

https://www.nationalgrideso.com/industry-information/codes/security-and-quality-supply-standards/frequency-risk-control-report

As part of the findings of the FRCR and to manage risks on the Transmission System, increasing use has been made of Dynamic Containment which is a commercial service available from providers to increase their Active Power output in response to a frequency deviation within 1 second of its inception.

[7] http://www.legislation.gov.uk/uksi/2002/2665/contents/made

5.1.4 Frequency Restoration Reserves (FRR) are provided by Generating Units/Power Generating Modules (including stationary Generating Units and/or Power Generating Modules such as open cycle gas turbines which can be started quickly), storage and demand side providers. Sufficient reserves are held to enable system frequency to be returned within the Maximum Steady State Frequency Deviation within 1 minute and to within the Standard Frequency Limit within 15 minutes.

~~4~~5.1.5 The system frequency is monitored on a second by second basis by ~~the~~ NGESO. Frequency response services required for any period are calculated at the day ahead stage (i.e. one day before the real operational timeframe) based on demand characteristics, economics, largest infeed/offtake criteria, volume of variable renewable energy sources and system inertia.

~~4~~5.1.6 Frequency Restoration Reserves (FRR) availability is continually assessed by ~~the~~ NGESO on a long-term basis. Required FRR holding for any period is calculated from week-1 and based on demand characteristics (including seasonal variations), economics, historic plant loss statistics and volume of variable renewable energy sources.

~~4~~5.1.7 Where insufficient frequency Restoration Reserve provision by the market is forecast, then Balancing Mechanism (BM) Start-Up contracts with long notice BM Units are enacted to ensure that sufficient reserves will be available.

~~4~~5.1.8 Should the frequency fall unexpectedly outside the Maximum Steady State Frequency Deviation limits, then automatic under/over frequency control schemes and/or Low Frequency Demand Disconnection schemes operate.

~~4~~5.1.9 *Grid Code BC2.5.4* states that in the event of the system frequency being below 49.~~7 Hz~~7Hz or above 50.3Hz, ~~Balancing Mechanism~~BM participants must not commence any reasonably avoidable action to regulate the input or output of any BM Unit in a manner that could cause the system frequency to deviate further from 50 Hz without first using reasonable endeavours to discuss the proposed actions with ~~the NGESO~~NGESO. In addition, and in order to provide further system robustness Electricity Storage Modules under Article 15(3) are required to automatically de-load from an import mode of operation to an export mode of operation. Where an Electricity Storage Module is not capable of satisfying this requirement, blocks of demand are required to be tripped once the System Frequency falls below 49.5Hz. These requirements are provided for in *Grid Code ECC.6.3.7.2.3*.

~~3.2~~5.2 Additional Demand Disconnection Following Low Frequency Demand Disconnection

In Accordance with EU NCER Article 22:

~~4~~5.2.1 If, because of a low frequency event, demand has been disconnected by ~~Automatic~~automatic Low Frequency Demand Disconnection relays, ~~the~~ NGESO may instruct reduction of transmission-connected demand and/or ~~Distribution~~ Network Operators to disconnect additional demand in accordance with *Grid Code OC6* to recover system frequency to within the frequency restoration range and restore frequency containment reserves.

~~3.3~~5.3 Demand Restoration

In Accordance with EU NCER Article 18:

~~4~~5.3.1 Following a demand disconnection event, ~~Distribution~~ Network Operators and/or transmission-connected demand customers can reconnect demand only on instruction from ~~the~~ NGESO in accordance with *Grid Code OC6*.

~~3.4~~5.4 Voltage Deviation Management Procedure

In Accordance with EU NCER Article 19:

~~4~~5.4.1 ~~The~~ NGESO is obliged to plan and operate the National Electricity Transmission System within the voltage limits defined in the System Operations Guideline Article 27 and Annex II *and the National Electricity Transmission System Security and Quality of Supply Standard* (*NETS SQSS*) at connection points. This is achieved by maintaining dynamic reactive power reserves, held on generating plant and reactive compensation equipment, to control pre and post fault voltage levels.

~~4~~5.4.2 Voltage limits used for system design are more stringent than those used for operational planning, which in turn are more stringent than those allowed in operational timescales. This reduces the risk of breaching voltage standards in operational timescales.

~~4~~5.4.3 Studies are undertaken by ~~the~~ NGESO using offline modelling of voltages pre-fault and following a list of credible contingencies from long-term planning down to 4 hours ahead. These studies identify any potential breach of voltage standards so that remedial action can be taken pre-fault or planned for post fault implementation. These studies are repeated following any significant change in system conditions.

~~4~~5.4.4 Emphasis is placed by ~~the~~ NGESO control engineers on the timely management of all aspects of voltage control with varying generation and demand patterns, including switching of Reactive Compensation Equipment, setting target voltages on Static VAr Compensators, switching out designated circuits and instructing generator plant to import/export reactive power, to achieve the required target voltage levels.

~~4~~5.4.5 A real-time assessment tool monitors power system conditions and continually re-evaluates voltages following a list of credible contingencies so that action can be taken pre-fault to avoid post fault breach of voltage standards.

~~4~~5.4.6 In operational timescales, the following measures can be taken by ~~the~~ NGESO to maintain reactive power reserves:

- Switching of Reactive Compensation Equipment;
- ~~Excitation~~Changing the excitation of synchronous machines by issuing reactive power instructions to generators;
- Changing reactive power flow at customer interface points, including super grid transformer tap changing;
- Repositioning generating plant, including at part load;
- Operation of gas turbines in synchronous compensation mode;
- Synchronising additional generation, including gas turbines;
- Switching out high reactive gain circuits;
- Simultaneous generator transformer tap changing;
- ~~Demand transfer~~Transferring demand out of a group to mitigate local issues;

- Restoration of circuit outages;
- Pre-fault demand reduction actions;
- Post fault demand reduction actions; and
- Manually disconnecting load.

~~4~~5.4.7 Automatic Tap Change Control (ATCC) schemes are installed on super grid transformers to assist in maintaining a desired voltage profile at the interface points to customers connected to the National Electricity Transmission System. The voltage profile must be maintained with varying generation and demand patterns and the target voltage for individual schemes can be set by ~~the~~ NGESO to meet the requirements of DNOs ~~or IDNOs~~.

~~4~~5.4.8 Should voltages unexpectedly exceed standards following a system event then ~~1~~one or more of the above measures can be used to restore voltages to within standards.

~~3.5~~5.5 Power Flow Management Procedure

In Accordance with EU NCER Article 20:

~~4~~5.5.1 Power flows across the National Electricity Transmission System are managed by ~~the~~ NGESO operating within derived transmission constraint boundaries. These constraints are dependent on transmission asset outage conditions and are optimised by ~~the~~ NGESO. Operating within transmission constraint limits may require ~~the~~ NGESO to instruct balancing actions of Balancing Service Providers; ~~e.g.~~eg Bid Offer Acceptances (BOAs). In addition, ~~the~~ NGESO has several bespoke actions available to assist with the power flow management on the National Electricity Transmission System.

~~4~~5.5.2 *Emergency Instructions* can be used to decrease/increase power exported/imported from the GB Total System Users (including disconnection), as detailed in the *Grid Code BC2.9*. ~~These can also be~~, for example, instructions issued to ~~Distribution~~ Network Operators to take appropriate action on their networks or instructions issued by NGESO through *Grid Code OC6B* and *OC7* requiring Network Operators to require tripping of Embedded Generation to control high frequencies. In the case of HVDC Interconnectors, an Emergency Instruction can also be a reversal of flow – leading to an effective increase in generation or demand on part of the National Electricity Transmission System on the basis that the Transmission System on the remote end of the Interconnector has the capability to do so without placing it at risk.

~~4~~5.5.3 *Special Actions*, as defined in the *Grid Code BC1.7*, are bespoke and bilaterally agreed between ~~the~~ NGESO and specific National Electricity

Transmission System Users. These are agreed in advance so that they can be implemented swiftly on instruction by ~~the~~ NGESO following a specified credible event.

~~4~~5.5.4 Generator Operational Tripping Schemes are installed to prevent circuit thermal overloads, voltage excursions and/or system instability problems in post-fault timescales, or to protect consumer demand and/or ~~Distribution~~ Network Operator’s systems against the loss of the generator/super grid system connections or islanding of generation.

~~4~~5.5.5 Demand Tripping Schemes are installed to protect circuits from thermal overloads and/or maintain voltage stability under fault conditions.

~~4~~5.5.6 Whenever downward regulation shortfall for a transmission constraint is identified (hours ahead to real time) an Insufficient Localised Negative Reserve Active Power Margin (NRAPM) warning will be issued by ~~the~~ NGESO under *Grid Code BC1.5.5* to see if any increase in generator flexibility is possible.

~~3.6~~5.6 Assistance for Active Power Procedure

In Accordance with EU NCER Article 21:

~~4~~5.6.1 Agreements are in place with neighbouring Transmission Licensees and Externally Interconnected System Operators (EISOs) to provide Emergency Assistance. The contracted service is for blocks of energy to be provided across HVDC Interconnectors for specific periods of time, and detailed in the relevant *Balancing and Ancillary Services Agreement* for each interconnector or as required under *Grid Code BC.2.9. 6*.

~~4~~5.6.2 Where a *Maximum Generation* Service Agreement is in place between ~~the~~ NGESO and a Generator (*CUSC Section 4.2*), the Generator will use reasonable endeavours to make available and provide Maximum Generation from each of its Maximum Generation BM Unit(s). ~~The~~ NGESO will request the Maximum Generation Service prior to the instruction of any measures related to Demand Control. This will be via Emergency Instructions.

~~4~~5.6.3 Under the EU NCER, ~~the~~ NGESO shall be entitled to request assistance for active power from a CUSC Party which does not already provide a balancing service. For the avoidance of doubt this would not extend to an Embedded Power Station unless the owner of that Power Station (i.e. the Generator) had a CUSC Contract with ~~the~~ NGESO.

~~4~~5.6.4 Whenever national downward regulation shortfall is identified (day ahead to real time) an Insufficient System Negative Reserve Active

Power Margin (NRAPM) warning will be issued by ~~the~~ NGESO under *Grid Code BC1.5.5* to see if any increase in generator flexibility is possible.

~~3.7~~5.7 National Electricity Transmission System Warnings Procedure

~~4~~5.7.1 The *Grid Code OC6, OC7*, and *BC1* provide for circumstances in which ~~the~~ NGESO may issue a National Electricity Transmission System Warning to all industry participants in circumstances where Demand Reduction may be required. National Electricity Transmission System Warnings consist of the following types: -

- (a) *Electricity Margin Notice*~~.~~;
- (b) *High Risk of Demand Reduction*~~.~~;
- (c) *Demand Control Imminent*~~.~~;
- (d) *Risk of System Disturbance*~~.~~;
- (e) ~~4~~*National Electricity Transmission System Warnings Table* – Appendix 1 of OC7; and
- (f) *Other System Alerts and warnings as detailed in Grid Code OC7.4.8.15.*

5.7.2 *Electricity Margin Notice* and/or *High Risk of Demand Reduction* warnings may be issued by ~~the~~ NGESO when insufficient system margins are anticipated for any period.

~~4~~5.7.3 Should the system conditions not return within the acceptable limits or there is still further concern, a *Demand Control Imminent* warning may be issued giving warning that ~~the~~ NGESO expects to issue a Demand Control instruction to ~~Distribution~~ Network Operators and/or Non-Embedded Customers in the next 30-minute window.

~~4~~5.7.4 ~~The~~ NGESO will issue the above instructions when the need for Demand Control is identified in advance but this may not be possible in all circumstances. However, an ~~increase~~increased level of Demand Control must be made available if a *High Risk of Demand Reduction* warning has been issued by 16:00 hours day 1.

5.7.5 NGESO can issue the following National Electricity Transmission System Warnings at times when there is more generation than demand in order to minimise the risk of high system frequencies on both a regional and national basis

- (a) *National Electricity Transmission System Warning – System NRAPM;*
- (b) *National Electricity Transmission System Warning – Localised NRAPM;*

(c) National Electricity Transmission System Warning – High Risk of Embedded Generation Reduction; and

(d) National Electricity Transmission System Warning - Embedded Generation Control Imminent warnings.

5.7.6 In addition NGESO can issue the following Other System Alerts and Warnings on the BMRS System which are summarised in Appendix 2 of OC7.

(a) Demand Control by Demand Disconnection instructed by NGESO;

(b) Demand Control by voltage reduction instructed by NGESO;

(c) Automatic Low Frequency Demand Disconnection;

(d) Demand Control (including voltage reduction and demand disconnection) - Network Operator activated;

(e) Grid Code Emergency Instruction (to Network Operator);

(f) Grid Code Emergency Instruction (to Generators & Demand – BCA, BEGA, & BELLA);

(g) Grid Code Emergency Instruction (to Interconnectors);

(h) System NRAPM;

(i) Localised NRAPM;

(j) Cancellation of National Electricity System Warnings;

(k) STC Emergency Instruction to Transmission Owner;

(l) ESEC Implementation;

(m) EMR Capacity Market Notifications; and

(n) Emergency Assistance Requests.

~~3.8~~5.8 Manual Demand Disconnection Procedure

In Accordance with EU NCER Article 22:

~~4~~5.8.1 *Grid Code OC6, OC7, BC1*, and *BC2 allow Demand Control* instructions to be issued by ~~the~~ NGESO to all DNOs, IDNOs and Non-Embedded Customers connected to the National Electricity Transmission System.

~~4~~5.8.2 *Manual Demand Reduction* in respect of ~~Distribution~~ Network Operators and Non-Embedded Customers may be instructed by ~~the~~ NGESO to avoid unacceptable operating conditions on the National Electricity Transmission System during periods of generation shortage, or in the event of unacceptable thermal overloading and/or unacceptable voltage conditions. There are 2 types:

(a) *Demand ~~Reduction~~Control*. This shall be achieved by ~~the~~ NGESO instructing voltage reduction and/or demand disconnection equally across Non-Embedded Customers and Grid Supply Points.

(b) *Emergency Manual Demand Disconnection*. This applies to a localised section of the National Electricity Transmission System under an emergency and shall be achieved by ~~the~~ NGESO instructing demand disconnection at specific Grid Supply Point(s).

~~4~~5.8.3 *Grid Code OC6.5* describes the stages of netted Demand Reduction. ~~Distribution~~ Network Operators shall be able to achieve the first 20% of netted demand reduction always with or without warning. Further stages of netted demand reduction (5% steps) up to a total of 40% shall be achievable following the issue of a "*National Electricity Transmission System Warning - High Risk of Demand Reduction*" by ~~the~~ NGESO before 16:00 hours day-1.

~~4~~5.8.4 Once netted Demand Reduction has been applied, each ~~Distribution~~ Network Operator must ensure that their netted Demand Reduction remains at the instructed level until ~~the~~ NGESO instructs otherwise.

~~4~~5.8.5 Whilst netted Demand Reduction is in place, the Balancing Mechanism will still be in operation and the markets will not be suspended. Demand Reduction instructions shall be issued by ~~the~~ NGESO as *Emergency Instructions*.

5.9 Manual Generation Disconnection

5.9.1 In the event that there is insufficient demand and a surplus of generation, there are a number of methods available to NGESO to balance the system. These include:

- Bidding generation down through the balancing mechanism through the use of BM Unit Bid Offer Acceptances;
- Ensuring sufficient negative reserve active power margin, as provided for in *Grid Code BC2.9.4*; and
- Instructing DNOs to curtail the export of embedded generation output (where those embedded generators do not have a CUSC contract) as provided for in *Grid Code OC6B* and *OC7*.

~~3.9~~5.10 Rota Load Disconnection Procedure

~~4.9~~5.10.1 *Rota Load Disconnections* are described in the *Electricity Supply Emergency Code*[8]. In an electricity supply emergency, it may be necessary to restrict customers' consumption of electricity by the issue of directions under the *Energy Act 1976* or the *Electricity Act 1989* requiring rota disconnections and associated restrictions.

~~4.9~~5.10.2 If the BEIS Emergency Response Team decides that rota disconnections must be introduced, the Secretary of State for Business, Energy and Industrial Strategy (BEIS) will implement the emergency powers in the *Energy Act 1976*. BEIS can then issue a direction to all Network Operators affected to implement a schedule of rota disconnections across their licence area(s) throughout the period of the emergency. Under this direction and within the provisions of the *Grid Code*, ~~the~~ NGESO will determine the level of disconnections required and instruct ~~Distribution~~ Network Operators accordingly.

~~4.9~~5.10.3 Under the *Electricity Supply Emergency Code* customers vital to national infrastructure are entitled to apply to BEIS for Protected status. ~~Distribution~~ Network Operators are obliged to review the Protected Site List every 2 years and provide an update to BEIS ~~on~~by 1st October of the review year.

~~4 RESILIENCE MEASURES TO BE IMPLEMENTED BY GB PARTIES~~

6 Resilience Measures to be Implemented by GB Parties

In Accordance with EU NCER Article 11(4~~)~~):

6.1 ~~5.1~~ Each GB Party which falls within the scope of the EU NCER as listed in Appendix A of this System Defence Plan must ensure their ~~critical tools and facilities are designed to remain~~plant and apparatus, equipment controlling 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) and the necessary personnel with the appropriate skill and knowledge to operate and control that plant and apparatus available for at least 24 hours in the case of a local loss of external power (EU NCER Articles 41.1 and 42.2).

[8] *Electricity Supply Emergency Code* *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698739/2018_03_29_Electricity_Supply_Emergency_Code__ESEC__2018_Revision_V1.0-.pdf*

~~5~~6.1.1 “Critical ~~tools~~Tools and ~~facilities are~~Facilities” is a defined term in ~~SOGL Article 24~~the Grid Code, and ~~include~~includes, but ~~are~~is not limited to, Supervisory, Control and Data Acquisition systems (SCADA), automatic logging devices and control telephony. Minimum resilience requirements for Critical Tools and Facilities are set out in the Grid Code. Similar requirements for Critical Tools and Facilities will be defined in the STC in due course.

~~5~~6.1.2 Generators who own and operate Type B Power Generating Modules ~~may have the possibility~~might be able to have only a data communication system, instead of a voice communication system, if agreed upon with ~~the~~ NGESO (EU NCER Article 41.4). In this case, the data communication facilities must have the same level of resilience as required for the voice communication system.

~~5 ASSURANCE & COMPLIANCE TESTING~~

7 Assurance & Compliance Testing

EU NCER Article 43 states the general principles for compliance testing. Articles 44 to 49 describe the testing requirements and are summarised below.

~~6.1 The NGESO shall prepare a test plan by 18th December 2019. In addition, the ESO in co-ordination with Transmission Licensees shall periodically assess the proper functioning of all procedures, equipment and tools required for the System Defence Plan and System Restoration Plan. The general principles of the test plan in accordance with Article 43 shall be included in each of the testing requirements for Articles 44 to 47. The test plans for Articles 44 to 47 shall identify the equipment and capabilities relevant for the System Defence Plan and System Restoration Plan that must be tested and include target periodicity and conditions for the equipment owned by GB Parties who are within the scope of the NCER. These changes are being introduced through Grid Code Modification GC0127 and GC0128. For the avoidance of doubt, GB parties who are within the scope of the NCER are detailed in Appendix A of this System Defence Plan.~~

~~6~~7.1 In accordance with Article 43(2) of the EU NCER NGESO has prepared a Test Plan which details how compliance and compliance testing is assessed against the EU NCER.

7.2.1 Each EU Code Generator and GB Code Generator (as defined in the Grid Code) or DC Converter Station Owner or HVDC Converter Station Owner and which has a Black Start Contract ~~service~~ shall be required to execute a Black Start capability test at least every 3 years~~. This requirement is being progressed through~~ as provided for in *Grid Code* ~~Modification GC0125.~~*OC5.7*.

~~6.2~~7.2.2 Any Restoration Service Provider is required to undertake testing in accordance with *Grid Code OC5.7*. The tests shall be executed at least every three years.

7.2.3 Each ~~EU~~ Generator which owns or operates a Type C or D Power Generating Module ~~and~~shall be capable of delivering a quick re-synchronisation service and shall execute a trip to house load test after any changes of equipment having an impact on its house load operation capability, or after 2 unsuccessful trips in real operation~~. This requirement is being progressed through Grid Code Modification GC0127/GC0128.~~ as provided for in *Grid Code OC5.7.3*.

~~6~~7.2.~~3 GB Parties~~4 Demand Response Providers who deliver a demand response service to NGESO shall execute a demand response test after 2 consecutive unsuccessful responses in real operation, or at least every year~~. This requirement is being progressed through Grid Code Modification GC0127/GC0128.~~ as provided for in *DRSC11.7* of the Grid Code.

~~6~~7.2.~~4~~5 GB ~~Parties~~User's and Non-Embedded Customers who deliver a low frequency demand disconnection service, shall execute ~~a~~ regular low frequency demand disconnection ~~test. The frequency of these~~ tests ~~is being progressed through~~in accordance with *Grid Code* ~~Modification GC0127/GC0128~~*CC/ECC.A.5.4*.

~~6~~7.2.~~5~~6 Transmission Licensees ~~and Distribution~~, Network Operators ~~(including Independent Distribution Network Operators)~~and Non-Embedded Customers in coordination with NGESO shall execute regular testing on the Low Frequency Demand Disconnection relays implemented on their installations~~. The frequency of these tests are being progressed through Grid Code Modification GC0127/GC0128~~ as provided for in *Grid Code CC/ECC.A.5.4*.

~~6~~7.2.~~6~~7 NGESO, Transmission Licensees, ~~Distribution~~ Network Operators and CUSC Parties shall test their communication systems at least every year~~. –~~ as provided for in *Grid Code CC/ECC.6.5.4.4*.

~~6~~7.2.~~7~~8 NGESO, Transmission Licensees, ~~Distribution~~ Network Operators and CUSC Parties shall test the backup power supplies of their communication systems at least every 5 years~~. These requirements are being progressed through Grid Code Modification GC0127/GC0128~~ as provided for in *Grid Code CC/ECC.6.5.4.4*.

~~6~~7.2.~~8~~9 NGESO and Transmission Licensees shall test the capability of main and backup power sources to supply its main and backup control rooms at least every year.

~~6~~7.2.~~9~~10 NGESO and Transmission Licensees shall test the functionality of critical tools and facilities at least every 3 years. Where these tools involve CUSC Parties and ~~Distribution~~ Network Operators, these parties shall participate in the tests. Critical tools and facilities are 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.

~~6~~7.2.~~10~~11 NGESO and Transmission Licensees shall test the capability of backup power sources to supply essential services of ~~the~~critical substations ~~listed in the System Restoration Plan Appendix D~~ at least every 5 years.

~~6~~7.2.~~11~~12 NGESO and Transmission Licensees shall test the transfer procedure for moving from the main control room to the backup control room at least every year. For Transmission Licensees these requirements are provided for in STCP-06-4 (Contingency Arrangements).

~~6.3 Starting from 1st April 2020, the NGESO, Transmission Licensees, Distribution Network Operators and CUSC Parties shall produce a report each calendar year on their completed compliance tests, along with a measure of each test success. The report shall be made available to NGESO by 1st April of the following calendar year. The report shall also indicate procedures, when the next occurrence of each test is expected to be completed, together with a risk assessment rating and justification. The first report is due by 1 April 2021.~~

~~6.4 All Distribution Network Operators with Low Frequency Demand Disconnection relays installed shall update the NGESO once per year of the frequency settings at which netted demand disconnection is initiated and the percentage of netted demand disconnection at every such setting. The NGESO shall monitor the Low Frequency Demand Disconnection capability based on these annual submissions.~~

~~6~~8 ~~PLAN IMPLEMENTATION~~Plan Implementation

Article 12 of the *EU NCER*, provides for the implementation of the System Defence Plan, ~~and required that by 18 December 2018 the NGESO will~~NGESO shall notify all those parties defined in Appendix A of this System Defence Plan of their obligations.

~~Articles relating to the System Defence plan will be implemented in two phases in GB. The first phase will include all Articles that will apply from 18 December 2019 which are being implemented via Grid Code Modifications GC0127 and GC0128. The second phase will include all Articles that shall apply from 18 December 2022 as per Article 55 of EU NCER (i.e. Article 15(5) to (8), Article 41 and Article 42(1)(2) and (5). The first phase (Grid Code Modifications GC0127 and GC0128) required implementation in the Grid Code by 18 December 2019 but this is subject to Ofgem approval of the changes. A decision is expected at least two months after submission to Ofgem, the~~

~~modifications were submitted on 3 December 2019. The code modifications required for the second phase will commence in 2020.~~

~~7~~9 ~~PLAN REVIEW~~Plan Review

EU NCER Article 50 requires ~~the~~ NGESO to review the System Defence Plan to assess its effectiveness at least every five years. ~~However, it is intended to carry out a review annually by 1st September.~~

The review will consider at least:

(a) The development of the National Electricity Transmission System~~.~~;
(b) The capabilities of new equipment installed on the Transmission and Distribution Systems~~.~~;
(c) The GB parties commissioned since the last review, their capabilities and services offered~~.~~;
(d) The results of the tests carried out as defined in Section 7~~.~~;
(e) The analysis of system incidents~~.~~; and
(f) The operational data collected during normal operation and after disturbance.

(g) ~~The~~ The recommendations arising from the latest iteration of the Frequency Risk Control Report (FRCR).which is to be reviewed at least every year.

NGESO will also review the relevant measures of the System Defence Plan in advance of a substantial change to the configuration of the National Electricity Transmission System. These measures and how they are assessed are covered in the Test Plan. The governance and modification process for the System Defence Plan, System Restoration Plan and Test Plan are detailed in section GC16 of the Grid Code.

Appendix A: GB Parties within the scope of the System Defence 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 GB Parties including which of those parties are included within the scope of the EU Emergency and Restoration Code and those which are not.

Table A1 details which ~~GB~~ Parties within GB would ~~be~~fall within the scope of EU NCER.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence 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 ESO~~NGESO and owns or operates a Type C or Type D Power Generating Module	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* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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,* 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 Defence Plan.
		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.	Not applicable~~.~~ ~~Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own or operate~~ unless that Generator has a ~~Type C or Type D Power Generating Module~~contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
	Existing	Any Generator who is a GB Code User who has a CUSC Contract with ~~the ESO~~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.A.1, OC.5.A.2, OC5.A.3* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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*, In satisfying the above Grid Code requirements, Generators with a CUSC Contract would meet one or more of the requirements of the System Defence 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 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~~ unless that Generator has a ~~Type C or Type D Power Generating Module~~contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service

EU Criteria	**New or Existing**	**List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)**	**Measures of the System Defence Plan**
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~~an EU Code User and has a CUSC Contract with ~~the ESO~~NGESO and owns or operates a Type B Power Generating Module	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,* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC1.7, 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*, 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 Defence Plan.
		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	Not applicable~~.~~ ~~Under the current GB Framework, there is currently no requirement for~~ unless that Generator has~~Non-CUSC Parties who own and operate~~ a ~~Type C or Type D Power Generating Module~~contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in~~

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			~~the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service
	Existing	Any Generator who is a GB Code User who has a CUSC Contract with ~~the ESO~~NGESO 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, OC.5.A.1, OC.5.A.2, OC5.A.3* *OC6.1.6, OC6.6.6** (*Note OC6.6.6 applies only to Pumped Storage Generators), *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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*, In satisfying the above Grid Code requirements, Generators with a CUSC Contract would meet one or more of the requirements of the System Defence Plan.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence 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 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~~ unless that Generator has a ~~Type B Power Generating Module~~contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service
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 ESO~~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.6.4.3, ECC.6.5, ECC.A.5.* *DRSC* *ECP.A.8* *OC1* *OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers).* *OC6.3, OC.6.5, OC6.6.6, OC6.8* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1* *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 Defence 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.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			There is no concept of an Embedded Non-Embedded Customer.
	Existing	Any Non-Embedded Customer who is a GB Code User and has a CUSC Contract with ~~the ESO~~NGESO	Applicable Grid Code requirements: *CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.3, CC.6.4.3, CC.6.5, CC.A.5.* *OC1* *OC5.4, OC5.5.4* (only in respect of CUSC Parties who are also Demand Response Providers). *OC6.3, OC.6.5, OC6.6.6, OC6.8* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1* *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 Defence 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.
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 ESO~~NGESO	Applicable Grid Code requirements: *ECC6.1.2, ECC.6.1.4, ECC.6.2.3, ECC.6.4.3, ECC.6.5, ECC.A.5.* *DRSC* *ECP.A.8* *OC1*

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers). *OC6.3, OC.6.5, OC6.6.6, OC6.8* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1* *BC2 (in particular BC.2.9)* *BC3* 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 Defence Plan. 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
	Existing	Any Non-Embedded Customer who is a GB Code User and which has a CUSC Contract with ~~the ESO~~NGESO	Applicable Grid Code requirements: *CC6.1.2, CC.6.1.3, CC.6.1.4, CC.6.2.3, CC.6.4.3, CC.6.5, CC.A.5.* *OC1* *OC5.4, OC5.5.4 (only in respect of CUSC Parties who are also Demand Response Providers).* *OC6.3, OC.6.5, OC6.6.6, OC6.8* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1* *BC2 (in particular BC.2.9)*

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			In satisfying the above Grid Code requirements, Non-Embedded Customers would meet one or more of the requirements of the System Defence Plan. 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.
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.	(*ECC/CC 6.5 only*) DRSC if they are also 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. *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* (As applicable but biased towards Generator who are registered as Gensets).
Existing and new high voltage direct current (HVDC) Systems and direct current connected Power Park Modules in accordance with	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 ESO~~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* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12*

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
the criteria set out in Article 4(1) of commission Regulation (EU) 2016/1447			*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,* 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 Defence Plan. An~~ unless that 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 ESO expect to work~~Owner has a contract with ~~all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~NGESO to provide a Defence Service
	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 ESO~~NGESO	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.A.4* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12* *BC1.4, BC1.5, BC.1.7, BC1.A.1, BC1.A.2.1* *BC2 (in particular BC.2.9)*

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			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.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
Existing and new Type A Power Generating Modules in accordance with the criteria set out in Article 5 of Regulation (EU) 2016/631, to existing and new Type B Power Generating Modules other than those referred to in paragraph 2(b), as well as to existing and new demand facilities, closed distribution systems and third parties providing demand response where they qualify as defence service providers pursuant to Article 4(4)	New	Any Generator who is an EU Code User and has a CUSC Contract with ~~the ESO~~NGESO and owns or operates a Type A Power Generating Module. Non-Embedded Customers and BM Participants in respect of Closed Distribution Systems and Aggregators.	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* *DRSC if they are also providing Demand Response Services and their equipment was purchased on or after 7 September 2019 and connected to the System on or after 18 August 2019.* *ECP.A.3, ECP.A.5, ECP.A.6* *OC5.4, OC5.5* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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,* In satisfying the above Grid Code requirements, Generators with a CUSC Contract who own or operate a Power Station comprising a Type A Power Generating Module would meet one or more of the requirements of the System Defence Plan in the same way as a Generator who owns or operates a Type B Power Generating Module. Note that a Generator in respect of a Type A Power Generating Module will have to meet those requirements of the Grid Code as applicable to Type A Power Generating Modules. However, where a Generator in respect of a Small Power Station comprises Type A Power Generating Modules, then the requirements on Small Power Stations are less onerous than those of Large Power Stations but this does not exclude those specific requirements applicable to Type A Power Generating

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
			Modules. The requirements will also vary if the Type A Power Generating Module is Embedded or Directly Connected.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
		Any Generator who does not have a CUSC Contract (i.e. Embedded) and owns or operates a Power Station comprising one or more Type A Power Generating Modules.	Not applicable~~.~~ ~~Under the current GB Framework, there is currently no requirement for Non-CUSC Parties who own or operate~~ unless that Generator has a ~~Type A Power Generating Module~~contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service
Existing and new Type A Power Generating Modules in accordance with the criteria set out in Article 5 of Regulation (EU) 2016/631, to existing and new Type B Power Generating Modules other than those referred to in paragraph 2(b), as well as to existing and new demand facilities, closed distribution systems and third	Existing	Any Generator who is a GB Code User who has a CUSC Contract with ~~the ESO~~NGESO 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 400W but less than 1MW and connected below 110kV (equivalent to a Type A Power Generating Module). Non-Embedded Customers and BM Participants in respect of Closed Distribution Systems and Aggregators.	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* *DRSC if they are also providing Demand Response Services and their equipment was purchased on or after 7 September 2019 and connected to the System on or after 18 August 2019.* *CP.A.3* *OC5.4, OC5.5, OC5.A.1, OC.5.A.2, OC5.A.3.* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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,* In satisfying the above Grid Code requirements, Generators with a CUSC Contract who own or operate a Power Station comprising a Type A Power Generating Module would meet

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
parties providing demand response where they qualify as defence service providers pursuant to Article 4(4)			one or more of the requirements of the System Defence Plan in the same way as a Generator who owns or operates a Type B Power Generating Module. Note that a Generator in respect of a Type A Power Generating Module will have to meet those requirements of the Grid Code as applicable to Type A Power Generating Modules. However, where a Generator in respect of a Small Power Station comprises Type A Power Generating Modules, then the requirements on Small Power Stations are less onerous than those of Large Power Stations but this does not exclude those specific requirements applicable to Type A Power Generating Modules. The requirements will also vary if the Type A Power Generating Module is Embedded or Directly Connected.
		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 have a maximum output of greater than 400W but less than 1MW and connected below 110kV (equivalent to a Type A Power Generating Module).	Not applicable~~.~~ ~~Under~~ unless the ~~current GB Framework, there is currently no requirement for Non-CUSC Parties who own or operate a Type A~~Generator in respect of that Power ~~Generating Module~~Station has a contract with NGESO to ~~contribute to the System~~provide a Defence ~~Plan. This however is subject to review and the ESO expect to work with all Stakeholders in the future to consider the approach to including Non-CUSC Parties within the System Defence Plan.~~Service.

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
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 ESO~~NGESO and which owns and operates Electricity Storage Modules would be classified as a Storage User as defined under the GC0096 Grid Code proposals	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* *ECP.A.3, ECP.A.5, ECP.A.6* *OC5.4, OC5.5* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *OC10* *OC12*

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
provided that they are identified as such in the system defence plans restoration plans or service contract.			*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,* ~~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 ESO~~NGESO who own and/or operate Electricity Storage Modules would therefore be within the scope of NCER.
	Existing	Any CUSC Party who owns or operates Storage plant	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.A.1, OC.5.A.2, OC5.A.3.* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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,* ~~In general, the requirements on Storage are the same as those on Generators. However, as Storage is comparatively new, and the requirements on storage are only being introduced through GC0096, Existing Generators caught by the requirements of the Bilateral Connection Agreement would have to satisfy the requirements of the Grid Code as listed above.~~

EU Criteria	New or Existing	List of GB Parties considered to be SGUs for purposes of the System Defence Plan (GB SGU's)	Measures of the System Defence Plan
Defence Service Provider with a legal contract to provide a defence service	New	Any non CUSC party which has a contract with NGESO is to provide a Defence Service would need to satisfy the appropriate requirements of the Grid Code through a contractual mechanisms.	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* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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.*
Defence Service Provider with a legal contract to provide a defence service	Existing	Any non CUSC party which is to provide a defence 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.* *OC6.1.6, OC6.6.6* (*Note OC6.6.6 applies only to Pumped Storage Generators),* *OC.7.4, OC7.6 (OC7.6 - Scotland and Offshore only)* *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,* .

GB parties falling within the remit of the EU NCER.

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

- CUSC Parties~~, Application of the Grid Code~~; and ~~the relationship~~
- Non-CUSC Parties who have a contractual agreement with ~~the Emergency~~NGESO to provide one or more measures of this System Defence Plan.

The Connection and ~~Restoration~~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~~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~~Participates in the Balancing Mechanism; or
- Owns or operates a Large Power Station and that Large Power Station comprises one or more Electricity Storage Modules.

To ~~sign~~accede to the CUSC and have an ~~Agreement~~agreement with ~~National Grid ESO~~NGESO. A condition of signing the CUSC will necessitate the need for that Party to also meet the applicable requirements of the Grid Code. In satisfying the requirements of the Grid Code, ~~and through the amendments being introduced through Grid Code modification GC0127 and GC0128,~~ any one of these parties ~~(in satisfying the requirements of the Grid Code)~~ will satisfy the requirements of EU NCER.

Network Operators are not Significant Grid User's (SGU's) however as they are CUSC Parties they would fall under the requirements of the EU NCER.

A non-CUSC Party would only be required to satisfy the requirements of the EU NCER where that party has a formal binding contract with NGESO to provide one or more measures of the System Defence Plan.

Non-CUSC Parties~~For the avoidance of doubt, a non~~

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

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

- ~~—~~A Generator ~~which~~who owns or operates an Embedded Small Power ~~-~~Station;
- ~~—~~A Demand Response Provider who may have a commercial contract ~~—~~with ~~National Grid ESO~~ 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 in Embedded and has a Connection Point ~~—~~below 110kV and has not signed the CUSC~~.~~;
- ~~—~~~~An~~A 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~~.~~; or
- ~~—~~A Generator ~~which~~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.

~~ESO Interpretation~~

~~The ESO considers for the implementation of the EU NCER, only CUSC Parties need to be within the scope of the EU NCER. We believe that this is an appropriate position based on the Legal Advice received.~~

For the avoidance of doubt, ~~the NGESO and Transmission Licensees are required to satisfy~~a Non-CUSC Party would not be bound by the requirements of the EU NCER~~. In complying~~ unless that Non-CUSC Party has a contract with ~~the requirements of the Grid Code, System Operator Transmission Owner Code (STC) and Distribution Code (as applicable), the~~ NGESO~~, Transmission Licensees, Distribution Network Operators (including Independent Distribution Network Operators) and CUSC Parties would satisfy the requirements of EU NCER.~~ to provide a Defence Service.

Appendix B: High Priority ~~SGU~~Significant Grid User list

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

- A Large Power Station connected directly to the National Electricity Transmission System~~:~~; or
- An Embedded Large Power Station.

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

Appendix C: List of Distribution Network Operators ~~and Independent Distribution~~

A list of Network Operators

~~A list of 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

Appendix D: Glossary

These definitions have been sourced from the Electricity Transmission Licence, the Grid Code Glossary and Definitions, the Network Code Emergency and Restoration and the European Union Emissions Trading Scheme website.

Balancing Mechanism	As defined in the Glossary and Definitions of the Grid Code. ~~The mechanism for the making and acceptance of offers and bids pursuant to the arrangements contained in the Balancing and Settlement Code.~~
BEIS	Her Majesty's Government Department for Business, Energy and Industrial Strategy.
Black Start Service Provider	As defined in the Glossary and Definitions of the Grid Code. ~~A User with a legal or contractual obligation to provide a service contributing to one or several measures of the System Restoration Plan.~~
BM Participant	As defined in the Glossary and Definitions of the Grid Code. ~~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.~~
CUSC Contract	As defined in the Glossary and Definitions of the Grid Code. ~~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;~~
Distribution Network Operator	Has the same definition as a Network Operator as defined in the Glossary and Definitions of the Grid Code. ~~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	As defined in the Glossary and Definitions of the Grid Code. ~~A User who is any of the following:~~ ~~(a) A Generator in respect of a Power Generating Module (excluding a DC 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~~ ~~(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.~~ ~~(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.~~ ~~(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.~~ ~~(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.~~ ~~(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.~~ ~~(g) A User which the Authority has determined should be considered as an EU Code User.~~ ~~(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.~~ ~~(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.~~ ~~(j) A Storage User in respect of an Electricity Storage Module whose Main Plant and Apparatus is connected to the System on or after XXXX 2020 and who concluded Purchase Contracts for its Main Plant and Apparatus on or after XXXX 2019. (Dates are a consequence of GC096 modification)~~
EU Generator	As defined in the Glossary and Definitions of the Grid Code. ~~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
GB Code User	As defined in the Glossary and Definitions of the Grid Code. ~~A User in respect of:~~ ~~(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 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.~~
GB Generator	As defined in the Glossary and Definitions of the Grid Code. ~~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 Glossary and Definitions of the Grid Code. ~~As defined in the Grid Code is "The AC power System in Great Britain which connects User's, Relevant Transmission Licensee's 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".~~
Generating Unit	As defined in the Glossary and Definitions of the Grid Code. ~~An Onshore Generating Unit and/or an Offshore Generating Unit which could also be part of a Power Generating Module.~~
Genset	As defined in the Glossary and Definitions of the Grid Code.

	~~A Power Generating Module (including a DC Connected Power Park Module), Generating Unit, Power Park Module or CCGT Module at a Large Power Station or any Power Generating Module (including a DC Connected Power Park Module), Generating Unit, Power Park Module or CCGT Module which is directly connected to the National Electricity Transmission System.~~
HVDC System	As defined in the Glossary and Definitions of the Grid Code. ~~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.~~
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.
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~~NGESO Website: https://www.nationalgrideso.com/codes/security-and-quality-supply-standards?code-documents
Non-Embedded Customer	As defined in the Glossary and Definitions of the Grid Code. ~~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.~~
Offshore Generating Unit	As defined in the Glossary and Definitions of the Grid Code. ~~Unless otherwise provided in the Grid Code, any Apparatus located Offshore which produces electricity, including, an Offshore Synchronous Generating Unit and Offshore Non-Synchronous Generating Unit which could also be part of a Power Generating Module.~~
Onshore Generating Unit	As defined in the Glossary and Definitions of the Grid Code. ~~Unless otherwise provided in the Grid Code, any Apparatus located Onshore which produces electricity, including, an Onshore Synchronous Generating Unit and Onshore Non-Synchronous Generating Unit which could also be part of a Power Generating Module.~~
Power Generating Module	As defined in the Glossary and Definitions of the Grid Code.

	~~Either a Synchronous Power-Generating Module or a Power Park Module owned or operated by an EU or GB Generator.~~
Storage User	As defined in the Glossary and Definitions of the Grid Code. ~~A Generator who owns or operates one or more Electricity Storage Modules. For the avoidance of doubt:~~ ~~(a) European Regulation (EU) 2016/631, European Regulation 2016/1388 and European Regulation 2016/1485 shall not apply to Storage Users; and~~ ~~(b)~~(a) ~~the European Connection Conditions (ECCs) shall apply to Storage Users on the basis set out in Paragraph ECC1.1(d).~~
System Operator Transmission Owner Code or STC	The System Operator Transmission Owner Code as published on The ~~National Grid ESO~~NGESO Website: https://www.nationalgrideso.com/codes/system-operator-transmission-owner-code?code-documents
Total System	As defined in the Glossary and Definitions of the Grid Code. ~~The National Electricity Transmission System and all User Systems in the National Electricity Transmission System Operator Area.~~
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 each 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 A Power Generating Module	As defined in the Glossary and Definitions of the Grid Code. ~~A Power-Generating Module with a Grid Entry Point or User System Entry Point below 110 kV and a Maximum Capacity of 0.8 kW or greater but less than 1MW.~~
Type B Power Generating Module	As defined in the Glossary and Definitions of the Grid Code. ~~A Power-Generating Module with a Grid Entry Point or User System Entry Point below 110 kV and a Maximum Capacity of 1MW or greater but less than 10MW.~~
Type C Power Generating Module	As defined in the Glossary and Definitions of the Grid Code. ~~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	As defined in the Glossary and Definitions of the Grid Code. ~~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	As defined in the Terms and Definitions of the Security and Quality of Supply Standard ~~These are conditions defined in the NETS SQSS where: the steady state frequency falls outside the statutory limits of 49.5Hz to 50.5Hz; or 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;~~ ~~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.~~

Appendix E~~: System Protection Scheme Standards~~

~~**ANNEX to the *EU NCER***~~

~~Automatic low frequency demand disconnection scheme characteristics:~~

~~Parameter~~	~~Values SA Continental Europe~~	~~Values SA Nordic~~	~~Values SA Great Britain~~	~~Values SA Ireland~~	~~Measuring Unit~~
~~Demand disconnection starting mandatory level: Frequency~~	~~49~~	~~48.7 – 48.8~~	~~48.8~~	~~48.85~~	~~Hz~~
~~Demand disconnection starting mandatory level: Demand to be disconnected~~	~~5~~	~~5~~	~~5~~	~~6~~	~~% of the Total Load at national level~~
~~Demand disconnection final mandatory level: Frequency~~	~~48~~	~~48~~	~~48~~	~~48.5~~	~~Hz~~
~~Demand disconnection final mandatory level: Cumulative Demand to be disconnected~~	~~45~~	~~30~~	~~50~~	~~60~~	~~% of the Total Load at national level~~
~~Implementation range~~	~~±7~~	~~±10~~	~~±10~~	~~±7~~	~~% of the Total Load at national level, for a given Frequency~~
~~Minimum number of steps to reach the final mandatory level~~	~~6~~	~~2~~	~~4~~	~~6~~	~~Number of steps~~
~~Maximum Demand disconnection for each step~~	~~10~~	~~15~~	~~10~~	~~12~~	~~% of the Total Load at national level, for a given step~~

~~Appendix F~~: Total Load and Netted Demand Definitions

The ENTSOE System Operations Committee has defined **Total Load** as the sum of all generation on both transmission and distribution systems (active power measured or estimated) and any imports, deducting power used for energy storage (e.g. pumps), house load of power plants and any exports.

Total Load = ∑ generation (gross) + imports - exports - energy storage - house load

(noting that energy storage could be a positive or negative value)

If part of the generation is unknown/unavailable (e.g. distributed generation) to the system operator (NGESO or DNOs ~~or IDNOs~~), the value must be estimated.

Netted Demand is defined as the netted value of active power seen from a given point of the system, computed as (load – generation – storage consumption), at a given instant or averaged over any designated interval of time.

Appendix ~~G~~F: Energy Storage Units

Energy Storage Units within the scope of the requirements of EU NCER are defined in Table A1 of Appendix A.

~~Faraday House, Warwick Technology Park,~~
~~Gallows Hill, Warwick, CV346DA~~

~~**nationalgridNGESO.com**~~

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