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EU NCER: System Test Plan

Issue 3~~2~~

November~~June~~ 2022

Contents

EU NCER: System Test Plan

1 Version Control

Version	Date	Author	Rationale
Issue 1	Dec 2019	NGESO	Each TSO shall have a Test Plan in Place
Issue 2	May 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 updates to the System Defence Plan and System Restoration Plan.
Issue 3	November 2022	NGESO	Refresh of document to reflect implementation of the Electricity System Restoration Standard (GC0156),Distributed Re-Start, System Defence Plan and System Restoration Plan

2 Introduction

The *European Network Code on Emergency & Restoration*[1] (***EU NCER***) came into force on 18 December 2017.

Under Article 43 of the EU NCER there is a requirement for a TSO (which in GB is NGESO) in consultation with Distribution System Operators, Significant Grid User's Defence Service Providers and GB Restoration Service Providers to prepare a Test Plan.

The purpose of this document is to define how the Test Plan is implemented in Great Britain (GB) and the relationship with other GB documents such as the System Defence Plan, the System Restoration Plan and the Grid Code.

This Test Plan is not intended to replace any provisions or testing requirements currently or proposed in the GB Codes. All the provisions contained within this Test Plan are already described in the GB industry codes (e.g. Grid Code, CUSC, STC, etc.) and therefore obligations specified upon parties be they User's or Transmission Licensees will be specified in the industry codes and not this Test 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 Test Plan. The governance of this Test 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.

3 REQUIREMENTS OF THE TEST PLAN

Article 43 of the EU NCER is reproduced below, which defines the General Principles of the Test Plan.

1. *Each TSO shall periodically assess the proper functioning of all equipment and capabilities considered in the system defence plan and the restoration plan. To this end, each TSO shall periodically verify the compliance of such equipment and capabilities, in accordance with paragraph 2 and with Article 41(2) of Regulation (EU) 2016/631, Article 35(2) of Regulation (EU) 2016/1388 and Article 69(1) and (2) of Regulation (EU) 2016/1447.*

2. *By 18 December 2019, each TSO shall define a test plan in consultation with the DSOs, the SGUs identified pursuant to Articles 11(4) and 23(4), the defence service providers and the restoration service providers. The test plan shall identify the equipment and capabilities relevant for the system defence plan and the restoration plan that have to be tested.*

3. *The test plan shall include the periodicity and conditions of the tests, following the minimum requirements outlined in Articles 44 to 47. The test plan shall follow the methodology laid down in Regulation (EU) 2016/631 Regulation (EU) 2016/1388 and Regulation (EU) 2016/1447 for the corresponding tested capability. For SGUs that are not subject*

[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

to Regulation (EU) 2016/631, Regulation (EU) 2016/1388 and Regulation (EU) 2016/1447, the test plan shall follow the provisions of national law.

4. *Each TSO, DSO, SGU, defence service provider and restoration service provider shall not endanger the operational security of the transmission system and of the interconnected transmission system during the test. The test shall be conducted in a way that minimises the impact on system users.*

5. *The test is deemed to be successful when it fulfils the conditions established by the relevant system operator pursuant to paragraph 3. As long as a test fails to fulfil these criteria, the TSO, DSO, SGU, defence service provider and restoration service provider shall repeat the test.*

4 Application

In GB, the parties within scope of the EU NCER are defined in Appendix A of the System Defence Plan and System Restoration Plan. In summary this extends to CUSC Parties and Non-CUSC Parties who have a contract with NGESO to provide a Defence Service or a Restoration Service.

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

5 Implementation of the Test Plan in GB

5.1 Assessment and Compliance

5.1.1 Article 43(1) states "*Each TSO shall periodically assess the proper functioning of all equipment and capabilities considered in the System Defence Plan and the Restoration Plan. To this end, each TSO shall periodically verify the compliance of such equipment and capabilities, in accordance with paragraph 2 and with Article 41(2) of Regulation (EU) 2016/631, Article 35(2) of Regulation (EU) 2016/1388 and Article 69(1) and (2) of Regulation (EU) 2016/1447".*

5.1.2 NGESO has prepared System Defence and System Restoration Plans. These documents are available on the NGESO Website. In order to ensure the equipment owned or operated by GB Parties who fall within the scope of the EU NCER (as defined in the Appendix A of the System Defence Plan and System Restoration Plan) compliance testing, simulation ~~and~~ monitoring and assurance is undertaken as required in the Grid Code (for example through the *Compliance Processes (CP's)*, *European Compliance Processes (ECP's)*, *Operating Code 5 (OC5)* Operating Code 9 *(OC9)* and *Operating Code 12 (OC12)*.

5.1.3 In addition, through the *European Compliance Processes (ECP's)*, compliance with Article 41(2) of Regulation (EU) 2016/631 (Requirements for Generators under ECP8.1), Article 35(2) of Regulation (EU) 2016/1388 (Demand Connection Code under DRSC.11.3.2.2) and Article 69(1) and (2) of Regulation (EU) 2016/1447 (HVDC Code under ECP1.1) is assured.

5.1.4 Article 43 (2) states "*By 18 December 2019 each TSO shall define a test plan in consultation with the DSOs, the SGUs identified pursuant*

to Articles 11(4) and 23(4), the defence service providers and the restoration service providers. The test plan shall identify the equipment and capabilities relevant for the system defence plan and the restoration plan that have to be tested.

5.1.5 Table 1 below shows the applicable requirements of the EU NCER which are implemented in the Grid Code, all of which are necessary for compliance purposes.

Requirement	**Grid Code Clause**
Connection Requirements	*CC/ECC.6.3 and OC5*
Compliance Requirements against the Connection Conditions and European Connection Conditions	*CC/ECP.A.3, CC/ECP.A.5, CC/ECC.A.6 and CC/ECC.A.7*
Power Generating Module Restoration Capability~~Black Start Service~~ repeatability, testing every three years as required under NCER Art 44(1)	*OC5.7.1 / OC5.7.2 /OC.5.7.4 / OC5.7.5*
Type C and Type D Power Generating Module and quick Resynchronisation tests required after two unsuccessful operations in real time as required under NCER Art 44(2)	*ECC.6.3.5.6 / OC5.7.1~~.1~~(a)(iii) / OC5.7.1~~.1~~(b)(iv) / OC5.7.2.5~~1.2 (e)~~ / ~~OC.5.7.3 / OC5.7.4.5~~*
Demand Modification Tests required after two unsuccessful operations in real time or at least every year as required under NCER Art 45(1)	*DRSC11.7.1*
Low Frequency Demand Disconnection Test within a period defined at National Level as required under NCER Art 45(2)	*DRSC11.7.2 – The relay test period is defined in GB as every three years*.
HVDC Restoration Capability~~Black Start~~ Service testing to be carried out every three years in accordance with NCER Art 46	*OC5.7.1 / OC5.7.2 / OC5.7.4 / OC5.7.5*
Low frequency demand disconnection Relay testing to be tested within a period defined at National Level as required under NCER Art 47	*CC/ECC.A.5.4.2 and CC/ECC.A.5.4.3 – In GB a period of once every three years has been selected.*
Testing of communication systems and backup power supplies for those communication systems in accordance with NCER Art 48	*CC/ECC.6.5.4.4 - Testing of inter TSO communications is covered in Section 6.0 below.*

Table 1

5.1.6 Article 43 (3) states "*The test plan shall include the periodicity and conditions of the tests, following the minimum requirements outlined in Articles 44 to 47. The test plan shall follow the methodology laid down in Regulation (EU) 2016/631 Regulation (EU) 2016/1388 and Regulation (EU) 2016/1447 for the corresponding tested capability. For SGUs that are not subject to Regulation (EU) 2016/631, Regulation (EU) 2016/1388 and Regulation (EU) 2016/1447, the test plan shall follow the provisions of national law".*

5.1.7 The periodicity and conditions of the requirements and tests in relation to Articles 44 to 47 of the NCER are covered in the Grid Code as referenced in Table 1 above. For parties who fall under the requirements of the EU NCER as defined in Appendix A of the System Defence Plan and System Restoration Plan which are not covered by the requirements of RfG (Regulation (EU) 2016/631, DCC (Regulation (EU) 2016/1388) and HVDC Code (Regulation (EU) 2016/1447) these are covered through the existing requirements of the Grid Code through the *Compliance Processes* and *Operating Code 5*.

5.1.8 Article 43(4) states "*Each TSO, DSO, SGU, defence service provider and restoration service provider shall not endanger the operational security of the transmission system and of the interconnected transmission system during the test. The test shall be conducted in a way that minimises the impact on system users".*

5.1.9 As defined in Appendices A of the System Defence Plan and System Restoration Plan, the approach adopted by NGESO is that the EU NCER will only apply to CUSC parties and Non-CUSC parties who have a contract with NGESO to provide a Defence Service or a Restoration Service. A "Defence Service" and a "Restoration Service" is defined in the Glossary of the System Defence Plan and System Restoration Plan. *Grid Code OC5.5.3.3* states "*The **User** is responsible for carrying out the test on their **Plant** and retains the responsibility for the safety of personnel and their **Plant** during the test*." As part of this Test Plan, any tests undertaken by a User, Defence Service Provider or GB Restoration Service Provider should not put the operational security of the Transmission System at risk and any tests conducted should also minimise the impact on Users as provided for under *Grid Code OC.5.5.3.3*.

5.1.10 Article 43(5) states "*The test is deemed to be successful when it fulfils the conditions established by the relevant system operator pursuant to paragraph 3. As long as a test fails to fulfil these criteria, the TSO, DSO, SGU, defence service provider and restoration service provider shall repeat the test."*

5.1.11 *Grid Code OC5.5.4* refers the individual performance requirements for each type of plant and tests against which the Grid Code requirements are assessed which include the requirements of RfG, DCC and HVDC Connection Network Codes. *Grid Code OC5.5.4* and OC5.7 of the Grid Code states the pass and fail criteria against the tests to be conducted.

5.1.12 *Grid Code CC.7.10/ECC.7.10* detail the obligations on Users in respect of Critical Tools and Facilities. In particular *Grid Code CC.7.10.3* and *ECC.7.10.3* details the requirements for testing these Critical Tools and Facilities

6 Compliance Testing and Periodic Review of the System Defence Plan

6.1.1 Article 50(1) of EU NCER states *"Each DSO concerned by the implementation of the low frequency demand disconnection on its installations shall update once a year the communication to the notifying system operator provided for in point (b) of Article 12(6). This communication shall include the frequency settings at which netted demand disconnection is initiated and the percentage of netted demand disconnected at every such setting".*

6.1.2. Article 50(2) of the EU NCER states "*Each TSO shall monitor the proper implementation of the low frequency demand disconnection on the basis of the yearly written communication referred to in paragraph 1 and on the basis of implementation details of TSOs' installations where applicable."*

6.1.3 Both the requirements of Articles 50(1) and 50(2) of the EU NCER are fulfilled through the Grid Code Week 24 process as required under *PC.A.1.2* and *PC.A.4.6* of the *Grid Code Planning Code*. The technical requirements for low frequency demand disconnection are detailed in *Grid Code CC.6.4.3, ECC.6.4.3, CC.A.5, ECC.A.5* and *OC6.6.6*.

6.1.4. Article 50(3) of the EU NCER states "*Each TSO shall review, at least every five years, its complete system defence plan to assess its effectiveness. The TSO shall in this review take into account at least:*

a) the development and evolution of its network since the last review or first design;
b) the capabilities of new equipment installed on the transmission and distribution systems since the last review or first design;
c) the SGUs commissioned since the last review or first design, their capabilities and relevant services offered;
d) the tests carried out and the analysis of system incidents pursuant to Article 56(5) of Regulation (EU) 2017/1485; and
e) the operational data collected during normal operation and after disturbance".

6.1.5 The mechanism by which items (a) to (e) of Article 50(3) are undertaken are summarised in Table 2 below.

EU Requirement	GB Implementation
The development and evolution of its network since the last review or first design;	Covered through the Grid Code Week 24 process under *PC.A.1.2* and *STC STCP 22-1, STCP 04-4 STCP 12-1*.
The capabilities of new equipment installed on the transmission and distribution systems since the last review or first design;	For Transmission this is covered through the *STC* via *STCP Procedures STCP 22-1, STCP 19-5, STCP 18-1, STCP 19-4, STCP 04-1, STCP 19-3, STCP 27-1 and STCP 19-3*. In the case of Distribution Systems caught by the requirements of the Grid Code, these issues are captured under the *Connection Conditions, European Connection Conditions, Compliance Processes, European*

	Compliance Processes, Planning Code and *Data Registration Code*
The SGUs commissioned since the last review or first design, their capabilities and relevant services offered;	Captured through the Grid Code compliance process under the *Compliance Processes* and *European Compliance Processes*. In this context first design means when the SGU was commissioned.
The tests carried out and the analysis of system incidents pursuant to Article 56(5) of Regulation (EU) 2017/1485; and	Captured through *Grid Code OC5, OC7* and *OC12*. Through the System Operator Transmission Owner Code these requirements are captured through *STCP-03-1, STCP 06-3, STCP 06-4, STCP 08-3, STCP 08-4, STCP 27-01 and STCP 19-3*. In addition, the outcome of measures introduced following previous System events and Incidents to prevent re-occurrence are managed through external investigations (eg via EC3, internal investigations and internal procedures including training and authorisation).
The operational data collected during normal operation and after disturbance".	Captured through *Grid Code CC.6.5.6, ECC.6.5.6, CC6.6, ECC.6.6* with any re-testing being carried out in *OC5*. For Transmission Licensees, the requirements are carried through the System Operator Transmission Owner Code under *STCP 03-1, STCP 08-3 and STCP 27-01*.

6.1.6 Article 50(4) of the EU NCER states "*Each TSO shall review the relevant measures of its system defence plan in accordance with paragraph 3 before any substantial change in the configuration of the grid".* This requirement relates to the need to review the System Defence Plan prior to making any changes to the Transmission System (for example major reinforcement made to the Transmission System as a result of load or generation growth which would need to be factored into the System Defence Plan). Within GB there is an obligation to refresh the System Defence Plan and System Restoration Plan, noting that the System Defence Plan refers to the Frequency Risk Control Report (FRCR) which is to be reviewed at least annually. ~~The Test Plan will be updated as necessary to reflect to the System Defence Plan or System Restoration Plans.~~ The Transmission System is also designed and operated to the requirements of the Security and Quality of Supply Standard (SQSS)[2] which accounts for new connections and reinforcements. In addition, and through internal and external investigations, learning points arising from System events, the development of internal procedures, training and authorisation beyond those already in existence updates will be introduced to the System Defence Plan~~, System Restoration Plan~~ and

[2] *Security and Quality of Supply Standard https://www.nationalgrideso.com/document/189561/download*

industry codes to improve the reliability and robustness of the System and ensure its timely re-establishment in the event of a disturbance.

6.1.7 Article 50(5) of the EU NCER states *"When the TSO identifies the need to adapt the system defence plan, it shall amend its system defence plan and implement these amendments in accordance with points (c) and (d) of Article 4(2) and Articles 11 and 12".* In summary there will be a need to update the System Defence Plan as the System and the type of plant connected to it evolves. When the System Defence Plan is updated, this shall follow the same process as defined in EU NCER Article 4(2) and Articles 11 and 12 in the same way that the current System Defence Plan has been prepared.

7 Compliance Testing and Periodic Review of the Restoration Plan

7.1.1 Article 51(1) of EU NCER states "*Each TSO shall review the measures of its restoration plan using computer simulation tests, using data from the DSOs identified pursuant to Article 23(4) and the restoration service providers, at least every five years. The TSO shall define these simulation tests in a dedicated testing procedure covering at least:*

a) the energising restoration path from restoration service providers with black start or island operation capabilities.
b) the supply of power generating modules main auxiliaries;
c) the demand reconnection process; and
d) the process for resynchronisation of networks in island operation.

7.1.2 In the event of a System Restoration~~Black Start~~ situation when the System has shutdown, NGESO has a well-established process to restore the System relying on its pre-prepared plan and strategy. This is based on a top down approach using Local Joint Restoration Plans and a bottom approach using Distribution Restoration Zone Plans as described in OC9.

7.1.3 In order to enact this plan, the first requirement is to have in place ~~Black Start~~ Anchor Restoration Contracts and Top Up Restoration Contracts with a number Restoration Service Providers at ~~of~~ strategically located sites~~placed Black Start Service Providers~~. Anchor Restoration Service~~Black Start Service~~ Providers are those with plants who can supply power and energise part of the System without any external power supply. Top Up Restoration Service Providers are those with plants, which once supplies have been restored, can be synchronised to the System upon instruction, such that they can deliver the service that the Top Up Restoration Service Provider has agreed to provide. Anchor Plants and Top Up Restoration Plants are used in both Local Joint Restoration Plans and Distribution Restoration Zone Plans. In a Local Joint Restoration Zone Plan, it is common practice for an Anchor Plant to energise parts of the Transmission or Distribution Network in less than 2 hours (subject to the requirements of the Anchor Restoration Contract) of an instruction from NGESO whereas in a Distribution Restoration Zone Plan it is common practice for an Anchor Plant to energise parts of the Distribution Network in less than 8 hours (subject to the requirements of

the Anchor Restoration Contract) of an instruction from the Network Operator.

7.1.4 In a Local Joint Restoration Zone Plan, instructions are instructed by NGESO to Anchor Restoration Service Providers and Top Up Restoration Service Providers to enable parts of the Transmission or Distribution Network to be energised and feed complementary blocks of demand. In a Distribution Restoration Zone Plan, NGESO will instruct a Network Operator to activate a Distribution Restoration Zone Plan (DRZP). In a Distribution Restoration Zone Plan a Network Operator, will instruct Anchor Restoration Service Providers and Top Up Restoration Service Providers to enable parts of the Distribution Network to be energised and feed complementary blocks of demand. To restore the System as quickly as possible and in the most efficient way Local Joint Restoration Plans and Distribution Restoration Zone Plans would be run in parallel.

7.1.4 ~~within two hours of an instruction from NGESO~~. The requirements for Restoration~~Black Start~~ Service Providers and their capabilities are defined in *Grid Code CC/ECC.6.3.5, CC/ECC7.10, CC/ECC.7.11, OC9.~~*4.5~~* and their Anchor Plant Contracts or Top Up Restoration~~Black Start~~ Contracts. There is also a requirement to ensure the facilities provided by~~ Black Start Service Providers and~~ Restoration Service Providers are fit for purpose and capable of operation when required which is why procedures (under *Grid Code OC5.7.4, OC5.7.5 and CC/ECC.6.5.5*) are in place for routine testing. ~~As part of this requirement under EU NCER, there will be a requirement for computer simulations and these will be included and developed as part of the Assurance Framework (see section 8.1.2 below).~~

7.1.3 Once ~~the~~ Anchor Plant~~Black Start Providers~~ energise part of the System and pick up complementary blocks of demand with the assistance (where necessary) of Top Up Restoration Plant, either through a Local Joint Restoration Plan or Distribution Restoration Plan~~, as per *Grid Code OC9.4.7*~~, their purpose is to energise parts of the System to form Power Islands, with local demand being fed within these Power Islands. Once the Power Islands are established, the individual Power Islands are then connected to each other , from which point onwards the Local Joint Restoration Plans and Distribution Restoration Plans are terminated. This then enables NGESO as coordinator of the overall System Restoration process to form an skeleton network and reconnect demand until the System is returned to normal operating conditions. ~~which then enables the System to be re-established. This process continues until the whole System is reconnected and all Demand is re-established.~~

7.1.4 In respect of Users of the Transmission System (for example Generators, HVDC System Owners, Distribution Network Operators) and Restoration Service Providers who are Non-CUSC Parties and have a contract with NGESO to provide a Restoration Service, the requirements for System Restoration during a System Restoration~~Black Start~~ situation are detailed in *Grid Code OC9*. The requirements on Transmission Licensees are detailed in STCP 06-1 and the obligations on CUSC Parties connected to the Distribution Network are defined in the Grid Code and Distribution Code.

7.1.5 Articles 51(2)(3)(4) and (5) of the EU NCER state: -

Article 51(2) - *In addition, where deemed necessary by the TSO for the effectiveness of the restoration plan, each TSO shall execute operational*

testing of parts of the restoration plan, in coordination with the DSOs identified pursuant to Article 23(4) and the restoration service providers. The TSO shall set out, in consultation with the DSOs and restoration service providers, those operational tests in a dedicated testing procedure.

Article 51(3) - Each TSO shall review its restoration plan to assess its effectiveness, at least every five years.

Article 51(4). *Each TSO shall review the relevant measures of its restoration plan in accordance with paragraph 1 and review their effectiveness before any substantial change in the configuration of the grid.*

Article 51(5). *When the TSO identifies the need to adapt the restoration plan, it shall amend its restoration plan and implement these amendments in accordance with points (c) and (d) of Article 4(2) and Articles 23 and 24.*

7.1.6 NGESO is bound by the requirements of the Electricity System Restoration Standard. This requirement is part of NGESO's Transmission License and introduces requirements which aims to ensure that at least 60% of Transmission System Demand is restored in all regions of the GB Synchronous Area within 24 hours of the start of the shutdown and 100% of Transmission Demand is restored within 5 days. This standard introduces the following features into the GB Industry Codes whilst also building on a number of existing features:-

i) An Assurance framework has been introduced, as defined in CC/ECC7.11 of the Grid Code. This requires Non contracted Restoration plants to have the ability to control assets during a System Restoration period for up to 72 hours whilst also having the ability to restart once site supplies are restored. This also requires Network Operators to have the capability to switch sufficiently quickly to restore 60% of the Transmission Demand within 24 hours on the assumption that Local Joint Restoration Plans, Distribution Restoration Zone Plans and the procedures of Grid Code OC9 have been successfully discharged.

ii) The requirements for Critical Tools and Facilities defined in CC/ECC.7.10 have also been reinforced to include minimum requirements for Distribution Restoration Zone Controllers to meet minimum technical requirements, the requirements for Users to have 72 hours mains independence, for all systems to be Cyber Secure to the Security of Network and Information System (NIS) Regulations and to ensure all data and SCADA systems are sufficiently robust to be capable of handling the large volumes of data that can arise during a System Restoration.

iii) Items i) – ii) above are tested through an Assurance and testing framework as introduced through OC5.7.4 and OC5.7.5. This process provides for regular desktop and computer exercises as well as tests.

iv) Grid Code OC9 includes provisions for Distributed Restoration Zone Plans alongside Local Joint Restoration Plans. Updates to the Industry Codes also enable Offshore Generation and Transmission to participate in System Restoration activities which previously were excluded. This is an important development as Offshore is expected to become an increasingly dominant source

of energy in the future and will be essential as part of the wider Restoration process.

v) The Connection Conditions and European Connection Conditions also make provision for different protection, control and governor settings to be used which are necessary during a System Restoration event.

v) The above provisions also build on the introduction of Grid Forming into the Grid Code as provided for in ECC.6.3.19. This enables converter based plant such as wind, wave, storage and solar technologies to provide a Restoration Capability should they so wish to do so, whilst noting that many of these plants are replacing thermal Power Stations which have traditionally provided the bulk of System Restoration services in the past.

~~7.1.6 Each of the items raised in section 7.1.5 above are covered through the assurance framework and implementation of the Restoration Plan as discussed in section 8 below.~~

8 Implementation of the Restoration Plan in GB

8.1.1 NGESO works with all stakeholders as emergency response plans and procedures cannot be considered reliable until they have been exercised and proven to be workable. This is especially true for ~~Black Start~~ System restoration, where it is not possible to exercise the process end-to-end in its entirety.

8.1.2 Exercising provides the following benefits:

a) Builds capability and competence across the sector and ensures all stakeholders are aware of their roles and responsibilities;
b) Identifies staff training needs and opportunities;
c) Validates existing response plans and procedures and ensures these are supported through continuous development, review and improvement including computer modelling; and
d) Provides assurance that the sector can effectively respond to a Black Start.

8.1.3 It is recognised that organisations carry out a range of exercises / testing activities for their own internal assurance. Whilst regular exercises and testing already takes place under Grid Code OC5.7 and OC9.4.7.12(b)(xii) and OC9.4.7.12(c)(xii) these have been reinforced through the additional testing and assurance activities being introduced through the Electricity System Restoration Standard though updates to Grid Code OC9, OC5.7.4, OC5.7.5, CC/ECC7.10 and CC/ECC.7.11 ~~NGESO however needs to engage and work with external stakeholders through an assurance framework to ensure that System restoration is achieved in the most efficient manner.~~ A diagram showing this assurance framework is shown below.

Figure 1.0

8.1.4 In order to achieve this objective, NGESO has undertaken the following activities:

a) Identified and mapped the high-level interactions that are likely to take place between organisations during a System Restoration~~Black Start~~;

b) Reviewed current exercising practices across the sector through an industry-wide survey and improvments on current practices;

c) Analysed survey response and assessed the gaps in current exercising practices; and

d) Proposed a framework to align and standardise ~~Black Start~~ System Restoration exercising and testing across the sector.

~~d)~~e) Updates to the industry codes through the Electricity System Restoration Standard work.

8.1.5 Individual organisations are responsible for undertaking the System Restoration ~~Black Start~~ exercising and tests at the frequencies necessary though through the Electricity System Restoration Standard work there has been a need identified for greater collaboration and regular exercises which have been introduced into the Industry Codes. Where NGESO is not legally obliged to assess the outcome of the tests, organisations will be expected to assess themselves.

8.1.6 NGESO is responsible for collating and analysing the results of completed restoration exercises in addition to sharing this with wider industry and providing an assurance assessment based on the overarching GB security of supply risk. This will provide an indication of the level of confidence around the ability of the NGESO and the wider stakeholder community to respond to a System Restoration~~Black Start~~ event and restore electricity supplies within acceptable timeframes a risk can be built up. In addition, the introduction of the Electricity System Restoration Standard reinforces these requirements which go well beyond the minimum requirements of the EU NCER.

8.1.7 This risk matrix is currently based on the frequency of exercising/testing undertaken across the industry over a year. ~~Further~~

~~work is required to incorporate other performance criteria e.g. successful execution of testing.~~

9 Future Work

9.1 It is recognised that as the System continues to evolve with new forms of connection technologies, there is a need to constantly review and update the System Defence Plan, System Restoration Plan and Test Plan. It is believed that this work is fully within the spirit and requirements of the EU NCER.

9.2 As part of the Electricity System Restoration Standard, NGESO working with the Energy Emergency Executive Committee (E3C) and all stakeholders across the industry has been assessing the risks with a view to reinforcing the requirements in the Industry Codes, but more importantly to i) ensure the requirements of the Electricity System Restoration Standard are met and ii) GB is as best prepared as it can be to insure against a System Shutdown so Customer supplies can be restored as quickly as possible in the most economic manner. ~~proposes developing a risk matrix for each stakeholder, tailored according to the tests they are expected to undertake and weighted according to their importance to the Black Start restoration process which would be included as part of the wider Electricity System Restoration Standard (ESRS) work.~~

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

nationalgridNGESO.com

nationalgridESO