

SQSS references are footnoted throughout the document

Summary of changes

1. Resilience of core systems
2. Sufficient switching speeds within the first 24 hours
3. Energising of auxiliaries to enable power transfer at Connection points and GSP
4. Ability to alter protection setting and protect discriminately during Fault ride through
5. Provision of reactive compensation to support Users
6. Incorporate ESRS in network design
7. Support during Assurance testing
8. Resilience of Comm Systems, control systems (critical tools and facilities)
9. Management (synchronisations) of power islands

Requirement from future Network report and Assurance Activities Report

Area	Requirement	STC/STCP/SQSS Requirements
1. Transmission Network Resilience	<ul style="list-style-type: none">• The transmission network to be operable remotely during Total Shutdown to be able to switch sufficient equipment to achieve the restoration standard.• For the Onshore TOs and Offshore TOs it will be required to ensure that substations they own/operate can be operated in a restoration situation for up to 72 hours following a Total or Partial Shutdown.	<ul style="list-style-type: none">• Section J – Critical Tools and Facilities definition, Section D Part I, 2.2.6, Section K, STCP 01-1 (Operational Switching), STCP 04-6 (Offshore Datalink).• Section J – Critical Tools and Facilities definition, Section D Part I, 2.2.6, Section K, STCP 04-6 (Offshore Datalink).
2. Transmission Network Switching Speed	<ul style="list-style-type: none">• The onshore TOs / offshore TOs (including TOs HVDC networks) shall have a capability to energize all transmission substations within 24 hrs.• The TOs will need to have the capability to perform faster switching, allowing time for other parties e.g., Network Operators to discharge their obligations.	<ul style="list-style-type: none">• Section D Part I, 2.2.6, Section C Part Three – Section 5, STCP 06-1 (System Restoration), STCP 16-1 (Investment Planning)• Section D Part I, 2.2.6, STCP 01-1 (Operational Switching) STCP 06-1 (System Restoration)
3. NB; It was proposed to limit this		

requirement to “Core” substations for the operational capability to energise within 24 hours.		
4. Migration from Resilient Auxiliary Supplies at TO Substations to Normal Auxiliary Supplies	<ul style="list-style-type: none"> Onshore TOs, OFTOs, DNOs & IDNOs need to work collaboratively to understand which circuits supply the transmission substations normal auxiliary supplies and to be able to energise these circuits as soon as reasonably possible within 72hrs hence migrating from the resilient auxiliary supplies. This will maintain the operability of the transmission substations from (or before) 72hrs onwards by Network Operators. Where the network quickly returns to serviceability, the need of fuel for auxiliary supplies is reduced. All new design builds and refurbishments of transmission substations should consider a standardised approach for normal auxiliary LVAC power, such as from a SGT tertiary winding such that there is no reliance on supplies from another Network Operator’s system. This would aid resilience of changing back to the normal auxiliary supply from the resilient supply 	<ul style="list-style-type: none"> Section C Part three, section 5, Section D Part I clause 2.2.6, STCP 06-1 (System Restoration) STCP 16-1 (Investment Planning), Appendix I SQSS¹
5. Network Operators & Users	<ul style="list-style-type: none"> Visibility of TOs’, OFTOs’, DNOs’ Network to the ESO. <ul style="list-style-type: none"> For the DNO Network this is limited to assets within the DRZ as defined in the associated DRZP and any other assets as defined in the associated LJP. Communication between TOs’, OFTOs’ and the ESO 	<ul style="list-style-type: none"> Section D Part I Section 2.2.6, Section J – Critical Tools and Facilities, Section C Part Three – Section 5 – DNO obligations are covered by Grid Code – CC.6.4.5 and ECC.6.4.6, STCP 04 -2 (Real Time data link Management), STCP 04-3 (Real Time Data Provision) STC Section D Part I clause 2.2.6, Section K, STCP 04-5 (Operational Telephony),

¹ SQSS Reference

	<ul style="list-style-type: none"> ○ There is a need for resilience of assets required to facilitate visibility and communication of user control points to the ESO and user control points to their sites. ○ There needs to be operational capability resilience to any extended loss of supply within ESO, TOS', OFTOs', DNOs' and Users' control points. The visibility and communication requirements above are required for restoration. 	
6. Network Design	<ul style="list-style-type: none"> • Proposed changes to the TO's and OFTO's systems and the connection of new Users, should be designed and built to be able to operate in a restoration situation with an electrically weak network i.e., considering reactive gain, inertia, inrush and the ability to energise and operate these with limited generator capability. • These requirements partly exist within the existing frameworks for TOs, but the STC requires further review to ensure requirements are fit for purpose. The framework needs developing/updating to ensure OFTOs have similar requirements to the onshore TOs. • Proposals for network design that may be included in the STC <ul style="list-style-type: none"> ○ Each user connection point will have a network designed around it to be able to energise a 0MW output to sufficient demand to load the generator above SEL, with only the reactive power from that User. ○ No Load gain between adjacent substations must be designed so that it can be energised within a restoration situation. (i.e., circuit busbars and associate reactive plant) This would include energising from Anchor Generator/ Top up services to demand, and then other CUSC Parties. ○ Once a power island is created with RC, Network and demand, it must be possible to energise to the next user on 	<ul style="list-style-type: none"> • STCP 16-1 (Investment Planning), SQSS Appendix I.² • STCP 16-1 (Investment Planning), SQSS Appendix I, ³STCP 06-1 (System Restoration)

² SQSS Reference

³ SQSS Reference

	<p>the network to either offer auxiliary supplies or to Synchronise Power Islands.</p> <ul style="list-style-type: none"> ○ The ability to deliver reactive compensation in steps of up to 60Mvar from a proportion of reactive equipment. Enabling utilisation of this equipment during a restoration. ○ Compensation equipment, such as Static Compensators and SVCs should be energised and used within initial stages of a restoration. ○ The ability to utilise Offshore Networks as part of the Restoration Process. 	
7. Protection Systems	<ul style="list-style-type: none"> • Transmission systems owned/operated by TOs, OFTOs and Interconnectors should have the ability to change between predefined protection and control settings as required during the restoration, to align with the system strength. • For equipment and personnel safety, there needs to be the capability for protection to operate at different fault infeeds that could realistically be expected during the implementation of a LJP or DRZP. 	<ul style="list-style-type: none"> • Section D Part I clause 2.2.6, Section C Part three, section 5, STCP 16-1 (Investment Planning) • Section C Part three, section 5, Section D Part I clause 2.2.6, STCP 16-1 (Investment Planning)
8. Operational Capability	<ul style="list-style-type: none"> • Transmission systems owned/operated by TOs, OFTOs and Interconnectors should have sufficient operational capacity to energise a skeleton network across Great Britain, all substations energised by at least one transmission circuit within 24 hours. This will need to take account of the time taken by other parties undertaking their tasks, e.g. DNOs to switch to restore customer supplies. TOs, OFTOs and Interconnectors should: <ul style="list-style-type: none"> ○ when considering resourcing and systems, have the ability to open switches to “clear circuits” prior to energisation over the first 24 hours. ○ have operational support for LJP/DZRP within each Region and undertake operational planning during a restoration process. ○ Have the ability to manage and expand Power Islands, including synchronising Power Islands together 	<ul style="list-style-type: none"> • Section C Part three, section 5, Section D Part I clause 2.2.6, STCP 06-1 (System Restoration)

<p>9. New Connections</p>	<ul style="list-style-type: none"> • TOs, OFTOs and Interconnectors should develop solutions to meet any reactive power requirements imposed by the STC, Bilateral Connection Agreement (BCA) with Users and the Grid Code (ECC.6.3). Need to add flexibility so that reactive power is able to be provided at 0MW active power output. • There should be the ability for users (including Offshore Wind Farms) to operate in islanded mode i.e. providing reactive power at 0MW, when the transmission system is not energised / available. • There should be the ability to operate in weak transmission system conditions expected during restoration 	<ul style="list-style-type: none"> • Section C, Part three, Section 5, Section D Part I 2.2.6, STCP 06 -1 (System Restoration), STCP 16-1 (Investment Planning), SQSS Appendix I⁴.
<p>10. Control Systems Resilience Demonstration – Alarm Event Handling</p>	<ul style="list-style-type: none"> • Stakeholders shall demonstrate the Control System’s ability to handle challenging events like a blackout (stress tests). 	<ul style="list-style-type: none"> • Section C Part Three, Section 2.1.3, Section D Part I Section 2.2.6 – Note Section C is the ability to demonstrate the ability and Section D covers the requirement to have the capability.
<p>11. Restoration Skeleton Network Availability</p>	<ul style="list-style-type: none"> • For LJP, within planning and operational timescales, assess the outages/availability of the network within LJPs required to deliver the requirements provided for in Restoration Service Providers Contracts. This includes consideration of circuit outages. • For DRZP, within planning and operational timescales, assess the outages/ availability of the network within DRZPs across each DRZ to deliver upon the requirements provided for in Restoration Service Providers Contracts. This includes circuit outage considerations 	<ul style="list-style-type: none"> • Section C Part Three, Section 5, STCP 06-1 (System Restoration) STCP 11-1 (Outage Planning) • For DRZP’s and Generators this is covered in Grid Code OC2 as drafted for GC0156.

⁴ SQSS Reference

12. Restoration Skeleton Network Review	<ul style="list-style-type: none"> • In line with the planning of network infrastructure (within Planning Timescales), to provide evidence of energisation routes that are suitable for use within 24 hours (0-60% demand loading) of the start of a restoration process. • This will involve a process being established to consider Restoration within the long-term design process across the network operators. This assurance activity checks that the process has been completed and a design is in place 	<ul style="list-style-type: none"> • Section C Part three, section 5, Section D Part I clause 2.2,6, STCP 01-1 (operational switching), STCP 06-1 (System Restoration) • Section C Part Three, clause 2.1.3, STCP 06-1 (System Restoration), STCP 16-1 (Investment Planning), SQSS Appendix I ⁵
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STCPs	Objectives/requirement	What may change
STCP 04-5 (Operational Telephony)	The provision of a resilient operational telephony infrastructure is essential for the secure operation of the National Electricity Transmission System. This document details the responsibilities and obligations on NGEESO and each TO with regard to the management and support of this infrastructure.	Making minimum Resilience requirement of comm systems 72 hrs (updated) Allowing Assurance testing of Comms to take place Grid code references – See STC Section C Part Three – clause 2.1.3 which references OC5.7 in respect of testing required.
STCP 04-6 (Offshore Datalink Functional Specification for Telecontrol Communications Interface)	This document describes the functional requirements for a Telecontrol Communication Interface (TCI) to enable the National Electricity System Operator (NETSO) to safely control, monitor and supervise Offshore Transmission Owner (OFTO) Network Assets (Plant and Equipment).	Resilience of Comms Testing of Critical tool and facility Introducing restoration in general STCP 04-6 introduces an Mains resilience requirement. The issue is also covered in STC Section J – definition of Critical Tools and Facilities and Section D Part I 2.2.6 which refers to Grid Code CC/ECC.7.10 and CC/ECC.7.11
STCP 06-1 (Black Start)	The objective of this document is to enable, as far as possible, restoration of the TOs' Transmission Systems and interfacing Users' Systems in the shortest possible	Changes to reflect new strategy which incorporates the recommendation of Distributed Restart

⁵ SQSS Reference

	time using the most effective means following a Total Shutdown or Partial Shutdown.	Major overhaul – Substantial overhaul undertaken to include DRZP's and Offshore Transmission Assets – Updates also added to Section K.
STCP 06-2 (De-Synchronised Island Management)	<p>This document specifies the roles and responsibilities for De-synchronised Island management in terms of:</p> <ul style="list-style-type: none"> ○ planning for a De-synchronised Island; ○ producing a Grid Code OC9 De-synchronised Island Procedure, (DIP); ○ transferring the operation of a De-synchronised Island between NGET and the TO by means of a De-synchronised Island Operating Certificate (DIOC); ○ establishing and operating a De-synchronised Island; ○ liaison with Users; and ○ re-synchronisation of the De-synchronised Island to the National Electricity Transmission System. 	<p>Management of DRZs</p> <p>Functions and relationship with DRZ-C</p> <p>Inclusion of PMUs and synchronous breakers</p> <p>Consequential changes added to STCP 06-2 to ensure consistency with Grid Code changes through Grid Code Mod GC0156</p>
STCP 06-3 (System Incident Management)	<p>The objective of this STCP is to specify the roles and responsibilities for the management of Significant Incidents which may arise from such events as (the following is not an exhaustive list):</p> <ul style="list-style-type: none"> ○ adverse weather; ○ accumulation of snow / ice; ○ terrorist threat / action; ○ major asset loss; ○ major safety incident; ○ Black Start; ○ De-synchronised Island; ○ voltage and or load reduction; and 	<p>Changes to reflect Restoration plans</p> <p>Setting up of restoration zones</p> <p>Demand separations under restoration</p> <p>Consequential changes made to STCP 06-3. These are generally minor and simply reflect the changes to change Black Start to System Restoration – all other changes are consequential and minor.</p>

	<ul style="list-style-type: none"> ○ partial system shutdown. that has had, or may have a widespread impact on any part of a TO's Transmission System. <p>In the case of Black Start this STCP should be read in conjunction with STCP 06-1: Black Start.</p>	
STCP 06-4 (Contingency Arrangements)	The objective of this procedure is to specify the minimum Emergency Control Centre facilities for each party and the actions to be taken when communication routes (data and voice) fail.	<p>Resilience of comms</p> <p>STCP 06-4 has been updated to reflect restoration. This procedure really covers contingency arrangements in terms of failure of critical systems and transfer of control facilities. Statement added that transfer of main to emergency control facilities should be achieved in 3 hours in line with EU Emergency and Restoration Code. The requirement for mains resilience of critical tools and facilities is covered in STC Section D Part I section 2.2.6 (ie compliance with CC/ECC7.10 and CC/ECC7.11), Section J – definition of Critical Tools and Facilities and Section K – in respect of Offshore Transmission Licensees. The 72 hour resilience is covered in STCP 04-2 (Realtime data link Management), STCP 04-5 (Operational Telephony) and STCP 04-6 (Offshore Datalink Functional Specification)</p>
STCP08-1 (Protection Testing)	This procedure describes the arrangements and processes across the TO interface for Protection Tests (with primary Plant and Apparatus in service). This does not include Protection Tests associated with commissioning or decommissioning activities, which are the subject of STCP19-4 Commissioning and Decommissioning or the planned tripping of circuits	<p>Changes to reflect recommended protection settings</p> <p>Also to reflect LFDDs and any limitations</p> <p>No change required – STCP covers Protection Testing – The requirement for</p>

	<p>which are subject to the requirements of STCP 8-2 Circuit Live Trip and DAR Tests.</p> <p>This process specifies the following:</p> <ul style="list-style-type: none"> ○ the responsibilities of NGESO and the TO(s) in relation to Protection Tests. ○ the requirements for exchange of information across the NGESO-TO interface; and ○ • the means of communication to be used across the NGESO-TO interface 	<p>protection changes for restoration are covered in STCP 16-1. For testing protection, the same provisions would apply to any other protection testing, irrespective of whether it is for system restoration or otherwise so no change required.</p>
STCP08-3 (Operational Tests and System Tests)	<p>This procedure applies to the arrangements and processes across the NGESO-TO interface for System Tests or operational tests including Black Start Tests and Power Island tests. This procedure does not include tests associated with commissioning activities, which are the subject of STCP 19-4 Commissioning and Decommissioning.</p> <p>This procedure specifies the following:</p> <ul style="list-style-type: none"> ○ the responsibilities of NGESO and the TO in relation to System Tests or operational tests, including Black Start Tests and Power Island tests; ○ the requirements for exchange of information across the NGESO -TO interface in relation to these Tests; and ○ • the means of communication to be used across the NGESO -TO interface. 	<p>STCP 08-3 has been updated for restoration. It includes LJRP and DRZPs and references OC9.4.7.6.2 and OC5.7 which requires testing for Restoration Plans and testing for proof of Assurance.</p>
STCP08-4 (User Tests)	<p>This procedure describes the arrangements and process across the NGESO-TO interface to facilitate User Tests and is complementary to the User compliance Test requirements specified under the Grid Code.</p>	<p>Changes to incorporate tests as it has been done in DRC schedule 16 No change as tests for Restoration are covered under STCP08-3. User Tests for</p>

	<p>This procedure specifies the following:</p> <ul style="list-style-type: none"> ○ the responsibilities of NGESO and the TO in relation to System Tests or operational tests, including Black Start Tests and Power Island tests; ○ the requirements for exchange of information across the NGESO -TO interface in relation to these Tests; and • the means of communication to be used across the NGESO -TO interface. 	<p>Restoration are covered under Grid Code OC5.7</p> <p>No need to change as there is no reference to Black Start and the other aspects of testing have been covered in the STC, Grid Code and other STCPs.</p>
STCP 11-1 (Outage Planning)	<p>This document specifies the requirements for the exchange of information across the NGET:TO interfaces throughout the Outage Planning process, from Outage requirements identified up to six years ahead (for complex schemes and National Electricity Transmission System reinforcement) to handover of the plan into the Control Phase (including Outage Proposals submitted in the Control Phase)</p> <p>The objective of this STCP is to provide for an efficient exchange of information between NGET and TOs to facilitate:</p> <ul style="list-style-type: none"> ○ the co-ordinated development of Outage Proposals by each TO; and ○ preparation of Outage Plans for the National Electricity Transmission System by NGET, taking into account each TO's Outage Proposals. 	<p>Outage of critical assets to restoration Updated to include Outage Planning for Restoration Purposes.</p> <p>Minor Point – STCP 11-1 refers to TOGA rather than ENAP and EGAMA. This is a wider issue for updating rather than specifically for System Restoration</p>
STCP 11-2 (Outage Data Exchange)	<p>This procedure describes the data exchange requirements between NGET and the TOs to facilitate the Outage planning process.</p> <p>The objective of this procedure is to set out the requirements for exchange of information between</p>	<p>Updates required but more admin based as the current procedure refers to TOGA rather than ENAP and EGAMA</p>

	NGET and the TOs to facilitate the process in STCP11-1 Outage Planning.	
STCP16-1 (Investment Planning)	This STCP describes the processes and procedures for investment planning and, individual project development across both the NGET -TO and TO -TO interfaces.	Testing new user against weaker networks STCP 16-1 has been updated to ensure System Restoration is included in the Investment Planning Process – Also backs off the requirements in Appendix I of the SQSS ⁶ as developed for System Restoration
STCP 18-1 (Connection and Modification Application)	<p>The objective of this procedure is to detail:</p> <ul style="list-style-type: none"> ○ how the Connection and Modification Application process is addressed across the NGESO ~ TO interface, the TO ~ TO interface, and where appropriate the NGESO/TO ~ Tender Panel interface; ○ the responsibilities of NGESO and the TO(s) in relation to working under indemnities activities between the TO(s) & NGESO; ○ the requirements for exchange of information in relation to these activities; and ○ the lines of communication to be used. 	Updated – to change Black Start to System Restoration – Consequential changes added to include Distribution Restoration Zones
STCP 19-3 (Operational Notification and Compliance Testing)	<p>To connect or use the National Electricity Transmission System (NETS), a User must comply with the requirements of the CUSC. This procedure outlines the responsibilities of NGET and the TO associated with checking Compliance that involve NGET or affect the TO</p> <p>The objectives of this procedure are to specify:</p> <ul style="list-style-type: none"> ○ the responsibilities of Parties in relation to Energisation Operational Notification 	Consequential changes only – Black Start changed to System Restoration plus formatting changes. Compliance is a separate activity to System Restoration Assurance which is covered in STCP 06-1 and STCP08-3.

⁶ SQSS Reference

	<p>(EON)/Interim Operational Notification (ION)/Final Operational Notification (FON) and Compliance Testing activities;</p> <ul style="list-style-type: none"> ○ the requirements for exchange of information between Parties related to EON/ION/FONs and Compliance activities; ○ an outline structure for the organisation of data; and ○ the means of communication to be used across the NGET – TO interface. 	
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Section C (Transmission Services and Operations) – Section C Part Three, Item 5, Item 6	<p>This Section C, Part One deals with the provision of Transmission Services by Transmission Owners to NGESO and the obligations of NGESO in relation to its operation of the National Electricity Transmission System, and sets out:</p> <ul style="list-style-type: none"> ○ the process for each Transmission Owner to specify the technical limits that normally apply to its Transmission Services in a Services Capability Specification. ○ the process for developing and implementing Services Restoration Proposals to restore Transmission Services in the event of any unplanned reduction in the technical limits actually applicable to the provision of Transmission Services from time to time; and ○ provisions dealing with the co-ordination and direction by NGESO of the flow of electricity onto and over the National Electricity Transmission System in accordance with technical limits and Licence Standards. <p>STC Section C Part Three – items 5, 6 have been updated.</p>
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	<p>This Section C, Part Two deals with the placement and implementation of Outages on the National Electricity Transmission System, and sets out the processes for:</p> <ul style="list-style-type: none"> ○ the co-ordinated development of Outage Proposals by each Transmission Owner; ○ NGEsO to prepare Outage Plans for the National Electricity Transmission System taking into account each Transmission Owner's Outage Proposals; ○ the real-time implementation of each Outage through a pre-agreed Outage Implementation Process; and ○ provision for the reinstatement of Transmission Services which are the subject of an Outage, where so directed by NGEsO. <p>Section C Part Two has been updated to cover outages and also references STCP 11-1 (Outage Planning)</p> <p>This Section C, Part Three deals with:</p> <ul style="list-style-type: none"> ○ the Testing of each Transmission Owner's Transmission System and arrangements between the Parties to facilitate the testing and commissioning of User Equipment; ○ Transmission Owners entering into Interface Agreements with Users in relation to Connection Sites and New Connection Sites; and ○ other operational matters including Event Reporting and Joint Investigations, Black Start, and the De-energisation of User Equipment. <p>Section C Part Three has been updated to cover testing and System Restoration whilst also referring to Grid Code OC5.7 and OC9.4 and OC9.5 which includes Restoration Plans.</p>
<p>Section D (Planning Co-ordination) – Changes to Section D Part I section 2.2.6</p>	<p>Section D Part I Section 2.2,6 states - Without limitation to Section C, Part One, paragraph 2.2, in planning and developing its Transmission System, each Transmission Owner shall ensure that its Transmission System complies with:</p>

	<p>2.2.6.1 the minimum technical, design and operational criteria and performance requirements set out or referred to in Connection Conditions 6.1, 6.2, 6.3 and 6.4 as applicable to Type 1 Transmission Owners or European Connection Conditions 6.1, 6.2, 6.3 and 6.4 as applicable to Type 2 Transmission Owners and in Planning Code 6.2 and/or 6.3; or</p> <p>As part of this modification we have included additional clauses CC/ECC 7.10 and 7.11 of the Grid Code which requires compliance with the requirements for Critical Tools and Facilities and Assurance.</p>
Section J (Interpretation and Definitions) – Changes to definitions in particular changing Black Start to System Restoration	This Section J sets out the general rules to be applied in interpreting this Code and any TO Construction Agreement and the defined terms used in this Code (other than those defined elsewhere in this Code). – Definitions – Section J updated to ensure consistency with Grid Code GC0156.
Schedule 2 (List of Code Procedures) – Change name of STCP 06-1 to “System Restoration”	Change name of STCP 06-1 to “System Restoration” Updated
Schedule 3 (Information and Data Exchange Specification) - Introduction of Distribution Restoration Zone Plans	This Schedule sets out the information and data permitted to be Disclosed by a Party to a Transmission Owner in accordance with Section F of the Code. Updated