

ESRS - WG Reports Recommendations Summary

Contents

Contents.....2

1 Recommendations from Communications Infrastructure Working Group Report3

2 Recommendations from Future Networks Working Group Report.....5

3 Recommendations from Modelling and Restoration Tool Working Group Report7

4 Recommendations from Technology and Locational Diversity Working Group Report ...8

5 Recommendations from Regulatory Framework Working Group Report9

6 Recommendations from Assurance Framework Working Group Report.....10

7 Recommendations from Markets and Funding Mechanism Working Group Report11

1 Recommendations from Communications Infrastructure Working Group Report

The Communication Infrastructure Working Group reported on key areas detailing the different aspects of the communication infrastructure and technologies to support the Electricity system restoration.

The report gives the following recommendations:

- Recommendation for Resilience of Data & Voice communications required at all primary restoration sites (72 hrs mains independence) – ESO, TO, DNO and Primary Restoration Provider sites required for restoration.
- High bandwidth, low latency communications upgrades may be required at Distributed Network Operators Operational telecommunication network and interface to Primary restoration providers (new protocols introduced for Distributed Restoration Zone Controllers) for Distribution Restoration Zone Control system (DRZC) automation in the DNO networks. This will be determined by the specific implementation of the DRZC. A guide is detailed based on specific DRZC implementation by Distributed Restart project.
- Inter-Control Centre Communications Protocol (ICCP) links are required between the ESO and DNOs used to map Distributed Management System changes to ESO's Energy Management System giving situational awareness.
- A recommendation for the setup and exchange of Phasor measurement data using Phasor Measurement Units (PMU/Synchronising Breakers between the TO and DNOs to enable synchronisation data between the Transmission and Distribution networks as part of implementing the DRZC.
- Technical and non-technical recommendations for Primary Restoration service participants (ESO, TO, DNOs and RSPs) for telecommunications infrastructure to support data and voice communication for the restoration process (Pages 3–9 of the ESRS Communications Infrastructure Report)
- Requirement for incorporating a Distribution Restoration Zone Control System in the distribution networks.
- Proposal for all Primary Restoration Providers including Primary Distribution Restoration Providers that are not currently classified as Operators of Essential Services (OES) to be classified as OES.
- Proposal for other Distributed Energy Resources (DER) to adopt the Distributed Energy Resource Cyber Security Connection Guidance published by Department of Business, Energy, and Industrial Strategy (BEIS) and Energy Network Association (ENA).
- Adherence to industry cyber security standards essential to the secure setup of a Distribution Restoration Zone Control System. (Pages 11 of the report).
- The Control Telephony Electrical Standard that is developed and being consulted on under GC0148 is proposed to be the standard that would apply for voice services provision.
- Proposal for Support and Testing Regime requirements for Service Providers covering:
 - Service Level Agreement (All year round, 7 days a week) in place to cover for service restoration infrastructure failures, application failures, and end terminals equipment failures.

- All infrastructure and services are proactively monitored – faults alerted to a monitoring centre which is staffed all the time.
- Voice communication resilience is tested in normal service where practical e.g. by alternating calls between Main and Alternative routes where applicable.
- New telecoms network provisioning functionality covering restoration services should be proven in lab testing and network commissioning tests. Numerous planned outages and faults to demonstrate it works reliably. All key components proactively monitored.
- Voice communication calls to be tested at predefined intervals by making calls both ways.
- Power Resilience audit to be carried out and it is expected that the Primary Restoration Service participants /site owners would be responsible for carrying this out.
- Cyber resilient test/audit to be carried out in line with the NIS regulations
- Resilience Application test
- Self-test of the application devices

ESO is also recommending that a GC0156 Sub-Group is established to

- **Review comments from a couple of DNOs on the recommendations above**
- **Identify requirements for communication and visibility channels between ESO and all DNOs including necessary updates to the Energy Management Systems.**
- **Identify requirements for synchronisation between TO & DNO network – Synchronising Breakers or PMUs**

2 Recommendations from Future Networks Working Group Report

The generation mix is changing significantly by 2030, and to ensure that ESRS can be complied with by 31 December 2026 it is important to facilitate as many different technologies providing the Restoration Service as possible. This is likely to mean changes to designs and installations to build the capability required.

The report gives the following recommendations:

- Technical and network capabilities of DNOs and TOs to support restoration

I. Requirements for DNOs may include (but is not limited to)

- Resilience
 - Have in place at substations the required infrastructure, regardless of route chosen for restoration, to remain available for a minimum of 5 days (e.g. Backup auxiliary power, such as diesel generators or alternative technology)
- Network Design
 - Consideration of design for a restorable network (e.g. reactive gain, or network arrangements)
 - The ability to change protection and control settings as required
 - The ability to provide slow balancing to support block loading and enable demand to be restored while retaining sufficient resources in reserve to respond to generation/balance mismatches.
 - The ability to segregate its network to allow block loads of a maximum 20MW or 2-10MW in Anchor Generators and Top up service provider.
 - The ability to initiate fast control of available resources to balance the system (frequency and voltage) and minimise the stress on the anchor generator
 - Ability to synchronize power islands in at least 50% of the installed circuit breakers at the highest DNO Voltage.
- Operability
 - The ability to block load every 3 minutes
 - Rota disconnection demand sharing during the restoration.

II. Requirements for TOs (Onshore and Offshore) may include (but is not limited to):

- Resilience – the transmission system needs to be visible and operable.
 - All substations should have resilient auxiliary power sources to remain functionally available for a minimum of 72 hours.
- Network Design – the design of the network needs to be able to facilitate a restoration, LJRP and Skeleton Network
 - No Load Gain between adjacent substations to not exceed 50Mvar.

- The ability to deliver reactive compensation in steps of up to 60Mvar
- The ability to change protection and control settings as required to ensure correct operation at low fault levels in an LJRP and skeleton network.

III. Requirements for iDNO's:-

iDNO's are currently treated as DNO's within the codes. We do not envisage any specific changes being required, over and above that detailed in the DNO section.

- Restoration Regions zonal and regional definitions:
 - Restoration service providers will be procured in Restoration Zones across Great Britain. This will increase the fleet provision, contributing to the ability to restore 60% of demand in 24 hours. These Restoration Zones will align with the 14 DNO licence areas.
 - Reporting of demand restored will then be completed via the Electricity Restoration Regions, ensuring a regional approach to restoration. The 7 Electricity Restoration Regions are deduced from the existing 6 Restoration Regions with the Scotland regions split into the 2 Transmission Networks. (North Scotland, South Scotland, North East, North West, Midlands, South East, South West)
- The three commercial service options were proposed in line with the Electricity System Restoration Assurance Framework 22/23 as follows.

Commercial Service	Restart Time
Phase 1 Electricity System Restoration	Within 2hrs
Phase 2 Electricity System Restoration	2-24hrs
Phase 3 Electricity System Restoration	24-72hrs

ESO is also recommending that a GC0156 Sub-Group is established to consider further network requirements for Network Operators.

3 Recommendations from Modelling and Restoration Tool Working Group Report

The purpose of the work under this group was to develop a framework that will give relevant industry parties confidence that the restoration model(s) outputs are a fair representation of restoration times in GB. The following recommendations are made.

For network modelling, the ESO currently use a probabilistic tool based on Monte-Carlo simulation techniques to explore the range of possible outcomes for a set of central circumstances. Following the probabilistic tool audit in Feb 2022, the recommendations below were made.

Modelling Development Shopping List March 2022	Estimated resource	Risk(s)	Priority?
Establish Standard confidence level(s) with BEIS	1 or 2 month - through regular BEIS meetings?	Low, the model functionality already exists	1
Align 6 x BS zones to DNO licence areas*	3 or 4 months rebuild	Medium	2
Data assumptions review	2 or 3 months to undertake systematic analysis of all major assumptions	Low or medium	3
Embedded demand and generation improvements	6 to 8 months (if data available?)	med or high	4
Future proofing model - new developments such as DER/Skeleton networks, offshore wind, contract changes etc.	1 month annual update, strategic changes (DER etc) significant time required.	Annual process low risk, new developments medium risk	5
Data verification process for any new assumptions/data	1 month - some data available through BSTG work	Low	6
Model documentation - technical specification	3 months?	Low	7
Review software platform evaluate risk/benefit of alternatives	Estimate 6 - 12 months, delivery unknown 2 years?	High or very high	8
Totals	23 to 63 months	2 to 5 years effort	
* Item 2 - Not raised by Auditors but now considered necessary by ESO			

Figure 1- February 2022 Audit recommendations summary

- As part of ESO Business Plan, a new deterministic tool (Restoration Decision Support Tool), based on Realtime data which would recommend restoration routes to the ESO Control Engineer is required to be developed.

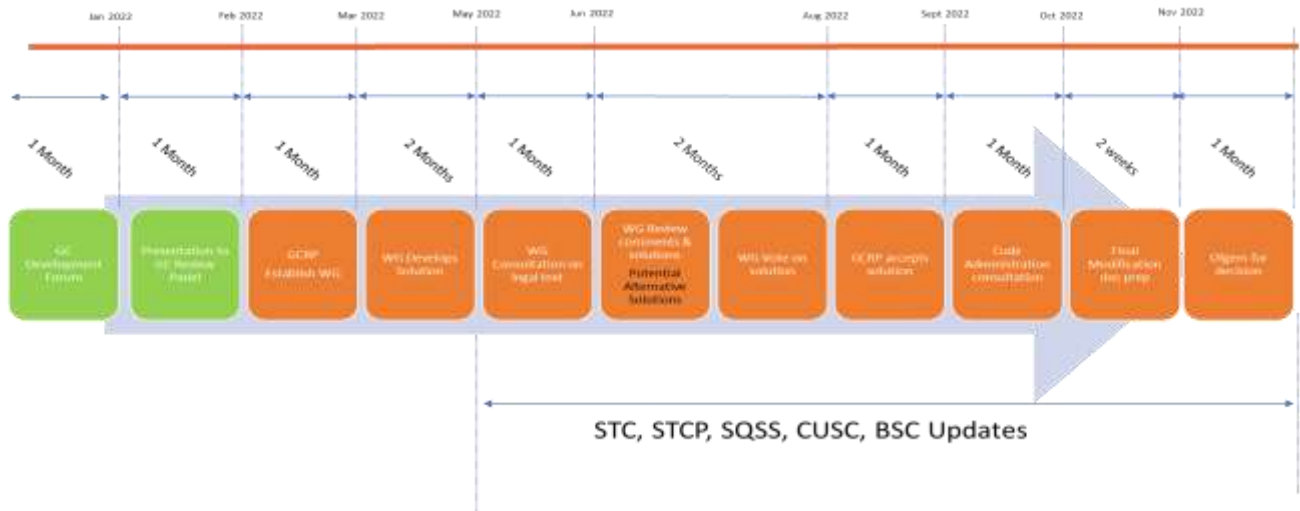
4 Recommendations from Technology and Locational Diversity Working Group Report

The working group report has provided following recommendations:

- Minimum of 3 Restoration Service Provider technologies within each DNO license area (excluding UKPN London).
- 5 initial Distribution Restoration Zone Controllers in (SPEN Scotland, UKPN London, SSEN South East, WPD Midland West and ENW) based on transmission generation versus total demand imbalance using 2026 Winter Peak figures.

5 Recommendations from Regulatory Framework Working Group Report

The working group recommended the timeline below for the changes needed in the relevant industry codes that will enable the implementation of a fit-for-purpose framework for the ESRS.



6 Recommendations from Assurance Framework Working Group Report

The working group report provides a range of detailed assurance activities. These can be found in “6.A Appendix A Assurance Activities Framework for Restoration Services V4”



6.A Appendix A
Assurance Activities Framework for Restoration Services V4

ESO recommends that a GC0156 Sub-Group is established to review the codes, in particular but not limited to OC5.7 to ensure that relevant assurance details are captured.

Also, as GC0156 progresses it is likely that further requirements for assurance activities are produced. As and when, these will be included within the Assurance Framework.

7 Recommendations from Markets and Funding Mechanism Working Group Report

The working group recommended the procurement principles

Purpose:

To establish the key procurement principles that the ESO will adhere to during the development and delivery of competitive procurement tenders where appropriate to support the ESRS in a way that does not commercially disadvantage individual parties.

There is also an expectation that all parties shall procure any services that will assist the provision of the ESRS efficiently and economically in accordance with Good Industry Practice.

Principles:

ESO shall continue to follow the over-arching Procurement Guidelines as prescribed in condition C16 of ESO transmission licence and shall also be guided by our general principles for procuring any restoration services, such as;

- A clear and transparent requirement.
- Enabling competition where appropriate to provide a fair and level playing field.
- Reducing and removing barriers for all to enable broader participation.

In addition, all parties shall not unduly discriminate to deliver the ESRS. This shall include and not be limited to

- ESO procurement of restoration services.
- TO and DNO funding through their respective price controls to facilitate the ESRS

ESO is also recommending that a Sub-Group is established to consider how the new solutions from GC0156 will be funded and reflected in CUSC/BSC.