Workgroup Consultation

GC0156:

Facilitating the Implementation of the Electricity System Restoration Standard

Overview: In October 2021, BEIS issued a direction in accordance with Special Condition 2.2 of National Grid's Electricity System Operator's Transmission Licence implementing an Electricity System Restoration Standard (ESRS) which requires 60% of electricity demand to be restored within 24 hours in all regions and 100% of electricity demand to be restored within 5 days nationally. The ESO is proposing a number of changes to the Grid Code to facilitate these requirements.

Modification process & timetable

1. **Proposal Form**
   09 February 2022
2. **Workgroup Consultation**
   21 November 2022 – 21 December 2022
3. **Workgroup Report**
   22 March 2023
4. **Code Administrator Consultation**
   03 April 2023 – 03 May 2023
5. **Draft Modification Report**
   17 May 2023
6. **Final Modification Report**
   05 June 2023
7. **Implementation**
   TBC

Have 5 minutes? Read our Executive summary

Have 60 minutes? Read the full Workgroup Consultation

Due to the volume of detailed Annexes we estimate that to read the full Workgroup Consultation and Annexes it will take at least 4 working days, as such the Workgroup Consultation has been extended to 1 calendar month.

Status summary: The Workgroup are seeking your views on the work completed to date to form the final solution(s) to the issue raised.

This modification is expected to have a: High impact
On Restoration Service Providers, Generators, Non CUSC Parties, Transmission Licensees, Interconnectors, Transmission Owners, Distributed Network Operators, Non-Embedded Customers, Virtual Lead Parties and the Electricity System Operator

Modification drivers: NGESOs compliance with the Special Condition 2.2 of National Grid's Electricity System Operator's Transmission Licence

Governance route	Standard Governance	
Who can I talk to about the change?	**Proposers:** Sade Adenola / Tony Johnson Sade.adenola@nationalgrideso.com /antony.johnson@nationalgrideso.com 0774 818 0789	**Code Administrator Chair**: Banke John-Okwesa Banke.john-okwesa@nationalgrideso.com 0792 971 6301
How do I respond?	Send your response proforma to grid.code@nationalgrideso.com **by 5pm on 21 December 2022**	

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Executive summary

What is the issue?

On 24 August 2021, Ofgem published a decision letter stating that they made the decision to make the licence modifications[1] to introduce the Electricity System Restoration Standard (ESRS) within the GB regulatory framework. These licence modifications include but are not limited to:

- introducing the definition of "restoration services" in Standard Condition C1 and amending the definition of balancing services to include "restoration services"
- replacing all references to "black start" with "Electricity System Restoration" in the Electricity Transmission Licence, including in the ESO's Special Licence Conditions, to align the licence terminology with BEIS's policy
- introduction of updated Special Condition 2.2 of National Grid's Electricity System Operator's Transmission Licence requiring the introduction of an ESRS) which requires 60% of electricity demand to be restored within 24 hours in all regions and 100% of electricity demand to be restored within 5 days nationally.

As a result of the introduction of ESRS and the associated licence changes, this GC0156 modification is therefore necessary to change the Grid Code and ensure that the ESO is following the direction issued to it by BEIS. The date by which BEIS require the ESO to be compliant with the ESRS is 31 December 2026.

What is the solution and when will it come into effect?

Proposer's solution: The ESO's aim for the implementation of the ESRS is to put in place measures, tools and procedures via the Grid Code such that in the event of a Total or Partial Shutdown of the GB electricity system, that 60% of demand can be restored within all regions of GB in 24 hours and 100% of demand can be restored in 5 days nationally[2]. This is against the background that the GB electricity system electricity system is in an intact and operable state and that there is not significant damage to electrical plant and apparatus.

Implementation date: 10 working days following Ofgem decision

Summary of potential alternative solution(s) and implementation date(s): No alternative raised to date

What is the impact if this change is made?

Modification of restoration requirements and clarification of relevant code obligations of parties. This will impact all CUSC parties, Restoration Service Providers (RSPs), transmission network owners, Distribution Network Operators (DNOs) and the ESO.

Interactions

There are likely to be consequential changes for the other electricity industry codes, for example the CUSC (CMP398), STC, BSC, Distribution Code (DCRP/MP/22/02) and related documents (EREC G99 and EREC G59).

[1] Which can be found via this link: Decision on licence modifications to facilitate the introduction of an Electricity System Restoration Standard | Ofgem
[2] BEIS's later specified that "electricity demand" should be calculated as "transmission demand"

What is the issue?

In April 2021, the Department for Business, Energy and Industrial Strategy (BEIS) released a policy statement setting out the need to introduce a legally binding target for the restoration of electricity supplies in the event of a National Electricity Transmission System (NETS) failure. This new policy is called the Electricity System Restoration Standard (ESRS).

As a consequence of BEIS's policy statement, Ofgem performed an initial consultation related to the required licence changes in April 2021 followed by a statutory consultation in July 2021 on licence amendments to facilitate the introduction of an ESRS, and to align the regulatory framework for procurement of restoration services with that of other balancing services.

These licence modifications include but are not limited to:

- introducing the definition of "restoration services" in Standard Condition C1 and amending the definition of balancing services to include "restoration services"
- replacing all references to "black start" with "Electricity System Restoration" in the Electricity Transmission Licence, including in the ESO's Special Licence Conditions, to align the licence terminology with BEIS's policy
- introduction of updated Special Condition 2.2 of National Grid's Electricity System Operator's Transmission Licence requiring the introduction of an Electricity System Restoration Standard (ESRS) which requires 60% of electricity demand to be restored within 24 hours in all regions and 100% of electricity demand to be restored within 5 days nationally.

Why change?

This modification is required so that National Grid ESO can satisfy the new ESRS Licence obligations. This will include altering, updating and clarifying the responsibilities and requirements of the ESO, CUSC parties, Restoration Service Providers, Transmission Licensees and Distribution Network Operators, taking part in restoration activities.

What is the solution?

Proposer's solution

The Proposer's aim for the implementation of the ESRS is to put in place measures, tools and procedures such that in the event of a Total or Partial Shutdown of the NETS, that 60% of demand can be restored within all regions of GB in 24 hours and 100% of demand can be restored in 5 days nationally. This is against the background that the GB electricity system is in an intact and operable state and that there is not significant damage to electrical plant and apparatus.

This modification will build on the work completed through the implementation of the EU Emergency and Restoration Code[3] which was in part introduced to the Grid Code through Grid Code modifications GC0125, GC0127 and GC0128 and further being implemented through Grid Code modification GC0148 (Implementation of EU Emergency and Restoration Code Phase II).

[3] Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration (Text with EEA relevance) (legislation.gov.uk) &
The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019

In addition, the work will build on the Distributed ReStart Project for which code changes were originally developed in the GC0148 modification. Many of the requirements being introduced through Grid Code modification GC0148 provide essential tools in achieving the objectives of the ESRS. It should be noted that whilst the legal text for Distributed ReStart was initially included within the scope of Grid Code Modification GC0148 it was subsequently removed following the GC0148 Workgroup Consultation on the basis that it better fitted within the framework of the Electricity System Restoration Standard and was not an obligation of the EU Emergency and Restoration Code.

The proposer's solution is to replace all references to 'black start' with 'Electricity System Restoration' based on Ofgem direction. This would also be consistent with the proposals being put forward to change the other industry codes such as the CUSC (CMP398) and STC and BSC to be confirmed.

The solution will also need to include changes to the System Restoration Plan and potentially the Test Plan.

As part of this modification, the proposer will also take the opportunity to undertake a house keeping change to OC5.7.1(b)(i) which is a correction that needs to be addressed following an inadvertent error arising from the implementation of Grid Code modification GC0108 (EU Code: Emergency & Restoration: black start testing requirements).

Workgroup considerations

The Workgroup met 8 times to discuss the issues, detail the scope of the proposed defect, devise potential solutions and assess the proposal in terms of the applicable grid code objectives. The Workgroup was well-represented; potentially affected stakeholders were included and opinions of relevant industry experts who were not Workgroup members were sought as and when required. In some circumstances, required experts were invited to join the Workgroup/subgroup meetings to provide their views.

ESO Presentation on Modification Requirements

The Proposer delivered a presentation which highlighted the following key points:

- The aim GC0156 is to facilitate the implementation of the ESRS requirements including, in particular that 60% of demand is restored within 24 hours (across all regions of GB) and 100% is restored within 5 days. This can only be achieved on the basis that network assets and users plant (e.g. generation, storage, HVDC etc) are in an operational and functional state and there is no extensive or prolonged network or equipment damage.
- In November 2021, the ESO set up 7 non-code working groups to engage with the wider industry for initial consideration of the possible requirements that may arise from the ESRS and to seek views on recommendations on how to implement the new ESRS licence obligations. All the working groups were disbanded at the end of April 2022 and the working group reports were shared with the GC0156 Workgroup for further development.
- The Distributed ReStart Project[4] had initially been included within GC0148 as a non-mandatory requirement, however following general industry agreement as a result of the GC0148 Workgroup Consultation, it was agreed that the provisions related to Distributed ReStart were best placed within the scope of this GC0156 modification.

[4] What is the Distributed ReStart project? | National Grid ESO

- GC0148 has progressed and includes updates to low frequency demand disconnection, communications systems, critical tools and facilities, the System Defence Plan, System Restoration Plan, Test Plan, how smaller non-CUSC Parties would fall under the remit of the EU Emergency and Restoration Code and requirements for electricity storage modules during low system frequencies.
- The Distributed ReStart provisions are included within the GC0156 legal text available in Annex 6.

Non-code working groups - ESO's ESRS Working Groups Report

The ESO's ESRS Implementation Team provided a high-level overview to the GC0156 Workgroup of the ESRS non-code workgroup initial findings that had been compiled reflecting the majority views, including the suggestion to create 4 sub-groups within the GC0156 Workgroup. These reports explore the options and issues in the following areas: (i) Future Networks, (ii) Assurance Activities, (iii) Communications Infrastructure and (iv) Markets and Funding Mechanism.

Full details of the ESO's ESRS working group recommendations and reports are available in Annex 3. The agreed terms of reference for each of these GC0156 subgroups are available in Annex 4.

Implementation Costs

The Market and Funding subgroup arrived at a conclusion that the requirement for likely cost will be revisited once Ofgem approves the set of requirements proposed by GC0156 for the regulatory frameworks and at that point it might be more appropriate for the generators to provide an indicative cost.

Over discussions from several workgroup meetings, no consensus was reached as to the need for a cost benefit analysis (CBA). Some Workgroup members expressed that a full cost benefit analysis should be undertaken to ensure that the measures considered will satisfy the ESRS criteria, and that this will be achieved at the least cost. Other Workgroup members held the view that a full CBA might not be necessary, and some form of cost estimation/ impact assessment would suffice to quantify the implementation costs.

Funding Mechanisms

It was noted that some funding mechanisms had been considered and discussed within the Markets and Funding subgroup discussions which are available in Annex 4.

The proposed approach with GC0156 would result in additional obligations on parties which could consequently cause a rise in implementation costs. For information, the table below shows the existing cost recovery mechanisms through which parties could (or could not) recover their implementation costs.

Obligated Party	**Existing Cost Recovery Mechanism**
ESO	Price Control / Re-opener
TO	Price Control / Re-opener

DNO	Price Control / Re-opener
OFTO	Unclear
Restoration Service Providers*	Contract with ESO
Non-Contracted CUSC parties (other CUSC parties)	None

In relation to the above table, there is currently no cost recovery mechanism in place for Non-Contracted CUSC parties (other CUSC parties). However, a CUSC proposal CMP398 has recently been raised to seek to address this and, unless that proposal is approved, a mechanism does not exist for those parties. Some Workgroup members considered that this could have considerable financial consequences for relevant parties.

Note:
*As part of the GC0156 Workgroup discussions, it was noted that there was confusion between the definition of a Restoration Service Provider as used in the EU Emergency and Restoration Code (2017/2196) and the term Restoration Service Provider proposed to be used in the GB Grid Code for implementation of the Electricity System Restoration Standard. The ESO have investigated this issue and agree that there is confusion between these definitions. As a solution, it is therefore proposed to introduce the below two definitions into the Grid Code:

i) a GB Restoration Service Provider which would be defined as *"A User or a party with a legal or contractual obligation to provide a service contributing to one or several measures of the System Restoration Plan"*;
ii) a Restoration Service Provider which would be defined as *"An Anchor Restoration Service Provider or a Top Up Restoration Service Provider"*.

Workgroup consultation questions:

Q5) Do you believe that a cost benefit analysis should be undertaken by the Workgroup and if yes what factors should be considered?

Q6) Do you believe that parties obligated by GC0156 should have a cost recovery mechanism in place?

Q7) Do you think that the proposals are sufficient and cost effective to ensure that NGESO can meet its ESRS licence obligations? Please provide a rationale for your answer

Q8) Do you agree that all the costs associated with TO/DNO implementation of ESRS should be recovered through their respective price controls? If not, what funding mechanism do you favour?

Discussions on Restoration

The ESO representative emphasised that it is in everyone's best interest to restore the system as quickly as possible in the most economic manner. The current approach to restore the NETS system is to have contracts with strategically located black start power

stations or Interconnectors across GB. These are generally transmission connected assets such that in the event of a Partial or Total Shutdown[5], these contracted assets or power stations are instructed by the ESO to start within two hours and energise parts of the NETS in accordance with a local joint restoration plan (LJRP). A LJRP is a process set out in a tri-party agreement (between the contracted asset owner, the ESO and the Network Operator) outlining the process of how a contracted asset owner energises part of the transmission or distribution system and then picks up demand from a DNO.

To develop a LJRP there is liaison between the power station and the DNO in coordination with the ESO. In each case the LJRP is used to form a power island. As the restoration progresses individual power islands are subsequently connected together to form a skeleton network. This facilitates the connection of other generators including those within distribution networks and those without a current 'black start' capability. This also enables restoration of demand as detailed in OC9 of the Grid Code.

The proposer noted that going forward, the number of traditional Restoration Service Providers is reducing, and alternative provision and solutions need to be developed to restore the NETS in accordance with the ESRS parameters.

Clarification of Definition of Restoration Demand

The Workgroup reviewed the proposed definition of 'Demand' in the context of the restoration of 60% of demand in 24 hours and the 100% in five days as set out in the ESRS. Workgroup members sought clarification of the definition of Demand as stated in the BEIS direction letter to NGESO. The Workgroup noted the definition is critical and highlighted the following practical concerns:

- It is too vague; it does not specify the expectations of areas where the transmission demand may be zero or negative at the time of GB peak.
- Some network colleagues had advised the Workgroup that at certain times of the year some DNO areas have very low transmission system demand or even export (to the transmission system) which could mean, in that scenario, that 60% or 100% could be based on a low / zero / negative number.
- There is no consideration of the significant variation in demands between weekends versus weekday impacts. For example, if the Partial or Total Shutdown occurred on, a Friday then the quantum of the demand (upon which the 60% target in 24 hours is then based) would be lower for a weekend / Bank Holiday, than if it had occurred on a Monday and vice versa.
- Focussing on transmission demand as opposed to the target percentages to be restored related to the whole total system demand or transmission demand leaves the restoration of the total system demand uncertain and undefined.
- The proportion of transmission to distribution demand is expected to decrease in coming years in the context of increased distribution generation and with time the target becomes less meaningful. Although, a BEIS representative who attended a workgroup meeting advised that whilst there were no current plans to change the ESRS, it was likely to be revisited as part of the long-term future system resilience work.

The representative from BEIS clarified the definition. and confirmed that BEIS's direction specifies that "electricity demand" should be calculated as "transmission demand", that

[5] As defined in the Grid Code.

being demand on the NETS. The requirement to restore 60% of transmission demand within 24 hours and 100% in five days is an obligation placed on the ESO as is the requirement to ensure that the necessary services and tools required to meet the standard are in place by December 2026. It was confirmed that 60% was the minimum standard required within 24 hours, with the expectation that industry parties would be doing everything possible to return the system to normal as quickly as possible.

Following this, several Workgroup members highlighted further concerns that the ESRS was based around 'transmission demand'; that is demand on the NETS; versus 'distribution demand'; that is demand, over and above that arising from the NETS, from the DNOs and IDNOs. The BEIS representative confirmed that the ESRS had been agreed based on assurance from the ESO that the proposed level would be sufficient to maintain a stable electricity grid therefore, the ESO are obliged to restore enough demand to stabilise the system

The ESO representative clarified that the proposed 60% of transmission demand had been developed by simulations undertaken by the ESO and provided to BEIS it was simply a proxy for a level of restoration which broadly reflects the nations critical infrastructure and welfare requirements. Although there was request for the simulations studies to be shared with the Workgroup, the Proposer did not have the permission to share at that point in time.

The BEIS representative suggested that the ESO and industry need to work together to facilitate the ESRS and ensure any 'nuances' are understood.

Note:

Within the draft legal text: "Electricity System Demand in the "Electricity System Restoration Standard" is treated by The Company to be the forecast peak National Demand which would have occurred within the 24 hour period following the start of the Total Shutdown or Partial Shutdown had the Total Shutdown or Partial Shutdown not occurred."

Workgroup consultation questions:

Q9) The ESRS restoration target is expressed in terms of transmission demand rather than total demand (see Glossary and Definitions). Do you understand the implications of this, and are you happy with those implications?

Q10) Do you think that there is a common understanding between stakeholders of the demand to be restored in GB required by ESRS?

The Distributed ReStart Development

The Distributed Restart Project was a Network Innovation Competition funded initiative that examined if embedded assets (such as generation and batteries connected to distribution networks) can provide restoration services to the ESO in the event of a Partial or Total Shutdown.

Originally the Distributed ReStart Project was intended to be incorporated into the GC0148 modification. However, as GC0156 addresses the wider issues of system restoration it was deemed to be more appropriate for GC0156 to pick up the restoration work via Distributed ReStart. Accordingly, the Distributed ReStart provisions were removed from GC0148, after that modification's Workgroup Consultation and transferred to GC0156.

The GC0148 discussions on the incorporation of Distributed ReStart into system restoration were quite advanced and discussions from GC0148 which are now directly relevant to GC0156 is included in Annex 5.

Analysis of effects of GC0156 on Parties

To provide clarity, some Workgroup members requested documenting their analysis of the effects of some of the proposed GC0156 solution on all parties, these are detailed in the below sections:

a. All Generators required to provide Mandatory Services

Regarding all new and existing generators, storage and interconnectors who are transmission connected or large embedded, it is proposed that connected assets shall:-

1) Ensure that all communications equipment within their site connected to the ESO's communications system (i.e., control telephony) shall continue to operate within the site for a minimum of 72 hours after the failure of all external electricity supplies to the site.
2) Ensure that on the failure of all external electricity supplies to the site all equipment on the site shall shutdown safely and be maintained in a condition such that when external electricity supplies are reconnected, if a start instruction is received from the ESO, the asset shall synchronise and load up typically as per its cold start dynamic parameters.
   To clarify, the generating site or storage site or interconnector site needs to either have or be capable of mobilising all required personnel and resources to site within the required timescales whilst all external electricity supplies are dead. This capability to start must be maintained for a period of at least 72 hours from the failure of the external electricity supplies. Also, the cold start dynamic parameters are those which have been submitted in the week 24 schedule 2 data for a shutdown period of greater than 48 hours (note these parameters shall apply even if the shutdown period is less than 48 hours if the site was de-energised from all external electricity supplies and the times shall apply from the time supplies of electricity were restored to the site).
3) Ensure that their control systems have governors or equivalent which are capable of operating in an island mode. The mode of governor control should be selectable so that either speed control or load control or an alternative can be used to ensure stable conditions during island mode operation. This does not only mean the equipment is capable of working in this mode also these operating modes are interfaced into the main control point controls and staff are familiar with these requirements.

A Workgroup member stated that the new proposed technical obligations relating to 72 hours resilience for existing assets (plus the communications on site) were materially different from a 'cold-start' where external electricity supplies are maintained to the site.

The associated issues were explored in a paper, which was shared with the Workgroup, that examined the situation where external electricity supplies are maintained ('scenario 1') and where they are not maintained ('scenario 2'). The full details of these scenarios can be found on pages 29 – 34 of the Future Networks subgroup report in Annex 4.

b. Anchor Plant

Currently, Plant used to energise parts of the total system have generally been referred to as Black Start Plant; it is proposed to change the term Black Start Plant to Anchor Plant. The Anchor Plant together with top up Restoration Service Providers can be used to supply increasing volumes of demand by using the common term Anchor Plant ensures consistency for both LJRPs and DRZPs. This will ensure parity between providers and also acknowledge the difference in transmission arrangements between England and Wales, Scotland and Offshore. In addition, there is a requirement for Anchor Plant to have the capability to switch specific protection and control modes into service in order to participate in the wider restoration process.

c. Top-up Restoration Service Providers

This is a new category of asset which is proposed to be introduced by this modification and will only apply to assets who enter into a commercial agreement with the ESO to provide this service. These assets shall provide this service to either the transmission system or the distribution system. These assets are not required to be capable of energising a dead section of network, however they are required to be capable of starting quickly, or to connect demand, when external electricity supplies are restored to the site and then provide their contracted capability to assist in restoring demand as part of the LJRP or DRZP. The exact requirements of these will be detailed in the service provider contract.

d. Distribution Network Operators

i. DNOs without Distribution Restoration Zone Plans

This section applies to all new and existing DNOs and it is proposed that all DNOs shall ensure that on the failure of all external electricity supplies to relevant substation sites, all equipment on the site shall be power resilient for 72 hours in accordance with the requirement of Engineering Recommendations G91. Whilst there are no external electricity supplies the ability to operate and reconfigure the substation shall be maintained so that the substation can be reconfigured to permit re-energisation.

ii. DNOs with Distribution Restoration Zone Plans

If a DNO agrees to implement a DRZ then it will enter into a tripartite contract with the Restoration Service Provider and the ESO. It may install a DRZ controller and other equipment to operate the DRZ should it wish to do so. The DNO shall also be required to be able to select different protection settings, and possibly modified earthing, to enable the DRZ to operate safely.

e. BM Participants

Currently BM Participants who are not directly connected to the transmission system or large embedded power stations are only required to comply with Connection Condition (& European Connection Condition) sections in either CC.6.5 or ECC.6.5 and submit data as per the Balancing Codes. This is so they can operate and be instructed in the wholesale market. With this modification, there are other significant changes, and no matter the size or connection point of a BM Participant they will be required to:

1) Ensure that all communications equipment connected to the ESO communication's system including internal communication shall continue to operate for a minimum of 72 hours after the failure of all external electricity supplies to the site.
2) Ensure that on the failure of all external electricity supplies to the site all equipment on the site shall shutdown safely and be maintained in a condition such that when external electricity supplies are reconnected, if a start instruction is received from the ESO, their Plant shall be able to synchronise and load up as would be expected from a cold start unit. This means that the site needs to either have or be capable of mobilising all required personnel and resources to site within the required timescales whilst all external Electricity Supply Industry (ESI) electricity supplies are dead. This capability to start must be maintained for a period of at least 72 hours from the failure of the external electricity supplies. The cold start dynamic parameters are those which have been submitted in the week 24 schedule 2 data for a shutdown period of greater than 48 hours (note these parameters shall apply even if the shutdown period is less than 48 hours if the site was de-energised from all external electricity supplies and the times shall apply from the time electricity supplies were restored to the site).

Workgroup consultation questions:

Q11) Do you see any barriers for Network Operators and Users to deliver the changes proposed to implement the ESRS by December 2026?

Q12) Do you believe there are further changes to the network i.e. NETS and/or Distribution Network required to implement ESRS obligations?

Q13) The Annex (pages 29 – 32) in the Future Networks subgroup report covers 2 scenarios where site supplies are lost up to 72 hours. Which of these 2 scenarios is the most realistic? (The full details of these scenarios can be found on pages 29 – 34 of the Future Networks subgroup report in Annex 4)

Q14) What are your views on the scope of the parties being impacted by the mandatory changes proposed as part of GC0156?

Q15) The GC0156 proposed solution 72 hrs resilience is expected to be applied retrospectively to existing CUSC parties. Do you agree with this retrospective application and if not, what is your rationale / view about this?

Feedback on the Potential Implications of ESRS on Aggregators

An Aggregator representative from Flexitricity was invited to the workgroup meeting to provide their views on the potential implications that GC0156 could have on Aggregators. Following their review of the ECC draft legal text of Critical Tools and Facilities requirements, they provided the following feedback to the ESO representative and also discussed with GC0156 Workgroup members:

-The addition of "BM Participant" is a powerful disincentive to enter the BM. This preserves the BM as the domain of large generators only, because the proportional costs of complying with this aspect of the code will be much higher for smaller units.

- BM Participants are not a static population of whom things can be required; a sizeable number of them can do all of their trading in wholesale markets. Selecting smaller resource to comply with the Critical Tools and Facilities requirements according to their choice to participate in the BM is not the best way, it should be a condition of connection or licence or something of that nature.

- In relation to "adequate control equipment redundancy", adding redundancy to each of the sites is not pragmatic. Where an aggregator controls many sites, redundancy is required, but this is surely better dealt with by reference to the control point thresholds set out in regard to EDL/EDT of the Electrical Standards.

- Many Generators and all VLP-controlled asset are distribution-connected. This could place them under potentially contradictory requirements (G99 versus this definition) hence it may be better to either apply this requirement only to parties who are delivering an ESRS, and/or carve out something less general than "Plant or Apparatus necessary for System Restoration".

GC0156 Subgroups Objectives

In line with the recommendations from the non-code working group, the four GC0156 subgroups were established to examine certain aspects of GC0156[6] which met on a bi-weekly basis between July 2022 – October 2022. The aim of these subgroups was to consider and develop aspects of the GC0156 modification requirements as outlined below. Some Workgroup members queried the relevance of the Markets and Funding Mechanism Subgroup to GC0156 (rather than CUSC), and after deliberations on this it was decided that the outputs of the Markets and Funding Subgroup will be for information only although the report will feed into other codes (modification proposals, CUSC & BSC most especially).

Full details of the subgroups Terms of Reference and the subgroup reports are available in Annex 4.

<u>Future Networks</u>

Objective: To determine further future network requirements that may have implications for network operators, TOs, OFTOs and CATOs to facilitate how the industry can meet the requirements of the ESRS.

<u>Assurance Activities</u>
Objective: To develop the assurance framework and performance monitoring framework and to enable Industry performance against the ESRS to be assessed.

<u>Communications Infrastructure</u>
Objective: To propose changes to the telecommunication requirements for Network Operators (DNOs), TOs, OFTOs, Restoration Service Providers and any other relevant parties required to facilitate the implementation of the ESRS.

With the DNO being responsible for ensuring the data is secure and meeting legal and Network and Information Security (NIS) Directive requirements.

[6] (i) Future Networks, (ii) Assurance Activities, (iii) Communications Infrastructure and (iv) Markets and Funding Mechanism

The ESO representative and a workgroup member representative advised the workgroup that the December 2026 deadline is challenging to get the required technologies in place, and the implementation costs that may need to be incurred by stakeholders to implement the required changes are unlikely to be determined within the set timeframe to complete subgroup meetings.

Markets and Funding Mechanism

Objective: To estimate costs (if possible) associated with the activities to implement the ESRS requirements; advise the CUSC/ BSC Panels of the funding implications for relevant stakeholders/parties, advise the GC0156 Workgroup on costs on other parties involved in facilitating the implementation of ESRS and suggest how these should be accommodated.

The subgroup had insufficient time to make an assessment of the costs that might be incurred by stakeholders.

Workgroup consultation question:

Q16) Do you believe that cyber security requirements in accordance with the NIS standard are sufficient and as referenced in the proposed Grid Code drafting (available in Annex 6)?

Draft legal text and Supplementary Documents

The legal drafting for this modification was achieved by a collaborative approach between the ESO and Distribution Code Administrator. CATOs have been excluded from the drafting of the legal text as this is expected to be picked up as part of the GC0159 CATO modification proposal raised at the Grid Code Review Panel in September 2022.

The draft legal text for this modification proposal can be found in Annex 6, any texts highlighted in yellow are to be re-assessed post consultation.

All other supplementary documents listed below are available in Annexes 7 – 12:

- Distribution Restoration Zone Control System Standard
- System Defence Plan
- System Restoration Plan
- System Test Plan
- Control Telephony Electrical Standard
- Communications Standard
- Distributed ReStart and Industry Codes Recommendations

Note

Due to comments received from some Workgroup members on Appendix 9 (technical requirements associated with restoration services) of the ECC draft legal text, the ESO representative proposed establishing a separate subgroup under the auspices of GC0156 with the appropriate technical representatives to consider placing technical requirements in the Relevant Electrical Standards.

Workgroup consultation questions:

Q17) Do you agree that the draft legal text is appropriate and sufficient to implement GC0156? If not please provide your suggestions?

Q18) Are there any barriers to new entrants to provide restoration services that are not covered in the GC0156 legal drafting?

Q19) Do you believe there should be further assurance activities in addition to those described in the proposed legal text within OC5? If yes, please state the activity and explain why?

Q20) Do you think the right requirements have been identified for Network Operators in terms of Network design and operational capability as summarised in the consultation document and annex and as detailed in the proposed legal text in CC/ECC.6.4.6.3b and OC9?

Q21) Due to comments received from some Workgroup members on Appendix 9 (technical requirements associated with restoration services) of the ECC draft legal text, the ESO has proposed that a separate subgroup should be established under the umbrella of GC0156 to develop a set of technical requirements associated with restoration services for inclusion in the Relevant Electrical Standards which would include appropriate experts from across the industry. Do you believe this is an appropriate way forward if not why?

Q22) Are you aware that Anchor Plants may be expected to carry out a deadline line charge test and remote synchronisation test as described in OC5.7.2.2(h) / OC5.7.2.3(d)? If so, do you have a view on this test?

What is the impact of this change?

Proposer's assessment against Code Objectives

Proposer's assessment against Grid Code Objectives	
Relevant Objective	**Identified impact**
(a) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity	**Positive** Provides a level playing field for Restoration Service Providers and CUSC Parties and to put measures in place to restore the NETS as soon as possible following a total or partial national power outage.
(b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);	**Positive** Competition for restoration services is encouraged via the tender process to ensure a good availability of services at strategically located points which provides value for money.

c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;	**Positive** Provide assurance of restoring the system following a total or partial national power outage as quickly as possible
(d) To efficiently discharge the obligations imposed upon the licensee by this licence and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and	**Positive** Provide assurance that the new licence obligation issued in October 2021 can be satisfied and discharged.
(e) To promote efficiency in the implementation and administration of the Grid Code arrangements	**Neutral**

Proposer's assessment of the impact of the modification on the stakeholder / consumer benefit categories	
Stakeholder / consumer benefit categories	**Identified impact**
Improved availability of the system	**Positive** It is in the widest possible interest of the country and consumers as a whole to restore power supplies as soon as possible following a Total or Partial Shutdown. This modification seeks to do that and therefore seen as Positive.
Lower bills than would otherwise be the case	**Positive** The financial implications of a national power outage can run into many tens of millions of pounds very quickly. Restoring power supplies as soon as possible and in the shortest possible time frame is essential to the country as a whole. Whilst not having a direct effect on consumer bills the loss of production for business and the wider community would be substantial and therefore insurance to minimise against the risk of a power outage is imperative.
Benefits for society as a whole	**Positive** This proposal puts measures in place that would reduce the time taken to restore electricity system demand following partial or total national power outage. This is a significant benefit to society as a whole.
Reduced environmental damage	**Positive** This proposal will support the use of a diverse range of technologies, many of which are low carbon sources. The proposal also recognises the important role of all technologies following a Total or Partial shutdown and

	therefore this modification is seen as a net positive in minimising environmental damage.
Improved quality of service	**Positive** This modification provides the potential for Restoration from renewable sources in addition to encouraging the use of embedded generation which is currently being trialled through the Distributed ReStart project.

When will this change take place?

Implementation date
10 working days following Ofgem decision

Date decision required by
Q3 2022

Implementation approach
Implementation of ESRS will be facilitated by a New Restoration Decision Support Tool, Restoration Tool, Local Joint Restoration Plans, Distributed Restoration Zone Plans & Annual Assurance Framework.

Interactions

☒CUSC	☒BSC	☒STC	☒SQSS
☒European Network Codes	☐ EBR Article 18 T&Cs[7]	☒Other modifications	☐Other

How to respond

Standard Workgroup Consultation questions

1. Do you believe that GC0156 Original proposal better facilitates the Applicable Objectives?
2. Do you support the proposed implementation approach?
3. Do you have any other comments?
4. Do you wish to raise a Workgroup Consultation Alternative request for the Workgroup to consider?

Specific Workgroup Consultation questions

5. Do you believe that a cost benefit analysis should be undertaken by the Workgroup and if yes what factors should be considered?
6. Do you believe that parties obligated by GC0156 should have a cost recovery mechanism in place?

[7] If your modification amends any of the clauses mapped out in Annex GR.B of the Governance Rules section of the Grid Code, it will change the Terms & Conditions relating to Balancing Service Providers. The modification will need to follow the process set out in Article 18 of the Electricity Balancing Regulation (EBR – EU Regulation 2017/2195). All Grid Code modifications must be consulted on for 1 month in the Code Administrator Consultation phase, unless they are Urgent modifications which have no impact on EBR Article 18 T&Cs. N.B. This will also satisfy the requirements of the NCER process.

7. Do you think that the proposals are sufficient and cost effective to ensure that NGESO can meet its ESRS licence obligations? Please provide a rationale for your answer
8. Do you agree that all the costs associated with TO/DNO implementation of ESRS should be recovered through their respective price controls? If not, what funding mechanism do you favour?
9. The ESRS restoration target is expressed in terms of transmission demand rather than total demand (see Glossary and Definitions (GR)). Do you understand the implications of this, and are you happy with those implications?
10. Do you think that there is a common understanding between stakeholders of the demand to be restored in GB required by ESRS?
11. Do you see any barriers for Network Operators and Users to deliver the changes proposed to implement the ESRS by December 2026?
12. Do you believe there are further changes to the network i.e. NETS and/or Distribution Network required to implement ESRS obligations?
13. The Annex (pages 29 – 32) in the Future Networks subgroup report covers 2 scenarios where site supplies are lost up to 72 hours. Which of these 2 scenarios is the most realistic? (The full details of these scenarios can be found on pages 29 – 34 of the Future Networks subgroup report in Annex 4)
14. What are your views on the scope of the parties being impacted by the mandatory changes proposed as part of GC0156?
15. The GC0156 proposed solution 72 hrs resilience is expected to be applied retrospectively to existing CUSC parties. Do you agree with this retrospective application and if not, what is your rationale / view about this?
16. Do you believe that cyber security requirements in accordance with the NIS standard are sufficient and as referenced in the proposed Grid Code drafting (available in Annex 6)?
17. Do you agree that the draft legal text is appropriate and sufficient to implement GC0156? If not please provide your suggestions?
18. Are there any barriers to new entrants to provide restoration services that are not covered in the GC0156 legal drafting?
19. Do you believe there should be further assurance activities in addition to those described in the proposed legal text within OC5? If yes, please state the activity and explain why?
20. Do you think the right requirements have been identified for Network Operators in terms of Network design and operational capability as summarised in the consultation document and annex and as detailed in the proposed legal text in CC/ECC.6.4.6.3b and OC9?
21. Due to comments received from some Workgroup members on Appendix 9 (technical requirements associated with restoration services) of the ECC draft legal text, the ESO has proposed that a separate subgroup should be established under the umbrella of GC0156 to develop a set of technical requirements associated with restoration services for inclusion in the Relevant Electrical Standards which would include appropriate experts from across the industry. Do you believe this is an appropriate way forward if not why?
22. Are you aware that Anchor Plants may be expected to carry out a deadline line charge test and remote synchronisation test as described in OC5.7.2.2(h) / OC5.7.2.3(d)? If so, do you have a view on this test?

23. The distributed restart legal text has been drafted on the basis that ESO will lead on the procurement of restoration services. Do you think this should move to DNO led in future? If yes, please explain why
24. The distributed restart legal text has been drafted on the basis that:

    i) there will be a connection agreement with the DNO that binds an embedded restoration service provider to the Distribution Code and
    ii) a tripartite agreement that binds the embedded restoration service provider to the relevant parts of the Grid and Distribution Codes.
    Do you see any difficulties with this proposed contractual arrangement?

25. Do you believe it is appropriate to have a mains independence minimum resilience period of 24 hours as required by the NCER or 72 hours as a general GB standard for existing black start purposes as proposed with the GC0156 solution for Grid Code parties, BM parties, VLPs and restoration service providers? Do you agree with a retrospective application of this and if not, what is your suggestion / views about this?
26. As a stakeholder, are there any implications of the proposed future requirements which are not clear?
27. Do you have any views on how the requirements should be implemented into the Grid Code bearing in mind the requirements of the ESRS are not enforceable until 31 December 2026?
28. Do you agree with Ofgem's proposed approach to the DNO ESR re-opener?

The Workgroup is seeking the views of Grid Code users and other interested parties in relation to the issues noted in this document and specifically in response to the questions above.
Please send your response to grid.code@nationalgrideso.comusing the response pro-forma which can be found on the GC0156 modification page.
In accordance with Governance Rules if you wish to raise a Workgroup Consultation Alternative Request please fill in the form which you can find at the above link.

If you wish to submit a confidential response, mark the relevant box on your consultation proforma. Confidential responses will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the Panel, Workgroup or the industry and may therefore not influence the debate to the same extent as a non-confidential response.

Acronyms and key terms

Acronym / key term	Meaning
BEIS	(Department for) Business, Energy and Industrial Strategy
BSC	Balancing and Settlement Code
BM	Balancing Mechanism
CATO	Competitively Appointed Transmission Owners
CUSC	Connection and Use of System Code
DRZ	Distribution Restoration Zone
DZRP	Distribution Zone Restoration Plan
DNO	Distribution Network Operator
EBR	Electricity Balancing Regulation

ECC	European Connections Conditions
ESRS	Electricity System Restoration Standard
ESO	Electricity System Operator
EU	European Union
GC	Grid Code
GCRP	Grid Code Review Panel
LJRP	Local Joint Restoration Provider
NETS	National Electricity Transmission System
NGESO	National Grid Electricity System Operator
RSP	Restoration Service Providers
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
OC	Operating Code
OFTO	Offshore Transmission Owner
T&Cs	Terms and Conditions
TO	Transmissions Owner

Annexes

Annex	Information
Annex 1	Proposal form
Annex 2	Terms of Reference
Annex 3	Non-code working groups - ESO's ESRS Working Groups Reports
Annex 4	Subgroup Terms of Reference and Reports
Annex 5	Distributed ReStart Development
Annex 6	Draft Legal Text
Annex 7	Distribution Restoration Zone Control System Standard
Annex 8	System Defence Plan
Annex 9	System Restoration Plan
Annex 10	System Test Plan
Annex 11	Control Telephony Electrical Standard
Annex 12	Communications Standards
Annex 13	Distributed ReStart and Industry Codes Recommendations