SECONDARY GENERATOR RESTORATION GUIDANCE

NESO
National Energy System Operator

1 Table of Contents

1 Table of Contents 2

1. Introduction 4

1.1 Definitions 6

1.2 When a Generator has Grid Code obligation and is Deemed a Secondary Generator. 7

1.3 Power Station Size 8

1.4 What this Guidance does and does not cover 9

2 Regulatory and Compliance Framework 10

2.1 Compliance Timeline and Applicability 10

2.2 DRC Schedule 16 Part I 11

2.3 DRC Schedule 16 Part III 13

2.4 Where Compliance Challenges Exist 17

3 Restoration Process Overview 19

4 Secondary Generator Duties and Expected Actions Before, During and After Restoration Event 22

4.1 Duties in preparation for Restoration Event 22

4.2 Duties and Expected Actions During a Restoration Event 23

4.3 Post Event Review 27

5 Appendix A 28

List of Acronyms

Acronym	Meaning
BEGA	Bilateral Embedded Generation Agreement
BELLA	Bilateral Exemptible Large Licence Exempt Generator Agreement
CUSC	Connection and Use of System Code
DESNZ	Department for Energy Security and Net Zero
DNO	Distribution Network Operator
ENCC	Electricity National Control Centre
ESRS	Electricity System Restoration Standard
MEL	Maximum Export Limit
NESO	National Energy System Operator
NDZ	Notice to Deviate from Zero
SEL	Stable Export Limit
TO	Transmission Owner
TNCC	Transmission Network Control Centre

1. Introduction

The National Energy System Operator (NESO) is an independent public organisation at the heart of Great Britain's energy system. We operate today's electricity system and design tomorrow's energy system. NESO is dedicated to ensuring everyone has access to energy that is reliable, clean and affordable.

In 2021, the Department for Energy Security and Net Zero (DESNZ) formerly known as the Department of Business, Energy and Industrial Strategy (BEIS) recognized the potential risk of a total system shutdown, a low probability but high-risk event in the national risk register because of its significant economic and social impact and responded by introducing the ESRS (Electricity System Restoration Standard).

This standard establishes a legal requirement for the restoration of electricity supplies in the event of an outage on the national electricity system. Under the ESRS, NESO is required, in the event of a Total or Partial Shutdown, to restore 60% of national demand within 24 hours across each of the seven restoration regions, and to restore 100% total demand within five days, with an implementation date of 31 December 2026.

Successful delivery of the ESRS necessitates the commitment of all stakeholders, as system restoration is a collective responsibility shared among NESO, Transmission Owners (TOs), Distribution Network Operators (DNOs), Generators, and other industry participants.

In accordance with the Grid Code, Generators are required to support the system restoration process in accordance with the restoration procedures reviewed by the System Operator for a Total or Partial Shutdown as detailed in OC9.4.7.

This document sets out detailed guidance for preparing Secondary Generators that are parties to Connection and Use of System Code (CUSC) and subject to the obligations of the Grid Code but do not hold a restoration contract at their sites for system restoration following a total or partial system shutdown.

It draws on current regulatory requirements, technical standards, and operational experience, with the aim of ensuring that all Generators are ready to support restoration safely, economically and efficiently under emergency conditions.

In the event of a Total or Partial Shutdown of the Great Britain (GB) electricity system, the Electricity National Control Centre (ENCC) oversees and coordinates the restoration process. In England and Wales, this is done in collaboration with the Transmission Network Control Centre (TNCC), while in Scotland, the ENCC coordinates with Scottish TOs.

Delays, incorrect assumptions, or unrealistic declarations from Secondary Generators can prolong restoration, destabilise power islands, or lead to trips during synchronisation. In response, the ESRS and associated Grid Code modifications require relevant CUSC Parties to demonstrate restoration readiness through week 24 data submitted under Schedule 16 of the Data Registration Code.

Since the introduction of the ESRS and associated Grid Code modifications, NESO has worked closely with industry to support implementation of the restoration readiness requirements. This engagement has included the review of DRC Schedule 16 submissions, bilateral discussions with Generators and engagement through industry forums and workshops. These activities have helped develop a clearer and more consistent understanding of the requirements, their intended outcomes and how they may be applied across different technologies, plant designs and operational arrangements.

This guidance brings together the applicable requirements, clarifications, industry feedback, implementation experience and lessons learned to date into a single, organised reference document. Its purpose is to help Secondary Generators understand the overall restoration readiness framework and support a consistent, outcome-based approach across the industry, while recognising that the arrangements used to demonstrate compliance will differ between sites and technologies.

1.1 Definitions

Secondary Generator: A Generator that is a party to the Connection and Use of System Code (CUSC), is bound by the requirements of the Grid Code, and does not hold a Restoration Contract.

Restoration Event: An incident involving a total or partial system shutdown, necessitating coordinated system restoration processes.

Restoration Contractor: Parties such as Generators, with specific self-start capabilities and obligations as defined within a local joint restoration plan (LJRP) or distribution restoration zone plan (DRZP).

Bilateral Connection Agreement (BCA): A CUSC contract which applies between NESO and any directly connected party irrespective of being demand or generation.

Bilateral Embedded Generation Agreement (BEGA): A CUSC contract which applies between NESO and any embedded Generator who has applied for transmission entry capacity (TEC). Large embedded Power Stations greater than 100MW must have a BEGA.

Bilateral Exemptible Large Licence Exempt Generator Agreement (BELLA): A BELLA applies only in Scotland and is applicable to large embedded Power Stations under 100 MW. BELLAs do not have TEC and must meet the Grid Code requirements applicable to large Generators.

Distribution Restoration Zone Plan (DRZP): A plan produced and agreed by a network operator, the company, restoration contractors and in certain situations transmission licensees under OC9.4.7.7, detailing the agreed method and procedure by which a network operator will instruct a restoration contractor with an anchor plant to energise part of a network operator's system within 8 hours of that instruction, and subsequently meet complementary blocks of local demand so as to form a power island. A distribution restoration zone plan may require the use of top up restoration plant.

Local Joint Restoration Plan (LJRP): A plan produced and agreed by the company, transmission licensee, restoration contractors and a network operator under OC9.4.7.7, detailing the agreed method and procedure by which the Company or

transmission licensee in Scotland will instruct a restoration contractor with an anchor plant to energise part of the total system within 2 hours of that instruction and subsequently meet complementary blocks of local demand so as to form a power island. A local joint restoration plan may require the use of Top Up Restoration Plant.

Total Shutdown: A Total Shutdown is the situation existing when all generation has ceased and there is no electricity supply from External Interconnections and, therefore, the total system (i.e. Transmission, Distribution and Interconnector infeed into the GB System) has shutdown with the result that it is not possible for the total system to begin to function again without the Company's directions relating to system restoration.

Partial Shutdown: The same as a Total Shutdown except that all generation has ceased in a separate part of the total system and there is no electricity supply from External Interconnections or other parts of the total system to that part of total system and, therefore, that part of the total system is shutdown, with the result that it is not possible for that part of the total system to begin to function again without the company's directions relating to system restoration.

1.2 When a Generator Has Grid Code Obligation and is Deemed a Secondary Generator.

A Generator is classified as a Secondary Generator and therefore subject to the requirements of the Grid Code if any of the following criteria apply:

- The Generator owns and/or operates a Power Station which is directly connected to transmission system (irrespective of being small, medium or large)
- The Generator owns and/or operates a large Power Station (even if embedded)
- The Generator owns and /or operates an embedded medium Power Station and has a BEGA.
- The Generator owns and operates plant or aggregated plant (for example a Virtual Lead Party) and is registered as a BM participant

- Small and medium embedded Power Stations that are BM Participants and hold a bilateral agreement with NESO are subject to the requirements of CC/ECC6.5, CC/ECC7.9, CC/ECC7.10 and CC/ECC7.11.

1.3 Power Station Size

Power Station size depends on the Power Station's registered capacity and the transmission area in which it is connected.

Large:

- Large Power Stations in NGET's transmission area are those with a registered capacity of 100MW and above (irrespective of being directly connected or embedded).
- Large Power Stations in SPT's transmission area are those with a registered capacity of 30MW and above (irrespective of being directly connected or embedded).
- Large Power Stations in SHET's transmission area are those with a registered capacity of 10MW and above (irrespective of being directly connected or embedded).

Medium:

Medium Power Stations exist only in NGET's transmission area and have a registered capacity of 50 MW or greater but less than 100 MW.

Small:

- Small Power Stations in NGET's transmission area are those with a registered capacity less than 50MW (irrespective of being directly connected or embedded).
- Small Power Stations in SPT's transmission area are those with a registered capacity less than 30MW (irrespective of being directly connected or embedded)
- Small Power Stations in SHET's transmission area are those with a registered capacity less than 10MW (irrespective of being directly connected or embedded).

1.4 What this Guidance does and does not cover

This Guidance:

- Explains existing obligations in practical and operational terms
- Highlights common misunderstandings and noncompliance risks
- Sets out NESO's expectations for Secondary Generators.

This guidance does not:

- Introduce new Grid Code obligations or introduce any mandatory requirements to Grid Code Users beyond those of the Grid Code.
- Require Secondary Generators to have a self-start capability.
- Replace the need to refer to the Grid Code. In case of ambiguity, the Grid Code takes precedence over this guidance document.

2 Regulatory and Compliance Framework

Secondary Generators are required to comply with all relevant Grid Code provisions for system restoration, including but not limited to the obligations set out in OC9 (Operational Code 9), which addresses system operation during restoration and OC5.7, which covers testing and monitoring of performance for restoration purposes.

In addition, compliance with CC/ECC7.10 and CC/ECC7.11 is required, ensuring adherence to specific procedures and technical requirements associated with system restoration and coordination during emergency conditions.

These references collectively ensure that Secondary Generators contribute effectively to the safe and efficient restoration of the electricity system following a Total or Partial Shutdown. Secondary Generators are required to comply with the applicable parts of data and registration code (DRC) schedule 16 and as detailed in PCA.5.7.3, they are required to submit evidence of compliance in their week 24 submissions.

DRC Schedule 16 Part I focuses on Generator's reasonable restoration cold start times which is different from normal cold start times. Data and Registration code (DRC) Schedule 16 Part II applies only to restoration contractors operating under a DRZP. If you do not hold a restoration contract, this section does not apply to you.

DRC Schedule 16 Part III sets out the assurance activities that each CUSC Party must be compliant with by 31 December 2026 to demonstrate resilience and readiness for restoration.

2.1 Compliance Timeline and Applicability

The restoration readiness requirements described within this guidance arise from a number of Grid Code obligations and ESRS-related activities and were not all introduced at the same time. The Critical Tools and Facilities requirements contained within CC/ECC7.10.1 to CC/ECC7.10.3 were introduced through Grid Code modification GC0148 and became applicable from 4 September 2024.

The introduction of DRC Schedule 16 through GC0156 does not create a new requirement for 72-hour resilience of Critical Tools and Facilities. Instead, it provides a structured process through which Generators demonstrate and provide assurance of their compliance with applicable restoration-related requirements, including Critical Tools and Facilities.

For existing Generators, compliance with all applicable ESRS related requirements described in this guidance should be demonstrated by 31 December 2026.

For any Generator seeking to achieve Interim Operational Notification (ION) after 31 December 2026, compliance with all applicable ESRS-related requirements should be demonstrated prior to the issue of ION.

The following is captured under Schedule 16, Part I and III of the data and registration code and should be submitted to NESO yearly through the week 24 process.

2.2 DRC Schedule 16 Part I

Reasonable restoration cold start time: The requirement is that assuming a Generator was running immediately prior to a Total or Partial Shutdown, and in the event of loss of all external power supplies, the Generator should provide the expected time it will take for the first and subsequent BM Units to be synchronised after the external site supplies have been restored at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours.

For clarity, external power supplies refer to electrical supplies provided from outside the generating plant, including TO and DNO networks. For assessment purposes, Generators should assume that supplies to their site, whether provided from the transmission system, distribution system or both, would be unavailable.

This requirement reflects restoration conditions where all external supplies may have been unavailable for an extended duration, plant may be operating under degraded conditions, and site access, communications and auxiliary systems may be constrained.

Generators should therefore ensure that declared restoration cold start times are realistic and achievable under restoration conditions, and reflect any operational, environmental, or technical constraints that may affect synchronisation.

Where capability is dependent on specific conditions (e.g. weather conditions for wind generation, or auxiliary systems), these dependencies should be clearly described within the "likely issues" section of the Schedule 16 Part I.

Likely issues: Describe any known or reasonably foreseeable factors arising from the technology, design, site configuration or operational arrangements of the Power Station and/or BM Unit that may significantly affect restoration activities or the time required to synchronise following a loss of external site supplies. This may include limitations relating to backup power, fuel supplies, communications, restoration dependencies, plant condition or the availability of individual BM Units following a Total or Partial Shutdown. Where generation availability, restoration timescales or operational limitations depend on particular assumptions, this should be clearly stated.

Block loading capability: Block loading capability describes a generating unit's ability to increase Active Power output from zero to its registered capacity in discrete steps without causing instability, protection operation, or plant trips.

Generators are required to provide an estimate of their block loading capability from 0 MW up to registered capacity including the size of each incremental loading step, the time interval between steps and any required hold points between increments.

The declared block loading capability should be valid for operation within a frequency range of 49.5 Hz to 50.5 Hz, in line with DRC Schedule 16 requirements. Block loading capability is critical during restoration, as it informs ENCC how generation can be safely added to a power island without destabilising frequency or voltage conditions. Block loading capability may vary depending on generation technology.

For synchronous Generators, block loading is typically defined as discrete MW step increases governed by turbine and Generator capability. For non-synchronous Generators, block loading capability is dependent on available resource (e.g. wind conditions) and control system capability (e.g. PPC). In such cases, block loading may not be suitably represented by discrete MW step changes.

Generators should therefore provide a realistic and conditional representation of their block loading capability. This may include an equivalent run-up (ramp) profile

indicating how active power output increases over time, including expected run-up rate (MW/min or equivalent), time to reach key output levels, and any limitations or dependencies (e.g. resource availability or control system constraints).

Governor setting information required: From 2025 onwards, Generators, HVDC System Owners and DC Converter owners are required to provide governor setting information in their Week 24 submission in accordance with the applicable requirements of CC.6.3.7(h) and ECC.6.3.7.3.8.

This requirement is intended to provide assurance that during islanded operation, the Generator's frequency control device (or turbine speed governor) does not have unintended implications on the main generating plant thereby reducing the risk of undesired plant-level control interactions (e.g. between governor, unit load controller and MW setpoint control) and unintended tripping during restoration.

Where a Generator does not have a conventional governor (e.g., Power Park Modules and Storage plant such as wind, solar or BESS), the Generator should provide the equivalent parameters and description for its power plant controller / power park controller (PPC) or other active power control system.

2.3 DRC Schedule 16 Part III

DRC Schedule 16 Part III is intended to provide assurance that, following a Total or Partial Shutdown, a Generator can determine whether its plant is capable of returning to service within its stated reasonable restoration cold start times once external site supplies become available and maintain that capability for up to 72 hours.

The requirements focus on ensuring that suitable site-specific arrangements are in place to support an informed assessment of plant readiness, enable the Generator to determine whether the plant can return to service within its stated reasonable restoration cold start times, and communicate that assessment when required.

The arrangements used to achieve this outcome will vary between sites and technologies and should reflect the Generator's specific plant design and operational arrangements. The requirements do not prescribe specific monitoring

systems, equipment or technical solutions, and full asset monitoring is not a default expectation.

Information provided under Schedule 16 Part III should be consistent with the reasonable restoration cold start times, likely issues, assumptions and limitations declared under Schedule 16 Part I.

A Part III submission should state whether the Generator considers the site compliant with each applicable assurance activity. The submission should briefly explain the site-specific basis for that conclusion, including relevant arrangements, assumptions, dependencies, known limitations and any actions still required to achieve compliance.

- **Resilience to a Total or Partial Shutdown for up to 72 hours**: The requirement is that following a Total or Partial Shutdown, a Generator's plant and equipment must be capable of safely shutting down without risk to plant or personnel and remaining in a safe state for up to 72 hours without external power supplies.

  The Generator should maintain sufficient resilience during this period to determine whether the plant can return to service once external site supplies become available. Following restoration of external site supplies, the plant should be capable of restarting within its declared reasonable restoration cold start times in accordance with CC/ECC7.11.

- **Voice Systems Resilience test for minimum 72 hours**: Generator voice communication systems used to support restoration activities must remain operational for a minimum of 72 hours following a Total or Partial Shutdown. Most Generators will have a designated Control Point equipped with Control Telephony provided by NESO in coordination with the relevant transmission licensees.

  The Control Telephony service provides a resilient communication route between NESO and the Generator's Control Point. Generators are responsible for ensuring that the Control Point and associated communication systems remain operational and resilient for a minimum of 72 hours during a restoration event. Control Telephony resilience to the Control Point does not,

by itself, demonstrate that the Generator's communication arrangements are resilient.

The Generator remains responsible for ensuring that the Control Point has the power supply, staffing or operational arrangements, and internal communication facilities necessary for Control Telephony to be accessed and operated throughout the 72-hour period. Public mobile telephone services should not be relied upon as the primary resilient restoration communication route.

Where the Control Point is located remotely from the generating plant, this responsibility extends to maintaining resilient communications between the Control Point and the generating plant for the same period. Further detail on communication requirements is provided in Section 3.

Compliance is not simply the provision of Control Telephony at the Control Point, but the ability to reliably communicate operational information between NESO, the Control Point and the generating plant throughout the restoration period.

The test should confirm that the designated voice route between NESO and the Generator's Control Point is accessible and operational. Where the Control Point is remote from the generating plant, the Generator should also confirm that the communication arrangements required to relay operational information between the Control Point and the plant are operational.

- **Critical Tools and Facilities Control Systems Resilience Demonstration:** Critical Tools and Facilities, as defined under CC/ECC7.10, refer to the tools and facilities required to enable a Generator to monitor, control and protect its Plant and Apparatus during a Total or Partial Shutdown. These tools and facilities should remain available and resilient for a minimum of 72 hours following a Total or Partial Shutdown.

The purpose of these requirements is to ensure that during a Total or Partial Shutdown, the Generator retains the decision critical control, monitoring, protection and communication capabilities necessary to understand the condition of its Plant and Apparatus and provide NESO with reliable information when contacted. This information supports the Generator's assessment of whether the plant is capable of returning to service within its stated reasonable restoration cold start times once external site supplies become available.

Generators are expected to demonstrate that appropriate and proportionate measures are in place to provide the information necessary to assess plant readiness during restoration conditions. Examples of Critical Tools and Facilities are provided in Appendix A for guidance and are not exhaustive.

NESO does not prescribe a specific technical solution, monitoring architecture, communication system, control philosophy or equipment list. The objective is to achieve the required restoration outcome.

Generators are responsible for determining the most appropriate arrangements for their individual sites and technologies. Different Generators may achieve compliance through different technical and operational solutions provided they can demonstrate that the required restoration assurance outcome has been achieved.

- **Cybersecurity:** Generators subject to the Grid Code should ensure that their critical tools and facilities are cyber secure in line with the Network and Information Systems (NIS) Regulations. Public guidance including the National Cyber Security Centre and Cyber Assessment Framework sets out good practice expectations for managing cybersecurity risk, protecting systems, detecting incidents, and supporting response and recovery. Generators should ensure they comply with applicable cybersecurity requirements and maintain the security and resilience of critical systems to support ongoing operation.

- **Telephony services test:** To ensure that communication infrastructure and applications are maintained to a high standard, an end-to-end confirmation of the voice route should be carried out through a live test at least once a year. This may include a routine call between NESO and the Generator's Control Point to confirm that the voice route is operational. Where the Control Point is located remotely from the generating plant, the communication arrangements between the Control Point and plant should also be tested at least annually.
- **Restoration Procedure review:** CUSC Parties should have internal operational procedures in place, so their staff are trained and aware of the actions they need to take in the event of total loss of supplies at site. Parties should review all relevant restoration related procedures to ensure these are up to date and available should a Total or Partial Shutdown occur. Refer to Table 1A and Table 1B below for the restoration control room questions that may be asked before or during a restoration event.
- **Training:** Actively participate in exercises and training coordinated by NESO.

Collectively, the Part III assurance activities are intended to provide confidence that, during a Total or Partial Shutdown, Generators can determine whether their plant remains capable of returning to service within their stated reasonable restoration cold start times once external site supplies become available and provide NESO with reliable information regarding that capability. The arrangements used to achieve this outcome may vary between technologies and sites and should reflect the Generator's specific plant design and operational arrangements.

2.4 Where Compliance Challenges Exist

Derogation may be sought where compliance with specific requirements cannot reasonably be achieved. This may arise in a number of circumstances, such as demonstrable technical limitations that make implementation impossible, prohibitive costs associated with the necessary modifications, or situations where the required changes would be disproportionate given the remaining operational life of the generating plant.

For example, derogation could be considered if the plant is nearing decommissioning, if original equipment manufacturers (OEMs) are no longer in

business and replacement parts or technical support cannot be sourced, or if there are fundamental design constraints that cannot be overcome without extensive and unreasonable expenditure.

It is important that Generators follow the established Grid Code derogation process and engage proactively with NESO at an early stage. This approach ensures that all relevant issues are documented and assessed transparently. Generators should provide clear evidence and supporting documentation outlining the barriers to compliance, including technical reports, cost analyses, and details of the plant's operational history and future plans.

NESO will review these submissions in detail, considering the broader impact on system security and resilience. Where derogation is granted, it may be subject to specific conditions or time limits, and Generators are expected to cooperate fully with any monitoring or mitigation measures required.

3 Restoration Process Overview

In the event of a Total or Partial Shutdown, ENCC and the relevant TOs assume responsibility for emergency system operations, coordinating the overall response and prioritising the protection of personnel and assets. Their immediate focus is on stabilising the network to reconnect customers whilst ensuring that safety protocols are rigorously followed throughout all affected sites.

All parties are required to adhere to established shutdown procedures, ensuring that plant and equipment are safely brought offline. This coordinated approach helps to prevent damage, maintain integrity of essential infrastructure, and position each site for an orderly and timely transition into the restoration phase. A list of questions that may be asked to Generators during a restoration event is shown in Table 1A and Table 1B below. Generators must ensure that their staff are appropriately trained to respond to these questions and requests.

From the Generator's perspective, the restoration process is structured into several distinct stages, which may overlap or occur in parallel depending on regional circumstances. Communication between ENCC and Generators can occur at any stage. These stages provide a clear framework for organised recovery and are designed to align Generator actions with ENCC directives, ensuring effective system wide coordination.

Stage 1: System Shutdown and Stabilisation

When a National Power Outage (NPO) occurs, Generators experience a loss of all external supplies and significant changes in network conditions. Plant responses will depend on the Generator's operating state and will occur in accordance with its protection, control and safety systems. The primary goal during this stage is to ensure plant integrity and safety as detailed in CC/ECC7.11 and maintain readiness for subsequent restoration activities. During this stage, NESO may initiate communications with Secondary Generators to gather key information on plant status, availability and readiness.

Stage 2: LJRP and DRZP Enactments

Restoration Contractors pre-selected for their self-start capabilities are instructed by ENCC to energise isolated sections of the network. These initial islands which are formed through the establishment of Local Joint Restoration Plans (LJRPs) or

Distribution Restoration Zone Plans (DRZPs) operate under tight frequency and voltage control with only essential plant connected to manage risks.

Stage 3: Communication with Secondary Generators

As restoration progresses, ENCC may contact Secondary Generators before or after external site supplies become available to obtain an updated assessment of plant condition, availability and expected restoration capability.

These communications may occur before a power island reaches the Generator's connection point. Generator control rooms should be prepared to provide up-to date information including any assumptions, limitations or uncertainties affecting whether the plant can return to service within its stated reasonable restoration cold start times.

During a Total or Partial Shutdown, public communication arrangements cannot be assumed to be available or reliable. Generators should therefore ensure that the site-specific arrangements identified as necessary to support restoration readiness remain available for up to 72 hours in accordance with the applicable requirements described in Section 2.3.

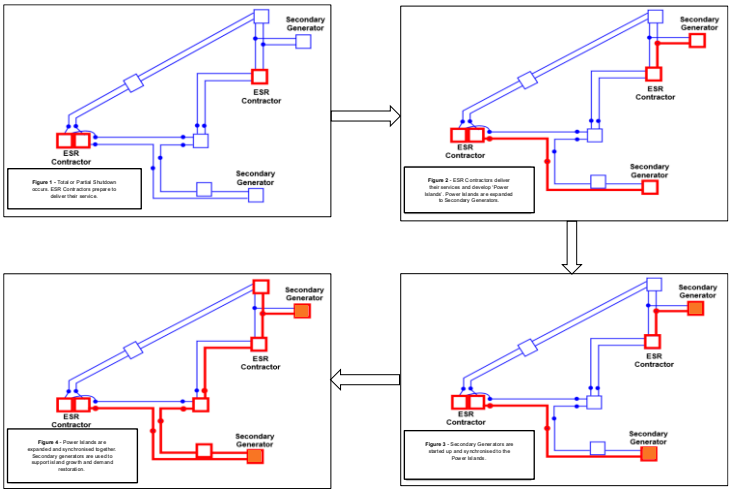
Stage 4: Synchronisation of Secondary Generators

Secondary Generators are contacted and instructed to prepare for synchronisation which only proceeds when system conditions permit. Accurate reasonable restoration cold start times and declared capabilities are essential at this point as Generators need to connect within their reasonable restoration cold start times as confirmed in their DRC Schedule 16 Part I submission. Generators must not synchronise back to the network during a restoration event unless instructed by ENCC.

Stage 5: Expansion and Reintegration

Islands are gradually expanded and interconnected, with demand systematically restored in phases. Secondary Generators may be required to operate flexibly, adapting to evolving system needs. The involvement and preparedness of Secondary Generators can affect both the timing and resilience of reintegration

activities. The diagram below shows an example of the system restoration sequence.



Restoration Sequence Diagram

By following this staged approach, Generators contribute to a robust and well-aligned restoration process, facilitating efficient coordination with the ENCC and ensuring that the electricity system can be safely and reliably brought back online following a Total or Partial Shutdown.

4 Secondary Generator Duties and Expected Actions Before, During and After Restoration Event

The role of Secondary Generators spans the entire restoration lifecycle, encompassing preparation prior to an event, operational actions during a Total or Partial Shutdown, and compliance throughout the recovery process.

4.1 Duties in preparation for Restoration Event

Generators are expected to prepare for restoration before a Total or Partial Shutdown occurs. This preparation underpins all subsequent actions. At a minimum, Generators should ensure that:

1. A comprehensive restoration plan is in place in accordance with the restoration procedure review requirements described in Section 2.3. This plan should set out the necessary procedures and arrangements for responding to a restoration event, ensuring site readiness, clear operational roles, and robust procedures for managing restoration activities in line with ENCC instructions.
2. The Control Point is clearly defined and has the power supply, staffing or operational arrangements and communication facilities necessary to remain operational for at least 72 hours following a Total or Partial Shutdown. Where the Control Point is remote from the generating plant, the communication arrangements necessary to obtain and relay operational information between the Control Point and plant should also remain available for the same period.
3. Communications systems including control telephony are installed, accessible, and tested at least once a year. As NESO progresses toward market restoration, Generators must ensure they have the necessary staffing and technical resources in place to resume EDT and EDL updates as soon as these systems are fully operational. This includes maintaining up-to-date operational data and being ready to submit required updates promptly.

4. The minimum staff required during the restoration event with the appropriate authority and competence are identified and available to support restoration activities.

4.2 Duties and Expected Actions During a Restoration Event

Following a Total or Partial Shutdown, Generators should assume the following conditions until confirmed otherwise:

- External electrical supplies may be unavailable for an extended period.
- Telecommunications and other utilities/services may be degraded.
- Access to site may be restricted.

Generators must therefore allow plant to shut down safely without posing risk to equipment and personnel and they are required to preserve plant integrity, avoiding damage that would delay restart, maintain essential control, monitoring, and communication functions using on-site resilience measures and avoid unauthorised restart attempts or configuration changes. At this stage, generators should not attempt to synchronise unless instructed by ENCC and in Scotland, the relevant TOs may be responsible for this communication.

Generators should not rely solely on dispatching personnel to site following a Total or Partial Shutdown as the means of determining plant readiness or enabling the plant to return to service once external site supplies become available. During a Total or Partial Shutdown, the feasibility of such actions is significantly hampered, given that essential infrastructure services such as roads, railways, water supply, communications, and sewage services etc are likely to be non-operational. Consequently, this may lead to extended restoration times and increased operational challenges.

For those reliant on diesel or alternative fuels for auxiliary power, it is particularly important to adopt a realistic approach to fuel management. This includes having a comprehensive grasp of actual consumption rates under restoration conditions, ensuring sufficient fuel is available to support the required restoration functions for at least 72 hours, as reliance on daily deliveries cannot be guaranteed during a national outage.

In the event of a Total or Partial Shutdown, **Generators should refrain from contacting ENCC unless strictly necessary to prevent congestion of communication and diverting resources from restoration activities.** ENCC will normally communicate directly with Secondary Generators to obtain information on plant condition, availability and restoration capability.

In Scotland, communications with Secondary Generators may also be undertaken by the relevant TOs where restoration activities have been delegated or where communications between ENCC and the Scottish TOs are unavailable.

Generators should be prepared to respond to the following types of questions in a timely and accurate manner. These questions are indicative and may vary depending on system conditions and the specific requirements of the restoration process.

Questions	Description
What is the current known condition of the Plant and Apparatus?	Provide the best available information on the condition of the plant, including whether the site remains safely shut down and whether any significant change in condition has been identified.
What information is currently available to assess the plant's restoration readiness?	Confirm the information available through the site's control, monitoring, protection and communication arrangements. Where the assessment is based on limited or last known information rather than current plant status, this should be clearly stated.
Are any resets, inspections, operator actions required before start-up can begin?	Identify any actions required to prepare the plant for return to service, together with any associated timescales or dependencies.
Are there any known reasons the plant would be unable to return to service within	Provide the Generator's current readiness assessment and identify any issue that could affect plant availability or delay return to service. Where the assessment is conditional, the relevant assumptions,

its stated reasonable restoration cold start times?	dependencies, limitations and uncertainties should be clearly stated.

Table 1A: Information required before external site supplies are available

Questions	Description
Have the required external site supplies been restored?	Confirm that the supplies necessary to commence the plant's start up process are available and identify any remaining supply limitations.
Which BM Units are available to return to service?	Confirm the units currently expected to be available and identify any units that are unavailable or subject to restrictions.
What is the expected time for each available BM Unit to synchronise?	Provide the current expected synchronisation time, taking account of the actual plant condition and the stated reasonable restoration cold start times.
Are there any outstanding checks, resets, inspections or operator actions?	Confirm any remaining actions required before the plant can be made ready for synchronisation and the expected time required to complete them.
What is the current capacity for each available BM Unit?	Confirm your technical capability for the following parameter: • Units Available • Stable export limits (SEL)- Minimum Stable Operating Level • Maximum export limit (MEL)- Maximum capacity • Reactive power capability • Block loading capability
What block loading or run up	Confirm the loading capability of the available units and any restrictions on the rate or size of loading changes.

capability is available?	
Are frequency response and droop operation available?	Confirm if the following operational modes are available: • Frequency response • Droop mode

Table 1B: Information required once external site supplies are available

Generators should ensure that this information is readily available at the Control Point and that staff are trained to provide responses under restoration conditions. Where full real-time data is not available, Generators may provide best available information or previously declared values together with any known limitations.

Following this exchange, and subject to instruction from ENCC, Generators may be directed to prepare for synchronisation. Generators should follow their internal restoration procedures, carry out the necessary preparatory checks and once the required external site supplies are available, start the available units and prepare them for synchronisation within their stated reasonable restoration cold start times. Generators should synchronise only when instructed by ENCC or in Scotland, the relevant TOs.

Generators should carry out all necessary checks to confirm readiness, communicate any limitations promptly, and avoid unnecessary delays or additional internal approval processes that may impact timely response to instruction as well as avoid introducing last minute configuration changes unless explicitly agreed with ENCC.

During synchronisation, system conditions may be outside normal operating ranges. ENCC may specify timing, loading, or operational constraints. Generators should ensure that block loading and control behaviour align with declared capabilities and should closely monitor plant performance during initial operation.

Once synchronised, Generators remain under the direction of ENCC or, in Scotland, the relevant TOs until restoration is complete. During this period, Generators may be required to hold output steady, vary output to support system stability, operate in frequency responsive mode and remain available for further instructions as restoration progresses.

4.3 Post Event Review

Following restoration of the GB network and reinstatement of market operations, Generators are recommended to undertake a review of plant performance during the restoration event. This may include consideration of start-up and synchronisation performance, operational challenges or constraints encountered, effectiveness of communication with ENCC or, in Scotland, the relevant TOs and alignment of plant performance with declared capabilities.

The outcomes of this review may be used to update restoration procedures and improve future readiness. This process supports continuous improvement and alignment with Schedule 16 assurance activities.

5 Appendix A

Illustrative Tools and Facilities That May Support Restoration Readiness

The following table provides illustrative examples of systems and functions that may be used to support compliance with the requirement of critical tools and facilities (CC/ECC7.10). These examples are provided for guidance only and do not represent a mandatory equipment or monitoring list. The specific systems and arrangements may vary depending on plant type, size, and configuration. In practice, essential functions may include:

Function	Required Outcome	Illustrative Examples
Control	Ability to assess plant status and maintain or restore operational control following a partial or Total Shutdown.	**Synchronous:** DCS, turbine control systems. **Wind:** Turbine control systems, wind farm controller, Power Park Control (PPC). **Solar PV:** Inverter control system, PPC. **BESS:** Energy Management System (EMS), PPC, battery control systems.
Protection	Ability to maintain appropriate protection functions and identify abnormal plant conditions.	**Synchronous:** Generator and transformer protection relays. **Wind:** Turbine and converter protection systems. **Solar PV:** Inverter and transformer protection systems. **BESS:** Battery, inverter and transformer protection systems.
Monitoring	Ability to determine whether the plant remains in a safe condition and assess readiness to return to service.	**Synchronous:** SCADA, plant alarms, equipment status indications. **Wind:** SCADA, turbine status

Function	Required Outcome	Illustrative Examples
		monitoring, alarm systems. **Solar PV:** SCADA, inverter monitoring, alarm systems. **BESS:** BMS, SCADA, battery status monitoring, alarm systems. ***Additional examples:*** *CCTV or remote visual monitoring may support situational awareness where appropriate.*
Communication	Ability to exchange information and communicate internally and externally to support restoration activities.	Control telephony, remote communications systems, operational communications and data exchange systems.
Auxiliary Support	Ability to maintain essential services required to support the above functions and facilitate return to service.	**Synchronous:** DC systems, UPS, auxiliary power systems. **Wind:** Auxiliary power supplies, UPS, communication power systems. **Solar PV:** Auxiliary power supplies, UPS. **BESS:** Auxiliary power supplies, UPS, battery-backed control and communication systems.

Table 2: Illustrative Tools and Facilities That May Support Restoration Readiness

Table 2 does not represent a mandatory equipment or monitoring list. The inclusion of a system in the table does not mean that every Generator must provide 72 hour resilience for that system. Generators should first identify the minimum information and functions required to determine plant condition and restoration readiness for their specific site. They should then identify the tools and facilities necessary to provide those functions. Full asset monitoring is not a default expectation.

Generators should determine, through a site-specific assessment, the minimum set of systems required to support these functions. Systems that are not required to support control, monitoring, protection, communication or safe operation during restoration may not need to be maintained for the full 72-hour duration.

Overall, Critical Tools and Facilities are required to provide sufficient information to understand the relevant condition and integrity of the plant during the loss of external site supplies and determine and communicate whether the plant is capable of returning to service within its stated reasonable restoration cold start times once external site supplies become available.