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Restoration Technical Requirements and Specification

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Version Control

Version number	Date	Notes
V1	24 March 2025	Initial version published at EOI. Please note this document may be updated at ITT stage following market feedback and/or learnings in-between EOI and ITT stages of the tender process.
V2	16 January 2026	Updated version during the ITT window, providing clarification on some of the ESR technical specification requirements. Some minor typo corrections have also been made. Amends can be identified by the 'V2 Clarification' indicator.
V3	16 March 2026	Updated version during the ITT window, providing clarification on the SCL requirements for this ESR service. Amends can be identified by the 'V3' indicator.

Introduction

This technical specification is made up of the follow parts:

- Part 1 – Regions of Needs
- Part 2 – Restoration Specific Eligibility Criteria
- Part 3 – Restoration Service Specification

Part 1 – Regions of Need

NESO are seeking any proposals that contribute towards meeting the Electricity System Restoration (ESR) standard across Great Britain. Any proposals received will be considered by NESO in line with the published assessment methodology.

Part 2 – Restoration Specific Eligibility Criteria

- New/Additional Capability
  - Solutions must be either: new, providing additional capability through incremental investment,
    - A new solution is:
      - Any solution with a new connection offer or connection agreement received after 30/09/2024 or;
      - Anything registered on TEC after 30/09/2024
    - A solution providing additional capability through incremental investment is:
      - Anything with a connection agreement in place prior to 30/09/2024 or on TEC register prior to 30/09/2024 but following 30/09/2024 is:
        - Making a modification to install additional restoration capability beyond any existing capability

- V2 Clarification**:** Primary Service Solutions must meet the relevant Grid Forming requirements for either GBGF-I or GBGF-S in ECC.6.3.19. Top-Up Service Solutions must also meet the relevant Grid Forming requirements for either GBGF-I or GBGF-S in ECC6.3.19 where they are offering either Short Circuit Level or Inertia as an optional requirement. Where a Top-Up Service Solution is not offering either Short Circuit Level or Inertia as an optional requirement, then they do not need to meet the relevant Grid Forming requirements.

- V2 Clarification: Solutions must remain compliant with all Grid Code requirements throughout the entire operating range.

Part 3 – Restoration Service Specifications

3.1 Availability

This tender is seeking solutions to be available for 80% of Settlement Periods.

3.2 Sizing and Number of Solutions

All minimum size requirements are listed within Section 3.3 and 3.4 below.

3.3 Technical requirements - Primary Restoration Service Providers

A potential Primary Restoration Service Provider must be able to provide all minimum technical requirements listed below under the relevant section. The potential Primary Restoration Service Provider may achieve this through adaptations proposed in the Feasibility Study, or by contracting

with other parties if they cannot meet all of the below themselves. The Primary Restoration Service Provider must be able to meet the technical requirements at one point of connection.

Requirement	Minimum	Definition	Rationale
Time to Connect	≤ 2hours	Time taken to start-up the Restoration Station from shutdown without the use of external power supplies, and to energise part of the NETS, within two hours of receiving an instruction from the National Energy System Operator (NESO) or its delegate.	As per the Grid Code requirement (OC9.4.5.1).
Or Phase 2 Time to Connect	2 - 24hours	Time taken to start-up the Restoration Station from shutdown without the use of external power supplies, and to energise part of the Network, within 2-24hours of receiving an instruction from the National Energy System Operator (NESO) or its delegate.	Primary Restoration Service Providers with the ability to re-start and contribute to Restoration.
Or Phase 3 Time to Connect	24 - 72hours	Time taken to start-up the Restoration Station from shutdown without the use of external power supplies, and to energise part of the Network, within 24-72hours of receiving an instruction from the National Energy System Operator (NESO) or its delegate.	Primary Restoration Service Providers with the ability to re-start and contribute to Restoration.
Service Availability	≥ 80%	The ability to deliver the contracted Restoration Service over 80% of a year. Note: It is the responsibility of the Provider to demonstrate its service availability. By submitting a tender, the provider commits to ensuring availability at least 80% of each year of the service.	Primary Restoration Service Providers are expected to have a high restoration service availability so that they can be relied upon in the instance of a Total or Partial shutdown, which could happen at any time.
Voltage Regulation	Existent	Ability to create a voltage source and remain connected within acceptable limits during energisation/block loading (±10%).	During events such as load pick-ups, Primary RSPs will need to maintain voltage (within limits) when creating, maintaining, and expanding a power island following instructions from the NESO.
Frequency Regulation	Existent	Ability to manage frequency level when block loading (47.5Hz – 52Hz).	During a restoration event, a Primary RSP will need to maintain frequency within limits when creating, maintaining, and expanding a power island following instructions from the NESO.

Resilience of Supply, Restoration Service	≥ 10hours	When instructed, the minimum time the RSP will deliver the contracted service.	To support restoration of the NETS.
Resilience of Supply, Restoration Auxiliary Unit(s)	≥ 72hours	Run continuously at the output required to support / deliver the contracted restoration Service	The NESO or it's delegate would not instruct all Primary RSPs at the same time therefore this is to allow for Primary RSPs to remain ready and instruct able anytime within the resilience period.
Block Loading Size	≥ 10MW	Capability to accept loading of demand blocks continuously during contracted service time.	The restoration approach for GB going forward will be a combination of top-down approach and bottom-up approach. The Primary RSP must be able to match the DNO's ability to segregate and switch the Distribution Network remotely.
Contracted Active Power	≥ 50MW	Minimum capability to provide active power continuously.	To support local demand restoration
Reactive Capability	≥ 50MVAr Leading	Ability to continuously energise part of the NETS, managing Voltage with Leading or lagging capability whilst active power is zero.	Primary RSPs must be able to re-energise parts of the National Electricity Transmission System (NETS), with no load. The higher the reactive capability of a provider, the more quickly access to demand can be achieved.
Sequential Restoration attempts	≥ 3	Ability to perform at least three sequential start-ups after a failure at any stage of start-up.	To allow for possible tripping of the NETS during the re-instatement period, or trips during the Primary RSP's own starting sequence.
Short-circuit level (SCL) (following the start of a system disturbance)	**V3**: For t = 40ms Where, $I \geq \frac{240\ [\mathrm{MVA}]}{\sqrt{3} \cdot U}$ [kA] U= connection voltage [kV]	Remain the continuous capability of Injection of reactive current during a disturbance.	The higher the SCL, the quicker Power Islands are developed. **V3**: This requirement should be demonstrated via appropriate simulation in line with the published simulation requirements. Bidders can also choose to submit a Fault Ride Through test at their discretion.

Inertia Value	≥400 MVA.s	Stored energy available in the RSP for immediate release in response to changes in power levels and thereby helping to maintain frequency and voltage on the power island within acceptable bounds. (This inertia can be provided through GBGF-S, or GBGF-I plant). The service is required to be continuous during contracted service time.	If more Inertia is provided, larger active power imbalances may be managed across re-energisation, enabling larger demand blocks and generation that is not synchronous to be restored earlier than would otherwise be possible.

3.4 Technical requirements - Top-up Restoration Service Providers

A potential Provider of a Top-up Service for Restoration must be able to provide all the Mandatory Requirements (Resilience, Availability, Frequency Regulation and Voltage Regulation) and at least one of the others listed below. The potential Provider of a Top-up service for Restoration may achieve this through adaptations evidenced by their Feasibility Study, or by contracting with other parties if they cannot meet all of the above themselves.

Mandatory Requirements

Requirement	Minimum	Definition	Rationale
Resilience	≥ 72h	Ability to maintain a state of readiness that will enable the Restoration Service Provider, once external electrical supplies are re-established, to receive an instruction from the NESO and Start-Up in alignment with the expected behaviour under normal operating conditions.	Increase likelihood of availability/readiness of generation to support Restoration.
Resilience of Supply, Restoration Service	≥ 10hours	When instructed, the minimum time the RSP will deliver the contracted service.	To support restoration of the NETS.
Service Availability	≥ 80%	The ability to deliver the contracted Restoration Service over 80% of a year. Note: It is the responsibility of the Provider to demonstrate its service availability. By submitting a tender, the provider commits to ensuring availability at least 80% of each year of the service.	Aligned with Primary RSPs, Providers expected to have a high availability so that they can be relied upon in the instance of a Total or Partial shutdown, which could happen at any time.
Voltage Regulation	Existent	Ability to manage voltage and remain connected within acceptable limits during energisation/block loading	Grid Code CC.6 / Grid Voltage Variations
Frequency Regulation-	Existent	Ability to manage frequency and remain connected within	Grid Code CC.6 / Grid Frequency Variations

		acceptable limits during energisation/block loading.	

At least one of the Requirements below

Requirement	Minimum	Definition	Rationale
Block Loading Size	≥ 10MW	Capability to accept instantaneous loading of demand blocks continuously for the contracted restoration service time.	The restoration approach for GB going forward will be a combination of top-down approach and bottom-up approach. The Primary RSP must be able to match the DNO's ability to segregate and switch the Distribution Network remotely.
Reactive Capability	≥ 50MVAr Leading	Ability to energise part of the NETS, managing Voltage with Leading or lagging capability whilst active power is zero. The service is continuous during contracted service time.	Primary RSPs must be able to re-energise parts of the National Electricity Transmission System (NETS), with no load. The higher the reactive capability of a provider, the more quickly access to demand can be achieved.
Short-circuit level (SCL) (following the start of a system disturbance)	**V3**: For t ≤ 40ms Where $I \geq \frac{240\ [\mathrm{MVA}]}{\sqrt{3} \cdot U}$ [kA] U= connection voltage [kV]	Injection of reactive current during a disturbance. The service is continuous during contracted service time.	The higher the SCL, the quicker Power Islands are developed. **V3**: This requirement should be demonstrated via appropriate simulation in line with the published simulation requirements. Bidders can also choose to submit a Fault Ride Through test at their discretion.
Inertia Value	≥400 MVA.s	Stored energy available in the RSP for immediate release in response to changes in power levels and thereby helping to maintain frequency and voltage on the power island within acceptable bounds. (This inertia can be provided through GBGF-S, or GBGF-I plant). The service is required to be continuous during contracted service time.	If more Inertia is provided, larger active power imbalances may be managed across re-energisation, enabling larger demand blocks and generation that is not synchronous to be restored earlier than would otherwise be possible.

3.5 Operational Metering Requirements

Providers will be required to provide operational metering if successful and offered a restoration contract. As a minimum the NESO Control Room will require a live feed showing:

- Frequency (Hz)
- Voltage (kV)
- Availability of Contracted Units (for each contracted Unit, Available/Unavailable)
- Power Output – MW
- Power Output – MVAr

Specifically for Wind Providers we are also expecting the additional information:

- Wind speed forecasts and observations (ms^{-1})
- Wind direction forecasts and observations (degrees)

3.6 ESR Communication Lines

All providers who are awarded a tender through this competitive procurement event are responsible for ensuring that the ESR telephone/comms line is always working effectively during the contract. It is the providers responsibility to test this at regular intervals in line with the tender terms.

3.7 Commissioning Test Requirements

V2 Clarification: Providers who are awarded a contract, must make necessary arrangements for a Commissioning Assessment test before the service can go-live. Requirements for this test are stated within the following published document “LT29 ESR Operational Metering Commissioning Assessment and Testing Guidance V5.pdf”. This document is currently V5 but from time to time this document may be updated. Providers should always refer to the latest version.