

Electricity System Restoration (ESR)

Northern Tender 2022

Project development - feasibility assessment process

Background

Electricity System Restoration (ESR) project development for Electricity System Operator (ESO) takes the form of a phased, two stage feasibility process. This approach will be applicable for all categories within this tender detailed below

Category	Description
Primary Restoration Service Provider	The ability to self-start and meet the full technical requirements to energise and block load at transmission or distribution level.
Top-up Service	The ability to self-start, can meet some of the technical requirements outlined for a primary service and further assist Restoration.
Anchor Generator (Distributed ReStart)	The ability to self-start and establish an independent voltage source at distribution network level.
Top-up Services (Distributed ReStart)	Can provide supplementary services required to fulfil the technical capability of a Distribution Restoration Zone (DRZ) such as energy (MWs), fast MW control, frequency control, voltage control and short circuit level (MVArS).

The detail of the Stage 1 Feasibility (F1) will be dependent on what category you tender in for. Each category will have a set of questions which will reflect the technical requirements of the service. The F1 requires a potential ESR Service Provider to assess the capability of providing the ESR service, together with some preliminary work to consider possible solutions. It allows the project to terminate at an early stage should the solution be deemed inappropriate for provision of the service.

The objective is to give enough information and confidence that the plant can meet the 'technical requirements' for the category of ESR you have tendered in for and that a decision can be taken about moving to a full design stage.

If the outcome of F1 is a decision to progress to a full design stage, then the ESO will instruct the tenderer to proceed to scoping a Stage 2 Feasibility (F2).

The aim of F2 is to provide a comprehensive and robust technical and commercial evaluation of the proposed service to enable progression to a contractual negotiation or tender. It is important to highlight that the scope of works for the F2 must be reviewed and agreed between ESO and the potential ESR service provider before any work should start on the F2 itself.

The outcome of F1 and F2 are dedicated reports (F1 Report, F2 Report). Both reports should be prepared using dedicated templates, which will be provided by the ESO. Where a section requires a format, details will be provided within the template. Each report should provide sufficient confidence in the capability of the service provider to support a decision to continue with the feasibility process.

Depending on the service bid for, the ESO can make a capped contribution of up to £150,000 towards these F2 studies (in line with historical spend) which will be contractually agreed with a side letter.

Providers are expected to minimise these costs to reduce the impact on the end consumer and will only be reimbursed for costs once invoices and supporting evidence of costs incurred are received and validated by ESO. Costs will be reimbursable following closure of the F2 assessment period and following satisfactory responses to all clarifications being issued by ESO during the assessment period.

Stage 1 Feasibility, F1

The objectives of F1 are to:

- Confirm ability to deliver the ESR service category you have tendered in for in alignment with the minimum technical requirements.
- Identify cost effective options for the proposal.
- Provide indicative project timescales for the development, construction and/or commissioning of the ESR plant.
- Source data required for F2 network study modelling (if required) with neighbouring sites.

1. Confirm ability to deliver the ESR service in alignment with the minimum technical requirements defined within the chosen tender category

Key generic capabilities of the ESR Service are given in “Appendix 1 technical requirements and assessment criteria” document.

The F1 should include details of, but is not limited to, the following (where applicable):

- Expected time to connect, identifying start up sequence.
- Reactive capability at various loading points.
- Expected block loading (BL) profile to achieve the contracted output (active power contracted).
- Identification of any constraints in the start-up / BL process (hold points, max time at full speed no load/low load levels, critical load points, etc.).
- Effect of warmth states on the time to connect and BL capability.
- Ability of the service to meet at least 80% availability.
- Summary of site control room and site arrangements, resilience, and telecoms.
- Difference(s) in characteristics between individual modules (if any).
- Resilience to a national power outage event
- If an inverter-based connection (for example: interconnector) identify any network studies required where the ESR operating mode of the equipment differs from that used for the connection studies.

2. Identify cost effective options for your proposal

For example - the study should include an initial assessment of the sizing requirement for the ESR auxiliary unit(s), together with a preliminary assessment of any possible options to meet this requirement:

- Any existing unit(s)
- New unit(s)

This will depend on the specific requirements and options available at the ESR Plant in question. The study should make initial considerations as to the environmental, civil and geological factors around the proposal.

3. Provide indicative project timescales for the development, construction and/or commissioning of the ESR Plant

F1 Report should include indicative completion times for each step and option.

Stage 2 Feasibility, F2

Prerequisites

Prior to commencement of an F2 Study and associated F2 Report, a scope of works for delivering the report (including costs and programme) must be delivered and approved by ESO.

Study and Report

The objectives of F2 are to:

- Confirm technical capability, detail, and how will the ESR service be delivered.
- Provide an Implementation Strategy.
- Develop network modelling to ensure the ESR service will not cause any impact or damage to third party plant or equipment, where the service is provided in an alternative operating mode.
- Provide a commercial offer for the ESR service.

1. Confirm capability and detail how will the ESR service be delivered

It is anticipated that the Original Equipment Manufacturer (OEM) will be consulted at this stage to provide assurance of any stated capability, with appropriate engineering analysis being evidenced. Confirmation of capability should be to a sufficient level to agree a contract for delivery of a ESR service.

As a guide, the F2 Report should include but not be limited to the following content and can be different for the specifics of each individual project:

- a. Confirmation of Capability (above that explored under the F1 Study and backed up with physical or simulated evidence):
 - ESR capability, operation, and control of the equipment/Plant, confirmed by the OEM.
 - Start-up power requirements / profile with any peak requirements.
 - Typical time to connect and start-up sequence in ESR mode (if variable, for example warmth state, detail accordingly).
 - Block loading profile, and requirements to achieve the 'Minimum Stable Operating Level'. Any variation in block loading capability due to equipment status, output level or energy/fuel supplies.
 - Identification of any timing constraints in the start-up or block loading process, specific hold points, maximum durations at low load levels, critical load points.
 - Resilience of Supply (ESR service and ESR auxiliary unit(s)).
 - Reactive capability at various loading points, including initial energisation (c0MW).
 - Ability to meet 90% availability requirement – assessed over typical maintenance cycle and merit order where appropriate.
 - Any differences between modules/ poles/ or units.
- b. ESR auxiliary unit(s) capability
 - Capability to start without external supplies and provide sufficient power output to enable the delivery of the contracted ESR service.
 - Governor investigations as necessary.
 - Start-up times, reliability, and availability.
 - Fuel supplies and durations.
 - Auxiliary single line diagram.
- c. ESR operation

- Conceptual design, control philosophy, supporting study work and any physical testing requirements to confirm capability. This should consider the capability of neighbouring sites likely to undertake 'Power System Synchronisation of Power Islands'.
- Control room and plant staffing summary and review to achieve the 24h availability of the service.
- Systems' resilience review noting telecommunication and systems' resilience to a blackout event, and their physical location.

d. ESR equipment schedules – existing and new

- Existing to include assessment of fitness for purpose and any modifications required.
- New to include general specifications and scope.
- Civil installations required.
- Balance of plant general arrangements.
- Single line diagrams.
- Typically includes auxiliary generation and starting equipment, electrical interconnections, fuel system, main and aux control systems, protection – energising and synchronising systems.

2. Provide an Implementation Strategy

- Build/Install programme plan, including the steps and timelines for the following:
 - Consents
 - Purchasing
 - Commissioning
 - Outage requirements
- Consents – please explain what will be required, and how the provider will ensure that at the time of F2 report submission, the provider will be confident that any necessary consents or permits will be in place to achieve the delivery timeline
- Operation and maintenance strategy
- Risks

3. Any network modelling to ensure the ESR service will not cause any impact or damage to third party plant or equipment, where the service is provided in an alternative operating mode

Where applicable.

4. Provide a commercial offer for the ESR Service

Capital Cost Estimates Recovery of capital costs will be agreed on an open book basis. Full and detailed breakdowns of all costs should be provided here, and ESO reserves the right to employ consultants to evaluate the designs and cost structures as part of the tender:

- Project development
- Main equipment
- Construction
- Monthly availability fee
- Service readiness strategy (Commercially viable runs, preparedness capability, etc.)