Distributed ReStart

Appendix 1 – Mock Tender Requirements Document

Procurement and Compliance
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In partnership with:

tnei

SP ENERGY NETWORKS

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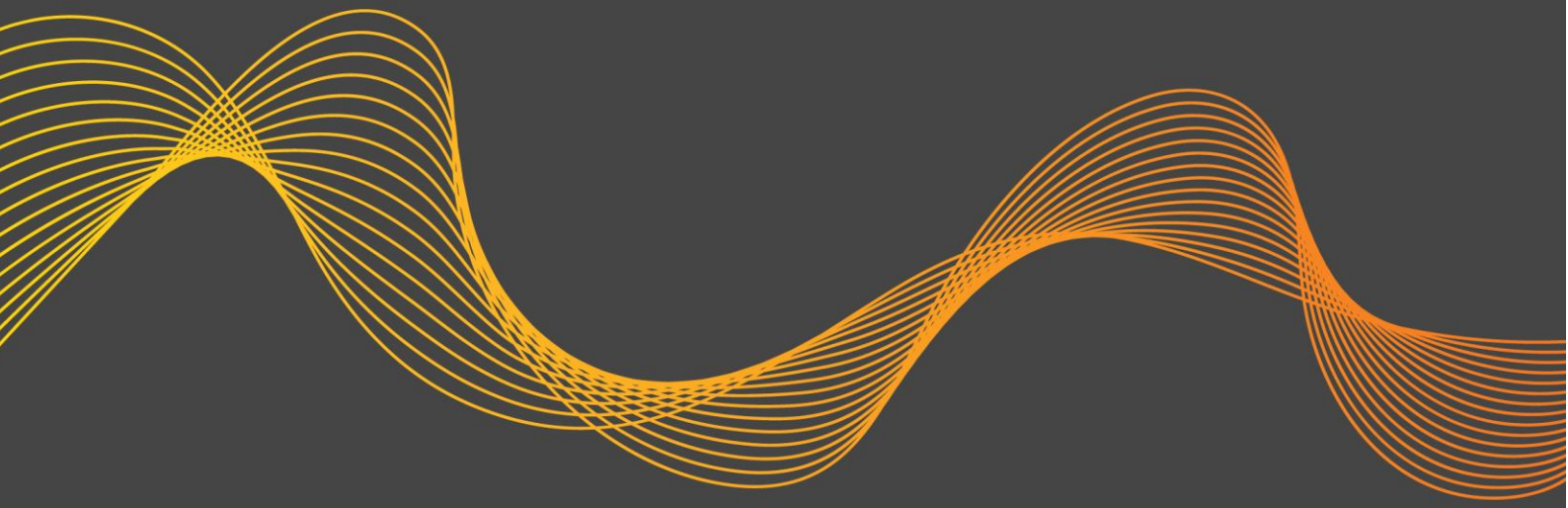

Context

Make sure you have read through the Invite to Test Procurement Event document, which talks you through the process and gives you the context to participate in this event.

Contained within this document is the supporting information for the Test Procurement Event, and it will equip you with the information required to participate in the event.

We will be looking for feedback on the information provided and whether it equips you with the knowledge you need to participate in a tender.

What's inside?

1. Draft functional requirements – These are the minimum requirements that a provider will need to meet.
    a. In this Test Procurement Event we are not expecting participants to conduct detailed feasibility study work to meet these requirements, but we do want to understand what it would take for you to meet the requirements specified.
    b. The functional requirements have been split into anchor generator and top-up services. In Appendix 1 – Mock Tender Submission Template, we will be looking to understand what services you would be wanting to provide, it may be services you can already do or outlining what you would have to change and how much it would cost to provide other services.
2. Draft assessment criteria – This is what we will be using to assess the submissions received in this Test Procurement Event. We have designed it to consider the different technical capabilities of submissions and look at the viable options for establishing a DRZ. The technical capabilities will be considered alongside the commercial submissions and combined to produce an overall evaluation of each mock bid.
3. Draft feasibility assessment process – This section outlines a high-level view of what the feasibility study assessment process for a distribution restoration service could entail.
4. Draft contract principles – This section outlines our initial thinking on elements within the potential contract terms, such as payments.

1 Draft functional requirements

The functional requirements are split out into anchor generator requirements and top-up service(s) requirements.

The design of the service allows for one asset to be an anchor generator and multiple assets to provide supporting top-up services in a Distribution Restoration Zone (DRZ). DRZs are most likely to be established at the 33 kV level within distribution networks. Although it will depend on the specific circumstances, and resources connected at higher and lower voltages may play a role.

An anchor generator must be able to meet all the anchor generator requirements or, highlight the changes that would need to be made to an asset to meet the requirements, whereas a top-up service provider can meet one or more of the top-up service requirements, depending on which service they want to provide. However, each participant will need to meet the resilience requirements, which may require enhancements to assets.

As part of this Test Procurement Event, we want to understand what potential providers can meet already, what changes may need to be made to meet the requirements, and what these changes may cost. The accompanying Mock Tender Submission Template is where you will need to highlight the capabilities that your assets can already do, where you would need to make changes/upgrades and what these changes could cost.

This is a Test Procurement Event and the functional requirements outlined below are subject to change before a final design is outlined at the end of the Distributed ReStart project. Any feedback is welcomed on the below, please complete Appendix 3 – Event Feedback Form. The outcomes from the Live Trials happening in the technical workstream will also feed into the final design of the functional requirements for anchor generators and top-up services.

1.1 Anchor generator functional requirements

To qualify as an anchor generator, you will need to be able to satisfy all of the requirements described below.

Requirement	Minimum	Definition	Comments
Time to Connect	≤ 8 hours	Time taken from instruction from the relevant system operator to start up the asset from shutdown without the use of external to site power supplies and energise to the point of connection to the DNO network. Instruction to start up may be up to 72 hours after a black out, which means your site will have been without external power supplies all of that time. Once started, you must be able to operate in a condition with no external load for at least four hours.	Capability to be declared in terms of hours. If time to connect is related to the time without external power supplies, then please provide brief comments on that relationship. Please confirm if a load bank or other additional equipment is required to enable operation without external load.
Service Availability	≥ 90 %	The ability to deliver the anchor generator service over 90 per cent of each year.	A Black Start could happen at any time thus a high service availability is required.
Resilience of Supply - Availability to start-up	≥ 120 hours	The anchor generator must have sufficient access to auxiliary power supplies (in network black out conditions) to: 1) Maintain the generator declared 'Time to connect' availability for up to 72 hours after a black out.	It may be several days before an anchor generator is instructed to start up and then the restoration process may last several days.

Requirement	Minimum	Definition	Comments
		2) Deliver the full range of anchor generator services as declared in 'Resilience of supply - Service delivery'.	
Resilience of Supply - Service delivery	≥ 72 hours up to 120h	Once instructed to start-up, the minimum time the provider will be able to deliver the full range of anchor services.	Full capability to be declared.
Sequential Black Starts	≥ 3	Ability to perform at least three separate start-up processes.	Time required between sequential start-ups to be declared.
Reactive Capability (Voltage Control)	Minimum of 0.95 leading and 0.95 lagging power factor at the point of connection. Ability to provide continuous steady state control of the voltage with a set point and slope characteristic.	The anchor generator must have the ability to absorb Mvars (leading power factor) to energise part of the network whilst active power export is zero. This may be achieved by using an onsite load bank or other means to allow a generator to operate at the MW level necessary to give the required Mvar range. The anchor generator must be “grid forming” in that it is able to create a voltage source independent of the DNO network. Voltage must be controlled within acceptable limits (+/- 10%) during the process of network energisation and addition of demand blocks. Voltage control capability should be as defined in Engineering Recommendation G99.	Mvar leading and lagging values at zero power export to be declared. During a Black Start event the anchor generator will need to keep voltage within limits when creating, maintaining and expanding a DRZ.
Frequency Control	Fast-acting proportional frequency control is required.	The anchor generator must have fast-acting frequency control capable of being operated in isochronous mode or with a set point and droop setting. Frequency must be controlled within acceptable limits (47.5 - 52.0 Hz) during the process of network energisation and addition of demand blocks. Frequency control capability should be as defined in Engineering Recommendation G99.	During a Black Start event the anchor generator will be the frequency leader for the DRZ.
Block Loading Size	≥ 2 MW (site specific depending on DRZ)	The anchor generator must have the capacity to accept instantaneous loading of demand blocks and maintain the frequency within the 47.5 - 52 Hz range.	Full capability to be declared.
Short-Circuit Infeed	≥ 1 x DER MVA rating (at t≥1s)	The anchor generator must be able to inject reactive current during a fault disturbance on the network. The maximum equivalent MVA short-circuit infeed that can be sustained as measured at the DNO point of connection for at least one second.	A minimum level of short circuit infeed is required to ensure network protection can operate safely, including fuses at low voltage.

There may potentially be extra requirements depending on the area that the Distribution Restoration Zone is in. As this is a Test Procurement Event we do not have any specific DRZ requirements.

1.2 Top-up service functional requirements

Top-up service providers will need to demonstrate a capability to provide one or more of the services described below, as well as satisfy the requirement on resilience that applies to all providers of top-up services.

Requirement	Minimum	Definition	Comments
Fast MW control	<200ms provide available MW, sustained for at least 15 minutes with gradual reduction toward preferred operating position, and/or <200ms provide available MW, sustained for at least 10 seconds with gradual reduction toward preferred operating position, and/or Active power output reduction in response to a change in system frequency above a certain value (value and required rate of reduction to be confirmed) and/or Active power output increase in response to a system frequency below a certain value (value and required rate of increase to be confirmed). This will only be required if output has been constrained below the maximum output power.	Deliver rapid MW response triggered by a local frequency measurement or on receipt of an external control request (which will change the set point at an agreed ramp rate). For the mock tender this will be assessed in terms of the maximum MW change upwards and downwards that can be achieved within 200ms.	This response will support the anchor to maintain DRZ frequency in the event that the anchor generator alone cannot restore frequency within limits. As an example, this response could be required if a DER tripped, or if additional sub second MW support is required to energise demand.
Inertia	There is no minimum requirement for individual generators/resources, but the service provider should state what inertia is available.	The inertial response should be provided by an inherent response without any measurement delays. (For synthetic inertia refer to 'Fast MW Control'.)	DRZ feasibility study to confirm what (if any) the inertia requirements will be (e.g. this may be required to increase the block load pick up capability within the DRZ).
Frequency Control	Provide frequency sensitive control of active power.	Frequency control capability as defined in Engineering Recommendation G99. All frequency response requirements are applicable including LFSM-O, LFSM-U and FSM.	This response will support the anchor generator to maintain the frequency within limits during normal operational.
Reactive Capability (Voltage Control)	Provide continuous steady state control of the voltage at point of connection. Compliant with Engineering Recommendation G99 requirements on reactive capabilities.	Voltage control capability as defined in Engineering Recommendation G99. As specified in G99 the voltage control should be provided with a droop characteristic. The voltage setpoint should be adjustable by an external control system. If voltage control cannot be provided, it may be acceptable to provide a Mvar set point controlled by an external signal.	Mvar leading and lagging values to be declared. The DER will support the anchor generator to maintain voltage within limits during events such as energisation of the distribution/transmission network and block loading.

Requirement	Minimum	Definition	Comments
		Ability to absorb Mvars (leading power factor) to energise part of the network.	
Short-Circuit Infeed	≥ 1 x DER MVA rating (at t≥1s)	Injection of reactive current during a disturbance. The maximum equivalent MVA short-circuit infeed that can be sustained as measured at the DNO point of connection for at least one second.	To increase DRZ fault level if anchor generator alone doesn't provide the DRZ minimum acceptable fault level.
Energy (MWh)	Generate or consume MW on instruction from an external control system, deliver within 10 seconds of request.	During operation the DER will report the maximum and minimum range of MW output which can be delivered if requested. Intermittent output is acceptable and will be controlled by a set point (a suitable constraint value will be given). For the mock tender this will be assessed in terms of the average power output that can be reliably maintained over a period of 120 hours. This should account for intermittency, fuel supply or other factors that may reduce average power available.	The DER will support the anchor generator to deliver MW to the DRZ and energise more demand.
Functional requirements required by all providers of top-up services.			
Resilience of Supply - Availability of communications	≥ 72 hours	Ability to maintain the availability of the control and communications with the DER site for up to 72 hours after a blackout before any DNO supplies (EHV, HV or LV) are restored.	The main connection to the DER will be restored as soon as practical, but it may be up to 72 hours after a blackout before the connection is restored and the DER will have to be resilient for this time period in order to then provide the required service.
Resilience of Supply - Service delivery	≥ 72 hours	When instructed to start-up the service will be available for a minimum duration of 72 hours (exact capability to be declared).	Declare the time to provide availability of the top up service after the DNO main connection has been restored (indicate if this time is dependent upon the length of time after the blackout before the DNO HV supply is restored)
Service Availability	≥ 90 %	The ability to deliver the contracted service for 90 per cent of each year of the contracted period (exact availability to be declared).	The top-up service(s) will be required to be available equal to, or above, the 'resilience of supply' capability of the anchor generator.

2 Draft assessment criteria

All tender submissions will be evaluated against the functional requirements and assessment criteria. The assessment criteria have been designed to look at all the variables that need to be considered in assessing potential Distribution Restoration Zone (DRZ) designs and options, including capabilities of the tender participants, the requirements of the DRZ area and total costs of the DRZ options.

The aims of the assessment criteria are to assess the capabilities of the participants in a tender to ensure the contracts are awarded to the most appropriate combination of options for the DRZ. The assessment will look to assess what are the viable technical combinations from the tender submissions, but at the lowest cost. As such, there are two elements to the assessment: technical capabilities and commercial.

The assessment process will consider all possible combinations of tender bids; individual tender submissions will be scored in combination with the other tender submissions.

We are aiming to test our proposed assessment criteria using the data received in this Test Procurement Event and thereby gather feedback on the proposed assessment criteria.

At the point that the assessment criteria would be applied in our designed procurement approach, several feasibility studies will have already been conducted. This means that there would be a full understanding of the capabilities of the different assets that have submitted tenders and the enhancements that would need to be made, if any.

2.1 Technical capabilities assessment

The functional requirements will be assessed as pass or fail at the minimum level, with the minimum requirements as outlined in the above section 1.

The abilities of participants will be considered alongside the submissions from other participants, to highlight viable combinations that could form a feasible DRZ.

There are 10 elements to the technical assessment criteria, and each has a measure and a typical minimum requirement for the DRZ:

Assessment Criteria	Measure	Typical Total DRZ Minimum
Anchor Capable	Pass/Fail	One pass
Power / Energy	Average reliable MW over 120 hours	50 MW
Block Load Pick Up	MW step increase capability	2 MW
Fast MW Control	MW change in 200 ms	2 MW
Inertia	MW.s	No minimum
Reactive Capability	Mvar absorb at minimum MW	10 Mvar
Short Circuit Level	MVA infeed 1s after fault	50 MVA
Time to Connect	Hours after instruction/energisation	No minimum
Service Availability	% of the year	90%
DRZ Specific	Depends on DRZ, assume score out of 10	Dependent on requirement

The minimum requirements for the DRZ will be calculated using the “rules of play”, as such, the minimum DRZ requirements will vary for the different network areas.

We have previously released the four “rules of play”, these can be accessed on our website.

During a future real-life procurement process the “rules of play” will have been applied to the network area where the tender is procuring services, so the minimum requirements for the DRZ in question should be known.

In this Test Procurement Event, we may receive submissions from participants that are in various locations, so we will not be applying the “rules of play” and instead be using typical values for a DRZ and assuming participants are all located within the same potential DRZ area.

2.2 Commercial assessment

As part of the assessment, consideration needs to be made to the total cost of the service. This includes understanding costs for service provision, upgrades to assets to meet the required technical elements, upgrades to networks to enable the service, upgrades to communications, and other related costs.

There are various costs that will be involved in a Distribution Restoration Zone, these all need to be considered in the assessment to ensure that the consumer is getting the best value for the service.

A commercial submission would involve a full breakdown of all costs for the DER, this will include a service fee, any capital investment, and any in-contract testing costs.

There are also costs outside of the DER that may be incurred by the host Distribution Network Operator (DNO), these include: network upgrade costs (such as protection changes) resilience upgrades including communications, and the potential installation of a Distribution Restoration Zone Control system (DRZC) to support the restoration process.

In this Test Procurement Event, we are looking to understand the costs that DER would incur as a result of tendering for, and providing, a distribution restoration service as designed by this project. Appendix 2 – Mock Tender Submission Template highlights where we are looking for indicative costs.

We have not yet designed how the commercial assessment will be weighted alongside the technical assessment but will be trialling a few options with the data we receive in this Test Procurement Event. We will be reviewing how different weightings between commercial and technical would influence any results, for example a 30:70 weighting for commercial scores versus technical scores.

2.3 Draft assessment criteria weightings

As part of the design of the assessment criteria we have weighted the different technical elements. Each technical element is important, but the weighting demonstrates the difference of importance between the capabilities and which are highly valued.

Assessment Criteria	Weighting	Rationale
Anchor Capable	Pass/Fail	No weighting as it is a minimum requirement.
Power / Energy	20%	Most valued as it increases ability to restore demand and meet restoration standard.
Block Load Pick Up	10%	Given a medium/low weighting as greater capability gives more flexibility and will help reduce restoration timelines but with lower capability a DRZ may still be feasible.
Fast MW Control	10%	
Inertia	10%	
Reactive Capability	15%	Given a medium/high weighting as these capabilities are essential to establishing a feasible DRZ.
Short Circuit Level	15%	
Time to Connect	10%	Given a medium/low weighting as it will help to reduce restoration timelines but does not undermine the basic feasibility of a DRZ.
Service Availability	10%	Given a low weighting as the minimum requirement already sets a high threshold and greater capability will deliver only marginal improvements. As this is a test event, we have given this element a weighting of 10%, but if there are specific DRZ requirements this may decrease to a 5% weighting.

Assessment Criteria	Weighting	Rationale
DRZ Specific	0%	As this is a test event, we have given this element a weighting of 0%, but if there are specific DRZ requirements this may be given a 5% weighting. Given a low weighting as it is not one of the fundamental technical requirements, although may be important in some circumstances.
Cost	TBC	This element still needs to be finalised, but we will be testing the weightings and joint assessment as part of this Test Procurement Event.
Total	100%	The above weightings may change following feedback and testing of the assessment criteria.

3 Draft feasibility assessment process

As part of the procurement process there will need to be feasibility studies to understand the full capability of DER assets.

In our current designs, the establishment of a DRZ will require several stages of feasibility assessment involving multiple parties, aligned with the procurement process. There will be further review and refinement of this process and we invite comments on all aspects of what is described here. Please capture any feedback comments in Appendix 3 – Event Feedback Form.

1. As part of their review of national and regional strategies for system restoration the ESO and DNOs will assess the potential and need for a DRZ in a given area. This will include a review of DER based on the information already available to the ESO and DNO. If a possible DRZ is of interest, then an invitation for Expressions of Interest (EOI) will be launched to identify DERs willing to participate.
2. In responding to the EOI each DER will have to assess their plant against the functional requirements, whether as an anchor generator or top-up service provider. Based on the responses to the EOI the DNO/ESO will assess the viability of establishing a DRZ and decide who to invite to participate in the next stage of assessment. **Our current view is that no funding will be provided to DERs for this stage of assessment.**
3. The “Initial Study” stage is roughly equivalent to the Stage 1 Feasibility Study (F1) undertaken in current Black Start project development, although the approach will be different for anchor generators and top-up services providers. The goal is to establish overall feasibility including an initial indication of costs and timeline for any changes required to equipment, supporting services and organisations. A similar assessment will be conducted by the DNO who may host the DRZ. If the initial study concludes that the DRZ is not feasible then the process will terminate. If feasibility is confirmed, then the DNO/ESO will decide who to invite to participate in the next stage of assessment. **Our current view is that some funding may have to be provided for the initial study of anchor generators, but top-up service providers will be able to complete this stage at their own cost.**
4. The “Detailed Study” stage is roughly equivalent to the Stage 2 Feasibility Study (F2) undertaken in current Black Start project development. The aim is to provide a comprehensive and robust technical and commercial evaluation of the proposed DRZ including the anchor generator, top-up service providers, and DNO network. Given the multi-party nature of the DRZ restoration process, the detailed study will require a significant degree of collaborative working between the DNO and DERs. Outputs will include an implementation plan and firm commercial offer from each service provider. **Our current view is that the detailed study work by DERs will be funded, subject to agreement of scope of work and contracts with the funding party (likely to be DNO or ESO).**
5. The final stage will involve further review by the DNO/ESO with clarifications sought from DERs as necessary. This will result in confirmation of the final offers that will be used in the commercial assessment. A DRZ may reach this stage but still be deemed unfeasible if costs are too high.

4 Draft contract principles

As part of the Distributed ReStart project we need to define a set of generic standard contract terms that will transition into a business as usual distribution restoration service.

4.1 Context

The purpose of this section is to provide visibility of what could be provided as part of a future contract. The below headings and high-level outlines show our indicative thoughts and considerations. This is all still work in progress, and these headings may not flow through to the final set of generic standard terms. Any feedback comments, please capture in Appendix 3 – Event Feedback Form.

We have included these outlines so that, if necessary, you can use the below to consider any of your costings within your mock tender bid submission.

The Organisational, Systems and Telecommunications (OST) workstream, has developed a Central Organisational Model, whereby the ESO is responsible for managing a Black Start situation and the DNOs have an enhanced role to manage and instruct the DRZ. This design of on-the-day organisational aspects will need to be brought into the design of the contract, and industry code drafting, to cover the roles and responsibilities of the different parties.

There are still some fundamental areas that the contract design is dependant on, these include: decision on lead procuring party, design of settlement & funding mechanisms and finalisation of service design following stakeholder engagement.

4.2 Potential areas of contract

The table below outlines the key elements needed for a service design. It contains our current thinking and thoughts on what is required in an effective contract. As highlighted, this is work in progress, and we are seeking your views on what is outlined below.

Heading	Key points
Service description	• This will outline the service, e.g. anchor generator/top-up service.
Required capability	• Outlines the specific capabilities required for the service contained within the contract e.g. self-start ability for anchor generators.
Payments	• This will outline how you will be paid for the service. • Suggestion is to have an availability fee which could be paid each month, calculated by converting submitted tender costs into a £/Settlement Period (SP) figure. • Payments could be for: service fee, any capital contributions, ongoing costs.
Roles and responsibilities	• This will outline the accountabilities on each party during the contracted period • For example, requirements on DER: to deliver the service, to undertake testing, respond to instructions, etc. • Required engagement with the ESO, DNO and other DER to develop the Distribution Restoration Zone Plan (DRZP), which will outline the processes to follow in the event of a Black Start.
Testing	• This will outline the tests that may need to be completed prior to service delivery and through the duration of the contract, as may be required.

Monitoring of capability	• This will outline how you will be monitored to ensure the required capabilities are met and what will happen if they are not met, which could involve penalties. • It will also outline requirements to notify of maintenance of assets or any absence of capability.
Events of Default	• If the requirements and capabilities of the contract are not met this could result in Events of Default which this section will outline. • It will also outline the consequences of any Events of Default.
Provision of other services	• This will look to outline the ability to stack other service provision for example, ESO balancing services or DNO services.

There will also need to be inclusion of boiler plate legal requirements for example, force majeure, anti-slavery, safety and insurance etc.