# Distributed ReStart

## DRAFT – Rules of play document

**Procurement and Compliance**

In partnership with:

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# 1 Draft proposal for rules of play

**The "rules of play" will stipulate the requirements that need to be met by the combination of potential providers in a given network area for there to be a feasible Distribution Restoration Zone (DRZ).**

## 1.1 Key components

The rules supplement the technical requirements to be applied to Anchor Generators (AG) and Top-Up Service (TUS) providers individually and specify what needs to be true with all participating Distributed Energy Resources (DER) in an area working together effectively.

The rules of play will inform the assessment of potential DRZs and service providers in the earlier stages of the procurement process where regional strategies are devised and there is a preliminary review of what might be feasible in a given area. The rules reflect the essential technical services and give a relatively simple set of key requirements. The rules thereby allow a first-pass or high-level assessment of feasibility, but it will always be necessary to follow up with more detailed analysis.

The rules remain valid and will inform the later stages of defining and contracting a DRZ, although more detailed and specific analysis will be necessary to ensure the combination of DER is operable and delivers what is needed.

The requirements presented below might be assessed for all Grid Supply Points (GSPs) across Great Britain and the values published, possibly as part of the annual Long Term Development Statement (LTDS), which already contains closely-related information. This will support review of DRZ opportunities by all stakeholders including Distribution Network Operators (DNOs), the Electricity System Operator (ESO) and DER owners/operators.

### 1.1.1 Rule1: Power

This involves comparing the maximum "reliable" power generation in a given area with the maximum demand, or some other value of demand considered appropriate. Power generation from intermittent sources would have to be discounted by some factor to determine a "reliable" value. The rule should reflect the requirement of the Electricity Restoration Standard and point to the possible purpose of the DRZ. This rule encompasses both the power and energy requirements, so no separate rule is required for energy.

***Power Required = 60% * Maximum MW Demand in a DRZ***

The DNO will provide information on demand.

***Power Available = Anchor MW * 90% + ∑ (TUS MW * Intermittency Factor)***

Where the Intermittency Factor for Top-Up Service providers depends on the technology type. The factors used in the Capacity Market may be appropriate, e.g. 9% for wind, 1.5% for solar. The 90% factor for the Anchor Generator reflects the stated functional requirements.

***Power Available must exceed Power Required.***

The excess Power Available will inform an assessment of what the DRZ may be used for, i.e. whether it can go beyond restoring demand within its own boundary. If the rule is not satisfied there may, in some circumstances, still be interest in development of a DRZ that focuses on transmission restoration or network resilience services only.

### 1.1.2 Rule 2: Block Load Pick Up

This rule focuses on Block Load Pick Up (BLPU) capability and thereby encompasses Fast MW Response, frequency control, and inertia, which are all related. It compares the combined BLPU capability of the Anchor and potential Top-Up Service (TUS) providers with the block loading requirement within a DRZ. The requirement is set by the largest MW step that will have to be accommodated. In some cases, it may be possible to avoid restoring some demands to prevent very large BLPU, or it may be possible to install additional switching flexibility to reduce the largest BLPU. The requirement will vary across potential DRZs, although a typical value might be 5 MW. While BLPU capability is a stated requirement for the Anchor, the capability provided by TUS providers must be derived from MW ramp rate or other information.

***BLPU Required = Largest Necessary MW Block Load in a DRZ***

The DNO will provide information on block loads. This will typically be the feeder or primary substation with the largest demand.

***BLPU Available = ∑ (DER BLPU Capability)***

Where DER covers the Anchor and TUS providers and including any supplementary resources like controllable load banks, if this is known at the time of assessment, and assuming that a DRZ Controller is used to harness the available capability. BLPU can be estimated where necessary using what information is available on the DER.

***BLPU Available must exceed BLPU Required.***

If BLPU Available is notably high then it suggests that the DRZ may be useful in energising other DNO areas, transmission-connected demand, or providing start-up power to large power stations or other resources. If the rule is not satisfied with the resources considered in the initial assessment, then a review might be conducted to identify opportunities for improvement, e.g. the addition of a controllable load bank may enhance the BLPU Available sufficiently.

### 1.1.3 Rule 3: Reactive Power

Mvar (Mega Volts Amp (Reactive)) capability of the DER can be compared against the requirement of the DRZ distribution network and, by considering the reactive power range available at the Grid Supply Point (GSP), point to the extent to which the DRZ might support transmission network energisation. In a first-pass feasibility assessment, this can be done quite simply as a sum of Mvar ranges, discounted by some factor derived from examples. As the assessment proceeds, it might be done in a more sophisticated way assessing the specific capabilities of a given network and its DER. The assessment is focused on the capability of DER to absorb Mvar produced by circuit energisation. Typical values for 33 kV networks will be around 10 Mvar. It is assumed that Mvar capability can be delivered quickly and in a controlled way, as per the functional requirements, so there is no need for a separate rule assessing the dynamic capability or Fast Mvar Response.

***Mvar Required = The total Mvar gain of circuits in the DRZ distribution network***

The DNO will provide information on Mvar gain, i.e. the total Mvar absorption capability that will be required.

***Mvar Available = ∑ (DER Mvar Absorb Capability) * Mvar Range Reduction Factor***

Where the Mvar Available is assessed across all potential participating DER in the DRZ. The Mvar Range Reduction Factor accounts for the effects of uneven sharing across the DER and the limitations on Mvar flows and voltage limits across the network. A typical value might be 60% but this could be refined through more detailed assessment of the DRZ in question.

***Mvar Available must exceed Mvar Required.***

The excess Mvar Available will inform an assessment of what the DRZ may be used for, i.e. how far into the transmission network might be energised. If the rule is not satisfied then the scope for providing additional Mvar capability might be considered, e.g. installation of reactive compensation.

### 1.1.4 Rule 4: Fault Level

Fault level must be sufficient to trigger protection and to allow other resources, including converters, to connect. In a first-pass feasibility assessment, this can be done quite simply as a sum of fault infeed contributions, discounted by some factor derived from examples. As the assessment proceeds, it might be done in a more sophisticated way assessing the specific capabilities of a given network and its DER. The DNO, with reference to the TO where appropriate, should specify the requirement at the main 33 kV busbar of the Grid Supply Point (GSP); a typical value could be 50 MVA. Analysis within the project suggests that if fault level is sufficient at 33 kV then energisation of 132 kV circuits should also be possible but that energisation to 275 and 400 kV may require additional fault infeed sources.

***Fault Level Required = Minimum Acceptable Fault Level at GSP***

The DNO/TO will provide information on fault level requirements.

***Fault Level Available = ∑ (DER Fault Level Infeed) * Fault Level Reduction Factor***

Where the Fault Level Infeed is assessed from all potential participating DER in the DRZ. The Fault Level Reduction Factor accounts for the effects of circuit impedances between the DER connection points and the GSP. A typical value might be 80% but this could be refined through more detailed assessment of the DRZ in question.

***Fault Level Available must exceed Fault Level Required.***

The excess Fault Level Available will inform an assessment of what the DRZ may be used for, i.e. how far beyond the DRZ boundary might be energised, and how much additional fault infeed may be necessary to support energisation up to 275/400 kV. If the rule is not satisfied then the scope for providing additional Fault Level might be considered, or means of reducing the requirement might be considered, e.g. modifying network protection.