Annex 5 – Distributed Restart Development

The Distributed Restart Project[1] was a Network Innovation Competition funded initiative that examined if embedded assets (such as generation and batteries connected to distribution networks) can provide restoration services to the ESO in the event of a partial or total shutdown. The conclusions of the project proposed the creation of distribution restoration zones (DRZs) as a means for facilitating the restoration process with distribution connected assets. The Distributed Restart Project provides this additional facility for the wider restoration process and, as a result, substantial changes to both the Grid Code and Distribution Code associated with it are being developed. However, the conclusions of the Distributed Restart Project is that it is not a mandatory requirement for DNOs, or potential restoration service providers to develop or participate in a DRZ, as the necessary embedded generation facilities may not exist or there may not be an appropriate network topology. Nevertheless, following the live trials which have been established as part of the Distributed Restart Project, the information exists for DNOs to consider developing these capabilities to help support achieve the implementation of the ESRS.
In the event of a partial or total shutdown the traditional approach to System Restoration in GB is a top-down approach where black start stations (traditionally transmission connected) are instructed by the ESO to energise dead sections of transmission network to form a power island. Blocks of demand (block load) are then connected by the TO / DNO under the requirements of a LJRP. The LJRP process runs in parallel across the transmission system to form a skeleton network whereby further power stations and demand are restored. Traditionally, black start stations have been drawn from the fleet of coal, hydro, and gas power stations with some input from HVDC Interconnectors. Going forward it is recognised that, primarily in terms of thermal plant which are generally carbon based, these providers are reducing in numbers as a result of the drive toward renewable technologies.

The conclusions of the Distributed Restart Project recognises the growth in embedded generation and from this, the pool of capability from distribution connected assets that could be used to energise sections of the distribution network to form a distribution restoration zone. In this scenario, the ESO would instruct the DNO (following formal agreement between the ESO and the DNO, including covering the DNO undertaking any necessary enabling works) to establish a DRZ which would be defined in an accompanying distribution restoration zone plan (DRZP), similar to a LJRP. The aim here is to run the traditional black start arrangements at transmission in parallel with the DRZs at distribution to restore the whole system to normal operation as soon as possible whilst also capitalising on the embedded generation assets.

The DZRP revolves around the new rôle of anchor generator, which is an embedded generator that is capable energising and loading sections of the Distribution Network. An Anchor Generator would be expected to provide a voltage source and therefore a grid forming capability would be required. The anchor generator may be supported by one or more top-up service providers who are capable of providing addition electrical energy input, albeit not necessarily grid forming, or a range of ancillary services to assist with running a stable power island, such as reactive power capability, inertia etc, and even flexible

[1] What is the Distributed ReStart project? | National Grid ESO

demand so as to assist with the load growth. Collectively all of these parties are referred to as restoration service providers. The Distributed Restart Project considered the balance between requirements embodied in the industry codes and contractual requirements, the various models for both the structure of any necessary contracts, who the contracts should be between, and who the lead procurement party should be. These considerations are covered in sections 10.1 and 3.3 of the Project's conclusions report "Distribution Restoration future commercial structure and industry codes recommendations" (December 2021) (See Annex 13 of this consultation document). The Distributed Restart Project's preferred approach is for tripartite agreements between the DNO, NGESO and the restoration service providers (be they either as an anchor generator or as a top-up service provider), with NGESO taking the procurement lead. This would require that restoration service providers enter into a tripartite contract with NGESO and the relevant DNO. The contract would be procured by NGESO through a tendering process. Figures 2.0 and 3.0 below show the proposed relationships.

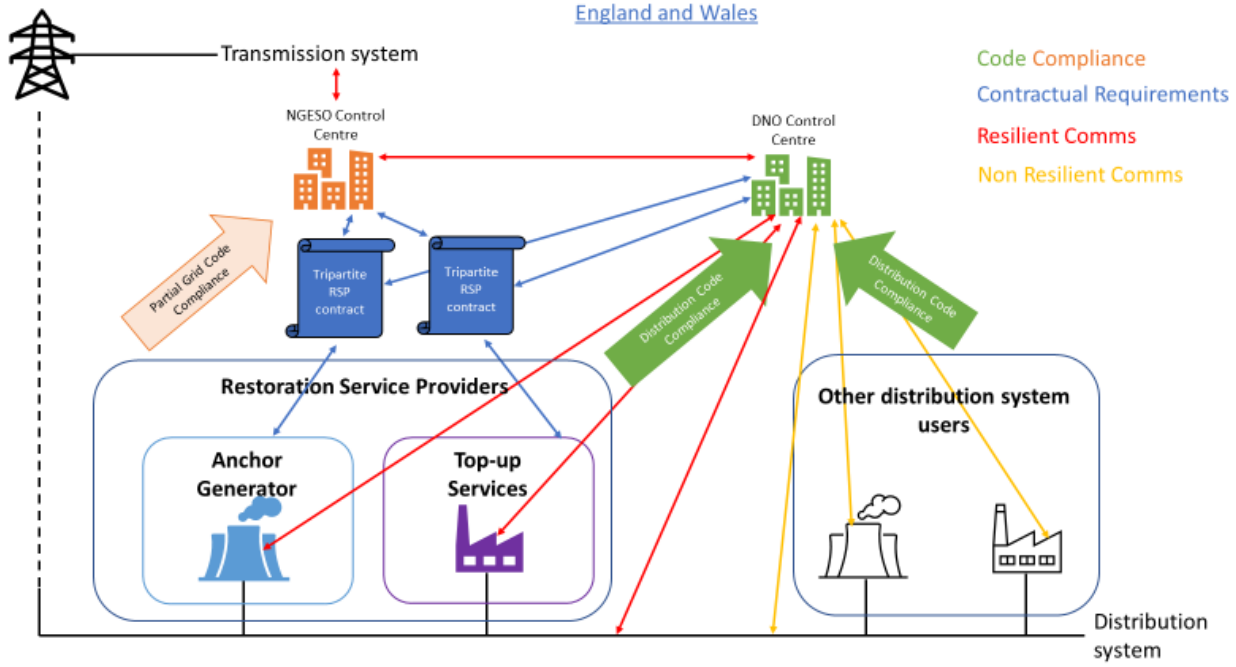

Figure 2.0

Figure 3,0

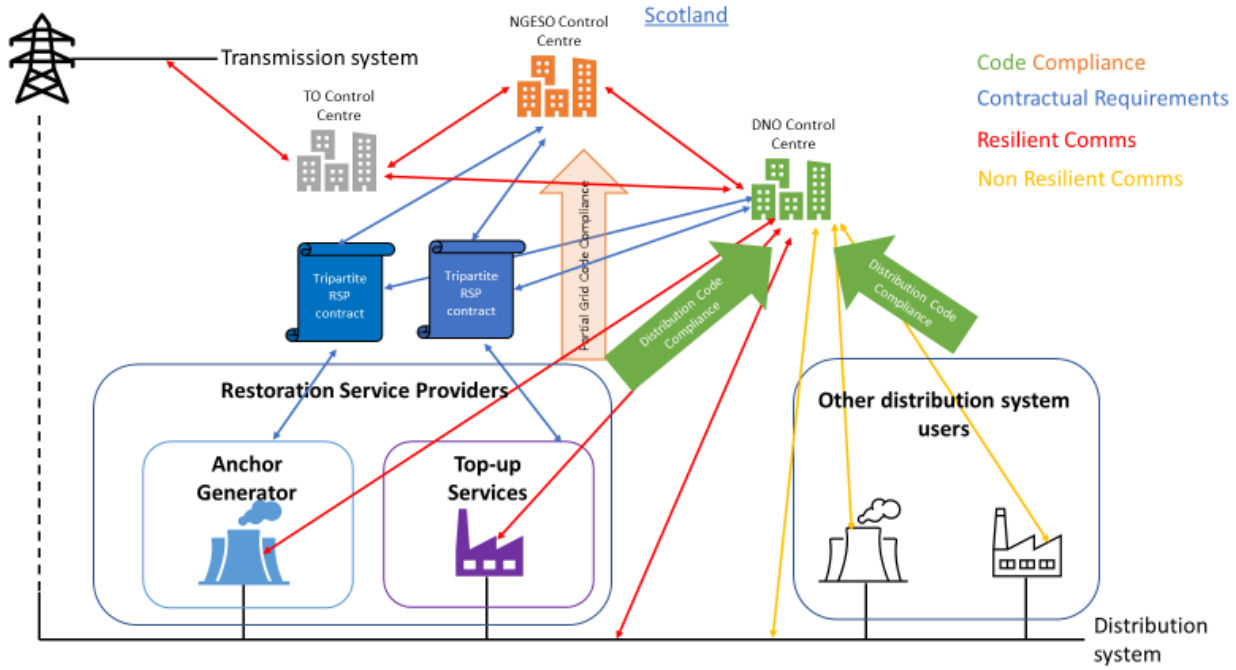

Figure 3.0

NGESO has the licence obligation associated with ESRS and the income stream to remunerate the restoration services and therefore the technical requirements need to be placed in the Grid Code (hence this GC0156 modification). The Grid Code legal text which is part of this modification encapsulates the whole distribution restoration process through a DRZ, and specifically covers the requirements on DNOs and restoration service providers. The current Grid Code does permit embedded generators to be part of a LJRP or a DRZP. In a LJRP instructions are given directly from the ESO to the parties within that plan whereas in the case of a DRZP instructions are given by the Network Operator to parties with the specific aim of energising and loading parts of the Distribution System. As a Distribution Restoration Zone restoration service provider is connected to the distribution system, it is bound by the Distribution Code, and the Distributed Restart Project's conclusions was that it believes it is appropriate to put the key requirements into the Distribution Code for the restoration service provider to conform to. Although contractually the restoration service providers can and should be bound to the Grid Code, it is not straightforward to apply Grid Code drafting to embedded parties, not least because the context of the drafting is subtly different and, for example, some of the key definitions are necessarily different. Hence it is appropriate to assign a contractual hierarchy such that the requirements of the Distribution Code have primacy for these restoration service providers, followed by the tripartite contract and then the Grid Code. Stakeholders views on the design of the contractual arrangements and the relationship with the codes will be welcome.