

# Emergency and Restoration GB implementation

GC0127/GC0128

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# Consultations & Mapping

- **Implementation of the Emergency and Restoration Code covers three Grid Code Consultations**
  - GC0125 :- EU Code Emergency & Restoration: Black Start testing requirements for Interconnectors
  - GC0127 :- EU Code Emergency & Restoration: Requirements resulting from System Defence Plan
  - GC0128 :- EU Code Emergency & Restoration: Requirements resulting from System Restoration Plan
- **The mapping table covers all three Consultations and is designed to ensure all elements of the E&R Code have been implemented in the appropriate GB documentation structure and it is clear which parties are affected and what obligations they have to meet.**

# Aim and Purpose of Mapping

- **A mapping spread sheet has been produced which aims to map all of the requirements in the EU Emergency and Restoration Code and where these requirements fit into the GB Document Framework.**
- **The key elements are to:-**
  - Define the requirements on the ESO and DNOs
  - Define the requirements on Transmission Licensees
  - Define the requirements on Significant Grid Users
  - Define in which documents these requirements apply
  - Identify any gaps in the current GB framework and amend these documents as necessary.
  - The mapping process is an essential element of ensuring compliance with E&R

# Key Documents (1)

- **EU Emergency and Restoration Code**
  - <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R2196&from=EN>
- **GB System Defence Plan**
  - <https://www.nationalgrideso.com/document/144026/download>
- **GB System Restoration Plan**
  - <https://www.nationalgrideso.com/document/144016/download>
- **Market Suspension relating to Emergency and Restoration**
  - <https://www.nationalgrideso.com/document/144011/download>
- **Terms and Conditions for Providers**
  - <https://www.nationalgrideso.com/document/144021/download>

# Key Documents (2)

- **Grid Code**

- <https://www.nationalgrideso.com/codes/grid-code?code-documents>

- **System Operator Transmission Owner Code**

- <https://www.nationalgrideso.com/codes/system-operator-transmission-owner-code?code-documents>

- **System Operator Transmission Owner Code Procedures**

- <https://www.nationalgrideso.com/codes/system-operator-transmission-owner-code?code-documents>

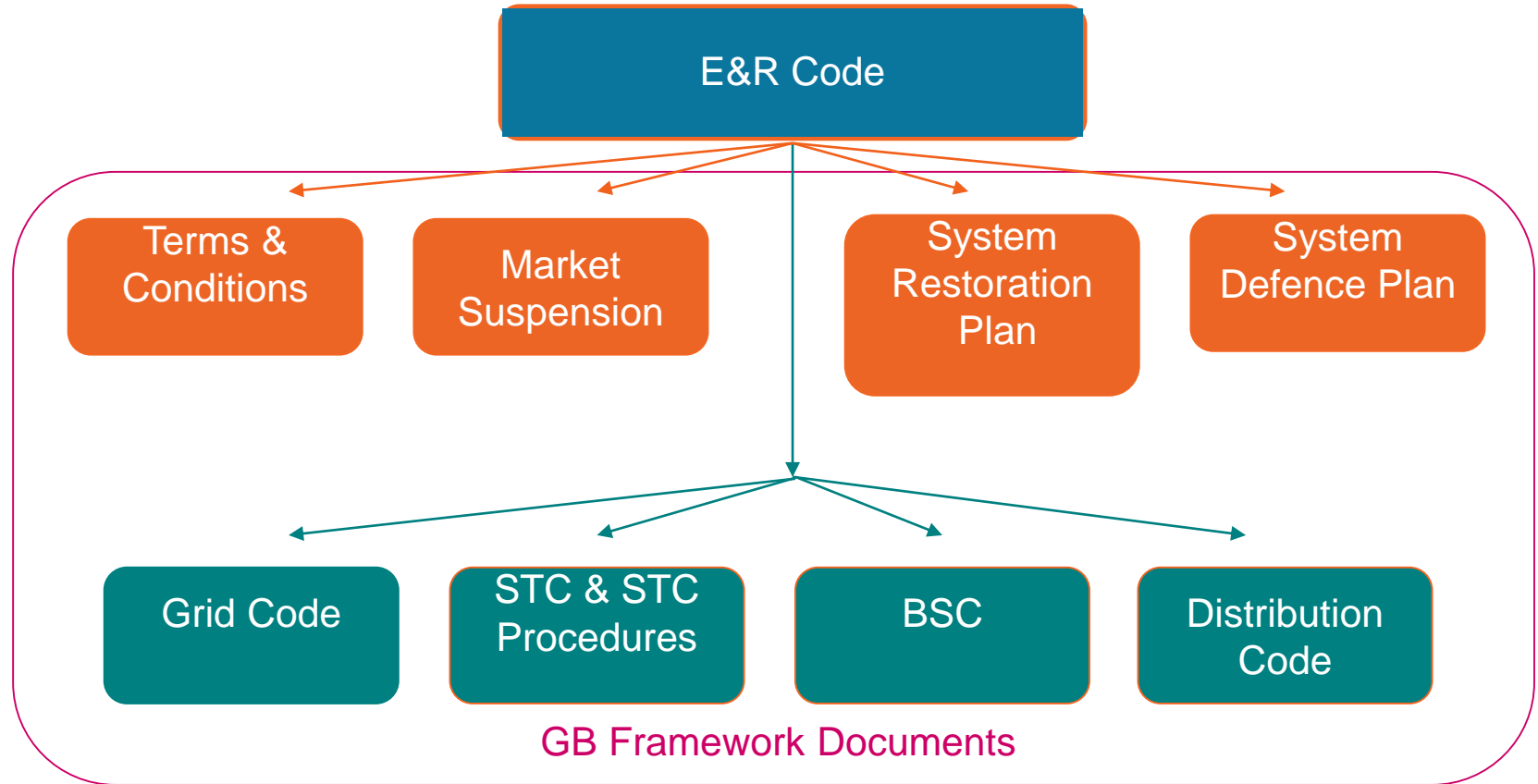
- **Distribution Code**

- [http://www.dcode.org.uk/assets/files/dcode-pdfs/DCode\\_v39\\_23052019.pdf](http://www.dcode.org.uk/assets/files/dcode-pdfs/DCode_v39_23052019.pdf)

- **Balancing and Settlement Code**

- <https://www.elexon.co.uk/bsc-and-codes/balancing-settlement-code/>

# Mapping – An Overview



# EU Code SGU Criteria

## Existing and New Type B, C or D Power Generating Modules

- In accordance with Article 5 of RfG
- Only SGUs with mandatory GB code obligations
- Note the System Restoration Plan excludes Type B Power Generating Modules

## Transmission connected demand facilities

- Existing and new facilities providing services to the Transmission System Operator (TSO) – E&R Code Article 2 (2)(d)

## All transmission connected closed distribution systems

- Existing and new facilities providing services to the TSO

## Aggregators

- Demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of the System Operation Guideline (SOGL)

## Existing and new HVDC

- In accordance with Network Code HVDC where existing HVDC only comply with articles 26, 31, 33 and 50 unless they undergo substantial modification (includes Offshore Transmission). This also includes DC Connected PPMs.



# Who the E&R Code applies to - SGU's within Scope of GB

- Any new or existing User who is caught by the requirements of the Grid Code and have an agreement with the ESO
- In general this includes:-
  - Generators who own and operate new and existing Power Generating Modules (ie pre and post RfG) at Large Power Stations or any Generator who owns and operates new and existing Power Generating Modules at a Power Station which is directly connected to the Transmission System or Generator who has a contract with the ESO.
  - HVDC System Owners and DC Converter Station Owners who are signatories to the CUSC and required to satisfy the requirements of the Grid Code
  - New and Existing Non-Embedded Customers (Transmission Connected Demand Facilities)
  - New and Existing Transmission Connected Closed Distribution Systems
  - Aggregators (ie Aggregated Demand Facilities which are caught by the requirements of the DRSC and have a commercial contract with the ESO)
- In GB the approach adopted is that the SGU's believed to be in scope and required to fulfil the requirements of E&R are based on the interpretation of Art 4(2), Art 11(4)(c) and Art 23(4)(c). In the case of SOGL under GC0106 a similar approach was adopted.

# Definitions

- **Defence Service Provider**

- A Legal entity with a legal or contractual obligation to provide a service contributing to *one or several* measures of the System defence plan (eg Commercial providers)

- **Restoration Service Provider**

- A Legal entity with a legal or contractual obligation to provide a service contributing to *one or several* measures of the restoration plan (eg Commercial providers)

- **In GB Terms both a Defence Service Provider and Restoration Service Provider would be any party that it is:-**

- Caught by the requirements of the Grid Code through being a CUSC Party or
- Has a commercial contract to provide Commercial Services

# Notifications

- Under E&R there is a requirement for the ESO to notify parties if they are caught by the requirements of the Code.
- If they are required to satisfy the requirements of the Grid Code then it is assumed that this requirement would be achieved.
- For New Applicants this could be achieved by information in the Covering Letter (issued at the time of the offer)
- For Existing parties this could be achieved by writing to those parties to whom the ESO have contracts in place.

# Approach

- **Obligations on the ESO**

- Specified in the System Defence Plan, System Restoration Plan, Market Suspension Document, Terms and Conditions document and relevant Internal Procedures. These will be individually documented as part of the mapping process

- **Obligations on Transmission Licensee's**

- Specified in the System Operator Transmission Code (STC) and related STC Procedures

- **Obligations on User's**

- Specified in the Grid Code

- **Obligations on Market Participants**

- Specified in the BSC and Market Suspension Document

- **Obligations on Distribution Network Operators**

- Specified in the Distribution Code and Grid Code

- **Obligations on Commercial Contract Providers**

- Specified in the Commercial Contract

# Areas for Discussion / Attention (1)

- **As part of the mapping exercise some gaps have been identified where the code will need to be updated.**
- **At a high level these include**
  - Art 15 (3/4) applicable to energy storage units when in a mode analogous to demand. E&R covers requirements for storage units to automatically switch from demand mode to Generation Mode. This has not been covered as part of the GC0096 (Storage Modifications)
  - Art 15 (5 - 8) – It is not currently clear how LFDD interacts with embedded generation and if priority is given to high inertia plant – Phase 2 – see slide 17.
  - Art 21 (1(b), 3 – 5) – Requires further discussion
  - Art 24 (2 – 6) – Requires further discussion
  - Art 32 – 34 Updates required to System Restoration Plan relating to Frequency Lead to reflect situation in Scotland
  - Art 35 (d) (Market Tools are not available – discuss)
  - Art 36 (4) and Art 37(4) – Discuss
  - 13. ▪ Art 37 (6) – How are the Authority notified

# Areas for Discussion / Attention (2)

## ▪ **Additional high level issues**

- Art 41 – Documentation exists but requires updating – for discussion
- Art 43 – Test Plan in consultation with DSO's
- Art 44(2) – Quick Resynchronisation Service
- Art 47 – Testing of low frequency demand disconnection relays
- Art 48 – Testing Back up Power Supplies for communication systems
- Art 49 – Testing backup power supplies
- Art 50(3) – Review of System Defence plan – Internal documents
- Art 51 – Review of System Restoration Plan – Internal documents – for discussion
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# Automatic under frequency control for Storage Providers (1)

- Emergency and Restoration Code Article 15.3 States:-
- Prior to the activation of the automatic low frequency demand disconnection scheme, each TSO and DSO identified pursuant to Article 11(4) shall foresee that energy storage units acting as load connected to its system:
  - (a) automatically switch to generation mode within the time limit and at an active power set-point established by the TSO in the system defence plan; or
  - (b) when the energy storage unit is not capable of switching within the time limit established by the TSO in the system defence plan, automatically disconnect the energy storage unit acting as load.
- As part of the GC0096 (Storage proposals) and also as part of the wider European Expert Group on Storage the proposal is for storage when operating in a mode analogous to demand to be tripped on low frequency. Pumped Storage plant is currently treated in the same way.

# Automatic under frequency control for Storage Providers (2)

- There are concerns over the rapid switching of plant from import to export which include:-
  - Affect on the System
  - Control System Stability issues
  - Differences in cycle times between different storage technologies (eg a battery will have a very different cycle time than say a mechanical storage system such as a compressed air energy storage system)
  - Existing plant is likely to struggle with these requirements especially as Storage is not codified in the Connection Network Codes
- Under E&R Article 15.3 if the TSO set the time threshold from import to export to a very short time, then the requirement defaults to automatic tripping which is the preferred option. Would this approach be considered as an acceptable and pragmatic solution to the Workgroup.
- Discussed at last Workgroup Meeting on 29 May and agreed this issue should be given more thought.



# Automatic under frequency control for Storage Units and Wider issues

- **How is a Storage Unit classified**
  - Is it part of a Type A, B, C or D Power Generating Module or a Demand Unit (irrespective of size)
  - As part of the European Expert Group on Storage, the general view was that the same approach should be adopted as that for Generation as classified under RfG.
  - The issues has also been raised with Legal for further discussion
- **Performance under low Frequency Events when storage is acting as a load**
  - Options available
    - Trip the storage at a specific frequency threshold before operation of Low Frequency Demand Disconnection
    - Put in place a characteristic similar to LFSM-U applicable for all storage units of Type C or D
    - This has the advantage of a controlled response but would need to have a profile that required contribution to generation (ie export above 49Hz) and the Target MW value would require definition.
    - Where there is little storage capability (ie because the store is fully depleted tripping would be required)
  - These options are currently under consideration

## Phase 2 Code changes

NCER Requirements	Implementation date
Automatic under frequency control scheme (Art.15(5) to15 (8))	18/12/2022
Communication systems (Art.41)	18/12/2022
Resilience tools and facilities (Art.42.1, 2 and 5)	18/12/2022
Testing and Communication Systems (Art.48)	18/12/2022
Inter-TSO test plan for testing of communication systems (Art.48)	18/12/2024

\*Aim to start Phase 2 Code Changes September / October 2019

# Next Steps

- **Assess mapping table in more detail**
- **Update legal text**
- **Update associated documents (eg System Defence Plan / System Restoration Plan)**
- **Seek stakeholder feedback**
- **Consultation**