GB LFC Block Operational Methodologies

Revision History

V0.1	**05.04.2018**	**NGET proposal for public consultation**
V0.2	**23.07.2018**	**NGET proposal for public consultation (revised Part_A; Part B texts added)**
V1.0	**14.09.2018**	**NGET proposal for OFGEM approval**

Disclaimer
This document, provided by NGET, is the proposal for the GB LFC Block Operational Methodologies in accordance with Article 119 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

Whereas

1. This Load Frequency Control (LFC) Block Operational Methodologies (hereafter referred to as "LFCBOM") document applies to the LFC Block of Great Britain and contains methodology texts listed in Article 119 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as "SOGL").).
2. The Electricity System Operator (ESO) is the Transmission System Operator (TSO) responsible for meeting the Frequency Quality and Defining Parameters and Load Frequency Control within GB.
3. This document uses the term Operational Methodology to replace the term Operational Agreement, in accordance with SOGL, Article 3, paragraph 136, which stipulates that an operational agreement defined in accordance with Article 119 may be considered a methodology where there is a single TSO in that LFC Block that is responsible for Frequency Quality and Defining Parameters and for operating Load Frequency Control, and as consequence there are no other TSOs sharing these responsibilities within whom an 'agreement' may be made. Further to this the SOGL uses the terms 'agreement', 'methodology' and 'terms & conditions' interchangeably within the cross-referencing between SOGL Articles 119 and 6.
4. On 14 September 2017 the GB regulatory authority, OFGEM, published a decision assigning obligations in Article 119 of SOGL to the GB electricity system operator (the "ESO"). As at the date of drafting the entity licensed to perform the role of the ESO is National Grid Electricity Transmission plc. The license to perform the role of the ESO will transfer to National Grid Electricity System Operator Limited on 1 April 2019. As a consequence, on and after 1 April 2019 all references to the ESO in this document will refer to National Grid Electricity System Operator Limited.
5. This LFCBOM document is a proposal for the LFC block of Great Britain, developed by the ESO.
6. This proposal takes into account the general principles and goals set in the Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as "SOGL Regulation").
7. The goal of SOGL is to safeguard operational security, frequency quality and the efficient use of the interconnected system and resources. SOGL, Part IV, Load Frequency Control & Reserves section, recognises the need for a degree of flexibility to cater for physics of scale in different synchronous areas as well as specific time varying influence of network connectivity and technology in the energy mix in determining how system operators' processes and the reserve provider services meet the system quality criteria. This flexibility is achieved through the development of methodologies.
8. In accordance with Article 6 (6) of the SOGL, the expected impact of the GB LFCBOM proposal on the objectives of the SOGL is described below;
    a. This proposal is expected to have a positive impact on determining common operational security requirements and principles by introducing a harmonised framework for frequency control and the management of reserves;.

b. This proposal is expected to have a positive impact on determining common interconnected system operational planning principles through the equitable treatment of interconnector ramps rates, and by establishing common principles for all interconnectors for the limits on the exchange and sharing of FRR and RR;

c. This proposal is expected to have a positive impact on the determining common load-frequency control processes and control structures which are defined in this document;

d. This proposal is expected to have a positive impact on ensuring the conditions for maintaining operational security throughout the Union. It does this at a GB level by establishing the Frequency Targets and Frequency Restoration Control Targets that the ESO must operate to; it contributes to cross-border security through the establishment of ramping-restrictions on HVDC interconnectors and determining how the ESO will determine what limits should be applied to the sharing and exchange of FCR, FRR and RR between the GB Synchronous Area and other Synchronous Areas;

e. This proposal is expected to have a positive impact on ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union, since it defines frequency quality standards the ESO must endeavour to maintain, the Basic Structure of control processes and methodologies defining procedures necessary to recover frequency quality when the system is no longer in a normal state;

f. This proposal is considered to have a positive impact on promoting the coordination of system operation and operational planning through the defining of mechanisms to reduce ramping-rates on interconnectors when GB is at risk of entering an emergency state and thereby obtaining support from neighbouring regions;

g. This proposal is considered to make a positive contribution towards ensuring and enhancing the transparency and reliability of information on transmission system operation through the publication of reserve capacities on the internet;

h. This proposal is considered to make a positive contribution to the efficient operation and development of the electricity transmission system and electricity sector in the Union by promoting effective operation of the load frequency control processes and effective and efficient use of reserves.

9. Furthermore, the methodologies contained in this LFCBOM proposal shall ensure application of the principles of proportionality and non-discrimination; transparency; optimisation between the highest overall efficiency and lowest total costs for all industry stakeholders and consumers; and use of market-based mechanisms as far as possible, to promote frequency quality and operational security.

10. In conclusion, the methodologies contained in this LFCBOM proposal shall contribute to the general objectives of the SOGL to the benefit of all TSOs, the Agency, regulatory authorities, market participants and the end consumers.

SUBMIT THE FOLLOWING LFC BLOCK OPERATIONAL METHODOLOGIES PROPOSAL TO THE GB REGULATORY AUTHORITY, OFGEM:

TITLE 1

General Provisions

Definitions and interpretation

1. For the purposes of this proposal, the terms used shall have the meaning of the definitions and references included in the SOGL, Article 3.
2. In this document, unless the context requires otherwise:
   a) the singular indicates the plural and vice versa;
   b) any reference to legislation, regulations, directive, order, instrument, code or any other enactment shall include any modification, extension or re-enactment of it then in force.
3. The Regulatory Authority, shall be taken to mean OFGEM, the sole competent National Regulatory Authority for these GB specific regulations, unless otherwise specified within the Articles themselves;
4. The NETS SQSS means the National Electricity Transmission System Security and Quality of Supply Standards;
5. The methodology for "The determination of LFC Blocks in the Synchronous Area GB", is being developed separately in accordance with obligations; that document further clarifies the allocation of the ESO roles within GB according to SOGL Article 141(2).
6. The LFCBOM relies on obligations, principles and mechanisms defined within the GB national industry codes. Where an article specifies this, the detailed GB electricity code references are located in a table in Annex 1.

TITLE 2

LFC block operational methodologies Part A

Article 1

Ramping restrictions for active power output

1. Rules for ramping restrictions on the active power output of each HVDC interconnector between a LFC Block of another synchronous area and the GB LFC block, in accordance with SOGL Article 137(3):

a. The ESO, and the connecting TSOs supervising a LFC block of an HVDC interconnector shall have the right to determine common ramping restrictions in the form of ramping periods and/or maximum ramping rates and shall enter into agreement with the TSOs responsible for operating the interconnector, to determine the processes and mechanisms by which these restrictions will be put in place. These ramping restrictions shall not apply to imbalance netting, frequency coupling, cross-border activation of FRR or cross-border activation of RR. These ramping restrictions shall not apply to any service aimed at maintaining or returning

one of the connected electricity systems to a normal system state. The common restriction shall also take into account the restrictions set in the GB synchronous area operational agreement in accordance with SOGL Article 137(1), if applicable;

b. The ramping restrictions for each interconnector shall be applied in a non-discriminatory manner. The ESO shall ensure alignment of ramping restrictions between all HVDC interconnectors linking the same two synchronous areas, taking into account the technical capabilities of each HVDC interconnector;

c. A summary of the ramping-restrictions to be applied to HVDC interconnectors connecting to the GB LFC Block, shall be published by the ESO on its website at least one week before the rules are enforced, in accordance with the obligations in SOGL Article 8;

d. The ESO, in order to prevent the GB LFC block from entering into an emergency state, may restrict equitably the ramp rates of GB interconnectors between GB and the same connecting synchronous areas, in coordination with the affected national TSOs and affected interconnector operators according to the terms referred to paragraph (a) of this Article;

e. Within 30 calendar days of an incident which restricted one or more of the HVDC interconnectors, under the process referred to in paragraph (d), the ESO shall prepare a report containing an explanation of the rationale, implementation and impact of this action and submit it to the relevant regulatory authority in accordance with Article 37 of Directive 2009/72/EC and neighbouring TSOs, and also make the report available to all significantly affected system users.

Article 2

Ramping restrictions for active power output on generation modules and demand units connecting with the area of the GB LFC Block

1. Rules regarding power generation modules and demand units connected to the electricity system within the GB LFC Block:

    a. Active restrictions on ramping restrictions on GB generation modules and demand units will apply where specified in the Grid Code.

Article 3

The FRR dimensioning rules

1. The GB ESO may use one or more services to meet the Frequency Restoration Reserve dimensioning requirements.
2. The NETS SQSS and Grid Code specify the standards which are used to dimension the GB services used to meet GB Frequency Restoration Reserve (FRR) dimensioning requirements:

    a. FRR dimensioning is met 100% by manual FRR in GB;

b. The NETS SQSS specifies the requirement to limit the loss of power infeed risk. The NETS SQSS terminology for infeed loss risk is equivalent to the SOGL defined term for the dimensioning incident;

c. The Grid Code specifies the reserve holding requirement and identifies the specific losses to be covered by the ESO in order to meet the NETS SQSS and SOGL frequency quality standards. In somuch the ESO ensures that

i. there is sufficient positive and negative reserve capacity on FRR,

1. in procurement timescales where FRR services are tendered; and

2. monitoring and adjusting these to changes in system requirements and service availability through to real-time;

ii. the capacity will meet positive and negative LFC block imbalances, 99% of the time based on statistical analysis of historical imbalance data from previous years;

iii. when conducting FRR sharing or exchange the risk of non-delivery will be factored into dimensioning and the ESOs continuous processes for reserve management;

3. Market parties will be made aware of the FRR capacity that the ESO has determined through publications on the internet in accordance with SOGL Article 188.

Article 4

Measures to reduce the Frequency Restoration Control Error (FRCE) by requiring changes in the active power production or consumption of power generating modules and demand units

1. Measures to reduce Frequency Restoration Control Error (FRCE) in GB are defined in the GB Grid Code. This includes:

a. Measures to ensure sufficient positive and negative reserve capacity through market notices and warnings and emergency instructions

b. Measures to correct the frequency through use of emergency instructions

2. The ESO may enter into agreements, where necessary, with specific parties to supplement these measures in accordance with its license to operate the system.

LFC block operational methodologies Part B

Article 5

LFC block monitor

1. The ESO performs the role of the LFC block monitor in GB.

Article 6

Operational procedures in case of exhausted FRR and RR

1. Ensuring sufficient FRR capacity is available to ESO under commercial arrangements:
    a. In order to ensure that the sufficient FRR capacity is made available in all timescales to the ESO, the Grid Code defines obligations for certain grid users to
        i. have the capability to provide FRR services to the ESO, and
        ii. a requirement to make those FRR services commercially available to the ESO.
    b. Those FRR services that are critical to ensuring sufficient FRR capacity offering in GB are defined in Grid Code.
2. Procedures performed in control timescales where FRR or RR provision from reserve providers is eroded below the dimensioning requirement:
    a. The approach to Frequency Restoration Reserve and Replacement Reserve management by the ESO is such that every endeavour is taken to ensure that requirements and risks are managed continuously and that a point of critically reduced or no FRR or RR is ever reached. Where operational conditions arise resulting in depletion of FRR or RR capability, the GB electricity system operator will:
        i. Put additional units in response mode;
        ii. Call on enhanced ancillary service provision;
        iii. Call upon emergency restoration of transmission equipment on outage or arm inter-tripping generation to relieve any generation that has been in a transmission congestion zone;
        iv. Or in more extreme circumstance disconnect load or generation to realign requirements with available provision.

Article 7

The RR dimensioning rules defined

1. The GB ESO may use one or more services to meet the Reserve Replacement dimensioning requirements.
2. The NETS SQSS and Grid Code specify the standards which are used to dimension the GB services used to meet GB Restoration Reserve (RR) dimensioning requirements:
    a. The NETS SQSS specifies the requirement to limit the loss of power infeed risk. The NETS SQSS terminology for infeed loss risk is equivalent to the SOGL defined term for the dimensioning incident.
    b. The Grid Code specifies the reserve holding requirement and identifies the specific losses to be covered by the ESO in order to meet the NETS SQSS and SOGL frequency quality standards. In so much the ESO ensures that

i. there are sufficient positive and negative reserve capacity on RR,
    1. in procurement timescales where RR services are tendered; and
    2. monitoring and adjusting these to changes in system requirements and service availability through to real-time.
ii. the capacity will meet positive and negative LFC block imbalances, 99% of the time based on statistical analysis of historical imbalance data from previous years;
iii. the RR capacity is sufficient to maintain frequency quality inside the FRCE quality targets from SOGL Article 128(5) & (6) and Annex IV, table.
iv. when conducting RR sharing or exchange the risk of non-delivery will be factored into dimensioning and also the ESOs continuous process for reserve management, considering the potential impact on FRCE quality targets.
v. when conducting RR sharing the ESO will ensure that the reduction in positive or negative capacity on RR does not exceed the remaining reserve capacity of RR of the GB LFC Block.

3. Market parties will be made aware of the RR capacity that the ESO has determined through publications on the internet in accordance with SOGL Article 189.

Article 8

The escalation procedure and, if applicable, the escalation procedure

1. Within the GB LFC Block if it is anticipated that there will not be sufficient Frequency Restoration Reserves or Replacement Reserves capacity, and there is sufficient time, a market warning is to be issued in accordance with requirements of the Grid Code.
2. Other European TSOs outside of GB will be informed of a change in System State via the ENTSO-E Emergency Awareness System.

Article 9

The FRR availability requirements, the requirements on the control quality and the RR availability requirements and the requirements on the control quality

1. In the GB LFC Block, the Reserve categories of Frequency Restoration Reserves and Replacement is comprised of multiple reserve services.
2. In the GB LFC Block, the ESO define the necessary Frequency Restoration Reserve and Replacement Reserve availability requirements and control quality requirements within the technical requirements of each reserve service and the associated contracts.

3. The ESO ensures that the needs of the Frequency Restoration Process and Reserve Replacement Process are met by the particular capacities of services it has selected.

Article 10

Roles and the responsibilities of the control capability providing TSO, the control capability receiving TSO and of the affected TSO for the sharing of FRR and RR between synchronous areas

1. For any exchange or sharing of reserves undertaken between GB with the LFC Blocks of Other synchronous areas via HVDC interconnectors, the ESO will be the only counter-party to TSOs providing or receiving services in those other synchronous areas. Insomuch,
2. Specific arrangements for the activation of reserves across HVDC interconnectors will require the ESO to be:
    a. the control capability providing TSO when it is activating reserves to be provided to another TSO under a reserve sharing agreement;
    b. the control capability receiving TSO when it is receiving reserves under a reserve sharing agreement;
    c. the affected TSO when reserve power required by one TSO is required by another TSO and it traverses GB under a reserve sharing agreement.

TITLE 3

Final Provisions

Timescale for implementation

1. The LFCBOM will enter into force 3 months after its approval by the GB National Regulatory Authority, OFGEM (not earlier than 14th June 2019) in line with SOGL Article 119(2).

Language

1. The reference language for this LFCBOM shall be English.

Annex 1. REFERENCES TO GB CODES

	Requirement	GB Code	Code Version	Section Reference
LFCBOM Article 2	Ramping restrictions for some GB grid users	Grid Code	Issue 5, revision 22	BC1A.1.1
LFCBOM Article 3	Limits to Loss of Power Infeed Risks	NETS SQSS	v2.3	Section 2.5
	secured events	NETS SQSS	v2.3	Section 2.6
	requirements for reserve holding	Grid Code	Issue 5, revision 22	BC1.5.4
	Secured loses	Grid Code	Issue 5, revision 22	BC1.5.4(b)
LFCBOM Article 4	System warnings and notices	Grid Code	Issue 5, revision 22	BC1.5.4 and OC7.4.8
	Emergency actions	Grid Code	Issue 5, revision 22	BC2.9 and OC6.5
LFCBOM Article 6	The obligation for certain grid users to have the capability to provide certain FRR services (namely 'Secondary' response) to the ESO	Grid Code	Issue 5, revision 22	CC.6.3.7
		Grid Code	Issue 5, revision 22	CC.6.3.12
		Grid Code	Issue 5, revision 22	CC.6.3.13
		Grid Code	Issue 5, revision 22	CC.6.3.14
		Grid Code	Issue 5, revision 22	BC3.5.1
		Grid Code	Issue 5, revision 22	CC.6.3.3
		Grid Code	Issue 5, revision 22	ECC.6.3.3
		Grid Code	Issue 5, revision 22	BC3.5.4(a)
	Exclusions to obligations on grid users to provide FCR services	Grid Code	Issue 5, revision 22	CC.6.3.7(f)
		Grid Code	Issue 5, revision 22	BC3.5.4(e)
		Grid Code	Issue 5, revision 22	BC3.5.4(f)
	Obligation for certain grid users to have the capability to provide certain FCR services (namely 'Primary' and 'High') to the ESO	Grid Code	Issue 5, revision 22	BC3.5.4(a)
		Grid Code	Issue 5, revision 22	BC3.5.2; CC.6.3.3; ECC.6.3.3
	Warnings, emergency instructions, connected party obligations	Grid Code	Issue 5, revision 22	OC6.5; OC6.7.1
	System Warnings and Emergency Actions	Grid Code	Issue 5, revision 22	OC7.4.8, BC2.9
LFCBOM Article 7	Limits to Loss of Power Infeed Risks	NETS SQSS	v2.3	Section 2.5
	Secured events	NETS SQSS	v2.3	Section 2.6
	requirements for reserve holding	Grid Code	Issue 5, revision 22	BC1.5.4
	Secured loses	Grid Code	Issue 5, revision 22	BC1.5.4(b)
LFCBOM Article 8	Warnings, emergency instructions, connected party obligations	Grid Code	Issue 5, revision 22	OC6.5; OC6.7.1
	System Warnings and Emergency Actions	Grid Code	Issue 5, revision 22	OC7.4.8, BC2.9
LFCBOM Article 9	Obligations to be able to declare availability of Balancing Mechanism aligned FRR services	BSC	BSC/V15.0	Section K-3, section 3.1.1
	Obligations to provide data	Grid Code	Issue 5, revision 22	BC1.4