GB LFC Block Operational Methodologies

Revision History

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|  | **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)** |
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| **Disclaimer**  This document, provided by NGET, is the draft 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 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. This LFCBOM document is a proposal for the LFC block of Great Britain, developed by the ESO (as defined in Article 2.2).
3. This proposal takes into account the general principles and goals set in:
   1. Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as “SOGL Regulation”);
   2. Regulation (EU) 2015/1222 on Capacity Allocation and Congestion Management (hereafter referred to as “CACM Regulation”).
   3. Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity.
4. 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.
5. 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;
   1. 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;.
   2. 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 here, and the establishing common principles for all interconnectors for the limits on the exchange and sharing of FRR and RR;
   3. 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;
   4. 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 SO must operate to; it contributes to cross-border security through the establishment of ramping-restrictions on HVDC interconnectors and determining how the SO 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;
   5. 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;
   6. 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;
   7. 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;
   8. 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.
6. 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.
7. 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:



General Provisions



Subject matter and scope

1. This LFCBOM document for Great Britain contains:
   1. Title 2: LFC block operational methodologies Part A

In accordance with SOGL Article 6(3), methodologies and conditions described in this title are subject to approval by the regulatory authority ;

* + 1. ramping restrictions for active power output in accordance with Article 137(3) and (4);
    2. the FRR dimensioning rules in accordance with SOGL Article 157(1);
    3. coordination actions aiming to reduce Frequency Restoration Control Error (FRCE) as defined in SOGL Article 152(14);
    4. measures to reduce FRCE by requiring changes in the active power production or consumption of power generating modules and demand units in accordance with SOGL Article 152(16);
  1. Title 3: LFC block operational methodologies Part A

In accordance with SOGL Article 6(3), methodologies and conditions described in this title are not subject to approval by the regulatory authority ;

* + 1. where the LFC block consists of more than one LFC area, FRCE target parameters for each LFC area defined in accordance with SOGL Article 128(4);
    2. LFC block monitor in accordance with SOGL Article 134(1);
    3. where the LFC block is operated by more than one TSO, the specific allocation of responsibilities between TSOs within the LFC block in accordance with SOGL Article 141(9);
    4. where the LFC block is operated by more than one TSO, the specific allocation of responsibilities between TSOs within the LFC block in accordance with SOGL Article 141(9);
    5. if applicable, appointment of the TSO responsible for the tasks in SOGL Article 145(6);
    6. additional requirements for the availability, reliability and redundancy of technical infrastructure defined in accordance with SOGL Article 151(3);
    7. operational procedures in case of exhausted FRR or RR in accordance with SOGL Article 152(8);
    8. the FRR dimensioning rules defined in accordance with SOGL Article 157(1);
    9. where the LFC block is operated by more than one TSO, the specific allocation of responsibilities defined in accordance with SOGL Article 157(3), and, if applicable, the specific allocation of responsibilities defined in accordance SOGL Article 160(6);
    10. the escalation procedure defined in accordance with SOGL Article 157(4) and, if applicable, the escalation procedure defined in accordance with SOGL Article 160(7);
    11. the FRR availability requirements, the requirements on the control quality defined in accordance with SOGL Article 158(2), and if applicable, the RR availability requirements and the requirements on the control quality defined in accordance with SOGL Article 161(2);
    12. if applicable, any limits on the exchange of FCR between the LFC areas of the different LFC blocks within the CE synchronous area and the exchange of FRR or RR between the LFC areas of an LFC block of a synchronous area consisting of more than one LFC block defined in accordance with SOGL Article 163(2), SOGL Article 167 and SOGL Article 169(2);
    13. the roles and the responsibilities of the reserve connecting TSO, the reserve receiving TSO and of the affected TSO for the exchange of FRR and/or RR with TSOs of other LFC blocks defined in accordance with SOGL Article 165(6);
    14. 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 in accordance with SOGL Article 175(2);
    15. 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 in accordance with SOGL Article 175(2).

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:
3. the singular indicates the plural and vice versa;
4. 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.
5. 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;
6. 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 1April 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;
7. The NETS SQSS means the National Electricity Transmission Quality of Supply Standards;
8. 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).

LFC block operational methodologies Part A



Ramping restrictions for active power output in accordance with SOGL Article 137(3)

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):
   1. The ESO, and the connecting TSOs of an HVDC interconnector shall have the right to determine ramping restrictions and shall enter into agreement with interconnector operators to put these in place. These ramping restrictions shall not apply to imbalance netting, frequency coupling, cross-border activation of FRR or cross-border activation of RR;
   2. In defining ramping restrictions, equitable treatment shall be ensured by the ESO for all HVDC interconnectors linking the same two synchronous areas;
   3. 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;
   4. The ESO, in order to prevent the GB Synchronous Area 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 1;
   5. Within 30 calendar days of an incident which restricted one or more of the HVDC interconnector, under the process refered to in paragraph 4, 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.

Ramping restrictions for active power output on generation modules and demand units connecting with the area of the GB LFC Block in accordance with SOGL Article 137(4)

1. Rules regarding power generation modules and demand units connected within the GB LFC Block:
   1. Active restrictions on ramping restrictions on GB generation modules and demand units will apply where specified in the Grid Code.

The FRR dimensioning rules in accordance with SOGL Article 157(1)

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:
   1. FRR dimensioning is met 100% by manual FRR in GB;
   2. 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;
   3. 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
      1. 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;
      2. 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;
      3. 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.

Coordination actions aiming to reduce the Frequency Restoration Control Error as defined in SOGL Article 152(14)

1. There is a single ESO within GB and no other TSOs within whom to coordinate within GB. Article 6 of this LFCBOM defines how the ESO endeavours to reduce FRCE in GB.
2. The ESO will coordinate with the TSOs of other Synchronous Areas when the system is not in a Normal state (according to definitions in SOGL Article 18) according to SOGL Article 152(11).

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 in accordance with SOGL Article 152(16).

1. Measures to reduce Frequency Restoration Control Error (FRCE) in GB are defined in the GB Grid Code. This includes:
   1. Measures to ensure sufficient positive and negative reserve capacity through market notices and warnings and emergency instructions
   2. 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



Where the LFC block consists of more than one LFC area, FRCE target parameters for each LFC area defined in accordance with SOGL Article 128(4);

1. SOGL Article 128(4) is not applicable to this document.
2. The LF Block Structure has a single LF Block and single LF Area within the Synchronous Area of GB.

LFC block monitor in accordance with Article 134(1);

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

Where the LFC block is operated by more than one TSO, the specific allocation of responsibilities between TSOs within the LFC block in accordance with SOGL Article 141(9);

1. SOGL Article 141(9) is not applicable to to this document.
2. The GB LFC Block is operated by the ESO alone.

If applicable, appointment of the TSO responsible for the tasks in SOGL Article 145(6);

1. SOGL Article 145(6) does not apply to this document.
2. There is only a single LFC Area within the GB LFC Block.

Additional requirements for the availability, reliability and redundancy of technical infrastructure defined in accordance with SOGL Article 151(3);

1. This LFCBOM specified no additional requirements for availability, reliability and redundancy of technical infrastructure above those already specified in the GB Synchronous Area Operational Methodologies (LFCBOM) document, Article 23.

Operational procedures in case of exhausted FRR and RR in accordance with SOGL Article 152(8);

1. Ensuring sufficient FRR capacity is available to ESO under commercial arrangements:
   1. 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
      1. have the capability to provide FRR services to the ESO, and
      2. a requirement to make those FRR services commercially available to the ESO.
   2. 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:
   1. 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:
      1. Put additional units in response mode;
      2. Call on enhanced ancillary service provision;
      3. 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;
      4. Or in more extreme circumstance disconnect load or generation to realign requirements with available provision.

The RR dimensioning rules defined in accordance with SOGL Article 160(2);

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:
   1. 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.
   2. 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
      1. 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.
      2. 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;
      3. the RR capacity is sufficient to maintain frequency quality inside the FRCE quality targets from SOGL Article 128(5) & (6) and Annex IV, table.
      4. 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.
      5. 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.

Where the LFC block is operated by more than one TSO, the specific allocation of responsibilities defined in accordance with SOGL Article 157(3), and, if applicable, the specific allocation of responsibilities defined in accordance SOGL Article 160(6);

1. SOGL Article 160(6) is not applicable to this document.
2. The LF Block Structure has a single LF Block and single LF Area within the Synchronous Area of GB. The ESO fulfills all the responsibilities associated with determining the required FRR capacities are obtained.

The escalation procedure defined in accordance with SOGL Article 157(4) and, if applicable, the escalation procedure defined in accordance with SOGL Article 160(7);

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.

The FRR availability requirements, the requirements on the control quality defined in accordance with SOGL Article 158(2), and if applicable, the RR availability requirements and the requirements on the control quality defined in accordance with SOGL Article 161(2);

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.

If applicable, any limits on the exchange of FCR between the LFC Areas of the different LFC Blocks within the CE Synchronous Area and the exchange of FRR or RR between the LFC Areas of an LFC Block of a Synchronous Area consisting of more than one LFC Block defined in accordance with SOGL Article 163(2), SOGL Article 167 and SOGL Article 169(2);

1. These SOGL Articles are not applicable to this document.
2. The LF Block Structure has a single LF Block and single LF Area within the Synchronous Area of GB. The single ESO in GB has no other TSO within GB to exchange reserves with within the GB synchronous area. In the absence of the possibility of such a service, no limits to the exchange of FCR between LFC Areas within the LFC Blocks of the Synchronous Area GB are specified here.

The roles and the responsibilities of the reserve connecting TSO, the reserve receiving TSO and of the affected TSO for the exchange of FRR and/or RR with TSOs of other LFC blocks within the same Synchronous Area as defined in accordance with SOGL Article 165(6);

1. SOGL Article 165(6) is not applicable to this document.
2. The LF Block Structure has a single LF Block and single LF Area within the Synchronous Area of GB. The single ESO in GB has no other TSO to exchange reserves with within the GB synchronous area.

The 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/or RR within the Synchronous Area GB, defined in accordance with SOGL Article 166(7);

1. SOGL Article 166(7) is not applicable to this document.
2. SOGL Article 166 considers sharing of FRR and RR within a synchronous area. The single ESO in GB has no other TSO to share reserves with within the GB synchronous area.

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 in accordance with SOGL Article 175(2);

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, The ESO will fulfil the roles specified in the Article title and as defined in SOGL Article 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.