Balancing Principles Statement Report

October 2019-September 2020

Executive Summary

National Grid Electricity System Operator (NGESO) has developed the Balancing Principles Statement (BPS) in accordance with the Electricity Transmission Licence Standard Condition C16 requirements to define the broad framework within which balancing action decisions are made.

The BPS is intended to help electricity market participants understand actions NGESO may take to achieve the efficient, economic and co-ordinated operation of the transmission system. To assist with this, we have also held regular industry forums where we have provided data, detailed explanations of our balancing actions and answers to questions raised by participants.

This report demonstrates that throughout the period from 1 October 2019 to 30 September 2020, NGESO has operated the National Electricity Transmission System (NETS) in accordance with the guidelines set out in the BPS. Our compliance with the BPS is subject to independent external review. A statement from the External Auditor PriceWaterhouseCoopers (PwC) accompanies this report.

Key events highlighted in this report:

- **There was no Emergency Instructions issued to Balancing Mechanism Units (BMUs). There was one instance where non BM participants were instructed down by Emergency Instruction due to a Localised Negative Reserve Active Power Margin Warning (NRPAM).**
- **Emergency Instructions were not given to any interconnector during the year, however there were eight Emergency Assistance requests agreed with interconnector parties.**
- **No Demand Control instructions were issued over this reporting period.**
- **No National NRAPM warnings were issued. However, there was one localised NRAPM warning issued in for Scotland.**
- **There was no partial or total system shutdown. No Black Start services were called off.**
- **Our Balancing Mechanism (BM) IT systems achieved 99.95% availability (excluding planned outages) in this reporting period.**
- **There was a single instance where a BMU had to involuntary reduce output. Bids were not used to reduce the output.**
- **There were twenty-six occasions where BMUs were disconnected from the GB Transmission System due to faults. No Bid-Offer Acceptances (BOAs) were issued to these BMUs.**

1. BPS Part A: Introduction

National Grid Electricity System Operator (NGESO) has developed a Balancing Principles Statement (BPS) in accordance with Licence requirements to define the broad framework within which balancing action decisions are made.

The BPS report is intended to help electricity market participants understand actions NGESO may take to achieve the efficient, economic and co-ordinated operation of the National Electricity Transmission System.

An overview of the BPS is contained in Appendix 1.

Our compliance with the BPS is subject to independent external review and reflected in this Annual Report. Appendix 5 of this report contains an opinion from the external auditors.

2. BPS Part B: General Principles

The BPS is written to be consistent with the NGET Licence obligation to operate the system in an efficient, economic and co-ordinated manner, whilst ensuring the security of the system at all times.

In determining which balancing measures to employ, we take account of various sources of information. These include Balancing Mechanism Unit (BMU) data, our demand forecasts, our Transmission outage plan, actual system conditions, and any other relevant data (Grid Code BC 1.4.2 (f)).

Throughout the period from 1 October 2019 to 30 September 2020, NGESO has operated the GB Transmission Systems in accordance with the general principles set out in the Balancing Principles Statement.

We are permitted in certain circumstances to operate the system outside the normal principles of Balancing Mechanism operation (as described in the BPS). Specific occurrences are covered in more detail below.

Category	Oct 2016 - Sept 2017	Oct 2017 - Sept 2018	Oct 2018 - Sept 2019	Oct 2019 - Sept 2020
Emergency Instructions	0[1]	0[3]	1[5]	0[8]
Interconnector Emergency Assistance	1	10	9	6
Demand Control	0	0	0	0
NRAPM Warnings	0[2]	0[4]	0[6]	0[9]
Black Start / Islanding	0	0	0	0
Maximum Generation Service	0	0	0	0
Availability of National Grid Balancing Mechanism systems	99.99%	99.99%	99.99%	99.95%
Involuntary Reductions	0	1	2	1
No. of occasions BMUs disconnected by Transmission System Faults	7	8	29[7]	26

Note 1: 4 Emergency instructions issued to non BM participants

Note 2: 5 localised NRAPMs issued for Scotland in YE Sept 2017

Note 3: 4 Emergency Instructions issued to non BM participants in YE Sept 2018

Note 4: 3 Localised NRAPMs issued for Scotland in YE Sept 2018

Note 5: 3 Emergency instructions issued to non BM participants

Note 6: 5 Localised NRAPMs issued for Scotland in YE Sept 2019

Note 7: Due to an admin error there was an additional 2 trips of OFTO disconnected by transmission equipment faults.

Note 8: 3 Emergency Actions on non BM participants

Note 9: 1 localised NRAPM issued for Scotland in YE Sept 2020

2.1 Emergency Instructions

In certain circumstances, the Electricity System Operator (ESO) may need to issue Emergency Instructions or Involuntary Reductions to preserve the integrity of the National Electricity Transmission System (NETS) and any synchronously connected external system. These circumstances may include system events and situations involving the requirement for demand control, Negative Reserve Active Power Margin, Black Start, frequency response and communication failure. In these circumstances, it may be necessary to depart from normal Balancing Mechanism operation in accordance with Grid Code BC2.9.

There were no emergency instructions for BMUs to shut down; however, there were three instances where Emergency Instructions were issued to non BM participants generating in Scotland due to localised NRAPM issues. See Appendix 2 for details.

There were no requests made for Maximum Generation Service.

There were five occasions where Interconnector Emergency Assistance was requested by NGESO, and an additional three where the request was made from other interconnector parties (Grid Code section BC2.9.6). See Appendix 3 for details.

2.2 Demand Control

A situation may arise in BM timescales where there is insufficient active power generation available to meet demand, or there may be local operating problems on part of the transmission system. Under these circumstances, it may be necessary for Network Operators and NGESO to make provisions for the reduction of demand in accordance with Grid Code OC6.

No Demand Control Actions were issued during the reporting year.

2.3 Negative Reserve Active Power Margin

To ensure system security, NGESO must always be able to schedule sufficient frequency responsive plant to contain system frequency against the largest credible loss of generation or demand. Under conditions of low system demand (particularly overnight demand minimums during summer weekends), the generation notified to us may not include enough plant capable of providing this response. Under these circumstances, we would normally accept bids to desynchronise un-responsive plant and accept offers to replace this plant with more responsive generation.

However, in extreme cases, there could be an insufficient volume of bids available to reduce the level of unresponsive generation. In these circumstances, NGESO would issue Negative Reserve Active Power Margin (NRAPM) warnings to the market to signal the shortage of responsive plant and request additional plant flexibility. If the NRAPM warnings have no effect, as a last resort NGESO could instruct plant to desynchronise under these NRAPM conditions in accordance with Grid Code section BC2.9.4. A localised NRAPM is issued where the same conditions exist, but in a localised area, usually due to a constraint on the system.

No National NRAPM warnings were issued. However, there was a single localised NRAPM warning issued for constraint groups in Scotland. See Appendix 2 for details.

2.4 Black Start / Islanding

Under extreme conditions (e.g. multiple circuit tripping during severe weather), parts of the National Electricity Transmission System could become disconnected from the main system, or islanded. In addition, there could be a “partial shutdown” where all generation has ceased within an island, or a “total shutdown” where all generation has ceased in the total system and there is no electricity supply from external Interconnectors.

Grid Code section OC9 describes the implementation of recovery procedures following a total or partial shutdown (Black Start), the re-synchronisation of islands and the Joint System Incidents Procedure which

would apply under the above circumstances. NGESO has Ancillary Service contracts with certain generators to provide a Black Start capability to re-establish supply following a partial or total system shutdown.

No Black Start services were called off (excluding routine testing). There no that caused BMUs to be islanded from the transmission system.

2.5 Communication Failures

This subject is covered in both Grid Code BC2.9.7 and BPS Part B section 5(g). A communication failure is defined in the BPS as an "*Where unplanned outages of the electronic data communication facilities or NGET associated computing facilities has occurred preventing normal BM operation*". Under these circumstances, NGESO will normally issue a "National Grid Balancing Mechanism IT System Failure" as soon as it is reasonably able to do so. This will normally be issued via the Balancing Mechanism Reporting System (BMRS), where possible will indicate the likely duration of the outage.

Our Balancing Mechanism IT systems achieved 99.95% availability (excluding planned outages) in this reporting period.

There was a single occasion on 6 March 2020 where an unplanned BM outage was declared to the market. Just prior to 02:00 the bid-offer profiling processes stopped working, and further BOAs could not be issued until the units returned to FPN before extension BOAs could be issued. BOAs could not be sent to the BMRA. This led to frequency control and operational awareness being compromised and an unplanned IT failure warning was issued to the market and the ENTSOE platform at 05:30. Extra response was instructed during this time and BM systems were returned to normal functioning at 09:34. The issue was caused by a single long notice submission sent via electronic data logging (EDL).

2.6 Involuntary Reductions

This subject is covered in BPS Part B section 6. Under certain exceptional circumstances, NGESO may need to instruct reductions in generation or demand before all valid and relevant Balancing Mechanism bids or offers have been accepted. This could be to preserve system response or reactive reserve levels, or as a result of automatic measures (e.g. the operation of intertrip services not covered by commercial agreements), or because communication problems prevent other relevant bids or offers being instructed. Involuntary Reductions include Demand Reduction and Disconnection as referred to in Grid Code OC6.

There was one instance where a BMU was required to reduce generation output due to faults on the Transmission System. See Appendix 4.

3. BPS Part C: Principles underlying Balancing Measures

There are a number of principles described in the BPS that underpin the measures NGESO will take to balance the system. The balancing measures include the acceptance of bids and offers, utilisation of Balancing Service contracts, other commercial services, instruction of Emergency Actions and other Involuntary Reductions. These measures are called off in cost order unless this is not possible under circumstances described in Part C section 5. Part C also describes the treatment of BMUs disconnected by Transmission System faults.

We have used balancing measures in cost order wherever possible during this reporting period, with exceptions being in line with the circumstances described in BPS Part C Section 5. For more information on Balancing Services please see the NGESO website under Balancing Services, Monthly Balancing Services Summary Report. See Appendix 5 from our External Auditors.

https://www.nationalgrideso.com/c16-statements-and-consultations

3.1 Treatment of BMUs disconnected by Transmission System faults

This subject is referred to in BPS Part C paragraph 6. Following transmission system faults, BMUs may become instantaneously disconnected from the transmission system. Under such circumstances following the fault and prior to reconnection, we would only issue a BOA to the affected BMUs if the trade provides immediate assistance to us in controlling the transmission system.

There were twenty-six occasions where BMUs were disconnected due to Transmission System faults. These are summarised in the table below. Eight of the BMUs affected had a capacity smaller than 20MW. The remaining eighteen Involved large wind units in Scotland, English offshore windfarms (OFTO), and a CCGT stations in England. The increased number of disconnections can be traced back to the increasing number of non BMUs entering the market, the congestion of various units in parts of the Scottish Networks where one fault can cause several BMUs to trip and the increase in offshore transmission operators (OFTO) which are connecting to the high voltage network.

No BOAs were issued to these BMUs following the transmission fault and the loss of generation was resolved through frequency response and In some cases alleviated constraint level around the area.

Category	SHETL	SP	NGT E&W	OFTO
Weather	3	4		
Transmission Eqpt Failure	1		1	
Field Issues	9	1	1	
Unknown	2	1	1	2

3.2 Pre-Gate Closure BMU Transactions

There have been no PGBTs enacted since June 2012 and PGBTs have been removed from the Balancing Principles Statement, in agreement from the market following the review in April 2019. This item will no longer be included in this report

4. BPS Part D: Transmission Constraint Management and Reserve/Response Principles

We employ a number of principles for the management of transmission constraints and response/reserve holdings. These include outage planning from year ahead to day ahead, security studies, constraint cost forecasting and negotiating Balancing Service contracts. BPS Part D also describes the calculation of response and reserve holding levels, allocation of holdings with due regard to cost, delivery dynamics and transmission constraints, and regaining levels of response holding following delivery.

We have managed transmission constraints and response/reserve holdings during this reporting period in line with the principles described in BPS Part D.

5. BPS Part E: Day Ahead and Within Day Balancing Processes

BPS Part E describes the Day Ahead and Within Day balancing processes – the Scheduling and Control phases. At the Day-Ahead stage, this includes publishing day ahead demand forecasts, performing security studies, calculating reserve/response levels and calculating half hourly system plant margins. It also includes forecasting constraint costs, calling off Balancing Service contracts and revising the national and Zonal margin data.

Within Day includes releasing revisions to the demand forecasts and margin data to the Balancing Mechanism Reporting System, performing additional security studies, reassessing the need to call off Balancing Service contracts, and balancing the system minute by minute through the deployment of Balancing Services on an economic basis.

We have managed the Day-Ahead and Within Day balancing processes during this reporting period in line with the principles described in BPS Part E. See Appendix 5 from our External Auditors

6. BPS Part F: Summary of GB Operational Security Standards

BPS Part F summarises the Operational Security Standards used by NGESO. We operate the system within these standards in order to maintain system security. The system is normally secured against certain specific "secured events" as defined in Part F – for example the fault outage of a double circuit overhead line.

We have planned and operated the GB Transmission System to a single GB Security and Quality of Supply Standard (GB SQSS).

The Loss of supply, frequency and voltage excursions outside statutory limits are reported separately in accordance with Standard Condition C17 of the Transmission Licence.

https://www.nationalgrid.com/uk/electricity/market-operations-and-data/transmission-performance-reports

7. BPS Part G: Exceptions to the BPS

Infrequently, circumstances may arise which require us to operate outside the principles described in the BPS. The specific examples identified in BPS Part G are:

- Black start
- System islanding
- When emergency control centre evacuation procedures have been invoked or widespread communication problems
- Circumstances where operating within the BPS would prejudice the safe and secure operation of the system
- Insufficient time available to balance the system in accordance with the BPS.

Actions were taken as described in the subsections above to ensure the safe and secure operation of the GB Transmission System, to avoid breaching our statutory obligations or where insufficient time was available to employ alternative measures to achieve balancing.

8. Future Reports

BPS reports are prepared by NGESO in accordance with the timetable set out in our Transmission Licence Standard Condition C16.

For further information on this report, please contact the Performance Transformation Manager via the group email: BM.liaisonandcompliance@nationalgrideso.com

Appendix 1 – Overview of the Balancing Principles Statement

I. The Purpose of the Balancing Principles Statement

The BPS has been developed by NGESO to assist electricity market participants to understand our actions in achieving the efficient, economic and co-ordinated operation of the transmission system.

NGESO is required by Transmission Licence Standard Condition C16 section 5, to establish and maintain a BPS to define the broad framework within which we make balancing action decisions.

II. Changes to the BPS

The BPS is approved by OFGEM and may only be modified in accordance with the processes set out in Transmission Licence Standard Condition C16.

Where changes are required to the BPS in advance of the annual update then, subject to approval, a BPS supplement may be issued.

The version of the BPS (version 18.0) was issued on 1 April 2020. The changes to these versions were due to the annual review of the BPS.

III. Further information

The BPS is available from the NGESO website.

https://www.nationalgrideso.com/c16-statements-and-consultations

For further enquiries relating to the BPS Report, please contact:

bm.liaisonandcompliance@nationalgrideso.com

Appendix 2 - Emergency Instructions

Non BM participants are intermittent or embedded generation who choose to not actively participate in the Balancing Mechanism. These units do not submit physical notifications or bid offer data to the Balancing Settlement Code Company (BSCCo /Elexon) and are therefore not liable for Balancing Services Use of System Costs. However, if they are positioned in an area with transmission constraints and would add to the overloading of circuits, they can be instructed to come off the system via an emergency instruction. It must be noted that these actions are only taken when no other options are available in the BM.

More information on non BM participants (Bilateral Embedded Licence Exemptible Large Power Station Agreement (BELLA) / (Bilateral Embedded Generation Agreement (BEGA) bilateral contracts) can be found on the National Grid website.

https://www.nationalgrid.com/uk/electricity/industrial-connections/applying-connection

There was a single localised NRAPM issued for the Dumfries and Galloway area in Scotland over the year. The loading in this area is usually controlled by a load management scheme but is insufficient to manage the constraint when there are high winds in the area. Therefore, when there is an insufficient volume of available bids to be taken in the BM, emergency actions are required to secure the system, until trades are enacted with the various parties. These have been summarised as below.

Localised NRAPM Effective		Emergency Instructions to Non BMUs		
Date from	Date to	Non BM Participant (NG ID)	Time From (GMT)	Time To (GMT)
Mon, 27/07/2020 13:46	Mon, 27/07/2020 15:32	TONG-1	27/07/2020 14:25	27/07/2020 16:12
		GLLEH-1	27/07/2020 14:25	27/07/2020 16:12
		KEOOH-1	27/07/2020 14:25	27/07/2020 16:12

Appendix 3- Interconnector Emergency Assistance

Currently with the Ireland (0.5GW) and Northern Ireland interconnectors (0.45GW), there another are four intercontinental interconnectors connecting the UK with Netherlands(1.05GW), Belgium (1.2GW), France (2GW) with another from France (1.15GW). These give us access to reserve services and clean renewable energy when required and the market is able to access more affordable generation reducing consumer bills.

Interconnectors submit reference programs to the NGESO at the day ahead, however due large capacities and where they are connected to the GB Transmission System, NGESO control the volume and the rate of imports and exports from them. This is usually done by adjusting the volumes in conjunction of our in house Trading Team.

Four of the eight emergency assisstance requests year were for Rate of Change of Frequency (RoCoF) to reduce the energy import, and the remaining four were Emergency owand the other four to reduce the flow due to contraint limits when trades were either not agreed or had been unwound by the market prior to the gate close.

INSTIGATOR	Reduce or Increase	Direction (NGESO)	INTERCONNECTOR	DATE FROM	DATE TO	REASON
RTE	Reduce	Export	France (IFA)	14/11/2019 17:52	14/11/2019 19:00	EA
RTE	Reduce	Export	France (IFA)	04/12/2019 17:00	04/12/2019 18:40	EA
RTE	Reduce	Export	France (IFA)	11/05/2020 05:30	11/05/2021 06:30	EA
NGESO	Reduce	Import	Netherlands (NEMO)	13/05/2020 05:00	13/05/2020 06:05	RoCoF management
NGESO	Reduce	Import	Netherlands (NEMO)	26/05/2020 05:00	26/05/2020 07:00	RoCoF management
NGESO	Reduce	Import	France (IFA)	22/08/2020 08:50	22/08/2020 12:00	RoCoF management
NGESO	Reduce	Import	Netherlands (NEMO)	22/08/2020 16:00	22/08/2020 17:00	RoCoF management
NGESO	Reduce	Import	France (IFA)	16/09/2020 19:53	16/09/2020 22:05	EA

Appendix 4 - Involuntary Reductions

15:06 Wednesday 11 March 2020: SHETL was advised of a road traffic accident on the A9 between two lorries, which required switching out the 33kV cable between the connection point and Bad-A-Cheo (BDCHW-1) windfarm due to concerns of fuel leaking on to the cable. The windfarm was made aware and the windfarm was shut down. No BOAs were given to the unit to reduce the output.

Appendix 5 - Review opinion by PricewaterhouseCoopers

The Auditor Opinion and their approach document can be found following the link below.

BPS Approach and Auditor Opinion