# APPENDIX F

# Balancing Principles Statement

Made in accordance with Condition C16 of National Grid Electricity Transmission plc's electricity transmission licence

~~Effective~~ Applies from~~:~~ 1 April 2009

**Version Control**

| Date | Version No. | Notes |
|---|---|---|
| 20.03.01 | 1.0 | Initial version |
| 01.05.02 | 2.0 | Revised to incorporate changes following March / April 2002 consultation. |
| 01.05.03 | 3.0 | Revision following annual review |
| 28.11.03 | 3.1 | Revision to incorporate introduction of Maximum Generation Service and changes to the PGBT Tender process |
| 01.05.04 | 4.0 | Revision following annual review |
| 04.10.04 | 4.1 | Revisions to incorporate changes as a result of CAP071: the development of Maximum Generation Service |
| 01.01.05 | 4.2 | Revisions to incorporate changes relating to BETTA |
| 02.09.05 | 5.0 | Revision following annual review |
| 06.04.06 | 6.0 | Revision following annual review |
| 01.11.06 | 6.01 | Revisions to incorporate the replacement of the Warming & Hot Standby service with BM Start Up service |
| 01.04.07 | 7.0 | Revisions to incorporate Short Term Operating Reserve (STOR) |
| 01.04.08 | 8.0 | Revision following annual review |
| 01.04.09 | 9.0 | Revisions following annual review and implementation of 'plain English' |

We have developed ~~This~~ this Balancing Principles Statement ~~has been developed and approved by the Authority~~ to assist Balancing and Settlement Code (BSC) participants ~~in~~to understand~~ing~~ what we do to operate the transmission system ~~our actions~~ in ~~achieving the~~ an efficient, economic and co-ordinated manner~~operation of the transmission system and ensuring~~ to keep ~~the security of~~ the system secure at all times. The Authority has approved the statement. This ~~Balancing Principles S~~statement can ~~may~~ only be changed ~~modified~~ in accordance with the processes set out in Standard Condition C16 of ~~National Grid's~~our ~~Electricity Transmission~~ Licence. When we review~~ing~~ this ~~Balancing Principles S~~statement, we will ~~provide~~ give the Authority ~~with~~ relevant information ~~in~~ relati~~on~~ng to ~~such~~ our review and ~~with~~ the relevant reports and statements in accordance with the relevant provisions of Standard Condition C16 of our~~the Electricity Transmission~~ Licence.

~~In the event that it is necessary to modify~~If we need to change this ~~Balancing Principles S~~statement before we issue ~~in advance of us issuing~~ the yearly ~~annual~~ updated version of the document, we ~~then~~ will ~~this will be done by~~ issue~~ing~~ a supplement to the ~~Balancing Principles S~~statement.

The latest version of this document ~~is available~~, and ~~together with~~ the relevant amended ~~change marked~~ version (if this applies~~any~~), is available on our ~~electronically from the National Grid W~~website~~;~~ at **~~http://~~www.nationalgrid.com/uk/Electricity/Balancing/transmissionlicensestatements~~/~~.**

You can also ask for a copy by e-mailing us at BalancingServices@uk.ngrid.com or writing to: ~~Alternatively, a copy may be requested from~~

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## Part A: Introduction

### 1. Purpose of this Documentdocument

We, National Grid Electricity Transmission plc (NGET), must produce This this document is the Balancing Principles Statement which National Grid Electricity Transmission plc (NGET) is required to establish in accordance with Standard Condition C16 of the Transmission Licence. The purpose of this Balancing Principles Sstatement is to set out define the general broad principles and criteria (known as the 'Balancing Principles') by which we used to will decidetermine, at different times and in different circumstances, which Balancing Services we will use to assist in the efficient and economic operation of the transmission system, and also to . We will also use the statement to set outdefine when we would resort to measures not involving the use of Balancing Services.

This Balancing Principles Statement is designed to indicate the broad framework against which we will make balancing action decisions.

- Part B sets out a number of general principles relating to how we the developed ment and will application apply of this Balancing Principles Sstatement.
- and Part C describes the general broad principles by which we will utilise balancing measures.
- Part D describes the general broad principles relating to how we by which we undertake both the management of transmission constraints and response and /reserve services.
  and Part E sets out the processes that we will normally undertake carry out at the day ahead and on the day to achieve system balance.
- Part F summarises ourthe operational security standards we must meet within which we willwhen carrying out balancing measures.

- Part G explains the exceptions to the Balancing Principles Statement– in other words, ~~where~~ the circumstances in which we would need ~~may arise which require us~~ to work ~~operate~~ outside the principles set out ~~detailed~~ in previous sections.

If we need to change this statement before we issue the yearly updated version of the document, we will issue a supplement to the statement. ~~In the event that it is necessary to modify this Balancing Principles Statement in advance of us issuing the annual updated version of the document, then this will be done by issuing a supplement to the Balancing Principles Statement.~~

~~This~~ We have developed this Balancing Principles Statement ~~has been developed by NGET, and approved by the Authority,~~ to assist BSC participants ~~in~~to understand~~ing~~ our actions in achieving the efficient, economic and co-ordinated operation of the transmission system. The Authority has approved the statement. This ~~Balancing Principles S~~statement may only be modified in accordance with the processes set out in Standard Condition C16 of the ~~Electricity Transmission~~ Licence. When ~~W~~we ~~will~~ review this ~~Balancing Principles S~~statement, ~~provide~~we will give the Authority ~~with~~ relevant information ~~in~~ relat~~ion~~ing to ~~such~~our review and ~~provide the Authority~~ the relevant reports and statements in accordance with the relevant provisions of Standard Condition C16 of the ~~Electricity Transmission~~ Licence.

This ~~Balancing Principles S~~statement ~~makes~~ refers~~ence~~ to a number of terms ~~provisions~~ set out ~~contained~~ in the Grid Code and Balancing and Settlement Code. If ~~In the event that~~ any of the terms ~~relevant provisions in the Grid Code or Balancing and Settlement Code~~ in these codes are amended~~, we it~~ may ~~become~~ need ~~cessary for us to seek~~ to change this statement to reflect those amendments~~modify the Balancing Principles Statement in order that it remains consistent with the Grid Code and/or Balancing and Settlement Code~~.

~~In any event where~~If our legal responsibilities, ~~statutory obligations~~ or the provisions of the Grid Code, ~~are considered inconsistent with~~contradict any part of this ~~Balancing Principles S~~statement, ~~then~~ the relevant legal responsibility or ~~statutory obligation and/or~~the Grid Code provisions will take pri~~ecedence~~ority.

In this statement, 'we' refers to National Grid Electricity Transmission plc and the 'Licence' refers to our Electricity Transmission Licence.

Unless they are defined otherwise in this ~~Balancing Principles S~~statement, the terms we use~~d~~ here~~in shall~~ will have the same meanings as ~~given to them~~ those that apply ~~in~~ to the Electricity ~~Transmission Licence~~, the Grid Code ~~and/~~or the Balancing and Settlement Code (whichever applies)~~as the case may be~~.

If you need ~~Copies~~ copies of this Balancing Principles Statement, please contact us~~are available from NGET upon request.~~. The most recent edition (and any archived editions) will be available on our ~~from National Grid's~~ website at ~~http://~~www.nationalgrid.com/uk/Electricity/Balancing/transmissionlicensestatements./

## Part B: General principles

### 1 Licence Duties

We have written This this Balancing Principles Statement is written to be consistent with and to satisfy meet the duties in our Licence our licence obligation to "operate the Licensee's Transmission System in an efficient, economic and co-ordinated manner" and our duty under the Electricity Transmission Licence not to discriminate in our procurement or use of Balancing Services.

NGET We will normally operate in accordance with the Balancing Principles Statement and our compliance will be measured by two processes:.

(i) we will need to Providing provide an annual report to the Authority on how the manner in which and the extent to which far we have kept to we have complied with the Balancing Principles Statement and whether we need to make any changes modifications should be made to the Balancing Principles Sstatement to reflect our practice more closely our practice.

(ii) independent auditorsWe will carry out checks be subject to an external audit to decide whether we have kept to this statement when determine the extent to which we have, in usinging Balancing Services, complied with the Balancing Principles Statement. The audit statement will be made available to the Authority in accordance with the Electricity Transmission Licence.

At least once a year (or when directed by the Authority), we will Additionally we shall, if directed by the Authority, and in any event at least once a year, review theis Balancing Principles Sstatement in

consultation with the Balancing and Settlement Code Parties and other interested parties likely to be affected by the ~~Balancing Principles S~~statement.

## 2 Other ~~Compliance R~~reporting

As well as carrying out the duties in ~~In addition to~~ our licence, ~~duties~~ we ~~shall~~ will also provide a report to the Authority~~,~~ – either when requested, or ~~where~~ when we become aware of any circumstances of significant non-compliance, in our use of Balancing Services.

The report will summarise the incident and ~~together with an~~ explain~~ation of~~ the circumstances relating to why we failed to keep to ~~leading to the deviation from~~ this ~~Balancing sPrinciples S~~tatement. We ~~shall~~ will try ~~endeavour~~ to provide ~~such~~ these reports ~~to the Authority~~ within 28 days of the Authority asking for them~~of the request being made~~. We will also make ~~Furthermore such~~these reports ~~shall be made~~ available to the industry (via the Ofgem website).

## 3 Information ~~S~~sources

We will decide ~~termine~~ what balancing measures we will use ~~be employed~~ by taking account of:

- Balancing Mechanism Unit (BMU) data (made available on the Balancing Mechanism Reporting System (BMRS) from market participants)~~,~~;
- our forecast of GB National Demand and GB Transmission System Demand (BC1 of the Grid Code ~~details~~ explains how ~~the release of~~ this information is released on the BMRS)~~,~~;

- the Transmission Outage Plan (our co-ordinated schedule of transmission plant outages, details of which are made available to relevant generators and Network Operators under OC2 of the Grid Code)~~,~~
- actual system conditions (including weather conditions)~~;~~ and
- any other relevant data as defined in BC1.4.2 (f) of the Grid Code.

## 4 Balancing Measures

The balancing measures available to us ~~constitute~~ make up the Balancing Services. ~~_~~The Balancing Services are defined in Standard Condition C1 of ~~National Grid's~~our ~~Electricity Transmission~~ Licence. There is ~~A~~ a detailed explanation of these Balancing Services ~~is provided~~ in the Procurement Guidelines.

## 5 Emergency Instructions

In certain circumstances~~,~~ ~~it will be necessary, in order~~ to protect ~~eserve the integrity of~~ the GB Transmission System and any other system synchronously connected to it, ~~external system, for us~~ we will need to issue 'Emergency Instructions''. In these ~~such~~ circumstances~~,~~ ~~it~~ we may need ~~be necessary~~ to depart from the normal BM operation in accordance with BC2.9 of the Grid Code.

### General Principles for Issuing Emergency Instructions

~~Where~~ If we need ~~identify the requirement~~ to issue Emergency Instructions, ~~and time permits,~~ we will ~~do so with due regard~~keep to the following principles (if time allows us to do so). ~~:~~

(a) ~~W~~we will issue instructions to those BMUs that are most effective in relieving the system problem~~;~~.

(b) if ~~Where~~ BMUs ~~have a~~ are similarly ~~level of~~ effective at ~~ness in~~ relieving the system problem, we will make a decision ~~select~~ based on the ~~basis of submitted~~ Bid-Offer Data they provide. ~~;~~

(c) if there is no difference ~~Where it is not possible to differentiate~~ between the effectiveness or cost of BMUs, we will issue instructions based on the following~~basis of.:~~

- ~~E~~effect on power flows (resulting in ~~the minimisation of~~ transmission losses being limited as much as possible) – we will issue instructions to BMUs that would reduce ~~lead to the greatest reduction in~~ transmission losses the most ~~being instructed first~~.
- Reserve and ~~/~~Response capability – we will issue instructions to BMUs with a lower response and ~~/~~reserve capability ~~being instructed~~ ahead of ~~in preference to~~ BMUs with a higher capability~~;~~.
- Reactive Power contribution – we will issue instructions to BMUs with a lower reactive power capability ~~being instructed in preference~~ahead of ~~to~~ BMUs with a higher capability~~;~~; and
- Dynamic Parameters – we will issue instructions to BMUs with more appropriate dynamic parameters ahead ~~being selected in preference to~~of those with less appropriate parameters.

(d) ~~where~~ if we have issued instructions to several BMUs ~~have been instructed~~ in response to an incident, we will restore those units in the reverse order of when we issued them with instructions, ~~where~~ if dynamic parameters and system conditions allow us to do so~~, in the reverse order of their instruction~~.

~~In the case of a BMU,~~ Emergency Instructions may include an instruction for the BMU to operate in a way that is not consistent with the dynamic parameters, QPNs (Quiescent Physical Notifications, as defined in the Grid Code) and/or export and import limits~~.~~. In all cases (~~with the~~ except for ~~ion of~~ the need to begin ~~invoke~~ the Black Start process or the Re-Synchronisation of De-Synchronised Island process in accordance with OC9 of the Grid Code) where we have issued an Emergency Instruction to a BM Participant, details will be posted on the BMRS (Balancing Mechanism Reporting Service) and the Emergency Instruction Acceptance Data will be agreed after the ~~post~~ event.

Examples of ~~such~~ circumstances where we may need to ~~that may require the~~ issue ~~of~~ Emergency Instructions include those set out below:

(a) **Events**

Events on the GB Transmission System or another User's ~~the~~ System ~~of another user~~ that lead, or could ~~potentially~~ lead, to the ~~insecure~~ system not operating securely, ~~operation~~ and where there are not enough ~~for which insufficient~~ relevant Bid-Offers ~~are available~~ to ~~restore~~ make the system secure~~ity~~. The Grid Code defines an 'Event' as~~:~~

'An unscheduled or unplanned (although it may be anticipated) occurrence on, or relating to, a **System** (including **Embedded Power Stations)** including, without limiting that general description, faults, incidents and breakdowns and adverse weather conditions being experienced'.

(b) **Demand Control** (see ~~detailed in~~ OC6.5 to OC6.8 of the Grid Code)

Operating Code ~~No.~~ 6 (OC6) of the Grid Code is concerned with the provisions to be made by Network Operators, and in relation to Non-Embedded Customers by us, ~~-~~to permit the reduction of

demand if ~~in the event of insufficient~~ not enough active power is ~~generation~~ being generated ~~available~~ to meet that demand, ~~or~~ if ~~in~~ the system ~~event of~~ breaks down or if there are operating problems (for example, ~~such as in respect of~~with system frequency, system voltage levels or system thermal overloads) ~~on~~ on any part of the GB Transmission System.

(c) **System and Localised Negative Reserve Active Power Margin (NRAPM)** (detailed in BC2.9.4 of the Grid Code).

BC2.9.4 of the Grid Code gives details of the action~~s that~~ we can take ~~undertake~~ to make sure ~~in ensuring~~ that:

- the sum of synchronised BMUs ~~at all times~~ is, at all times, ~~are~~ capable of reducing enough output ~~sufficient~~ to offset the loss of the largest secured demand on the system; and
- synchronised BMUs ~~at all times~~ are, at all times, capable of reducing output to allow transfers to and from system constraint groups to be contained within the required limits.

In both cases, this action must be sustainable.

**System Negative Reserve Active Power Margin**

~~It should be noted that i~~If the System ~~Negative Reserve Active Power Margin (~~NRAPM~~)~~ is not met, ~~then~~ the resulting high frequency after ~~following~~ the loss of the largest secured demand would not be reduced~~abated~~.

If ~~Where~~ we are not ~~un~~able to meet ~~satisfy~~ the required System NRAPM, we will select (and issue instructions to) BMUs for ~~D~~de-synchronising based on the ~~basis of~~ Bid-Offer ~~D~~data submitted to us.

**Localised Negative Reserve Active Power Margin**

If Localised NRAPMs are not maintained, ~~then it~~we may not be able ~~possible~~ to reduce the effects of incidents involving ~~alleviate incidences of~~ thermal overloading, system instability, and voltage problems following transmission system faults.

We will ~~select~~ choose (and issue instructions to) BMUs for ~~De~~de-synchronising based on the ~~basis of~~ Bid-Offer ~~D~~data submitted to us and their effectiveness in restoring the Localised NRAPM to the required level.

~~In the event that~~If there is no ~~we are unable to~~ differen~~ce~~tiate between BMUs according to the Bid-Offer ~~D~~data ~~and/~~or their effectiveness in restoring any Localised NRAPM (or both), we will~~, where time permits,~~ select BMUs in ~~accordance~~line with the General Principles described above (if time allows us to do so).

(d) **Black Start** (see ~~Detailed in~~ OC9 of the Grid Code)

The need to invoke the Black Start process or the Re-Synchronisation of De-Synchronised Island process in accordance with OC9.

(e) **Maximum Generation Service**

The need to request the Maximum Generation Service would normally be ~~in order~~ to maintain the system's security ~~in the event that~~if all valid and feasible Bids and Offers have been accepted in the BM (Balancing Mechanism). If ~~Where~~ possible, we will ~~the~~ make a request for the Maximum Generation Service ~~will take place prior~~before we issue ~~to the~~ instructions for ~~of~~ any measures related to Demand Control under OC6 1.2.(c), (d) or (e) of the Grid Code. Information relating to ~~the~~ instructions for ~~of~~ the Maximum Generation Service will be published on the BMRS as soon as ~~reasonably practicable~~possible.

We will only make a request for ~~The~~ the Maximum Generation Service ~~will only be instructed~~if ~~where~~ a BMU ~~–~~has been instructed to, or is generating at, its Maximum Export Limit.

~~For the~~To avoid any ~~ance of~~ doubt, valid and feasible Bid and Offers are those that ~~Bids and Offers which facilitate the~~allow ~~delivery of~~ energy to be delivered within the relevant Settlement Period. In ~~Under~~ certain exceptional circumstances, we ~~it~~ may need ~~be necessary~~ to make a request for ~~invoke~~ the Maximum Generation Service before we have accepted all valid and feasible Bids and Offers~~ have been accepted~~. These circumstances may include where:

(i) ~~where the~~ calling off ~~of~~ available Offers would lead to ~~an erosion of~~ the system reserve ~~f~~or response falling below the required level;

(ii)~~where the~~ accepting ~~ance of~~ relevant Offers would lead to ~~the depletion of~~ reactive reserves falling below the required levels; and

(iii)~~where~~ no other plant with suitable dynamics is available.

To ~~For the~~ avoid any ~~ance of~~ doubt, we will make the decision to issue ~~instruc~~instructions for~~t~~ the Maximum Generation Service ~~will be taken~~ based ~~up~~on the ~~prevailing system~~ conditions ~~on~~ of the transmission system at the time. The price of other available action~~s~~ offered through the BM (Balancing Mechanism) will have no bearing ~~up~~on thi~~s~~e decision ~~to instruct Maximum Generation Service~~.

(f) **Frequency Sensitivity** (see ~~Detailed in~~ BC2.9.5 of the Grid Code)

The need to maintain ~~adequate~~ enough frequency~~-~~sensitive Generating Units in accordance with BC2.9.5.

(g) **Communication Failure**

Where unplanned outages of the electronic data communication facilities or NGET associated computing facilities has occurred preventing normal BM operation.

## 6 Involuntary Reductions

~~Under~~ In certain, mainly exceptional, circumstances, we may need to take actions that will involve the involuntary reduction of generation or demand before all valid and relevant BM Bid-Offers have been accepted. Relevant BM Bid-Offers are defined as those which are ~~being~~ based ~~located~~ in the correct geographic location ~~and/~~or which have~~ing~~ the required dynamic parameters to ~~resolve~~ relieve the system problem ~~in question~~. Reasons for making involuntary reductions ~~such actions~~ include~~:~~ the following.

(i) if ~~where the~~ call~~ing~~ off ~~of~~ available Offers would lead to ~~an erosion of~~ the system response holding falling below the required level. (~~It should be noted that a~~An instantaneous generation loss ~~occurring~~ that happens at a time when the ~~of depleted~~ response holding has fallen below the level needed could lead to a change in frequency ~~deviation~~ outside ~~of~~the statutory limits. In ~~the~~ an extreme case, the system frequency could fall below the trigger point for automatic low~~-~~ frequency demand disconnection – a minimum level of 6% of the total system demand.)

(ii) ~~where~~if automatic ~~curtailment~~ measures have been taken ~~initiated in~~to respond~~se~~ to an incident

(iii) ~~where the~~ accepting ~~ance of~~ relevant Offers would lead to the ~~depletion of~~ reactive reserves falling below the required levels; or

(iv) ~~where~~ communication problems prevent us from accepting ~~clude the instruction of~~ relevant Bid-Offers.

Involuntary Reductions can arise either through our instructions (either manually or automatically) or following a fault with the system. ~~Where~~ If we find that we need ~~identify the requirement~~ to call involuntary reductions (~~,~~ and time allows this)~~permits~~, we will do so by considering ~~with due regard to~~ the following principles~~:~~.

(a) we will issue instructions to Network Operators whose demand is most effective ~~in~~ at relieving the system problem~~;~~.

(b) we will issue instructions to those BMUs ~~-~~that are most effective ~~in~~ at relieving the system problem~~;~~.

(c) ~~where~~ if there is no~~it is not possible to~~ differenceti~~ate~~ between the effectiveness of Network Operators' demand ~~(~~or BMUs~~)~~ we will issue instructions to those Network Operators or BMUs that will ~~lead to the greatest~~ reduction ~~in~~ transmission losses the most.~~; and~~

(d) If we have issued instructions to ~~where~~ several Network Operators ~~(~~or BMUs~~)~~ ~~have been instructed~~ in response to an incident, we will instruct the restoration of demand ~~(~~or the BMUs~~),~~ in the reverse order of when we issued them with instructions, if~~where~~ dynamic parameters and system conditions allow~~,~~ us to do so ~~in the reverse order of their instruction~~.

## Part C: ~~—~~ Principles ~~underlying~~ relating to balancing measures

1 We ~~shall~~ will be responsible for making a forecast of 'GB National Demand' and 'GB Transmission System Demand' (as defined in the Grid Code) and ~~the periodic~~ releasing ~~e of~~ these forecasts to the Balancing Mechanism Reporting Agent (BMRA) in ~~accordance~~ line with the timetable set out ~~specified~~ in ~~the~~ BC1, Appendix 2 of the Grid Code. The BMRA publishes ~~This~~ this data ~~is published by the BMRA~~ in line ~~accordance~~ with ~~s~~Section Q, Sub ~~-~~ ~~S~~section 6 of the Balancing and Settlement Code.

2 ~~Having regard to~~By considering the information provided to us by the Balancing and Settlement Code Parties (including their forecast levels of electricity demand) and ~~to~~ the requirements of the ~~licensed~~ transmission system security standards provided for by the Licence, we ~~shall~~ will ~~undertake~~ carry out operational planning for the timescales year ahead to day ahead:~~-~~

(a) for ~~the~~ matching ~~of~~ generation output (including, if possible~~achievable~~, a reserve of BMUs to provide enough of a security margin ~~sufficient~~ to maintain an acceptable level of short ~~-~~term supply security) with forecast demand after taking ~~into~~ account of:

(i) the ~~BMUs~~ availability, flexibility and~~,~~ prices of BMUs and submitted dynamics;

(ii) transmission system capability;

(iii) electricity delivered to the transmission system from generation which ~~is~~ does not have ~~required~~ to provide ~~submit~~ Physical Notification (PN) data; and

(iv) any other relevant information.

(b) to allow us to carry out ~~enable~~ maintenance on parts of the transmission system.

3 We will aim ~~seek~~ to keep to ~~comply with~~ the above principles when using ~~in deploying~~ all available balancing measures ~~in order~~ to keep the ~~maintain~~ system secure~~ity~~ at all times.

4 We will achieve balancing measures through ~~the~~:

(i) ~~acceptance~~ accepting ~~of~~ Bids and Offers submitted by generation and demand to the BM;

(ii) calling off ~~of~~ Ancillary Service contracts;

(iii) calling off ~~of~~ other services which help us ~~serve to assist us in~~ operate~~ing~~ the transmission system (including ~~, for the avoidance of doubt,~~ services from external system operators); and

(iv) issuing instructions for~~of~~ ~~E~~emergency ~~Actions~~ actions and other Involuntary Reductions.

In specific circumstances, we will provide services to external system operators through ~~via S~~system-to-~~S~~system ~~S~~services. In ~~On~~ these cases, ~~occasions it is~~we expect~~ed that we will~~ to procure Balancing Services to be able to provide the system-to-system ~~effect this~~ service~~s provision~~.

5 We ~~shall~~ will call off balancing measures defined in 4(i), 4(ii) and 4(iii) in ~~a~~ cost order to maintain system balance. However, in ~~Under~~ certain circumstances ~~however~~ this may not be possible. These circumstances include:

(i) where urgent contingency action is needed to restore operational standards on the transmission system;

(ii) where technical constraints arise on the transmission system;

(iii) the observed and declared dynamic operating characteristics of available generation and demand Balancing Services;

(iv) other matters ~~(such as those detailed in BC2.9) provided~~set out ~~for~~ in the Grid Code (such as those set out in BC2.9);

(v) the failure of communication links; and

(vi) where ~~S~~services provided on Interconnector BMUs ~~that~~ may not ~~could~~ be operationally ~~un~~acceptable to us~~NGET~~, or may not be commercially or~~/~~ operationally acceptable to the External Interconnected System Operator (EISO).

Once the problem in (i) to (vi) above has been contained, we will take steps ~~shall be taken~~ to gradually ~~progressively~~ return to a normal cost order.

## 6 Treatment of BMUs Disconnected by Transmission System Faults

In ~~Rarely~~rare cases, following faults with the transmission system ~~faults~~, BMUs may become instantl~~aneously~~y disconnected from the transmission system. In these ~~Under such~~ circumstances, following the fault and before ~~prior to~~ reconnecti~~on~~ng the system, we would only issue a BOA (Bid-Offer Acceptance)~~-~~ to the affected BMUs if the trade gives ~~provides~~ us immediate ~~assistance~~help to ~~us in~~ control ~~ling~~ the transmission system.

Following a transmission system fault which has caused disconnection, a BMU ~~-~~can only ~~assist~~ help us ~~in~~ balance~~ing~~ the transmission system ~~when~~if:

- it is available to reconnect and return to its expected operating position in ~~accordance~~ line with its submitted (or resubmitted) dynamics; and
- it can be reconnected to any part of the synchronised transmission system.

~~Under such~~In these circumstances, we may issue a BOA ~~may be issued~~ to the BMU ~~to~~ delay it from ~~the~~ returning to its expected operating position if the trade ~~assists~~ helps us balance the ~~in~~ system ~~balancing~~.

~~For the~~I~~ avoidance of doubt, i~~n circumstances other than those described above, where a BMU submits a PN (Physical Notification) to connect to the transmission system, we will ~~NGET~~ issue a BOA (Bid-Offer Acceptance ~~(~~or Emergency Instruction~~)~~ within~~ ~~ Balancing Mechanism timescales if we want ~~it wishes~~ to change the ~~proposed~~ time the BMU ~~of~~ connects to ~~ion of~~ the ~~BMU~~system.

## 7 Arbitrage Trades

We would only make direct arbitrage trades within the Balancing Mechanism ~~Only~~ if ~~such~~ these opportunities arise in relation to performing our balancing ~~obligations~~ responsibilities and where an economic advantage would be gained with no detrimental impact on system security ~~would we undertake direct arbitrage trades within the BM~~.

## 8 Beyond the Wall Actions

~~On occasion, NGET~~We will issue BOAs that extend to the end of the current BM window (‘the wall’). In ~~On~~ these cases~~occasions~~, we ~~NGET~~ will issue BOAs to return the BMU to its PN level in line with submitted dynamics (as long as ~~subject to no change in~~ the prevailing BMU data has not changed). Further details of these circumstances are provided below.

~~NGET~~ We continually assess the various factors that affect system conditions. This may lead to a requirement for a continuing increase or ~~decrease~~ reduction in the BMU’s output, from its PN level, some time in

the future that extends beyond the end of the current BM window ('beyond the wall'). ~~In order t~~To reflect the relevant BMU dynamics, we ~~NGET~~ may need ~~be required~~ to issue a further BOA '~~"~~beyond the wall'~~"~~. We will also take account of ~~System~~ system ~~Conditions~~ conditions and special circumstances ~~will also be taken account of~~ in these situations.

The '~~Beyond~~ beyond the wall' action we will take depends specifically ~~s will be taken~~ on the ~~a~~ BMU ~~specific basis~~ ~~, subject to~~and the following information~~:~~.

- indicative PN~~'~~s;
- dynamic data;
- indicative Bid-Offer prices;
- export and import limits;
- location of BMU;
- reactive capability;
- frequency response performance;
- system conditions;
- predicted weather conditions; and
- Ancillary Service contracts.

If we have issued a current BOA that extends up to the end of the current BM window ('the wall'), and we plan ~~The intention~~ to issue a further BOA '~~"~~beyond the wall', we~~"~~ will ~~be~~ communicate this ~~d~~ to the relevant BMU Control Point. ~~in cases where a current BOA has been issued that extends up to the end of the current BM window ('the wall').~~

~~The intention~~Our plan to issue a BOA '~~"~~beyond the wall'~~"~~ will be based on the ~~submitted~~ dynamics and price data the BMU has provided for all ~~anticipated~~ expected BOA timescales. ~~It is~~We assume~~d~~ that all dynamics and prices remain as ~~submitted~~ provided for all expected ~~anticipated~~ BOA timescales. To ~~For the~~ avoid ~~ance of~~any doubt, if the plan ~~intention~~ is to extend a BOA 'beyond the wall', indicative prices,

dynamics and ~~PN~~Physical Notification for periods beyond the wall' must not change from those that were used in assessing the requirement for the BOA.

~~This intention to issue a BOA "beyond the wall"~~We will issue ~~be translated into~~ an actual BOA after the start of each ~~applicable~~ Gate Closure period that applies. Before we issue ~~Prior to~~ the BOA ~~being issued~~, we will check all BMU data ~~will be checked~~ against the data ~~at~~ used during the initial assessment. If there are ~~Any~~ any differences in the data, we ~~material changes made from the data used during the initial assessment~~ will ~~lead to a~~ review ~~of~~ the requirement for the BOA.

## 9 Canceling ~~of~~ BOAs that extend beyond the wall

We will unwind ~~The unwinding of~~ BOAs that are issued 'beyond the wall' ~~will be~~ in line with the procedure for ~~at of~~ standard BOAs.

We will cancel BOAs that are issued 'beyond the wall' ~~will be cancelled~~ by returning the BMU to its PN in line with ~~submitted~~ the dynamics provided, taking into consideration any ~~applicable~~ price changes that apply.

## 10 Pre Gate Closure BMU Transactions

PGB Transactions we make will depend ~~will be taken~~ on the specific ~~a~~ BMU. We will use ~~specific basis and~~ the following criteria ~~will be used in the~~to choose ~~selection of~~the BMUs that are ~~potentially~~ best able to meet the system requirements~~:~~.

- indicative ~~PN's~~Physical Notifications;
- relevant BMU dynamics;

- specialised BMU information (for example, ~~e.g.~~ dynamic parameters that vary from the ones provided)~~differ from those submitted~~;
- transmission constraints imposed on the system;
- location of BMU;
- reactive capability;
- frequency response performance;
- previous performance of PGB Transaction ~~performance~~ (this will only be a factor where reliability is ~~of significant importance~~ important and when we have to make a decision ~~has to be made~~ close to Gate Closure); and

~~7.~~• associated ancillary service contracts.

Using the above information, we will choose the most suitable BMUs that fit the system requirements ~~will be selected~~ and contact them~~ed~~ by ~~tele~~phone. We will give them ~~An~~ an outline of the profile we need~~required will be communicated over the telephone to the selected BMUs~~ and ~~. We will~~ invite offers from them ~~selected BMUs detailing the profile and price~~.

If the ~~system~~ circumstances limit the time ~~scales~~ we need ~~required~~ for identifying and agreeing a PGB Transaction , we may need ~~then it may be necessary~~ to ~~restrict~~ limit the number of BMUs ~~that~~ we contact (for example, for ~~a~~ PGB Transaction needed ~~required~~ close to Gate Closure). In this case, we will prioritise the BMUs ~~will be prioritised~~ based on our ~~National Grid Electricity Transmission plc~~ assessment of whether ~~the BMUs that~~they are likely to meet the criteria. ~~with due regard to the requirements in line with the Transmission License obligations not to discriminate.~~ This assessment ~~may~~ may consider ~~include~~ a BMU's ~~anticipated~~ expected prices (by taking account ~~informed by~~of past ~~historic~~ Bid-Offer and PGB Transaction prices) when deciding on what ~~as a~~ priority to award it~~isation factor~~.

Once we have received all offers ~~have been received~~, ~~they~~ we will ~~be~~ assess~~ed~~ them against the following criteria~~:~~.

- ~~C~~cost ; and
- ~~W~~which Offer best meets the requirements based on the criteria set out above and the requirements described in Part B, Section 4 of the Procurement Guidelines ~~(Part B, Section 4).~~

We will contact ~~The~~ the successful BMU~~(~~s~~)~~ by telephone ~~will be contacted by telephone~~ and formally agree the transaction~~s formally agreed~~. We will expect to receive an amended Physical Notification ~~modified PN in line with the transaction details~~ within 15 minutes of the transaction.

## Part D: Transmission constraint management and response/reserve principles

The general ~~broad~~ principles ~~that~~ we will normally ~~employ~~ keep to for ~~the~~ managing ~~ement of~~

- transmission constraints; and
- response and ~~/~~reserve holdings

are set out ~~detailed~~ below. ~~It should be noted that~~Managing transmission constraints ~~management~~ involves an iterative process over all planning timescales, where ~~with, where possible,~~ the system is continually ~~ed~~ optimised ~~ation of the system~~ as updates to relevant information are received.

You can gain ~~It should be further noted that~~ an idea ~~ndication~~ of how far ~~the extent to which~~ the transmission system is constrained ~~can be gained~~by looking ~~from~~at the margin information ~~that~~ we have a duty ~~are required~~ to release under OC2 and BC1 of the Grid Code.

### 1 Principles for Managing Transmission Constraints ~~Management Principles~~

- We will carry out ~~Outage~~ outage planning for the period year ahead to day ahead ~~will be undertaken~~. To ~~In~~ develop~~ing~~ the outage plan for the transmission system, we need to work with ~~co-ordination is required with~~ other Network Operators (~~where Network Operators is~~ as defined in the Grid Code).

- We will try ~~endeavour~~ to place outages ~~coincident with~~at the same time as relevant generation outages ~~in order~~ to minimise constraint costs.

- We will carry out ~~Security~~ security analysis studies (~~are undertaken~~ as appropriate) to confirm the ~~system~~ security of the total transmission system and identify constraints.

- We will make ~~Forecasts~~ forecasts of constraint costs ~~are made~~ and ~~the~~ optimise the outage plan ~~re-optimised~~ to minimise these, if ~~where~~ possible.

- If there are ~~Significant~~ significant changes to the availability of forecasts for a ~~availability of~~ BMU ~~and/~~or the transmission system (or both), we may need to ~~trigger a~~ reassess ~~ment of~~ the outage plan and, if ~~where~~ possible, optimise the outage plan again ~~will be re-optimised~~.

- We may negotiate Balancing Services contracts to manage the financial risks associated with potential high-~~-~~cost outages.

- ~~In calculating~~When working out constraints, we will take account of any ~~pre and post fault~~ actions available before and after a fault on the system ~~in order~~ to minimise restrictions of generation capacity.

- ~~In resolving~~When dealing with the constraints, we will call off Balancing Services based on the ~~a~~ cost ~~basis~~ (taking account of ~~with due regard to~~ the criteria set out in Part C, paragraph 5). If there is no difference ~~Where~~ between the cost or ~~services can not be differentiated on cost or~~ flexibility of the services, we will call off the service that delivers the greatest reduction in transmission losses ~~will be called~~.

- During periods when there are difficulties ~~of~~ on the system ~~difficulties~~ (for example, severe weather conditions), we may alter ~~modify~~ constraint limits in line ~~accordance~~ with the level of risk to the system ~~risk~~. When ~~In so~~ doing this, we will ~~consider ation of~~ the following criteria ~~will be given:~~.

  (i) how long ~~the likely duration of~~ the system difficulties are likely to last.~~;~~

  (ii) how ~~the~~ likely it is ~~increase in probability of~~that the system will develop faults as a result of these ~~arising from the system~~ difficulties~~; and~~.

  (iii) what effect ~~the impact on system security of~~these faults are ~~deemed~~ likely to have on the security of the ~~arise as a result of the~~ system ~~difficulties~~.

## 2 Processes for Managing Constraints ~~Management Processes~~

In the ~~Year~~ year-~~Ahead~~ ahead timescale, we minimise transmission constraints ~~are minimised~~ by ~~through~~ carefully planning ~~of~~ transmission outages. Within the current year, we calculate and optimise transmission constraints ~~are calculated and optimised~~ as necessary from ~~9~~ nine weeks ahead, down to day-~~-~~ahead timescales and in the pre Gate Closure control phase. We also continually monitor and optimise constraints ~~Furthermore constraints are continually monitored and optimised~~ in real time.

### 2.1 Year Ahead

Throughout the year-~~-~~ahead planning process, we~~NGET~~, generators~~,~~ and other Network Operators exchange data relating to the transmission system and generation outages for the following year. The requirements for when we need to exchange data, and what the

data should ~~The~~ contentain~~,~~ ~~and timing of these data flows are~~are currently set out ~~specified~~ under ~~the~~ OC~~-~~2 of the Grid Code.

Using a combination of this data and ~~the NGET~~ our estimated generation merit order, ~~NGET~~ we develop our ~~builds its~~ transmission outage plan for the following plan year. When developing ~~In building~~ the plan, we apply the following principles ~~are applied:~~.

(i) We must include ~~The~~ the necessary ~~NGET~~ maintenance and construction programme ~~must be accommodated~~.

(ii) We must keep the ~~System~~ system secure ~~ity must be achievable~~ at all times.

(iii) We must minimise ~~Transmission~~ transmission constraints ~~must be minimised~~.

To ~~Achieving~~ meet these principles, we need to carry out detailed ~~requires extensive~~ security and economic studies of the planned transmission system.

~~Where~~ If these ~~is analysis~~studies identify~~ies~~ that we will not be able to meet some of the above principles ~~cannot be met~~ due to conflicting outage requirements, we hold discussions with the generators and Network Operators ~~take place between the parties involved~~ to deal with ~~resolve~~ the issues. ~~The method of resolving conflicting requirements is set out in~~ OC2 of the Grid Code explains how we deal with conflicting requirements.

We formally communicate our ~~Progress~~ progress ~~towards~~ with developing ~~achievement of~~ a final transmission operating plan ~~is formally communicated at~~ regularly ~~intervals~~ throughout the planning year to generators and other Network Operators. These updates are ~~specified~~ set out under OC2 of the Grid Code.

## 2.2 ~~9~~Nine Weeks Ahead, ~~/~~ down to Day Ahead

By carrying out ~~The~~ the following process ~~is undertaken across~~in line with the above timescales, we aim to keep the~~the objective being to ensure~~ system secure ~~ity is achieved~~ at the lowest ~~minimum~~ cost possible, while~~st~~ meeting the requirements for ~~our system~~ maintaining and building the system~~enance and construction requirements:~~.

Step 1~~-~~ Using our forecast of demand, availability and prices of BMUs ~~availability/running, BMU prices~~ and the transmission outage plan, we carry out security analysis studies ~~are undertaken~~. These studies involve ~~the~~ running ~~of~~ system analysis models to identify ~~that can determine~~ system voltage, thermal and stability conditions.

Step 2~~-~~ ~~From the output of~~We use these studies to assess the security of the system ~~security is assessed~~. If we ~~security~~ can not keep the system secure, we review~~be achieved then the~~ the outage plan and make any necessary changes~~will be reviewed and revised accordingly~~.

Step 3~~-~~ We will identify ~~Transmission~~ transmission constraint boundaries ~~will be identified~~ and carry out further studies ~~will be undertaken~~ to calculate the limiting power flows across these boundaries.

Step 4~~-~~ At the day-~~-~~ahead stage, after ~~following~~ receiving ~~pt of PN~~Physical Notification data, we may use the BM Start-up service ~~may be called~~ (if ~~where~~ appropriate) to maintain the ~~system~~ security of the transmission system.

Step 5~~-~~ We will then calculate t~~T~~he forecast costs of these constraints ~~are then calculated~~ and, if ~~where~~ necessary

and possible, amend the transmission outage plan ~~will be revised~~.

## 2.3 ~~Control Phase –~~ Pre Gate Closure Control Phase

~~In light of~~Due to actual system conditions and ~~revisions~~ amendments to our day-ahead forecasts, we will carry out further security analysis studies ~~will be undertaken~~ to assess the requirements for ~~our~~ transmission constraint~~s requirements~~. We will also assess ~~Our~~ our plant requirements ~~will also be re-assessed~~ and ask suitable units ~~requested~~ to synchronise or de-synchronise depending on the outcome of this assessment. This will usually take the form of a BM Start-up service or, in certain circumstances (~~,~~ as set out in Part C, paragraph 10 of the Procurement Guidelines), a PGB Transaction ~~(see Part C Paragraph10)~~.

## 2.4 ~~Control Phase –~~ Real Time Control Phase

We will continually monitor the security of the ~~S~~system ~~security will be continually monitored~~ in real time by ~~through the~~ use ~~of~~ing 'on-line' security analysis studies based on actual system conditions. ~~In light~~As a result of these studies and actual BMU bidding, we will continually review and optimise all transmission constraints ~~will be continually reviewed and optimised~~ to make sure we minimise ~~seek to ensure~~ balancing costs ~~are minimised~~.

## 3 Principles for Response~~/~~ and Reserve Holding ~~Principles~~

~~The objectives of o~~Our response and ~~/~~reserve holding policy aims ~~shall be~~ to provide assurance (as far as we can)~~, in so far as we are able,~~ that reasonably foreseeable levels of generation failure, shortfall, demand forecast error~~s~~, and ~~credible~~ generation or demand loss do not cause us to invoke involuntary demand disconnection. By doing this, we will try ~~In so doing we shall endeavour~~ to adopt a response and~~/~~

reserve holding strategy that maintains the current ~~prevailing~~ level of short-term supply security.

~~Initially~~ At first, we will use the current ~~prevailing~~ supply security standards as a benchmark for our reserve and response policies. However, we recognise that our policies may develop and change ~~in the light~~as a result of market circumstances and our operational experience.

## 3.1 Response

Response is provided by sources that automatically react to changes in frequency ~~deviations~~ and is needed ~~required~~ to manage instant ~~aneous~~ imbalances between generation and demand~~—~~. There are three categories of response (Primary Response, Secondary Response and High Frequency Response) that we will contract for and these are defined in the Grid Code.

The ~~magnitude~~ size of the largest infeed set against the contribution of system inertia and reaction of demand to falling frequency will determine whether ~~the~~ primary ~~and~~ or secondary response is needed~~requirement~~. ~~In g~~Generally, as more generation is synchronised to meet increased demand, the system has more stored energy in rotating machines, meaning less response is needed ~~required~~ to contain the same generation loss. Similarly, as demand increases, the absolute reduction in demand in response to falling frequency increases.

Similarly, the need for high~~-~~ frequency response ~~requirement~~ will be determined by the ~~magnitude~~ size of the largest secured demand and the level of system inertia.

Response can be delivered by both dynamic (or continuous) and non-dynamic (or occasional) sources. Dynamic response is delivered continuously as system frequency deviates from target and is provided by part-loaded generation. Non-dynamic response is delivered only when the system frequency reaches a set trigger point and is predominantly mainly provided by contracted demand armed with low-frequency relays.

A minimum dynamic response requirement exists In order thatto contain frequency can be contained within operational limits, and restrict thereby minimise the risk of it frequency falling outside the of statutory limits, a minimum dynamic response requirement exists. The actual level of this minimum dynamic requirement is determined by our operational requirement to maintain the standard deviation of 5 five-minute spot frequency to 0.07Hz.

## 3.2 Reserve

Reserve is used to cover longer-term imbalances between supply and demand caused by demand forecast errors, plant failure, and the uncertainty associated with periods of rapid changes in demand change. Reserve is also used to restore system frequency and response capability following a short-term loss. We have the following four categories for system reserve which are detailed below.:

(a) Contingency Reserve

This will be delivered primarily mainly through the BM Start-up service to make ensure there is enough sufficient generation is available at gate- closure to meet system demand, maintain system security and meet our response and reserve holding requirements. It effectively covers for longer-term (that is, i.e. day-ahead to pre-Gate Closure timescales) plant losses and demand forecasting errors.

We will make ~~The~~ the initial assessment for contingency requirements ~~will be made~~ at the day ahead and amend it ~~revised~~ throughout the control phase, as certainty in both demand forecasting and generation availability increases.

The requirements for contingency reserve will be based on longer-term plant loss statistics, demand forecast errors and demand BMU offers.

(b) Regulating Reserve

Regulating reserve is needed ~~required~~ to cover for short-term generation losses (~~i.e~~that is, ~~.~~ post-~~-~~Gate Closure) and demand forecasting errors, and will be carried on part-~~-~~loaded synchronised generation or demand BMUs.

At first, we expect ~~It is envisaged~~ that ~~initially~~ this service will be provided by BMUs that are voluntarily submitting suitable Bids-Offers to the Balancing Mechanism although we may put ancillary service contracts in place for providing this reserve service~~,~~ if we cannot gain enough ~~insufficient volumes of~~ regulating reserve ~~can be obtained~~ in this way or it is economic to do so~~, ancillary service contracts may be put in place for the provision of this reserve service~~.

(c) Short Term Operating Reserve (STOR)

STOR is provided by contracted generation or demand reduction that can deliver reserve in short timescales. As with regulating reserve, it is needed~~required~~ to cover for post-~~-~~Gate Closure plant loss and demand forecasting errors. We can buy STOR ~~may be~~ efficiently ~~procured~~ across varying ~~differing~~ timescales, while taking account of our ~~on an efficient basis in conjunction with consideration of~~ wider ~~obligations~~ duties under the Electricity Transmission Licence.

Regulating reserve and STOR make up the total requirement ~~dictated~~ set by ~~Final~~ final ~~Planning~~ planning stage statistics and demand forecasting errors. The actual split between STOR and regulating reserve will be ~~dictated~~ set by the economics ~~of the provision~~ of buying in these services from the available sources across the relevant timescales.

(d) Fast Reserve

Fast reserve is a subset of regulating reserve and STOR, and is ~~required~~ needed to keep ~~for the maintenance of~~ system frequency within operational limits. It is provided ~~primarily~~ mainly by contracted generation that is capable of significantly increasing output within two~~2~~ to ~~5~~ five minutes' notice.

The volumes of fast reserve~~s~~ are determined by our operational standard to limit the number of cases where frequency falls ~~excursions~~ outside operational limits (lasting ~~greater~~ more than 10 seconds) to below 1500 ~~per annum~~a year.

## 3.3 Principles Relating to Response and Reserve Holding.

- We will calculate response and reserve holding levels based on the following criteria~~:~~ .
  - (i) BMU loss statistics;
  - (ii) the largest generation infeed being covered;
  - (iii) the largest secured system demand;
  - (iv) demand forecast statistics;
  - (v) system characteristics such as inertia and load response;
  - (vi) judgement of levels of unpredictable rises and falls in demand ~~volatility/uncertainty~~; and
  - (vii) judgement of levels of generation uncertainty

- We will allocate response and reserve holding by considering the~~with due regard to~~:

  (i) cost;

  (ii) dynamics of delivery (as ~~detailed~~ set out in 3.1 and 3.2 above); and

  (iii) transmission constraints

- We will not allocate response or ~~/~~reserve to constrained BMUs if ~~the~~ delivery~~y~~ing ~~of~~ that response~~/~~ or reserve would result in ~~violation of~~ the constraint being exceeded.

- During system difficulties (~~caused~~ for example, because of ~~by~~ severe weather conditions), we may ~~strategically~~ allocate response or ~~/~~reserve on a geographic basis to manage system risk. When ~~In so~~ doing this, ~~consideration~~ we will consider ~~be given to~~ the following criteria:

  (i) how long ~~the likely duration of~~ the system difficulties are likely to last;

  (ii) which ~~the~~ parts of the system will be affected by these ~~system~~ difficulties; and

  (iii) how ~~the~~ likely it is ~~increase in probability of~~that the response~~/~~ or reserve holding will be~~ing~~ affected by the ~~system~~ difficulties.

- At all times, we will try ~~endeavour~~ to maintain enough ~~sufficient~~ levels of response on the system ~~in order~~to make sure that the loss of the largest generation infeed would not result in ~~a~~failure to meet ~~violation of~~ the security standards.

- Following an event that leads to ~~the~~ delivering ~~y of~~ response, we will, as soon as is practical, take action to regain the level of response holding on the system ~~such~~ so that we would not be failing to meet system security standards ~~would not be~~ if there was

violated following a further generation infeed loss. This Such action includes the instructing theof STOR sosuch that responsive BMUs can be brought back to their respective response holding levels.

2.• We will aim seek to hold enough sufficient high -frequency response on the system to make ensure that we do not fail to meet security standards are not compromised shouldif the largest secured demand on the system trips.

- By In achieving the above, we will aim seek to ensure make sure that there is a suitable level of generation capable of reducing output on the system at all times.

## Part E: Day-ahead and within-day balancing

### 1. Day Ahead Balancing Process – Scheduling Phase

Step 1 By 09:00 hours each day, we will publish our day-ahead demand forecast covering the period from 05:00 hours day ahead to 05:00 hours day ahead + 1.

Step 2 By 11:00 hours we will receive ~~PN~~ Physical Notification and other data from all BMUs, covering the period 05:00 hours day ahead to 05:00 hours day ahead + 1, and default ~~such~~ this data as ~~is~~ necessary.

Step 3 Using the ~~submitted PN~~Physical Notification data, demand forecasts and planned transmission outage information, we will carry out ~~undertake~~ security analysis studies to check the ~~verify~~ system security (see Part F ~~refers~~).

Step 4 For each half-hour period from 05:00 hours day ahead to 05:00 hours day ahead + 1, we will calculate the system BMU requirement (that is, ~~i.e.~~ that needed ~~required~~ to meet system demand and system response and~~/~~ reserve levels) ~~is calculated~~ from the total ~~sum~~ of forecast demand, scheduled reserve (see below)[1], contingency reserve and STOR (less that provided by contracted non-BMU sources).

Step 5 For each half-hour period from 05:00 hours day ahead to 05:00 hours day ahead + 1, we will calculate the total ~~the sum of~~ BMU maximum export limits (MEL) ~~is calculated~~ based on the ~~11:00~~

[1] Scheduled reserve is the total amount of headroom required to meet the level of regulating reserve and frequency response allocated to synchronised BMU.

~~hours PN~~Physical Notification data provided at 11:00 ~~submission~~.

Step 6 ~~–~~ We will then calculate~~T~~ the system plant margin for each half-hour period ~~is then calculated~~ by subtracting the identified BMU requirement from $\sum$ MEL (after accounting for BMUs likely to be restricted by constraints).

Step 7 ~~–~~ So, we calculate ~~The~~ the system plant margin for each half~~-~~ hour ~~is therefore derived~~ from~~:~~ the following formula.

$$(\sum \text{MEL} - \sum \text{Constrained Off BMUs}) - \text{BM Unit Requirement}$$

Step 8 ~~–~~ If the system plant margin is negative, ~~then~~ we will look again at ~~revisit~~ the transmission outage plan and, if ~~where~~ possible, make amendments ~~revisions in order~~ to reduce the level of constrained off BMUs.

Step 9 ~~–~~ If the system plant margin remains negative, we ~~shall~~will, depending ~~ant~~ on the level ~~and duration~~ of the shortfall and the time period it applies for~~to the shortfall~~, issue the appropriate system warning to the market.

Step 10 ~~–~~ By 12:00 hours each day, we will issue the total system plant margin data to the market for the period 05:00 hours day ahead to 05:00 hours day ahead + 1.

Step 11 ~~–~~ We will forecast constraint costs based on the ~~submitted indicative~~ Physical Notification ~~PN~~ (and other BMU~~–~~) data provided and our estimation of Final Physical Notification (FPN) levels and Bid-Offer prices and volumes. Depending on the levels we forecast for ~~levels of~~ these costs, we may ~~will give~~

consider ~~ation to the~~ cancelling or delaying ~~ation/deferral of~~ transmission system outages.

Step 12 ~~–~~ If we consider it ~~Where judged~~ necessary, we will aim ~~seek~~ to call off Balancing Services contracts (based on ~~a~~ costs, after taking account of ~~basis with due regard to~~ the criteria set out in Part C, paragraph 5 of this statement) to make~~en~~ sure, among other things~~inter alia~~, that BMUs needed ~~required~~ to maintain system security are available to be chosen ~~for selection~~ in the Balancing Mechanism.

Step 13 ~~–~~ After ~~Following~~ 11:00 hours, we will continue to receive updated ~~PNs~~ Physical Notification data from BMUs.

Step 14 ~~–~~ Using this updated data, we will revise the national plant margin data and publish this, together with zonal margin data, by 16:00 hours.

## 2. Within Day Balancing Process – Control Phase

Step 1 ~~–~~ At ~~defined~~ set times, we will revise and release half-hourly averaged demand forecasts to the Balancing Mechanism Reporting Agent (BMRA) in line ~~accordance~~ with paragraph 6.1.7 of Section Q of the Balancing and Settlement Code ~~half-hourly averaged demand forecasts~~.

Step 2 ~~–~~ As participants become aware of changes to their physical position, we will ~~they will be~~ expect them~~ed~~ to tell ~~advise~~ us ~~of~~ about those changes.

Step 3 ~~–~~ At set ~~defined~~ times, using the latest demand forecast, ~~PN~~ Physical Notification data and other BMU data, we will reassess the zonal and national margins ~~will be reassessed~~ and release

them d to the BMRA, in line accordance with paragraph 6.1.7 of Section Q of the Balancing and Settlement Code.

Step 4 – Using the revised data, we will carry out undertake security analysis studies and reassess the requirements for the calling off of Balancing Services contracts or Other other Services services such as PGB Transactions.

Step 5 – At Gate Closure, the PN Physical Notification data will become Final Physical Notification FPN data and we will have received Bid-Offer Prices and volumes for those BMUs wanting ishing to take actively part icipate in the Balancing Mechanism.

Step 6 – In the Balancing Mechanism, using the revised demand forecast and validated FPN and Bid-Offer Data, we will aim seek to balance the system (on a minute - by - minute basis) by buying through the purchase of Balancing Services, on an economic basis taking into account of:

(i) urgent contingency action to restore operational standards on the transmission system;

(ii) technical constraints imposed on the system from time to time;

(iii) the dynamic operating characteristics of available generation and demand balancing services;

(iv) those Bid-Offer Prices associated with all BOA timescales, Physical Notifications and dynamics for the BMU, if where BOAs are expected to be issued for periods 'beyond the wall', those Bid-Offer Prices associated with all BOA timescales, PNs and dynamics for the BMU;

(v) uncertainty in demand at timescales within the BM window;

(vi) other matters provided for in the Grid Code; and

(vii) ~~Services~~ services provided on Interconnector BMUs that may not ~~could~~ be operationally ~~un~~acceptable to us~~NGET~~, or commercially ~~/~~ or operationally acceptable to the External Interconnected System Operator (EISO).

In extreme situations, this may mean issuing ~~require the instruction of~~ Emergency Instructions ~~and/~~or instructions for Involuntary Reductions (or both), as defined in Part B, Sections 5 and 6 of this statement.

## Part F: Summary of Operation of the GB transmission system from the GB Security and Quality of Supply Standard (GBSQSS)

### 1. ~~Overview~~Summary

(a) We will aim ~~shall seek~~ to operate the GB Transmission system in accordance with the GB ~~s~~Security and Quality of Supply Standard as summarised so that for the secured event (as defined in the GBSQSS) of a fault outage of ~~any of the following~~:

- a single transmission circuit, a reactive compensator or other reactive power provider; ~~or~~
- the most onerous loss of power infeed; or
- a section of busbar or mesh corner, if~~where~~ the system is designed to be secure against a fault outage of a section of busbar or mesh corner under planned outage conditions;~~, a section of busbar or mesh corner,~~

will not cause any ~~there shall not~~of ~~be any of~~ the following:

- a loss of supply capacity, except as set out ~~specified~~ in the GBSQSS;
- unacceptable frequency conditions;
- any primary transmission equipment being ~~unacceptable~~ unacceptably overloaded~~ing of any primary transmission equipment~~;
- unacceptable voltage conditions; or
- system instability.

(b) and ~~for~~ the secured event of a fault outage of:

- a double circuit overhead line; or
- a section of busbar or mesh corner~~,~~;

~~there shall~~will not cause ~~be~~ any of the following:

- a loss of supply capacity greater than 1500 MW;
- unacceptable frequency conditions; ~~or~~
- unacceptable voltage conditions affecting one or more Grid Supply Points for which the total group demand is greater than 1500 MW; or
- system instability of one or more generating units connected to the supergrid.

(c) and ~~for~~ the secured event on the supergrid of a fault outage of:

- a double circuit overhead line, where any part of either circuit is in the England and Wales area; or
- a section of busbar or mesh corner in the England and Wales area~~,~~;

~~there shall~~will not cause any of the following.~~be:~~

- primary transmission equipment in the England and Wales area being ~~unacceptable~~ unacceptably overload~~i~~ed~~ng of primary transmission equipment in the England and Wales area;~~
- unacceptable voltage conditions in the England and Wales area~~.~~

Conditional Further Operational Criteria

If conditions are so bad ~~adverse such~~ that the likelihood of a double circuit overhead line fault is significantly higher than normal,~~;~~ or if there is no significant economic justification for failing to secure the transmission system ~~to this~~ as set out above ~~criterion~~ and the probability of losing~~s of~~ supply capacity is not increased by following the above~~is criterion~~, we will operate the GB Transmission System ~~shall be operated~~ under current ~~prevailing~~ system conditions. As a result, ~~so that for~~ the secured event of~~:~~

- a fault outage on the supergrid of a double circuit overhead line will not

cause any of the followingthere shall not be:

- a loss of supply capacity greater than 300 MW, if where possible and if there is no significant economic penalty, any loss of supply capacity greater than 300 MW;
- any primary transmission equipment being unacceptable unacceptably overloaded ing of any primary transmission equipment;
- unacceptable voltage conditions; or
- system instability.

1.1 Exceptions

We may need to make Exceptions exceptions to the criteria may be required whereif variations to the standard connection designs have been agreed.

## 2 Frequency Control

There should not be “Unacceptable High or Low Frequency Conditions” under the conditions laid down in the Security and Quality of Supply Standard.

These are conditions where:

i) the steady state frequency falls outside the statutory limits of 49.5Hz to 50.5Hz; or

ii) a transient frequency deviation on the MITS persists continues outside the above statutory limits and does not recover to within 49.5Hz to 50.5Hz within 60 seconds.

Transient frequency deviations outside the limits of 49.5Hz and 50.5Hz ~~shall~~ will only arise ~~occur~~ at intervals which ought to be reasonably considered as infrequent. ~~It is~~We are not ~~possible~~ able to give ~~be prescriptive~~fully accurate examples of ~~with regard to~~ the type of secured event ~~which~~ that could lead to transient deviations ~~since~~as this will depend on the exact frequency response characteristics of the system. ~~which~~ W~~NGET~~ e wi~~sha~~ll adjust these from time to time to meet the security and quality requirements of Security and Quality of Supply Standard~~this Standard~~.

For either significant or abnormal events, any frequency deviation below 49.5Hz should not continue ~~persist~~ for more than 60 seconds, and system frequency should return to between operational limits within 10 minutes.

If necessary, we ~~shall~~ will~~achieve~~, in exceptional circumstances, control frequency ~~control~~ by demand control – as set out ~~pecified~~ in OC6 of the Grid Code.

## 3 Voltage Control

Under normal system conditions, we ~~s~~wi~~ha~~ll aim ~~seek~~ to buy ~~purchase~~ and economically schedule enough ~~sufficient~~ Mvar reserves ~~in order~~ to maintain steady state voltage levels so ~~such~~ that:~~-~~

- each user connection site ~~On~~on the 400kV system ~~each user connection site~~ will normally remain within +/- 5% of the nominal value with a minimum /maximum range of +/-10% (however, voltages between +5% and +10% should not last longer than 15 minutes)~~.~~;

- each user connection site ~~On~~ on the 275kV and 132kV system ~~each user connection site~~ will normally remain within +/- 10%~~.~~ ; and

- ~~B~~below 132kV, the limits are~~-~~ +/- 6%.

~~In addition for any secured event w~~We ~~shall~~ will buy ~~purchase~~ and economically schedule enough ~~sufficient~~ Mvar reserves ~~in order~~ to limit voltage step change to~~:~~

+/-6% at the user connection site after a secured event, relaxed to a voltage fall of 12% for loss of a double circuit, busbar or mesh corner. This voltage step change relates to a period about ~~5~~ five seconds after the fault has clear~~an~~ed~~ce~~. We ~~It~~ must be able ~~possible for us~~ to automatically and manually restore voltage at Grid Supply Points (GSPs) to 95% ~~following automatic and manual action~~ within 20 minutes.

We will also buy and schedule enough Mvar reserves to limit voltage step change to +/- 3% at the user connection site for planned switch operations.

## Part G: Exceptions to the balancing principles statement

Sometimes, ~~Infrequently~~ circumstances may arise which mean we need ~~require us~~ to operate outside the principles set out ~~detailed~~ in this statement. These ~~Such~~ circumstances are listed below~~:~~.

(i) Black Start events (as ~~detailed~~ set out in OC9 of the Grid Code);

(ii) If~~where~~ parts of the transmission system have become islanded (as set out ~~detailed~~ in OC 9 of the Grid Code);

(iii) If~~when~~ emergency evacuation procedures have begun ~~en invoked~~ at our control centres or if we experience wide-spread communication problems ~~are experienced~~;

(iv) If~~where circumstances exist where~~ not operating outside the principles set out in this statement ~~to do so~~ would put the ~~prejudice the~~ safety and security of the transmission system at risk, ~~e operation of the transmission system~~ or would mean we were failing to carry out ~~would be~~ our ~~in breach of~~ statutory obligations;

(v) If ~~where~~ operational information shows that there is not enough ~~indicates insufficient~~ time ~~is~~ available to take ~~employ~~ particular measures, in line ~~accordance~~ with the ~~Statement~~ statement, to balance the system~~if balancing is to be achieved; and~~

(vi) If~~where~~ the ~~Statement~~ statement has been shown to be inappropriate and the procedures for altering it ~~Balancing Principles Statement modification procedures~~ have begun ~~been implemented~~ but not been completed.

For parts (i) to (iii) above, we would issue the appropriate system warning in line ~~accordance~~ with the Grid Code and report ~~occurrences of~~instances of any of the circumstances above ~~would be reported~~ in our annual statement of performance against the Balancing Principles.