BUSINESS REQUIREMENTS SPECIFICATION
for Modification Proposal P138
Contingency Arrangements on relation the Implementation of Demand Control Measures pursuant to Grid Code OC6

Prepared by: Pricing Issues Standing Modification Group

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PURPOSE OF THIS DOCUMENT

The primary purpose of this document is to specify the Modification Group's requirements for the requisite change to BSC Central Service Agent, and other affected parties, functionality and associated documentation in sufficient detail to allow an Impact Assessment to be undertaken by all impacted parties

For the purposes of this assessment, the reader should assume that the changes will be implemented as a standalone development project managed by BSCCo.

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SUMMARY OF IMPACTED PARTIES AND DOCUMENTS

The following parties/documents have been identified as being potentially impacted by Modification Proposal P138.

Parties	
Suppliers	☒
Generators	☒
Licence Exemptable Generators	☒
Transmission Company	☒
Interconnector	☐
Distribution System Operators	☐

Party Agents	
Data Aggregators	☐
Data Collectors	☐
Meter Operator Agents	☐
ECVNA	☐
MVRNA	☐

BSC Agents	
SAA	☒
FAA	☐
BMRA	☐
ECVAA	☐
CDCA	☐
TAA	☐
CRA	☐
Teleswitch Agent	☐
SVAA	☐
BSC Auditor	☐
Profile Administrator	☐
Certification Agent	☐
MIDP	☐
TFLA	☐

Other Agents	
SMRA	☐
Data Transmission Provider	☐

Sections of the BSC	
A	☐
B	☐
C	☐
D	☐
E	☐
F	☐
G	☒
H	☐
J	☐
K	☐
L	☐
M	☐
N	☐
O	☐
P	☐
Q	☒
R	☐
S	☐
T	☒
U	☐
V	☐
W	☐
X	☒

Code Subsidiary Documents	
BSC Procedures	☐
Codes of Practice	☐
BSC Service Descriptions	☐
Service Lines	☐
Data Catalogues	☒
Communication Requirements Documents	☐
Reporting Catalogue	☐
MIDS	☐

Core Industry Documents	
Grid Code	☒
Supplemental Agreements	☐
Ancillary Services Agreements	☐
Master Registration Agreement	☐
Data Transfer Services Agreement	☐
British Grid Systems Agreement	☐
Use of Interconnector Agreement	☐
Settlement Agreement for Scotland	☐
Distribution Codes	☐
Distribution Use of System Agreements	☐
Distribution Connection Agreements	☐

BSCCo	
Internal Working Procedures	☒

Other Documents	
Transmission Licence	☐

The following acronyms have been used in the above matrix:

Term		Term	
SAA	Settlement Administration Agent	SVAA	Supplier Volume Allocation Agent
FAA	Funds Administration Agent	MIDP	Market Index Data Provider
BMRA	Balancing Mechanism Reporting Agent	SMRA	Supplier Meter Registration Agent
ECVAA	Energy Contract Volume Aggregation Agent	MIDS	Market Index Definition Statement
CDCA	Central Data Collection Agent	TOMAS	Trading Operations Market Analysis System
TAA	Technical Assurance Agent	ECVNA	Energy Contract Volume Notification Agent
CRA	Central Registration Agent	MVRNA	Metered Volume Reallocation Agent

1 INTRODUCTION

1.1 Proposed Modification

Modification Proposal P138 'Contingency Arrangements in relation to Implementation of Demand Control Measures pursuant to Grid Code OC6' (P138) was raised on 8 August 2003 by Innogy PLC.

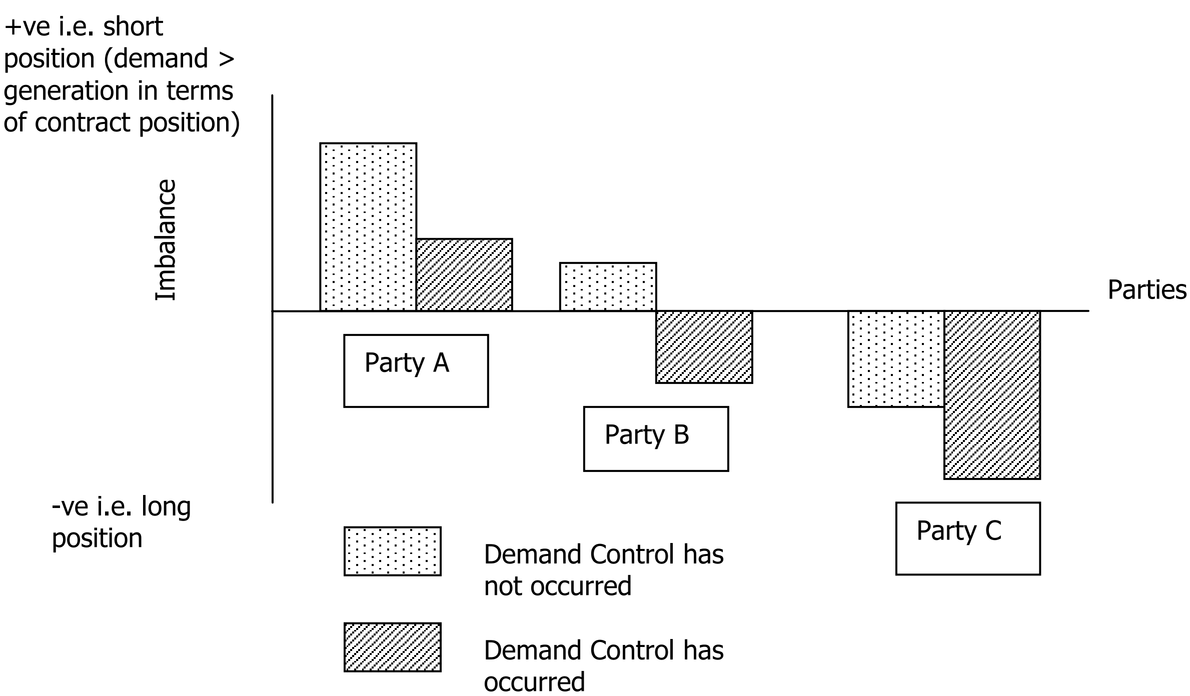
P138 aims to bring certain aspects of the Demand Control process within the provisions of the Balancing and Settlement Code (the Code) as there are currently no provisions in the Code that relate to the impact of Demand Control measures as defined by the Grid Code OC6 (Reference 1).

Since Demand Control has never occurred, in practise, if it did occur then the obligations set out in OC6 (Reference 1) would be followed by the System Operator (SO – Transmission Company) and the Licensed Distribution System Operators (LDSO) for the instruction and carrying out of the Demand Control. P138 focuses on how relevant aspects of the Demand Control can be incorporated into the Balancing and Settlement Code (the Code) once Demand Control has been instructed by the SO under OC6 (Reference 1).

Should Demand Control occur, under the current arrangements, the existing pricing calculations (i.e. Settlement Calculations and Energy Imbalance Price) would be carried out. This would mean that:

- During a period of Demand Control, those parties who are affected would have a lower Metered Volume than if the Demand Control had not occurred (i.e. their demand has been reduced). This would affect their imbalance position by lengthening their position and so those Suppliers who were short could be less short, or possibly long, and those parties who were long could be longer (as shown in Figure 1);
- The change of imbalance position created by the period of Demand Control could mean that Parties face an increase exposure to Imbalance; and
- Residual Cashflow Reallocation Cashflow (RCRC) could be more unpredictable and may not fully offset the additional exposure to imbalance created by the Demand Control.

Figure 1 Imbalance with and without Demand Control



The Proposed Modification will only apply in 'Demand Control' Settlement Periods. These are Settlement Periods in which Demand Control is occurring i.e. Settlement Periods (whole) that fall between the start and end of the Demand control, as determined (and notified) by the SO. The changes proposed by P138 will not apply in any Settlement Periods within which Demand Control has not occurred.

A Modification to the Code would introduce the following:

- Where an instruction issued by the SO for Demand Control as defined in the Grid Code OC6 (Reference 1) as a consequence of insufficient generation to meet demand (i.e. 6.2.1 (c) - Demand Reduction instructed by NGC, (d) - Automatic Low Frequency Demand Disconnection and (e) - Emergency Manual Demand Disconnection), would require that an Offer Acceptance be created, reflecting the volume associated with the Demand Control and a price.
- Deemed volumes would be calculated for all affected Parties. Details of this calculation would be included within the Code. Some of these details would have been provided to the SO by LDSOs as this is a current requirement of the Grid Code OC6 (Reference 1). The volumes would be apportioned to affected Parties using volume allocation rules, which are based upon the BM unit's Metered Volume on the last equivalent day for which for which Initial Settlement has been performed. Only Supplier BM Units which were importing (i.e. had negative consumption) on the equivalent day will be considered in the volume allocation rules. Therefore P138 is limited to Supplier BM Units that are importing on the equivalent day to the Demand Control;
- Affected Parties would receive a Marginal Offer Price (Demand Control Offer Price) for the volume by which their demand is reduced (Demand Control Volume); and
- Affected Parties expected Metered Volume would be adjusted by the Demand Control Volume so that each Parties position would be the same whether or not the Demand Control had occurred.

The difference between a Metered Volume if Demand Control had occurred compared to that had Demand Control not occurred could only ever be estimated, however there are various tools to aid this estimation. Therefore an overtly accurate process for calculating the price for this Demand Control and the volume affected may not be necessary.

The Pricing Issues Modification Group (PSMG) believe that Demand Control will be a rare, and possibly non-existent event and therefore the have stated that the solution developed for P138 should not involve any system changes and also that an over accurate calculation is not required as a best approximation will be good enough.

1.2 Potential Options for Alternative Modification

Currently, the only aspect of P138 for which there is a possible Alternative Modification is the calculation of the Demand Control Offer Price (i.e. the amount that Parties would receive for their Demand Control Volume). The Proposed Modification states that this would be a marginal price i.e. most expensive energy offer taken in the Settlement Period within which Demand control was invoked, however three other options for the Demand Control Offer Price have been proposed:

- Use the Market Index Price (for the purposes of this document, the Market Index Price is the volume weighted average defined from the Market Index Data Providers in accordance with T4.4.5(b) or T4.4.6(b) as the case may be);
- Use the marginal price with a cap; and
- Use a fixed price.

In every other way the Alternate Modification is the same as the Proposed Modification.

1.3 Background and Scope

P138 'Contingency Arrangements in relation to Implementation of Demand Control Measures pursuant to Grid Code OC6' (P138) was raised on 8 August 2003 by Innogy PLC.

P138 was submitted to a three month Assessment Procedure by the Panel at its meeting of 5 September 2003. The assessment of P138 is being undertaken by the Pricing Issues Standing Modification Group (PSMG) supported by the members of the Volume Allocation Standing Modification Group and Licensed Distribution System Operators.

So far, the PSMG have met four times, 15 September 2003 and 2, 10 and 23 October 2003.

1.4 Requirements Specification Overview

This specification of the process is a relatively high level view of the amendments required to support P138, as agreed by the PSMG at its meetings and finalised on 31 October 2003. The PSMG agreed that this specification of the process provides the basis for the Requirements Specification of changes required to implement P138.

The following points give an overview of the solution to be implemented. Section 2 described the solution in detail.

- Demand Control occurs;
- As soon as practicable, the SO provides the Balancing Mechanism, Reporting Agent (BMRA) of an estimate of the volume of Demand Control achieved and the marginal Offer Acceptance taken in the Settlement Period within which Demand Control was invoked (i.e. If the Demand Control spans more than one Settlement Period, only one marginal acceptance is quoted, the one from the Settlement Period within which Demand Control was invoked.);
- By Day + 2, the SO notifies the Settlement Administration Agent (SAA) of a more accurate estimate of the volume of Demand Control achieved (Demand Control Volume) by email;
- By the Initial Information Run (II) a Demand Control Offer Price (i.e. the amount Parties will be paid for their Demand Control Volume) is calculated;
- By the II, volume allocation rules are used to apportion the Demand Control volume over all Importing Supplier BM Units in the affected GSP Group;
- By the II, these are fed into the Bid-Offer stack at the Demand Control Offer Price so that there is an Accepted Offer against each affected BM Unit in the GSP Group affected by the Demand Control (to influence the System Buy Price in that Settlement Period) using a method based upon workaround 18;
- In normal timescales and using normal processes, the SO's liability to each Supplier affected by the Demand Control is calculated on the basis of the Demand Control Offer Price and the Demand Control Volume apportioned to each of its BM Units; and
- In normal timescales and using normal processes, the Demand Control Volumes and prices feed into the calculation of the Energy Imbalance for each energy account.

Note the calculation of the reverse price is not amended by P138.

2 PROPOSED MODIFICATION

2.1 Description of Proposed Modification

This section describes the basic mechanism for P138. The following sections give the impacts on individual Parties.

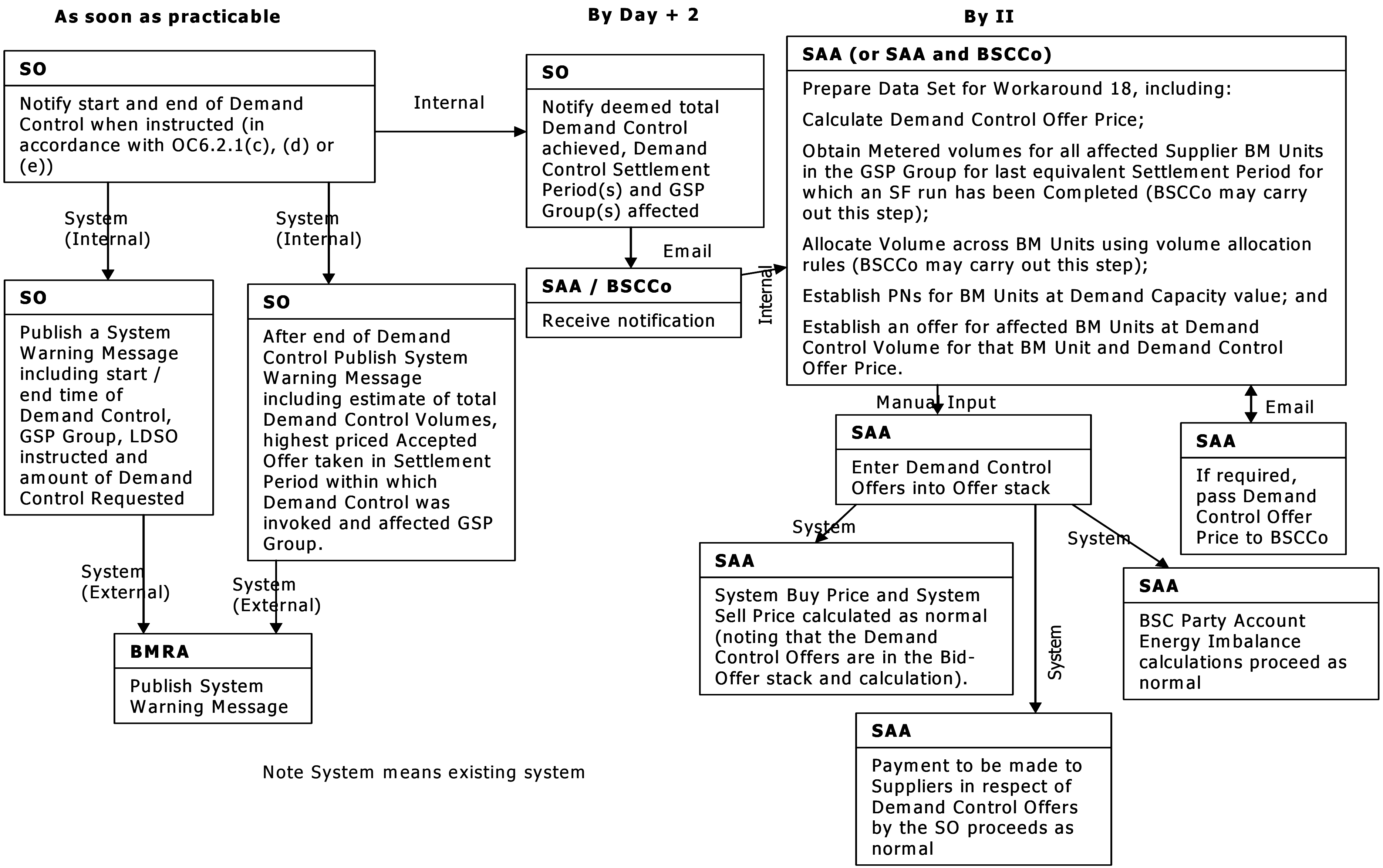
The mechanism for P138 has been split down into a number of steps:

- Notification of Demand Control;
- Initial Notification of Demand Control Volumes and Prices;
- Preparation of the data set for workaround 18, consisting of
  - Calculation of the Demand Control Offer Price; and
  - Calculation of BM Unit Deemed Demand;
- Allocation of Demand Control Volume to the Bid Offer Stack;
- Payment of Demand Control Offers by the System Operator; and
- Calculation of Energy Imbalance.

2.1.1 Process diagram

Figure 2 shows how the various steps of the process fit together.

Figure 2 Process Diagram



2.1.2 Notification of Demand Control

The SO would instruct the LDSOs in accordance with OC6.2.1 (c), (d) and (e), (Reference 1). (Note that it is assumed that the instruction to the LDSOs is synonymous with the corresponding Grid Supply Point (GSP) Groups)

The SO sends a system warning message as soon as possible following the Demand Control instruction to the BMRA notifying the start time of the Demand Control Period, the affected GSP Group(s) and LDSO(s) and the amount of Demand Control requested (as both a MW value and percentage of Demand to be reduced in each GSP Group) per Settlement Period. The start time of the Demand Control Period is defined as the time the instruction to reduce demand is issued by the SO. (Note that it is assumed that the SO will not issue an instruction for Demand Control to take effect at a given point in the future, i.e. the Demand Control instruction would take affect at the moment that it is instructed).

The SO instructs the LDSOs to start reconnecting demand in accordance with OC6, (but only where the initial instruction was issued in accordance with OC6.2.1 (c), (d) or (e)) (Reference 1).

The SO sends a system warning message to the BMRA as soon as possible following the instruction to start reconnecting demand notifying the time of the end of the Demand Control Period the affected GSP Group(s) and LDSO(s) and an estimate of the Demand Control achieved per Settlement Period, if possible. (Note that OC6.5.9 and OC6.6.8 (Reference 1) require LDSOs to notify the SO of an estimate of the Demand Reduction that occurred within five minutes of the disconnection or restoration for Demand Control initiated by the SO or Automatic Low Frequency Demand Disconnection). The end time of the Demand Control Period is defined as the time the instruction to reconnect demand is issued by the SO.

Demand Control Settlement Periods are Settlement Periods that fall within the start the end time notified above. For the avoidance of doubt, where the start or end of a Demand Control Period falls part way through a Settlement Period, then the whole Settlement Period is a Demand Control Settlement Period.

2.1.3 Initial Notification of Demand Control Volumes and Prices

As soon as practicable, the SO publishes a system warning message on BMRA providing an estimate of the total Demand Control Volume for each demand Control Settlement Period, the Offer Acceptance with the highest price, which is greater than 1MW in energy, taken in the Settlement Period within which Demand Control was actually instructed and the affected GSP Group(s).

Under the auspices of the Grid Code, LDSOs would write to the SO informing them of their estimates of the volume demand reduction was deemed to have achieved and an estimate of what the demand would have been had the Demand Control not occurred, as soon as possible, and in all cases by Day + 1 (As required by OC1.5.6 (Reference 2)). The format of this data is specified in the appendix to OC6 (Reference 1) and gives a percentage of demand reduction every five minutes from the instruction and the peak MW value.

If not supplied by the LDSOs, the SO calculates the total volume of energy that it deems to have been reduced due to the Demand Control as a MWh per Settlement Period figures and passes this information onto the SAA, at the latest by D+2. This communication would be via email.

The Demand Control Volume for each Settlement Period as notified to the SAA by the SO by Day + 2 will be deemed to be correct, aside from any manifest error.

Any Settlement Period falling wholly or partially between the time the SO instructed Demand Control to start and the time the SO instructed Demand Control to finish (as defined in 2.1.1) will be determined to be a Demand Control Settlement Period and the procedure set out in 2.1.4 to 2.1.8 will be followed.

2.1.4 Preparation of the data set for workaround 18

2.1.4.1 Calculation of the Demand Control Offer Price

By II, the SAA calculates the Demand Control Offer Price. The Demand Control Offer Price for a Settlement Period is calculated from each such Settlement Period within a Demand Control Period. This would be the Accepted Offer with the highest Offer price with a volume greater than 1 MW (note that this does not include BSAD) accepted in the Settlement Period in which Demand Control occurred [as it is considered that in a Demand Control Settlement Period, all actions are taken for energy balancing purposes (even if the Demand Control was taken for locational reasons)] Note that the Offer setting the Demand Control Offer Price may have been taken in the same Settlement Period within which Demand Control was invoked, but equally may have originally been taken in a Settlement Period prior to the Settlement Period within which Demand Control was invoked, but is ongoing in the Settlement Period within which Demand Control was invoked. The Demand Control Offer Price derived for the Settlement Period within which Demand Control was invoked would be used for all subsequent Settlement Periods which were subject to the same period of Demand Control. (Note that the Demand Control Offers may be tagged out later on in the Process by Net Imbalance Volume (NIV) tagging)

If there are no Accepted Offers then as a default, the Market Index Price would be used as the Demand Control Offer Price. If there was also no Market Index Price for that Settlement Period, then the Demand Control Offer Price will default to the Energy Imbalance Price derived from a volume weighted average of balancing actions in the Net Imbalance Volume (as calculated in accordance with Section T4.4.5(a) or T4.4.6(a) as the case may be. Note that this is the same value to which Market Price defaults when it is zero).

It should be noted that since the volume of energy lost due to the period of Demand Control will only ever be an estimate, an overtly accurate price for this energy may not be necessary. The proposed Modification refers to the Demand Control Offer Price as being a marginal price, since the cost associated with Demand Control should be a cost that reflects this action.

2.1.4.2 Calculation of BM Unit Deemed Demand

P138 makes the assumption that all Suppliers and therefore all BM Units in the affected GSP Group are affected by the Demand Control equally. Although this is true for voltage reduction, it will not necessarily be true if some supply is disconnected, however, for the purposes of the solution, equal impact is assumed.

The volume allocation rules described will be used to apportion the Demand Control Volume across all Importing Suppliers in the affected GSP Group by either the SAA or BSCCo.

For the avoidance of doubt, these volume allocation rules will be applied no matter by which method demand is reduced (within the previously defined constraints).

The volume allocation rules will only apply to Supplier BM Units (i.e. those beginning 2_) that are importing in the given Settlement Period (i.e. which have negative consumption on the equivalent day used in the following volume allocation rules). Exporting BM Units, Embedded Generation and Directly Connected Demand will not be affected.

To calculate the Demand Control Volume, the most recent day which has the same day of the week as the Settlement Day in which Demand Control was called, and for which Initial Settlement has been performed is identified (equivalent day as defined in section T4.2.4 (d)).

The Metered Volume of all the BM Units in the affected GSP Group for the equivalent Settlement Period of the Day identified is summed. (Note if this value is zero for any BM Unit, take the Metered Volume of the Settlement Period prior to the equivalent Settlement Period)

Divide the Metered Volume of each BM Unit by the total over the GSP Group (as calculated above) to give the proportion of demand per BM Unit throughout the GSP Group.

For each BM Unit in the affected GSP group, derive the Demand Control Volume for the BM Unit by multiplying the total Demand Control Volume for the GSP Group (as notified by the SO by Day + 2) by the proportion of each BM Unit's demand in the GSP group as calculated above.

Then multiply each BM Unit Demand Control Volume by the Demand Control Offer Price to derive the amount that the SO will pay the lead Party of each affected BM Unit.

Note that this calculation is carried out once by II and will not alter as more information becomes available in each Settlement Run.

Note also that no specific processing is required to account for Bank Holidays i.e. volumes for a Bank Holiday Monday will be estimated in the same way as those for a working day.

For example:

- Demand Control is called in GSP Group X wholly within Settlement Period 45 on 2 October. The SO notifies SAA that 50MW of Demand was reduced within the GSP Group. The most recent day which has the same day of the week as the 2 October and for which Initial Settlement has been performed is the 28 August. In Settlement Period 45 on the 28 August, BM Unit A consumed 100MWh, BM Unit B consumed 200MWh, BM Unit C consumed 300 MWh and BM Unit D consumed 400MWh. There are no other BM Units in GSP Group X.
- The Demand Control Offer Price is £100 per MWh.
- Therefore the total Consumption in GSP group X on the 28 August was 100+200+300+400=1000MWh
- BM Unit A had 100/1000 = 0.1 proportion of the consumption
- BM Unit B had 200/1000 = 0.2 proportion of the consumption
- BM Unit C had 300/1000 = 0.3 proportion of the consumption
- BM Unit D had 400/1000 = 0.4 proportion of the consumption
- Therefore:
  - The volume attributed to BM Unit A due to the Demand Control is 0.1*50 = 5MWh;
  - The volume attributed to BM Unit B due to the Demand Control is 0.2*50 = 10MWh;
  - The volume attributed to BM Unit C due to the Demand Control is 0.3*50 = 15MWh; and
  - The volume attributed to BM Unit D due to the Demand Control is 0.4*50 = 20MWh.
    - The Supplier responsible for BM Unit A is paid 5*100 = £500 by the SO;
    - The Supplier responsible for BM Unit B is paid 10*100 = £1000 by the SO;
    - The Supplier responsible for BM Unit C is paid 15*100 = £1500 by the SO; and
    - The Supplier responsible for BM Unit D is paid 20*100 = £2000 by the SO;

2.1.5 Allocation of Demand Control Volume to the Bid Offer Stack

The BM Unit deemed Demand Control Volume, for all affected BM Units is allocated an Offer price of the Demand Control Offer Price. These are entered into the Bid Offer stack, using a method based upon Workaround 18 by II. For importing Supplier BM Units, the Non-Delivery Rules should not apply for Demand Control Settlement Periods. For all other BM Units, the Non-Delivery Rules should apply for Demand Control Settlement Periods. Therefore Physical Notifications (PNs) of all importing Supplier BM Units, including those that do not submit PNs will be altered to the Demand Capacity (DC) value of that BM Unit (For only the Demand Control Settlement Periods) to mitigate the effects of Non-Delivery for those BM units. (Note that Workaround 18 can be used to submit PNs.)

The Bids and Offers would then be stacked, using the current mechanism and NIV tagging would occur and the main price for that Settlement Period would be calculated as normal (noting that the Bid Offer stack includes the Demand Control Offers at the Demand Control Offer Price).

2.1.6 Payment of Demand Control Offers by the System Operator

Provided a method similar to workaround 18 is used to create the Demand Control Offers as Bid Offer Acceptances, the SO will then pay each affected Supplier the required amount for that Offer by normal methods in normal timescales as the Demand Control Offers will automatically be included in the Settlement Report.

2.1.7 Calculation of Energy Imbalance

Provided a method similar to workaround 18 is used to create the Demand Control Offers as Bid Offer Acceptances, the Demand Control volume will feed into the Account Period Balancing Services Volume ($QABS_{aj}$) value in the calculation of the Energy Imbalance for each energy account by normal methods and in normal timescales. Therefore each Parties position, had the Demand Control not occurred, will be similar to that if the Demand Control does occur.

2.2 Implementation Options

The following section details the implementation options for the introduction of P138 defined in this Requirements Specification.

For the purposes of this document, the requirements have been specified in such a way that the requirements specification applies to all of these implementation options.

This document gives the option for both the SAA and the BSCCo to carry out the calculation of the BM Unit deemed Demand Control Volumes via the volume allocation rules since it may be appropriate for a manual solution that BSCCo carries out this step.

2.3 Potential Changes to External Systems

2.3.1 System Operator

The introduction of P138 has an impact on the System Operator's systems. This is believed to be the extent of the impact on external systems at this time.

- The SO will use existing System Warning Messages with new text content which BMRA will publish, as soon as practicable, containing:
  - The start time of the Demand Control, the affected GSP Group(s) and LDSOs and the amount of Demand Control requested as a MW value;
  - The end time of the Demand Control, the affected GSP Group(s) and LDSOs and an estimate of the Demand Control achieved as a MW value; and
  - An estimate of the total Demand Control Volume for each affected Settlement Period, the Accepted Offer with the highest price taken in the Settlement Period within which Demand Control was instructed and the affected GSP Group (Note that this may be different from the

Demand Control Offer Price calculated by the SAA later on in the process, but gives an indication of the likely level of the Demand Control Offer Price).

It is assumed that since the System Warning Message field on BMRA is free text, no system changes will be required to support these new system warning messages.

- Provision and receipt of information to the SAA and BSCCo:
  - By Day + 2, the SO should calculate the total volume of energy that it assumes to have been reduced due to the Demand Control as MW figure (Note that the SO may also choose to use the volume as passed to it from the LDSO as the total volume of energy reduced, or may wish to use its own Demand Forecast to estimate the total volume of energy reduced.) This should be passed to the SAA and BSCCo along with the Demand Control Settlement Periods and GSP Group affected by the Demand Control by email.
  - Note that if the Demand Control Spans more than one Settlement Period, the SO will report to the SAA and BSCCo a MW figure for each Settlement Period.
  - Following calculations, the SO will receive details of each affected BM Unit, the volume by which it is assumed its Demand to have been reduced by, the associated Supplier and the amount that the SO should pay that Supplier for the Demand Control Volume for its BM Unit via normal methods (i.e. the Settlement Report) and in normal timescales.
- Payment to Suppliers affected by the Demand Control:
  - The SO will pay each Supplier affected by the Demand Control for the deemed offer against each of their BM Units, via normal methods and in normal timescales.

2.4 Potential Changes to Central Services Systems

The introduction of P138 has an impact on Central Services Systems, in particular the Settlement Administration Agent (SAA). This is believed to be the extent of the impact on Central Services Systems at this time.

2.4.1 Impact on Balancing Mechanism Reporting Agent

The SO will issue a System warning messages giving details of the Demand Control which will be published on BMRA under System Warning Messages, however since the System Warning Message field on BMRA is free text, no system changes will be required to support these new system warning messages.

It should however be noted that since at this stage calculations are not being performed by the SAA, the information contained on the BMRA will not be correct.

2.4.2 Impact on Settlement Administration Agent

The SAA will be impacted by a number of steps of the proposed solution to P138.

2.4.2.1 Calculation of the Demand Control Offer Price

By II, the SAA calculates the Demand Control Offer Price (the SAA will have received notification by Day + 2 from the SO that Demand Control has occurred, the Settlement Period(s) and GSP group(s) affected by email, which will trigger the calculation of the Demand Control Offer Price). The Demand Control Offer Price is calculated from the Settlement Period within which Demand Control was invoked. This would be the Accepted Offer with the highest Offer Price with a volume greater than 1 MW (note that this does not include BSAD) taken in the Settlement Period within which Demand Control occurred (that was not itself a Demand Control Offer). Note that the Offer setting the Demand Control Offer

Price may have been taken in the same Settlement Period within which Demand Control was invoked, but equally may have originally been taken in a Settlement Period prior to the Settlement Period within which Demand Control was invoked, but is ongoing in the Settlement Period within which Demand Control was invoked. The Demand Control Offer Price derived for the Settlement Period within which Demand Control was invoked would be used for all subsequent Settlement Periods which were subject to the same period of Demand Control.

If there are no Accepted Offers then as a default, the Market Index Price would be used as the Demand Control Offer Price. If there was also no Market Index Price for that Settlement Period then the Demand Control Offer Price will default to the Energy Imbalance Price derived from a volume weighted average of balancing actions in the Net Imbalance Volume (as calculated in accordance with Section T4.4.5(a) or T4.4.6(a) as the case may be). (Note that this is the same value to which the Market Price defaults when it is zero).

2.4.2.2 Calculation of BM Unit Deemed Demand

The SAA will receive notification from the SO of the total Demand Control achieved, the Demand Control Settlement Period and affected GSP Group(s) by email by Day + 2. The SAA will allocate the Demand Control Volume received from the SO by II across all BM Units and therefore Suppliers in the affected GSP Group using the volume allocation rules described. It is assumed that all Suppliers and therefore all BM Units in the affected GSP Group are affected by the Demand Control equally no matter by which method demand is reduced (as the SO will not report which method is used for the Demand Control).

The volume allocation rules will only apply to importing Supplier BM Units (i.e. those which have negative consumption on the equivalent day used in the following volume allocation rules). Exporting BM Units, Embedded BM Units (i.e. Embedded Generation) and Directly Connected BM Units will not be affected by the volume allocation rules.

To calculate the Demand Control volume:

- Identify the most recent day D′ which has the same day of the week as the Settlement Day D, and for which Initial Settlement has been performed.
- For the Settlement Period(s) in which Demand Control occurred on day D, identify the corresponding Settlement Period j′ on the previous day D′. This mapping process is entirely trivial (period 1 mapping to period 1, period 2 mapping to period 2, and so on), except in the case where the two days contain different numbers of Settlement Periods (due to a clock change on one of the days). In this case, the mapping should assume that the Settlement Period j affected in Day D would map to the last Settlement Period of Day D′ (i.e. If Settlement Period j on Day D was 49 or 50, it would map to Settlement Period 48 on Day D′. If Settlement Period j on Day D was 47 or 48 and Settlement Period D′ was a Short Day, then it would map to Settlement Period 46. If Day D was a short day, Settlement Period 46 would map to Settlement Period 46 on Day D′.)
- If the Metered volume apportioned to a particular BM Unit in Settlement Period j′ and day D′ is zero, then the Metered volume for that BM Unit from Settlement period j′-1 from D′ is substituted to be the Metered Volume for Settlement Period j′. (Note If the Meted Volume in Settlement Period j′-1 is zero, then a value of zero is used in the calculation.)
- Sum the Metered Volume of all the BM Units i, in the affected GSP Group in Day D′ and Settlement Period j′ (to give $\sum_i QM_{ij'}$)
- Divide the Metered Volume of each BM Unit i, in Day D′ and Settlement Period j′ by the total over the GSP Group (as calculated above) to give the proportion of demand per BM Unit throughout the GSP Group (to give $PDC_{ij} = QM_{ij'} / \sum_i QM_{ij'}$).

- Multiply this value obtained by the total Demand Control Volume (TDC_j as notified by the SO by D+2) to give the volume that should be added onto that BM Unit to take account of the Demand Control (i.e. $VDC_{ij} = PDC_{ij} * TDC_j$).
- Then multiply this volume by the Demand Control Offer Price ($DCOP_j$) to give the amount that the SO will pay the Lead Party of each affected BM Unit i (i.e. $QVDC_{ij} = VDC_{ij} * DCOP_j$).
- Notify the SO of each affected BM Unit, the associated Supplier, the volume by which it is assumed its Demand to have been reduced by and the amount that the SO should pay that Supplier for the Demand Lost from its BM Unit (i.e. BM Unit i, associated Supplier, VDC_{ij}, $QVDC_{ij}$ for each BM Unit i and Settlement Period j affected by the Demand Control).

Note that this calculation is carried out once and does not alter as more information becomes available in each Settlement Run.

For the avoidance of doubt no specific processing is required to account for Bank Holidays i.e. volumes for a Bank Holiday Monday will be estimated in the same way as those for a working day.

Note that this calculation would have to be carried out separately for each Settlement Period affected by the Demand Control. The SO will report a MW figure of Demand Control Volume for each Settlement Period affected by the Demand Control.

Note that BSCCo may be required to carry out the volume allocation rules as opposed to the SAA. In this case the SAA will notify BSCCo of the Demand Control Offer Price via email in sufficient time that BSCCo could calculate the volume allocation rules by II (and ideally by Day + 3). BSCCo will use the volume allocation rules to allocate the Demand Control Volume to the affected BM Units in the GSP Group.

2.4.2.3 Allocation of Demand Control Volume to the Bid Offer Stack

The SAA will feed the Demand Control Volumes and Demand Control Offer Price for each affected BM Unit calculated using the volume allocation rules in to the Bid Offer stack as a Demand Control Offer. Note that this Demand Control Offer is time-limited to only the Demand Control Settlement Period(s). This method will require a Bid Offer pair, so the corresponding Bid to the Demand Control Offer would be set to zero. The method used will be based upon workaround 18 (i.e. the SAA would use the method that they would normally use when carrying out workaround 18 to enter the Offers into the Offer stack, but SAA would not be notified of these Offers by BSCCo, they would use the volumes calculated by them using the volume allocation rules and the Demand Control Offer Price).

Also, the PN for all importing Supplier BM Units, including those that do not submit PNs will be altered to the DC for that BM Unit to mitigate the effects of the Non-Delivery Rules. This PN will be time limited to only Demand Control Settlement Periods. This would use a method based upon workaround 18 (i.e. the SAA would use the method that they would normally use when carrying out workaround 18 to enter PNs, but SAA would not be notified of these PNs by BSCCo, the SAA would allocate a PN of the DC of that BM Unit to all BM Units affected by the Demand Control). The Bids and Offers would then be stacked, using the current mechanism, NIV tagging would occur and the main price for that Settlement Period would be calculated as normal (noting that the Bid Offer stack includes the Demand Control Offers at the Demand Control Offer Price). The calculation of the reverse price is not amended by P138.

If the volume allocation rules were carried out by BSCCo, workaround 18, in its normal form would be used by BSCCo to notify the SAA of the amendments required to the Offer stack for the Demand Control Settlement Period. The communication methods currently contained within workaround 18 would be used for the submission of this data to the SAA (i.e. the deemed Offers would be detailed in notepad and emailed to the SAA). BSCCo would provide the SAA of the Demand Control Offers to be entered in to the Bid-Offer stack by II. BSCCo would not be involved in the changes to the PNs, even if they had carried out the volume allocation rules. The SAA would carry out the changes to PNs as described above.

The SAA will also notify the SO of details of each affected BM Unit, the volume by which it is assumed its Demand to have been reduced, the associated Supplier and the amount that the SO should pay that Supplier for the Demand Control Offer from the SAA via the normal method (i.e. the Settlement Report), and in normal timescales as the Demand Control Offers will have been entered into the Bid-Offer stack and so will automatically feed into the Settlement Report.

2.4.2.4 Calculation of Energy Imbalance

One of the aims of P138 is that each Supplier's position if the Demand Control had not occurred would be similar to their position when the Demand Control does occur. Provided a method based upon workaround 18 is used to enter the Demand Control Offers into the Bid Offer stack, the Demand Control Volume will feed into the calculation of the Account Period Balancing Services Volume ($QABS_{aj}$) value in the calculation of the Energy Imbalance for each energy account using normal methods and in normal timescales.

2.5 Potential Changes to BSCCo Systems

The introduction of P138 has an impact on BSCCo systems. This is believed to be the extent of the impact on BSCCo Systems at this time.

BSCCo may be required to carry out the volume allocation rules, as opposed to the SAA. BSCCo will receive notification from the SO of the total Demand Control achieved, the Demand Control Settlement Period and affected GSP Group(s) by email by Day + 2 (whether or not they carry out the volume allocation rules). BSCCo will be required to allocate the Demand Control Volume received from the SO across all BM Units and therefore Suppliers in the affected GSP Group using the Volume Allocation Rules. The SAA would notify BSCCo of the Demand Control Offer Price via email in sufficient time that BSCCo could calculate the volume allocation rules by II (ideally by Day + 3).

It is assumed that all Suppliers and therefore all BM Units in the affected GSP Group are affected by the Demand Control equally no matter by which method demand is reduced (as the SO will not report which method is used for the Demand Control).

The volume allocation rules will only apply to Importing Supplier BM Units (i.e. those beginning 2_ which have negative consumption on the equivalent day used in the following volume allocation rules). Exporting BM Units, Embedded BM Units (i.e. Embedded Generation) and Directly Connected BM Units will not be affected by the volume allocation rules.

To calculate the Demand Control volume:

- Identify the most recent day D′ which has the same day of the week as the Settlement Day D, and for which Initial Settlement has been performed.
- For the Settlement Period(s) in which Demand Control occurred on day D, identify the corresponding Settlement Period j′ on the previous day D′. This mapping process is entirely trivial (period 1 mapping to period 1, period 2 mapping to period 2, and so on), except in the case where the two days contain different numbers of Settlement Periods (due to a clock change on one of the days). In this case, the mapping should assume that the Settlement Period j affected in Day D would map to the last Settlement Period of Day D′ (i.e. If Settlement Period j on Day D was 49 or 50, it would map to Settlement Period 48 on Day D′. If Settlement Period j on Day D was 47 or 48 and Settlement Period D′ was a Short Day, then it would map to Settlement Period 46. If Day D was a short day, Settlement Period 46 would map to Settlement Period 46 on Day D′.)

- If the Metered volume apportioned to a particular BM Unit in Settlement Period j' and day D' is zero, then the Metered volume for that BM Unit from Settlement period j'-1 from D' is substituted to be the Metered Volume for Settlement Period j'. (Note If the Meted Volume in Settlement Period j'-1 is zero, then a value of zero is used in the calculation.)
- Sum the Metered Volume of all the BM Units i, in the affected GSP Group in Day D' and Settlement Period j' (to give $\sum_i QM_{ij'}$)
- Divide the Metered Volume of each BM Unit i, in Day D' and Settlement Period j' by the total over the GSP Group (as calculated above) to give the proportion of demand per BM Unit throughout the GSP Group (to give $PDC_{ij} = QM_{ij'} / \sum_i QM_{ij'}$).
- Multiply this value obtained by the total Demand Control Volume (TDC_j as notified by the SO by D+2) to give the volume that should be added onto that BM Unit to take account of the Demand Control (i.e. $VDC_{ij} = PDC_{ij} * TDC_j$).
- Then multiply this volume by the Demand Control Offer Price ($DCOP_j$) to give the amount that the SO will pay each affected Supplier owning each BM Unit i (i.e. $QVDC_{ij} = VDC_{ij} * DCOP_j$).
- Notify the SO of each affected BM Unit, the associated Supplier, the volume by which it is assumed its Demand to have been reduced by and the amount that the SO should pay that Supplier for the Demand Lost from its BM Unit (i.e. BM Unit i, associated Supplier, VDC_{ij}, $QVDC_{ij}$ for each BM Unit i and Settlement Period j affected by the Demand Control).

Note that this calculation is carried out once and does not alter as more information becomes available in each Settlement Run.

For the avoidance of doubt, no specific processing is required to account for Bank Holidays i.e. volumes for a Bank Holiday Monday will be estimated in the same way as those for a working day.

Note that this calculation would have to be carried out separately for each Settlement Period affected by the Demand Control. The SO will report a MW figure of Demand Control Volume for each Settlement Period affected by the Demand Control.

BSCCo will use workaround 18 to pass the Demand Control Offer for each affected BM Unit to the SAA to be fed into the Bid Offer stack. The Demand Control Offer will be matched with a corresponding Bid of zero. The communication methods currently contained within workaround 18 would be used for the submission of this data to the SAA (i.e. the deemed Offers would be detailed in notepad and emailed to the SAA). BSCCo would provide the SAA of the Demand Control Offers to be entered in to the Bid-Offer stack by II.

3 POTENTIAL OPTIONS FOR ALTERNATIVE MODIFICATION

3.1 Description of Potential Options for Alternate Modification

The only aspect of P138 for which there is a possible alternative modification is the calculation of the Demand Control Offer Price. The Proposed Modification states that this would be a marginal price, however three other options for the Demand Control Offer Price have been proposed:

- Use the Market Price;
- Use the Marginal Price with a cap; and
- Use a fixed Price.

In every other way the Alternate Modification is the same as the Proposed Modification.

3.2 Implementation Options

The Implementation options for the Alternate Modification are the same as those for the Proposed Modification.

3.3 Potential Changes to External Systems

3.3.1 System Operator

The introduction of P138 has an impact on the System Operator's systems. This is believed to be the extent of the impact on external systems at this time.

The impact of any of the possible Alternate Modifications on the System Operator's systems is the same as the impact of the Proposed Modification on the System Operator's systems.

3.4 Potential Changes to Central Services Systems

The introduction of P138 has an impact on Central Services Systems, in particular the SAA. This is believed to be the extent of the impact on Central Services Systems at this time.

3.4.1 Impact on Balancing Mechanism Reporting Agent

The impact of any of the possible Alternate Modifications on the BMRA systems as the same is the impact of the Proposed Modification on the BMRA systems.

3.4.2 Impact on Settlement Administration Agent

The only difference in impact on the SAA between the Proposed Modification and any of the possible Alternate Modifications is that instead of the Demand Control Offer Price being calculated as a Marginal Price, another option for the calculation of the Demand Control Offer Price would be chosen.

All other impacts of any of the possible Alternate Modifications on the SAA are the same as described in the Proposed Modification.

3.4.2.1 Calculation of the Demand Control Offer Price

The options for the Alternate Modification centre on the definition of the Demand Control Offer Price. SAA would calculate the Demand Control Offer Price for an Alternate Modification in the same timescales as in the Proposed Modification. The impact on the SAA of the three possible options for the Demand Control Offer Price, which could form an Alternate Modification follow:

Market Price

The Market Price in the Settlement Period within which the Demand Control was invoked is taken as the Demand Control Offer Price for all Settlement Periods subject to that period of Demand Control. If there is no data to provide a market price, the Demand Control Offer Price would default to the Main Price (as currently the reverse price defaults to the Main price where there is no data provided from a Market Index Data Provider).

Marginal Price capped at a fixed Price

The Marginal Price would be calculated from the Settlement Period within which Demand Control was invoked as described in the Proposed Modification, however if the price calculated exceeded a fixed number x, the Demand Control Offer Price would be set as the price x. If the Marginal Price did not exceed the fixed price x, then the Demand Control Offer Price would be set at the Marginal Price. The price calculated would apply to all Settlement Periods subject to that period of Demand Control.

Fixed Price

The Demand Control Offer Price would be set at a fixed price y, determined by the Panel, for all Settlement Periods affected by the Demand Control, and would only change if the Panel agreed to a change to that fixed price y.

The Demand Control Offer Price would feed into the next stage of the process, i.e. the volume allocation rules whether it is calculated as a Marginal Price or by one of the options for an Alternate Modification in the same timescales as by the same method described in the Proposed Modification. Therefore all steps following the calculation of the Demand Control Offer Price by the SAA would continue as described in the Proposed Modification.

3.5 Potential Changes to BSCCo Systems

The introduction of P138 has an impact on BSCCo's systems. This is believed to be the extent of the impact on BSCCo's systems at this time.

The impact of any of the possible Alternate Modifications on BSCCo's systems is the same as the impact of the Proposed Modification on BSCCo's systems.

4 DEVELOPMENT PROCESS

For the purposes of this assessment, the reader should assume that the changes will be implemented as a standalone development project managed by BSCCo.

The following sections give an indication of the control points required during design, testing and implementation and are supplied to provide a basis on which the BSC Central Service Agent can estimate.

4.1 Design

BSCCo intend that responsibility for the correctness of the design should remain with the BSC Central Service Agent, but that BSCCo should have the opportunity to review it, and identify apparent inconsistencies with the requirements

4.2 Testing

BSCCo intend that responsibility for software testing should lie with the BSC Central Service Agent, but that BSCCo should have some visibility of the process, in order to gain assurance that the integrity of

Trading and Settlement is maintained. Note that if BSCCo calculates the volume allocation rules, BSCCo will test need to test this calculation.

5 GLOSSARY

The following acronyms have been used throughout this document:

Term	
BM	Balancing Mechanism
BMRA	Balancing Mechanism Reporting Agent
BMRS	Balancing Mechanism Reporting Service
BSAD	Balancing Services Adjustment Data
BSC	Balancing and Settlement code
BSCCo	Balancing and Settlement Code Company
CADL	Continuous Acceptance Duration Limit
EIP	Energy Imbalance Price
GSP	Grid Supply Point
II	Initial Information
LDSO	Licensed Distribution system Operator
MW	Mega Watt
NGC	National Grid Company
NIV	Net Imbalance Volume
OC6	Operating Code No. 1
OC6	Operating Code No. 6
PN	Physical Notification
PSMG	Pricing Issues Standing Modification Group
RCRC	Residual Cashflow Reallocation Cashflow
SAA	Settlement Administration Agent
SF	Settlement Final Run
SO	System Operator

6 DOCUMENT CONTROL

a Authorities

Version	Date	Author	Reviewer	Reason for review
0.1	13/10/03	Change Delivery	PSMG	Peer review
0.2	24/10/03	Change Delivery	PSMG	Further peer review
1.0	31/10/03	Change Delivery		

b Distribution

Recipient	Version	Date	Reason
PSMG members	0.1	21/10/03	Peer Review
PSMG members	0.2	28/10/03	Peer Review
Transmission Company	1.0	31/10/03	For Impact Assessment
BSC Agents	1.0	31/10/03	For Impact Assessment
BSCCo	1.0	31/10/03	For Impact Assessment

c References

Ref	Document	Owner	Issue date	Version
Reference 1	Operating Code No. 6 (OC6)	National Grid Company	15 October 2001	Revision 3
Reference 2	Operating Code No. 1 (OC1)	National Grid Company	30 September 2002	Revision 8