05 June 2001

URGENT MODIFICATION CONSULTATION DOCUMENT

MODIFICATION PROPOSALS P15 and P18

Removal of Price Spikes Associated with System Balancing from System Prices; and Removing/Mitigating the Effect of System Balancing Actions in the Imbalance Price Calculations

Prepared by ELEXON on behalf of the Pricing Issues Modifications Group

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1 INTRODUCTION

1.1 General

This Consultation Document has been prepared by ELEXON Ltd, on behalf of the Modifications Group, in accordance with the terms of the Balancing and Settlement Code ('BSC'). The BSC is the legal document containing the rules of the balancing mechanism and imbalance settlement process and related governance provisions. ELEXON is the company that performs the role and functions of the BSCCo, as defined in the BSC.

An electronic copy of this document can be found on the BSC website, at www.ELEXON.co.uk.

Electronic responses should be sent to: Modifications@elexon.co.uk by 09:00 on 11th June 2001 and responses sent by post should be addressed to Modifications Department, ELEXON, 10th Floor, 338 Euston Road, London NW1 3BP, again to arrive by 09:00 on 11th June 2001. If you have any queries about the issues raised in this consultation paper then please contact Gwilym Rowlands on 0207 380 4373. Responses should be marked "Response to the P15 & P18 Modifications Consultation".

1.2 Disclaimer

The contents of this Consultation Document are intended to reflect the discussions held in the Modifications Group. Additional supporting data analysis has also been undertaken by ELEXON and NGC based on data available from Go-Live in order to assist in the analysis of the Modifications, sometimes using data provided by third parties. In some cases, ELEXON has drawn conclusions based upon its view of the data analysis.

It should be recognised that this Consultation Document has been produced in relatively short timescales, consistent with the requirements of the BSC Panel and the Authority for progressing the Modification. The data analysis by ELEXON and NGC has also been undertaken in the same short timescales.

Given the above, it is possible that the views of the Modifications Group have not been fully captured in this paper, or that errors may appear in this document (or that the data and analysis appearing in this document is not comprehensive and is not therefore authoritative). Where this has occurred, ELEXON hopes that recipients of this document will understand the trade-off to be made between accuracy and timescales of progression of the Modification Proposals. Clearly, in producing this document, ELEXON intends that no such errors are present. However recipients should recognise the possibility of such errors in relying in any way on the information contained in any part of this document.

2 PURPOSE AND SCOPE OF THE REPORT

BSC Section F sets out the procedures for progressing proposals to amend the BSC (known as 'Modification Proposals'). These include procedures for proposing, consulting on, developing, evaluating and reporting to the Authority on potential modifications.

The BSC Panel is charged with supervising and implementing the modification procedures. ELEXON provides the secretariat and other advice, support and resource required by the Panel for this purpose. In addition, if a modification to the Code is approved or directed by the Authority, ELEXON is responsible for overseeing the implementation of that amendment (including any consequential changes to systems, procedures and documentation).

The modification procedures culminate in a modification report to the Authority, which normally contains the Panel's recommendation on whether or not a proposed modification should be approved and a proposed date for its implementation, together with a detailed assessment of the proposal in question. The report forms the basis upon which the Authority will decide whether to approve, direct or reject a modification proposal.

The Transmission Company or ELEXON may recommend that a Modification Proposal be treated as urgent, subject to approval by the Authority. The procedure for progressing an Urgent Modification Proposal is set out in Sections F2.9 and B4.6 of the Code. These urgent procedures allow the normal modification procedures to be circumvented as necessary to fit with the urgency of the matter. In such cases, the Authority will confirm the timetable and procedure that should apply. The timetable and procedure directed by the Authority must be adhered to, along with any other special instructions. A statement containing the reasons why the Panel (or Panel Chairman) considers the Proposal should be treated as urgent must be included in the Urgent Modification Report, together with a description of the extent to which the procedure followed deviated from the normal modification procedure.

Depending on the urgency of the matter, it may not be possible to establish a Modification Group or undertake detailed assessment of the modification proposal. The level of detail and analysis presented in this Urgent Modification Report therefore represents the full extent of relevant information regarding the modification proposal that could be collated within the time available.

3 SUMMARY AND VIEWS INVITED

3.1 Purpose of the Report

This report is the Urgent Modification Consultation Document for Urgent Modification Proposals P15 and P18. It has been produced by ELEXON on behalf of the Pricing Issues Modifications Group and is issued for consultation.

3.2 Nature of the Modifications

On 23 May 2001, Vattenfall submitted Modification Proposal P15 - "Removal of Price Spikes Associated With System Balancing From System Prices". This Modification proposed that bid-offer acceptances with an acceptance time after [30] minutes before the start of the real time half-hour period be tagged and excluded from the calculation of SBP and SSP.

On 23 May 2001, NGC submitted Modification Proposal P18 – "Removing/Mitigating the Effect of System Balancing Actions in the Imbalance Price Calculations". This Modification included two options for making amendments to the imbalance price calculations.

Option 18A proposed an enhanced definition of system balancing actions whereby Bid/Offer acceptances of 'Continuous Instruction Duration' less than a threshold duration of [15] minutes would be tagged as System rather than Energy balancing actions.

Option 18B proposed that the BRL parameter is set as a minimum volume of balancing actions from which the imbalance prices can be set. When there is a smaller volume of actions, the imbalance price is set as a weighted average of the price derived from the current rules, and the default price that would apply if no balancing actions had been taken. The weighting would be in proportion to the volume of balancing actions, and BRL minus this volume, respectively.

3.3 The Process to Date

The Proposer of P15 requested that it be treated as an Urgent Modification. ELEXON supported this recommendation and in addition proposed that P18 (due to the similar nature of the issue raised) be considered in conjunction with P15 and also treated urgently.

The BSC Panel Chairman contacted a number of Panel Members to seek their views on the proposed urgent treatment of the Modification Proposals and the Panel recommended prompt resolution of P15 and P18.

Further to the recommendation from the BSC Panel Chairman, supported by the BSC Panel, the Authority granted the modification urgent status for the purposes of Section F2.9 of the BSC on 25th May 2001 and agreed the timetable and process set out in Section 6 of this report.

The Modifications Group met on 1st June 2001 to discuss the Modifications. This consultation document was produced by ELEXON further to the discussions at the Modifications Group meeting.

3.4 Views Invited

Respondents to this Consultation Document are invited to comment on any of the issues raised in this consultation document, however responses are requested in particular to the questions raised in Section 7 and repeated below:

Q1: Do you believe that the exclusion of certain additional acceptances is desirable such that the BSC Objective of promoting effective competition in generation and supply is better achieved?

Q2: If P15 were to be progressed, below what "lead-time" should acceptances be excluded?

Lead Time	Preference (Mark one)	Comments
15 Minutes		
30 Minutes		
45 Minutes		
1 Hour		
Other (please specify)		

Q3: If P18A were to be progressed, below what "Continuous Instruction Duration" (CID) should acceptances be excluded?

CID	Preference (Mark one)	Comments
5 Minutes		
15 Minutes		
20 Minutes		
30 Minutes		
Other (please specify)		

Q4: Which of the following proposals do you believe better delivers the relevant BSC Objectives in the context of excluding certain additional acceptances?

Modification	Preference (1=high, 5=low)	Comments
P15		
P18A		
P18Ai)		
P18Aii)		
P18B		
BRL=0		
Other (please specify)		

Q5: How would your preference for the above Modifications be affected if your preferred solution was found to have protracted implementation timescales (e.g. six months or more), for example would this increase your preference for BRL=0?

These questions arise in the main body of this Consultation Document, and are duplicated here for convenience.

Electronic responses should be sent to: Modifications@elexon.co.uk by 09:00 on 11th June 2001 and responses sent by post should be addressed to Modifications Department, ELEXON, 10th Floor, 338 Euston Road, London NW1 3BP, again to arrive by 09:00 on 11th June 2001. If you have any queries about the issues raised in this consultation paper then please contact Gwilym Rowlands on 0207 380 4373 (e-mail gwilym.rowlands@elexon.co.uk**). Responses should be marked "Response to the P15 & P18 Modifications Consultation".**

4 DESCRIPTION OF PROPOSED MODIFICATIONS

On 23 May 2001, Vattenfall submitted Modification Proposal P15 - "Removal of Price Spikes Associated With System Balancing From System Prices". This Modification proposed that bid-offer acceptances with an acceptance time after [30] minutes before the start of the real time half-hour period be tagged and excluded from the calculation of SBP and SSP.

On 23 May 2001, NGC submitted Modification Proposal P18 – "Removing/Mitigating the Effect of System Balancing Actions in the Imbalance Price Calculations". This Modification included two options for making amendments to the imbalance price calculations.

Option 18A proposed an enhanced definition of system balancing actions. Bid/Offer acceptances of 'Continuous Instruction Duration' less than a threshold duration of [15] minutes would be tagged as System rather than Energy balancing actions.

Option 18B proposed that the BRL parameter is set as a minimum volume of balancing actions from which the imbalance prices can be set. When there is a smaller volume of actions, the imbalance price is set as a weighted average of the price derived from the current rules, and the default price that would apply if no balancing actions had been taken. The weighting would be in proportion to the volume of balancing actions, and BRL minus this volume, respectively.

Copies of the Modification Proposals are available on the ELEXON Website (www.ELEXON.co.uk). These have been replicated in Annex 2 of this document.

5 STATEMENT OF URGENCY

Section F2.9 of the Balancing and Settlement Code makes provision for proposals to be treated as Urgent Modification Proposals upon the recommendation of the Transmission Company and BSCCo (ELEXON).

The Proposer of P15 requested (in submitting the Modification Proposal to ELEXON) that that it be treated as an Urgent Modification. ELEXON supported this recommendation on the basis that the issues addressed by the Modification were "having a highly material effect on imbalance prices". In addition ELEXON proposed that P18 (due to the similar nature of the issue raised) be considered in conjunction with P15 and treated urgently.

The BSC Panel Chairman contacted a number of Panel Members to seek their views on the proposed urgent treatment of the Modification Proposals. Some of the Panel Members were supportive of the proposals being treated as urgent. Others said that the issue that the proposals seek to address should be expedited but was so fundamental that they wished to see adequate consultation and discussion of the matter. One Panel Member suggested that it would be sensible to broaden the scope of the discussion to include P12: 'Reduction Of Gate Closure From 3.5 Hours To 1 Hour'. The Panel recommended prompt resolution of P15 and P18.

Further to the recommendation from the BSC Panel Chairman, supported by the BSC Panel, the Authority granted the modification urgent status for the purposes of Section F2.9 of the BSC on 25th May 2001.

6 DETAIL OF PROCEDURE AND PROCESS FOLLOWED

The key steps that have been adopted in progressing these Urgent Modification Proposals are as follows:

(i) On 23 May 2001, Modification Proposals P15 and P18 were raised by Vattenfall and NGC respectively.

(ii) The BSC Panel Chairman sought the views of Panel Members who broadly supported the recommendation that the Modification Proposals be treated together and as urgent (in accordance with the procedures set out in F2.9 of the BSC).

(iii) The BSC Chairman's recommendation to treat the Modification as Urgent was subsequently ratified by the Authority on 25th May 2001. A Modification Group was established with the membership agreed by the Panel Chairman and the Group was subsequently notified of a meeting to be held on 1st June 2001;

(iv) The Authority also agreed the proposed timescale and process for progression of the Modification included in the BSC Chairman's recommendation as follows:

Mod Proposal	**Mon 21st**	**Tue 22nd**	**Wed 23rd**	**Thu 24th**	**Fri 25th**	**Sat 26th**	**Sun 27th**
P15 & P18	-	-	-	ELEXON Analysis	Agree Urgency	-	-
	Mon 28th	**Tue 29th**	**Wed 30th**	**Thu 31st**	**Fri 1st**	**Sat 2nd**	**Sun 3rd**
P15 & P18	-	ELEXON Analysis	ELEXON Analysis	Panel Update	1st Mods Group meeting	-	-
	Mon 4th	**Tue 5th**	**Wed 6th**	**Thu 7th**	**Fri 8th**	**Sat 9th**	**Sun 10th**
P15 & P18	Produce mods report	Produce mods report	Consult	Consult	Consult	-	-
Mod Proposal	**Mon 11th**	**Tue 12th**	**Wed 13th**	**Thu 14th**	**Fri 15th**	**Sat 16th**	**Sun 17th**
P15 & P18	Collate responses	2nd Mods Group meeting	Update report	Panel consideration	Issue report to Ofgem	-	-

Deviations from the normal Modification Procedures (as prescribed in Section F of the BSC) were as follows.

- Views on how the Modification Proposal should be progressed were sought directly from Panel Members by the BSC Panel Chairman. Given the perceived urgency of the Proposal no Initial Written Assessment was undertaken.
- Panel Members recommended treating the proposal as an Urgent Modification.
- The BSC Panel delegated agreement to the membership of the Modification Group to the BSC Chairman.
- The proposers of the Modifications had an opportunity to present their proposals at the Panel meeting on 31 May. The Panel recognised the distinction between the need to distinguish between system and energy actions and purchases as distinct from looking at what might give a better price profile. The Panel indicated that the

Modifications Group should exercise a degree of pragmatism and should come forward with one or two options. The Panel also recognised that there may be significant system implications which may have an effect on the implementation timetable (and hence pressure would need to be put on timescales). The BSC Panel also identified the need for a separate wider discussion on the issue of imbalance pricing. As a consequence, an action was placed for ELEXON to scope out a package of work setting down how this issue may be taken forward, ensuring the involvement of relevant parties (which may include the use of groups that have already been established).

- The Modification Group reviewed the proposal and identified a number of issues. The views of the Modification Group on the specific points of the proposal and the broader generic issues that it raised were collated in this Report by ELEXON and issued to the BSC Parties for consultation.

7 MODIFICATION GROUP DISCUSSIONS AND REPORT

7.1 Modifications Group Meeting

A Modifications Group was convened and met on Friday 1st June 2001 to consider the proposed modifications.

At the meeting, the Modifications Group Chairman reported that the BSC Panel meeting of 31st May 2001 had identified the need for a separate wider discussion on the issue of imbalance pricing. As a consequence, at the BSC Panel, an action had been placed for ELEXON to scope out a package of work setting down how this issue may be taken forward, ensuring the involvement of relevant parties (which may include the use of groups that have already been established). This work does not form part of this consultation.

7.2 Approach Taken

It was recognised at the Modifications Group meeting, that there were two broad approaches that could be taken to progress the Modification Proposals. These were:

i) To consider from first principles how Energy Imbalance Prices should be calculated in order to be consistent with the relevant BSC Objectives, and then to assess Modification Proposals P15 and P18 (and alternatives) against these deliberations; or

ii) Without considering the underlying principles associated with how the Energy Imbalance Prices should be calculated, to consider whether the specific changes to the imbalance price calculations set down in Modification Proposals P15 and P18 would better meet the BSC Objectives. This assessment would be based upon the Modification Group's views of the likely impact of the changes on the price calculations and the likely consequent changes in the market that may be expected.

The Modifications Group noted that Modifications Proposals P15 and P18 were Urgent Modifications, and that an approach that required an analysis of the underlying objectives of the Energy Imbalance Price calculations from first principles would be unlikely to be completed in the required timescales.

Furthermore, the Modifications Group noted the fact that the BSC Panel had placed an action on ELEXON to scope out how a wider review of imbalance pricing (which the Modifications Group anticipated would include a review of the pricing arrangements from first principles).

As a consequence, in the interests of progressing the Modifications in an appropriate timescale, and recognising that alternative arrangements for a wider review were being considered, the Modifications Group restricted its approach to progressing the Modifications to that set down in ii) above. In order to progress the Modification Proposals it was necessary to consider the impact of the existing price calculations on the market in general, and then to consider whether the changes proposed would better met the relevant BSC Objectives.

A further consequence of this approach, was that the Modifications Group restricted its deliberations to the Modification Proposals submitted. Alternatives that were not consistent with the perceived issue/defect that the submissions sought to resolve were

not considered. Some relatively minor variations on the Modification Proposals submitted were considered. Furthermore, an additional "quick fix" to set the value of BRL to zero was also discussed in conjunction with the Modification Proposals.

7.3 Impact of Existing Energy Imbalance Price Calculations

In the discussions in the Modifications Group meetings, a number of parties indicated that they believed that the existing Energy Imbalance Price calculations were having an undesirable effect on the trading of electricity. More specifically, they believed that Energy Imbalance Prices were unduly volatile and, at times, inappropriate in magnitude. Furthermore, they indicated that the way in which the Energy Imbalance Prices were calculated and applied to Energy Imbalance volumes meant that those parties causing the need for highly priced balancing actions to be taken were not necessarily the ones that were subsequently exposed to the high Energy Imbalance Prices.

Other members of the Modifications Group indicated that they did not believe that the existing price calculation methodology had necessarily proved to be inappropriate, and that it was premature to consider implementing one or more "quick fix" changes before the trading arrangements had been given more time to bed down. Whether or not any changes would be required should therefore be considered further at a later date, in the light of additional experience.

The Modifications Group agreed that the objective of the imbalance pricing arrangements should be to provide market participants with an appropriate incentive to balance. However there was not necessarily consensus as to whether or not the existing arrangements already provided such an appropriate incentive.

A number of members believed that the existing Energy Imbalance Prices (most particularly System Buy Prices) were unduly volatile, and included the costs of balancing actions that should more appropriately be treated as System Balancing Trades (indeed it was the inclusion of such inappropriate balancing actions in the price calculations that caused the undue volatility). Because of the volatility and extreme prices that this caused, they believed that market participants faced an inappropriate incentive to contract so as to be long (i.e. for suppliers to deliberately purchase energy in excess of their demand, and for generators deliberately to sell less energy than their intended physical generation – which may itself be greater than demand). In deliberately trading long, participants could reduce their expected exposure to System Buy Price that arose through natural fluctuations in generation and demand. Thus they believed that the existing pricing arrangements did not provide appropriate incentives for participants to balance, rather they provided an incentive for participants to trade long.

Some members of the Modifications Group also believed that the high costs of system-balancing actions were not necessarily being reflected on those participants who caused the requirement for such actions to be taken in the first place. First, those that did cause the need for relatively highly priced Offers to be accepted were not necessarily short overall in the half-hour concerned, and second, some parties that had not caused the need for such offers to be purchased were short in the half-hour concerned. An example that was discussed related to a number of high System Buy Prices that were believed to have resulted from the purchase of relatively highly priced Offers by NGC in response to "TV pickups". Such Offers were being purchased in the Balancing Mechanism in order to match generation and demand in short (intra-half-hour) timescales, and not for bulk inter-half-hour balancing. It was not necessarily true to say that the half-hourly integrated demands of those Suppliers, whose customers increased the demand at the TV pickup,

were short (compared to contract position) over the entirety of the relevant Settlement Period. This is because energy imbalances were measured as the difference between contract position and the integrated energy consumption over the half-hour, and not over the precise minutes of the TV Pickup. Furthermore, parties who were short in that Settlement Period, but which had not caused the need for the relatively highly priced Offers to be accepted (because they were either not short at the exact time of the TV Pickup, or because their shortfall could be met by longer-term balancing action) were still exposed to the high prices that arose in that particular Settlement Period. One example of this is discussed further in Annex 4 section A4.2, in which a generating unit has tripped, resulting in the need for the purchase of Offers in the Balancing Mechanism. If such an event coincides with a TV pickup, then the generator may face the very high resulting energy imbalance prices (that would not have been high had the generator trip alone occurred). Conversely, Suppliers whose customers' demand has caused the TV pickup may not be exposed to System Buy Price in the Settlement Period, and therefore do not pay for the costs of the balancing action they caused (except via BSUoS charges).

Some members of the Modifications Group believed that the existing arrangements were exacerbated by a "positive feedback" effect. Because parties were given incentives to enter the market long (so as to avoid exposure to high System Buy Prices) the likelihood of NGC being required to buy any significant quantity of Offers in the Balancing Mechanism was reduced. Furthermore, it was suggested that a number of parties were submitting Physical Notifications such that generation plant entered the Balancing Mechanism part-loaded (perhaps so that they could, to a certain extent self-provide reserve - again so as to avoid high System Buy Prices, or alternatively to be in a position so as to able to provide Offers into the Balancing Mechanism). Because plant was already part-loaded, NGC was not required to purchase Bids and (and more particularly) Offers so as to place plant in a position to provide reserve. The general reduction in the quantity of balancing action that NGC is required to purchase means that any Offers that are purchased have a strong influence on System Buy Price. Thus, small quantities of relatively expensive acceptances (required for example in response to TV pickups) produced high System Buy Prices.

It should be reiterated that not all members of the Modifications Group believed that it was appropriate at this stage to change the way in which the Energy Imbalance Prices were calculated. However, those that did, believed that it was appropriate to exclude certain acceptances from the Energy Imbalance Price calculations so that parties faced more appropriate incentives to balance, and so that the costs of certain relatively highly priced accepted Offers were not inappropriately targeted on those who were short, but did not cause the requirement to purchase such acceptances in that particular Settlement Period.

Overall, the view of the majority of the Modifications Group was that the existing pricing arrangements did not place appropriate incentives on parties to balance (in fact parties were incentivised to trade "long". Furthermore, the costs of certain balancing actions were being visited on parties that did not necessarily create the need for such actions. The majority of the Modifications Group did not therefore believe that the existing arrangements were consistent with the relevant BSC Objective of "Promoting effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity".

Q1: Do you believe that the exclusion of certain additional acceptances is desirable such that the BSC Objective of promoting effective competition in generation and supply is better achieved?

7.4 System and Energy Balancing

Modification Proposals 15 and 18A essentially operate so as to identify and tag "short-term" acceptances so that they can be excluded from the Energy Imbalance Price calculations. The difference between these two Modification Proposals is primarily associated with how they propose that "short-term" acceptances should be identified. In either case, the division between those acceptances that were treated as System balancing actions and those that were treated as Energy Balancing actions would be changed relatively to the existing arrangements.

Modification 18B does not require a change to the division between those balancing actions that are deemed to be required for System and for Energy reasons. Instead, Modification 18B varies the way in which accepted Offers (and Bids) are used to determine the Energy Imbalance price.

There was some discussion in the Modifications Group over the existing division between Energy and System balancing actions. It was noted for example that changes in output arising from the provision of automatic frequency response was treated as a System balancing action, whereas changes in output required in order to provide reserve were currently treated as an Energy balancing service. The Modifications Group did not believe that it was possible to produce an unambiguous definition of what actions taken by the Transmission Company were System balancing actions and what were Energy balancing actions, and that any division would necessarily be arbitrary. As a consequence, it was believed that a more fundamental review of the division between System and Energy balancing and how (to the extent that it continued to prove necessary) such a division should be effected in order to calculate Energy Imbalance prices would more appropriately be included as part of any wider review of the price calculations. Such a review was not considered necessary for the purposes of considering Modification Proposals P15 and P18. Clearly however, if Modification Proposal P15 or P18A were implemented, a change in what was treated as Energy and System balancing services would implicitly be made.

7.5 Discussion of Alternative Options - Overview

In discussing the Modification Proposals, the Modifications Group considered a number of key aspects of each, as follows:

i) how effective was the proposed Modification in removing "short-term" acceptances (the analysis included in Annex 4 of this document provides some support for the assertions made in relation to each Modification in this area);

ii) to what extent was the Modification Proposal acceptable from an "intellectually pure" perspective (note that because a fundamental review of the objectives of the price calculations was not undertaken, this assessment was based subjectively upon the views of the Modification Group attendees);

iii) how simple would the proposed Modification be to implement (note that formal impact assessments have not yet been carried out, and again this assessment was based upon the understanding of the attendees of the Modifications Group meeting)?

A number of observations which were considered worthy of consideration were also raised in discussions on each of the Proposed Modifications. A number of sub-options were also considered which were essentially variants on the Modification Proposals.

In all of the options considered, the fact that any change in the price calculations would have an impact on NGC's incentive arrangements (as set down in the Transmission Licence) was noted. It is clear that this issue is outside the scope of the Modifications Group and it is not discussed further in this paper. Generally, however the impact of any change on NGC's incentives was not considered to be a determining factor in the acceptability (or otherwise) of any particular Modification Proposal.

It should also be noted that none of the Modification Proposals set down in this paper affect the payments or charges made to/from parties participating in the Balancing Mechanism. They deal solely with the issue of how the Energy Imbalance prices should be calculated.

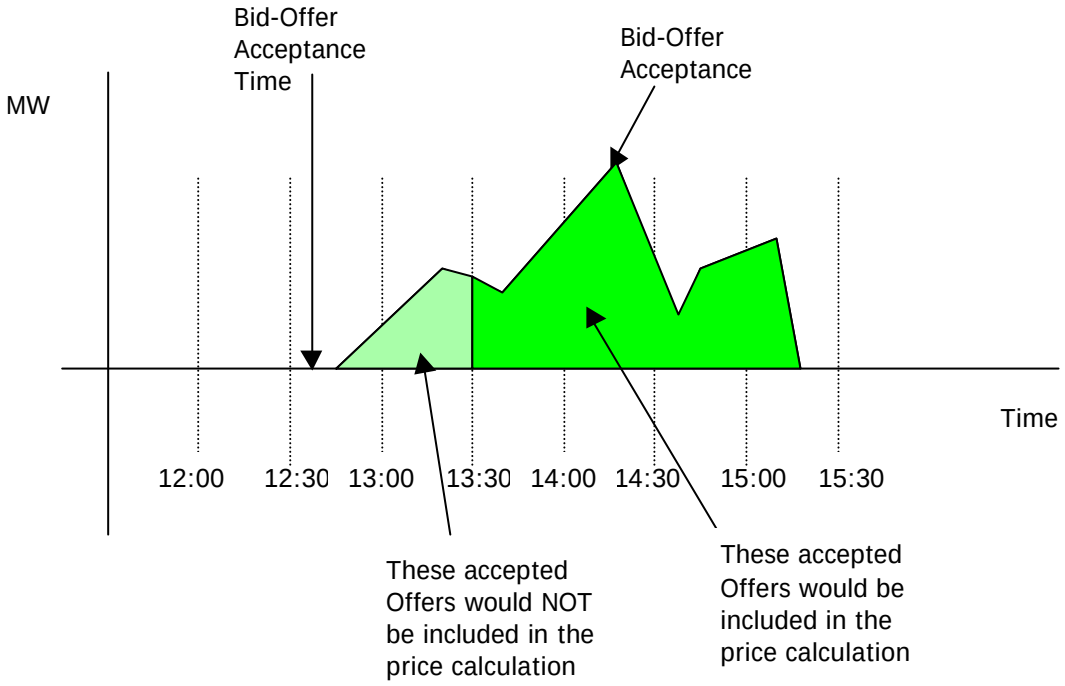
7.6 Modification Proposal P15

As has been noted in section 4 above, Modification Proposal P15 proposes that acceptances for which the Bid-Offer Acceptance Time is less than 30 minutes prior to the start of the Settlement Period to which it relates would be disregarded for the purposes of the Energy Imbalance Price calculations.

Thus in this case, the exclusion of an acceptance would be based upon its "lead-time" rather than the duration of the acceptance itself (as is the case with P18A). It was noted that under this option, whether or not an acceptance was included could partly be determined by NGC. If, for example, NGC had identified that certain balancing action was required, it may be possible for them to "decide" whether it would or would not be included in the price calculation based upon when it chose to issue the acceptance.

In clarifying how the Modification Proposal would operate, it was noted that if, for example, an acceptance spanned more than one Settlement Period, its effect may be excluded from the Energy Imbalance Calculation in the early Settlement Periods, but not in later ones. This is illustrated in the following figure.

Figure 1



In Figure 1 above, a Bid-Offer Acceptance has been issued at 12:37, which affects more than one Settlement Period. In fact it spans a total of six Settlement Periods. Based upon the Modification Proposal, those Offers accepted as a consequence of the acceptance that fall in the Settlement Periods 12:30 – 13:00 and 13:00 – 13:30 would not be included in the price calculations. Those accepted Offers accepted in subsequent periods would be included.

The Modification Proposal as submitted, determines which acceptances should be excluded by comparing the Bid-Offer Acceptance Time to the time at the start of each Settlement Period. Thus, sometimes acceptances with a "lead time" of up to 1 hour may be excluded, if, for example the Bid-Offer Acceptance Time falls just after a half-hour boundary. In some cases, however, acceptances with a lead time of just over 30 minutes may be included (i.e. if the Bid-Offer Acceptance Time fell just after a half-hour boundary).

Given the data available and the timescales for progressing the Modification it has not been possible to undertake a thorough analysis of the impact on prices that this Modification would have. However, it was suggested at the Modification Group that were this Modification implemented, between 75% and 80% of existing acceptances would be removed from the Energy Imbalance Price calculations. Further analysis (included in Annex 4, section A4.4 suggests that in fact this figure falls somewhere between 45% and 70%.

An alternative to the Modification Proposal submitted that was considered briefly by the Modifications Group was to tag acceptances based upon a standardised "lead-time" (i.e. one that did not vary between ½and 1 hour as discussed above). Such a change would

however be likely to result in relatively significant additional complexity because it would be necessary to identify the first time at which each acceptance had a non-zero acceptance quantity (rather than simply having to identify the Settlement Period in which the non-zero value occurred).

A further issue that was raised was the interaction that this Modification would have with Modification Proposal P12 (i.e. that proposing to reduce Gate Closure to 1 hour). Clearly in the extreme, if Gate Closure were reduced to ½an hour, and P15 were implemented as proposed, all acceptances would be disregarded for the purposes of determining the Energy Imbalance Prices (which would then effectively both always be set on a default basis).

Finally, it was noted that were this proposal to be implemented, it may be necessary to review whether the principles should be extended to those Balancing Services that contributed to the Balancing Services Adjustment Data (BSAD Data). Again, this was viewed as being outside the scope of the Modifications Group.

The general view of the Modifications Group was that whilst Modification Proposal P15 did not necessarily represent an intellectually pure solution (largely because it was not necessarily clear that lead-time was a good measure of whether a certain acceptance was for System or Energy balancing purposes in all cases), it would be effective in removing the acceptances that some of the Modifications Group viewed as having inappropriately caused recent price spikes[1].

Furthermore the general view of the Modifications Group was that the Modification would be relatively easy to implement. This was seen as a major advantage of this proposal (compared to Modification Proposal P18A which, as is discussed later, was seen as more "intellectually pure"). As this was the case, the Modifications Group did not believe there was much merit in progressing further the alternative variant of this Modification Proposal discussed above. This is because such a variant would not necessarily constitute a more intellectually pure solution, but it would be likely to be more complicated to implement.

Summary of Views of Modifications Group on P15

Intellectual Purity of solution	Medium
Effectiveness	High
Practicality of Implementation	Medium

[1] It should be noted that in the Modification Proposal itself, Vattenfall recognise that the proposal is a pragmatic solution rather than one that seeks to rigorously define the difference between System and Energy balancing.

Q2: If P15 were to be progressed, below what "lead-time" should acceptances be excluded?

Lead Time	Preference (Mark one)	Comments
15 Minutes		
30 Minutes		
45 Minutes		
1 Hour		
Other (please specify)		

7.7 Modification Proposal P18A

Modification Proposal P18A proposes that acceptances with a "Continuous Instruction Duration" of less than 15 minutes would be disregarded for the purposes of the calculation of Energy Imbalance Prices. The Modifications Group noted that this Modification was comparatively (to P15) complex from an implementation perspective. This was principally because it was necessary to determine the duration of the non-zero part of any acceptance. Unlike P15, the information required to carry out the calculations would be likely to be less readily available in Settlement (although it should again be noted that no formal impact assessment results are available). Despite this, it was not thought that the changes that would be required to implement Modification P18A would be excessive.

The mechanism by which Energy and System actions were differentiated in Modification Proposal P18A was viewed as a more intellectually pure approach compared to P15. This was largely because there was a general view that very short term intra-half-hour action clearly did constitute a System Balancing action, because such action was not linked to the costs of half-hourly energy balance. There was a view that automatic frequency response fell at one end of the spectrum with a very short "continuous Instruction Duration" and that it was already excluded from the price calculations for this reason. Thus implementing P18A would not require a fundamental change to what was classed as Energy and System balancing, but would, instead simply be a change to the existing timescales for delineation.[2]

There was some discussion in the Modifications Group as to what value of "Continuous Instruction Duration" it would be appropriate to adopt were this Modification Proposal to be implemented. The majority of the Modifications Group favoured a timescale of between 20 and 30 minutes (although it is again noted that some members of the Group did not necessarily believe that any changes to the price calculations at all should be made at this stage).

[2] Although it is noted that automatic frequency response is also differentiated from other BM action because it's call off is not undertaken on a price merit order basis when a frequency deviation occurs.

In the Modification Proposal, it was suggested that the definition of "Continuous Instruction Duration" should be set so as to take into account continuous periods of non-zero acceptances from more than one Bid-Offer Acceptance. This is illustrated in Figure 2.

Figure 2

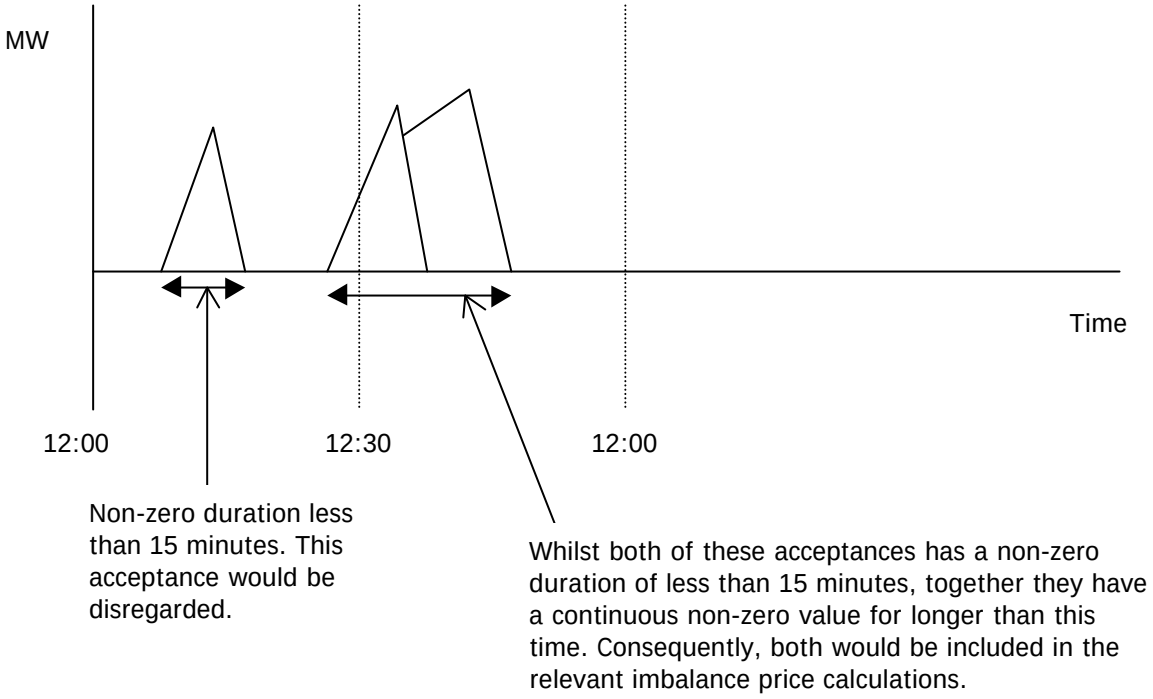


Figure 2 shows three separate acceptances for a single BM Unit. The first is disregarded because the continuous non-zero duration is less than 15 minutes. Whilst this is also true individually for the second and third acceptances, their combined continuous non-zero duration is greater than 15 minutes, and consequently the acceptances are included in the price calculations.

Q3: If P18A were to be progressed, below what "Continuous Instruction Duration" (CID) should acceptances be excluded?

CID	Preference (Mark one)	Comments
5 Minutes		
15 Minutes		
20 Minutes		
30 Minutes		
Other (please specify)		

Two sub-options were considered as follows:

P18Ai) was considered in which acceptances were processed individually rather than together when determining whether the continuous non-zero duration (i.e. Continuous

Instruction Duration) is less than 15 minutes. Whilst this would be likely to make the Modification simpler to implement, it was thought that it may give NGC significant latitude to determine whether or not acceptances were included in the price calculations depending upon how they decided to format acceptances. Whether such a change would mean that the Modification would be significantly easier to implement is also uncertain.

P18Aii) was considered that used a MWh test rather than a test based upon a Continuous Instruction Duration. This would be significantly easier to implement as it was seen as a relatively simple extension of Modification Proposal P10, although the Modification Group believed that such a change would be less "pure" from an intellectual perspective.

Annex 4 section 4.6 includes some analysis (provided by NGC) of the effectiveness of this option. In particular all offers with a price of £1000/MWh or greater would be tagged with a value of limiting Continuous Instruction Duration of 22 minutes. If, however, this value is set to 16 minutes, only those offers with prices of greater than £2000/MWh would be tagged.

As with P15, it was noted that were this proposal to be implemented, it may be necessary to review whether the principles should be extended to those Balancing Services that contributed to the Balancing Services Adjustment Data (BSAD Data).

It was noted that of those members of the Modifications Group that believed a change to the Energy Imbalance price calculations was necessary, the majority favoured a solution based upon Modification Proposal P18A.

Summary of Views of Modifications Group on P18A

Intellectual Purity of solution	High
Effectiveness	Low-High [depending upon CID chosen]
Practicality of Implementation	Low

Summary of Views of Modifications Group on P18Ai)

Intellectual Purity of solution	Medium-High
Effectiveness	Low-High [depending upon CID chosen]
Practicality of Implementation	Low

Summary of Views of Modifications Group on P18Aii)

Intellectual Purity of solution	Medium
Effectiveness	Low-High (depending upon MWh CID chosen)
Practicality of Implementation	High (subject to implementation of Modification P10)

7.8 Modification Proposal 18B

Modification Proposal 18B proposed that the BRL parameter be set as a minimum volume of balancing actions from which the imbalance prices can be set. When there is a smaller volume of actions, the imbalance price is set as a weighted average of the price derived from the current rules, and the default price that would apply if no balancing actions had

been taken. The weighting would be in proportion to the volume of balancing actions, and BRL minus this volume, respectively.

It was noted that this Modification Proposal did not require any change to the existing delineation between System and Energy Balancing. Instead, the Modification Proposal simply changed the way in which acceptances were used to determine the Energy Imbalance Prices.

The question of whether the proposed changes could apply to both price calculations in the same Settlement Period was raised or whether the revised rules would apply only to the price with the smaller magnitude of acceptances. It was noted that the proposal was that it could in theory apply to both.

One disadvantage of this option as perceived by the Modifications Group was that it would not necessarily be particularly effective in removing the effects of very highly priced acceptances.

The dependency of this Modification with the value of BRL was also highlighted. Clearly a reduction in the value of BRL would reduce the effectiveness of this Modification in removing the effects of relatively highly priced acceptances.

Generally, this Modification Proposal did not receive much support in the Modifications Group, even from those who supported some change to the price calculations. This was principally because it was not perceived as being particularly effective at removing the effect of highly priced acceptances.

Again, some further analysis of Modification Proposal 18B is included in Annex A4. Some damping of prices is achieved through the use of this option, although a number of price spikes remain. This reflects the fact that for example a £5000/MWh acceptance for even a relatively small quantity of accepted Offer (e.g. 18MWh) still has a significant impact on SBP (£500/MWh) if it is combined with a default Offer with a zero price for 162 MWh.

Summary of Views of Modifications Group on P18B

Intellectual Purity of solution	Low - medium
Effectiveness	Low - medium
Practicality of Implementation	Medium-High

7.9 Setting BRL to Zero

Whilst, as discussed in section 7.2, the Modification Group did not seek to identify alternative solutions that deviated significantly from the Modification Proposals themselves, the question of setting BRL to zero was discussed briefly. This is because the option of setting BRL to zero was seen as a change that would be very easy to implement, and which would be effective at removing the recent "price spikes" that some members of the Modifications Group believed were inappropriate. This "solution" was, to a certain extent, viewed as an interim measure, which perhaps could be implemented quickly pending the introduction of a longer-term solution.

One concern that was raised were such a change to be made was that it may have the effect of flattening out price too much, i.e. it may set prices on a default basis in periods where it was unnecessary to do so. This may result in a need to reconsider some of the detailed technical operation of the default price calculation rules.

It should be noted that setting BRL to zero would have the effect of setting at least one of the Energy Imbalance prices on a default basis in every Settlement Period (whether this is System Buy Price or System Sell Price in any particular Settlement Period depends upon whether NGC buys a higher volume of Bids than Offers (or vice versa) in that Settlement Period).

It is also noted that the BSC Panel has initiated a consultation on the future value of BRL levels in accordance with Section T1.5.5 of the Code (additional background information is available in BSC Panel Paper 19/012 – "Initial Review of the Balancing Reserve Level").

Some additional analysis of the effectiveness of setting BRL to zero in damping Energy Imbalance prices is also included in Annex 4. Based on this background analysis it is noted that in order to be effective at removing such "price spikes" the value of BRL would need to be set to zero (rather than to a small number). This is because in periods in which (say) a highly priced Offer is the only acceptance that has been made, unless all of the acceptance is tagged, it will continue to set System Buy Price. Once it is tagged completely, then prices are determined on a default basis for the Settlement Period.

Furthermore, it should be noted that even setting BRL to zero does not remove all "price spikes".

Summary of Views of Modifications Group on Setting BRL to Zero

Intellectual Purity of solution Low - medium

Effectiveness Medium-High

Practicality of Implementation Medium

Q4: Which of the following proposals do you believe better delivers the relevant BSC Objectives in the context of excluding certain additional acceptances?

Modification	Preference (1=high, 5=low)	Comments
P15		
P18A		
P18Ai)		
P18Aii)		
P18B		
BRL=0		
Other (please specify)		

Q5: How would your preference for the above Modifications be affected if your preferred solution was found to have protracted implementation timescales (for example would this increase your preference for BRL=0).

7.10 Further Discussion of Implementation Issues

7.10.1 General

There are a wide range of systems issues to be considered in relation the progression of a software Modification, these include:

- the development and testing of the change;
- testing against a wide range and volume of possible scenarios;
- interaction with other changes, either in development, or bundled into the same release; and
- assurance testing the rest of the system so no new or old faults are introduced.

In the case of fundamental issues such as the calculation of imbalance prices, this can mean that even the simplest of modifications can attract the same effort and elapsed time as a more complex change.

This is especially true if changes are made to the internal storage of core data or data interfaces. A number of the potential solutions discussed in this document change the data used to calculate the prices. This raises the question as to whether the output reports, such as SAA-I014, should be updated to ensure all new data is reported. Failure to do this may stop 3rd party applications from working, i.e. parties may not otherwise be able to duplicate the imbalance price calculations. Furthermore, whether or not additional BMRS reporting is required in support of a particular Modification should also be considered.

Given the timescales for progression of the Modifications in this document, a technical assessment of each solution has been limited to a basic review of the overall complexity, and the demands/interactions it is likely to put on the development process. It has not been possible at this stage to provide a detailed impact assessment to accurately indicate what each of the proposals would cost, in both effort and elapsed time, especially if any proposed change had to be bundled with other urgent work.

Some more specific issues in relation to each Modification are set down below.

7.10.2 P15 Implementation Issues

It may be possible to exploit implementation details of the way in which bid-offer data is stored at acceptance level within the BMRA/SAA system. If so, then this Modification may not require an architectural change, a feature that would simplify development and implementation. It should be reiterated that whether or not this is the case is subject to confirmation following a full impact assessment.

However, as it changes the volumes being used in the imbalance calculations, the QAB^{n}_{ij} / QAO^{n}_{ij} values reported in the I014 flow are no longer sufficient to represent both the volume used to calculate the cashout payment to the party, and also the impact on the imbalance prices. It is possible that this flow would need to be updated to include the necessary data.

7.10.3 P18A Implementation Issues

This is perceived as the most complex of the proposed solutions and involves determining details about the shape of each acceptance and its relationship to other acceptances for the same BMU.

- In particular it involves looking at all points on the acceptance profile to determine:
- whether they overlap another acceptance, to form part of a continuous acceptance;

if each point on the acceptance represents a different level to the original FPN – i.e. it is actually delivering a non-zero value. This is required to correctly identify an acceptance that may follow the FPN for (say) 5 minutes of an overall 18 minute acceptance as constituting two distinct acceptance volumes in this context.

This processing has more to do with overall acceptance data, than the calculated acceptance volumes. It might be more appropriate to do this processing at an earlier stage in the process, rather than repeat it for each acceptance volume that results from an acceptance. It is likely that this modification would have architectural issues on the internal data storage that would need to be considered.

In common with Proposal 15 this modification changes the volumes being used in the imbalance calculations. It is recommended that this flow is updated to include the necessary data.

7.10.4 P18B Implementation Issues

This is regarded as the simplest proposed Modification as changes are limited to the final SBP/SSP calculations as specified in sections BSC T4.4.5 and T4.4.6.

The modification means that in the majority of cases it is necessary to calculate the default price and then combine that with the SBP or SSP calculated in line with the current formula. Once both terms are available they can be combined using a proportion based on the total accepted volume.

Although the proposal specifies that the configurable limit should be BRL, this should be implemented as a separate value to ensure there is the flexibility to vary its value independently of BRL.

As this approach does not change the actual Bids/Offers being used within the calculations, there is no need to change any reporting data flows to ensure sufficient information is available to the parties to do their own data analysis

7.10.5 BRL Set to Zero Implementation Issues

The level of BRL is already a configurable value within the BMRA/SAA systems and hence a change in value should not require any software modifications within the central systems.

8 NEXT STEPS

The proposed next steps to be taken in progressing these Modification Proposals are set down in the approved timetable contained in Section 6 of this document. In summary, the principal next steps are as follows:

Receive Consultation responses **8th June 2001**

Collate responses for consideration **11th June 2001**

This will be undertaken by ELEXON prior to the second meeting of the Modifications Group.

Second Modifications Group Meeting **12th June 2001**

It is proposed that at this meeting, the responses to the consultation would be assessed, and take into account in preparing an Urgent Modifications Report from the Modifications Group to the BSC Panel.

Update Modifications Report **13th June 2001**

It is proposed that ELEXON would update the report based upon discussions at the Modification Meeting.

Send Report to Panel for consideration **14th June 2001**

Produce Report for Ofgem **15th June 2001**

The further next steps to be taken will be contingent upon the discussions of the Panel.

ANNEX 1 - MODIFICATIONS P15 AND P18

Modification Proposal	**MP No: 15** *(mandatory by BSCCo)*

Title of Modification Proposal *(mandatory by proposer)***:**

Removal Of Price Spikes Associated With System Balancing From System Prices

Submission Date *(mandatory by proposer)***:** 22nd May 2001

Description of Proposed Modification *(mandatory by proposer)***:**

It is proposed that bid-offer acceptances with an acceptance time after [30] minutes before the start of the real time half-hour period be tagged and excluded from the calculation of SBP and SSP.

Description of Issue or Defect that Modification Proposal Seeks to Address *(mandatory by proposer)***:**

In Ofgem's April 2000 consultation (NGC systems operation under NETA: transitional arrangements), the view is reiterated that there is a distinction between NGC actions taken for system balancing as opposed to energy balancing reasons. In practice it is very difficult to distinguish between these factors but, in principle, system balancing actions should not impact upon imbalance prices. An extract of the relevant text is given in the attachment to this proposal.

Certain actions taken in the Balancing Mechanism have set System Buy Price to several thousand pounds even where the system was net long. At NGC's Operational Forums it was explained that a common cause for these spikes has been TV pick-ups where there is a requirement for very small amounts of near-instantaneous energy for a very few minutes. Much of the TV pick-up can be pre-progammed on slow response plant, but where the pick-up is underestimated, or generation coincidentially trips or underperforms, generation must be brought on at very short notice. Because of the short notice period required, only certain types of plant can be used. The price of such plant has been very high.

There are various reasons why the prices offered for such a service are so high. A significant factor is that NGC's policy of "just-in-time" scheduling may have created temporal monopolies on several occasions. However, there is no definitive evidence that NGC could have procured the services provided by the problem acceptances more economically by alternative contracts and so such prices seem likely to persist.

These spikes are far more likely to affect SBP than SSP. Participants have reacted by contracting long and over-delivering. This is the only way they can avoid the consequences of such price spikes because they cannot contract for energy for periods of less than a half-hour. This is an understandable contravention of licence obligations to seek to balance. The BM is therefore delivering perverse incentives. This makes the market for system balancing offers very thin and also makes buy price spikes more likely.

The proposal is a pragmatic solution to the central problem that a significant number of BM prices do not reflect the cost of energy imblance because the actions that set the price are primarily for system balancing purposes. This is important in that so many of the prices are extreme, which distorts the economic incentive signals the mechanism is intended to provide. It is acknowledged that this proposal does not rigorously define the differences between a system balancing action and an energy balancing action but such a distinction can only be made after we have considerably more experience of the new markets. The price distortions experienced are too severe for there to be a delay in finding a resolution.

The definition of an action taken for system balancing purposes is based on the lead time between instruction and fulfilment. This takes one characteristic of certain system balancing actions, which is their short-term nature and seeks to address those system balancing actions most likely to distort imbalance prices.

The proposal is also pragmatic in seeking to utilise existing tagging software to minimise systems cost.

Modification Proposal	**MP No: 15** *(mandatory by BSCCo)*

Impact on Code *(optional by proposer)***:**

The description of tagging in the Annex to Section T would need to be extended to include a separate class of tagged acceptance.

Impact on Core Industry Documents *(optional by proposer)***:**

Impact on BSC Systems and Other Relevant Systems and Processes Used by Parties *(optional by proposer)***:**

It seems likely that the tagging processes will need to be revised. Such system changes are already being included as a result of the implementation of Modification P10.

Impact on other Configurable Items *(optional by proposer)***:**

Justification for Proposed Modification with Reference to Applicable BSC Objectives *(mandatory by proposer)***:**

This proposal is a pragmatic methodology for making imbalance settlement prices allign more closely with the costs of balancing energy as opposed to balancing the system. This facilitates the NGC licence objective of operation of an efficient and economic transmission system by providing participants with price signals more reflective of the true costs of energy imbalance.

By reducing the risk on participants of imbalance price spikes that do not reflect energy imbalance, participants have a greater incentive to contract to balance rather than to seek to over-contract. This facilitates competition between generators and suppliers because they can contract to balance more economically. This allows a lower net cost of supply, which should benefit customers.

This proposal is supported by: Electricity Direct (UK) Ltd., BizzEnergy.com Ltd., Atlantic Electicity and Gas Ltd., Enfield Energy Centre Ltd., Maverick Energy Ltd., Slough Energy Supplies Ltd., Alcan, Axia Energy Europe Ltd; Combined Heat and Power Association

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Modification Proposal	**MP No: 15** *(mandatory by BSCCo)*

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Attachments: YES

If Yes, Title and No. of Pages of Each Attachment:

Annex To Modification Proposal – Removal Of Price Spikes Associated With System Balancing From System Prices,

1 page

Annex To Modification Proposal – Removal Of Price Spikes Associated With System Balancing From System Prices

Extract from Ofgem Consultation: "NGC systems operation under NETA: transitional arrangements", April 2000.

Chapter 4, page 50

Introduction

4.1 Under the new trading arrangements, NGC as SO will be purchasing a range of services through a variety of different arrangements, both inside and outside of the Balancing Mechanism, in order to meet its licence and other obligations to operate the electricity transmission system in an efficient, economical and co-ordinated manner and thus to ensure the security and stability of supply. In doing so, the SO will incur a range of costs. The December Consultation summarised these services and their costs into two broad categories:

- Energy balancing - the activities of the SO in matching overall supply and demand at a half-hourly level; and
- System balancing – the activities of the SO in achieving the stable and secure operation of the transmission system.

4.2 The December Consultation argued that participants who are out of energy balance should be exposed to all the costs incurred by the SO in achieving a gross energy balance (i.e. matching demand and generation at the half-hourly level). The actions the SO takes in the Balancing Mechanism naturally flow through to energy imbalance prices i.e. the System Buy Price (SBP) and System Sell Price (SSP) charged to out of balance participants. However, imbalance prices based solely on actions taken by the SO in the Balancing Mechanism are unlikely to reflect the total costs incurred by the SO in maintaining a gross energy balance. For example, they would not include the costs incurred by the SO in contracting ahead for reserve to meet energy imbalances.

4.3 Furthermore, **some Balancing Mechanism actions will be taken for system balancing reasons** such as those taken to provide frequency response services or to relieve transmission constraints. The December Consultation argued that **system balancing actions taken by the SO should be recovered from all participants on a fair and non-discriminatory basis**. In addition, the July 1999 and October 1999 NETA documents argued that ways in which the costs of transmission constraints, in particular, could be removed from imbalance prices should continue to be explored.

4.4 We address first the issue of how imbalance prices can be changed to reflect better the full costs including contract costs of energy balancing then consider how to exclude system balancing costs from energy imbalance cash out. The next section discusses how the costs of energy and system balancing services should be recovered under NETA. Finally, we consult on detailed proposals for the recovery of central NETA system costs being incurred by BSCCo.

Modification Proposal	**MP No: 18** *(mandatory by BSCCo)*

Title of Modification Proposal *(mandatory by proposer)***:**

Removing / Mitigating The Effect Of System Balancing Actions In The Imbalance Price Calculations

Submission Date *(mandatory by proposer)***:** 23 May 2001

Description of Proposed Modification *(mandatory by proposer)***:**

The current imbalance price calculations utilise Trade Tagging to identify system balancing actions and exclude them from setting SBP and SSP. The trade tagging methodology was based on the assumption that there would be a significant volume of balancing actions in both directions in each half-hour. However, experience to date is that many periods have only a small volume of balancing actions in one direction, and so the methodology is less effective at removing system balancing actions.

It is recognised that it is not possible to separate balancing actions into 'energy' and 'system' in an unambiguous and clearcut manner. However, the current methodology is resulted in some extreme imbalance prices, as balancing actions that appear to be more related to system effects (such as minute by minute frequency control) are being included in price setting, and can have a disproportionate effect on the prices (when there are only small balancing volumes taken in one direction in a period).

Two options for addressing this issue are proposed:

Option A: This proposes an enhanced definition of system balancing actions. Bid / Offer acceptances of 'Continuous Instruction Duration' less than a threshhold duration of [15] minutes are tagged as System rather than Energy balancing actions, and so are excluded from the imbalance price calculation. In consequence, fewer acceptances are eligble to set imbalance prices. The rationale is that short duration balancing actions are most likely to related to minute-by-minute frequency control, rather than energy balancing at a half-hour level. Therefore, it is not appropriate that these actions are used to set imbalance prices which are faced by market participants who have half-hourly imbalances.

Option B: This proposes that the BRL parameter is set as a minimum volume of balancing actions from which the imbalance prices can be set. When there is a smaller volume of actions, the imbalance price is set as a weighted average of the price derived from the current rules, and the default price that would apply if no balancing actions had been taken. The weighting would be in proportion to the volume of balancing actions, and BRL minus this volume, respectively.

The rationale for this option is that it limits the impact that any small volume balancing action can have on the imbalance price in the cases where the assumptions behind the trade tagging methodology (i.e. that there will be at least BRL volume of balancing actions in each direction) are invalid. It does not attempt to improve the allocation of balancing actions between energy and system, but ensures that the price effects of system balancing actions which are incorrectly tagged as energy is mitigated.

Description of Issue or Defect that Modification Proposal Seeks to Address *(mandatory by proposer)***:**

See the attached paper, dated 23 May 2001

Modification Proposal	**MP No: 18** *(mandatory by BSCCo)*

Impact on Code *(optional by proposer)***:**

Option A:

Modification required to the 'Trade Tagging' Annex T-1 of the Code, to include a definition of Short Duration Bids and Short Duration Offers. Exclusion of Short Duration Bids and Offers in 'Determination of Energy Imbalance Prices' (section T4.4) of the Balancing and Settlement Code.

Option B:

Modification required to calculation of System Buy Price and System Sell Price in Section T Paragraphs 4.4 of the Code

Impact on Core Industry Documents *(optional by proposer)***:**

None.

Impact on BSC Systems and Other Relevant Systems and Processes Used by Parties *(optional by proposer)***:**

Under either option, the software calculating System Sell Price and System Buy Price will need to be altered.

Impact on other Configurable Items *(optional by proposer)***:**

None

Justification for Proposed Modification with Reference to Applicable BSC Objectives *(mandatory by proposer)***:**

Option A refines the definition of system and energy balancing actions, and thus results in a more appropriate stack of accepted Bids and Offers being used in the determination of System Buy Price and System Sell Price. Option B ensures that small volume system balancing actions cannot have a disproportionate effect on the System Buy Price and System Sell Price. Therefore both options meet the objective of "promoting efficiency in the implementation and administration of the balancing and settlements agreement."

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Attachments: YES

If Yes, Title and No. of Pages of Each Attachment:

Enhanced Trade Tagging - BSC Modification Proposal, 5 pages.

23rd May 2001

NATIONAL GRID COMPANY

Mitigation of System Balancing Actions in Imbalance Prices
BSC Modification Proposal
(Paper by National Grid)

Extreme imbalance prices can arise from expensive Offers or Bids accepted in the BM for short-term frequency control. We believe that it is inappropriate that market participants should be exposed to these extreme prices. This paper proposes two alternative modifications to the BSC that will moderate imbalance prices in such circumstances.

I. BACKGROUND

A feature of the Balance Mechanism to-date, is that National Grid is accepting a number of Bids and Offers of short duration, usually on plant of fast dynamics. These are high value services, and are often expensively priced. The imbalance prices, System Sell Price and System Buy Price, are set as the average of accepted Bids and Offers, which are not tagged as 'system balancing actions' by the trade tagging process. Particularly when we accept only a modest total volume of Bids or Offers accepted in one half-hour, these expensive Bids or Offers have a large effect on imbalance prices.

We believe that the underlying expectation, before Neta Go-Live, was that there would usually be a reasonable volume of both Bids and Offers accepted, so that the resulting Imbalance prices in each direction would reflect a reasonable average of Bid and Offer prices, and that the Trade Tagging rules would usually be able to exclude extreme price system effects. While it was accepted that both SSP and SBP would occasionally take extreme values, reflecting underlying system stresses at such times, it was not expected that short-term actions arising daily would have such a significant impact on imbalance prices

It was agreed before Go-Live, that balancing actions directly relating to frequency control, relating to the balancing service of automatic frequency response, should be excluded from imbalance price setting. Whereas balancing actions relating to the half-hourly balance of generation and demand, generally termed reserve, should be included in imbalance price setting. However, it is unclear as to whether an action of 5-15 minutes duration should be regarded as system or energy, and it remains a matter of viewpoint as to which treatment to adopt.

II. PROPOSALS

In order to address the inappropriate levels of imbalance prices, we propose two modifications to the calculation of SBP and SSP as defined in the BSC. We expect these proposals to be considered as alternatives. (However, we note that one could in fact implement both together.)

Proposal A: Tagging Short Duration BOAs
Proposal B: Averaging Imbalance Price Setting

IIA. PROPOSED SOLUTION A: Tagging Short Duration BOAs

This proposes an enhanced definition of system balancing actions. Bid or Offer acceptances (known as BOAs), whose duration is less than a threshold of (say) 15 minutes, are tagged as system balancing actions, and are excluded from the imbalance price calculations.

The rationale behind this proposal is that short duration actions are likely to relate to minute-by-minute frequency control, and thus it is not appropriate to include them in imbalance prices. Of course, the attribution of short duration to frequency control is not perfect, but since BOAs can be accepted for many overlapping reasons, no attribution will be unambiguous.

The proposal enhances the current distinction between response actions and reserve actions. At present, response actions are automatic, are not recorded as BOAs, and the cost of them is reflected within the Response Imbalance; they are thus definitely system actions. Any reserve actions are Bid / Offer acceptances (BOAs), and are eligible to set imbalance prices, subject only to current trade tagging rules.

Within the main text of Section T4.4 'Determination of Energy Imbalance Prices', the proposal is simply effected by a new clause, after T4.4.4:

T4.4.4A In respect of each Settlement Period, some of the accepted Bids and accepted Offers may be defined as Short Duration Accepted Bids and Short Duration Accepted Offers respectively in accordance with the provisions of Annex T-1, and all such Short Duration Accepted Bids and Short Duration Accepted Offers shall be disregarded for the purposes of calculation of energy imbalance prices.

Modification to the Trade Tagging Rules

To give effect to this proposal, it is desirable to extend the Trade Tagging rules, which constitute Annex T-1 to BSC Section T, to define a 'Continuous Instruction Duration' for each BOA. The 'Continuous Instruction Duration' should be constructed by looking at all Bid or Offer acceptances for each BMU, across Bid/Offer pair ranges and across half-hours; where acceptances of non-zero MW are contiguous over adjacent minutes, the 'Continuous Instruction Duration' of all contiguous acceptances is set to the end time of the latest minus the start time of the earliest.

The rationale for this definition of 'Continuous Instruction Duration' is that we may issue sequential instructions to the same BMU, for example during conditions of minute-by-minute uncertainty on the system. The settlement system records each acceptance separately, but it is the aggregate acceptance that is meaningful

Then, individual BOAs are tagged as 'Short Duration Acceptances', if their Continuous Instruction Duration is less than a threshold level. We propose that this threshold level is initially set to 15 minutes.

We recognise that we have not yet defined precise rules, suitable for drafting Annex T-1, to give effect to this proposal. We expect such a definition to be progressed during the assessment stage of this modification.

IIB. PROPOSED SOLUTION B: Averaging Imbalance Price Setting

This proposes that the BRL parameter is used as a minimum volume of balancing actions, from which the imbalance prices can be set. When there is a smaller volume of untagged actions, the imbalance price is set as a weighted average of the price defined by the current rules, and the default price that would apply if no balancing actions had been taken in that direction.

The rationale for this option is that it limits the impact that any small volume balancing action can have on the imbalance price in the cases where the assumptions behind the trade tagging methodology (i.e. that there will be at least BRL volume of balancing actions in each direction) are invalid. It does not attempt to improve the allocation of balancing actions between system and energy, but ensures that the price effects of actions of small volume, which are inappropriately included as energy actions, is mitigated.

A further argument for this option relates to the volumes of balancing actions, as against the volumes of gross imbalance. An expensive price over a small volume will only cause a modest cost within the Balancing Mechanism. But the resulting large imbalance price may be charged out to a large volume of gross imbalance, because there can easily be large volumes of gross imbalances which nearly net out, and so the gross imbalance payments are very large. The averaging approach of this proposal mitigates a modest cost of balancing giving rise to a very large cost of gross imbalances.

Modification to the SBP Calculation

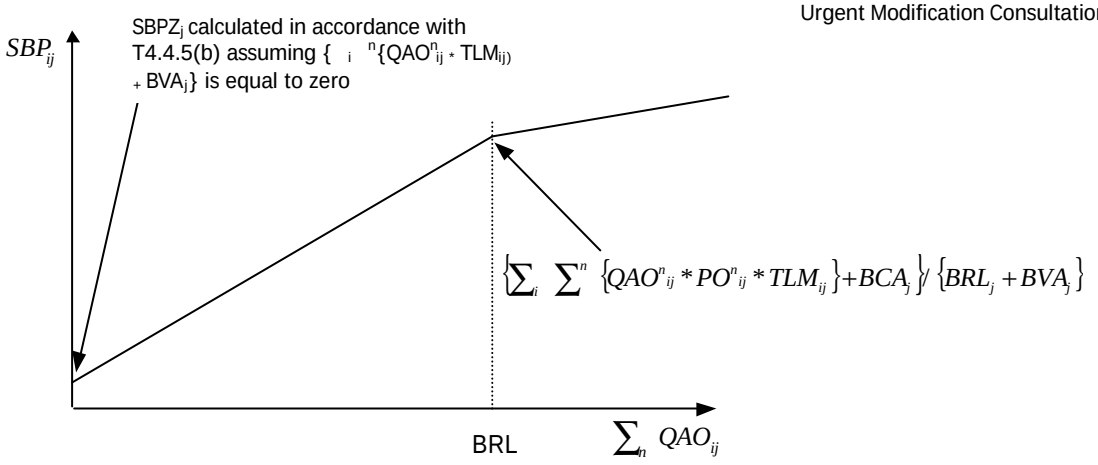
Under Section T, Paragraph 4.4 of the BSC, System Buy Price is calculated as follows:

$$SBP_j = \left\{ \sum_i \sum^n \left\{ QAO^n{}_{ij} * PO^n{}_{ij} * TLM_{ij} \right\} + BCA_j \right\} / \left\{ \sum_i \sum^n \left\{ QAO^n{}_{ij} * TLM_{ij} \right\} + BVA_j \right\}$$

The aggregate cost of Offer acceptances and energy contracts for a given half-hour is divided by the associated energy volume. Thus, if we accept a small volume of Offers, the price of these Offers set the imbalance price. If we accept no Offers, the imbalance price defaults to the maximum of SSP and the cheapest available Offer price, in accordance with the BSC. This current approach ensures continuity in the imbalance price as the volume of accepted Offers increases.

However, when the system is long, we may sometimes accept a small volume of highly priced Offers close to real time. Effectively a discontinuity can exist in setting imbalance prices depending on whether we accept a zero or non-zero volume of Offers. We propose the removal of this discontinuity by smoothing out potential price spikes.

The diagram below illustrates how we propose that Imbalance Prices could be set when the volume of accepted Bids exceeds the Volume of accepted Offers ($_i{}^n QAB^n{}_{ij} > {}_i{}^n QAO^n{}_{ij}$).



For zero Offer volume acceptance, the imbalance price would continue to be set as defined in the BSC to 'SBPZ' (para T4.4.5(b)), namely to the maximum of SSP and the cheapest available non-arbitraged Offer. For an accepted Offer volume equal to or greater than the Balancing Reserve Level (BRL), the imbalance price would continue to be set according to the formula in the BSC. However, for Offer acceptance volumes between zero and BRL, we propose a linear extrapolation to determine the appropriate value for SBP.

Hence when $\sum_i \sum^n \{QAB^n_{ij} * TLM_{ij}) > \sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\}$ and $\sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\} < BRL_j$:

$$SBP_j = \left(\frac{\sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\}}{BRL_j}\right) * \left(\frac{\left(\sum_i \sum^n \{QAO^n_{ij} * PO^n_{ij} * TLM\} + BCA_j\right)}{\sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\} + BVA_j}\right) + \left(1 - \frac{\sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\}}{BRL_j}\right) * SBPZ_j$$

where $SBPZ_j$ is calculated in accordance with T4.4.5(b) (i.e. in the current case where: $\{\sum_i \sum^n \{QAO^n_{ij} * TLM_{ij}\} + BVA_j\}$ is equal to zero.

Modification to the SSP Calculation

The modifications to the SBP calculation would also be repeated in the System Sell Price (SSP) calculation.

IV. IMPACT ASSESSMENT

For proposal A, we have performed some analysis of our concept of 'Continuous Instruction Duration' (CID), and applied it to one week of BM operation. Over 1500 BOAs, 80% have CID greater than 15 minutes, and so we are not tagging out a large proportion of acceptances. However, over a class of BMUs of fast dynamics, 75% of the acceptances have CID of less than 15 minutes, and so would be tagged out.

Detailed assessment of proposal A will require full replication of the Trade Tagging rules, and we have been unable to achieve this. However, our review of the prices associated with our class of BMUs of fast dynamics, leads us to a view that a threshold of 15 minutes might mitigate half the instances of 'extreme' System Buy Prices (say, those above 100 £/MWh). A threshold of 10 minutes might mitigate only one third of such instances.

For proposal B, there have been many half-hours where imbalance price has been set over a volume less than BRL, and it is clear that proposal B will mitigate extreme imbalance prices.

V. OTHER ALTERNATIVES

The BSC Panel may wish to consider a number of wider alternatives to the proposal of this paper, which include:

Extending the 'P10' modification, which excludes acceptances of less than 1MWh, to a much larger level such as 50MWh. This proposal has the advantage of being implementable as soon as P10. Our analysis of the price of accepted bids and offers, against the volume, shows little relationship of price to volume of call-off, apart from the spike of prices of <1MWh call-offs. Hence we believe that this proposal would have little overall impact on imbalance prices.

There are a number of sub-options of Proposal A, which could refine the basic definition of a 'short duration' Bid / Offer acceptance.

The maximum MW of Bid or Offer accepted could be used as a criterion. For example, an acceptance of less than 200MW could be seen as fine-tuning of the system, whereas an acceptance of greater than 200MW must have a major impact on the energy balance over the whole half-hour. We have examined the spread of maximum MW over a number of Bid / Offer acceptances during one week, and conclude that there is no natural level to set such a tolerance.

A variant of the above criterion, would be to impose a rule that no more than (say) 500MWh of Bid or Offer acceptances could be tagged as 'short duration' in any half-hour. Such a rule seems to us to be counter to the objective of a clear distinction between system and energy balancing actions, and would be complicated to design and implement.

Another consideration might be only to exclude 'short duration' acceptances, when they are in the opposite direction to the system length. Thus this modification would only affect System Buy Price when the system is long, and System Sell Price when the system is short. Again, this rule seems to us to be counter to the objective of a clear distinction between system and energy balancing actions.

Another criterion might be a direct test on the dynamic parameters of each accepted Bid / Offer. For example, any BOA whose run-up and run-down rate exceeded say 25 MW/minute would be always tagged as a system action. Apart from the issue that BSC Settlement has no current use of dynamic parameter data, we believe that such a rule might encourage participants to make careful selections of dynamic parameters of 24 or 26 MW/minute, in order to influence imbalance prices.

A further criterion could be used, that any short duration acceptance should also be called at a lead-time of less than (say) five minutes. This would reflect a concept than 'unplanned' actions should be system, whereas actions planned at a greater horizon should contribute to energy imbalance prices. However, such a rule would prevent short duration actions on certain BMUs, such as OCGTs and demand-side providers of standing reserve, which have to be called at up to 20 minutes notice, being tagged as system actions.

ANNEX 2 – ATTENDEES OF THE MODIFICATIONS GROUP

Name	Organisation
Richard Clarke	ELEXON
Peter Davies (Chair)	ELEXON
Paul Dawson	Enron
Tony Diciccio	PowerGen
Libby Glazebrook	Edison Mission Energy
Richard Haigh	ELEXON
Ian Moss	APX
Paul Mott	London Electricity
Rheka Patel	Dynegy
Paul Plumptre (Proposer)	NGC
Gwilym Rowlands	ELEXON
Nick Simpson	Ofgem
Maurice Smith (Proposer)	Campbell Carr
Lisa Waters	Dynegy
Steve Wilkin	St Clements' Services
Ben Willis	Yorkshire Electricity Group

ANNEX 3 - APPLICABLE BSC OBJECTIVES

The Applicable BSC Objectives are set out in paragraph 3 of Condition 7A of the Licence, as follows:

(a) The efficient discharge by the Transmission Company of the obligations imposed under the Transmission Licence;
(b) The efficient, economic and co-ordinated operation by the Transmission Company of the Transmission System;
(c) Promoting effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity;
(d) Promoting efficiency in the implementation and administration of the balancing and settlement arrangements.

ANNEX 4 – SUPPORTING DATA ANALYSIS

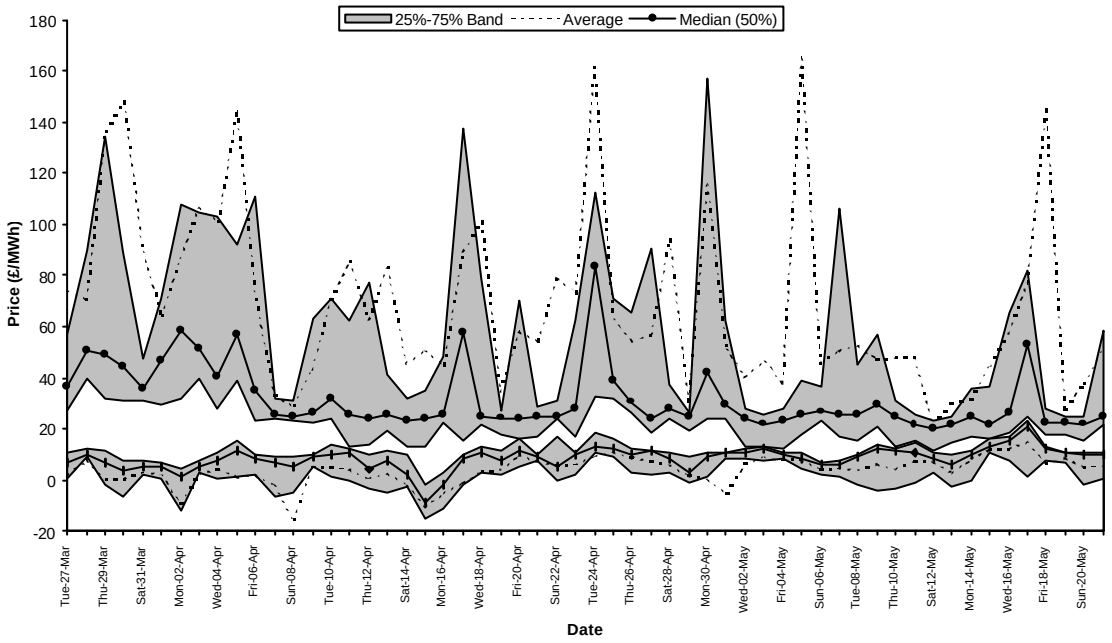
This Annex includes supporting data analysis undertaken by ELEXON (and others, including NGC) that it is believed will help in the assessment of the Modifications discussed in this document.

A4.1 Overview

Both the modifications P15 and P18 were raised due to concerns that the imbalance prices are being heavily influenced by the level of system balancing during the period, rather than energy balancing. This is particularly true of the SBP which has been very volatile since Go-Live.

The following figure shows the SSP/SBP price profiles experienced since the 27th March.

Figure A4-1 – System Buy Price / System Sell Price



The top set of lines represent the SBP prices, whereas the lower set represent the SSP set. The range of the prices is so large that it is considered clearer to use a shaded area to represents the middle band of prices (25%-75%), rather than try and show any maximum values. In addition a solid line is used to indicate the median, or the 50% price, and dotted lines represent the averages. As can be seen, the average SBP quite often extends past the top of the shaded area, indicating it is greater than 75% of prices for that day and hence there are some very large prices on that day.

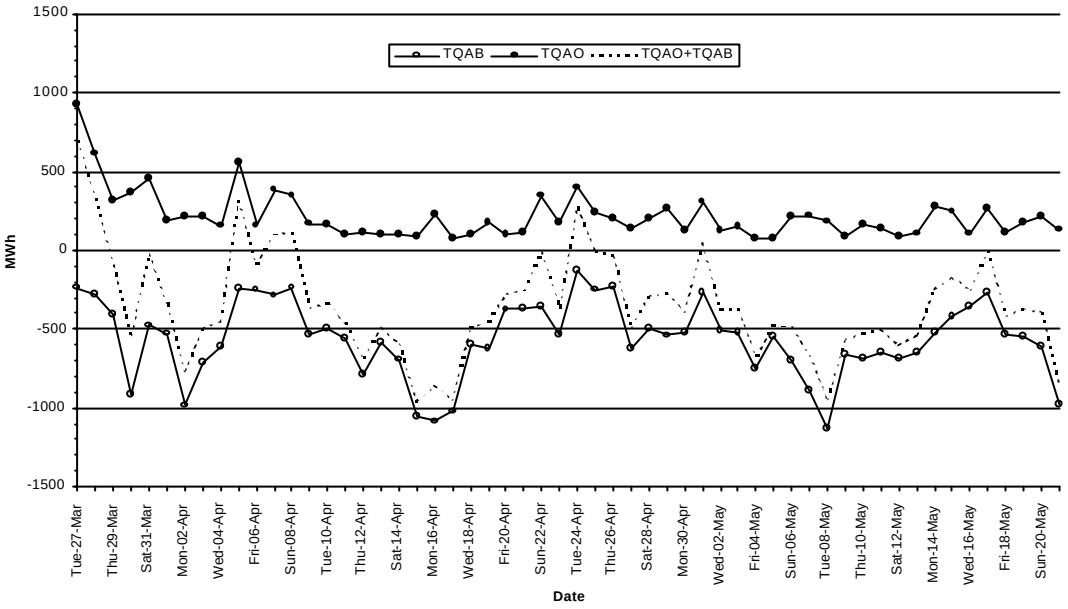
By comparison the SSP is much less volatile, although the effects which cause the volatility in the SBP, are not entirely removed from the SSP profile.

Within a few days of NETA Go-Live, the Trading positions adopted by Trading Parties within the Balancing Mechanism tended to adopt a stance of going long. This means that Suppliers, and hence Generators declare FPN positions that are greater than expected demand.

The extreme SBP price spikes, which could occur prior to the introduction of the revised BSAD Methodology (introduced following discussions relating to Modification Proposal 3), was one factor in creating the initial impetus for the overall BM market to go long. The underlying cause may be Suppliers, with the more volatile demand profile, trying to protect themselves by exposing the majority of their imbalance to the SSP.

Although P3 has been removed as a factor, the BM is still predominantly made up of accepted Bids, as parties continue to manage their position to remain exposed to the less volatile SSP. The following figure shows the average volume of total accepted bids and offers taken during each period. It shows that the average position since the 5th April has been almost 400 MWh long.

Figure A4-2 Total Accepted Bids and Offers



The proposals identify one of the causes of this being the simple tagging methodology used in calculation of imbalance prices, which assumes:

- Majority of Energy purchases are on the larger stack
- After arbitrage the smaller stack is expected to contain:
    - Matching Bids/Offers, used to address system constraints
    - Matching Bids/Offers, used to create regulating reserve

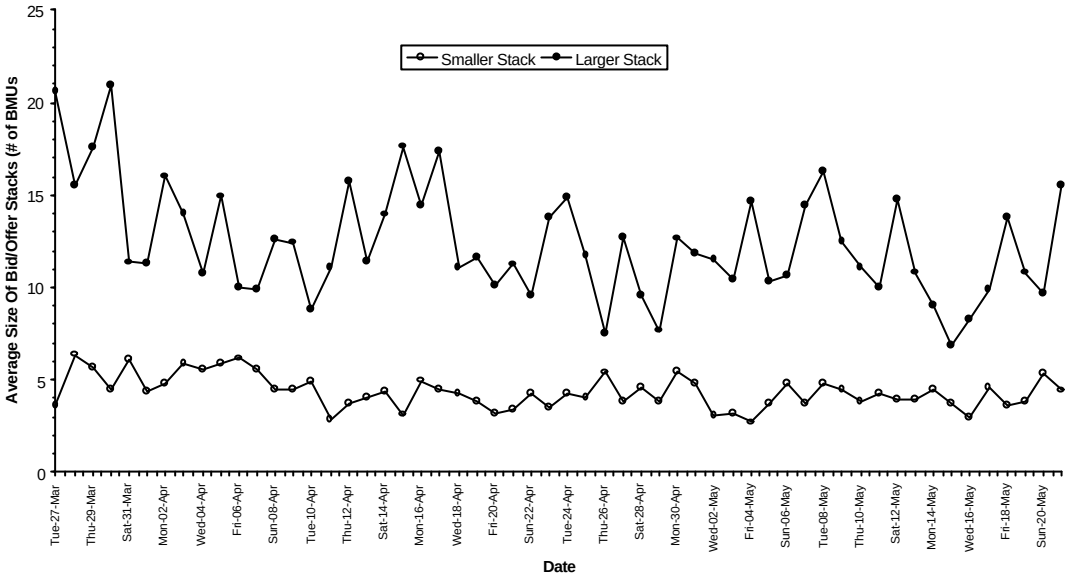
Experience has shown that the smaller stack currently contains a minimal amount of either of these - low volume of system constraints (foot & mouth), regulating reserve being provided on part loaded plant, and also being created as a result of buying bids to shorten the market[3]

As a result of the lack of matching Bids/Offers being taken in the BM, the number of Bids/Offers available on the smaller stack, to form the weighted average, is low.

[3] See Panel Paper 19/012 for further details on the extent of system tagging and the creation of regulating reserve.

The following figure, which shows the average number of BMUs responsible for setting the prices on the smaller and larger stacks.

Figure A4-3 Size of Smaller and Larger Stacks of Bids and Offers



In such circumstances it is unclear as to whether the contents of the smaller stack represent Energy or System purchases, and which of these should be eligible, or ineligible, for setting imbalance prices.

However normally, it is to be expected that the larger stack will contain the greater proportion of energy balancing action, taken with longer lead times, and hence with more favourable prices. This will help dampen the effect of any high priced Bids/Offers on the longer stack and currently this means that the SSP is naturally less volatile than the SBP.

Analysis of the statistics suggests that the volatile nature of the SBP could equally occur on the SSP, should the BM market become consistently short. If applied to the SSP some additional factors would need to be considered:

- Buying Bids to shorten the market has been automatically creating some of the regulating reserve, without this help there would be more chance of matching Bids/Offers being required.
- The current trend to declare part loaded plan may continue to provide regulating reserve.
- Those real time events that require plant with fast dynamics are more likely to require Offers than Bids
- The price profile on plant with fast dynamics may differ between Bids and Offers.

However, it is suggested that this is not sufficient to alter the theory that the current formula will cause the market to settle either long or short. This equilibrium is maintained by a pricing signal to follow the pack – anyone who breaks with this will be exposed to the more volatile price.

At the moment this means:

- Suppliers tend to ensure the majority of their imbalance, caused by variations (or errors) in the real demand profile, is subject to the SSP – i.e. they aim to be long of their contracted position.
- Generators tend to ensure that any uncontrollable fluctuations in their output level, results in an imbalance which is also subject to the SSP – i.e. they need to be slightly short of their contacted position, which is still long of expected demand.

A4.2 Impact on Prices

The previous section explained the dynamics of why the market has settled in this way. It is less clear, or agreed, what the purchases on the smaller stack should ideally represent:

- System – because they are bought for small periods with the half hour
- Energy – because they are topping up short falls in the energy prediction.

Irrespective of the underlying principles behind such decisions, it is also important to understand exactly how sensitive the current formulae are to any decision and hence whether they realistically represent the high level principles.

The following section provides a hypothetical example to illustrate how prices can be affected by actions taken during real time and how sensitive they are to certain conditions.

The scenario is that during a fairly settled period, where the BM market is long, a genset fails during the first sample period. This does not get fixed quickly and remains out of action for the rest of the scenario, even though the generator declares an FPN of zero at the next Gate Closure, this is too late to affect the rest of the scenario. NGC rectify the situation using a mixture of regulating reserve and fast dynamic plant to cover an initial shortfall. In a subsequent quiet period, where only the initial Bids are required to balance the network, there is a TV pickup demand that needs to be met using fast plant.

The following table postulates a series of events that occur during each period and the outcome as far as the affected parties are concerned.

Period/Event		Description
Assumptions:		All events are assumed to be within a couple of hours, to avoid complications caused by changes in contracted position
		The BM market is assumed to be 500MWh long for all sample periods (all figures in MWh – i.e. it is really 1GW long).
		NGC need to initially take 500MWh of Energy Bids to balance the network before each period starts.
P1	Events	The only plant within an account fails, removing 250MWh of generation
		NGC make up the short fall using regulating reserve, but use some expensive fast dynamic plant for a short period
	Outcome	The failing plant will receive a strong pricing signal for the cost of the fast plant, diluted by any offers required to call upon the regulating reserve
		It is less clear that the other parties in SBP imbalance should receive this same strong pricing signal, caused by an event during real time, especially as those exposed to the SSP would not.
P2 P3 P4	Events	The failed plant will remain inactive with its MEL re-declared to 0.
		NGC now only need to initially buy 250MWh of Bids to Energy balance the network
		The size of the Offers stack will again tend towards zero again
	Outcome	The failing plant will continue to be required to pay for their failure. An estimate of cost to the failed plant could be 250MWh x ~£40/MWh = £10,000, a cost which is required to recover income they will still be receiving for their existing bi-lateral contract.
P5	Events	A TV pickup creates a need for additional fast dynamic plant. This becomes the only Offer (£5000/MWh) needed during that period and hence it would sets the SBP to the full value of the Offer.
	Outcome	In general suppliers (who are arguably responsible for TV pick up) will not be affected, because they aim to be long and exposed to the SSP.
		The failing plant will receive an astronomic imbalance cost (250MWh x £5000/MWh = £1,250,000), even though NGC had recovered from the initial problem a couple of periods ago. This is one of the arguments behind MP12 to reduce Gate Closure.

From this is it clear that once NGC has initially balanced the system, shortly before real time, that any expensive actions taken during real time can cause unintended results with the current formula, they:

- tend to only impact one of the two imbalance prices;
- have a greater relative impact on the price of the shorter stack, as there is less volume to dilute any expensive Bids/Offers;
- have a greater impact on parties who's imbalances are in the opposite direction to the majority of the BM market – i.e. those parties who are short, when the majority of the market is long; and
- can mean that the parties who create the need for certain balancing actions are not the ones who are affected by the consequent impact on Energy Imbalance prices.

A4.3 Proposal P15 Overview

This solution proposes that bid-offer acceptances with an acceptance time less than 30 minutes before the start of the real time half-hour period be tagged and excluded from the calculation of SBP and SSP.

It is a prime feature of this proposal that it considers the contribution *each* acceptance makes to *each* period. It is possible that a single long duration acceptance may be excluded from one period, but included in subsequent periods[4].

This approach means that the processing takes place on the standard acceptance volumes (QAB^{kn}_{ij} / QAO^{kn}_{ij}) calculated by both BMRA/SAA. It uses a simple comparison between the acceptance time for each volume, and the starting time for the period being processed, to decide whether to exclude each acceptance volume from the calculation of SBP/SSP.

This is very similar to the manner in which data is processed in the current tagging process, except it is at acceptance level, rather than bid-offer level (QAB^{n}_{ij} / QAO^{n}_{ij})

A4.4 Proposal P15 Analysis

There was no analysis presented with the original proposal, and the submitting party does not have the same level of access to information as NGC, or ELEXON.

However a simple level of interpretation can be performed against the data presented to support the NGC proposal. This suggests that:

- 45% of all instructions (combination of both NGC Instruction graphs) are less than 30 minutes duration and lead time.
- 70% of all instructions are less than 60 minutes duration and lead-time.

The actual number of instructions disregarded, as a result of this modification, would therefore be somewhere between these two values. This figure could obviously be reduced if the 30-minute limit itself was reduced. It should also be noted that Figure A4.3 suggests that typically not many BOAs contribute to the smaller stack, and hence this solution may result in significantly more prices being set on a default basis.

Further analysis as to the impact on prices has not yet been possible. The nature of the modification means any modelling would need to identify the precise acceptances to be excluded. It is not considered possible to look at a different abstraction of the data to obtain a view on the effectiveness of this proposal.

[4] See Figure 1 section 7.6

A4.5 Proposal P18A Overview

This proposes an enhanced definition of system balancing actions. Bid or Offer acceptances (known as BOAs), whose duration is less than a threshold of (say) 15 minutes, are tagged as system balancing actions, and are excluded from the imbalance price calculations.

This modification, like Proposal 15, determines whether each acceptance volume (QAB^{kn}_{ij} / QAO^{kn}_{ij}) is included in the calculation of the imbalance price for each period.

However, it differs in that it performs a relatively sophisticated analysis of each of the individual acceptance points to establish whether it is part of a continuous instruction of less than a configurable limit. In the case of acceptances which span period start or end times it means a set of continuous instructions are included, or excluded from *all* periods that they cover.

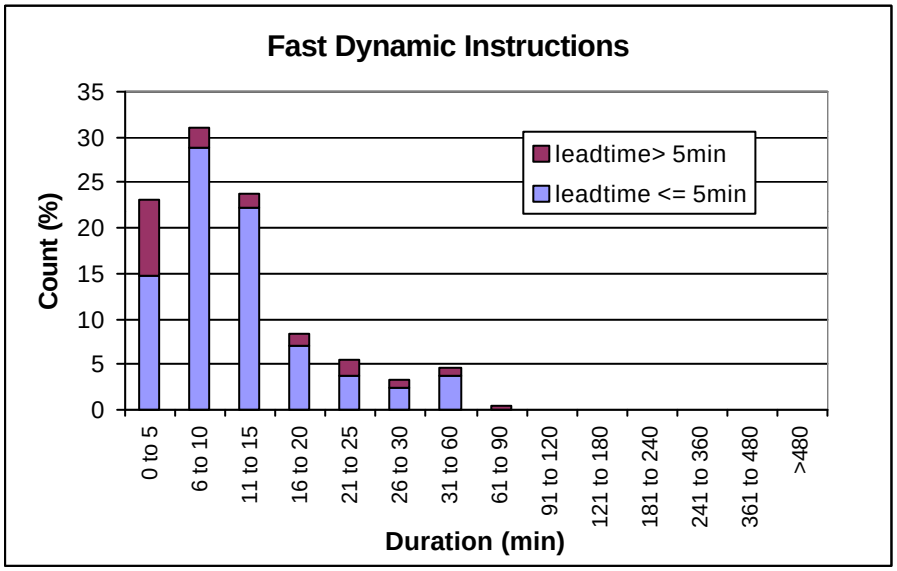
This proposal is sufficiently complex that it would require a detailed BSC definition to ensure the new functionality is accurately specified and not open to interpretation.

A4.6 Proposal P18A Analysis

Before submitting the modification proposal NGC did some basic modelling of the acceptances to determine how sensitive the change was to the 15 minutes continuous duration variable. The complex nature of the data meant that analysis was limited to a sample week and required some assumptions to establish those BMUs which would be considered to have "fast dynamics" and used extensively for additional frequency control.

Their first graph shows the duration and lead time for all instructions which are identified as being on the plant with fast dynamics:

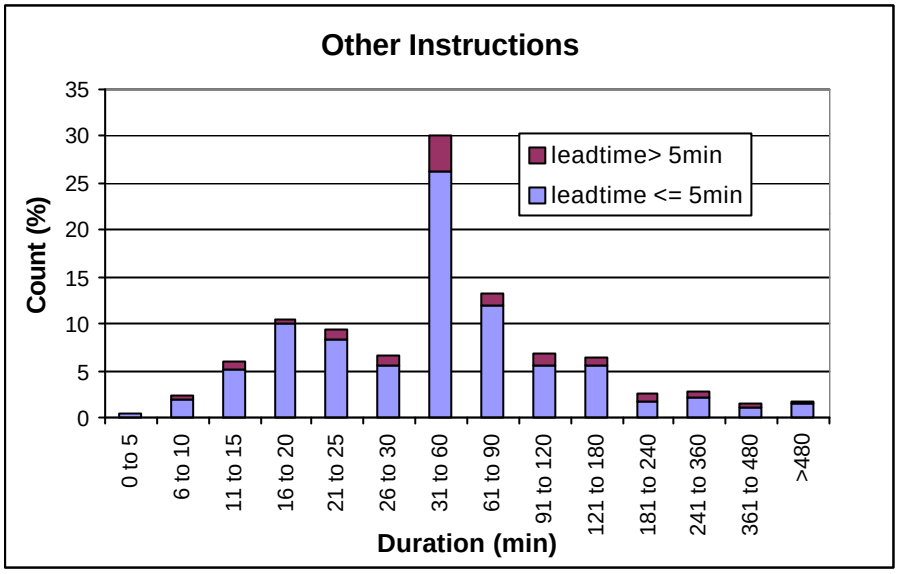
Figure A4-4 P18A Instructions on Fast Dynamic Plant



As can be seen 80% of instructions are issued with a continuous duration of less than or equal to 15 minutes. This is significantly different from the results obtained for the other BMUs, where the average duration is between 31 and 60 minutes and only 20% of instructions are less than or equal to 15 minutes[5].

[5] It should be noted that this modelling used an arbitrary definition of "fast dynamic" plant and other fast plant may be included in the "other instructions".

Figure A4-5 P18A Instructions on all other Plant

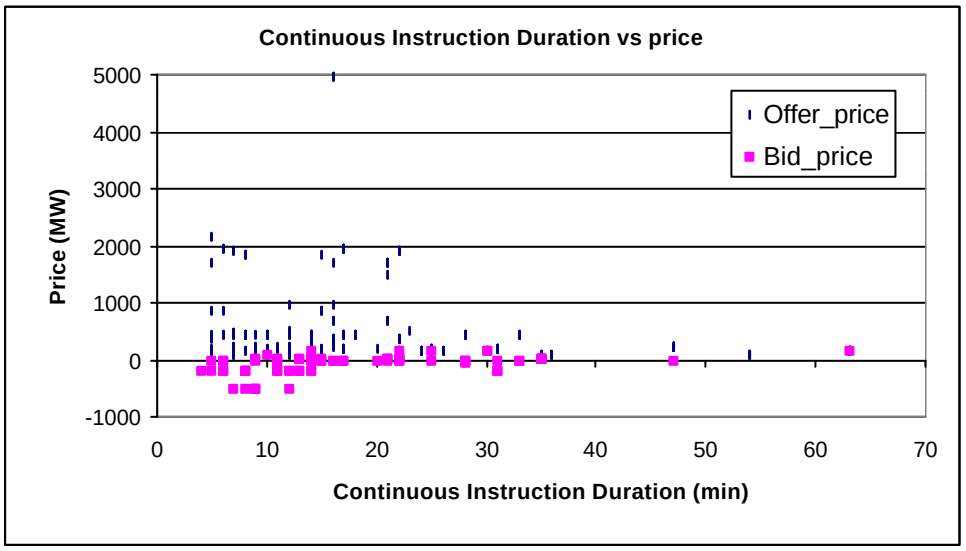


The second part of the NGC analysis investigation related to the price profile for those Bids/Offers provided on the fast dynamic plant.

This shows the length of continuous instructions against price. It identifies that for the sample data all those Offers with an associated price of greater than:

- £1000/MWh, would be caught by a threshold of less than or equal to 22 minutes; and
- £2000/MWh, would be caught by a threshold of less than or equal to 16 minutes.

Figure A4-6 P18A Continuous Instruction Duration Vs Price



NGC have not yet managed to perform any modelling on the impact on SBP/SSP prices. Like proposal 15 this would need to be based on analysing acceptance data and does not lend itself to analysis based on the derived data provided in the I014 flows.

However some initial modelling has been performed within ELEXON on different abstracted views of the settlement data, such as removing specific BMUs, or excluding Bids/Offers based on a price limit.

These indicate that an approach based on removing these short instructions would dampen prices, without totally removing all sensitivity to the trends within the underlying data.

This would need further analysis before a stronger conclusion could be reached on this approach.

A4.7 Proposal 18B Overview

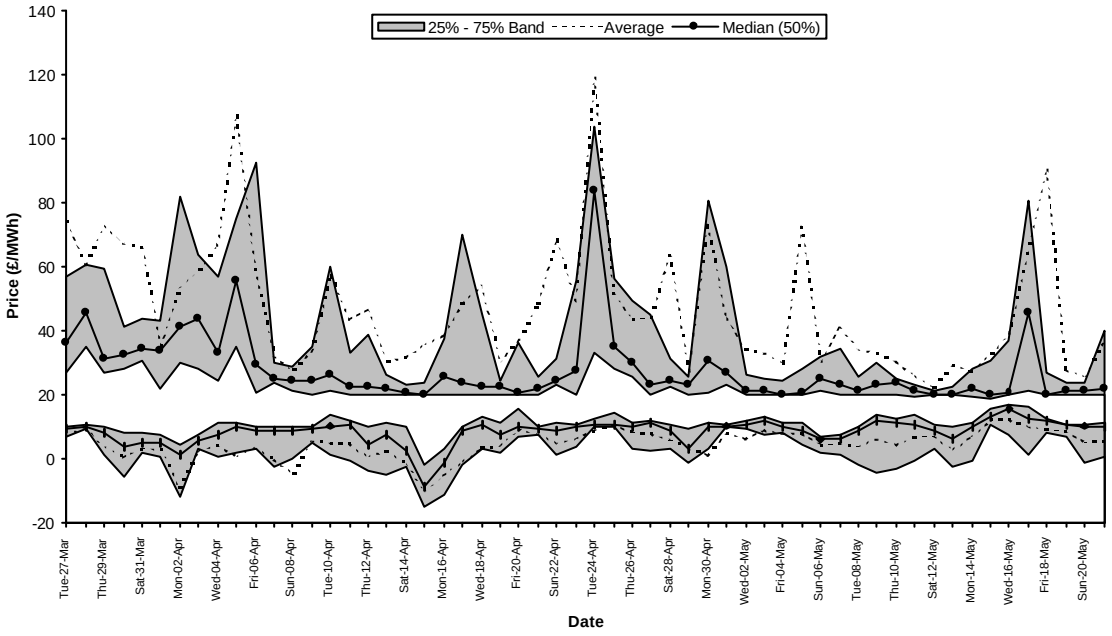
This proposes that the BRL parameter is used as a minimum volume of balancing actions, from which the imbalance prices can be set. When there is a smaller volume of untagged actions, the imbalance price is set as a weighted average of the price defined by the current rules, and the default price that would apply if no balancing actions had been taken in that direction.

A4.8 Proposal 18B Analysis

There has not been sufficient time to perform a detailed analysis of the prices which result from this modification.

However, it was possible to perform a basic approximation using a single set of default prices and then determining the proportions to take based on the value of the priced Bids/Offers (i.e. after arbitrage and trade tagging). This can be used to examine the behaviour of those periods where higher prices still occur[6]. The values chosen for this exercise were a £20/MWh SBP and a £10/MWh SSP, values that are in line with the current average default prices.

Figure A4-7 P18B System Buy Price / System Sell Price



As expected the lower limit for the SBP tends towards £20/MWh and £10/MWh for the SSP. However the area of interest is the profile is at the top of the 25-75% band and the average price. Compared to figure A4-1 it can been seen there is a significant degree of damping.

However there are still significant spikes, where there are sufficient expensive Offers or Bids to dominate even a dampened price, one such example is Period 13 on the 05 May:

- Offer of 43MWh taken at £5000/MWh

[6] It takes 60MWh of purchases at £20/MWh to keep the SBP below £100, if only 1MWh is bought at £5000/MWh

- Another Offer does exist for 0.054MWh. This is a De Minimis volume and will be ignored in the future, however, it is sufficient to reduce the SBP to £4993
- The proportion of £4993, which goes into the final P18B price, will be 43/180. This will then create a final price of £1207/MWh.

A4.9 Setting BRL to Zero - Overview

Panel Paper 19/012 describes the initial findings from the BRL sub-group about the current level of BRL.

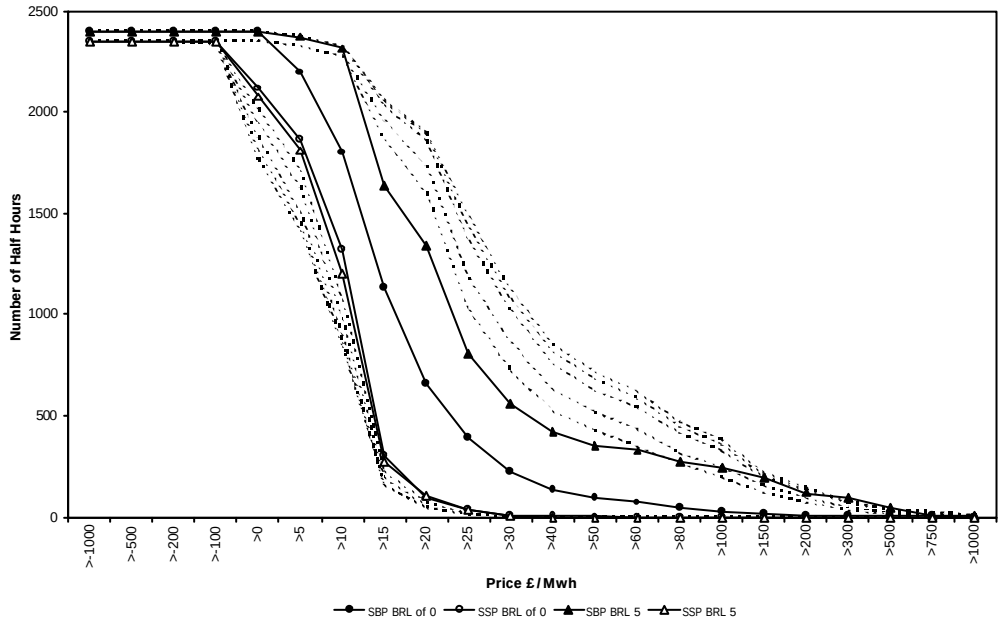
The paper highlights that even at BRL levels of 5 MWh, a significant number of periods still do not reach the level at which tagging starts to occur and the amount of smoothing on the calculated prices is minimal. It is not until BRL is set to zero that a significant smoothing of prices occurs.

It was recognised by the Modification Group that setting BRL to zero may, in the absence of any other quick to implement solution, provide an interim solution to removing system balancing from the setting of imbalance prices.

A4.10 Setting BRL to Zero - Analysis

The initial analysis presented in the Panel paper provided a graph to show how the duration of prices varies with different levels of BRL (0, 5, 40, 80, 140, 180, 220). This has been modified to simplify the display to highlight the values of BRL= 0 and 5 MWh:

Figure A4-8 System Buy Price / System Sell Price With Different Levels of BRL

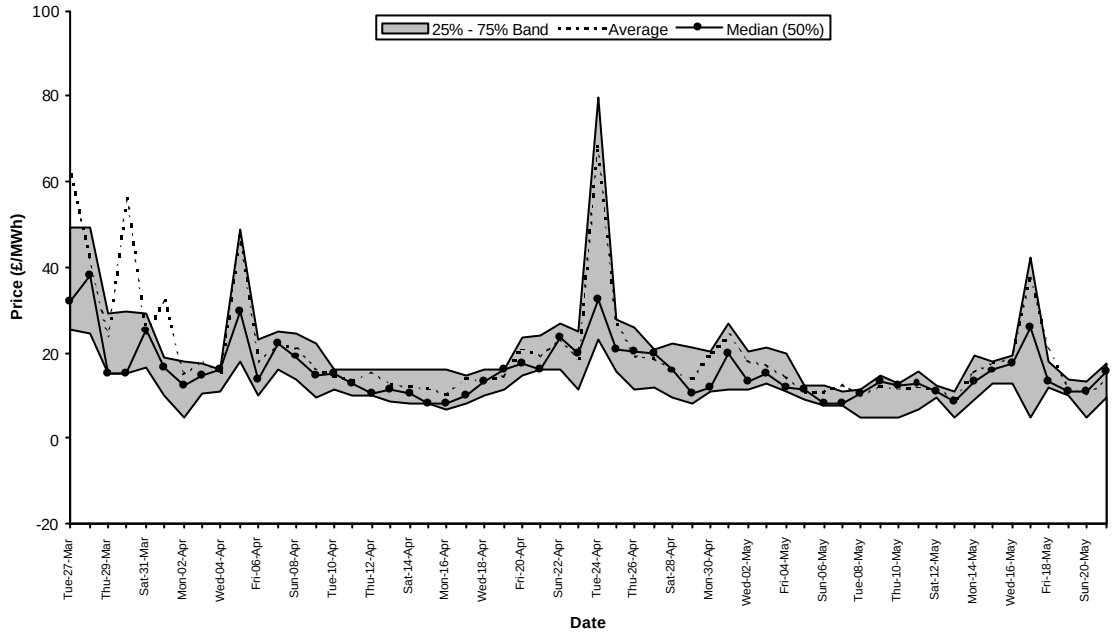


As can be seen although the SSP price distribution is fairly immune to changes in the value of BRL, the profile for the SBP varies considerable, especially between 0 and 5. This effect is primarily due to the difference between zero and non-zero:

- zero ensures that the smallest stack always takes the default price.
- small non-zero value means there will still be a significant number of periods where a single expensive Offer remains on the larger stack.

The following graph shows how the SBP price varies and gives an indication of the amount of damping that has occurred. The SSP price has not been included as it overlaps for a significant amount of time, i.e. the default price is being capped.

Figure A4-9 System Buy Price With BRL Equal to Zero



The peak that occurs on 24th April was during period 14:

- an offer of 31MWh was taken at £5000/MWh;
- the size of the stack of Bids was 14 MWh;
- the resulting trade tagging reduced the 31MWh to 17MWh;
- The rest of the Offers stack provided 184MWh of volume to dilute the effect of £5000 down to set a SBP of £486/MWh;
- The original (BRL=180) SBP was £793/MWh.

This illustrates how a high priced Offer can still dominate the price when the Bids stack is initially quite small.

APPENDIX 5 – GLOSSARY

This section has been provided for ease of reading and sets out the glossary of acronyms used within the document.

Acronym	Term
BSC	Balancing and Settlement Code
BM	Balancing Mechanism
BMU(s)	Balancing Mechanism Unit(s)
BOA	Bid Offer Acceptance
BRL	Balancing Reserve Level
BSAD	Balancing Service Adjustment Data
CID	Continuous Instruction Duration
FPN	Final Physical Notification
SBP	System Buy Price
SSP	System Sell Price
NGC	National Grid Company
SO	System Operator

The table below sets out the acronyms used within formulas within the body of this document and has been derived from Section X2 of the BSC.

Arithmetic Acronyms	Defined Term	Units	Meaning
BCA_j	Buy Price Cost Adjustment	£	The amount sent by the Transmission Company as the 'Buy Price Cost Adjustment' in accordance with Section Q6.3.
BRL_j	Balancing Reserve Level	MWh	The value established and from time to time revised and approved in accordance with Section T1.5
BVA_j	Buy Price Volume Adjustment		The amount sent by the Transmission Company as the 'Buy Price Volume Adjustment' in accordance with Section Q6.3.
PO^n_{ij}	Offer Price	£/MWh	The amount in £/MWh associated with an Offer and comprising part of a Bid-

			Offer Pair.
QAB^{kn}_{ij}	Period Accepted Bid Volume	MWh	The quantity established in accordance with Section T3.8.2.
QAB^{n}_{ij}	Period BM Unit Total Accepted Bid Volume	MWh	The quantity established in accordance with Section T3.9.2.
QAO^{kn}_{ij}	Accepted Offer Volume	MWh	The quantity established in accordance with Section T3.7.2.
QAO^{n}_{ij}	Period BM Unit Total Accepted Offer Volume	MWh	The quantity established in accordance with Section T3.9.1.
TLM_{ij}	Transmission Loss Multiplier		The multiplier calculated in accordance with Section T2.3.1(a) or (b).