

## **BSC Modification Proposals P211 'Main Imbalance Price based on Ex-post Unconstrained Schedule' and P212 'Main Imbalance Price based on Market Reference Price'**

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Target audience: Generators, suppliers, customers, the system operator and other interested parties.

### **Overview:**

Two modifications have been proposed that would change the way imbalance ("cash-out") prices are calculated in the wholesale electricity market. In April 2007 EDF Energy raised Modification Proposal P211 in response to concerns that cash-out prices, that are used to settle imbalances between participants' physical and contracted electricity positions, do not reflect properly the costs incurred by the System Operator of maintaining an overall energy balance on behalf of the industry. EDF Energy said that cash-out prices were being "polluted" by other, non-energy related, costs of system operation such as those incurred in resolving transmission constraints. Bizz Energy raised Modification Proposal P212 in the same month citing the same defect. Each modification takes a different approach to addressing the issue by proposing two alternative ways to calculate cash-out prices.

This document sets out Ofgem's impact assessment of the two modifications for consultation. We believe the case for accepting Modification Proposal P211 is finely balanced but are currently minded to approve, and are minded to reject Modification Proposal P212.

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## Context

The imbalance settlement or cash-out arrangements are an important, but sometimes overlooked, part of the wholesale trading arrangements in any electricity market where companies compete to generate and supply electricity over a common transmission network. They can have a significant impact on the costs of maintaining security of supply by balancing the market, and the competitive dynamic between companies. Complex arrangements that produce artificially high or volatile cash-out prices can act as a barrier to entry for smaller companies. They may also make it more difficult for any company other than one of the existing large energy companies to invest in newer or lower carbon generation technologies such as transmission connected wind, combined heat and power and distributed generation.

There have been a number of changes made to the rules used to calculate cash-out prices since the introduction of the New Electricity Trading Arrangements (NETA) in 2001.

Ofgem is very aware of the importance of effective cash-out rules to the operation of a well-functioning wholesale market. Problems with the cash-out rules harm customers who will ultimately be exposed to the costs resulting from higher wholesale prices, contract risk premia and use of system charges. In line with one of the commitments in our Corporate Strategy, we launched the Cash-out Review in February 2007 to understand better how the current arrangements could be improved. The two modifications which are the subject of the Impact Assessment presented in this document relate to issues identified during this review.

## Associated Documents

- Final Modification Report for Modification P211 'Main imbalance Price based on an Ex-Post Unconstrained Schedule'  
[http://www.elexon.co.uk/documents/Change\\_and\\_Implementation/modifications/211/P211\\_Final\\_Modification\\_Report.zip](http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/211/P211_Final_Modification_Report.zip)
- Final Modification Report for Modification Proposal P212 'Main Imbalance Price based on Market Reference Price'  
[http://www.elexon.co.uk/documents/Change\\_and\\_Implementation/modifications/212/P212\\_Modification\\_Report\\_Attachments.zip](http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/212/P212_Modification_Report_Attachments.zip)
- Assessment Report for Modification Proposal P211 'Main Imbalance Price based on Ex-post unconstrained schedule'  
[http://www.elexon.co.uk/documents/Change\\_and\\_Implementation/modifications/211/P211AR10.pdf](http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/211/P211AR10.pdf)
- Assessment Report for Modification Proposal P212 'Main Imbalance Price based on Market Reference Price'  
[http://www.elexon.co.uk/documents/Change\\_and\\_Implementation/modifications/212/P212AR10.pdf](http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/212/P212AR10.pdf)

- Decision Letter on Modification P205: Increase in PAR level from 100 MWh to 500 MWh.  
<http://www.ofgem.gov.uk/Markets/WhIMkts/CompandEff/CashoutRev/Documents1/15830-P205%20D.pdf>
- Decision Letter on Modification P194 'Revised Derivation of the Main Energy Imbalance Price'  
<http://www.ofgem.gov.uk/Markets/WhIMkts/CompandEff/CashoutRev/Documents1/13406-P194%20D.pdf>
- Initial Written Assessment for P217 'Revised Tagging Process and calculation of Cash Out Prices'  
[http://www.elexon.co.uk/documents/BSC\\_Panel\\_and\\_Panel\\_Committees/BS C\\_Panel\\_Meetings\\_2007\\_-\\_133\\_-\\_Papers/133\\_06\\_P217IR10.pdf](http://www.elexon.co.uk/documents/BSC_Panel_and_Panel_Committees/BS C_Panel_Meetings_2007_-_133_-_Papers/133_06_P217IR10.pdf)

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## Summary

This document sets out our impact assessment (IA) of two proposed modifications to the cash-out regime (P211 and P212). We would welcome views on our IA by 31 January 2008.

### Background

Imbalance settlement or "cash-out" is the process used in the British wholesale electricity market to settle all market participants' energy account imbalances. A company has an imbalance if the physical metered volumes for its generation or its customers' demand differs from its notified net contract position for sales and purchases of electricity. For a variety of reasons, including demand forecasting errors and sudden unplanned loss of generating stations, companies cannot always balance perfectly in each half-hour settlement period. National Grid Electricity Transmission plc (NGET) is therefore responsible for residual energy balancing and is known as the System Operator (SO). Parties are "cashed-out" for any imbalance volume at a price that is designed to reflect the costs that the SO incurs in balancing in each half-hour settlement period.

Cash-out prices provide important commercial incentives on companies to manage the level of imbalance between contracted and delivered energy. This in turn helps to facilitate efficient operation of the system and maintain security of supply. The potential exposure of suppliers and generators to very high cash-out prices when margins of supply over demand are very tight provides powerful commercial incentives. In response they will contract ahead to meet their customers' demand, invest to maintain and improve generation reliability, contract with and build peaking plant, and forecast demand accurately. Large industrial energy customers will also offer to be paid to reduce their demand in periods where margins are tight.

Although the volumes of electricity settled through cash-out are low (~ 15 TWh/annum) compared to wholesale and contract markets (~ 1000 TWh/annum), the effect of cash-out prices on the market is much more significant than these figures suggest. Since the default prices for uncontracted energy consumption or production are the cash-out prices, these tend to drive prices and volatility in short term markets, which in turn impact on forward and contract markets. If cash-out prices do not reflect the costs of energy balancing, this can have a knock-on effect on wholesale prices which could ultimately lead to customers having to pay more for their electricity. The cash-out arrangements also determine the flows of monies between competing generators and suppliers. So inappropriate rules could lead to competitive distortions and could in the longer run be detrimental to competition and customers.

Inappropriate cash-out rules that produce cash-out prices that are unpredictable and/or unjustifiably high or volatile (for example when the overall supply and demand conditions on the system are benign) can also harm newer, lower carbon technologies. The generating output from some newer and lower carbon technologies such as renewables and combined heat and power may be less predictable than the output from more established, large scale generation such as

coal and combined cycle gas turbines. Distortions in cash-out prices could put these technologies at a competitive disadvantage.

For all these reasons, Ofgem has been working with the industry over the last year to explore the operation of the current cash-out regime.

The proposers of the two modifications which are the subject of this IA believe that there is a defect in the way that cash-out prices are calculated. The potential problem stems from the fact that the SO uses the same commercial tools (the Balancing Mechanism and Balancing Services contracts) to fulfil its role of residual energy balancer and for system balancing. Residual energy balancing relates to the resolution of net energy imbalances in each half-hour. System balancing involves actions to secure the safe and reliable operation of the transmission system and includes frequency response, second-by-second balancing, creation of reserve and management of network constraints. System balancing actions are normally, but not always, more expensive than energy balancing actions.

The proposers argue that cash-out prices are being "polluted" as they often include some of the costs of system balancing actions. The impact of any "pollution" will be more keenly felt by companies less able to balance as a result of the nature of their portfolio or scale of operation. This includes smaller and new entrant generators and suppliers and many of the lower carbon technologies such as wind and distributed energy generators.

We set out in this document analysis that supports the proposers' arguments that the current rules lead to cash-out prices being "polluted" by the costs of system balancing actions. The analysis shows that the current rules for stripping out the costs of system actions from the cash-out price calculation are imperfect and the resulting prices do not always reflect the underlying cost of half-hourly energy imbalances. Our analysis, set out in this document, suggests that since November 2006 when the rules for cash-out were last changed, the System Buy Price (SBP) when the system is short has been on average 11.2% higher, and the System Sell Price (SSP) when the system is long 6.0% lower, than the cost implied by solving energy imbalances alone.

### **Modification Proposal P211**

P211 was raised by EDF Energy in April 2007. It seeks to use an "ex-post unconstrained schedule" of Balancing Mechanism offers and bids available to the SO at gate closure to remove system balancing costs and calculate cash-out prices. By basing the calculation on all available bids and offers rather than the actual bids and offers the SO purchased or sold (which may include system actions) the problem of "system pollution" is avoided.

Based on the issues and analysis presented in the Final Modification Report (FMR) and in this IA, we think that the case for accepting Modification Proposal P211 is finely balanced but are currently minded to approve. We explain why we reach this view in more detail in the remainder of this document.

**Modification Proposal P212**

P212 was raised in April 2007 by Bizz Energy. It seeks to base cash-out prices on market prices rather than SO actions, with SBP set at a 5% premium to the Market Index Price (MIP) when the system is short, and SSP set at a 5% discount to the MIP when the system is long.

Based on the issues and analysis presented in the FMR and in this IA, we are currently minded to reject Modification Proposal P212. We explain why we reach this view in more detail in the remainder of this document.

**Next Steps**

We invite views on the definition of energy and system balancing proposed in this document, and the merits of P211 and P212 against the current baseline. Having considered the responses to this consultation, we intend to make final decisions on the two modifications by the end of February 2008. In addition, we are interested in views on whether, in the event that either of these two modifications is approved by the Authority, we should proceed to implement immediately or wait for a decision on another cash-out related Modification Proposal, P217, that was recently raised by RWE to address the same problem.



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## 1. Introduction

### Question box

There are no specific questions in this chapter.

1.1. This document consults on Ofgem's Impact Assessment (IA) for Balancing and Settlement Code (BSC) Modification Proposals P211 "Main Imbalance Price based on Ex-post Unconstrained Schedule" and P212 "Main Imbalance Price based on Market Reference Price". We refer throughout the rest of this document to the two proposals as P211 and P212 respectively.

### Structure of this document

1.2. This document follows the structure below:

- Chapter 2 explains the background to P211 and P212;
- Chapter 3 outlines key considerations relevant to assessment of P211 and P212;
- Chapter 4 attempts to evaluate the potential costs and benefits of P211;
- Chapter 5 attempts to evaluate the potential costs and benefits of P212;
- Chapter 6 sets out Ofgem's initial conclusions on the impact of P211 and P212;
- The appendices set out how to respond to this consultation, the Authority's powers and duties, a glossary of terms, and a feedback questionnaire;
- Further detailed background and analysis can be found in the Supplementary Appendices<sup>1</sup>.

### View invited

1.3. The analysis presented in this document provides our estimates of the potential range of costs and benefits of P211 and P212, based on a set of high level assumptions and the potential uncertainties around any estimates of costs and benefits.

1.4. We invite views on this IA, to be received by close of business on 31 January 2008. See Appendix 1 for further details on how to respond to our consultation questions.

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<sup>1</sup> BSC Modification Proposals P211 'Main Imbalance Price based on Ex-post Unconstrained Schedule' and P212 'Main Imbalance Price based on Market Reference Price': Impact Assessment Supplementary Appendices, December 2007.

## Way forward

1.5. Any responses to this IA received will help inform the Authority's<sup>2</sup> final decision whether to approve one of these proposals or to reject both. The initial views expressed in this IA are entirely without prejudice to Ofgem's final decision, which will take into account all relevant considerations, including, among other things, the responses received to this IA.

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<sup>2</sup> Ofgem is the office of the Authority. The terms "Ofgem" and "the Authority" are used interchangeably in this document.

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## 2. Background

**Chapter summary** This chapter provides background to the current cash-out arrangements, the proposed modifications and related initiatives.

### Question box

There are no specific questions in this chapter.

### Purpose of cash-out arrangements

2.1. The current wholesale electricity market in Great Britain was created with the implementation of the British Electricity Trading and Transmission Arrangements (BETTA)<sup>3</sup>. Individual energy companies are primarily responsible for balancing their electricity supplies with the demand of their customers on a half-hourly basis through bilateral contracting between generators, traders, suppliers and large business customers.

2.2. The role of physically balancing the system on a second-by-second basis is undertaken by the System Operator (SO), National Grid Electricity Transmission plc (NGET). This role has two components: 1) residual energy balancer ("energy balancing"), because for a variety of reasons including uncertainty in forecasting supply and demand companies will not usually achieve a perfect balance in each half-hour settlement period; and 2) provision of system balancing services ("system balancing"), such as frequency response, constraint management and system reserve that are currently most cost effectively managed by a single organisation on behalf of the whole market.

2.3. The SO has two balancing tools available. The Balancing Mechanism (BM) where energy companies and large customers can offer spare flexibility in their generation or demand portfolios in real-time. The SO uses the BM for both energy and system balancing purposes. In addition, the SO can contract for balancing services with energy companies and large customers in advance, where it thinks this would lower the overall costs of energy and system balancing.

2.4. Cash-out prices provide important commercial incentives to companies to manage their level of imbalance or be exposed to the costs they impose on NGET to balance the system. Cash-out prices are not intended to force companies to balance. Companies can choose to be out-of-balance and will do so if they think that the cost to NGET of balancing the system is lower than the costs they would incur to balance their own position. But by reflecting the costs to NGET of energy balancing they are designed to provide commercial incentives to maintain (or improve) reliability of generating plant over time, maintain or invest in peaking plant and maintain or

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<sup>3</sup> BETTA was introduced in April 2005 with the merging of the Scottish and England and Wales electricity markets. Prior to this, England and Wales operated under the broadly similar New Electricity Trading Arrangements (NETA) which were introduced in March 2001.

improve forecasting accuracy. During periods of peak demand and/or when margins are tight cash-out prices should also signal the relative scarcity of electricity and this should encourage companies to make all generating capacity available and large business customers to offer to receive payments to reduce their demand. The potential for suppliers to be exposed to high cash-out prices during periods of peak demand provides the incentive to contract with generators in advance to meet their customers' peak demand. Generators can potentially be exposed to high cash-out prices if they cannot meet their contracted supply, for example because of mechanical failure. This provides an incentive to maintain their plants or to contract with other plants to provide physical cover, thus maintaining the generation levels necessary to meet their contracted demand, with appropriate margin to spare.

2.5. Although the volumes of electricity settled through cash-out are low (~15 TWh/annum) compared to wholesale and contract markets (~1000 TWh/annum), the effect of cash-out prices on the market is much more significant than these figures suggest. Since the default prices for uncontracted energy consumption or production are the cash-out prices, these tend to drive prices and volatility in short term markets, which in turn impact on forward and contract markets. If cash-out prices do not reflect the costs of energy balancing, this can have a knock-on effect on wholesale prices which could ultimately lead to customers having to pay more for their electricity. The cash-out arrangements also determine the flows of monies between competing generators and suppliers. So inappropriate rules could lead to competitive distortions and could in the longer run be detrimental to competition and customers.

2.6. Inappropriate cash-out rules that produce cash-out prices that are unpredictable and/or unjustifiably high or volatile (for example when the overall supply and demand conditions on the system are benign) can also harm newer, lower carbon technologies. The generating output from some newer and lower carbon technologies such as renewables and combined heat and power may be less predictable than the output from more established, large scale generation such as coal and combined cycle gas turbines. Distortions in cash-out prices could put these technologies at a competitive disadvantage.

2.7. Ofgem puts in place annual commercial incentives on NGET as SO to manage and reduce the total costs of energy and system balancing through the Balancing Services Incentive Scheme (BSIS).

## **Current cash-out arrangements**

2.8. The Balancing and Settlement Code (BSC) sets out, amongst other things, the ways that the SO's balancing costs are recovered from companies using the network. The general principle is that the SO's costs of energy balancing should be targeted and recovered through cash-out prices from those companies that are out-of-balance in each half-hour, whereas the costs of system balancing are charged to all companies via Balancing System Use of System (BSUoS) charges that are currently recovered on a simple per MWh basis. Since the SO's system balancing costs are not driven by levels of energy imbalance in each half-hour, it is not appropriate to recover them through cash-out. There may be more robust ways of targeting these

costs than the current approach. For example, since a significant portion of system balancing costs are caused in resolving locational constraints, cost targeting based on geographical location could be considered in the future.

2.9. Cash-out operates currently under a dual price mechanism. There are two Energy Imbalance Prices: the System Buy Price (SBP) charged to short imbalances, and the System Sell Price (SSP) paid for long imbalances. There is also the concept of a "main" and "reverse" price that affects how SBP and SSP are calculated. SBP is the main price, and SSP the reverse price, when the overall system is short and vice versa when the system is long. System length is determined by the Net Imbalance Volume (NIV). The NIV is positive when the system is short overall and negative when it is long.

2.10. Appendix 5 summarises the current cash-out arrangements, which are also described in section 1.1 of Elexon's Final Modification Report (FMR) for P211<sup>4</sup>.

2.11. Since the New Electricity Trading Arrangements (NETA) went live in March 2001 a number of modifications have been made and a number of proposed modifications rejected to the way that cash-out prices are calculated. Common themes among proposals have been concerns that the rules for calculating cash-out prices did not produce prices reflecting NGET's costs of energy balancing. The most recently approved pricing modification, P205, was implemented in November 2006 and introduced the Price Average Reference (PAR) methodology, so called "chunky marginal", for calculating prices. A history of relevant modification proposals can be found in Appendix 5.

## Cash-out Review

2.12. The Cash-out Review was launched by Ofgem in February 2007 in response to concerns raised by some participants about the current arrangements. The objective of the review is to identify a set of electricity cash-out arrangements that:

- Are simple and transparent;
- Provide appropriate economic signals and commercial incentives;
- Are non-discriminatory;
- Promote effective competition in the electricity market.

2.13. Key outputs from the Cash-out Review can be found on Ofgem's website<sup>5</sup>.

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<sup>4</sup> See Elexon's P211 FMR

<sup>5</sup> See

[www.ofgem.gov.uk/Markets/WhlMkts/CompendEff/CashoutRev/Pages/CashoutRev.aspx](http://www.ofgem.gov.uk/Markets/WhlMkts/CompendEff/CashoutRev/Pages/CashoutRev.aspx)

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2.14. Through the Cash-out Review, we have received a wide range of feedback from bilateral meetings with industry participants and at open industry seminars<sup>6</sup>. Some parties think that the current cash-out arrangements are broadly adequate and that further change is unnecessary. But a number of other parties expressed significant concerns. Most of these concerns fall into the following three areas:

- Cash-out prices designed to reflect the costs of energy imbalances are being "polluted" by the costs of the SO taking system balancing actions, such as resolving transmission constraints, in the BM;
- There is a lack of transparency in the SO's actions making cash-out prices very unpredictable;
- The arrangements are very complex and difficult to understand representing a barrier to new entrants and smaller players in the market.

2.15. In parallel with the Cash-out Review, the industry has brought forward three proposals to modify the cash-out arrangements (P211, P212 and P217). In addition, Utilita raised an issues group, "Issue 30", under the BSC to discuss some of the insights and questions summarised by Ofgem at the September industry seminar. Further details about Issue 30 can be found on Elexon's website<sup>7</sup>.

## **Modification Proposal P211**

2.16. P211 was raised by EDF Energy in April 2007. It seeks to amend the calculation of the main cash-out price so that when the market is short ( $NIV > 0$ ), SBP will be based on the least expensive offers that the SO could have utilised on an unconstrained system. Conversely, when the market is long ( $NIV < 0$ ), SSP will be based on the least expensive bids that the SO could have utilised on an unconstrained system. PAR tagging<sup>8</sup> would then be applied to the new Ex-Post Unconstrained Schedule (EPUS)<sup>9</sup> price stack to ensure that only the most expensive 500 MWh of submitted bids or offers are used to set the main price. The "reverse" price would be calculated in the same way as it is now.

2.17. The proposal is designed to address the "system pollution" defect by removing the distorting effect that "energy plus" actions may have on cash-out. "Energy plus" actions are those taken by the SO that simultaneously resolve energy imbalances and system issues. Current tagging mechanisms<sup>10</sup> may not remove these actions and where they are taken out of price order may be making cash-out prices more extreme. By using the EPUS methodology, only the least expensive actions that the SO could have taken to resolve the outturn NIV are included in the price stacks, which the proposer believes reflects better the costs of pure energy balancing.

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<sup>6</sup> Open industry meetings were held on 30 March 2007 and 26 September 2007.

<sup>7</sup> See [www.elexon.co.uk/documents/issues/30/Issue\\_30.pdf](http://www.elexon.co.uk/documents/issues/30/Issue_30.pdf)

<sup>8</sup> See Appendix 5 and Elexon's P211 FMR for an explanation of tagging methods.

<sup>9</sup> See Elexon's P211 FMR for an explanation of the EPUS methodology.

<sup>10</sup> See footnote 8.

2.18. The proposer believes that P211 would better facilitate applicable BSC objective (c)<sup>11</sup> by more appropriate targeting of energy balancing costs, by increasing short term liquidity since parties are more likely to sell volume than using it to self-hedge, and by making it easier for parties and new entrants to understand the imbalance pricing mechanism. By removing the complex tagging mechanisms the proposer believes that the modification would also positively impact applicable objective (d)<sup>12</sup>. Finally, the proposer believes that P211 would facilitate applicable objective (b)<sup>13</sup> since parties would be less likely to go long to reduce the risk of exposure to unfavourably high SBPs thus reducing the amount of balancing required by the SO. No alternative was included with P211, although one was considered and rejected by the Modification Group.

2.19. The Panel recommended by a majority that P211 should not be made. A minority supported the view of the proposer that the modification would further Applicable Objectives (b), (c) and (d). However, the majority believed that the approach would produce less cost reflective cash-out prices and would increase the cost to the SO of balancing with a detrimental effect on competition because the incentives on parties to trade out their imbalances in the forward market would be reduced. Whilst, the system pollution defect was recognised for certain settlement periods<sup>14</sup>, the majority also believed that the impact was not sufficiently material to warrant fundamental change.

2.20. For full details of P211 including consultation responses and the Panel's assessment, please refer to Elexon's FMR.

## **Modification Proposal P212**

2.21. P212 was raised in April 2007 by Bizz Energy. It seeks to replace part of the current cash-out price methodology with an alternative method for determining the main imbalance price. When the market is short ( $NIV > 0$ ) the SBP is set equal to the Market Index Price (MIP) plus a 5% premium; when the market is long ( $NIV < 0$ ) the SSP is set equal to the MIP less a 5% discount. The reverse price methodology is unchanged.

2.22. P212 is designed to address the same defect as P211, namely the impact of system actions on cash-out prices. Its underlying principle is that the within day market provides the true value of "half-hourly energy", thus removing the direct link between the costs of the SO's actions and the cash-out prices.

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<sup>11</sup> "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."

<sup>12</sup> "Promoting efficiency in the implementation and administration of the balancing and settlement arrangements."

<sup>13</sup> "the efficient, economic and co-ordinated operation of the Transmission System by the Transmission Company."

<sup>14</sup> The analysis of P211 took place prior to September 2007, when further evidence emerged of constraints in Scotland impacting cash-out prices.

2.23. The proposer believed that P212 will facilitate applicable BSC objective (c) by removing distortions to competition inherent in the current arrangements that discriminate against intermittent technologies and non-vertically integrated suppliers who are exposed to greater forecast errors. It argues that the modification would also increase liquidity in the short-term market because parties will be less inclined to self-hedge because of "fear of cash-out". As P212 would also remove the complexity inherent in the current cash-out calculations, the proposer believed that the modification would positively impact applicable BSC objective (d). Finally, the proposer believed that the modification will better facilitate applicable BSC objective (b) by reducing the volatility and improving the predictability of cash-out prices thus reducing the incentive for parties to take a long position and hence reducing the level of balancing required by the SO.

2.24. With one member abstaining, the Panel unanimously recommended that P212 should not be made. The unanimous view of the Panel was that P212 would not better facilitate the achievement of applicable objectives (b), (c), and (d). It was stated that cash-out prices under P212 would not be cost reflective due to the removal of the link to the SO's actions, reducing the incentive to balance. Concerns were expressed that P212 could lead to undesirable changes in participant behaviour, with incentives to influence the MIP and to change physical positions after MIP is set.

2.25. For full details of P212 including consultation responses and the Panel's assessment, please refer to Elexon's FMR.

## **Modification Proposal P217**

2.26. Modification Proposal P217 "Revised Tagging Process and Calculation of Cash-out Prices" (P217) was raised on 19 October 2007 by RWE Npower. P217 is currently in the "definition" phase. This stage will conclude in mid-February 2008 at which time the modification will move to "assessment".

2.27. P217 aims to address the same system pollution defect as P211 and P212. It seeks to introduce a revised tagging process enabling Bid Offer Acceptances (BOAs) and forward trades to be tagged as either "system", "energy plus system" or "energy" based on the primary reason for the action. Where these BOAs are taken out of price order their price would be replaced in the cash-out price calculation, therefore preventing "system" actions distorting the cash-out price. The proposer envisages that the SO would have some role in tagging every BOA into one of the three categories above, as it is in the best position to know the reasons for each action it as taken.

2.28. P217 is clearly an alternative solution to the defect that P211 and P212 are trying to address, and is incompatible with either modification. However, the timescale for assessment of P217 is several months behind that for P211 and P212. It will not be possible for the Authority to align its decisions on all three related modifications without jeopardising the winter 2008/09 implementation timescales for P211 or P212, should either be approved. We have therefore published an open letter in parallel with this IA inviting views from the industry on the best way of



addressing the implementation issues created by the current assessment timescales for P211, P212 and P217.

### **Linkages with other initiatives**

2.29. In May 2007, Ofgem announced in an open letter to the industry that it was launching a System Operator Review. This was followed in August 2007 with an "Initial Thoughts" document<sup>15</sup> requesting views on whether incentives on SO activities were both appropriate and effective. We see a close linkage between the SO and Cash-out Reviews since the way in which the SO contracts for Balancing Services and operates in the BM can impact on cash-out prices. We will work to ensure that any changes in the cash-out regime are appropriately reflected in SO incentives.

2.30. In August 2007, Ofgem and the Department of Business, Enterprise and Regulatory Reform (BERR) jointly issued a Call for Evidence document<sup>16</sup> as the first stage of their Transmission Access Review which was announced in the Energy White Paper 2007. The purpose is to review the present technical, commercial and regulatory framework for the delivery of new transmission infrastructure and the management of the grid to ensure that they remain fit for purpose as the proportion of renewable generation on the system grows. To the extent that constraints are still influencing cash-out, the Transmission Access Review has implications for the Cash-out Review since it will affect how investments in the transmission network are made and hence the role of the SO in alleviating constraints. Conclusions from the Transmission Access Review will be published in May 2008.

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[http://www.ofgem.gov.uk/Markets/WhIMkts/EffSystemOps/SystOpIncent/Documents1/July\\_initial\\_thoughts\\_document\\_-\\_070731.pdf](http://www.ofgem.gov.uk/Markets/WhIMkts/EffSystemOps/SystOpIncent/Documents1/July_initial_thoughts_document_-_070731.pdf)

<sup>16</sup> Transmission Access Review documentation is available on Ofgem's website <http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/>

### 3. Key issues associated with the modification proposals

**Chapter Summary** This chapter sets out the main issues that Ofgem believes require consideration in the assessment of modification proposals P211 and P212.

#### Question box

Question 1: What is your view on the proposed definition of energy balancing?

### Applicable BSC Objectives and Ofgem's statutory duties

3.1. In making decisions in respect of P211 and P212, Ofgem must consider whether each proposal better facilitates the achievement of the applicable BSC objectives compared to the current baseline. The applicable BSC objectives are set out in NGET's Transmission Licence<sup>17</sup>, 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.

3.2. In reaching a decision on the modifications, Ofgem must also have regard to its wider statutory duties. As outlined in Appendix 2, Ofgem's principal objective when carrying out its functions under the Electricity Act 1989 is to protect the interests of consumers, present and future, wherever appropriate by promoting effective competition. Other statutory duties include consideration of the potential impacts for security of supply and sustainable development.

3.3. The cash-out arrangements impact upon business and domestic customers directly and indirectly in a number of ways. Customers are directly exposed to the costs of energy balancing since their suppliers will price in their expectations of internal balancing costs and BSUoS in their contracts and tariffs. Unpredictability and lack of transparency in the cash-out arrangements may also impact the contract or risk premia that suppliers pay and pass through to their customers. Overall inefficient cost targeting via cash-out prices would lead to customers paying more.

3.4. Both P211 and P212 seek to address concerns that energy imbalance prices under the current arrangements are polluted by the costs of SO actions taken for

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<sup>17</sup> Standard Condition C3(3) of the Transmission Licence

reasons other than resolving energy imbalance. Ofgem has identified three key priorities for this IA:

- Clarifying the definitions of energy and system balancing;
- Assessing the degree of system pollution in the current cash-out arrangements using this definition;
- Evaluating whether the proposed modifications will result in a reduction in any pollution of the current cash-out rules.

3.5. In this chapter we consider whether the current cash-out mechanism is providing appropriate signals of the costs the SO faces in balancing energy supply and demand. We discuss a number of benchmarks that may serve to indicate the degree of system pollution in energy imbalance prices, with the goal of establishing a framework for reviewing the merits of P211 and P212. Chapters 4 and 5 then assess whether modifications P211 and P212 are likely to provide cash-out prices that are more reflective of the costs of energy balancing than the current arrangements. In these chapters we also assess the proposals against the relevant objectives looking at efficiency and economy, impact on effective competition, and, where relevant, Ofgem's wider statutory duties.

## **Defining energy and system balancing**

3.6. NGET has indicated that the majority of balancing actions can be characterised as "energy plus", combining energy balancing with one or more of the following system related activities:

- Frequency response;
- Reserve creation;
- Intra half-hour balancing;
- Constraint management.

3.7. Industry discussions over the past year have highlighted the lack of a consensus on the definition of energy balancing. Points of debate include:

- The balancing activities which should ideally be excluded from cash-out prices;
- The relationship between idealised and actual balancing costs;
- The recovery of reserve availability fees.

3.8. For the purposes for this IA, Ofgem has taken the following views on these key issues:

- Frequency response, reserve creation, intra half-hour balancing and constraint management should be deemed as "system" related and should not be included in the calculation of cash-out prices;
- Deriving an idealised half-hourly energy balancing price from the SO's actions is complicated and challenging (since the balancing tools currently available to the SO do not generally deliver half-hourly blocks of energy). Neither the prompt

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market price nor an idealised stack at gate closure is likely to fully reflect the costs of energy balancing since they ignore the premia associated with short notice energy balancing requirements and assume perfect foresight of any changes in supply or demand post gate closure<sup>18</sup>. Assessing cash-out rules therefore involves some compromise and trade-offs to be considered between objectives such as those adopted for the Cash-out Review<sup>19</sup>; and,

- The reserve availability costs should not be ignored in the calculation of cash-out prices, but at the same time it is not appropriate for all of these costs to be included in the cash-out price calculation since reserve is required for both energy and system reasons.

3.9. Our rationale for these positions is set out in more detail in Appendix 6.

### **Assessing the extent of the system pollution defect**

3.10. The proposers of P211 and P212 have claimed that cash-out prices are currently polluted by system balancing actions. As summarised in Elexon's FMR for P211, the existence of system pollution in certain settlement periods is not disputed by market participants, but there is disagreement as to the materiality of this problem and its effects.

3.11. A key challenge is to define a benchmark for assessing whether the proposed modifications will improve the cost reflectivity of energy imbalance prices. It was widely accepted during the P211 modification process that measuring the extent of system pollution under the current arrangements is far from straightforward. One difficulty is that only the SO is in a position to identify readily the rationale for each BOA, thereby limiting the analysis that can usefully be undertaken by market participants. It is often cost effective for the SO to take actions that address a combination of energy and system balancing requirements, but retrospectively separating out the energy and system cost impacts of these actions is not straightforward. Finally, the balancing tools available to the SO do not generally deliver half-hourly blocks of energy consistent with a definition of an idealised energy imbalance price.

3.12. In this section we first review the analysis of system pollution that has been undertaken during the modification process for P211 and P212. We then seek to develop a framework for quantifying the extent of system pollution under the current arrangements and under the proposed modifications. This framework comprises two benchmarks for measuring cost reflectivity in the arrangements:

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<sup>18</sup> Gate closure is the point in time, currently 1 hour before the start of each settlement period, at which all parties must submit to the SO notifications of the volume of electricity they intend to produce and consume in that settlement period.

<sup>19</sup> See Chapter 2

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- Proxy Energy Price (PEP) comparison: Comparison of prices under the current arrangements, and under the two modifications, to a "proxy energy price" series derived from historic data using manual tagging analysis conducted by NGET;
  - Annual energy balancing cost comparison: Comparison of total annual energy balancing charges (RCRC) under the current arrangements, and under the two modifications, to the SO's underlying costs of energy balancing.

### **Review of system pollution analysis**

3.13. NGET and EDF Energy both presented analysis during the P211 modification process, as summarised below.

#### *NGET "energy plus" and "idealised stack" analysis*

3.14. NGET presented its analysis on the prevalence of "energy plus" actions at the Cash-out Review seminar hosted by Ofgem in March 2007<sup>20</sup>. As described in Appendix 7, this analysis revealed that, in volume terms, 75% of the offers and 59% of the bids included in the main imbalance price calculation could be considered as "energy plus" balancing actions. However, the analysis does not indicate the extent to which "energy plus" actions were taken out of price order and the impact of this on energy imbalance prices. To estimate the price impact, NGET presented an approach based on an "idealised stack".

3.15. Rather than basing prices on accepted bids and offers as per the current arrangements, the idealised stack uses an ex-post unconstrained schedule (EPUS) of submitted bids and offers to estimate the costs of resolving a notional half-hourly imbalance position. The methodology is very similar to that subsequently proposed for P211, although in developing the idealised stack NGET stated that it did not have a view on the most appropriate methodology for constructing an EPUS-style stack or whether an unconstrained stack, that did not incorporate the dynamic characteristics of BMUs, was a suitable methodology for cash-out pricing. Given that the results of NGET's idealised stack analysis have inevitably been compared with the prices modelled under P211 during the modification process, we compare the NGET and P211 methodologies in more detail in Chapter 4. We also discuss the results and limitations of NGET's idealised stack analysis in Appendix 7.

3.16. As NGET stated at the March 2007 Cash-out Review seminar, its modelling results for November 2006 show that on average the idealised price appears to be 9% lower and 7% higher than the comparable SBP and SSP respectively. These differentials are based on a comparison of the volume-weighted average results net of the Buy Price Adjusters (BPAs)<sup>21</sup> which are included in SBP when the system is

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<sup>20</sup> 'What is the Impact of Non Exclusive Energy Actions on Imbalance Pricing', 30 March 2007

<sup>21</sup> BPAs are added to the SBP to capture the costs associated with availability fees of certain forward Balancing Services contracts.

short. Like-for-like price comparisons using the current PAR 500 methodology are unavailable.

#### *EDF Energy analysis of "system pollution"*

3.17. EDF Energy, the proposer of P211, presented its analysis of the system pollution defect to the Modification Group. As described in Appendix 7, EDF Energy has sought to identify instances of system pollution in specific settlement periods, and has also applied a proxy for the short run marginal generation cost to estimate the likely frequency of SSP system pollution. EDF Energy concluded from its analysis that non-energy actions have had a detrimental impact on cash-out prices.

### **Benchmark 1: Proxy Energy Price comparison**

3.18. At Ofgem's request, NGET has undertaken extensive additional analysis to estimate the frequency and price impact of "energy plus" balancing actions. From this analysis we have sought to extract proxy energy prices (PEPs) that we compare to historic cash-out prices to assess the extent of the system pollution defect. In the next two chapters we use these PEPs to evaluate whether P211 and P212 produce cash-out prices that more closely reflect the underlying cost of energy balancing.

#### *Categorising balancing actions*

3.19. For each settlement period between January and September 2007, NGET has sought to categorise the activity undertaken in the BM using the following four groupings: "Reserve", "Constraints", "Response" and "Intra half-hour".

3.20. The groups are not mutually exclusive and so a single balancing action may be allocated to more than one group. Any activity not allocated to any of the defined groups is considered for this exercise to resolve pure energy imbalances. NGET emphasises that the allocation exercise requires a number of assumptions and a degree of engineering judgement. Appendix 8 set out NGET's notes on the assumptions and limitations of the categorisation process.

3.21. As shown in Appendix 7, Ofgem has analysed the results provided by NGET to assess the frequency and average price of actions falling into the different balancing categories. This analysis does not directly indicate the proportion of "energy plus" balancing actions within the PAR stack, nor does it provide evidence on how effective the current tagging arrangements are or the degree of system pollution in the cash-out price. As described below, additional assumptions are required to estimate the impact that the different balancing activities have on the outturn imbalance price. However, given the concerns raised during the Cash-Out Review regarding the lack of transparency around the SO's actions, these results do provide extremely useful background information on the nature of NGET's balancing activities.

*Estimating the price impact*

3.22. Having first categorised its balancing activities over the nine month study period, NGET then assessed the impact that these different activities have had on the outturn imbalance price. By removing groups of actions, both individually and collectively, from the imbalance price calculation, the analysis attempts to identify their impact on cash-out prices.

3.23. The tagging results show that a significant proportion of balancing actions have been tagged under one or more categories. Simply excluding tagged volumes from the imbalance calculation may therefore lead to situations in which insufficient actions remain to calculate a credible price. In these circumstances, the average price of the remaining untagged actions may not reflect the costs of resolving the overall energy imbalance in the period. To address this concern, NGET has substituted the tagged actions in the stack with an equivalent volume of energy actions at an assumed replacement price.

3.24. The assumptions regarding the replacement price are an important component of this analysis. A variety of options could be considered for the replacement price. For the purposes of this analysis, NGET has calculated a replacement price for each settlement period by creating a simple unconstrained stack of feasible bids or offers up to the value of NIV<sup>22</sup>. The volume weighted average of these actions is then used to replace the price of any actions removed in the tagging process<sup>23</sup>.

3.25. NGET used this approach to recalculate imbalance prices over the sample period, assuming that one or more categories of balancing activity were removed from the price calculation. These price series (PEPs) represent an estimate of the ideal non-polluted energy balancing price. Recognising the industry debate on the treatment of reserve creation, we have created two series:

- PEP (Base) in which reserve creation is treated as system-related and hence tagged out of the price calculation (our base case);
- PEP (Alt) in which reserve creation is treated as energy and hence not tagged out of the price calculation.

3.26. As shown in Appendix 7, the analysis suggests that system pollution is leading to an average 11.2% increase in SBP when the system is short and a 6.0% reduction in SSP when the system is long over the first nine months of 2007, assuming reserve creation actions are system-related. If reserve creation is deemed to be an energy action, the results indicate that system pollution is leading to a 5.1% increase in SBP

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<sup>22</sup> The methodology for the replacement price methodology is consistent with NGET's idealised stack approach, as described previously.

<sup>23</sup> Note that by making an assumption on replacement prices for this analysis, neither NGET nor Ofgem seek to endorse a particular replacement price methodology which might arise from the work on P217.

when the system is short and a 4.4% decrease in SSP when the system is long. In addition to assessing the average impact of system pollution over the study period, we have examined the stacks in selected individual half-hours. Appendix 9 presents the tagged actions and recalculated prices in a number of sample settlement periods, including a recent example of reported constraint activity on the transmission network between Scotland and England (29 September 2007).

3.27. The analysis presented here does not model potential changes in behaviour under a regime with different cash-out prices. The PEP estimates of energy-only cash-out prices are based upon the existing bid-offer stacks. The "pay-as-bid" nature of the BM creates incentives for participants to adjust their offer and bid prices to reflect their expectation of the marginal BOA price. There is also a feedback loop between cash-out price signals and the within-day market: when within-day prices increase in response to high cash-out price signals, BM participants holding spare capacity can be expected to raise their offer prices to reflect the higher opportunity cost of not trading out their available position ahead of gate closure. To the extent that re-pricing occurs under the current arrangements, with participants revising their bids and offers against a backdrop of cash-out signals polluted by system balancing actions, the PEP estimates may not completely eliminate the effects of system pollution.

## **Benchmark 2: Annual energy balancing cost comparison**

3.28. The second benchmark that we use to assess the extent of the system pollution defect is to compare the total annual imbalance charges recovered through cash-out to the annual costs that the SO has incurred in energy balancing. There is a high level argument that the closer these two values are the more cost reflective cash-out arrangements are (although this is not necessarily the case as even if annual figures are broadly equivalent there could be significant differences for a relatively large number of half-hours). We use this measure in the next two chapters to assess whether P211 and P212 would lead to more or less cost reflectivity in the cash-out arrangements.

3.29. A key objective of the cash-out arrangements is to target the costs of energy balancing at out-of-balance parties (as far as possible). This promotes economic efficiency. The current arrangements were designed so that the costs of system balancing are not targeted on out-of-balance parties, since they are not primarily driven by energy imbalances in each half-hour. There is not a perfect method for targeting system balancing costs, and they are currently paid by all parties based on throughput, subject to adjustments for the BSIS. If energy balancing costs were being correctly targeted, in-balance parties should have no exposure to energy balancing costs, either positive or negative.

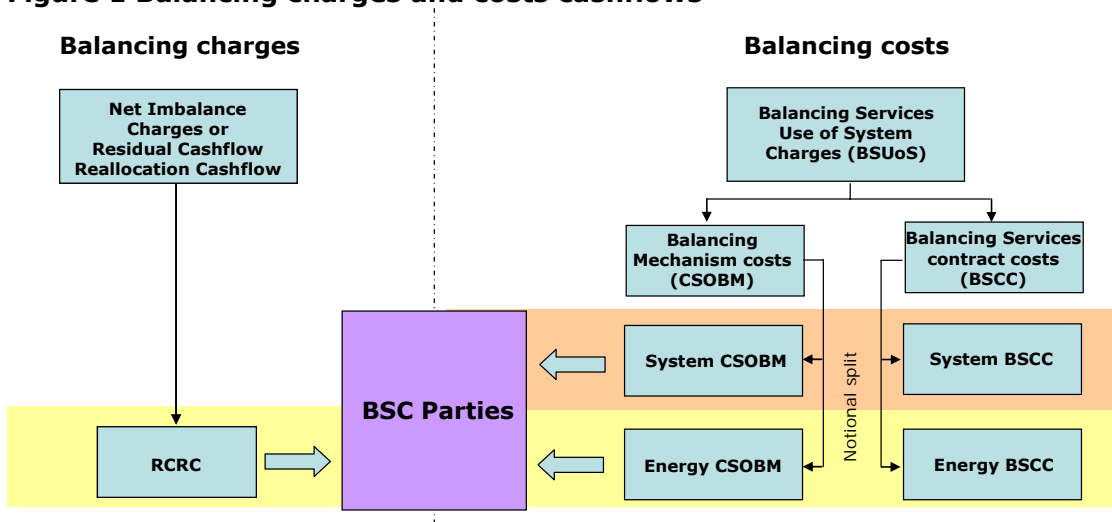
3.30. However, it is not straightforward to determine how closely energy balancing costs are being targeted at out-of-balance parties. Figure 1 illustrates the cashflows that all BSC parties are exposed to:



- Parties will pay or receive the RCRC which is the net imbalance charge for each settlement period once all out-of-balance parties have been cashed out - for most settlement periods this is currently a net payment to parties;
- Parties will pay the BSUoS charge for each period which comprises of the costs of actions in the BM (CSOBM) and the costs of Balancing Services contracts (BSCC).

3.31. Since the SO may be taking actions for both energy and system reasons, and the SO's current incentives are geared around the total costs, there is no formal separation of BSUoS into energy and system<sup>24</sup>. If there were, it should be expected that what parties receive in RCRC they should pay in energy BSUoS, and hence in-balance parties would be neutral to energy balancing costs and only exposed to system balancing costs.

**Figure 1 Balancing charges and costs cashflows**



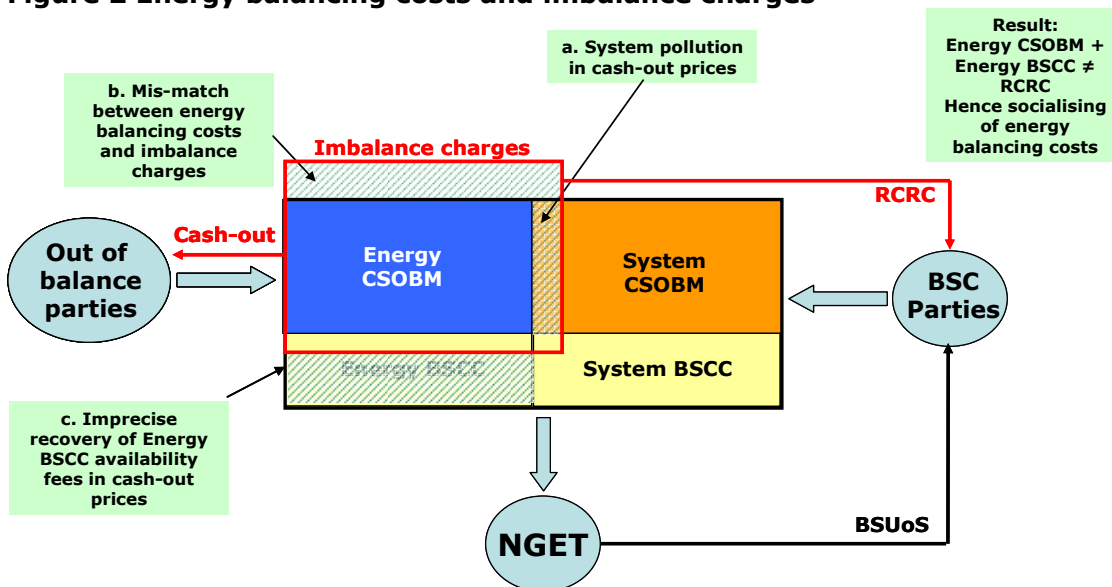
3.32. There are three reasons why net imbalance charges (RCRC) and "energy" BSUoS do not cancel each other out, as shown in Figure 2.

- First, there is the possibility of cash-out prices being polluted by system actions.
- Second, there is a mismatch driven by the way that cash-out prices are calculated. Some of this is caused by the difference between the PAR 500 averaging methodology for the main cash-out price calculation and the pay-as-bid approach for BOAs. The rest is caused by the reverse price being based on a market reference price (the MIP) which may correlate with, but does not directly relate to, the SO's energy balancing costs.

<sup>24</sup> The energy and system elements of CSOBM are not formally separated. While Balancing Services contracts are separated into energy and system by the SO, the definitions used are subject to debate.

- Third, the current BSAD methodology may lead to imprecise recovery of availability fees for Short Term Operating Reserve (STOR) and BM Start-up. As shown in Appendix 10, we estimate that 27.5% of these costs were recovered through cash-out in 2006/07.

**Figure 2 Energy balancing costs and imbalance charges**



3.33. Since both modifications are designed to address the system pollution effect, we concentrate here on the proportion of the mismatch between imbalance charges and energy balancing costs attributable to system pollution. The impact of dual pricing (main/reverse price methodology) was raised in the Cash-out Review and is currently the subject of Issue 30, and is not discussed in detail in this IA.

3.34. The issue of reserve availability fees is complex and is currently being discussed within the definition phase of P217. Some argue that all reserve should be treated as "system" and hence reserve availability fees should not be included in the cash-out calculation, whereas others argue that reserve is all energy related and that 100% should be recovered through cash-out.

3.35. We note that these views are both polar extremes and we are currently of the view that in practice reserve is required for both energy and system balancing. By contracting for reserve in advance the SO is seeking to guarantee availability (and price) of certain units, in exchange for paying an availability fee up front. This results in additional competitive bids and offers being available to the SO than would otherwise have been the case. The effect would be to dampen cash-out prices if the availability fees were completely ignored. However, by its nature not all reserve is fully utilised in each half-hour and hence it would seem inappropriate to target the total costs to parties whose aggregate imbalances may be significantly less than the contracted reserve volume. Furthermore, we do not think that the utilisation of all STOR and BM Start-up contracts is necessarily purely energy related. For example, it seems very likely given the prevalence of "energy plus" actions generally, that

BOAs relating to STOR and BM Start-up contracts will be used to address system related activities such as frequency response, constraint management and intra half-hour balancing<sup>25</sup>. This being the case, it could be argued that a certain proportion of reserve availability costs is system related.

3.36. For the purposes of assessing P211 it is not necessary to take a view on the correct split of reserve availability fees into energy and system since it does not seek to change the current BSAD methodology. However, since P212 implicitly changes the BSAD methodology by removing BPAs from the cash-out price calculation, it is necessary to take a view of the proportion of reserve availability fees that should be deemed to be energy balancing costs. We have not undertaken detailed analysis of the utilisation of reserve in this IA, and for simplicity we adopt the current BSAD methodology as the proxy definition of the energy/system split in reserve availability fees, namely approximately 30% energy:70% system. This is not to say that we think that this is necessarily the correct split and further analysis is required in this area.

3.37. Given the lack of transparency in defining "energy" BSUoS it is difficult to quantify exactly the extent to which the efficient targeting of energy balancing costs to out-of-balance parties is distorted by system pollution. Our methodology for assessing the impact of system pollution is outlined in Appendix 7. The results, which compare estimated annual energy balancing costs to annual imbalance charges (RCRC), are shown in the table below.

**Table 1 Estimated energy balancing costs and imbalance charges**

£m	Current	PEP (Base)
Energy CSOBM	25.18	25.18
Energy BSCC	21.56	21.56
<b>Total energy balancing costs</b>	<b>46.74</b>	<b>46.74</b>
RCRC	117.28	74.06
<b>Net over/(under) recovery</b>	<b>70.54</b>	<b>27.32</b>
Effect of system pollution		43.22

3.38. On this basis, annual energy balancing costs are approximately £47m whereas total annual imbalance charges (RCRC) under the current arrangements are approximately £117m. This suggests an annual net over-recovery of approximately £70m, i.e. out-of-balance parties are paying £70m too much in cash-out relative to the SO's underlying costs of energy balancing. With the effect of system pollution removed under the PEP (Base), this over-recovery would fall to £27m, suggesting that system pollution is costing out-of-balance parties around £43m<sup>26</sup> annually. (The remaining £27m mismatch is attributable to dual pricing and PAR 500 imbalance charging versus pay-as-bid for BOAs.)

<sup>25</sup> Under the current BSAD methodology where BM Start-up is used for constraint management these costs are excluded from the BPA.

<sup>26</sup> The extent of system pollution would be less, approximately £22m, under the PEP (Alt) case where the costs of reserve creation are deemed as energy rather than system.

3.39. A party with an average balancing performance will, on average, be unaffected financially by the system pollution effect since the additional charges it faces through cash-out will be offset by additional receipts through RCRC. However, the cost of system pollution is borne disproportionately by parties less able to balance, such as small suppliers, distributed energy providers and intermittent renewable generators. Using our cash-out simulation model<sup>27</sup>, we estimate that small suppliers and intermittent renewable generators pay on average an additional £0.05/MWh and £0.14/MWh respectively for imbalance settlement due to system pollution. By contrast, we estimate that an average vertically integrated player is approximately £0.01/MWh better off due to the proportionally higher rebate that it receives through RCRC relative to the size of its imbalance. For a small supplier with an average customer demand of say 10 TWh/annum, the effect of system pollution could be to add £500,000 to its annual costs, which is significant in the context of a low margin business, and this does not include the possible knock-on effect of system pollution in the short term markets and in contract and risk premia.

3.40. It should be noted that this analysis only seeks to quantify the impact of system pollution on different parties. Including a greater proportion of reserve availability fees in cash-out, as some advocate, would act in the opposite direction to removing system pollution, and sharpen the signals from cash-out prices. This would act to increase the share of the SO's balancing costs borne by those parties with weaker balancing performance.

## Summary

3.41. In summary, we believe that the following actions should be deemed as system and excluded from the calculation of cash-out prices:

- constraint management
- frequency response
- intra half-hour
- reserve creation

3.42. We think that we have presented evidence to suggest that currently all four categories are polluting cash-out prices. Our analysis indicates that the impact of system pollution falls disproportionately on those parties less able to balance as a result of the nature of their portfolio or scale of operation, including many of the lower carbon players such as wind and distributed energy generators.

3.43. We have constructed two unpolluted energy price series - PEP (Base) in which all four system balancing actions have been removed, and PEP (Alt) recognising the view of some parties that reserve creation should be deemed an energy action and

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<sup>27</sup> Described in Appendix 11.

not tagged out of cash-out. Prices generated by P211 and P212 are compared to these proxy energy prices (Benchmark 1) in the subsequent two chapters.

3.44. We think that the current arrangements are leading to annual imbalance charges that are not fully reflective of the annual costs incurred by the SO in energy balancing, and that system pollution is a key contributor to this mismatch. The mismatches between annual imbalance charges generated under P211 and P212 and the SO's energy balancing costs (Benchmark 2) are assessed in the subsequent two chapters.

## 4. Costs and benefits of Modification Proposal P211

**Chapter summary** This chapter examines the costs and benefits of P211.

### Question box

Question 2: Do you agree with our assessment of the costs and benefits of P211?

4.1. In this chapter, we summarise the analysis of P211 in terms of the potential impacts on economy and efficiency, and on competition. Since P211 seeks to improve the cost reflectivity of cash-out prices by removing the effects of system pollution, much of our analysis is focused on comparing the targeting of costs to out-of-balance parties under P211 and under the current baseline. Consistent with Ofgem's wider statutory duties, we then go on to consider the other areas that P211 could affect, including security of supply and sustainable development. In undertaking this analysis, we have initially considered the direct effects of the modification proposal on the derivation of the cash-out price, assuming no significant changes in participant behaviour. We then consider the potential impact of P211 on the incentives to balance. Later in this chapter, we address other possible changes in behaviour by participants in response to P211, including concerns over gaming.

4.2. While Ofgem has endeavoured to consider all the material costs and benefits that would be likely to result from the implementation of P211, certain issues lend themselves to quantitative analysis better than others. The analysis has concentrated on examining the impact of P211 in terms of efficient cost targeting and effective competition. This is the area in which P211 is intended to deliver a net benefit, and was also the most hotly disputed during the modification process.

4.3. The central costs of implementing P211 were estimated in the Elexon FMR and we have not sought to develop our own estimates of these costs.

### Economy and efficiency

4.4. This section focuses on what impact P211 might have on cash-out prices, the overall level of participants' imbalance exposure and the SO's balancing costs.

4.5. A key consideration is whether P211 will improve the targeting of energy balancing costs to out-of-balance parties. As stated previously, it is extremely challenging to establish a benchmark for an idealised energy balancing price free from the effects of system pollution. Here we draw upon the PEP values derived from the NGET tagging analysis presented in Chapter 3 to estimate the likely range in which a cost reflective energy price might lie.

### Impact on cost targeting

4.6. To support the Modification Group's analysis of P211, cash-out prices were modelled and recalculated using the P211 methodology for the 13 month period

1 March 2006 to 31 March 2007<sup>28</sup>. Prices were also recalculated for certain days outside this date range that were selected as illustrative periods of system stress or known transmission constraints. Retrospective analysis of this nature ignores secondary effects such as potential changes in behaviour, but has proved useful in informing discussions on previous proposed cash-out modifications.

4.7. Table 2 summarises the recalculated P211 price results for the period 2 November 2006 to 31 March 2007<sup>29</sup>. Modification P205 introduced the PAR 500 methodology on 2 November 2006, and so live cash-out prices from this date provide the baseline for comparison.

**Table 2 Comparison of P211 and live average cash-out prices**

<b>2/11/06-31/3/07 (£/MWh)</b>	<b>SBP all periods</b>	<b>SBP short periods</b>	<b>SSP all periods</b>	<b>SSP long periods</b>
P211 prices	32.89	53.75	22.03	18.74
Live prices	35.82	64.13	21.20	17.54

4.8. Over this five month period, the P211 approach produced a SBP that was on average 16.2% lower than the current arrangements when the system was short and a SSP that was on average 6.8% higher when the system was long.

#### *Comparison with NGET idealised stack analysis*

4.9. NGET presented the results of its idealised stack analysis at the March 2007 Cash-out Review seminar to inform discussions on the extent of system pollution. NGET's analysis was not intended to provide a cost-reflective energy price benchmark for subsequent cash-out modifications. Inevitably, however, comparisons have been drawn during the modification process between NGET's results and the recalculated P211 prices. Ofgem notes that these comparisons appear not to have been made on a like-for-like basis, with potential discrepancies including the comparison date range, averaging methods and BSAD treatment. It is therefore instructive to review the similarities and differences between the NGET and P211 modelling approaches and results.

4.10. NGET's analysis covered a one month period (2 to 30 November 2006). Table 3 compares the SBP and SSP averages for P211 and NGET's idealised stack over this

<sup>28</sup> A summary of the recalculated price analysis was published as an attachment to Elexon's Assessment Report for P211.

<sup>29</sup> Note that the average values shown here for P211 differ slightly from those presented previously by Elexon. Ofgem asked Elexon to recalculate the P211 prices after an error was spotted in the application of default rules when the system was short. This error occurred in 306 periods between March 2006 and March 2007, and the corrected P211 SBP values in these periods were £22.4/MWh lower on average. Between 2 November 2006 and 31 March 2007, the corrected P211 SBP values in the 47 affected periods were £5.7/MWh lower on average, but the impact on the average SBP in all short periods was only £0.1/MWh (or 0.2%).

one month<sup>30</sup>. Ofgem has adjusted the NGET SBP results to include the BPA component for consistency with the P211 and live cash-out prices. However, it should be noted that NGET calculated its stack prices on a simple volume-weighted average (VWA) basis, whereas the P211 and live prices have had PAR tagging applied such that only the most expensive 500 MWh of remaining bids or offers is averaged<sup>31</sup>.

**Table 3 Comparison of P211, NGET idealised stack and live cash-out prices**

<b>2/11/06-30/11/06 (£/MWh)</b>	<b>SBP short periods</b>	<b>SSP long periods</b>
P211 prices (PAR 500)	78.22	23.02
NGET stack (VWA)	81.87	23.05
Live prices (PAR 500)	89.01	21.36

4.11. When the system was long in November 2006, the P211 EPUS methodology and NGET idealised stack appear to produce very similar prices on average, with the P211 prices 7.8% higher than actual SSP. There is a greater differential between the P211 and NGET SBP results in short periods. The P211 prices are 12.1% lower on average than the live SBP when the system was short, while the NGET stack price is 8% lower. NGET had reported a 9% SBP differential between its idealised stack and a comparable volume-weighted average price based on accepted offers.

4.12. The EPUS methodology proposed for P211 is very similar to the idealised stack approach described by NGET, and so the comparable results for November 2006 are not surprising. Ofgem understands that there are four main differences between the P211 and NGET methodologies:

- As noted already, NGET did not apply PAR tagging;
- NGET also omitted arbitrage tagging<sup>32</sup> in its approach;
- NGET excluded BSAD variables in the idealised stack price calculation whereas energy BSAD is incorporated in the P211 EPUS stack;
- NGET applied a rule to exclude generators with long notice periods extending beyond gate closure<sup>33</sup> whereas all plant dynamic parameters are ignored in P211 as proposed.

<sup>30</sup> Half-hourly P211 and idealised stack results were provided by Elexon and NGET, respectively.

<sup>31</sup> Although the VWA and PAR results are not directly comparable, NIV exceeded 500 MWh in only 5% of short periods and 31% of long periods during November 2006.

<sup>32</sup> As explained in Appendix 5, arbitrage tagging is applied in the current arrangements and in the P211 methodology to remove bids and offers with overlapping prices from the cash-out price calculation.

<sup>33</sup> Plant with a FPN= $\leq 0$  must have a NDZ declaration of 89 minutes or less to be included in NGET's idealised stack (FPN and NDZ are described in the Glossary)



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4.13. The first two differences would be expected to depress (lower SBP, raise SSP) the NGET stack price relative to the P211 price, while the final two differences are likely to have the opposite effect<sup>34</sup>. We have not attempted to quantify the significance of each of these discrepancies between the two methodologies. However, the resulting prices for November 2006 imply that the net effect is modest on average, particularly when the system is long.

*Constrained and system stress days*

4.14. A number of settlement days characterised by known transmission constraints or system stress conditions were selected for more detailed analysis by the P211 Modification Group.

4.15. The selected transmission constraint examples were all related to the "Cheviot" constraint between England and Scotland that was known to be active in 2005 after the introduction of BETTA. Some respondents to Elexon's assessment procedure consultation suggested that the Cheviot constraint has subsequently been alleviated by the SO's actions in the forward market, and commented on the lack of more recent evidence for this particular system pollution defect. Elexon's consultation took place prior to the incidence of transmission constraint events in September and October 2007<sup>35</sup>, which have demonstrated the ongoing potential for system pollution of cash-out prices under the current arrangements. NGET has subsequently indicated that it expects the incidence of Cheviot constraints to increase significantly over the next year due to planned transmission outages associated with a major network upgrade programme<sup>36</sup>.

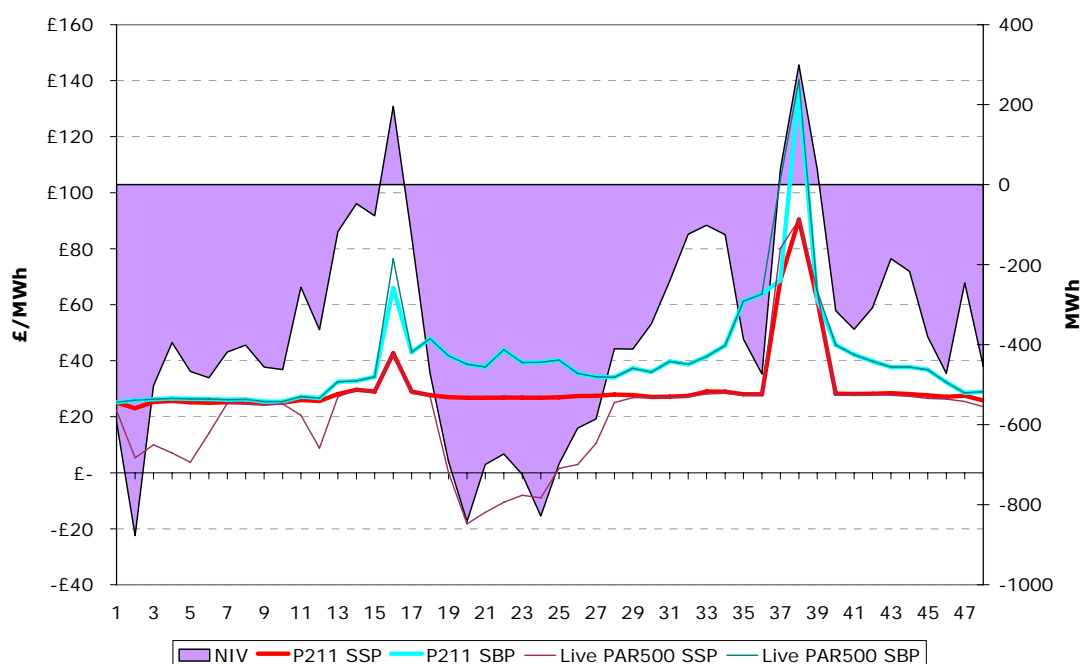
4.16. Here we reproduce Elexon's P211 recalculated price analysis for one of these Cheviot constraints days, 19 October 2005. Note that the live SBP and SSP values in Figure 3 have been adjusted to represent PAR 500 prices, since PAR tagging was not implemented until November 2006. The market imbalance NIV indicates the direction of the main and reverse cash-out prices.

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<sup>34</sup> Note that the fourth discrepancy, NGET's rule to exclude generators with long notice times, only applies to offers. This may partly explain why a greater differential was observed for the SBP results than the SSP results.

<sup>35</sup> See the sample BOA stacks for 29 September presented in Appendix 9 and the recalculated price analysis for this day below.

<sup>36</sup> During 2008/09 major construction works will begin on the Scotland-England border to increase the capacity of the system to connect renewable generation in Scotland. As indicated in NGET's "Initial Proposals Consultation" on SO incentives (issued 7 December 2007), there are 30 weeks of programmed outage on the Cheviot boundary circuits in 2008/09, compared to 8 weeks in 2007/08.

**Figure 3 Comparison of P211 and live prices on 19 October 2005**

4.17. The graph shows that the adjusted PAR 500 live SSP is negative for five periods on this day<sup>37</sup>. It is believed that this was due to the impact of bids accepted to relieve the Cheviot transmission constraint. For example, according to BMRS<sup>38</sup> data for settlement period 21 on 19 October 2005, the SO accepted bids to reduce output from three Cockenzie units and one Longannet unit in Scotland - all these bids were priced at minus £50/MWh. By contrast, the recalculated SSP for P211 is broadly flat at around plus £27/MWh during this portion of the day, indicating the depth of positively priced bids available to the SO if energy balancing was the only consideration.

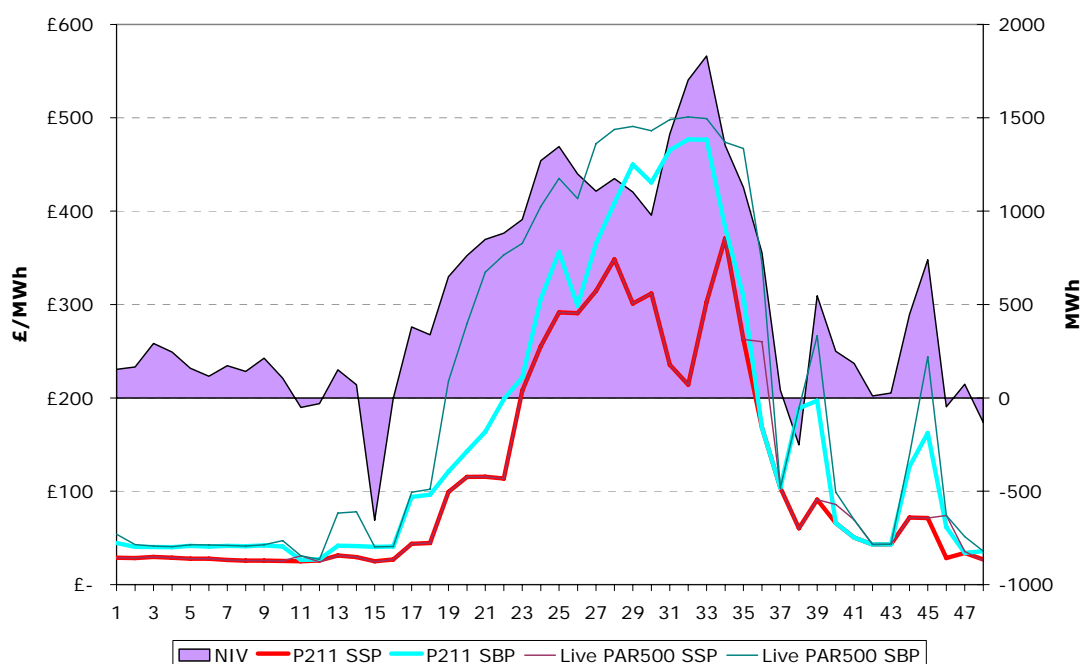
4.18. EDF Energy, the proposer of P211, stated that the recalculated price analysis clearly demonstrated how the P211 approach removed the impact of the Cheviot constraints from cash-out prices, thereby providing a more appropriate signal of the costs of energy balancing. Ofgem agrees with EDF Energy that, on the limited number of Cheviot constraint days analysed, P211 does appear to be effective at removing the potential pollution of cash-out prices by constraint-related balancing actions, although it should be noted that we do not have access to a benchmark unpolluted energy price for these days. Later in this section we review a more recent example of reported constraint activity and compare the recalculated P211 price to the PEP benchmark.

<sup>37</sup> The actual volume weighted average SSP was negative in two periods on 19 October 2005.

<sup>38</sup> Bid and offer data are publicly available on the BMRS website [www.bmreports.com](http://www.bmreports.com).

4.19. One of the system stress days assessed by the P211 Modification Group was 18 July 2006, on which the SO issued a High Risk of Demand Reduction (HRDR) notice<sup>39</sup>. Figure 4 shows the recalculated P211 and live prices for this day, together with NIV. The live prices have been adjusted for the PAR 500 rule. The large positive NIV values over the peak period of the day illustrate that the system was significantly short at these times.

**Figure 4 Comparison of P211 and live prices on 18 July 2006**



4.20. It can be seen that the P211 SBP does track sharply upwards in the periods when the system is particularly short, although the peak price is slightly below the adjusted PAR 500 live SBP. Ofgem notes that the actual SBP, calculated using the pre-P205 volume weighted average methodology, peaked at £387/MWh on 18 July 2006. This is £78/MWh less than the P211 SBP in the corresponding period, implying that the P211 price would have provided a stronger signal to balance than the arrangements that were in force on this High Risk of Demand Reduction day.

#### *FMR views on cost targeting*

4.21. The FMR for P211 acknowledges the difficulty of establishing whether prices calculated under P211 or the current baseline are closer to an optimal price that reflects the costs of energy balancing. The P211 Modification Group noted the divergence between the P211 recalculated prices and actual cash-out prices, but was

<sup>39</sup> The 18 July 2006 was also analysed in Ofgem's P205 decision letter.

unable to draw a conclusion from this analysis. Elexon's Assessment Report states that "without any benchmark for where an optimal price (without any tagging imperfections) would lie (and acknowledging that this was unlikely to be achievable), the [P211 Modification] Group could not conclude whether the P211 prices were better estimates of the true energy costs of the SO balancing the system than the current arrangements".

4.22. Although the recalculated price analysis was felt to be inconclusive, the majority view of the Modification Group was that P211 would lead to less cost reflective imbalance prices. Elexon's Assessment Report and the FMR both state this majority view in the assessment of P211 against the applicable BSC objectives:

"The Modification creates a trade-off where more cost reflective Energy Imbalance Prices are sacrificed in all Settlement Periods for removing a defect that has only been shown to occur from time to time."

4.23. Ofgem does not understand how the Modification Group reached this strong conclusion on the basis of the quantitative analysis presented during the modification process. However, a number of more qualitative arguments were put forward in support of the view that P211 would lead to less cost reflective imbalance prices.

4.24. The majority view expressed in Elexon's reports is that cash-out prices would be less cost reflective under P211 because the EPUS methodology breaks the linkage between energy imbalance prices and the actual costs incurred by the SO in balancing the system. Since P211 bases cash-out prices on the actions that were theoretically available to the SO rather than the actual actions taken, there are concerns that the imbalance price calculation may include bids and offers that cannot feasibly be accessed by the SO. As stated in Elexon's Assessment Report and FMR, a majority believed:

"Cost reflectivity will be reduced as the Proposed Modification moves away from what the SO actually did to resolve the imbalance on the system."

4.25. The opposing minority view was that P211 would produce more cost reflective price by removing the impact of system balancing actions.

4.26. It is undoubtedly the case that the P211 solution does move away from utilising the costs of the actual balancing actions taken by the SO. The key question for this IA is whether P211 will increase or decrease how cost reflective the imbalance price is of the costs of energy balancing compared to the current baseline. This will depend on:

- The extent to which the actual costs considered in the current imbalance price calculation are polluted by non-energy balancing actions;
- The extent to which the P211 methodology underestimates the costs of energy balancing faced by the SO in practice (e.g. by ignoring dynamic considerations and assuming perfect foresight).

4.27. We discuss these points further below by comparing P211 to the two benchmarks of cost reflectivity identified in the previous chapter.

*Benchmark 1: Proxy Energy Price comparison*

4.28. Ofgem asked NGET to undertake additional analysis to assess the materiality of system pollution between January and September 2007. By focusing on more recent settlement periods, we sought to inform the industry debate as to whether the effect of transmission constraints on the pollution of the energy imbalance price has diminished since the initial BETTA period in 2005. By investigating the frequency and price impact of the various categories of "energy plus" balancing actions, we also aimed to improve our understanding of the likely range in which an idealised energy balancing cost may lie.

4.29. NGET's tagging analysis has provided additional insights into the extent of system pollution under the current arrangements. As discussed in Chapter 3, the results indicate that over the first nine months of 2007, non-energy balancing actions may have increased SBP by between 5% and 11%, depending on the treatment of reserve creation in the energy/system tagging analysis. For SSP, the price impact of system pollution over this period is estimated as between 4% and 6%.

4.30. Actual rather than available balancing actions comprise the starting point for NGET's tagging analysis. The practical constraints of plant dynamics and imperfect foresight will therefore have been a factor in the selection of the untagged (energy balancing) actions in the stack. A comparison of the NGET tagging and P211 results should therefore yield some insights as to the materiality of ignoring these practical considerations in the P211 EPUS methodology. However, the PEP values emerging from NGET's tagging analysis also depend on the replacement price that is chosen for the tagged system balancing actions in the stack. The NGET results presented here utilise an idealised stack to estimate the average cost of a replacement energy action in each settlement period. As discussed previously, NGET's stack approach is similar to P211 in assuming perfect foresight at gate closure. Unlike P211, NGET's stack methodology does incorporate a dynamic selection rule, albeit very limited in scope (only offers/bids with notice times beyond 89 minutes are excluded).

4.31. Table 4 compares the PEP results to the P211 recalculated and live prices between January and March 2007, the time period for which the two analytical studies overlap. Percentage differentials are shown relative to live prices. On average, the PEPs lie between the P211 and live prices. The "PEP (Base)" SBP average is closer to the P211 value, whereas the alternative "PEP (Alt)" SBP, treating all reserve creation actions as energy, is closer to the live price. The spread between the SSP values is narrower, although both the PEP values are closer to the P211 price than the live price.

**Table 4 Comparison of P211, PEP and live cash-out prices**

<b>1/1/07-31/3/07 (£/MWh)</b>	<b>SBP short periods</b>		<b>SSP long periods</b>	
P211 prices	48.66	-17.7%	16.64	+5.9%
PEP (Base)	50.28	-15.0%	16.35	+4.0%
PEP (Alt)	55.52	-6.1%	16.31	+3.8%
NGET PAR 500 baseline	58.91	-0.4%	15.75	+0.2%
Live prices	59.13	0	15.72	0

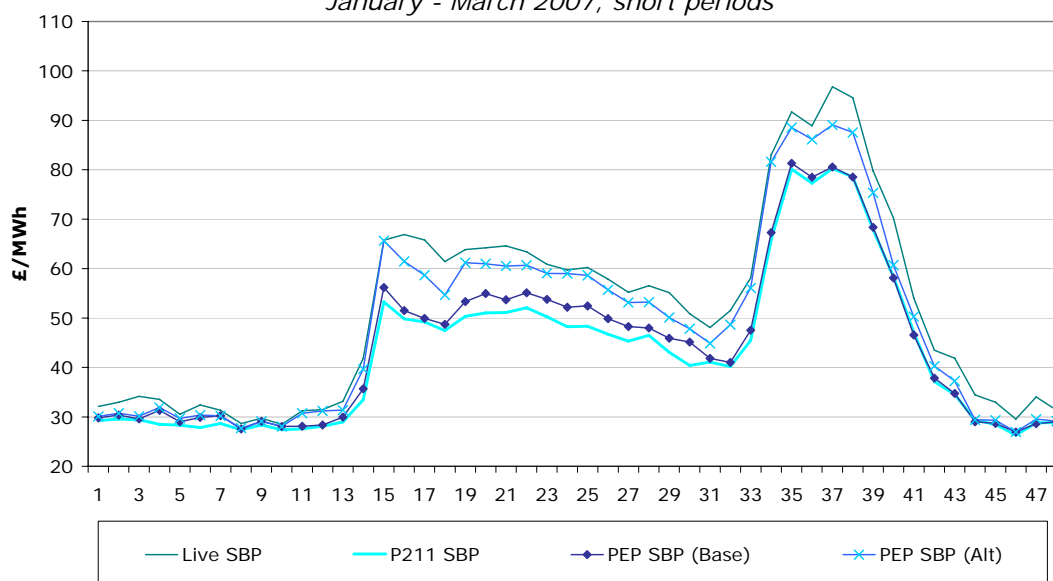
4.32. The NGET PAR 500 baseline values have been included to illustrate the magnitude of modelling errors arising from differences between NGET's PAR imbalance price calculations and the live arrangements (for example, NGET's calculations do not model arbitrage). The differential between the live prices and NGET baseline does not appear to be material on average over this time period.

4.33. The lower SBP and higher SSP average prices observed under P211 compared to the PEP values are consistent with the concern that the P211 EPUS methodology may underestimate the true costs of energy balancing by ignoring dynamic considerations and assuming perfect foresight. Nevertheless, the gap between the PEP and live prices indicates the potential extent of system pollution in the current baseline.

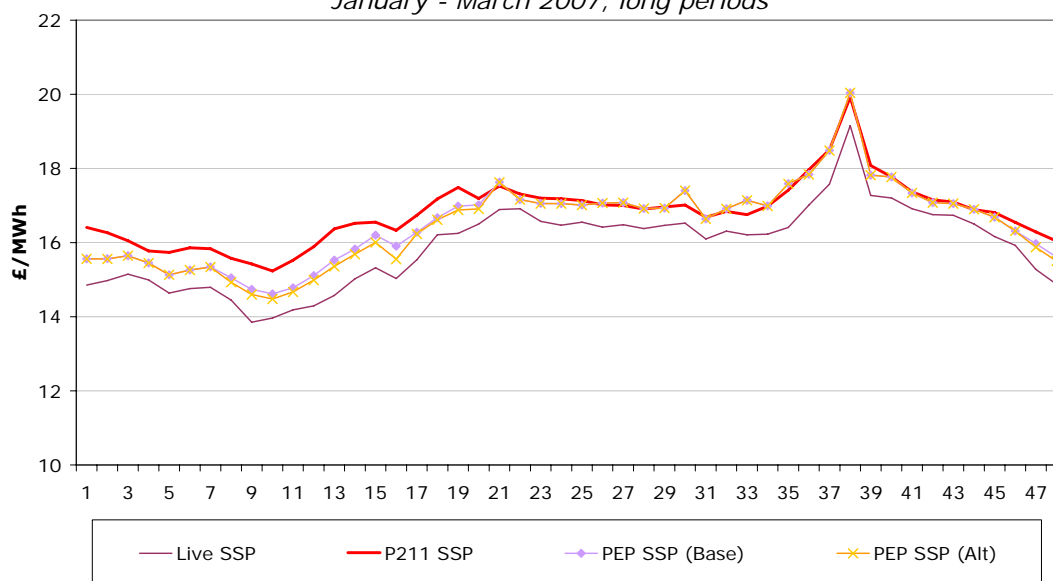
4.34. There are clearly limitations to the derivation of the proxy energy prices from the NGET tagging analysis - notably in the assumptions required for the categorisation process and replacement price methodology. It could be argued that basing replacement prices upon an idealised stack may lead to the PEP underestimating the true costs of energy balancing. On the other hand, as discussed in Chapter 3, there may be a counter-acting effect due to the repricing of bids and offers in response to polluted cash-out price signals. In the absence of alternative benchmarks, we consider that these PEP results do provide a useful indicator of the likely range in which an idealised energy balancing price would lie.

4.35. Figure 5 and Figure 6 compare the average main imbalance price by settlement period between January and March 2007.

**Figure 5 Average "main" SBP by settlement period**  
*January - March 2007, short periods*



**Figure 6 Average "main" SSP by settlement period**  
*January - March 2007, long periods*

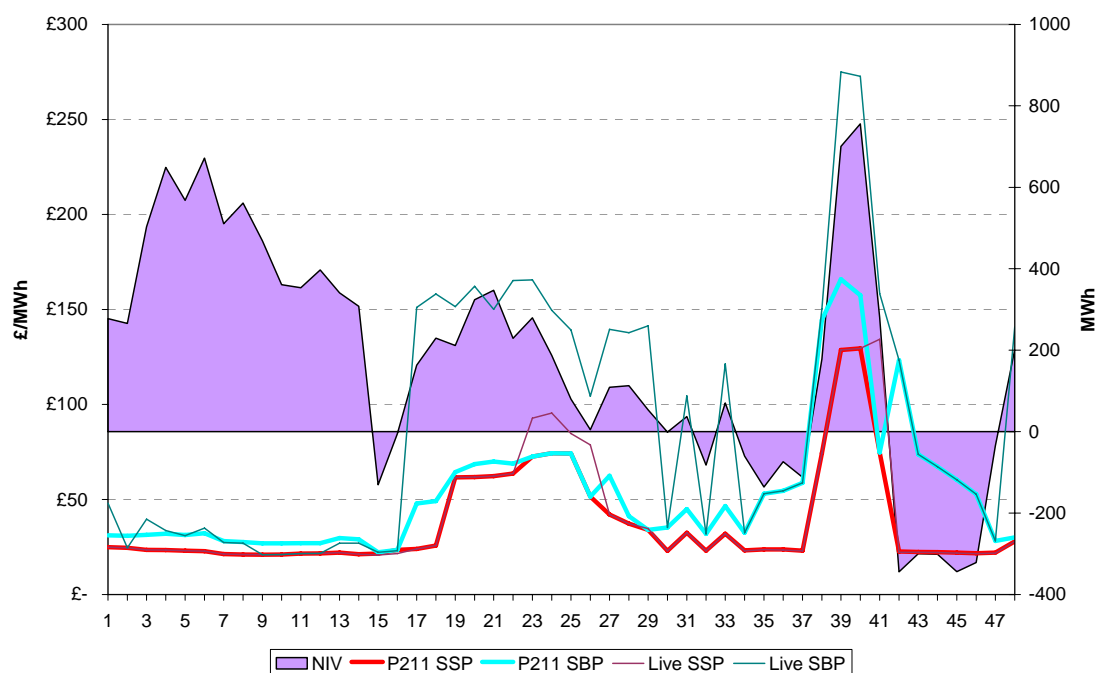


4.36. When the system is short, the average PEP (Base) SBP closely follows the P211 price in the majority of periods. PEP (Alt) is generally higher and closer to the live SBP value. There is little differential between the two PEP SSP values in long periods. The PEP SSP values lie midway between the P211 and live prices off-peak (overnight) but are notably closer to the P211 SSP value over the rest of the day.

4.37. The transmission constraint examples considered in Elexon's Assessment Report were all taken from 2005. In order to study a more recent event of potential

system pollution, Ofgem asked Elexon to recalculate cash-out prices using the P211 methodology for 29 September 2007. As stated previously, it has been reported that network constraints on this day led to NGET taking balancing actions to increase output from generation plant in Scotland. Figure 7 plots the live and P211 cash-out prices along with NIV by settlement period. As shown by NIV, the system was net short for most of the day.

**Figure 7 Comparison of P211 and live prices on 29 September 2007**

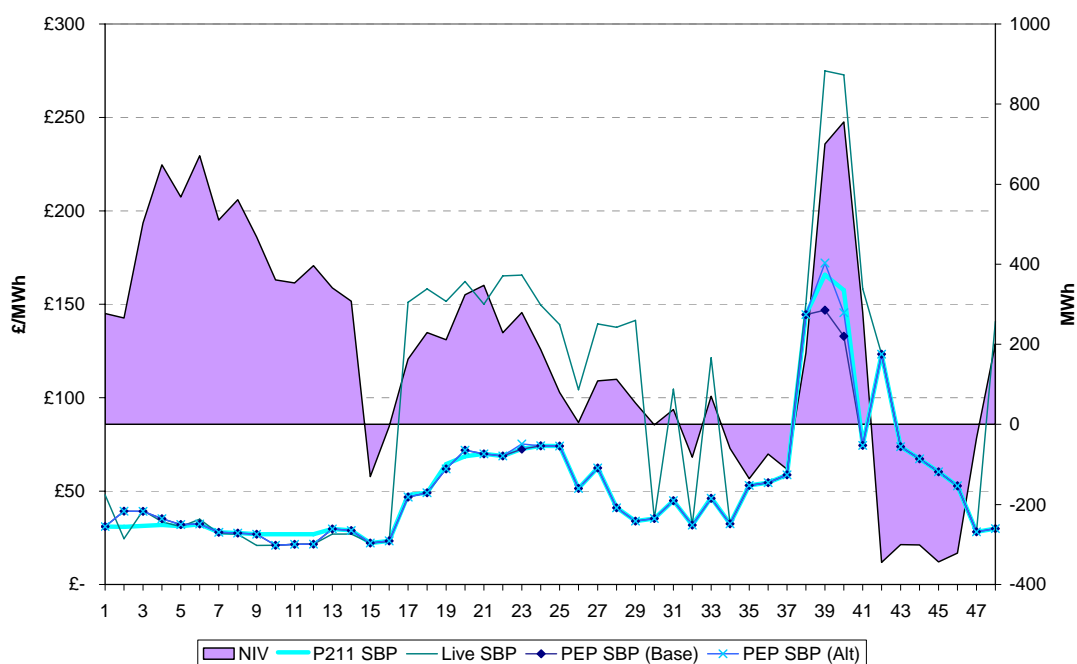


4.38. The P211 SBP is consistently lower than the live SBP from period 17 onwards. The peak SBP in period 39 is £109/MWh lower under P211 than the live price of £275/MWh, a decrease of 40%<sup>40</sup>. The daily average SBP is also 40% lower under P211 than the current arrangements.

4.39. Figure 8 shows the live and P211 SBP values for 29 September 2007 together with the PEP SBP results. The PEP (Base) and PEP (Alt) recalculated prices are both very close to the P211 price. Given that the PEP values estimate energy-only balancing costs, these results indicate that the live SBP was indeed influenced by non-energy actions on this day.

<sup>40</sup> Note that both the live and P211 SBP in this period include a sizeable BPA component of £52/MWh.



**Figure 8 Comparison of P211, live and PEP SBPs on 29 September 2007**

4.40. As was noted in the FMR, an imbalance price that is more reflective of energy balancing costs is likely to lie between the P211 EPUS price and the current baseline. The analysis presented in this IA has confirmed the potential for cash-out prices to be polluted by non-energy actions under the current arrangements. On the other hand, by ignoring generator dynamic constraints and imperfect foresight, the P211 EPUS methodology is likely to underestimate actual energy balancing costs.

4.41. The results of NGET's tagging analysis reinforce this viewpoint. The indicative PEPs excluding non-energy balancing actions lie between the P211 prices and live prices on average. The spread between the PEP (Base) and PEP (Alt) results emphasises the significance of agreeing the classification of reserve creation as either system or energy. Under our central view that reserve creation is system related, the analysis suggests that on average P211 would produce cash-out prices that would more closely reflect the costs of energy balancing than the current arrangements.

#### *Benchmark 2: Annual energy balancing cost comparison*

4.42. The magnitude of cash-out prices and the spread between them influences the level of RCRC received or paid by market participants. The recalculated P211 prices have been used to recalculate RCRC, assuming no change in market behaviour. Elexon reports that the recalculated RCRC was significantly lower under P211 than the prevailing arrangements: for the period 1 March 2006 to 31 March 2007, the P211 RCRC was £48m less than the historic RCRC, a reduction of around 50%. Given the upward trend in RCRC since the implementation of P205 in November

2006<sup>41</sup>, the average reduction in RCRC is likely to have been more significant in the latter months of the P211 study.

4.43. We have estimated the potential impact of P211 on RCRC and the mismatch between energy balancing costs and imbalance charges. Table 5 compares energy balancing costs and RCRC under the current arrangements, the PEP (Base) and P211 (assuming no behavioural change).

**Table 5 Estimated annual balancing cost comparison for P211**

<b>£m</b>	<b>Current</b>	<b>PEP (Base)</b>	<b>P211</b>
Energy CSOBM	25.18	25.18	25.18
Energy BSCC	21.56	21.56	21.56
<b>Total energy balancing costs</b>	46.74	46.74	46.74
RCRC	117.28	74.06	67.03
<b>Net over/(under) recovery</b>	70.54	27.32	20.30

4.44. This analysis suggests an annual decrease in RCRC under P211 of approximately £50m, which is consistent with the Elexon analysis. It also signals that P211 would lead to a £50m decrease in the over-recovery of imbalance charges. This exceeds the estimated £43m annual cost of system pollution identified in Chapter 3. It reinforces the conclusion that P211 may under-estimate the cost of energy balancing in its main price calculation, whilst overall providing a closer match with the PEP (Base)<sup>42</sup>. Under the PEP (Alt) case, where reserve creation is included in the energy balancing costs, P211 would significantly overestimate the effect of system pollution, reducing imbalance charges by approximately £50m compared to approximately £22m costs of system pollution.

4.45. Elexon's P211 Assessment Report notes that there could be upward pressure on RCRC if more benign cash-out prices reduce the incentive on participants to balance. We consider the potential impact of P211 on incentives to balance in the following section.

### *Summary*

4.46. Using our two benchmarks, and under our base case definition of energy balancing, P211 would be more cost reflective than the current arrangements. Prices generated under P211 are a closer match to the PEP (Base) and annual imbalance

<sup>41</sup> Total RCRC over the first six months of 2007 was almost double that of the comparative period in 2006 (£63m compared to £33m).

<sup>42</sup> In aggregate P211 appears to yield a closer match between energy balancing costs and imbalance charges than the PEP (Base) would. This is because the residual estimated £27m of over-recovery under the PEP (Base) case caused by dual pricing would be partially offset by under-recovery in the main price calculation under P211. In our view, the PEP is a closer estimate of underlying energy balancing costs in each period than the P211 price.

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charges would more closely match the SO's energy balancing costs. However, P211 may tend to underestimate the actual cost of energy balancing because of the failure to capture the premia on balancing actions required to resolve unforeseen short notice changes in the supply/demand balance. Should reserve creation be considered to be an energy rather than a system action (which is not our current view) then P211 would significantly underestimate the costs of energy balancing and would be less cost reflective than the current arrangements.

### **Impact on incentives to balance**

4.47. Market participants are not obliged to balance their positions in each half-hour, but cash-out prices provide a financial incentive for them to do so. If the cash-out price correctly signals the SO's costs of energy balancing, generators and suppliers would be expected to take actions to balance their own positions if they are able to do so at lower cost than the SO.

4.48. As expressed in Elexon's Assessment Report and FMR, the majority view of the P211 Modification Group was that P211 would provide less incentive to avoid being out-of-balance in the same direction as the system. This followed the recalculated price analysis which showed that, under identical conditions, P211 led to more benign prices (lower SBP, higher SSP) than the current baseline. It was argued that the reduced incentive to balance would increase the need for SO balancing actions, raising SO costs. Opponents of P211 believed that higher SO balancing costs under P211 would not be appropriately targeted to out-of-balance parties, and would therefore need to be recovered by other means (BSUoS), to the detriment of competition.

4.49. The view of P211 supporters was that there would be a reduced incentive for parties to go long on average (to avoid what they regarded as potentially penal values of SBP caused by system pollution). Compared to the current baseline, this would reduce the actions the SO needs to take to address the net length on the system, thereby lowering balancing costs. Those in favour of P211 also noted that the recalculated price analysis shows that P211 prices do rise at times of system stress and therefore retain appropriate signals to balance.

4.50. Changes in balancing behaviour and the resulting system length will impact the SO's balancing costs. Elexon's FMR summarises NGET's view as to the potential impact of P211 on SO balancing costs. Due to the uncertain impact of P211 on NIV, NGET did not take a view as to whether SO balancing costs would rise or fall under P211. NGET described the likely relationship between NIV and BSUoS costs<sup>43</sup> but

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<sup>43</sup> NGET stated that if NIV became less long than at present, BSUoS costs would be expected to increase due to a reduction in bid receipts (as the SO would be accepting fewer bids on average) and an increase in reserve costs (due to the reduction in NIV length that the SO could use as reserve). Conversely, if NIV tended to become longer under P211, NGET expected that BSUoS costs would fall due to an increase in bid receipts and a reduction in reserve costs.

commented that the total costs to the industry may not change in the same net direction as the SO's costs. For example, a reduction in SO costs under a longer NIV scenario may be more than offset by increased costs to participants in procuring the contract positions that led to the additional market length. As stated previously, Ofgem considers that cost reflective cash-out prices should lead to an efficient allocation of balancing activities between the SO and market participants, with parties taking the appropriate measures to balance their position if they can do so at lower cost than the SO. If P211 improves the cost reflectivity of cash-out prices, we would therefore expect to see a reduction in overall (SO plus participant) balancing costs.

4.51. Some participants have expressed concerns about the volatility of imbalance prices under the current arrangements. As stated in Ofgem's IA for P194, cash-out prices that are distorted by the presence of system trades in the NIV stack reduce the ability of market participants to analyse and forecast the imbalance price in any period. Unpredictable cash-out price signals do not facilitate efficient balancing decisions by participants, and increase the risk premium for managing imbalances that is ultimately borne by consumers. If system pollution is currently exacerbating the volatility of cash-out prices, P211 may have a mitigating effect. Table 6 shows that the standard deviation of SBP under P211 (recalculated) is notably lower than that for live prices between November 2006 and March 2007, although there is little variation in the SSP values.

**Table 6 Standard deviation of prices**

<b>2/11/06-31/3/07 (£/MWh)</b>	<b>SBP all periods</b>	<b>SSP all periods</b>
P211 prices (PAR 500)	23.87	11.30
Live prices (PAR 500)	30.63	11.48

4.52. Both the level and volatility of cash-out prices influence the risk premia that suppliers ultimately charge consumers for managing the imbalances resulting from the variability in their load. EDF Energy, the proposer of P211, has provided Ofgem with some analysis of risk premia utilising the Elexon recalculated P211 prices. EDF Energy estimates that over a twelve month period, the lower mean and volatility of cash-out prices under P211 compared to the current arrangements would have enabled it to pass on savings of around £3.5 million to its customers in terms of reduced risk premia.

4.53. Some respondents to Elexon's Assessment Report consultation took the view that the complexity of the current arrangements may act as a barrier to market participation. It was argued that P211 was simpler to understand and would improve transparency by removing the distortions caused by system pollution. However, there is always a risk with complex algorithms that players are not able to replicate accurately the calculations. The P211 EPUS methodology ignores the dynamic constraint parameters that complicated the potential alternative considered by the Modification Group. The imbalance price calculation for P211 would appear to be no more or less complex than that under the current arrangements: in both cases, participants seeking to replicate the price calculation would depend on the published

Elxon data flows of actual or available balancing actions. Hence P211 may be no more transparent than the current arrangements.

4.54. On balance, by removing the effects of system pollution in cash-out prices, we think that P211 could potentially lead to a more efficient allocation of balancing activities between the SO and market participants compared to the current arrangements. The recalculated price analysis indicates that cash-out prices may be less volatile under P211 than they are currently, facilitating more efficient balancing decisions by participants and ultimately reducing the risk premium for imbalance management that is borne by consumers. However, these potential benefits for P211 do not take account of the opportunities for P211 cash-out prices to be distorted by behavioural changes. We consider concerns that P211 may be susceptible to gaming later in this chapter.

## Competition and distributional impacts

4.55. Table 7 estimates the impact of P211 on different player types using our cash-out simulation model. It suggests that independent suppliers and intermittent renewable/distributed energy generators would be better off under P211 compared to the current arrangements, and the average vertically integrated utility would be slightly worse off. It also shows that P211 would be slightly more favourable to the smaller players than the PEP, suggesting that they would benefit somewhat from the underestimation of energy balancing costs in P211 prices.

**Table 7 Impact of P211 per MWh of throughput by player type versus current arrangements and PEP**

£/MWh	Current	PEP (Base)
Vertically integrated utility	-0.015	-0.004
Independent generator	0.021	0.009
Independent supplier	0.062	0.012
Renewables/DE generator	0.180	0.041

4.56. As noted in Chapter 3, the cash-out simulation analysis indicates that the costs of system pollution in the current arrangements fall disproportionately on smaller suppliers and intermittent renewable generators. By removing the distortion of system pollution, we believe that P211 should on balance benefit competition compared to the current arrangements by targeting energy balancing costs more accurately and by reducing barriers to entry.

## Behavioural changes

4.57. Concerns were raised by some parties during the modification process, and highlighted in the FMR, that P211 may be susceptible to gaming. The potential originates from the fact that cash-out prices would no longer be based on actual actions, thus allowing companies to influence cash-out prices with "phantom" bids and offers, those that would appear within the EPUS stack but due to plant dynamic parameters could not be used by the SO to resolve energy imbalances. Under the

current arrangements, there is no advantage to be gained from posting "infeasible" bids or offers, since any resulting non-delivery charge<sup>44</sup> if the action was accepted would add to the party's imbalance position. Moreover, the SO is obliged to take account of the submitted dynamic parameters when issuing BOAs.

4.58. Appendix 12 presents a number of scenarios to illustrate the potential for participants to exploit unintended commercial opportunities created by P211. The examples demonstrate that calculating cash-out prices from an unconstrained EPUS stack could potentially present the opportunity for parties to influence the price through submission of bids/offers which cannot in practice be taken. It is uncertain how easily these opportunities could be exploited to gain commercial advantage, but the risks to parties of doing so would be relatively low.

4.59. Any such actions would not promote effective competition since they would either benefit those parties who undertake them or financially damage other parties.

4.60. However, we think that in general, cash-out arrangements should be designed to provide appropriate commercial incentives on the assumption that companies will not behave anti-competitively. This principle should apply unless there is strong evidence that the risks of gaming are very high and that the impact of any gaming on customers and the market would be significant.

4.61. We do not currently think that the implementation of P211 would increase the risk of gaming significantly; and as long as parties do not try to game the rules then P211 is likely to be beneficial to competition. In any event, if P211 were implemented, Ofgem would need to monitor behaviour carefully, and would also be looking to other parties, in particular NGET, to bring any such behaviour to our attention. Identifying such activity may therefore require sophisticated monitoring of actions in the BM.

4.62. Monitoring for such behaviour has the potential to be complex and resource intensive, partly because actions might (but will not necessarily) be characterised by coordination with other BMUs operated by a party. The identification of such actions is made more difficult by the potential for entirely legitimate actions to have unintended effects on the cash-out price, in exactly the same manner as actions taken to intentionally influence the price. For example, there may be legitimate reasons for changing technical parameter declarations such as NDZ<sup>45</sup> due to unforeseen problems with generation plant. Likewise, there are situations where offers into the BM with an NDZ longer than the time until gate closure are perfectly legitimate. Depending on their price, it is possible that such offers would affect the cash-out price even though NGET is unable to accept them.

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<sup>44</sup>Imbalances arising from the failure to deliver an accepted bid or offer are settled at the least favourable of the relevant cash-out price and the BOA price.

<sup>45</sup> The NDZ parameter indicates the notification time required for a unit to start importing or exporting energy from a zero level (see Glossary).

4.63. We also need to take account of how quickly further rule changes could be considered and made if problems did emerge and whether Ofgem's powers under the Competition Act could be used.

4.64. Because of these concerns, we think that cash-out prices should ideally be based on real SO actions, but that a proxy might be acceptable if it is closely related to underlying costs and effective monitoring could be established.

### **Security of supply**

4.65. P211 may dilute the targeting of costs in the event of plant outages compared to the present arrangements. The P211 methodology does utilise the outturn NIV and therefore captures the volumetric effect of outages post gate closure. However, the P211 EPUS approach is likely to under-estimate the cost of replacement energy by ignoring plant dynamics and assuming that the SO has perfect foresight of plant failures. As noted in the FMR, plant loss post gate closure would be likely to require expensive short term balancing actions by the SO. P211 may therefore result in dampened price signals to parties whose plant trips.

4.66. In the longer term, it is argued that dampened price signals in the event of plant outages will reduce the incentive to invest in plant reliability. This in turn may increase balancing costs, with the SO needing to procure more reserve if plant reliability deteriorates and outages become more frequent.

4.67. We have not attempted to quantify the potential magnitude of this effect for P211. With regard to cash-out price signals, it is highly likely that the omission of plant dynamics in the EPUS methodology contributed towards the differential observed between the recalculated P211 prices and actual SBP in short periods. Some evidence of the impact of dynamic constraints was provided by the recalculated price analysis undertaken for the potential P211 alternative, which included a set of rules to approximate plant dynamics.

4.68. On balance, we believe that P211 would be marginally detrimental to security of supply.

### **Sustainable development and environmental impacts**

4.69. As described in previous Ofgem reports<sup>46</sup>, modifications to the cash-out regime have the potential to change the incentives for plant to operate at part load. This in turn may have an environmental impact since part load operation is generally characterised by reduced plant efficiency and higher emissions per unit of output.

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<sup>46</sup> See for example the Impact Assessment for P194.



4.70. There is no evidence to suggest that P211 would have a material net impact on the environment in the short term. If, as some parties have argued, the SBP imbalance price becomes more benign under P211, this would reduce the incentive for self-provision of reserve by part loaded generators. However, reductions in part loading by market participants are likely to be offset by increased SO reserve requirements as the level of free headroom diminishes. In addition to expectations of cash-out prices, environmental considerations such as EU ETS prices and LCPD<sup>47</sup> constraints will also influence participants' decisions on whether to part load their plant.

4.71. Over the longer term there may be an environmental benefit associated with P211 if distortions in cash-out prices are removed. As indicated previously in Table 7, our analysis suggests that intermittent renewables and distributed energy providers would be better off under P211 compared to the current arrangements. A reduction in the balancing risk associated with such generators should promote greater levels of investment in renewables and distributed energy, thereby contributing to the achievement of sustainable development.

4.72. On balance, we think that P211 will have little environmental impact in the short term, but may have positive benefits for sustainable development longer term.

### **Costs of implementation**

4.73. The FMR estimates the total central costs for implementing P211 as a stand-alone release at £345,595 with a tolerance of +/- 20%. The SO has provided an initial cost estimate for implementing P211 of approximately £80,000.

4.74. Six market participants responded to Elexon's BSC Party impact assessment survey with individual cost estimates. Four of the six respondents stated that P211 would have no impact/cost while one indicated that the impact was limited to minor procedural and process changes. The final respondent estimated that a number of internal systems would require updating, at a cost of between £50k and £100k. Ofgem notes that the respondents included four large vertically integrated parties as well as the largest generator. Although five of the six respondents indicated that P211 would not have a significant cost impact, we shall assume an average implementation cost of £10k to be conservative. Assuming there are 30 market participants incurring a £10k implementation cost on average, this implies total participant costs in the region of £300k. Adding the central and SO cost estimates leads to an overall P211 implementation cost of around £725k.

4.75. These estimated implementation costs, while not immaterial, are of an order less than the perceived benefits of P211 in terms of improved cost targeting.

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<sup>47</sup> See the Glossary for descriptions of the EU ETS and the LCPD.



## 5. Costs and benefits of Modification Proposal P212

**Chapter summary** This chapter examines the costs and benefits of P212.

### Question box

Question 3: Do you agree with our assessment of the costs and benefits of P212?

5.1. As with the analysis of P211 presented in the previous chapter, we have particularly focused on the likely impacts on the targeting of energy balancing costs. P212 arguably represents a more fundamental revision to the trading arrangements than P211 and the implications for changes in participant behaviour are more significant. We have therefore given greater weight to assessing potential behavioural changes and the consequent impacts upon efficiency and competition.

5.2. The central costs of implementing P212 were estimated in the FMR and we have not sought to develop our own estimates of these costs.

### Economy and efficiency

#### Impact on cost targeting

5.3. Ofgem has recalculated settlement prices using the P212 methodology for the 13 month period 1 March 2006 to 31 March 2007. As noted in the P211 discussion, retrospective analysis ignores potential changes in participant behaviour. The potential for behavioural change is greater under P212 than P211, and as the Modification Group noted in its P212 Assessment Procedure Consultation, calculating Energy Imbalance Prices based on historic MIP is unlikely to give a good indication of what prices would have occurred under P212 (see "Behavioural Changes" section below).

5.4. Nonetheless, Table 8 summarises the recalculated average P212 price results for the period 2 November 2006 to 31 March 2007. Modification P205 introduced the PAR 500 methodology on 2 November 2006, and so live cash-out prices from this date provide the baseline for comparison.

**Table 8 Comparison of live and P212 average cash-out prices**

<b>2/11/06-31/3/07 (£/MWh)</b>	<b>SBP all periods</b>	<b>SBP short periods</b>	<b>SSP all periods</b>	<b>SSP long periods</b>
P212 prices	26.56	31.85	25.25	23.22
Live prices	35.82	64.13	21.20	17.54

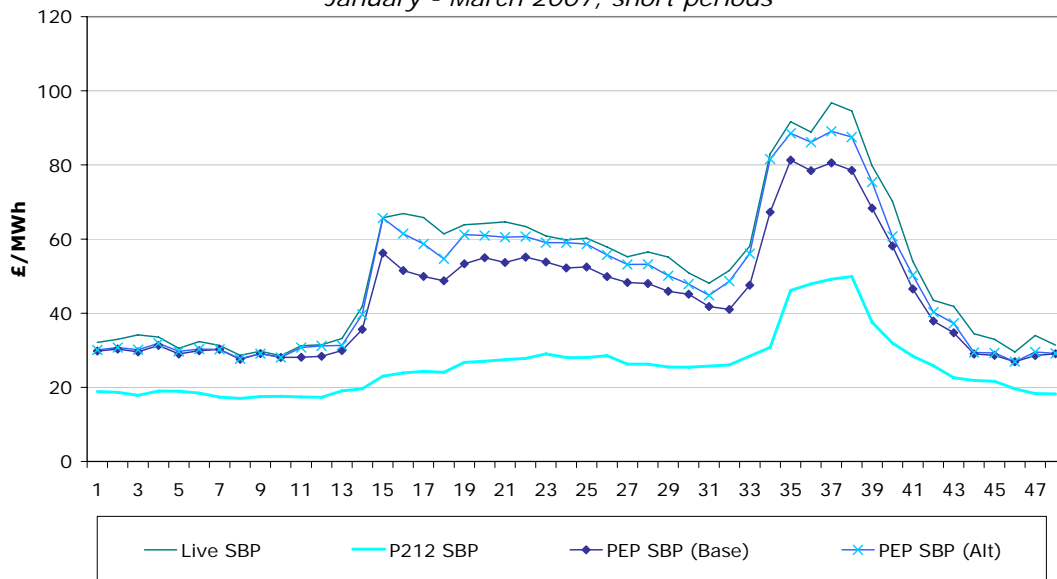
5.5. Over the five month period, the P212 solution produced a SBP that was on average 50% lower than the current arrangements when the system was short, and a SSP that was on average 33% higher when the system was long.

*Benchmark 1: Proxy Energy Price comparison*

5.6. Figure 9 and Figure 10 show the average SBP (when short) and SSP (when long) by settlement period from 1 January 2007 to 31 March 2007 under P212, and compare them to the live cash-out prices and the PEPs. It can be seen that the P212 SBPs are further from the PEPs than the current prices, and are significantly below, whilst P212 SSPs are significantly above the PEPs. This suggests that P212 would lead to under-recovery of energy balancing costs from out-of-balance parties.

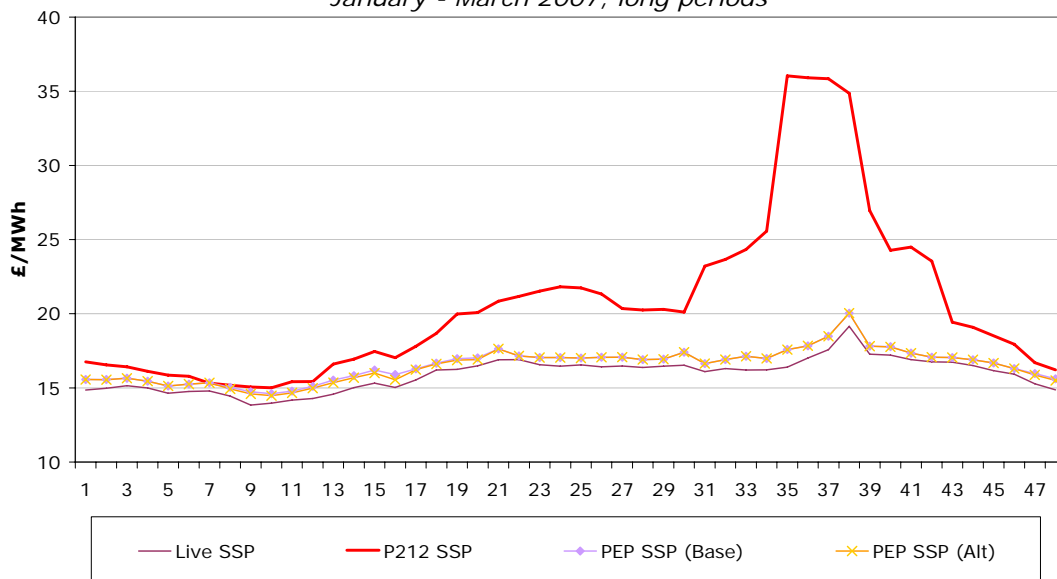
**Figure 9 Average "main" SBP by settlement period**

*January - March 2007, short periods*



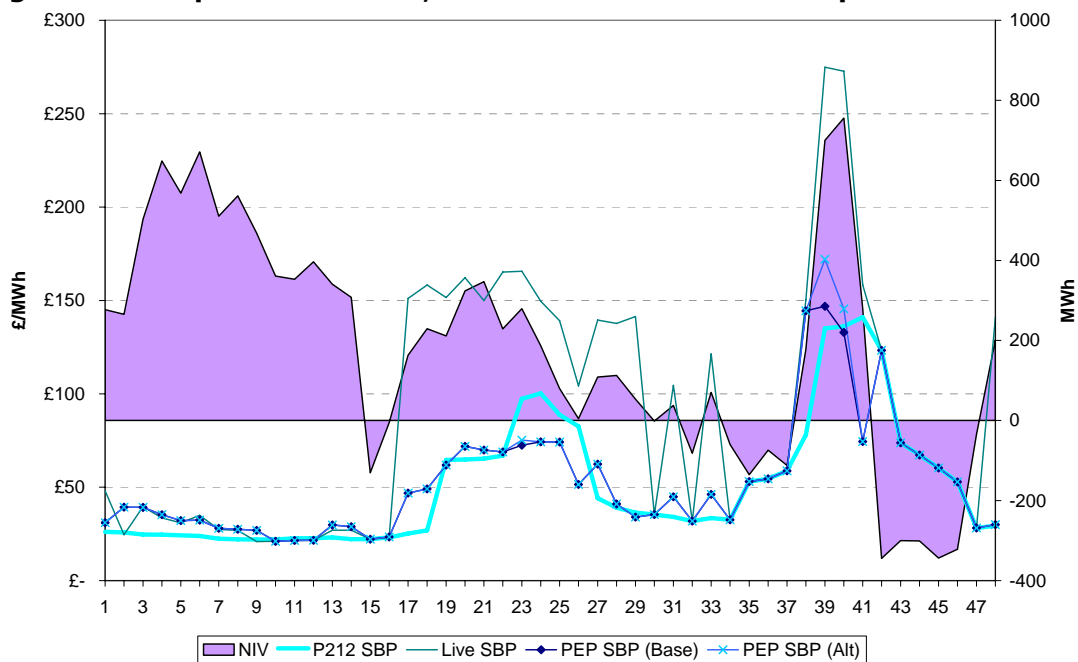
**Figure 10 Average "main" SSP by settlement period**

*January - March 2007, long periods*



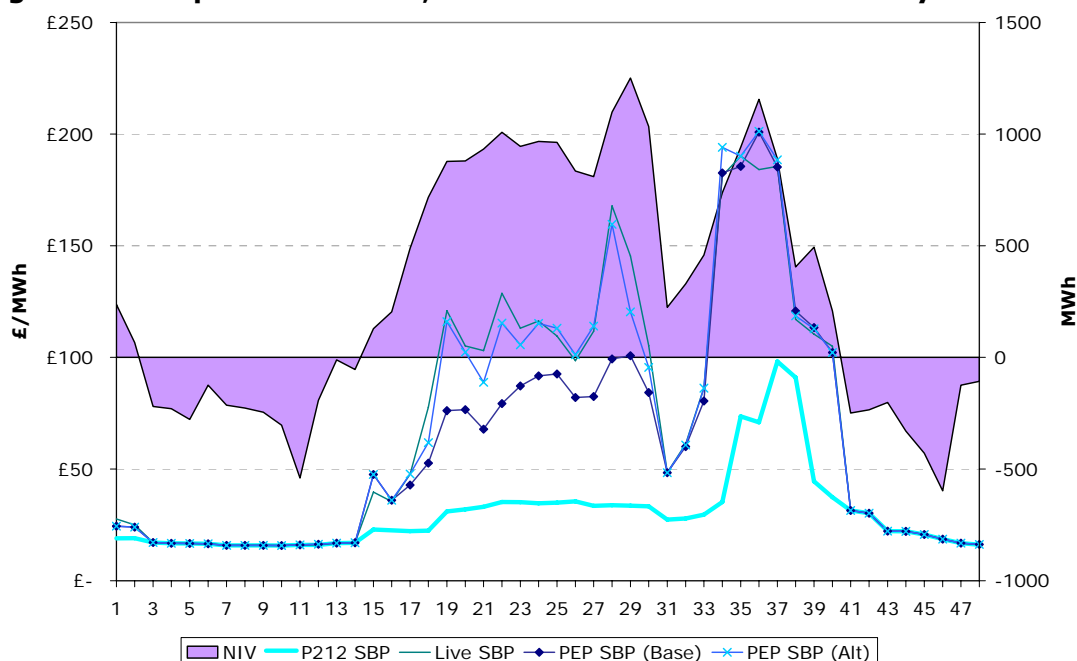
5.7. Whilst on average the P212 prices underestimate the costs of energy balancing, there is significant variation between days. On one of the days recently affected by transmission constraints between England and Scotland, 29 September 2007, there is a good match between the P212 SBP and the PEP (Base). This is illustrated in Figure 11 where the P212 SBP closely tracks the PEP (Base). It demonstrates that P212 would have been effective in removing the effect of constraints on the cash-out price, whilst not underestimating the energy costs of resolving the short NIVs.

**Figure 11 Comparison of P212, live and PEP SBPs on 29 September 2007**



5.8. Figure 12 shows a day (12 February 2007) when the opposite is the case with P212 SBPs significantly below the PEPs.

**Figure 12 Comparison of P212, live and PEP SBPs on 12 February 2007**



*Benchmark 2: Annual energy balancing cost comparison*

5.9. We have estimated the potential impact of P212 on RCRC and the mismatch between energy balancing costs and imbalance charges. Table 9 compares energy balancing costs and RCRC under the current arrangements, the PEP (Base) and P212 (assuming no behavioural change).

**Table 9 Estimated annual balancing cost comparison for P212**

£m	Current	PEP (Base)	P212
Energy CSOBM	25.18	25.18	25.18
Energy BSCC	21.56	21.56	21.56
<b>Total energy balancing costs</b>	<b>46.74</b>	<b>46.74</b>	<b>46.74</b>
RCRC	117.28	74.06	-23.42
<b>Net over/(under) recovery</b>	<b>70.54</b>	<b>27.32</b>	<b>-70.16</b>

5.10. The analysis suggests that P212 would reduce RCRC by around £140m compared to an annual cost of system pollution of around £43m. Whereas under the current arrangements the cash-out prices appear to be over-recovering the costs of energy balancing, P212 pricing would lead to a significant under-recovery. The under-recovery would be greater still if reserve creation was included in the definition of energy balancing costs.

5.11. Hence, we believe that prices calculated under the P212 methodology would not on average sufficiently reflect the SO's costs of energy balancing. The key weakness is the use of the MIP as the reference price for energy balancing costs. As discussed in Appendix 6, the products currently traded in the balancing and spot

energy markets are not homogenous due to the differing time resolution and treatment of technical constraints. For this reason alone cash-out prices derived from spot market trades are likely to differ from prices derived from the SO's balancing activities. However, one of the chief shortcomings of the MIP is that it does not reflect events that are close to or after gate closure.

*MIP and cost reflectivity*

5.12. As set out in the Market Index Definition Statement (MIDS)<sup>48</sup>, the MIP is currently derived from an equal weighting of all APX spot products (Half Hour, 2 Hour Block and 4 Hour Block) traded within a 20 hour window before gate closure. Hence, trades that take place 21 hours before delivery or that span multiple settlement periods can have the same bearing on the MIP as Half Hour trades close to gate closure. However, expectations of NIV may vary considerably during this 20 hour time window.

5.13. Figure 13 shows the difference between IMBALNGC, which is the sum of Physical Notifications of exporting BMUs less NGET's demand forecast, at 8 hours, 4 hours and 1 hour before the settlement period and NIV. The width of the distributions demonstrate that there is considerable variation between the "forecast" system imbalance and how it outturns, even at gate closure (1 hour before the settlement period)<sup>49</sup>. This suggests that expectations of the magnitude and indeed direction of NIV may vary considerably within the 20 hour horizon that MIP is set, and hence raises the concern that the adoption of the MIP as a proxy for the value of half-hourly energy at or near real time will be limited by the 20 hour averaging period and the flattening effect of the block products.

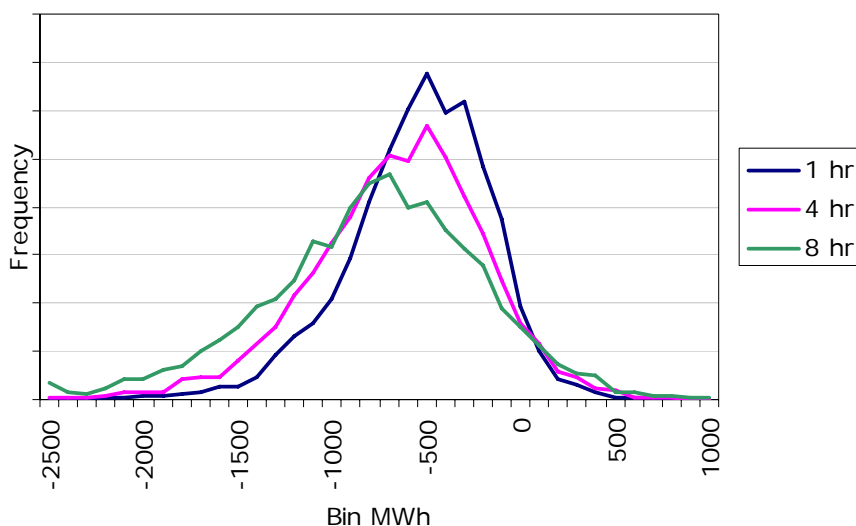
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<sup>48</sup> Market Index Definition Statement, version 5.0 (Effective date: 1 April 2006).

<sup>49</sup> The distributions are skewed to the negative side suggesting that IMBALNGC is consistently forecasting a longer system than turns out to be the case. This is believed to be caused by short notice reductions in generator availability.

**Figure 13 Relationship between "forecast" imbalance and NIV**

**IMBALNGC forecast - NIV outturn**  
**1/11/06 - 28/2/07**



5.14. An example of the possible dampening effect of P212 on prices in the event of a pre-gate closure generator trip is shown in Box 1. This example demonstrates that P212 would not only dampen cash-out prices but may also act to dampen prices in the within-day market.

**Box 1 Effect of pre-gate closure generator trip under P212**

Compare the situation where a 1000 MW plant trips one hour before gate closure under the current arrangements and under P212. Under the current arrangements, news of the outage and any attempt by the affected party (Party 1) to replace its lost volumes would likely have an immediate impact on the market price. Party 1 would still have an incentive to try to trade out the imbalance since the exposure to SBP could be greater. However, under P212 the incentives and impact on price would be very different. Let us assume that the prevailing MIP for the settlement period in question is £40/MWh based on 2000 MWh of trades to that point. Current expectations of SBP would be £42/MWh (105% of £40/MWh). Party 1 would be willing to buy the 500 MWh shortfall (1000 MW times 1/2 hour) at any price up to £42/MWh; any higher and it would be better off being cashed out. Assuming for now that all other parties are in balance, the only possible sellers would be players with spare capacity that could be ramped up. However, it is very unlikely that any would be willing to sell at that price since they could likely earn greater revenues by offering the capacity into the BM.

Now let us assume that there is in fact one party (Party 2) who is long by 250 MWh, and potentially prepared to trade with Party 1. Prior to the news of the plant outage, Party 2 might have been forecasting a long NIV and it would have been willing to sell above its expectation of SSP at £38/MWh. However, now that it is expecting a short NIV it believes that it can do no worse than the reverse price of £40/MWh. Had been

Party 1 been able to buy the full 500 MWh of its shortfall from Party 2, it would have been prepared to trade up to £42/MWh, and let us say that a deal was struck at £41/MWh between the two parties. However, since it is only able to buy 250MWh it needs to consider the impact of its trade on the residual 250 MWh imbalance since by engaging in a trade above the current MIP it will be pushing up the SBP. Taking this into account, Party 1 would be prepared to trade up to £41.80/MWh, and so let us say that the deal was struck at £40.90/MWh, midway between Party 2's £40.00/MWh floor price and Party 1's £41.80/MWh ceiling price. If this trade was undertaken (and no further trades took place) SBP would increase from £42.00/MWh to just £42.11/MWh. By contrast, under the current arrangements, SBP on average increases by £3.28/MWh for every 100 MW of additional NIV, and so based on simple extrapolation, the 1000 MW plant loss might lead to an approximate £33/MWh increase in SBP under the current arrangements. This suggests that P212 would significantly dampen the signals associated with short term changes in the supply/demand balance.

5.15. Data provided by APX to the P212 Modification Group, the BSC Panel<sup>50</sup> and to Ofgem show that, in the current marketplace, the majority of Half Hour trades occur within the final four hours before gate closure. However, trading in the 4 Hour Block product tends to peak earlier (between 4 to 8 hours before gate closure). It is therefore possible that changes to the MIP weightings<sup>51</sup> could somewhat improve reflectivity of the market conditions prevailing at or close to gate closure<sup>52</sup>, although the influence of individual trades on the MIP at times of low market liquidity would also require consideration. Changes to the MIDS were deemed to be out of scope for the P212 Modification Group, but the Group agreed that the MIDS would benefit from review were P212 to be approved.

5.16. Even if the MIP definition was changed to be more reflective of prevailing market conditions at gate closure, the extent to which the MIP and hence P212 imbalance prices reflect the real time supply and demand balance will be dependent on the magnitude of post gate closure changes. Ofgem has analysed data provided by NGET to determine the differentials between notified and outturn generation and between forecast and outturn demand on a half-hourly basis<sup>53</sup>. Figure 14 shows the distribution of post gate closure changes for generation and demand.

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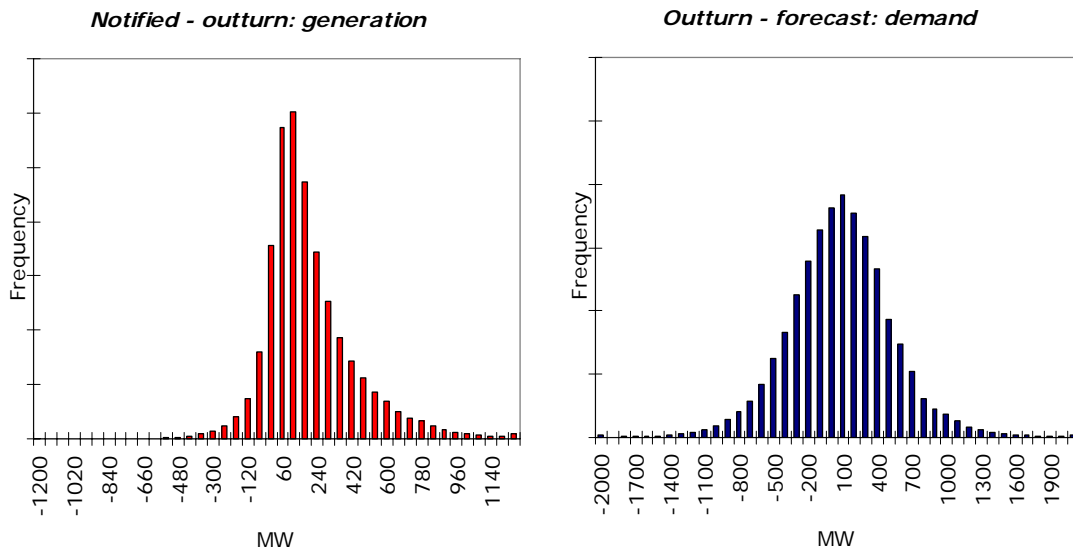
<sup>50</sup> The MIDS is reviewed by the BSC Panel at least annually. BSC Panel paper 122/10 (11 January 2007) and its attachments summarise the most recent review.

<sup>51</sup> Note that the MIDS does include the following principles for setting product and time weightings: (i) "weightings may be set to ensure that the MIP is reflective of the price of trades as close as possible to gate closure" and (ii) "weightings may be set to minimise the flattening effect on the MIP of including traded products used in the methodology that have one price for a time period longer than one Settlement Period".

<sup>52</sup> The APX market for spot products actually closes 30 minutes before gate closure to allow time for contract volume notification.

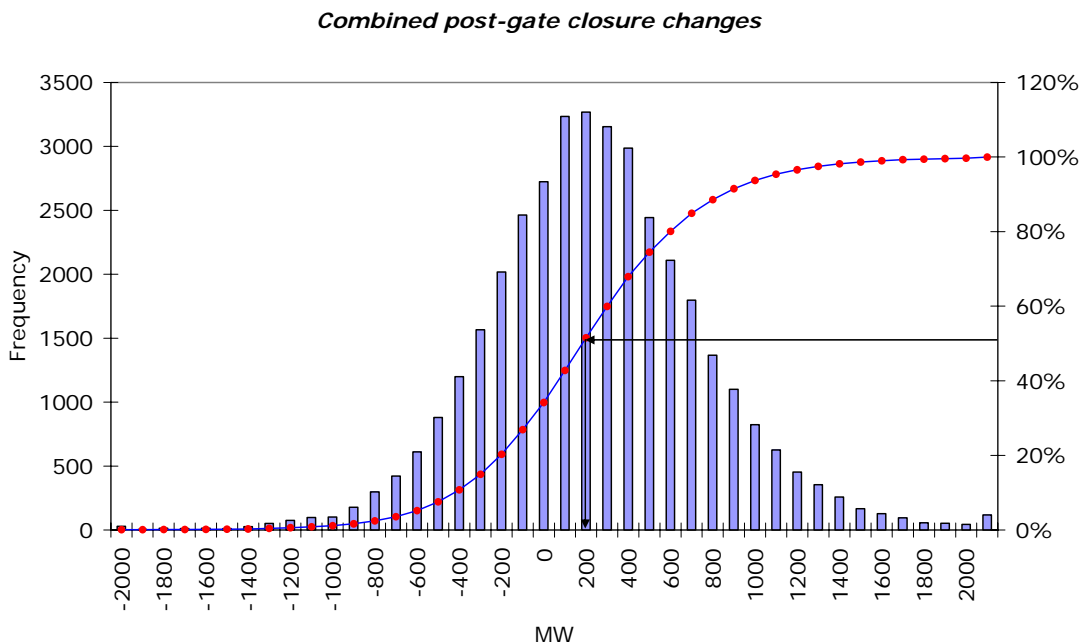
<sup>53</sup> The analysis covers the period 1/4/2005 to 20/5/2007.

**Figure 14 Distribution of generation and demand changes post gate closure**



5.17. The skewed distribution of post gate closure changes for generation is believed to be attributable to short notice reductions in generator availability, while the NGET demand forecast error appears to be approximately symmetrical. Figure 15 shows the combined distribution of post gate closure changes for generation and demand.

**Figure 15 Combined distribution of post gate closure changes**





5.18. This analysis suggests that post gate closure uncertainty is material relative to NIV. Between 1 November 2006 and 30 September 2007 the mean of NIV was 224 MW, with a standard deviation of 723 MW.

5.19. The potential magnitude of generation and demand changes post gate closure limits the cost reflectivity of imbalance prices set ex ante<sup>54</sup>. The SO may need to take balancing actions that are more expensive than the market price prevailing at gate closure, reflecting both the change in the supply/demand balance and the premium that providers of balancing energy may command for adjusting their positions at short notice.

5.20. Our analysis indicates that 69% of settlement periods involve a post gate closure change of 100 MWh or more in the overall generation and demand position. It is reasonable to expect the energy price to change between gate closure and real time in response to such changes in the underlying physical position. Although P212 addresses the problem of system pollution, it is likely to deliver an inappropriate energy price too often.

### *Summary*

5.21. Using our two benchmarks, and under our base case definition of energy balancing, P212 would be less reflective of the costs of energy balancing than the current arrangements. The principle reason is that the MIP used as the basis for P212 prices does not respond sufficiently to pre-gate closure changes in anticipated supply/demand balance and cannot, being an ex ante price, reflect post-gate closure changes. Prices generated under P212 would on average be further from the PEP (Base) than the current arrangements. Annual imbalance charges would be significantly below the SO's energy balancing costs.

### **Impact on incentives to balance**

5.22. As summarised in Elexon's Assessment Report and FMR, it is generally agreed that the P212 solution would provide a weaker incentive to balance than the current arrangements. A number of arguments were put forward in support of this view:

- P212 removes the link between cash-out prices and the costs faced by the SO when balancing the system, so energy balancing costs are not targeted to out-of-balance parties;
- Energy imbalance prices are likely to be more benign under P212;

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<sup>54</sup> Although P212 imbalance prices would actually be determined ex post depending on the direction of the outturn NIV, the range of possible outcomes in SBP and SSP would be restricted to within 5% of the MIP established prior to gate closure. Thus P212 would effectively see imbalance prices set ex ante.

- P212 creates incentives for parties to focus on influencing the imbalance price level rather than reducing their imbalance positions;
- The fixed 5% premium or discount to the MIP may be insufficient to encourage balancing.

5.23. It was argued that the weaker signals to participants would result in higher SO balancing activities and costs. The P212 Modification Group did not reach any conclusions in quantifying the likely impact of P212 on NIV, although the majority believed that NIV would be more volatile and unpredictable than under the current arrangements. One reason for increased NIV volatility may be the ex ante nature of the P212 imbalance price, subject only to the 5% premium or discount. Parties could potentially change their physical positions during the 30 minutes between the exchange market close and gate closure in order to manage their exposure to cash-out prices. For example, generators with uncontracted output may rationally choose to spill output if the imbalance price is favourable.

5.24. For illustrative purposes, the SO provided a paper to the P212 Modification Group estimating the SO cost impact if average NIV remained unchanged but NIV volatility increased. The SO estimated that an arbitrarily assumed 10% increase in the standard deviation of NIV would increase SO balancing costs by around £16m, due to higher reserve requirements and the extra cost of resolving energy imbalance.

5.25. Taking the scenario in which P212 prices lead to a 10% increase in the standard deviation in NIV, we have used our cash-out simulation model to estimate the impact on RCRC. We have analysed a further case whereby mean NIV is 0 on the assumption that parties may be less inclined to go long to mitigate against the risk of extreme SBPs.

5.26. Table 10 shows the projected annual RCRC for three P212 cases using the cash-out simulation model: 1) no behavioural change, 2) 10% increase in NIV standard deviation, 3) mean NIV goes to zero. RCRC is compared to the estimated energy balancing costs in each case<sup>55</sup>. We have used the same methodology as NGET in its attachment to the P212 Assessment Report to estimate the additional costs of Balancing Services contracts to resolve a more variable and less negative NIV, and attributed 30% of these costs to Energy BSCC.

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<sup>55</sup> Note that the annual energy balancing costs and RCRC projected by the cash-out simulation model are lower than those extrapolated based on historic analysis of 1 January 2007 to 31 March 2007.

**Table 10 Annual P212 balancing costs and charges with behavioural change**

£m	No behavioural change	10% increase in NIV SD	Mean NIV = 0
Energy BSUoS	12.62	24.76	87.14
Energy BSCC	21.56	23.41	28.83
<b>Total energy balancing costs</b>	<b>34.18</b>	<b>48.17</b>	<b>115.97</b>
RCRC	-8.90	-0.46	58.65
<b>Net over/(under) recovery</b>	<b>-43.08</b>	<b>-48.63</b>	<b>-57.32</b>

5.27. The results suggest that the net under-recovery of energy balancing costs associated with P212 would become greater if NIV was to become more variable in response to weaker signals to balance, or if NIV was to become shorter in response to lower risk from extreme SBPs. This is because the increase in the SO's energy balancing costs is not matched by the increase in RCRC<sup>56</sup>. From this we conclude that anticipated behavioural changes would further reduce the cost reflectivity of P212.

5.28. We have not attempted to quantify the extent to which parties' balancing costs may go down as a consequence of the weaker balancing performance, for example, by investing less in forecasting and plant reliability. However, we conclude that the less accurate cost targeting under P212 would lead to economic inefficiency and hence result in an overall increase in energy balancing costs across the SO and parties.

## Competition and distributional impacts

5.29. By making cash-out prices more benign, P212 would benefit those parties with poorer balancing performance. We have attempted to quantify the distributional impact of P212 using our cash-out simulation model.

5.30. Table 11 estimates the annual aggregate net change in settlement cashflow between player types under P212 (assuming no behavioural change) compared to the current arrangements. It suggests that on average intermittent renewable/distributed energy generators would be as much as £0.60/MWh better off under P212 than the current arrangements. It also shows that the same players would be £0.45/MWh better off under P212 cash-out prices compared to the unpolluted PEP series. This demonstrates that P212 would over-compensate these players for the system pollution effect, thus potentially leading to cross-subsidy from parties with good balancing performance to those with poorer balancing performance.

<sup>56</sup> It should be noted that the SO's system balancing costs would also increase with poorer balancing behaviour or a reduction in the length of NIV.

**Table 11 Impact of P212 per MWh of throughput by player type versus current arrangements and PEP**

£/MWh	Current	PEP (Base)
Vertically integrated utility	-0.033	-0.022
Independent generator	0.061	0.049
Independent supplier	0.165	0.115
Renewables/DE generator	0.589	0.450

## Behavioural changes

5.31. Early on in the modification process for P212 it was recognised that the proposal could lead to significant changes in player behaviour for two reasons. First, as described above, with the cash-out premia and discounts relative to the MIP much more benign than under the current arrangements the incentives for parties to balance may be diminished. Second, with cash-out prices set within the short-term market rather than based on the costs of the SO's actions, it would be possible for parties to influence their imbalance exposures by the way in which they traded in the market.

5.32. To gain a better understanding of the former, the Modification Group undertook some behavioural analysis using a simplified representation of the market, and a number of simplifying assumptions<sup>57</sup>. This is summarised in Appendix 12. It explored the incentives of different parties with different positions under different system conditions. Two different market conditions were identified: a "restricted" state where parties traded with each other at prices that reflected market fundamentals in an attempt to reduce their imbalance volumes, and a "non-restricted" state where parties traded explicitly to influence the cash-out prices as a way of minimising their imbalance exposure. The key conclusions were that under a "restricted" state cash-out and market prices would be significantly dampened, whereas under a "non-restricted" state cash-out and market prices could become very volatile and erratic.

5.33. The behavioural analysis undertaken by the Modification Group suggested that the impact of P212 on balancing may be greater than simply the effect of benign cash-out prices leading to weaker incentives to balance. Should extreme high cash-out prices be set on APX market closure (half an hour prior to gate closure), parties may be encouraged to "spill", whereas extreme low cash-out prices may encourage parties to take short positions. The result could be far greater uncertainty in NIV and a significant increase in the SO's balancing costs.

5.34. We recognise that there is a material risk of market instability resulting from the implementation of P212, although we believe that these risks may have been somewhat overstated in the analysis undertaken by the Modification Group. First, its

<sup>57</sup> See "Attachment 4\_Additional Analysis V1.0" to the P212 Assessment Report on the Elexon website.

analysis assumes that all parties know their own positions and have the same expectations of outturn NIV. In reality informational differences and different expectations of the supply/demand balance should drive different behaviours amongst parties. Second, we would not expect parties to engage in the types of behaviours suggested by the non-restricted market state. And finally, we believe that were balancing performance to deteriorate materially, the SO may elect to trade in the within-day market to reduce its costs of energy balancing. This would re-establish the link between the SO's actions and cash-out prices, and should act as a moderating effect on any anti-competitive behaviours.

## **Security of supply**

5.35. By reducing the cost and risk of cash-out, P212 would likely result in parties taking fewer measures to balance their positions. There would be less incentive to make necessary contractual arrangements to cover uncertainties in their positions.

5.36. Furthermore, P212 is likely to dilute the targeting of costs associated with plant outages compared to the present arrangements. Under the current arrangements, the sudden loss of a plant would result in the SO having to take additional actions at short notice. The combination of the greater NIV and the premium cost of short notice offer acceptances will push up the SBP. This will expose the owner of the plant (and all other parties who are short) to the additional costs of energy balancing. This in turn provides an incentive on parties to invest in the reliability of their plant. Under P212, the SO would have to take identical actions in the BM to replace the lost plant, and yet the impact on cash-out would be minimal. At most, the SBP will increase by 5% assuming that the plant loss leads to NIV going from negative (long) to positive (short). If the system was already short there would be no impact on price at all for the periods where the APX had already closed.

5.37. As a result we believe that P212 would be detrimental to security of supply since it would reduce the incentive on parties to contract to cover uncertainties in their positions and to invest in forecasting and plant reliability.

## **Sustainable development and environmental impacts**

5.38. As noted in Chapter 4, modifications to the cash-out regime have the potential to change the incentives for plant to operate at part load. This in turn may have an environmental impact since part load operation is generally characterised by reduced plant efficiency and higher emissions per unit of output.

5.39. There is no evidence to suggest that P212 would have a material net impact on the environment in the short term. Under the more benign cash-out prices associated with P212 (notwithstanding the possibility of anomalous prices caused by the types of player behaviour described above), the incentive would reduce for self-provision of reserve by part loaded generators. However, reductions in part loading by market participants are likely to be offset by increased SO reserve requirements as the level of free headroom diminishes.

5.40. Over the longer term there may be an environmental benefit associated with P212 (again assuming that anomalous prices did not result). Intermittent renewables and distributed energy providers, with their lower balancing performance, would benefit from more benign cash-out prices. This would reduce the balancing risk associated with such generators which should lead them to secure more favourable offtake agreements with their counterparties. In turn this could lead to greater levels of investment in renewables and distributed energy, depending on other important drivers of such investment, such as planning, connection access and levels of support through the Renewables Obligation and Climate Change Levy.

5.41. In conclusion, we believe that P212 will have little environmental benefit or detrimental effect in the short term, but may have a benefit in the longer term. Having said that, we do not believe that intermittent technologies should be cross-subsidised through the cash-out arrangements, which we think would be the case if P212 was implemented.

### **Costs of implementation**

5.42. The FMR estimates the total central costs for implementing P212 as a stand-alone release at £258,637 with a tolerance of +/- 20%. The SO has provided an initial cost estimate for implementing P212 of approximately £80,000.

5.43. Eight market participants responded to Elexon's Assessment Report and/or Draft Modification Report with individual party impact estimates. Two respondents stated that P212 would have no impact/cost while three indicated that their required system changes would be minor. One respondent believed that a number of internal systems would require updating, but did not submit a cost estimate for this work. Given that respondents did not supply specific cost estimates, the FMR does not quantify P212 implementation costs for market participants. Although the majority of respondents indicated that P212 would not have a significant cost impact, we shall assume an average implementation cost consistent with P211 to be conservative<sup>58</sup>. Assuming there are 30 market participants incurring a £10k implementation cost on average, this implies total participant costs in the region of £300k. Adding the central and SO cost estimates leads to an overall P212 implementation cost of around £640k.

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<sup>58</sup>The main impact on participants' systems identified for both P211 and P212 is the need to accommodate changes to settlement data flows.

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## 6. Initial Conclusions

**Chapter summary** This chapter sets out our initial conclusions on P211 and P212.

**Question box**

There are no specific questions in this chapter.

### Extent of the defect

6.1. We think that analysis presented in the FMR for P211 and in this IA clearly illustrates that a defect exists associated with system related actions polluting cash-out prices. These system related actions include resolution of constraints, creation of reserve, frequency response and intra half-hour balancing. For example, we calculate that import constraints into Scotland during September and October 2007, led to SBP in certain periods being over £125/MWh higher than the underlying cost of energy balancing.

6.2. Based on our analysis of data provided by NGET in which proxy energy prices have been created by manually tagging out system related actions, we estimate that system pollution is leading to an average increase in SBP of at least 5.1% when the system is short and a decrease of 4.4% in SSP when the system is long. If reserve creation is classified as a system rather than an energy action (as we believe should be the case), these figures rise to 11.2% and 6.0% respectively.

6.3. On this basis, we estimate that system pollution is increasing annual imbalance charges by approximately £43m. This additional cost is borne disproportionately by smaller players who typically have poorer balancing performance. In effect this represents a cross-subsidy from parties with poorer balancing performance to parties with better balancing performance.

6.4. A counter argument is that the proportion of reserve availability fees being targeted at out-of-balance parties may not sufficiently reflect the energy component of certain Balancing Services. If this was the case then there may be an element of cross-subsidy in the opposite direction, namely from parties with better balancing performance to those with poorer balancing performance. Since this issue is not explicitly part of the scope of P211 and P212, we have not attempted to analyse it in detail.

### Modification Proposal P211

6.5. Table 12 summarises the assessment of P211 against the relevant objectives and wider statutory duties.

**Table 12 Summary assessment of P211**

<b>Criteria</b>	<b>Assessment</b>	<b>Comments</b>
Economy and efficiency	✓	Effective in removing effect of system pollution but may lead to underestimation of energy balancing costs.
Competition	✓	Should be beneficial to competition since it lowers barriers to entry by removing system pollution effect. However, there are concerns that by breaking the direct link between SO actions and cash-out prices, the approach may increase the risk of price manipulation.
Security of supply	x	By under-estimating the costs associated with post gate closure changes in the supply/demand balance, would be marginally detrimental to security of supply.
Sustainable development and environmental impacts	✓	Could promote investment in renewables and distributed energy since it would reduce the balancing risk of these technologies.
Cost of implementation	x	Would involve costs across the industry but not sufficient to act as barrier to implementation.
Overall assessment	✓	

6.6. Based on the issues and analysis presented in the FMR and in this IA, we believe that the case for accepting P211 is finely balanced. We think that there may be benefits for economy and efficiency, competition (whilst recognising the risk of price manipulation) and sustainability. On balance, we think that these benefits marginally outweigh the possible detriment to security of supply and the costs of implementation, and are currently minded to approve.

## **Modification Proposal P212**

6.7. Table 13 summarises the assessment of P212 against the relevant objectives and wider statutory duties.



**Table 13 Summary assessment of P212**

<b>Criteria</b>	<b>Assessment</b>	<b>Comments</b>
Economy and efficiency	xx	Would significantly under-estimate the SO's costs of energy balancing since the Market Index Price used as the basis of cash-out prices does not accurately reflect the real-time supply/demand energy balance.
Competition	x	Could create incentives for parties to trade to influence cash-out prices rather than to trade to manage their imbalance volumes.
Security of supply	xx	May reduce the incentives on parties to contract to cover their positions, and invest in forecasting and plant reliability.
Sustainable development and environmental impacts	✓✓	Could promote investment in renewables and distributed energy since it would significantly reduce the balancing risk of these technologies.
Cost of implementation	x	Would involve costs across the industry but not sufficient to act as barrier to implementation.
Overall assessment	xx	

6.8. Based on the issues and analysis presented in the FMR and in this IA, we are currently minded to reject P212 principally because we believe it would be detrimental to economy and efficiency and to security of supply.

## Appendices

### Index

Appendix	Name of Appendix
1	Consultation Response and Questions
2	The Authority's Powers and Duties
3	Glossary
4	Feedback Questionnaire
<i>In separate Supplementary Appendices document<sup>59</sup></i>	
5	Cash-out arrangements background
6	Rationale for energy/system definition
7	System pollution analysis
8	NGET note on manual tagging analysis
9	Sample settlement period analysis
10	Reserve availability fees
11	Cash-out modelling assumptions
12	Potential behavioural consequences

<sup>59</sup> BSC Modification Proposals P211 'Main Imbalance Price based on Ex-post Unconstrained Schedule' and P212 'Main Imbalance Price based on Market Reference Price': Impact Assessment Supplementary Appendices, December 2007.

## Appendix 1 - Consultation Response and Questions

1.1. Ofgem would like to hear the views of interested parties in relation to any of the issues set out in this document.

1.2. We would especially welcome responses to the specific questions which we have set out at the beginning of each chapter heading and which are replicated below.

1.3. Responses should be received by 31 January 2008 and should be sent to:

Ben Woodside  
GB Markets  
Ofgem, 9 Millbank, London, SW1P 3GE  
020 7901 7471  
GB.markets@ofgem.gov.uk

1.4. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website [www.ofgem.gov.uk](http://www.ofgem.gov.uk). Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.5. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

1.6. Next steps: Having considered the responses to this consultation, Ofgem intends to make final decisions on the two modifications by the end of February 2008. Any questions on this document should, in the first instance, be directed to:

Ben Woodside  
GB Markets  
Ofgem, 9 Millbank, London, SW1P 3GE  
020 7901 7471  
ben.woodside@ofgem.gov.uk

### Question box

Question 1: What is your view on the proposed definition of energy balancing?  
Question 2: Do you agree with our assessment of the costs and benefits of P211?  
Question 3: Do you agree with our assessment of the costs and benefits of P212?

## Appendix 2 – The Authority's Powers and Duties

1.1. Ofgem is the Office of Gas and Electricity Markets which supports the Gas and Electricity Markets Authority ("the Authority"), the regulator of the gas and electricity industries in Great Britain. This Appendix summarises the primary powers and duties of the Authority. It is not comprehensive and is not a substitute for reference to the relevant legal instruments (including, but not limited to, those referred to below).

1.2. The Authority's powers and duties are largely provided for in statute, principally the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Act 2004, as well as arising from directly effective European Community legislation. References to the Gas Act and the Electricity Act in this Appendix are to Part 1 of each of those Acts.<sup>60</sup>

1.3. Duties and functions relating to gas are set out in the Gas Act and those relating to electricity are set out in the Electricity Act. This Appendix must be read accordingly<sup>61</sup>.

1.4. The Authority's principal objective when carrying out certain of its functions under each of the Gas Act and the Electricity Act is to protect the interests of consumers, present and future, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the shipping, transportation or supply of gas conveyed through pipes, and the generation, transmission, distribution or supply of electricity or the provision or use of electricity interconnectors.

1.5. The Authority must when carrying out those functions have regard to:

- The need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;
- The need to secure that all reasonable demands for electricity are met;
- The need to secure that licence holders are able to finance the activities which are the subject of obligations on them<sup>62</sup>; and
- The interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas.<sup>63</sup>

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<sup>60</sup> entitled "Gas Supply" and "Electricity Supply" respectively.

<sup>61</sup> However, in exercising a function under the Electricity Act the Authority may have regard to the interests of consumers in relation to gas conveyed through pipes and vice versa in the case of it exercising a function under the Gas Act.

<sup>62</sup> under the Gas Act and the Utilities Act, in the case of Gas Act functions, or the Electricity Act, the Utilities Act and certain parts of the Energy Act in the case of Electricity Act functions.

<sup>63</sup> The Authority may have regard to other descriptions of consumers.

1.6. Subject to the above, the Authority is required to carry out the functions referred to in the manner which it considers is best calculated to:

- Promote efficiency and economy on the part of those licensed<sup>64</sup> under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems;
- Protect the public from dangers arising from the conveyance of gas through pipes or the use of gas conveyed through pipes and from the generation, transmission, distribution or supply of electricity;
- Contribute to the achievement of sustainable development; and
- Secure a diverse and viable long-term energy supply.

1.7. In carrying out the functions referred to, the Authority must also have regard, to:

- The effect on the environment of activities connected with the conveyance of gas through pipes or with the generation, transmission, distribution or supply of electricity;
- The principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed and any other principles that appear to it to represent the best regulatory practice; and
- Certain statutory guidance on social and environmental matters issued by the Secretary of State.

1.8. The Authority has powers under the Competition Act to investigate suspected anti-competitive activity and take action for breaches of the prohibitions in the legislation in respect of the gas and electricity sectors in Great Britain and is a designated National Competition Authority under the EC Modernisation Regulation 65 and therefore part of the European Competition Network. The Authority also has concurrent powers with the Office of Fair Trading in respect of market investigation references to the Competition Commission.

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<sup>64</sup> or persons authorised by exemptions to carry on any activity.

<sup>65</sup> Council Regulation (EC) 1/2003

## Appendix 3 - Glossary

### A

#### Arbitrage tagging

Removal of overlapping accepted bids and offers from the energy stack, where the price of an accepted offer is less than the price of an accepted bid. No net energy has been delivered to the system, but an overall financial benefit to the system has been provided.

#### Applicable BSC objectives

The objectives of the BSC trading arrangements are set out in Standard Condition C3 of NGET's Transmission Licence, and are used to evaluate proposed modifications.

### B

#### Balancing and Settlement Code (BSC)

The Balancing and Settlement Code (BSC) contains the governance arrangements for electricity balancing and settlement in Great Britain.

The energy balancing aspect allows parties to make submissions to NGET to either buy or sell electricity from/to of the market at close to real time in order to keep the system from moving too far out of phase.

The settlement aspect relates to monitoring and metering the actual positions of generators and suppliers (and interconnectors) against their contracted positions and settling imbalances when actual delivery or offtake does not match contractual positions.

#### Balancing Mechanism (BM)

The Balancing Mechanism is the principal tool used by the SO to balance the electricity system on a second-by-second basis. Generators and consumers with spare flexibility in their portfolios submit offers (to increase generation or decrease demand) and bids (to decrease generation or increase demand) to the SO via the Balancing Mechanism. The SO uses the Balancing Mechanism for energy balancing and for system balancing, for example frequency response.

#### Balancing Mechanism Unit (BMU)

The basic unit of participation in the Balancing Mechanism, describing one or more generation or demand units which import or export electricity onto the electricity system.

### Balancing Services

The SO supplements the Balancing Mechanism with forward contracts for a range of Balancing Services. The SO will enter into these agreements where it believes that it cannot source the service through the Balancing Mechanism, or it wishes to reduce the costs of Balancing Mechanism actions by guaranteeing the availability of certain units. These include services related to frequency response, reserve, reactive power and system security as well as energy products procured in advance of gate closure.

### Balancing Services Adjustment Data (BSAD)

Balancing Services Adjustment Data (BSAD) is used to incorporate the costs of the SO's Balancing Services contracts into the calculation of Energy Imbalance Prices. This is laid out in the BSAD Methodology statement which the SO is required to produce under Standard Condition C16 of the Transmission Licence.

### Balancing Services Use of System charges (BSUoS)

Balancing Services Use of System charges (BSUoS) are the mechanism by which the costs that the SO incurs in the Balancing Mechanism and in procuring Balancing Services are recovered from parties using the system. They are charged on a half-hourly basis based on throughput.

### Bid/Offer Acceptances (BOAs)

Acceptances by the SO of Balancing Mechanism offers to increase electricity on the system, or bids to reduce electricity on the system. The prices of BOAs form the basis for the calculation of the Energy Imbalance or cash-out prices.

### BM Start-up

A Balancing Service giving the SO access to additional generation BMUs that would not otherwise have run and which could not be made available in Balancing Mechanism timescales due to their technical characteristics and associated lead times.

### BSC Party

All licensed electricity companies are required to accede to the BSC. Other market participants may choose to become BSC Parties, for example, in order to notify bilateral contract volumes.

### Buy Price Adjuster/Sell Price Adjuster (BPA/SPA)

The Buy Price Adjuster (BPA) and Sell Price Adjuster (SPA) are defined in the BSAD methodology. They capture the availability fees that the SO incurs on certain Balancing Services such as Short Term Operating Reserve and BM Start-up. The BPA for each half-hour is added to SBP, and the SPA subtracted from SSP.

**C****Continuous Acceptance Duration Limit (CADL) tagging**

Volumes associated with acceptances of short duration (less than 15 minutes) are treated as un-priced volumes. This is designed to remove the impact of sub half-hourly balancing actions from cash-out prices.

**Contracted position**

Parties must notify their contracted position to the SO for each settlement period through the process of Contract Notification. A long contracted position indicates that a party has contracted more supply than demand and a short contracted position vice versa.

**Constraints**

There are various parts of the transmission network where import or export capacity is limited. Constraints can become active when this capacity limit is reached. This may require the SO to take 'sub-economic' balancing actions to reduce generation behind the constraint, and increase generation or reduce demand elsewhere on the network to maintain the energy balance.

**Costs of System Operator in the Balancing Mechanism (CSOBM)**

Costs incurred by the SO in accepting Bids and Offers in the Balancing Mechanism.

**D****De Minimis tagging**

Individual accepted bid and offer volumes below 1 MWh are excluded from the price calculation. This is intended to remove any 'false' actions which are created because of the finite accuracy of the systems used to calculate bid and offer volumes.

**E****Elexon**

Elexon is the Balancing and Settlement Code company which manages the BSC on NGET's behalf.

**Energy Imbalance Prices (or cash-out prices)**

Energy Imbalance Prices are applied to parties for their imbalances in each half-hour period – SBP is charged for short contracted positions, SSP is paid for long contracted positions.



### Energy plus

The term 'energy plus' describes actions taken by the SO that combine an energy balancing dimension with one or more other purposes such as frequency response, reserve creation or constraint management.

### Energy stack

The energy stack comprises of Bid Offer Acceptances in price order and is used to calculate the main energy imbalance price, once relevant tagging has been applied.

### EU Emissions Trading Scheme (EU ETS)

The EU ETS is the cap and trade scheme for the reduction of carbon dioxide emissions across EU member states, which was introduced in January 2005.

### Ex-Post Unconstrained Schedule (EPUS)

The stack of Balancing Mechanism bids or offers available to the SO to resolve the outturn energy imbalance in a settlement period, ignoring transmission and other system constraints.

## F

### Final Modification Report (FMR)

The final report produced by the industry group who define and then assess any proposed modification. This report is presented, alongside a recommendation to accept or reject the modification, to the BSC Panel and then to the Authority.

### Final Physical Notification (FPN)

The Final Physical Notification (FPN) is the level of generation or demand that the BMU expects to produce or consume. It is submitted to the SO as a ramped profile prior to gate closure.

### Frequency response

The SO has a statutory obligation to maintain system frequency between +/- 1% of 50 hertz. The immediate second-by-second balancing to meet this requirement is provided by continuously modulating output through the procurement and utilisation of mandatory and commercial frequency response.

## G

### Gate closure

The point in time by which all Contract Notifications and Final Physical Notifications must be submitted for each settlement period. Parties should not change their positions other than through instruction by the SO after gate closure. It is currently set at one hour before the start of the relevant settlement period.

**H****High Risk of Demand Reduction (HRDR)**

The SO may issue a HRDR warning at times when there is inadequate system margin and there is an increased risk of the SO instructing parties to reduce their demand. An HRDR specifies which parties may receive instructions and the period in which instructions may be required.

**I****Imbalance**

The difference between a party's contracted position and metered position measured on a half-hourly basis.

**IMBALNGC**

The difference between the sum of all Physical Notifications for exporting BMUs (i.e. indicated Generation) and NGET's demand forecast. This information is provided by the SO for the day ahead and current day.

**Impact Assessment (IA)**

Impact Assessments (IAs) are undertaken by the Modification Group as part of the modification evaluation process, and by Ofgem prior to a decision on accepting or rejecting a modification, including when required under the Utilities Act 2000.

**L****Large Combustion Plant Directive (LCPD)**

An EU Directive placing restrictions on the levels of sulphur dioxide, nitrogen oxides and dust particulates which can be produced by combustion plants with a thermal output greater than 50MW. The implementation of the LCPD in the UK requires coal and oil plant to fit flue gas de-sulphurisation (FGD) equipment or have their total running hours restricted to 20,000 between 1 January 2008 and 31 December 2015 before closing.

**M****Main price**

There are two Energy Imbalance Prices, "main" and "reverse". The main price is charged to parties out of balance in the same direction as the system. When the system is long, long parties receive the main price (SSP), whilst when it is short, short parties pay the main price (SBP).

### Market Index Price (MIP)

The Market Index Price (MIP) is used to set the reverse Energy Imbalance Price. It is calculated based on short term trading activity on exchanges. Currently the MIP is set based on trades undertaken on the APX over a period of 20 hours finishing half an hour before gate closure.

### Market Index Definition Statement (MIDS)

The Market Index Definition Statement (MIDS) defines the methodology for calculating the MIP. It is periodically reviewed by the BSC Panel.

### Maximum Export Limit (MEL)

The maximum level at which a BM Unit may export to the System.

### Metered Volume

The actual volume of electricity imported or exported at each BMU.

### Modification Proposal

A proposal to modify the Balancing and Settlement Code (BSC). Modifications can be raised by any Party to the BSC. Modifications are then defined and assessed by a Modification Group formed of BSC Parties in conjunction with Elexon. The BSC Panel will recommend whether a modification should be approved or rejected. The final decision is made by the Authority.

## **N**

### Net Imbalance Volume (NIV)

The overall energy imbalance on the system as determined by the net volume of actions taken by the SO in the Balancing Mechanism and under Balancing Services contracts.

### NGET

National Grid Electricity Transmission plc (NGET) is the system operator (SO) for the electricity transmission system in Great Britain (GB), with responsibility for making sure that electricity supply and demand stay in balance and the system remains within safe technical and operating limits.

### Notice to Deviate from Zero (NDZ)

The notification time required for a BM Unit to start importing or exporting energy from a zero level of import/export, in minutes.

**P****Price Average Reference (PAR)**

The volume of electricity from the main stack (taken in descending price order) included in the calculation of the main price. PAR is currently set to 500 MWh. The PAR volume is always the most expensive 500 MWh of available electricity in the main stack.

**R****Reserve**

Additional capacity available to the SO in order to manage uncertainty in the supply/demand balance.

**Reserve creation**

The use of BOAs in order to create sufficient flexibility and responsiveness to meet variations in the supply/demand balance.

**Residual Cashflow Reallocation Cashflow (RCRC)**

The net cashflow received by Elexon through energy imbalance charges and which is reallocated amongst participants based on throughput on a half-hourly basis.

**Reverse price**

There are two Energy Imbalance Prices, "main" and "reverse". The reverse price is charged to parties out of balance in the opposite direction to the system. When the system is long, short parties pay the reverse price and vice versa. The reverse price is currently set to the Market Index Price.

**S****Short Term Operating Reserve (STOR)**

A contracted Balancing Service, whereby the service provider delivers a contracted level of power when instructed by the SO, within pre-agreed parameters. The SO makes two kinds of payments for use of STOR, availability payments, and utilisation payments.

**Stable Export Limit (SEL)**

The minimum value at which a BMU, under stable conditions, may export to the System.

**System Operator (SO)**

The entity charged with operating the GB high voltage electricity transmission system, currently NGET.

### System Buy Price (SBP)

The price which imbalanced parties pay for a short energy imbalance.

### System Sell Price (SSP)

The price which imbalanced parties receive for a long imbalance.

## T

### Tagging

The process by which bids and offers are removed from the energy stack, either completely or leaving only volume, so that remaining actions determine energy imbalance prices.

### Transmission system

The national high voltage electricity network, operated by the SO.

## U

### Unpriced volume

Bids and offers which have their price removed and so do not feed into the cash-out price calculation but remain in the energy stack to be included in the determination of NIV.

## Appendix 4 - Feedback Questionnaire

1.1. Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process, which was adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand, could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments?

1.2. Please send your comments to:

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