

Electricity and gas cash out review

A Consultation Document

May 2004

Summary

The cash out arrangements are a very important part of the wholesale market rules in both the gas and electricity markets. The cash out rules set the commercial incentives for the market as a whole and for the companies who operate in the wholesale markets to promote effective competition in the wholesale markets and to maintain security of supply to the benefit of customers.

In the electricity market, suppliers contract with electricity generators to purchase the energy they need to meet their customers' demands and can also contract with customers to reduce their demand (for example during periods of high prices). The electricity cash out rules set the prices that:

- ◆ are paid/received by suppliers for any imbalance between their customers' metered demand and their contracted electricity purchases over the relevant balancing period; and
- ◆ are paid/received by generators for any imbalance between their metered output and the amount of electricity they are contracted to deliver to suppliers over the relevant balancing period.

In the gas market, shippers contract with gas producers and storage operators to purchase (and store) gas they need to meet their customers' demands and can also contract with customers to provide interruptible services. The cash out rules set the prices that:

- ◆ are paid/received by shippers for any imbalance between their metered inputs and offtakes over the relevant balancing period.

The primary responsibility for balancing lies with market participants (i.e. electricity generators, electricity suppliers and gas shippers). National Grid Transco (NGT), in its role as System Operator for both the gas (via Transco plc – Transco) and electricity networks (via National Grid Company plc – NGC), has a role as residual system balancer. NGT can buy and sell energy to correct the residual imbalances of the market to ensure that the two systems remain in balance at all times. The cash out rules are designed to ensure that the imbalance prices reflect the costs that NGT incurs in buying or selling energy to bring the system into balance during that balancing period. The cash out rules place strong commercial incentives on market participants to achieve energy balance.

Governance of cash out rules and recent proposed revisions

Cash out prices are determined by rules set out in the relevant industry codes (the Balancing and Settlement Code in electricity and Transco's Network Code in gas) and also, in the case of electricity cash out prices, in the Balancing Services Adjustment Data Methodology Statement governed by NGC's electricity transmission licence. The governance of the codes allows companies to propose changes to the rules. In both markets, the rules have evolved over time. Several modifications have been made to the rules in both gas and electricity in the light of experience of operating under the rules.

Ahead of last winter a number of modification proposals to electricity cash out arrangements were raised. A number of companies expressed concern about whether the current rules were sending accurate price signals and providing appropriate incentives to balance, particularly when the margin of supply over demand was very low. Similar concerns had also been expressed in the gas market and two gas cash out related modification proposals were raised during the previous winter in relation to the inclusion of Operating Margins (OMs) within the calculation of gas cash out prices. NGT has, in its recent Winter Outlook Report, continued to express concerns about the current cash out arrangements.

Ofgem rejected the proposed modifications. However, in considering the electricity modifications, Ofgem considered that evidence, albeit from a small number of days from when the system was under stress suggested that a review of cash out arrangements might be necessary. Ofgem identified that the purpose of such a review would be to consider whether the current cash out arrangements were providing appropriate price signals and the correct incentives at all times but particularly when the system was under stress and the margin of available supply over demand was tight. As gas-fired generators make up a significant proportion of gas demand and electricity supply, there are strong interactions between the two markets. Ofgem therefore considered that this interaction and the issues raised during recent modification proposals to the gas cash out arrangement suggested that any review of cash out arrangements should also look at the gas arrangements.

Review of cash out arrangements¹

The cash out rules are a highly complex and often controversial area of the wholesale market arrangements. There has been a lot of discussion and some confusion about Ofgem's views on the cash out arrangements². In particular, there has been a perception amongst some industry participants that rule changes approved by Ofgem, particularly in the electricity market, were designed to lower or dampen cash out prices at all times. This is not the case. Ofgem does not consider that there is a 'correct' level of imbalance prices. The level of imbalance prices should vary over time to reflect changes in market conditions, as in any other market. When the margin of available supply over demand is very small, imbalance prices may be very high reflecting the scarcity of supply. When the margin is large, prices may be relatively low. Cash out prices may also be higher than the relevant market price for the balancing period reflecting a premium that more flexible sources of supply can command.

Ofgem therefore considers that one of the key aims of the review should be to analyse whether the current cash out price arrangements send the appropriate signals and create the right incentives under different market conditions. This will inevitably involve empirical analysis of cash out prices under different market conditions based on actual (and potentially simulated) data on balancing costs and prices. The review will also consider areas of the cash out rules which are governed under NGC's and Transco's licences such as rules that determine how, for example, reserve and OMs costs feed into cash out prices. It will also consider the effect of the gas neutrality and residual cash flow reallocation mechanisms that refund surplus cashflow (or recover shortfalls) created by the arrangements back to (or from) companies, on incentives to balance. The review will also consider bidding behaviour and its impact on cash out prices.

Ofgem has not launched this review because it considers that changes to the current arrangements are necessary or that the gas and electricity arrangements need to be brought into line. The review may conclude that changes are necessary in one (or both) of the markets or may conclude that the existing arrangements are working well and no change is necessary.

¹ This review focuses on the gas cash out arrangements that apply across Great Britain and the electricity cash out arrangements that apply in England and Wales. The England and Wales electricity cash out arrangements are due to be extended to additionally apply across Scotland as of the introduction of the British Electricity Trading and Transmission Arrangements.

² Ofgem also notes that there has been discussion concerning re-pricing of Bids and Offers submitted into the Balancing Mechanism. However, this issue is not discussed in this document.

This document and the way forward

Given the complexity of the existing arrangements, Ofgem has set out in this document a complete description of the arrangements. Ofgem has then highlighted areas of the arrangements that it considers may need attention. Ofgem would welcome the views of respondents on these (and other areas) of the arrangements and whether they are working as intended. Ofgem would particularly welcome views, backed by empirical analysis, of any identified shortcomings in the current arrangements in providing appropriate incentives to balance, particularly during periods of system stress. We would also welcome views on appropriate international experience on cash out arrangements. We would be particularly interested in international experience from energy markets with developed retail and wholesale competition whose cash out arrangements have been tested under periods of system stress.

Given the complexity of the issues and the current rules, Ofgem intends, in the light of respondents' views, to inform its review by carrying out analysis of the effects of the current rules. This analysis will be based on historic data and simulated data and it will inform a detailed assessment of the possible options for reform. Following its review, Ofgem intends to publish a further document (a 'Final Thoughts' document) which will outline the analysis undertaken and incorporate a detailed assessment of the issues considered and present any findings made. The purpose of the 'Final Thoughts' document will be to help facilitate the debate and help the industry to understand Ofgem's views. In accordance with its normal approach, if Ofgem recommends changes, it will then be for the industry to consider whether to raise modification proposals under the relevant codes and/or methodology statements to change the existing rules.

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1. Introduction

Purpose of this document

- 1.1. On 1 March 2004, Ofgem published a letter stating that it was intending to carry out a review of cash out arrangements in electricity and gas in relation to their impact on incentives for the market to balance supply and demand and therefore maintain security of supply³. This consultation document is intended to start that review process.
- 1.2. Ofgem has identified those areas of the cash out arrangements that it considers are most relevant when considering incentives to balance and security of supply but wishes to seek the views of interested parties on whether any other areas are particularly relevant to these issues.
- 1.3. This document is designed to provide the necessary background to the more detailed analysis of specific areas that will follow. It describes the current cash out arrangements in some detail and explains which areas of the cash out arrangements Ofgem considers should be examined in more depth. Discussion of these issues as part of the cash out review in no way fetters Ofgem's discretion in relation to any existing or future Modification Proposals concerning cash out prices.

Background and rationale

- 1.4. The cash out (or imbalance price) arrangements are important in providing commercial incentives for electricity market participants to balance their contractual and physical positions and for gas market participants to balance their inputs into and offtakes from the gas transportation system over the relevant balancing periods. The cash out arrangements set the price that companies pay for any imbalances. The arrangements are important for ensuring that the market

³ This review focuses on the gas cash out arrangements that apply across Great Britain and the electricity cash out arrangements that apply in England and Wales. The England and Wales electricity cash out arrangements are due to be extended to additionally apply across Scotland as of the introduction of the British Electricity Trading and Transmission Arrangements.

delivers security of supply by providing incentives for market participants to balance supply and demand.

- 1.5. The rules are designed to target the costs that the System Operator (SO)⁴ has incurred keeping their relevant systems in energy balance onto those companies who are out of balance. By exposing market participants who do not balance their positions to the costs of electricity or gas balancing incurred by the SO, the cash out arrangements provide commercial incentives for them to balance. The legal framework for these commercial arrangements is governed by a set of industry codes⁵ and also by methodology statements that fall under the SOs' licences⁶.
- 1.6. The gas and electricity cash out arrangements have evolved over time as a number of modifications to the cash out price calculation methodologies proposed by the market have been approved and implemented, following assessment by market participants and careful consideration by Ofgem. However issues raised during the assessment of recent proposed modifications, particularly in the case of electricity cash out arrangements, and concerns expressed by market participants in relation to how cash out prices have behaved in certain circumstances indicate that a wider review of cash out arrangements may be required.
- 1.7. Ofgem considers that this review should focus on both the gas and electricity cash out arrangements, given the interaction between the gas and electricity markets through, for example, the operation of gas-fired generating stations. The current arrangements provide for different cash out arrangements in gas and electricity. There may be valid reasons for these differences such as the ability to store gas and the different time-frames over which the two systems are balanced.
- 1.8. It is, however, important for the arrangements to be consistent to avoid the potential for perverse incentives (e.g. where the incentives provided by one set

⁴ National Grid Company plc (NGC) is the SO in the electricity market. Transco plc (Transco) is the SO in the gas market. Both Transco and NGC are subsidiaries of National Grid Transco plc (NGT).

⁵ The Balancing and Settlement Code (BSC) in the case of the electricity cash out arrangements and the Network Code (NC) in the case of the gas cash out arrangements.

⁶ The relevant statement in the electricity cash out arrangements is the Balancing Services Adjustment Data (BSAD) Methodology Statement and the relevant statement in the gas cash out arrangements is the System

of cash out arrangements are to the detriment of operations in the other market). Ofgem is therefore reviewing aspects of both the gas and electricity cash out arrangements at the same time.

- 1.9. However, the cash out arrangements in electricity and gas cover a broad range of interlocking issues and consequently a full review of the cash out arrangements would have to be very wide-ranging in scope. Therefore, Ofgem does not presently consider that it is appropriate to conduct a full review of the arrangements, because it is of the view that the cash out arrangements in both electricity and gas are considered to be working relatively well. Ofgem considers that the review should have a narrower scope, focusing on those issues in relation to the cash out arrangements which have potential significance in terms of security of supply from the short term and beyond, including the issues highlighted by market participants during the recent assessment of a number of cash out related modification proposals (as discussed below). This is against the backdrop of concerns expressed by NGT in terms of security of supply from the short term extending over the next two winters.

Recent proposed revisions to the cash out arrangements

- 1.10. In recent months, Ofgem has issued decision letters in respect of four proposals for modifications to the cash out arrangements (two in electricity and two in gas)⁷. As briefly outlined below, the issues raised during the assessment of these proposed modifications indicated that a wider review of gas and electricity cash out arrangements may be required.
- 1.11. Balancing and Settlement Code (BSC) Modification Proposals P136 and P137, raised by NGC and Barclays Bank plc respectively, sought to introduce marginal cash out pricing for electricity, to replace the existing volume weighted average

Management Services Adjustment Data (SMSAD) Methodology Statement.

⁷ BSC Modification Proposals P136 ("Marginal Definition of the 'main' Energy Imbalance Price") and P137: ("Revised Definition of the System Buy Price and System Sell Price") in electricity and Network Code Modification Proposals 0606 ("Reform of the cash-out arrangements and the inclusion of costs of OM gas used for end of day balancing purposes using a stack process") and 0607 ("Change to the cash-out arrangements where Transco defines Operating Margins (OM) gas usage for end of day balancing

cash out pricing. Following the industry's assessment of BSC Modification Proposals P136 and P137 during which strong views were expressed both for and against the Proposed Modifications, Ofgem rejected the Modification Proposals on 30 March 2004, on grounds that the proposals could create distortions in the market as cash out prices would have been set by a small and possibly unrepresentative volume of accepted offers and also that the proposed mechanisms for setting cash out prices could potentially have been manipulated.

- 1.12. Network Code Modification Proposals 0606 and 0607 sought to include the use of Operating Margins (OM)⁸ gas in the calculation of gas cash out prices. Both these modification proposals were rejected by Ofgem on 29 August 2003 because of concerns over introducing non market-related costs into cash out prices, and the appropriateness of increasingly determining cash out prices via fixed price differentials. However Ofgem noted in its decision letter that the inclusion of OM gas in cash out prices could in principle improve the regime by making it more cost-reflective.
- 1.13. Therefore, in recognition that a number of wider issues were raised throughout the assessment and consultation process in relation to these Modification Proposals, including the gas and electricity market interactions, and in order to facilitate debate particularly in relation to security of supply considerations ahead of winter 2004/05, Ofgem has initiated this review of the cash out arrangements for both gas and electricity. In addition to this review, Ofgem is undertaking a wider ranging review of those aspects of the gas and electricity trading arrangements that could have an impact on security of supply for winter 2004/05. As part of this broad review, Ofgem has published documents on the security of supply and the top up arrangements in gas, concurrently with this cash out review.
- 1.14. In coming to the decision to review the gas and electricity cash out arrangements, Ofgem's views were influenced by concerns that in instances where the supply and demand gap is tight, electricity cash out prices did not

purposes").

⁸ Operating Margin (OM) gas relates to the securing of gas in storage which allows Transco to ensure the supply of gas is maintained in the event of a network emergency.

reach levels that reflected the underlying system conditions. A commonly cited example of this is 10 December 2002 when the electricity system was under considerable stress and yet the resulting cash out prices did not appear to be providing the appropriate market signals to indicate the strain on the electricity system. Ofgem would note, however, that the number of days when the system has been under stress have been very few and care should be taken before seeking to draw too many lessons from experience on a handful of days. In publishing this review, Ofgem is seeking to explore areas of the cash out review which may not be functioning as well as intended. Given only the limited number of days when the system has been under stress, Ofgem intends to use both historic and simulated data to consider how effective the current rules are in providing appropriate incentives.

- 1.15. To inform discussions, this cash out review will need to consider the arrangements in the BSC, Transco's Network Code (NC) and in the methodology statements that fall under the SOs' licences, as well as encompassing the arrangements in a broader sense, including residual cashflows generated from imbalance and also the incentives on market participants in formulating their bidding strategies.

Way forward

- 1.16. Given that security of supply is an important element of the cash out review, and further to timing considerations also highlighted in the security of supply review Ofgem has sought to initiate this cash out review at this early stage in the year to ensure that there will be sufficient time for industry and Ofgem both to assess and consider these aspects of the cash out arrangements ahead of next winter. To that end, Ofgem welcomes responses to this review by 9 June 2004.
- 1.17. All responses will normally be published on the Ofgem website and held electronically in the Research and Information Centre unless there are good reasons why they must remain confidential. Respondents to the consultation should try to put any confidential material in appendices to their responses and mark it as confidential. Ofgem prefers to receive responses in an electronic form so they can be placed easily on the Ofgem website. Responses should be

submitted by 9 June 2004 either electronically to becky.neale@ofgem.gov.uk or by post, addressed to:

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- 1.18. Ofgem intends, in the light of respondents' views, to inform its review by carrying out analysis of the effects of the current rules. This analysis will be based on historic data and simulated data. Ofgem expects to publish a 'Final Thoughts' document on the cash out review in July 2004 which will outline the analysis undertaken, incorporate a detailed assessment of the issues considered and present any findings made, indicating those areas (if any) that Ofgem considers merit further consideration by market participants. The purpose of the 'Final Thoughts' document will be to help facilitate the debate and help the industry to understand Ofgem's views.
- 1.19. Following publication of the 'Final Thoughts' document, the onus will be on the industry to raise modification proposals to the relevant codes and methodology statements where it considers there to be merit in doing so. The aim of the review is to help the industry gain an understanding of Ofgem's views and the areas which Ofgem considers are worth revisiting. The review process may conclude that they are working in broadly the manner in which they were intended and that no change is necessary.
- 1.20. An indicative timetable is provided in Table 1.1 below, which, whilst tight, would allow for both industry and Ofgem to assess, consider and, where appropriate, seek to address any aspects of the cash out arrangements which the review may identify as requiring further attention ahead of next winter:

Table 1.1 – Indicative timetable for cash out review

Stage	Timing
Publication of this consultation document	17 May 2004
Responses due to this consultation document	9 June 2004
Publication of 'Final Thoughts' document (incorporating analysis undertaken, a detailed assessment of the possible options for reform and findings made)	July 2004
Consideration by market participants of those areas (if any) that Ofgem considers merit further attention and assessment of any modification proposals raised	From July 2004

1.21. Ofgem recognises that this leaves a relatively short window in which to progress and, if appropriate, implement changes to the cash out arrangements ahead of winter 2004/05 but considers that changes can, if considered appropriate by market participants, feasibly be progressed in this time period. Whilst the focus of the review is on possible changes ahead of winter 2004/05, this should not preclude market participants from developing potential revisions to the cash out arrangements which would need to be progressed over a longer time period.

1.22. Ofgem is happy to meet with market participants who wish to discuss the issues raised within this document. If market participants would like to organise a meeting to discuss any aspect of this document, please contact any of the following people who will be pleased to help:

- ◆ Jo Witters – telephone number: 020 7901 7159, fax number: 020 7901 7452, email: jo.witters@ofgem.gov.uk; or
- ◆ Simon Bradbury – telephone number: 020 7901 7249, fax number: 020 7901 7452, email: simon.bradbury@ofgem.gov.uk; or
- ◆ Fiona Lewis – telephone number: 020 7901 7436, fax number: 020 7901 7452, email: fiona.lewis@ofgem.gov.uk .

Outline of this document

1.23. This document outlines the proposed process and scope of the cash out review. Chapter 2 describes the current cash out arrangements in electricity and gas and

the most recent modification proposals that have been raised in relation to the cash out arrangements. Chapter 3 contains Ofgem's views on the appropriate scope for the cash out review. Chapter 4 highlights the way forward and next steps for the review.

- 1.24. Appendix 1 covers the regulatory framework in electricity and gas relevant to the cash out arrangements. Appendix 2 outlines the tagging and residual cashflow mechanisms in the electricity cash out arrangements. Appendix 3 highlights the main developments to the cash out arrangements over time. Appendix 4 outlines recent Modification Proposals in relation to the cash out arrangements.

2. Current cash out arrangements

- 2.1. The underlying rationale and aim of the cash out arrangements in gas and electricity are the same, although the way in which these aims are implemented varies between gas and electricity. Many of these differences reflect the varying nature of gas and electricity as products. For example, electricity cannot be readily stored economically and needs to be balanced on a moment to moment basis whereas gas is much more readily stored and does not physically need to be balanced in timescales comparable to electricity.
- 2.2. This chapter outlines the aims underlying both sets of cash out arrangements and discusses how the balancing process works in both electricity and gas. Finally, it describes the recent proposals raised for modifications to the cash out arrangements. The regulatory regimes within which the cash out arrangements sit are outlined in Appendix 1 and a brief history of how the cash out arrangements have developed over time is provided in Appendix 3.

Electricity SO's tools for balancing the system

- 2.3. The Balancing Mechanism (BM) was designed as a tool to assist NGC, as the SO, to keep the Transmission System in balance in real time by providing a mechanism to adjust levels of generation and demand through the acceptance of Bids and Offers submitted to the BM (electricity balancing). The SO also uses the BM, amongst other things, to ensure that the system remains within safe operating limits, and that the pattern of generation and demand is consistent with any transmission system constraints (system balancing). System balancing actions include, but are not limited to, frequency control and the alleviation of locational constraints.
- 2.4. As well as the BM, NGC, as SO, has commercial freedom to trade in the short term markets and can use a range of other tools to contract with generators, suppliers and customers to balance the system. It can, for example, enter into balancing services contracts, typically option contracts that allow it to call on a service when it needs it; forward trades (typically non-locational) and pre gate

closure balancing trades (PGBT⁹). At Gate Closure¹⁰, which occurs one hour before the start of the settlement period, bilateral trading stops and NGC, in its role as SO, takes control of balancing the system.

- 2.5. The costs incurred by NGC in procuring balancing services, both pre-Gate Closure and in the BM, form a component of the balancing costs that NGC has incentives to reduce under its SO incentive scheme. NGC also has an obligation under its transmission licence to operate the system in an economic, efficient and co-ordinated manner.

Gas SO's tools for balancing the system

- 2.6. Transco uses linepack as a flexibility tool. Linepack is the storage of gas within the National Transmission System (NTS), which allows the inventory of gas in the system to change in response to imbalances between demand and supply within certain safe operational limits. If the linepack pressure rises or falls towards unsafe parameters, Transco is responsible for maintaining the overall system balance. Transco has complete discretion in determining both the extent to which linepack can change during the day and the final target for linepack at the end of the gas day. However, Transco has commercial incentives to minimise linepack changes day-on-day.
- 2.7. Transco manages the system by buying and selling on the On-the-day Commodity Market (OCM), this includes buying locational, title and physical gas. Locational gas is mainly traded to resolve locational constraints on the NTS, i.e. for system balancing reasons whilst title and physical gas are traded for gas balancing purposes. Title trades involve a mere change in the ownership of the gas without any physical consequences, while physical trades require the counterparty to amend its nominations of the volume of gas to be flowed onto

⁹ These are explained in more detail in the section titled 'Inclusion of NGC's non BM trades'.

¹⁰ Gate Closure is the last point at which Parties can notify their contractual position to NETA Central Systems and at which Parties can resubmit their Physical Notifications to NGC. After Gate Closure, NGC uses the Balancing Mechanism to enable them, amongst other things, to keep the system in electricity balance close to, and in, real time by adjusting levels of generation and demand in the light of the Bids and Offers submitted. From NETA Go-Live until 2 July 2002, Gate Closure was 3½ hours before real time. On 2 May 2002 the Authority accepted BSC Modification Proposal P12 ("Reduction of Gate Closure From 3.5 Hours To 1 Hour") and this modification was implemented on 2 July 2002 from which point Gate Closure was reduced from 3.5 hours to 1 hour.

the NTS. The vast majority of Transco's trades are now title rather than physical or locational trades.

- 2.8. Transco also has a role in managing top up. Transco will store gas, known as top up gas, if it considers that shippers have booked insufficient storage capacity to meet the security criteria. Further information on the top up arrangements can be found in the top up review document to be published shortly.
- 2.9. As part of its safety case established under the Gas Safety (Management) Regulations 1996, Transco is required to hold Operating Margins ('OM') in order to deal with system and balancing issues within the balancing period that the market is unable or unwilling to resolve. OM gas is provided mainly in the form of storage, although there are alternative tools available to Transco. Operating Margins is used by Transco to maintain system pressure under circumstances including compressor trips, pipe breaks or other failures of transmission plant and including periods immediately after a supply loss or demand forecast change before other management measures become effective. To date, Transco has used gas in storage to deliver OM, although it has considered using producers/demand side interruption and could do so if it is considered to be appropriate. The costs associated with OM gas, based on Transco's current contracting strategy, can be split into two categories, storage capacity costs and commodity (gas) costs. Under Transco's NTS SO incentives it receives a fixed allowance (or target) for OM storage capacity costs. Transco is fully exposed to OM storage costs that exceed this target and receives the full benefit if OM storage costs are below this target. Commodity costs are incurred when OM gas is used. On days when OM gas is employed, Transco recovers the commodity charge from shippers through balancing neutrality charges (see below).
- 2.10. Transco also has the right to interrupt the gas supplies to customers who have signed interruptible gas transportation contracts. Transco may use its interruptible rights for gas balancing purposes when demand exceeds 85% of peak day demand (it can also use interruptions to alleviate system constraints at any time). The existence of such contracts enables Transco to run a more efficient network by deferring the need for additional investment in pipeline, capacity or compression until there is a widespread requirement for further investment. However, going forward, reforms to the interruptions arrangements

would need to consider whether it is appropriate that Transco uses these contracts for supply-demand balancing, and if so whether these costs should feed through into the cash out price.

- 2.11. Transco also has administered operational tools available to it, known as terminal flow advices (TFAs), which enable it to request a delivery facility operator (DFO) to reduce flows onto the network for a specified period of time within the balancing period. In addition, contractual obligations on some large offtake points (such as power stations) set out in Network Exit Agreements (NExAs) enable Transco to limit the extent to which shippers increase or decrease offtakes within the balancing period.

Aim of cash out arrangements

- 2.12. In their roles as SOs, NGC (in electricity) and Transco (in gas) are responsible for:

- ◆ ensuring that each system remains within safe operating limits over operational timescales (i.e. within the relevant balancing period) and that the pattern of inputs and outputs is consistent with any transmission system related constraints (system balancing); and
- ◆ the residual purchasing and selling of electricity or gas to keep the transmission system in balance in the required timeframes (electricity or gas balancing).

- 2.13. The distinction between system balancing and electricity/gas balancing is relevant to the discussion of cash out arrangements. It is Ofgem's view that cash out prices should reflect the costs of electricity/gas balancing but not the costs of system balancing. System balancing actions are undertaken by the SOs on behalf of the system as a whole and are not related to an individual party's energy imbalance over the relevant balancing period, whereas the SOs undertake electricity/gas balancing actions primarily as a result of market participants not balancing their own positions over the relevant balancing period.

- 2.14. Consequently, the cash out arrangements are designed to target the costs that the SO has incurred in electricity or gas balancing onto those Parties that are in a position of imbalance, i.e. those Parties on behalf of whom the SO has taken electricity or gas balancing actions. System balancing costs are not included in the cash out prices and are not targeted onto those in electricity/gas imbalance. System balancing costs are recovered from all companies using the system and are ultimately borne by customers.
- 2.15. It is important that the prices calculated by the cash out arrangements are applied consistently for all market participants and so do not discriminate between parties. Additionally, it is important that the methodology for calculating cash out prices is robust and not easily open to manipulation.

Governance of cash out arrangements

- 2.16. The electricity and gas cash out arrangements are contained in the following documents:
- ◆ electricity cash out arrangements are contained in a combination of the BSC and the Balancing Services Adjustment Data (BSAD) Methodology Statement¹¹. Broadly, the BSC outlines the methodology for calculating cash out prices and how pre- and post-Gate Closure balancing actions are treated in calculations. The BSAD Methodology Statement sets out how information on balancing actions taken pre-Gate Closure will be compiled and submitted for the purposes of determining cash out prices; and
 - ◆ gas cash out arrangements are contained in the NC. As with BSAD in electricity, the gas cash out arrangements make provision for System Management Services Adjustment Data (SMSAD) which relate to the option contracts undertaken by Transco in the purchase of gas. At present the trades that would feature in SMSAD have not been developed, and therefore SMSAD is set at zero.

¹¹ NGC produces and maintains the BSAD Methodology Statement in accordance with special condition AA4 ("Licensee's Procurement and Use of Balancing Services") of its transmission licence.

2.17. The arrangements therefore fall within the governance of industry codes and, in the case of electricity (and potentially gas in the future), also under the governance of a Methodology Statement produced in accordance with relevant licence conditions. Any proposed revisions to the arrangements must be progressed through the specified modification procedure.

BSC and NC

2.18. It is for market participants, including the SOs, to raise modification proposals and to assess changes to the code baseline. In gas, assessment can be progressed in accordance with urgent timescales if this is requested by the appropriate Parties and approved by the Authority. In electricity, assessment can be progressed in accordance with urgent timescales if this is recommended by the SO or ELEXON to the BSC Panel, and the BSC Panel agrees with this recommendation and is granted approval by the Authority. Following assessment by market participants and consideration of the Panel (under the BSC in the case of electricity) and Transco (under the NC in the case of gas), the Authority makes the decision to either approve or reject a proposal. The Authority, in reaching its decision, carefully considers the proposed revisions within the context of the applicable objectives of the relevant Code and, if appropriate, its wider statutory duties.

BSAD Methodology Statement

2.19. NGC is required to review and to seek to revise the BSAD Methodology Statement whenever a change to its procurement of balancing services suggests that a modification is required to make cash out prices more closely reflect its actions. Market participants are free to suggest areas for modification to NGC and/or the Authority, for action by NGC if considered appropriate. Proposed revisions are consulted upon for at least 28 days with BSC Parties¹². After consideration of the responses received, and within seven days of the close of the consultation period, NGC submits a report in relation to the proposed revisions to the Authority for decision. NGC is free to make the proposed

¹² A shorter consultation period can be directed by the Authority.

revisions 28 days after submitting its report to the Authority, unless the Authority has directed either an earlier implementation date or that the proposed revisions should not be made.

- 2.20. Consistent with the arrangements in electricity, Transco is required to publish an SMSAD Methodology Statement. However, as mentioned previously, although SMSAD in gas is analogous to BSAD in electricity, at the present time, there has not been development of the trades that would form SMSAD.

Electricity

Definition of imbalances

- 2.21. Market participants are free to contract bilaterally up to Gate Closure for each half-hour settlement period. Participants have to notify both the volumes of electricity that they have contracted for that period and their intended level of consumption or generation over the period. They can also choose to submit Bids and Offers into the BM, which NGC can then use to balance the system¹³. Under the rules of the BSC, a Party's imbalance volume is equal to the difference between its notified contract volume, including accepted Bids and Offers, and its loss-adjusted¹⁴ metered volume. If these two volumes do not match, the Party is producing (or consuming) electricity which has not been sold (or bought) and is therefore not covered by contracts. Imbalance settlement, or cash out, is designed so that any electricity consumed, or produced, that is not covered by contracts is paid for, or charged, at a price that reflects the costs incurred by NGC as SO associated with actions taken for electricity balancing purposes.
- 2.22. Parties that are 'long' when the market as a whole is 'short' (i.e. generators whose physical output exceeds their contracted volume or suppliers whose customers' demand is less than their contract volume when total demand on the system is greater than total generation at Gate Closure), are not, in any meaningful sense, contributing to balancing the system (except inadvertently).

¹³ Only NGC can accept Bids or Offers in the Balancing Mechanism.

¹⁴ Some electricity is lost from transmission wires and cables in the form of heat, light and sound. Although NGC, in its capacity as transmission asset owner, has incentives to reduce transmission losses, the transmission system still loses around 1.5% of total electricity generated in a year.

Similarly, Parties who are short when the market is long are only inadvertently contributing to balancing the system.

- 2.23. Separate imbalance volumes are calculated for production and consumption on a half-hourly basis. At the time that the imbalance arrangements were designed, there was considerable debate as to whether participants should be able to net off their production and consumption imbalances. It was decided that allowing such netting off would discriminate against market participants who were only active on one side of the market, i.e. were only generators or suppliers, and hence might create a barrier to entry. Consequently, separate settlement of production and consumption imbalances was considered to be the appropriate arrangement.

Background to current arrangements

- 2.24. Since NETA Go-Live¹⁵, in the light of experience gained under the new arrangements, a number of modifications¹⁶ have been made to the way in which Energy Imbalance Prices are calculated. These modifications were raised as a result of concerns that the rules did not give rise to prices that appropriately reflected costs and market conditions and were approved because the proposed changes were considered appropriately to address these concerns. The modifications include the introduction of the Continuous Acceptance Duration Limit (CADL)¹⁷ and changes to the treatment of pre-Gate Closure balancing actions in the calculation of the cash out prices. Most recently, Approved Modification P78¹⁸ was introduced to address a defect that the methodology for calculating cash out prices did not only reflect electricity balancing costs but could also include costs associated with system balancing¹⁹.

¹⁵ NETA Go-Live occurred on 27 March 2001.

¹⁶ See table of approved modifications to the cash out arrangements in Appendix 3.

¹⁷ Approved Modification P18A: CID definition 1a

¹⁸ BSC Modification Proposal P78: "Revised Definitions of System Buy Price and System Sell Price".

¹⁹ In addition, on 2 May 2002, the Authority accepted BSC Modification Proposal P12: 'Reduction of Gate Closure from 3.5 hours to 1 hour', which was implemented on 2 July 2002.

Current derivation of cash out prices

- 2.25. A dual cash out mechanism exists in which there are two Energy Imbalance Prices, or ‘cash out prices’: the System Buy Price (SBP) and the System Sell Price (SSP). Parties that are short are charged SBP for their imbalance volumes and Parties that are long receive SSP for their imbalance volumes²⁰. These prices apply whether the system itself is long or short. In reflecting the costs that Parties in imbalance impose on the system, a dual cash out mechanism provides incentives for Parties to contract ahead to meet their customers’ demands, as those Parties that are long are likely to receive a lower price for electricity than if they had been fully contracted and Parties that are short are likely to pay a higher price than if they had been fully contracted.
- 2.26. Cash out prices are derived such that there is a ‘main’ price and a ‘reverse’ price. The reverse price is derived from a market price based on short-term energy trades made in the forward and spot markets. The main price is derived using a volume weighted average of all the eligible²¹ Electricity Balancing actions taken by the SO to alleviate the Net Imbalance Volume²² (NIV). The main price applies to imbalances in the same direction as the imbalance of the System and the reverse price applies to imbalances in the opposite direction. Table 3.1 summarises how the imbalance prices are calculated.

Table 3.1 – Calculation of electricity imbalance charges

System Position	Party Long	Party Short
Long	Receives SSP, calculated as volume-weighted average of energy sold by the SO which is derived to be for electricity balancing purposes	Pays SBP, calculated from the short-term market price
Short	Receives SSP, calculated from the short-term market price	Pays SBP, calculated as volume-weighted average of electricity bought by the SO which is derived to be for electricity balancing purposes

²⁰ This assumes that SBP and SSP are positive. If SBP or SSP are negative, the monetary flows are reversed.

²¹ Defined as actions that are not: Bids or Offers which have a Continuous Acceptance Duration of less than 15 minutes; De Minimis accepted Bids or Offers; Arbitrage accepted Bids or Offers; NIV Tagged Bids or Offers; or System actions identified in the BSAD methodology.

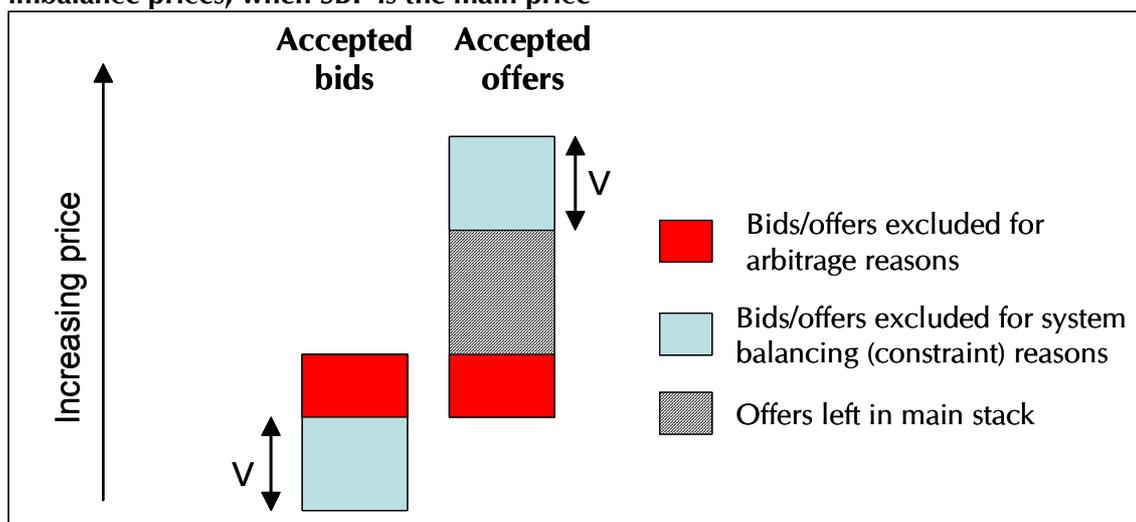
²² The NIV is calculated by netting off all purchase actions against all sell actions to give the imbalance of the overall System.

Calculation of cash out prices

Separation of system balancing actions

2.27. The methodology for separating electricity balancing actions in the BM from system balancing actions is as follows. First, accepted Offers/Bids with a continuous duration of less than 15 minutes are excluded from consideration (as the balancing period is set at half an hour, parties' electricity imbalance position are measured on a half-hourly basis). Next, all accepted Bids/Offer of less than 1 MWh are excluded. Then, in situations where accepted Offers have Offer prices below the Bid prices of accepted Bids, arbitrage tagging occurs and a matching volume of accepted Bids and Offers for which the Offer price is lower than the Bid price are excluded. Finally, if the Offer stack is greater than the Bid stack, Offers are excluded in order of descending Offer prices until the volume excluded is equal to that of the Bid stack and the remaining Offers are used to calculate the main price. (If the Bid stack is greater than the Offer stack, then the cheapest Bids are excluded until the Offer stack volume has been reached and the remaining Bids set the main price). The operation of the last two parts of this process, where the main price is the SBP, is shown in Figure 3.1. Further details of the 'tagging' process are included in Appendix 2.

Figure 3.1 –Exclusion of system balancing actions from the calculation of electricity imbalance prices, when SBP is the main price



Inclusion of NGC's non BM trades

- 2.28. In addition to taking balancing actions after Gate Closure in the Balancing Mechanism by accepting Bids and Offers, NGC can, where it is efficient and economic to do so, contract ahead of Gate Closure for the provision of Balancing Services. In order for electricity cash out prices to reflect the true costs of Electricity Balancing, it is important to ensure that cash out prices reflect all Electricity Balancing transactions conducted by NGC ahead of Gate Closure, in addition to NGC's Balancing Mechanism acceptances. The kinds of balancing services that NGC may be interested in purchasing are defined in the Procurement Guidelines²³, which NGC is required to maintain in accordance with Special Licence condition AA4 of its transmission licence.
- 2.29. In order to ensure that the costs and volumes associated with NGC's pre-Gate Closure actions feed into the calculation of electricity cash out prices, NGC submits defined Balancing Services Adjustment Data (BSAD) variables to Central Systems. The BSAD variables are defined in the BSAD Methodology Statement²⁴, which NGC produces and maintains in accordance with special condition AA4 of its transmission licence. The BSAD Methodology Statement sets out the information on relevant pre-Gate Closure actions which will be taken into account under the BSC for the purposes of determining electricity cash out prices. Following implementation of BSC modification proposal P78²⁵, the calculation of electricity cash out prices has been amended to further exclude system balancing trades via NIV tagging.
- 2.30. At present there are eight BSAD components, six relate to electricity balancing actions and two relate to system balancing actions. BSAD costs (for electricity balancing actions only), volumes (for both electricity and system balancing actions) and option fees (for electricity balancing actions only) feed into the calculation of electricity cash out prices in order to better reflect the cost that NGC has incurred when taking electricity balancing actions.

²³ See 'Procurement Guidelines', NGC. This document can be found at the following location: http://www.nationalgrid.com/uk/indinfo/balancing/pdfs/Procurement_Guidelines_v3_1_281103.pdf

²⁴ See 'BSAD Methodology Statement', NGC. This document can be found at the following location: http://www.nationalgrid.com/uk/indinfo/balancing/pdfs/BSAD_v3_1_281103.pdf

- 2.31. Following implementation of BSC Modification Proposal P12²⁶, which reduced Gate Closure from 3.5 hours to 1 hour from 2 Jul 2002, NGC also has at its disposal Pre Gate Closure Balancing Mechanism Unit Transactions (PGBTs). These trades serve as an additional Balancing Service, and are entered into ahead of Gate Closure should they match NGC's requirements. The costs (in the case of PGBTs taken for electricity balancing purposes only) and volumes of these forward actions feed through into cash out prices via BSAD.
- 2.32. Whilst the costs and volumes of PGBTs feed into cash out prices on the basis of utilisation, a number of non-BM services that NGC has at its disposal are charged on the basis of availability and utilisation. First, to ensure that a service is available for a particular time, NGC may enter into a contract to define an availability payment, also termed an "option fee". The availability payment is a single contract fee for a particular service over a particular period of time, i.e. for a one-year period. Where these option fees are for a particular energy-related service such as standing reserve, it is appropriate for both the availability and utilisation costs to be reflected in cash out prices, as this best reflects the energy-related costs of the transaction.
- 2.33. At present, option fees for standing reserve are profiled according to expected patterns of utilisation. NGC creates a profile of when it considers standing reserve is most likely to be used, and allocates standing reserve option fees into these periods. These fees feed into cash out via the Buy-Price Price Adjustment (BPA) which is added to the main price following the volume-weighted calculation of energy-related Balancing Mechanism trades and forward trades. Equally some negative reserve may be procured, in which case the relevant BSAD parameter is the Sell-Price Price Adjustment or SPA, and is reflected in cash out prices when SSP is the main price. This is best illustrated by the following equation:

$$\text{Cashout price} = \frac{\text{Cost of BM electricity balancing trades} + \text{Cost of forward trades}}{\text{Volume of BM electricity balancing trades} + \text{Volume of forward trades}} + \text{Option fee price}$$

²⁵ See 'Revised definition of System Buy Price and System Sell Price', ELEXON. Related documents can be found at: http://www.elexon.co.uk/ta/modifications/mods_docs.html.

²⁶ See 'Reduction of gate closure from 3.5 Hours to 1 Hour', ELEXON. Related documents can be found at: http://www.elexon.co.uk/ta/modifications/mods_docs.html.

Residual Cashflow Reallocation Cashflow

- 2.34. The cash out arrangements are not designed to recover NGC's balancing costs. Instead, the cash out arrangements relate to cashflows associated with market participants' energy imbalance volumes. As outlined above, Parties that are short are charged SBP for their imbalance volumes and Parties that are long receive SSP for their imbalance volumes. Imbalance revenues received from those in short positions feed into a central fund, while imbalance payments to those in long positions are made from the same fund. However, it is unlikely for the imbalance payments and revenues to match and consequently an imbalance cashflow surplus or deficit exists for each balancing period. The net surplus/deficit²⁷ resulting from summing the imbalance payments and revenues for all market participants is returned to/recovered from market participants via Residual Cashflow Reallocation Cashflow (RCRC).
- 2.35. The RCRC in each settlement period is allocated to each energy account pro-rated on the basis of the values of the energy volumes credited to each energy account. The pro-rated proportion to be allocated to each energy account is the Residual Cashflow Reallocation Proportion (RCRP), which is multiplied by the Total Residual Cashflow (TRC) to give each energy account's RCRC. The RCRC values are then summed over the energy accounts of each party, and summed across all settlement periods to give the daily RCRC. A worked example of the RCRC process is included in Appendix 2.

Information Imbalance Charge

- 2.36. As well as the imbalance charge described above, the BSC also contains provisions for an information imbalance charge, which covers differences between market participants' notified and metered positions. At present this information imbalance charge is set to zero.

²⁷ The materiality of these costs or payments vary greatly (and can be a few million pounds per day) depending on the direction and magnitude of the energy imbalances as well as the prices on the BM and the power exchanges, as well as other influencing factors such as generator breakdown and bidding strategies.

Gas

Definition of Imbalances

- 2.37. The current gas balancing arrangements are designed to provide shippers with commercial incentives to balance their inputs to and offtakes from Transco's high-pressure pipeline system, the NTS, at the end of the gas day²⁸. If a shipper is out of balance at the end of the day, any imbalance volume is cashed-out at prices determined by trades on the OCM. To alleviate these imbalances, Transco has the same flexibility as NGC with regards to trading forward and also has the same scope to develop other balancing initiatives, but has, as yet, not chosen to use it.
- 2.38. In gas there is no equivalent concept to that of Gate Closure in electricity and market participants can continue trading throughout each daily balancing period and, indeed, can continue to trade out their imbalance volumes for up to 15 days after the end of the month in which the relevant gas day occurs²⁹. However, participants have to notify their intended inputs and offtakes ahead of time.
- 2.39. Since the imbalance charge is intended to provide incentives on shippers to balance their gas inputs and outputs, a shipper's imbalance volume is the difference between its inputs to and offtakes from the NTS, allowing for the impact of any ex-post trading.

Background to current arrangements

- 2.40. The introduction of the OCM and commercial incentives on Transco to reduce the costs of gas balancing was part of the New Gas Trading Arrangements (NGTA), which were introduced in stages from October 1999. The NGTA reforms also improved incentives on shippers to balance their own positions through a phased reduction of imbalance tolerances.³⁰

²⁸ That is, in each 24 hour period beginning at 6am each day.

²⁹ After the day trading is a concept that does not exist in the electricity arrangements.

³⁰ A shipper whose imbalance volume was less than its imbalance tolerance was exposed to an average

- 2.41. Since the introduction of the OCM there have been a number of modifications to the way in which cash out prices have been calculated. These include modifications for the removal of tolerances³¹ and the revised definitions of cash out prices.³²
- 2.42. Market participants can trade bilaterally on the OCM and Transco buys and sells gas through the OCM to keep the NTS within safe operational limits both within-day and at the end of the day.

Current derivation of cash out prices

- 2.43. Different imbalance prices apply depending on whether the shipper is short gas or long gas. A shipper that is short gas pays the system marginal buy price (SMPbuy) which is the higher of:
- ◆ the highest price of any trade to which Transco is a party on the OCM, excluding any trades that it takes for locational reasons; and
 - ◆ the average price of gas traded on the OCM (SAP) plus a fixed value set at 0.0287p/kWh, which is based on the price for injecting gas into the Hornsea storage site in 2000. Note that if Transco does not purchase any gas, SMPbuy defaults to this price.
- 2.44. Conversely, a shipper that is long gas is paid the system marginal sell price (SMPsell) which is the lower of:
- ◆ the lowest price of any trade to which Transco is a party on the OCM, excluding any trades that it takes for locational reasons; and
 - ◆ SAP minus a fixed value set at 0.0324p/kWh, which is based on the price for delivering gas from the Hornsea storage site in 2000. As for SMPbuy, the SAP related price is the default SMPsell price if Transco does not sell any gas.

rather than a marginal cash out price.

³¹ On 1 October 2002, network code modification proposal 0511 "removal of NDM forecast deviation from imbalance calculations" was implemented. This removed the last of the imbalance tolerances.

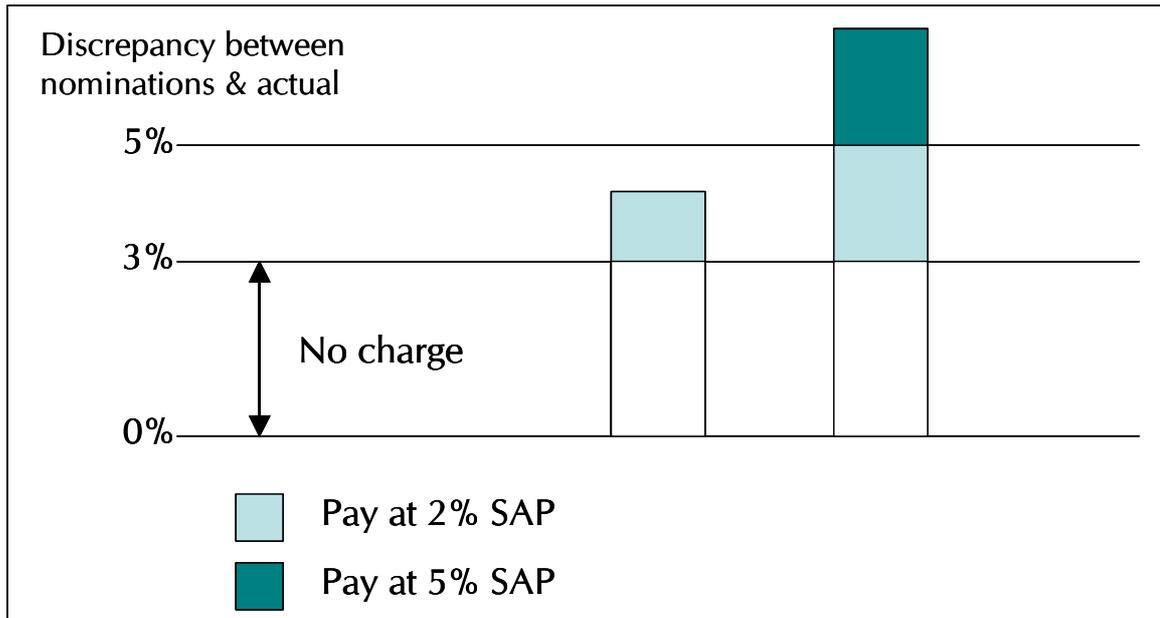
³² On 1 April 2001, network code modification proposal 0433 "Changes to system cash-out prices" was implemented. This amended the cash-out arrangements to those described below.

2.45. The current derivation of cash out prices was introduced via Approved Modification 0433. The Modification sought to provide a proxy price for system flexibility and to introduce a guaranteed minimum differential into the cash out prices. This was intended to ensure that on days when Transco does not take balancing actions on one (or both) side(s) of the market, cash out prices better reflect the costs of imbalances and encourage shippers to balance their portfolios by buying or selling gas on the OCM. At the time the current methodology was introduced, it was felt that the use of prices from the Hornsea storage site represented a suitable proxy for system flexibility.

Scheduling Charge

- 2.46. In addition to an imbalance charge, the cash out arrangements in gas include a scheduling charge.
- 2.47. The scheduling charge is designed to provide incentives for shippers to make accurate input and output nominations, irrespective of whether the nominations match. If a shipper's actual inputs or offtakes differ from its final nominations, it will pay scheduling charges if the difference is greater than its scheduling tolerance. The rules for calculating input and output scheduling charges are different. Figure 3.2 illustrates how a shipper's input scheduling charge is calculated, i.e. based on the shipper's final allocation at each entry terminal. Output scheduling charges are payable at 1 per cent of SAP outside the shipper's tolerance volume, with different tolerances applying to different types of exit points:

Figure 3.2 – Calculation of input scheduling charges



Balancing Neutrality Charge

2.48. As in electricity, the cash out arrangements are not used to recover the costs that Transco incurs in balancing the system. Instead, the money that is paid to (or paid by) Transco as a result of imbalance charges, scheduling charges and purchases and sales of gas on the OCM is returned to (or paid by) shippers via the balancing neutrality charge. The aggregate system payments are returned to (or paid by) shippers on the basis of their throughputs (the sum of their inputs and outputs).

Recent proposals for cash out modifications

2.49. Ofgem has recently published decision letters in relation to several modification proposals which proposed revisions to the electricity or gas cash out arrangements set out above and has a number of other cash out related modification proposals with it for decision. Details of these Modifications Proposals are provided in Appendix 4.

3. Cash out issues

Overview

3.1. In considering an appropriate scope for this review, Ofgem first endeavoured to identify all the issues that could be examined. Ofgem has narrowed down this list to focus on areas:

- ◆ that are directly relevant to incentives to balance and security of supply; and
- ◆ where possible revisions could be considered by market participants and then, if deemed to be necessary, assessed by industry and Ofgem with a view to implementation in time for winter 2004/05 if appropriate.

3.2. Therefore, this review focuses very much upon the cash out arrangements in the short-term, particularly arrangements for winter 2004/05, rather than any longer term developments.

Refining the scope

3.3. The issues that Ofgem considered for inclusion within the cash out review are wide ranging but can roughly be divided into three main groups, namely issues relating to:

- ◆ economic efficiency and incentives;
- ◆ cost-reflectivity and cost-recovery; and
- ◆ scope of cash out prices.

3.4. Ofgem has concluded that the issues associated with economic efficiency and incentives and the scope of the cash out arrangements are those most relevant when considering incentives to balance and security of supply. The review will also focus on aspects of cost-reflectivity and cost recovery issues that are relevant to the incentives to balance and to security of supply. The scope of cash out

prices will also be considered to the extent that they are relevant in terms of incentives to balance and security of supply.

3.5. Issues that Ofgem intends to exclude because the change associated with the issues means that it is unlikely that any modification addressing the issue could be implemented in time for this winter include³³:

- ◆ single versus dual cash out prices – is it appropriate to continue to utilise a dual cash out mechanism given the narrowing of the spread between SBP and SSP? Ofgem’s current view is that dual cash out prices continue to be appropriate.
- ◆ pay-as-bid v cleared price – does it remain appropriate for pay-as-bid BM acceptances to form the basis of the imbalance price? Ofgem’s current view is that it continues to be appropriate for pay-as-bid acceptances to form the basis of cash out prices.
- ◆ ex post trading in electricity and gas – should parties be entitled to trade out their imbalance subsequent to delivery? Ofgem’s current view is that the existing cash out arrangements in this respect continue to be appropriate.
- ◆ Gate Closure – should Gate Closure be retained in the electricity cash out arrangements and if so should the Gate Closure Period be revised? Should Gate Closure be introduced into the gas cash out arrangements? Ofgem’s current view is that the existing cash out arrangements in relation to these questions continue to be appropriate.
- ◆ system balancing/energy balancing split principle – is it appropriate to continue to split system balancing and energy balancing actions in the calculation of cash out prices? Ofgem’s current view is that it is appropriate to continue to differentiate between system and energy balancing actions when calculating cash out prices³⁴.

³³ Although this cash out document will not deal with these issues, it does not preclude market participants from raising modifications to the BSC with the intention of revising the arrangements in the longer term.

³⁴ The tagging mechanisms by which the system balancing/energy balancing split is achieved are within the

- ◆ balancing periods – should the duration of the balancing periods in the gas and electricity trading arrangements be changed? Ofgem’s current view is that the existing balancing periods should be retained³⁵.
- ◆ separate production and consumption accounts for electricity imbalance volumes – should production and consumption accounts continued to be separated? Ofgem’s current view is that production and consumption accounts should continue to be separate.

Key issues for security of supply in winter 2004/05

3.6. Having concluded that issues associated with economic efficiency and incentives, cost-reflectivity and cost recovery, and the scope of the cash out arrangements are those most relevant when considering incentives to balance and security of supply, Ofgem considered the key issues to be addressed within these areas. Ofgem therefore considers that the cash out review should focus upon the following key issues:

- ◆ should electricity cash out prices be based on some form of marginal pricing basis?
- ◆ should gas cash out prices be based on some form of weighted average pricing basis (as is currently the case in electricity)?
- ◆ are the current ways in which electricity/gas balancing actions (including NGT’s option contracts) are identified and included in cash out prices appropriate? In particular, should the costs of OM gas be included in gas imbalance charges and are the tagging mechanisms used to remove system balancing actions from electricity cash out prices appropriate?

scope of this review.

³⁵ In relation to the balancing period in the gas arrangements, Ofgem is expecting to publish shortly a document setting out its proposals in respect of the introduction of set of indicators to monitor the performance of the current gas balancing arrangements. Ofgem intends to utilise the indicators to monitor the performance of the gas balancing regime and to inform its decision with respect to the need for major reforms to the current arrangements, including the duration of the balancing period.

- ◆ are the current arrangements for returning/collecting the residual imbalance charge cashflows to/from market participants appropriate (this applies to both gas and electricity)?
- ◆ should the default imbalance price mechanism in gas (SAP plus or minus a differential based on Hornsea costs in 2000) be revised?
- ◆ is the current methodology for calculating the reverse electricity cash out price appropriate?
- ◆ scheduling charges – do they remain appropriate or should they be removed?
- ◆ for all of the above is there appropriate justification for differences between the gas and electricity cash out arrangements or should the two be made more consistent?

3.7. A further issue that could be considered within the cash out review is the question of whether shippers should be allowed to make their own NDM nominations rather than having to accept Transco's. To the extent that this encouraged more accurate nominations to be made, it could be argued that this would enhance security of supply.

3.8. Ofgem would like to take the opportunity to seek full industry participation in the cash out review. In particular, where market participants are of the opinion that a particular area of the current arrangements (that is within the scope of the review) is not functioning in its intended manner, or is having a detrimental effect on competition or the cost-reflectivity of the cash out arrangements, Ofgem is interested to see to what extent the industry's views can be supported with analysis. To facilitate this process and to stimulate discussion, the paragraphs below outline the types of options that might be considered following exploration of the above issues.

Marginal or volume-weighted imbalance prices

3.9. Marginal cash out prices are generally expected to provide stronger incentives to balance than volume-weighted average cash out prices given that they will be

based on the highest or lowest priced actions rather than an average. Moreover, it will always be the case that a marginal price will be at least as high (or as low) as the volume-weighted average, and will normally be higher (or lower).

- 3.10. In instances where the supply/demand gap is tight, prices in the BM would be expected to rise to reflect scarcity, as in any other market. During periods when the system is under stress, when it is important that cash out prices send signals about the scarcity of electricity to the market, the difference in the effect of using a volume weighted average rather than a marginal approach to determining cash out prices should, in theory, be small, since Offer prices are likely to converge and this should lead to the two approaches to pricing giving similar results.
- 3.11. If, however, the volume of the marginal action that sets the cash out price is very small, it can be argued that the resulting calculation does not appropriately reflect the costs that have been incurred by NGC in resolving market participants' imbalances, and is therefore not economic or efficient, particularly given the residual cashflow reallocation mechanisms that are in place. Furthermore, a marginal mechanism that sets the energy imbalance price on the single most (or least) expensive trade remaining in the stack could increase the risks that the rules are manipulated. Therefore, there may be some value in considering an intermediate form of cash out pricing for the main cash out price somewhere between full marginal and the existing weighted average approaches. For example, the cash out price could be set as the volume-weighted average of a pre-specified percentage of accepted electricity balancing actions (the top x% of purchases and the bottom x% of sales) or it could be set as the volume-weighted average across some pre-specified volume of actions; however, Ofgem recognises the potential difficulties in defining the appropriate level of 'x' such that cash out prices are representative of the electricity balancing costs incurred by NGC in resolving the imbalances.

Identifying and including electricity/gas balancing actions in cash out prices

- 3.12. The approach to identifying and including electricity balancing actions in cash out prices is different to that adopted in the gas market. In part, it reflects the fact that NGC trades forward more actively than Transco such that adopting the

gas approach in electricity would exclude a significant proportion of the electricity balancing costs that NGC incurs. Nonetheless, on the gas side, it would seem appropriate to explore what, if any, types of costs are excluded from gas imbalance charges that are included in electricity balancing charges and whether these differences remain appropriate. One area to consider is the cost of OM gas.

- 3.13. In the electricity market, Ofgem considers the more relevant questions to explore are whether the way in which electricity balancing actions taken outside the Balancing Mechanism are included in cash out prices is appropriate and whether the methodology by which actions are excluded from the cash out calculations is also appropriate. Although the modifications were validly rejected. It may, for example, be worth reconsidering some of the changes proposed under BSC Modifications P136 and P137 with regard to the treatment of forward trades, option fees etc., particularly if the introduction of some form of marginal pricing might be considered. This is likely to require consideration of the methodology for incorporating NGC's pre-Gate Closure trades into cash out prices as outlined in the BSAD Methodology Statement.

Residual cashflow reallocations

- 3.14. It can be argued that returning/collecting the residual imbalance charge cashflows to/from market participants on the basis of volume, as happens in both electricity and gas, distorts or reduces the incentives to balance. This may particularly be the case for larger market participants, who, given that when the short cashflow is larger than the long cashflow, a surplus is reallocated, benefit most from volume-related residual cashflow reallocations. This is of note particularly as larger market participants are most able to influence whether the reallocation cashflow is a receipt or a payment. Moreover, the concern surrounding the effects of the residual cashflow reallocation is that as the proportion of the cashflow/cost that is reallocated to a Party is independent of whether or not it was in balance, that the incentives to balance on that Party can be distorted. Furthermore, in some cases this mechanism may present gaming opportunities to the detriment of competition and the efficient operation of the transmission system.

- 3.15. It may be worth considering whether there are more appropriate ways of reallocating the residual cashflows. For example, would a methodology whereby the proportion of residual cashflow returned to/collected from a market participant is reduced/increased as its imbalance volume increases/decreases provide better incentives to balance?

Default cash out mechanism in gas

- 3.16. Whilst the default cash out mechanism in gas (SAP plus or minus a fixed differential) was considered appropriate when it was introduced, in that the differential was related to prevailing storage costs, the continued use of the same differentials even though storage costs have changed may not now be appropriate. At the very least, it would seem appropriate to consider revisiting the fixed differentials given that since 1 April 2001, default prices on both sides of the market have set the cash out prices for 66 per cent of the time. It might, however, be worth considering whether the fixed differential should be removed altogether if, for example, the costs of OM gas were included in cash out prices.

Reverse cash out price in electricity

- 3.17. The concept of a reverse cash out price derived from market indices was introduced as part of BSC Modification Proposal P78 in March 2003. As this method of determining the reverse price has now been in operation for over a year, it would seem appropriate to assess whether the methodology for calculating it continues to be appropriate.

Scheduling charges in gas

- 3.18. Scheduling charges form one of the payments made to Transco by shippers in order to provide incentives for shippers to make accurate nominations of inputs and offtakes. If a shipper's actual inputs and offtakes differ from the final nominations levels, it will pay scheduling charge should these differences exceed its scheduling tolerance. At present, shippers are not liable for payment unless the difference between nominations and actual inputs and offtakes exceeds 3 per cent. Beyond this point, and up to a 5 per cent difference between inputs and offtakes, the shipper is liable for payments at 2 per cent of

SAP on the volumes. Should the difference exceed 5 percent, then the shipper will pay 5 per cent of SAP on the volumes³⁶. There may be merit in considering whether these fixed values (both in terms of differences between inputs and offtakes and also in payment rates as a per cent of SAP) should be adjusted or even removed.

Summary

3.19. Ofgem considers that the cash out review should focus only on areas:

- ◆ that are directly relevant to incentives to balance and security of supply; and
- ◆ where possible revisions could be considered by market participants and then, if deemed to be necessary, assessed by industry and Ofgem with a view to implementation in time for winter 2004/05 if appropriate.

3.20. Specifically, the cash out review will involve consideration of the following key issues:

- ◆ should electricity cash out prices be based on some form of marginal pricing basis?
- ◆ should gas cash out prices be based on some form of weighted average pricing basis (as is currently the case in electricity)?
- ◆ are the current ways in which electricity/gas balancing actions (including NGT's option contracts) are identified and included in cash out prices appropriate? In particular, should the costs of OM gas be included in gas imbalance charges and are the tagging mechanisms used to remove system balancing actions from electricity cash out prices appropriate?
- ◆ are the current arrangements for returning/collecting the residual imbalance charge cashflows to/from market participants appropriate (this applies to both gas and electricity)?

³⁶ See figure 3.2.

- ◆ should the default imbalance price mechanism in gas (SAP plus or minus a differential based on Hornsea costs in 2000) be revised?
- ◆ is the current methodology for calculating the reverse electricity cash out price appropriate?
- ◆ scheduling charges – is there a better way of dealing with them or should they be removed?
- ◆ for all of the above is there appropriate justification for differences between the gas and electricity cash out arrangements or should the two converge?

3.21. Again, Ofgem would like to take the opportunity to seek full industry participation on the above issues. In particular, Ofgem would be interested in empirical evidence and urges the industry to stimulate further discussion based on experience and analysis of the following:

- ◆ marginal against average pricing;
- ◆ the effect of residual cashflow reallocations on the incentives to balance and the predictability thereof;
- ◆ the price of storage;
- ◆ the manner in which option fees are dealt with; and
- ◆ the effect of bidding behaviour of market participants.

3.22. If market participants consider that any other issues should be included in the review, please feel free to include suggestions within any response to this consultation document. The way forward is outlined in the next chapter.

4. Way forward

Summary of views invited

- 4.1. Ofgem invites views on any of the issues raised in this document. In particular, Ofgem invites views and analysis where appropriate on:
- ◆ the proposed timetable for the consultation;
 - ◆ whether the cash out review should be a one step or two step process with the first phase leading, if necessary, to changes in the cash out arrangements for this winter and the second phase potentially resulting in further changes next year ;
 - ◆ whether the areas identified by Ofgem for inclusion in the review as outlined in paragraph 3.20 are appropriate;
 - ◆ the areas of the gas and electricity cash out arrangements as identified in paragraph 3.20; and
 - ◆ whether any other issues should be included in the review.

Next steps

- 4.2. Ofgem invites views on any of the aspects raised in this document, and in particular where views have been specifically requested, as detailed above. Responses to this consultation will normally be made available in the Ofgem library and on the Ofgem website unless respondents request that they should remain confidential. Respondents should mark any part of their response (or the whole response) which is to remain confidential. If this is the case, where possible, any confidential material should be confined to appendices. We anticipate, as part of the review process, providing discussion papers on particular issues raised in this document. In addition, it may be appropriate to set up a series of workgroups.
- 4.3. Responses should be submitted in writing by 9 June 2004. Following consideration of the responses, Ofgem intends to publish a 'Final Thoughts'

document, which will outline the analysis undertaken as part of the review, incorporate a detailed assessment of the issues considered and present any findings made, indicating those areas (if any) that Ofgem considers merit further consideration by market participants. The purpose of the next document will be to help facilitate the debate and help the industry to understand Ofgem's views.

Appendix 1 Regulatory framework

Introduction

- 1.1 This appendix summarises the current regulatory framework for the electricity and gas markets that are relevant to the determination and changing of the cash out arrangements. It outlines the current legislative, licensing and regulatory regimes and describes the relationship between the Electricity Act 1989, the Gas Act 1986, the Utilities Act 2000, licences and industry agreements.

The Electricity Act 1989 (the 'Electricity Act')

- 1.2 The Electricity Act, as amended by the Utilities Act 2000, provides the framework for the functions of the Gas and Electricity Markets Authority (the 'Authority') and sets out the licensing regime in relation to the supply, distribution, generation and transmission of electricity.
- 1.3 Under section 9(2) of the Electricity Act, holders of transmission licences are obliged to develop and maintain an efficient, co-ordinated and economical system of electricity transmission and to facilitate competition in the supply and generation of electricity.

The Gas Act 1986 (the 'Gas Act')

- 1.4 The Gas Act, as amended by the Utilities Act, provides for the regulation of the onshore gas regime in Great Britain and for the separate licensing of gas transporters ('GTs'), gas shippers and gas suppliers.
- 1.5 Where the Authority is satisfied that a licensee is contravening, or is likely to contravene any licence condition or relevant obligation (as defined in the Gas Act), the Authority must, except in certain limited circumstances take enforcement action, i.e. the issue of an enforcement order against the licensee under section 28 of the Gas Act.
- 1.6 Section 30A of the Gas Act sets out the provisions by which the Authority can impose penalties on a licence holder where it contravenes its obligations.

Section 30E sets out the provisions by which the licence holder can appeal such penalties.

- 1.7 Section 34(1) of the Gas Act places a duty on the Authority, as far as it appears to the Authority to be practicable, to keep under review the carrying on both within and outside Great Britain licensed activities and relevant ancillary activities. It is also the duty of the Authority, as far as it appears to the Authority to be practicable, to collect information on the activities of GTs, gas shippers, gas suppliers and ancillary services, in relation to matters with respect to which its functions are exercisable.
- 1.8 Section 35 of the Gas Act provides the Authority with the powers to publish advice or information, related to the conveyance of gas through pipes, where it would promote the interests of existing and future consumers. In publishing the advice or information the Authority must have regard to the need for excluding information, so far as that is practicable, which relates to an individual or body if, in the Authority's opinion, publication of the information would or might seriously and prejudicially affect that individual or body's interests. Before deciding to publish advice or information in relation to a particular individual or body, the Authority must consult that individual or body.

The Utilities Act 2000 (the 'Utilities Act')

- 1.9 The Utilities Act received Royal Assent on 28 July 2000. It introduced a new principal objective for the Authority. In relation to gas, the principal objective of the Authority is to protect the interests of consumers in relation to gas conveyed through pipes, wherever appropriate by promoting effective competition between those engaged or concerned with the shipping, transportation or supply of gas or engaged in commercial activities relating to such activities. In carrying out its functions under the Gas Act in a manner which is best calculated to further the principal objective, the Authority is required to have regard to the following:
- ◆ 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; and

- ◆ the need to secure that licence holders are able to finance the carrying on of the activities which they are authorised or required to do.
- 1.10 In performing such duties, the Authority must, amongst other things, have regard to the interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes or residing in rural areas.
- 1.11 The Authority may, in carrying out any of its functions, have regard to the interests of consumers in relation to electricity, telecommunications, and water and sewerage services, which are affected by the carrying out of those functions.
- 1.12 The Authority must carry out its functions in the manner it considers is best calculated to:
- ◆ promote efficiency and economy on the part of authorised persons and the efficient use of gas conveyed through pipes;
 - ◆ protect the public from dangers arising from the conveyance of gas through pipes or the use of such gas; and
 - ◆ secure a diverse and viable long term energy supply.
- 1.13 In carrying out these functions, the Authority must also have regard to the effect on the environment of activities connected with the conveyance of gas through pipes. The Authority is also required to have regard to the social and environmental guidance given to us by the Secretary of State.
- 1.14 Equivalent provisions apply with regard to the Authority's role and responsibility in relation to the electricity industry. For example, the Authority's principal objective is "to protect the interests of consumers in relation to electricity conveyed by distribution systems, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the generation, transmission, distribution or supply of electricity".

NGC's electricity transmission licence

- 1.15 NGC owns and operates the national grid in England and Wales, which transports electricity at high voltage from the generators to the local distribution

networks and to customers connected directly to the transmission system. The Secretary of State granted, under section 6(1) of the Electricity Act, an electricity transmission licence to NGC. NGC is the sole possessor of an electricity transmission licence in England and Wales.

Special condition AA4

1.16 NGC's transmission licence contains several provisions relating to information provision and transparency:

- ◆ special condition AA4 (1) requires the licensee to operate the licensee's transmission system in an efficient, economic and co-ordinated manner; and
- ◆ special condition AA4 (2) prohibits the licensee from discriminating as between any persons or classes of persons in its procurement or use of balancing services.

1.17 NGC is required to procure any balancing services competitively and via transparent processes. In order to fulfil this requirement, NGC is obliged under special condition AA4 of the transmission licence to have in place two documents³⁷:

- ◆ the Procurement Guidelines ('PGs'), which detail the types of balancing services that NGC may be interested in purchasing, together with the mechanisms envisaged for purchasing such balancing services. Table 3 within Part E of the PGs outlines NGC's approach to providing information relating to its procurement of balancing services in order to provide market participants and other interested parties with sufficient information without compromising the commercial position of any contracting party; and

³⁷ Details of the PGs, BPS and the BSAD Methodology Statement can be found at NGC's website www.nationalgrid.com/uk/indinfo. NGC is also required to produce under special condition AA4, the Applicable Balancing Services Volume Data (ABSVD) Methodology Statement, which can also be found at this address.

- ◆ the Balancing Principles Statement ('BPS'), which defines the broad principles and criteria by which NGC will determine, at different times and in different circumstances, which balancing services it will use to assist in the operation of the transmission system.

Transco's gas transporter licence

- 1.18 Transco has a duty, under section 9 of the Gas Act, to develop and maintain an efficient and economical pipeline system for the conveyance of gas and, so far as it is economical to do so, to comply with any reasonable request to connect to that system and convey gas by means of that system to any premises. It is also the duty of Transco to facilitate competition in the supply of gas. A GT has a further duty to avoid any undue preference or discrimination in the connection of premises to any pipeline system operated by it, or in the terms on which it undertakes the conveyance of gas by means of such a system.
- 1.19 Amended standard condition 4D(1) of Transco's GT licence requires it to conduct its transportation business in the manner best calculated to ensure that neither the GT nor any affiliate, nor any gas shipper nor gas supplier, obtains any unfair commercial advantage.
- 1.20 Standard condition 16(2) sets out certain gas security standards to which Transco must plan and develop its pipeline system. In essence, these standards require the pipeline system to be capable of meeting a peak aggregate daily demand that is only likely to be exceeded in one year in every 20 years.
- 1.21 Special condition 27(1) requires Transco to operate the NTS in an efficient, economic and co-ordinated manner.
- 1.22 Amended standard condition 4E requires Transco only to enter into transportation arrangements, which are in conformity with any relevant provisions of the network code. This would include any obligations in the network code to disclose information relating to the operation of Transco's pipeline system or any market relating to Transco's pipeline system.

Industry Codes

The Balancing and Settlement Code ('BSC')

- 1.23 The BSC's scope is defined in general terms in the Transmission, Generation and Supply licences. The BSC is a code that sets out the rules for the Balancing Mechanism and imbalance settlement process under NETA and it is maintained by NGC under supplementary standard condition C3 of its transmission licence.
- 1.24 The BSC sets down the arrangements in respect of:
- ◆ making, accepting and settling Offers and Bids to increase or decrease electricity delivered to, or taken off, the total system (NGC's transmission system and the distribution systems) to assist NGC in balancing the system; and
 - ◆ determining and settling imbalances and certain other costs associated with operating and balancing the transmission system.
- 1.25 A BSC Panel has been created and charged with overseeing the management, modification and implementation of the BSC rules, as specified in Section B of the BSC. The Panel has twelve representatives made up from industry members, consumer representatives, independent members and NGC. The Authority appoints the Chairman of the Panel.
- 1.26 The Balancing and Settlement Code Company (ELEXON³⁸) is a wholly owned subsidiary of NGC and it supports the BSC Panel. The primary purpose of ELEXON is to provide or procure a range of operational and administrative services (both directly and through contracts with service providers) and to implement the provisions of the BSC and modifications to it.
- 1.27 The details of the modification procedures are contained in Section F of the BSC. They are designed to ensure that the process is as efficient as possible whilst enabling as many parties as possible to propose modifications and have the opportunity to comment on modification proposals. Whilst Ofgem cannot initiate any modifications, it is required to approve or reject all modifications to

³⁸ The Balancing and Settlement Code Company was named ELEXON Limited on 7 June 2000.

the BSC, according to defined objectives relevant to the appropriate code, and where appropriate, also according to its wider statutory duties.

Transco's Network Code

1.28 Transco's GT licence places certain obligations on Transco, including the requirement that it prepares a network code (amended standard condition 9), which sets out the arrangements between the GT and shippers for the use of, and connection to, that GT's pipeline system. The network code is required to meet the following relevant objectives as set out in standard condition 9 of the GT licence:

- ◆ the efficient and economic operation by the licensee of its pipeline system;
- ◆ so far as is consistent with sub-paragraph (a), the efficient discharge of its obligation under its licence;
- ◆ so far as is consistent with sub-paragraphs (a) and (b), the securing of effective competition between relevant shippers and between relevant suppliers; and
- ◆ so far as is so consistent, the provision of reasonable economic incentives for relevant suppliers to secure that the domestic supply security standards (as defined in the GT licence) are satisfied as respects the availability of gas to their domestic customers.

1.29 Transco's network code was put in place in March 1996. The mechanism for modifying the network code is set out in standard condition 9 of Transco's GT licence and in the network code modification rules. Under the modification rules, shippers, Transco and third party participants are able to propose modifications to the network code. Paragraph 6(a) of condition 9 also sets out the requirement for the network code modification rules to identify the designated third party participants. Ofgem is not itself able to propose modifications, although the implementation of all modifications requires the consent of the Authority.

1.30 The Authority may only direct that the NC should be modified if, in its opinion, the proposed modification would, as compared with the existing provisions of the network code or any alternative proposal, better facilitate the achievement of the relevant objectives as set out in standard condition 9 of the GT licence. In making such a direction, the Authority is required to have regard to its statutory duties.

Appendix 2 Tagging and RCRC methodologies

2.1 This appendix goes through the steps that are carried out to calculate the main electricity cash out price, ignoring the impact of the option fee adjustment. An example is used to illustrate the effect of the various steps. It also explains how a market participant's share of RCRC is calculated.

Tagging methodology

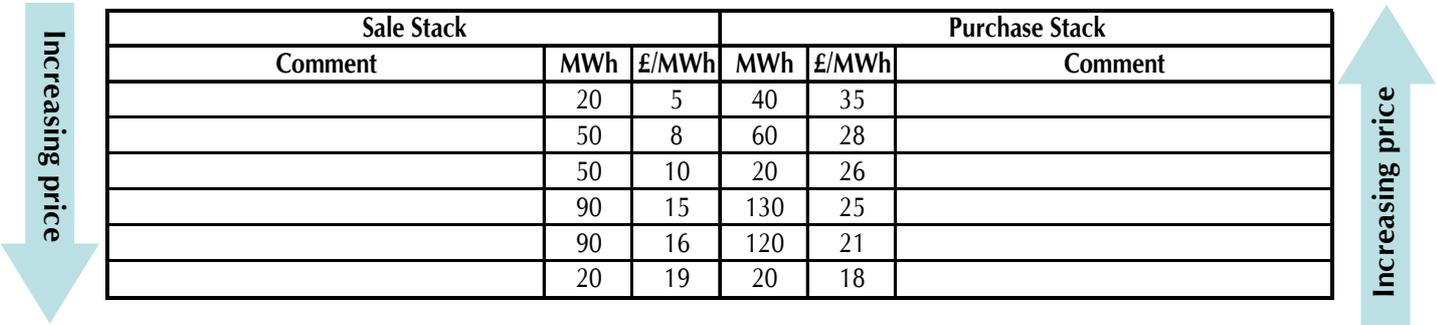
2.2 In this section, we describe the various steps that are taken to remove ('tag out') actions that have been taken for system rather than electricity balancing reasons.

2.3 **Step 1: CADL trades** are removed. Any accepted Bids and/or accepted Offers with a continuous acceptance duration limit of less than 15 minutes are not considered when calculating imbalance prices.

2.4 **Step 2: De Minimis trades** are removed. Any accepted Bids and accepted Offers below 1MWh are not considered when calculating imbalance prices. Together the volume of CADL and de minimis Offers removed is known as the *unpriced Offer volume*; similarly the sum of the CADL and de minimis Bid volumes removed is known as the *unpriced Bid volume*. These unpriced volumes are re-introduced at Step 5.

2.5 Following the removal of de minimis trades the following occurs:

- ◆ Accepted Bids are stacked in price order with the cheapest first.
- ◆ Accepted Offers are stacked in price order with the most expensive first.



Sale Stack			Purchase Stack		
Comment	MWh	£/MWh	MWh	£/MWh	Comment
	20	5	40	35	
	50	8	60	28	
	50	10	20	26	
	90	15	130	25	
	90	16	120	21	
	20	19	20	18	

2.6 **Step 3: Arbitrage trades** are removed. A matching volume of accepted Bids and accepted Offers for which the Bid Price > Offer Price are not considered when

calculating imbalance prices. The arbitrage trades that are tagged out are shaded in blue in the table below.

Sale Stack			Purchase Stack		
Comment	MWh	£/MWh	MWh	£/MWh	Comment
	20	5	40	35	
	50	8	60	28	
	50	10	20	26	
	90	15	130	25	
	90	16	120	21	
Tagged out: arbitrage trade	20	19	20	18	Tagged out: arbitrage trade

2.7 **Step 4: Forward purchases and sales** are separated into system balancing actions and electricity balancing actions. Purchases and sales in each category are netted off to give the net system balancing volume and the net electricity balancing volume. The net system balancing volume and net electricity balancing volume are then included in either the Bid stack or the Offer stack depending upon whether the net position is a purchase or a sale (if the net position is 'purchase' the net volume is included in the Offer stack whereas if the net position is 'sale' the net volume is included in the Bid stack)³⁹. The price attached to the net electricity balancing volume is calculated as a weighted-average of all electricity balancing actions. The net electricity balancing volume is included in either the Bid or Offer stack as appropriate in price order. The net system balancing volume is unpriced and is included either at the top of the Offer stack or the bottom of the Bid Stack as appropriate. The electricity balancing forward trade inclusions are shown in orange in the table below while the system balancing forward trade inclusions are shown in purple in the table below.

2.8 **Step 5: Unpriced Bid and Offer volumes** are added to the stacks. Next, the volume of unpriced accepted Bids (as defined above in paragraph 2.4) is added in at the bottom of the Bid stack below any unpriced net system balancing volume from forward trades and the lowest priced accepted Bid and the volume of unpriced accepted Offers is added in at the top of the Offer stack above any

³⁹ The net electricity balancing volume and the net system balancing volume may both be purchases, both be sales or one could be a net purchase while the other could be a net sale.

unpriced net system balancing volume from forward trades and the highest priced accepted Offer. This is shown in yellow in the table below.

Sale Stack			Purchase Stack		
Comment	MWh	£/MWh	MWh	£/MWh	Comment
Unpriced Bid volumes	5		15		Unprice Offer volumes
Net forward system balancing actions	10		40	35	
	20	5	60	28	
	50	8	20	26	
	50	10	130	25	
	90	15	80	22	Net forward electricity balancing actions
	90	16	120	21	
Tagged out: arbitrage trade	20	19	20	18	Tagged out: arbitrage trade

2.9 **Step 6:** The **direction of the main price** is determined. The main price is the imbalance price in the direction of the overall system imbalance. This is determined from the following steps:

- ◆ The total volume of remaining Bids and Offers in the stacks is compared. In this example, the total volume of remaining Bids is 315 MW and that of remaining Offers is 465 MW.
- ◆ If the total volume of remaining Offers exceeds the total volume of remaining Bids (as in the example), then the main price is the System Buy Price. Conversely, if the total volume of remaining *Bids* exceeds the total volume of remaining Offers then the main price is the System Sell Price.

2.10 **Step 7:** The **main price is calculated** as follows:

- ◆ If the main price is the SBP, then the remaining Offers are excluded from the imbalance calculation in price order, beginning from the top of the stack, until the excluded volume equals the volume of remaining Bids. For the example, the excluded Offers are shown in red below. The volume to be excluded may not exactly match an accepted Offer volume, in which case a fraction of the volume of the final accepted Offer affected by the exclusion process will be included in the imbalance price calculation. In the example, 30 MW of the accepted Offer with a price of 22 £/MWh (half-shaded in red) will be included in the SBP calculation.

- ◆ Similarly, if the main price is the SSP, then remaining Bids are excluded from the imbalance calculation in price order, beginning from the top of the stack, until the excluded volume equals the volume of remaining Offers.
- ◆ The main price is then the volume weighted average of all the Offers (or Bids as the case may be) that have not been excluded. In the example, ignoring the effect of any option fees, the system buy price would be:

$$◆ \quad SBP = \frac{30 \times 22 + 120 \times 21}{30 + 120} = \frac{3180}{1405} = 21.2$$

Sale Stack			Purchase Stack		
Comment	MWh	£/MWh	MWh	£/MWh	Comment
Unpriced Bid volumes	5		15		Unprice Offer volumes
Net forward system balancing actions	10		40	35	
	20	5	60	28	
	50	8	20	26	
	50	10	130	25	
	90	15	80	22	Net forward electricity balancing actions
	90	16	120	21	
Tagged out: arbitrage trade	20	19	20	18	Tagged out: arbitrage trade

RCRC methodology

2.11 The RCRC methodology is best explained by example. As shown in the table below, the Total System Residual Cashflow is calculated by subtracting the total system sell payments made to market participants from the total system buy revenues collected from market participants. In the example, although the system is long overall the SBP receipts exceed the SSP payments so that there is a net payment of £0.05 million to be made to participants.

2.12 The Total System Residual Cashflow then has to be divided between all market participants. This is done on the basis of the values of the energy volumes credited to each energy account. The sum of participants' credited energy volumes for production and consumption is calculated (in the example, 69 GWh) and the share of that accounted for by each participant is then calculated. Participant A is a vertically-integrated player with both production and consumption volumes. In total, these amount to 7.5 GWh, which is

approximately 11 per cent of the total system credited energy volumes. Hence, Participant A receives nearly £5,500, being 11 per cent of £0.05 million.

Identifier	Calculation	Description	Value
[A]		SBP (£/MWh)	25
[B]		SSP (£/MWh)	10
[C]		Short participants' total imbalance volume (GWh)	10
[D]		Long participants' total imbalance volume (GWh)	20
[E]	$[A]*[C]/1000$	Total SBP revenues (£m)	0.25
[F]	$[B]*[D]/1000$	Total SSP payments (£m)	0.20
[G]	$[E]-[F]$	Total System Residual Cashflow (£m)	0.05
		Total metered volume (GWh)	
[H]		Production	35
[I]		Consumption	34
[J]	$[H]+[I]$	Total	69
		Participant A's metered volumes (GWh)	
[K]		Production	2.5
[L]		Consumption	5.0
[M]	$[K]+[L]$	Total	7.5
[N]	$[M]/[J]$	Participant A's share of total metered volume	11%
	$[N]/[G]*1000$	Participant A's RCRC (£ '000s)	5.43

Appendix 3 Development of cash out arrangements over time

Approved modifications to the electricity cash out arrangements

Date implemented	Number	Name	Description
April 2001	P3	Correction Of Price Spikes Generated By De-Minimis Purchases	Temporary solution to the problem of BSAD related price spikes occurring as a result of very low overall BM acceptance volumes
May 2001	P10	Eliminating Price Spikes Caused by Truncating Effects	To prevent spurious bid/offer acceptances from causing price spikes, removed bids and offers with a volume of less than 1 MWh from the cash out calculation
September 2001	P18A	Removing/Mitigating Effect Of System Balancing Actions	To remove actions taken for system balancing rather than energy balancing reasons from the calculation of cash out prices. Removes bids and offers with a duration of less than 15 min
September 2001	P8	Introduction Of A Price Adjuster To Reflect Option Fees	Permanent solution to the work around implemented by P3
June 2002	Panel decision	Change in the BRL	BRL reduced from 180MWh to 5MWh
July 2002	P12	Reduction Of Gate Closure From 3.5 Hours To 1 Hour	Gate closure shortened from 3.5 hours to 1 hour
March 2003	P78	Revised Definitions of SBP and SSP	<p>Change to the calculations</p> <p>Main price:</p> <ul style="list-style-type: none"> • derived from the costs of the SO actions in the BM and pre-Gate Closure. (SBP when the system is short and SSP when the system is long) • applies to parties with imbalances in same direction as the system imbalance <p>Reverse price:</p> <ul style="list-style-type: none"> • derived from a market price, based on short term energy trades on the UKPX and UKAPX • applied to parties with imbalances

Date implemented	Number	Name	Description
			in the opposite direction to the system imbalance
October 2003	-	BSAD Methodology Statement Change	Revision to the way in which standing reserve option fees are allocated into settlement periods for the purposes of cash out. Allocation of these option fees was revised according to an expected pattern of utilisation

Approved modifications to the gas cash out arrangements

Date Implemented	Number	Name	Description
October 1999	313	Development of the energy balancing regime to facilitate implementation of an on-the-day commodity market	Facilitated the introduction of the new gas trading arrangements by: <ul style="list-style-type: none"> • Enabling the introduction of the OCM to replace the flexibility mechanism and facilitated shipper to shipper trading • Reducing Imbalance Tolerance Quantity by 25% • Setting out the calculation of SAP for imbalance cash out within tolerance, from all trades on the OCM, and SMP buy and sell determination based on Transco trades • Introducing incentives on Transco in its role as residual system balancer • Providing discretion to Transco over timing and volume of balancing actions • Permanently removing the matched renomination rule • Introducing physical renomination incentives on shippers
February 2000	373	Changes to shipper tolerance, cash out and introduction of tolerance services	Removed existing shipper balancing tolerances and set out a replacement tolerance service from 1 October 2000 involving tolerance auctions if a linepack service is not available. Modification 386, temporarily extended the absolute Tolerance Quantity until the introduction of

Date Implemented	Number	Name	Description
			a tolerance/ linepack service in October 2000. Modification 411 postponed the introduction of the tolerance auction for six months. Modification 415 required a phased reduction in shipper tolerances. Finally, modification 440 cancelled the auction of tolerance services.
April 2001	433	Changes to system cash-out prices from 1 April 2001	Introduced minimum SMP buy and sell differentials based on storage costs.
October 2002	479	Incentivised Nomination Scheme	Placed incentives on shippers to correctly estimate their end of day imbalance position at four designated times ahead of and during the gas day.
October 2002	511	Removal of cash out tolerances	Removed the last of the imbalance tolerances. In particular it removed imbalance tolerances arising from errors in Transco's demand forecasting.
October 2003	632	Revise INS charge to zero	Removed the charges for INS

Appendix 4 Recent proposals for cash out modifications

BSC Modification Proposal P135

- 4.4. BSC Modification Proposal P135⁴⁰ sought to amend the Energy Imbalance Price calculation such that the SBP would be derived from the most expensive Offer Acceptance remaining in the NIV, but only during times where demand control has been instructed by the Transmission Company (in accordance with OC6.1.2(c), (d) and (e) of the Grid Code) where there is insufficient generation to meet demand. Proposed Modification P135 was raised by NGC (and granted urgent status) as an ‘interim measure’, ahead of raising what they considered to be a more enduring long term solution with Proposed Modification P136.
- 4.5. The Authority rejected Proposed Modification P135 on grounds that it would not better facilitate achievement of the Applicable BSC Objectives⁴¹. This decision was reached for a number of reasons which included concerns that by having two regimes in place for the calculation of Energy Imbalance Prices there would be scope for perverse incentives to exist and also that there could be increased risk that setting cash-out prices on the basis of a very small volume Offer may not be appropriately reflective of the electricity balancing costs incurred by NGC as SO. In addition, Ofgem considered that the incentives that would be created by the RCRC mechanism could also undermine the intended effect of the Proposed Modification and that there was a significant risk that the Proposed Modification could increase the risk of generators inefficiently part-loading or withholding capacity in the event that demand control was likely.

⁴⁰ BSC Modification Proposal P135: “Marginal System Buy Price During Periods of Demand Reduction”.

⁴¹ The Applicable BSC Objectives, as contained in Standard Condition C3 (3) of National Grid Company’s (“NGC’s”) Transmission Licence, are:

- a) the efficient discharge by the licensee of the obligations imposed upon it by this licence;
- b) the efficient, economic and co-ordinated operation by the licensee of the licensee’s 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
- e) the undertaking of work by BSCCo (as defined in the BSC) which is:
 - (i) necessary for the timely and effective implementation of the proposed British Electricity Trading and Transmission Arrangements (BETTA); and
 - (ii) relevant to the proposed GB wide balancing and settlement code; and does not prevent BSCCo performing its other functions under the BSC in accordance with its objectives.

BSC Modifications Proposals P136 and P137

- 4.6. BSC Modification Proposals P136 and P137⁴², submitted by NGC and Barclays Bank plc respectively, both sought to replace the current volume-weighted average methodology for calculating cash out prices with a marginal pricing methodology for the main price. The marginal price would be derived from the most expensive accepted balancing action⁴³ remaining in the Net Imbalance Volume after all system balancing actions and arbitrage trades had been removed, as described above.
- 4.7. Both Modification Proposals also proposed a change to the way in which forward trades are taken into account in calculating cash out prices. Under the present arrangements, pre-Gate Closure balancing actions are included as net aggregated volumes and costs, and both Modification Proposals proposed that, instead, forward trades should be included on an individual basis. In addition, they both proposed that the methodology for including option fees should be changed so that the option fee price (based on expected utilisation) for a BM unit would be added to the accepted Offer price before the Offer price is placed in the stack, rather than the aggregate option fee price being added on after the stack price has been determined as is currently the case. Finally, they proposed that the prices associated with standing reserve contracts that are not delivered via the BM should be included in an equivalent way to the prices associated with standing reserve delivered via the BM.
- 4.8. BSC Modification Proposal P137 proposed two further changes to the mechanism. First, where an action is accepted for an individual generating unit and then subsequently unwound, the original action should not be included in the main imbalance price stack. Second, where pre-Gate Closure actions for electricity balancing reasons cannot be assigned to a specific generating unit (as will be the case for exchange trades, for example), the volume of these actions should be summed up separately for Bids and Offers and a volume equal to the

⁴² BSC Modification Proposals P136: "Marginal Definition of the 'main' Energy Imbalance Price" and P137: "Revised Definition of the System Buy Price and System Sell Price".

⁴³ If the main stack is being used to calculate SBP, this would be the highest priced offer left. Conversely, if the main stack is being used to calculate SSP, this would be the lowest priced Bid left.

smaller of the two sums should be removed from the bottom of the relevant stack of accepted actions⁴⁴ before the process of removing system balancing actions begins.

- 4.9. The Authority decided not to approve Proposed Modifications P136 and P137. While Ofgem acknowledges that strong views were expressed both for and against the introduction of marginal imbalance pricing, on balance Ofgem was of the opinion that neither Modification Proposal would be economic and efficient on the basis that they would lead to non cost-reflective pricing. Furthermore, on the basis that that the Proposed Modifications may not be effective in targeting NGC's costs back on to BSC Parties, Modification Proposals P136 and P137 would not better facilitate competition in that they would increase costs to, and risks on, market participants.

BSC Modification Proposal P138

- 4.10. BSC Modification Proposal P138⁴⁵ was designed to address the situation where electricity suppliers who are short electricity benefit if their customers are interrupted in emergency conditions (via Demand Control instructions) because their imbalance exposure is reduced. It would have resulted in an Offer from such a supplier being deemed to have been accepted in every settlement period for which the interruption lasts, with a volume equal to that of the customers whose supplies have been interrupted and a price equal to the marginal Offer price in the first settlement period in which the Demand Control began. Modification Proposal P138 is currently with Ofgem for decision.

BSC Modification Proposal P144

- 4.11. As part of the Authority's decision letter on Proposed Modification P135, Ofgem highlighted several areas where it considered potential improvements could be made in respect of the Energy Imbalance Price calculations. These areas included:

⁴⁴ For example, if the volume of Bids not relating to individual units is smaller than the equivalent volume of offers, then this volume of Bids should be removed from the accepted Bid stack.

⁴⁵ BSC Modification Proposal P138: "Contingency arrangements in relation to the implementation of Demand Control measures pursuant to Grid Code OC6".

- ◆ Continuous Acceptance Duration Limit ('CADL') tagging;
- ◆ NIV tagging;
- ◆ NIV volume;
- ◆ +/-£99,999/MWh Bid and Offer price constraint; and
- ◆ Ensuring that correct incentives are in place on suppliers if demand control is instructed.

4.12. Following this, Modification Proposal P144⁴⁶ was raised and granted Urgent status⁴⁷. The Authority issued its decision letter to reject Proposed Modification P144 on 18 December 2003 on grounds that it would not better facilitate achievement of the Applicable BSC Objectives. This decision was reached on the basis that CADL tagging is an appropriate mechanism for identifying balancing actions taken to address within-half-hour effects (such as frequency control) and that this mechanism complements the NIV tagging mechanism in achieving the best differentiation between System Balancing and Electricity Balancing actions.

4.13. As in the Authority's decision letter on Proposed Modification P135, in the decision letter for Proposed Modification P144 Ofgem made clear that it considered that, where there are potential improvements to be made in respect of the Energy Imbalance Price calculations, it is important for the industry to address these issues in the appropriate forum and, if any perceived defects are identified, for resolution of these defects to be progressed as quickly as possible.

NC Modification Proposal 0575

4.14. In August 2002, AEP Energy Services raised NC Modification Proposal 0575⁴⁸. This proposed that when OM gas is withdrawn for end-of-day gas balancing purposes, the full cost of OM gas should be included in the calculation of cash-

⁴⁶ Modification Proposal P144: "Removal of CADL from the BSC".

⁴⁷ Proposed Modification P144 was raised by First Hydro Company.

⁴⁸ NC Modification Proposal 0575: "Revisions to cash out pricing and the methodology for recovery of OM cost".

out prices for that gas day. The purpose of the proposal was to improve cost targeting and provide better incentives on shippers to balance their inputs and offtakes, particularly on days of high demand when OM gas may be used as tool of last resort when the system is under stress. AEP argued that by including OM gas in cash-out prices, shippers' incentives would be strengthened thereby benefiting system security on the most critical days.

- 4.15. The proposal was discussed and developed at workstreams. As a result, two separate options were developed, which led AEP to withdraw the original Modification Proposal and propose two separate Network Code Modification Proposals, 0606 and 0607.

NC Modification Proposals 0606 and 0607

- 4.16. NC Modification Proposal 0606⁴⁹ proposed that when the system finishes the day short of gas, the SMP buy price would be set at the relevant point in an ordered net stack of system buy actions as determined by comparing the stacked volumes against the aggregate net system imbalance for the gas day. The resulting SMP would not necessarily be the most expensive buy action on the day. Under this modification proposal any use of OM gas would be deemed to be a market balancing action and no longer determined by Transco as to whether the OM use was for energy or system balancing.
- 4.17. NC Modification Proposal 0607⁵⁰ proposed that when an OM action is deemed by Transco to be a market balancing action for end-of-day energy balancing reasons (e.g. beach gas supply failure, or step increases in demand with no matching supply), a unit price for OM usage would be calculated to contribute to the determination of the SMP buy price. Specifically if OM gas is used for energy balancing purposes and it is the highest priced buy action taken by Transco on the day, the OM unit rate would set the SMP buy price.

⁴⁹ NC Modification Proposal 0606: "Reform of the cash-out arrangements and the inclusion of costs of OM gas used for end of day balancing purposes using a stack process".

⁵⁰ NC Modification Proposal 0607: "Change to the cash-out arrangements where Transco defines OM gas usage for end of day balancing purposes".

4.18. Ofgem considered that the proposals had merit in the inclusion of OM in cash out prices. It considered that including OM gas could make the cash out regime more cost-reflective, thereby facilitating more efficient and economic system operations. However Ofgem had concerns regarding the business rules proposed to implement such modifications and therefore rejected the modifications. Ofgem also raised concerns over introducing non market-related costs into cash out prices, and the appropriateness of increasingly determining cash out prices via fixed price differentials.

NC Modification Proposal 0635

4.19. NC Modification Proposal 0635⁵¹ was concerned with changing the arrangements for gas supply emergencies. Currently, as outlined above, the OCM is automatically suspended when stage two of an emergency is announced by the National Emergency Coordinator (NEC) and a single cash-out price imposed. Under 0635, the NEC would have discretion as to whether Transco would retain the option of using the Trading System for system balancing purposes i.e. allow the OCM to remain operational and retain dual cash out prices, so long as no firm load was being shed. Modification Proposal 0635 is currently with Ofgem for decision.

NC Modification Proposal 0671

4.20. NC Modification Proposal 0671⁵² proposes changes to the Top-up Manager's calculation of the Top-up Market Offer Price (TMOP). In particular, this proposal seeks to amend both the storage capacity and system entry overrun charges that go to form the TMOP calculation, as well as allowing the Top-Up Manager greater flexibility in reviewing gas surpluses on a daily basis.

4.1 The final modification report for NC Modification Proposal 0671 is currently with Ofgem for decision. However, given the nature of the modification and its relevance to the issues raised in this consultation document, Ofgem considers it

⁵¹ NC Modification Proposal 0635: "Changes in Gas Supply Emergency Arrangements".

⁵² NC Modification Proposal 0671: "Enhancements to Winter Injection Process".

appropriate to review the conclusions of this consultation proposal before arriving at a decision regarding NC Modification Proposal 0671.