



November 1998

**An investigation into gas balancing prices at the
Barrow Terminal during winter 1997/1998**

A conclusions document

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1. Introduction

A number of shippers expressed concern to Ofgas regarding the action taken by Transco to overcome transportation constraints at the Barrow entry terminal during winter 1997/1998. Transco took action to avoid constraints on 34 occasions on a total of 27 days between 24 November 1997 and 3 February 1998. Shippers were concerned that British Gas Trading (BGT) was able to take advantage of its position as the sole shipper at Barrow, thereby causing increased costs to other shippers.

Ofgas requested information from Transco and BGT in order to complete this investigation and asked for comments from shippers. This enabled us to consider the issues and we present our findings in this report.

In chapter 2, we set out the regulatory framework against which this complaint needs to be assessed. In chapter 3 we consider the balancing regime whilst in chapter 4 we outline the background behind transportation constraints. In chapter 5 we summarise events at Barrow during winter 1997/98. In chapter 6 we assess the nomination and pricing behaviour of BGT at Barrow whilst in chapter 7 we set out BGT's view of what happens. In chapter 8 we present our conclusions and recommendations.

Ofgas welcomes comments on the issues raised in this document by 20 December 1998. Responses should be addressed to:

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It is open to respondents to mark all or part of their responses as confidential. However, we would prefer, as far as possible, that responses were provided in a form that can be placed in Ofgas' library. If you have any queries concerning this document, Rebecca Purves on 0171 932 1645 will be pleased to help.

2. Regulatory Background

2.1 *The Gas Act*

The general duties of the Director General of Gas Supply (DGGs) are set out in section 4 and 4A of the Gas Act 1986 (as amended by the Gas Act 1995). The DGGs must exercise his functions in a manner he considers is best calculated to secure that all reasonable demands for gas are met, that licence holders are able to finance their activities, and that there is effective competition in the shipping and supply of gas.

Subject to these primary duties, the DGGs also has a duty to exercise his functions in the manner he considers is best calculated to protect the interests of consumers, to promote energy efficiency and economy by licensees and to secure effective competition in the carrying on of activities which are ancillary to shipping and supply (including storage). In doing so, he has to take into account the effect on the environment of activities connected with the conveyance of gas through pipes. In addition he has certain duties related to safety.

The Gas Act provides for the licensing of Public Gas Transporters (PGTs), shippers and suppliers. A PGT has a duty, under the Act, to develop and maintain an efficient and economical pipe-line system for the conveyance of gas and, so far as is 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. A PGT has a further duty, under the Act, to avoid any undue preference or discrimination in the connection of premises to any pipe-line system operated by him or in the terms on which he undertakes the conveyance of gas by means of such a system. The largest PGT is Transco, a part of BG plc.

Section 31 of the Gas Act requires the DGGs to investigate any matter which appears to him to be a matter which is the subject of a representation made to him by a person appearing to have an interest in the matter. Under the Act and under the conditions of licences, the DGGs may require licence holders to furnish him with information.

2.2 UK Competition Legislation

The DGGs has concurrent powers with the Director General of Fair Trading (DGFT) under the Fair Trading Act 1973 and the Competition Act 1980. In relation to these concurrent powers Ofgas works with the Office of Fair Trading (OFT) under the terms of a Concordat between the DGGs and DGFT.

2.3 Gas Shippers' Licence

Condition 2(1) of the Gas Shippers' Licence requires the licensee to act in a reasonable and prudent manner in making use of the PGTs pipeline for the conveyance of gas.

Condition 2(2) requires that the licensee shall not knowingly or recklessly pursue any course of conduct which is likely to prejudice:

- (a) the safe and efficient operation, from day to day, by a relevant transporter of its pipeline system;
- (b) the efficient balancing by that transporter of its system, or
- (c) the due functioning of the arrangements provided for in its network code.

Condition 3 relates to the policies of dominant shippers in flexibility markets. Condition 3(2) requires that a dominant shipper must, if requested by the DGGs, supply him with a statement of its policies as respects its participation in the flexibility market. Where that statement no longer adequately or accurately describes the policies to which it relates, the licensee shall as soon as is reasonably practicable give the DGGs a statement of any change in those policies or of any new policies.

Under Standard Condition 7(3) of the PGT licence, PGTs may only enter into contracts for the conveyance of gas on network code terms. A number of long term contracts for the conveyance of gas were entered into by BG plc prior to the establishment of the Transco network code. These contracts are called 'legacy contracts'. Standard Condition 5 of the gas shippers licence imposes certain obligations on shippers in respect of legacy contracts which put them on a similar basis to contracts on network code terms, particularly in relation to balancing inputs and offtakes.

2.4 Public Gas Transporters' (PGTs) Licences

The PGT licence imposes certain obligations upon all PGTs. In particular they are required to introduce a network code. A network code is the contract between a PGT and shippers for the use of, and connection to, a PGT's pipeline system. Transco's network code was put in place in March 1996. All network codes are required to meet the following 'relevant objectives' as set out in standard condition 7 of the PGT licence:

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

There are several elements of Transco's network code. It sets the rules for the allocation of transportation capacity on its system, supply point administration, gas balancing and storage. The operating and capital costs associated with providing these services are recovered via transportation and storage charges which are regulated by Ofgas.

The requirement for a mechanism for modifying the network code is set out in Standard Condition 7 of the PGT licence. The mechanism itself is contained in the network code modification rules. Under the modification rules in Transco's network code, only shippers and Transco are able to propose modifications to the network code. Ofgas is not itself able to propose modifications, although all modifications require the consent of the DGGs.

The DGGs may only direct that the network code should be modified if, in his opinion, the proposed modification will, as compared to the existing provisions of the network

code or any alternative proposal, better facilitate the achievement of the relevant objectives. In making such a direction, the DCGS is bound by his duties under sections 4 and 4A of the Gas Act 1986.

3. The Balancing Regime

In this chapter we outline the network code rules which govern shippers' daily flows of gas on the pipeline, and the guidelines which govern Transco's balancing actions. We describe the flexibility mechanism - Transco's primary balancing tool, and outline the information that shippers provide to Transco.

3.1 *Daily Balancing and Cash-Out*

Within the framework of the network code, Transco is responsible for maintaining an overall physical system balance. Individually, however, each shipper is responsible for controlling how much gas it inputs into the pipeline system and for monitoring its customers' offtakes. These inputs and offtakes are accounted for on a daily basis. Any difference, or imbalance, between a shipper's daily input and offtake is bought or sold by Transco through a system known as 'cash-out'.

If there is a net difference between aggregate shipper inputs and offtakes from the system as a whole, it may be necessary for Transco to take action to maintain a physical balance. Transco's primary balancing tool is the flexibility mechanism, a screen-based system on which shippers can place bids and offers to buy or sell gas from or to Transco.

Any net difference (positive or negative) in Transco's daily balancing revenues and costs, from both the cash-out process and the flexibility mechanism, is charged or rebated to the shippers in proportion to their throughput.

3.2 *Transco's Operational Guidelines*

The way in which Transco takes balancing actions is governed by the Operational Guidelines (OGs), a set of rules which Transco is required to establish in accordance with special condition 17 of its PGT licence. These must be consistent with Transco's relevant objectives as defined in standard condition 7 of the PGT Licence. The OGs are intended to ensure that Transco takes balancing actions which are consistent with the efficient and economical operation of the system. Because the OGs are a rule based

system, these actions are transparent and predictable to other users of the system. Only Transco is allowed to propose modifications to the OGs and these require the consent of the DGGS.¹

The OGs identify the various balancing measures open to Transco and the basis on which these measures will be used on any day. In particular, the OGs define the circumstances in which Transco may buy or sell gas on the flexibility mechanism, and how much. They also define when Transco is able to draw on other sources of within day flexibility (in particular, gas in storage) and the storage capability within the pipeline system itself (known as linepack).

Under the OGs, Transco makes its balancing decisions based on forecasts of the volumes of gas delivered to, and taken off the system during the course of each gas day. Transco uses its own total system demand forecast, plus nominations made by very large demand sites such as power stations, to estimate offtakes. For its forecast of deliveries it has two primary sources. These are estimates of hourly flow rates from terminal operators known as Daily Flow Notifications (DFNs), and nominations from shippers on AT-Link.²

For the system to be physically in balance, inputs and offtakes must match to within a certain tolerance. The tolerance is determined by the range of linepack volume that can be safely stored on the system. In other words, system over- or under- deliveries can, to some extent, be accommodated by use of the storage space within the pipeline system.

Should Transco's forecasts indicate that linepack will be outside a determined range, or 'bandwidth', at the end of the gas day, a balancing action will be taken by buying or selling gas through the flexibility mechanism. The OGs specify a constant bandwidth of $\pm 3 \text{ mcm}^3$ for this purpose.

¹ Where there are inconsistencies between the network code and the OGs, the DGGS can ask Transco to make changes to the latter.

² AT-Link is part of the IT system used for communication between shippers and Transco. The overall system which includes AT-Link, the sites and meters data base and other facilities is called UK-Link.

³ Million cubic metres.

Transco may depart from the OGs in a limited number of circumstances. These circumstances are:

- ◆ where complying with the hierarchies established in the OGs would prejudice the interests of safety;
- ◆ where there is insufficient time to comply with the relevant hierarchy and achieve balancing; and
- ◆ where the OGs have been shown to be inappropriate and guideline modification procedures have been agreed but not completed.

Transco must inform Users when it has departed from the hierarchies.

3.3 *The Flexibility Mechanism*

The flexibility mechanism allows shippers to place bids, either to provide gas to the system (a 'System Buy' bid) or to take gas off the system (a 'System Sell' bid). Bids are specific to a certain gas day, and may be placed or withdrawn at any time. If Transco takes a balancing action it will accept bids in price order (lowest price bids for a System Buy and highest price bids for a System Sell) up to the required volume. If a shipper has a bid accepted it will receive, or pay, the bid price for the gas.

As well as price and volume, bids must specify the entry or exit point at which they will be delivered, the flow rate and a lead time.⁴ Sources for flexibility bids include deliveries at terminals, storage facilities and interruption of customers. Delivery of the bids is expected to commence within the specified lead time, and to be completed by the end of the gas day.

The prices of bids accepted through the flexibility mechanism are used to calculate cash-out prices for shippers' imbalances. On days when no balancing action is taken, all individual shipper imbalances are 'cashed out' at the System Average Price (SAP).⁵ If a System Buy action has been taken, then a shipper which has under-delivered will pay

⁴ Lead time is the maximum time between bid selection and start of delivery.

⁵ SAP is the volume-weighted average price of all Transco's flexibility purchases and sales for that gas day, excluding constraint sells.

a higher price, the System Marginal Buy (SMP Buy) price for any part of its imbalance outside a tolerance level. Similarly, if a System Sell action has been taken, a shipper which has over-delivered will be paid the lower System Marginal Sell (SMP Sell)⁶ price for any imbalance outside of its tolerance. The tolerance level is defined as a percentage of throughput and varies for each shipper depending on the make up of the shipper's customer portfolio. The imbalance tolerance quantity (ITQ) for a medium sized shipper is around 2% of its throughput.⁷

3.4 Nominations and Scheduling

Before the gas day, each shipper is required to inform Transco how much gas it will input to the pipeline system, and how much customers will offtake. These 'nominations' are made electronically via AT-Link. Prior to the day, there is no requirement that inputs and offtakes should match. Renominations can be made throughout the course of the gas day although the net difference between input and offtake nominations cannot be changed. If actual inputs or offtakes differ from final nominations, a shipper may have to pay a 'scheduling' charge. This charge is typically small compared to imbalance charges. Where allocations exceed booked capacity the shipper will incur a capacity overrun charge.⁸

⁶ SMP Sell is the price of the lowest priced accepted system sell bid accepted through the flexibility mechanism for that gas day (excluding bids accepted for constraint reasons). System Average Price (SAP) is the volume weighted average of all bids accepted through the flexibility mechanism for that gas day (excluding bids accepted for constraint reasons). Where no system sell bid is accepted, SMP Sell is set equal to SAP.

⁷ Transco estimate for 8 December 1997.

⁸ This is currently 8 times the equivalent daily capacity booking charge. This charge was significantly higher earlier this year. This is not linked to the shipper's nominations during the course of the day.

4. Background to Transportation Constraints

4.1 Occurrence of Constraints

Under Transco's network code, a constraint at an entry terminal can occur when shippers nominate to flow a volume of gas which in aggregate exceeds the physical capacity of the pipeline system at that location. When such a situation arises, Transco takes steps as outlined in the OGs to reduce nominated flows down to a level that can be physically delivered.

A constraint can also occur if too little gas is coming into the system. This supply deficit has been the cause of constraints at Bacton in October 1998. This report does not cover such transportation constraints.

The capacity of the pipeline system to accept gas at any time is not just dependent on the physical specifications of pipes and compressor. It is also affected by the pressure at which the system is operating, by flows elsewhere on the network, including demand at different locations, and by supply at different entry points. Maintenance or infrastructure work undertaken by Transco on the network, and failure of compressors, may also reduce available capacity. As a result, it is impossible to forecast accurately how much gas can physically be delivered at a terminal on a particular future day.

It is possible for nominated flows to exceed available capacity for two main reasons.⁹ First, under the network code, entry capacity is booked by shippers at a fixed price on an annual basis. There is no limit to the aggregate volume of capacity that can be booked. Thus total booked capacity on any day may not match that physically available. Further, shippers are able to nominate flows in excess of their booked capacity with no financial exposure. However, where the volume of gas finally allocated to the shipper for that gas day exceeds booked capacity, the shipper will incur a capacity overrun charge.

⁹ Shippers have been required under the network code not to nominate in excess of available capacity at St Fergus terminal since 8 October 1998 when modification 0271 was implemented.

4.2 Procedures for Alleviating Constraints

At the day-ahead stage (D-1), Transco assesses the available physical capacity for the following day at each terminal, based on demand forecasts, system specifications, and anticipated flows at entry points. Initially, this assessment is based on the nominations of gas flows made by shippers to Transco.

At 16:00 D-1, if nominated flows exceed available capacity, Transco informs shippers of a constraint, and requests downward renominations on flows at that entry point. There is no obligation on shippers to respond to this request. By midnight, Transco receives information from terminal operators on aggregate flows anticipated for the following gas day. If, based on this information, forecast flows are still in excess of available capacity, Transco sells gas through the flexibility mechanism at the terminal to alleviate the constraint. Where this sale of gas (to relieve a constraint) leads to the volume of gas in the pipeline as a whole falling outside a certain bandwidth, Transco will also buy gas at other locations to resolve the consequential supply/demand mis-match.

Within day, Transco monitors pressure at the constrained terminal. If this pressure exceeds a defined trigger level, Transco informs the terminal operator that flows need to be curtailed by issuing a Transportation Flow Advice (TFA). The trigger pressure is generally between 97% and 100% of the maximum permitted operating pressure (MPOP). Where there is a resulting loss of end of day volume due to the TFA, Transco again sells gas at the constrained terminal through the flexibility mechanism.

4.3 Cost Recovery

All costs and revenues arising from Transco's flexibility mechanism purchases and sales, and from cash-out of shippers' imbalances, are aggregated for each gas day. As noted earlier, any net cost or revenue is charged or rebated across all shippers on the basis of daily gas. The costs and revenues associated with transportation constraints are aggregated in the same way as other costs and revenues.¹⁰

When an entry constraint occurs, Transco will sell gas at the constrained terminal and buy gas at other locations. Revenues and costs resulting from the sale and purchase of gas are returned to shippers (via neutrality) because Transco is cash-neutral. Costs may

¹⁰ Transco does not gain money from, nor does it face any of, the costs of balancing actions; it is cash neutral.

be direct, through the flexibility mechanism, or indirect, through cash-out of shipper imbalances. Gas sales by Transco to alleviate constraints are not included in the calculation of neutrality but resulting gas purchases are.¹¹ As a result, it is not possible to separate completely the costs of constraints from other neutrality costs and revenues. The most commonly used proxy for the cost is found by assuming that the volume of gas sold to alleviate the constraint is bought elsewhere at the System Average Price (SAP).

¹¹ This changed on 29 September 1998 with the implementation of modification 0265, such that purchases of gas following a constraint sell are also excluded from the calculation of cash-out prices.

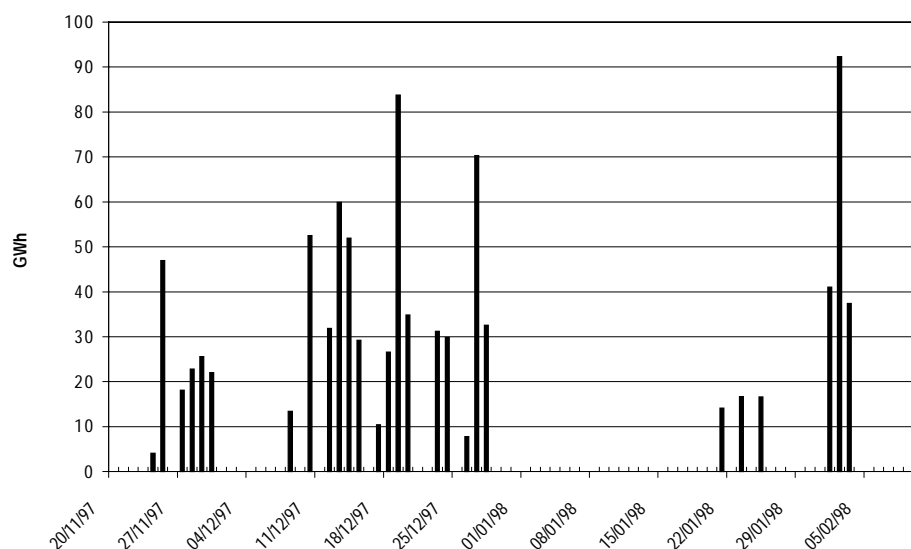
5. Overview of Constraints at Barrow During Winter 1997/98

1997/98

The Barrow terminal is located on the west coast of England, taking deliveries of gas from the Morecombe fields in the Irish Sea. Entry capacity at Barrow is particularly affected by changes in demand in the North-Western Local Distribution Zone (LDZ) and the aggregate flow south from Lupton.

There were 27 days when the Barrow terminal was constrained during winter 1997/98. The volume of constraint sells on each of these days is shown in Figure 1.¹² The total volume of sells to resolve constraints was 92 GWh.

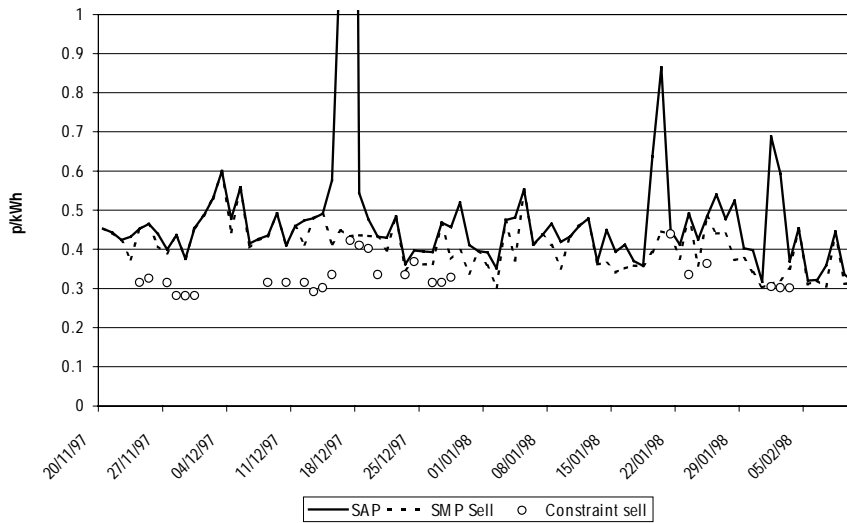
Figure 1 - Volume of Constraint System Sells at Barrow, Winter 1997/98



As discussed in chapter 3, it is impossible to precisely separate the costs associated with constraints. Figure 2 shows the average price of the constrained sell on each day, compared to SAP and SMP Sell.

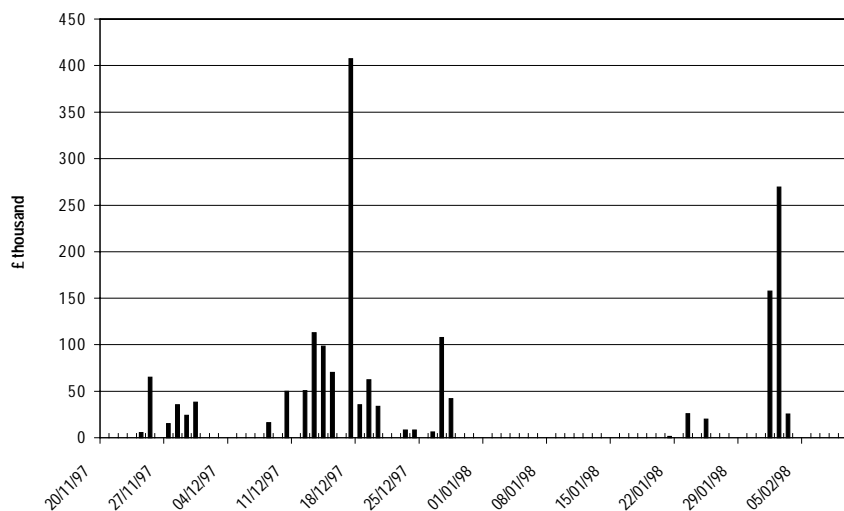
¹² On 23 and 28 December 1997, and 1 February 1998, two separate constraint sell actions were taken, and three on 19 December 1997. These have been aggregated in figures 1-4.

Figure 2 - Average Constrained Sell Price Versus SAP and SMP Sell



One way to assess the cost of constraints is to compare the price at which Transco has sold gas at Barrow to SAP. SAP is used here as a proxy for the average price at which Transco has bought gas back on the other side of the constraint, either directly through the flexibility mechanism, or indirectly through shipper imbalances. Figure 3 shows the proxy for cost of constraints at Barrow, calculated based on the differential between the average price of the constraint sell and SAP for each day.

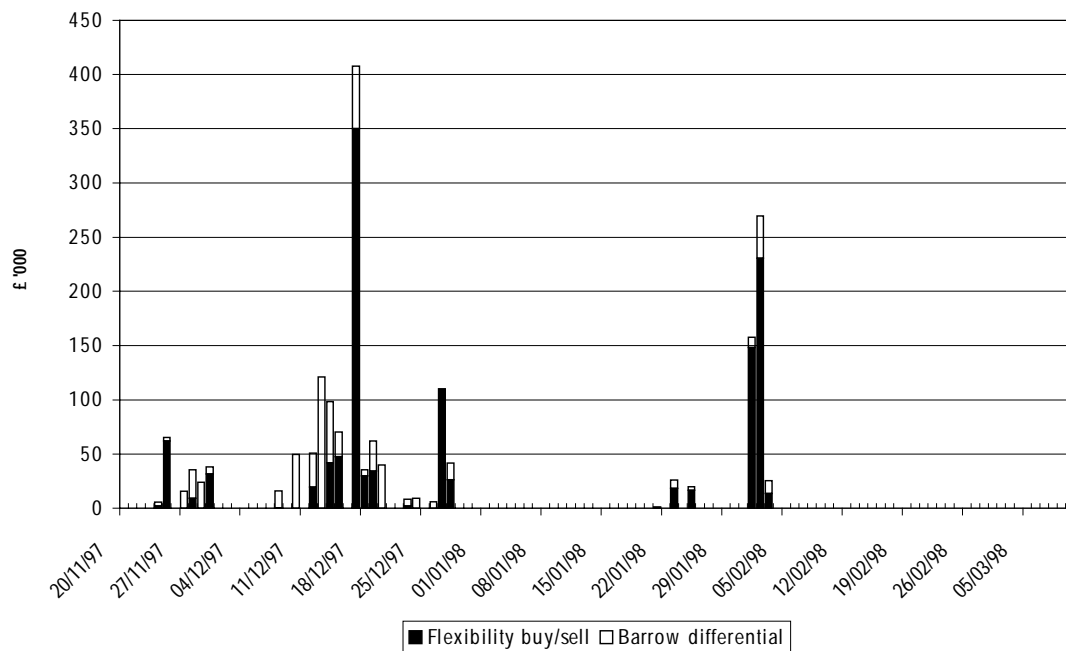
Figure 3 - Cost of Barrow Constraints (Based on SAP Differential)



The total cost calculated in this way is £1.8m. Of this, £0.47m was incurred on 17 December, a day when SAP was set at 4.34 p/kWh (127 p/th).

Any difference between the price of gas sold by Transco at Barrow, compared to the price at which it buys gas back, could be seen as being made up of two components. First there is a component associated with the buy/sell spread apparent for all bids and offers on the flexibility mechanism. In other words, there will be a difference between the lowest priced system buy bids, and the highest priced system sell bids, irrespective of location. Second, there may be an additional component associated with an extra differential for gas at Barrow, whereby Transco receives a lower price for gas sold at Barrow than that which it would obtain for the highest priced system sell bids. In Figure 4, we show the cost the Barrow constraints, broken down into these two components. The component associated with the Barrow differential has been calculated by comparing the average price that Transco would have received for selling the constraint volume by selecting the highest priced system sell bids on the flexibility mechanism at the time of the constraint.

Figure 4 - Cost Breakdown of Barrow Constraints



The total cost associated with the Barrow differential component, calculated in this way, is £479,000.

6. Nominations and Pricing of Barrow System Sell Bids

BGT is the only shipper with gas flows at the Barrow terminal. Some shippers expressed concern to Ofgas that BGT might be abusing this position. Where only one shipper is operating at a terminal, it would be possible for that shipper to abuse its position in two ways. First, a shipper could deliberately nominate at a level above that at which it expects to flow gas. This may force more frequent, or larger, constraint actions than would otherwise have been the case. Second, where there is a constraint it may offer to purchase gas from Transco to alleviate the constraint at a price lower than that at which it would be prepared to do so in a competitive situation. Transco would still be required to sell the gas.

6.1 Nominations at Barrow

The data provided by BGT and Transco to Ofgas indicates that BGT nominated at Barrow during winter 1997/98 in a manner consistent both with the level of booked capacity, and with the volume of flow that might be expected from Barrow at that time of year. We therefore do not analyse this further in this report.

6.2 Pricing of Barrow System Sell Bids

Bids to purchase gas from Transco at a particular location (system sell bids) are placed by shippers on the flexibility mechanism. When the bid is posted, there is no differentiation between bids which may be accepted by Transco as a part of a sale of gas to correct a national imbalance, and bids accepted to alleviate a constraint. However, some shippers have suggested that on days when there was a constraint at Barrow, BGT may have bid to purchase gas from Transco at Barrow at a lower price than at other times, in the expectation that Transco will be required to accept the bids, irrespective of price, to alleviate the constraint.

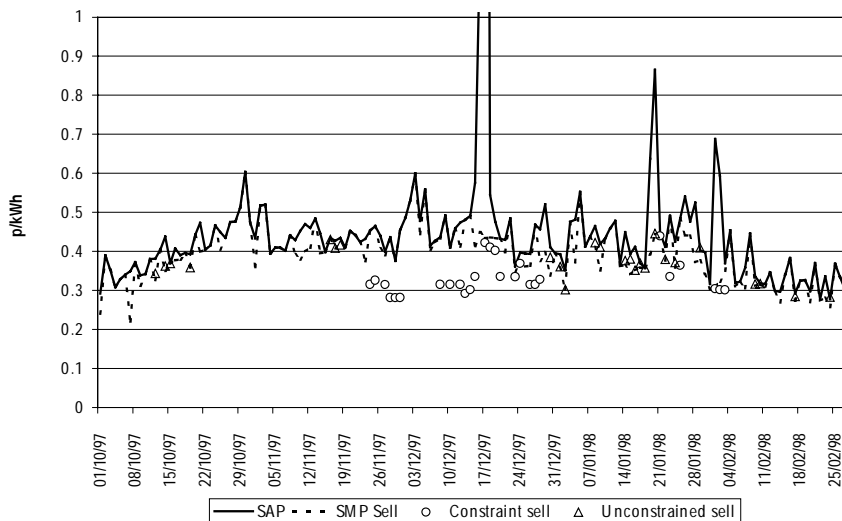
Any beach flexibility, including Barrow system sells, placed by BGT on the flexibility mechanism is priced in accordance its flexibility policy.¹³ This policy limits the buy/sell

¹³ This is a policy which constrains the volumes and prices of bids placed by BGT on the flexibility mechanism. The DGGS has not requested such a policy from BGT, although under the Shipper's Licence, a dominant shipper must comply with any such request. BGT has, however, chosen to notify Ofgas of its existing policy.

spread of bids and offers that are posted. The system sell bids posted at Barrow during winter 1997/98 were consistent with this policy.

In order to address the concern expressed by shippers, it is necessary to compare the price of system sell bids accepted at Barrow on days when the terminal was constrained, with the price of bids on days when the terminal was unconstrained. We show first, in Figure 5, the graph in Figure 2 above, with average price of bids accepted at Barrow on unconstrained days included. We have also shown the level of SMP Sell each day in addition to SAP.

Figure 5 - Average Price of Accepted Bids at Barrow

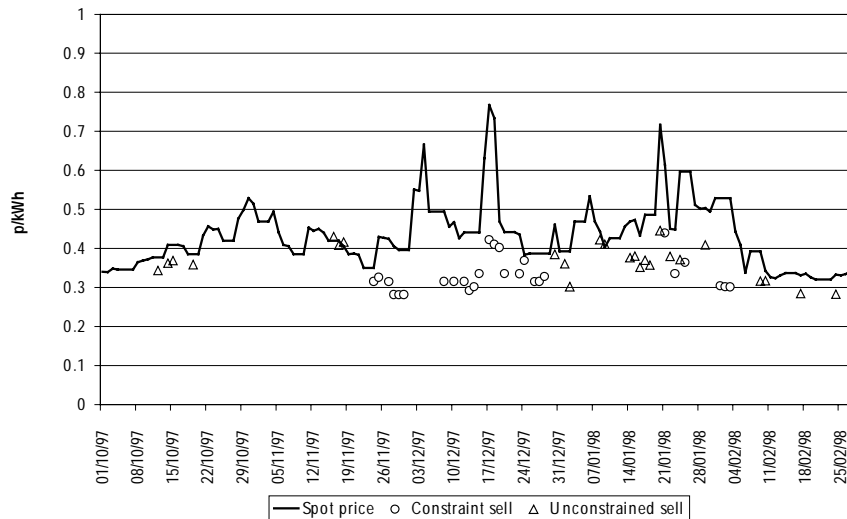


It can be seen from the graph that bids accepted at Barrow on unconstrained days are typically closer to SAP than those on constrained days. As an indication, the average differential to SAP on unconstrained days is 0.04 p/kWh (1.2 p/th), compared to 0.14 p/kWh (4.1 p/th) on constrained days.¹⁴

¹⁴ 17 December 1997 is excluded from these calculations due to the abnormally high SAP. These averages are not volume-weighted.

SAP and SMP Sell are not known to shippers when bids are being posted, and they may therefore not always be the most appropriate reference level for bid prices. In Figure 5, we show the same bid price data compared to the spot price.¹⁵

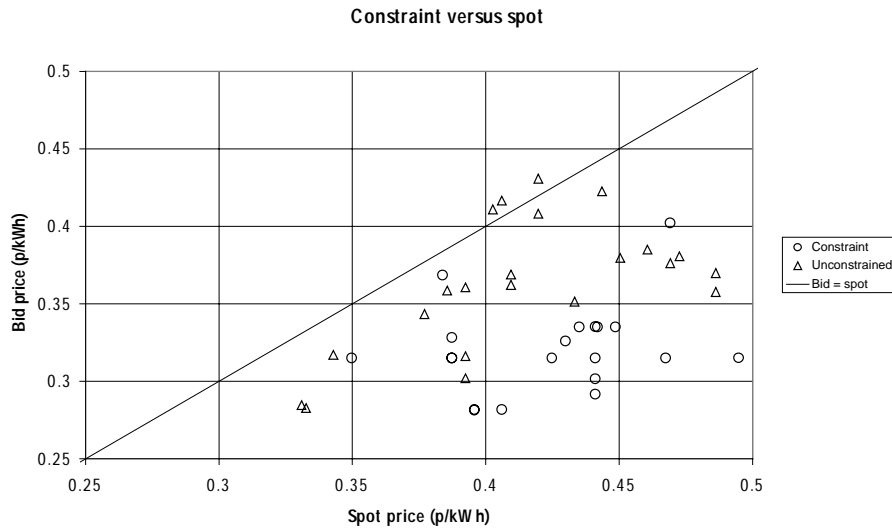
Figure 6 - Barrow Bid Prices Compared to Day-Ahead Spot Price



Although there is some divergence between accepted bid prices on unconstrained days compared to day-ahead spot price, that on constrained days is greater. In Figure 6, we present the same data as a crossplot. Occasions when the accepted bid price is equal to the day-ahead spot price will appear in this figure on the diagonal line. Where the accepted bid price is lower than the day-ahead spot price, this will plot below the line.

¹⁵ The price shown is the midpoint of the day-ahead NBP price assessment in the British Spot Gas Markets Heren Report for the day in question. (For example, the day-ahead price quoted on the Heren report of 10 October 1997 is shown on the graph as the reference spot price for 11 October 1997.)

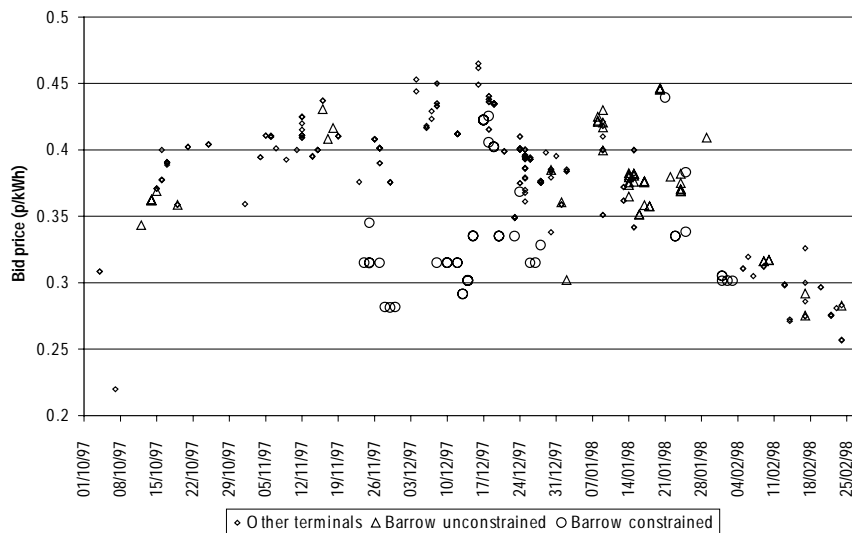
Figure 7 - Accepted Bid Price Differential with Day-Ahead Spot Price



Although there is some overlap, it is clear that the differential on constrained days tends to be greater than that on unconstrained days.

Another reference price that can be considered is the accepted bid prices for BGT system sell bids at other terminals.¹⁶ We show in Figure 8 the prices for all BGT accepted system sell bids.

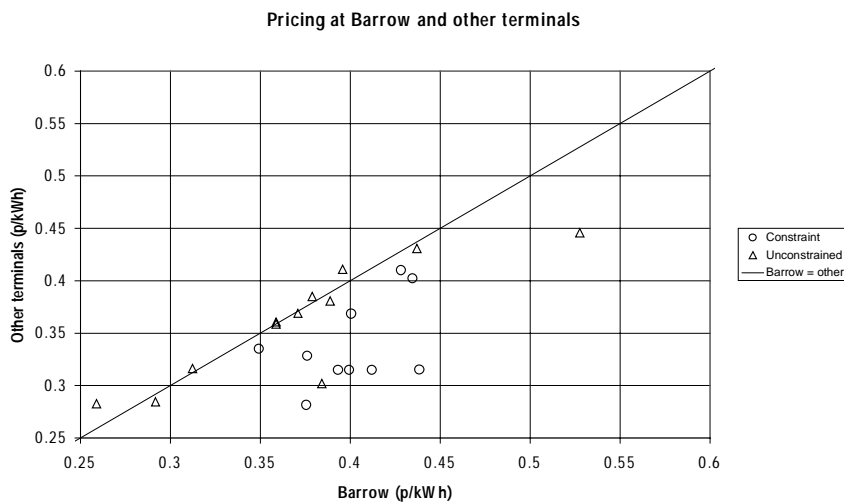
Figure 8 - Bid Prices for BGT Accepted System Sell Bids



¹⁶ We have excluded storage bids from the following calculations.

From this graph it may be seen that Barrow bid prices on constrained days fall more frequently outside the range of prices at other terminals, compared to unconstrained days. We show this on a day by day basis in Figure 9, again using a crossplot. In this graph, where on the same day system sell bids have been accepted at Barrow and at other terminals, the prices are plotted against each other. If these prices were the same, the point would appear on the diagonal line. Where points appear below this line, the Barrow price is lower than that at other terminals.

Figure 9 - Barrow Prices Compared to Prices at Other Terminals



From this graph, again, the greater divergence of Barrow bids on constrained days is apparent.

The data presented above indicates that the price of system sell bids at Barrow has tended to be lower on days of constraints, compared both to price indices such as SAP and the day-ahead spot price, and to BGT's prices at other terminals.

6.3 Cost of Lower Prices at Barrow on Constrained Days

In the section above, we identified a trend in Barrow prices which suggested that prices tended to be lower on days of constraints. In this section we use one method of calculation to estimate an approximate cost of such a differential in pricing.

Accurate quantification of the cost is difficult. In theory, it requires an assessment of the price at which BGT would have posted system sell bids at Barrow if there was no constraint. In practice, given the large number of factors involved, this would be

extremely difficult to achieve. The estimate we make below is based on using a price index, combined with an approximation as to how bids were priced on unconstrained days in relation to that price index. For constrained days, this enables us to make an estimate of an 'unconstrained' bid price. By comparing this to the actual constraint price, we derive a cost associated with the lower prices on constrained days.

We present this calculation as an illustrative indication. The sample sizes we use for this are small, and we therefore have not attempted a full statistical analysis.

The price index we use is the day-ahead spot price. This is an indicator that would be known prior to bids being placed (unlike cash-out prices, which would only be known after the day). We compare this with the bid prices on unconstrained days, and calculate an average 'unconstrained differential' between these bid prices and the spot price. Then, for days of constraints, we can calculate a 'spot reference' price which is equal to the actual day-ahead spot price, with the 'unconstrained differential' subtracted. Any further difference between the constraint price and the spot price is attributed to a lower 'constraint' price.

On some days, the price of gas may change significantly within-day, with a corresponding impact on the price of bids that might be offered at Barrow. The methodology fails to take this into account. Where the price of gas rises, the methodology may underestimate the 'constraint differential'. Where the price of gas falls, the differential may be overestimated. We have applied a second calculation to cover this latter eventuality. Where an unconstrained system sell action has been taken on the day in question, then if the price of the lowest accepted bid is below our 'unconstrained differential' reference price, we compare the constraint price to SMP Sell instead. In other words, where a competitive system sell bid has been accepted, we assume that the constraint bid could have been priced to match this.

We summarise this methodology below:

1. Compare prices of unconstrained accepted Barrow system sell bids with the day-ahead spot price, and calculate the average *unconstrained differential*.

2. For each constrained day, calculate a *spot reference* equal to the day-ahead spot price with the *unconstrained differential* subtracted.
3. Compare the constraint price with the *spot reference* price.
4. Calculate a cost associated with any extra *constraint differential* where the constraint price is lower than the *spot reference* price.
5. Where an SMP Sell has been set, calculate a second cost based on the lower of the *spot reference* price and SMP Sell.

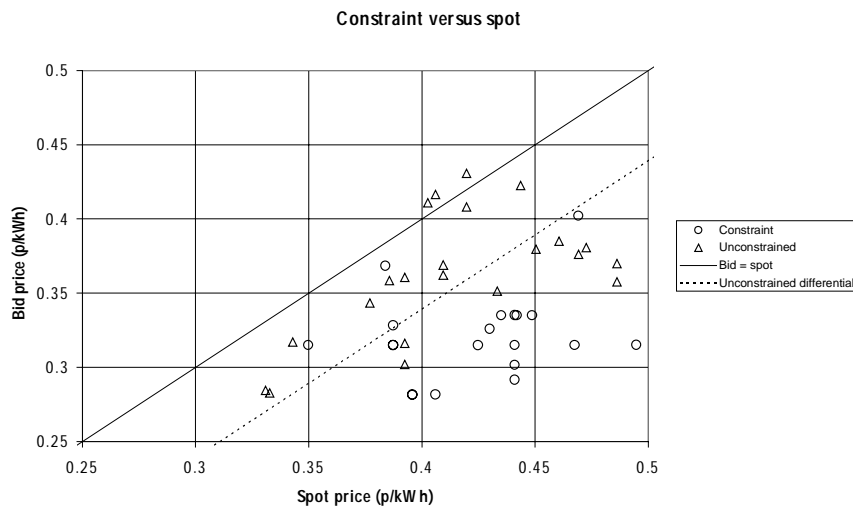
In Table 1 below, we show the derivation of the 'unconstrained differential'. The days shown are days when there were no constraints, but a Barrow system sell bid was accepted.

Table 1 - Calculation of 'Unconstrained Differential'

Date	Spot (D-1) p/kWh	Average bid price p/kWh	Spot differential p/kWh
12/10/97	0.3770	0.3434	0.0336
14/10/97	0.4095	0.3622	0.0473
15/10/97	0.4095	0.3689	0.0406
19/10/97	0.3856	0.3586	0.0270
16/11/97	0.4197	0.4307	-0.0110
17/11/97	0.4197	0.4082	0.0115
18/11/97	0.4060	0.4165	-0.0105
30/12/97	0.4606	0.3850	0.0756
01/01/98	0.3924	0.3606	0.0318
02/01/98	0.3924	0.3020	0.0904
08/01/98	0.4436	0.4225	0.0210
09/01/98	0.4026	0.4109	-0.0083
14/01/98	0.4692	0.3762	0.0930
15/01/98	0.4726	0.3807	0.0919
16/01/98	0.4333	0.3514	0.0820
17/01/98	0.4862	0.3698	0.1164
18/01/98	0.4862	0.3576	0.1286
20/01/98	0.7165	0.4457	0.2709
22/01/98	0.4504	0.3797	0.0707
24/01/98	0.5971	0.3718	0.2254
29/01/98	0.5033	0.4091	0.0942
09/02/98	0.3924	0.3163	0.0761
10/02/98	0.3429	0.3171	0.0258
17/02/98	0.3310	0.2845	0.0464
24/02/98	0.3327	0.2827	0.0500
			Average 0.0688

We show in Figure 10 how the 'unconstrained differential' calculated in this way compares to accepted system sell bids at Barrow on unconstrained days. In this figure, we show the same crossplot shown in Figure 6, with a line to indicate the 'unconstrained differential'. Where unconstrained bids are priced lower than the calculated differential, these appear below the line, and vice versa.

Figure 10 - Unconstrained Differential



As can be seen from the graph, most constraint prices fall below the line.

In Table 2, we present the rest of the cost calculation, presented for days when a constraint sell was taken at Barrow.

As can be seen from the table, the total cost calculated based on the 'unconstrained differential' alone totals some £740,000. Where SMP Sell prices set during the day are taken into account, this reduces to some £372,000.

Table 2 - Calculation of Cost of Differential Pricing on Constraint Days

Date	Constraint Volume 1.	Constraint Price 2.	SMP Sell 3.	Spot price 4.	Spot reference 5.	Constraint differential (Spot) 6.	Cost (Spot) 7.	Constraint differential Spot/SMP 8	Cost (Spot/SMP) 9.
	kWh	p/kWh	p/kWh	p/kWh	p/kWh	p/kWh	£	p/kWh	£
24/11/97	4,069,372	0.315	0.453	0.350	0.289	0.000	0	0.000	0
25/11/97	46,974,913	0.326	0.465	0.430	0.369	0.043	20,328	0.043	20,328
27/11/97	18,095,965	0.315	0.390	0.425	0.364	0.049	8,907	0.049	8,907
28/11/97	22,819,622	0.282	0.436	0.406	0.345	0.064	14,526	0.064	14,526
29/11/97	25,620,985	0.281	0.376	0.396	0.335	0.054	13,763	0.054	13,763
30/11/97	22,050,756	0.282	0.455	0.396	0.335	0.053	11,779	0.053	11,779
08/12/97	13,405,285	0.315	0.433	0.495	0.434	0.119	15,948	0.118	15,791
10/12/97	52,478,403	0.315	0.410	0.467	0.407	0.092	48,157	0.092	48,157
12/12/97	31,861,525	0.315	0.412	0.441	0.380	0.065	20,828	0.065	20,828
13/12/97	59,912,407	0.292	0.480	0.441	0.380	0.089	53,176	0.089	53,176
14/12/97	51,962,922	0.302	0.491	0.441	0.380	0.079	40,888	0.079	40,888
15/12/97	29,213,194	0.335	0.413	0.441	0.380	0.045	13,188	0.045	13,188
17/12/97	10,395,489	0.422	0.434	0.768	0.707	0.285	29,583	0.011	1,147
18/12/97	26,552,454	0.410	0.436	0.734	0.673	0.263	69,793	0.026	6,884
19/12/97	83,758,096	0.402	0.434	0.469	0.408	0.006	5,282	0.006	5,282
20/12/97	34,814,923	0.335	0.432	0.442	0.381	0.046	16,050	0.046	16,050
23/12/97	31,177,161	0.335	0.348	0.435	0.374	0.039	12,271	0.013	4,115
24/12/97	29,876,467	0.369	0.375	0.384	0.323	0.000	0	0.000	0
26/12/97	7,793,770	0.315	0.363	0.387	0.327	0.012	911	0.012	911
27/12/97	70,310,204	0.315	0.468	0.387	0.327	0.012	8,148	0.012	8,148
28/12/97	32,526,003	0.328	0.375	0.387	0.327	0.000	0	0.000	0
21/01/98	14,123,868	0.439	0.440	0.614	0.553	0.114	16,129	0.000	28
23/01/98	16,666,865	0.335	0.491	0.449	0.388	0.053	8,820	0.053	8,820
25/01/98	16,628,252	0.364	0.485	0.597	0.536	0.172	28,682	0.121	20,047
01/02/98	41,037,339	0.304	0.311	0.529	0.468	0.164	67,181	0.006	2,550
02/02/98	92,274,566	0.302	0.322	0.529	0.468	0.167	153,722	0.020	18,639
03/02/98	37,448,062	0.302	0.350	0.529	0.468	0.167	62,423	0.049	18,162
Total							740,484		372,116

Notes:

1. Sum of Barrow bids accepted for constraint purposes.
2. Volume-weighted average price of Barrow bids accepted for constraint purposes.
3. SMP Sell set for the gas day.
4. Mid-point of BSGM NBP day-ahead price assessment, from report of previous day.
5. Spot price minus average difference between accepted Barrow bids and spot price on unconstrained days.
6. Difference between constraint price and spot reference (zero when constraint > spot reference).
7. Cost calculated as constraint differential multiplied by volume.
8. As 6 but adjusted where SMP Sell is less than spot reference to be difference between SMP Sell and constraint price.
9. Cost calculated as constraint differential (Spot/SMP) multiplied by volume.

7. BGT's View

BGT has submitted a detailed response to Ofgas as a part of this investigation. Whilst much of the contents is commercially confidential, we provide a summary below of BGT's views.

7.1 *Nominations at Barrow*

BGT has confirmed that its nominations were within its firm booked entry capacity at Barrow and that this capacity, as well as the quantities nominated, are consistent with Transco's published planning assumptions for Barrow. Further, BGT maintains that its nominations were consistent with its gas purchase contracts, and its gas lifting requirements on the days concerned.

7.2 *Pricing of System Sell Bids at Barrow*

BGT has confirmed that it has not changed its bidding policy during winter 1997/98, and that it complied with its flexibility policy as notified to Ofgas.

BGT has provided an explanation to Ofgas of the pricing of Barrow system sell bids for winter 1997/1998. BGT has confirmed that the price of its system sell bids at Barrow has been consistently lower than at other terminals during the period late November and December. It claims that the reason for this differential was not the opportunities provided by the frequent constraint actions during this time, but tax-related issues. BGT points to the fact that the price of Barrow bids was low on unconstrained days during this period as well as on constrained days, and that as a result Barrow bids were not accepted on these days.

7.3 *Cost of Constraint Actions at Barrow*

BGT notes that, due to its high level of throughput, it makes a significant contribution to neutrality charges, partially offsetting both any potential benefits to BGT from selected bids and also the cost to other shippers. It also notes that any benefit to BGT through direct energy balancing cashflows may not be reflective of the net benefit to BGT, as the cost of changing flow rates at Barrow needs to be taken into account.

BGT has also noted that Transco's projects to reinforce legs of the NTS in the North-Western LDZ should reduce the extent of constraints on inputs at Barrow, and that these reinforcements were scheduled for commissioning by October 1998.

8. Recommendations and Conclusions

Following representations from some shippers, Ofgas investigated the circumstances surrounding constraints at Barrow during winter 1997/98, and in particular BGT's pricing of system sell flexibility bids during this period. In conducting this investigation, Ofgas has made use of data provided by Transco, and has solicited an explanation from BGT with regard to its pricing.

Ofgas believes that nominations made by BGT at Barrow during this period were in accordance with its gas flow requirements through Barrow.

As we have outlined in this report, the prices of system sell bids offered by BGT at Barrow during the winter period were typically priced at an increased differential to the market price for gas. The analysis we have presented indicates that there is correlation between these lower prices and the occurrence of constraints at Barrow.

BGT has stated that these bids were priced on the basis of tax considerations, and independent of potential constraints at Barrow. However, BGT has also stated that no bids priced on this basis were accepted on days other than constraint days. In other words, BGT's pricing during this period was such that, had there been no constraints, BGT would not have expected any system sell bids at Barrow to have been accepted.

BGT did, however, have system sell bids accepted during this period on constraint days. BGT has a dominant position at Barrow and it is arguable that as a result of its pricing policy there was a cost to other shippers. Accurate quantification of the cost is difficult but an illustrative indication can be produced. Depending on the method of calculation, this figure was between £370,000 and £740,000.

These figures do not, however, represent the net revenue to BGT. First, BGT will pay neutrality charges at a level consistent with its throughput, reducing this revenue significantly. During the period under investigation, BGT's percentage of total system throughput was approximately 62%. Second, the level of costs associated with BGT reducing flows at Barrow would need to be accounted for and BGT has, to date, provided no estimate of these costs. Ofgas has requested BGT to provide documented evidence of the relevant costs that it has faced. If there has been a net benefit to BGT as

a result of a constraint at Barrow, Ofgas will at that stage consider whether further action is necessary with respect to winter 1997/98.

Ofgas also recognises that the flexibility policy to which BGT currently adheres has provided some restrictions on the way in which it has bid at Barrow. BGT has suggested to Ofgas that, in addition to its flexibility policy, it provides Ofgas with an undertaking in regard to BGT's pricing when a constraint exists at Barrow. Ofgas considers that an appropriate undertaking would state that on occasions when Transco informed BGT that a constraint existed at Barrow, BGT would bid in a way which directly reflected the cost associated with reducing flows at Barrow. BGT would then make available to Ofgas documented evidence of those costs.

Changes to the entry capacity regime are currently being considered by the industry through the BC99 balancing and capacity review. Such changes may significantly alter the way in which Transco manages entry transportation constraints in the future. Key changes implemented as a result of the BC99 review will be in place by 1 October 1999, but where appropriate changes will be implemented before this date.