

The Impact and Possible Causes of the Rise in Wholesale Gas Prices

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24 November 2004

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EXECUTIVE SUMMARY

Europe Economics was commissioned by the Chemical Industries' Association (CIA) and the Energy Intensive Users' Group (EIUG) to examine the impact and possible causes of the rise in wholesale gas and electricity prices.

Impact on competitiveness

The government's energy policy objectives in relation to industrial competitiveness are being undermined by recent rises in UK wholesale energy prices. Wholesale gas prices in the UK are now showing a significant premium to prices on the continent, and the effect has fed through into the electricity market because of the large proportion of generation which is gas-fired.

The impact of these price increases is most pronounced on energy-intensive sectors of the economy. ONS figures show that these sectors also tend to be more open to international trade and to have lower gross operating margins than the economy as a whole. Firms which compete on international markets are unlikely to be able to pass cost increases through to consumers. Furthermore, where margins are already low, cost increases may have a significant impact on profitability.

Possible causes

Europe Economics' analysis concludes that the behaviour of forward prices for the coming winter cannot be easily explained with reference to market fundamentals. In particular, the majority of the rise in forward prices cannot be explained by rising world oil prices, partly because the price of heavy fuel oil has not risen in line with crude oil prices.¹ Furthermore, while the interconnector is likely to be constrained this winter, and thus UK prices might rise above continental prices consistent with economic fundamentals, the magnitude of the price rise exceeds what would appear reasonable in light of Ofgem's modelling.

Ofgem's investigation has identified the drivers behind reductions in physical supplies which pushed up prompt gas prices in November/October 2003 and summer 2004. However, the regulator is continuing to pursue enquiries on a number of issues, namely contractual arrangements which appear to have prevented gas supplies from reaching the market and the behaviour of European gas supplies during October/November 2003.

Europe Economics examined the theoretical potential for anti-competitive behaviour in the gas market. This analysis concluded that upstream consolidation and co-operation, the historical lack of transparency and the inelasticity of gas demand might in theory create the conditions for such

¹ The prices of heavy fuel oil and gas oil tend to be used for indexation purposes in gas contracts on the continent.

behaviour. However, it must be emphasised that the firm is not aware of any evidence to suggest that such behaviour is actually taking place.

Key recommendations

Europe Economics suggests that further investigation into forward gas prices is vital, given the impact of these prices on customers locking into energy supply contracts. Such investigation might seek to gather evidence on whether there has been a change in the willingness of upstream gas producers to sell forward, as has been suggested by a number of buyers. If so, the reasons behind these decisions should be examined carefully, and remedial action considered if any market distortions are identified.

Unanswered questions in relation to the spot gas market also deserve attention. In particular, Europe Economics suggests that:

- checks should be made on whether the field outages seen during summer 2004 were justified and completed in an appropriate timescale;
- it may be appropriate to examine upstream production to verify that year-on-year declines in beach flows are caused by a genuine acceleration in UKCS decline;
- Ofgem should be encouraged to speed its enquiries in those areas where it is still pursuing its investigation.

Europe Economics suggests that the FSA should be asked to provide further details of the enquiries it carried out into the gas market and how it reached its conclusions.

1 INTRODUCTION

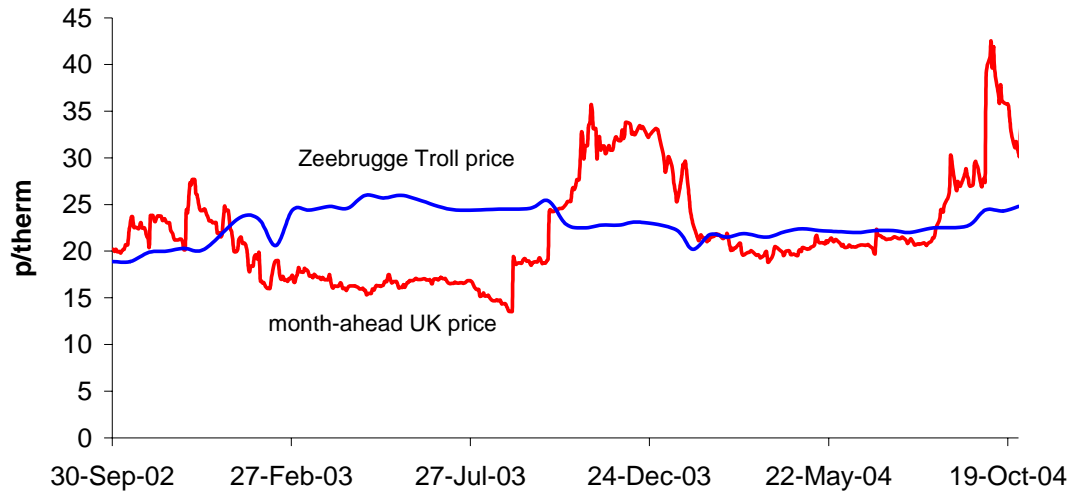
- 1.1 Europe Economics has been commissioned by the CIA and the EIUG to provide an independent report into the impact and possible causes of recent rises in the wholesale price of gas and electricity.
- 1.2 In carrying out this work, Europe Economics has analysed market data on energy price movements and has used input-output data from the Office of National Statistics (ONS) to analyse the potential effect on energy-intensive industries. In addition, Europe Economics conducted a number of interviews with large industrial energy users and received additional survey information from the CIA and the EIUG.
- 1.3 Section 2 of the report summarises the issue of rising wholesale energy prices, section 3 analyses the impact on energy-intensive industries, section 4 considers the causes of increases in the wholesale gas price and section 5 provides recommendations.

2 THE ISSUE

- 2.1 The government's objective of achieving energy prices which maintain business competitiveness is threatened by recent rises in the wholesale price of gas, which is in turn increasing electricity prices due to the large volume of gas-fired generation.
- 2.2 One of the four goals for energy policy set out in the government's Energy White Paper² in February 2003 was to promote competitive energy markets in the UK and beyond, thus helping to raise the sustainable rate of economic growth and to support the UK's industrial and business competitiveness.
- 2.3 The White Paper stated that "we must ... ensure that the price of energy allows us to maintain our competitiveness." The White Paper explicitly mentioned the importance of how UK energy prices compare to prices in other countries, stating that "energy for business and consumers must be competitively priced, including in comparison with other EU and G8 countries."
- 2.4 Wholesale gas prices in the UK now show a significant premium to prices on the continent. As illustrated in Chart 2.1, the month-ahead price for gas in the UK has risen above continental gas prices both last winter and from around September this year. Whereas in 2003 high winter prices were offset by lower UK prices during the summer months, this summer the UK gas price did not fall significantly below the gas price on the continent, resulting in a considerable price premium in the UK for the year as a whole.

² DTI (2003), "Our energy future – creating a low carbon economy", February

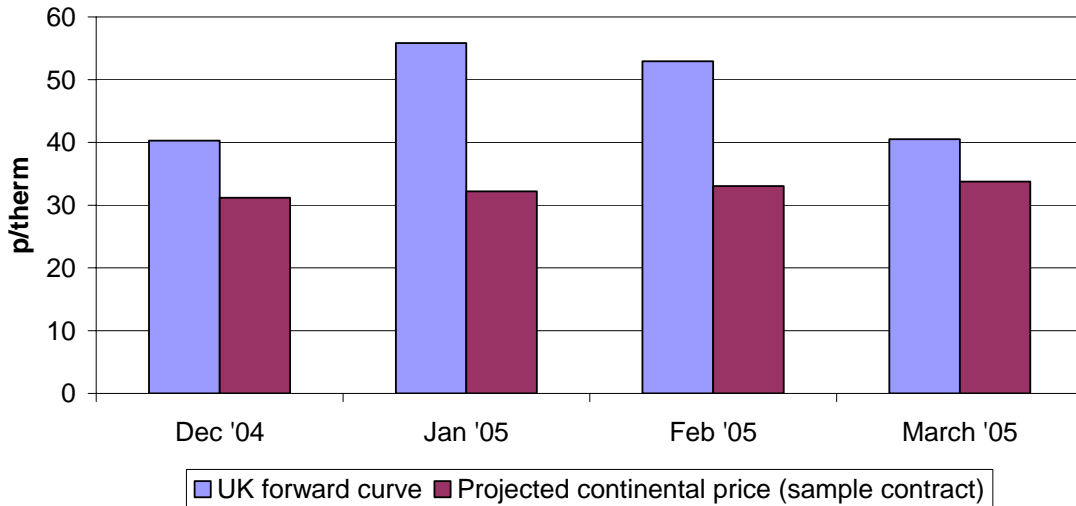
Chart 2.1: Comparison of UK Gas Price with European Contract Price



Source: Heren

- 2.5 While some larger industrial customers may buy gas near to the time of delivery, smaller industrial customers and public sector customers appear more likely to have fixed-price energy supply contracts based on the forward gas price.
- 2.6 Looking at the current forward curve, the comparison becomes worse from the viewpoint of UK industrial consumers. As shown in Chart 2.2, UK forward prices for this winter are significantly higher than the projected future level of gas prices on the continent.

Chart 2.2: UK Forward Price Compared to Projected Price Levels on the Continent

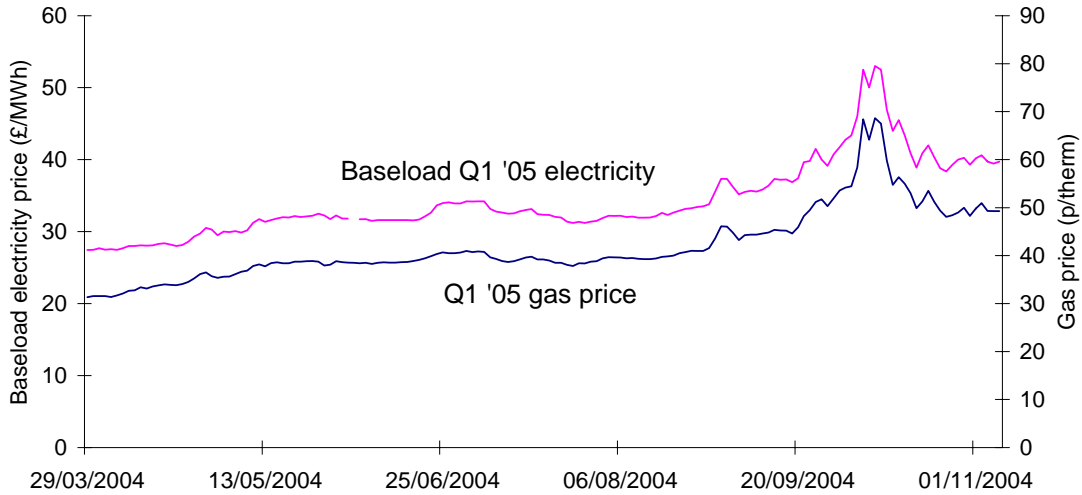


Notes: The UK forward curve is based on the average of the prices reported by Heren between the 1st and 5th of November 2004. The projected continental price is based on the inputting historic and current prices for gas oil and fuel oil into a specific contract formula known to Europe Economics, taking the current price of the oil products and the current exchange rate as a predictor of their future values.

- 2.7 The rise in wholesale gas prices has had a knock-on impact on electricity prices, further exacerbating the adverse effect on the competitiveness of UK industry. Chart 2.3 illustrates how closely forward electricity prices have moved with forward gas prices. This reflects the large market share of gas-fired generation (38 per cent of generation output in 2003³). Gas-fired plant will determine market prices at times when they represent the marginal source of generation.
- 2.8 Some large industrial customers have their own on-site generation. Where this plant runs on gas, the increase in gas prices will directly increase the cost incurred by customers in generating their own electricity requirements.

³ DTI (2004), "UK Energy in Brief", July

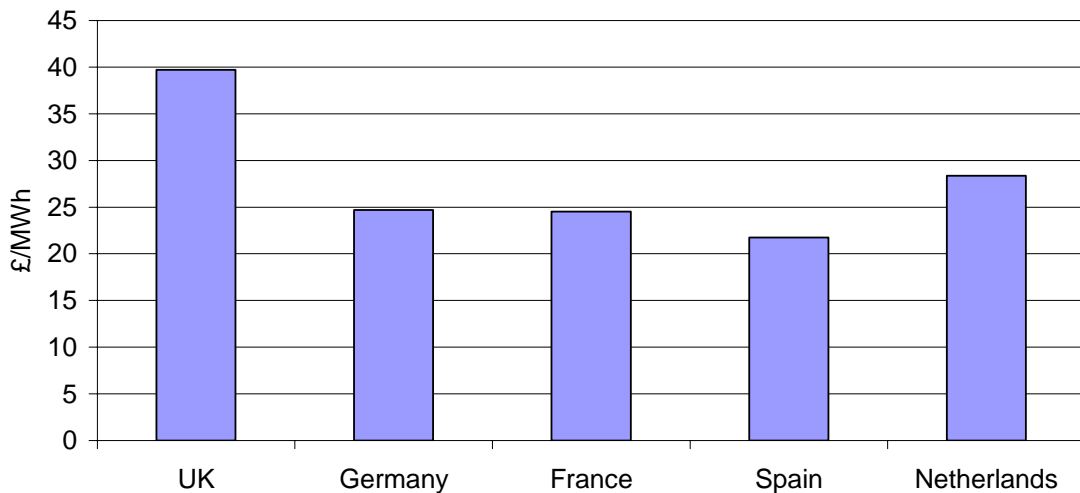
Chart 2.3: Movements in Wholesale Gas and Electricity Prices



Source: Heren

2.9 As a consequence of the impact of gas prices on the electricity market, wholesale electricity prices in the UK also show a significant premium to prices on the continent. Chart 2.4 compares prices for baseload electricity in Q1 '05. The wholesale price for this contract in the UK is around 60 per cent higher than it is in Germany and France.

Chart 2.4: Comparison of UK and Continental Forward Electricity Prices for Q1 '05



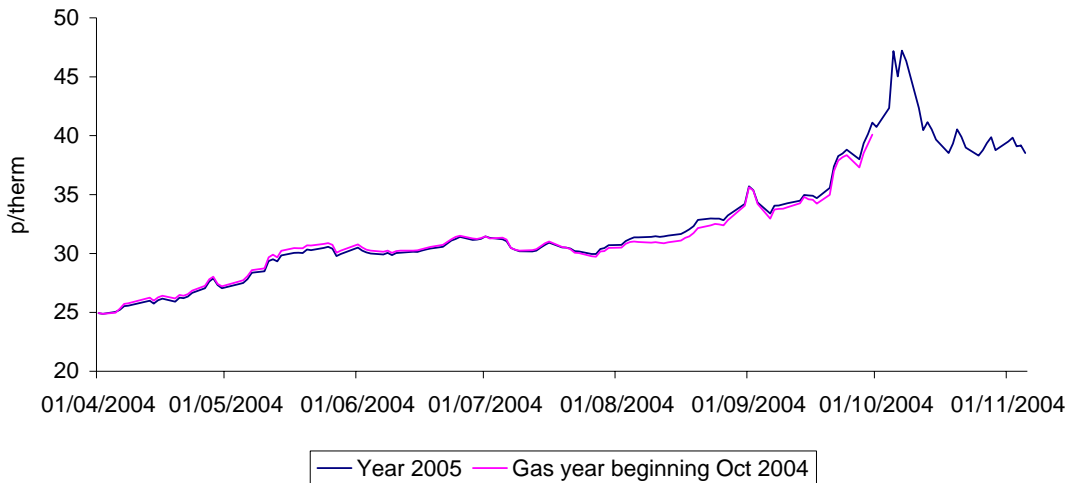
Source: Heren

2.10 Appendix 1 discusses the impact of rising wholesale prices on delivered prices of gas and electricity (i.e. including network and supply costs) to “extra large” industrial consumers.

3 IMPACT

- 3.1 Ofgem has calculated that average day-ahead price movements have increased the annual value of wholesale gas to be supplied this winter by £3.5 billion across Great Britain and the annual value of wholesale electricity by £1.7 billion in England and Wales.
- 3.2 Europe Economics has calculated that if the comparison is instead based on forward gas and electricity prices, then the value of gas consumption (excluding consumption by the power generation sector) has risen by £4.6 billion or 69 per cent from winter 03/04 to winter 04/05, with the value of electricity consumption rising by £4.3 billion or 46 per cent. Industrial consumers are estimated to account for £1 billion of the increase in the value of gas consumption and £1.2 billion of the increase in the value of electricity consumption.
- 3.3 Whether the comparison is based on day-ahead or forward prices, these figures suggest a very substantial transfer of revenue from gas and electricity consumers to producers. The breakdown of this revenue between producers cannot be calculated without access to information on the contractual arrangements of market participants.
- 3.4 The rise in the wholesale price of gas is substantially increasing energy costs for industrial customers. Appendix 1 shows data provided by the EIUG on the rise in gas and electricity prices reported by a sample of steel and glass companies. Glass companies have reported price increases of up to 40 per cent for gas and up to 51 per cent for electricity from 2004 to 2005; steel companies have reported increases of up to 42 per cent for gas and up to 55 per cent for electricity.
- 3.5 It has been suggested that industrial and public sector customers that lock into fixed-price energy supply contracts typically have contracts which come into effect from October or April each year, and which might thus be negotiated in the previous month. Chart 3.1 shows how forward prices for annual contracts were moving upwards during the period when such contract negotiations might have been taking place.

Chart 3.1: Forward Price Available During the Period of Contract Negotiations



Source: Heren

- 3.6 The fall away in forward prices from the very high value seen in early October does not necessarily mean that forward prices are no longer a matter of concern. This is because prices still appear to be at a high level compared to likely out-turn spot prices (discussed in paragraphs 4.40 to 4.44), and because some customers may have locked into contracts when prices were at their peak. Furthermore, if past peaks were driven by market distortions and these are not adequately identified and addressed, then there is clearly a risk that the similar developments might occur in the future.
- 3.7 The impact of these price increases is greatest on energy-intensive sectors i.e. those which spend a high proportion of turnover on gas and electricity relative to other sectors of the economy. Table 3.1 summarises major energy-intensive sectors which make up the membership of the EIUG.

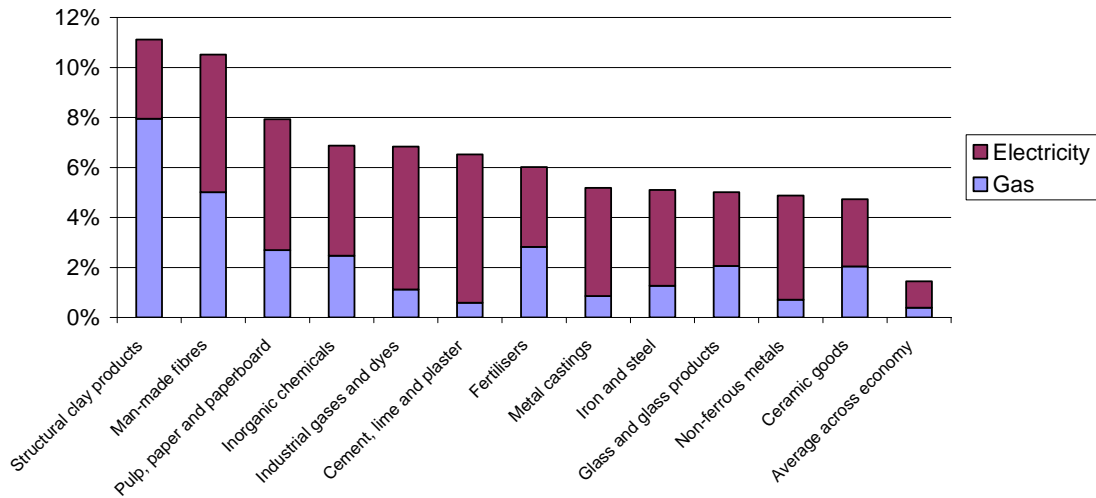
Table 3.1: Major Sectors Represented by EIUG

Sector
Chemicals
Steel
Paper
Glass
Ceramics
Gypsum
China Clay
Aluminium

- 3.8 Europe Economics has obtained information on the energy-intensity of these sectors from input-output supply and use tables produced by the ONS. These tables disaggregate the UK economy into 123 sectors, and include data on the expenditure of each sector on intermediate products produced by other industries.⁴
- 3.9 Chart 3.2 shows the proportion of turnover spent on gas and electricity by a selection of the most energy-intensive sectors of the economy. These figures relate to 2002, the latest year for which data are available. Given rises in energy prices since this date, the figures are likely to underestimate the current level of expenditure on energy.
- 3.10 The data show that in 2002 the two most energy-intensive sectors, structural clay products and man-made fibres, spent more than 10 per cent of turnover on gas and electricity. The other ten sectors shown in the chart spent between 4.7 and 7.9 per cent of turnover on energy, compared to an average of 1.4 per cent across the economy as a whole.
- 3.11 These broad sectoral figures mask much higher energy intensities for some individual companies. For example, in a survey by the CIA, one chemical company quoted a figure of 20 per cent for the proportion of their turnover that was spent on gas and electricity. Europe Economics has been informed by the CIA that another chemical company uses gas both as a source of energy and as a feedstock, together costing 40 per cent of the company's turnover.

⁴ Expenditure on intermediate products includes expenditure on imports of these products.

Chart 3.2: Expenditure on Energy in Selected Energy-intensive Sectors, as Percentage of Turnover (2002)



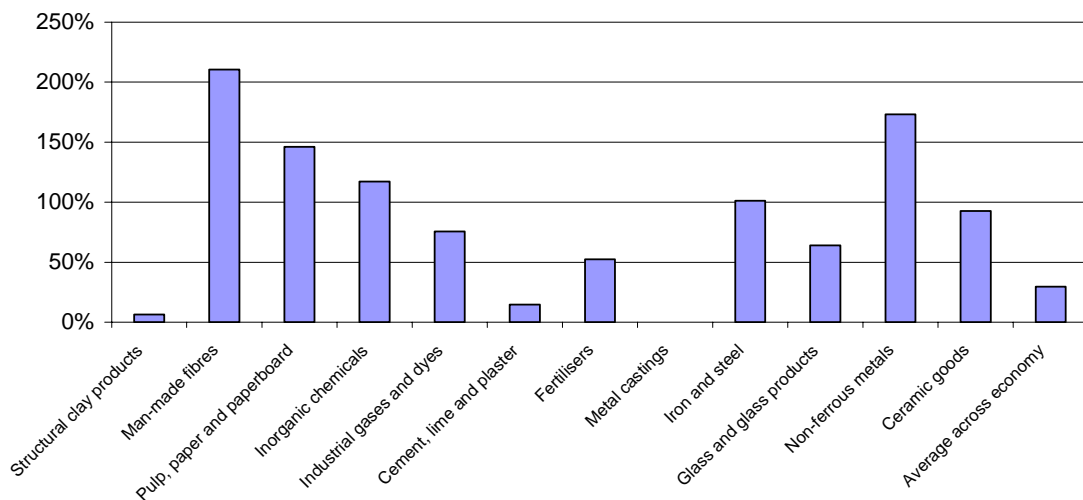
Source: ONS; Europe Economics calculations

- 3.12 The longer term impact on UK industrial competitiveness will depend on the extent to which companies can pass through energy cost increases into final product prices.
- 3.13 Companies might be able to pass cost increases on to consumers where:
- The product is not widely traded internationally (perhaps due to transport costs), so that the UK market is self-contained. In this case, all suppliers into the market will face similar cost increases and hence final product prices to UK consumers are likely to increase.
 - The firm has some degree of market power which enables it to act as a price-maker, rather than having to accept the prevailing market price.
- 3.14 Where a product is widely traded and there is a competitive international market, UK producers are likely to be price-takers. This means that they have to price their output at the prevailing international price or they will lose their sales to overseas competitors. In these sectors, increases in energy prices which affect only UK producers will tend to make it more difficult for UK firms to operate effectively in international markets.
- 3.15 A similar effect occurs when the customers are themselves unable to sustain cost increases. An interesting illustration of this arose in one of Europe Economics' interviews with an energy-intensive user concerning the production of a bulk material which was sold as an input to other UK manufacturers. Although the bulk material itself was not widely traded internationally due to high transport costs, there were established international markets for the product which it was used to produce. The industrial consumer stated

that passing through increased energy costs into the price of the bulk material would put its customers out of business, as they would be unable to increase the price of their product.

- 3.16 Europe Economics' analysis of ONS data suggests that energy-intensive sectors tend to be more open to international trade than the economy as a whole. Chart 3.3 shows a measure of the openness of each sector to trade in 2002, constructed by dividing the sum of imports and exports by domestic output. Across the economy as a whole this index has a value of 30 per cent, whereas across the selected energy-intensive sectors it has an average value of 88 per cent. The figures show that all but three of the twelve sectors are significantly more open to trade than the economy as a whole.

Chart 3.3: Openness of Selected Energy-intensive Sectors to International Trade (2002)



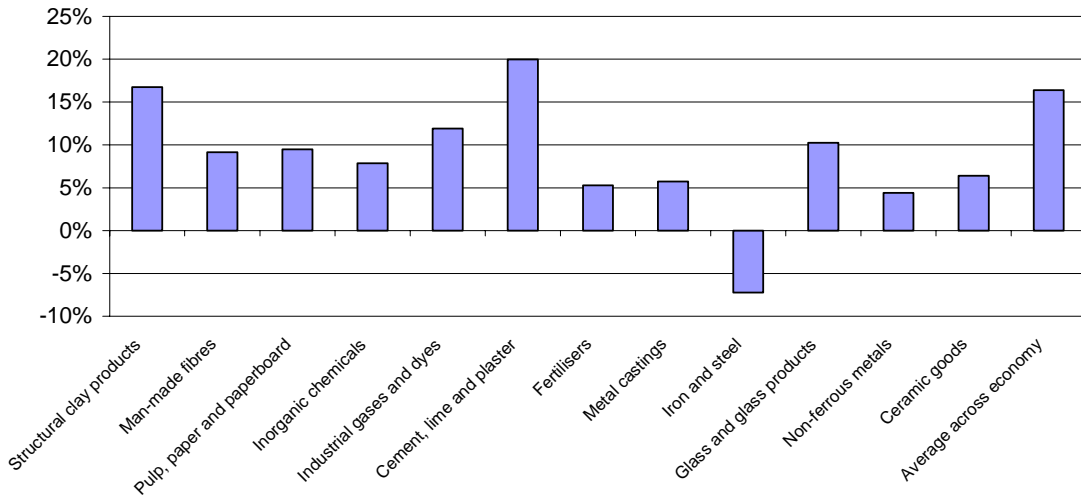
Note: Europe Economics has received feedback from suggesting that the metal castings sector is open to international trade, rather than closed as suggested by the above figures.

Source: ONS; Europe Economics calculations

- 3.17 The worst affected energy-intensive sectors are likely to be those which, as well as being price-takers on international markets, also have low margins. For these sectors, increases in energy prices which affect only the UK may lead to a significant reduction in the profitability of UK production.
- 3.18 Chart 3.4 presents ONS data showing that gross operating margins in the year 2002 tended to be lower in the most energy-intensive sectors of the economy. Whereas the

gross margin across the economy as a whole was 16 per cent, gross margins were lower in all but two of the energy-intensive sectors, with an (unweighted) average across the selected energy-intensive sectors of 8 per cent.⁵

Chart 3.4: Gross Operating Margin in Selected Energy-intensive Sectors (2002)



Notes: calculated by dividing gross operating profit by total output at basic prices. The gross operating margin for the steel sector may have risen since 2002 given movements in steel prices.

Source: ONS; Europe Economics calculations

3.19 How might increases in gas and electricity prices affect the behaviour of energy-intensive firms? The answers suggested by economic theory include the following:

- (a) First, the energy consumption behaviour of firms may alter. There is likely to be an increased focus on energy efficiency, as the return to investments which lead to energy savings will increase. In some cases, firms may also be able to reduce costs by switching to alternative fuels.
- (b) Second, for those firms which are price-takers on international markets and whose profitability is undermined by increased energy costs, there may be a reduction in the level of production activity undertaken in the UK.

⁵ The iron and steel sector had a negative margin in 2002. If this is excluded from the calculation, the (unweighted) average across the energy-intensive sectors is 10%.

3.20 The CIA's survey of chemical companies requested details of the effect of energy price increase on the respondent's business and what specific actions the business was taking in response. The answers provided by respondents are summarised in Table 3.3, and are broadly in line with the above discussion.

Table 3.3: The Effects of Rising Energy Prices Quoted by Respondents to CIA Survey

Effects on business
Big threat from imports
Further loss of competitiveness
Margins further eroded
"Business is threatened"
Loss of ability to plan ahead
Unable to manage input price risk
Reduced ability to secure fixed price contracts
Cannot pass energy costs on
Customers moving out of UK
Volumes up 10% gross profit down 8%
Foreign executive concern over government not having proper control over the issues
Response of business
Business targeted towards far east
Long term: plant closure
Product restriction/cessation
Products and sites under close review
Energy efficiency investment
Capital funds diverted from core business/productivity improvements to energy saving
Energy efficiency optimisation
Energy mix review
Gas purchase strategy moved from fixed term contract to day-ahead
Move towards renewable energy sources
Marginal costing for parts of business
Cost saving in areas of personnel, maintenance and overheads

Note: Some of the survey responses to the question regarding effects on the business appeared to relate more to the response of the business. Europe Economics has reallocated these answers to the appropriate heading.

3.21 It might be argued that any reduction in production and employment by energy-intensive sectors of the economy will be offset by increased growth in other sectors, as the economy adjusts by reallocating resources to other uses. However, the following considerations should be borne in mind:

- (a) First, there may be adverse impacts on local or regional economies in the period of transition. For example, the closure of manufacturing plant in regions whose economies were dependent on these plant may lead to higher unemployment in that region for a period of time.

- (b) Second, if the rise in the gas price is not justified by economic fundamentals (an issue which is discussed in the next section), then the reallocation of resources from energy-intensive sectors to other sectors of the economy is inefficient and would give rise to a net loss of economic welfare. This is because, under these circumstances, resources would be reallocated to sectors which are less productive when energy is priced at its “true” economic value.

4 CAUSES

4.1 This part of the report discusses:

- (a) whether economic fundamentals appear to adequately explain price movements; and
- (b) if not, whether it is plausible that market distortions might be responsible.

4.2 This section of the report draws on the findings of Ofgem's investigation into gas prices. Ofgem initiated its probe with a letter to gas shippers in November 2003,⁶ following high prompt prices in October and November of that year. The probe was later extended to cover high forward gas prices for the coming winter and high prompt prices during summer 2004. The regulator published an interim report in May 2004⁷ and its conclusions paper in October 2004.⁸

4.3 The Financial Services Authority (FSA) conducted separate enquiries into whether the activities surrounding the gas price fluctuations of October-November 2003 amounted to a breach of the market abuse regime under the Financial Services and Markets Act 2000. The FSA has stated that it did not find any evidence of such a breach occurring during that period, although no details of its enquiries were published.

Assessment of Economic Fundamentals

4.4 This part of the report first discusses some background theory as to how gas prices might be expected to behave in a competitive market, and then looks in turn at whether economic fundamentals can explain recent movements in spot and forward gas prices.

Background theory

4.5 In a competitive market, price would tend in the longer-term towards the long-run marginal cost (LRMC) of supplying the commodity. The LRMC is the full cost of the marginal source of supply required to meet demand, including capital costs and a reasonable return on capital given the non-diversifiable risks involved.⁹ The reason why price tends to LRMC in the long-term is as follows:

- (a) if price is greater than LRMC, then it is likely to be profitable for additional sources of supply to be brought to the market, driving prices downwards because of the excess of supply over demand;

⁶ Ofgem letter titled "gas prices", November 14th 2003

⁷ Ofgem (2004), "Wholesale Gas Prices in October and November 2003: Interim report", May

⁸ Ofgem (2004), "Ofgem's probe into wholesale gas prices: Conclusions and next steps", October

⁹ Non-diversifiable risks are those which investors cannot protect themselves against by holding a diversified portfolio of shares.

- (b) if price is lower than LRMC, then it will not be profitable in the long-run for the marginal source of supply required to meet demand to be brought to the market. In this case, demand will exceed supply and prices will rise due to the shortage.
- 4.6 In the short term, the price in a competitive market may be either higher or lower than LRMC, due to demand and supply shocks and the time lag associated with entry and exit from the market.
- 4.7 In the context of the European gas market, this means that in the long-term price should tend towards the cost of the most expensive source of gas required to meet demand (e.g. gas piped from Russia, or LNG transported by sea from Africa), if the market is competitive.
- 4.8 However, as a consequence of the slow pace of gas market liberalisation on the continent, European gas prices do not currently move in line with gas market fundamentals (i.e. LRMC, short-term demand and supply shocks). There are only a few gas trading hubs on the continent, and liquidity at these hubs tends to be low. Instead, most wholesale gas is sold through long-term contracts, which index prices mostly to lagged movements in prices for heavy fuel oil and gas oil. Movements in the prices of these oil products are likely to be unrelated to the demand/supply balance for gas in Europe.
- 4.9 The distortion caused by the absence of the competitive wholesale gas markets on the continent is recognised by Ofgem. For example, in its recent conclusions document the regulator stated that it was concerned about “the lack of effective competition in key European markets and the effects of oil-indexed contracts on the GB market and customers.”
- 4.10 Although there is a relatively liquid wholesale market in the UK, prices on the continent affect the UK market because of the existence of an interconnector between the two markets. Provided the volumes flowing across the interconnector are not constrained by capacity limits, prices in the UK would be expected to be equal to prices on the continent, adjusted for the cost of transporting gas across the interconnector. This because:
- (a) If prices on the continent rose significantly above UK prices, it would be profitable for firms to arbitrage between the two markets by exporting gas over the interconnector, thus increasing prices in the UK. This would continue until UK prices equalled continental prices less transportation costs.
- (b) If, on the other hand, UK prices were above those on the continent, firms would have an incentive to arbitrage by importing gas over the interconnector, thus reducing UK gas prices. This would continue until UK prices were equal to continental prices plus transportation costs.
- 4.11 This process of arbitrage and price equalisation would be expected to break down at times when the volume of gas flowing through the interconnector reaches its capacity

limit, and at times when the interconnector is out of action (e.g. for maintenance). In the past, flows have sometimes reached maximum export capacity in the summer, leading to UK prices falling below prices on the continent. In the winter, flows might reach maximum import capacity, allowing UK prices to rise above those on the continent.

- 4.12 Gas is traded both close to delivery (e.g. on-the-day, day-ahead) and further ahead of time (months, quarters or years ahead of delivery). The forward price of gas should reflect the expected spot price of gas for the delivery period of the forward contract, with a premium for the provision of price security (assuming that the buyers value price security more than sellers). The out-turn spot price may be either higher or lower than the forward price, depending on the impact of any unanticipated supply or demand shocks.

Spot market

Ofgem's findings in relation to prompt prices in October/November 2003

- 4.13 Ofgem's investigation looked in most detail at the rise in prompt gas prices in October/November 2003, which was the initial trigger for its probe. Ofgem's conclusions document broke down its analysis of this rise in prices into three components:

- (a) the causes of reduced UK supply;
- (b) the behaviour of European gas supply and the interconnector; and
- (c) the effects of reduced gas supply on prices.

- 4.14 Ofgem found that reduced UK supply in these months was largely due to reduced flows at five sub-terminals, at which gas supply fell by a total of 40 per cent compared to the previous year. The regulator analysed the reasons for this 40 per cent reduction and identified the following breakdown:

- (a) 18 per cent was due to a decline in production capability of fields;
- (b) 11 per cent was due to unplanned maintenance;
- (c) 7 per cent was due to planned maintenance;
- (d) 4 per cent was apparently due to contractual arrangements.

- 4.15 Ofgem stated that it would be giving further consideration as to whether contracts which prevented gas reaching the market represented reasonable commercial behaviour or were having anti-competitive effects. However, the regulator was satisfied that all maintenance could be appropriately explained and was completed in a timely manner.

- 4.16 With regard to European gas supplies, Ofgem concluded that the interconnector operated appropriately in light of price differentials between the NBP and the Zeebrugge hub. However, Ofgem found the arbitrage which might have been expected between the Zeebrugge hub and neighbouring hubs on the continent did not occur, with potential explanations including:

- (a) high demand for gas on the continent;
 - (b) low levels of gas in storage on the continent for the coming winter following an earlier interconnector outage;
 - (c) limited access to transport capacity on Belgian grid;
 - (d) risks created by the cash-out regime in Belgium;
 - (e) the adoption of a cautionary approach to trading by some players following the interconnector outage, and a lack of liquidity at European hubs.
- 4.17 Nonetheless, Ofgem stated that it had concerns in relation to European gas supplies. In particular, it was unable to satisfy itself that all contractually available gas was released into the market, that use of storage capacity was appropriate and that transit capacity was not inappropriately withheld. Ofgem has presented its findings to the European Commission and said that it intends to work in collaboration with the Commission and other European competition authorities to identify whether infringements of competition law have taken place.
- 4.18 Ofgem carried out high level analysis of whether the rise in UK gas prices was consistent with the reduction in UKCS supply and imports. Ofgem estimated that UKCS maintenance and the pattern of interconnector flows may have reduced supplies by up to 91-98 mcm/day, potentially justifying a price of up to 45-49 p/therm. Given that the highest actual price observed was 34 p/therm, Ofgem concluded that price movements were within the range that might be expected given physical reductions in supply.

Ofgem's findings in relation to prompt prices in summer 2004

- 4.19 Ofgem looked more briefly at NBP day-ahead gas prices between the middle of July and the middle of September this year. During this period, prices peaked at 33.4 p/therm and were significantly higher than those seen during the same period of 2003.
- 4.20 The regulator found that price increases during these months did not appear to be attributable to changes in demand. Indeed, once interconnector flows were taken into account, total system demand was lower for much of August and September 2004 than in the previous year. Instead, Ofgem's analysis suggested the following explanation:
- (a) a reduction in UKCS supply (a year-on-year decline of 11 per cent for August 2004 and 16 per cent for September 2004) due to ongoing decline and higher than normal levels of outages;
 - (b) increases in European prices, partly reflecting increases in the oil price;
 - (c) UK and European prices remaining coupled throughout the summer because the reduction in UKCS supply meant that arbitrage was not constrained by interconnector capacity.

- 4.21 In the time available, Ofgem was not able to determine whether patterns of maintenance during the summer were abnormal, or whether gas that was physically available did not reach the market due to the nature of existing contracts in the UK.

Remaining questions

- 4.22 Ofgem's analysis is a useful starting point in understanding the factors that may have influenced spot prices in October/November 2003 and summer 2004. However, there are a number of areas where there remain unanswered questions.
- 4.23 First, as discussed above, Ofgem has identified unanswered questions in relation to:
- (a) contracts which appear to have prevented UK supplies from reaching the market;
 - (b) the behaviour of European gas supplies during October/November 2003;
 - (c) whether or not outage patterns were abnormal during summer 2004.
- 4.24 Second, Europe Economics has identified the following additional issues:
- (a) Were any fields deliberately turned down on a prolonged basis? Ofgem's methodology would not pick up such behaviour, because it implicitly treats maximum flows at each sub-terminal as a proxy for the production capability of fields connected to the sub-terminal.
 - (b) Why did the contractual arrangements which contributed to the reduction in UKCS supply in October/November 2003 keep more gas being brought to market than in the previous year, despite the fact that prices were higher in autumn 2003?

Forward market

Ofgem's findings in relation to forward prices for winter 2004/05

- 4.25 Ofgem analysed what it referred to as the drivers of current forward prices, although it stated that the results should be treated with caution because of the role of expectations in determining these prices. The regulator found that the rise in forward prices for Q1 '05 from 31.55 p/therm on April 1st to 51.727 p/therm on September 27th 2004 might be attributed to the following causes:
- (a) 30 per cent – the impact of rising oil prices;
 - (b) 19 per cent – expectations of a faster decline in UKCS production, requiring demand-side response and peak gas to be brought into use on peak demand days;
 - (c) 5 per cent – increase in storage costs.
- 4.26 Ofgem's qualitative discussion suggested that the remainder (almost half) of the price rise might be due to a higher risk premium and general market sentiment.

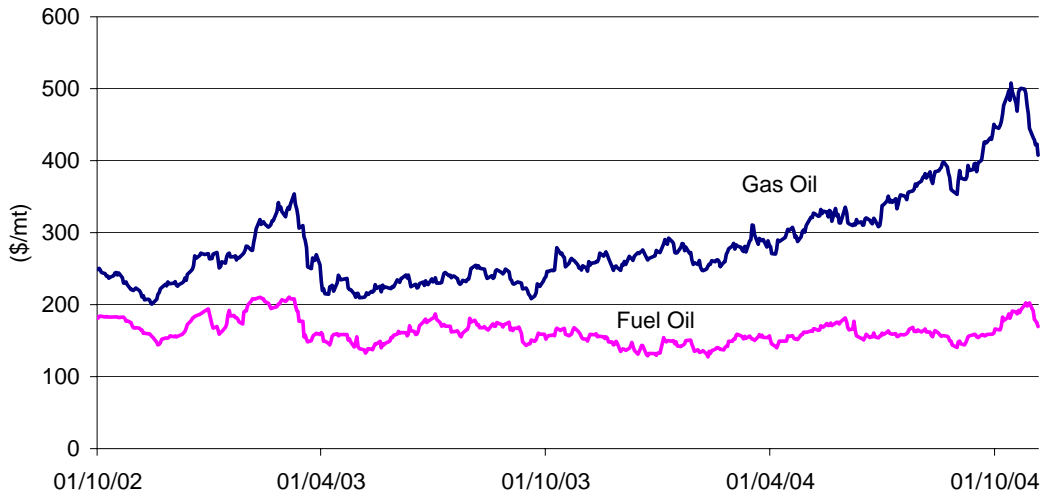
- 4.27 Ofgem's approach involved constructing a merit curve for the different sources of gas supply into the UK (beach gas, interconnector, storage, peak shaving and demand-side response). For each source of gas, the regulator analysed its cost, and the proportion of days during Q1 '05 in which it might be the marginal source of supply and thus set the market clearing price. Whereas higher oil prices were considered to increase the cost of gas imported through the interconnector and taken out of storage,¹⁰ declining UKCS production was regarded as leading to an increase in the number of days on which high cost supplies of gas represented the marginal source.
- 4.28 The results quoted above were obtained utilising historic demand/supply balance data for 2003/04, which was a relatively warm winter. Ofgem also analysed the prices that might be expected if the coming winter were to be particularly cold. It concluded that the forward price of 54 p/therm for Q1 2005 at the time its report was published was only slightly below the price that would be expected for a 1:50 winter.
- 4.29 Ofgem's conclusions document also mentioned the view of some market participants that Value at Risk (VAR) limits mean that companies may have to buy forward as prices rise in order to limit their risk exposure.

Most of the rise in forward gas prices cannot be explained by rising oil prices

- 4.30 It is important to recognise that the majority of the rise in forward gas prices for this winter cannot be explained by rising oil prices.
- 4.31 As mentioned in paragraph 4.8, prices in gas contracts on the continent tend to be linked to heavy fuel oil and gas oil rather than to crude oil. Chart 4.1 shows that whereas gas oil prices have increased significantly over recent years, fuel oil prices have remained relatively stable.

¹⁰ Higher oil prices were regarded as leading to higher UK gas prices in summer months, and thus increasing the cost of gas put into storage for winter months.

Chart 4.1: Movements in Gas Oil and Fuel Oil Prices (\$/mt)

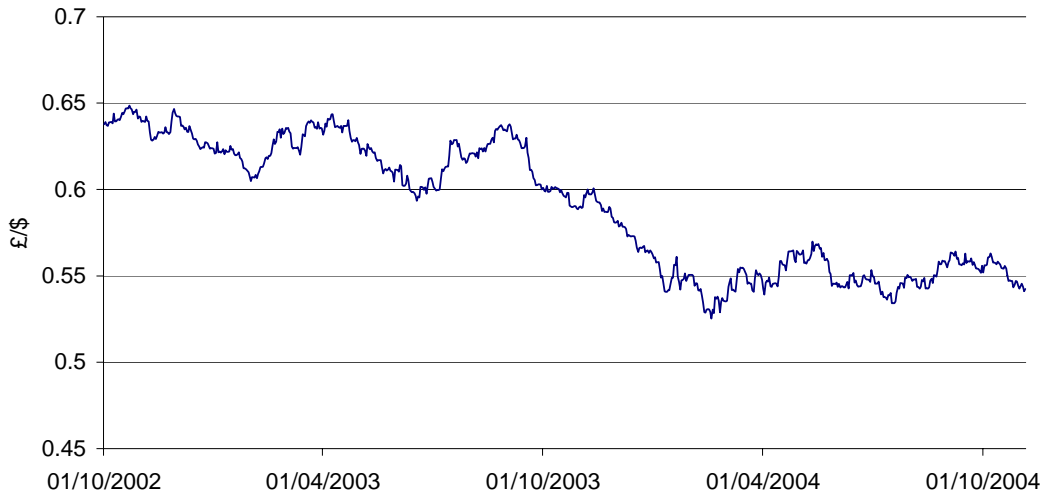


Note: figures are closing prices for each day.

Source: Platts

- 4.32 Europe Economics understands that the precise weighting between the prices of these oil products varies between contracts, but that a weighting of 70 per cent on heavy fuel oil and 30 per cent on gas oil might be considered typical. This would mean that more weight tends to be placed on the oil product which has **not** risen in price when calculating indexed contract prices on the continent.
- 4.33 The effect of increases in world oil prices is further dampened by the fall in the value of the dollar over the last few years. This means that a given rise in the price of oil products quoted in dollars translates into a lower rise in terms of euros – the currency relevant to the pricing of contracts on the continent. The comparison between continental and UK prices is further affected by the exchange rate between euros and pounds sterling. Chart 4.2 shows how the exchange rate between the dollar and pounds sterling (which combines movements in both the dollar/euro and the euro/sterling exchange rates) has changed since October 2002.

Chart 4.2: Decline in £/\$ Exchange Rate Through Time

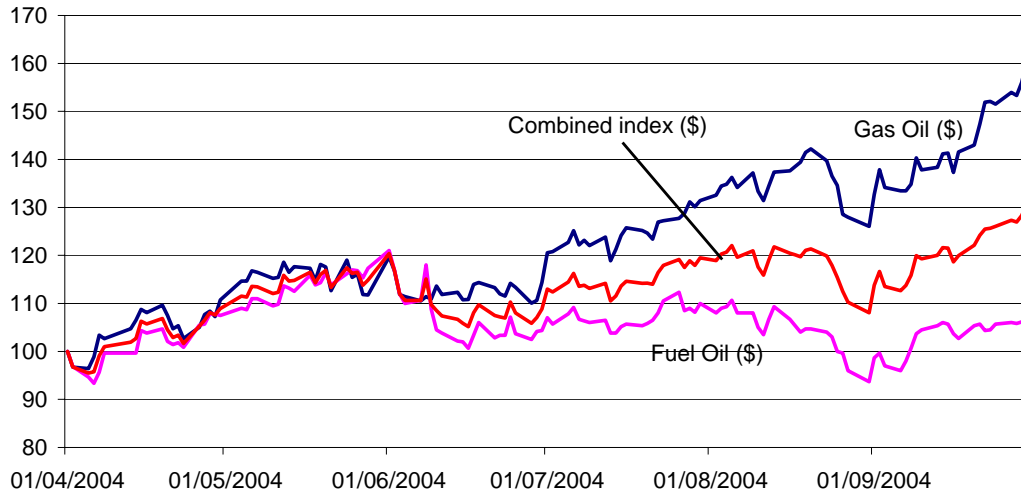


Note: Interbank daily average

4.34 Charts 4.3 and 4.4 demonstrate how, once these effects are taken into account, the rise in world oil prices can be seen not to explain the majority of the increase in forward gas prices for this winter. The charts focus on the period that Ofgem looked at in its analysis of forward prices (April to September 2004). First, Chart 4.3 shows that an index weighted 70 per cent on fuel oil and 30 per cent on gas oil rose by significantly less than gas oil prices alone. Second, Chart 4.4 shows that the UK forward gas price for Q1 '05 rose by 72 per cent compared to 34 per cent for the weighted index of oil product prices, now shown in sterling terms.¹¹ (This period is after the fall in the value of the dollar and hence exchange rate movements had relatively little effect over this particular timeframe.)

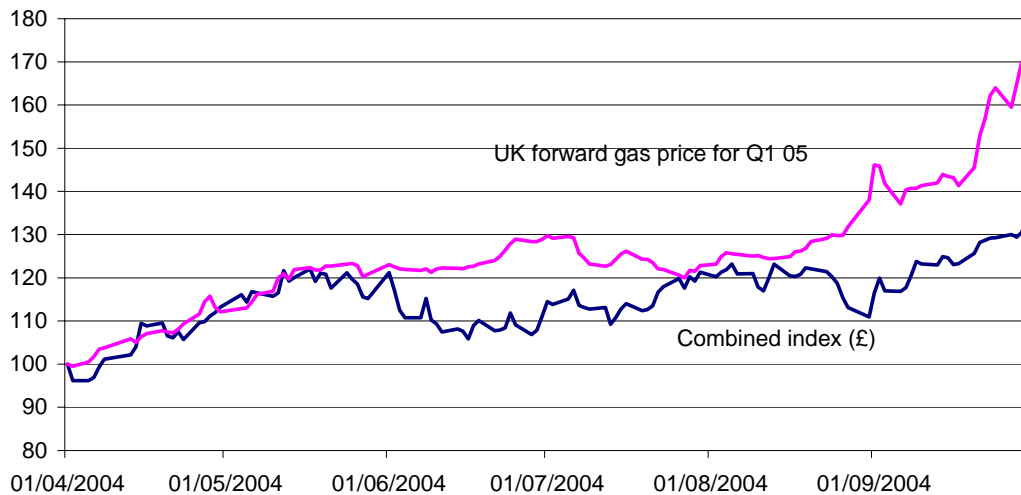
¹¹ The comparison will clearly depend on the forward contract analysed. Europe Economics selected Q1 '05 because this is the contract examined by Ofgem.

**Chart 4.3: Rise in Index of Fuel Oil and Gas Oil since April 2004
(01/04/2004 = 100)**



Source: Platts; Europe Economics' calculations

**Chart 4.4: Comparison of Rise in Forward Price and Rise in Index of Oil Products
(01/04/2004 = 100)**



Source: Heren; Platts; Europe Economics' calculations

4.35 This discussion broadly fits with Ofgem's conclusion that only a minority of the rise in forward prices can be explained by oil prices (Ofgem's estimate was 30 per cent). Ofgem's work was partially based on statistical analysis of the relationship between crude oil prices in sterling and Emden prices. The regulator's report does not publish details of

its regression, and hence it is difficult to know to what extent the effect of the weighting on fuel oil prices might have been picked up (whether directly or indirectly) by its methodology.

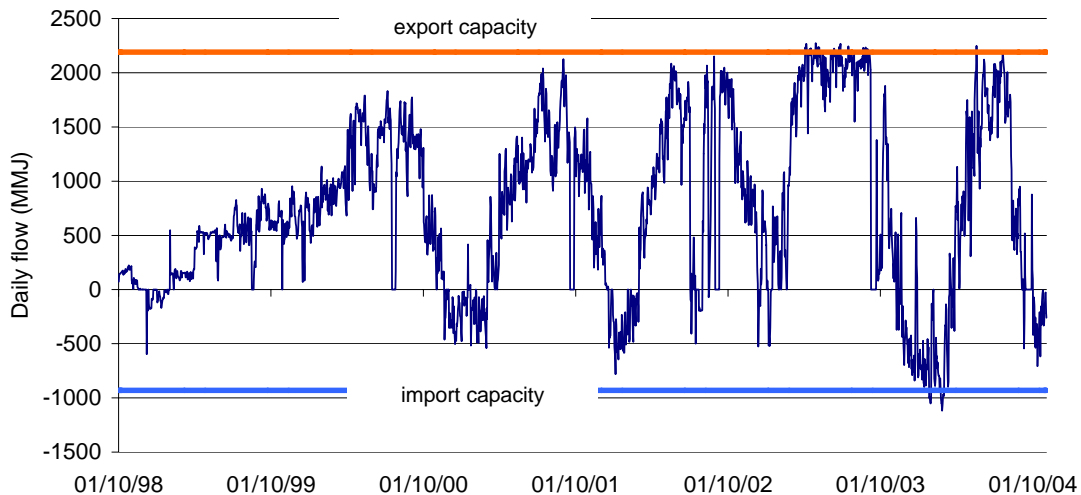
Interconnector constraints may occur this winter

4.36 Given the anticipated ongoing decline in UKCS production, it is plausible to suggest that there might be interconnector constraints this winter. This is supported by NGT's recent Winter Outlook Report:¹²

... the Belgium-England interconnector was importing into the UK at levels at or above its nameplate capacity for prolonged periods during the 2003/04 winter. With the supply-demand position tightening further, it seems reasonable to assume that this trend will continue in 2004/05.

4.37 Chart 4.5 illustrates this statement by showing historic interconnector flows, which reached the interconnector's import capacity limit for the first time last winter. Transco projects a year-on-year decline in UKCS production capability of 13 mcm/day. Interconnector flows would have to increase by around 500 MMJ/day in order for imports to offset such a decline in production - an increase which does not appear feasible given that the interconnector may already be operating close to capacity.

Chart 4.5: Historic Interconnector Flows



Source: Interconnector (UK)

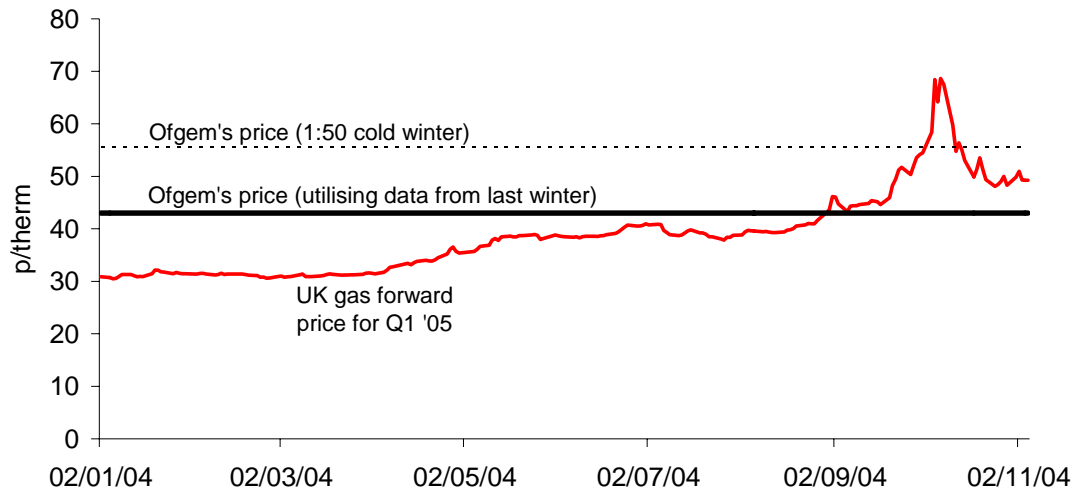
¹² NGT (2004), "Winter Outlook Report – 2004/05", October

- 4.38 As discussed in paragraph 4.11, when the interconnector imports are constrained the UK gas price may rise above continental gas prices, consistent with economic fundamentals. This is because other more expensive sources of supply (e.g. peak storage, demand-side response) may be required to bring supply and demand into balance at times of peak demand.
- 4.39 The key issue for examination is hence whether the *magnitude* of the rise in forward prices is consistent with expected demand/supply in the market.

The magnitude of the rise in forward prices is difficult to explain with reference to market fundamentals

- 4.40 As set out in paragraph 4.25, Ofgem's quantitative analysis (using last winter's demand figures) was only able to explain 54 per cent of the rise in forward gas prices between April 1st and September 27th 2004. The UK demand/supply balance and storage costs, which are UK-specific factors and might thus become relevant as a result of anticipated interconnector constraints, together accounted for 24 per cent of the rise. This suggests that a large proportion (almost half) of the rise in forward prices remains unexplained, even once the impact of interconnector constraints has been taken into account.
- 4.41 Ofgem's report appears to provide little solid evidence in favour of attributing the unexplained part of price movements to an increased risk premium or "market sentiment". Indeed, by adopting this explanation without detailed supporting analysis, Ofgem has foregone the opportunity to consider whether market distortions might be responsible for price movements.
- 4.42 Ofgem's finding that market prices have at times almost been consistent with the expectation of a 1 in 50 winter would appear to suggest that something is wrong with the market. By definition, there is only a 1 in 50 probability of such harsh weather. It is not plausible to suggest that an outcome with a 1 in 50 probability is being viewed as a central expectation for the purposes of price formation.
- 4.43 Furthermore, forward prices continued to rise after the publication of Ofgem's report. Indeed, at the beginning of October, prices were above even the value that Ofgem calculated might occur during a 1:50 winter. This implies that even if market participants were influenced by an irrational expectation of a harsh 1:50 winter, this would be insufficient to explain the level of forward prices that has been observed.

Chart 4.6: Forward Price for Q1 '05 Relative to Prices Justified by Ofgem's Modelling



Source: Heren; Ofgem

- 4.44 Overall, it appears that a significant proportion of increases in forward prices, especially those seen during early October, cannot be easily explained with reference to economic fundamentals.

Plausibility of Market Distortions

- 4.45 This part of the report examines the theoretical potential for distortions to exist in the gas market. It must be emphasised that Europe Economics is not aware of any evidence to suggest that anti-competitive behaviour is taking place.

Conditions for anti-competitive behaviour

- 4.46 Anti-competitive behaviour is more likely in markets which are highly concentrated, where firms can observe each other's actions, where the actions of producers are not transparent to buyers and regulators, and where price is relatively inelastic. To what extent do these conditions apply in the UK wholesale gas market?
- 4.47 The upstream gas market has become more concentrated in recent years due to upstream consolidation. Indeed, a series of major mergers between 1998 and 2002 had the effect of turning 12 separate companies into 5 larger ones.

- 4.48 The large number of smaller producers operating in the UKCS may provide a misleading picture, if these smaller producers sell to or through the biggest producers. This would mean that selling of gas into the wholesale market is more concentrated than the HHI¹³ of upstream production would suggest. Europe Economics does not have access to the information required to analyse this issue, but suggests that it is an area which requires further analysis.
- 4.49 Producers tend to co-operate in upstream gas production, with shared ownership stakes in many fields and joint use of pipelines and sub-terminals. This could be an efficient way to reduce costs and maximise development of the UKCS. However, these co-operative relationships would clearly enhance the ability of upstream producers to behave together in the wholesale market, in the absence of transparency and robust regulation.
- 4.50 In the past, upstream producers have placed little information into the public domain with regard to upstream production, field outages etc. (Ofgem and DTI were unable to say whether the recent pattern of field outages during summer 2004 were unusual in comparison with previous years.) This lack of transparency from the perspective of buyers and regulators strengthened the theoretical possibility of collusive activity. The situation with regard to transparency is improving, with Transco beginning to publish some items of market data received from offshore producers on its website.
- 4.51 At a theoretical level, anti-competitive behaviour is more likely to be profitable if demand for gas is price inelastic (i.e. consumption does not fall much in response to price increases). This is because a given reduction in supply will lead to a larger price rise before the balance between demand and supply is restored. A previous study found that that “the market elasticity of demand [for gas]... is likely to be highly inelastic, lying somewhere in the range 0 to -0.3.”¹⁴
- 4.52 This discussion suggests that there may be some reasons why the gas market could be vulnerable to anti-competitive behaviour. This vulnerability could be reduced by increased transparency and market surveillance.

Potential for market distortions in spot market

- 4.53 In theory, a firm with market power in the spot gas market could have an incentive to withhold a proportion of its supplies (whether upstream production, imports over the interconnector or stored gas) in order to increase the price obtained for the remainder of its gas sales.

¹³ The Herfindahl-Herschman Index (HHI) is calculated by squaring the percentage market shares of each firm in the market and summing them. The higher the HHI, the more concentrated the market.

¹⁴ Appendix 5.5 to Competition Commission's report on Centrica/Dynegy merger, “Lexecon's analysis of Centrica's incentives”

- 4.54 The effect on prices of an individual producer withholding supplies will depend on the response of other gas producers as well as demand elasticity. If other producers were able and willing to increase supplies to the market at the prevailing market price, then there would be no increase in prices. Hence, for prices to rise, the (short run) marginal cost of replacement supplies must be greater than the market price, so that prices have to rise to induce other producers to increase their output.
- 4.55 If the total volume of gas that other firms are able to supply to the market is less than demand, then the gas producer in question can act as a monopolist over the remaining part of demand. The likelihood that a producer would have the ability to exercise market power is therefore likely to be greater in periods where there is a demand/supply constraint.

Potential for market distortions in forward market

- 4.56 Theoretically, the forward market could be distorted in at least two ways:
- (a) by firms influencing expectations about future spot prices e.g. by announcing a future restriction to supply;
 - (b) by firms restricting the supply of forward contracts so that they trade at an unjustified premium to the expected spot price.
- 4.57 The discussion in this section focuses on the second of these theoretical possibilities.
- 4.58 For forward prices to persist trading at an unjustified premium to expected spot prices, three conditions must be met:
- (a) Upstream gas companies must individually or collectively decide to offer fewer forward contracts;
 - (b) There must be an absence of trading companies or financial institutions willing to arbitrage between the forward and spot price;
 - (c) Lack of information or other constraints must prevent buyers responsible for a significant proportion of purchases from switching to spot gas purchases.
- 4.59 Further research would be needed to substantiate whether or not the market is operating in this way.

Upstream producers selling less forward

- 4.60 There is a perception among some industrial consumers that gas producers have stopped selling their output forward. Explanations that have been put forward for this behaviour include production risks associated with ageing fields and infrastructure, the stock market expectations of oil and gas companies, the transfer pricing rules applicable

for tax purposes and the impact of accounting standards on the reporting of derivatives (IAS 39).

- 4.61 Europe Economics has additionally considered whether market manipulation might plausibly provide a reason for gas producers choosing to sell less output forward (if this is the case). Clearly, such behaviour would only be in the interests of gas producers if they were to benefit in some way from a higher forward price.

Lack of arbitrage

- 4.62 The effect of the absence of speculative traders willing to arbitrage between the forward and spot markets was noted in the recent report commissioned from UKOOA by ILEX:¹⁵

One factor noted by ILEX in its discussions with market participants is that the absence of a major non-physical trader in the market-place may have contributed to the steady increase in gas prices. It is argued that if the likes of Enron or Dynegy were still present in the UK gas market then they would be more likely to take a speculative position, in particular with respect to the winter months and quarters. With a very high price for January 2005, for instance, a non-physical speculative trader may take a short position, selling January 2005 gas at a high price now with the expectation that they would be able to cover their position at a later date at a cheaper price. The effect of a major trader selling short in a peak month would exert a downward influence on prices.

... This lack of players talking the market down has resulted in the 'physical' players in the market, looking to cover their positions, exerting an upwards only influence on prices.

- 4.63 Nonetheless, if forward prices for this winter are significantly higher than likely spot prices, why have not other players (e.g. financial institutions) taken advantage of the arbitrage opportunity on a sufficient scale to close the price gap? One possibility is that there might be a time lag associated with new entry (e.g. as potential entrants build up their knowledge of the gas market). However, potential entrants might also be deterred if they perceived the spot market itself to be open to price manipulation.

Buyer behaviour

- 4.64 If forward prices are disproportionately high relative to spot prices, it would appear logical for customers to switch to purchasing spot gas. If this happened on a sufficient scale, forward prices would fall to levels reflecting economic fundamentals.
- 4.65 There is some evidence from the CIA survey and from Europe Economics' interviews with large industrial consumers that some companies are indeed adopting this strategy.

¹⁵ ILEX (2004), "Gas prices in the UK", October

- 4.66 However, it is plausible that lack of information about what is happening in the gas market and the purchasing options that are available may prevent smaller industrial and commercial customers from switching to the spot market in this way. Imperfect information is a well-recognised type of market failure.
- 4.67 There may also be transaction costs and knowledge acquisition associated with purchasing nearer the time (e.g. the cost of personnel and access to data to track day-to-day movements in the gas market) which might also deter smaller consumers from responding in this way.
- 4.68 Some buyers may place a high value on the certainty provided by forward contracts, which may facilitate business planning and reduce exposure to risk. There is likely to be a reduction in economic efficiency if market distortions mean that such firms cannot purchase forward cover at a cost-reflective price.

5 RECOMMENDATIONS

- 5.1 The analysis presented in this report suggests that there are some significant issues which need to be addressed in relation to the workings of the gas market.

More Investigation is Required

- 5.2 The evidence suggests that the behaviour of forward prices for the coming winter cannot be easily explained with reference to market fundamentals. Given the impact of these prices on customers locking into energy supply contracts, this is an area where further investigation is vital.
- 5.3 Such investigation might seek to gather evidence on whether there has been a change in the willingness of upstream gas producers to sell forward, as has been suggested by a number of buyers. If so, the reasons behind these decisions should be examined carefully, given that selling forward would appear to have been a profitable strategy (given likely spot prices), particularly at the time when forward prices peaked during early October. If the reluctance to sell forward reflects market distortions, then remedial action should be considered.
- 5.4 There are also unanswered questions in relation to the spot gas market, which also deserve attention. In particular:
- (a) checks should be made on whether the field outages seen during summer 2004 were justified and completed in an appropriate timescale;
 - (b) it may be appropriate to examine upstream production to verify that year-on-year declines in beach flows are caused by a genuine acceleration in UKCS decline (as is claimed).
- 5.5 Ofgem should be encouraged to speed its enquiries in those areas where it is still pursuing its investigation, notably the nature and impact of contractual arrangements which appear to have prevented gas supplies from reaching the market and the behaviour of European gas supplies during October and November 2003.
- 5.6 The collection and review of information on the contractual relationships between major players in the gas market is likely to be valuable. For example, this information would enable identification of the companies who have gained most from recent rises in prices, and would establish the extent to which sales into the wholesale gas market are controlled by the largest producers.
- 5.7 If necessary to obtain the required information, consideration might be given to opening a formal investigation under competition law, thus enabling the relevant authorities to use statutory powers to gather data from market participants.

- 5.8 The FSA should be pressed to provide further details of the enquiries it carried out and how it reached its conclusions. It is important to be sure that there are no areas of concern which have not been addressed by either Ofgem or the FSA.

Reforms to Policy and Regulation

- 5.9 Alongside the above, consideration should be given to whether there are any other actions which the government and/or Ofgem might take to improve the workings of the gas market. Areas that might be examined include:

- (a) *The transparency of the upstream gas sector.* While progress so far on this issue is to be welcomed, further increases in transparency are likely to be beneficial. For example, the mandatory release of real-time information on unplanned field outages would reduce the scope for market manipulation and ensure that all participants in the gas market were competing on an equal basis.
- (b) *The capacity of the interconnector.* The fact that the import capacity of the interconnector is less than export capacity is now working to the disadvantage of UK consumers, because UK gas prices have remained linked to continental prices in the summer but are rising above continental prices in the winter. The interconnector is in the process of being upgraded, with the first phase of the upgrade due to be effective from December 2005 and a second phase due to be effective from December 2006. Political pressure might be brought to bear to ensure that the upgrade to the interconnector's import capacity proceeds on time.
- (c) *The ability of customers to choose between buying gas forward or spot.* The government's support for small businesses might include advice on energy procurement strategies, and it may be appropriate to review whether there are any restrictions which prevent public sector customers altering the way in which they purchase their energy requirements.
- (d) *Taxation and accounting issues.* As stated in paragraph 4.60, it has been suggested that the transfer pricing rules applicable for tax purposes and accounting standards on the reporting of derivatives (IAS 39) might be deterring upstream producers from selling forward. It might be appropriate to examine whether this is the case and consider whether or not any reforms should be made in these areas.

APPENDIX 1: DELIVERED ENERGY PRICES FOR EXTRA LARGE INDUSTRIAL CONSUMERS

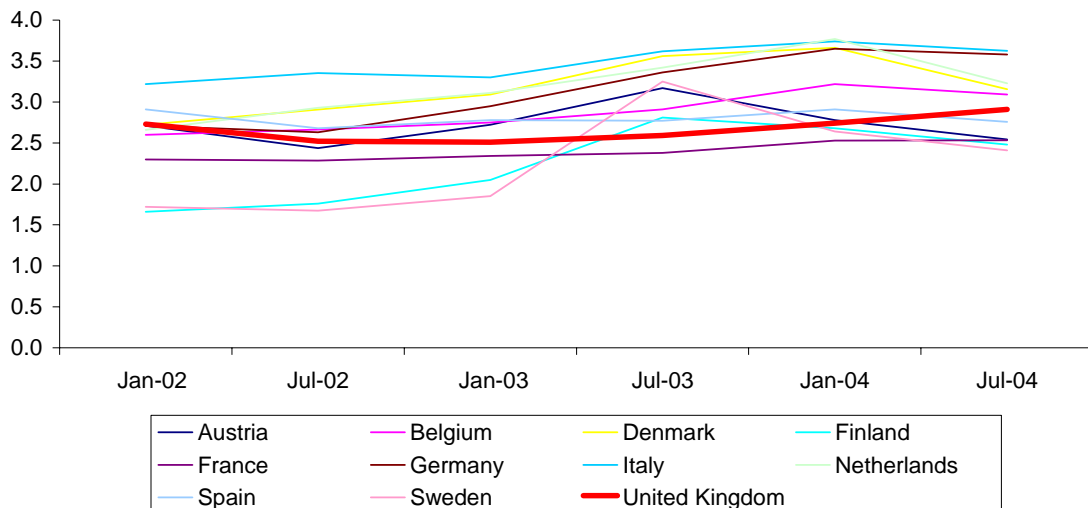
Delivered energy prices include network and supply costs in addition to the wholesale cost of the energy itself. However, for very large industrial consumers, the wholesale element tends to account for the dominant proportion of the delivered energy price.

The DTI publishes a comparison of delivered prices across the EU for “extra large” industrial electricity consumers, defined as those consuming 420 GWh per year with a maximum demand of 50 MW. However, no figures are provided for “extra large” industrial gas consumers. While the DTI publishes figures for “large” industrial consumers, these are defined as those that consume 116.3 GWh per annum.

The figures published for “extra large” industrial electricity consumers are shown in Chart A1.2. It should be noted that these figures only go up to July 2004 and therefore will not reflect wholesale price increases since this date.

The data show that delivered electricity prices to “extra large” industrial consumers are rising in the UK, whereas prices have recently fallen in most of the other countries. The consequence is that delivered prices to these consumers in the UK are now higher than prices in France, Spain, Sweden, Austria and Finland, and may rise above those prevailing in other EU countries if current trends continue.

Chart A1.2: Industrial Electricity Prices in the EU for Extra Large Consumers (p/kWh, excluding taxes)



Source: DTI

APPENDIX 2: REPORTED PRICE INCREASES

Table A2.1: Recent Price Increases Reported by Sample of Steel Companies

Company	Gas	Electricity	Comments
A	+30%	+45%	Currently purchasing gas at the monthly index price. Electricity coming to the end of two year contract.
B	n/a	+40%	In process of renewing electricity contract after end of two year deal. Firm information on gas price rise still awaited – expect to be similar to electricity.
C	n/a	+40% +38% +45% +35%	Quotes for contract renewal at four sites.
D	+42%	n/a	Concluded a twelve month deal with gas supplier starting Oct 04 at 1.634p/kWh. Electricity contract for same start date not yet negotiated, but expecting a similarly steep increase.
E	+23%	+55%	Electricity price increase at end of 2006.
F	+30%	+46%	Just coming out of a two year contract that was signed up around May 2002 – new contract signed up at end of July.
G	+41%	+49%	Contract expires Oct 04 – currently paying 22p/therm – best quote so far is 31p/therm. Contract expires Oct 05 – currently paying £24/MWh – existing supplier quoting £35.7/MWh for one year extension.
H	+30-35%	+30-35%	Expected increases - energy contracts yet to be renewed.
I	+35%	+36%	Negotiating October gas contracts – quotes keep being pulled as "world events" occur. New electricity contract negotiated in June to begin October.
J	+ 27%	+26%	Contract ended March 04 – £8/MWh increase for 2005/6. Natural gas prices locked in monthly, so seasonal – Aug 04 prices 25.33p/therm (20.37p/therm in Aug'03) – Jan 05 prices around 45p/therm (35p/therm in Jan 04).

Table A2.2: Price Increases Reported by Sample of Glass Companies

Company	Gas		Electricity	
	2003 to 04	2004 to 05	2003 to 04	2004 to 05
A	+28%		+29%	
B		+30 to +40%	+7%	
C		+28%		+35%
D		+30 to +40%		+27%
E	Spot +11% Contract +28%		+6 to +10%	
F		+40%		+29%
G		+38%		+51%