

EUROGAS STUDY ON OIL – GAS PRICE LINKAGE IN THE EUROPEAN UNION

(THIS PAPER WAS PREPARED BY THE EUROGAS ECONOMIC STUDY TASK FORCE)

SUMMARY AND CONCLUSIONS

The rise in world oil prices during 1999 and the sustained high level of oil product prices during 2000 and in to 2001 has resulted in significant increases in most gas prices throughout the EU. This has led to concern that the contractual linkage of wholesale gas prices to oil product prices negates somehow the expected price benefits of gas market liberalisation.

This note sets out the gas price linkages that occur for the biggest stake of supplies to EU countries and markets and presents data on oil and gas price levels in markets with high level of liberalisation such as the UK and USA.

It is clear that because of the contractual and physical market links, continental gas prices have tracked oil prices, but there are lags and damping effects that reduce volatility.

As energy markets liberalise, the main economic drivers affecting the gas price remain the competitive forces and the supply/demand position. Some correlation with other fuel prices (e.g. coal, oil products, etc.) is still likely to occur if there is some potential for end users to switch between fuels. That is particularly true over a long period.

In a fully liberalised gas market spot gas price might substantially de-couple from the oil price.

Oil- indexation in an individual long-term contract does not inhibit competition. Price conditions reached in the contracts result in different indexation formulas based on competing offers. Price clauses provide a risk sharing mechanism between buyer and producer. If oil price-indexation, spot gas pricing or any other pricing mechanism is believed by independent counter-parties to provide competitive pricing based on market value, it should be left to the market participants to conclude what type of contract they wish.

More contracts that are linked, at least in part, to the price of gas at trading hubs on the Continent are expected to emerge, but for the time being oil-price indexation facilitates the development of remote gas sources providing security of supply for the European market.

HISTORICAL BACKGROUND

Currently, most EU gas is brought to market under long-term Take-or-pay contracts. This contract form has continued through 1970s, 80s and 90s as the natural gas market was established and developed in an increasing number of Member States.

The gas trading companies, who were also usually a national or major pipeline company, needed to find some fair and economic means to set the contractual prices of gas, particularly the purchase price paid to producers for the lifetime of the delivery.

The gas companies also needed to ensure that their gas costs (based on the contractual prices) remained competitive when judged against competing fuels, particularly the oil products 'fuel oil' and 'gas oil' used in the industrial and commercial markets. Natural gas needed to remain

competitive with the costs of competing fuels if it were to break in to these new markets and then retain market share. The integrated oil and gas producers had a similar concern to link their gas sales prices to oil products in order to motivate economic gas versus oil production and also to finance production and long distance gas transmission systems for remote sources (Russia, Algeria, Norway, Nigeria...). Although oil escalation did not guarantee the revenues for the producers, an alternative of gas price indexation was not available at that time and the oil price risk was well understood.

Indexing gas prices to oil product prices have proved a sensible risk-sharing approach and many think this will meet this objective in future contracts as well. Long-term Take-or-Pay contracts with integrated gas price indexation to oil are still the main source of EU gas supplies. Price review negotiations held at regular intervals ensure that the gas price is adjusted to current market conditions.

Recent developments have seen the integration and of spot-price trading into this long-term price mechanism.

CONTRACT STRUCTURES

There are several different forms of long term take-or-pay gas contract currently in force in the EU. The main continental take-or-pay gas contract structure for pipeline gas is a buyer's nomination take-or-pay supply contract indexed to gas oil and fuel oil prices. This involves a defined time-scale of, say, 10 or 20 years for the delivery and payment of certain volumes of gas.

The take-or-pay mechanism provides certainty to the seller (the upstream producer or exporter) that they will receive payment for a minimum quantity of gas whether or not the buyer takes this gas in each year. That gives the banks some security when financing capital intensive projects for instance for long distance transmission. The take-or-pay mechanism also provides some flexibility to the buyer to nominate somewhat more than the annual quantity in one year and reduce their minimum bill in the following year, or alternatively to take less than the minimum bill quantity and to recover this gas in a later year.

The gas price in such contracts is re-calculated every 1 to 3 months based on a formula to adjust the Basic Price (i.e. a market oriented equilibrium between gas and its competitors at a given time) in line with the development of prices of these competing fuels. The most frequently used core structure of such a price formula is

$$\begin{aligned} \text{Actual Gas Price} = & \text{Base Price of Gas} \\ & \pm \text{development of gasoil prices to a given extent} \\ & \pm \text{development of fuel oil prices to a given extent} \end{aligned}$$

The negotiations on the elements of such a price formula result in differences in border prices.

The contracts will also specify the conditions under which the parameters of the formula can be renegotiated. For example, either party might be able to request a review of the contract price at intervals of three years. In most cases the review will focus on the changes in economic circumstances in the gas market since the last review.

Because of the price review mechanism for a product may cause lengthy negotiations between contract partners, an arbitration clause puts a formal end to any debate on prices after one side has triggered a price renegotiation under the review clause.

Although an increasing number of continental gas purchase contracts include a small amount of indexation to other fuels or indices (e.g. coal, inflation etc...), the 'wholesale' price of the majority of gas is strongly linked to average north west Europe oil product prices during part of the preceding year. Continental gas suppliers' gas costs are therefore linked to the world oil price, but the effect is both lagged and damped.

END-USER PRICE LINKAGES

What gas companies under this mechanism of price recalculation and price renegotiation have obtained on their purchase side as gas purchase costs is what they believed they needed to be competitive on their sales side : they were able to attract new customers with competitive prices and were not forced to discriminate between existing and new customers. For companies using this mechanism, which is commonly known as "oil price linkage" this is still regarded as an effective short term pricing instrument. Other companies operating where there is a developed spot market are able to choose to link prices to long or short-term take-or-pay contracts to spot prices. Price risk can be managed using tools available in the liquid gas market. Some companies consider this avoids the need for price review clauses as the price is always linked to the spot gas price.

Gas prices with oil linkage mechanism are influenced by the different switching possibilities of categories of customers along different time scales:

- customers able to switch only in the long run, mostly in the residential/commercial sectors.
- customers able to switch on a day-by-day basis, like industries and dual/multi-fired power plants.

The latter category of customer gives an immediate marginal pricing signal to the market, that is confirmed and made more robust by the possibility to switch in the long run by the other category.

If customer choice is increasingly a choice between different gas suppliers rather than different fuels, then the marginal cost of competing gas supplies becomes more significant than the cost of other fuels in establishing the gas price.

Price trends in different markets

In many markets there is some linkage between gas prices and the prices of competing fuels. Oil product and gas price linkages in different countries vary between different markets and between different stages of liberalisation.

Experience of the US market (see appendix 1) :

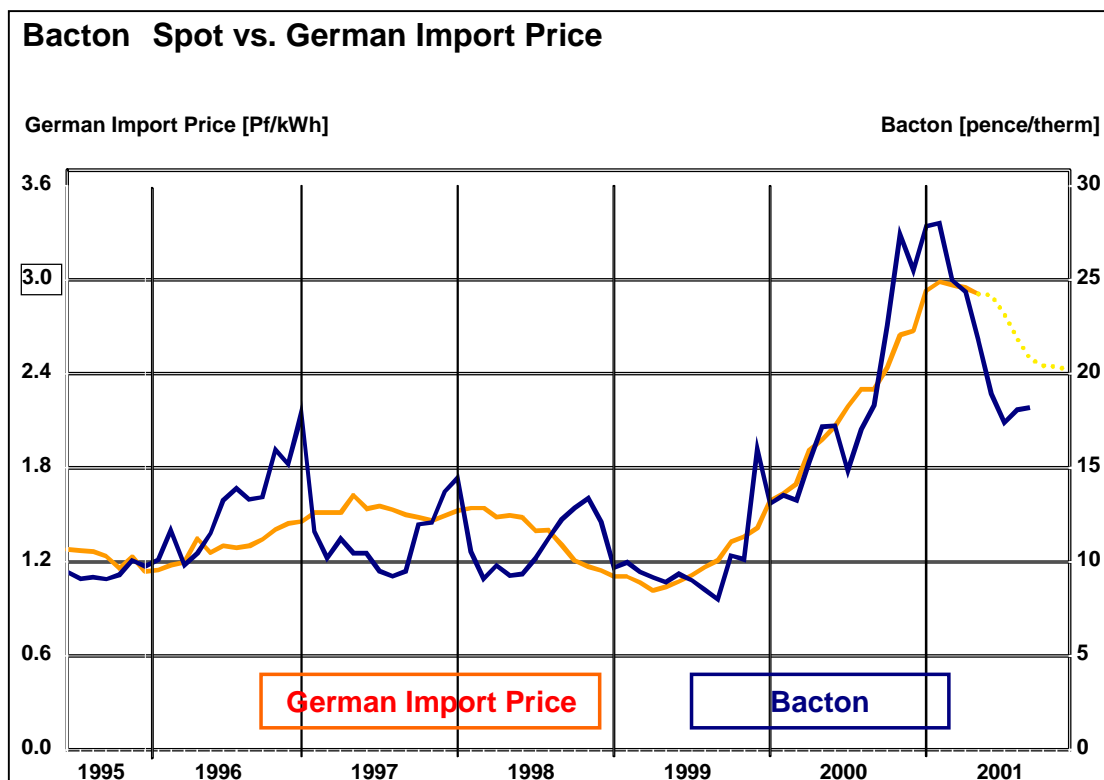
Competitive supply to end-users is still developing and there is a vast amount of potential fuel switching (e.g. power plant on the east coast) so there is frequently some market linkage between oil product prices and the Henry Hub gas price even though there is no general contractual linkage. Now that gas supply is tighter and that fuel switching is reduced for booming electricity demand and environmental limitations, prices are no longer well below European oil-indexed gas prices.

The experience in the liberalised UK gas market is reviewed in appendix 2 :

Wholesale prices fell in the mid-nineties as the result of gas-to-gas competition introduced at a time of potential oversupply and during a period of relatively stable oil prices.: After an increase in 1996 as the result, in particular, of the network code and the value of storage being recognised by the market, and coincidentally following rising oil prices, the yearly average gas price decreased between 1996 to 1998. Since mid 2000 gas prices have risen, not because of fuel switching in the UK (few industrials or power plants able to switch on the short term from oil to gas) but because the Gas Interconnector has linked the UK gas market with the continental wholesale gas price which is dominated by the contractual linkage with oil. Nevertheless that coincidental increase follows the sharp and continuous rising of world oil prices from 1999.

Interestingly the seasonal price volatility that became a feature of the UK spot (monthly) price did not necessarily flow through to end consumers. For example in the highly competitive Industrial and Commercial gas markets, the customers have tended to require their prices to be fixed for a year at a time. All the same, with the increase of prices the trend is to a certain extent to variable prices indexed on monthly gas indicators.

A direct comparison of spot gas prices in the UK and import prices in Germany (see graph below) illustrate the period of cost reflective gas spot prices in the UK from 1996-1998. After the UK-Continental Interconnector was opened in October 1998, the trend of both gas price curves was again determined by oil price developments – either directly though oil price indexation in the supply contracts for Germany (representing continental Europe) or indirectly for the spot prices as a result of the liberalised UK gas markets and contractual oil linkage on the continent.



The Bacton price represented in the chart is the BoM (= balance of month) as monthly average

However, it is evident that in the long run spot gas prices will be affected by oil price developments, in particular major changes in the oil price level. Both in the US and in the UK the spot gas prices have followed to some extent the significant, lasting increase in oil prices since the beginning of 2000 but for different reasons.

The Future

Only recently has gas-to-gas competition and a traded gas market started to enable the price to be set as a commodity value of gas in the UK and now in Belgium and soon on the boarder of Germany and The Netherlands, other trading hubs may follow.

It is clear that continental gas pricing based on oil-indexation has been influencing to a certain extent the price of gas in the fully competitive UK market.

With a fully open gas market on the continent then at times when there is a buyers' market the price of gas will fall. In a seller's market they will rise. Those companies with higher prices would lose market share and/or sell for a short while below cost. Further re-negotiation of long-term contracts to change prices or the oil linkage might be possible, once markets change.

What are the effects of market liberalisation on the Continent – what is already happening now, and what can be expected in the future?

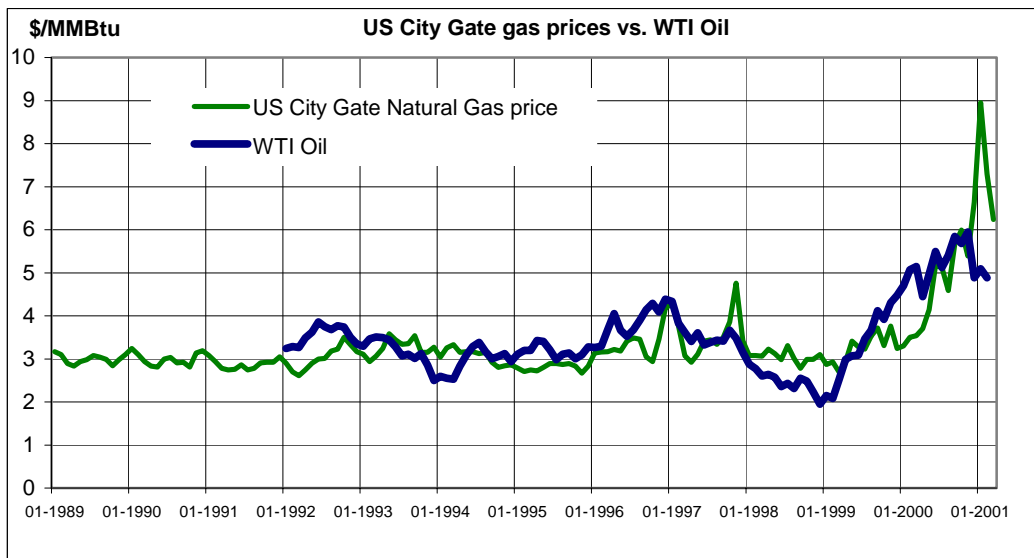
- Cedigaz has reported 1998 & 1999 renegotiation of several sales contracts to major buyers to include competing gas prices in the price review,
- Zeebrugge/Huberator now providing some price transparency, with Dow Jones now publishing a daily Zeebrugge gas index,
- New trading hubs are starting to develop, with increasing liquidity and bringing more players,
- Increasingly short-term trades, but evidence that trading on the continent remains influenced by the prices in the long-term contracts as a reference and also in part by possible switching from gas to oil in some large industry.

Appendix 1

The interaction of oil and gas prices in the US

The US gas market is more complex than in the UK as the liberalisation process is at different stages in different States.

There is however a well traded gas market, with prices often quoted as differentials to the Henry Hub. If the average city gate prices are compared with the oil price then it is clear that there is some correlation, but the volatility in one market is not necessarily reflected in the other.

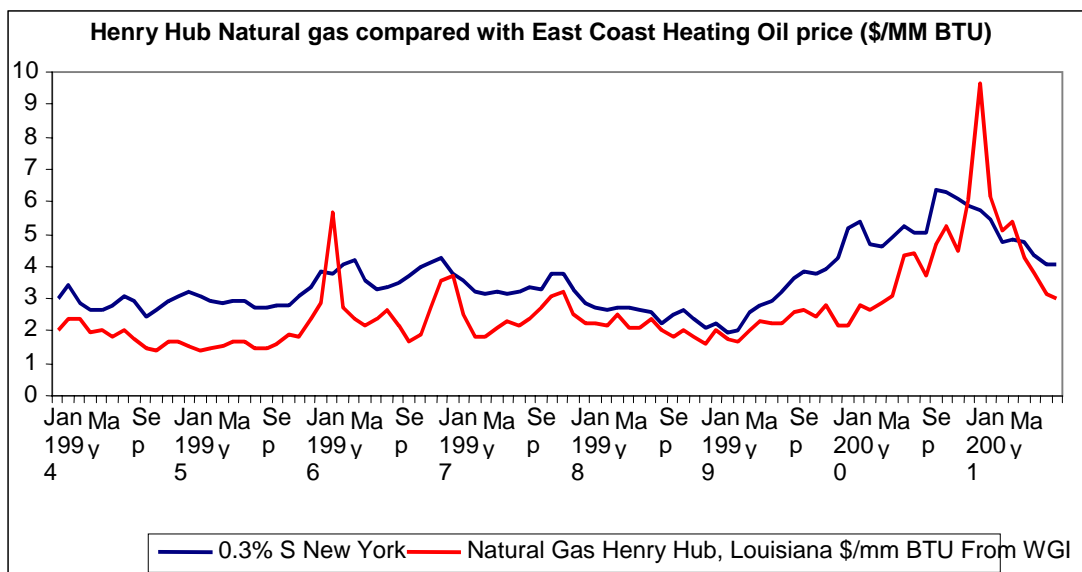


Comparisons can also be made between Henry Hub gas prices and oil product prices, with a certain degree of correlation.

EXPLANATION REGARDING THE DISTINCT PEAK IN NATURAL GAS PRICES
EXPERIENCED IN THE U.S. IN DECEMBER 2000

The U.S. Department of Energy has explained the sudden rise in U.S. natural gas prices experienced at the end of December 2000. They attributed the peak to a culmination of factors, including a record demand for natural gas of 22.7 trillion cubic feet (Tcf) during 2000. This extreme demand meant that less natural gas than usual was in store at the onset of winter. The year 2000 also experienced an increase in the indigenous production of natural gas, but this was somewhat less than the extreme rise in consumption, resulting in upward pressure on short-term prices. Besides high demand, severely cold temperatures resulted in some instances of capacity constraints and bottleneck problems at points in the system. The strong economy and high oil prices were also considered to have contributed to the distinct peak in US gas prices.

The data shows that this increase was short-lived and by the week commencing February 19, 2001, the Henry Hub natural gas prices had fallen sharply to below \$6/MMbtu. Since then US spot gas prices have continued to fall.



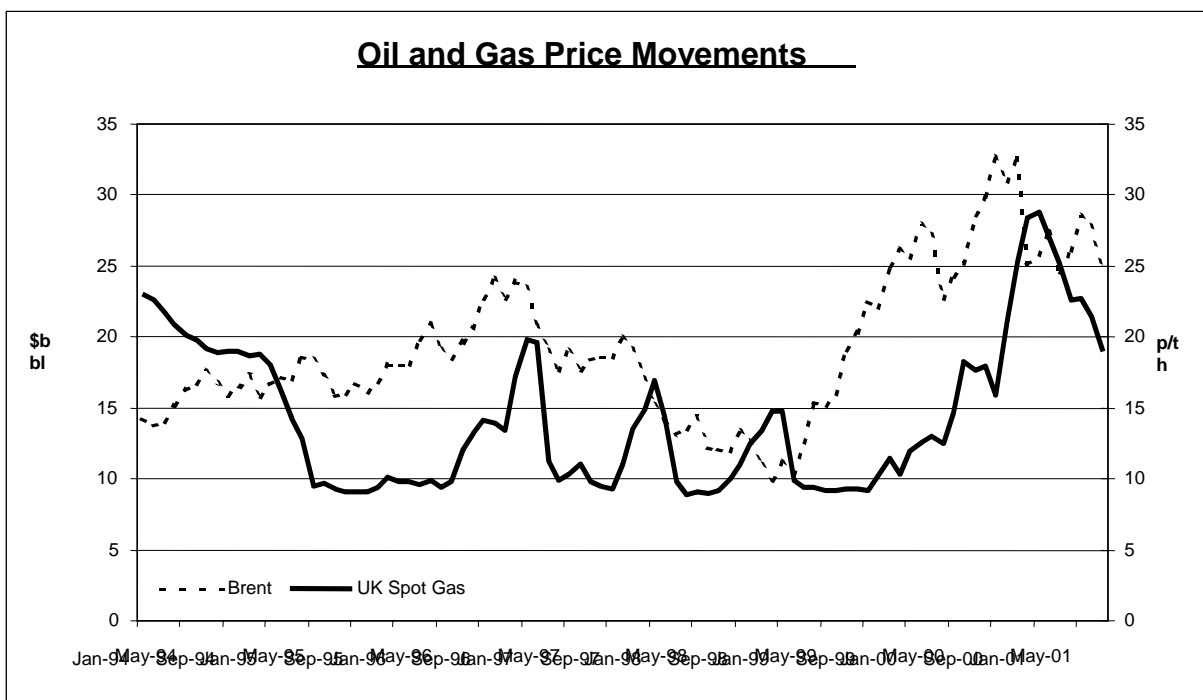
Appendix 2

The interaction of oil and gas prices in the UK

This part examines the relationship between oil prices and gas prices in the UK market during the development of full competition and the subsequent linkage with the Continental gas markets via the Bacton-Zeebrugge Interconnector.

The following graph show the monthly average dated Brent oil price compared with the UK prompt month gas price over the period January 1994 to December 2000. From the analysis of price movements it is evident that:

1. Gas to gas competition coincided with some de-coupling of gas prices from oil prices, with a fall in UK gas prices at a time when oil prices were relatively stable. The yearly average gas price rose in 1996, in particular due to the introduction of daily balancing and network code, and following after some delay rising oil prices.
2. From mid 1996 to the end of 1998 the price of gas in the competitive UK gas market followed the seasonal costs of gas supply. Coincidentally, the yearly average gas price decreased within a context of decreasing oil prices.]
3. Once the UK-Continental Interconnector, promoted initially in order to deliver UK gas on the Continent, was open, the UK gas market was effectively linked with a market in which gas was indexed to oil product prices. The price difference leads continental operators to buy gas from the UK and commonly on the basis of one year deliveries or at least with contracts lasting several months in order to secure benefits. As the result, the demand on UK producers increased and this currently results in far higher prices in the UK than would have occurred if the UK had continued to operate as an isolated commodity market.



The onset of gas to gas competition

During the early 1990s the competitive gas market emerged rapidly in the large industrial and commercial market and the new gas-fired power market. Long-term gas purchase contracts that had been linked at least in part to the price of oil products (Gas oil and Heavy Fuel Oil) were on average priced at approximately 20 p/th. New long-term contracts and short-term purchases at the beginning of 1994 were also around this price.

From the beginning of 1994 to the end of 1995 the spot oil price rose from under \$15/bbl to nearly \$25/bbl, the yearly average increasing from \$16/bbl in 1994 to \$21/bbl in 1996 (\$17/bbl in 1993). The UK spot price fell below 10p/th, towards the marginal cost of production, in the summer of 1995, before picking up during autumn 1996 with the introduction of daily balancing so following coincidentally an increase of oil prices. Conditions had been made favourable at that time for new entrants such that they were only subject to monthly balancing requirements. The costs of balancing over shorter periods were effectively borne by the integrated pipeline-supply company until the network code was put in place during 1996.

The established competitive gas market

In the winter of 1996/97 gas prices continued its rise reflecting the tighter supply-demand balance and the additional costs of storage. The gas price over the following two years fell back towards marginal spring/summer production costs, as would be expected in a commodity market. The pattern of higher winter prices reflecting the additional storage or seasonal supply costs was repeated in the following two winters. Winter storage costs fell as the regulator placed a greater reliance on market-based mechanisms.

During this period oil prices drifted downwards but the pattern bore little relationship to the changes in prices in the competitive UK gas market. Nevertheless the yearly average gas price decreased during this period.

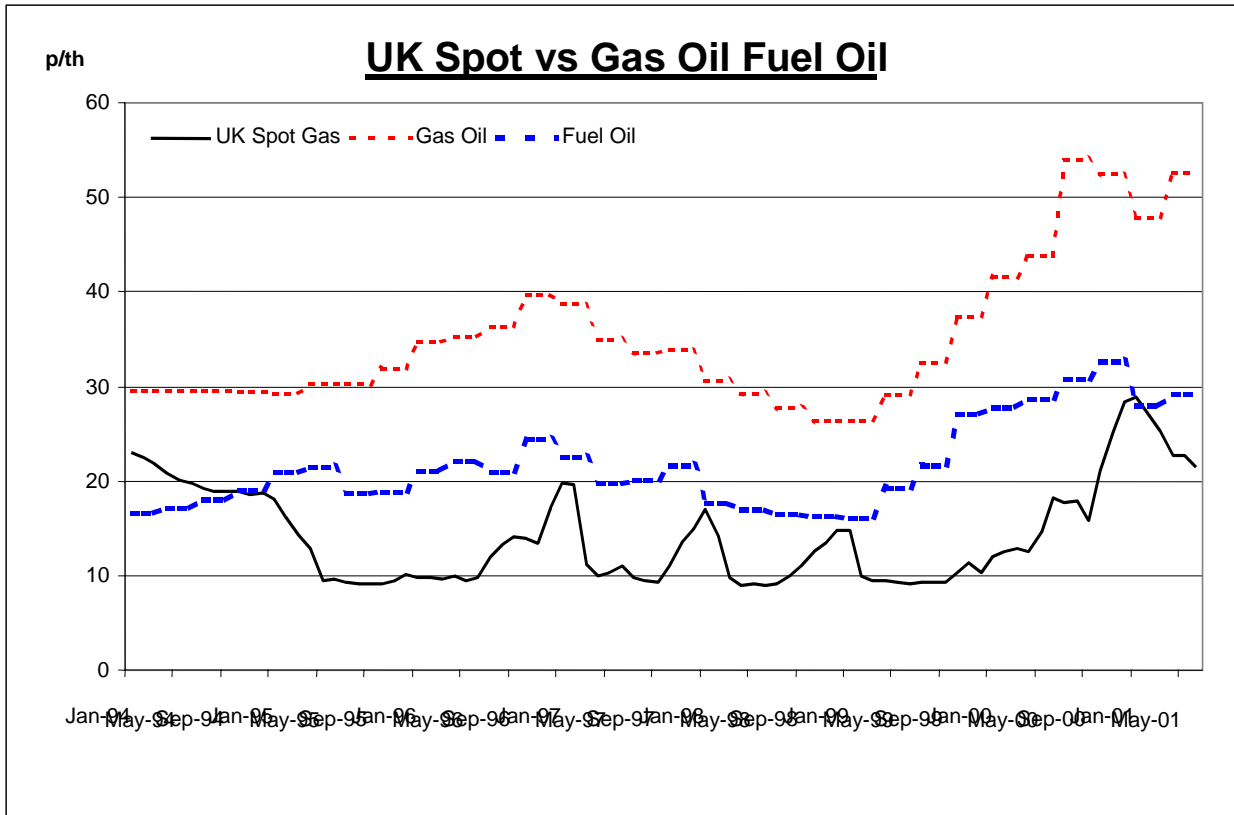
The UK-Continental linkage

The UK-Continental gas Interconnector opened in October 1998 at a time when Continental long term contract prices and UK spot gas prices were similar. One of the reasons that the UK gas price did not rise in the 1998/9 winter by as much as in the two previous years is that gas flowed in from the continent thus increasing supply availability in the UK.

During 1999 oil prices rose from under \$10/bbl to over \$25/bbl, while UK gas prices stayed low. But by Q2 2000 the high oil prices had worked their way through to the long-term continental gas purchase contracts resulting in a much higher price than gas was trading in the UK. From the beginning of April 2000 large outflows of gas were committed to the higher value Continental markets that were driven by the high oil prices. This coincided with an abnormally cold month and higher than anticipated system entry costs such that the UK gas price rose rapidly towards Continental price levels.

UK gas prices have stayed fairly high during the 2000/01 winter in line with a tighter UK supply position and the continuing influence of high continental oil and gas price.

The same trends are seen when the UK spot (prompt month) gas price is plotted against oil product prices (gas oil and fuel oil) on a thermal equivalent basis.



Summary

1994-1995- steady oil prices but a collapse in the gas price in the competitive market

end 1995-1996 – rising oil prices and gas prices staying low until daily balancing was introduced and the value of storage realised at the end of 1996

1997-1998 - falling energy prices but gas price being essentially determined by seasonal variations in supply and demand with a slowly decreasing trend

1999-2001 - established trade through the UK-Continental Interconnector led to a sudden increase in UK gas prices in Q1 2000 not as a result of fuel switching in the UK but because of the high energy prices on the continent (more oil and gas substitution possibilities than in UK) and of the oil price linkage in continental gas contracts.

