



Chapter Four

Future Developments

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4. Future Developments

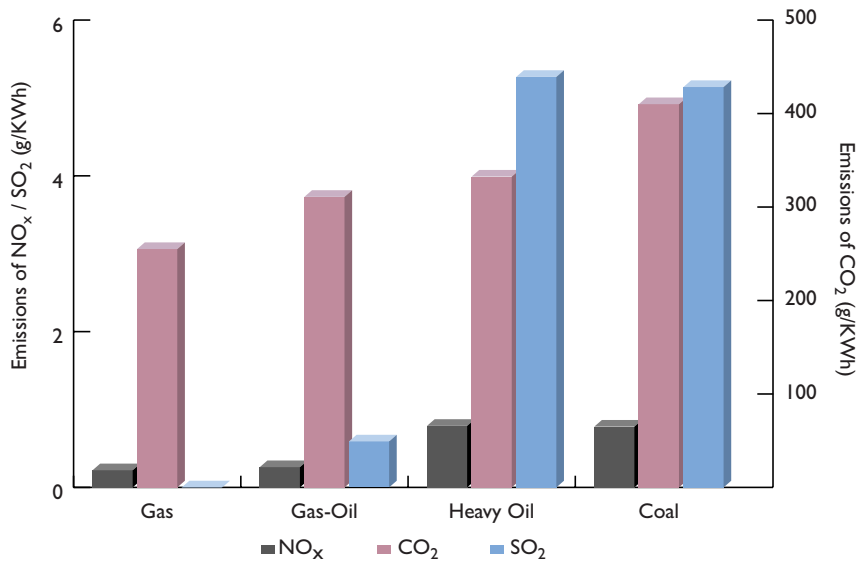
4.1 Introduction

Many factors influence the development of energy markets, including the interaction between different fuels in terms of price and their environmental impact. This Chapter considers the future development of the UK gas industry in the light of these effects.

4.2 The Environment

As the “greenest” fossil fuel, gas emits 40% less carbon dioxide (CO₂) than coal when it is burnt. In addition combined cycle gas turbines (CCGT’s) are up to 20% more efficient than traditional steam turbines. Combined Heat and Power (CHP) units can have overall efficiencies of up to 80%. Emissions of nitrogen oxides and sulphur dioxide (NO_x and SO₂) are also very low compared to coal or oil, as shown in Figure 4.2 below. The greater use of gas for power generation, especially in highly efficient, point-of-use CHP units, would assist the present Government in achieving the Kyoto target of reducing production of the six greenhouse gases by 12.5% of 1990 emission levels by 2010, and its manifesto pledge of a 20% cut in CO₂ emissions.

Figure 4.2 - Comparison Of Emissions From Fuels



In the long run, the drive towards sustainable and renewable sources of energy will ultimately mean that demand for fossil fuels reduces. However the gas industry, and in particular BG, can play a significant role in the drive towards sustainability through innovation within the gas market.

Given Government concerns about maintaining a mixture of fuels for power generation, one means of reducing emissions of particulates, NO_x and SO₂ from coal fired power stations is to use **gas reburn technology**. This involves injection of gas into a furnace after the main coal combustion zone to produce a fuel rich region where the NO_x is reduced to N₂. NO_x reductions between 50 and 60 per cent can be achieved when 20% of the coal is replaced by gas. This process is being used by Scottish Power at their Longannet site, through a European partnership that includes BG.

Another area where the substitution of gas for another fuel could result in lower emissions of carbon, NO_x and SO₂ is in the use of **compressed natural gas (CNG) for road vehicles**. The limited infrastructure currently in place makes this impractical for most domestic users (although the technology for “home-fill” is available). However a number of fleet managers are switching to CNG and installing refuelling facilities. CNG is particularly attractive as an urban solution, in particular where hub-and-spoke operations (such as park-and-ride, and distribution fleets) are involved. There is significant opportunity for Industry and Government to work in partnership, to remove barriers to entry for CNG including market distortions arising from the subsidy of diesel (a heavy polluter) for buses and the lack of infrastructure.

4.3 The Convergence of Gas and Electricity Markets

Apart from encouraging technological innovation, the convergence of gas and electricity markets will have a significant impact on the Energy Market. There have been number of recent Government reviews considering these effects, including the Green Paper on Utility Regulation, and the imminent appointment of a common regulator for gas and electricity, and the Review of Energy Sources for Power Generation, which considered the mixture of fuel used for electricity generation and the interaction between the two markets.

Power stations and other large consumers have a number of different types of contract in place which may offer them the opportunities to act on market conditions and price differentials to generate additional revenue. The difference in balancing timescales between the gas and electricity markets could work to the advantage of power stations which are able to start up and shut down quickly. This is because they can generate during the electricity peak half hour, but still provide demand side management to the gas industry.

In some cases, sites may have a quantity of gas besides the minimum requirements they are obliged to take under a 'take or pay' contract. This additional gas could be traded within the flexibility mechanism or spot market particularly if prices are higher than the combined cost of the gas and the revenue which would have been received by the generating into the Pool. The main drivers for this decision are the day ahead Pool Purchase Prices and Gas Spot Prices although the exact prices which determine the point of arbitrage will vary for each power station depending on its own contractual obligations.

Alternatively, sites could decide to change their source fuel and switch to either coal or oil so as to continue generating but freeing the gas volume for trading. This action may be taken when there is a difference in the relative prices of the fuels and an opportunity to sell the gas at the higher price. However, the potential of this type of arbitrage is reduced as legislation regarding emission levels restricts the number of days when oil and coal can be burnt. The development of emissions trading may have an impact on the fuel mix as well, but this is in its infancy at the moment.

The opportunities for arbitrage could increase in the near future as changes are made to both the gas and electricity balancing regimes. Following consultation by Ofgas, the gas market is likely to be operating a within day commodity market by the spring of 1999. The electricity market is considering moving away from a centrally dispatched and scheduled mechanism to one that is bilaterally traded. The changes to the electricity regime are likely to include a forward market, a short term bilateral market and a balancing market similar to those currently available in the gas market. In Transco's view, it is important that incentives are in place in both the gas and electricity markets to ensure both short and long term security of supply.

To date there has been little evidence of arbitrage by firm loads, possibly due to a lack of operational flexibility in the older stations, most of which have interruptible transportation contracts and consequently would not be generating at times of high gas demand. Additionally the extremely mild weather which has been experienced recently has reduced the number of opportunities for arbitrage. However, this situation is changing as more players enter both the gas and electricity markets and realise the potential of arbitrage between energy markets.

As mentioned in Section 4.2, CHP is ideally positioned to take advantage of market convergence. CHP has environmental and efficiency benefits and is growing within the industrial and commercial sector. Through community heating schemes, CHP has the potential to be extended to the domestic market. Domestic CHP is a concept that has strong synergies with the changes that may flow from the Government's green paper on Utility Regulation published in March 1998. It is a visible example of the convergence of gas and electricity. It is energy efficient and environmentally friendly and can be used in social housing to reduce energy costs to the consumer. Domestic CHP is also an innovative product which could have application in packages with, for example, home automation and electricity metering.

4.4 The Interconnectors

Great Britain is connected to Eire and Northern Ireland by high pressure gas pipeline and by the end of 1998 will also be linked to Continental Europe. These Interconnectors will have a substantial impact on the UK market. In particular the commencement of gas flows through the Continental Interconnector in October 1998 will have an influence far greater than would be associated with the annual volume of 20 bcm that can physically be exported from the UK. Besides gas, the pipeline offers a medium for competition and changes to the established practices of European gas markets.

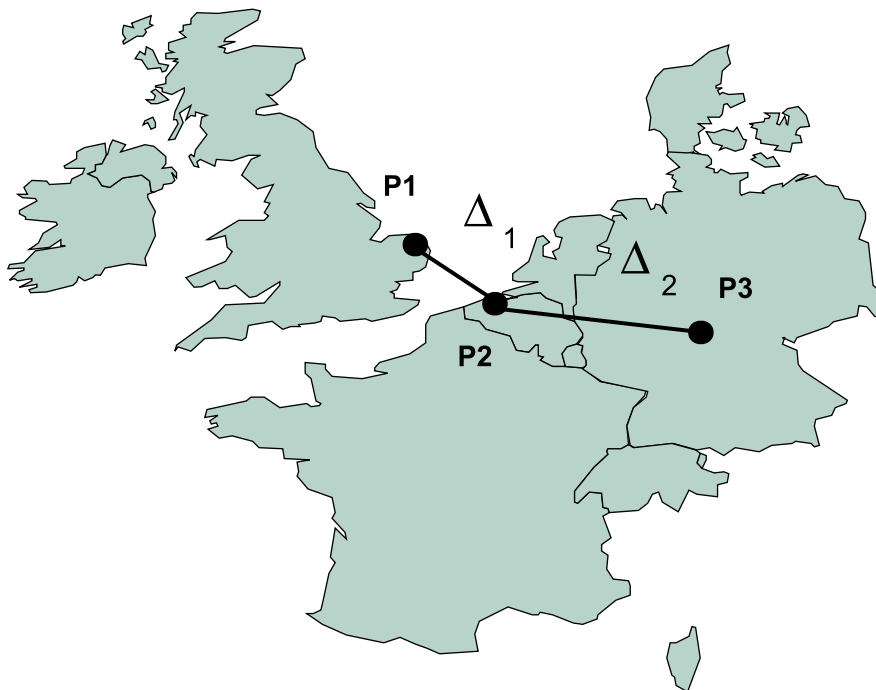
The European Interconnector will form a strategic link between the UK and the continental gas grids. The physical link will also add diversity of supply to both the UK and the continent and will act as a trading point between the UK and continental gas markets.

4.4.1 Impact Of Continental Interconnector On Gas Prices

The extent to which the availability of gas at the Interconnector will affect gas prices to end-consumers will depend on the removal of barriers to entry. This is illustrated below, where Δ_1 is the Interconnector transportation charge and results in prices at Zeebrugge (P2) being slightly higher than those in Great Britain (P1). Δ_2 is the difference between P2 and the price paid by a gas consumer in Continental Europe (P3). Δ_2 will depend on a range of factors across countries:

- market structure and level of state ownership
- price transparency and access to networks
- long term contracts
- system balancing requirements
- trading arrangements between large utilities in Europe

Figure 4.4.1 a - Schematic Of Gas Price Change Across Europe

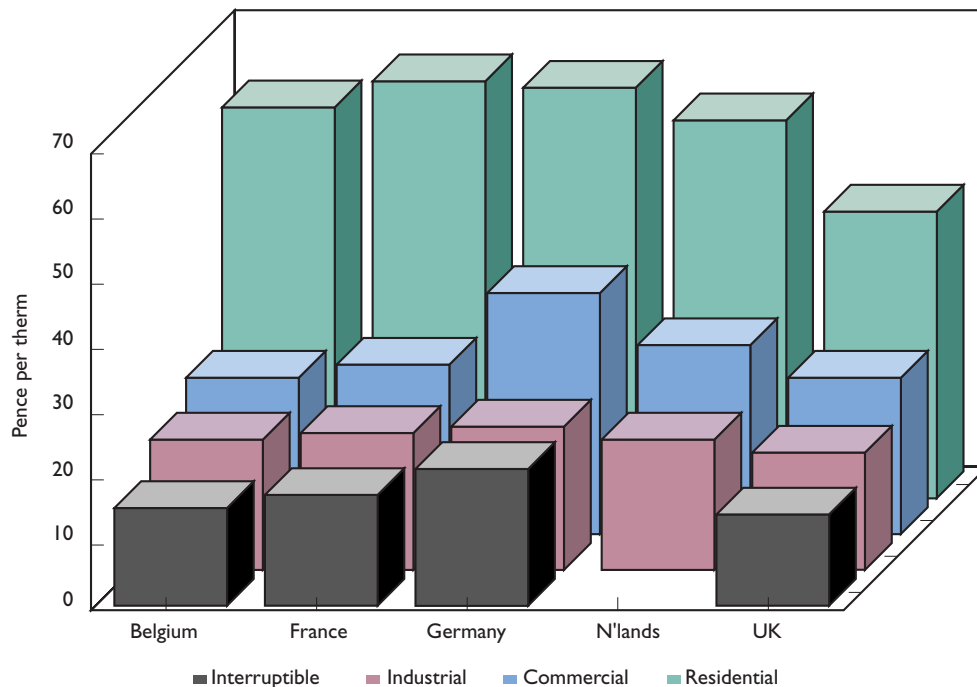


Although some short term contracts exist (particularly now for third party transportation) the gas markets of Western Europe (excluding the UK), are dominated by long term (20-25 year) supply contracts. These are generally between producers or exporters and transmission companies or integrated transmission and distribution utilities. These contracts often have take or pay conditions whereby the purchaser pays for a large portion of gas whether the gas is taken or not. Take or pay has been a feature of the natural gas industry in Europe (including the UK) since its inception, and was introduced to ensure recovery of the

development costs for the gas production and infrastructure. Besides take or pay, most continental gas contracts are indexed to competing fuels, usually oil, with provisions to adjust the price through re-negotiation clauses.

The effect of liberalisation in Britain has been to drive prices for gas consumers downwards. Even with the recent rise in the pound against all other major European currencies, British consumer prices are appreciably less than their continental counterparts in all market segments. This is summarised below with approximate gas costs for end users:

Figure 4.4.1b - Consumer Prices Across Europe



Such price differentials may be a source of competitive advantage for British industry. However the Interconnector will introduce some uncertainty as to whether prices will rise to meet those in continental Europe or those in Europe will fall.

Before assessing the influence of the Interconnector on British prices, the planning assumptions behind the operation of the Continental Interconnector need to be addressed. The Interconnector has an export capacity of 58 mcm/d and an import capacity of 26 mcm/d. For planning purposes, Transco currently assumes that the Interconnector will be exporting at peak, increasing from an initial 23 mcm/d in 1998/9 to about 46 mcm/d by 2001/2.

As the Interconnector can reverse operation from exports to imports in approximately one day, the potential additional gas to the UK could be as high as 84 mcm/d. This additional peak gas is equivalent to two Rough storage facilities or nearly 75% of all existing British storage. This could have a significant effect on the British gas market in terms of both physical delivery and price. As imports preceded by exports remaining in Britain would only be likely to occur if the price in Britain was sufficiently attractive, any reversals of this magnitude have to be considered in the short term as highly unlikely for numerous reasons:

- When high gas prices have been experienced in Britain they have been in the form of extreme spikes for relatively short duration (at the most one or two consecutive days), not a sustained period. Hence with one day for reversal from exports to imports the response time of the Interconnector may not be sufficient to react to sudden market conditions.
- When high gas prices have been experienced in Great Britain only relatively small volumes of gas have been affected.
- There is limited weather diversity between the UK and Northern Europe, therefore at times of high demand and consequently high prices in Britain, continental storage is likely to be operating to support local demand.

Though full reversal of the Continental Interconnector appears unlikely some reduction of exports when the gas price in Britain is high does present a likely scenario. This is further supported by some of the Interconnector export contracts agreed to date, some of which are believed to include “clawback” clauses. Though there is uncertainty regarding the specific detail of gas sales contracts to continental buyers most sales contracts could result in reduced exports which effectively results in additional peak gas to Britain, for example;

- contracts that are on interruptible basis, whereby the seller has options to retain the gas in Britain;
- contracts that offer shared flexibility and benefit between buyers and sellers, i.e. this gas would be available in the UK if the price was right with the benefits shared; or
- contracts directly to consumers. Although these contracts effectively transfer the trading opportunities to the continental buyer, with sufficient continental storage or alternative supplies the gas could be sold where the greatest opportunities arose. Again, if the price was right this could be Britain.

With the resultant availability of gas from reduced Interconnector exports, price volatility in Britain is expected to decrease. However this will depend on changes to the energy balancing regime and developments in storage services.

4.4.2 The Irish Interconnectors

The markets in both Eire and Northern Ireland are very small and immature, due to a lack of indigenous supplies and to the population diversity making the development of infrastructure expensive. Until 1995, the gas demand in Eire was met by indigenous production from Kinsale Head and Ballycotton. However, as these fields have depleted, imports from Great Britain have replaced them.

Transco largely relies on data from Bord Gais Eireann (BGE) and ESB, the electricity board, to forecast demand. However information from these sources is not always consistent. There is very little information available about future production from Kinsale Head or other gas fields which adds to the uncertainty.

At the moment there are no gas storage facilities in Ireland, although there has been speculation that Kinsale Head may be developed to provide peak supplies. This presents another area of risk and uncertainty for Transco and UK shippers.

4.5 Summary

- The environmental benefits of using gas make it an ideal for road vehicles and for power generation. The high efficiencies available from CHP make it particularly attractive.
- Innovation in new and sustainable technology is a key to the success of the gas industry in the future.
- Gas and electricity markets in Britain can no longer be considered in isolation.
- The European Interconnector will form a strategic link between Great Britain and the continental gas grids and in providing a physical link acts as a trading point between the British and continental gas markets.
- Markets in both Northern Ireland and Eire are growing rapidly, increasing the importance of reliable information for future developments.