PIU Energy Review

GAS – INITIAL SCOPING NOTE

Reference: Gas 1v1.0
Date: August 2001

1. PURPOSE OF THIS NOTE AND WAY FORWARD

1.1 The aim of this note is to set out the current position for the UK with relation to gas and to identify the main issues and questions that need to be addressed in the energy review.

1.2 This is one of a series of initial scoping notes that have been prepared by the PIU Energy Review Team on a series of topics. The team will not be producing scoping notes on every aspect of the Review. Some areas relevant to the Review have already been explored in depth by the PIU Resource Productivity and Renewables Review Team which has been working since January 2001 and which has been merged into the Energy Review Team.

Readers should not assume that the PIU has in any respect closed its mind. Propositions are made, and questions are put, in order to draw responses.

1.3 We will be taking forward discussion of the questions and propositions raised in this note over the next two months.

1.4 This will be done via bilateral meetings with key stakeholders. We are also likely to arrange a workshop involving all key stakeholders where views on the key issues can be exchanged and debated, probably during October.

1.5 The PIU has already invited all interested parties to put submissions to it by 10th September on all aspects of the PIU Energy Review. Interested parties are invited to respond in their submissions to the questions and propositions raised in this scoping note.

1.6 We would also be grateful if interested parties could let us know as soon as possible if they consider this note overlooks key questions, if any of the questions posed, or propositions put, are fundamentally misconceived, or if the note contains any factual errors.

2. BACKGROUND

UK Gas Demand

2.1 Natural gas is the dominant fuel in the UK. In 1999, the UK consumed some 90 Mtoe (million tonnes of oil equivalent) of gas, accounting for some 41% of primary energy use and some 40% of CO_2 emissions[i].

2.2 Demand can be disaggregated into the following components: households (33%), electricity generation (29%), industry (25%) and service/agriculture (13%)[ii].

2.3 Gas has been the fastest growing energy source with demand growing by 6% in 1999 and some 4% in 2000. A significant part of this increase in demand can be attributed to demand from gas-fired power stations. It is also due, in part, to the need to comply with higher environmental standards. Demand is expected to continue to increase, although not necessarily as rapidly as in the past, with gas predicted to represent some 50% of total energy demand by 2020 and some 50% of CO_2[iii] emissions.

UK Gas Reserves

2.4 The UK has substantial gas reserves and last year was a net exporter of gas by some 5.7 Mtoe[iv]. The decision how far to explore and produce these reserves is dependent on oil/gas prices, technology and cost of recovery.

2.5 The North Sea is a mature hydrocarbon producing province. It must compete with newer provinces, where production may be either less costly or less technically difficult, for investment capital that can be employed to exploit incremental gas reserves. As a result of current market conditions, levels of exploration for incremental reserves are low.

2.6 Based on the current level of reserves and prices, the Department of Trade and Industry (DTI) forecasts that the UK will become a net importer of gas on an annual basis from 2005[vvi]. The UK's demand is forecast to exceed UK's indigenous production, requiring net imports of around 1 Mtoe in 2005, rising to some 13 Mtoe in 2006[vii]. Although relatively modest to begin with, the import requirement is expected to grow rapidly and may be as high as between 55 - 90% of total consumption by 2020[viii]. These levels of import dependency will leave the UK as reliant on imported gas as most other EU states. However, as discussed in paragraph 4.1, there is continued debate about the level of recoverable reserves from the UKCS.

Supply-Demand balance

2.7 The predicted shortfall in indigenous supply can, at least initially, be made up of imports of gas from Norway via the Norwegian Frigg line and from the European market via the Bacton-Zebrugge interconnector.

2.8 Europe (not including Russia) has proven reserves of some 6,820 Mtoe, over 50% of which are Norwegian. On current predictions, Norway expects to produce some 85 Mtoe a year until 2050. However, by 2020 current estimates suggest that this will only account for some 20% of total EU demand. Norway alone can, therefore, only meet a small part of expected EU demands[ix]. Other potential European suppliers include the Netherlands (which has proven reserves of some 1,800 Mtoe), insufficient alone to meet the shortfall between EU supply and demand.

2.9 Therefore, on many projections, the EU will – on present policy – become increasingly dependent on gas supplies from non-indigenous supplies, notably

from Russia, Algeria and Caspian Sea producers. Other potential suppliers include Iran, Egypt and Libya.

Market structure

2.10 Exploration for and production of gas (the upstream market) occurs within a competitive market, with many producers and shippers participating. The upstream market is now regional (European) with gas discovered in the UKCS capable of being exported to continental Europe via the interconnector and gas from Norway and continental Europe having the potential to be imported into the UK. However, the decreasing costs and increasing commercialisation of Liquefied Natural Gas (LNG) production may, in the medium term, transform the market for gas into a global one.

2.11 Supply of gas to consumers (the downstream market) can be split into two parts: the supply of gas and transportation (transmission and distribution) of gas. The supply of gas is competitive, with many suppliers and customers. However, transportation is largely characterised by a monopoly infrastructure owner (Transco) with producers/ shippers paying to put gas into the system and shippers/ suppliers paying to take gas out[x]. The market for the transmission of gas is regional with gas transmitting GB to N Ireland and Ireland, trade through the interconnector and imports from Norway. Similarly the supply of gas. Distribution is the local supply of gas to the final customer from the national transmission system (NTS).

Regulatory control

2.12 The GB gas markets is subject to regulation by five main sources: the DTI, the Office of Gas and Electricity Markets (Ofgem), the general competition authorities (notably the OFT), the European Commission and the Department for Environment Food and Rural Affairs (DEFRA). In addition the HSE is responsible for safety regulation.

2.13 The Secretary of State for Trade and Industry is responsible for setting the overall regulatory framework for regulation of the gas supply market. The Secretary of State also has responsibility for licensing of upstream exploration and production of gas, and for strategic international issues including European policy and hence for security of supply.

2.14 Ofgem is responsible for the regulation of the gas and electricity markets in GB, within the regulatory framework set by the Secretary of State for Trade & Industry. The primary duty of Ofgem is to protect the interests of consumers. It does this largely through the licensing regime - the issue, modification and enforcement of licences (which may include price controls). The Secretary of State for DTI has the power to give guidance on social and environmental issues to Ofgem.

2.15 DEFRA's Secretary of State is responsible for energy efficiency in England, for the devolved administrations this responsibility falls to the Scottish Executive and the Welsh Assembly. He is also responsible for setting the overall regulatory framework for the environment. The main function of the

Secretary of State in relation to the gas markets is to ensure that the UK meets its legally binding Kyoto targets.

3. POLICY AFFECTING THE UK

3.1 The UK domestic gas market has undergone a considerable transformation over the past two decades from a market characterised by a vertically integrated nationalised monopoly (British Gas) to a competitive market. The main driver behind this transformation was the belief that competitive markets were more efficient, offered a better quality of service and price to consumers and were more innovative than markets dominated by monopolies. The Gas Act 1986 paved the way for privatisation later that year, and introduced independent arm's length regulation by Ofgas (a predecessor of Ofgem). The Gas Act 1995 prepared for the introduction of full supply competition by introducing a new licence regime (effective from 1996), with full legal separation of gas pipeline licensees from the shippers and suppliers who use those pipelines for gas trading purposes. The move towards liberalisation was achieved at a rapid pace with all domestic gas supply becoming fully open to competition in 1998.

3.2 The UK Government continued to pursue a competitive agenda via the Utilities Act 2000, which will create more competitive markets; provide greater protection for consumers, in particular disadvantaged groups; rationalise the regulation on the gas industry; and encourage energy efficiency. The main implications for gas were the creation of a single corporate regulator for gas and electricity (the Gas and Electricity Markets Authority, which heads Ofgem); and the introduction of greater competition in gas transportation.

3.3 The New Gas Trading Arrangements came into effect in October 1999. The arrangements consist of auctions for entry capacity into the National Transmission System (NTS) and a screen based trading system – the "On the day Commodity Market" for shippers to trade their imbalances. The auctions were introduced as an economically more efficient way of allocating entry capacity to the NTS than the previous system, in which Transco could oversell capacity without limit and in the event of a constraint on the system was able to scale back capacity rights at no cost to itself.

3.4 The move towards greater liberalisation of energy markets has also been a common theme in the European Union. This is embodied in the European Gas Directive (Directive EC 98/30) which established general rules for transmission, distribution, supply and storage of natural gas. The Directive is based on gradually allowing certain consumers to choose their suppliers. The Directive set a minimum level of 33% open markets in the EU by 2008. Great Britain has fully open markets, well ahead of the market opening requirements. However, the "Third Party Access and Accounts Regulations 2000" (SI 2000 No. 1937) were introduced to make technical amendments to ensure that GB fully complies with all the requirements of the Directive. The European Commission, strongly supported by HMG, is working towards a further Gas Directive, to complete the process of market opening and to finesse the regulatory framework.

3.5 The UK has also committed itself to legally binding cuts in its emissions of carbon dioxide and other greenhouse gases under the Kyoto Protocol. The UK is required to deliver a 12.5% reduction from 1990 emissions levels by 2008 – 2012. The strategy by which the UK intends to meet these targets is set out in the Climate Change Programme.

3.6 Since stabilisation of atmospheric greenhouse gas concentrations at even double pre-industrial levels would require emissions to fall to less than 30% of 1990 levels, the Kyoto commitment is likely to be the first of a series of international attempts to address greenhouse gas emissions and the prospect of climate change. It is therefore likely that the UK will be required to commit to much larger emissions reductions in future.

3.7 The Government is actively promoting combined heat and power (CHP), much of which is generated from gas. Currently CHP provides about 6% of electricity generated in the UK or around 4,700 MW of good quality CHP electrical capacity. The potential for installed good quality CHP has been calculated in range 10,000 – 19,000 MW; with each 1,000 MW of CHP reducing carbon emissions by around 0.8 million tonnes a year. This could significantly reduce long-term carbon dioxide emissions.

4. KEY ISSUES

UK gas demand/supply balance

4.1 DTI's forecasts project that the UK will become a net importer of gas on an annual basis from 2005, although there is considerable uncertainty about the exact timing of the switch from net exporter to net importer.[xi] The UKCS is a mature producing sector yet demand for gas is predicted to continue to increase.

4.2 The increasing reliance on external sources of gas raises a number of key questions relating to the location of, and access to global supplies. The complexity of these issues has become clear from our initial meetings, where difference in views began to emerge on whether the UK's increasing reliance on external gas should be a major concern to the UK government.

4.3 The arguments are complex on both sides. A simplified version suggests that on the one hand the UK becoming increasingly reliant on non-indigenously produced gas is not an issue for concern. The gas industry has, for over three decades, ensured a safe, diverse and reliable source of gas supplies to the UK at affordable prices and will continue to do so for many more years to come. Advocates of this argument have stressed that global reserves for gas comfortably outweigh potential demand and that the market, even one dominated by a small number of supplier countries, will continue to operate in a competitive manner and will continue to be very reliable sources of supply.

4.4 However, on the other hand, the location of the reserves, the geopolitics involved and the current lack of investment in infrastructure in these areas

suggests that the UK should, at least in the short-medium term, be concerned as supply may simply not be available to meet demand – especially during peak times. Advocates of this argument have stressed that unless large levels of investment in production and transportation are forthcoming very soon, the lead time to ensure the quantity of gas required will simply be too long to ensure the quantities of gas required in the short-medium term. This had led to some parties arguing for the increased storage of gas reserves to ensure that the UK isn't left short, especially during peak demands.

4.5 The key questions that therefore need to be addressed in the review are:

Q: What is the range of predicted UK supply and demand for gas over the next 20 years and beyond?
Q: Are there enough proven gas reserves globally to meet this predicted demand? Even during peak times?
Q: Are there any constraints (commercial, political or physical) to the UK accessing these reserves?
Q: If there are constraints, what is the UK government's role in ensuring access?
Q: What is the role of LNG in future UK gas markets?
Q: Are there any implications for UK security of supply from the increasing reliance on non-indigenous reserves?
Q: Should the UK have an explicit policy for increasing the storage of gas reserves? If so, what level should this be set at? And who should be responsible for maintaining it?
Q: Should the UK have an explicit demand management policy in relation to the use of gas? And if so, what should this policy look like?
Q: What alternative fuels could replace gas?

Gas prices

4.6 The liberalisation of domestic energy markets following the Gas Act 1986, and the ensuing "dash for gas", resulted in gas prices being based on supply and demand rather than the traditional long-term contracts. This move effectively resulted in a gradual de-coupling of UK gas prices from oil prices in the early 1990s. The move to gas prices based on market fundamentals was, however, short-lived and by the late 1990s the link between oil and gas prices was firmly re-established by the onset of gas flows through the interconnector between the liberalised UK market and the non-liberalised European market. The "re-coupling" of gas prices with oil prices has occurred because gas prices in the UK are now heavily influenced by gas prices on the Continent, which are typically set under long-term contracts which are indexed to the lagged oil product prices.

4.7 The re-coupling of the oil and gas price means that the UK gas price is highly sensitive to the volatility in international oil markets. This raises a number of issues:

Q: How large is the influence of international oil markets on UK gas prices?
Q: What are the implications of the move towards greater liberalisation in European gas markets for UK gas prices?
Q: What is the role for UK energy policy in relation to wholesale European gas prices?
Q: Should the gas-oil contractual link be broken? And if so, how?

4.8 The Climate Change Levy is designed to curb energy use by increasing the cost of energy bills. It is envisaged that it will play a major role in helping the UK meet its international commitments on emissions. There appears to be a general support for the idea of the climate change levy, though some have expressed concern that gas and coal face the same levy, even though the environmental impact is different.

Auctions

4.9 The precise design of auctions is outside the scope of this study; however, the auction system as an idea, or alternatives to the auction system, and the likely impact of these systems on long-term investment in the network is not. Key questions for this review are therefore:

Q: Is an auction system the most appropriate approach for determining who has the right to supply gas into the system?
Q: What conditions are required to ensure a successful auction?
Q: What are the implications of an auction system on investment into the upstream and downstream gas markets?
Q: Does an auction system represent an appropriate approach for ensuring that monopoly networks invest enough to meet the demands of their networks?
Q: Are there any non-discriminatory alternatives to auctions, consistent with competitive markets?
Q: To what extent should auctions be seen as just one mechanism, amongst others by which the overall level of investment is determined?

Long-term investment decisions in a liberalised market

4.10 The gas market is characterised by high cost, long-term investment decisions in relation to indigenous exploration and production, distribution and storage, as well as in the investment required for importing gas. Liberalised markets, however, are characterised by flexibility in market operations. The increased flexibility associated with liberalised markets has led some to express concerns about the incompatibilities that may exist between short and long-term decisions in liberalised markets.

4.11 This review will involve looking at government's role within a liberalised market and the incentive structures that need to be in place in order to ensure that the twin objectives of competitive markets and long-term investment can

be met. The following paragraphs look at the concerns expressed in relation to exploration and production, distribution, storage and import potential.

4.12 Exploration and production: the main issue raised here is that investment in exploration and production is a high cost, high uncertainty, long-term investment decision that requires a degree of confidence of a final market in advance of the investment decision. Some concerns have been expressed that the onset of liberalisation and the potential move away from long-term contracts may result in the smaller or incremental indigenous fields not being developed - even though they may be economic to do so at the market price. However, others have argues that market liberalisation and a move to shorter contracts is not inevitable, noting that new long-term contracts are still being entered into and pointing to the oil industry which has developed a sophisticated system of varying length contracts, only some of which are short-term.

4.13 Distribution networks: the main issue here is related to the belief that the regulatory regime does not take full account of long-term investment needs. The traditional price control of the energy markets was the RPI-X formula. However, there has been an increasing recognition that, whilst this was a successful mechanism for exerting a downward pressure on cost and prices, it may not always have been the most appropriate incentive for encouraging long-term investment. Ofgem is currently consulting on the appropriate price control for the next five years.

4.14 Storage: storage is relevant to security of supply. The possibility that GB is to become increasingly reliant on non-indigenous sources for its gas supplies has led some, including the European Commission[xii], to consider introducing the requirement for post production storage gas supplies. Some concern has been expressed that if storage is to become a private sector activity, investors may be unwilling to take the necessary risks. Others have argued that this is unlikely to be the case, and that planning on storage poses a greater risk. There is also a question on whether society has a greater risk aversion than markets and hence requires a greater level of storage than the market would provide. There is therefore the question of whether government should intervene to ensure minimum levels of storage are delivered on national strategic grounds.

4.15 Imports: over the next decade or so, GB may become increasingly reliant on gas sources from outside GB. In deciding which market to supply, these importers will take into account a number of decisions including the rate of return to their investments. During our initial meetings, a number of parties have expressed concern that a lack of confidence in the GB market may mean that such countries are unwilling to invest in the infrastructure required to ensure safe and secure supplies of gas into the GB.

4.16 Key questions on investment incentives are therefore:

Q: Can liberalised gas markets produce the right incentives for long term investment?
Q: What lessons can we draw from incentive structures of other capital intensive industries operating in competitive markets?
Q: What is the role of the UK government in relation to incentives for long-term investment decisions in a liberalised market?

Regulatory Regime

4.17 As mentioned in paragraph 2.12, there is a complex regulatory regime overseeing the gas industry which is further complicated by there being a number of different regulatory authorities. There is mixed opinion on whether the regulatory system as it currently stands is the optimum one for GB. Some argue that it is important to separate out the regulatory roles so that each regulator has a specific, transparent and accountable role. However, others have argued that the separation of responsibilities between different authorities is creating uncertainty and confusion in energy markets.

4.18 The question of the appropriate regulatory regime is not unique to the gas markets, however some have suggested that there are distortionary impacts of the regulatory regime on the gas markets.

4.19 Key questions that need to be addressed are therefore:

Q: How should Great Britain's gas markets be regulated?
Q: Should there be a separate onshore and offshore regime?
Q: Can the current system ensure the three main objectives of energy policy – economic, social and environmental – are properly addressed?

4.21 Of particular concern with the regulatory regime was the proposal to require gas shippers to move from a twenty-four hour balancing system to an hourly balancing system. A number of parties at our initial meetings questioned whether the expected costs of this system were justified by the expected benefits. The security of supply implications arising from the different characteristics of gas and electricity, in particular that gas can be stored and electricity cannot, was also raised.

4.22 The current proposals, which are being consulted on by Ofgem, are outside the scope of this study; however, the balancing system as an idea and the likely impact of this on decisions of which fuel source to use for electricity generation is not. Key questions for this review are therefore:

Q: What are the long-term implications of moving the gas balancing system into line with electricity balancing system?
Q: How should gas supply and demand be balanced?

Safety

4.23 Safety of the infrastructure is obviously a key issue in relation to gas. At our initial meetings, there was some concern expressed about whether appropriate incentives structures were in place to guarantee the long-term safe delivery of

gas to consumers, and in particular whether the drive towards liberalised markets was at the expense of ensuring a safe gas network.

Q: What are the long-term implications of market liberalisation on the safety of the gas network?

Q: Are long-term safety concern adequately addressed in the regulatory regime?

[i] Energy Trends, March 2001
[ii] Energy Report, 2000
[iii] Energy Paper 68, based on the average of central low and central high scenarios
[iv] Energy Trends, May 2001
[v] Current DTI estimates
[vi] Note: the UK is already a seasonal importer of gas.
[vii] DTI, 2001 Initial contribution to PIU Energy review.
[viii] Wood Mackenzie, from Energy White Paper 1998.
[ix] DTI, 2000 Initial contribution to PIU Energy review.
[x] Although Transco is the dominant player, there is emerging competition among pipeline connections. Offshore pipelines may also be a substitute for onshore pipelines.
[xi] Gas Matters, September 2000. "Is the UK running out of Gas? Not at all ….."
[xii] Green Paper: "Towards a European strategy for the security of energy supply" (2000).