



## **Disclaimer**

This Statement is produced for the purpose of and in accordance with Transco's obligations in Standard Condition 12 of its Public Gas Transporter's Licence and Section O.4.1 of its Network Code in reliance on information supplied pursuant to Section O of its Network Code. Section O 1.3 of its Network Code applies to any estimate, forecast or other information contained in this Statement.

Transco's Ten Year Statement is not intended to have any legal force or to imply any legal obligations as regards capacity planning, future investment and the resulting capacity.

## Foreword

The 2000 edition of Transco's Ten Year Statement is the fifth produced in accordance with Condition 12 of BG's Public Gas Transporter Licence. This requires that the Ten Year Statement, published annually, shall provide a ten-year forecast of transportation system usage and likely system developments that can be used by companies, who are contemplating connecting to the Transco system or entering into transport arrangements, to identify and evaluate opportunities.

The Statement explains our volume forecasts, system reinforcement projects and investment plans. It has been published at the end of the 2000 planning process and follows on from the 2000 Base Plan Assumptions published in November 1999.

## Changes for 2000

In an attempt to make the Statement easier to use the main body of the document (previously entitled Gas Volumes) has been re-ordered into three separate sections (Demand, Supply and Development of the Gas Transportation System). New information within the main body of the document includes Warm Weather Uncertainties and the inclusion of supply and demand scenarios.

It is also proposed that the 2000 Statement should be used as a substitute for the 2001 Consultation on Gas Volumes – Base Plan Assumptions to start the consultation process off earlier than normal due to the uncertain future supply and demand position highlighted in this document. Your views on this proposal would be appreciated via the feedback form.

Compared with the 1999 Ten Year Statement, the order of the appendices has been altered slightly and the following appendices have either been amended or excluded:

- Actual Flows 1998 (formerly Appendix 1) – this year Appendix 3 (Actual Flows 1999) has been slimmed down.
- Comments On The 1999 Base Plan Assumptions (formerly Appendix 5) - this information can now be obtained from Transco's internet site [[www.transco.uk.com](http://www.transco.uk.com)]
- The Interconnectors (formerly Appendix 7) – previous Ten Year Statements have included a commentary on the introduction and development of the interconnector pipelines. The impact of European and Irish Interconnector flows on Transco's system is now detailed in the volume and investment related sections of this document.
- Transco Publications (formerly Appendix 10) - this information can now be obtained from Transco's internet site [[www.transco.uk.com](http://www.transco.uk.com)]
- Transco Contacts List (formerly Appendix 11) – this information can now be obtained from Transco's internet site [[www.transco.uk.com](http://www.transco.uk.com)]

## Layout

The Statement contains essential information on actual volumes, the process for planning the development of the system, including supply and demand forecasts, system reinforcement projects and associated investment. The main body of the document provides an overview of the key issues, with all the detail contained in the appendices.

I hope you find the 2000 Ten Year Statement both interesting and informative. We always welcome a response from readers, which is why we have attached a feedback form.

I look forward to receiving your views on the Statement, including suggestions as to how it might be further improved.



Rob Verrion, Finance Director.

September 2000

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## ***Supply, Demand & System Development***

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### **1 Executive Summary**

The purpose of this document is to set out Transco's assessment of the future demand and supply position for natural gas in Great Britain, and the consequences for investment in the transmission network.

#### **Market Developments & Uncertainties**

##### **Gas Supply / Demand Outlook**

Forecasting gas' role in Britain's complex liberalised energy markets is an increasingly difficult task and an examination of recent trends and developments is included in the document to highlight the extent to which individual events can significantly alter the course of market development.

One of the most significant developments is the deterioration in the United Kingdom Continental Shelf (UKCS) annual gas supply outlook, when comparing the current position, based on data available up to the beginning of September, with the situation as recently as two years ago. This conclusion is supported by other analyses carried out by other forecasters in the industry, but there remains some degree of uncertainty in supply forecasts as a result of the significant rise in oil price.

While Transco forecasts a tightening in indigenous gas supplies, earlier than hitherto expected, this does not mean a lack of gas for the British gas market which has potential access to large quantities of imports, most notably from Norway. Transco's analysis of future infrastructure requirements is based on the assumption that supplies will be forthcoming to meet growing demand.

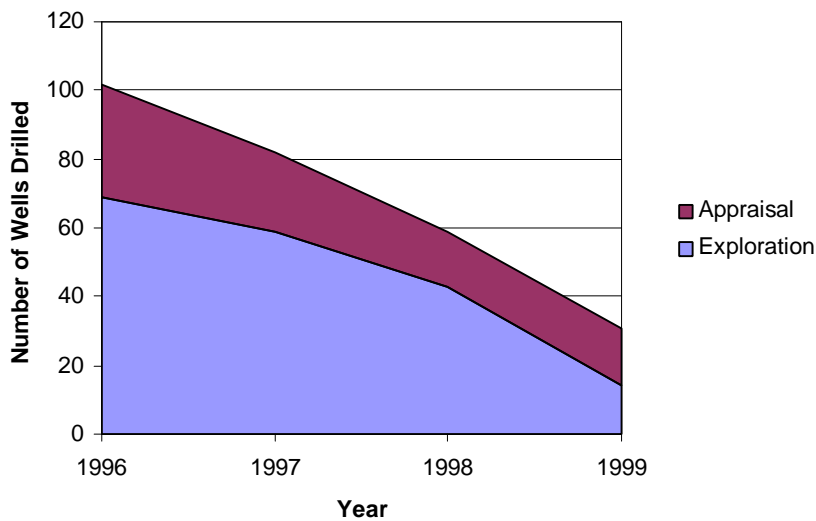
For Transco, the issue is where the new supplies of gas will come from (the UKCS/Norway, via the European Interconnector, or some combination of these) and when the gas will arrive, given the prospective growth in gas demand.

The change in the gas supply outlook implies, in the absence of significant new developments on the UKCS, that new imports will start earlier and to a greater extent than previously envisaged. However the European Interconnector, which can either export or import gas, is not expected to deliver net imports over a given year, for several years.

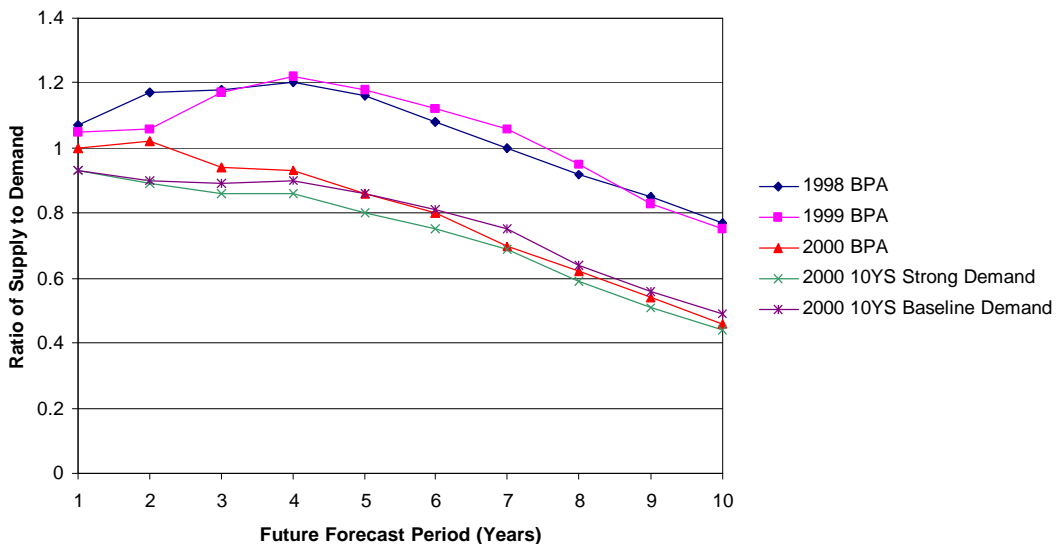
The peak day position does not appear as tight, given the expected development of proposed new storage facilities and Interconnector imports. The effects of an impending tightening on gas prices and hence load management, could change this position in either direction, but there remains the possibility that a severe winter could cause increasingly longer supply disruptions into the future.

The tightening of the supply position is supported by evidence that the drilling of exploration and appraisal wells in the UKCS has declined appreciably over the last 3 years and the ratio of gas supply to demand has significantly declined based on the raw data available to Transco (see below).

**UKCS Exploration and Appraisal Activity 1996 to 1999**



**Supply Availability Versus Annual Demand**



Note:- The above graph only uses raw data available to Transco from all sources of supply information. Transco then make specific assumptions to achieve a supply/demand match as detailed in section 3.1.1.

Clearly, this year's analysis is subject to an unusual degree of uncertainty. The oil price has recovered from \$10 per barrel in January 1999 to over \$30 per barrel in recent months. High oil prices may well change the supply position if they persist long enough to stimulate oil and gas developments on the UKCS. Recent announcements from major oil producers give some indication that there will be renewed activity in British waters, but the focus is on oil developments. Transco also understand that the United Kingdom Offshore Operators Association (UKOOA) are currently undertaking a survey that should provide more evidence on producer intentions in the light of current market conditions.

Gas production remains a by-product of oil production in many instances and would appear to Transco, even at current higher prices, to be generally less attractive to produce than oil. There is also the possibility that in the presence of high oil-related European gas prices any new gas developed will be exported, especially when the demand of the British market is low in the summer. Hence, the make-up of future gas availability, especially in respect of the timing and marketing of additional supplies from the UKCS, remain uncertain.

It should be noted that the prospect of some increase in activity is already factored into the gas supply/demand matches assumed by Transco. Therefore, the issue of how Transco's network is expanded to deal with gas flows from the UKCS and prospective Norwegian imports, as well as the export/import dynamics of the Interconnector is now a matter still of particular importance to the development of the British gas market.

In conclusion, the need for longer term additional annual supplies is clear, although the range of possible solutions to this problem introduces further challenges for the industry in planning to accommodate the various options as regards the landfall of future supplies to meet gas demand requirements.

### **European Interconnector**

The effect of the oil price increase on continental gas markets, where a strong link exists between oil and gas prices, has been particularly pronounced. This has had a knock on effect on Interconnector flows to Europe. The differentials that have existed between British and European gas prices have provided a strong incentive for shippers to flow gas through the Interconnector, particularly during the summer months, when large surpluses of gas exist as a result of low levels of demand in the British market.

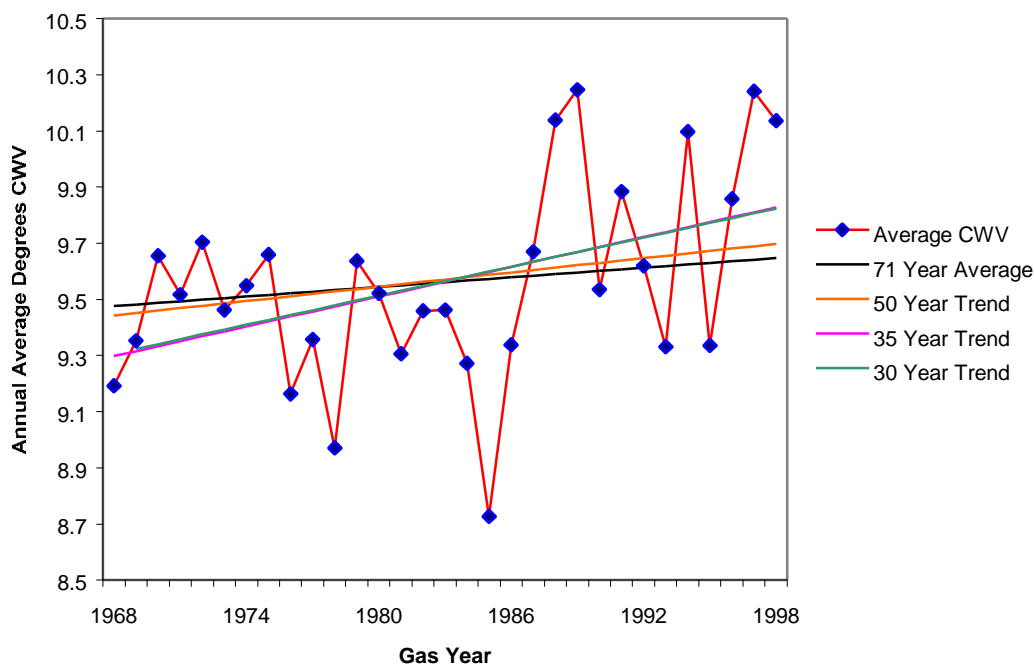
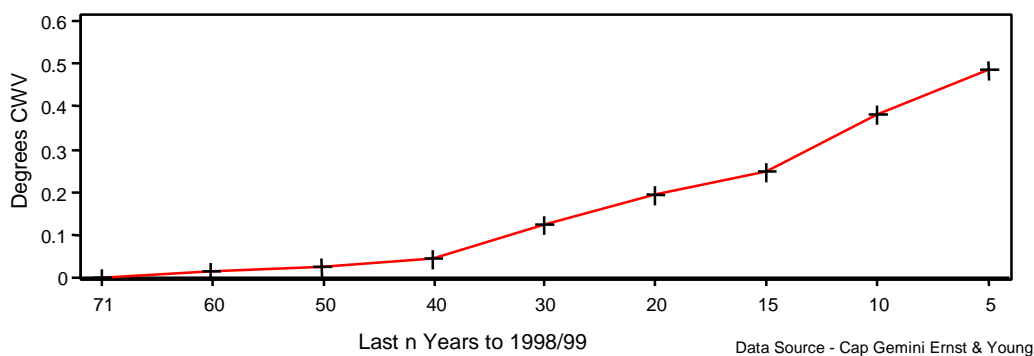
### Recent Weather Trend

In 1995 Transco commissioned a study to investigate the perceived impact of “global warming” on gas demand. The study concluded that Local Distribution Zone (LDZ) regional demand should be reduced by 2% to allow for the observed warming weather pattern. During the subsequent 1997 Price Control Review the study’s results were discussed with Ofgem who agreed it would be prudent to include such a correction.

However, since 1995 Great Britain has seen some of the warmest winters on record and consequently it is felt that the 2% mild weather correction (MWC) is understated. Therefore a new study was commissioned to include the additional years of weather data. The subsequent report concludes that there is evidence to support a greater reduction than 2%, potentially to more than 5%. The overall recommendation is for a MWC of 3.5% based on the trend over the last 35 years and consequently this correction is included in the forecast figures of annual demand shown in Appendix 2. The rate of warming implied by this trend is consistent with that reported by climate change experts.

The two graphs below are taken from the new study and illustrate:-

- a) the recent warming trend in average Composite Weather Variables (CWV) when comparing averages taken over different historical time periods with the 71 year average.
- b) the different trend analyses carried out within the study.



Note - Gas Year refers to twelve months commencing 1st October

Data Source - Cap Gemini Ernst and Young

With regard to peak demand conditions, independent experts have in the past been unable to conclude to what extent extremes of weather will be affected by “global warming”. Consequently, Transco considers it prudent to make no adjustment to its 1 in 20 peak day demand forecast at this stage. This approach is supported by the fact that the coldest day over the last 71 years only occurred 14 years ago.

Further analysis is being sought to supplement the study and evaluate the potential impact on peak demands.

### **Other Significant Market Variables**

There are other uncertainties which may impact on the development of the British gas industry. Transco still forecasts continued growth in the demand for gas, but with a range of potential outcomes. The factors which are likely to have the greatest impact are: -

- growth of the gas-fired power generation market following the ending of the Government’s ‘Stricter Consent Policy’, the impact of new energy trading regimes and the Government’s policy on renewable energy sources
- the impact of the proposed Climate Change Levy and the extent of negotiated agreements
- Interconnector flows to Continental Europe and Ireland, the latter especially in respect of the potential development of the Corrib gas field west of Ireland

### **Potential Outcomes**

For the reasons set out above, this Ten Year Statement has been prepared with less certainty about both future supply and demand for gas than in previous years. The future investment programme is particularly sensitive to the supply assumptions, in particular whether all new North Sea gas supplies, including Norwegian imports, are landed at St.Fergus, or whether the European Interconnector is used to import gas to the maximum extent, with remaining increases in supply being spread across all major terminals.

To highlight this uncertainty, Transco has developed two specific demand cases and two supply cases, which are combined to form three scenarios. These are described more fully in the main report. The effect of the scenarios is particularly marked if investment in the National Transmission System (NTS) is considered separately, as Ofgem has indicated it wishes to do in setting new price controls. As an illustration of this the level of reinforcement between 2002 and 2006 could range from around £209m in the Baseline Demand Interconnector Balance scenario to some £1,100m in the Strong Demand St.Fergus Expansion scenario.

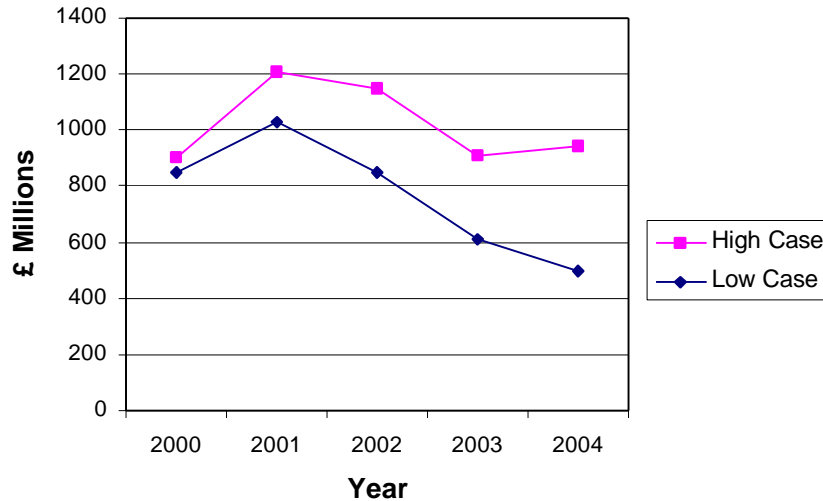
Looking at the overall impact of the scenarios on Transco’s transmission and distribution network the following indicates the range of investment based on the combination of Strong Demand/St.Fergus Expansion and Baseline Demand/Interconnector Balance<sup>1</sup>

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<sup>1</sup> Given the nature of the presented supply/demand scenarios and associated sensitivities around each major category of expenditure, the investment forecasts shown are indicative only. This information does not imply a commitment by Transco to any specific project or to any level of expenditure, apart from those projects designated as committed in the NTS and Local Transmission System (LTS) Development Plan sections of this document.

**Gross Capital & Net Replacement Expenditure**

£m (2000 prices)	2000	2001	2002	2003	2004	Total 2000 - 2004
Low Case	850	1,030	850	610	500	3,840
High Case	900	1,210	1,150	910	940	5,110



**Further Consultation**

Because of the increased supply uncertainty, the variation between the high and low cases set out in this report is considerably greater than previously experienced. However, the consequences for customers of inability to put sufficient gas into the network could be severe. Given the effect of supply uncertainties, and the need to provide sufficient entry capacity for peak demands – which may involve different sources of supply at different times – there may therefore be a case for planning for greater resilience in the NTS. This might involve reinforcing the NTS to allow for new supplies both through the Interconnector and from St.Fergus.

These issues will need to be considered further in advance of Transco’s submission, as part of the review of its price control, of its Business Plan Questionnaire (BPQ) to Ofgem in December. Transco will continue to consult with shippers, producers and other industry parties over the coming months.

To ensure that its investment plans are based on the most accurate and up to date information, Transco proposes to use this document as a substitute for the 2001 Consultation on Gas Volumes – Base Plan Assumptions to start the consultation process off earlier than normal. Readers of this document are requested to return the attached feedback form to advise Transco of their thoughts on this proposal. The feedback form also contains some questions regarding the data collection process, which we would also like some comments on.

Detailed questionnaires will be circulated to a range of industry players requesting supply and demand forecast data shortly after publication of this document.

## 2 Demand

### 2.1 Recent Energy Trends

This section endeavours to put into historical context gas' position within the energy market and identify the main market drivers supporting recent growth in gas demand.

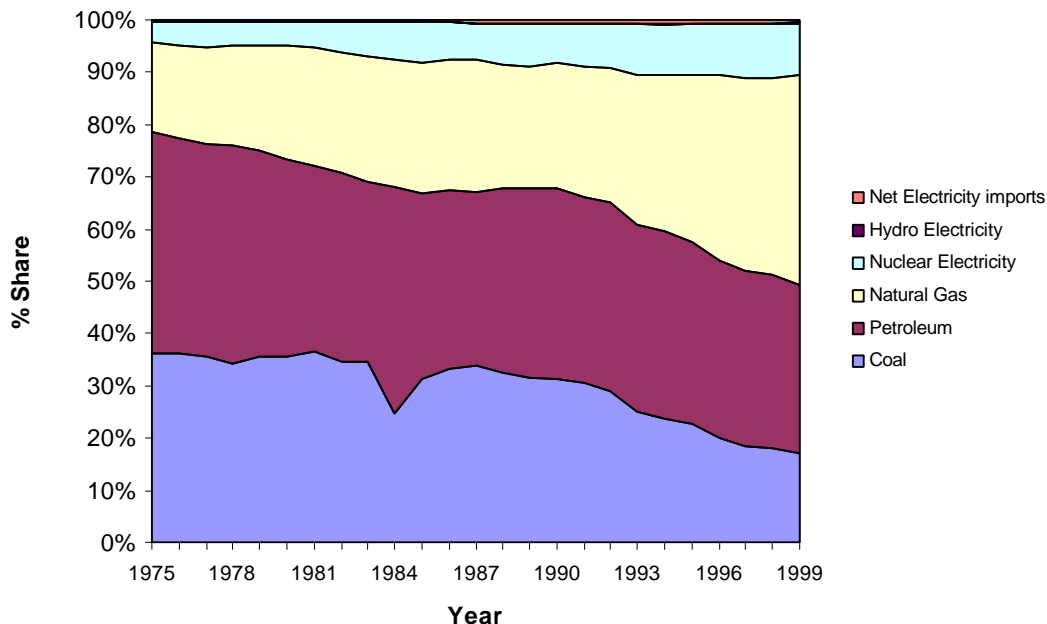
#### 2.1.1 Energy's Position in the Economy

The energy industry currently accounts for only 5% of GDP compared to around twice that 10 year ago. This fall in percentage share is attributed to greater productivity and more efficient use of fuel.

#### 2.1.2 Energy Market

Total primary energy consumption in the UK has remained fairly static over the past 25 years, growing at a rate less than 0.5% per annum. As Figure 2.1a illustrates the most significant change during this period has been one of fuel substitution and sectoral change. The gas share of UK primary energy consumption (before conversion and distribution losses) has increased significantly from 17% in 1975 to around 40% at present. If transportation related usage is excluded from primary energy consumption, gas' share increases to around 50%.

**Figure 2.1a Inland Consumption of Primary Fuels**  
 Source – DTI, Digest of UK Energy Statistics (DUKES) 1999

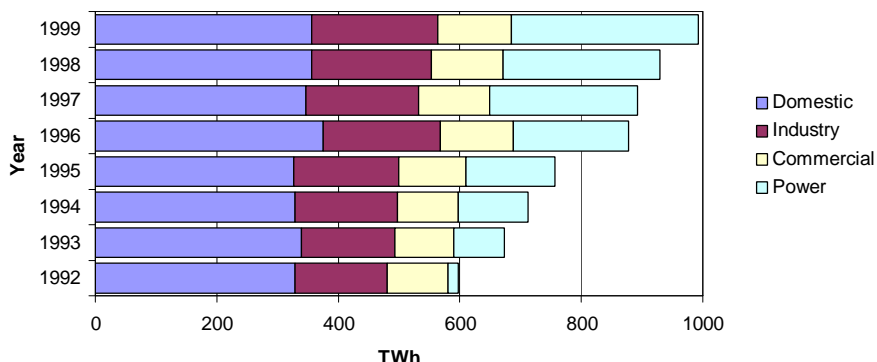


### 2.1.3 Historical Gas Demand Growth

To obtain a better understanding of why gas' share of the energy market has risen so dramatically in recent years it is important to consider the development of a number of different market sectors. Figure 2.1b illustrates how each of the main market sectors have developed since 1992.

**Figure 2.1b Gas Consumption by Sector**

Source – DTI, Digest of UK Energy Statistics (DUKES) 1999



Individual sectors will now be discussed in greater detail.

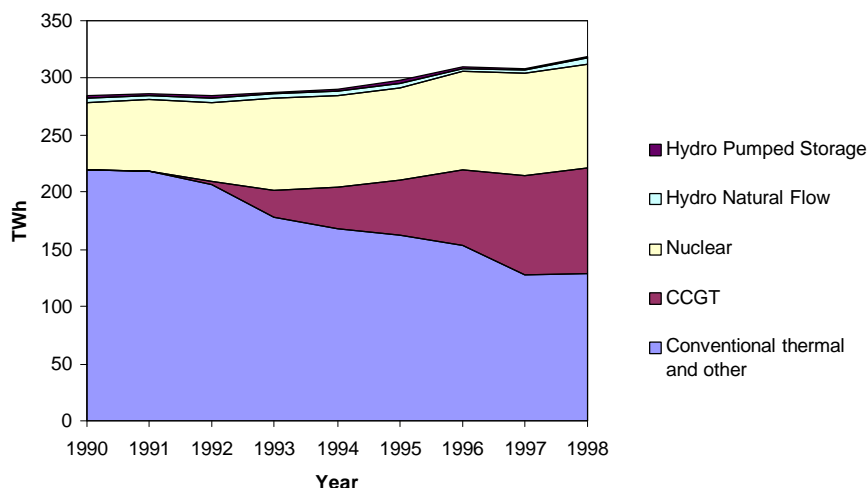
#### 2.1.3.1 Power Generation

The highest growth rates can be found in the relatively new market of power generation where the number of centrally dispatched power stations connected to Transco's NTS has grown from 1 in 1991 to 31 in 1999. This has resulted in gas' share of generation growing to around 40%, a figure that is likely to increase following the commissioning of stations currently under construction. Figure 2.1c illustrates the generation mix of power stations operated by major electricity producers in the UK.

In addition to the growth in larger scale power generation, i.e. centrally dispatched CCGT stations, there has been strong growth in the smaller scale embedded generation and CHP. This growth has been supported by Government initiatives and the activities of trade associations, such as the CHPA, to promote energy efficiency and in particular the use of CHP.

**Figure 2.1c Electricity Generated by Major Power Producers in the UK**

Source – DTI, Digest of UK Energy Statistics (DUKES) 1999





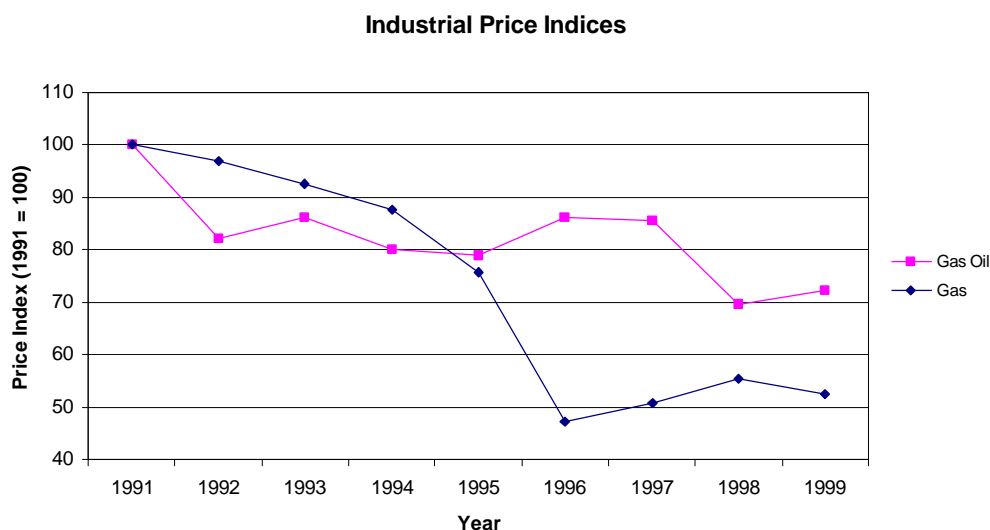
### 2.1.3.2 Industrial and Commercial

Historically growth in the industrial and commercial sectors has been driven by the economic climate and fuel substitution brought about by the competitive position of gas in relation to other fuels, most notably oil. The level of fuel substitution was supplemented by various environmental initiatives undertaken by, for instance, the chemical industry which replaced high sulphur content HFO with gas. Coupled with this, demand was further enhanced through the implementation of various development schemes that sought to encourage new industry and investment into economically deprived areas.

Figure 2.1d provides a comparison of how the price of gas to industrial consumers over the last 10 years has changed in relationship to changes in the price of gas oil.

**Figure 2.1d Industrial Price Indices**

Source – DTI, Digest of UK Energy Statistics (DUKES) 1999

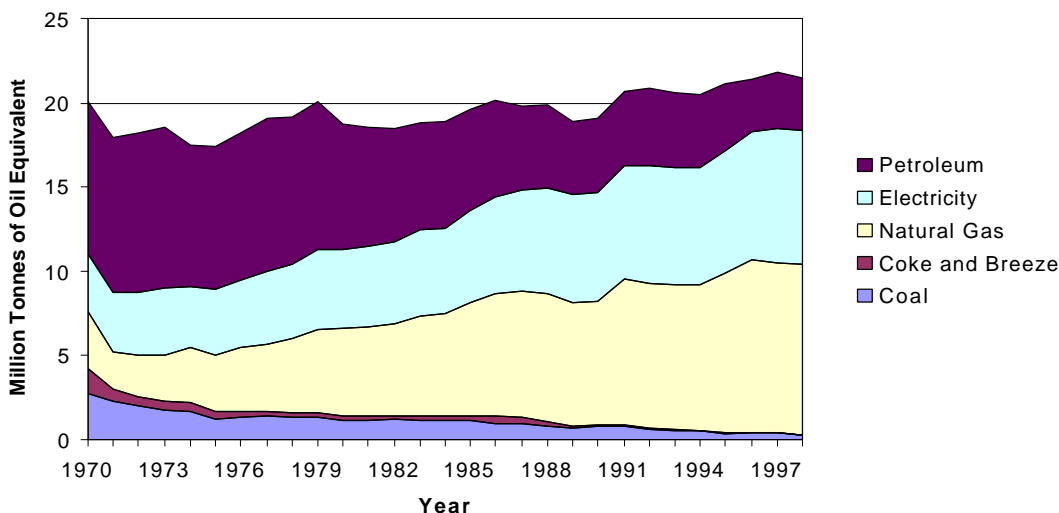


In more recent times, a favourable economic climate and highly competitive gas prices, brought about by fierce gas on gas competition and rising oil prices, have supported strong growth in the industrial and commercial sectors.

Figure 2.1e illustrates, by fuel type, industrial energy consumption over the last 30 years.

**Figure 2.1e Industrial Energy Consumption**

Source – DTI, Digest of UK Energy Statistics (DUKES) 1999

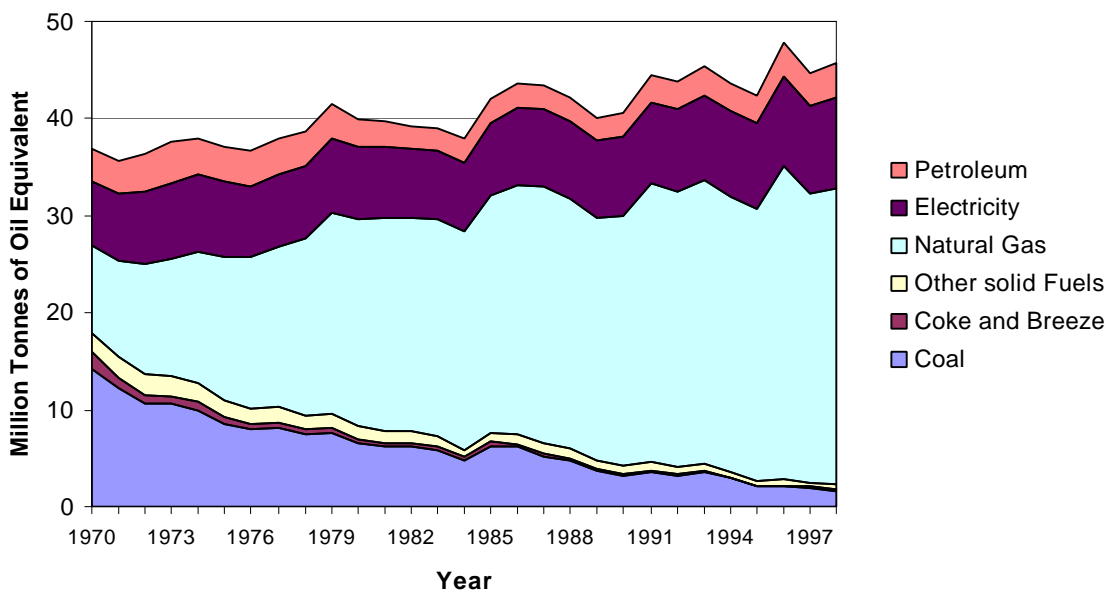


### 2.1.3.3 Domestic

The growth rate of gas consumption in this sector has fallen slightly in recent years as a result of the near saturation of the domestic energy market. Over 85% of all homes in the UK are currently central heated and gas-fired installations account for in excess of 75% of these systems (having risen from a share of only 33% in 1970).

Figure 2.1f illustrates the development of domestic energy consumption and fuel mix over the last 30 years.

**Figure 2.1f Domestic Energy Consumption**  
 Source – DTI, Digest of UK Energy Statistics (DUKES) 1999



### 2.1.3.4 Exports

The consumption data presented by Figures 2.1b, 2.1e and 2.1f excludes gas that has passed through Transco’s network prior to being exported to Ireland or Europe. Exports to Ireland commencing in 1995 and to Continental Europe in 1998, both markets have grown rapidly and amounted to a total demand of 91 TWh in 1999.

## 2.2 Demand Growth Drivers and Market Uncertainties

An assessment of future growth drivers and their impact on gas volumes is an essential part of the forecasting process. The 2000 Base Plan consultation process provided Transco with the opportunity to discuss key demand growth drivers with the industry prior to preparing the demand forecasts presented by this document.

The volume forecasts have been based on a wide range of factors including: historical trend information, development of new and existing markets for gas, local demand intelligence, contracts with large end users, nomination of new supply points by shippers, general economic factors and the possible effects of taxation.

In particular, the following growth drivers are considered to have a potentially significant effect on the development of gas demand over the forecast period:

### 2.2.1 Economy & End User Fuel Prices

The volume projections presented in Appendix 2 have been developed from a range of economic and fuel price assumptions based on forecasts obtained from recognised external organisations. Further details of these assumptions are given in section 2.3.

Assumptions are made in the following general areas:

- economic growth over the forecast period
- price inflation
- the pattern of economic development and performance of individual industrial sectors
- gas price and gas' relationship to competing fuels

Significant variation of these key economic factors away from Transco's core assumptions will influence demand growth – Transco's assumptions are based over the forecast period and therefore allow for short periods of strong, weak or zero growth. However, sustained periods of either boom or bust could influence the accuracy of the forecasts presented by this document.

Changes in the real price of gas, or its price in relation to alternative fuels, may encourage fuel type switching or drive further fuel efficiency measures.

While there is always variation in the price of oil, recent price fluctuations, from \$10 a barrel in spring 1999 to in excess of \$30 a barrel in summer 2000, has lead to greater uncertainty in world energy markets. Such large variations have a number of potential impacts on the demand for gas, the most significant of which may be:

- the price of gas in many European markets is linked to the price of oil. Oil price trends and uncertainties are mirrored in gas markets and influence the volume of gas exported from Britain via the European Interconnector pipeline
- if British gas market prices become significantly influenced by European gas prices as a result of trading through the European Interconnector there will tend to be a greater link between gas prices in Britain and oil prices. This may result in an erosion of gas' price advantage limiting future growth

### 2.2.2 Energy Trading Regimes

New Electricity and Gas Trading Arrangements (NETA and NGTA respectively) are intended to allow greater competition in both markets and keep prices to energy consumers as low as possible.

There is considerable uncertainty in the energy industry around the extent to which NETA will influence the power generation market. It is possible that there will be greater interaction between gas and electricity markets which may impact on the amount of arbitrage. Power generators may wish to offer greater flexibility to meet changing demand conditions that in turn could impose a greater burden on Transco's network, possibly requiring additional capital expenditure.

### 2.2.3 Environmental

The environmental measures introduced under the terms of the Kyoto Protocol specify a range of emission reductions amounting to an overall reduction in carbon based emissions output of about 5.2 per cent for the developed countries at 1990 levels by 2008-2012. This is far below the 15 per cent reduction at 1990 levels by 2010 proposed by the European Union as a realistic and achievable target.

The Kyoto Protocol allows carbon credits to be traded between countries, for example a less developed country with relatively low volumes of emissions could sell credits to industrial countries allowing them to increase their carbon emissions and hence burn more fossil fuels. The extent to which emissions trading will occur, or the possible participation of individual energy consumers, is difficult to foresee.

The Climate Change Levy (CCL) is a revenue neutral tax on non-transport related energy use by businesses, proposed by the Government to help meet their domestic goal of reducing emissions of carbon dioxide (20% from 1990 levels by 2010) through the promotion of energy efficient technologies. The rate at which CCL is applied may be subject to re-evaluation, as the country's progress towards this goal becomes apparent.

The CCL will be payable on the use of Electricity, Gas and Coal although concessions will be available for energy intensive users subject to the achievement of certain efficiency targets. Discounts for energy intensive users will be based around agreements negotiated by the Department of the Environment, Trade and Regions (DETR) and trade associations. The negotiated agreements will set targets to be met by either individual companies or trade bodies as a whole.

Total exemption from the CCL will be granted to users of "good quality" CHP and "new" renewable energy sources. The introduction of the CCL will also be accompanied by increased allowances for measures to improve energy efficiency.

Thermal efficiency gains driven by the CCL have the potential to reduce demand growth in certain industrial sectors.

#### **2.2.4 New Technology**

The development of new gas utilisation technologies is likely to provide further growth drivers in the later years of the forecast period. The advancement of small-scale novel power generation technology is expected to be one of the most significant developments in this area. New technology may also introduce additional growth drivers to the domestic sector with domestic gas-fired CHP and household air conditioning systems providing new ways of burning gas in the home.

There is significant potential for the further development of natural gas powered vehicles.

The development of renewable energy sources has the potential to limit future demand for gas. The amount of electricity generated from "renewables", such as biofuels, hydro and solar energy sources, although relatively little in comparison to more traditional fuels, is growing quickly. Renewable energy sources continue to receive support from the Government which has set targets of 5% of total electricity generated from renewable energy by 2003 increasing to 10% by 2010.

#### **2.2.5 Weather**

The effects of recent warm weather trends on gas demand are considered in section 2.4.

#### **2.2.6 Gas-Fired Power Generation**

In recent years the power generation sector has been one of the most significant drivers of gas demand growth, a factor that is expected to persist during the latest plan period.

There are presently a number of factors which could impact on the potential volume of additional demand associated with gas-fired power generation, the most significant of which are:

- the degree to which NETA, in particular lower wholesale electricity prices, could influence the economics of new gas-fired power projects – a particularly acute sensitivity if coupled with higher gas prices
- the "post moratorium" approach taken by the DTI when granting consents for new power generation projects and the degree, if any, of future Government interventions into the development of the power market. In April 2000 the Government announced that it would lift the Stricter Consents Policy for new gas-fired power generation projects to coincide with the implementation of the New Electricity Trading Arrangements (NETA)

- a shift away from the development of large scale centrally dispatched power stations towards smaller projects, such as CHP developments, embedded within the systems of Public Electricity Suppliers
- the development of renewable energy sources

The contribution made by new power generation loads to the demand cases presented by this document is based on an assessment of the electricity generation market. From this assessment Transco has derived views, one for each forecast case, of the volume and location of new centrally dispatched power stations, dual fired installations and fuel conversions.

Under current trading arrangements, centrally dispatched power stations are those which may submit bids to the National Grid Company (NGC) for the generation of electricity at a predetermined time. The NGC schedules and issues direct instructions to centrally dispatched generators as specified by the terms of their transmission licence.

Several of the power generation loads predicted by the latest forecast are expected to connect to LDZ systems.

### **2.2.7 Combined Heat and Power (CHP)**

The benefits of CHP are well established and the development of new CHP capacity is expected to be a major driver of LDZ demand growth.

There is a clear link between the economic viability of potential CHP plants and the wholesale price of electricity. Any development that has the potential to exert downward pressure on the price of electricity, such as the implementation of NETA, may influence the volume of new CHP entering the market. It is possible that developers will choose to defer investment decisions in light of market uncertainties in the run up to NETA.

The exemption, subject to the achievement of certain quality criteria, of CHP schemes from the Climate Change Levy (CCL) is considered to be a major factor in the development of this sector of demand. Additional measures may be introduced to promote the adoption of CHP technologies in order to achieve the Government's target of 10GW of installed CHP capacity by 2010.

The Combined Heat and Power Association (CHPA) is an agency involved in the active promotion and support of CHP technology. The CHPA co-ordinates a range of programmes to support the development of both domestic and industrial CHP installations, offering advice, information and capital grants towards the cost of new developments. The CHPA also manages the Transco Feasibility Programme, funded by Transco and the DETR, offering 50 to 70% grants towards feasibility studies into medium scale (1 to 20MWe) CHP developments in public and commercial buildings and industrial sites.

### **2.2.8 Exports**

#### **2.2.8.1 Ireland**

Forecasts of exports to Ireland continue to indicate significant growth potential particularly in the Republic of Ireland where gas' share of primary energy consumption is considerably lower in than in the UK.

In February 2000 the electricity market in the Republic of Ireland was subject to partial deregulation allowing a number of the country's largest consumers to select an electricity supplier for the first time. A number of companies are now vying to supply electricity into the new market and this has led to the proposal of numerous new power generation projects – the majority of these projects, if developed, will be gas-fired.

A continuation of Ireland's recent record of impressive economic performance will provide further growth drivers.

In Northern Ireland, plans are being developed to re-power the existing gas-fired power station at Ballylumford (the largest power station in the province) and convert Coolkeeragh power station to gas-fired operation.

The volume of gas exported to Ireland is subject to a number of influences and possible market developments, the most significant of which are:

- the depletion of existing indigenous supplies
- the development of new indigenous gas supplies such as the Corrib field, 70km off the west coast of Ireland
- economic slow-down & increased inflation
- Ireland's ability to limit emissions of carbon. Under the Kyoto agreement Ireland was allowed to increase carbon emissions by 13% from 1990 levels by 2010, however this level has already been exceeded and the Irish Government has put forward various measures to reduce emissions. One option is to switch existing coal-fired power stations to gas.

### **2.2.8.2 Europe**

The impact of exports to Europe, via the European Interconnector pipeline, are considered in section 3.1.

### **2.2.9 Domestic Markets**

The number of housing connections and PGT mains extension projects will be a primary driver of growth in the domestic sector. The domestic "comfort factor" is expected to increase slowly during the forecast period although any resultant increase in demand will be offset by efficiency improvements.

Efficiency gains brought about by improved construction standards and appliance design could lead to average household consumption dropping below historical levels. Given the size of the domestic demand base a development of this type could prove to have a significant impact on gas demand.

## **2.3 Demand Cases**

Following this years Consultation on Gas Volumes, Transco provided feedback to the industry on the responses received and the effect this had on the Transco forecasts.

This indicated that there is significant uncertainty with respect to the key drivers of demand. As a result of this uncertainty Transco has developed two specific demand cases that have equal likelihood of occurring. These are not necessarily the only possible demand cases, but the two selected are considered to be realistic examples.

### **2.3.1 Baseline Demand**

This case assumes a period of recession will occur which has the net effect of causing a decline in the rate of growth in demand for gas, both in the domestic and non-domestic sectors.

The other significant general assumptions that influence this case are:

- increased efficiency as various sectors replace existing equipment/appliances. This is supported by the fact that EU legislation has been put in place requiring new plant to be more efficient, for example the recent tightening of minimum efficiency standards for domestic central heating boilers. This assumption is further substantiated by the fact that some 80% of all gas central heating installations are system replacements or upgrades. The introduction of the CCL, aimed at reducing energy consumption, impacts on demand growth in non-domestic markets.
- greater sectoral shift from manufacturing to service driving down total consumption in the non-domestic sector

The other specific assumptions are:

- greater penetration of renewables into the CHP market reduces the number of new gas-fired CHP demands
- despite the removal of the Stricter Consents Policy there will not be a dash for new gas fired plant
- the Corrib field off the west coast of Ireland is developed and substitutes for part of the gas exported from Britain
- Shearwater Elgin Area Line (SEAL) gas is exported via the European Interconnector by-passing the Transco network entirely

### **2.3.2 Strong Demand**

This case envisages strong growth in all sectors with prospects for the British economy remaining favourable over the medium term, based on steady economic growth and low inflation. Gas remains highly competitive in price terms, with:

- non-domestic growth continuing, with strong generic growth and CHP growth
- continued growth in the power generation sector, with gas' share of generation increasing from 40% to 50%
- exports to Ireland and Europe growing, but with SEAL by-pass to the European Interconnector
- domestic sector growth coming from new connections, with significant impact of the Affordable Warmth programme. Continuation of the current stable level of average domestic consumption and the assumption that insulation/efficiency gains will be offset by an increased "comfort factor".

## **2.4 Warm Weather Uncertainties**

In 1995 Transco commissioned a study to investigate the perceived impact of "global warming" on gas demand. The study concluded that Local Distribution Zone (LDZ) regional demand should be reduced by 2% to allow for the observed warming weather pattern. During the subsequent 1997 Price Control Review the study's results were discussed with Ofgem who agreed it would be prudent to include such a correction.

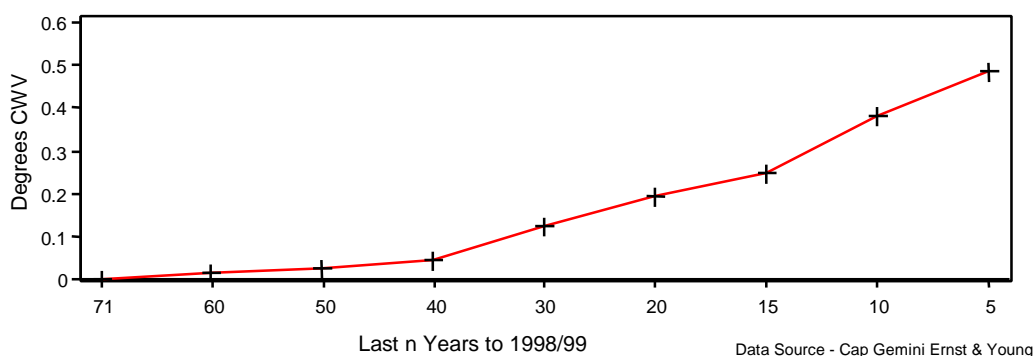
However, since 1995 Great Britain has seen some of the warmest winters on record and consequently it is felt that the 2% mild weather correction (MWC) is understated. Therefore a new study was commissioned to include the additional years of weather data. The subsequent report concludes that there is evidence to support a greater reduction than 2%, potentially to more than 5%. The overall recommendation is for a MWC of 3.5% based on the trend over the last 35 years and consequently this correction is included in the forecast figures of annual demand shown in Appendix 2. The rate of warming implied by this trend is consistent with that reported by climate change experts.

The two graphs below are taken from the new study and illustrate:-

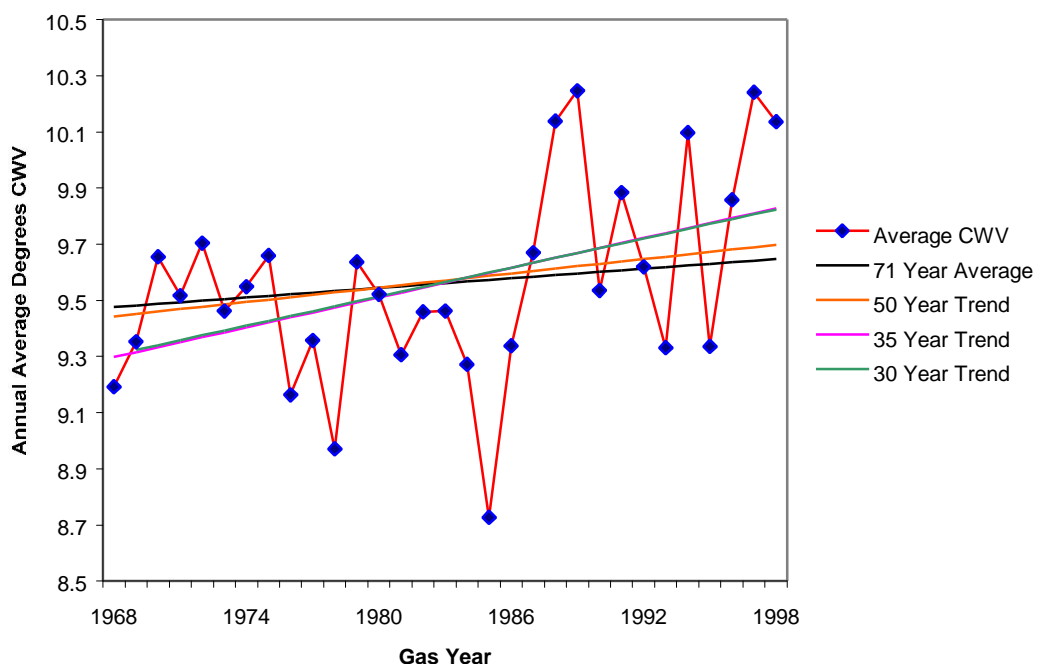
- a) the recent warming trend in average composite weather variables (CWV) when comparing averages taken over different historical time periods with the 71 year average.
- b) the different trend analyses carried out within the study.

Figures 2.4a and 2.4b are taken from the new study.

**Figure 2.4a Recent Warming Trend in Average Composite Weather Variables (CWV) When Comparing Averages Taken Over Different Time Periods With the 71 Year Average**



**Figure 2.4b Trend Analyses of Composite Weather Variables**



With regard to peak demand conditions, independent experts have in the past been unable to conclude to what extent extremes of weather will be affected by “global warming”. Consequently, Transco considers it prudent to make no adjustment to its 1 in 20 peak day demand forecast at this stage. This approach is supported by the fact that the coldest day over the last 71 years only occurred 14 years ago.

Further analysis is being sought to supplement the study and evaluate the potential impact on peak demands.

### 3 Supply

#### 3.1 Recent Supply Trends and Market Uncertainties

##### 3.1.1 Supply Availability

Supply information received by Transco following publication of the 2000 Base Plan Assumptions (BPA) continues to indicate a potential tightening of annual supplies against demand. This is shown in Figure 3.1a which presents an outline of annual supplies category against demand. Due to the seasonal nature of British gas demand, the near term shortfall in supplies will in most instances be met by an increase in production from existing supplies and a greater reliance on seasonal supplies at higher demands. In terms of information provision, Base Plan consultation responses from producers on a field specific basis account for approximately 80% (by volume) of the supplies information used by Transco. This is supplemented with commercially available sources (again on a field specific basis).

For the supply categories shown in Figure 3.1a there is little uncertainty associated with production and development fields with the exception of the start-up dates for new developments which have frequently slipped in recent years. The fields that are included in the appraisal category have greater uncertainty associated with them as they have, in most instances, yet to be approved for development. Though not shown due to limited availability of information there are other potential supplies that could contribute towards the longer term provision of supplies, namely:

- new discoveries
- enhancement of existing supplies (beyond those incremental projects included in the supply forecasts)
- additional imports (Norway, Continent)
- LNG

Figure 3.1a Annual Supplies – Data Available to Transco by Supply Category

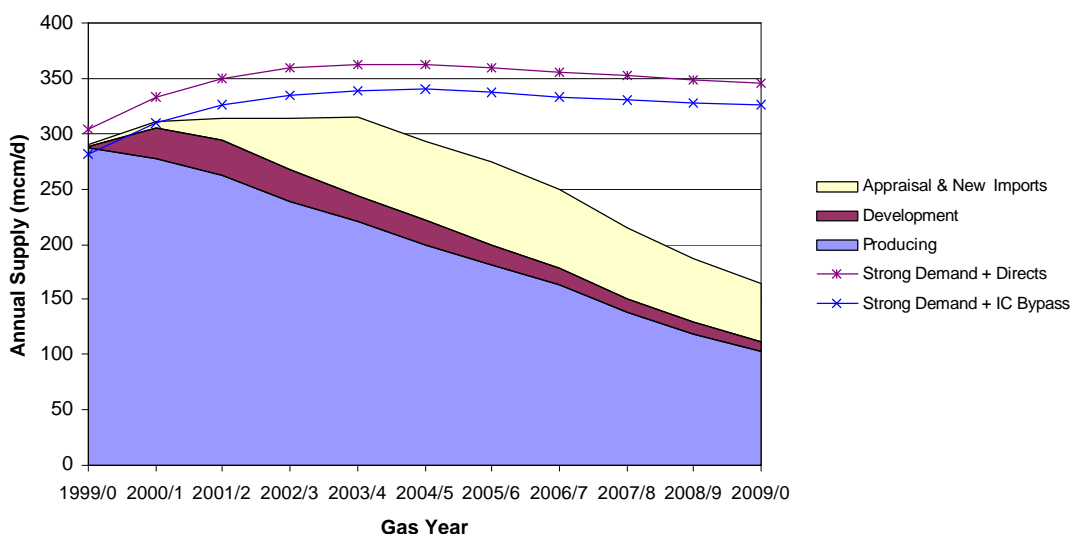
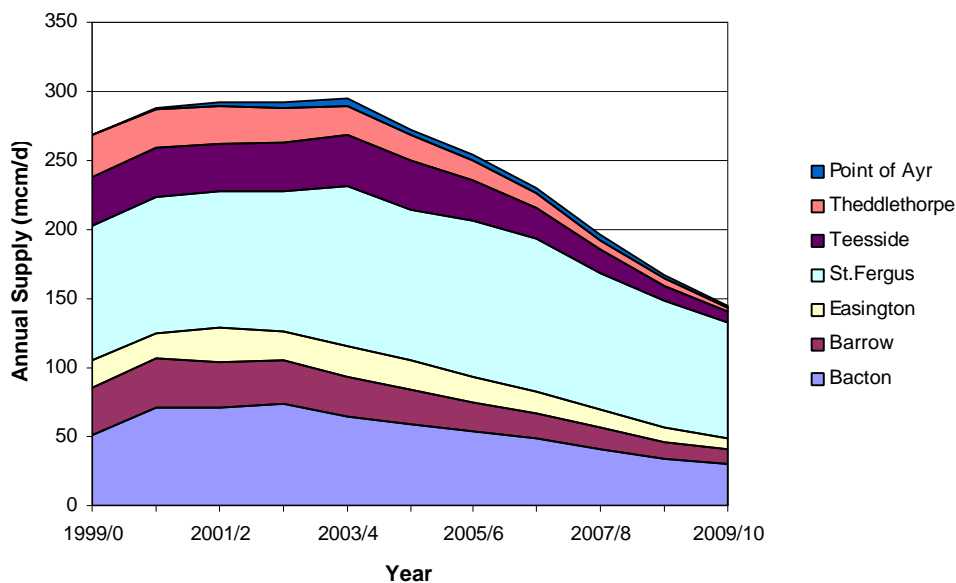


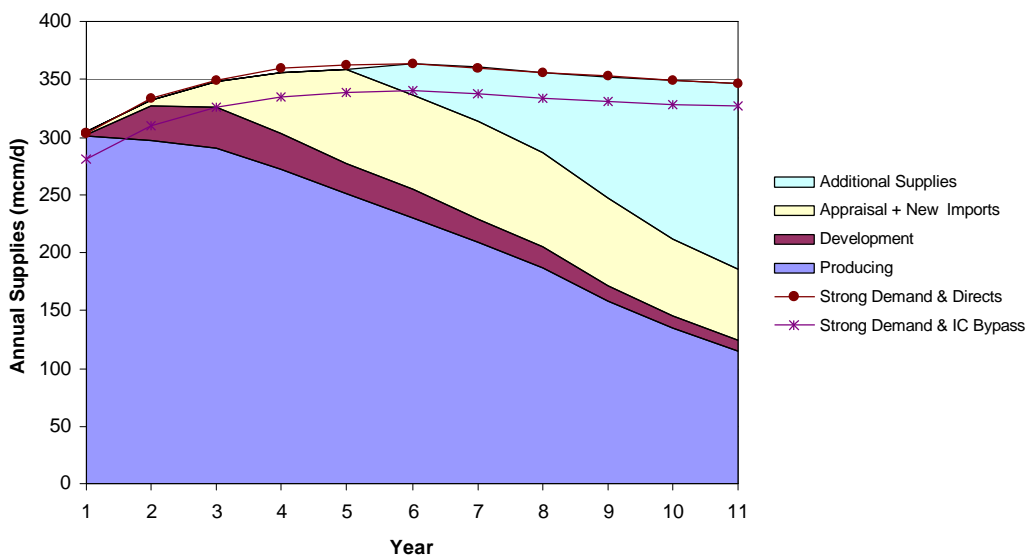
Figure 3.1b shows the annual supply information received by Transco on a supply terminal basis. Only St.Fergus with its prolonged production from some large fields supplemented with new Norwegian imports shows sustained production throughout the plan period.

**Figure 3.1b Annual Supplies – Data Available to Transco by Terminal**



Transco assumes that annual supplies will be available to meet demand throughout the 10 year plan period. To achieve an annual supply/demand match, as shown by Figure 3.1c, Transco assumes that through to 2004/5 demand will only be met by supplies detailed in Figure 3.1b. As annual demand exceeds reported supply availability during this period an increase in the annual production of supplies can be assumed on the basis of the seasonal nature of demand. From 2004/5 onwards the supply shortfall is met by assumed additional supplies. The assumptions made for the provision of these supplies form the basis to Transco’s supply cases described in section 3.2.

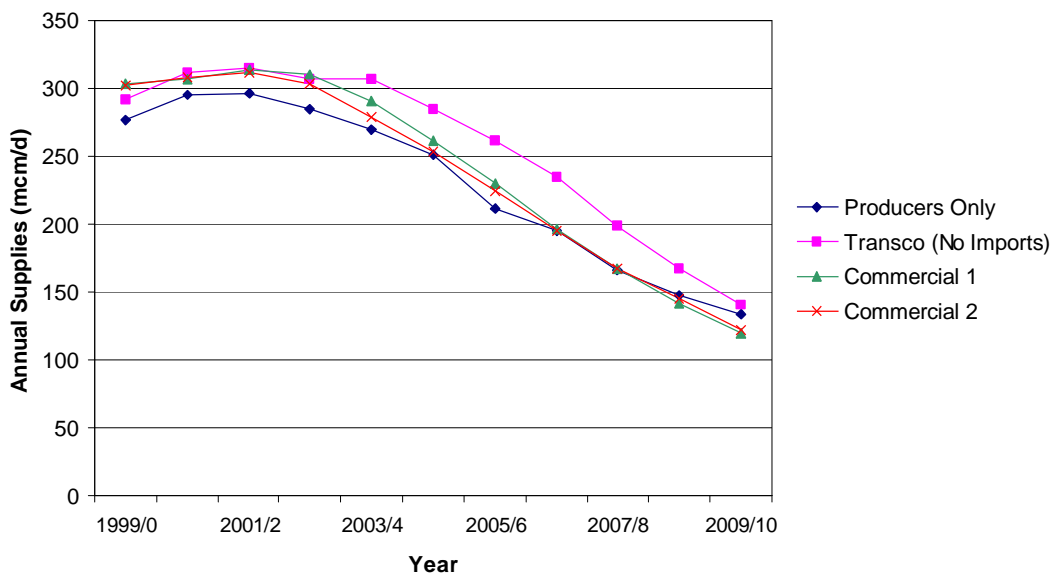
**Figure 3.1c Annual Supplies Modified for Match**



The supply information that Transco has received from the Base Plan consultation process, used as the basis for its supply forecasts, is comparable in the near term with commercially available supply information, as shown in Figure 3.1d. In later years there is a divergence between the Transco and commercially available supply data which is largely due to the variability and availability of long term field specific information.

This divergence highlights the need for Transco to receive field specific data. Without field specific data the BPA derived supply information cannot be readily supplemented leading to the possibility of understated supplies in Transco's forecasts.

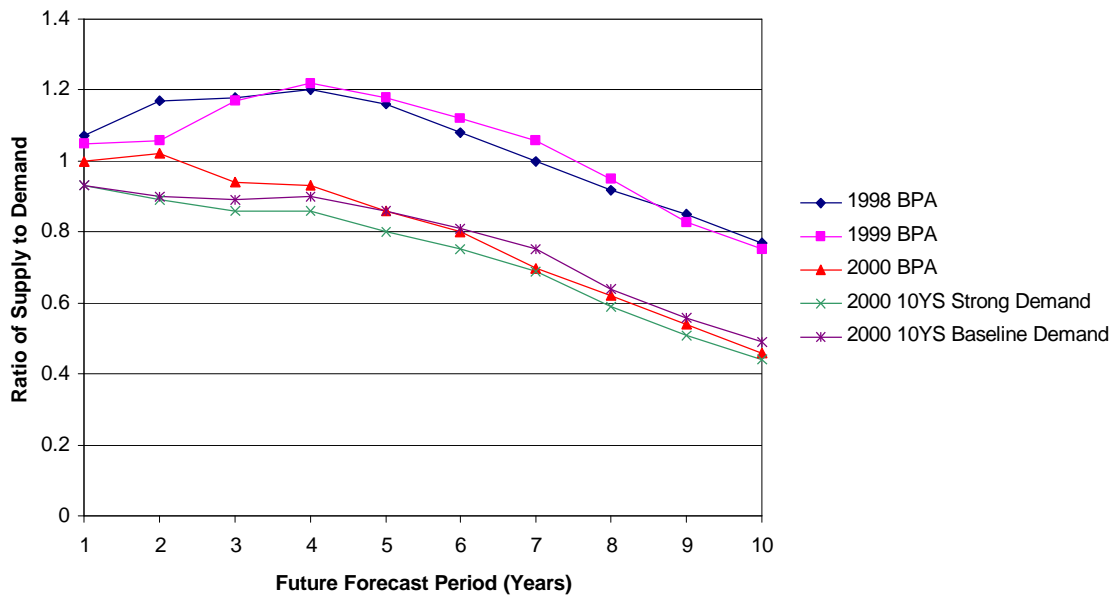
**Figure 3.1d Comparison of Supply Data**



The change that has occurred in the supply position from a surplus of supply last reported in the 1999 BPA, to a potential supply shortfall first reported in the 1999 Ten Year Statement is illustrated in Figure 3.1e. This data provides a comparison of the ratio of available supply to annual demand, where supply availability reflects the information received by Transco (primarily from producers) supplemented with commercially available information. Figure 3.1e clearly shows the erosion of the supply position since the reporting of the 1999 BPA. This is due to a combination of factors notably:

- a reduction in future supply developments as a consequence of a depressed oil price (since recovered). The higher oil price has triggered a small rise in drilling activities during 2000
- consolidation of producers resulting in a more selective approach to new projects both in terms of the United Kingdom Continental Shelf (UKCS) and internationally
- increased demand forecasts, notably to Europe through the Interconnector

Figure 3.1e Supply Availability Versus Annual Demand



### 3.1.2 Crude Oil and Spot Gas Prices

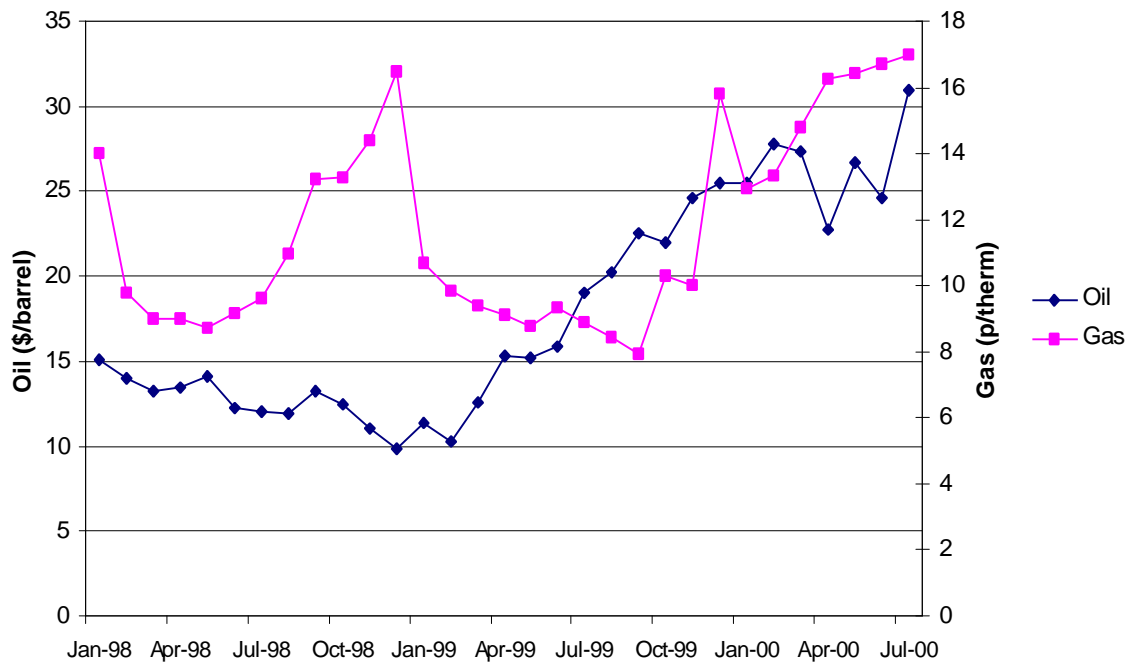
Oil prices, shown in Figure 3.1f, steadily declined from about \$15 per barrel at the start of 1998 to as low as \$10 per barrel in early 1999. Since then there has been a dramatic recovery to recent highs in excess of \$30 per barrel even with reported increased production from OPEC.

British gas prices have also strengthened during this period from summer lows of 8 p/therm in 1999 to 16 p/therm in summer 2000. The seasonal nature of British gas prices, however, is likely to remain. Current summer/winter price differentials are about 6 p/therm.

Though spot market trading in gas is developing at Zeebrugge, volumes to date remain small with most continental gas prices indexed to competing fuels, notably oil.

Differences in British and Continental gas price continue to determine the volume and direction of Interconnector flows. The combination of oil price uncertainties (and hence continental gas prices) and uncertainties around British gas price with its seasonality and currency fluctuations complicates the ability to forecast Interconnector flows. The commencement of SEAL gas to Bacton in 2000/01 will exacerbate this difficulty.

Figure 3.1f Oil and Gas Prices January 1998 to July 2000

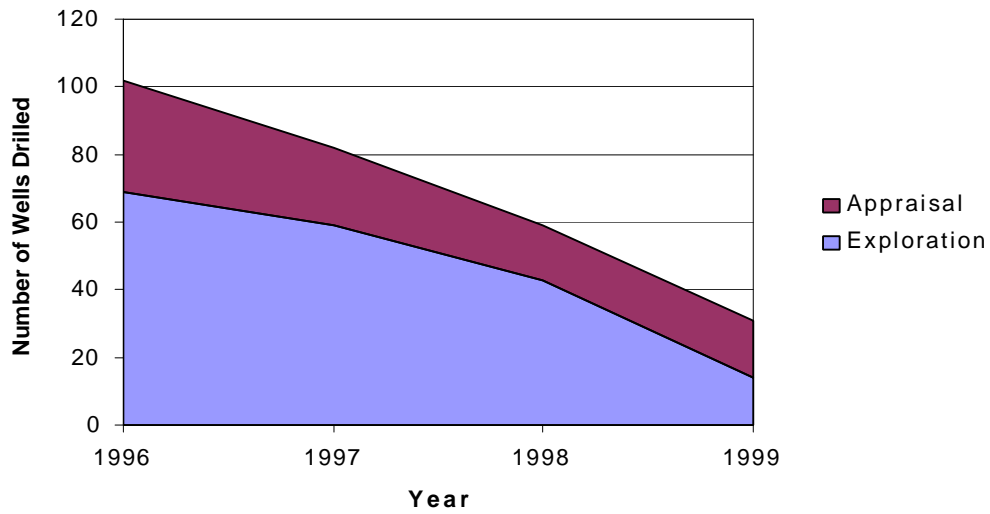


### 3.1.3 UKCS Drilling Activity and Reserves

Though oil and gas prices have recovered from the dramatic falls seen last year, and despite some small recovery in the first half of 2000, UKCS exploration and appraisal, as shown by Figure 3.1g, remains depressed. It may be possible to attribute this to:

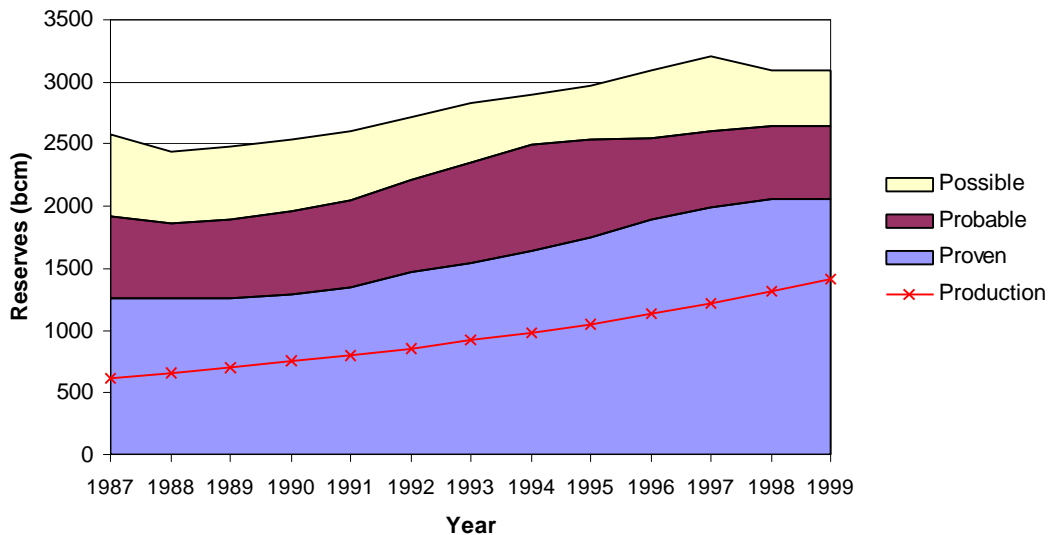
- volatility of oil and gas prices and uncertainties regarding future prices
- low cost exploration opportunities elsewhere in the world
- the UK having insufficient significant development opportunities

Figure 3.1g UKCS Exploration and Appraisal Activity 1996 to 1999



The previous comment that the UK may have insufficient significant development opportunities is based on current commercially available information and relates to stand alone gas projects with the exception of possible future West of Shetland gas developments. Consequently with these few exceptions, most future gas developments including those where gas is essentially a co-product or by-product of hydrocarbon liquids, will utilise existing offshore infrastructure. This is not readily reflected in terms of UKCS reserves which have broadly been maintained at a consistent level above that produced for the last 10 years or so. This is shown below in Figure 3.1h.

Figure 3.1h UKCS Gas Reserves



The more recent trends in Figure 3.1h, over the past 5 years or so, show a levelling off of total UKCS reserves and increased production. If both of these trends were to be continued the UKCS would be fully depleted of gas by about 2020. This far exceeds the current reserves to production ratios for proven reserves which stand at just 8 years but is consistent for maximum reserves which includes proven, probable and possible reserves.



## **3.2 Supply Cases**

The uncertainties outlined in section 3.1 regarding the level of drilling activity and potential new reserves has led Transco to develop two different, but plausible, future gas supply cases.

### **3.2.1 St.Fergus Expansion**

The greatest impact that can reasonably be anticipated is that all future discoveries of new gas supplies will be landed at St.Fergus. Although this seems quite extreme, there could be several drivers that bring this about. Firstly, most of the undeveloped gas reserves on the UKCS are located in northern waters, including the West of Shetland area. For all these developments the closest landing point, if gas is to be delivered to British Markets, is St.Fergus. The other source of large amounts of gas is imports from Norway, which has reserves much higher than those of the UK.

### **3.2.2 Interconnector Balance**

This case assumes that the supply deficit is met by a combination of limited additional supplies at all terminals, with the European Interconnector providing increased flexibility to provide a match. The European Interconnector is emerging as a swing provider.

## **4 Development of the Gas Transportation System**

### **4.1 Gas Volumes and System Development**

Transco maintains and develops the capacity of its pipeline system in order to comply with its obligations as a public gas transporter. Customer requirements are a major driver of Transco activity and, hence, the prospective gas developments described in earlier sections have a significant bearing on the provision of capacity infrastructure - its timing, where and how it is provided.

The primary drivers for investment on the NTS and LTS are:

- increased peak entry capacity for beach supplies at individual terminals
- increased peak exit capacity for generic growth, interconnectors and large specific loads connected directly to NTS or LTS , for example large CHP projects
- ongoing serviceability of the network to ensure supply security and meet legislative requirements
- projects to deliver additional flexibility and security
- increased diurnal storage requirements

Three gas volume supply/demand scenarios have been designed specifically to capture the likely range of potential gas market developments based on the Base Plan consultation process and other information available to Transco, so that these can be evaluated in terms of their potential impact on capacity infrastructure provision. These scenarios are outlined in the following section.

In interpreting the consequences of potential gas market developments, two other factors need to be kept in mind:

- Transco must usually be given between two and three years notice of any new requirements that could necessitate construction of new plant. This notice period is essential to address the long lead times inherent in system reinforcement projects, allow sufficient time to comply with environmental legislation, easement processes, planning procedures (particularly when gaining permission to develop new compressors), enable the placing of orders for specialist materials, etc. In certain circumstances project lead times may exceed this period
- the NTS and LTS networks are designed to satisfy a standard of security equivalent to a 1 in 20 peak day demand, as laid out in the PGT Licence. The provision of this level of security ensures that Transco's networks have sufficient capacity to meet aggregate firm demand for the transmission of gas under 1 in 20 peak day demand conditions. 1 in 20 peak day demand is the demand that, in a long series of winters, with connected load held at the level appropriate to the winter in question, would be exceeded in one out of twenty winters, each winter being counted only once even though the demand may occur on more than one day

## 4.2 Gas Supply/Demand Scenarios for Investment Purposes

Transco indicated in its feedback on the Consultation on Gas Volumes that there is significant uncertainty surrounding the sourcing of future gas supplies. Transco, therefore, has developed three gas supply/demand scenarios combining the two demand and two supply cases outlined in earlier sections to represent plausible outcomes for the UK market. These scenarios are not the only ones that could be developed, but they are indicative of how the UK market may develop and, hence, provide a base for evaluating the likely range of investment required to meet potential market requirements.

The three scenarios are:

- **Strong Demand & Interconnector Balance**
- **Strong Demand & St.Fergus Expansion**
- **Baseline Demand & Interconnector Balance**

It is not considered necessary to combine the Baseline Demand & St.Fergus Expansion cases into a separate scenario as the three selected scenarios provide sufficient information to establish the impact on Transco's development programme of the uncertainty in the forecasts over the period of the long term plan. It should be noted that in all the above scenarios gross export volumes to Europe are identical but in the two scenarios involving Interconnector Balance the maximum potential import capability of the Interconnector (i.e. using compression for imports) is assumed as opposed to the current physical capacity.

Figures 4.2a and 4.2b illustrate the impact of the Interconnector Balance and St.Fergus expansion cases, matched to strong demand, on each of the supply terminals.

**Figure 4.2a Strong Demand & Interconnector Balance**

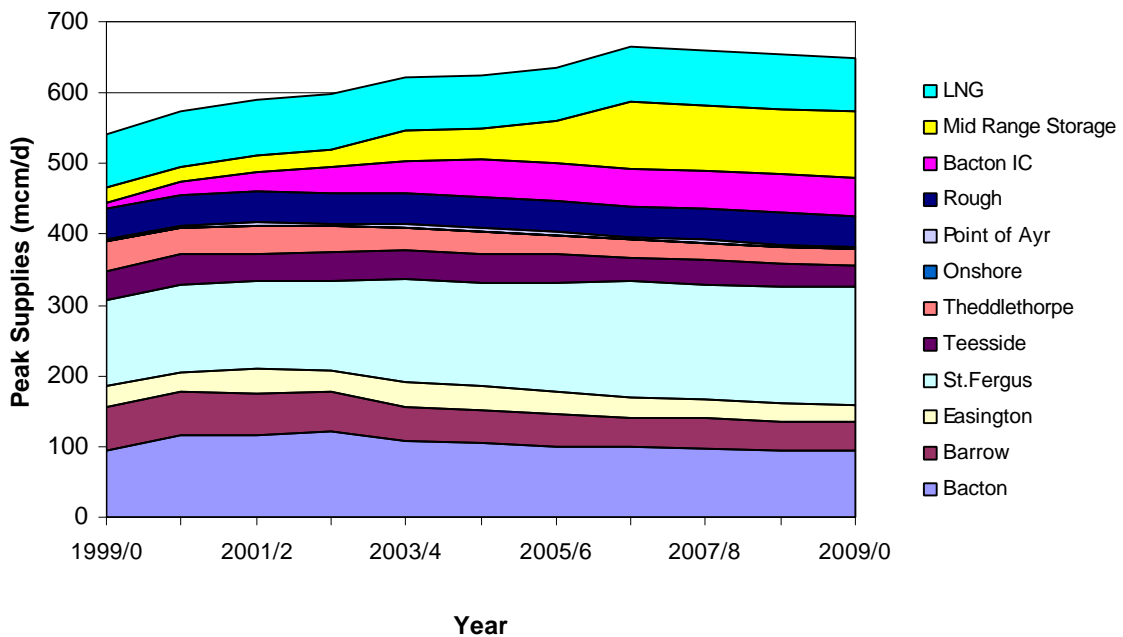
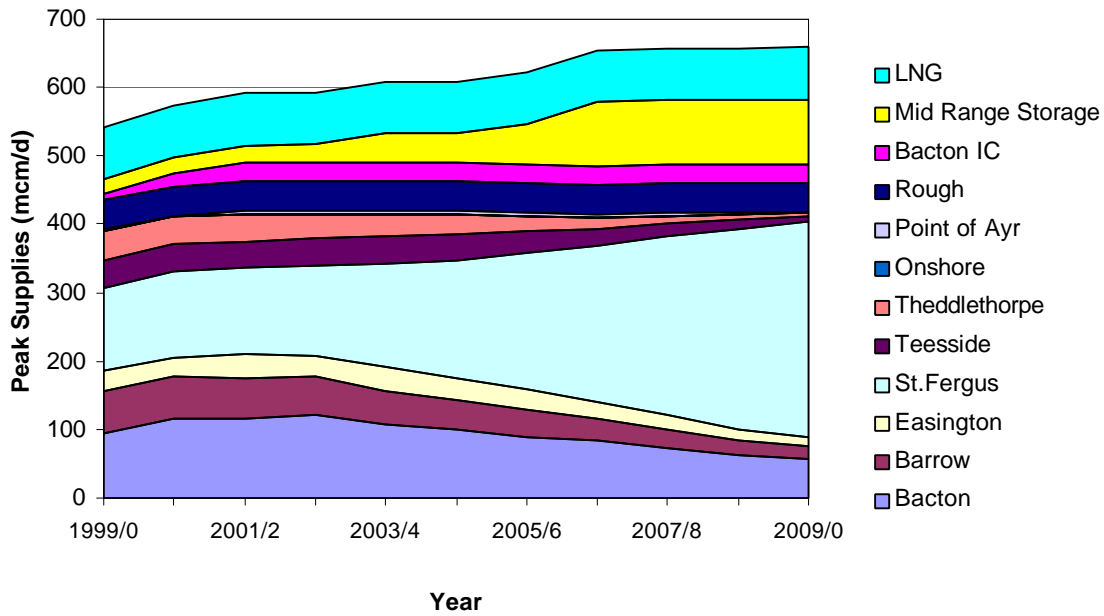


Figure 4.2b Strong Demand & St.Fergus Expansion



### 4.3 NTS Development Plan

Given the length of lead time needed to develop required projects, there is a clear need to resolve the future sourcing of gas to meet prospective demand and avoid unnecessary/inefficient investment in capacity. This emphasises the need for Transco to receive more complete gas field production and development information as part of the Base Plan consultation process.

Following publication of this document, Transco will initiate further consultation on how and where capacity will be provided to meet gas demand requirements.

In addition to providing capacity to meet prospective gas demand, the NTS Development Plan includes:

- projects that would increase network flexibility and security. Such investment would be justified if customers wish to insure against risks associated with shortfalls of gas at the beach or increased transportation, etc.
- serviceability investment, for example for environmental considerations. Transco is proposing a programme, to reduce Carbon Monoxide and Nitrogen Oxide emissions from its compressor stations. The replacement and modification of some compressor station plant and equipment is required by new guidelines issued by the Environment Protection Agency

#### 4.3.1 NTS Projects Completed in 1999

During 1999, all planned projects (as listed by 1999 Ten Year Statement) were completed, namely:

- A. Aylesbury Compressor Station (New Larger Units)
- B. Huntingdon Compressor Station (Re-wheel & Aftercooler)
- C. Aylesbury to Chalgrove (25 km x 900 mm)
- D. Churchover to Newbold Pacey (33 km x 900 mm)  
+ 1 Compressor Station Re-wheel

The following major projects are necessary to meet short term forecast peak flows for the supply years ending 2001 and 2002.

#### 4.3.2 2000 Approved Projects

- E. Carnforth to Nether Kellet (2 km x 900 mm)
- F. Bridge Farm to Birch Heath (20 km x 900 mm)
- G. Shorne to Farningham (16 km x 750 mm)
- H. Bathgate Parallel Compressor Modification
- I. Churchover Compressor Station Upgrade
- J. Alrewas Compressor Station Upgrade

#### 4.3.3 2001 Approved Projects

- K. Aberdeen Compressor Station – Third Unit
- L. Alrewas Compressor Station New Unit
- M. Nether Kellett Compressor Station
- N. Uprating of 1150 km of NTS pipelines
- O. Mawdesley to Warrington (40 km x 1050 mm)
- P. Newbold Pacey to Honeybourne (26 km x 900 mm)
- Q. Wormington to Tirley (30 km x 900 mm)
- R. Peterstow to Llanvetherine (26 km x 600 mm)
- S. St.Fergus to Aberdeen (70 km x 1200 mm)
- T. Huntingdon to Willington (24 km x 900 mm)
- U. Hatton to Silk Willoughby (45 km x 1200 mm)
- V. Llanvetherine to Gilwern (19 km x 900 mm)
- W. Bathgate Compressor Re-wheel
- X. Scunthorpe Compressor Re-wheel
- Y. Wormington Compressor Re-wheel
- Z. Birch Heath to Mickle Trafford (14 km x 900 mm)

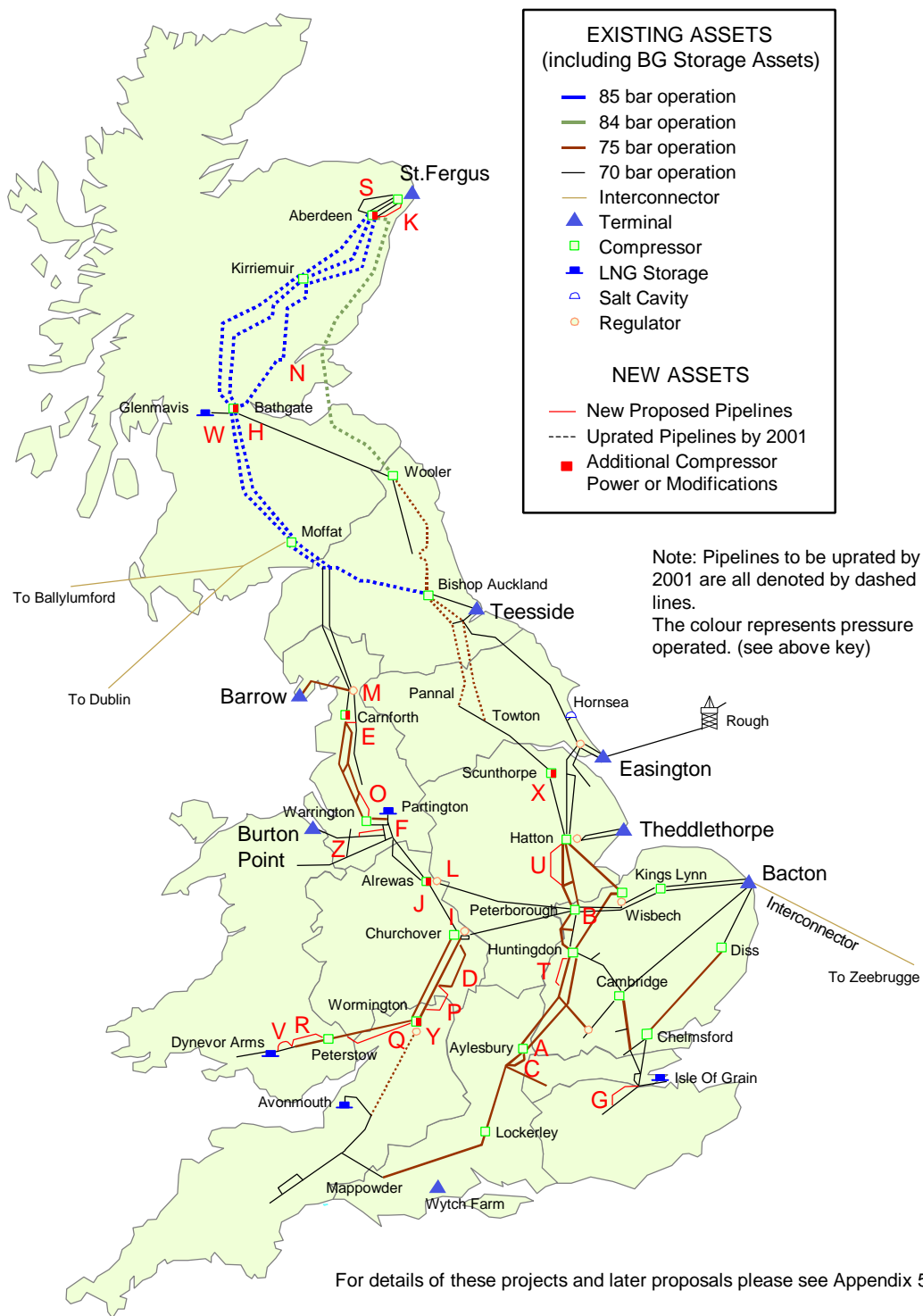
The above projects are shown in Figure 4.3a and in the detailed maps, one for each LDZ, in Appendix 5.



Beyond 2001, there is major uncertainty regarding the prospective level of NTS expenditure. If the growth in demand is met predominantly with gas imports through the European Interconnector, projects will concentrate around reinforcement of the system from Bacton. The alternative supply case will lead to further reinforcement of the system from St.Fergus. The pace of demand growth will also impact on the timing of reinforcements.

As a result, the cost of reinforcement between 2002 and 2006 could range from around £209m in the Baseline Demand/Interconnector Balance scenario to some £1,100m in the Strong Demand/St.Fergus Expansion scenario.

Figure 4.3a NTS Projects Scheduled for Completion by End of 2001



## 4.4 LTS Development Plan

LTS Projects tend to be numerous and of lower value than NTS projects. Major LTS projects include:

### 4.4.1 2000 Approved Projects

North (NO)	- East Cleveland
	- Northern Development
East Midlands (EM)	- Drinton to Sutton on the Hill
Wales (WN & WS)	- Caersws to Machynlleth
	- 3L's (Llandoverly, Lampeter, Llangadog) Phase 1 & 2
South East (SE)	- Betchworth to Rowhook

### 4.4.2 2001 Approved Projects

North West (NW)	- Salmesbury to Helmshore
North East (NE)	- West Hull Reinforcement
Wales (WN & WS)	- Pontyates to Bancyfelin
South East (SE)	- Farningham to High Halden
Southern (SO)	- Ipsden Midgham
South West (SW)	- Maudlin to Indian Queens
	- Nailsea to Weston-Super-Mare
	- Eastern Grey to Minety

Remaining projects are smaller and typically cost less than £2 million.

Appendix 5 provides schematic diagrams of the LTS networks and is intended to give an indication of the approximate location of the networks within each LDZ. Networks operating below 7 bar are not shown.

## 4.5 Overall Investment in the Transportation System

The focus of preceding sections has been on the drivers of investment in capacity. Transco also undertakes significant expenditure on other aspects of the transportation system, notably the replacement of mains and services for safety reasons and the installation and replacement of meters.

Investment for safety reasons is an ongoing priority, which is currently being reviewed with the HSE and Ofgem in the light of a serious incident in December 1999. While a preliminary assessment to cover this uncertainty is included in the overall investment range, the outcome of the review may impact on current forecasts.

On meters, there is an ongoing replacement programme to tackle specific meter categories that are proving to be reading outside of the prescribed tolerance ranges, in addition to meeting shipper requirements for connections and Electronic Pre-Payment Meters.

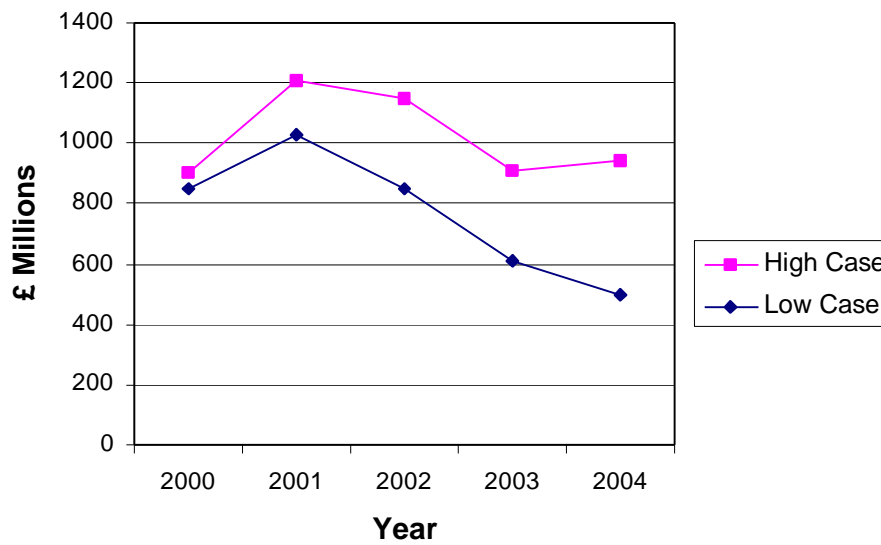
An indication of the relative size of these expenditures can be gauged from 1999 outcomes:

- NTS and LDZ reinforcement to meet supply/demand developments (£265 million invested in 1999)
- replacement of mains and services for system safety (£200 million invested in 1999)
- installation and replacement of meters (£118 million invested in 1999)

Given the nature of the gas supply/demand scenarios presented by this document and associated sensitivities around each major category of expenditure, the investment forecasts presented by figure 4.5a are indicative only. This information does not imply a commitment by Transco to any specific project or to any level of expenditure, apart from those designated as committed in the NTS and LTS Development Plan sections.

It can be seen from Figure 4.5a the implications of the gas volume scenarios and additional sensitivities on other areas of transportation investment are significant in terms of overall Transco investment. Expenditure could range from around £3,840m over the period 2000-2004 to some £5,110m, depending primarily on supply/demand developments.

**Figure 4.5a Gross Capital & Net Replacement Expenditure 2000 to 2004**



£m (2000 prices)	2000	2001	2002	2003	2004	Total 2000 - 2004
Low Case	850	1,030	850	610	500	3,840
High Case	900	1,210	1,150	910	940	5,110