

Chapter 1: Long term trends

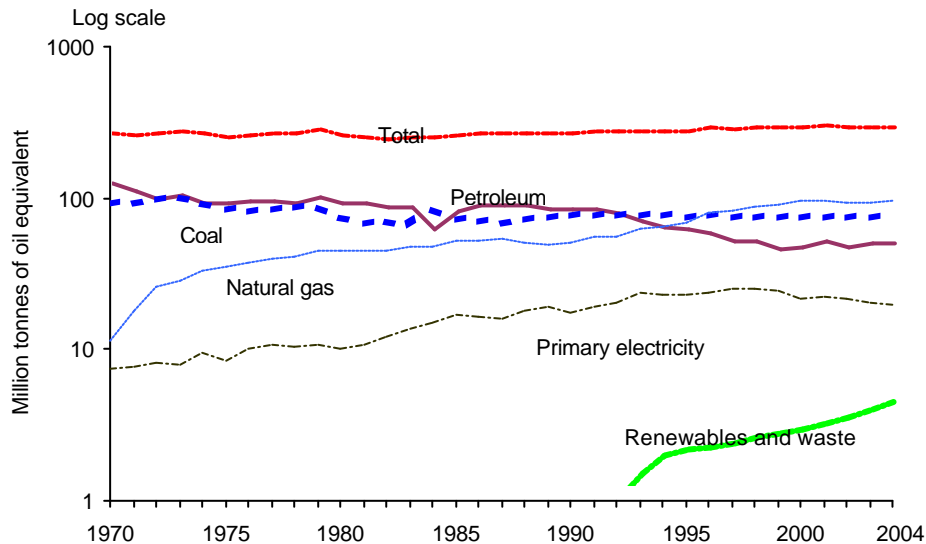
Energy

Inland consumption of primary fuels (Table 1.1.1)

1.1.1 The trends for inland consumption of primary fuels for energy use are illustrated below in Chart 1.1.1. Overall consumption for energy use increased steadily up to 1973, when the oil price rise following the Arab-Israeli war of that year led to a major change in patterns of fuel consumption. Having reached a level of over 220 million tonnes of oil equivalent in 1973, energy use fell, but by 1979 had returned to a similar level to that in 1973. After the outbreak of another Middle East war, consumption fell back to less than 200 million tonnes of oil equivalent in the years 1981 to 1984. It has since grown again, and by 1996 had exceeded the peak levels of 1973 and 1979. In 2004 it had grown to 234.9 million tonnes.

1.1.2 The changing trend in overall energy consumption was affected by petroleum consumption, which had continued to grow in the period 1970 to 1973 despite the strong growth in consumption of natural gas and primary electricity, mainly nuclear. After 1973 petroleum consumption declined for ten years, following much the same pattern as coal use. Over the last ten years petroleum consumption has not changed a great deal. In 2003 consumption had fallen to its lowest level since 1987, but consumption increased slightly in 2004. Over the same period the decline in coal consumption has continued, although it increased in 2000, 2001 and 2003 when there was increased demand for coal at power stations. Natural gas consumption grew steadily over this period, and exceeded petroleum consumption for the first time in 1996 and by 2004 it accounted for 41 per cent of all fuels consumed. Consumption of energy from renewables and waste continued to increase in 2004.

Chart 1.1.1: Inland consumption of primary fuels and equivalents for energy use, 1970 to 2004



Availability and consumption of primary fuels and equivalents (Table 1.1.2)

1.1.3 An overall view of energy presented in the form of energy balances is given in Table 1.1.2. It is based on [Chapter 1](#), Tables 1.1 to 1.3 with the time series extended back to 1970. Supplies and uses of energy are expressed on an energy-supplied basis in tonnes of oil equivalent, and are balanced by fuel type and for total energy. More details on the derivation of these balances and on the calculation of energy contents are given in [Chapter 1](#), paragraphs 1.26 to 1.27. Calorific values of fuels are shown in [Annex A](#).

Chapter 2: Long term trends

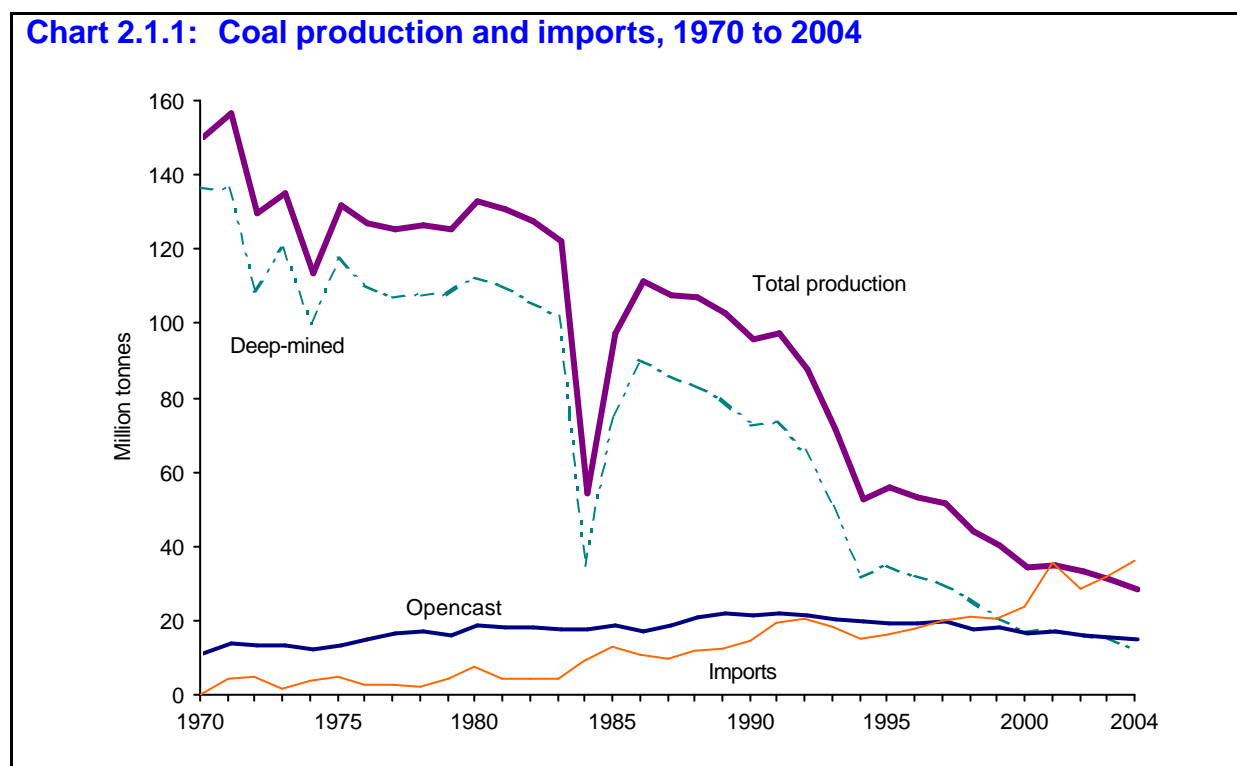
Solid fuels and derived gases

Coal production and stocks ([Table 2.1.1](#))

2.1.1 Figures for coal production, imports, overseas shipments and stocks are given in Table 2.1.1, which is based on Table 2.7 in [Chapter 2](#) of the main Digest. The table series extends back to 1970.

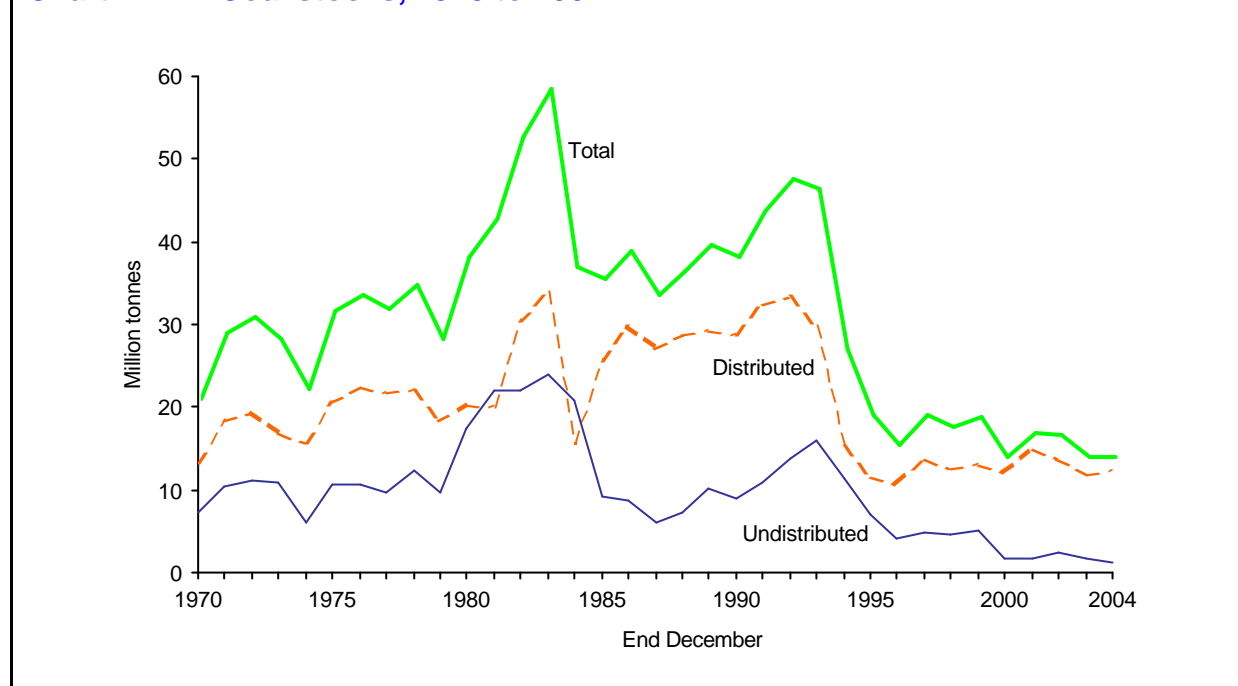
2.1.2 Table 2.1.1 shows a decline in deep-mined production of 91 per cent since the highest level shown in this table in 1970. Opencast production in 2004 was at its lowest since 1976. Table 2.1.1 also shows that imports, initially of coal types in short supply in this country, started in 1970. Imports grew steadily to reach the 20 million tonnes a year mark by the late 1990s. The very rapid expansion of imports in 2001 meant that imports exceeded the level of UK production for the first time. In 2002 imports fell sharply and were slightly lower than UK production but picked up in 2003 and exceeded production again. In 2004 imports were at a new record and accounted for nearly 60 per cent of coal supplied. These trends are illustrated in Chart 2.1.1.

Chart 2.1.1: Coal production and imports, 1970 to 2004



2.1.3 Stock levels in the early 1990s were relatively high, reaching a peak of 53 per cent of annual inland coal consumption in 1993. After this, electricity generators began to run down their stocks sharply, so that at the end of 1996 stocks were only 21 per cent of annual consumption. But between 1997 and 1999 they rose again, in proportionate terms, to 33 per cent of annual consumption. In 2000 stocks fell to 23 per cent of annual consumption, but rose to 26 per cent in 2001 and to 28 per cent in 2002 before falling back to 1996 levels in 2003. In 2004 stocks as a proportion of annual consumption were marginally higher at 22 per cent. Trends in coal stocks are shown in Chart 2.1.2, below.

Chart 2.1.2: Coal stocks, 1970 to 2004



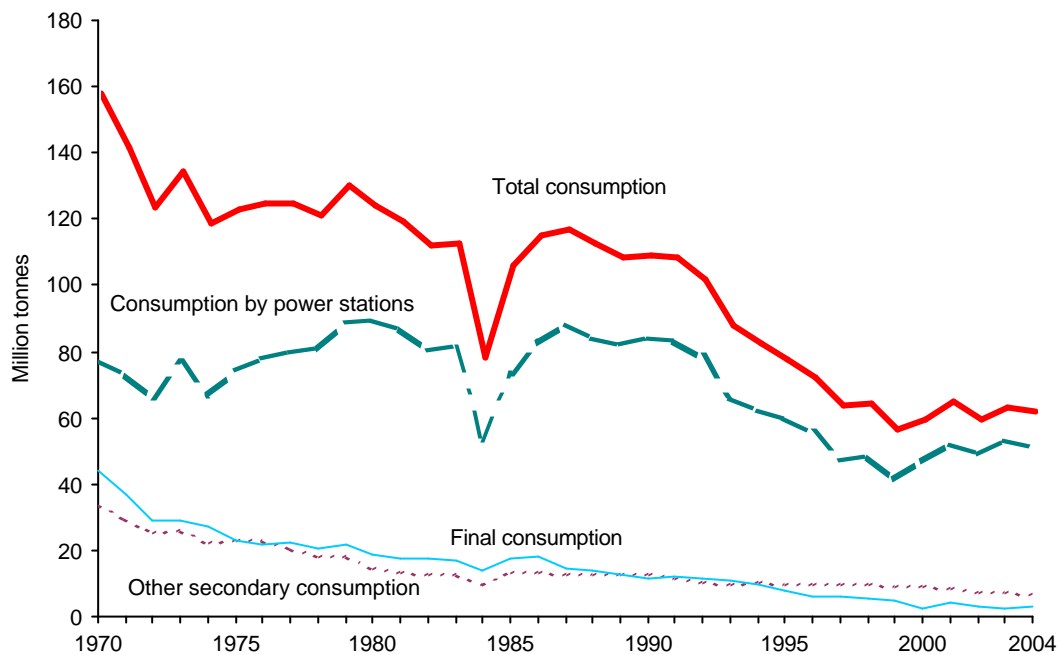
Inland consumption of solid fuels (Table 2.1.2)

2.1.4 Figures for inland consumption of coal by fuel producers and final users are given in Table 2.1.2, which based on Table 2.7 of [Chapter 2](#) of the main Digest. The table also shows final consumption figures for coke and breeze and other solid fuels based on Table 2.8 of Chapter 2. These products are mainly supplied from the conversion of coal, supplemented by a small amount of foreign trade. Where possible the series have been extended back to 1970.

2.1.5 Trends in inland consumption of coal, in total and by power stations, coke ovens and final consumers, are illustrated in Chart 2.1.3 below.

2.1.6 Total inland consumption of coal fell by 61 per cent from 157 million tonnes in 1970 to 61 million tonnes in 2004. Consumption by the electricity generators increased from 77 million tonnes in 1970 to a peak of 90 million tonnes in 1980 and continued in the 80-90 million tonnes range until 1991 with the exception of the miners' strike years. With the increased use of nuclear power and natural gas, the consumption of coal by the generators fell steadily after 1991 until 1999, with the exception of 1998, when coal fired generation was called upon to make up for the temporary reduction in imported electricity from France. After 1999 coal fired generation increased. In 2000 this was because nuclear generation suffered a large number of outages for repair and maintenance, but from the end of 2000 and into 2003 the fluctuations in gas prices has enabled coal fired stations to supply electricity at a lower cost than some gas fired stations. In 2004, coal prices rose relative to gas prices and made gas cheaper to burn, this led to a reduction in the amount of coal consumed. The proportion of electricity supplied from coal in the early 1990s was around 70 per cent, falling to 28 per cent in 1999, but increasing to 33 per cent in 2004 (see [Chapter 5](#) of the main Digest). At 51 million tonnes in 2004, use of coal at power stations represents 84 per cent of total coal consumption, compared with only 49 per cent in 1970.

Chart 2.1.3: Inland consumption of coal, 1970 to 2004



(1) Includes all generators from 1987 only (see footnote (1) to Table 2.1.2).

2.1.7 A more detailed examination of historical coal statistics was published in the September 2001 issue of Energy Trends. This looked at trends in coal production, consumption and employment in the coal mining industry over the last 150 years. The updated data set on which the article is based includes data for 2004 and is available on the DTI website at:

www.dti.gov.uk/energy/inform/energy_trends/coalsince1853.xls

The original article is to be found at:

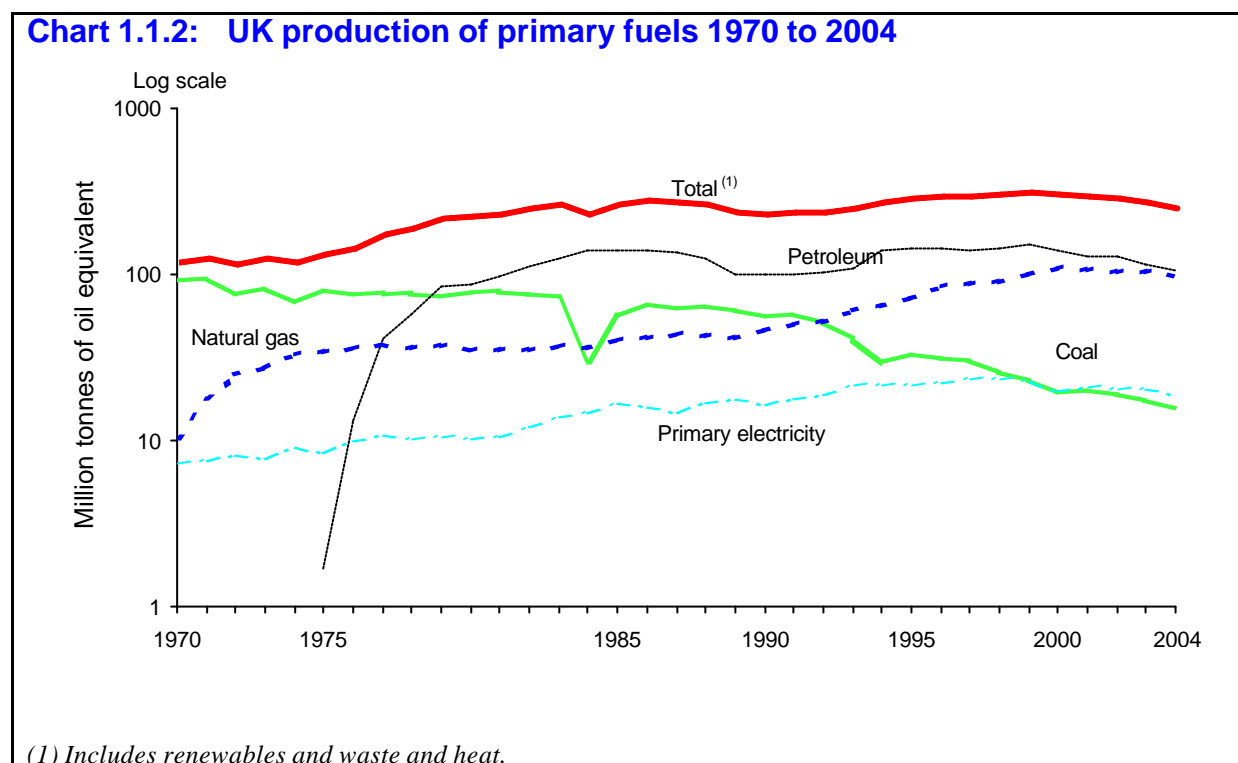
www.dti.gov.uk/energy/inform/energy_trends/2001/sep_01.pdf (page 16).

[Chapter 2, long term trends, tables](#)

[Chapter 2, main text](#)

[Chapter 2, main tables](#)

1.1.4 Trends in the production of primary fuels in the United Kingdom are illustrated in Chart 1.1.2.



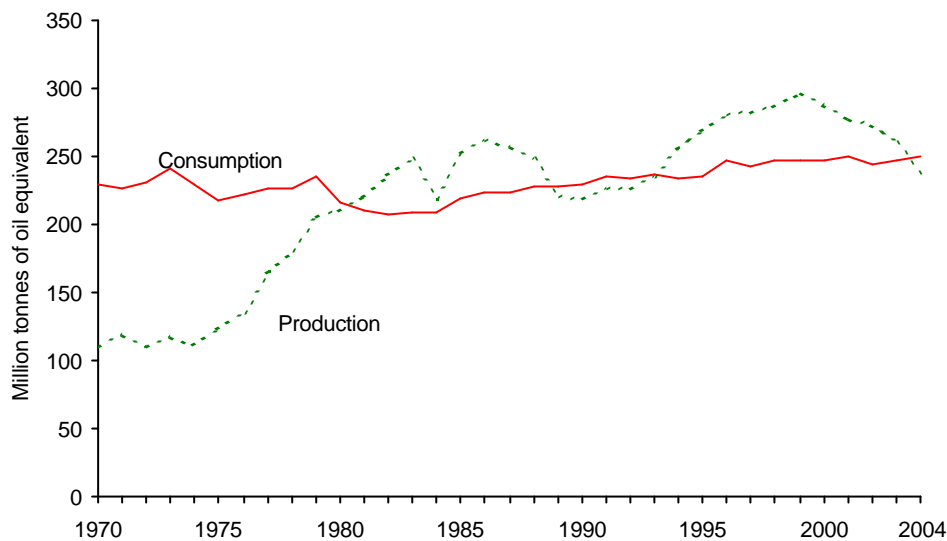
1.1.5 In 1970, total energy production was around 111 million tonnes of oil equivalent with coal accounting for some 84 per cent. From 1975, petroleum production also grew rapidly to peak at over 139 million tonnes of oil equivalent in 1985 when it accounted for 55 per cent of total energy production at 252.5 million tonnes of oil equivalent. By 1991, temporary production problems had reduced petroleum production to less than 100 million tonnes of oil equivalent. Since then petroleum production has steadily recovered, reaching a record level of 150.2 million tonnes of oil equivalent in 1999. Between 1999 and 2004 production of petroleum fell by 30 per cent and represented 44 per cent of total energy production in 2004. Natural gas from the North Sea started to be produced in substantial quantities from the early 1970s, accounting for 9½ per cent of total production in 1970, and grew steadily to peak at 108.4 million tonnes in 2000. Since then natural gas production has eased and by 2004 had fallen by 11 per cent from this peak, and it accounted for 40 per cent of total energy production. In 2004, coal accounted for 7 per cent of total energy production and nuclear, wind and hydro electricity together accounted for 8 per cent.

Comparison of net imports of fuel with total consumption of primary fuels and equivalents (Table 1.1.3)

1.1.6 In Table 1.1.3 gross fuel consumption in the United Kingdom, including non-energy use and international marine bunkers, is compared with net imports of fuel to show net import dependency or net export ratio.

1.1.7 Chart 1.1.3 shows United Kingdom primary energy production and consumption (from Table 1.1.2) and illustrates the degree to which the United Kingdom was dependent on energy imports prior to North Sea oil and gas becoming available. In the early 1970s energy imports accounted for over 50 per cent of United Kingdom consumption, but by 1983 the United Kingdom was a net exporter at a level equivalent to 18 per cent of inland consumption. After 1986 net exports declined. Following temporary production losses in the North Sea, the United Kingdom became a small net importer of energy between 1989 and 1992. Between 1993 and 2003 the United Kingdom became a net exporter again with a new peak of 21 per cent in 1999. However, in 2004 the United Kingdom became a net importer again at a level of 4.9 per cent of inland consumption.

Chart 1.1.3: UK energy production and consumption 1970 to 2004



Energy ratio (Table 1.1.4)

1.1.8 The relationship between energy consumption and economic activity at the aggregate level can be gauged by comparing a country's temperature corrected inland primary energy consumption with its gross domestic product (GDP). This approach is simple and comprehensive but it has a number of drawbacks which were discussed in articles in the August 1976, May 1981 and May 1989 issues of *Economic Trends* (The Stationery Office).

1.1.9 The temperature corrected series of total inland fuel consumption given in Table 1.1.4 indicates what annual consumption might have been if the average temperature during the year had been the same as the average for the years 1971 to 2000. This average is given, with annual deviations, in Table 1.1.7 whilst Table 1.1.8 shows average temperatures for each month from 1970. The corrections used to increase demand per degree Celsius above average are:

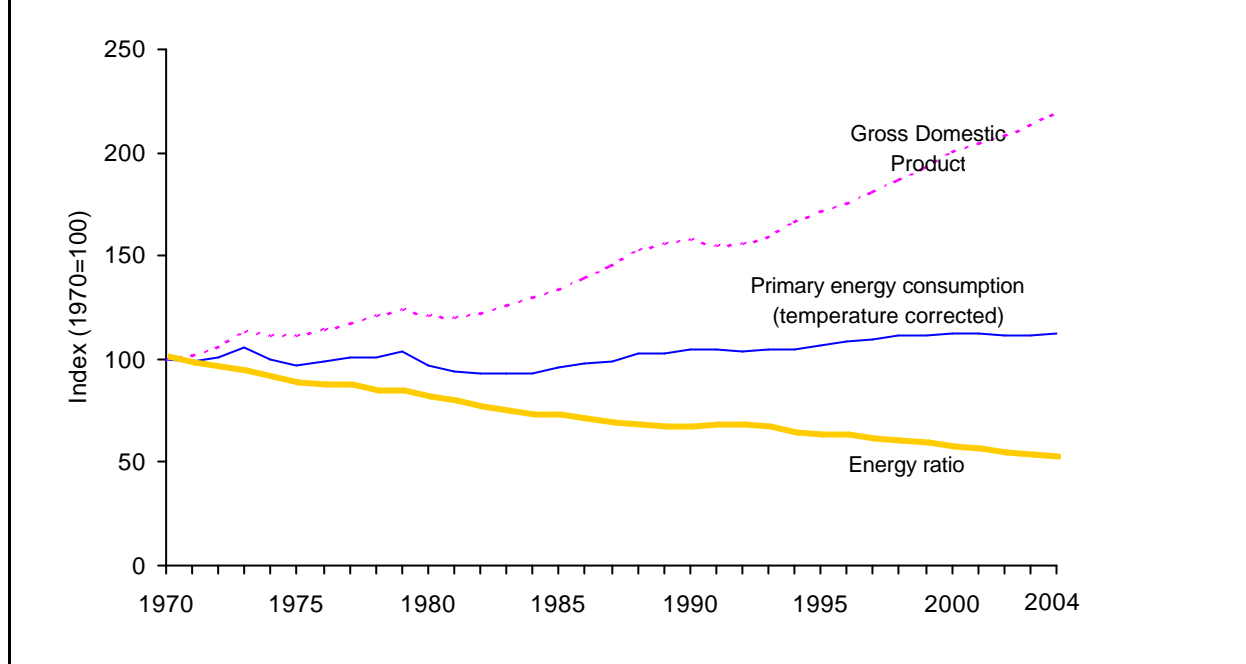
Coal	2.1 per cent
Petroleum	0.7 per cent (June - August)
	1.8 per cent (September - May)

1.1.10 Figures for natural gas from 1990 onwards are corrected using a method developed by Transco. Prior to 1990, the annual temperature adjustment applied by the DTI differed from that applied by British Gas due to the effect of seasonal adjustment of the monthly data. Nuclear, hydro and net imports of electricity are not corrected for temperature.

1.1.11 Table 1.1.4 show the United Kingdom's temperature corrected inland primary energy consumption in column A and GDP at constant prices since 1970 (column B), both expressed in absolute units (millions of tonnes of oil equivalent and billions of 2000 pounds sterling respectively). Dividing energy consumption by GDP yields the energy ratio, which is expressed in column C of the table as energy consumed per million pound of GDP and in column D as an index number based on 2000=100. For GDP at constant prices the published measure of GDP at market prices at 2001 prices has been used. The GDP figures used are now on the European System of Accounts (ESA 95) basis, consistent with the UK national accounts.

1.1.12 Chart 1.1.4 illustrates trends in primary energy consumption, GDP and the energy ratio over the period 1970 to 2004.

Chart 1.1.4: Energy ratio since 1970



1.1.13 Chart 1.1.4 shows that energy ratio fell steadily (with the exception of 1990 and 1991) from its 1970 level to 51 per cent by 2004, an average decrease of nearly 2 per cent per annum. The strong downward trend since 1970 is explained by at least four factors: improvements in energy efficiency; saturation in the ownership levels of the main domestic appliances; the unresponsiveness of certain industrial uses, like space heating, to long run output growth; and a structural shift away from energy intensive activities (such as steel making) towards low energy industries (such as services).

Energy consumption by final user (Table 1.1.5)

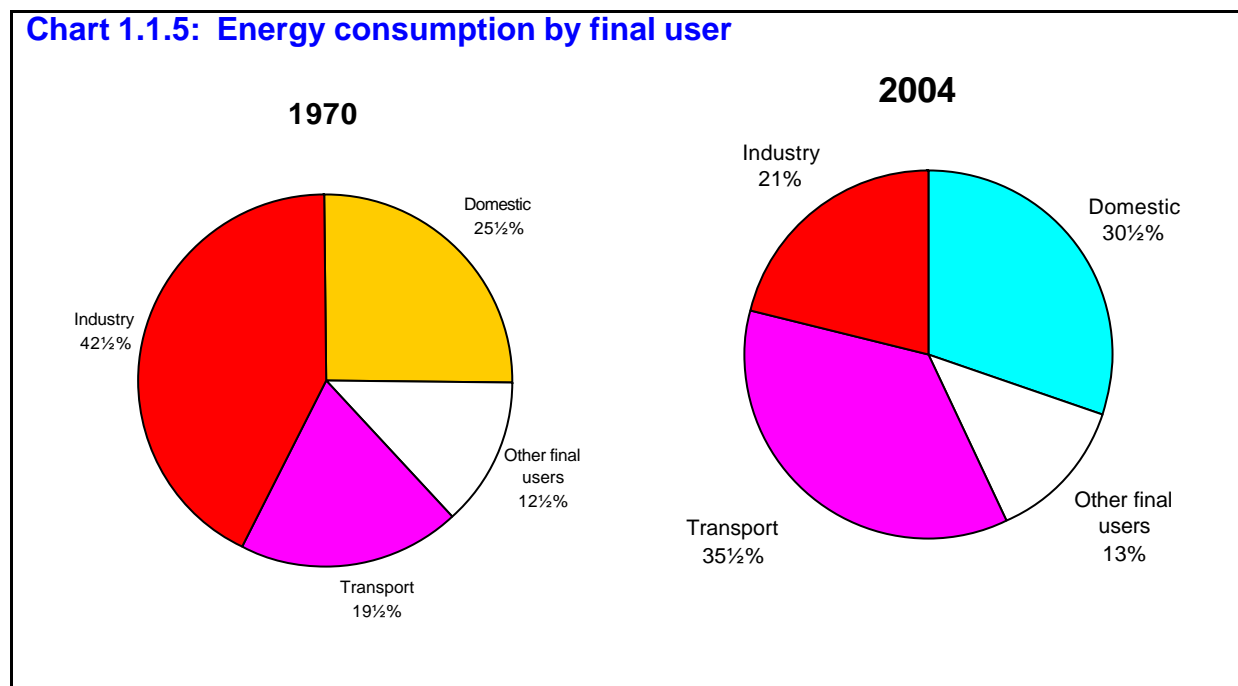
1.1.14 Figures for energy consumption (excluding non-energy use) by category of final users are given in Table 1.1.5. Final users' consumption is net of the fuel industries' own use and conversion, transmission and distribution losses, but it includes conversion losses by final users. The user categories are industry (including iron and steel), transport (including coastal shipping), domestic and other final users (public administration, agriculture, commerce and other sectors), see [Chapter 1](#), paragraphs 1.52 to 1.56.

1.1.15 Up to 1986 data for final consumption of electricity include acquisitions from public supply, output of industrial nuclear stations, and amounts produced by transport undertakings and industrial hydropower for final consumption. From 1987 onwards, all consumption of electricity, whether produced by major power producers or by other generators are included. There is a corresponding change in treatment, between 1986 and 1987, for other fuels used in electricity generation (see [Chapter 1](#), paragraph 1.32).

1.1.16 Overall consumption by final users followed the same pattern as overall primary energy consumption since 1970, accounting for around 70 per cent of the total consumption throughout the period.

1.1.17 In 1970, industry (including iron and steel) sector had the greatest level of consumption, with 43 per cent of total final consumption. However, since 1970 this sector has steadily reduced its consumption so that it now stands at 21 per cent of total final consumption for energy use. This share is now less than that of the domestic sector which, at 30 per cent, has retained around the same share since 1980. Greatest growth has been in the transport sector; this had a share of 19 per cent in 1970, but has risen to 36 per cent in 2004.

1.1.18 A comparison of energy consumption for energy purposes by final users in 1970 and 2004 is shown in Chart 1.1.5.



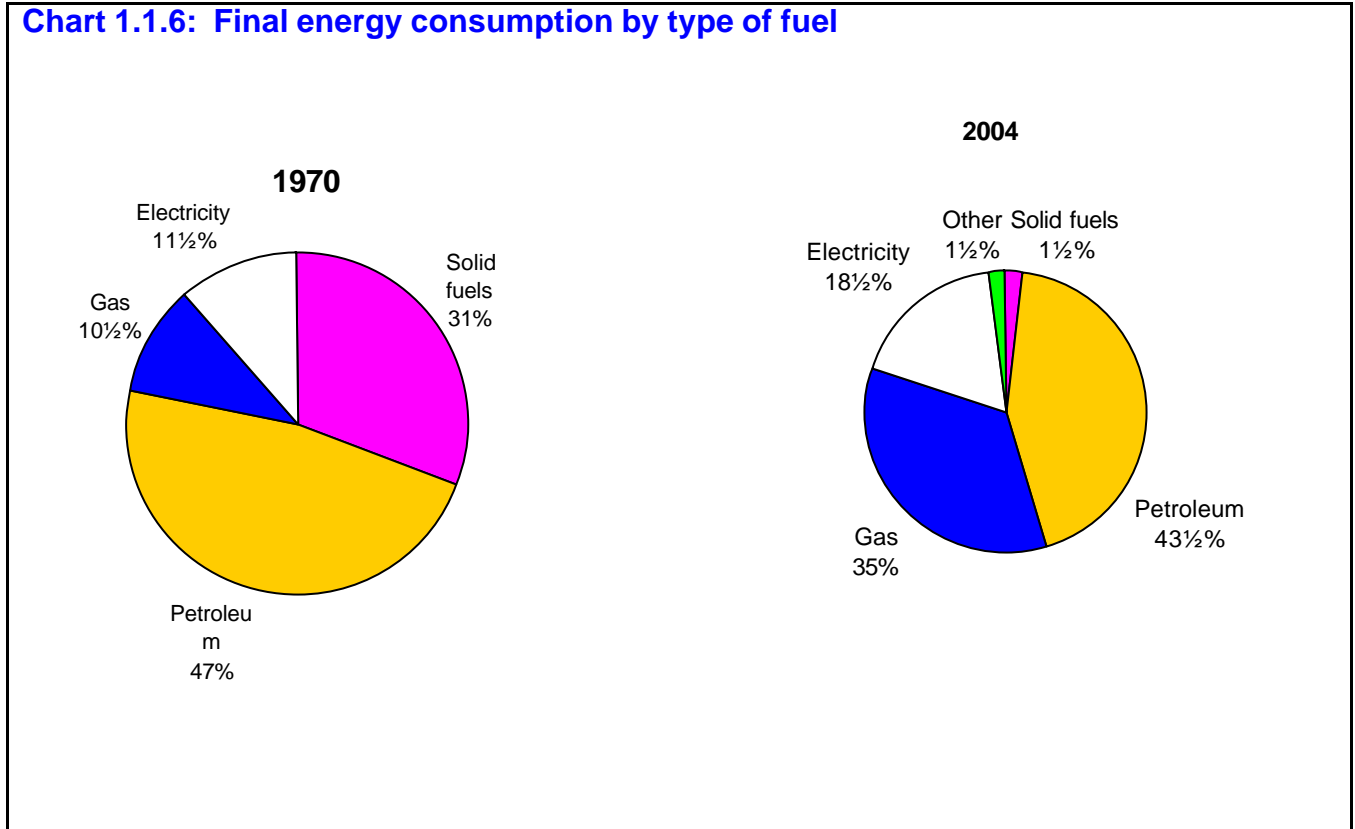
1.1.19 Table 1.1.5 also shows trends in final energy consumption for individual fuels. In 1970, consumption of coal and other solid fuels accounted for 31 per cent of final energy consumption, but this share has declined steadily, as the level of natural gas usage increased at the expense of both solid fuel and petroleum consumption. Electricity consumption has made steady progress over the last three decades, rising from 11 per cent of the total in 1970 to 18 per cent in 2004. A comparison of final energy consumption for individual fuels in 1970 and 2004 is shown in Chart 1.1.6.

Expenditure on energy by final user (Table 1.1.6)

1.1.20 Total expenditure on fuels is presented in Table 1.1.6 from 1970; and figures for recent years are illustrated in [Chapter 1](#), Chart 1.4. Data for the latest years are taken from the value balances ([Chapter 1](#), Tables 1.4 to 1.6) whilst earlier years are taken from their forerunner tables of estimated values of energy purchases by sector. The total fuels series is simply the sum of fuels presented in the table and so is slightly different from the value presented in the value balances as other fuels and heat sold (which accounted for around 0.5 per cent of total final expenditure in 2004) are excluded but coal purchased by the iron and steel sector is included as a final purchase of coal.

1.1.21 Overall final expenditure on energy rose by around £11,020 million (about 17 per cent) in 2004 compared to 2003. The level of £75,105 million represents a 39 per cent rise on 1995 and 63 per cent more than in 1990. The final expenditure for coal and solid fuels and petroleum products increased in 2004 by 24 and 22 per cent respectively, whereas expenditure on electricity and gas rose by 6 and 10 per cent respectively.

Chart 1.1.6: Final energy consumption by type of fuel



1.1.22 The make up of total expenditure has changed through time reflecting structural or long term changes in fuel mix and shorter term price and consumption effects. In 1970, expenditure on coal and coke accounted for around 15 per cent of total final expenditure but was down to 1 per cent in 2004. By contrast, the general increase in the consumer price of petroleum (where duty is a major component) has meant that petroleum rose from 45 per cent of all expenditure in 1970 to 65 per cent in 2004. Electricity, despite seeing over a 77 per cent increase in volume consumed since 1970, still accounts for roughly the same share of total expenditure, 21 per cent in both 1970 and 2004, as prices have seen significant real term falls.

Mean air temperatures (Tables 1.1.7 and 1.1.8)

1.1.23 These tables give the average air temperatures in Great Britain between 1971 and 2000 by year, part year and month. Deviations from these means are presented for January 2000 to December 2004. Average monthly temperatures back to 1970 are also given in Table 1.1.8. These temperature deviations are used to provide the temperature corrected consumption series in Table 1.1.1. The average temperature in 2004 was 1.1 degree Celsius higher than the long term mean.

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[Chapter 1. Energy. main tables](#)

Chapter 3: Long term trends

Petroleum

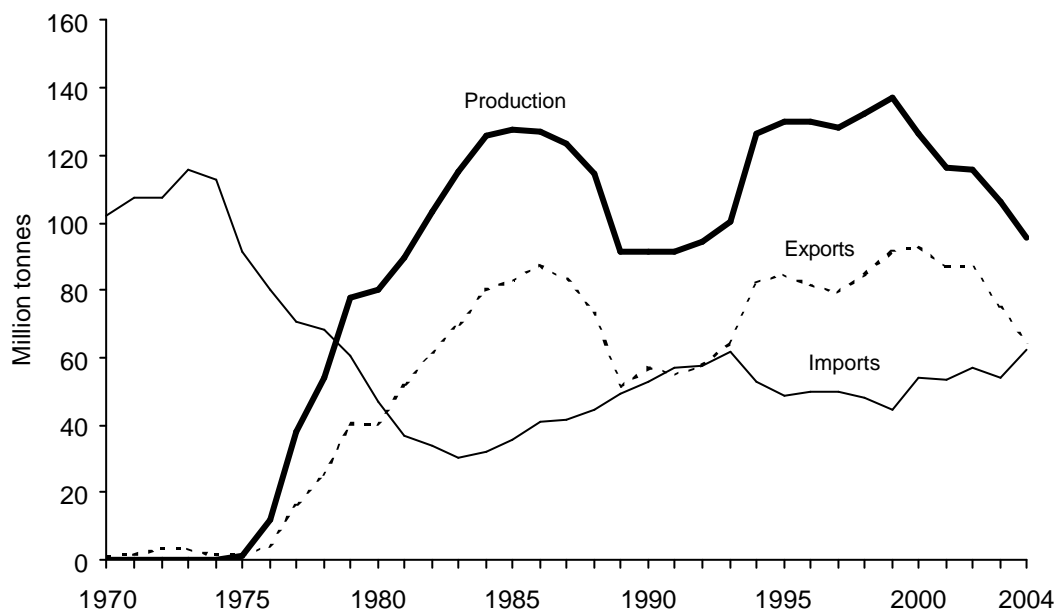
3.1.1 Tables 3.1.1 and 3.1.2 present extended time series of selected, more aggregated data, from the tables in [Chapter 3](#) of the Digest of United Kingdom Energy Statistics. They give additional background on the historic development of the crude oil and petroleum sectors.

Crude oil and petroleum products: production, imports and exports ([Table 3.1.1](#))

3.1.2 The left-hand side of Table 3.1.1 shows data from 1970 to 2004 for production, imports and exports of crude oil (including natural gas liquids and feedstocks) and oil products. This part of the table also shows United Kingdom refinery throughput of crude oil, and the inland deliveries of oil products. Indigenous production of crude oil is shown in total with landward production shown separately.

3.1.3 The first three columns of the right-hand side of Table 3.1.1 consist of time series showing net exports of crude oil and products. It should be noted that exports of crude oil include some imports that have been re-exported. In years of significant indigenous production these have little effect on exports as a proportion of indigenous production, but in the earlier years (approximately pre-1975) the re-exports exceeded indigenous production and thus the ratio of exports to indigenous production was greater than one.

Chart 3.1.1: Production, exports and imports of oil⁽¹⁾ 1970 to 2004



(1) Includes crude oil, natural gas liquids and process oils.

3.1.4 Chart 3.1.1 illustrates the trends in the production, exports and imports of crude oil. It shows that indigenous production of crude oil was negligible up to 1974 and then increased rapidly as North Sea production came on stream. Imports peaked in 1973, immediately prior to the first OPEC price 'hike'. The chart shows the rapid decline of net imports thereafter as imports fell and indigenous production rose, until 1981 when the surplus turned from net imports to net exports. Net exports peaked in 1984, one year before the first peak for North Sea production in 1985.

3.1.5 The large fall in production in 1988 and particularly 1989 reflects the effects of the Piper Alpha disaster and subsequent incidents, and the continued 'low' production in 1990 and 1991 reflects the consequent safety work. Production has been declining since the peak production of 137 million tonnes in 1999. In 2004 production was 10 per cent lower than in 2003. More information on the reasons behind this reduction can be found in [Annex F](#), paragraph F.9

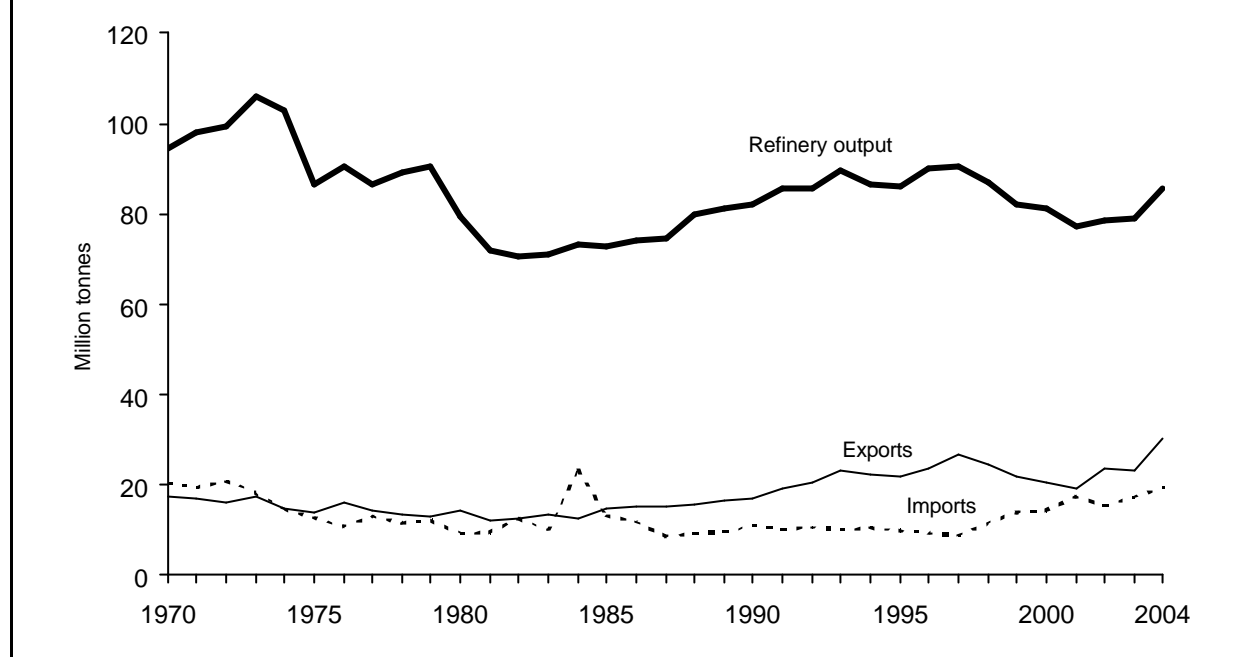
3.1.6 Table 3.1.1 also shows that the import share of refinery throughput of crude oil fell from near 100 per cent, prior to North Sea oil production starting, to a low of 39 per cent in 1983 (the lowest year for imports), before rising to 64 per cent in 1993. Since then, indigenous production has increased significantly leading to the import share falling to 51 per cent in 1999, the year of record UK production of crude oil. The imports' share has since risen to 70 per cent in 2004 due to the lower levels of production mentioned above. These developments are mirrored by the changes in the ratio of indigenous production to refinery throughput. Ignoring pre-1976 figures, the proportion of indigenous production exported increased from 35 per cent to around two-thirds towards the end of the 1980s. Although the decreases in production in the late 1980s did lead to some reduction in the level of exports, the proportion of production exported continued at roughly this level during the 1990s. Since 2000, however, the proportion has risen to about two thirds.

3.1.7 In 1984 the UK was a net importer of oil products due to the increased demand for oil products as a result of the miners strike. Since 1984 the UK has been a net exporter of oil products with increases in exports during the 1990s leading to a record high in 1997. The increases in net exports of products in the 1990s reflect the increased throughput from refineries mainly feeding through to increased exports of oil products, rather than increases in deliveries to the domestic market. Net exports of products decreased in both 1998 and 1999, (following the closure of the Gulf Oil refinery from December 1997). The closure of the Shell Haven refinery was the main reason for the decline in net exports of products in 2000. The sharp fall in 2001 occurred due to a number of prolonged shutdowns and slowdowns at refineries in the first half of the year to allow upgrade work for the introduction of ultra low sulphur petrol. Imports of crude oil in 1991 (and marginally again in 1992) exceeded exports for the first time since 1980. Net exports of crude oil resumed in 1993, and continued to rise until 1999. In 1999 net exports of crude oil were 47 million tonnes at their highest since 1984 with overall net exports of crude oil and oil products at a record level of 54½ million tonnes. However, the decreased level of crude oil production since 1999 has seen net exports of crude oil falling over the last five years to 2 million tonnes in 2004. In 2004 net exports of crude oil and oil products stood at 12½ million tonnes, a decrease of 52 per cent on 2003.

3.1.8 Refinery throughput peaked in 1973 but subsequently fell to pre-1970 levels together with refinery output. (The difference between refinery throughput and output is refinery use of fuel and gains/losses). Since the low point of 1982/83, both refinery throughput and output increased to a new peak in 1997. However, with the closure of the Gulf Oil refinery in late 1997, refinery output fell by 3½ per cent in 1998 and then by another 6 per cent in 1999 to the lowest level seen since 1989. However, the remaining refineries in the UK worked to increase their capacity and utilisation rates and to a large extent offset the closures of the Gulf Oil and Shell Haven refineries. The fall in refinery output in 2001 is the result of the shutdowns mentioned above. In 2004 refinery output stood at 85½ million tonnes, 5½ per cent higher than in 2003.

3.1.9 Exports of oil products increased from 1991 to 1993 (comfortably exceeding the earlier peak at the beginning of the 1970s), fell in 1994 and 1995 before climbing again to reach a new peak in 1997 at 26.8 million tonnes. Imports of oil products were at their highest in 1967 and, apart from a 'blip' in 1984 as a result of the miners' strike, have been less than half this peak in recent years. As a result, 1984 apart, exports of oil products have exceeded imports in every year since 1974. In 2004 imports made up 26 per cent of inland deliveries, comparable to the levels of the early 1970s. Chart 3.1.2 summarises the trend in refinery output, exports and imports of oil products over the period.

Chart 3.1.2: Refinery output, exports and imports of oil products 1970 to 2004



Inland deliveries of petroleum products ([Table 3.1.2](#))

3.1.10 Table 3.1.2 shows data for deliveries of petroleum products from 1970 to 2004, split between non-energy uses in total and the major products delivered for energy use. While data for deliveries are considered to be a good proxy for consumption, differences can occur mainly due to stock changes along the chain of consumption. Total deliveries for energy use shown in the first (left-hand) half of the table and include 'own use' by refineries that are separately identified in the right-hand part of the table.

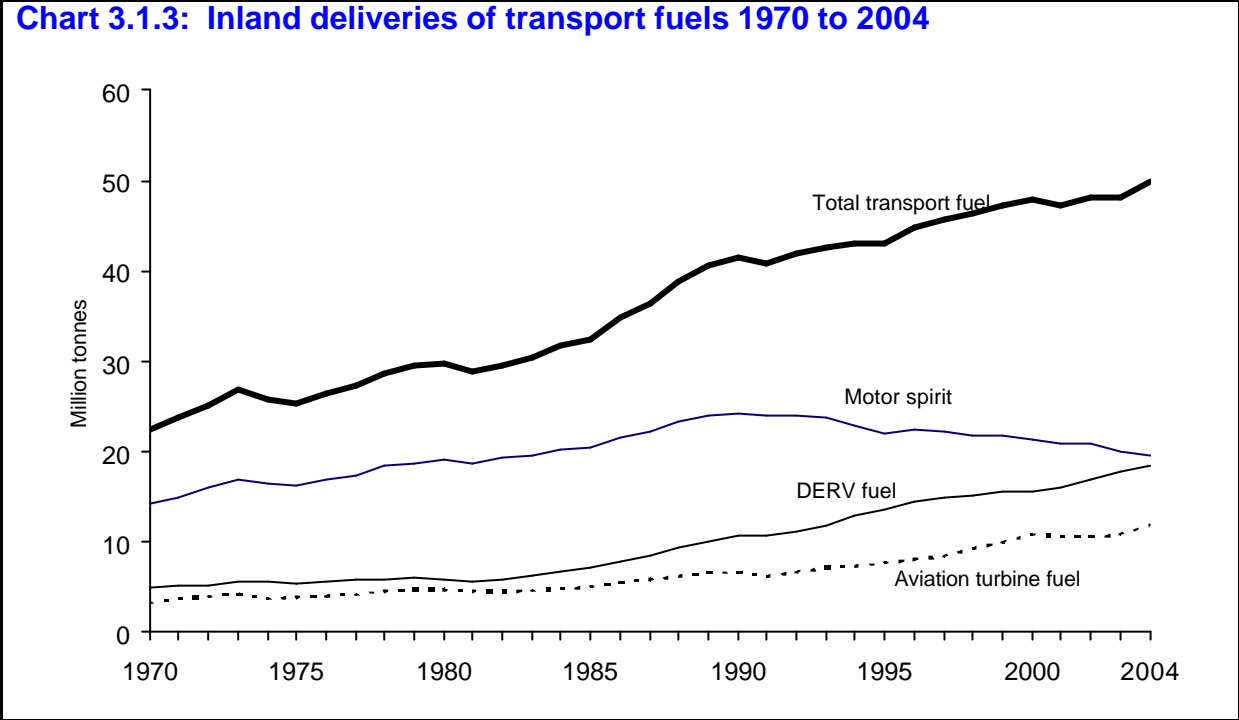
3.1.11 Deliveries of petroleum products peaked in 1973, in common with other aggregate oil figures (see [Table 3.1.1](#)). The 'blip' in 1984 reflects the increased deliveries (of fuel oil in particular) during the miners' strike. Fuel oil deliveries are now about 10 per cent of their level in the 1970s while gas oil deliveries (excluding DERV fuel) are about half of their early 1970s level. In contrast, deliveries of aviation turbine fuel have grown continuously throughout the period. After limited growth during the 1970s and early 1980s, deliveries of DERV fuel resumed the high growth rates apparent in the 1960s, and have nearly doubled over the last 10 years. The upward surge of deliveries of transport fuels slowed in 1990 and ceased in 1991 with the twin impacts of the Gulf crisis and recession, with some recovery being seen in 1992.

3.1.12 Since 1992, motor spirit deliveries have declined each year, with the exception of 1996 which saw deliveries 2 per cent higher than in 1995. In 2004 deliveries of motor spirit were 13 per cent lower than in 1996. These changes reflect the switch to diesel-engine cars and are mirrored by the consistent pattern of increases in deliveries of DERV fuel each year since 1990. Deliveries of DERV fuel in 2004 were 74 per cent higher than in 1990. Deliveries of aviation turbine fuel also increased each year from 1990 to 2000. However deliveries of aviation turbine fuel fell in 2001 due to the terrorist attacks on the United States on 11th September 2001 that caused a downturn in the global aviation industry. Developments in Afghanistan and Iraq during 2002 also impacted on the aviation industry with deliveries of aviation turbine fuel in 2002 being 1 per cent lower than in 2001, although deliveries have since recovered slightly by increasing by 13 per cent in 2004. Deliveries of aviation turbine fuel have increased by 80 per cent between 1990 and 2004. Chart 3.1.3 shows the trends in deliveries of transport fuels from 1970 to 2004.

3.1.13 By the end of the 1980s and during the 1990s deliveries for non-energy uses were not far off their peak of the early to mid-1970s. Non-energy use fell in 2000 and 2001 but has increased subsequently for the 2004 figure to be 19 per cent higher than in its lowest point in 2001.

3.1.14 The right hand columns of Table 3.1.2 (headed “Energy industry use” and “Final users”) show a sector-by-sector breakdown of the total deliveries for energy use given in the left hand columns. Fuels used in blast furnaces are included in the “other energy industry uses” column rather than in the iron and steel column. Total uses by the transport industry are now double the amount delivered in 1970 as Chart 3.1.3 shows. Deliveries to every other major sector are below 1973 levels - well below for electricity generators, gas works, iron and steel and ‘other industries’, and other final users (mainly agriculture, public administration and commerce).

Chart 3.1.3: Inland deliveries of transport fuels 1970 to 2004



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- [Chapter 3, Oil, main tables](#)

Chapter 4: Long term trends

Gas

Natural gas and colliery methane production and consumption ([Table 4.1.1](#))

4.1.1 Table 4.1.1 shows data for production, imports, exports, and the consumption of natural gas and colliery methane by major sector in each year from 1970 to 2004. Separate figures are shown for consumption of town gas and methane.

4.1.2 Total consumption in Table 4.1.1 is defined to match the definition of gas consumption used in the gas tables before the 1999 Digest. This enables a consistent long term series to be presented. In 2004, total consumption of natural gas and colliery methane in this table is related to total UK consumption of natural gas in Table 4.3 of [Chapter 4](#) of the main Digest as follows:

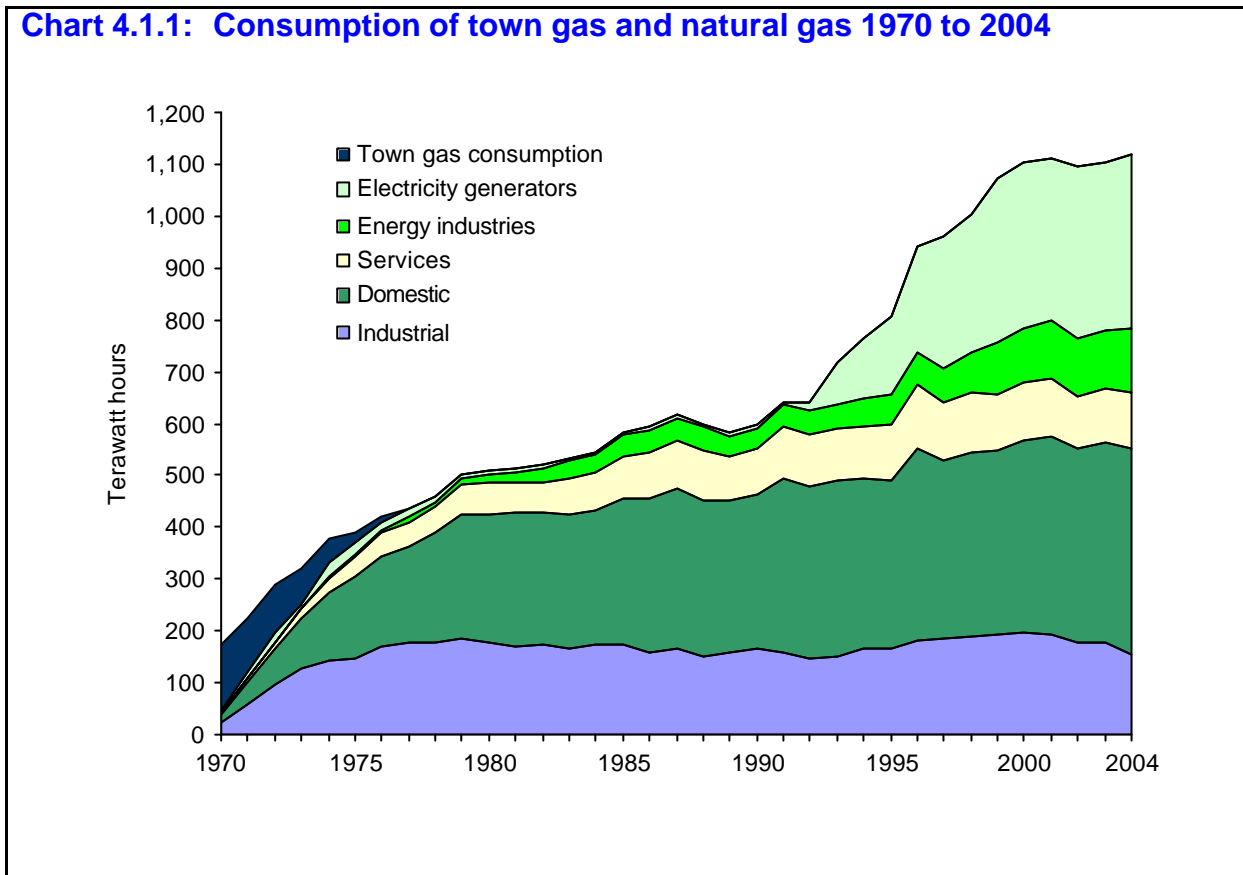
	GWh
Total consumption (Table 4.1.1)	1,119,829
<i>less</i> Colliery methane	<u>- 810</u>
<i>equals</i>	
Total consumption of natural gas	1,119,019
<i>less</i> Producers' own use	- 76,899
<i>less</i> Operators' own use	<u>- 6,560</u>
<i>equals</i>	
Total UK consumption (Table 4.3)	1,035,560

Paragraph 4.27 of [Chapter 4](#) of the main Digest shows how natural gas consumption in Table 4.3 relates to total demand in the balances Tables 4.1 and 4.2.

4.1.3 Chart 4.1.1 illustrates the data in Table 4.1.1. It shows how the supply of natural gas became established during the first part of the 1970s and the decline of town gas to zero by the middle of that decade. Thereafter, the supply of natural gas continued to grow less rapidly, with indigenous production bolstered from 1977 by increasing imports from the Norwegian sector of the North Sea. In 1998 imports fell to only 7 per cent of their peak in the mid-1980s. In 2004 imports added 12 per cent to indigenous production compared with about one-third in the mid-1980s. This was not only because of the depletion of the (mainly Norwegian) Frigg field (ceased production in October 2004), but also because of the resurgence of UK production, which achieved a new record each year from 1989 to 2000. Since 2000 UK production has fallen back by 11½ per cent as UK reserves deplete. 1992 saw the first exports of natural gas from the United Kingdom's share of the Markham gas field. In 1995 these were supplemented by the first exports to the Republic of Ireland, followed by the start of gas exports from the Windermere field via the Markham field during 1997, and exports by the UK-Belgium interconnector during 1998. By 2000 exports were 5½ times the volume of imports. In October 2001 new gas supplies began to arrive from the Norwegian sector of the North Sea via the newly commissioned Vesterled pipeline. Imports through the Vesterled pipeline have increased each year and in 2004 were 2½ times higher than in 2002. In December 2003 imports re-commenced from the UK/Norway trans-median line Statfjord field. These additional supplies of gas from the Norwegian sector of the North Sea saw the UK become a net importer of gas in 2004 for the first time since 1996.

4.1.4 Table 4.1.1 also shows that the bulk of the rapid growth in the 1970s in consumption of natural gas was in the domestic and industrial sectors. In the 1980s and early 1990s there was a fall in industrial use, but gas consumption by industry was on an upward trend from 1992 to 2000 when it exceeded the previous peak of 1985 by 14 per cent. Industrial use of gas has fallen back by 21 per cent from this new peak by 2004. Between 1980 and 2003 there was a 82 per cent increase in gas consumption by the service sector (which for this table is defined as including public administration, commercial activities and agriculture), although in its peak year (1996) service sector consumption was 95 per cent higher than in 1980. In 2003 domestic sector gas consumption was at a record level, 61 per cent higher than its 1980 level. The increase in total consumption accelerated in the early 1990s because of the large increase in consumption by electricity generators as Chart 4.1.1 illustrates. Even if consumption by electricity generators is excluded, consumption of natural gas in 2004 was 54 per cent up on its level in 1980.

Chart 4.1.1: Consumption of town gas and natural gas 1970 to 2004



4.1.5 A more detailed examination of historical gas statistics was published in the December 2001 issue of Energy Trends. This looked at trends since 1880 in gas production, gas consumption and fuel used in the past to manufacture gas. The updated data set on which the article is based includes data for 2004 and is available on the DTI website at:

www.dti.gov.uk/energy/inform/energy_trends/gassince1882.xls

The original article is to be found at:

www.dti.gov.uk/energy/inform/energy_trends/2001/dec_01.pdf

[Chapter 4. Natural gas, long term trends tables](#)

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Chapter 5: Long term trends

Electricity

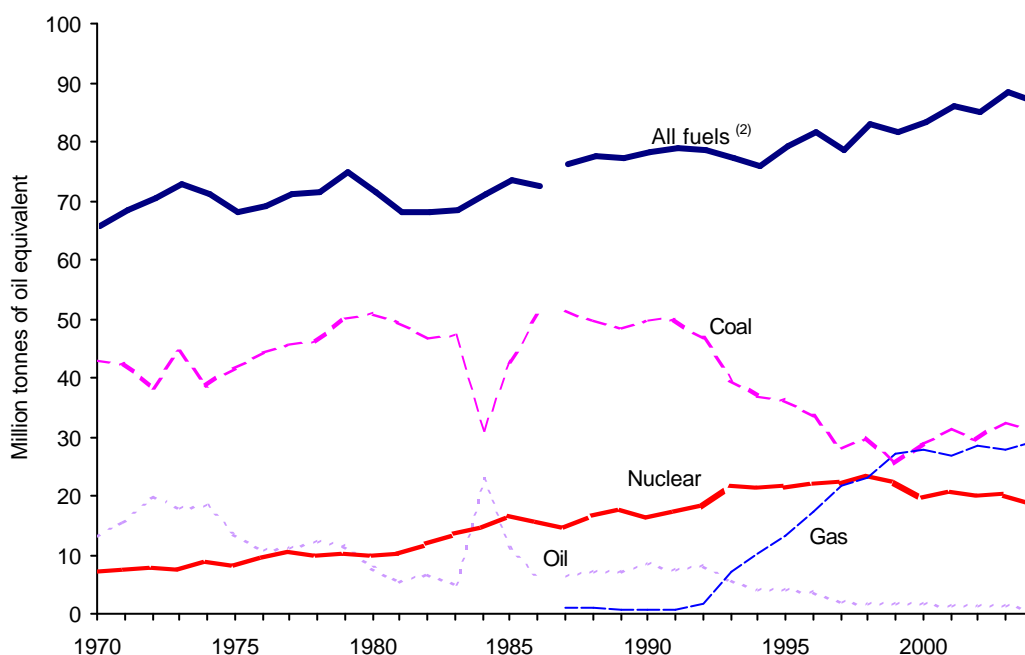
Fuel input for electricity generation (Table 5.1.1)

5.1.1 This table extends the series shown in Table 5.4 of [Chapter 5](#) of the main Digest back to 1970. For the period up to 1987, only fuel inputs for electricity generation at stations owned by the major power producers, transport undertakings, and industrial hydro-electric and nuclear power stations are given; data for conventional thermal electricity generated by industrial producers are not available for this period. From 1987 onwards the table covers **all** generating companies.

5.1.2 The unit of measurement used in this table is the tonne of oil equivalent. An outline of the method used for converting both fossil and non-fossil fuel energy sources to this unit is given in paragraph 5.25 of [Chapter 5](#) of the main Digest.

5.1.3 Trends in fuel input for electricity generation are shown in Chart 5.1.1.

Chart 5.1.1: Fuel input for electricity generation⁽¹⁾, 1970 to 2004



(1) Prior to 1987 major power producers, transport undertakings and industrial hydro and nuclear stations only. From 1987 all generators are covered, hence there is a break in the series for all fuels other than nuclear.

(2) Including hydro, other renewables, coke and other fuels, but excluding electricity imports.

5.1.4 In 1970, coal provided over two thirds of the fuel input for electricity generation, with oil making up two thirds of the rest. Oil use reached a peak in 1972 when it accounted for 29 per cent of fuel input, but after the oil supply crisis in the following year, its use declined, apart from a temporary increase during the 1984/85 miners' dispute. By 2002, the use of oil for electricity generation had fallen to below 2 per cent. Nuclear generation has grown steadily from 11 per cent in 1970 until in 1998 it reached a peak when its oil equivalent input amounted to 29 per cent of total fuel input. In subsequent years higher levels of outages for maintenance, repair and safety case work reduced this proportion as did the closure of some older stations and after stabilizing at around 24 per cent in 2000 to 2003 it fell again in 2004 to just 21½ per cent. Between 1975 and 1990 a European Community directive limited the use of natural gas in public supply power stations. After 1991 the role of gas in electricity generation grew rapidly, its share rising from 2 per cent in 1992 to 17 per cent in 1995, and 28½ per cent in 1998. Then in 1999 its share exceeded that of both coal and nuclear and reached 34

per cent. In 2000 its share edged up to 34½ per cent but in subsequent years it has fluctuated between 32 and 34 per cent. Throughout the '70s, '80s and early '90s coal provided the largest input to generation, but by 1999 its share had fallen to 32 per cent, having been 50 per cent as recently as 5 years earlier, and 65 per cent 10 years earlier. Since 2000, coal has been called upon to make up for unavailable nuclear and gas fired stations and then as a substitute for high priced gas, so its share has re-bounded to 37½ per cent of fuel input in 2003, falling back a little to 37 per cent in 2004 which is a return to its level in 1997.

Electricity supply, availability and consumption (Table 5.1.2)

5.1.5 Figures for the supply, availability and consumption of electricity are given in Table 5.1.2. This table retains the nomenclature of electricity chapters in the 1999 and earlier Digests, whereas the balance methodology has introduced a new nomenclature (see [Chapter 5](#) of the main Digest, paragraph 5.29 and Table 5.5). The series in Table 5.1.2 are extended back to 1970.

5.1.6 For the period up to 1986 the data for electricity supplied covered major power producers, transport undertakings and industrial hydro and nuclear stations only. Purchases from other electricity producers are also included, along with net imports, to give electricity available. Losses are deducted from electricity available to give consumption, which is shown by type of consumer. Availability and consumption before 1986 exclude electricity consumed or sold by other generators without passing through the public distribution system.

5.1.7 The table shows that virtually all electricity available came from home supply until 1986 when the interconnector between France and England commenced operations. At their peak in 1994 net imports from France, combined with net imports into Northern Ireland from the Irish Republic over the interconnector (re-instated in 1996) contributed 5½ per cent of total electricity available in the UK. However, by 2002 this proportion had fallen to 2 per cent mainly because under NETA electricity prices have fallen removing the cost advantages previously enjoyed by French electricity. In 2003 exports of electricity to continental Europe, fostered by higher electricity prices there, became a more prominent feature reducing net imports to only ½ per cent of electricity available. In 2004 the share of net imports returned to 2 per cent.

5.1.8 Consumption of electricity by industry accounted of 34½ per cent of total consumption in 1974 but despite increased mechanisation, which brought about a 55 per cent increase in electricity consumption by industry in the 30 years to 2004, this proportion fell slightly to 33½ per cent in 2004.

5.1.9 The domestic sector's share of total consumption has fallen from 42 per cent in 1974 to 33 per cent in 2004 despite a 25 per cent increase in electricity consumed by households over the last 30 years. The biggest growth in consumption has been in the services sector where in 2004 electricity consumption was 2½ times its level in 1974, and the share of consumption has risen from 20½ per cent in 1974 to 30½ per cent in 2004.

Electricity generated and supplied (Table 5.1.3)

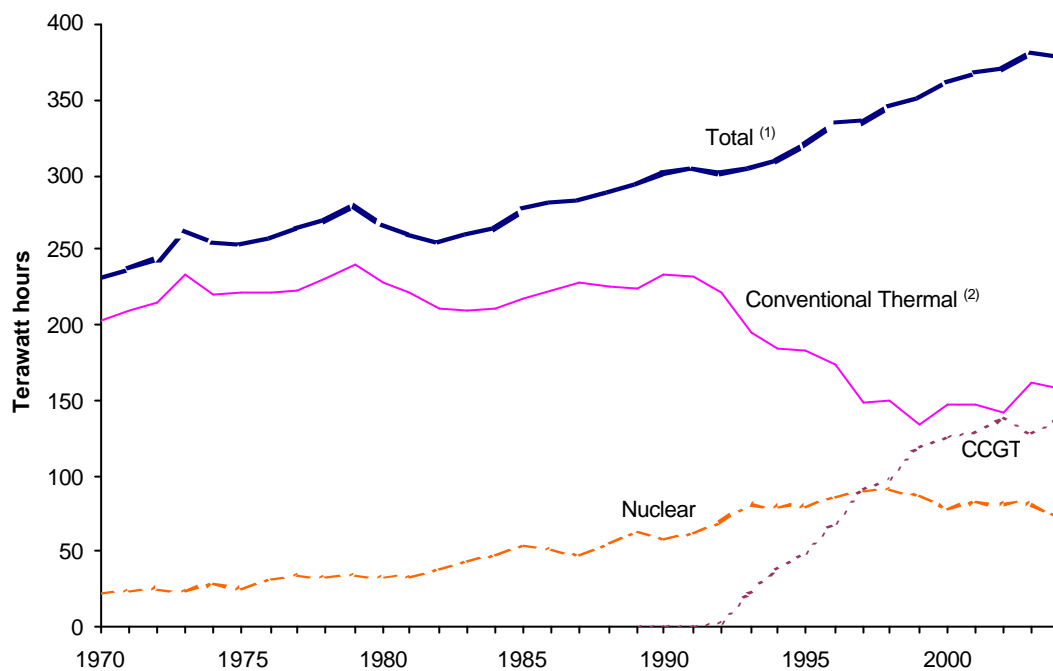
5.1.10 Figures for the generation and supply of electricity are given in Table 5.1.3. This table retains the nomenclature of electricity chapters in the 1999 Digest and earlier, whereas the balance methodology has introduced a new nomenclature (see [Chapter 5](#) of the main Digest, paragraph 5.29 and Table 5.5). Data are given for major power producers, for other generators and for all generators in total, with separate series for the different types of power station.

5.1.11 Over the whole period 1970 to 2004 total gross electricity supplied by all generating companies has increased at an average annual rate of 1¾ per cent. However, within these thirty four years there was growth at over 2½ per cent a year in the early 1970s, 2 per cent a year in the late 1970s, a decline of 1 per cent a year on average during the early 1980s, 2 per cent growth again in the late 1980s, 1 per cent growth in the early 1990s and most recently growth of 1¾ per cent a year on average since 1995.

5.1.12 In the period between 1970 and 1994 electricity output by generators other than the major producers fluctuated between 11,000 and 18,000 GWh, but moved up to over 20,000 GWh in 1995. Subsequently it increased every year to reach almost 34,000 GWh in 2000, mainly as a result of the greater capacity of combined heat and power schemes now in use (see main Digest, [Chapter 6](#)). However, in 2001 electricity supplied by other generators fell back to 30,400 GWh, mainly because

high gas prices discouraged generation, but has since increased again to 35,400 GWh in 2004 aided by growth in generation from renewables. The contribution of other generators to total supply was under 7 per cent in 1970 and fell to under 5½ per cent in 1990, but then increased again to reach 9½ per cent in 2000. In 2001 and 2002 it fell back to 8½ per cent before returning to 9 per cent in 2003 and 9½ per cent in 2004. Trends in electricity supplied by all generators by type of plant are illustrated in Chart 5.1.2.

Chart 5.1.2: Gross electricity supplied by all generating companies by type of plant, 1970 to 2004



(1) Total includes hydro which is not shown separately on this chart
 (2) Includes electricity supplied by gas turbines, oil engines and renewable sources.

5.1.13 In 1970, conventional thermal power stations produced 88 per cent of the gross electricity supplied. Output from these stations rose, peaking in 1990 before falling back because of the development of new generating technologies. Firstly there was the development of nuclear generation, which supplied only 10 per cent of total gross electricity supplied by United Kingdom generators in 1970 but by 1997 accounted for 27 per cent. For the 4 years from 2000 to 2003 nuclear sources fell back to between a 21½ and 22½ per cent share and fell further in 2004 to a 19½ per cent share, the lowest since 1988. Secondly there was the growth of combined cycle gas turbine stations (CCGTs), which overtook nuclear in 1997 and in 2002, supplied 37½ per cent, falling back to 34 per cent in 2003 because of high gas prices, but climbing back to 36½ per cent in 2004.

5.1.14 A more detailed examination of historical electricity statistics was published in the September 2002 issue of Energy Trends. This looked at trends in the generation, supply and consumption of electricity over the last 80 years. The updated data set on which the article is based includes data for 2004 and is available on the DTI website at:

www.dti.gov.uk/energy/inform/energy_trends/electricitysince1920.xls

The original article is to be found at:

www.dti.gov.uk/energy/inform/energy_trends/2002/sep_02.pdf (page 20).

[Chapter 5, Electricity, long term trends tables](#)

[Chapter 5, Electricity, main text](#)

[Chapter 5, Electricity, main tables](#)

Chapter 7: Long term trends

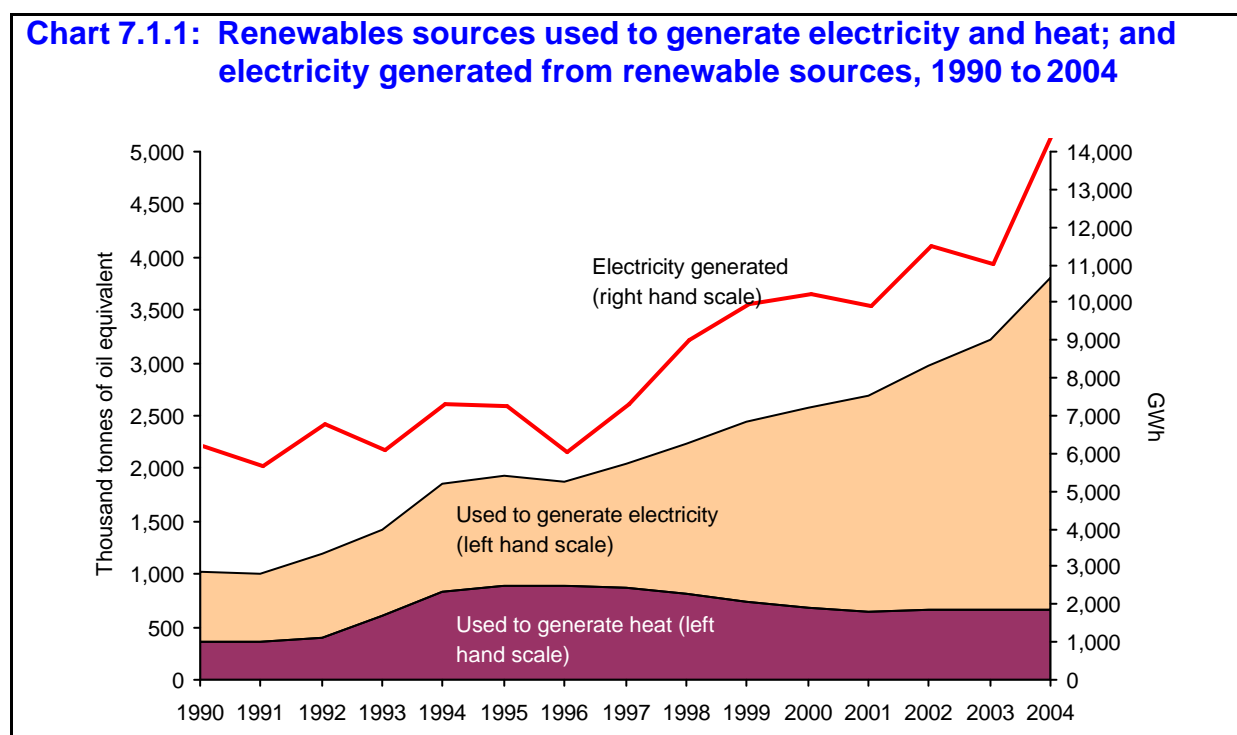
Renewables

Renewables sources used to generate electricity and heat; and electricity generated from renewable sources (Table 7.1.1)

7.1.1 This table extends the series shown in Table 7.4 and 7.7 of [Chapter 7](#) of the main Digest back to 1990, the earliest year for which comprehensive data on renewables and wastes are available.

7.1.2 Between 1990 and 1996 the volume of renewables used to generate electricity grew at an average rate of 6½ per cent a year. After 1996 the rate of increase quickened and over the most recent seven years it has averaged 21 per cent a year. The rate of increase in electricity generated is more influenced by the contribution of hydro since on an energy supplied basis, hydro inputs are assumed to be equal to the electricity produced whereas biomass sources lose energy during their transformation into electricity. Hence the growth in electricity generated from renewables has been more erratic, as Chart 7.1.1 illustrates. In 2004 there was growth of 33 per cent on 2003. The main contributors to this growth were hydro (+53 per cent from 2003's low levels caused by low rainfall and snowfall), wind (+52 per cent), landfill gas (+22 per cent) and co-firing of biomass with fossil fuels (+70 per cent). The average rate of growth in electricity generated from renewables over the last 5 years was 8½ per cent.

Chart 7.1.1: Renewables sources used to generate electricity and heat; and electricity generated from renewable sources, 1990 to 2004



7.1.3 The use of renewables to generate heat reached a peak in 1996 having more than doubled over the previous 6 years. Since 1996 the use of renewables for heat generation has declined by a quarter mainly because of the halving of industrial wood combustion due to the introduction of more stringent emission controls.

[Chapter 7, Renewable energy, long term trends tables](#)

[Chapter 7, Renewable energy, main text](#)

[Chapter 7, Renewable energy, main tables](#)