

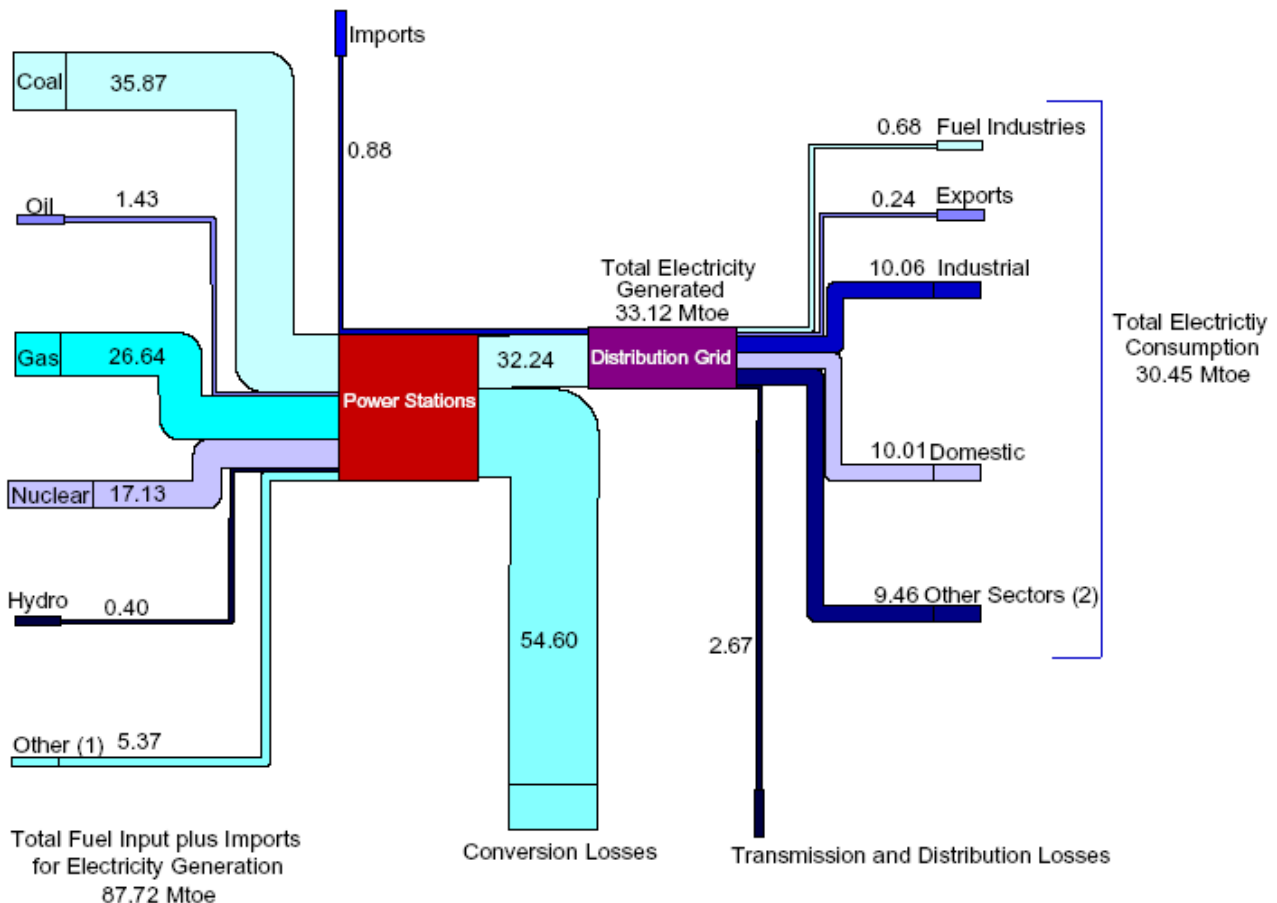
Changes in electricity generation and usage, 1976-2006

Background

The 2007 Digest of United Kingdom Energy Statistics' Internet tables includes data on the generation and usage of electricity for every year between 1970 and 2006, allowing the way electricity has been generated and used in the UK over the last three decades to be examined. This article looks at the flows of electricity, from generation to sector usage in 2006 and then compares it to the trends seen in electricity generation and usage since 1976.

Chart 1 shows, in flow chart form, generation and consumption of electricity, from fuel input to sector usage while Charts 2 and 3 show the input and output sides of the diagram in percentage terms.

Chart 1: Fuels used for electricity generation and sector usage of electricity in Mtoe, 2006



¹ Other fuels used for electricity generation include coke oven and blast furnace gas, refuse derived materials, waste products from chemical processes, and forms of renewable electricity generation other than hydro electric power. These data are only available from 1987 onwards. Before 1987 the data are for major power producers, transport undertakings, and industrial hydro and nuclear stations only.

² Other Sectors include Public Administration, Commercial Sectors, Agriculture and Transport

Chart 2: Fuels used for electricity generation, 2006

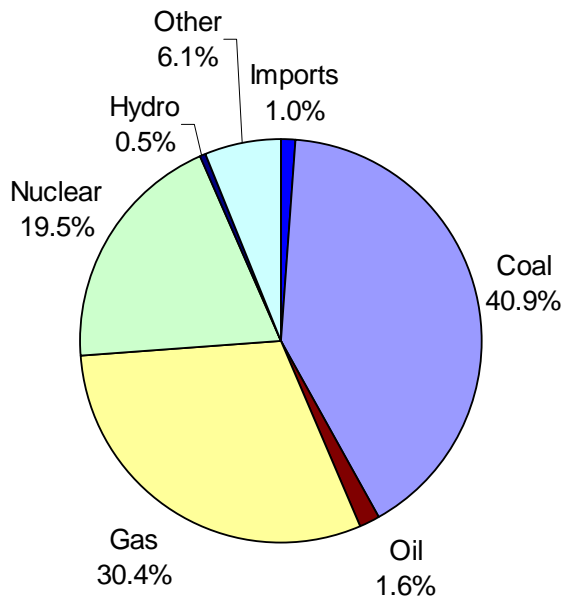
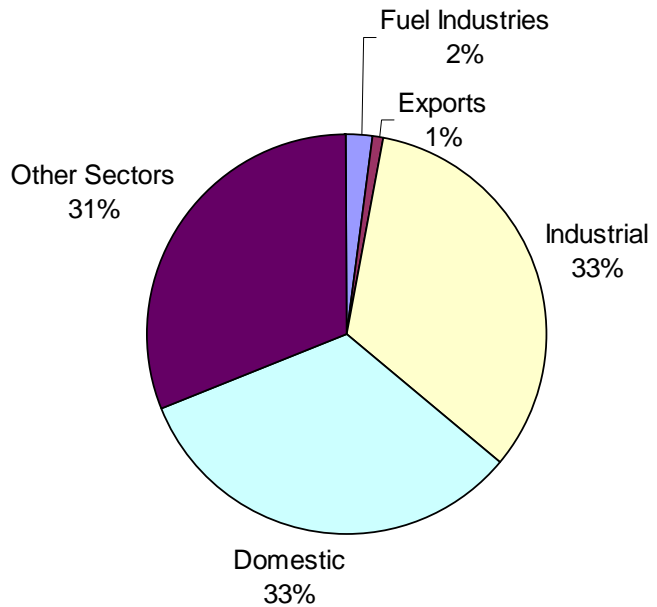


Chart 3: Sector usage of electricity, 2006

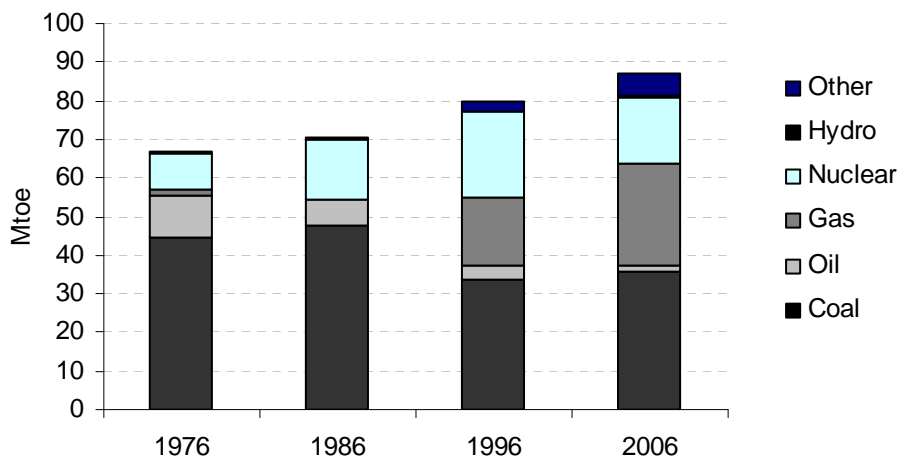


Electricity generation

Charts 1 to 3 show that coal, gas and nuclear power accounted for over 90 per cent of the fuel input for UK electricity generation in 2006, with coal, the largest fuel group, accounting for 41 per cent alone. In 1976 these three fuels made up only 84 per cent of UK electricity generation with coal accounting for almost two thirds of all fuel input. Chart 1 also shows that 54.6 million tonnes of oil equivalent (62 per cent of the total fuel input) was accounted for by losses arising from the conversion of fuel into electric power. A further 2.7 Mtoe (3 per cent) was lost via the transmission and distribution grids. A similar diagram for 1976 would show that in that year fuel inputs were 67.0 Mtoe, conversion losses 46.3 Mtoe (69 per cent) and transmission and distribution losses 1.6 Mtoe (2½ per cent). Thus there has been a sizeable improvement in the overall efficiency of the industry in the last 30 years. This is reflected in carbon dioxide emission statistics, which show an 11.5 per cent reduction in CO₂ emissions from power stations between 1990 and 2006³.

Chart 4 shows how the fuels used to generate electricity have changed since 1976.

Chart 4: Fuels used for electricity generation, 1976-2006



³ Carbon Dioxide Emission and Energy Consumption in the UK, Energy Trends, March 2007.

The major change is the increased use of natural gas which has risen significantly over the last 15 years, from minimal amounts before 1992 to over 26.6 Mtoe by 2006. During the 1990s the UK built 36 gas-fired power stations with a total capacity of 16,978 MW⁴ as the economic viability of new gas power stations was particularly compelling⁵. This era, known as the “dash for gas”, is shown in Chart 5.

Chart 5: Natural gas used in UK electricity generation, 1976 to 2006

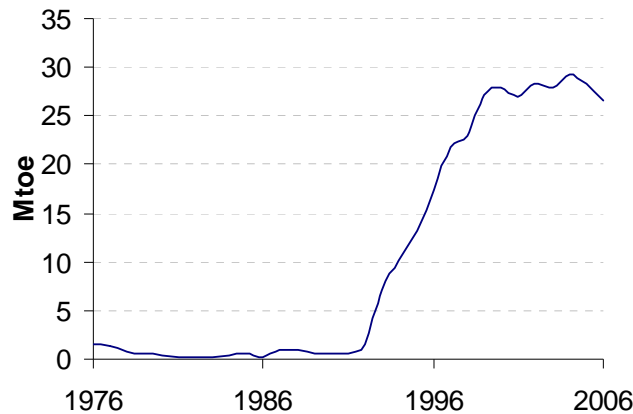
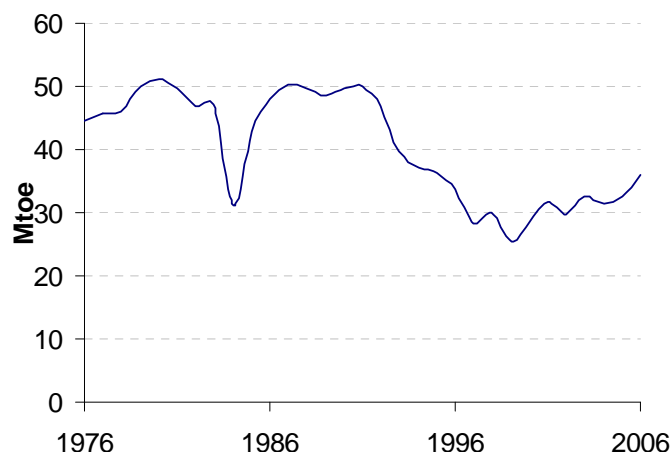


Chart 5 also shows that since 2000, the use of gas for generation has stabilised. One cause has been rising gas prices, which were 70 per cent higher in 2006 in real terms than in 2001⁶.

Another major change in the way the UK generates electricity is the reduction of 10 Mtoe in coal usage, since 1976 - a fall of just under 20 per cent over the 30 year period. As Chart 6 shows there was a sharp drop in 1983/84, at the time of the coal miners strike. However, consumption rose back to previous levels within a year or two once production resumed. The main decrease in coal use for electricity generation began in the early 90's at the same time as the use of natural gas for power generation increased. Despite the recent upturn due to high gas prices, BERR scenarios show a further decline in coal-fired generation in part driven by the Large Combustion Plant Directive (LCPD). This aims to reduce sulphur dioxide and nitrogen oxide emissions. It is estimated that 8.5 GW of coal-fired capacity will have to close by 2015 in order to meet this directive⁷.

Chart 6: Coal used in UK electricity generation, 1976-2006



⁴ Digest of United Kingdom Energy Statistics 2007 Table 5.11. For these purposes, “gas-fired power stations” includes CCGT and Gas-fired power stations, but excludes gas CHP and gas oil fired power plants.

⁵ Meeting the Energy Challenge – A White Paper on Energy. Page 12.

See www.berr.gov.uk/energy/whitepaper/page39534.html for more information

⁶ Quarterly Energy Prices June 2007 Chart 3.2.2.

See www.berr.gov.uk/energy/statistics/publications/prices/index.html for more information

⁷ Updated Energy Projections. See www.berr.gov.uk/energy/environment/projections/index.html

Special feature – Electricity generation and usage

Oil fired power stations are also affected by the LCPD legislation – there has been a 85 per cent drop in oil consumption in power stations over the past 30 years and it is estimated that a further 2.5 GW of oil fired capacity will need to close by 2015. However, as Charts 1 and 2 show, in 2006 oil accounted for only 1.6 per cent of the fuel used for generation.

Electricity output

Overall electricity use has increased by 58 per cent since 1976, but as electricity generation has become more efficient there has only been a 30 per cent increase in fuel input (see Chart 4). Over this period the industrial sector has grown slightly faster than the domestic sector. The amount of electricity used in industry has increased by over 44 per cent since 1976, despite an overall drop in industrial energy demand of 48 per cent during that period.

Domestic sector demand has also increased, in this case by well over a third in the last 30 years. This is probably due to a number of factors including, an increase in UK population, a decrease in average household size, as well as an increase in the number of electrical devices in the average home. Household domestic appliances consumed twice as much electricity in 2005 as they did in 1976.⁸

However, the biggest growth has been in the Public Administration and Commercial Sectors' use of electricity, which has more than doubled since 1976 as the size of this sector to the UK economy has increased. Within these sectors the largest users of electricity are retail, warehouses and hotels and catering. In 2005 35 per cent of this sector's electricity use was by the retail sector, of which 43 per cent was used for lighting⁹.

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This article has been written in conjunction with the Electricity Statistics section of BERR's Energy Strategy and International Unit.

A full UK Energy Flow Chart for 2004 is available on the BERR web site at www.berr.gov.uk/energy/statistics/publications/flowchart/page37716.html or in hard copy from Clive Sarjantson at the address on page 2.

The flow chart is updated every third year and a diagram for 2007 will be available at the end of July 2008.

⁸ 2007 Energy Consumption in the UK Table 3.10 See www.berr.gov.uk/energy/statistics/publications/ecuk/domestic/page18071.html for more information.

⁹ 2007 Energy Consumption in the United Kingdom Table 5.5 See www.berr.gov.uk/energy/statistics/publications/ecuk/service/page18187.html for more information.