

The UK oil industry over the past 100 years

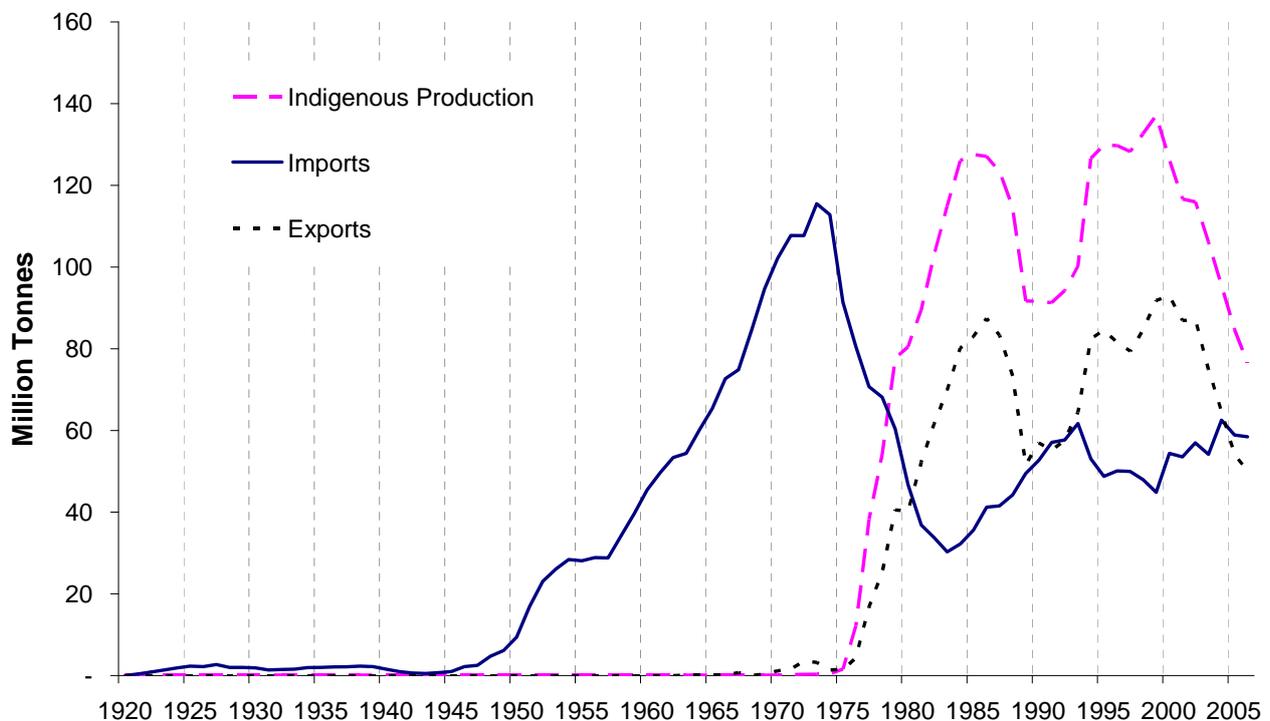
Background

The March 2002 edition of Energy Trends included an article on the UK Oil industry back to the 1940s. This article uses archive data from old editions of the DTI's Digest of UK Energy Statistics (DUKES) back to 1950 to extend the analysis. This has enabled the long term trends table 3.1.1 to be extended back to 1920 with a restricted series going back to 1890. Other archive data from the early 1950s have enabled the creation of a new long term trends table covering consumption of petroleum products dating back to 1870. This article highlights some trends from these long term data series.

Crude oil

In the first part of the 20th Century the UK relied on imports of crude oil although there was some limited indigenous production from oil bearing shale. Chart 1 below shows UK use of crude oil. Consumption (ie imports) took off after 1945 rising steadily to a peak of 115 million tonnes in 1973. Imports subsequently fell following the 1973/74 oil supply crisis and their gradual replacement by indigenous production from the North Sea oil that began in 1975. After a dramatic build-up following the start of offshore oil production from the North Sea in 1975, and against a background of rapidly falling dollar oil prices, UK oil production peaked at 128 million tonnes in the mid 1980s ahead of the Piper Alpha disaster in 1988 which resulted in a sudden and dramatic decline in production. With recovery of production from existing fields and increasing numbers of new fields coming on stream (following a period of significantly higher development expenditure in the early and mid 1990s), oil production reached a second (and higher) peak of 137 million tonnes in 1999. Since then UK indigenous crude production has gradually declined and eventually led to the UK reverting to being a net importer of crude oil in 2005 for the first time since 1991-92.

Chart 1: Crude oil production, imports and exports, 1920 – 2006

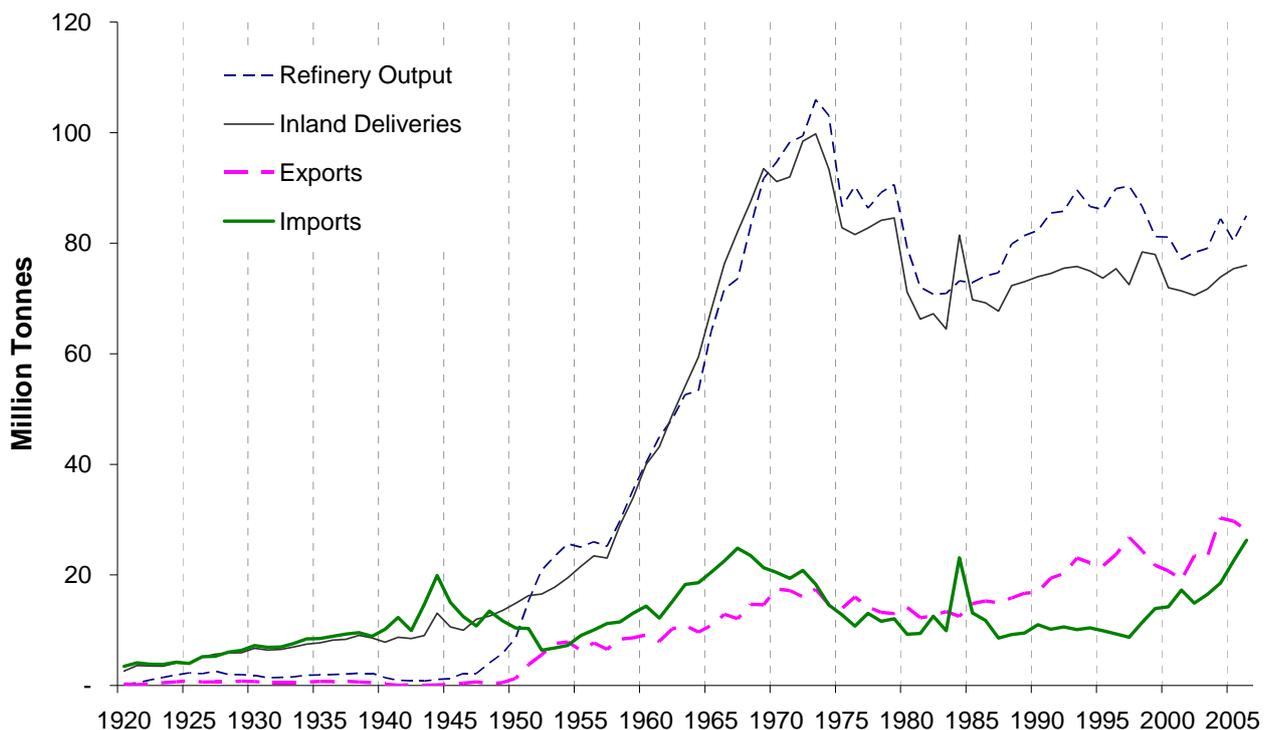


Oil products

Chart 2 shows a similar pattern to crude oil for oil products with imports providing the majority of inland deliveries of products until the early 1950s. Until this time, refinery output remained steady at around 1.5 million tonnes although a number of small refineries were operating, such as Grangemouth in Scotland (opened 1924), Fawley on the south coast (1921) and Stanlow (1924). Development of indigenous refinery capacity from the late 1940s onwards resulted in UK refinery output passing product imports as the main contributor to inland deliveries in 1950. Inland consumption and refinery output increased in tandem to peak in 1973 at 100 million tonnes and 106 million tonnes, respectively. The oil supply crisis of 1973/74 reduced consumption and refinery output, dropping to about 80 million tonnes, a level it has broadly stayed at subsequently. This reduction in demand also reduced the number of active UK oil refineries - in 1970 23 were in operation but this has been rationalised to the 9 major refineries and 3 smaller refineries that are currently operating. While the number of active oil refineries has fallen, their individual refining capacities increased to keep overall UK production at broadly the same level.

The sudden increase in 1984 of 17.0 million tonnes (26 per cent) in inland deliveries and of 13.2 million tonnes (133 per cent) in imports were a consequence of the 1984 miners' strike when refinery output was unable to cope with the sudden increased demand. After this, deliveries reverted to trend with the UK currently remaining a net exporter of oil products.

Chart 2: Production and trade of petroleum products, 1920 – 2006



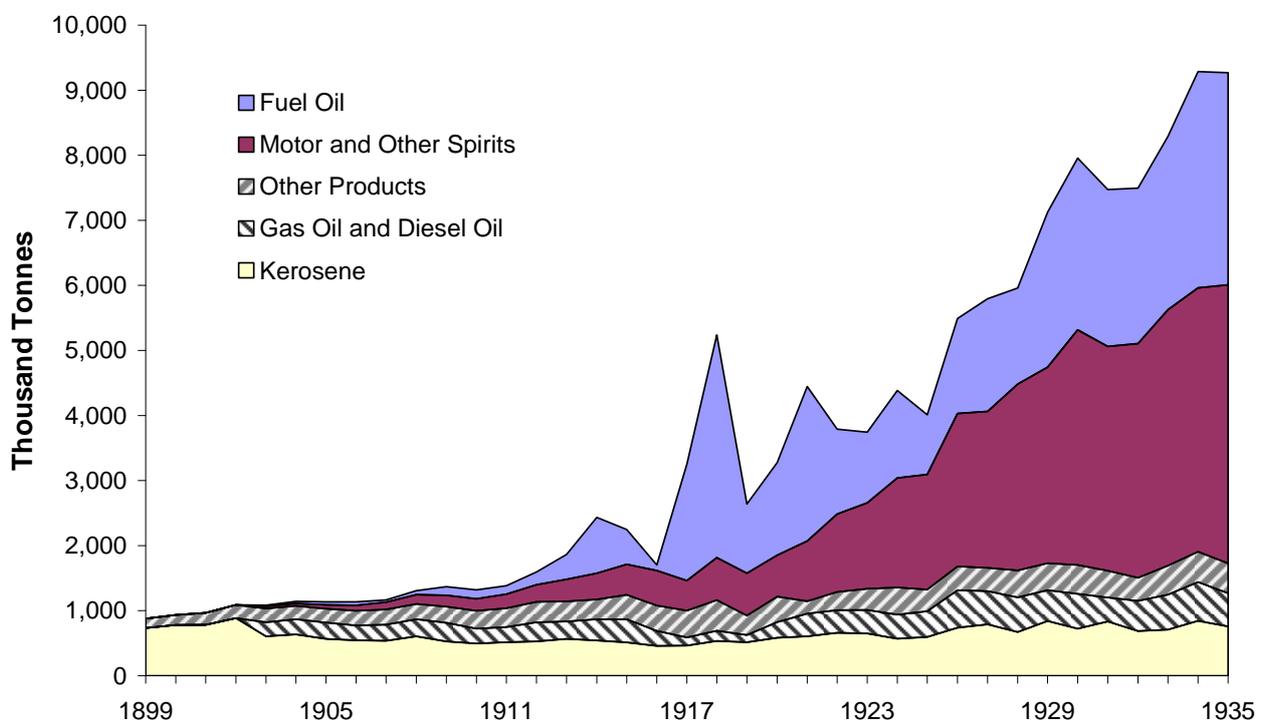
Early use of oil products

Chart 3 shows consumption by fuel type from 1899 to 1935 with motor spirit and fuel oil being the two key products. Motor vehicle innovation gathered pace in the late 1890s but did not result in significant demand for motor spirit consumption until after 1903. It should also be noted that until the jet turbine engine, aviation engines were also fuelled by motor spirit although usually with a higher octane rating.

The demand for fuel oil was also prompted by transportation use. In 1904, the British Navy made a strategic decision to replace coal fired engines for a system using fuel oil as a power source for their submarines and destroyers. Fuel oil had been used in coal-fired engines when it was sprayed onto coal to increase combustion and this technique was used elsewhere in the naval fleet. Admiral Fisher, the First Sea Lord from 1904 to 1910, said that undoubtedly “a fleet with oil fuel will have an overwhelming strategic advantage over a coal fleet”. This change of power source led to increased fuel oil consumption and ultimately oil consumption in general. The decision also had a global impact as other nations followed suit with their fleets.

A clear peak can be seen in consumption of fuel oil during the latter half of the First World War, with an increase of 3.3 million tonnes between 1916 and 1918, despite having decreased in the first half of the war. In 1918, fuel oil accounted for over 65 per cent of total consumption of petroleum products.

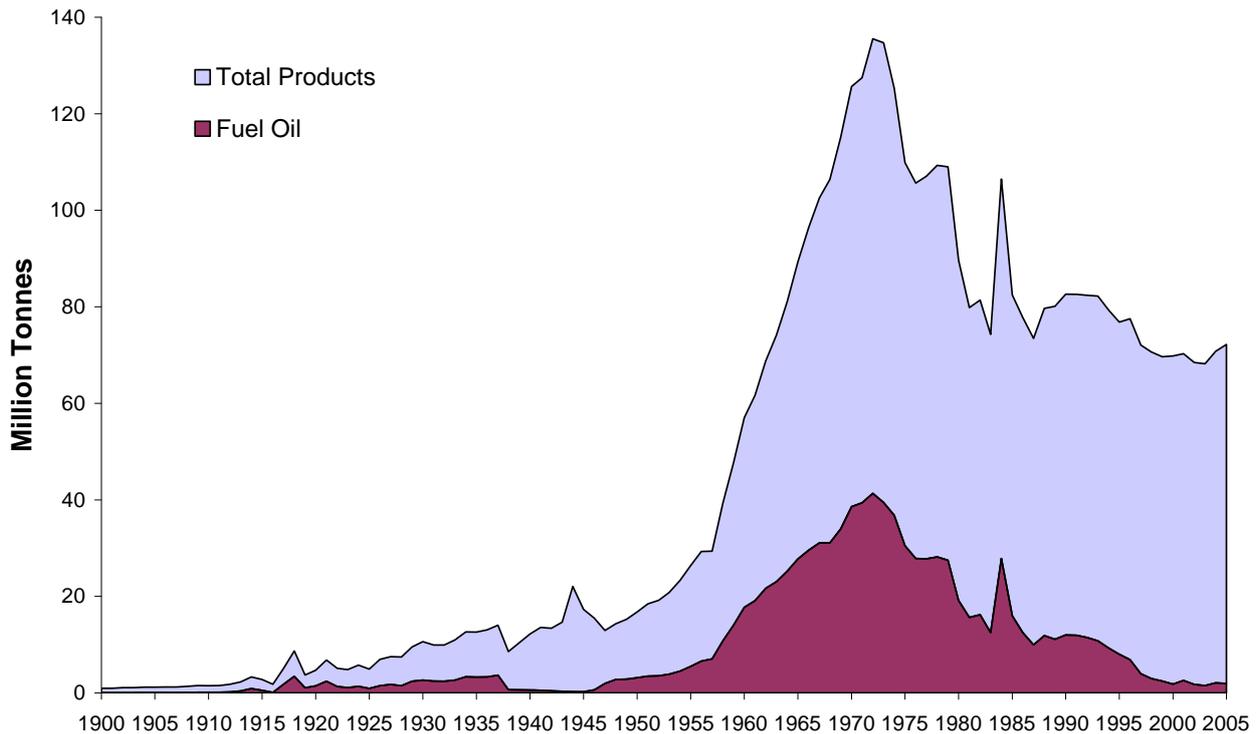
Chart 3: Consumption of petroleum by product, 1899 – 1935



Trends for specific oil products

Fuel oil

There are two distinct uses for fuel oil that have significantly influenced its demand. As noted above, the initial significant use was as marine bunker fuel for shipping. This still remains a substantial use although is not included within inland demand. The other significant use was for electricity generation in power stations. From 1950 to 1973, fuel oil consumption grew in line with rising overall product demand. However this usage has fallen significantly since the 1973/74 oil supply crisis with a temporary reprieve in 1984 due to the miners' strike. Since about 2000, its use has been broadly level at about 2 million tonnes (Chart 4).

Chart 4: Total deliveries for energy use and deliveries of fuel oil, 1900 - 2005

Aviation Fuels

As noted previously, aviation gasoline (effectively higher octane motor spirit) was used to power all aircraft until the advent of the jet turbine. Chart 5 illustrates the massive increase over 4 years of approximately 4.2 million tonnes in consumption of aviation gasoline during the Second World War. Of the 12 million tonne increase in consumption of petroleum products between 1939 and 1944, 35 per cent of the increase was in aviation gasoline.

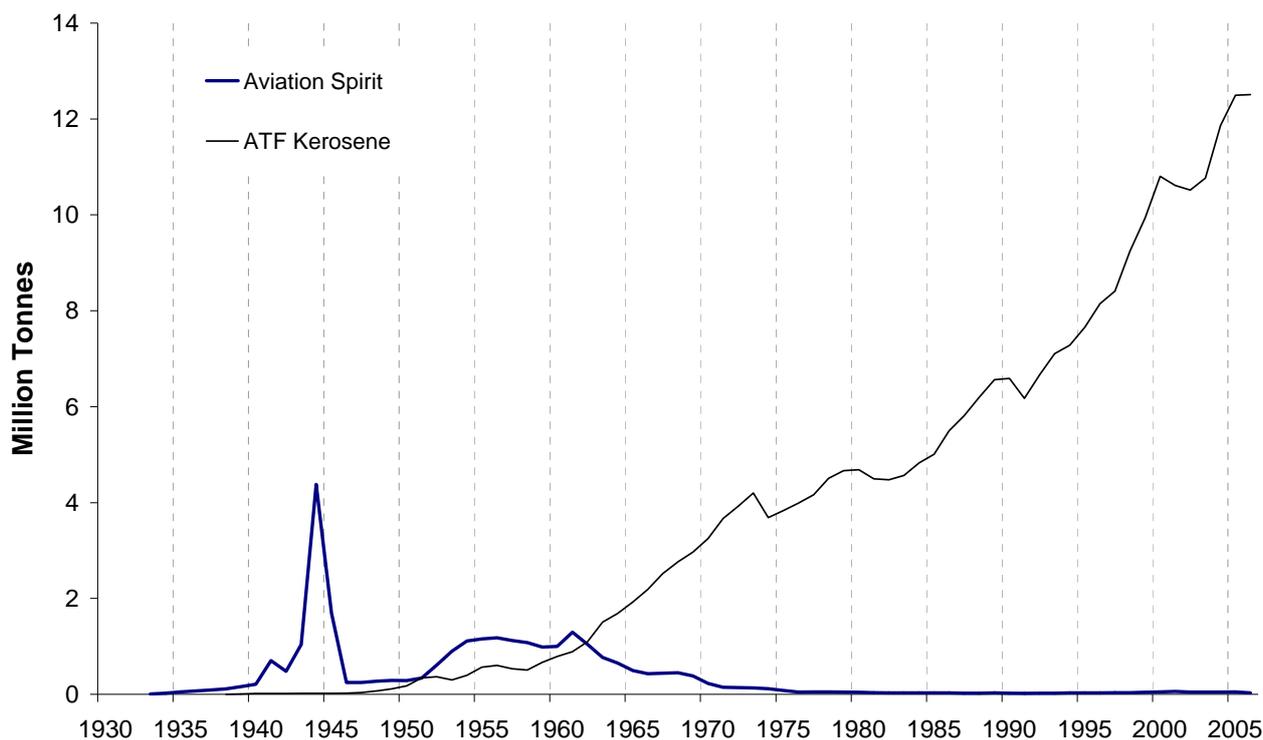
In 1952 the first commercial jet powered flight took place from London to Johannesburg, with the *De Havilland Comet*. Since then, Aviation Turbine Fuel Kerosene (ATF/jet fuel) deliveries have risen to pass deliveries of aviation gasoline in 1962 and continue to rise to this present day.

Aviation gasoline initially increased in line with ATF kerosene, but after having peaked in 1961 at 1.3 million tonnes, deliveries fell below ATF and have fallen to 50 thousand tonnes. Aviation gasoline now is used by the few piston-engines aeroplanes.

In the years following the 9/11 attacks in the U.S.A in 2001, deliveries of ATF fell by 3 per cent, but have now recovered, increasing by 19 per cent in the past 3 years, and in 2005 were at their highest ever level of 12.5 million tonnes.

The high demand of ATF has led to imports dramatically rising over the period, especially since the closure of the Shellhaven refinery on the Thames in 1999.

Chart 5: Deliveries of aviation fuels, 1930 – 2006



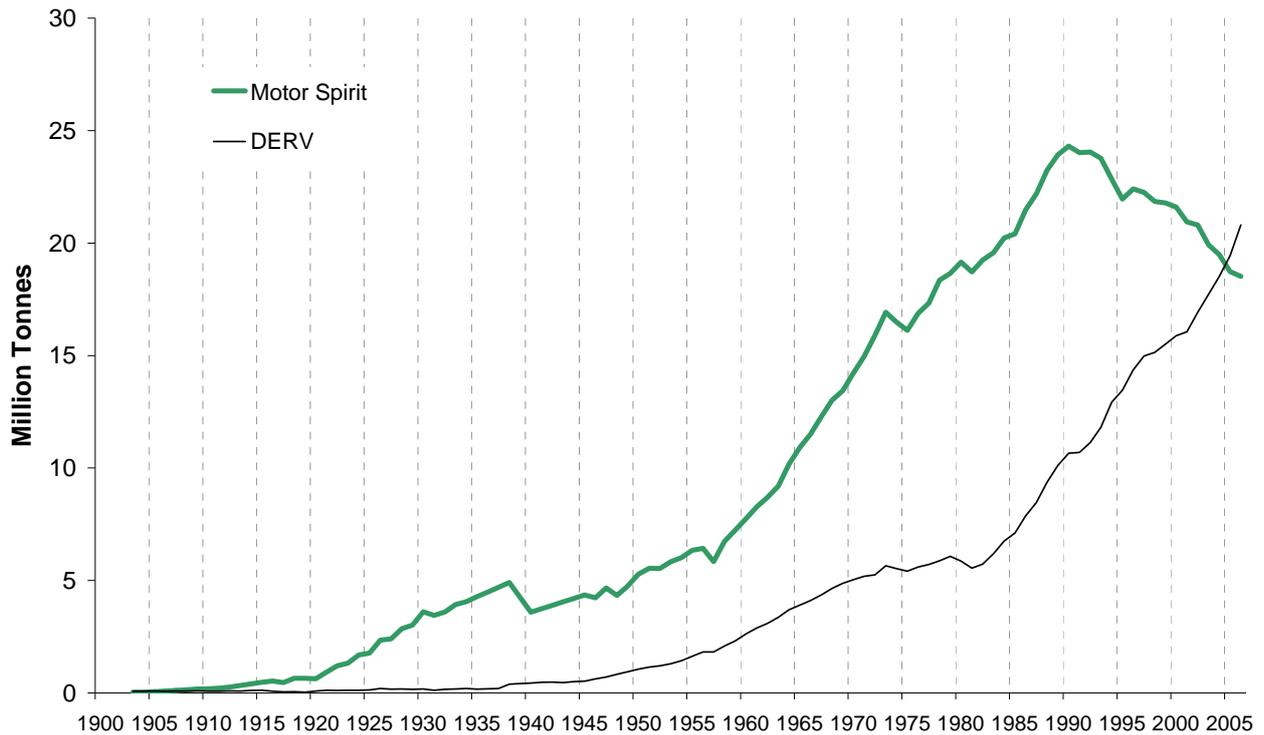
Road Transport Fuels

Chart 6 shows the steady increase in deliveries of motor spirit and DERV (fuel for Diesel Engined Road Vehicles) since the early part of the 20th Century. Motor spirit peaked at 24.3 million tonnes in 1990, and then witnessed a gentle decline to the present day. In contrast, DERV deliveries have continued to rise, and in 2005, DERV deliveries by weight overtook motor spirit. (DERV is a heavier fuel than motor spirit, so while in mass terms there were more DERV deliveries, in volume terms motor spirit deliveries were larger.) But what has caused these contrasting trends? Part can be attributed to the ever increasing popularity of diesel powered cars, especially large MPV/family cars. A key contribution to the fall in motor spirit can be placed with the ‘White Van’. In past years, small vans such as the Ford Transit would have been petrol driven, but in recent years these are being replaced with diesel powered vans. This has had a noticeable impact on fuel sales over the past 10 years, motor spirit decreasing by 16.4 per cent and DERV rising by 35.5 per cent.

Now accounting for 66 per cent of demand for petroleum products (compared with 41 per cent in 1980 and 33 per cent in 1940), road transport fuels are likely to have an ever increasing influence on trends in the oil industry.

It should be noted that developments in the demand and supply of biofuels are likely to have an impact on deliveries of both motor spirit and DERV. In 2005 the UK witnessed demand of approximately 75 thousand tonnes for Bio-Ethanol and 27 thousand tonnes for Bio-Diesel, and both are increasing quickly month on month. Nevertheless it should be noted that this is still very small in comparison to motor spirit or DERV with deliveries of biofuels only 0.5 per cent of that of motor spirit or DERV. This is likely to change with the government’s proposals for the Road Transport Fuel Obligation Order (RTFO), which will require that 5 per cent of all UK road transport fuel comes from a renewable source by 2010, with the aim of helping to meet the UK’s climate change objectives. This proposal will indubitably ensure the continued growth of biofuels for year to come.

Chart 6: Deliveries of road transport fuels 1900 – 2006



What does the future hold for the UK oil industry?

The UK oil industry has adapted to changing trends in UK consumption over the last 100 years and will continue to do so. It now faces numerous challenges and the DTI recently commissioned an independent review of UK oil refining capacity to understand UK oil product capacity requirements and the long term sustainability of the UK refining sector. Some trends that have been discussed in this article clearly show that demand for some products is strongly increasing (DERV and ATF kerosene), whilst others are seeing a decline in usage (most notably fuel oil). The refining sector will need to adapt to this changing demand.

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The long term data series for oil that has been examined in this article can be found at:

Oil since 1870: www.dti.gov.uk/files/file38536.xls

Other long term data series are also available:

Coal since 1853: www.dti.gov.uk/files/file18938.xls

Electricity since 1920: www.dti.gov.uk/files/file18945.xls

Gas since 1882: www.dti.gov.uk/files/file18939.xls