



Energy Tutorial: Energy and Sustainability

# What's energy used for?

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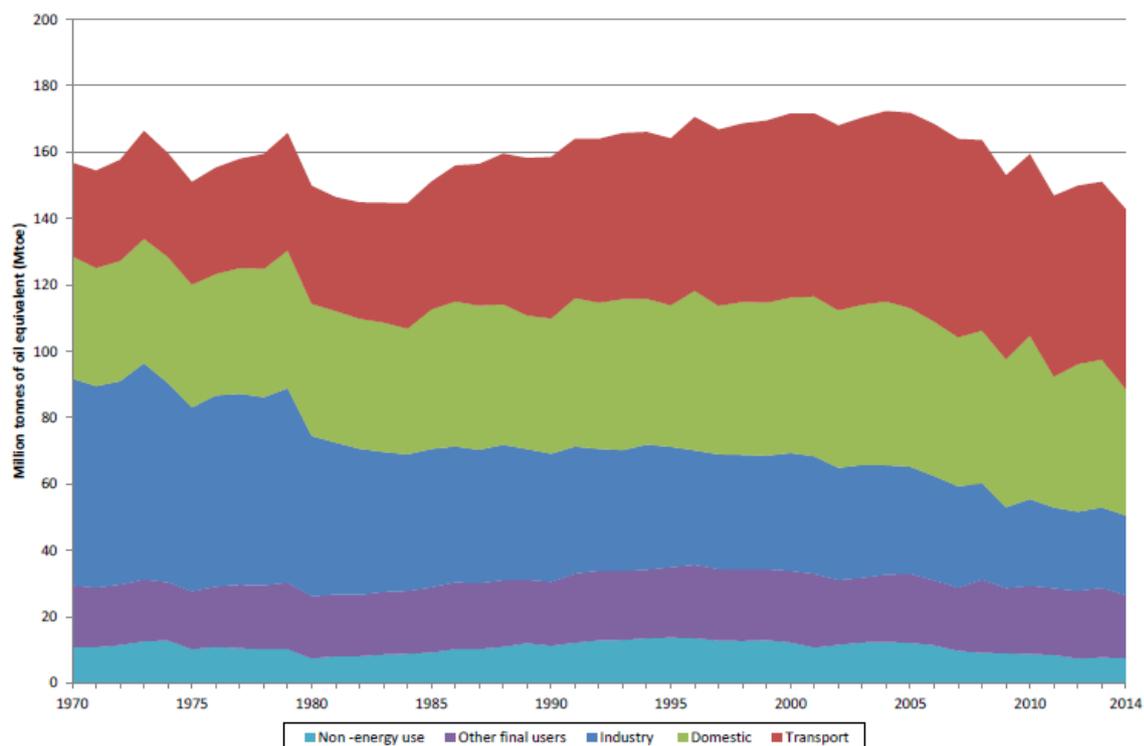


## INTRODUCTION

We're all surrounded by energy, at all times, in everything we do. Every time we switch on a light or turn on the central heating, or even eat a hot meal, we use energy. Essentially, we divide our energy use among four sectors: domestic (energy used in our homes), transportation, industrial and services. Heating and cooling our homes, driving cars, moving freight, manufacturing goods and lighting office buildings are all functions that require energy.

Figure 1 below shows the changes in energy consumption by sector from 1970 to 2014. In 1970, the industrial sector was responsible for 40% of total UK energy consumption, followed by the domestic sector (24%), transport (18%) and other final users (services) (12%) (mainly agriculture, public administration and commerce), with 7% being used for non-energy purposes. However, by 2014 energy consumed by industry had fallen to 17% of total energy consumption, transport consumption had risen to 38% and domestic use had increased slightly to 27%, with energy used by services remaining relatively constant at 13%.

**Figure 1: UK energy consumption by sector (1970 to 2014)**



Source: DECC, ECUK Table 1.05

Here you'll find an overview of energy consumption in each of the four sectors of the UK economy. This overview was prepared using information from the Department of Energy and Climate Change's (2015) "Energy Consumption in the UK" series, which can be found here: <https://www.gov.uk/government/collections/energy-consumption-in-the-uk>

## DOMESTIC

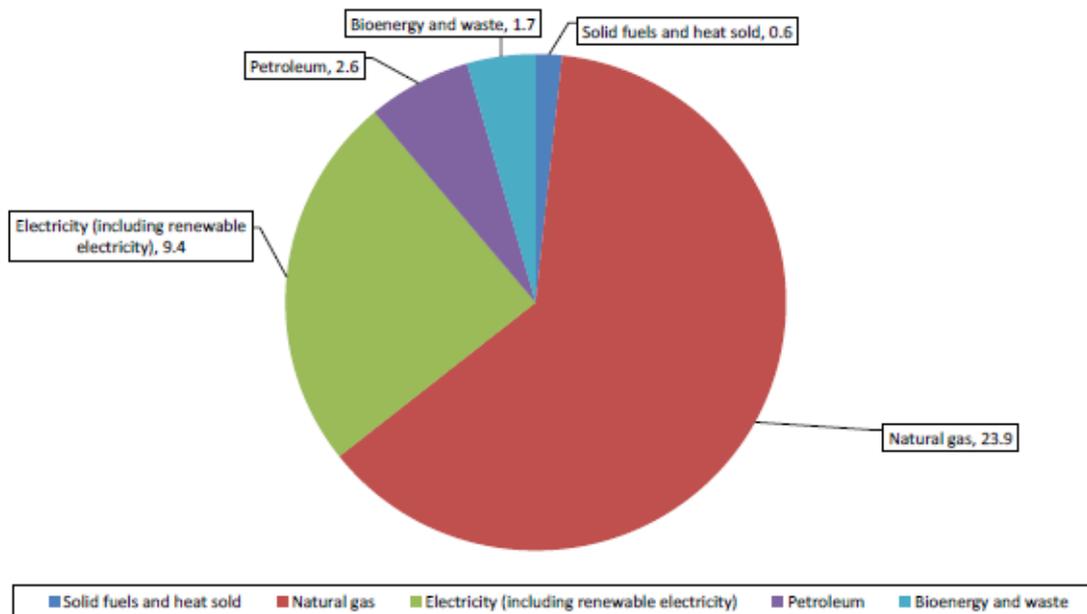
The domestic sector accounted for 27% of total UK energy consumption in 2014. This is energy we use in our homes for cooking, heating, lighting and anything else that requires power.



Domestic energy consumption is affected by the temperatures we experience. When the weather is warmer, we need to have the heating on less and therefore use less energy for heating. Many significant reductions in domestic energy consumption (e.g. between 2010 and 2011, and 2013 and 2014) can be explained by warmer average temperatures, particularly during the winter months. Improvements in energy efficiency have also helped to reduce domestic energy consumption, both through improvements to the energy efficiency of appliances (such as fridges/freezers, light bulbs, and so on), but also through improving the energy efficiency of buildings through insulation and more energy efficient heating systems.

Figure 2 below shows domestic energy consumption in 2014 by fuel type.

**Figure 2: UK domestic energy consumption by fuel type (2014)**



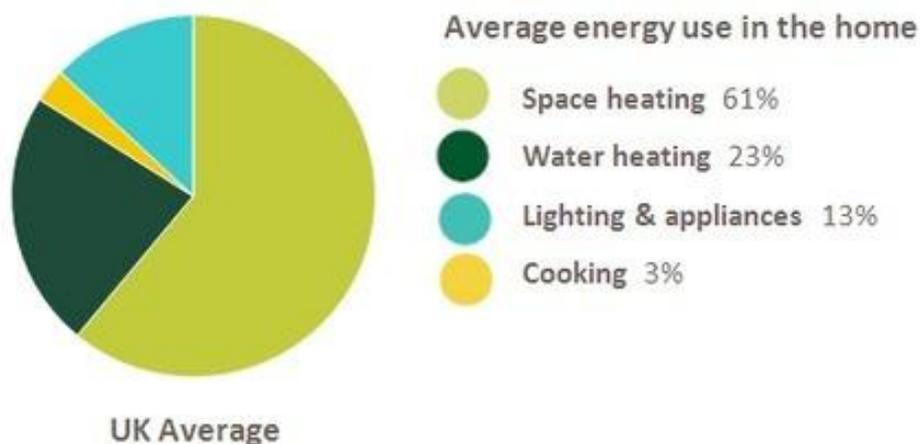
Source: DECC, ECUK Table 3.03

A significant change which has taken place since 1970 is that the majority of the energy we use at home now comes from natural gas, rather than coal. In 1970, 39% of the energy used in our homes came from coal, 24% from natural gas and 18% from electricity. This has now changed to

just 1% from coal, 63% from natural gas and 25% from electricity. While using natural gas is better for the environment than using coal, as it produces a lower level of carbon dioxide emissions per unit of energy generated, and is also a cheaper and more efficient way for us to heat our homes, it is not as environmentally friendly as using renewable energy sources, such as solar and wind, which don't emit carbon dioxide to produce energy. Because natural gas is a non-renewable resource, there is a risk that it will become more and more expensive to use over time and could one day run out.

As shown in Figure 3 below, the majority of our domestic energy is used to heat our homes (space heating) (61%) with the second largest amount of energy being used to heat our hot water (23%). 13% of our energy is used for lighting and appliances, and 3% is used for cooking. Given that heating is by far the biggest consumer of energy use in our homes, reducing the amount of energy used for heating is really important if we are going to significantly reduce our energy consumption and carbon dioxide emissions. Remember this when you start your energy saving project!

**Figure 3: Average energy use in the home**



Source: Centre for Alternative Technology  
Data: Energy Saving Trust

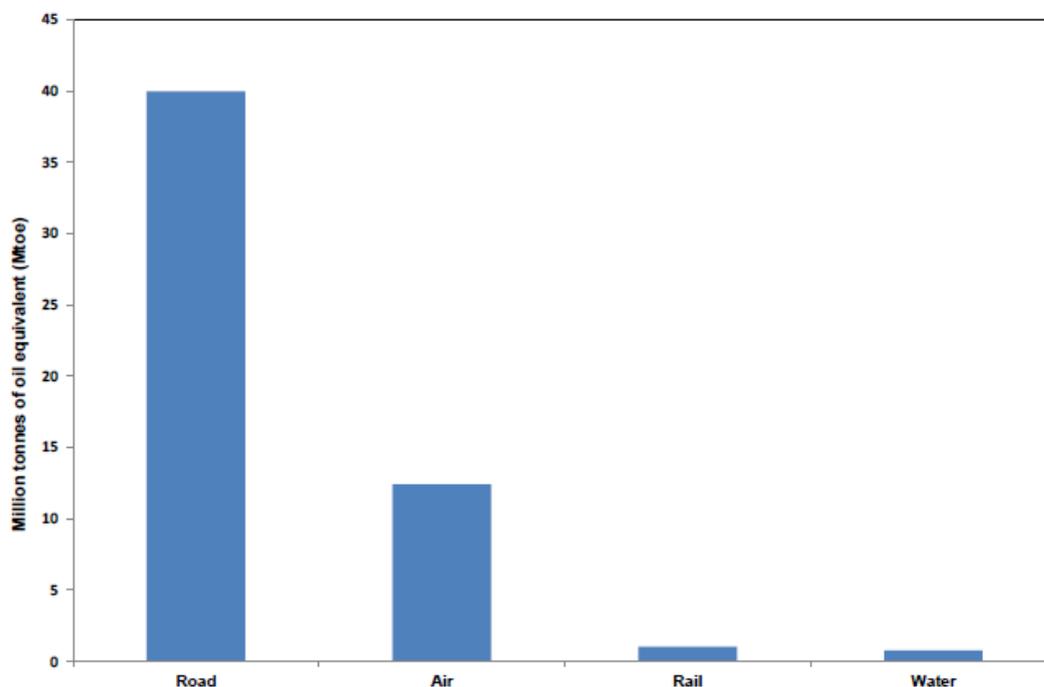
## TRANSPORTATION

Consumption in the transport sector represented 38% of total UK energy consumption in 2014. Total transport energy consumption can be split by four types of transport: road, air, rail and water. The energy consumed by each type of transport in 2014 is illustrated in Figure 4 below. In 2014:



- **Road** transport accounted for 74% of total transport energy consumption in the UK. Of the total energy consumed by road transport, an estimated 63% relates to passenger transport and 37% to freight transport.
- **Air** transport accounted for 23% of total transport energy consumption.
- **Rail** transport accounted for 1.9% of total transport energy consumption.
- **Water** transport accounted for just 1.4% of total transport energy consumption.

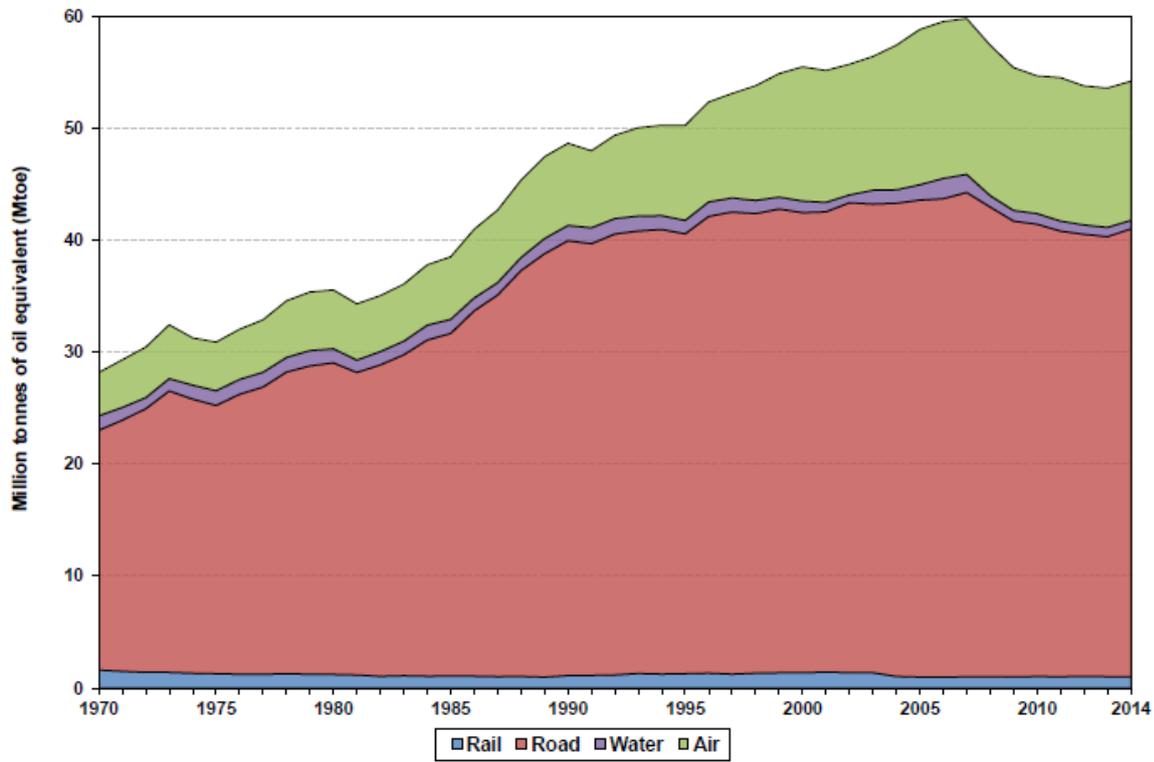
**Figure 4: UK transport energy consumption by type of transport (2014)**



Source: DECC, ECUK Table 2.01

Figure 5 below illustrates the rapid growth in energy consumed by transport experienced between 1970 and 2007. However, since 2007 there has been a fall in transport energy consumption as a result of the economic downturn and increasing efficiency in fuel consumption for new cars and air transport (such that less energy is needed to travel a certain distance). The graph also shows how while energy consumed by road and air travel increased substantially during the period, travel by water and rail actually fell. This is because many more people now drive their own car and travel by plane compared to in 1970.

Figure 5: UK transport energy consumption by type of transport (1970 to 2014)



Source: DECC, ECUK Table 2.01

What's clear is that reducing our car journeys is really important if we're going to reduce our energy use and carbon emissions. Walking, cycling and using public transport (such as buses and trains) are all easy steps we can take to reduce our energy use. A quarter of all car journeys are less than two miles long, which is a perfect distance to walk or cycle! There are other benefits to this too, such as keeping fit.

## INDUSTRIAL

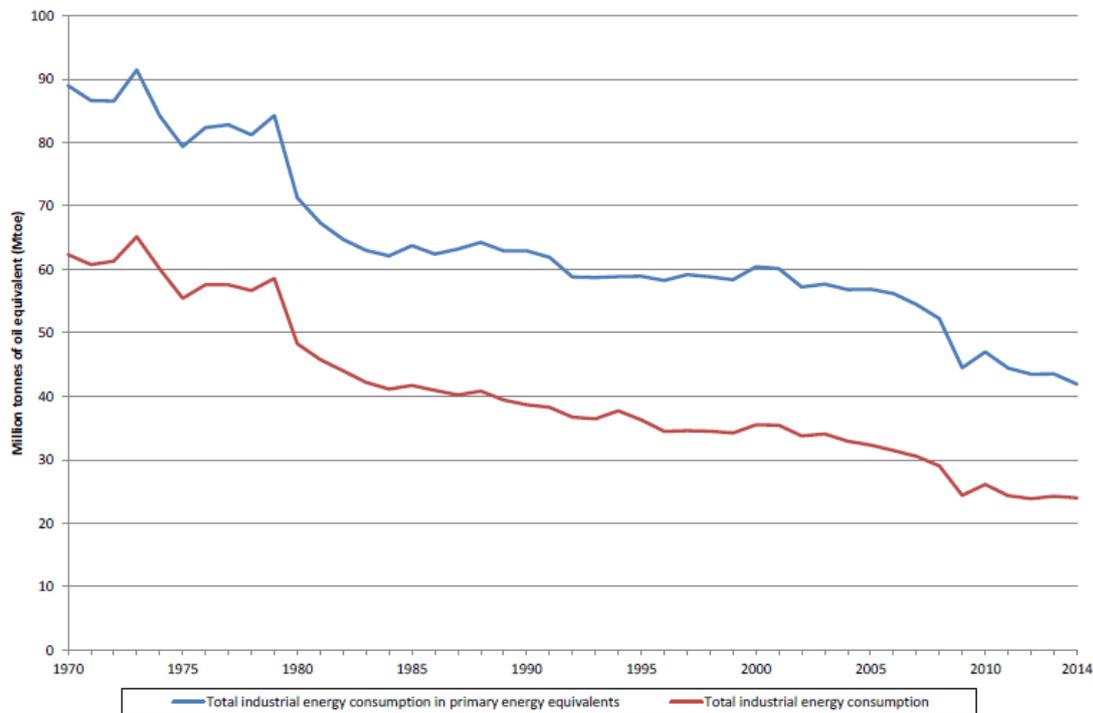


The industrial sector accounted for 17% of total UK energy consumption in 2014. Every product we rely on – from aluminium cans to fertiliser to glass to paper products – takes energy to produce. Energy is needed directly to run industrial machinery and to raise the temperature of components in the manufacturing process. A common use of energy in industry is to heat a boiler that generates steam or hot water.

Figure 6 below shows how industrial energy consumption has dramatically reduced since 1970. This is mainly due to generating electricity in a more energy efficient way, changes in the

structure of the industrial sector (moving industry away from more energy intensive activities) and using the goods produced more efficiently (so they last longer and use less energy).

**Figure 6: UK total industrial energy consumption (1970 to 2014)**



Source: DECC, ECUK Tables 4.01 & 4.02

In 2014, the most energy-consuming industrial sub-sector was the chemicals sector which was responsible for 14% of total industrial energy consumption, followed by the food, drink and tobacco sector and the mineral products sector, which both consumed 12%.

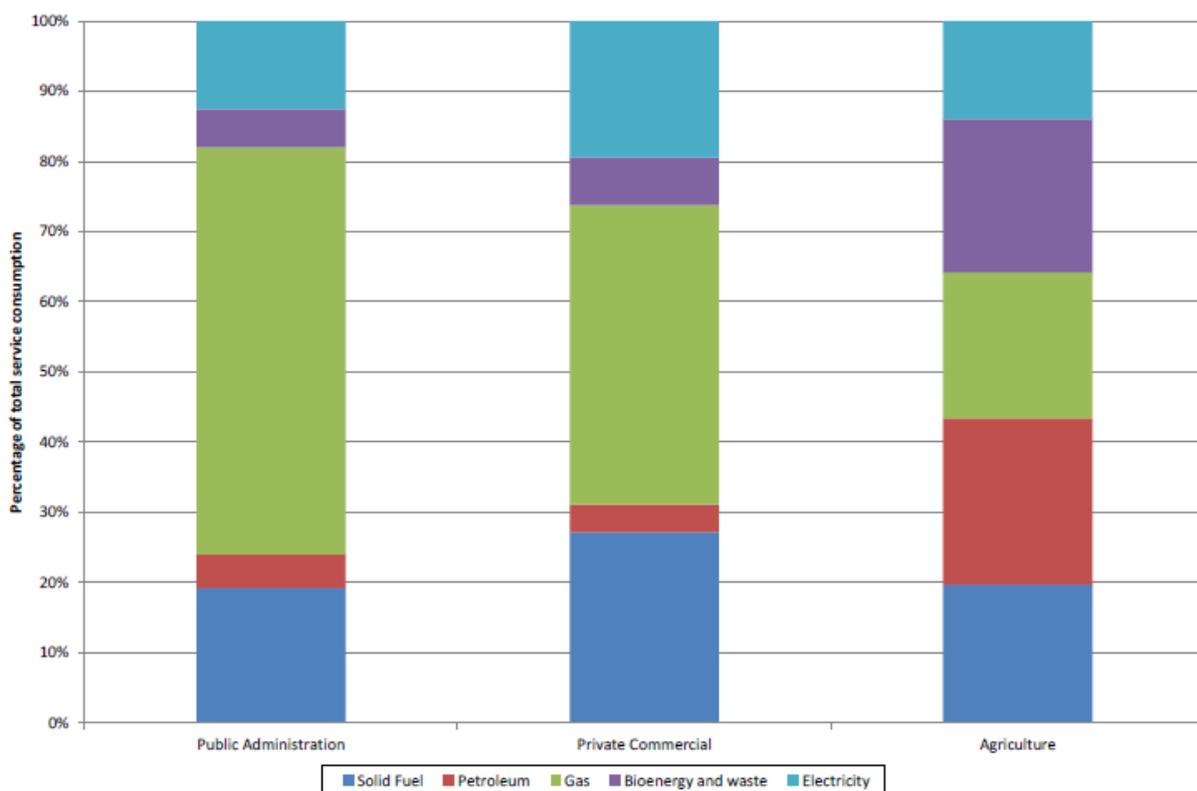
## SERVICES

The services sector accounted for 13% of total UK energy consumption in 2014. The services sector involves the selling of services and skills, as well as goods produced by the industrial sector. Examples of activities in the sector include retail, sales, entertainment, tourism, business and finance. Energy is used in this sector mainly for heating, lighting and appliances (e.g. computers) in buildings – just like in our own homes.

Energy consumed by the services sector has changed very little in comparison with the transport, domestic and industrial sectors despite a dramatic increase in its size, mainly because of energy efficiency improvements. The biggest area of expansion in the sector has been in financial and business services. According to government statistics, 25 years ago 1 in 10 people worked in this sector, now it is 1 in 5!

Figure 7 below shows the split of energy consumption in the services sector between different sub-sectors and fuel types. In 2014, 69% of energy used by the services sector was consumed by the commercial sector, 26% by public administration and 5% by agriculture. The highest consumed fuel in the public administration and commercial sectors was gas (58% and 43% respectively). Fuel consumption in the agriculture sector was more evenly spread with petroleum having the largest share. Agriculture uses the largest share of bioenergy and waste (a renewable resource), mostly because it has more easy access to such resources (e.g. agricultural waste products can be used for anaerobic digestion).

**Figure 7: UK service sector energy consumption by fuel and sub-sector (2014)**



Source: DECC, ECUK Table 5.01

### FURTHER RESOURCES AND INFORMATION

- Check out this overview of energy consumption in the UK from the Department of Energy and Climate Change for more information:  
<https://www.gov.uk/government/collections/energy-consumption-in-the-uk>