

## Estimates of heat use in the United Kingdom in 2013

### Introduction

This article presents a summary of the latest information on heat use in the United Kingdom. Data from the three non-transport sectors (domestic, services and industrial) are analysed and interpretations on differences between sectors and general trends in heat energy use are highlighted.

The analysis relates to 2013 provisional figures, and is based upon data published in Energy Consumption in the UK (ECUK), which was updated in September 2014, this can be found at:

[www.gov.uk/government/collections/energy-consumption-in-the-uk](http://www.gov.uk/government/collections/energy-consumption-in-the-uk)

### Background

For both the services and industrial sectors, the information regarding the end-use of energy consumption was derived from historic data supplied to DECC by the Building Research Establishment (BRE). For the domestic sector, Cambridge Architectural Research has provided underlying data for 2008 onwards. Prior to this date, information came from BRE. This has resulted in a discontinuity in domestic end-use tables between 2007 and 2008. The article is centred on direct use of fuels and does not include the indirect consumption of fuels as an input to electricity generation. Heat sold and bio-energy & waste are included within overall energy consumption, together with a variety of fossil fuels. The heating purposes vary depending on the consuming sector.

For both the domestic and services sector heat purposes include:

- *space heating;*
- *water heating;*
- *cooking/ catering.*

In the industrial sector heating purposes cover:

- *space heating;*
- *high temperature processes* – including coke ovens, blast furnaces and other furnaces, kilns and glass tanks;
- *low temperature processes* – including process heating and distillation in the chemicals sector; baking and separation processes in food and drink; pressing and drying processes in paper manufacture; and washing, scouring, dyeing and drying in the textiles industry;
- *drying and separation* - which is particularly important in paper-making.

While the data in this article provide a good estimate and overall picture of underlying trends, the data are modelled and therefore it is not possible to confidently report slight movements in year-on-year heat use. As such, the heat estimates provided should only be viewed as indicative.

In 2013, overall final energy consumption was 136,786 thousand tonnes of oil equivalent (ktoe)<sup>1</sup>. Non-transport energy use was 83,368 ktoe of which 65,363 ktoe (78 per cent) was accounted for by heat usage. This is a 2 per cent increase compared to 2012, the majority of which was in the service and industry sectors, where each grew by 4 per cent. Whilst in the domestic sector, there was 0.4 per cent of growth. This coincided with a 0.6 degree Celsius decrease in average heating season temperature<sup>2</sup>. The domestic sector did not respond to the same extent suggesting that perhaps this modest change in average temperature was not solely responsible for the growth in the other sectors (see the domestic sector section for further details).

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<sup>1</sup> In addition to this, 664 thousand tonnes of oil equivalent was used in construction, 932 thousand tonnes of oil equivalent in agriculture (based on 2012 data), and 3587 thousand tonnes of oil equivalent was used by industry, but where the end use was not known. This consumption is therefore excluded from the remainder of this article.

<sup>2</sup> Heating season is January to March and October to December.

## Special feature – Estimates of heat use in the UK

Table 1 provides an overview of energy use by sector. The domestic sector accounted for the largest proportion of non-transport energy use, 53 per cent. This is followed by the service and industry sectors at 24 and 23 per cent. Of the heat total over half (64 per cent) is used on space heating. This is followed by water and process use (14 per cent each). The remaining 8 per cent is split between cooking/catering (5 per cent) and drying/separation (3 per cent).

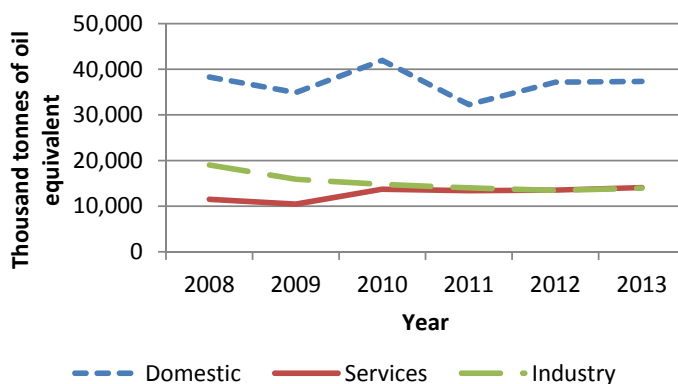
**Table 1: Final energy consumption by sector and end use, 2013**

End use	Thousand tonnes of oil equivalent					
	Domestic	Services	Industry	Transport	Total	Total excluding transport
Space heating	28,728	10,084	3,109	-	41,922	41,922
Water heating	7,494	1,953	-	-	9,447	9,447
Process use	-	-	9,082	-	9,082	9,082
Cooking/catering	1,108	2,042	-	-	3,150	3,150
Drying/separation	-	-	1,762	-	1,762	1,762
<b>Heat total</b>	<b>37,330</b>	<b>14,079</b>	<b>13,954</b>	<b>-</b>	<b>65,363</b>	<b>65,363</b>
Non-heat uses	6,464	6,006	5,535	53,418	71,423	18,005
<b>Total</b>	<b>43,794</b>	<b>20,085</b>	<b>19,489</b>	<b>53,418</b>	<b>136,786</b>	<b>83,368</b>
<b>Percentage used for heating</b>	<b>85%</b>	<b>70%</b>	<b>72%</b>	<b>-</b>	<b>48%</b>	<b>78%</b>

There is a decreasing trend in the amount of energy used for heat in the industrial sector while the services sector energy for heat use remains constant since 2010; this is shown in Chart 1. The domestic sector has fluctuated with the average temperature (see the domestic sector section for further details).

Chart 2 shows non-transport final energy consumption split by sector and end-use for 2013, while Chart 3 displays the end use broken down into fuel types. Within the domestic sector 85 per cent of energy is used for heating purposes. This is the biggest proportion from all three sectors for energy to be used on heating. The majority of heat use in the domestic and service sectors is for space heating, (77 per cent and 72 per cent respectively) whereas most heat consumption in the industrial sector was on heat processes (65 per cent).

**Chart 1: Final energy consumption by heat use by sector, 2008 to 2013**



**Chart 2: Non-transport final energy consumption by use by sector, 2013**

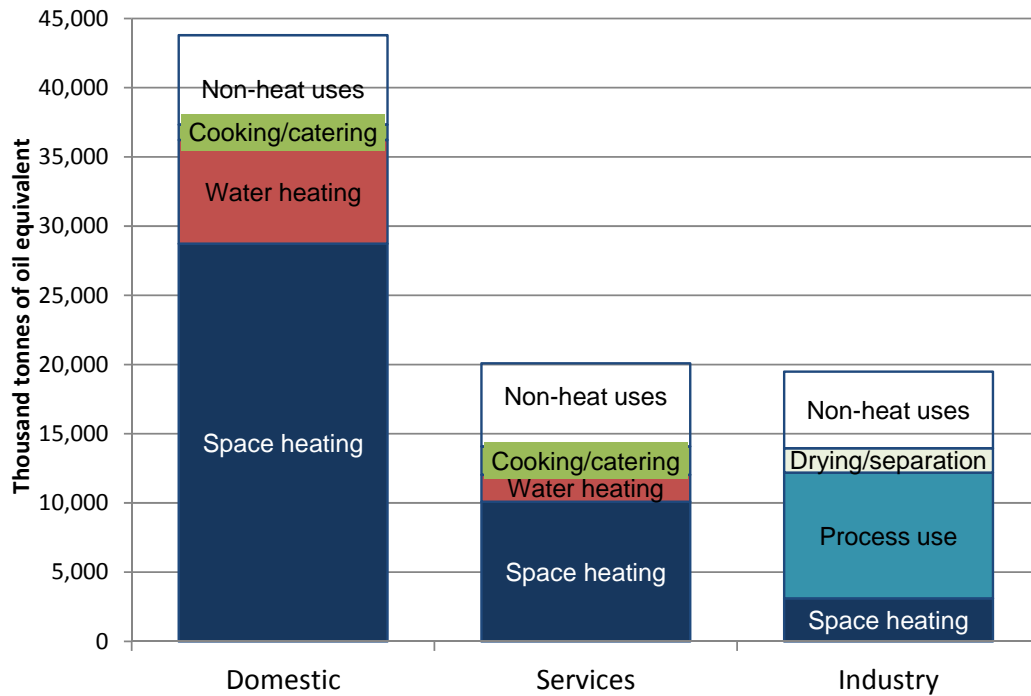
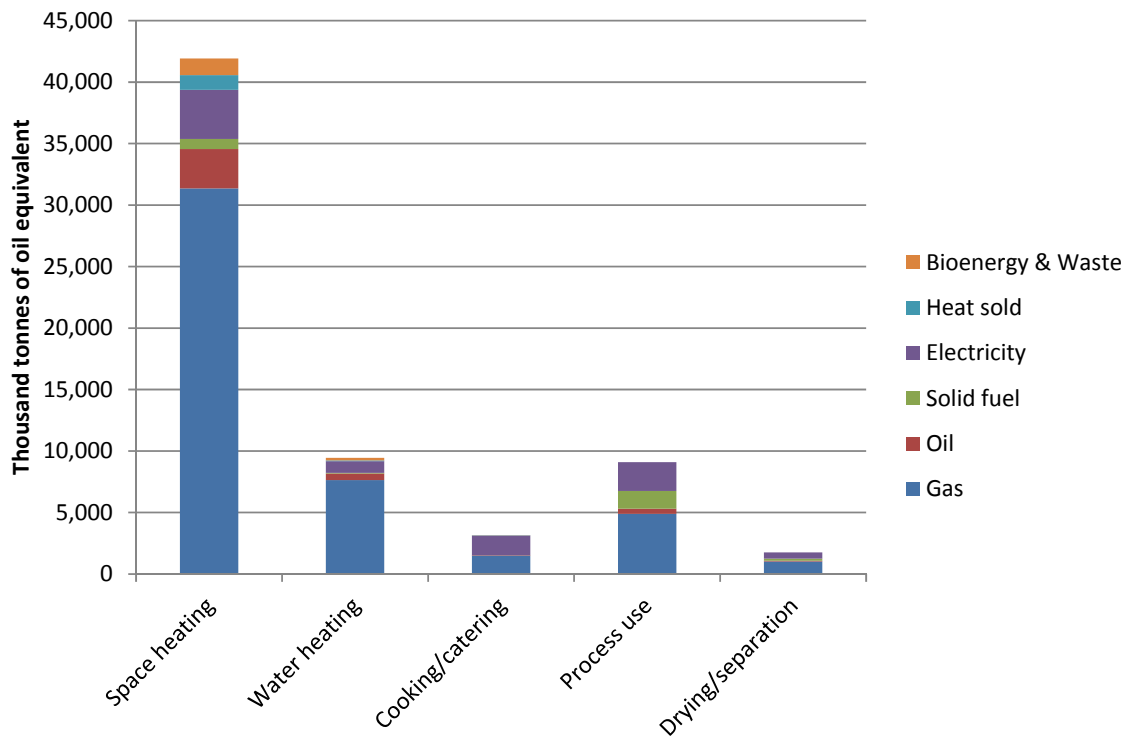


Chart 3 shows that gas dominates space and water heating. In the industrial sector (process use and drying/separation) the proportion of gas used is less and solid fuel and electricity share a greater proportion of the final energy consumption.

**Chart 3: Non-transport final energy consumption of heat energy**



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The following sections provide a more detailed analysis of energy consumption in each of the three non-transport sectors; domestic, industrial and services.

### Energy consumption for heating purposes by sector

#### Domestic Sector:

*Gas dominates the fuel mix for heating purposes and end use*

Table 2 displays the breakdown in the domestic sector by fuel type and end uses and shows that the majority of heat use, 77 per cent of the heating total is used for space heating. The fuel mix for domestic consumption for heat was dominated by gas which provided 79 per cent (29,622 ktoe). Electricity use was the next biggest energy source responsible for 9 per cent of total heat consumption.

#### *Increase in share of bioenergy and waste*

The last two years have seen a marked increase in use (26 per cent between 2011 and 2012, and by 21 per cent from 2012 to 2013) though this is from a relatively low base and its overall contribution to domestic heating remains low at 2 per cent.

**Table 2: Domestic energy consumption by fuel and end use, 2013**

End use	Thousand tonnes of oil equivalent						Total
	Gas	Oil	Solid fuel	Electricity	Heat sold <sup>1</sup>	Bioenergy & Waste <sup>1</sup>	
Space heating	22,865	2,314	667	2,148	52	682	28,728
Water heating	6,139	454	45	653	-	203	7,494
Cooking/catering	617	-	-	490	-	-	1,108
Heat total	29,622	2,769	712	3,291	52	884	37,330
Lighting and appliances	-	-	-	6,464	-	-	6,464
Overall total	29,622	2,769	712	9,755	52	884	43,794

<sup>1</sup> Heat sold and waste is included in this table. Assumptions have been made that, in the domestic and industry sector, all uses for these two sources is for space and water heating.

Chart 4 displays the distribution of domestic consumption by the type of end use, clearly identifying space heating as the main end use within the sector. From 2012 to 2013, space heating increased by 0.4 per cent. This coincided with a 0.6 degree Celsius decrease in average heating season temperature<sup>3</sup>. Domestic heat use did not increase to the same extent as the services and industrial sectors (both grew at 4 per cent); with the additional growth in these sectors perhaps relying on increased economic activity.

<sup>3</sup> Heating season is January to March and October to December.

**Chart 4: Domestic sector energy consumption by end use, 2008 to 2013**

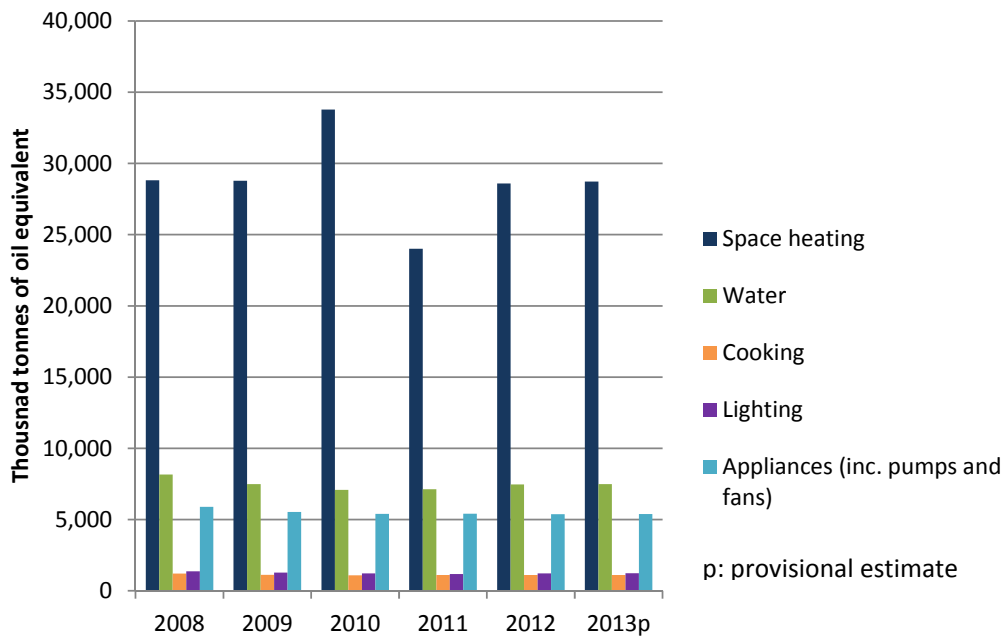
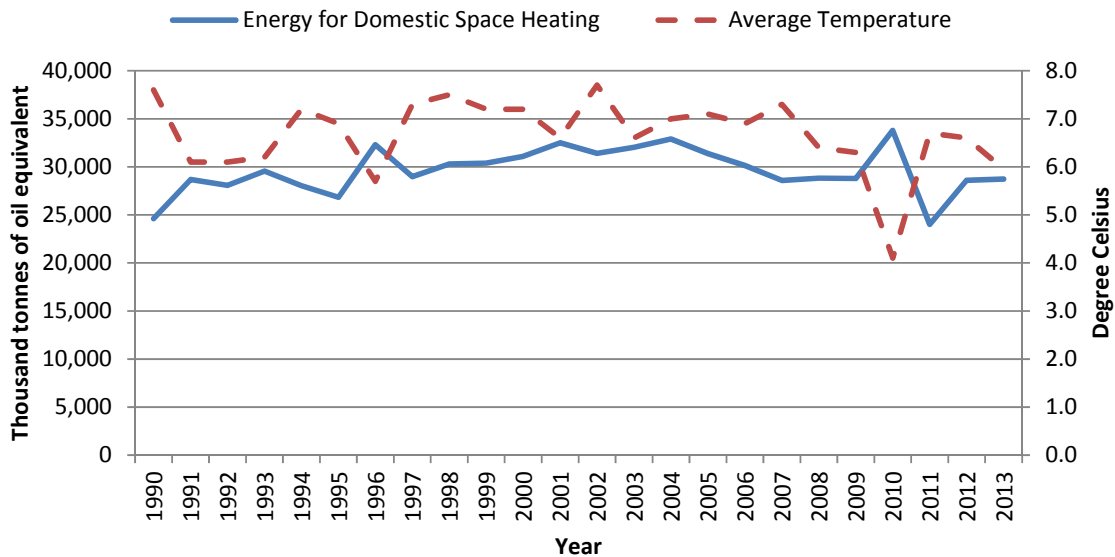


Chart 5 shows that over the longer term it is evident that space heating is negatively correlated with average temperature. When the average temperature is warmer the fuel for space heating decreases, this is highlighted in 2011. Other variables that could have impacted space heating consumption are GDP, salary and wages, and energy prices.

**Chart 5: Average temperature and domestic energy consumption**



## Service Sector

*Two thirds of energy consumed in the services sector is for heating purposes*

Gas provides 71 per cent of heat to the service sector (excluding agriculture uses of 932 ktoe) compared to 79 per cent for the domestic sector and 48 per cent for industry. Electricity is the next biggest energy source providing 19 per cent of heat, compared to 9 per cent for the domestic heat and 25 per cent for industry. Although oil is used more widely than in the industrial sector, its use is considerably smaller than in the domestic sector and its share of the energy mix for heating is just 6 per cent.

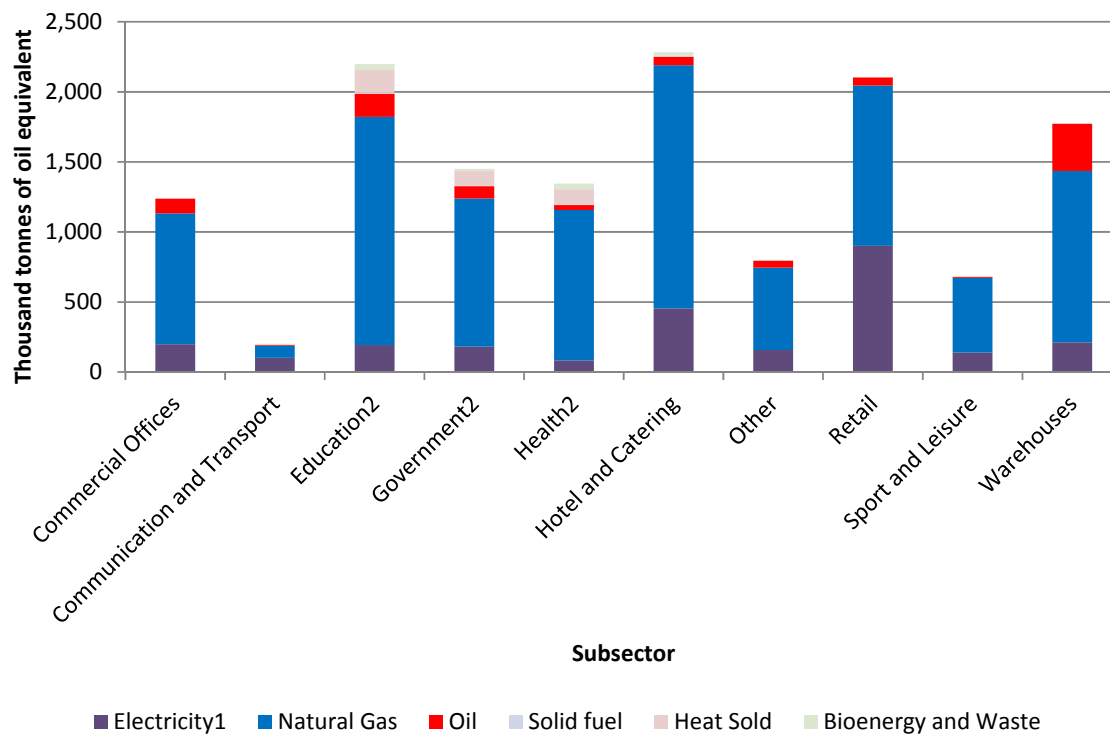
**Table 3: Service sector energy consumption by fuel and end use, 2013**

End use	Thousand tonnes of oil equivalent						Total
	Gas	Oil	Solid fuel	Electricity	Heat sold <sup>1</sup>	Bioenergy & Waste <sup>1</sup>	
Space heating	7,649	792	21	1,201	306	116	10,084
Water heating	1,497	84	3	297	56	15	1,953
Cooking/catering	859	34	-	1,124	24	1	2,042
Heat total	10,005	910	24	2,622	386	132	14,079
Non-Heat Total	197	10	-	5,792	7	-	6,006
<b>Overall Total</b>	<b>10,202</b>	<b>920</b>	<b>24</b>	<b>8,414</b>	<b>393</b>	<b>132</b>	<b>20,085</b>

<sup>1</sup> Heat sold and waste is included in this table. Assumptions have been made that, in the domestic and industry sector, all uses for these two sources is for space heating.

In 2013, the four main consumers of heat related energy in the service sector were hotel and catering, education, retail and warehouses in descending order of consumption.

Chart 6 shows how fuel type is distributed for heat uses within the sector. Natural gas is the biggest provider of heat in all subsectors except from communication and transport where electricity provides the most energy.

**Chart 6: Final Energy consumption of Heat by subsector and fuel type, 2013**

<sup>1</sup>Electricity includes consumption of electricity generated from renewable sources.

<sup>2</sup>Aggregated energy use in the service sub-sectors education; Government and Health have been scaled to the 'Public Administration' energy use as published in the Digest of UK Energy Statistics.

## Industry Sector:

*High/low temperature Process use is the main consumer of energy*

The breakdown of the industrial energy consumption follows in Table 4. Unlike the domestic and services sector, where the majority of energy use is for space heating, 65 per cent of heat energy use in the industrial sector is for high and low temperature processes.

The industrial sector also differs in its fuel mix; 25 per cent of heat energy is sourced from electricity as opposed to 9 per cent in the domestic sector and 19 per cent for services.

**Table 4: Industrial energy consumption by fuel and end use, 2013**

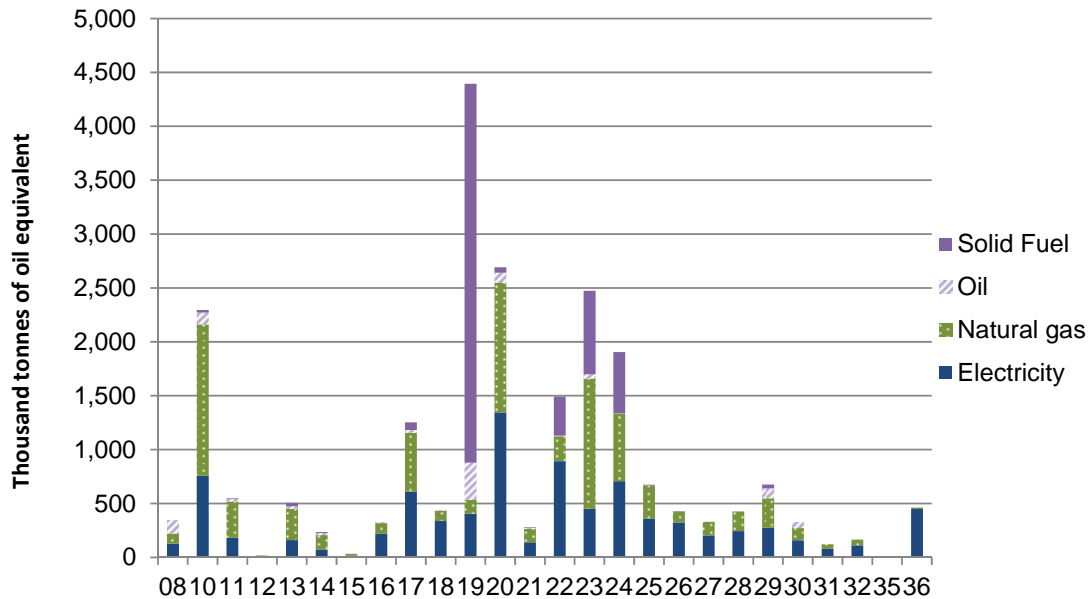
End use	Thousand tonnes of oil equivalent						Total
	Gas	Oil	Solid fuel	Electricity	Heat sold <sup>1</sup>	Bioenergy & Waste <sup>1</sup>	
Space heating	833	108	127	643	847	550	3,109
High temperature process	1,839	152	1,128	939	-	-	4,057
Low temperature process	3,057	254	324	1,391	-	-	5,026
Drying/separation	1,011	70	176	504	-	-	1,762
Heat total	6,739	584	1,755	3,478	847	550	13,954
Non-Heat Uses	890	71	199	4,375	-	-	5,535
Overall total	7,629	655	1,954	7,853	847	550	19,489

<sup>1</sup>Heat sold and waste is included in this table. Assumptions have been made that, in the domestic and industry sector, all uses for these two sources is for space heating.

*Special feature – Estimates of heat use in the UK*

Chart 7 shows the use of fuel in all industrial subsectors with the manufacture of coke and refined petroleum products being responsible for using the largest amount of heat energy. The most striking feature of the chart is of the manufacture of coke and refined petroleum products, where 80 per cent of the energy is sourced from solid fuel. This differs to the other subsectors, where either natural gas or electricity dominates the fuel mix.

**Chart 7: Fuel energy consumption for heat in the industry sector, 2013**



- 08 Other mining and quarrying
- 10 Manufacture of food products
- 11 Manufacture of beverages
- 12 Manufacture of tobacco products
- 13 Manufacture of textiles
- 14 Manufacture of wearing apparel
- 15 Manufacture of leather and related products
- 16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 17 Manufacture of paper and paper products
- 18 Printing and publishing of recorded media and other publishing activities
- 19 Manufacture of coke and refined petroleum products
- 20 Manufacture of chemicals and chemical products
- 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations
- 22 Manufacture of rubber and plastic products
- 23 Manufacture of other non-metallic mineral products
- 24 Manufacture of basic metals
- 25 Manufacture of fabricated metal products, except machinery and equipment
- 26 Manufacture of computer, electronic and optical products
- 27 Manufacture of electrical equipment
- 28 Manufacture of machinery and equipment n.e.c.
- 29 Manufacture of motor vehicles, trailers and semi-trailers
- 30 Manufacture of other transport equipment
- 31 Manufacture of furniture
- 32 Other manufacturing
- 36 Water collection, treatment and supply



## Summary

The data presented in this article highlights the significant proportion of energy used for heating purposes. An understanding of the types of fuel used for heating purposes, the specific end uses, as well as the energy efficiency improvements in use of modern heating equipment, are important in order to gain a full knowledge of the heat market.

### *Fossil fuels are still the main energy source used for generating heat*

Primary consumption of fossil fuels (gas, oil and solid fuel) is the main energy source for heating purposes (81 per cent). The use of fossil fuels made up 89 per cent of heat energy consumption in the domestic sector and 78 and 65 per cent in the services and industrial sectors respectively.

Bioenergy and waste energy has increased in the last two years though still accounts for just 2 per cent of heat energy consumption. The majority (86 per cent) is used for space heating and the main consumer is the domestic sector.

### *Over half of heat was produced from gas*

In 2013, gas was the main fuel used for heating purposes in all sectors (71 per cent). In the domestic sector gas provided 79 per cent of heat consumed compared to 71 per cent for the service sector and 48 per cent in the industry sector.

Oil provided 7 per cent of the heating for the domestic sector compared to 6 per cent for the services sector and just 13 per cent in industry. Solid fuels were the least common energy source (4 per cent) in all sectors to generate heat.

### *Electricity is used more for heating purposes in the service and industry sectors*

The industrial sector uses the biggest proportion of electricity for heating purposes as this accounts for 25 per cent of all heat generated. This is followed by the service sector where 19 per cent of the heat total is generated by electricity.

## User feedback

We welcome all feedback from the users of this data, therefore if you would like to comment on these or on the content of this article, please contact Vicky Goodright using the details below.

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