

## Estimates of heat use in the United Kingdom in 2012

### 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 the sectors and general trends in heat energy use are highlighted.

The analysis relates to 2012 provisional figures, and is based upon data published in Energy Consumption in the UK, which was updated in July 2013:

[www.gov.uk/government/publications/energy-consumption-in-the-uk](http://www.gov.uk/government/publications/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 data for 2008 onwards. This has resulted in a discontinuity in all 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.

Heating purposes vary depending on the consuming sector.

For both the domestic and service sectors 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.

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

*Almost half of final energy consumption in the UK is for heating uses, and over three quarters of non-transport energy use*

In 2012, total final energy consumption in the UK was 136,019 thousand tonnes of oil equivalent<sup>1</sup>. Consumption for heating purposes accounted for almost half of total final energy consumption (47 per cent, 64,122 thousand tonnes of oil equivalent). Transport uses accounted for 39 per cent, and other uses for 14 per cent. When transport energy use is excluded, the heat proportion of energy use increases to over three quarters (77 per cent). Over two fifths of non-transport energy use is used for domestic heating purposes (44 per cent), just under one fifth (19 per cent) for industrial heat uses and 15 per cent by the service sector. The following analysis explores how consumption is split by sector, end use and fuel type.

### *Households are the greatest consumer of energy for heating purposes*

Of the energy used for heating purposes in the UK in 2012 (64,122 thousand tonnes of oil equivalent) the domestic sector accounted for 57 per cent, followed by the industrial sector (24 per cent) and the services sectors (19 per cent). Space and water heating were the largest contributing uses of heat in both the domestic (97 per cent of heat demand) and the services sector (85 per cent). In the industrial sector, processing (high and low temperature process combined) was the principal purpose of heat use, contributing 65 per cent of sector's heat energy consumption.

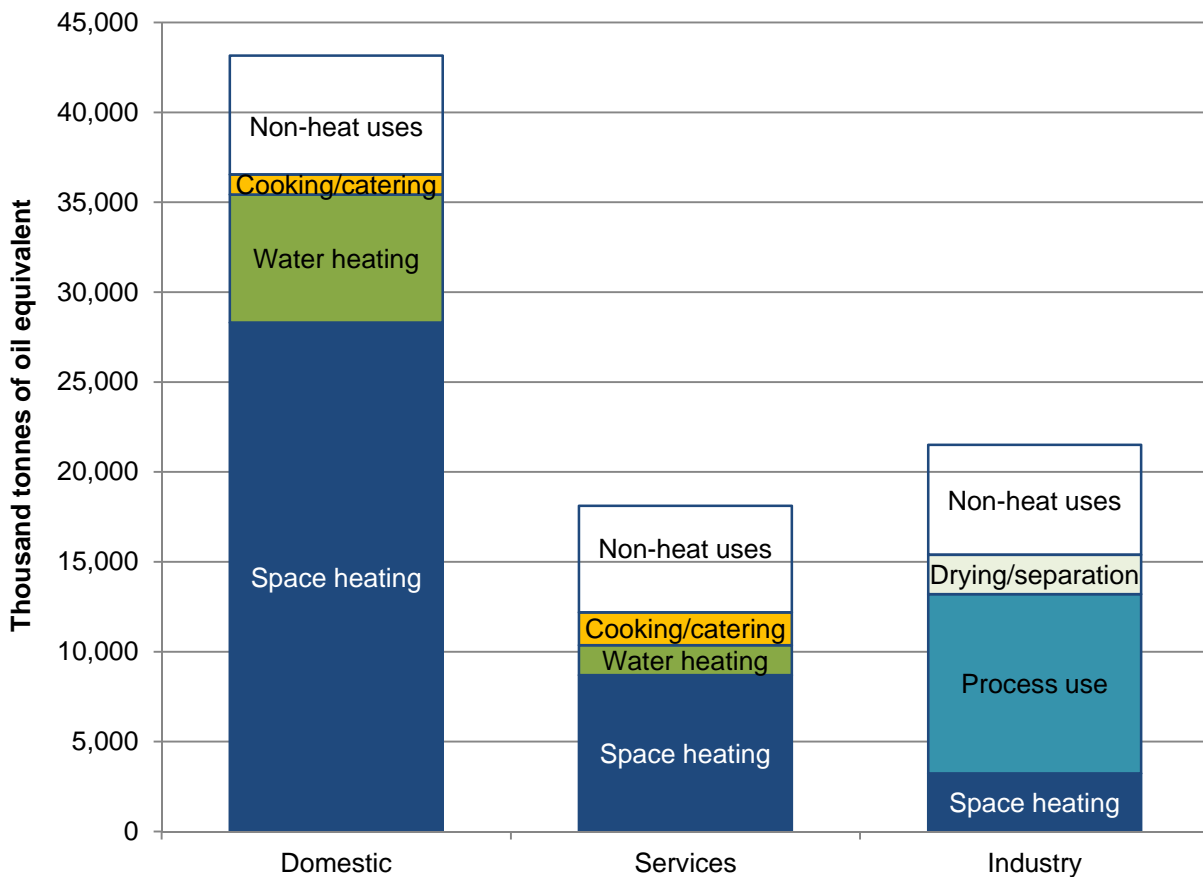
Table 1 and Chart 1 show the consumption split by sector and end-use for 2012.

**Table 1: Final energy consumption by sector and end use, 2012**

End use	Thousand tonnes of oil equivalent					Total excluding transport
	Domestic	Services	Industry	Transport	Total	
Space heating	28,306	8,702	3,229	-	40,237	40,237
Water heating	7,120	1,659	-	-	8,780	8,780
Process use	-	-	9,974	-	9,974	9,974
Cooking/catering	1,116	1,831	-	-	2,946	2,946
Drying/separation	-	-	2,186	-	2,186	2,186
<b>Heat total</b>	<b>36,542</b>	<b>12,192</b>	<b>15,388</b>	<b>-</b>	<b>64,122</b>	<b>64,122</b>
Other uses	6,611	5,921	6,116	53,248	71,897	18,648
<b>Total</b>	<b>43,153</b>	<b>18,113</b>	<b>21,505</b>	<b>53,248</b>	<b>136,019</b>	<b>82,771</b>
<b>Percentage used for heating</b>	84.7%	67.3%	71.6%	-	47.1%	77.5%

<sup>1</sup> In addition to this, 312 thousand tonnes of oil equivalent was used in construction, 914 thousand tonnes of oil equivalent in agriculture, and 3,347 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.

**Chart 1: Final energy consumption by use by sector, 2012**



The following sections provide a more detailed analysis of energy consumption in each of the three non-transport sectors.

### Energy consumption for heating purposes by sector and fuel

#### *Majority of energy consumed in the domestic sector is for heat uses*

In 2012 energy consumption from the domestic sector was 43,153 thousand tonnes of oil equivalent. Of this it was estimated that 85 per cent (36,542 thousand tonnes) was used for heating purposes (space heating, water heating and cooking/catering) and the remaining 15 per cent (6,611 thousand tonnes of oil equivalent) for lighting and appliances.

#### *Gas dominates domestic fuel mix for heating purposes*

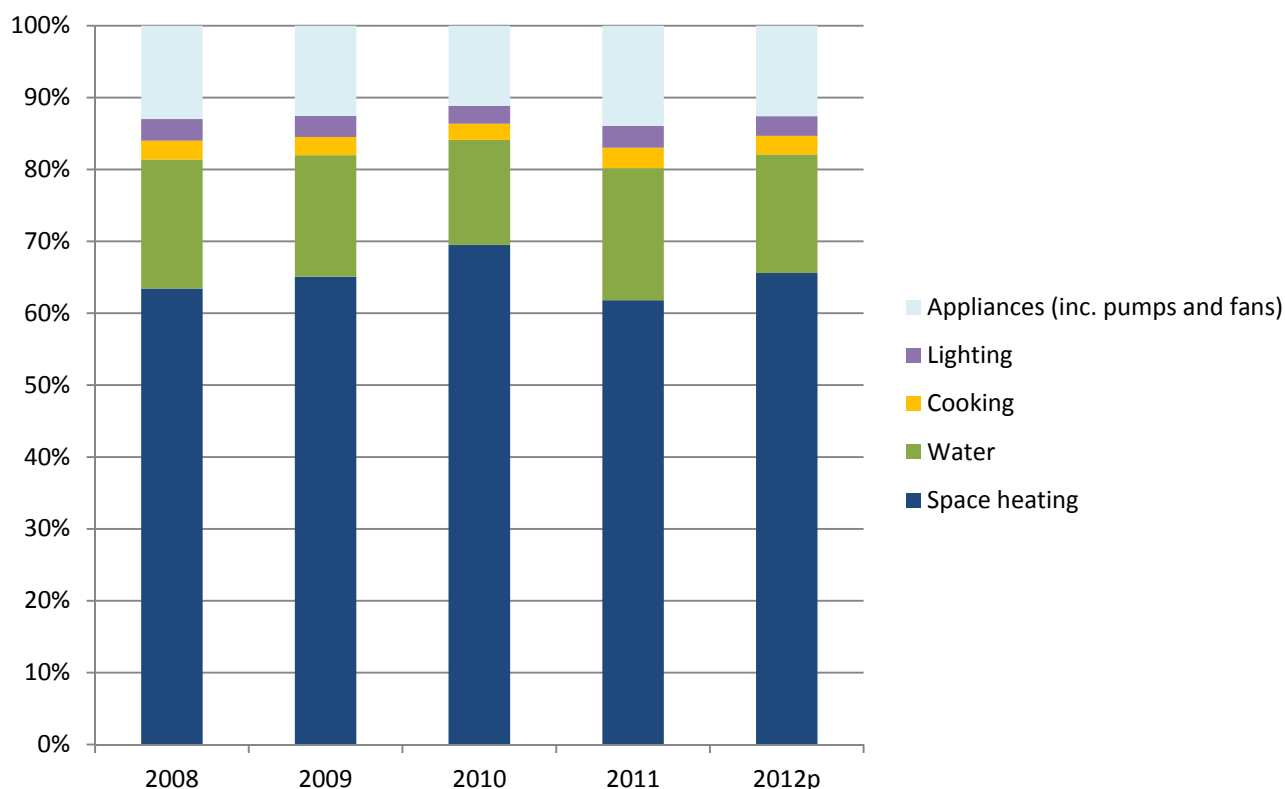
The fuel mix of domestic consumption for heat purposes is dominated by gas where direct consumption was responsible for 80 per cent (29,156 thousand tonnes of oil equivalent) of the sector's heat consumption and 68 per cent of overall domestic consumption (see Table 2). Electricity for heat was responsible for 9 per cent of total heat consumption. Electricity for lighting and appliances accounted for 15 per cent of total domestic energy consumption.

**Table 2: Domestic energy consumption by fuel and end use, 2012**

Thousand tonnes of oil equivalent							
End use	Gas	Oil	Solid fuel	Electricity	Heat sold	Bio-energy & Waste	Total
Space heating	22,540	2,281	666	2,098	52	669	28,306
Water heating	6,004	425	42	650	-	-	7,120
Cooking/catering	612	-	-	503	-	-	1,116
<b>Heat total</b>	<b>29,156</b>	<b>2,705</b>	<b>709</b>	<b>3,251</b>	<b>52</b>	<b>669</b>	<b>36,542</b>
Lighting & appliances	-	-	-	6,611	-	-	6,611
<b>Overall total</b>	<b>29,156</b>	<b>2,705</b>	<b>709</b>	<b>9,862</b>	<b>52</b>	<b>669</b>	<b>43,153</b>

Chart 2 displays the distribution of domestic consumption by end use, clearly identifying space heating as the main heat purpose within the sector. Energy consumption for space heating was greater in 2010 because the average temperature for the year was approximately one degree lower than the two years before and the two years after 2010.

**Chart 2: Domestic sector energy consumption by end use, 2008 to 2012**



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

In 2012, energy consumption in the services sector was 18,113 thousand tonnes of oil equivalent, with 67 per cent (12,192 thousand tonnes of oil equivalent) of this used for heating purposes.

Similar to the domestic sector, space heating dominated energy consumption for heat purposes, being responsible for 71 per cent of energy consumed (Table 3). Direct gas use was used to deliver 66 per cent of total heat used in the services sector with electricity a further 21 per cent.

**Table 3: Service sector energy consumption by fuel and end use, 2012**

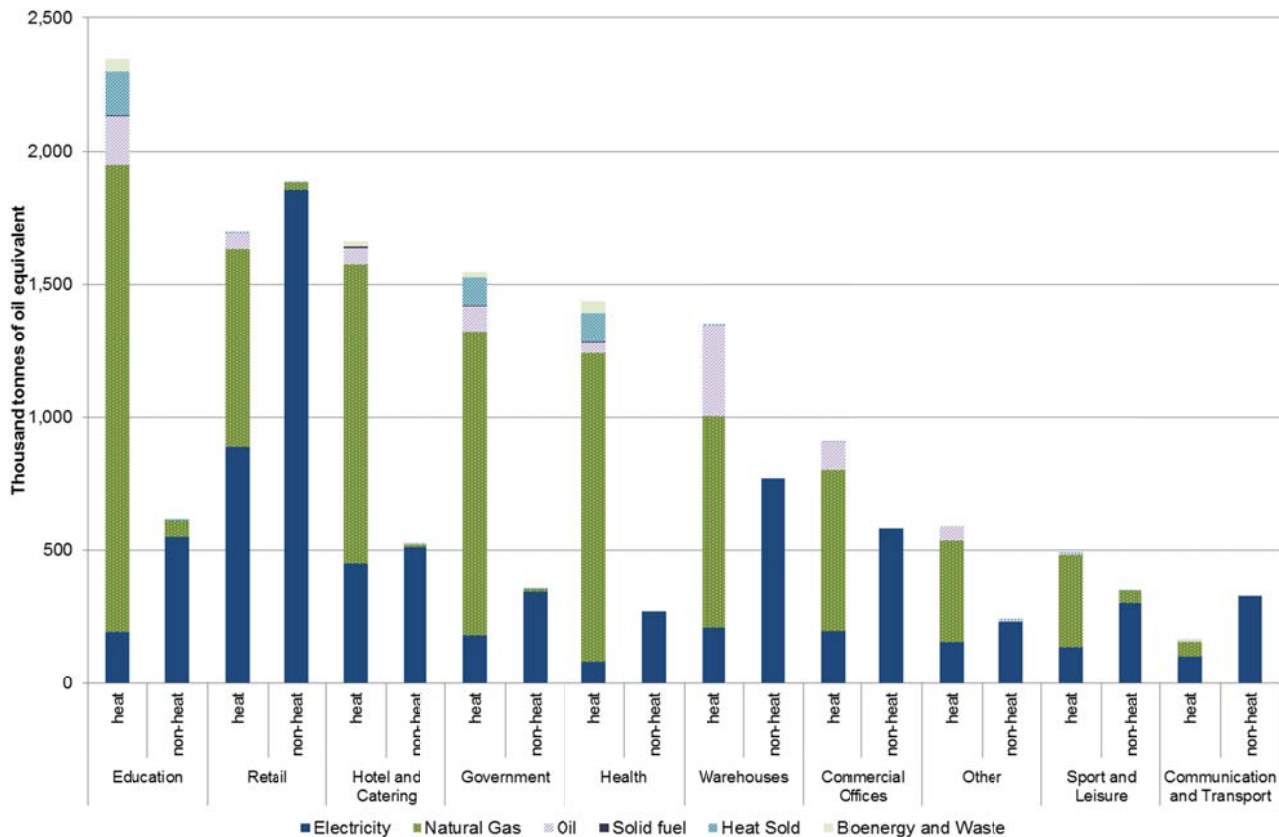
Thousand tonnes of oil equivalent							
End use	Gas	Oil	Solid fuel	Electricity	Heat sold	Bio-energy & Waste	Total
Space heating	6,244	831	13	1,192	301	121	8,702
Water heating	1,206	87	3	295	55	14	1,659
Cooking/catering	656	35	0	1,114	23	1	1,831
<b>Heat total</b>	<b>8,106</b>	<b>954</b>	<b>16</b>	<b>2,601</b>	<b>379</b>	<b>136</b>	<b>12,192</b>
Computing	-	-	-	505	-	-	505
Cooling and ventilation	23	-	-	741	0	-	764
Lighting	-	-	-	3,405	-	-	3,405
Other	134	10	-	1,096	7	-	1,247
<b>Overall total</b>	<b>8,263</b>	<b>964</b>	<b>16</b>	<b>8,349</b>	<b>386</b>	<b>136</b>	<b>18,113</b>

*Education is the main consumer of energy for heat in the service sector*

In 2012, the four main consumers of heat related energy in the services sector were Education, Retail, Hotel and Catering and Government who between them consumed nearly three fifths of total service sector heating use.

Chart 3 shows the distribution of energy consumed in the services sector by end-use.

**Chart 3: Service sector energy consumption by fuel and end use, 2012**



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

*Industrial sector uses more than seventy per cent of its energy for heating, and low temperature processes are the main use of heat*

In 2012, industrial consumption accounted for 21,505 thousand tonnes of oil equivalent, of which 15,388 thousand tonnes of oil equivalent (72 per cent of the total) was consumed for heating purposes.

Of the energy used for heating, 39 per cent was for low temperature process, with high temperature process accounting for a further 26 per cent, space heating 21 per cent and drying/separation 14 per cent.

Direct consumption of fossil fuels accounted for 68 per cent of heat consumption in the industrial sector. Gas consumption dominated the fuel mix for heat with 54 per cent of consumption, followed by electricity (23 per cent), solid fuel (9 per cent) and oil (6 per cent). Three per cent of heat generated within the sector was attributable to renewables.

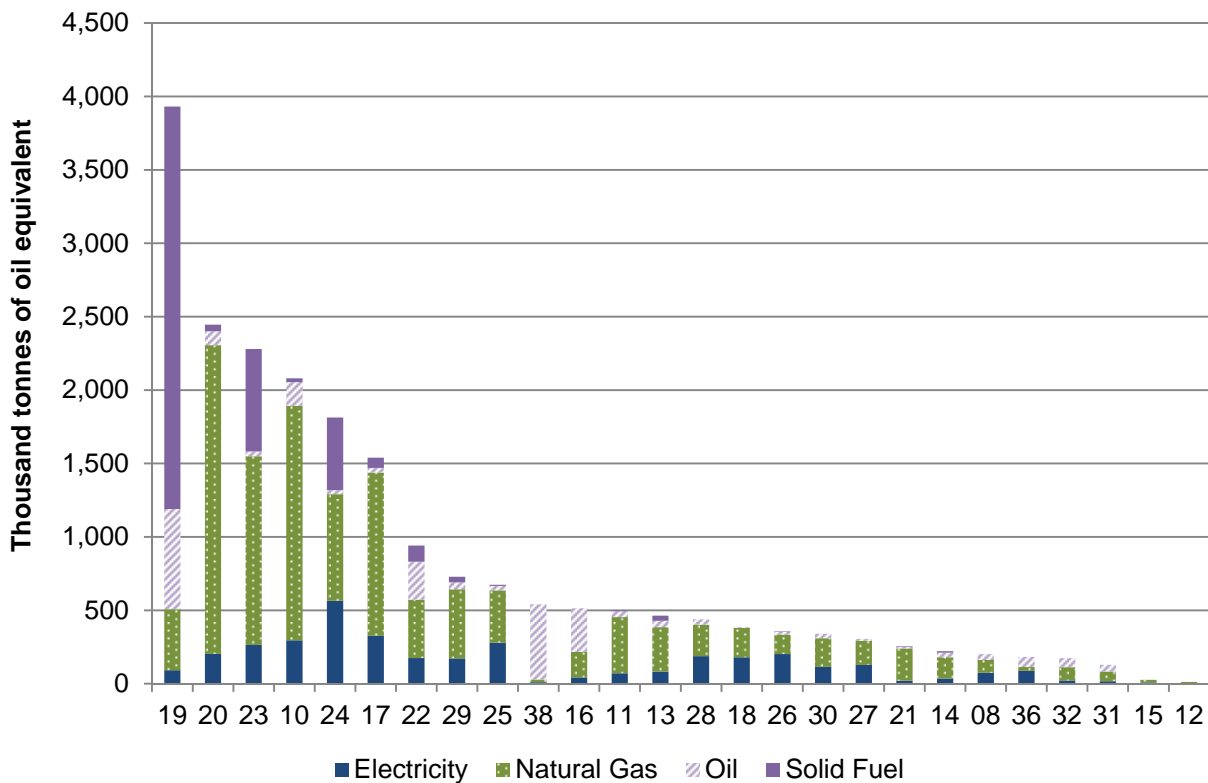
**Table 4: Industrial energy consumption by fuel and end use, 2012**

End use	Thousand tonnes of oil equivalent						Total
	Gas	Oil	Solid fuel	Electricity	Heat sold	Bio-energy & Waste	
Space heating	1,133	83	75	656	795	487	3,229
High temperature process	1,973	91	989	951	-	-	4,005
Low temperature process	3,780	570	183	1,436	-	-	5,969
Drying/separation	1,387	167	109	524	-	-	2,186
Heat total	8,273	911	1,356	3,567	795	487	15,388
Motors	-	-	-	2,788	-	-	2,788
Compressed air	-	-	-	793	-	-	793
Lighting	-	-	-	242	-	-	242
Refrigeration	-	-	-	482	-	-	482
Other	1,106	149	146	411	-	-	1,811
Overall total	9,378	1,059	1,502	8,283	795	487	21,505

*Less than one quarter of industry sub-sectors consume two thirds of the sectors heat*

Chart 4 shows that there are 6 key sub-sectors that are more heat intensive. 66 per cent of total energy consumption for heat purposes comes from 6 of the 26 industry sub-sectors at two digit SIC (2007) level. The chart also shows the fuel mix for heat use varies between the different sub-sectors within the industrial sector.

Chart 4: Fuel energy consumption for heat in the industry sector, 2012



- 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
- 38 Waste collection, treatment and disposal activities; materials recovery

## **Summary**

The data presented in this article highlight 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*

Direct primary consumption of fossil fuels (gas, oil and solid fuel) were the main energy sources for heating purposes (81 per cent); electricity (fuelled by fossil and renewable fuels) accounted for a further 15 per cent. The use of those fuels made up 89 per cent of heat energy consumption in the domestic sector and 74 and 68 per cent in the services and industrial sectors respectively.

### *Over half of energy generated for heating was from gas*

In 2012, gas was the main fuel used for heating purposes in all sectors (55 per cent). In the domestic sector gas for heating contributed to 68 per cent of total domestic energy consumption. The respective proportions for the services and industry sectors were 45 per cent 38 per cent.

Use of oil for heating comprised 6 per cent of total energy consumption. The domestic sector used oil to generate heat for 6 per cent of its total energy consumption. The industrial and service sectors used slightly less, 5 per cent and 4 per cent respectively. Solid fuels were the least common fossil fuel source (3 per cent) in all sectors to generate heat but were mainly used by the domestic and industrial sectors accounting for 2 and 6 per cent of total energy consumption within each sector respectively. Direct consumption of sold heat, sourced from CHP and community heating schemes accounted for around 2 per cent all heat, but was more prevalent in the industrial and services sectors (at 5 per cent and 3 per cent respectively).

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

Use of electricity made up 9 per cent of heat energy consumption in the domestic sector. The respective figures for services and industry sectors were 21 and 23 per cent.

### *Two per cent of energy for heating was generated by renewables*

Total renewables final energy consumption in the UK, including biofuels for transport, was 2,250 thousand tonnes of oil equivalent in 2012, with consumption for heating purposes at 57 per cent (1,292 thousand tonnes of oil equivalent). This figure equates to two per cent of the total energy consumed for heating purposes across the three sectors. Renewables made up 2 per cent of total consumption in both the domestic and industrial sectors and 1 per cent of total service sector consumption. Nearly all, 99 per cent, renewable heat is used for space heating across the three sectors.

## **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 Victoria Thompson using the details below.

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