

15. UK

For a more detailed discussion of energy consumption patterns and energy policy in the UK see *Lower Carbon Futures*.

15.1 Households

New household projections suggest that the rate of household formation in the UK is slowing down due to an increase in the number of couples living together. There are expected to be approximately 3.8 million new households by 2020 (compared with 4.4 million in previous projections) in England alone (Planning, 1999). See Table 15.1 for household data.

Around one third of the UK's 24 million households are defined as being 'low-income'. Low-income households are frequently fuel-poor, which means that the household needs to spend more than 10% of its income (compared to the national average of 4.3%) in order to obtain sufficient energy services (DETR, 1999a). In 1996, the English House Condition Survey estimated that at least 4.3 million households suffered from fuel poverty, equivalent to around 21% of households in England), of which around half were pensioner households. An old, inefficient housing stock poses major obstacles to improving domestic energy efficiency in the UK. More than 1.5 million dwellings were considered unfit for habitation in 1996, either in terms of being in a condition of serious disrepair, prejudicial to health, or lacking basic services and facilities (DETR, 1999c).

Table 15.1: Household data (UK)

		Year	Source
Number of households	24,484,000	1999	DECADE, 1999
Number of households in 2010	26,419,000	2010	DECADE, 1999
Average household size	2.4	1997	ONS, 1998
% 1-person households	27%	1997	ONS, 1998
Average floor area	80 m ²	1991	DoE, 1996
% owner-occupying households	67%	1997	ONS, 1998
% in single houses	82%	1997	DETR, 1999c

15.1 Natural gas

The use of gas has been established in the Great Britain since the mid-nineteenth century. The natural gas industry in Northern Ireland is a much more recent development and is summarised separately below.

Great Britain

In Great Britain, town gas was used for lighting, heating and cooking. From the 1920s to the 1950s, around 80% of British dwellings were connected to the town gas distribution network. In the 1950s, the industry encountered strong competition from electricity, but took off again in the 1960s with the discovery of natural gas in the North Sea. Conversion to natural gas was largely complete by 1974. In the mid-1970s, gas penetration fell to a low of just under 70%, but since that time has recovered virtually all of its lost share (Figure 15.1). The number of domestic natural gas customers in Great Britain has increased by an average of 1.5% per year between 1992 and 1996, and the number of projected connections for 1997 and 1998 were in the region of 255,000 per year (*cf.* Table 15.2) (BG, 1998). Households in remote or rural locations are much less likely to have access to gas than those in urban areas. The availability of gas is reflected in the large variation in the use of gas across the country, ranging from 95% of homes in the West Midlands Metropolitan Area, to only 57% of homes in Devon and Cornwall (DETR, 1999c).

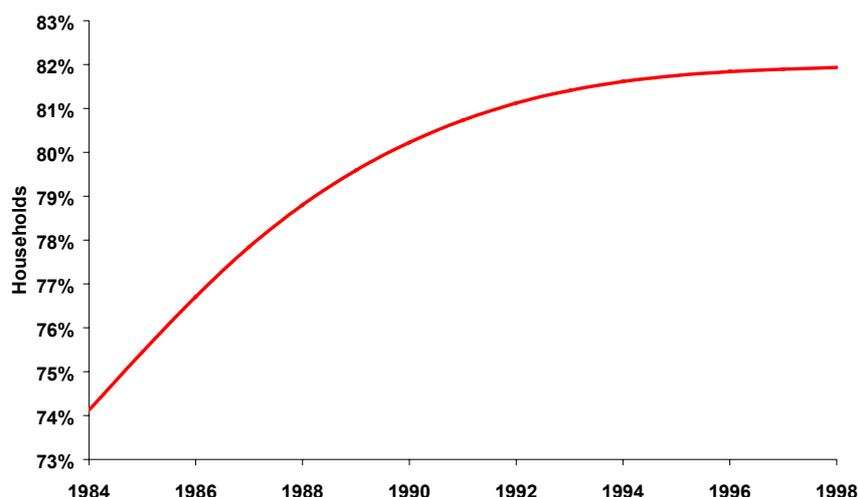


Figure 15. 1: Expansion of the low pressure gas distribution network, Great Britain

Source: BG, 1998

Formerly, British Gas was the sole gas supplier for the domestic sector. It was a state-owned company in charge of approximately 19 million residential distribution consumers, a situation unparalleled elsewhere in the EU (apart from France, to a certain extent). The massive subsidies supplied by the government to this monopoly industry for the purpose of extending the gas network go a fair way (as well as the abundance of indigenous supplies) towards accounting for the very high current gas penetration levels in Great Britain. However, the adoption of market liberalisation policies by the UK government has broken up the monopoly. By August 1998 over 3 million domestic customers had switched to a new supplier, mainly in the expectation of lower bills. Currently, with around 60 distribution companies, the UK gas market has the most widespread competition in Europe (Mabro and Wybrew-Bond, 1999). British gas industry liberalisation is not likely to increase the rate of household connections, and may even act as a barrier (Stern, 1999). Barriers to network connection are less of an issue in a saturated market, than the problems that may be encountered by low-income residential consumers on pre-payment meters (these are currently being addressed by the government and by Ofgas – the industry watchdog).

Northern Ireland

Northern Ireland had no access to natural gas before the construction of the Scotland-Northern Ireland Pipeline (SNIP) interconnector between 1992 and 1996. The gas industry has developed over a period of little more than two years, and as such is ‘younger’ than that in the Republic of Ireland. The main impetus for the SNIP was the conversion of one of the four main power stations from heavy fuel oil to natural gas (it is estimated that natural gas will capture 45% of Northern Ireland’s electricity generation market by the year 2000).

Like Dublin in the Irish Republic, the city of Greater Belfast (around 300,000 households, over 30% of the Northern Ireland total) had a pre-existing town gas network, supplying around 20,000 homes, which was harnessed to the new natural gas supply (*cf.* Table 15.2). Supply of natural gas to the domestic sector did not begin until 1997, and was then limited to Greater Belfast. Phoenix Natural Gas plans to develop the gas grid to supply 200,000 households in Greater Belfast by the year 2007, and to extend the grid beyond the city. Despite initial problems, after little more than two years 15,000 households were connected and around 100 local companies were qualified to install gas appliances (PNG, 1999). As in the Republic of Ireland, much of the development of the domestic market for natural gas will be at the expense of solid fuel. A single company – Phoenix Natural Gas – is licensed to supply gas to Northern Ireland, and is likely to retain the monopoly to around 2010.

There is greater resistance to fuel switching to natural gas in Northern Ireland than in the Republic. A survey carried out by Market Research Northern Ireland Ltd, indicated that over 90% of respondents had no intention of switching to natural gas within the next five years. This resistance is largely due to the implementation of the natural gas project too late to divert a market shift from solid fuels towards heating oil. Many of the Belfast households that decided to move away from coal had switched to oil as the only real alternative before natural gas became available, and the relatively high initial outlay costs are likely to deter many people who had recently completed such a switch (unless they are undertaking major building or renovation work at home).

Economic barriers to change (and other issues such as tenure) need to be addressed at national policy level. Fuel poverty is as great a problem in Northern Ireland as in Republic of Ireland. At the time of writing, only one policy appears to have been designed to address economic barriers, and solely in the rented sector. The Housing Executive inspection programme, carried out every 10-12 years, will ensure that households in rented accommodation are offered a choice of fuel, but will suggest conversion (free of charge) on the basis of energy efficiency considerations.

Table 15. 2: Natural gas, UK

		Year	Source
Number of connected households	19,897,000	1998	Eurogas, 1998
Proportion of connected households	81.9	1998	Eurogas, 1998
% Population living in gas supply area	87%	1997	IGU, 1998
Number of domestic suppliers	61*	1999	OFGEM, 2000

* Around 60 in Great Britain, and 1 in Northern Ireland.

15.3 Domestic energy market

Natural gas has by far the greatest share in the UK domestic energy market. The relative pricing structures for domestic fuels over the last three decades have favoured widespread adoption of gas at the expense of electricity, oil and solid fuels. This has created a long-term upward trend in gas consumption (DETR, 1999a). Table 15.3 provides a breakdown of domestic energy use in 1996, and Figure 15.2 illustrates the major trends in residential fuel use since 1970. Table 15.4 gives the breakdown of domestic fuel consumption by fuel type and end-use.

Table 15. 3: Final use energy consumption profile for the UK domestic sector, 1997

Fuel type	TWh	%
Natural gas	345.6	66
Electricity	104.5	20
Oil	39.5	8
Solid fuels (74% of which coal)	31.4	6
Other (including solar power)	0.1	<0.1
Total	521.0	100

Source: DUKES, 1998

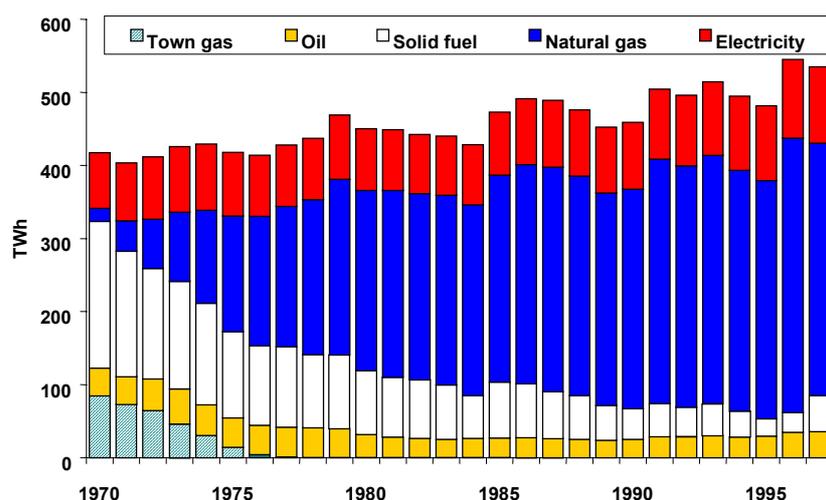


Figure 15. 2: Energy use of the housing stock by fuel type (TWh), Great Britain, 1970-1997

Source: BRE, 1998; DUKES, 1998

Table 15. 4: Breakdown of domestic fuel consumption (%) by fuel type and major end-use

Fuel type	Space heating	Water heating	Cooking	Other
Natural gas	66.1	28.7	5.2	0.0
Electricity	16.3	13.6	7.4	62.7
Solid fuels	79.1	20.6	0.3	0.0
Oil	75.7	23.2	1.1	0.0
Total	57.4	24.7	5.1	12.9

Source: DTI, 1997

In 1997, coal, gas and nuclear power had roughly equal shares in electricity generation: 33%, 31% and 26% respectively. The large share of natural gas is relatively recent, as it only started to be significant in 1993 (IEA/OECD, 1998b).

The UK has consistently had the lowest taxes on domestic energy in the EU over the last 10 years. Electricity and gas for households were slightly cheaper in 1996 than the European average, at 0.093 ECU/kWh and 0.21 ECU/kWh respectively, compared to 0.098 and 0.026 (European Commission, 1999).

15.4 Space heating

Central heating, and mains gas as the fuel for both central and non-central fixed heating, are becoming increasingly dominant. Over 80% of dwellings have central heating, and around 80% of those are gas-fired (Table 15.5). The predominant system is a natural gas-fired dedicated boiler heating water to radiators, which is found in nearly half of the household stock. Individual gas heating appliances are the main facility in most dwellings without central heating. Of electrically-heated dwellings, 80% have night storage heaters (DoE, 1996). By 1996, the number of households with either central or programmable heating had increased to 87.6% (DETR, 1999c).

Table 15.5: Ownership of space heating equipment by fuel type (% dwellings), England, 1991

Fuel type	System type		
	Central	Non-central	All systems
Natural gas	67.2	11.6	78.8
Electricity	7.7	0.8	8.5
Solid fuels	4.6	2.3	6.9
Oil	3.3	-	3.3
Other/mixed	1.3	-	1.3
Total	84.1	15.9	100%
<i>No fixed heating</i>			0.5*
<i>Additional heating equipment</i>			

* Data refers to EHCS, 1996 (DETR, 1999c)

Source: DoE, 1996; DETR, 1999c

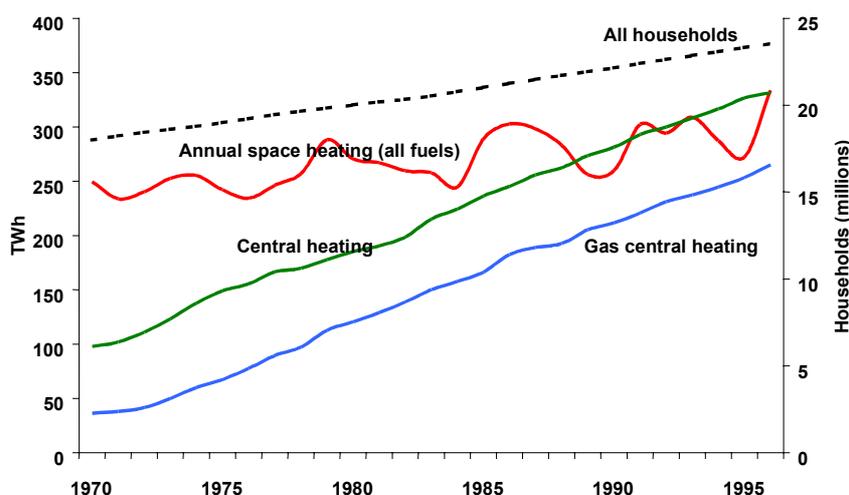
Table 15.6: National energy consumption by residential space heating*, Great Britain, 1997

Fuel type	TWh	% share
Natural gas	228.4	76.4
Oil	29.9	10.0
Solid fuels (coal and wood)	24.8	8.3
Electricity	17.0	5.7
Total	299.1	100%

* Calculated on the basis of data in Tables 15.3 (DUKES, 1998) and 15.4 (DTI, 1997)

Source: DUKES, 1998; DTI, 1997

Despite the increase in the number of households since 1970 and higher standards of living, total national energy consumption for space heating (Table 15.6) has not undergone a significant increase, varying mainly with winter temperatures (Figure 15.3). This is because of the growth of central heating ownership, particularly gas central heating, and the improvement of home insulation measures (BRE, 1998). In 1999, 88% of households have central heating, compared with under 40% in early 1970s (DETR, 1999b).

**Figure 15.3: Development of national energy consumption for domestic space heating (TWh, all fuels) and the ownership of central heating and gas central heating systems, 1970-1996 (UK)**

Source: BRE, 1998

15.5 Water heating

Around 9 out of 10 dwellings with a central heating system are able to use this facility to heat water (*cf.* Table 15.7). The proportion of households in which central heating is the main hot water facility fall from 90% of the owner-occupied sector, to 50% of the private rented sector (DETR, 1999c). Table 15.8 gives the national energy consumption.

Table 15. 7: Ownership of water heating equipment by fuel type and system type, England, 1996

Fuel type	Linked to central heating?		
	Yes	No	All
Oil	3.2	-	3.2
Solid fuels	5.2	-	5.2
Electricity, of which:	-	19.4	19.4
<i>On-peak immersion</i>		13.0	
<i>Off-peak immersion</i>		5.8	
<i>Individual</i>		0.6	
Natural gas	66.9	4.2	71.1
Other/mixed	0.6	-	0.6
Total	75.9	23.6	99.5
<i>No provision for hot water</i>			<i>0.4</i>

Source: DETR, 1999c

Table 15. 8: National energy consumption by residential water heating*, Great Britain, 1997

Fuel type	TWh	% share
Natural gas	99.2	77.1
Oil	9.2	7.1
Solid fuels (coal and wood)	6.5	5.0
Electricity	14.2	11.0
Total	128.7	100%

* Calculated on the basis of data in Tables 15.3 (DUKES, 1998) and 15.4 (DTI, 1997)

Source: DUKES, 1998; DTI, 1997

15.6 Cooking

Ownership of cooking equipment is given in Table 15.9. The figures for gas and electricity come from *Lower Carbon Futures* and relate to 1998, the remainder of the figures are for 1991.

Table 15. 9: Ownership of cooking equipment (% households) by fuel type, 1991 and 1998

Fuel type	Hob	Oven
Natural gas*	54	41
Electricity*	46	57
LPG	2	1.5
Solid fuel	0.4	0.4
Oil	0.3	0.3
Other	0.1	0.1
<i>No cooker</i>	<i>0.5</i>	

Source: DoE, 1996, * *Lower Carbon Futures*

Energy use by domestic cooking for gas and electricity only is given in Table 15.10. For these figures, electricity used in cooking includes microwave ovens, kettles and small cooking appliances (e.g., toasters) as well as hobs and ovens.

Table 15. 10: National energy consumption by residential cooking, UK, 1997-1998

Fuel type	TWh	% share
Natural gas	8.2	38
Electricity (including small cooking appliances)	12.8	60
Oil*	0.4	2
Solid fuels (coal and wood)*	0.1	0.5
Total	21.5	100%

* Calculated on the basis of data in Tables 15.3 (DUKES, 1998) and 15.4 (DTI, 1997)

Source: *Lower Carbon Futures*

15.7 Appliances and lighting

Ownership of appliances and lighting is given in full for the UK in *Lower Carbon Futures*. A summary of some key appliances is given in Table 15.11.

Table 15. 11: Ownership of domestic electrical appliances, UK, 1998

Appliance type	% households
Fridge	43
Freezer	41
Fridge-freezer	62
Washing machine	92
Tumble dryer	50
Dishwasher	22
Microwave	77
TV	98
VCR	82

Source: *Lower Carbon Futures*

Total electricity consumption for lights and appliances (not including cooking) in 1998 was 60.4 TWh. For further details see *Lower Carbon Futures*.

15.8 Policies and programmes for domestic energy efficiency

As yet, there are no official sector targets for energy efficiency, energy conservation or carbon emissions reduction in the UK, only the total of 20% carbon dioxide reduction by 2010 for the nation as a whole (and a legally binding target of 12.5% for a basket of greenhouse gases). Similar to developments at the Community level, there was a shift away from the emphasis on energy conservation in the 1970s to energy efficiency in the 1980s and 1990s, and efficiency remains the focus of EU and UK policy. The distinction between energy conservation and efficiency represents a shift in emphasis: using less energy by any means (either through efficiency measures or through lowered consumption and potentially reduced service) to maintaining the same service with lower energy consumption.

At the national level, lights and appliance efficiency instruments are mainly confined to subsidies and information provision in various forms. In addition, building regulations affect the efficiency of space and water heating systems. A number of programmes and legal instruments have been created to promote energy efficiency in the UK. Their implementation is usually delegated to institutions other than central government. The most important of these institutions are the privatised energy utilities, the Energy Saving Trust (EST) and local government.

Funding for subsidy schemes is provided via a levy of £1 (1.5 Euros) per electricity customer per year, which is due to be increased to £1.20 (1.8 Euros) per year from April 2000, and also extended to gas customers. Clearly the low level of charge is not intended to send a price signal to the consumer. The schemes funded in this manner are known as Standards of Performance (SOP) schemes, and include insulation and heating as well as appliance and lighting efficiency measures.