

Domestic energy fact file: private rented homes

J E Dunster, BSc, I Michel, BSc, MSc, L D Shorrocks, BA, PhD
and J H F Bown*, MA

*NBA Tectonics

INTRODUCTION

The aim of this report

This report provides information on energy use and energy efficiency in private rented homes. It presents tables, graphs and charts equivalent to those in the domestic energy fact files which cover all tenures^{1,2}. Two companion reports covering owner occupied³ and local authority⁴ homes have also been prepared. The information in the three new reports is consistent with the information previously presented for all tenures. In addition, data for a further year have been included. Although this particular report focuses on private rented homes, it also draws comparisons with owner occupied homes to illustrate important points.

The aim in preparing this report has been to form as complete a picture as possible of the trends in energy use and energy efficiency in private rented homes between 1970 and 1992. However, some data are missing, and consequently several tables only present figures from around the mid-1970s (although the relevant information for the earlier years does usually exist for homes in general^{1,2}). The tables, graphs and charts are intended to illustrate long-term trends. Fluctuations in the figures from year to year should be viewed with caution since they may sometimes only reflect statistical variations between respective survey samples.

The relationship between this report and previous domestic energy fact files

The text in this and the companion reports is kept to a minimum because the main domestic energy fact file¹ already provides most of the necessary discussion and explanation. Text is restricted to:

- additional explanations where needed, and
- discussion of notable differences between the characteristics of private rented homes and those of owner occupied homes or homes in general.

Most — but not all — of the tables in the original domestic energy fact files^{1,2} have their equivalent in this report. If a table in the original fact files does not have its equivalent in the following sections, it is either because the information is common to all tenures, or because, in a given instance, it is not very meaningful to attempt to distinguish between the different tenures.

The definition of 'private rented homes'

The reader should note that, in this report, the term 'private rented homes' includes housing association dwellings. Some information does exist to allow housing association dwellings to be separately identified. For example, the domestic energy fact files which cover all tenures^{1,2} do give details of the numbers of housing association homes. However, there is a relatively small number of housing association homes in the United Kingdom: small sample sizes mean that it is not yet possible to produce meaningful statistics on trends within this tenure. Indeed, as some of the figures within this report illustrate, such problems are to an extent evident even for the combined 'private rented' tenure group. Nevertheless, the differences between the characteristics of housing association homes and other private rented homes are important. Therefore this report also includes an appendix which compares these characteristics for 1992, the first year for which reasonably complete information exists.

HOUSEHOLD EXPENDITURE ON FUEL, LIGHT AND POWER

Table 1 gives average weekly expenditure by private rented households on fuel, light and power and on all goods. Year-by-year actual expenditures are shown, as well as expenditures adjusted by the Retail Price Index to 1989 equivalents: 1989 is used as the reference in order to ease comparison with the figures from the main domestic energy fact file¹. The adjusted expenditures are also plotted on Figure 1. Note that expenditure data by tenure are not available for years before 1981.

It is clear that private rented households spend slightly less than owner occupied households on fuel, light and power, but substantially less on all goods. The expenditure of private rented households on fuel, light and power, expressed as a percentage of their expenditure on all goods, is therefore higher than in owner occupied households, but lower than in local authority households⁴. It is notable that the gap between private rented household expenditure on all goods, and owner occupied household expenditure on all goods, has remained fairly constant. By contrast, the gap between private rented households and local authority households has steadily widened⁴.

Fuel expenditures have generally fallen in real terms over the past decade. One reason for this is that fuel prices have also fallen in real terms over the period^{1,2}. Another factor, illustrated elsewhere in this report, is that mean household sizes have been steadily reducing while insulation standards and efficiencies have been improving. Offsetting these effects to some extent has been the improving levels of service in British homes, eg the improving standards of comfort (also discussed in a subsequent section of this report).

Table 1 Average weekly expenditure on all goods, fuel, light and power (£/week)*†

Year	Contemporary prices		1989 prices: private rented and others			1989 prices: owner occupiers		
	All goods	Fuel, light and power	All goods	Fuel, light and power	% on fuel, light and power	All goods	Fuel, light and power	% on fuel, light and power
1981	106.55	6.63	164.09	10.21	6.2	224.76	12.26	5.5
1982	103.54	6.30	146.89	8.94	6.1	225.43	12.97	5.8
1983	108.60	6.95	147.35	9.43	6.4	229.37	13.72	6.0
1984	116.34	7.66	150.25	9.89	6.6	237.01	13.03	5.5
1985	121.72	7.93	148.23	9.66	6.5	237.94	13.01	5.5
1986	138.60	8.53	163.26	10.04	6.2	256.32	13.27	5.2
1987	148.37	8.88	167.73	10.04	6.0	258.16	12.67	4.9
1988	161.66	8.91	174.21	9.60	5.5	262.48	11.99	4.6
1989	187.00	8.84	187.00	8.84	4.7	264.92	11.04	4.2
1990	198.48	9.27	181.32	8.47	4.7	264.66	10.67	4.0
1991	197.07	9.98	167.55	8.49	5.1	261.69	11.06	4.2
1992	207.64	11.14	172.71	9.26	5.4	269.16	11.41	4.2

*Source: *Family Expenditure Survey*

†This table refers to the UK; the other tables in this report apply to Great Britain

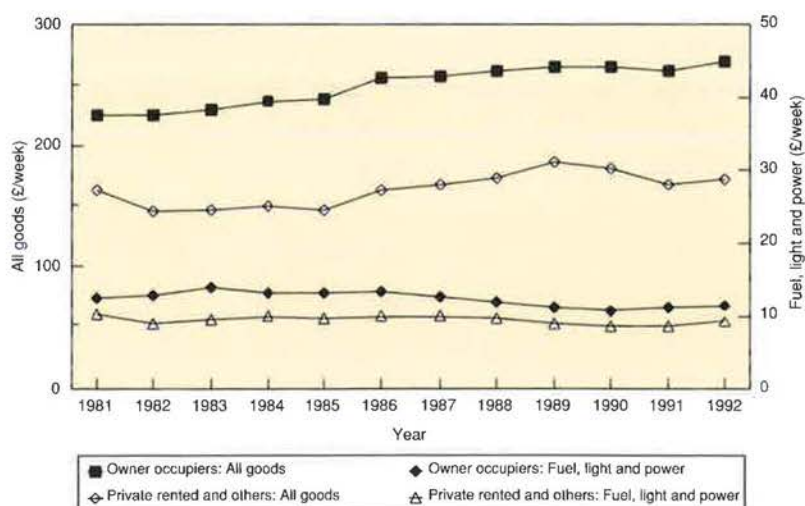


Figure 1 Average weekly expenditures on all goods, fuel, light and power at 1989 prices

HOUSEHOLDS AND HOUSEHOLD SIZE

Table 2 shows figures for the number of private rented households and the mean household size for this tenure. The mean household size for owner occupied tenure is also shown. Figure 2 shows that private rented mean household sizes are substantially the smaller of the two. By multiplying the number of households by the mean household size, it is possible to estimate what percentage of the population was living in private rented households in any one year. For example, this calculation indicates that, in 1991, about 10% of the household population lived in private rented homes. The 1991 census⁵ also shows about 10% living in private rented homes.

The numbers of private rented households quoted in this report are based on figures for the national housing stock published in *Housing and Construction Statistics*. Mid-year figures have been derived from that publication and then adjusted by a factor to eliminate unoccupied dwellings. The resulting figures appear under the heading 'households' in Table 2. In other tables they appear under the heading 'total houses'.

Table 2 Households and household size*

Year	Households (1000s)	Mean household size	
		Private rented and others	Owner occupied
1972	3274		
1973†	3161	2.20	2.93
1974	3055		
1975†	2908	2.24	2.89
1976	2813		
1977	2730	2.23	2.81
1978	2773		
1979†	2709	2.21	2.77
1980	2654		
1981	2572	2.15	2.81
1982	2502		
1983	2444	2.09	2.79
1984	2383	2.09	2.77
1985	2330	2.16	2.71
1986	2278	2.12	2.69
1987	2248	2.19	2.70
1988	2215	2.15	2.62
1989	2319	2.07	2.66
1990	2255	2.10	2.59
1991	2277	2.12	2.59
1992	2353	2.17	2.57

*Sources: *Housing and Construction Statistics* (households)
General Household Survey (mean household size)

†The mean household sizes for these years have been extrapolated or interpolated

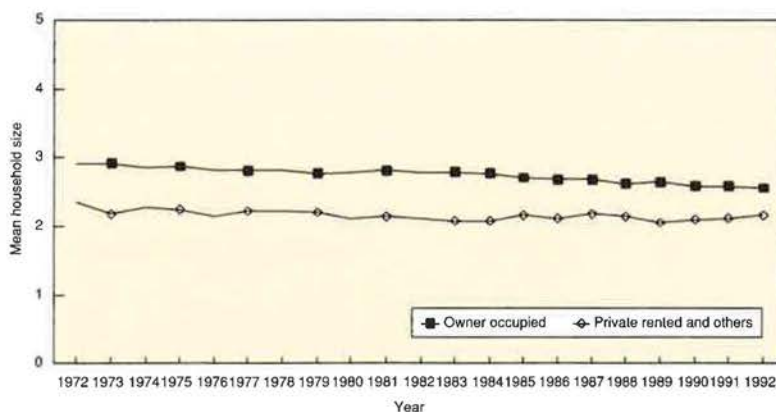


Figure 2 Mean household size

AGE OF THE HOUSING STOCK

The most notable thing about the age distribution of private rented homes is that a very large proportion of the stock was built before 1918. This bias towards older homes is part of the reason why the heat loss of the average private rented home is higher than the overall average (see Table 12). Another reason for the relatively high heat loss from private rented homes is that they generally have poorer insulation standards. This is discussed in subsequent sections of the report.

The age categories used for this report and its companions are not the same as those used for the original domestic energy fact file¹. The source used for the original report (*Housing and Construction Statistics*) did not allow the distribution to be determined for individual tenures, and so another source had to be used (*GfK Home Audit*). There are some significant discrepancies between these sources. Therefore the reader is warned that the age distributions need to be viewed with some caution.

Table 3 Housing stock distribution by age (1000s of houses)*

Year	Pre-1918	1918-1938	1939-1959	1960-1971	1972-	Total houses
1978	1387	536	373	344	133	2773
1979	1492	550	300	210	157	2709
1980	1478	497	280	200	199	2654
1981	1418	490	227	222	215	2572
1982	1297	422	278	218	287	2502
1983	1300	417	228	189	310	2444
1984	1150	480	224	198	331	2383
1985	1094	453	197	229	357	2330
1986	1104	376	131	208	459	2278
1987	964	365	261	235	423	2248
1988	921	408	256	193	437	2215
1989	1058	396	241	206	418	2319
1990	902	320	264	180	589	2255
1991	930	362	236	194	555	2277
1992	931	406	243	227	546	2353

*Source: *GfK Home Audit*

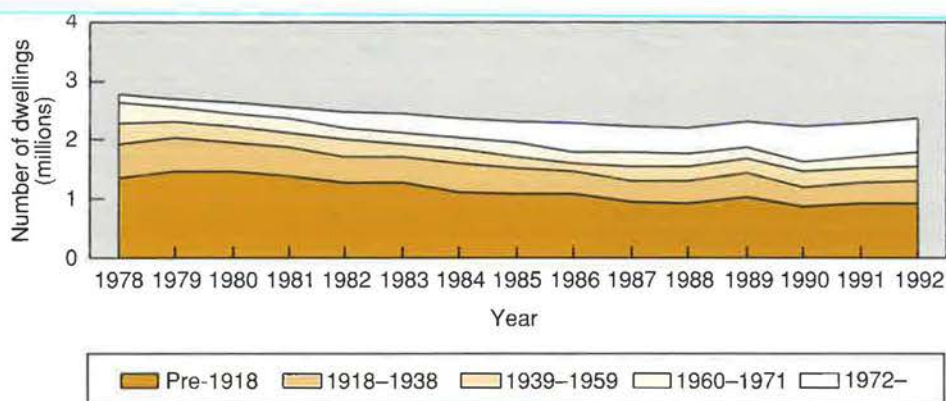


Figure 3 Housing stock distribution by age

HOUSE TYPES

The distribution of private rented homes between the different types of dwelling is quite different from the distribution of owner occupied homes between different dwelling types. Flats, in particular, make up a very high proportion of private rented homes. Terraced houses are also more common in this sector than they are in general. For a given standard of insulation, a flat will have the lowest heat loss, and a terraced house the second lowest heat loss, of all house types. A tendency towards relatively high heat loss is associated with older dwellings; it is also associated with their generally poorer standards of insulation. However, this is somewhat offset by the tendency of flats and terraced houses to have a relatively low heat loss. Consequently, the average private rented home has a heat loss which is only slightly higher than the overall average (see Table 12).

Table 4 Housing stock distribution by type of dwelling (1000s of houses)*

Year	Semi-detached	Terrace	Flat	Detached	Bungalow	Other	Total houses
1976	573	1155	760	151	93	81	2813
1977	526	1140	748	182	49	85	2730
1978	531	975	861	168	107	131	2773
1979	534	1074	705	238	94	64	2709
1980	529	1057	744	192	57	75	2654
1981	450	1035	674	259	79	75	2572
1982	474	974	745	184	66	59	2502
1983	497	993	638	192	64	60	2444
1984	430	907	704	228	68	46	2383
1985	430	843	768	186	71	32	2330
1986	412	739	818	223	57	29	2278
1987	331	733	804	235	114	31	2248
1988	382	729	785	217	79	23	2215
1989	403	820	804	200	61	31	2319
1990	390	694	939	143	59	30	2255
1991	372	802	850	184	51	18	2277
1992	354	852	877	144	89	37	2353

*Source: GfK Home Audit

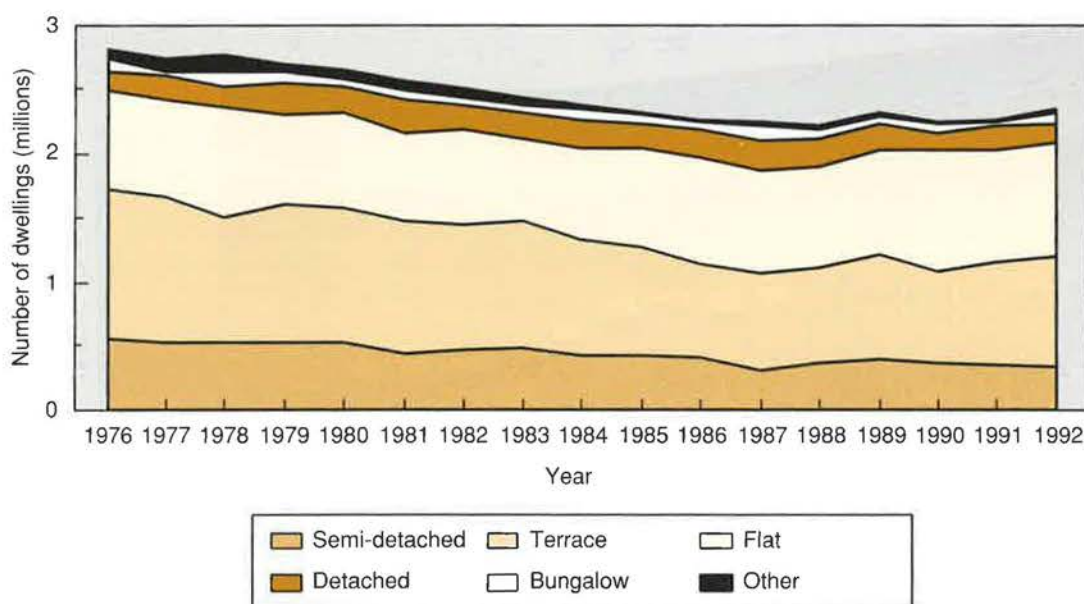


Figure 4 Housing stock distribution by type of dwelling

CAVITY WALL INSULATION

Only slightly more than half of private rented homes have cavity walls. Uptake of cavity wall insulation in these homes has been very slow. In 1992, 10.5% of cavity walls in private rented homes were insulated, whereas for owner occupied homes the figure was 26%. However, the figures for cavity wall insulation show fluctuations caused by the relatively small sample size (this is another, more extreme example of the effect described in the section on loft insulation). Thus Table 7 indicates that 17% of cavity walls in private rented dwellings were insulated by 1991, although this figure does not appear to be consistent with the general trend.

Table 7 Ownership of cavity wall insulation (1000s of houses)*

Year	Houses with cavity insulation	Potential	Total houses
1974	18	998	3055
1975	21	1022	2908
1976	13	950	2813
1977	20	1062	2730
1978	37	1009	2773
1979	76	1342	2709
1980	35	1017	2654
1981	37	942	2572
1982	59	989	2502
1983	47	1028	2444
1984	111	1095	2383
1985	92	1060	2330
1986	83	1076	2278
1987	116	1161	2248
1988	125	1137	2215
1989	130	1266	2319
1990	117	1256	2255
1991	212	1239	2277
1992	131	1252	2353

*Source: GfK Home Audit

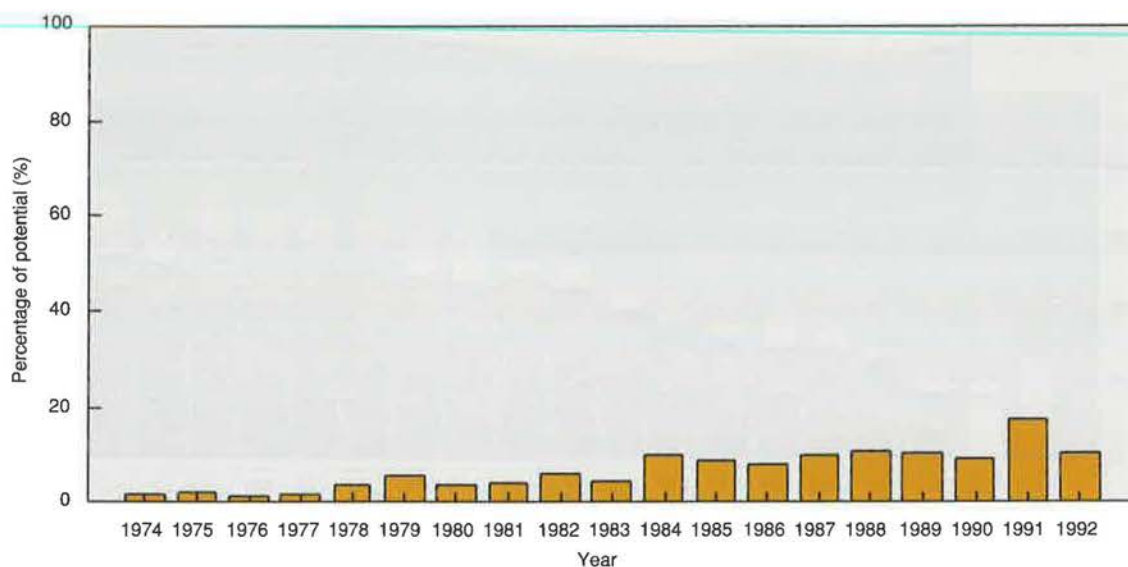


Figure 7 Ownership of cavity wall insulation

DOUBLE GLAZING

Double glazing has shown a very poor uptake in private rented homes. The uptake has, however, been marginally better than in local authority homes⁴. Currently, only 26% of private rented homes have some double glazing. By contrast, over 65% of owner occupied homes have some double glazing.

Table 8 Ownership of double glazing (1000s of houses)*

Year	Percentage of rooms treated					Not stated	Private rented houses	
	<20%	20-39%	40-59%	60-79%	≥80%		Total with double glazing	Potential
1974	0	0	0	0	0	69	69	3055
1975	0	0	0	0	0	68	68	2908
1976	0	0	0	0	0	56	56	2813
1977	0	0	0	0	0	66	66	2730
1978	0	0	0	0	0	98	98	2773
1979	0	0	0	0	0	90	90	2709
1980	0	0	0	0	0	118	118	2654
1981	0	0	0	0	0	124	124	2572
1982	0	0	0	0	0	196	196	2502
1983	0	0	0	0	0	246	246	2444
1984	49	42	64	44	36	12	247	2383
1985	33	58	32	23	31	50	227	2330
1986	52	35	68	6	116	13	290	2278
1987	69	75	93	48	109	0	394	2248
1988	75	91	37	48	94	13	358	2215
1989	69	70	67	80	100	65	451	2319
1990	63	91	76	45	127	38	440	2255
1991	54	61	99	77	139	42	472	2277
1992	50	79	75	58	302	36	600	2353

*Source: GfK Home Audit

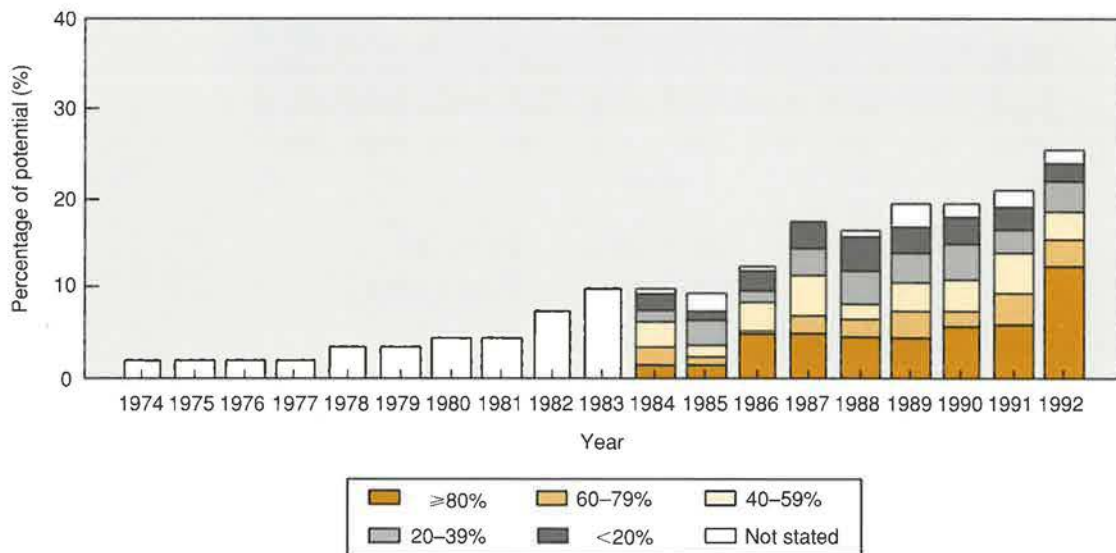


Figure 8 Ownership of double glazing

DRAUGHT STRIPPING

Draught stripping in private rented homes shows no obvious trends. However, it is notable that draught stripping is less common in private rented homes than it is in owner occupied homes and local authority homes. In 1992 slightly less than 27.9% of private rented homes had any draught stripping. The corresponding figure for owner occupied homes was 30.9%; for local authority homes it was 39.8%.

Table 9 Ownership of draught stripping (1000s of houses)*

Year	Percentage of rooms treated					Not stated	Private rented houses	
	<20%	20-39%	40-59%	60-79%	≥80%		Total with draught stripping	Potential
1983	192	202	82	21	50	28	575	2444
1984	214	177	50	24	104	0	569	2383
1985	175	277	79	42	108	0	681	2330
1986	202	286	76	60	80	0	704	2278
1987	180	209	77	62	142	0	670	2248
1988	191	253	72	57	95	0	668	2215
1989	220	249	119	49	159	0	796	2319
1990	161	255	76	41	95	0	628	2255
1991	128	206	91	25	118	6	574	2277
1992	175	275	88	34	83	2	657	2353

*Source: GfK Home Audit

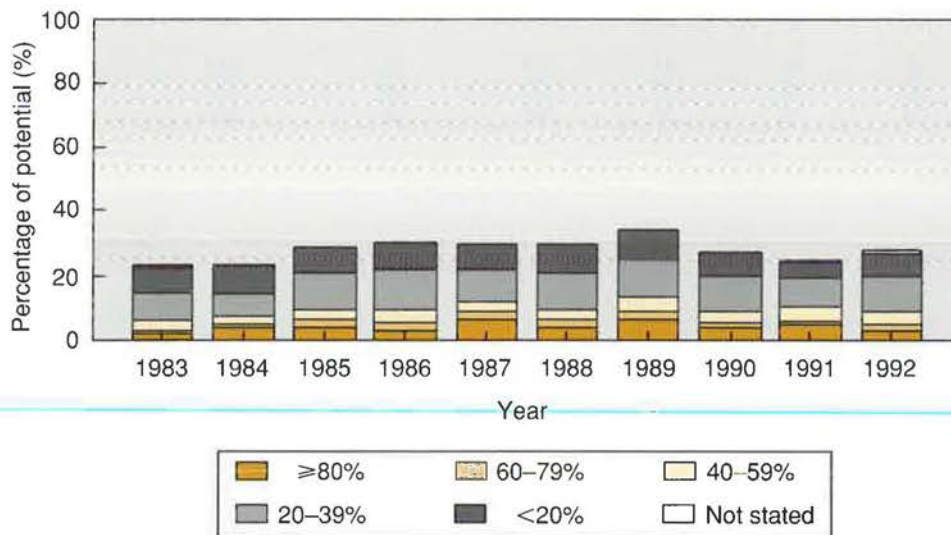


Figure 9 Ownership of draught stripping

HOT WATER TANK INSULATION

Uptake of hot water tank insulation in private rented homes used to be lower than in owner occupied homes, but has now almost caught up. About 89% of private rented homes with hot water tanks currently have tank insulation. The corresponding figure for owner occupied homes is about 96%.

Table 10 Ownership of hot water tank insulation (1000s of houses)*

Year	Depth of insulation					Not stated	Private rented houses		
	≤1 in	2 in	3 in	≥3 in	>3 in		Total with insulation	Potential	Total houses
1976	275	487		288		151	1201	1871	2813
1977	379	393		205		260	1237	1848	2730
1978	343	470	177		51	223	1264	1809	2773
1979	318	368	165		16	88	955	1299	2709
1980	330	619	350		80	76	1455	1860	2654
1981	327	587	359		79	76	1428	1866	2572
1982	413	515	278		94	80	1380	1675	2502
1983	358	671	324		90	88	1531	1881	2444
1984	421	598	292		128	128	1567	1859	2383
1985	293	684	327		110	181	1595	1917	2330
1986	311	604	369		132	236	1652	1880	2278
1987	275	581	330		178	257	1621	1865	2248
1988	223	604	370		189	249	1635	1852	2215
1989	271	639	400		82	297	1689	1936	2319
1990	223	589	442		163	298	1715	1917	2255
1991	244	617	368		224	293	1746	1945	2277
1992	224	520	404		186	314	1648	1850	2353

*Source: GfK Home Audit

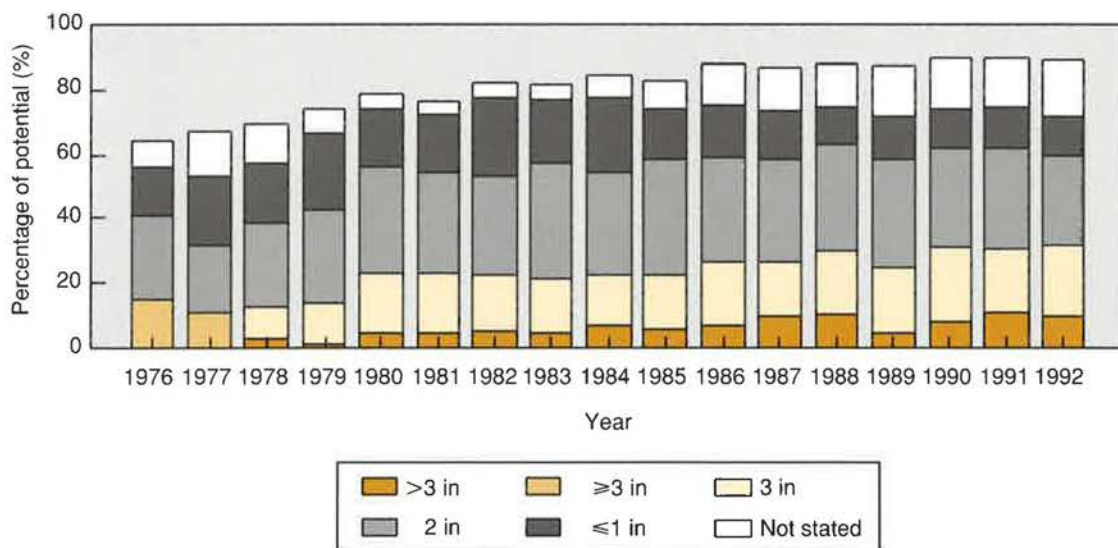


Figure 10 Ownership of hot water tank insulation

ENERGY CONSUMPTION AND EXTERNAL TEMPERATURES

Energy consumption of private rented homes fell markedly between 1970 and the early 1980s, but has since remained reasonably level. This change follows the sharp decline and then levelling off in the number of private rented homes. The average consumption per dwelling has remained relatively stable throughout, at a level around 25% lower than for owner occupied homes.

Peaks in energy use generally correspond with troughs in the external temperature, as would be expected. Note that the energy use figures before 1981 are slightly more speculative than those from 1981 onwards. This is due to the lack of expenditure data by tenure for years before 1981. However, the estimates given are likely to be close to the true consumptions: firstly, because of the constraints that the figures for the individual tenures must add to the known total consumptions, and secondly, because the estimates are consistent with the trends within those tenures.

Table 11 Domestic energy consumption and external temperatures*

Year	Total houses (1000s)		Total delivered energy (PJ)		Average external temperature (°C)	Average consumption per private rented dwelling (GJ)
	Private rented	All tenures	Private rented	All tenures		
1970	3486	17759	246.3	1502	5.8	70.7
1971	3394	17990	228.3	1453	6.7	67.3
1972	3274	18192	221.1	1482	6.4	67.5
1973	3161	18367	217.7	1531	6.1	68.9
1974	3055	18545	209.6	1544	6.7	68.6
1975	2908	18747	191.4	1503	6.4	65.8
1976	2813	18971	180.7	1488	5.8	64.2
1977	2730	19203	179.0	1539	6.6	65.6
1978	2773	19401	183.5	1572	6.3	66.2
1979	2709	19575	190.1	1686	5.1	70.2
1980	2654	19756	176.7	1620	5.8	66.6
1981	2572	19921	168.7	1615	5.4	65.6
1982	2502	20067	145.5	1592	5.8	58.2
1983	2444	20225	138.5	1585	6.2	56.7
1984	2383	20402	149.8	1541	5.8	62.9
1985	2330	20580	168.1	1696	4.8	72.1
1986	2278	20760	136.3	1768	5.2	59.8
1987	2248	20945	134.2	1768	4.9	59.7
1988	2215	21138	149.5	1708	6.3	67.5
1989	2319	21340	141.1	1638	6.9	60.8
1990	2255	21531	131.5	1653	7.6	58.3
1991	2277	21698	149.7	1822	6.1	65.7
1992	2353	21932	158.5	1782	6.1	67.4

*Sources: Family Expenditure Survey, Digest of United Kingdom Energy Statistics

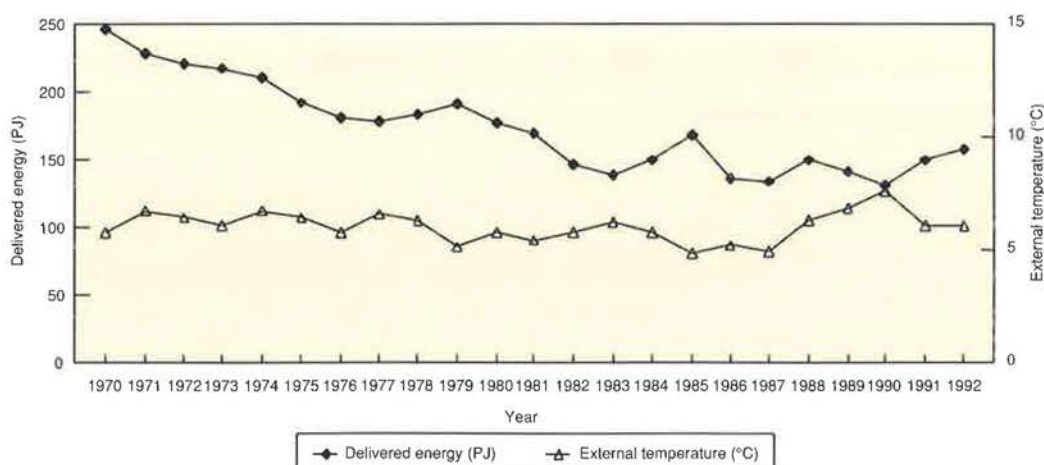


Figure 11 Domestic energy consumption and external temperatures

HEAT LOSS OF THE AVERAGE PRIVATE RENTED DWELLING

The heat loss of the average private rented dwelling is slightly higher than that for the average across all tenures, although the change over the years is similar. This is because, although the distribution of house types is biased towards flats and terraced houses, insulation standards are worse in private rented homes and there are a lot of older properties (as discussed in a previous section of this report). Table 12 and Figure 12 also give average heat losses for the other tenures, and these show the expected trends and values relative to the private rented figures.

The fluctuations in the insulation ownership figures for private rented homes manifest themselves in the heat loss estimates where year-by-year figures have been calculated.

Table 12 Heat loss of the average private rented dwelling*

Year	Average dwelling heat loss (W/°C)			
	All tenures	Private rented and other	Local authority	Owner occupied
1976	351.2	363.3	305.7	378.9
1977†	345.0	359.6	297.3	373.1
1978†	339.0	356.1	289.3	367.5
1979†	334.0	353.2	282.5	362.8
1980†	327.0	349.0	273.1	356.2
1981†	321.0	345.5	265.0	350.6
1982	314.7	341.8	256.5	344.7
1983†	309.0	332.4	248.3	336.7
1984	306.1	327.6	244.1	332.7
1985	304.3	318.5	246.0	328.1
1986	300.4	322.8	242.4	323.1
1987	296.9	313.4	238.2	319.1
1988	294.7	314.5	235.8	315.5
1989	292.6	302.0	231.9	314.1
1990†	290.2	298.1	231.4	310.3
1991	287.8	294.1	230.8	306.5
1992	283.0	287.7	225.4	301.5

*Source: BREHOMES

†Figures for these years are interpolated

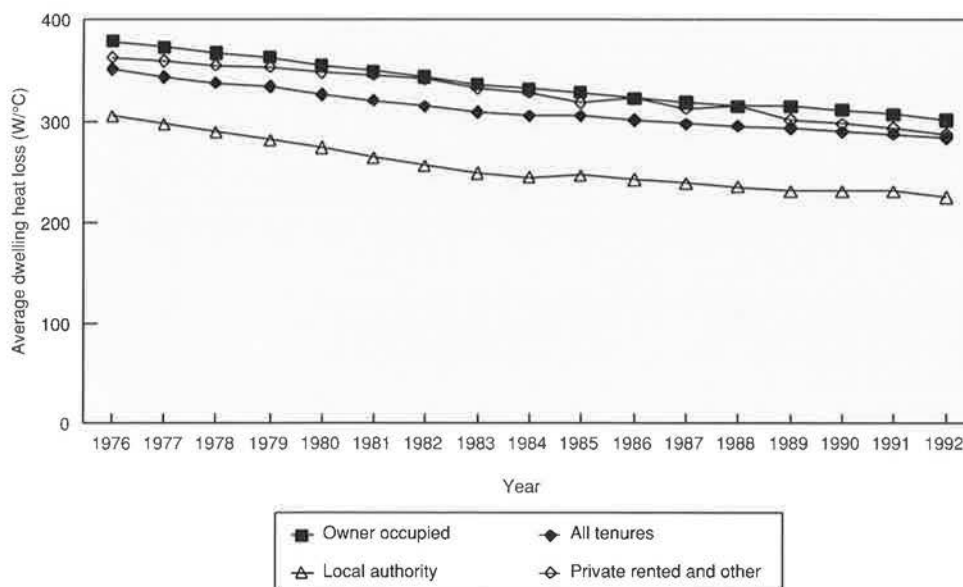


Figure 12 Heat loss of the average private rented dwelling

CENTRAL HEATING OWNERSHIP

Central heating is substantially less common in private rented homes than it is in owner occupied homes. On the other hand, the rate of uptake has been much faster in private rented homes than in general, so they are catching up. By 1992, almost 69% of private rented homes had central heating. The corresponding figure for owner occupied homes was just over 86%.

Table 13 Central heating ownership*

Year	Private rented houses (1000s)			Percentage of households with central heating	
	No central heating	Central heating	Total houses	Private rented and others	Owner occupied
1977	1954	776	2730	28.4	64.5
1978	1906	867	2773	31.3	65.2
1979	1879	830	2709	30.6	67.2
1980	1886	768	2654	28.9	68.0
1981	1763	809	2572	31.4	69.8
1982	1613	889	2502	35.5	70.8
1983	1456	988	2444	40.4	75.6
1984	1441	942	2383	39.5	76.9
1985	1176	1154	2330	49.5	77.8
1986	1062	1216	2278	53.4	79.7
1987	940	1308	2248	58.2	80.5
1988	951	1264	2215	57.1	82.0
1989	920	1399	2319	60.3	83.9
1990	813	1442	2255	63.9	84.2
1991	769	1508	2277	66.2	85.7
1992	736	1617	2353	68.7	86.7

*Source: GfK Home Audit

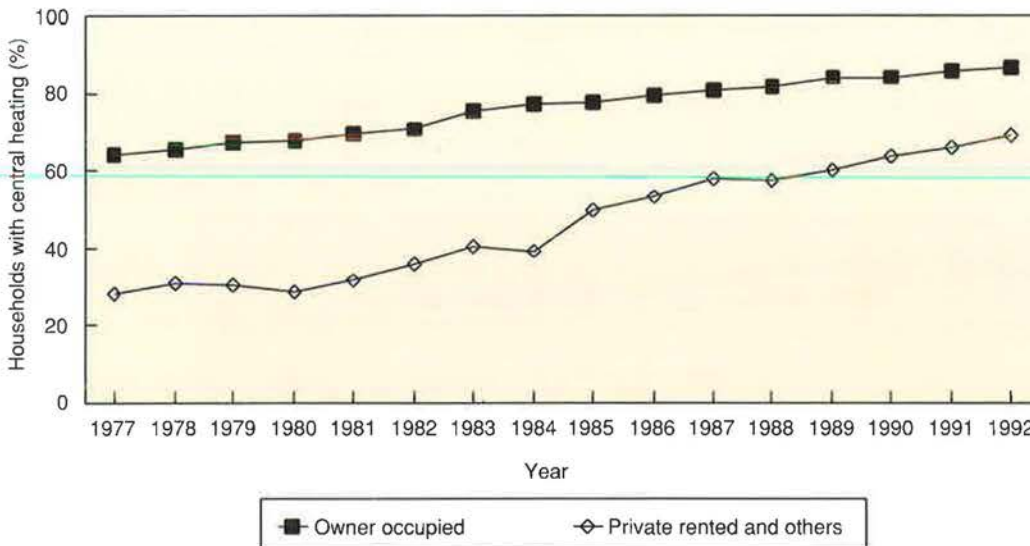


Figure 13 Central heating ownership

HEATING APPLIANCES

There has been a strong increase in the proportion of private rented homes with gas central heating. By 1992, nearly 44% of private rented homes were heated by such systems. In owner occupied homes the figure was nearly 70%. Individual gas heaters provided the next most common form of heating, so that gas as a whole accounted for over 61% of heating systems in private rented homes. For owner occupied homes the corresponding figure was over 79%.

Electric central heating accounted for over 14.5% of systems in private rented homes, but only just under 9% in owner occupied homes. Solid fuel heating is also still quite common in private rented homes. Other forms of heating individually represent a small, and generally declining, proportion of homes.

Table 14a Main form of heating in centrally heated dwellings (1000s of houses)*

Year	Solid fuel	Electric	Electric storage	Other electric	Gas	Oil	Other	Oil + other	Total houses
1978	96	313			344			114	867
1979	115	291			352			72	830
1980	79	274			362			53	768
1981	88	261	186	75	379	24	57		809
1982	94	228	134	94	478	27	62		889
1983	102	259	174	85	549	37	41		988
1984	96	250	175	75	532	30	34		942
1985	141	254	180	74	649	35	75		1154
1986	135	272	204	68	691	48	70		1216
1987	145	269	223	46	741	60	93		1308
1988	159	284	227	57	715	54	52		1264
1989	108	335	261	74	886	34	36		1399
1990	88	314	233	81	951	24	65		1442
1991	99	297	245	52	980	49	83		1508
1992	106	345	269	76	1030	55	81		1617

*Source: GfK Home Audit

Table 14b Main form of heating in non-centrally heated dwellings (1000s of houses)*

Year	Solid fuel	Electric	Gas	Oil	Other	Oil + other	Total houses
1978	522	483	713			188	1906
1979	452	482	809			136	1879
1980	420	516	844			106	1886
1981†	365	522	837			39	1763
1982†	383	404	788			38	1613
1983	333	316	704	31	72		1456
1984†	304	296	759	16	66		1441
1985†	279	211	635	13	38		1176
1986	222	189	593	6	52		1062
1987	193	188	519	9	31		940
1988	181	200	520	7	43		951
1989	194	174	508	4	40		920
1990	139	173	458	1	42		813
1991	131	145	459	3	31		769
1992	131	159	406	3	37		736

*Source: GfK Home Audit

†Figures for these years are interpolated

There is no Figure 14.

WEIGHTED AVERAGE SPACE HEATING EFFICIENCIES

Table 15 shows heating efficiencies calculated on the same basis as for the domestic energy fact file update². Data are given for private rented homes and owner occupied homes. The heating efficiency is slightly lower in private rented homes (see Figure 15) because a smaller proportion of private rented homes have central heating. However, the efficiency is not quite as low as might be expected. This is because a relatively high proportion of private rented homes have electric heating (for which the efficiency is taken to be 100%).

Table 15 Weighted average space heating efficiencies (%)

Year	Central heating efficiency	Non-central heating efficiency	Average efficiency	
			Private rented and others	Owner occupied
1977†	73	51	55	58
1978	73	51	56	59
1979	73	52	57	60
1980	74	53	58	61
1981	73	53	58	62
1982	71	52	58	62
1983	72	54	60	63
1984	72	54	60	64
1985	71	52	60	64
1986	71	53	61	63
1987	70	53	62	64
1988	71	54	63	64
1989	72	53	63	64
1990	71	54	64	65
1991	70	54	64	65
1992	71	54	65	65

*Source: BREHOMES

†Figures for this year have been extrapolated

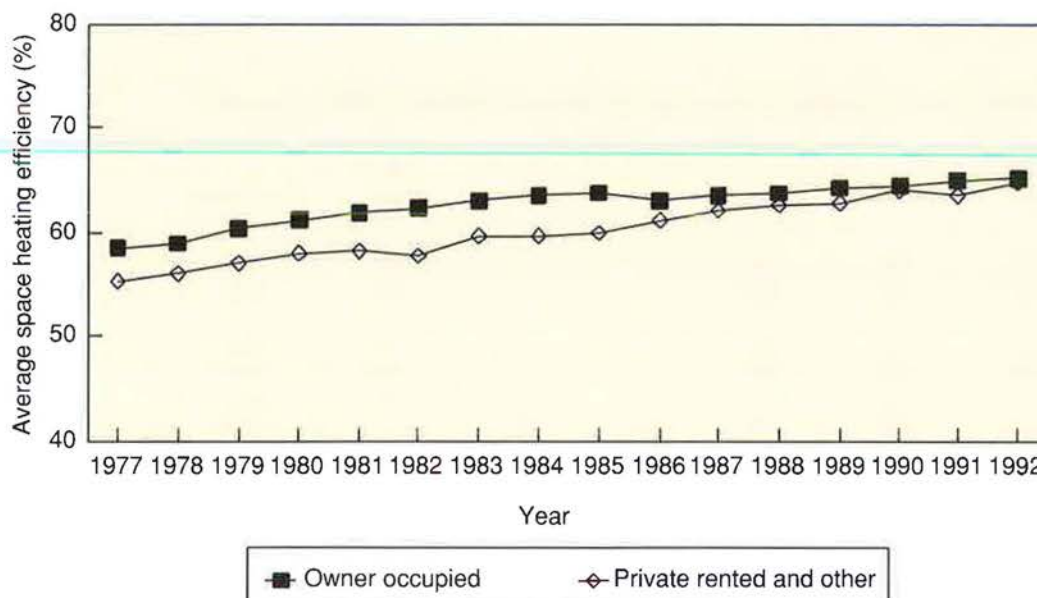


Figure 15 Weighted average space heating efficiencies

STANDARDS OF COMFORT

The main domestic energy fact files^{1,2} present some estimates for mean internal temperatures. It is noted in these previous reports that the absolute values should be viewed with some caution, but that greater confidence can be attached to the extent of the rise in temperatures. Table 16 presents some tentative estimates of mean internal temperature in private rented homes, and compares these with estimates for owner occupied homes.

The temperatures assumed for centrally heated and non-centrally heated homes are exactly the same as those in the update to the main domestic energy fact file². The overall average has been calculated from these temperatures, knowing the numbers of private rented homes with and without central heating. As might be expected, this indicates that private rented homes tend to be cooler than owner occupied homes.

Table 16 Standards of comfort: mean internal and average winter external temperatures*

Year	Percentage of dwellings with central heating	Calculated average internal temperatures (°C)		External temperature (°C)	Total temperature houses (1000s)
		Private rented and others	Owner occupied		
1977	28.4	13.80	14.70	6.6	2730
1978	31.3	13.81	14.66	6.3	2773
1979	30.6	13.28	14.19	5.1	2709
1980	28.9	13.79	14.77	5.8	2654
1981	31.4	13.52	14.47	5.8	2572
1982	35.5	13.99	14.87	5.8	2502
1983	40.4	14.55	15.43	6.2	2444
1984	39.5	13.92	14.85	5.8	2383
1985	49.5	13.91	14.61	4.8	2330
1986	53.4	14.78	15.44	5.2	2278
1987	58.2	14.49	15.05	4.9	2248
1988	57.1	15.65	16.27	6.3	2215
1989	60.3	15.88	16.47	6.9	2319
1990	63.9	16.73	17.24	7.6	2255
1991	66.2	16.28	16.76	6.1	2277
1992	68.7	16.72	16.97	6.1	2353

*Source: BREHOMES

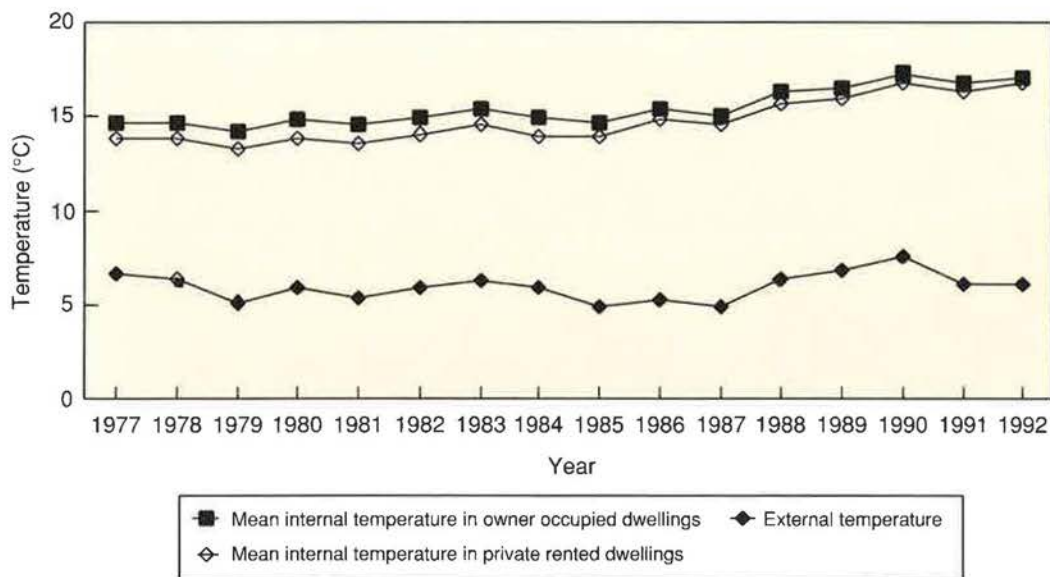


Figure 16 Standards of comfort: mean internal and average winter external temperatures

ENERGY CONSUMPTION BY END USE

The distribution of total domestic energy consumption between the main end uses is necessarily a little tentative, particularly for individual tenures.

The figures quoted below for private rented homes are based on the assumption that the proportions for the individual end uses are the same as those already estimated for all tenures. The same assumption has also been used for the other tenures^{3,4}. This assumption may not be entirely correct but it is unlikely to be seriously in error.

Table 17 Domestic energy consumption by end use*

Year	End uses (PJ)				All energy (PJ)	Space heating per household (GJ)
	Space heating	Water heating	Lights and appliances	Cooking		
1970	147.7	66.7	14.3	17.4	246.3	42.4
1971	134.0	62.6	14.8	16.9	228.3	39.5
1972	131.8	57.9	15.2	16.2	221.1	40.2
1973	130.8	55.9	15.5	15.5	217.7	41.4
1974	126.6	52.4	15.8	14.9	209.6	41.4
1975	113.5	48.2	15.7	14.1	191.4	39.0
1976	104.7	46.9	15.6	13.5	180.7	37.2
1977	104.8	45.5	15.6	13.0	179.0	38.4
1978	108.0	46.0	16.3	13.2	183.5	38.9
1979	116.2	44.8	16.3	12.8	190.1	42.9
1980	106.5	41.6	16.3	12.4	176.7	40.1
1981	101.1	39.8	16.0	11.8	168.7	39.3
1982	85.8	35.1	14.4	10.2	145.5	34.3
1983	81.1	33.8	14.1	9.5	138.5	33.2
1984	86.8	36.8	16.0	10.3	149.8	36.4
1985	102.2	39.1	16.7	10.0	168.1	43.9
1986	84.6	30.9	13.3	7.5	136.3	37.1
1987	82.9	30.7	13.5	7.1	134.2	36.9
1988	90.1	35.8	15.7	7.9	149.5	40.7
1989	82.6	35.3	15.7	7.5	141.1	35.6
1990	76.8	33.0	14.9	6.7	131.5	34.1
1991	92.9	34.3	15.7	6.8	149.7	40.8
1992	96.8	37.2	17.1	7.3	158.5	41.2

*Source: BREHOMES

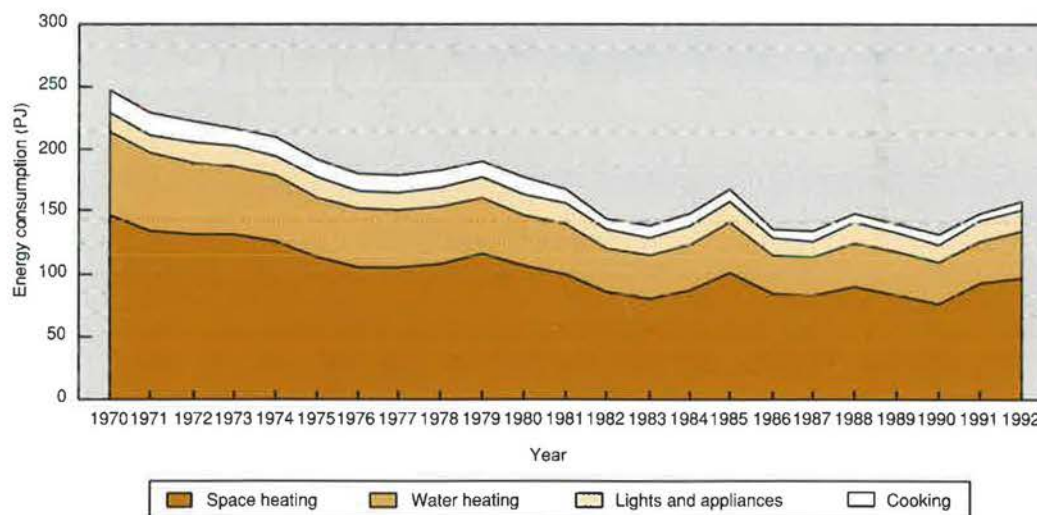


Figure 17 Domestic energy consumption by end use

DOMESTIC ENERGY CONSUMPTION BY FUEL

The total energy use figures for private rented homes quoted in Table 11 and Table 17 were actually worked out using information relating to individual fuels. Table 18 presents the estimated consumptions by fuel. As noted in a previous section of this report, the figures before 1981 are a little more tentative than those from 1981 onwards. However, the estimates given are likely to be close to the true consumptions; firstly, because of the constraints that the figures for the individual tenures must add to the known total consumptions of each fuel, and secondly, because the estimates are consistent with the trends within those tenures. The general pattern which emerges for private rented homes is the same as the pattern for all tenures. It is characterised by the rapid penetration of natural gas, the disappearance of town gas, and the declining use of solid fuel and oil.

Table 18 Energy use of the housing stock by fuel type*

Year	Fuel type (PJ)						All fuels (PJ)	Average consumption per household (GJ)
	Solid fuels	Natural gas	Town gas	Gas (total)	Electric	Oil		
1970	157.8	5.3	24.8	30.1	36.0	22.4	246.3	70.7
1971	135.1	12.1	21.3	33.4	37.7	22.1	228.3	67.3
1972	117.8	19.4	18.6	38.0	40.2	25.1	221.1	67.5
1973	111.3	26.1	12.9	39.0	40.8	26.6	217.7	68.9
1974	102.8	34.7	8.3	43.0	40.6	23.2	209.6	68.6
1975	85.1	42.2	3.9	46.1	38.3	21.9	191.4	65.8
1976	76.7	46.0	1.1	47.1	35.5	21.4	180.7	64.2
1977	75.2	48.2	0.3	48.5	34.5	20.8	179.0	65.6
1978	70.8	55.5	0.1	55.6	35.8	21.3	183.5	66.2
1979	70.6	62.0	0.1	62.1	37.0	20.4	190.1	70.2
1980	61.1	63.6	0.1	63.7	35.5	16.4	176.7	66.6
1981	55.8	64.3	0.1	64.5	34.1	14.3	168.7	65.6
1982	44.1	61.9	0.1	62.0	30.7	8.7	145.5	58.2
1983	34.3	64.0	0.1	64.1	30.8	9.3	138.5	56.7
1984	13.1	91.2	0.1	91.3	34.4	11.1	149.8	62.9
1985	22.7	100.9	0.1	101.1	34.4	9.9	168.1	72.1
1986	27.0	70.2	0.1	70.3	24.9	14.1	136.3	59.8
1987	14.7	69.4	0.0	69.5	34.1	15.9	134.2	59.7
1988	24.3	76.4	0.0	76.4	30.4	18.4	149.5	67.5
1989	20.4	76.3	0.0	76.3	31.2	13.2	141.1	60.8
1990	17.0	72.2	0.0	72.2	32.0	10.3	131.5	58.3
1991	21.9	77.9	0.0	77.9	30.8	19.1	149.7	65.7
1992	23.9	79.5	0.0	79.5	33.4	21.7	158.5	67.4

*Sources: *Family Expenditure Survey, Digest of United Kingdom Energy Statistics*

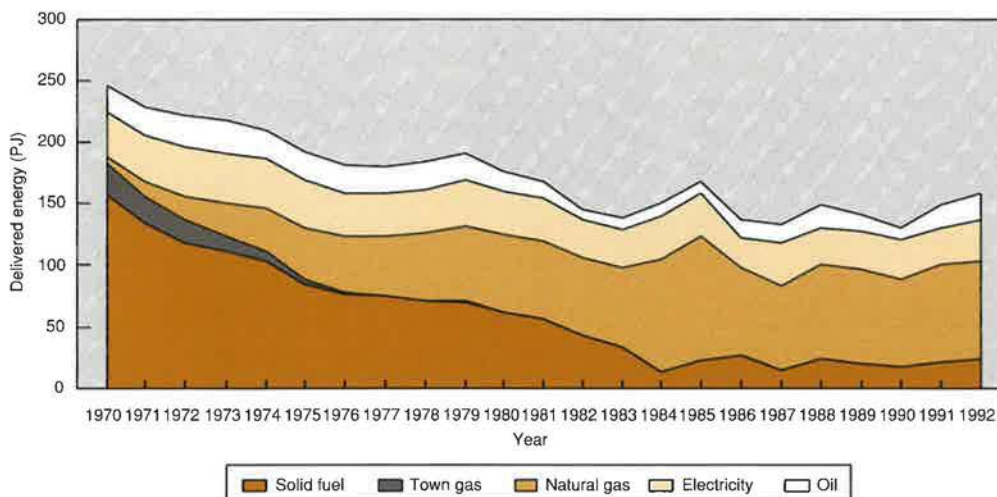


Figure 18 Energy use of the housing stock by fuel type

CARBON DIOXIDE EMISSIONS

Building Research Establishment (BRE) estimates of carbon dioxide emission factors have been applied to the energy use figures of Table 18. The resulting carbon dioxide emission trend shows a very marked reduction in emissions. There are a number of reasons for this reduction, of which the most obvious is that the decline in the number of private rented homes has markedly reduced the overall energy use of this tenure.

- The energy efficiency improvements to private rented homes described in this report have also held energy use down.
- The move towards natural gas and away from solid fuel and oil has had a beneficial effect because of the lower emission factor associated with natural gas.
- The electricity emission factor has been steadily declining because of the improving efficiency of generation, transmission and distribution, as well as the increasing proportion of electricity derived from non-fossil fuel. The current trend towards greater electricity generation by gas should help to sustain the decline in the electricity emission factor.

Table 19 Carbon dioxide emissions due to domestic energy consumption

Year	Fuel type (million tonnes CO ₂)					All fuels	
	Solid fuels	Natural gas	Town gas	Electric	Oil	Total (million tonnes CO ₂)	Per household (tonnes CO ₂)
1970	14.6	0.3	2.6	10.7	1.7	30.0	8.6
1971	12.6	0.7	1.8	10.8	1.7	27.7	8.2
1972	11.0	1.1	1.5	11.4	2.0	27.0	8.2
1973	10.4	1.5	1.0	11.5	2.1	26.4	8.4
1974	9.6	2.0	0.6	10.9	1.8	25.0	8.2
1975	8.0	2.4	0.3	10.4	1.7	22.8	7.8
1976	7.2	2.7	0.1	9.3	1.7	21.0	7.4
1977	7.0	2.8	0.0	9.1	1.6	20.5	7.5
1978	6.6	3.2	0.0	9.1	1.7	20.6	7.4
1979	6.6	3.6	0.0	9.7	1.6	21.5	7.9
1980	5.7	3.7	0.0	9.3	1.3	20.0	7.5
1981	5.2	3.7	0.0	8.8	1.1	18.9	7.3
1982	4.1	3.6	0.0	7.6	0.7	16.0	6.4
1983	3.2	3.7	0.0	7.4	0.7	15.1	6.2
1984	1.2	5.3	0.0	7.9	0.9	15.3	6.4
1985	2.1	5.8	0.0	8.0	0.8	16.7	7.2
1986	2.5	4.1	0.0	5.7	1.1	13.3	5.9
1987	1.4	4.0	0.0	7.7	1.2	14.3	6.4
1988	2.3	4.4	0.0	6.5	1.4	14.7	6.6
1989	1.9	4.4	0.0	6.5	1.0	13.9	6.0
1990	1.6	4.2	0.0	6.6	0.8	13.2	5.9
1991	2.0	4.5	0.0	6.1	1.5	14.2	6.2
1992	2.3	4.6	0.0	6.4	1.7	15.0	6.4

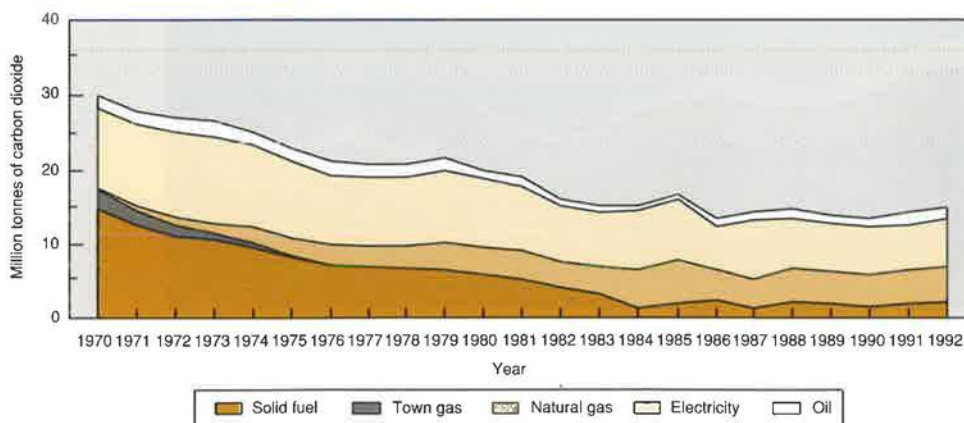


Figure 19 Carbon dioxide emissions due to domestic energy consumption

SOURCES

Several statistical sources have been referred to while compiling the domestic energy fact files for the individual tenures. The relevant sources are quoted below individual tables, and are listed in full in this section. In most cases, several editions of these sources have been consulted.

Some tables simply quote their source as *BREHOMES*. For these tables, a fuller explanation of the derivation of the figures can be obtained from the text accompanying the equivalent tables in the main domestic energy fact file¹.

- **Department of the Environment, Scottish Development Department, Welsh Office.** *Housing and Construction Statistics. Great Britain.* London, HMSO, published annually.
- **Department of Trade and Industry.** *Digest of United Kingdom Energy Statistics.* London, HMSO, published annually.
- **Department of Employment.** *Family Expenditure Survey.* London, HMSO, published annually.
- **Office of Population Censuses and Surveys.** *General Household Survey.* London, HMSO, published annually.
- **GfK Marketing Services Ltd.** *GfK Home Audit.* Home heating and insulation reports are produced annually.

REFERENCES

- 1 **Shorrocks L D, Henderson G and Bown J H F.** *Domestic energy fact file.* Building Research Establishment Report. Garston, BRE, 1992.
- 2 **Shorrocks L D and Bown J H F.** *Domestic energy fact file: 1993 update.* Building Research Establishment Report. Garston, BRE, 1993 (supplement to 1992 report).
- 3 **Dunster J E, Michel I, Shorrocks L D and Bown J H F.** *Domestic energy fact file: owner occupied homes.* Building Research Establishment Report. Garston, BRE, 1994.
- 4 **Dunster J E, Michel I, Shorrocks L D and Bown J H F.** *Domestic energy fact file: local authority homes.* Building Research Establishment Report. Garston, BRE, 1994.
- 5 **Office of Population Censuses and Surveys.** *1991 census. Report for Great Britain. Part 1.* London, HMSO, 1993.

APPENDIX A

Characteristics of housing association and private rented homes: 1992

This appendix presents information on the characteristics of housing association homes and other private rented homes. The information to allow this to be done is sufficiently complete only for 1992.

Figures in the main part of this report have been adjusted to ensure consistency with other domestic energy fact files. However, much of the information in this appendix comes directly from the source documents. Consequently, some of the figures presented here may show very slight inconsistencies if compared with those in the main text for all 'private rented' homes.

	Private rented homes	Housing association homes
Number of households	1636	717
Mean household size	2.22	2.04
Percentage of expenditure on fuel, light and power	5.0%	6.9%
Distribution of dwellings by age:		
Pre-1918	47%	26%
1918-1938	20%	11%
1939-1959	8%	14%
1960-1971	7%	15%
1972-	18%	34%
Distribution of dwellings by type:		
Semi-detached	16%	14%
Terraced	40%	29%
Flat	34%	43%
Detached	6%	7%
Bungalow	3%	6%
Other	2%	1%
Distribution of dwellings by region:		
South West	11%	6%
Wales	4%	4%
South East	38%	40%
East Anglia	5%	4%
Yorkshire, Humberside	8%	6%
East Midlands	7%	5%
West Midlands	7%	8%
North West	9%	13%
North	5%	6%
Scotland	6%	9%
Lofts with insulation	68%	87%
Cavity walls with insulation	8%	13%
Homes with any double glazing	22%	33%
Homes with any draught stripping	26%	31%
Hot water tanks with insulation	87%	93%
Average dwelling heat loss (W/°C)	296	263
Homes with central heating	66%	83%
Breakdown by fuel type:		
Solid fuel	3%	6%
Electric storage	11%	15%
Electric other	2%	5%
Gas	45%	49%
Oil	3%	2%
Other	2%	6%

(continued)

	Private rented homes	Housing association homes
Non-centrally heated homes	34%	17%
Breakdown by fuel type:		
Solid fuel	6%	3%
Electric	8%	3%
Gas	18%	10%
Oil	—	—
Other	2%	1%
Average space heating efficiency	65%	68%
Total energy use (PJ)	111.3	47.2
Breakdown by fuel type:		
Solid fuel	22.2	1.7
Electricity	23.6	9.8
Gas	52.3	27.2
Oil	13.2	8.5
Total carbon dioxide emission (million tonnes)	10.7	4.3
Average dwelling energy use (GJ)	68.0	65.8

