

Energy Use in Homes

A series of reports on domestic energy use in
England

Fuel Consumption



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Fuel Consumption

This is one of a series of five reports on the energy characteristics of the stock as observed by the 2001 English House Condition Survey.

The reports in this series are:

- 1. Energy Summary Report**
- 2. Space and Water Heating**
- 3. Thermal Insulation**
- 4. Fuel Consumption**
- 5. Energy Efficiency**

The English House Condition Survey is funded and provided courtesy of the Office of the Deputy Prime Minister. More information about this survey can be found at www.odpm.gov.uk/ehcs

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Fuel Consumption

Executive Summary

This study into fuel consumption across the English housing stock used meter reading data from the 2001 EHCS and subsequent follow up readings taken in early 2003.

It is important to stress that the study focussed strictly on gas and electricity consumption as no data was available for non-metered fuel sources. Throughout the report the phrase 'combined consumption' will always represent the total gas and electricity consumption and will include dwellings with no gas present. Where gas or electricity consumptions are analysed individually, this will be stated explicitly.

The mean combined gas and electricity consumption in 2002 was 22,290 kWh / household, the mean gas consumption was 19,788 kWh / household and the mean electricity consumption was 5,282 kWh / household.

Owner occupiers had the highest combined and gas consumptions, whilst households in private rented dwellings consumed the most electricity. Electric heating was found to be more predominant in the latter than in other tenures. Of the dwelling types, the highest consumptions were found in categories that are typically larger and have higher potential for heat loss such as detached and semi-detached dwellings. Smaller dwellings in the private rented sector have particularly high electricity consumptions, caused by the large proportion of electrically heated dwellings in this category.

Comparing consumption by dwelling age shows that combined and gas consumptions are at their highest in older (pre-WW II) dwellings and decrease as the construction date becomes more recent. Electricity consumption was roughly comparable across the range of construction dates.

The highest combined and gas consumptions occur in dwellings with mid range SAP ratings, with consumption decreasing among higher SAP ratings due to the improved energy efficiency in these dwellings. The lowest SAP scores also coincide with low combined consumption but these dwellings have the highest electricity consumption, reflecting the reliance on electric heating of these households.

Larger households are consuming more of each type of fuel, with single people consuming the lowest amount. A strong correlation between consumption and income can be seen with a high income corresponding with a higher consumption.

Households not in fuel poverty had higher combined and gas consumptions but lower electric consumption than those in fuel poverty. This trend was particularly strong in smaller dwellings and the private rented sector. Again, households in fuel poverty were more reliant on electricity for primary heating requirements.

Between 1996 and 2001, total gas and electricity consumptions increased by 17% and 22% respectively. Comparing individual categories with 1996, households with the lowest incomes saw the largest increase in gas and electricity consumptions with fuel use in the largest dwellings falling slightly. Older households saw the largest increase in gas consumption.

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INTRODUCTION

The data used in this study came from two sources; gas and electricity meter readings taken from the 2001 EHCS and follow up readings from a specialist meter reading company at a sample of 7,370 EHCS addresses. The time period between these sets of readings means that the fuel consumptions being discussed will broadly cover 2001 – 2002. The report focuses only on gas and electricity consumption – no data for unmetered fuels was available.

The report will give mean fuel consumptions, compare the consumptions of different categories within key physical and household variables and establish some evidence for the patterns seen. The data will also contribute to later analysis of annual expenditure on fuel and levels of underspend.

All households had an electricity supply; but gas was present in only 87% of the stock. Where mean gas consumptions, distributions or proportions are discussed in the report, only this 87% portion has been used for the analysis; where electricity is being discussed, 100% of the stock has been used. Appendix A has further comments on the data used in the report.

1 Headline Figures

- 1.1 Table 1.1 gives averages for combined, gas and electricity consumptions, along with typical corresponding values for kWh per unit area. It is important to clarify that “combined” refers to the total consumption for all dwellings, whether they use both gas and electricity or electricity only.

Fuel Type	Households (000s)	Percent	Mean kWh
Combined Consumption	20,510	(100.0)	22,290
Gas Consumption	17,844	(87.0)	19,788
Electric Consumption	20,510	(100.0)	5,282

Table 1.1: Headline Mean Consumptions

- 1.2 It should be noted that the combined mean is lower than the sum of the gas and electric means; this is caused by the 13% of households that have only an electric supply – these will typically have lower combined consumptions than households with both fuels present, and the electricity only households will reduce the mean combined consumption.

2 Stock Characteristics

- 2.1 Comparing the standard tenure types in Table 2.1 shows that owner occupied households have significantly higher combined fuel consumptions and gas consumptions than other tenures, with Local Authority housing having the second highest combined figure, followed by private rented and RSL categories.

Tenure Type	Households (000s)	Percent	Combined	kWh / household	
				Gas	Electricity
Owner occupied	14,488	(70.6)	24,373	20,982	5,197
Private rented	2,010	(9.8)	16,988	16,771	6,581
LA	2,684	(13.1)	18,843	16,614	4,601
RSL	1,328	(6.5)	15,840	15,542	5,792
Total	20,510	(100.0)	22,290	19,788	5,282

Table 2.1: Consumption by Tenure

This order is different for electricity consumptions, with the private rented sector having the highest mean. This is because the private rented stock has a high proportion of households which are without gas and this factor will be examined in more detail later in the report.

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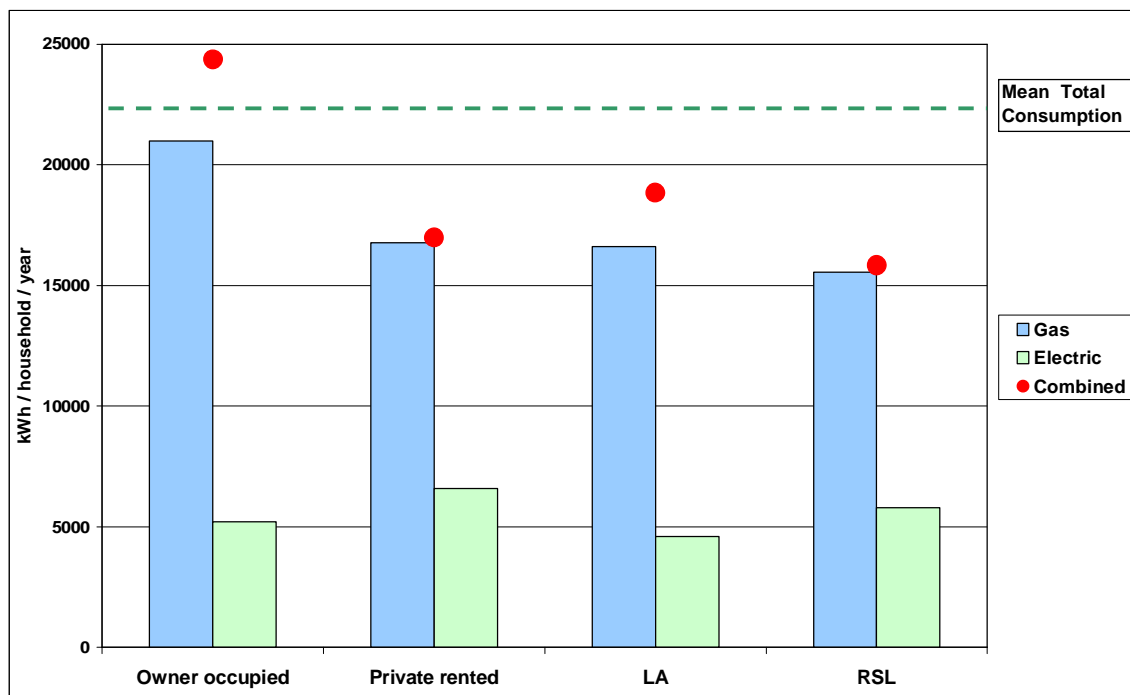


Figure 2.1: Mean Consumptions Categorized by Tenure

Figure 2.1 shows the combined consumption figures along with breakdowns for gas and electricity. The most noticeable feature is that the gas consumptions for all tenures other than owner occupied are very similar.

The high electricity consumptions of privately rented and RSL households reduce the respective combined consumptions. This is because these categories have a higher proportion of households whose combined fuel consumption is provided solely by the electricity supply.

2.2 Table 2.2 gives an analysis of mean consumptions by the physical type of dwelling.

Dwelling Type	Households (000s)	Percent	kWh / household		
			Combined	Gas	Electricity
End terrace	1,995	(9.7)	23,563	19,744	5,159
Mid terrace	3,820	(18.6)	21,504	18,243	5,019
Semi detached	5,740	(28.0)	24,500	20,538	5,122
Detached	3,218	(15.7)	30,075	25,100	5,665
Bungalow	1,998	(9.7)	21,205	19,737	5,330
Converted Flat	639	(3.1)	20,024	17,295	7,101
Purpose built flat	3,101	(15.1)	12,061	12,471	5,453
Total	20,510	(100.0)	22,290	19,788	5,282

Table 2.2: Consumption by Dwelling Type

The results are fairly consistent with the characteristics of each category, with the 3 highest combined and gas consumption categories: detached, semi detached and end terraces, having high potential heat loss characteristics. The purpose built flats category has by far the lowest combined and gas consumptions, however their mean electricity consumption is above the average of the whole stock.

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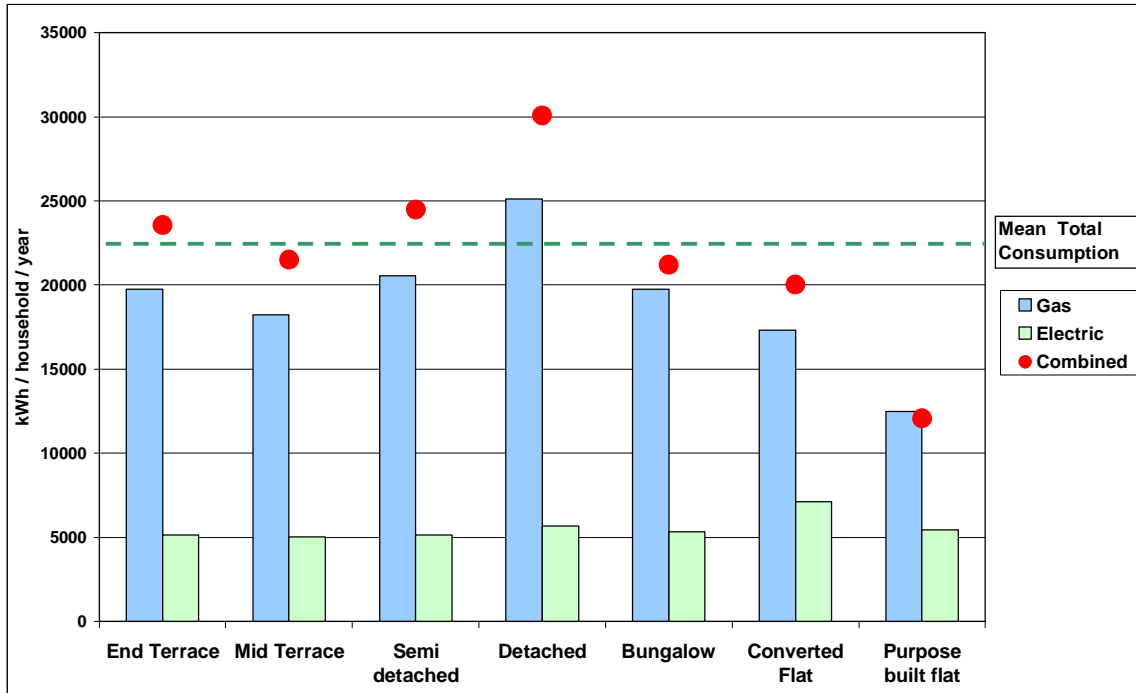


Figure 2.2: Mean Consumptions Categorized by Dwelling Type

Figure 2.2 represents the data from Table 2.2 and we can see the gas consumptions closely following the pattern set by the combined figures, whilst the electricity consumption remains close to the 5,000 kWh level, apart from in the converted flat category where the mean consumption is significantly higher than average at around 7,100 kWh. This is due to a high proportion of electric heating.

2.3 Splitting the sample into 5 equal percentiles by gross floor area gives the analysis shown in Table 2.3 and Figure 2.3.

Floor Area Quintiles	Area Range	Households (000s)	Percent	kWh / household		
				Combined	Gas	Electricity
1st quintile	Up to 58m ²	4,102	(20.0)	14,314	13,938	5,404
2nd quintile	58m ² – 71m ²	4,102	(20.0)	19,792	17,489	4,879
3rd quintile	71m ² – 83m ²	4,102	(20.0)	22,138	18,654	5,127
4th quintile	83m ² – 102m ²	4,102	(20.0)	25,499	21,278	5,144
5th quintile	102m ² and above	4,102	(20.0)	32,037	27,099	6,066
Total		20,510	(100.0)	22,290	19,788	5,282

Table 2.3: Consumption by Floor Area Quintiles

We see the combined and gas figures climbing as the dwelling size increases, with electricity consumptions remaining fairly static, although the highest electric consumptions occur in the 1st and 5th quintiles.

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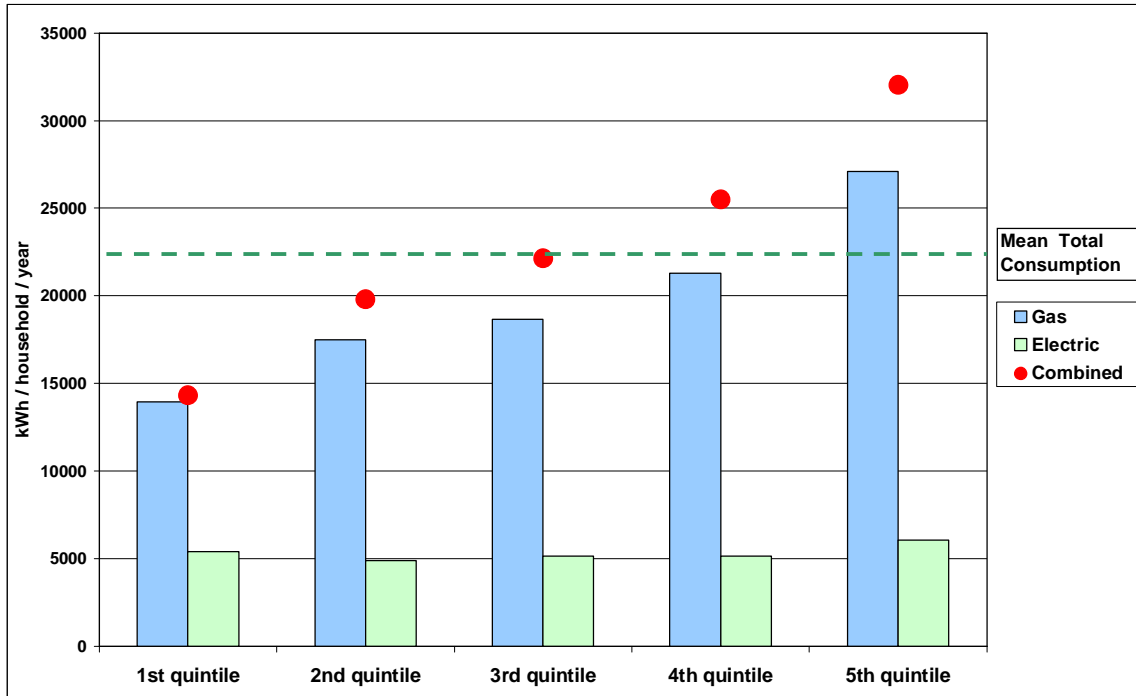


Figure 2.3: Mean Consumptions Split by Floor Area Quintiles

The above table and Figure 2.3 show the highest electricity consumption to be in the 5th quintile as we would expect. In section 3.3 a clear correlation between dwelling size, household income and fuel consumption is shown which accounts for this rising trend.

The only exception to this pattern is the electricity consumption in the 1st floor area quintile. Figure 2.4 takes a closer look at this.

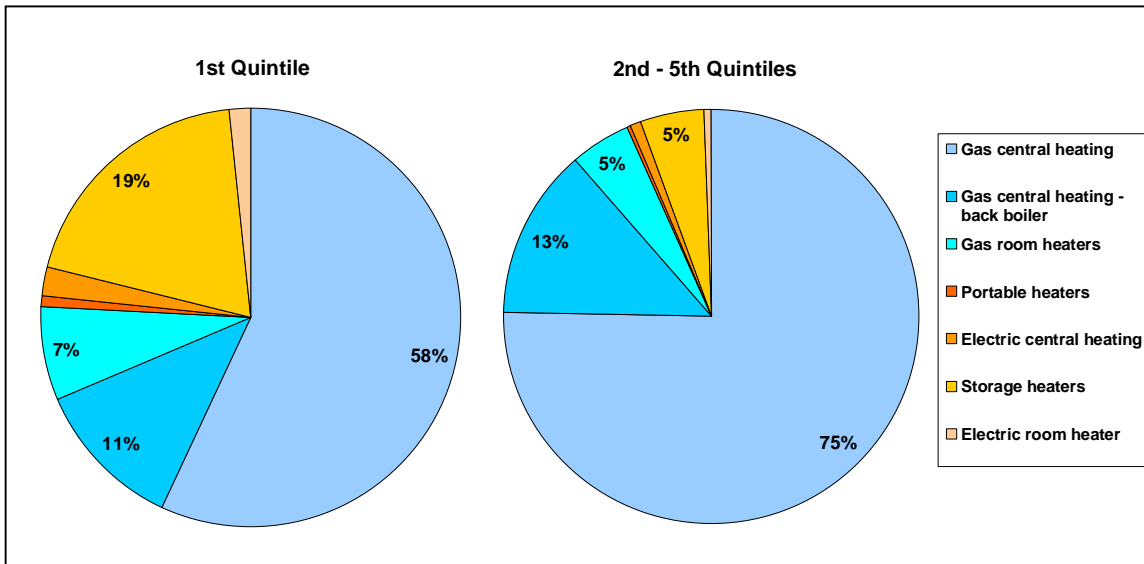


Figure 2.4: Primary Heating Comparison by Floor Area Quintiles

Each chart represents the percentage of households using certain types of heating system as their primary source, with gas-fuelled systems in blue and electric systems in orange. Isolating the 1st floor

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area quintile we can see the reliance on electric heating systems in small dwellings with the proportion of electric systems falling from 24% in the 1st quintile to below 7% in the 2nd – 5th quintiles. Much of this difference is in the storage heater category. The proportion of gas central heating usage (with or without a back boiler) is 69% for the 1st quintile compared with 88% in the 2nd – 5th quintiles.

2.4 In Table 2.4 we see how consumption changes with the dwelling construction date. The highest consumptions for both gas and combined occur in pre 1945 housing, with consumption gradually decreasing in dwellings built post 1945. Overall, the electricity consumption is fairly static.

Construction Date	Households (000s)	Percent	kWh / household		
			Combined	Gas	Electricity
Pre 1919	4,200	(20.5)	25,475	22,448	5,577
1919-1944	3,641	(17.8)	25,589	21,392	4,832
1945-1964	4,388	(21.4)	22,471	19,802	5,427
1965-1980	4,463	(21.8)	20,457	18,622	5,409
Post 1980	3,818	(18.6)	18,634	16,904	5,106
Total	20,510	(100.0)	22,290	19,788	5,282

Table 2.4: Consumption by Construction Date

Figure 2.5 shows these figures graphically, with a clear post-war falling trend, as heating systems become more efficient and insulation more prevalent and more effective.

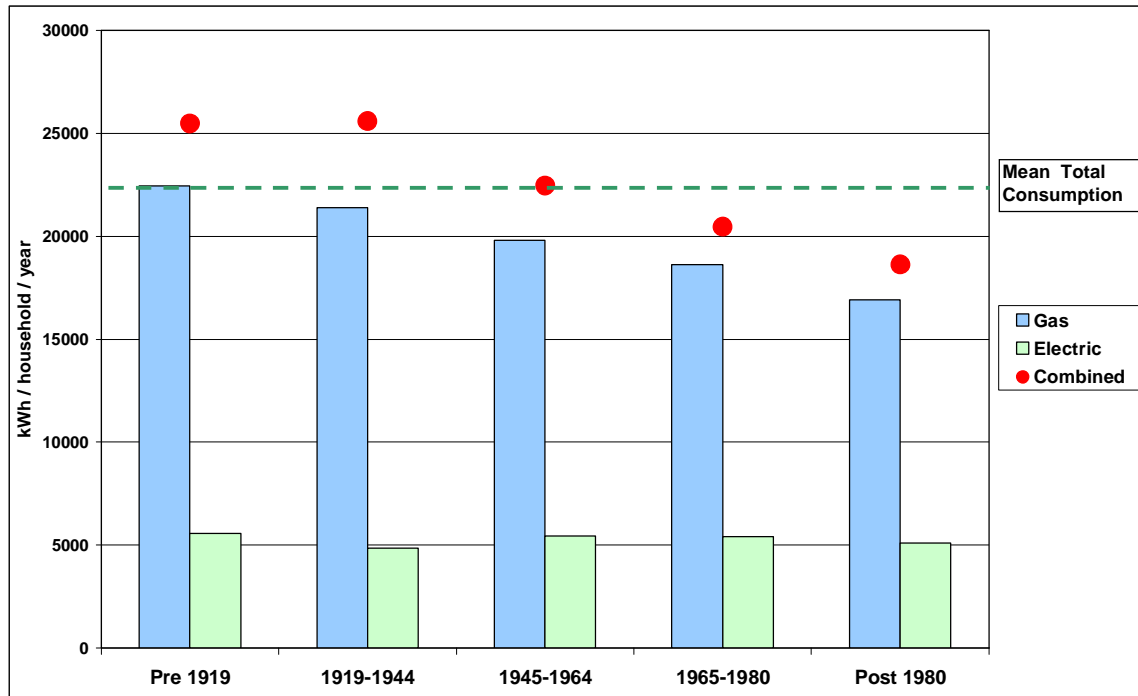


Figure 2.5: Mean Consumptions Categorized by Construction Date

2.5 Table 2.5 and Figure 2.6 show the mean consumptions against the identified primary heating systems.

Primary Heating type	kWh / household		
	Combined	Gas	Electricity
Gas central heating	25,076	20,600	4,482
Gas central heating - back boiler	23,415	19,480	3,965
Gas room heaters	17,402	12,770	4,931
Portable heaters	7,197	6,671	5,691
Electric central heating	10,807	10,505	10,634
Storage heaters	10,963	7,741	10,457
Electric room heater	8,352	5,826	7,058
Total	22,290	19,788	5,282

Table 2.5: Consumption by Primary Heating Type

Electrically fuelled systems have lower combined consumptions than gas fuelled systems but have higher electricity consumptions and higher total costs. Households using portable heaters have the lowest combined consumption with both types of gas central heating using more fuel than the mean total consumption.

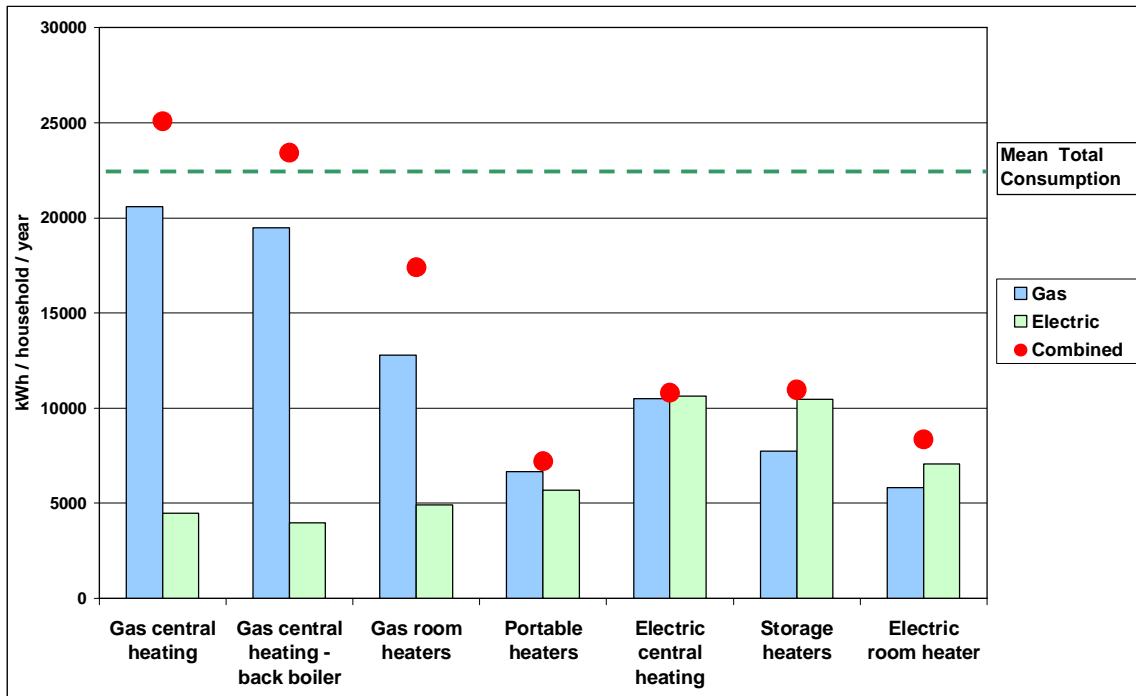


Figure 2.6: Mean Consumptions Categorized by Primary Heating Type

2.6 Figure 2.7 shows a distinct correlation between floor area quintiles and fuel consumption when split by tenure – with the greatest range being displayed in owner occupied dwellings. The range of floor areas within each quintile is given in appendix table C2.7.

Examining each quintile across the tenures we see that the range of combined consumptions grows as the dwelling size grows, with the lowest quintile representing a range of 8,678 kWh / household across the tenures and the highest quintile a range of 12,292 kWh / household.

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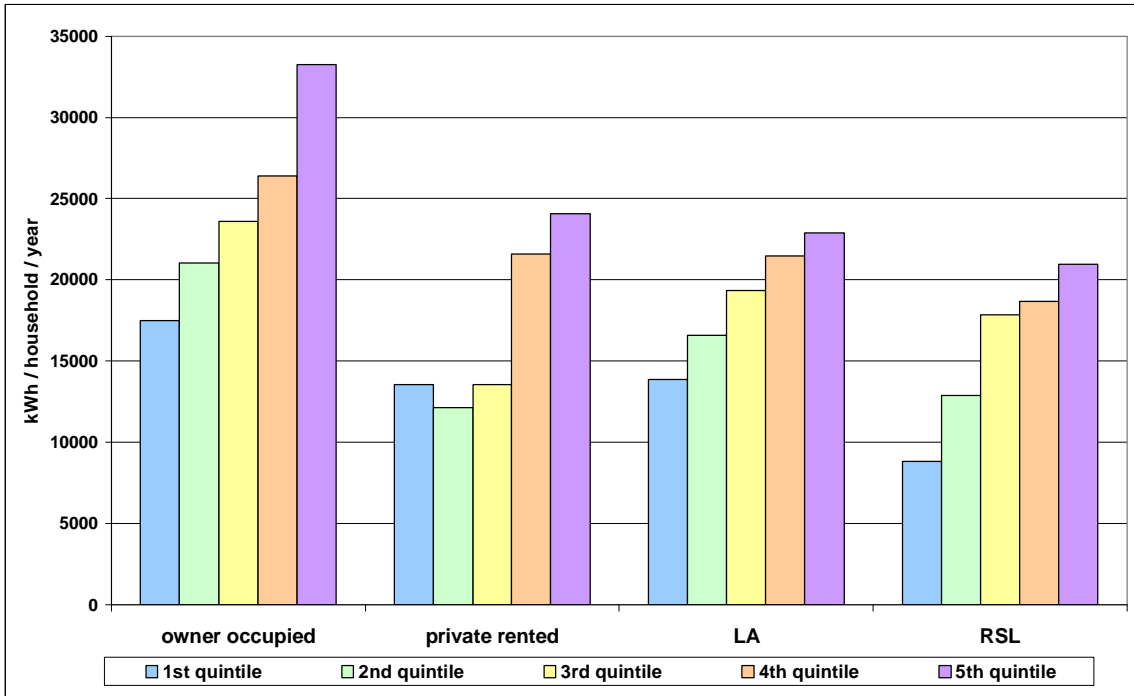


Figure 2.7: Combined Consumption Categorised by Floor Area Quintiles and Tenure

2.7 Focussing on electricity and particularly the private rented sector, Figure 2.8 compares dwelling size against either private rented or all other tenures and appendix table C2.8 gives the range of areas within each quintile.

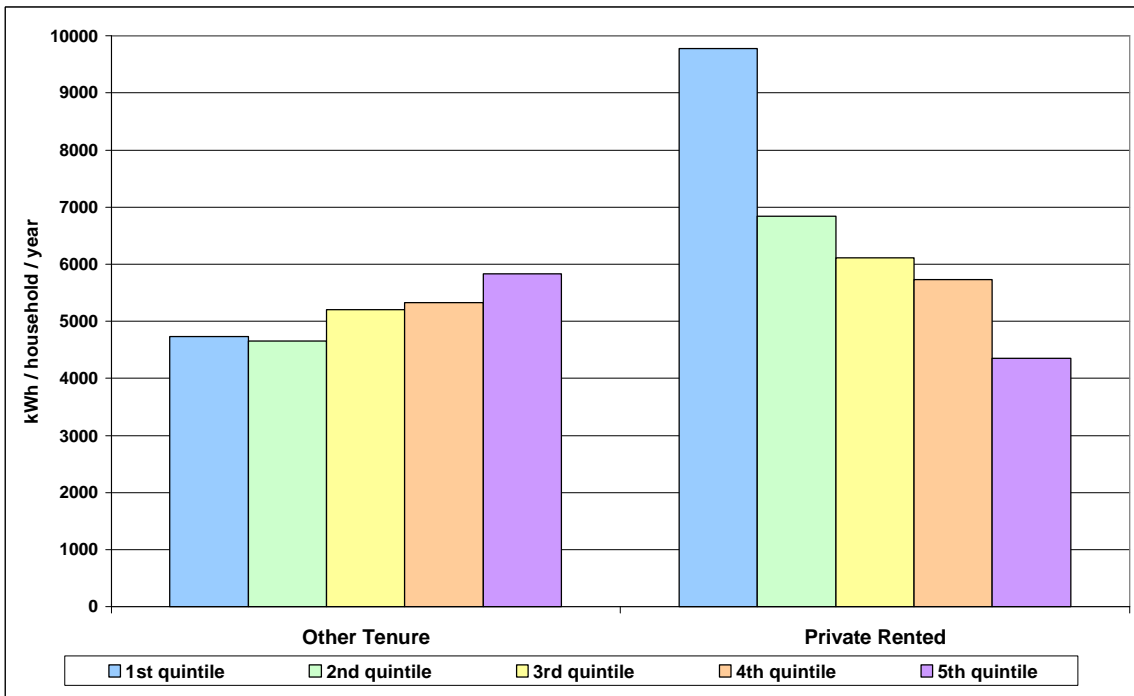


Figure 2.8: Electricity Consumption Categorised by Floor Area and Private Rented split

The figure shows a relatively uniform distribution in the grouped tenures whereas consumptions above 6,500 kWh / household in the 1st and 2nd quintiles of the private rented category are a result of a large proportion of households relying on electricity for space heating.

Figure 2.9 examines the comparative reliance on electricity for heating in private rented dwellings, with a total of 28% of private rented sector households primarily using electricity for heating; this figure drops to 15% in the other tenure types. Total use of gas central heating rises from 60% to 78% when comparing private rented with the rest of the stock.

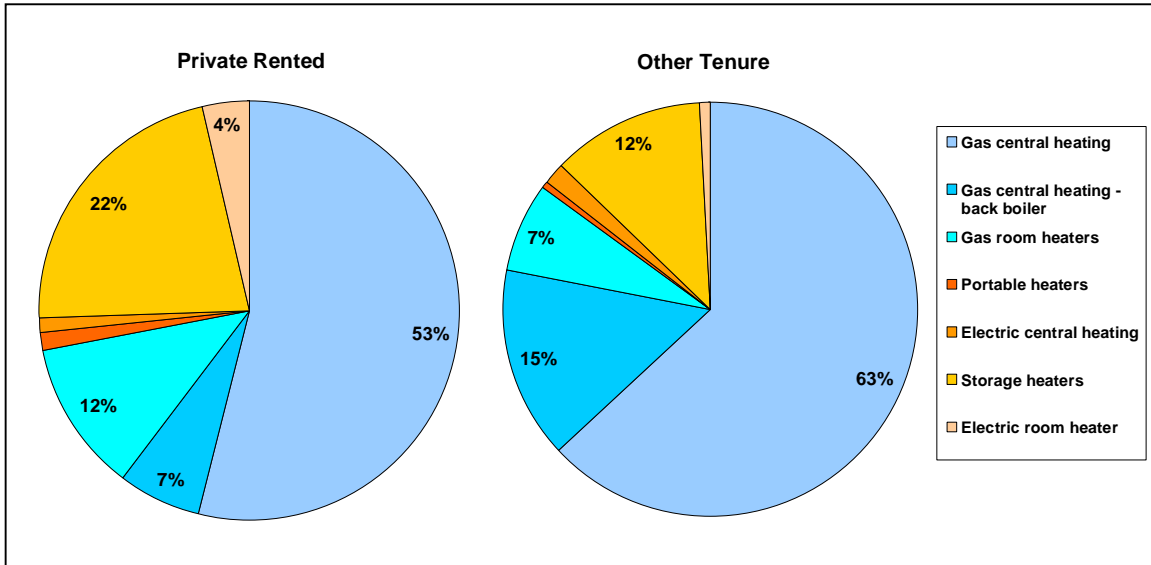


Figure 2.9: Primary Heating Comparison by Floor Area Quintiles

3 Social Characteristics

3.1 Table 3.1 and Figure 3.1 describe the type of household and their average fuel consumptions.

Household Type	Households (000s)	Percent	Combined	kWh / household	
				Gas	Electricity
Couple under 60, no children	4,085	(19.9)	23,942	20,504	5,556
Couple 60 or over, no children	2,925	(14.3)	25,069	22,224	4,927
Couple with dependent child(ren)	4,986	(24.3)	27,080	22,708	5,996
Lone parent with dependent child(ren)	1,597	(7.8)	20,972	18,416	5,274
Other multi-person households	1,443	(7.0)	23,157	20,148	6,316
One person under 60	2,397	(11.7)	16,079	14,028	4,731
One person aged 60 or over	3,077	(15.0)	16,852	17,102	4,349
Total	20,510	(100.0)	22,290	19,788	5,282

Table 3.1: Consumption by Household Type

The lowest gas and combined consumptions are in single person households. Households with 2+ members have the next highest consumptions, with the single parent being the lowest of this group. The couple with dependent children category, with 3+ members, has the highest consumption. A similar pattern is seen with electricity consumptions.

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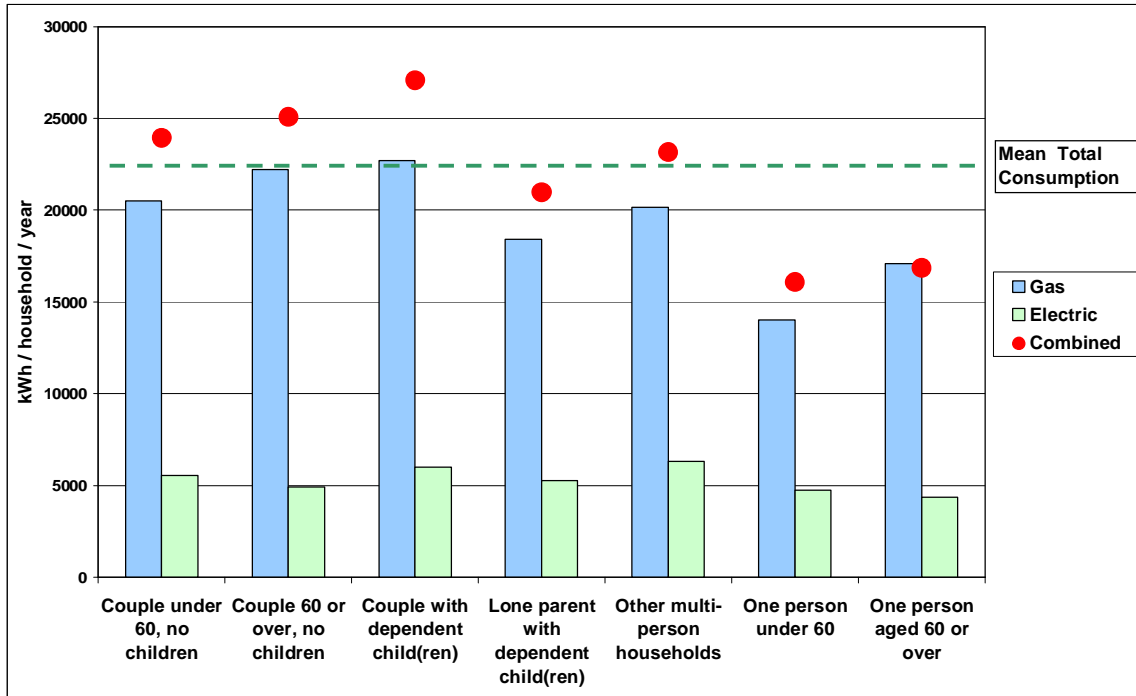


Figure 3.1: Mean Consumptions Categorised by Household Type

3.2 Focussing on electricity, we can see in Figure 3.2 that tenure types apart from private rented follow a similar consumption pattern to Figure 3.1, but the private rented sector shows higher electricity consumptions than the stock average, particularly in the other multi-person household and one person under 60 categories, with 7,512 kWh / household and 8,321 kWh / household respectively.

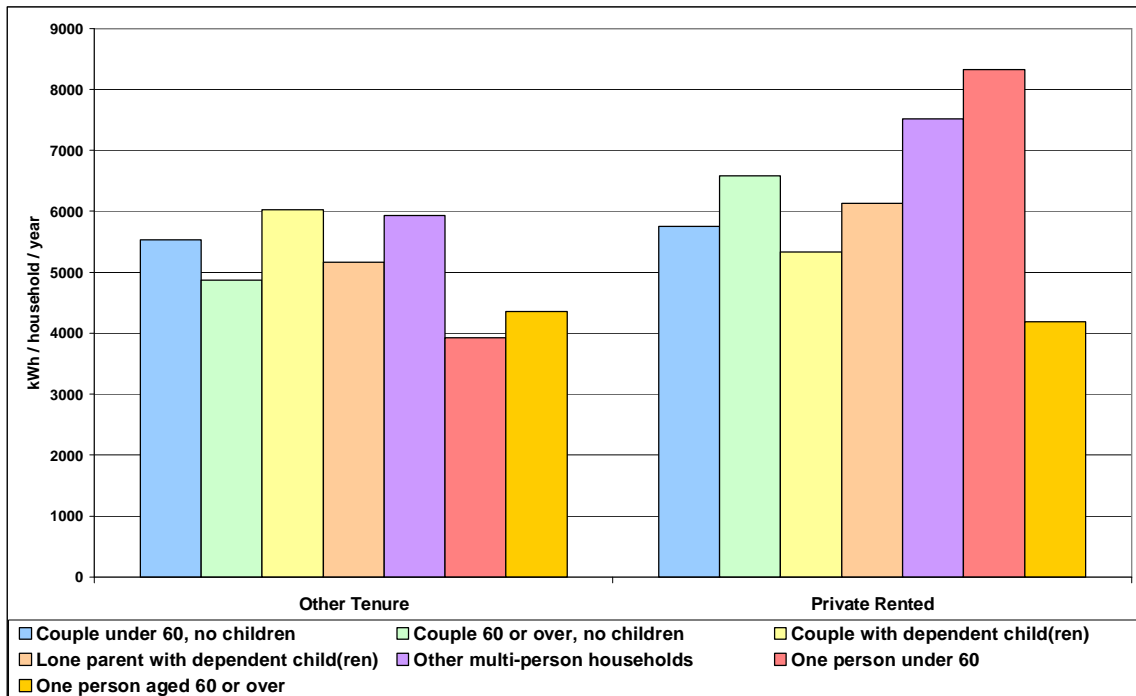


Figure 3.2: Electricity Consumption by Household Type and Private Rented split

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There is evidence of increased reliance on electrically fuelled heating systems for certain social groups within the private rented sector as shown in Table 3.2:

Tenure	Household Type	% of category	
		Gas System	Electric System
Private Rented	Other multi-person households	87%	13%
	One person under 60	63%	37%
Other Tenure	Other multi-person households	91%	9%
	One person under 60	85%	15%

Table 3.2: Proportion of Gas or Electric Systems in Households Types with High Electric Consumption

3.3 Table 3.3 gives headline figures for consumption split by household income quintiles. Appendix table C3.3 lists the floor area range within each income and floor area quintile.

Income Quintiles	Households (000s)	Percent	Combined	kWh / household	
				Gas	Electricity
1st quintile	4,102	(20.0)	17,743	16,912	4,594
2nd quintile	4,102	(20.0)	21,176	19,243	5,436
3rd quintile	4,102	(20.0)	23,272	20,440	5,187
4th quintile	4,102	(20.0)	23,380	19,421	5,245
5th quintile	4,102	(20.0)	28,488	23,701	6,254
Total	20,510	(100.0)	22,290	19,788	5,282

Table 3.3: Consumption by Income Quintiles

Comparing floor area quintiles against income quintiles, as in Figure 3.3, provides a useful assessment of the quality of the dataset. In general we have a uniform profile of higher mean consumptions for ascending sizes of dwelling within ascending household income quintiles. Mean consumptions range from 12,701 kWh / household in the 1st income quintile and 1st floor area quintile to 36,324 kWh / household in the 5th income quintile and 5th floor area quintile.

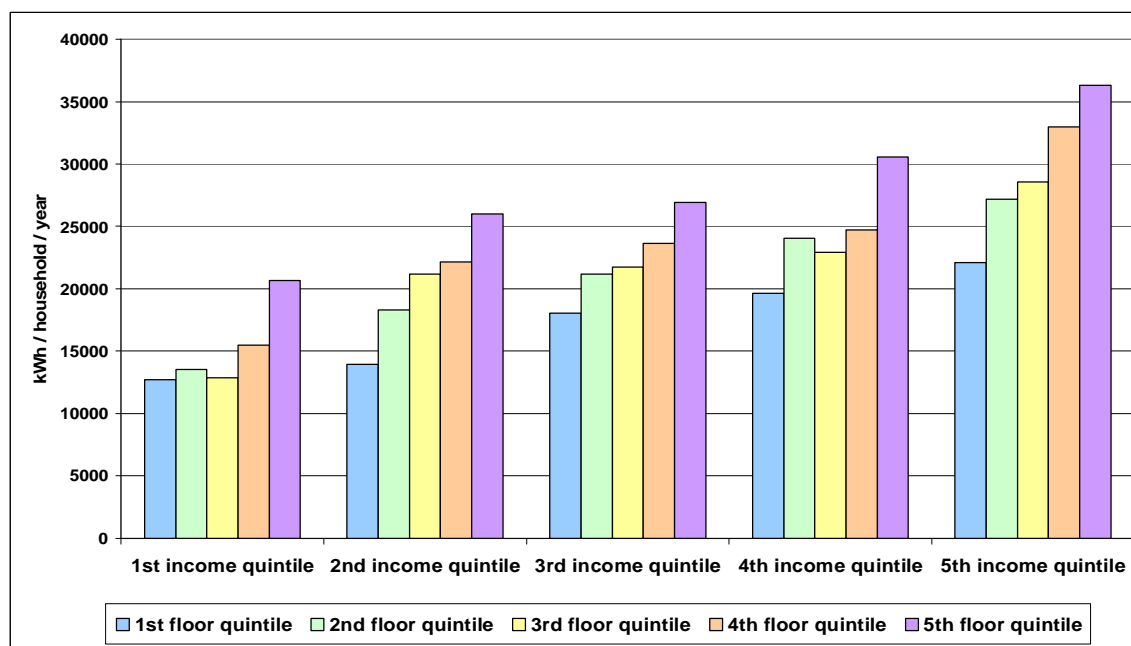


Figure 3.3: Combined Consumption Categorized by Floor Area and Income Quintiles

4 SAP Bands and Floor Area

4.1 An interesting profile is found when the sample is split into banded SAP ratings and the standard consumptions are analysed as shown in Table 4.1 and Figure 4.1.

Banded SAP	Households (000s)	Percent	Combined	kWh / household	
				Gas	Electricity
< 20	948	(4.6)	14,627	12,194	10,666
20 - 30	931	(4.5)	16,326	18,269	8,891
30 - 40	2,346	(11.4)	24,598	23,743	6,278
40 - 50	5,032	(24.5)	24,722	21,620	4,897
50 - 60	5,614	(27.4)	23,363	20,015	4,802
60 - 70	3,784	(18.4)	20,657	17,669	4,361
> 70	1,854	(9.0)	18,411	15,128	4,026
Total	20,510	(100.0)	22,290	19,788	5,282

Table 4.1: Consumption by SAP Rating Band

For dwellings with very low SAP scores, it is unlikely that the household can afford to maintain a high heating regime and hence they have below average energy consumptions. For mid-range SAP values the fuel consumptions are at their highest with sufficient income balancing insufficient thermal efficiency. For SAP values of 60 and above, good energy efficiency measures are taking effect so fuel consumption is lower.

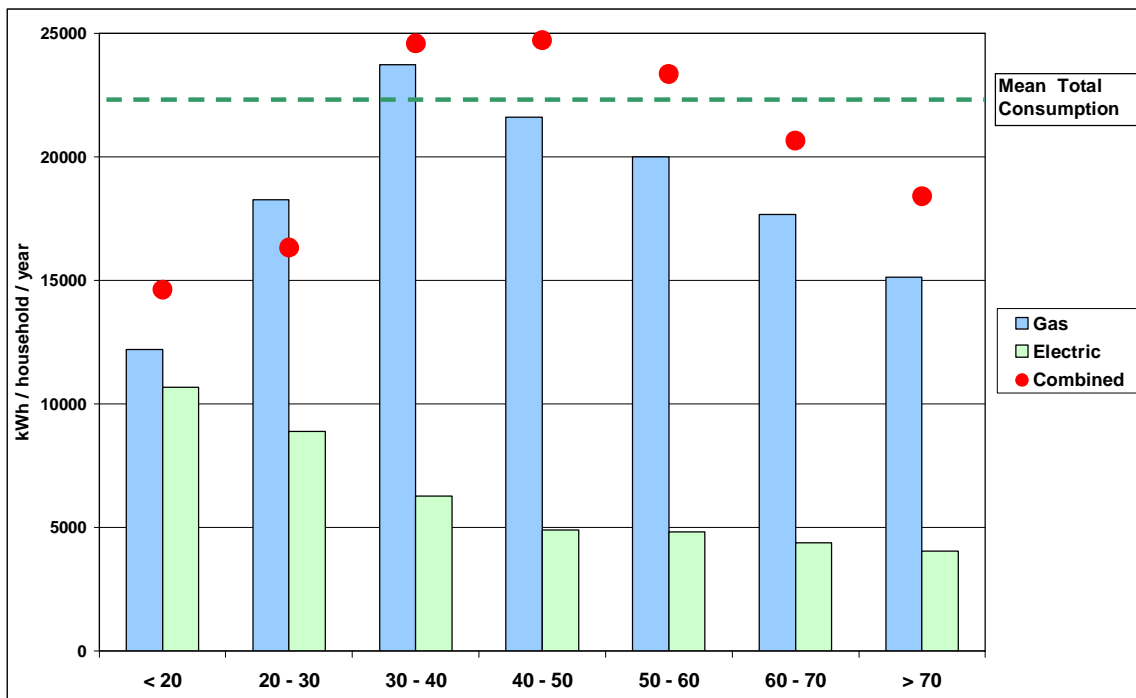


Figure 4.1: Mean Consumptions Categorized by SAP Rating Bands

4.2 Figures 4.2 and 4.3 show mean combined and electricity consumptions split by floor area and SAP bands. The gas consumption is not displayed since it follows a similar pattern to the combined data. The range of floor areas included in each SAP band and area quintile are shown in appendix table C4.2.

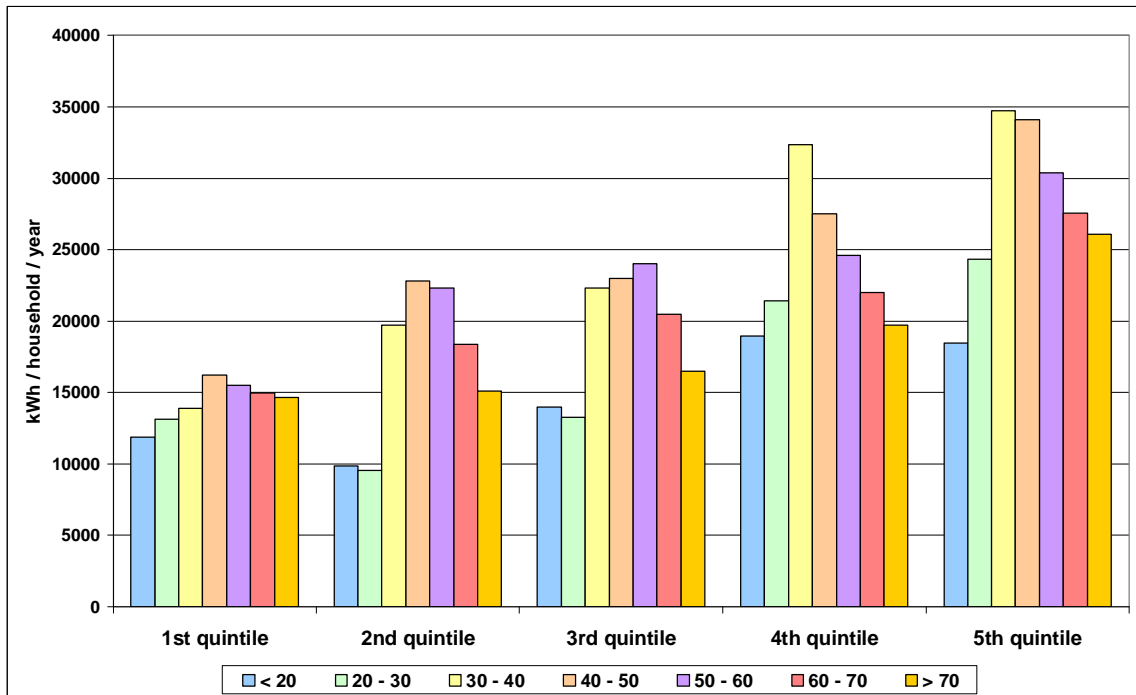


Figure 4.2: Combined Consumption Categorised by Floor Area Quintiles and SAP Bands

In Figure 4.2 we can approximately see the following pattern. The highest mean consumption within each quintile appears within a lower SAP band as the dwelling size increases – visually the peak moves from right to left with each increasing quintile. In the first three floor area quintiles the combined consumptions peak in the 40 – 60 SAP band, while in the 4th and 5th quintiles the consumptions peak in the 30 – 40 range of SAP ratings. In these top quintiles the consumption is also fluctuating to a greater extent than in lower quintiles, reflecting the wider range of different dwellings at the higher end of the dwelling size scale. The pattern of a varying SAP profile within each floor quintile is due to households with larger dwellings being more likely to have the income to pay for the extra heating made necessary by poor energy efficiency measures. Evidence for the correlation between dwelling size, household income and fuel consumption has been shown in Figure 3.3.

- 4.3 Figure 4.3 shows that the highest electricity consumptions are found in dwellings with a SAP value of less than 30, suggesting that these make up a large proportion of dwellings that are heated predominantly by electricity.

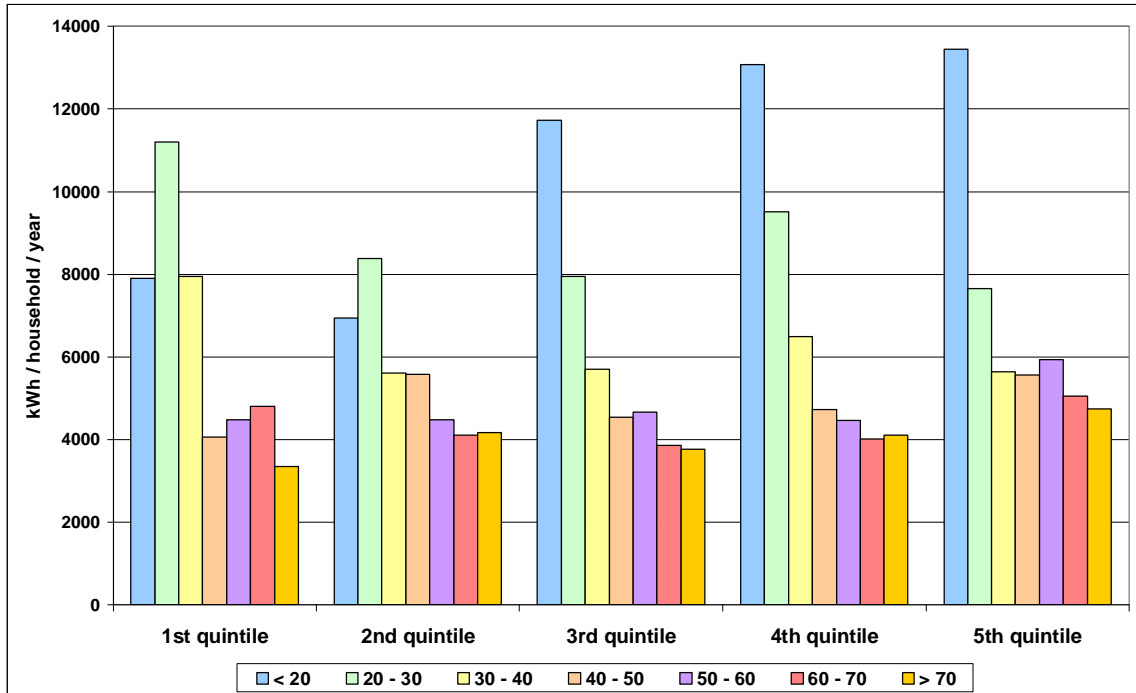


Figure 4.3: Electricity Consumption Categorised by Floor Area Quintiles and SAP Bands

The bands containing cases where the SAP is less than 30 are examined more closely in Figure 4.4, in which these dwellings are compared to the rest of the stock. A clear reliance on electrical heating systems in the left hand chart with the proportions of electric central heating and storage heaters in dwellings with SAP less than 30 far larger than those with a higher SAP score and portable heater and room heater use all but non-existent in dwellings with SAP greater than 30.

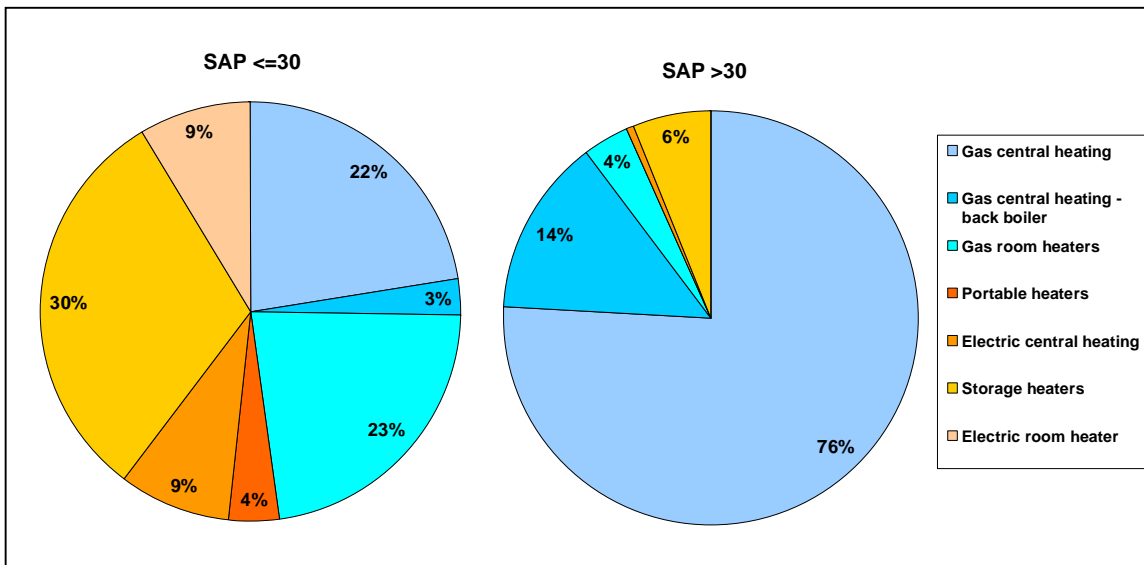


Figure 4.4: Primary Heating Comparison by SAP Rating split

Even where gas is used in the most energy inefficient dwellings, nearly half rely on gas room heaters, with the proportion of gas central heating rising from 25% in this category to 90% where the SAP score is greater than 30.

4.4 Figure 4.5 collects the SAP bands into groups greater than or less than 50, (which gives an approximately equal split of the whole stock in terms of household numbers) and analyses each category against the dwelling construction date. Dwellings with SAP ratings above 50 follow a uniform distribution against construction date categories similar to Figure 2.5.

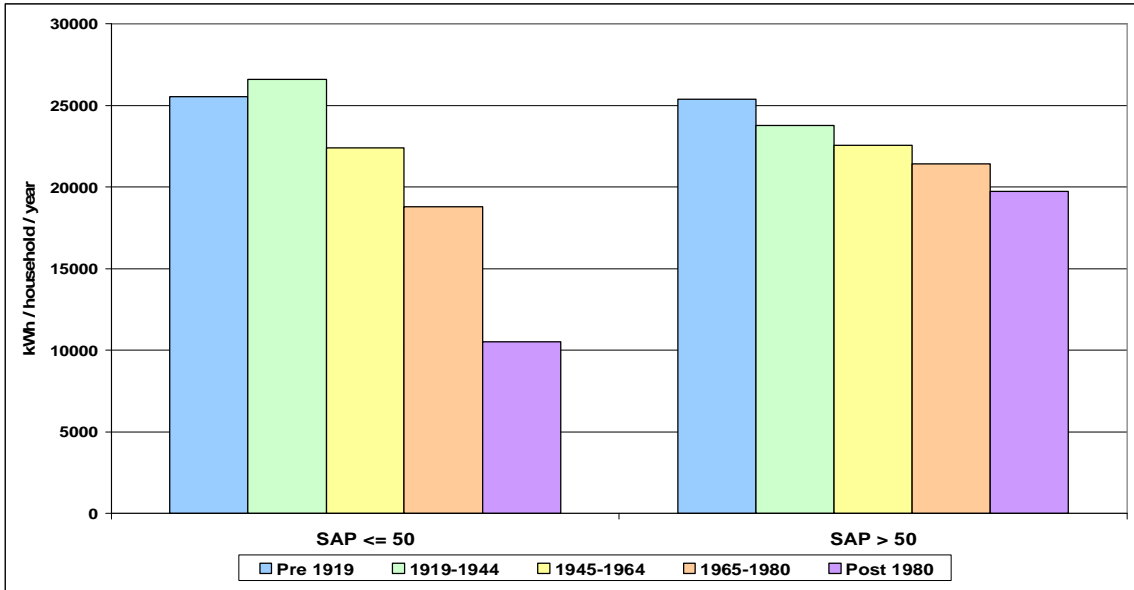


Figure 4.5: Combined Consumption by SAP Greater / Less than 50 and Construction Date

But we see a more exaggerated profile for dwellings with a lower SAP rating, with a more dramatic drop in combined consumption in newer dwellings, which corresponds to higher electricity consumptions in these categories as shown in Figure 4.6.

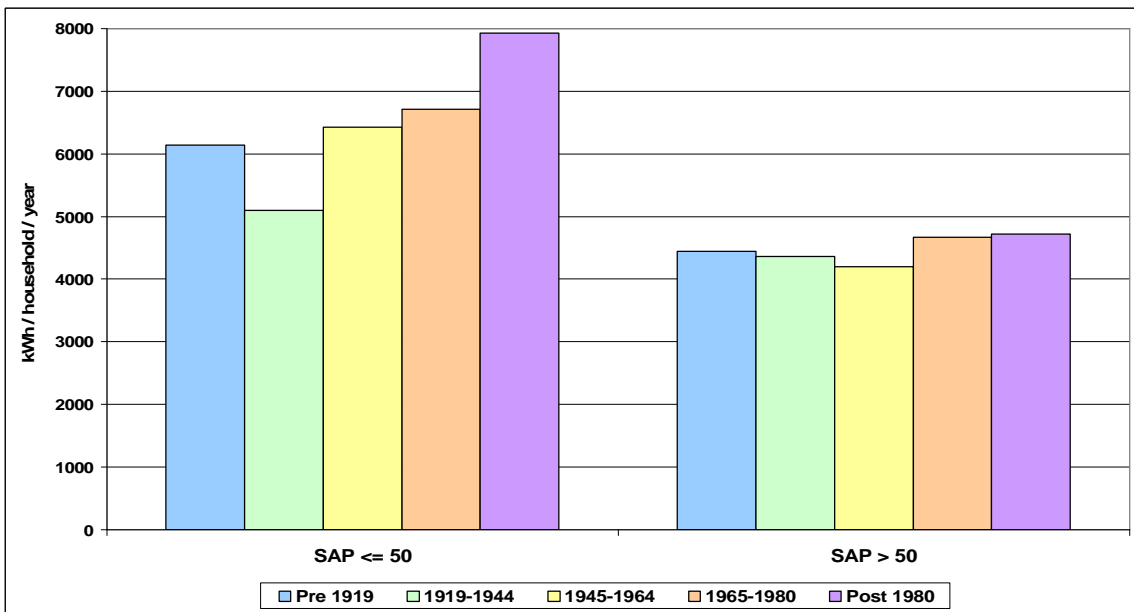


Figure 4.6: Electricity Consumption by SAP Greater / Less than 50 and Construction Date

4.5 These higher electricity consumptions are analysed in Figure 4.7, which demonstrates similar results to Figure 4.4, with only around 5% of households in the upper half of SAP scores using electricity as their primary heating source compared to 17% in the lower half.

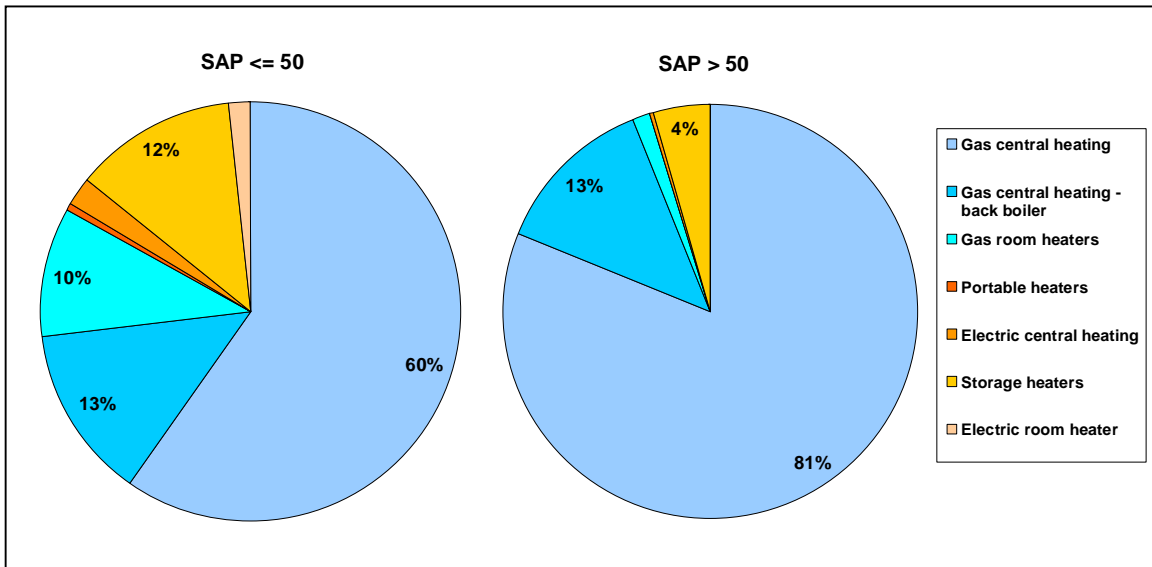


Figure 4.7: Primary Heating Comparison by Floor Area Quintiles

5 Fuel Poverty

5.1 Figures 5.1 – 5.4 compare the mean fuel consumption of households in and out of fuel poverty against several other criteria. In all cases the fuel poverty indicator takes into account the full household income. Appendix table C5.1 shows the range of floor areas included in each quintile.

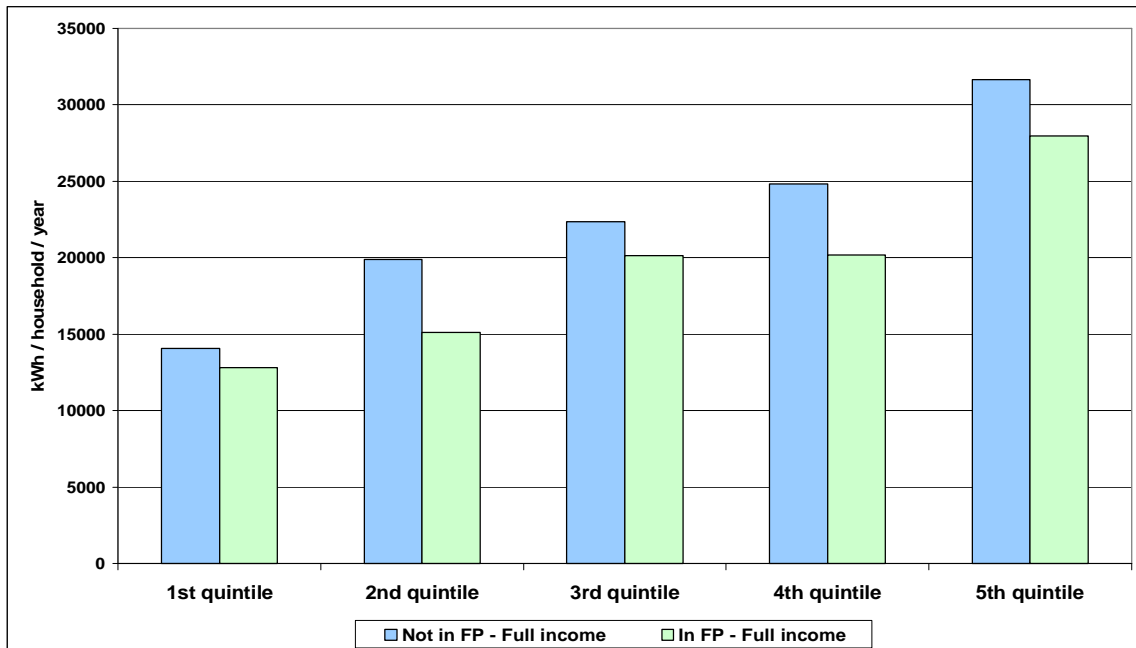


Figure 5.1: Combined Consumption Categorised by Floor Area Quintiles and Fuel Poverty

5.2 The general trend shown in Figures 5.1 and 5.2 is that a household in fuel poverty is consuming less combined fuel than a household which is from the same category of floor area size or tenure, but not in fuel poverty. This is as expected because a primary factor in fuel poverty is low income, so a household will be more limited in its fuel expenditure.

The only exception to this pattern is in the private rented sector, where the mean consumption for households in fuel poverty is slightly higher than the mean for households not in fuel poverty. This is caused by relatively poor energy efficiency in private rented dwellings, leading to increased consumption. Average SAP ratings demonstrating the low level of energy efficiency in private rented stock are in Table 5.1. The private rented stock has a mean SAP rating 5 points lower than owner occupied dwellings and at least 9 points lower than social housing:

Tenure	Mean SAP
Owner Occupied	50
Private Rented	45
LA	54
RSL	60
Whole Stock	51

Table 5.1: Mean SAP by Tenure

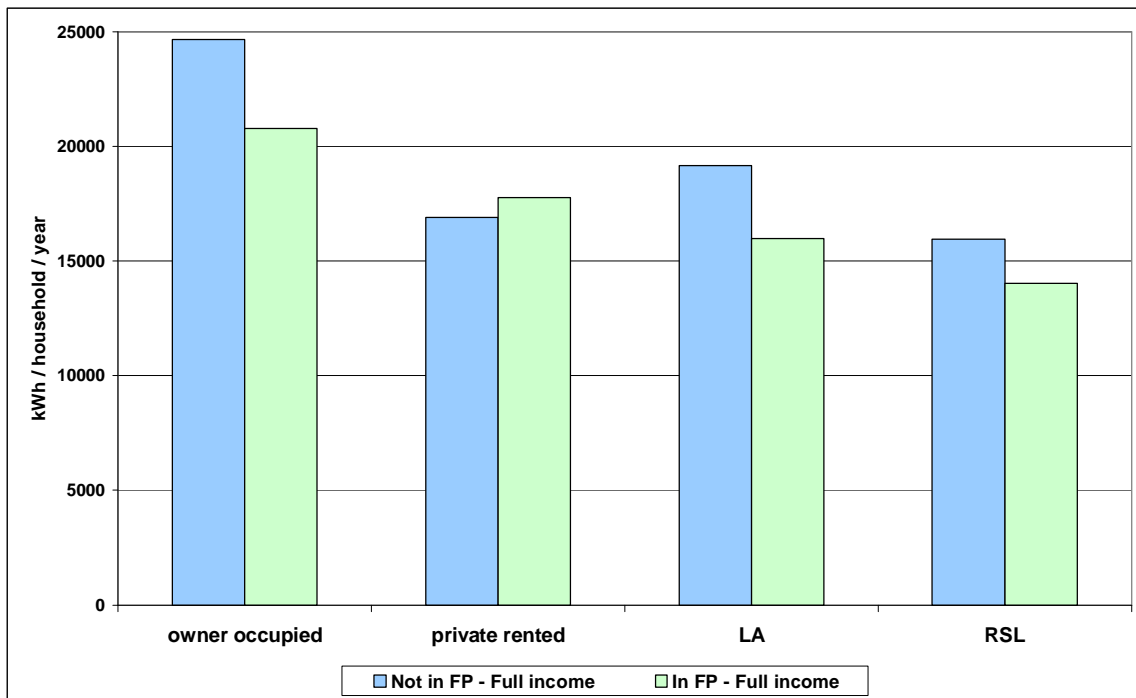


Figure 5.2: Combined Consumption Categorised by Tenure and Fuel Poverty

5.3 Figures 5.3 and 5.4 use the same indicators as before, but focus on electricity consumption.

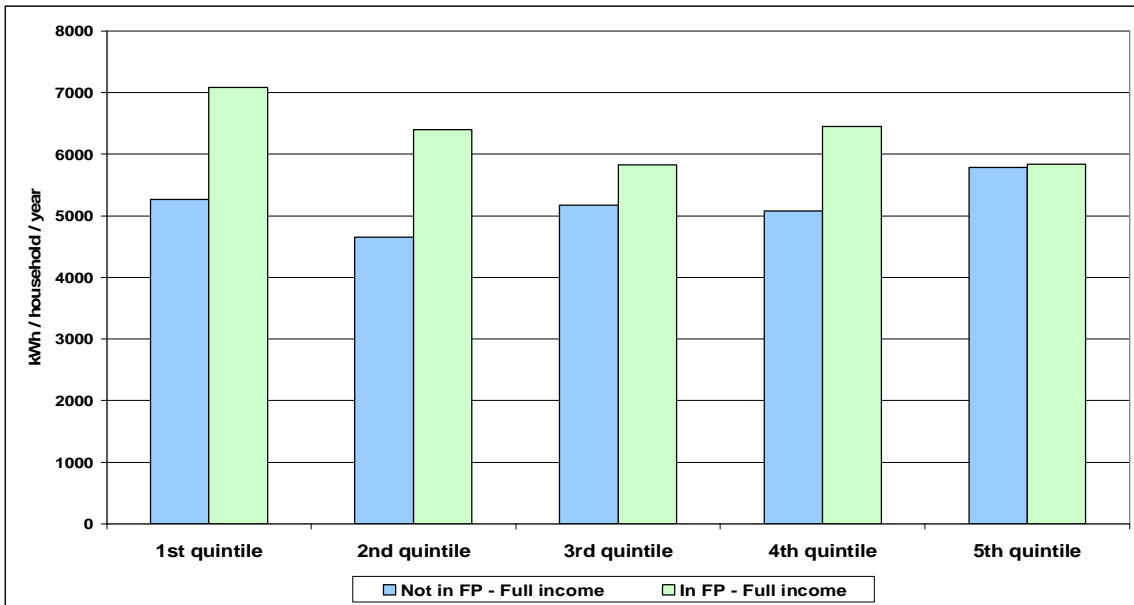


Figure 5.3: Electricity Consumption Categorised by Floor Area Quintiles and Fuel Poverty

Here we see that electricity consumptions for households in fuel poverty are higher than for those not in fuel poverty in all categories. This is because a higher proportion of households in fuel poverty have no gas supply and use electricity for space heating, we find that 29% of those in fuel poverty have no gas supply, compared with 12% of those not in fuel poverty. The higher cost of this electricity can often cause a household to cross the threshold into fuel poverty. This factor coupled with poor energy efficiency in private rented stock leads to the pattern shown in Figure 5.4, in which the private rented electric consumption is again far higher than in other tenures, due to the reliance on electric heating identified throughout this report.

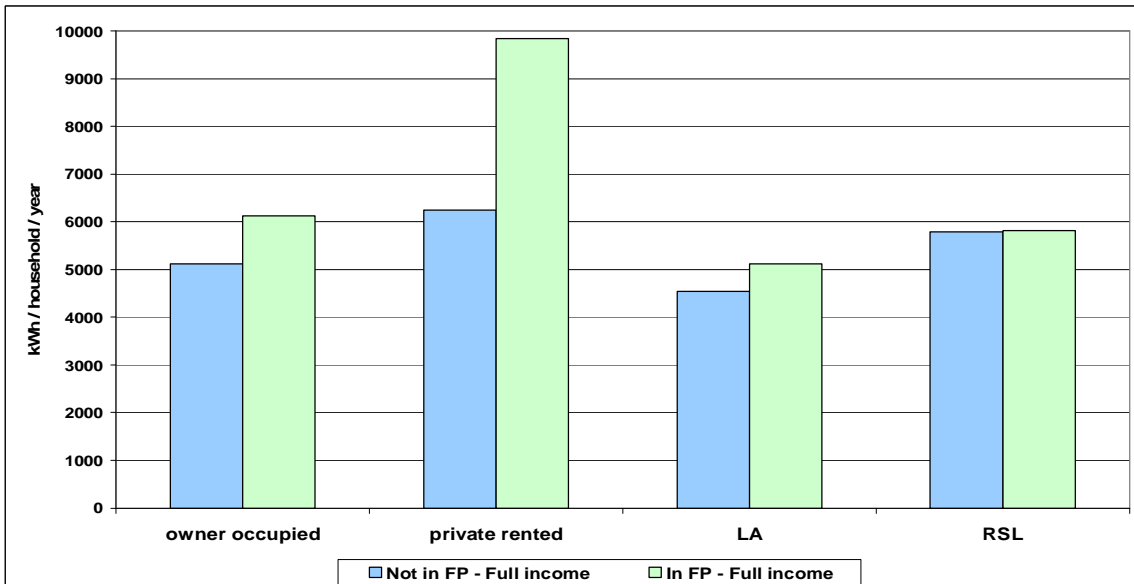


Figure 5.4: Electricity Consumption Categorised by Tenure and Fuel Poverty

6 Fuel Consumption Distributions

6.1 Figure 6.1 shows a distribution of mean combined consumptions with each numbered band representing 2000 kWh. A small number of outliers contributing to less than 1% of the sample have been omitted from the figure to emphasise the distribution of the majority of the sample. These outliers fall in the range 64,000 – 98,000 kWh / household and have been included in all other analyses.

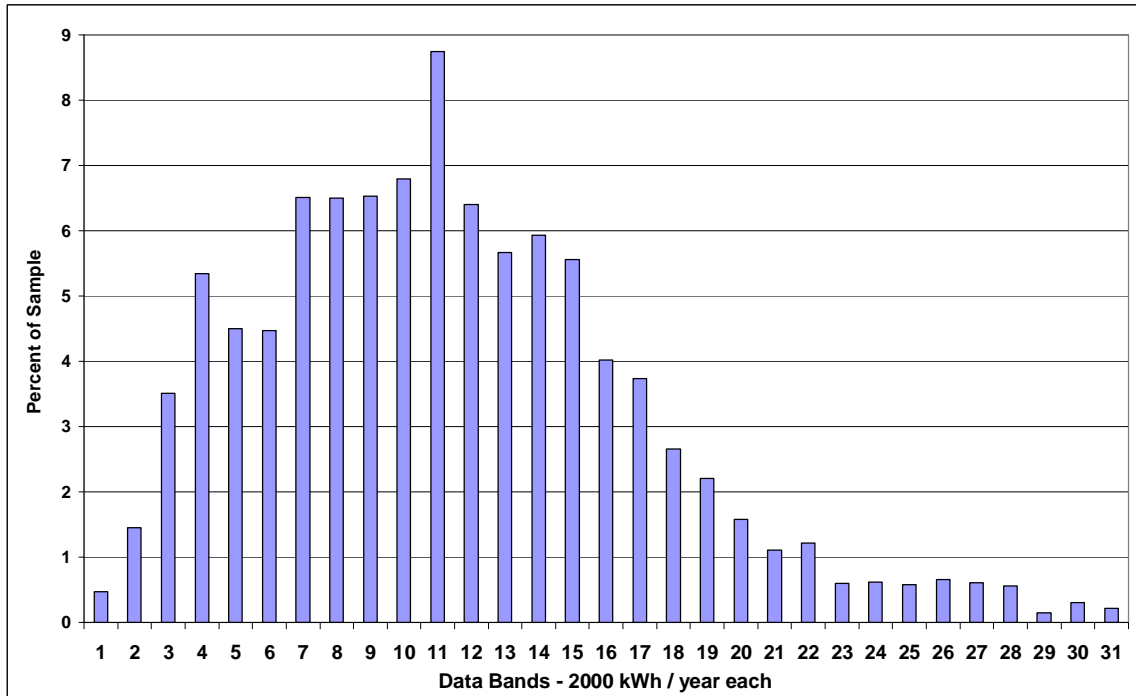


Figure 6.1: Combined Consumption - 2000 kWh / year Bands

The distribution is what may be expected from a sample of metered fuel consumptions, with the majority of cases grouped around the mean value and a tail reaching towards the higher levels of consumption. The highest frequency is in band 11 (20,000 – 22,000 kWh / household) which is roughly consistent with the mean combined consumption of 22,290 kWh / household shown in Table 1.1. The very slight discrepancy is caused by the highest individual consumptions pulling the mean upwards.

6.2 Figures 6.2 and 6.3 split the consumptions into 2000 kWh bands for gas and 1000 kWh bands for electricity respectively, again outliers representing less than 1% of the sample have been omitted.

Fuel Consumption

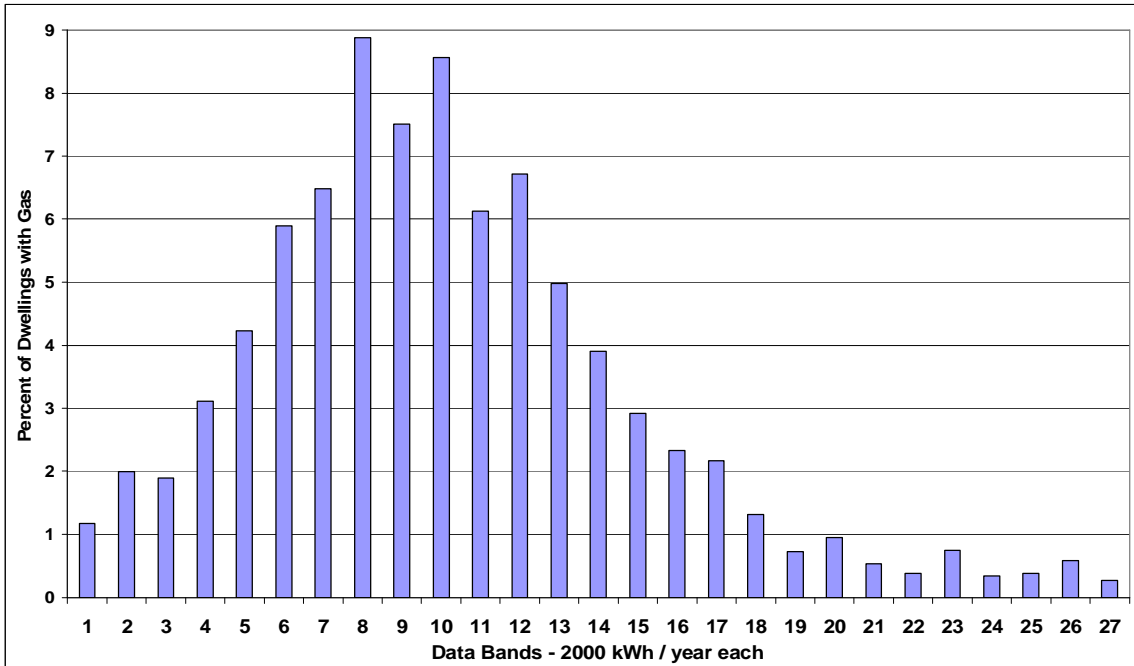


Figure 6.2: Gas Consumption - 2000 kWh / year bands

These follow similar shapes to the combined distribution, with gas consumption frequencies peaking at around the 18,000 – 20,000 kWh / household band and electricity consumption frequencies peaking in the 3,000 – 4,000 kWh / household band. The mean gas consumption of 19,788 kWh is consistent with this chart, whilst the higher electric mean of 5,282 kWh is again caused by dwellings heated predominantly by electricity.

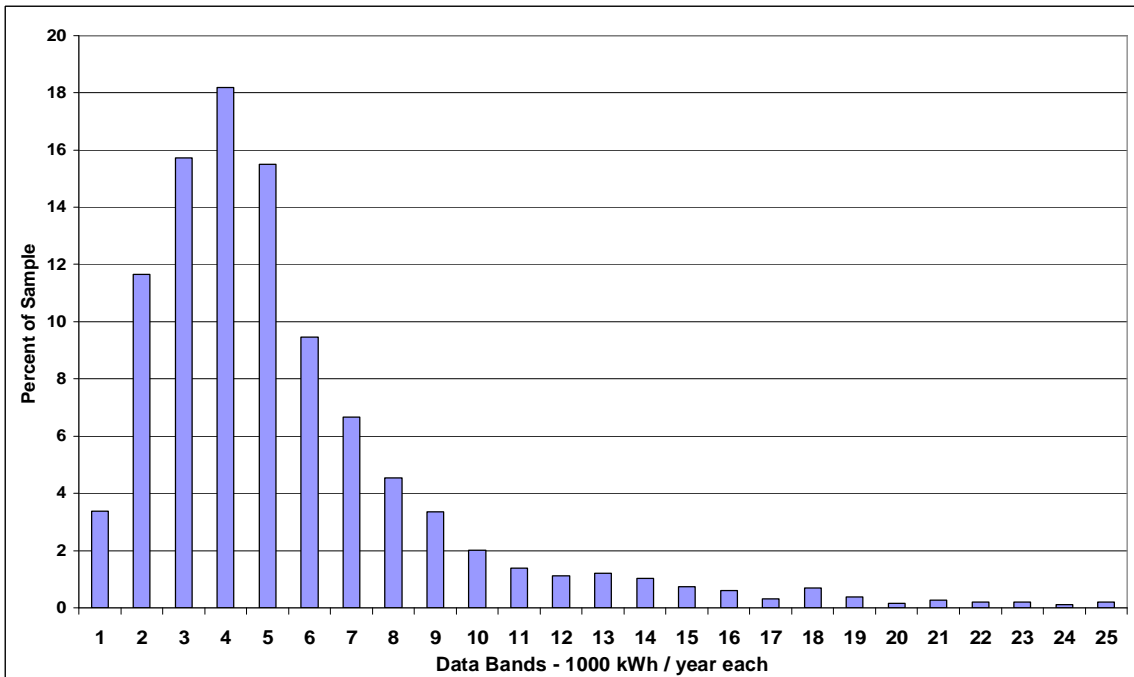


Figure 6.3: Electricity Consumption - 1000 kWh / year Bands

7 Comparison between 1996 and 2001

7.1 Total consumption between 1996 and 2001 for each fuel type compare as shown in table 7.1, where EHCS refers to the English House Condition Survey and DEFF to the Domestic Energy Factfile.

Year	Total PJ			
	1996 EHCS	2001 EHCS	1996 DEFF	2001 DEFF
Total Gas Consumption (PJ)	1,082	1,270	1,353	1,365
Total Electricity Consumption (PJ)	319	390	377	403

Table 7.1: Total Fuel Consumption Comparison for 1996 and 2001 (PJ)

The DEFF figures are taken from the 2003 Domestic Energy Fact File for the UK, figures for England were not available, hence the higher values when compared to the EHCS. Comparing 1996 with 2001, both the EHCS data and the Domestic Energy Factfile data show increases in total consumption for both gas and electricity.

7.2 Figure 7.1 compares mean gas and electric consumptions per household in 1996 and 2001, within each income quintile. The increase in electricity use is demonstrated in each category, whilst gas consumption increased in the 1st – 3rd quintiles and dropped slightly in the 4th and 5th quintiles. This could partly be attributed to benefits such as winter fuel payments, made available to those with lower income, who could then afford to consume more gas in 2001. In the 4th and 5th improved energy efficiency measures will have contributed to the reduction in gas consumption.

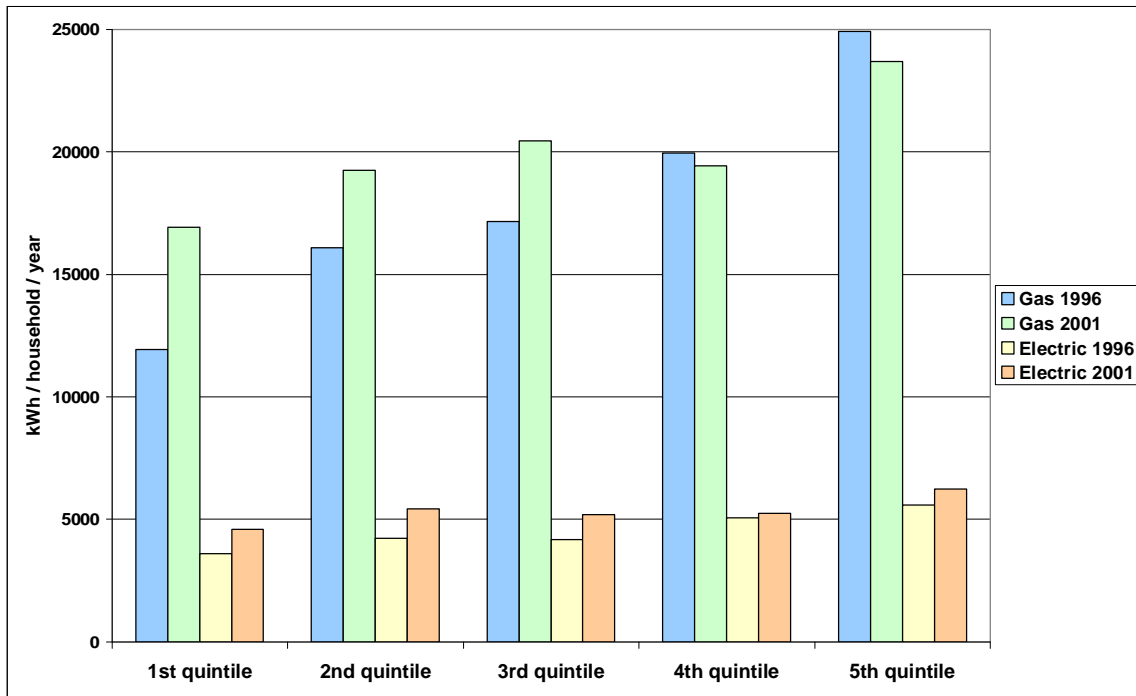


Figure 7.1: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per Household)

7.3 Figure 7.2 combines the same variables as above, but gives the consumption per unit area rather than per household. This has the effect of normalising the data to an extent, particularly in the case of 2001 gas consumption and slightly emphasising the increased electricity consumption.

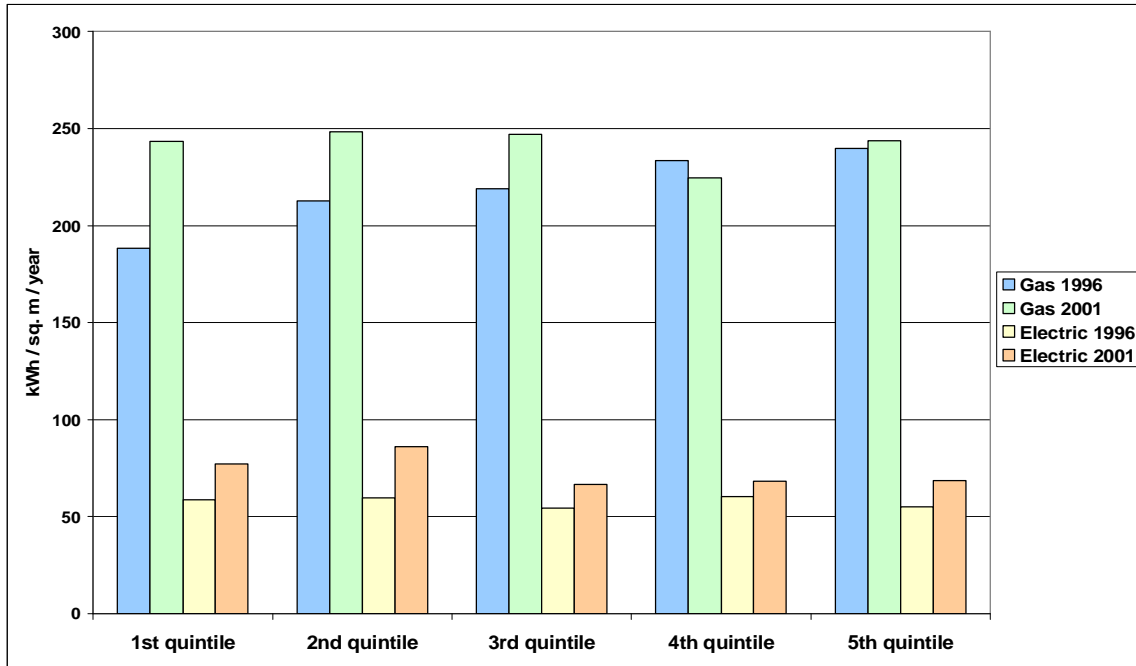


Figure 7.2: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per unit area)

7.4 Figure 7.3 gives a 1996 / 2001 comparison categorised by household type. Again an increase in electricity consumption is seen across the categories. The largest increases in gas can be seen in older couples and older single person households, which again suggest the effects of benefits to help with fuel payments.

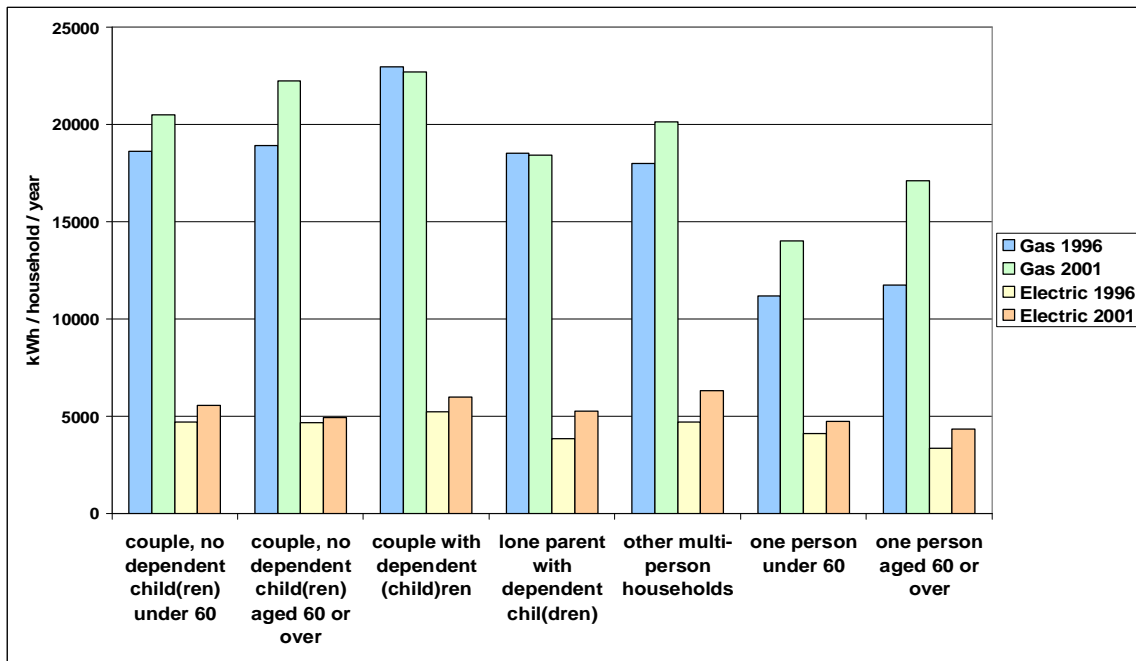


Figure 7.3: Comparison of Gas and Electric Consumptions 1996 - 2001 by Household Type

Appendix A – Notes on the Database

A.1 *Time Period Covered*

The EHCS 2001 survey provided data for the final database from the period May 2001 – April 2002 and the follow up readings were taken in the period March 2003 – May 2003, which gave raw consumption periods of between 373 and 696 days. The consumptions for these periods were normalised for 365 days and climatic variations were also taken into account, using degree day data for the applicable months.

A.2 *Data Validation*

The initial 7,370 cases produced a validated database of 3,211 useable cases. This figure is within the expected range stated in the pilot study, though slightly toward the lower end of that range. The following criteria were used to decide that the consumption figures for a case were invalid:

- Those for which a gas / electric consumption could not be calculated, despite a gas / electric source being identified.*
- Those for which any consumption figure was deemed to be unreliable.*
- Those where the significant fuel source is a fuel other than gas / electricity.*
- Those identified as using more than one electricity tariff but only providing one valid electricity consumption figure.*

Appendix B Index - supporting tables in the following order:

- Table B2.7: Combined Consumption Categorised by Floor Area Quintiles and Tenure
- Table B2.8: Electricity Consumption Categorised by Floor Area and Private Rented split
- Table B3.2: Electricity Consumption Categorised by Household Type and Private Rented split
- Table B3.3: Combined Consumption Categorised by Floor Area and Income Quintiles
- Table B4.2: Combined Consumption Categorised by Floor Area Quintiles and SAP Bands
- Table B4.3: Electricity Consumption Categorised by Floor Area Quintiles and SAP Bands
- Table B4.5: Combined Consumption Categorised by SAP Greater / Less than 50 and Construction Date
- Table B4.6: Electricity Consumption Categorised by SAP Greater / Less than 50 and Construction Date
- Table B5.1: Combined Consumption Categorised by Floor Area Quintiles and Fuel Poverty
- Table B5.2: Combined Consumption Categorised by Tenure and Fuel Poverty
- Table B5.3: Electricity Consumption Categorised by Floor Area Quintiles and Fuel Poverty
- Table B5.4: Electricity Consumption Categorised by Tenure and Fuel Poverty
- Table B7.1: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per Household)
- Table B7.2: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per unit area)
- Table B7.3: Comparison of Gas and Electric Consumptions 1996 - 2001 by Household Type (per Household)

Appendix C Index - tables giving floor quintile ranges in the following order:

- Table C2.7: Ranges of Floor Area Quintiles within each Tenure
- Table C2.8: Ranges of Floor Area Quintiles within Private Rented and Other Tenures
- Table C3.3: Ranges of Floor Area Quintiles within each Income Quintile
- Table C4.2: Ranges of Floor Area Quintiles within each SAP Band
- Table C5.1: Ranges of Floor Area Quintiles for the Fuel Poverty Indicator

Tenure Type	Floor area broken into quintiles					kWh / household
	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Total
Owner occupied	17,494	21,054	23,613	26,423	33,271	24,373
Private rented	13,546	12,135	13,568	21,586	24,088	16,988
LA	13,869	16,604	19,362	21,472	22,893	18,843
RSL	8,816	12,864	17,832	18,671	20,979	15,840
Total	14,314	19,792	22,138	25,499	32,037	22,290

Table B2.7: Combined Consumption Categorised by Floor Area Quintiles and Tenure

Floor area broken into quintiles						kWh / household
Tenure split between Private Rented and Other	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Total
Other Tenure	4,735	4,656	5,207	5,326	5,836	5,152
Private Rented	9,772	6,842	6,115	5,732	4,355	6,581
Total	5,404	4,879	5,127	5,144	6,066	5,282

Table B2.8: Electricity Consumption Categorised by Floor Area and Private Rented split

Tenure split between Private		kWh / household	
Household Type	Other Tenure	Private Rented	Total
Couple under 60, no child(ren)	5,534	5,752	5,556
Couple 60 or over, no child(ren)	4,874	6,581	4,927
Couple with dependent child(ren)	6,028	5,334	5,996
Lone parent with dependent child(ren)	5,167	6,132	5,274
Other multi-person households	5,937	7,512	6,316
One person under 60	3,926	8,322	4,731
One person aged 60 or over	4,359	4,186	4,349
Total	5,152	6,581	5,282

Table B3.2: Electricity Consumption Categorised by Household Type and Private Rented split

Income broken into quintiles	Floor area broken into quintiles					kWh / household
	1st Floor Quintile	2nd Floor Quintile	3rd Floor Quintile	4th Floor Quintile	5th Floor Quintile	Total
1st income quintile	12,701	13,932	18,061	19,653	22,095	17,743
2nd income quintile	13,516	18,324	21,149	24,031	27,202	21,176
3rd income quintile	12,864	21,151	21,743	22,888	28,555	23,272
4th income quintile	15,493	22,159	23,621	24,734	32,975	23,380
5th income quintile	20,644	25,974	26,927	30,554	36,324	28,488
Total	14,314	19,792	22,138	25,499	32,037	22,290

Table B3.3: Combined Consumption Categorized by Floor Area and Income Quintiles

Banded SAP	Floor area broken into quintiles					kWh / household
	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Total
< 20	11,855	9,832	13,950	18,947	18,452	12,194
20 - 30	13,120	9,564	13,263	21,413	24,331	18,269
30 - 40	13,909	19,730	22,297	32,334	34,720	23,743
40 - 50	16,211	22,807	22,968	27,522	34,094	21,620
50 - 60	15,492	22,328	24,020	24,583	30,392	20,015
60 - 70	14,943	18,359	20,472	22,002	27,571	17,669
> 70	14,658	15,113	16,500	19,729	26,070	15,128
Total	13,938	17,489	18,654	21,278	27,099	19,788

Table B4.2: Combined Consumption Categorised by Floor Area Quintiles and SAP Bands

Banded SAP	Floor area broken into quintiles					kWh / household
	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Total
< 20	7,899	6,940	11,731	13,071	13,443	10,666
20 - 30	11,195	8,388	7,943	9,505	7,660	8,891
30 - 40	7,950	5,608	5,694	6,488	5,645	6,278
40 - 50	4,063	5,573	4,545	4,727	5,554	4,897
50 - 60	4,476	4,477	4,668	4,460	5,930	4,802
60 - 70	4,809	4,099	3,853	4,005	5,044	4,361
> 70	3,344	4,167	3,766	4,101	4,739	4,026
Total	5,404	4,879	5,127	5,144	6,066	5,282

Table B4.3: Electricity Consumption Categorised by Floor Area Quintiles and SAP Bands

SAP split either side of 50 kWh / household			
Construction Date	SAP <= 50	SAP > 50	Total
Pre 1919	25,524	25,377	25,475
1919-1944	26,601	23,769	25,589
1945-1964	22,407	22,551	22,471
1965-1980	18,775	21,404	20,457
Post 1980	10,511	19,746	18,634
Total	22,937	21,751	22,290

Table B4.5: Combined Consumption Categorised by SAP Greater / Less than 50 and Construction Date

Construction Date	SAP split either side of 50		kWh / household
	SAP <= 50	SAP > 50	
Pre 1919	6,142	4,447	5,577
1919-1944	5,094	4,362	4,832
1945-1964	6,423	4,193	5,427
1965-1980	6,718	4,673	5,409
Post 1980	7,933	4,719	5,106
Total	6,165	4,544	5,282

Table B4.6: Electricity Consumption Categorised by SAP Greater / Less than 50 and Construction Date

Floor area broken into quintiles	Fuel Poverty		kWh / household Total
	Not in FP - Full income	In FP - Full income	
1st quintile	14,087	12,808	14,314
2nd quintile	19,885	15,119	19,792
3rd quintile	22,343	20,158	22,138
4th quintile	24,827	20,186	25,499
5th quintile	31,635	27,972	32,037
Total	22,555	19,252	22,290

Table B5.1: Combined Consumption Categorised by Floor Area Quintiles and Fuel Poverty

Tenure	Fuel Poverty		kWh / household
	Not in FP - Full income	In FP - Full income	
owner occupied	24,668	20,795	24,373
private rented	16,905	17,783	16,988
LA	19,177	15,974	18,843
RSL	15,942	14,039	15,840
Total	22,555	19,252	22,290

Table B5.2: Combined Consumption Categorised by Tenure and Fuel Poverty

Floor area broken into quintiles	Fuel Poverty		kWh / household Total
	Not in FP - Full income	In FP - Full income	
1st quintile	5,272	7,089	5,404
2nd quintile	4,653	6,395	4,879
3rd quintile	5,170	5,826	5,127
4th quintile	5,078	6,448	5,144
5th quintile	5,784	5,839	6,066
Total	5,191	6,318	5,282

Table B5.3: Electricity Consumption Categorised by Floor Area Quintiles and Fuel Poverty

Tenure	Fuel Poverty		kWh / household
	Not in FP - Full income	In FP - Full income	
owner occupied	5,120	6,126	5,197
private rented	6,244	9,835	6,581
LA	4,541	5,119	4,601
RSL	5,791	5,817	5,792
Total	5,191	6,318	5,282

Table B5.4: Electricity Consumption Categorised by Tenure and Fuel Poverty

kWh / household				
Income broken into quintiles	1996 - Gas	2001 - Gas	1996 - Electric	2001 - Electric
1st quintile	11,930	16,912	3,600	4,594
2nd quintile	16,090	19,243	4,220	5,436
3rd quintile	17,150	20,440	4,170	5,187
4th quintile	19,960	19,421	5,070	5,245
5th quintile	24,930	23,701	5,590	6,254

Table B7.1: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per Household)

kWh / m²

Income broken into quintiles	1996 - Gas	2001 - Gas	1996 - Electric	2001 - Electric
1st quintile	188	243	59	77
2nd quintile	213	248	60	86
3rd quintile	219	247	54	67
4th quintile	233	225	60	68
5th quintile	240	244	55	69

Table B7.2: Comparison of Gas and Electric Consumptions 1996 - 2001 by Income Quintiles (per unit area)

Household type	kWh / household			
	1996 - Gas	2001 - Gas	1996 - Electric	2001 - Electric
Couple under 60, no child(ren)	18,620	20,504	4,690	5,556
Couple 60 or over, no child(ren)	18,910	22,224	4,680	4,927
Couple with dependent child(ren)	22,950	22,708	5,240	5,996
Lone parent with dependent child(ren)	18,530	18,416	3,860	5,274
Other multi-person households	17,990	20,148	4,700	6,316
One person under 60	11,200	14,028	4,120	4,731
One person aged 60 or over	11,740	17,102	3,370	4,349

Table B7.3: Comparison of Gas and Electric Consumptions 1996 - 2001 by Household Type (per Household)

Tenure Type	Floor area broken into quintiles	Dwellings (000s)	Minimum (m ²)	Maximum (m ²)
Owner occupied	1st quintile	2837	22	63
	2nd quintile	2860	63	76
	3rd quintile	2846	76	89
	4th quintile	2840	89	110
	5th quintile	2848	110	427
Private rented	1st quintile	378	27	40
	2nd quintile	392	41	58
	3rd quintile	344	58	66
	4th quintile	377	67	81
	5th quintile	373	82	231
LA	1st quintile	582	21	50
	2nd quintile	578	50	62
	3rd quintile	583	62	73
	4th quintile	581	73	83
	5th quintile	582	83	267
RSL	1st quintile	302	15	45
	2nd quintile	300	45	55
	3rd quintile	305	55	69
	4th quintile	299	69	83
	5th quintile	303	83	288

Table C2.7: Ranges of Floor Area Quintiles within each Tenure

Tenure split between Private Rented and Other	Floor area broken into quintiles	Dwellings (000s)	Minimum (m ²)	Maximum (m ²)
Other Tenure	1st quintile	3731	15	59
	2nd quintile	3732	59	72
	3rd quintile	3726	72	85
	4th quintile	3721	85	103
	5th quintile	3735	103	427
Private Rented	1st quintile	378	27	40
	2nd quintile	392	41	58
	3rd quintile	344	58	66
	4th quintile	377	67	81
	5th quintile	373	82	231

Table C2.8: Ranges of Floor Area Quintiles within Private Rented and Other Tenures

Income broken into quintiles	Floor area broken into quintiles	Dwellings (000s)	Minimum (m ²)	Maximum (m ²)
smallest quintile	1st quintile	820	15	48
	2nd quintile	817	48	59
	3rd quintile	816	60	71
	4th quintile	819	71	84
	5th quintile	819	84	287
next smallest quintile	1st quintile	826	21	57
	2nd quintile	824	57	68
	3rd quintile	807	68	79
	4th quintile	834	79	94
	5th quintile	823	94	288
middle quintile	1st quintile	832	22	57
	2nd quintile	809	58	69
	3rd quintile	814	69	80
	4th quintile	823	80	100
	5th quintile	821	100	271
next largest quintile	1st quintile	824	22	61
	2nd quintile	819	61	75
	3rd quintile	831	75	86
	4th quintile	808	87	102
	5th quintile	827	103	427
largest quintile	1st quintile	826	35	71
	2nd quintile	810	72	87
	3rd quintile	821	87	101
	4th quintile	812	102	130
	5th quintile	828	130	407

Table C3.3: Ranges of Floor Area Quintiles within each Income Quintile

Banded SAP	Floor area broken into quintiles	Dwellings (000s)	Minimum (m ²)	Maximum (m ²)
< 20	1st quintile	167	22	49
	2nd quintile	168	49	63
	3rd quintile	187	63	73
	4th quintile	168	73	88
	5th quintile	175	89	199
20 - 30	1st quintile	178	29	50
	2nd quintile	184	50	60
	3rd quintile	190	61	72
	4th quintile	165	72	87
	5th quintile	194	88	258
30 - 40	1st quintile	466	15	58
	2nd quintile	468	58	72
	3rd quintile	460	72	87
	4th quintile	467	87	121
	5th quintile	465	122	271
40 - 50	1st quintile	1035	27	64
	2nd quintile	1067	65	75
	3rd quintile	1048	75	85
	4th quintile	1038	85	103
	5th quintile	1044	103	359
50 - 60	1st quintile	1179	22	59
	2nd quintile	1177	59	72
	3rd quintile	1186	72	83
	4th quintile	1177	83	102
	5th quintile	1178	102	427
60 - 70	1st quintile	726	21	55
	2nd quintile	724	55	68
	3rd quintile	736	68	82
	4th quintile	714	82	98
	5th quintile	721	98	250
> 70	1st quintile	331	24	53
	2nd quintile	342	53	63
	3rd quintile	321	63	79
	4th quintile	334	79	102
	5th quintile	332	103	288

Table C4.2: Ranges of Floor Area Quintiles within each SAP Band

Fuel Poverty	Floor area broken into quintiles	Dwellings (000s)	Minimum (m ²)	Maximum (m ²)
Not in FP - Full income	1st quintile	3772	21	57
	2nd quintile	3771	58	70
	3rd quintile	3775	70	83
	4th quintile	3775	83	101
	5th quintile	3772	101	427
In FP - Full income	1st quintile	327	15	63
	2nd quintile	326	63	73
	3rd quintile	333	73	86
	4th quintile	332	86	112
	5th quintile	327	112	288

Table C5.1: Ranges of Floor Area Quintiles for the Fuel Poverty Indicator