



Department
of Energy &
Climate Change

Annual Report on Fuel Poverty Statistics 2013

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Executive Summary

Note on the Low Income High Costs indicator used in this publication

Last year, the Government published a consultation document setting out its proposals to adopt an alternative fuel poverty measure based on the Low Income High Costs (LIHC) indicator that was recommended by Professor Hills in his independent review.¹ The Government is currently considering the responses to this consultation and hopes shortly to be able to issue a formal response. As such, the LIHC statistics that are presented in this document are based on the indicator that was proposed in last year's consultation document. We intend to update the analysis after the consultation response is published. An exact date for this will be publicised on the statistics release schedule on the DECC website.

Fuel poverty definition

At the Spending Review in October 2010, the government announced that it would commission an independent review to consider the current fuel poverty target and definition. In March 2012 Professor Hills published the final report of his independent review of fuel poverty, making several recommendations for how fuel poverty should be measured. Professor Hills proposed a new measure: the Low Income High Cost (LIHC) indicator. This report covers both the 10 per cent indicator and Hill's low income high cost measure of fuel poverty.

The report covers:

- the latest statistics on the number of households living in fuel poverty, in England and the United Kingdom;
- analysis of the composition of the fuel poor group in 2011;
- reasons for changes in the number of households in fuel poverty;
- estimates of sub-regional fuel poverty.

Under the 10 per cent definition, a household is said to be fuel poor if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth².

Although the emphasis in the definition is on heating the home, modelled fuel costs in the definition of fuel poverty also include spending on heating water, lights and appliance usage and cooking costs. The Fuel Poverty Ratio is defined as:

$$\text{Fuel poverty ratio} = \frac{\text{Modelled fuel costs (i.e. modelled consumption x price)}}{\text{Income}}$$

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66570/6406-fuel-poverty-changing-the-framework-for-measureme.pdf

² The adequate standard of warmth is usually defined as 21 degrees for the main living area, and 18 degrees for other occupied rooms.

If this ratio is greater than 0.1 then the household is Fuel Poor.

Under the **Low Income High Cost** definition a household is considered to be fuel poor where:

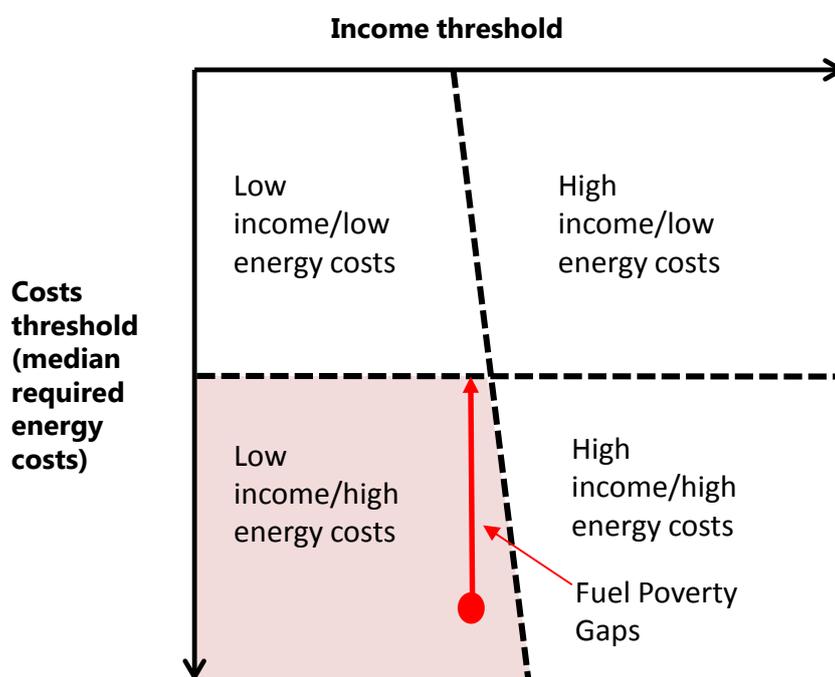
- They have required fuel costs that are above average (the national median level)
- Were they to spend that amount, they would be left with a residual income below the official poverty line.

The low income high cost measure consists of two parts:

The **number** of households that have both low incomes and high fuel costs (the bottom left quadrant in the diagram below).

The **depth** of fuel poverty amongst these households. This is measured in terms of a fuel poverty gap, which represents the difference between the modelled fuel bill for each household, and the reasonable cost threshold for the household. This is summed for all households that have both low income and high costs to give an aggregate fuel poverty gap.

Fuel Poverty under the Low Income High Costs (LIHC) measure



The 10 per cent measure of fuel poverty

In 2011 there were 4.5 million households in the UK in fuel poverty, down by 0.25 million from 2010. In England there were 3.2 million fuel poor households, 0.3 million lower than in 2010.

The Low Income High Cost measure of fuel poverty

Under the low income high cost measure, 2.6 million households were fuel poor in England in 2011³, a decrease of 0.1 million from 2010.

The 10 per cent indicator shows a larger drop in the number of fuel poor households, than the low income high costs measure. This is mainly because the 10 per cent measure is absolute, whereas the LIHC is relative. As such for the low income high cost headcount measure to change substantially, the incomes and energy efficiency of the homes of those in the bottom left quadrant (in the diagram) would need to improve by a relatively larger amount than the households in the other quadrants.

The decrease in fuel poverty in England between 2010 and 2011 was the result of a rise in income, and a reduction in energy use, through improvements in the energy efficiency of housing. These two things combined to offset the price increases seen in 2011. The impact of these three factors varies according to the measure as discussed in Chapter 3.

The aggregate fuel poverty gap however, increased in real terms from 2010 by £22 million to £1.15 billion, and the average gap increased by £26 to £448, largely reflecting the increase in energy prices. A detailed explanation of the reasons for change between 2010 and 2011 is available in Chapter 3.

Developments and future work

The statistics report contains a wealth of information that will help inform the development of key DECC policies. It helps to develop understanding and target policies towards those most likely to be fuel poor, or those most at risk of falling into fuel poverty.

Since the last publication we have continued our analysis of how households actually consume energy (gas and electricity). We are also starting to analyse results from the Energy Follow Up Survey, which have implications for the fuel poverty methodology. We anticipate consulting on improvements to the detailed methodology with key stakeholders towards the end of 2013.

³ The low income high cost measure is only available for England.

Introduction

1.1 What is fuel poverty?

Fuel poverty is defined and measured in two ways in this report. The original 10 per cent measure of fuel poverty is used, along with the low income high costs measure proposed by Professor Hills in his Independent Review of fuel poverty published in March 2012:

<https://www.gov.uk/government/publications/final-report-of-the-fuel-poverty-review>

The 10 per cent measure

A household is said to be fuel poor if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth. The adequate standard of warmth is usually defined as 21 degrees for the main living area, and 18 degrees for other occupied rooms. Fuel poverty is therefore based on modelled spending on energy, rather than actual spending.

$$\text{Fuel poverty ratio} = \frac{\text{Modelled fuel costs (i.e. modelled consumption x price)}}{\text{Income}}$$

If this ratio is greater than 0.1 then the household is fuel poor.

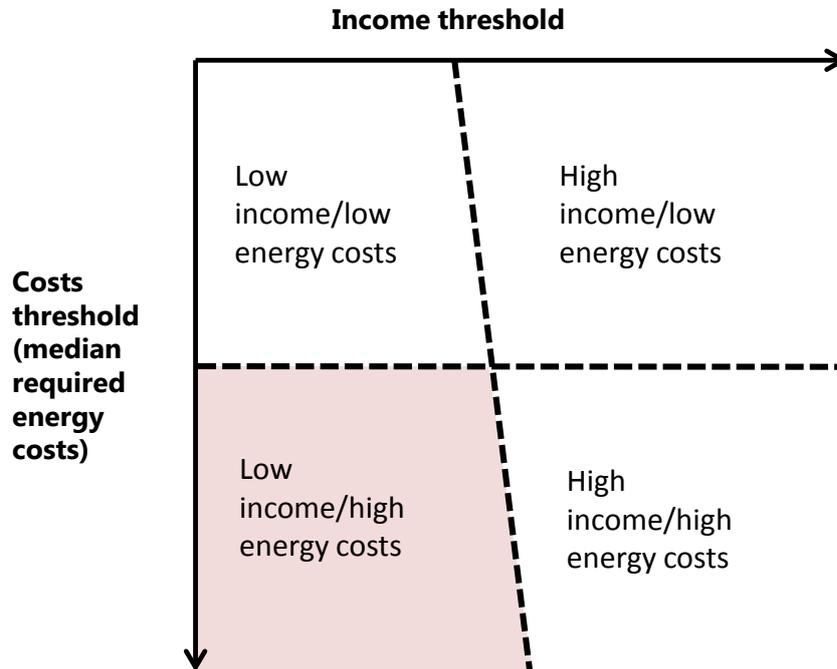
The Low Income High Cost measure

Professor Hills' Review recognised that fuel poverty was a distinct issue but found that there were some fundamental flaws with the existing measure, based on whether a household would need to spend more than 10 per cent of its income to maintain an 'adequate' standard of warmth. He proposed an alternative indicator: the Low Income High Cost (LIHC) indicator, which Hills argued offers a more accurate measure of the problem of fuel poverty. Under this definition a household is considered to be fuel poor where:

- They have required fuel costs that are above average (the national median level)
- Were they to spend that amount, they would be left with a residual income below the official poverty line

Chart 1.1 shows the four quadrants of the LIHC measure. Those defined as fuel poor are in the bottom left quadrant. This quadrant includes some households who might not usually be considered to be poor under standard poverty definitions, but are pushed into fuel poverty by their very high energy requirements (giving the slope to the income threshold). While it is recognised that those households in the top left quadrant have low incomes, they also have relatively low fuel costs, and so are not considered fuel poor. Those to the right of the income threshold have high incomes, with those in the top right box being those households with high incomes and low costs, and those in the bottom right being households with high income and high costs.

Chart 1.1: Fuel Poverty under the Low Income High Costs (LIHC) measure



The depth of fuel poverty is also defined for households with low incomes and high costs (Chart 1.2). This is measured as the difference between a household's required fuel costs and what these costs would need to be for them not to be in fuel poverty. This is referred to as the fuel poverty gap, and gives an indication of the severity of the problem for different households. The gap for each household can then be summed to produce an aggregate fuel poverty gap, which gives an understanding of the scale of the national problem.

Chart 1.2: The Fuel Poverty Gap

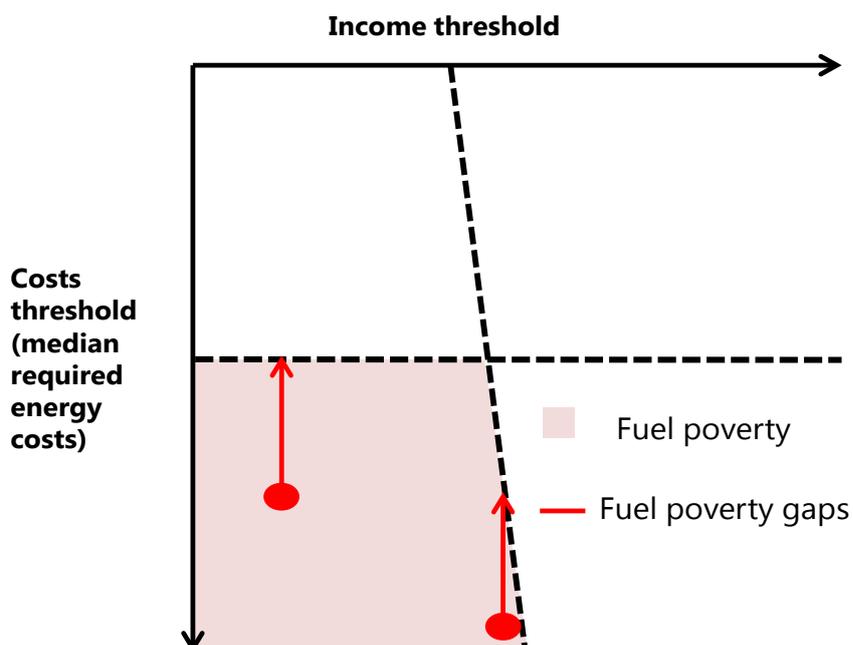


Table 1.1 below shows the number of fuel poor households in England back to 1996 under both measures, and Chart 1.3 is a graph of the change in fuel poverty over time, covering all three measures.

Table 1.1 – Number of fuel poor households (thousands) in England, under the 10 per cent and Low Income High Costs measures

England	10 Per cent (000s)	Low Income High Costs (000s)	Fuel Poverty Gap £m (2011 prices)
1996	5,100	2,810	1,061
2003	1,222	2,613	660
2004	1,236	2,652	704
2005	1,529	2,564	819
2006	2,432	2,423	966
2007	2,823	2,522	999
2008	3,335	2,629	1,051
2009	3,964	2,697	1,173
2010	3,536	2,675	1,130
2011	3,202	2,570	1,152

4

Chart 1.3 – the 10 per cent, Low Income High Cost headcount and Fuel Poverty Gap measures of fuel poverty, England 1996-2011



⁴ The LIHC figures for 2008 to 2010 are slightly different to those published in the Hills Review. This is due to two factors: a) people living in halls of residence have now been excluded from the calculation of the total number of people in the household b) previously, in some instances, rent included specified services such as water, sewerage, meals and heating. Where possible from 2008, these have now been excluded to ensure all housing costs are treated the same.

1.2 Understanding changes in fuel poverty

Under the 10 per cent measure, increasing household income helps to reduce the fuel poverty ratio and therefore potentially remove households from fuel poverty, i.e. their fuel poverty ratio falls to or below 0.1. Reducing income has the opposite effect, i.e. the fuel poverty ratio increases, potentially pushing households into fuel poverty.

Decreasing fuel prices and/or improvements made to the energy efficiency of the home can also reduce the fuel poverty ratio, while rising prices will have the opposite effect. It is rare for a dwelling to become “less efficient”, but an increase in consumption can occur if the householders change their routine (for example spend longer at home) or the household composition changes (e.g. the householders have children), etc.

As the low income high cost headcount indicator is a relative measure, it provides a much steadier trend in the number of fuel poor households over time than the 10 per cent measure. Whereas an increase in income is likely to reduce the extent of fuel poverty under 10 per cent, under the low income high cost measure, a change in income will only have an impact on fuel poverty if households with low incomes and high costs see relatively larger income changes (increases or decreases) than the overall average change in income.

The 10 per cent measure tends to be very responsive to changes in prices, such that these usually dominate the measure, outweighing other factors such as income and energy efficiency. Under the LIHC measure, the fuel poverty gap is the thing that is more responsive to prices, as evidenced by an increase between 2004 and 2011 when prices rose substantially.

The limited effect of rising prices on the number of households in fuel poverty under the LIHC measure is largely due to the relative nature of the measure. Because households are measured by the proportion by which their bills are greater or less than average, when prices rise equally across all households, these proportions do not change. For example, if prices were to rise by 10 per cent for all households, then a household that previously had costs that were five per cent above the median costs will still have costs that are five per cent higher than the median, assuming all other factors stay the same. As a result, the fuel poverty status of the household is unlikely to change, unless the extra costs of fuel bring their income below the threshold.

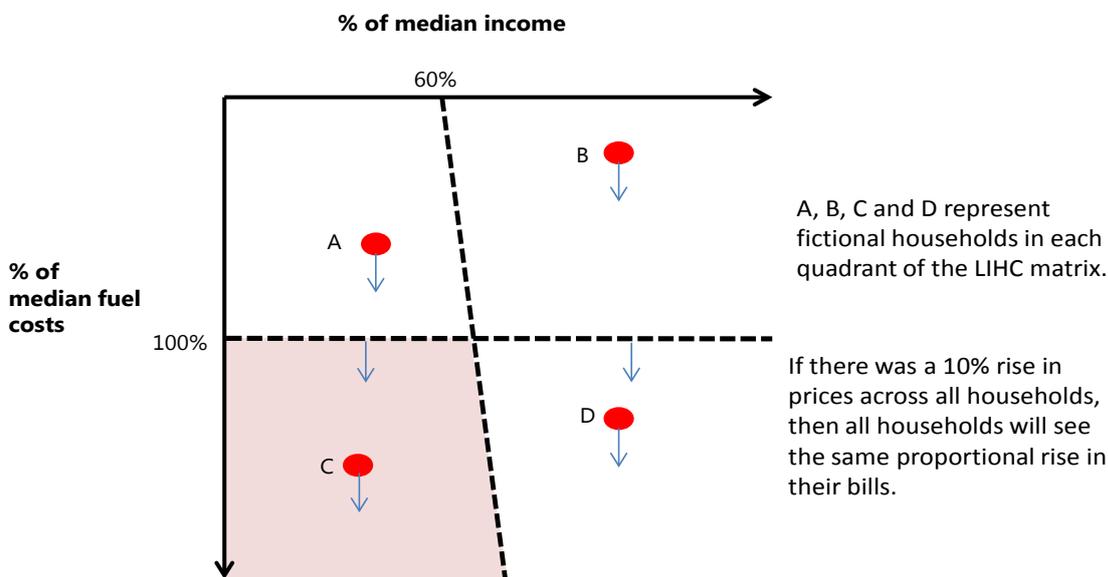
The fuel poverty gap, on the other hand, is measured in pounds rather than proportions. Therefore under the example above, a 10 per cent rise in prices for all households will mean a greater increase, in pounds, of the bill of households above the median bill than for those at the median level. If the median bill, for example, were £1,000, then an increase of 10 per cent would mean this changed to £1,100. However, for a household with a bill of £1,500, their bill would now be £1,650. Their fuel poverty gap has therefore increased from £500 to £550.

This means that the gap calculation is even more closely linked to prices than the 10 per cent measure (as increased income has only a marginal impact on the gap, but would remove some households from FP under 10%). This mainly explains the deviation in 2011, as the gap rises with prices but the 10 per cent headcount measure goes down (shown in Chart 1.3).

Chart 1.4 and 1.5 highlight the different responses of the fuel poverty low income high cost headcount measure and gap under a scenario where prices rise by ten per cent. Under the headcount measure, the bills of all households should increase by the same amount in proportional terms. Under the fuel poverty gap measure, households with larger bills will see

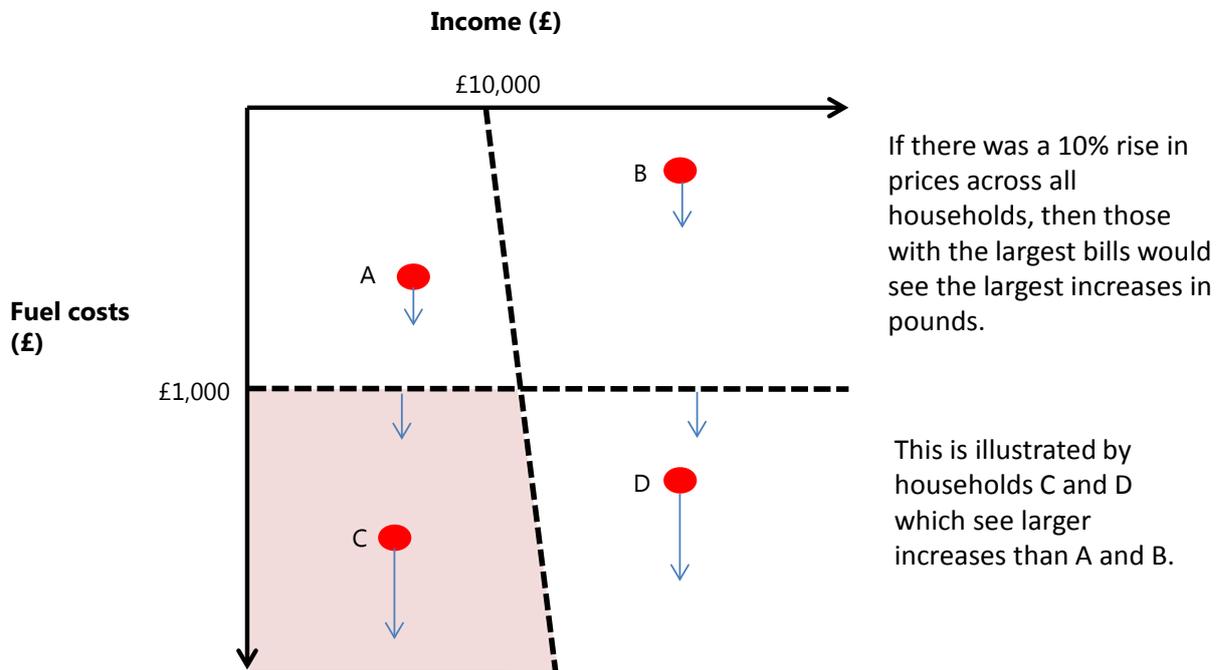
greater increases in their bills (and thus fuel poverty gaps for those in the LIHC quadrant) in monetary terms.

Chart 1.4 – The LIHC headcount measure under a scenario where prices rise by ten per cent.



In this example (where there is no change in energy consumption or income), households whose fuel costs are below the median (e.g. households A and B) will see their bills increase by less, in pounds, than the median. As a result, these increases can never take them over the threshold into fuel poverty, as the median bill will always increase by more than their bill. However, households with fuel costs above the median (e.g. households C and D) will see a bigger increase in their bill, in pounds, than the median. These households will therefore spend increasingly more than the median bill, such that the difference between their bill and the median bill will widen. Consequently, there will be no change in the number of households in fuel poverty, but households already in fuel poverty will move further into fuel poverty. The gap, which represents the difference between their bills and the median bills, will therefore increase.

Chart 1.5– The LIHC fuel poverty gap measure under a scenario where prices rise by ten per cent



1.3 Measuring Fuel Poverty

The key elements in determining whether a household is fuel poor or not are:

- Income
- Fuel prices
- Fuel consumption (which is dependent on the dwelling characteristics and the lifestyle of the household)

Incomes and fuel bills are calculated in slightly different ways in the two measures.

Incomes

Under the 10 per cent indicator incomes are calculated on a before housing costs basis, and are unequivalised.

For the low income high cost measure, incomes are calculated after housing costs. This is to reflect the fact that money spent on housing costs cannot be spent on fuel. Therefore mortgage and rent payments are deducted from the full income of each household to give an after housing costs measure of income. Once housing costs have been deducted, incomes are also equivalised, to reflect the fact that different types of households have different spending requirements. For example, a single person on a given income will usually have more disposable income than a family of four on the same income.

The equivalisation factors used are the same as in the DWP Households Below Average Income (HBAI) statistics. These were devised by the Organisation for Economic Co-operation and Development (OECD), and are widely used across Europe, including by Eurostat.

Fuel Bills

Both measures use modelled fuel bills. It is necessary to model fuel bills, as this allows energy consumption to be controlled to ensure the household maintains an adequate standard of warmth. In reality, many households actually under-heat their home, relative to the recommended adequate standard of warmth.

For the low income high costs measure, fuel bills are also equivalised. They are equivalised by household composition, to reflect the fact that different types and sizes of households will have different required spend on fuel. For example, a single person will need to spend less on fuel than a family of four living in the same home.

Fuel Consumption

Although the emphasis is on fuel for heating the home, fuel costs in the definition of fuel poverty also include spending on heating water, lights and appliance usage and cooking costs. In calculating fuel consumption, the fuel costs are modelled dependent on the following factors:

- The economic circumstances of people that live in the home (for example, if they are unemployed and at home for longer periods of the day),
- the heating system and the fuels used, and
- the dwelling characteristics.

The fuel poverty modelling of heating requirements takes into account long-term regional variations in climate. However, it does not reflect shorter periods of annual temperature variations. So if there is a particularly cold winter, in which households heated their homes for longer periods, this would not be reflected in the fuel poverty methodology. This is covered further in section 3.7.

The 2010 data was the first to include the impact of social tariffs and rebates over the full two year dataset. The 2011 data also includes the impact of Warm Home Discount⁵ (for the single 2011 year data). More information is available on the impact of this scheme in Chapter 3.

More detailed information and explanations of how consumption, prices and income are measured is included in the updated comprehensive Methodology Handbook, published at:

http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx

For a more detailed description of how to calculate fuel poverty under the low income, high costs measure see Annex C.

1.4 Fuel poverty in the devolved administrations

Fuel Poverty is a partially devolved issue, with each separate administration having their own targets. The main reason for this is that the devolved administrations have the power to affect

⁵ Warm Homes Discount was launched in April 2011. Energy suppliers are mandated to provide support, in the form of discounts and rebates, to fuel poor customers. For more information see: <http://www.ofgem.gov.uk/Sustainability/Environment/WHDS/Pages/WHDS.aspx>

certain aspects of fuel poverty policies (for example energy efficiency programs) but not others (e.g. incomes and energy market conditions, which impact on fuel prices).

The devolved administrations continue to measure fuel poverty using a method similar to the 10 per cent indicator of fuel poverty.

England

In England, fuel poverty (under both definitions) is modelled using the data from the English Housing Survey (EHS). More information on the EHS is available in Section 1.5.

Scotland

In Scotland, the Scottish House Condition Survey (SHCS) is used to model fuel poverty. The main differences⁶ in the Scottish definition compared to the English 10 per cent definition are:

- the more stringent interpretation of a satisfactory heating regime for pensioners, long-term sick and disabled households. This essentially means that these groups are assumed to require a higher temperature to reach an adequate standard of warmth in their homes.
- the different approach to under-occupancy with regard to heating regimes.

Scotland publishes its own report on their national level of fuel poverty. The latest report was published in December 2012 and relates to fuel poverty in 2011. The report is available at:

<http://www.scotland.gov.uk/Publications/2012/12/4995/0>

The Scottish Government also publishes fuel poverty figures at a local authority level, which are available at:

<http://www.scotland.gov.uk/Topics/Statistics/SHCS/LA0810>

These data were published in October 2012 and relate to fuel poverty in 2009, 2010 and 2011 combined.

Wales

The Living in Wales Survey is used to calculate fuel poverty figures for Wales.

The Welsh Assembly published fuel poverty projections in April 2013, based on the 10 per cent and low income high cost definition. The aim was to show the changes in fuel poverty since the 2008 survey. The report is available at:

<http://wales.gov.uk/about/aboutresearch/social/latestresearch/wales-fuel-poverty-projection-tool/>

Northern Ireland

The Northern Ireland House Condition Survey is used to calculate the Northern Ireland fuel poverty levels.

⁶ A summary of differences in the fuel poverty methodology in each country has been published by the Scottish Government and can be found here: <http://www.scotland.gov.uk/Topics/Statistics/SHCS/UKfuelpoverty>

The latest statistics, which were published in 2013 and relate to 2011, are available at:

http://www.nihe.gov.uk/index/corporate/housing_research/house_condition_survey.htm

Chapter 2 presents estimated levels of fuel poverty in the UK by combining the latest estimates and projections for each country.

1.5 The English Housing Survey (EHS)

The EHS is a national survey of housing in England, commissioned by the Department of Communities and Local Government (DCLG). It covers all tenures (i.e. private and social housing) and involves a physical inspection of properties by professional surveyors. The information obtained through the survey provides an accurate picture of the type and condition of housing in England (including its energy efficiency), the people living there, and their views on housing and their neighbourhoods.

The two most important components of the EHS for fuel poverty are:

- The survey of the physical condition and features of the dwelling
- The interview survey with the householders living in the dwelling.

The interview survey is conducted with all households in the sample and, in 2010, this equated to around 17,000 households. Of these, a subsample of around 8,000 properties were selected for the physical survey, which involves a physical inspection by qualified surveyors. In 2011, sample sizes were reduced by between a fifth and a quarter, to around 13,300 interview surveys and 6,200 physical surveys.

From this information, a detailed picture of the energy requirement can be modelled.

For more information on the EHS generally, see:

<https://www.gov.uk/government/organisations/department-for-communities-and-local-government/series/english-housing-survey>

DCLG published the headline EHS results on 22nd February 2013. The report is available for download on the DCLG website at:

<https://www.gov.uk/government/publications/english-housing-survey-2011-to-2012-headline-report>

Full data relating to 2011/12 will be published in the summer by DCLG.

The fuel poverty data are used widely throughout Government to help develop and target policies towards those most likely to be fuel poor, or those most at risk of falling into fuel poverty. Although it is impossible to identify actual individual households experiencing fuel poverty, the data can point to groups that are most likely to be at risk. Since the EHS data (used to model fuel poverty) include comprehensive information on the home each household

occupies and the people that live there, the data can also provide insight into the living conditions, the energy efficiency and features of different types of household.

1.6 Developments since the last publication

Last year, the Government published a consultation document setting out its proposals to adopt an alternative fuel poverty measure based on the Low Income High Costs (LIHC) indicator that was recommended by Professor Hills in his independent review. The Government is currently considering the responses to this consultation and hopes shortly to be able to issue a formal response. As a consequence this report is shorter than previous reports and covers the 10 per cent indicator and the Hills measure of fuel poverty. We intend to update the analysis after the consultation response is published. An exact date for this will be publicised on the statistics release schedule on the DECC website.

Sub-regional estimates of fuel poverty are provided for the 10 per cent measure of fuel poverty (see Chapter 6). Further work is in progress to produce sub-regional estimates on a low income high cost basis, and these will be published alongside the additional report above. In addition, work has been done to improve the modelling of sub-regional fuel poverty and provide users with confidence intervals around small area estimates. It is anticipated this will also be published later in 2013.

This current sub-regional data is available on the DECC website:

<https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/fuel-poverty-sub-regional-statistics>

DECC are continuing developing work to look at how households actually consume energy (gas and electricity). This work involves matching actual energy consumption to the fuel poverty and EHS datasets and can allow for an understanding of where people might be under heating their homes, amongst other things. Results of this work will be published either in future annual fuel poverty reports or in additional statistical releases.

In addition, DECC will be analysing the Energy Follow Up Survey and assessing the implications of the results for the fuel poverty methodology. Specifically, they will be looking at the temperatures people heat their homes and heating patterns. DECC will consult with key stakeholders on the results from this analysis.

The full fuel poverty dataset will be available to users from the UK Data Archive, alongside the EHS, later in 2013 (timed to coincide with publication of the EHS data). There will also be a range of other variables, available on the archive, such as breakdowns of consumption and income.

1.7 Further information

For further information on the data presented in this report, please email

fuelpoverty@decc.gsi.gov.uk.

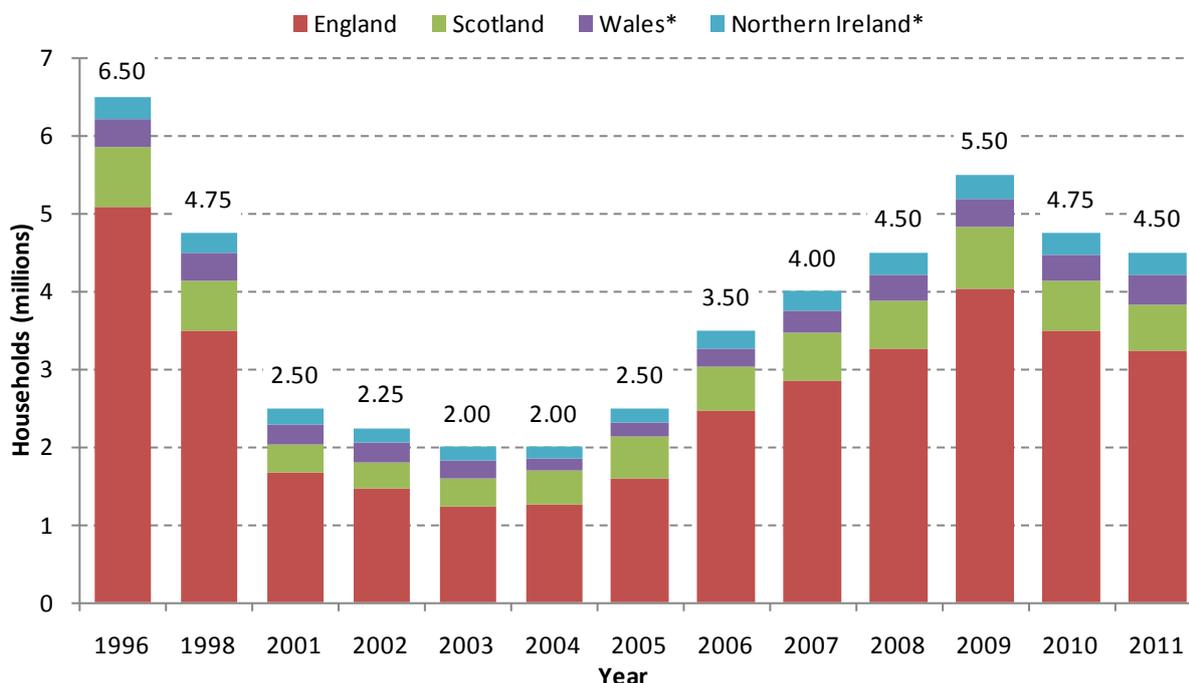
Chapter 2: Summary of Fuel Poverty in the UK and England

This chapter covers the measurement of fuel poverty under the 10 per cent and the Low Income High Cost definition, as presented in the Hills report. The Low Income High Cost measure is only available for England.

2.1 Fuel Poverty in the UK under the 10 per cent measure

In 2011, the number of fuel poor households in the UK was estimated at around 4.5 million, representing around 17 per cent of all UK households. This is a fall of around 0.25 million (approximately 8%) since 2010. Chart 2.1 shows the overall trend and breakdown of fuel poverty in the UK. It should be noted, the 2009 to 2011 fuel poverty figures for Wales as well as 2010 Northern Ireland figures are based on extrapolated estimates.

Chart 2.1 – Fuel poverty in each country in the UK, 1996 to 2011⁷



*Fuel poverty figures have been estimated for: Northern Ireland for 2010; Wales for 2009, 2010 and 2011

Generally, the fuel poverty level in each country follows a similar trend to the overall pattern observed in the UK, with year on year reductions seen between 1996 and 2003, due to a combination of falling fuel prices and rising incomes. This trend then begins to reverse from 2004 onwards, in line with price increases. In 2010, chiefly as a result of result of improving energy efficiency standards, fuel poverty fell for the first time since 2003.

⁷ Fuel poverty was not calculated in 1997, 1999, or 2000.

Between 2004 and 2009, energy prices increased: domestic electricity prices rose by over 75 per cent, and gas prices increased by 122 per cent⁸. The overall effect of price rises since 2004 outweighed the impact of increasing incomes and energy efficiency measures in this instance. This led to the rise in fuel poverty seen over this period. However, this pattern reverses from 2010 onwards, when the combined effect of rising incomes and energy efficiency standards (particularly among lower income households) begins to outweigh the effects of increasing energy prices and so results in the two consecutive falls seen in fuel poverty levels in 2010 and 2011. A more detailed explanation of the change in fuel poverty is provided in Chapter 3.

Table 2.1 – Number and proportion of fuel poor households by nation

Country	Number of fuel poor households (millions)	Proportion of the population fuel poor (%)	Year of estimate
England	3.20	15%	2011
Scotland	0.58	25%	2011
Wales	0.37	29%	2011
Northern Ireland	0.29	42%	2011

Of the four UK nations, Northern Ireland has the greatest proportion of fuel poor households, followed by Wales, then Scotland and finally England (Table 2.1). Northern Ireland has a higher proportion of fuel poor than other nations due to a high percentage of off gas grid households (who therefore use alternative, more expensive fuels to heat their homes).

In addition to being affected by changing domestic energy prices, the number of fuel poor households within each UK country is also affected by the housing stock, the prevalent heating fuels and levels of household income. Finally, the methodology used to measure fuel poverty, can make a difference to the level. Finally, for more information on the measurement of fuel poverty in each country, see section 1.4 in Chapter 1 of this report.

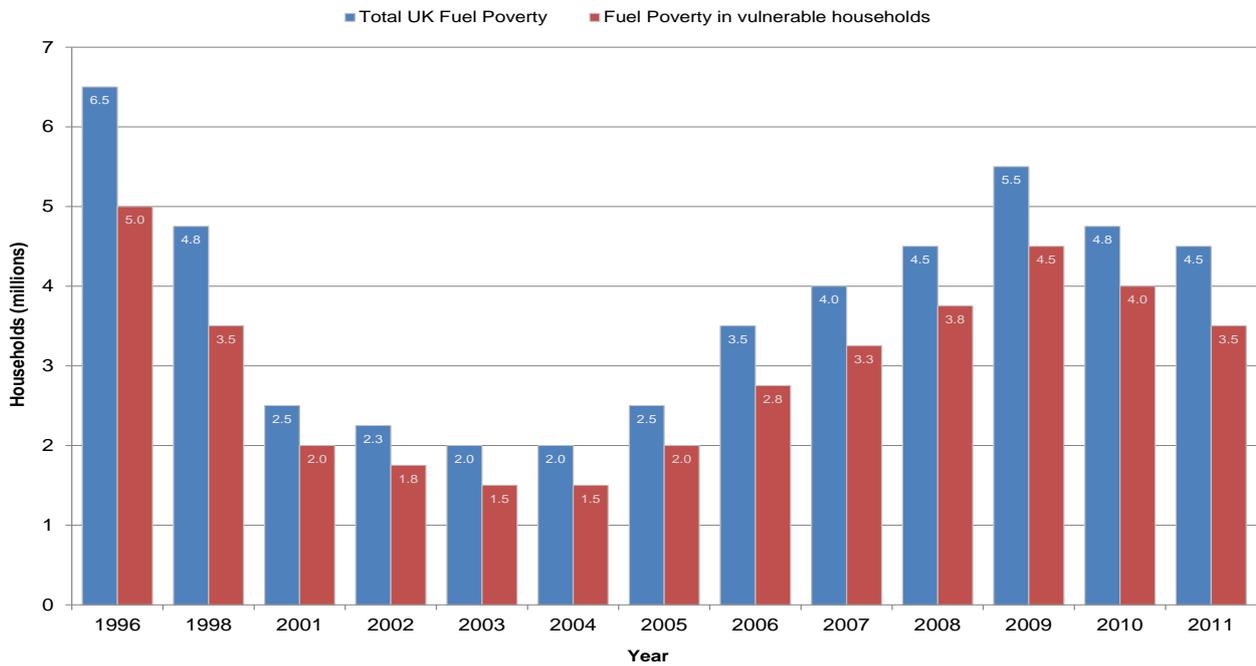
In 2011, around 3.5 million vulnerable⁹ households in the UK were fuel poor, a decrease from four million in 2010. In England, around 73 per cent of households were classified as vulnerable in 2011.

⁸ Table 2.1.1 Retail prices index: fuel components

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/171915/qep_mar_2013.pdf

⁹ A vulnerable household is one that contains the elderly, children or someone who is disabled or has a long term illness.

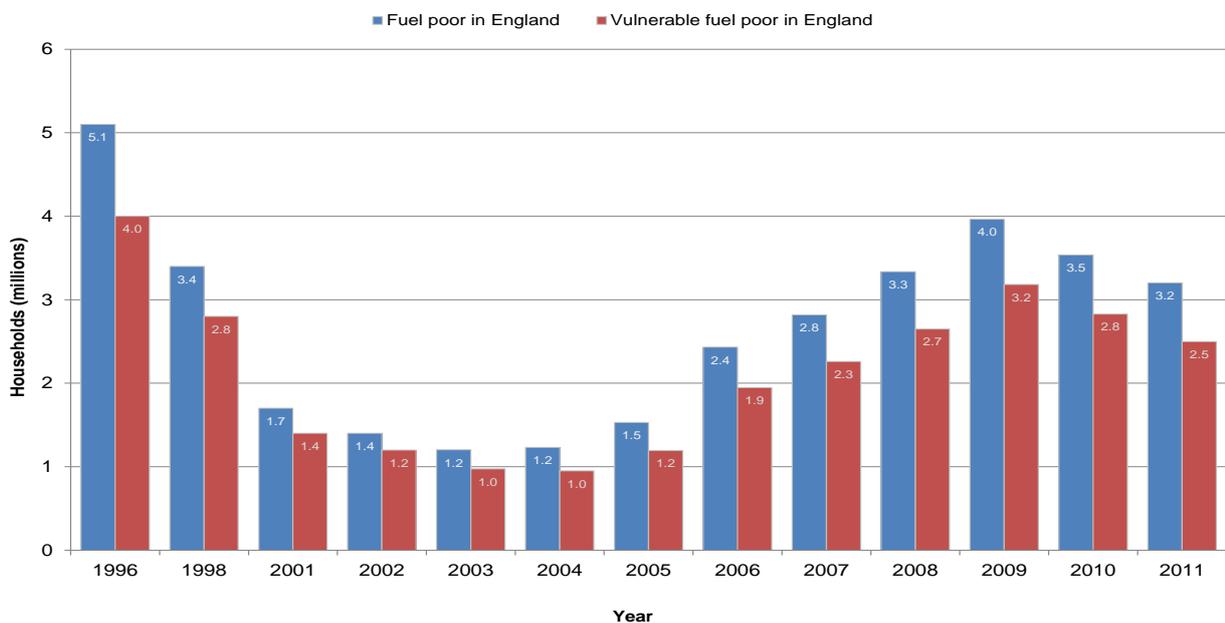
Chart 2.2 – Fuel poverty in the UK, 1996 to 2011



2.2 Fuel Poverty in England

In 2011, 3.2 million households were fuel poor under the 10 per cent indicator, equivalent to 14.6 per cent of all households. This is a fall of around nine per cent since 2010 and 19 per cent since 2009 (the highest peak in recent years). Around 2.5 million of the fuel poor households were also vulnerable, representing around 16 per cent of the vulnerable population.

Chart 2.3 – Fuel poverty in England – 10 per cent, 1996 to 2011



In 2011, the number of fuel poor households in England under the low income high cost measure was estimated at around 2.6 million. This represents approximately 11.7 per cent of all English households. This is a fall of around 100 thousand (or four per cent) when compared with 2010. The aggregate fuel poverty gap increased marginally in 2011 from £1.1 billion to £1.15 billion in 2011 prices (approximately two per cent), and the average gap also rose by £26 to £448.

Chart 2.4 shows the number of households that were living in fuel poverty in England between 1996 and 2011, and Table 2.2 gives the numbers behind the chart.

Chart 2.4- Fuel poverty in England- low income high costs, 2003 to 2011

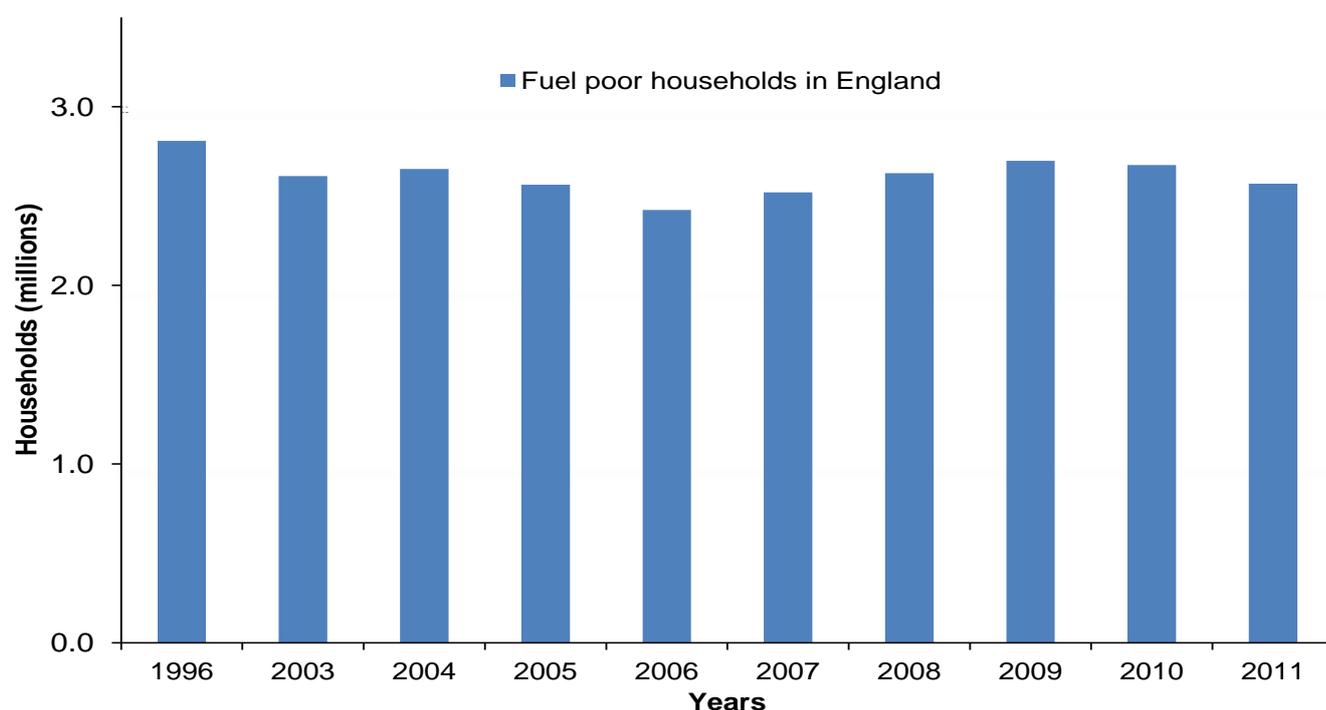


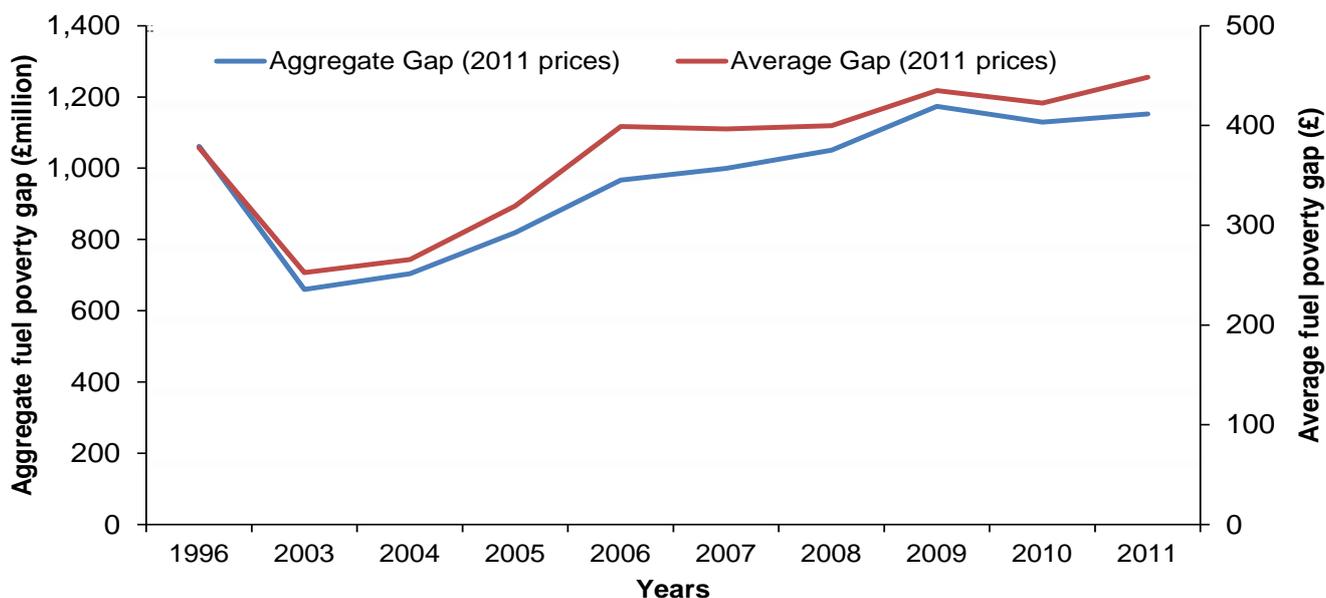
Table 2.2- Fuel poverty in England under the low income high costs measure, 2003 to 2011.

Fuel poverty	1996	2003	2004	2005	2006	2007	2008	2009	2010	2011
England (millions of households)	2.81	2.61	2.65	2.56	2.42	2.52	2.63	2.70	2.67	2.57
Fuel Poverty Gap (£millions) 2011 Prices	1,061	660	704	819	966	999	1,051	1,173	1,130	1,152
Fuel Poverty Average Gap (£)	378	253	266	319	399	396	400	435	422	448

The number of households with low income and high costs has remained relatively stable over time, and consistently below the 10 per cent measure. The fuel poverty gap has however changed over time in response to prices. Between 2004 and 2009, when energy prices were increasing, the fuel poverty gap rose from £704 million to £1.17 billion (in 2011 prices). In 2010, electricity and gas prices declined, resulting in a slight reduction in the fuel poverty gap.

In 2011, the number of households in fuel poverty reduced marginally but the aggregate and average gap increased (Chart 2.5). Improvements in energy efficiency among the low income-high cost group, relative to all other groups, meant these households saw reductions in required energy spend that took them below the median bill threshold. Consequently there was a reduction in the number of fuel poor households. However, price rises in 2011 contributed to the rise in the aggregate and average fuel poverty gap. A more detailed explanation of the reasons for the change in fuel poverty for both measures is available in Chapter 3, while Chapter 1 explains reasons for differences in the measures.

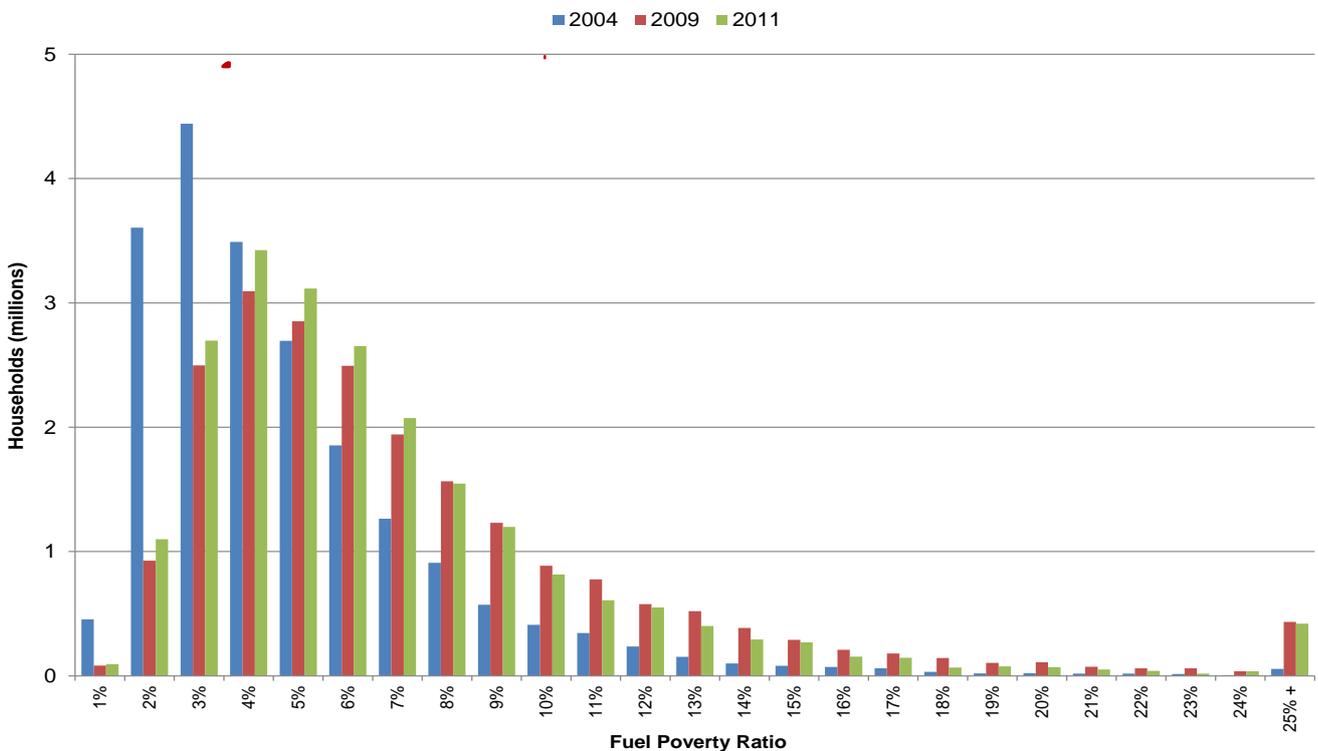
Chart 2.5- Aggregate and average fuel poverty gaps, 2003-2011, England



2.3 Fuel Poverty distribution in England under the 10 per cent measure

Under the 10 per cent measure, a household with a fuel poverty ratio in excess of 10 per cent is defined as fuel poor. Chart 2.6 below illustrates the distribution of fuel poverty ratios of English households in 2004 (the most recent 'low' point of fuel poverty), 2009 and 2011.

Chart 2.6 – Fuel poverty ratios (required energy spend as a proportion of income), 2004, 2009 and 2011¹⁰.

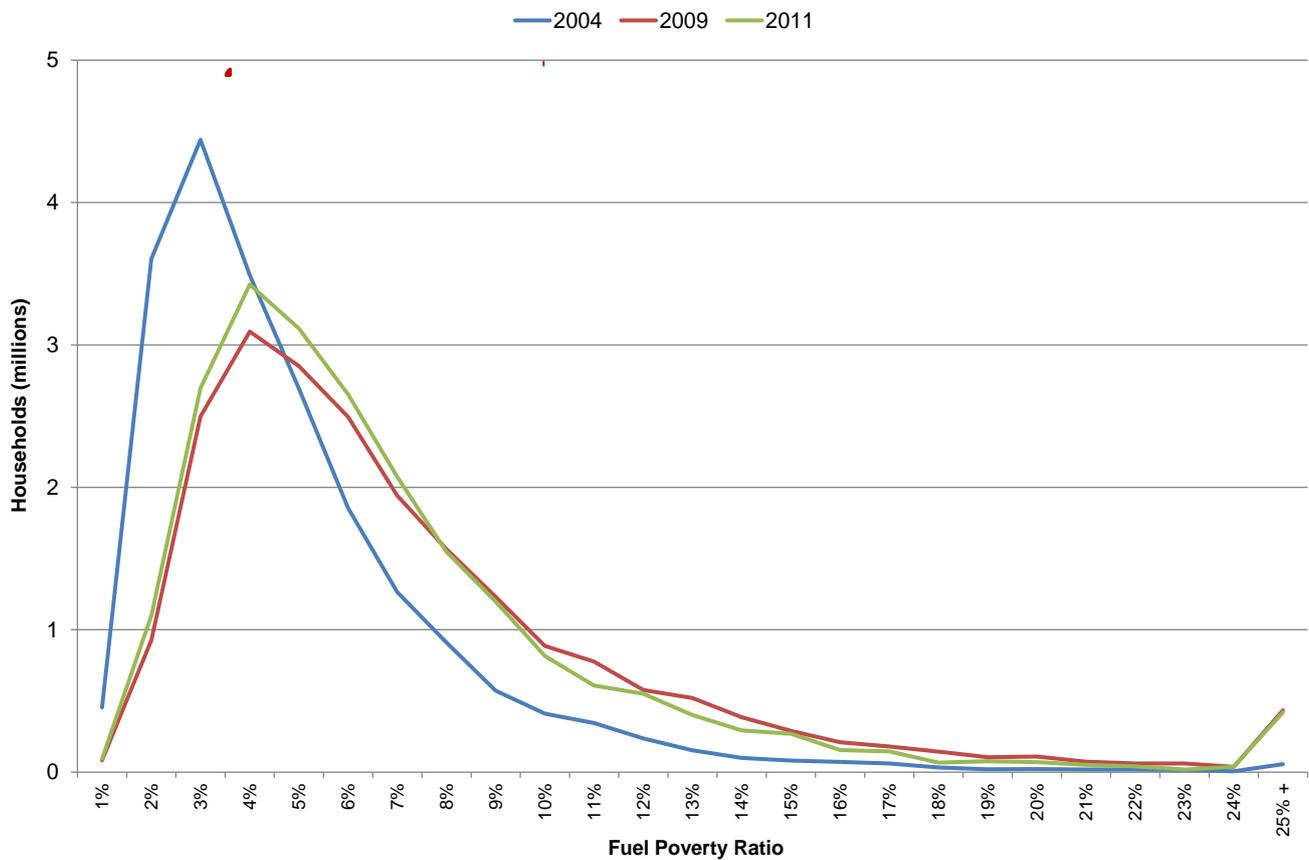


Rising domestic energy prices between 2004 and 2011 has led to a shift of households towards the fuel poverty threshold and, in some cases, beyond. The model value has shifted from three per cent of income in 2004 to four per cent in 2011. In line with this, the median too has shifted from 3.5 per cent in 2004 to 5.2 per cent in 2011. This change has resulted in more households being placed around the 10 per cent threshold than before, with almost twice as many households in the 10th percentile in 2011 compared to 2004, although household numbers have also increased over this period. This further reflects the impact of rising domestic energy prices on nearly all households.

The gradual shift in the fuel poverty distribution between 2004 and 2011 is emphasised clearly in Chart 2.7, which shows the distribution of the fuel poverty ratios in each of these years.

¹⁰ A change to the modelling of missing income variables in 2006 led to a “spike” in the number of households at the extreme right (those required to spend 25 per cent or more of income on energy to obtain an adequate standard of warmth) of the distribution for all years post 2006. This is due to reduced imputation of low incomes as a result of the change, therefore leading to some very low incomes being recorded.

Chart 2.7 – Fuel poverty ratios (required energy spend as a proportion of income), 2004, 2009 and 2011



The above chart shows that the distribution of fuel poverty ratios across all households becomes less skewed and flatter over time (moving further to the right in the latter years compared to 2004). This illustrates that more households are now in fuel poverty than in 2004 (greater number of households over the threshold) and a greater number are also at risk of becoming fuel poor than before (illustrated by the higher number of households in the 10th percentile in 2011).

Chapter 3: Contributions to the change in fuel poverty

3.1 The drivers of fuel poverty

The fuel poverty status of a household depends on the interaction of three key factors:

- Income;
- Fuel prices;
- Fuel requirement (which is affected by the fuels they use, the properties of their dwelling, and energy efficiency)

This chapter begins by considering the change in each of these factors in recent years, with particular focus on the change between 2010 and 2011. We then examine how this has affected fuel poverty under both the 10 per cent measure, and the low income high costs (LIHC) measure as proposed by Professor Hills. For the latter, we examine changes in both the number of households in fuel poverty, and the fuel poverty gap.

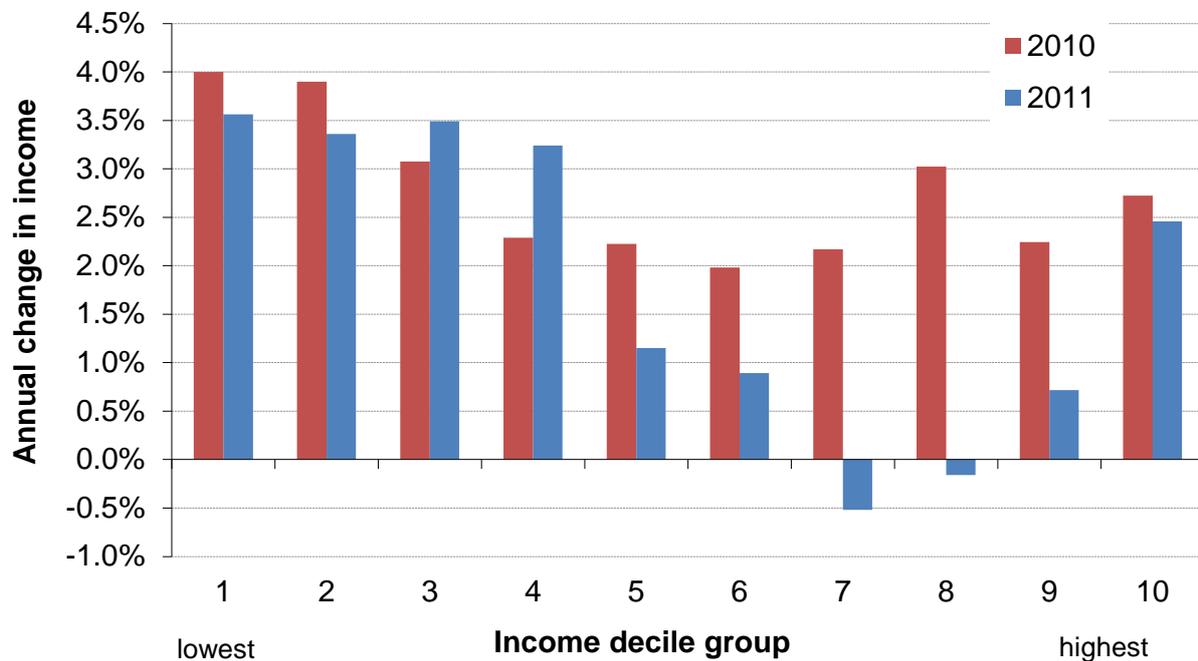
Because of the relative nature of the LIHC headcount measure, the key factor when assessing changes is how the drivers of fuel poverty have changed for households that currently have low incomes and high costs (and so are classed as fuel poor), and those who are at most risk of falling into this category. For example, if incomes rise faster (or fall more slowly) for households with low incomes than for the population as a whole, we would expect the number of households in fuel poverty to fall. One of the difficulties in explaining changes in this measure is that the fuel poverty dataset is not longitudinal. As a result, we cannot explore how individual households move between the LIHC quadrants over time as their circumstances change.

3.2 Income

In 2011, average incomes (before housing costs) again rose from the previous year, with the median income rising by 0.7 per cent, from £23,240 to £23,420. However, unlike the change between 2009 and 2010, incomes did not rise equally across all households. This can be seen in Chart 3.1: the poorest 40 per cent of households saw the largest rises in incomes between 2010 and 2011, of between three and four per cent. Higher income groups saw more modest increases, and even decreases in the case of deciles seven and eight.

This income data is taken from the EHS, which, although not designed as a dedicated survey of incomes, is relevant to analyse, as it is the source of data used when measuring fuel poverty. This data is compared with income data from other sources such as the Annual Survey of Hours and Earnings (ASHE) and the Family Resources Survey (FRS), to ensure it is consistent.

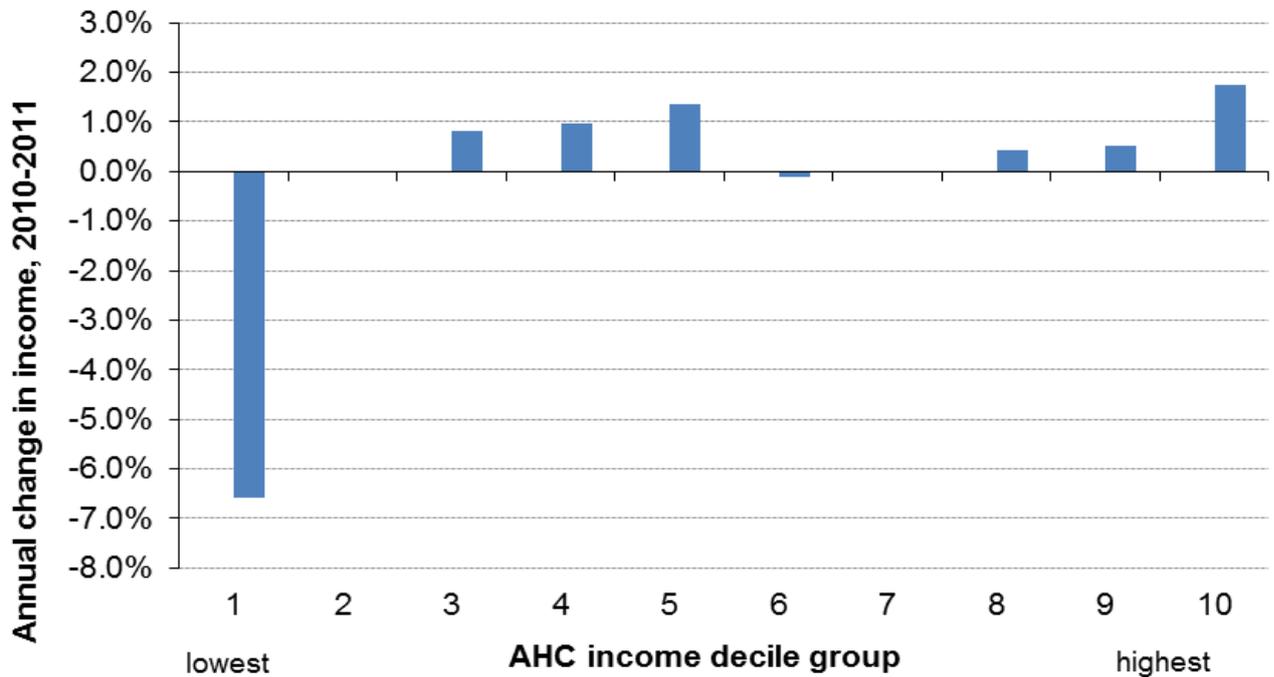
Chart 3.1 – Median annual household before housing costs (BHC) income, by BHC income decile group, 2010 and 2011



The chart above shows income that has not been adjusted for household composition or housing costs, and is the definition of income used in the 10 per cent measure of fuel poverty. Given the increases seen in the lower income groups, we would expect to see a reduction in fuel poverty between 2010 and 2011, as these groups typically make up the vast majority of fuel poor households. This decrease in fuel poverty was observed, and the role of income in causing this is discussed in section 3.5 of this chapter.

Under the low income high costs measure, housing costs are subtracted from the income of each household. Inevitably, this will make those that own their own home (and so have no housing costs) better off relative to those with rent and have mortgage payments. Between 2010 and 2011, the median after housing costs (AHC) income increased slightly, from £19,130 to £19,210. Chart 3.2 shows how AHC income changed for each AHC income decile between 2010 and 2011. Whilst incomes remained similar or increased slightly across most income groups, they fell sharply for those in the bottom income decile. This is in sharp contrast to the changes seen in before housing costs (BHC) income.

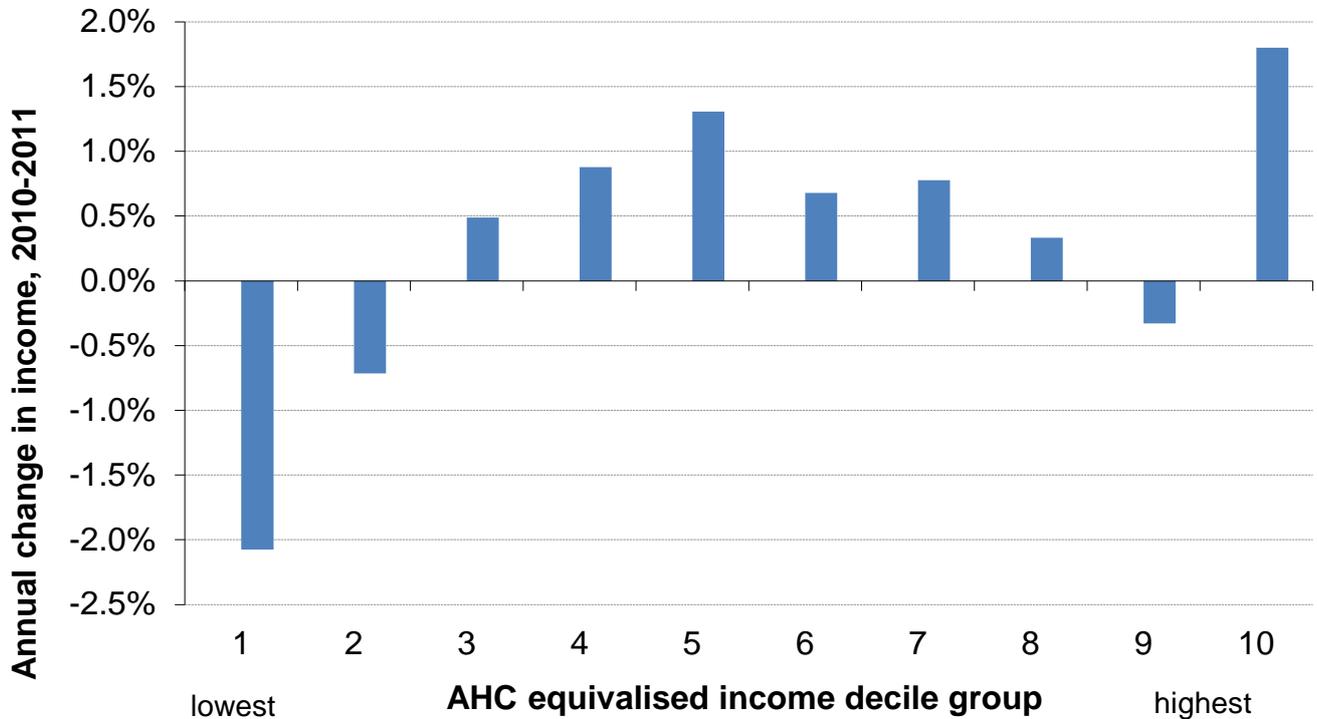
Chart 3.2 – Annual change in median after housing costs (AHC) income, by AHC income decile group, 2010 and 2011



The decrease in AHC incomes of the lowest income decile, despite an increase in BHC incomes, reflects a change in housing costs for this group. There appear to be three things driving this. Firstly, poorer households are less likely to own their home outright than households in the higher income groups. For example, in the bottom AHC income decile, only ten per cent of households have no housing costs, compared with nearly 40 per cent of households in the top decile. As a result, the general increases in housing costs between 2010 and 2011 will affect more households in the lower income groups than the higher ones. Secondly, the proportion of outright home owners in the bottom AHC income group fell between 2010 and 2011, meaning that more of these households had housing costs than in previous years, and were likely to have had a reduced income as a result.

Finally, of those that don't own their home outright, the bottom AHC income decile contains by far the highest proportion of households who rent their home. As a result, the rent increases seen across almost all income groups between 2010 and 2011 will have a much larger impact on the housing costs of this group than for higher income groups. Their AHC incomes are therefore likely to decrease accordingly.

Chart 3.3 – Annual change in median after housing costs (AHC) equivalised income, by AHC equivalised income decile group, 2010 and 2011



The impact of the reduction in AHC equivalised incomes of those in the bottom two income deciles on fuel poverty under the low income high costs measure are likely to be relatively small. This is because all of the households in these groups are likely to already be classed as having 'low incomes'. The households in the group that are not classed as having low incomes and high costs will be those with low fuel costs. As a result, a reduction in the incomes of this group should not actually push many extra households into fuel poverty. It will simply mean that of those already in fuel poverty, they are driven even further into the low income group.

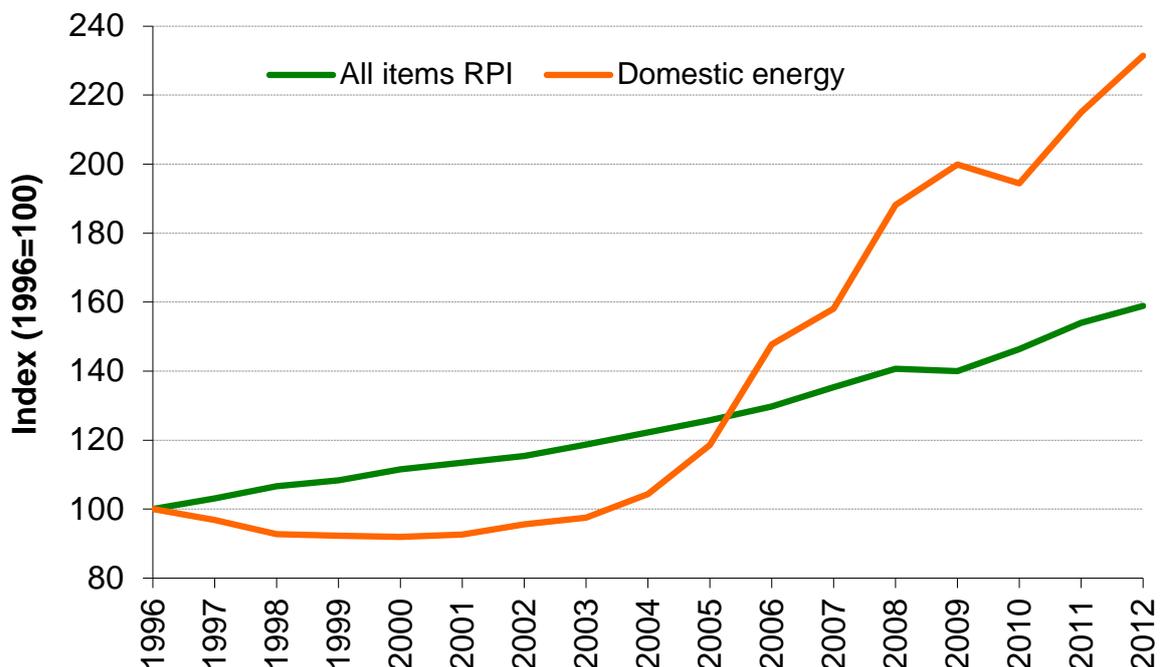
However, rises in the incomes of middle income households are likely to mean that these households are less likely to be pulled into fuel poverty by their incomes, and could reduce the number of households in fuel poverty. The interaction of income with other factors in determining the number of households with low incomes and high costs is discussed in section 3.6.

3.3 Prices

Under the 10 per cent definition, prices have typically been the most influential factor in movements in fuel poverty. Between 2004 and 2009, prices rose at a greater rate than incomes, thus leading to an increase in fuel poverty.

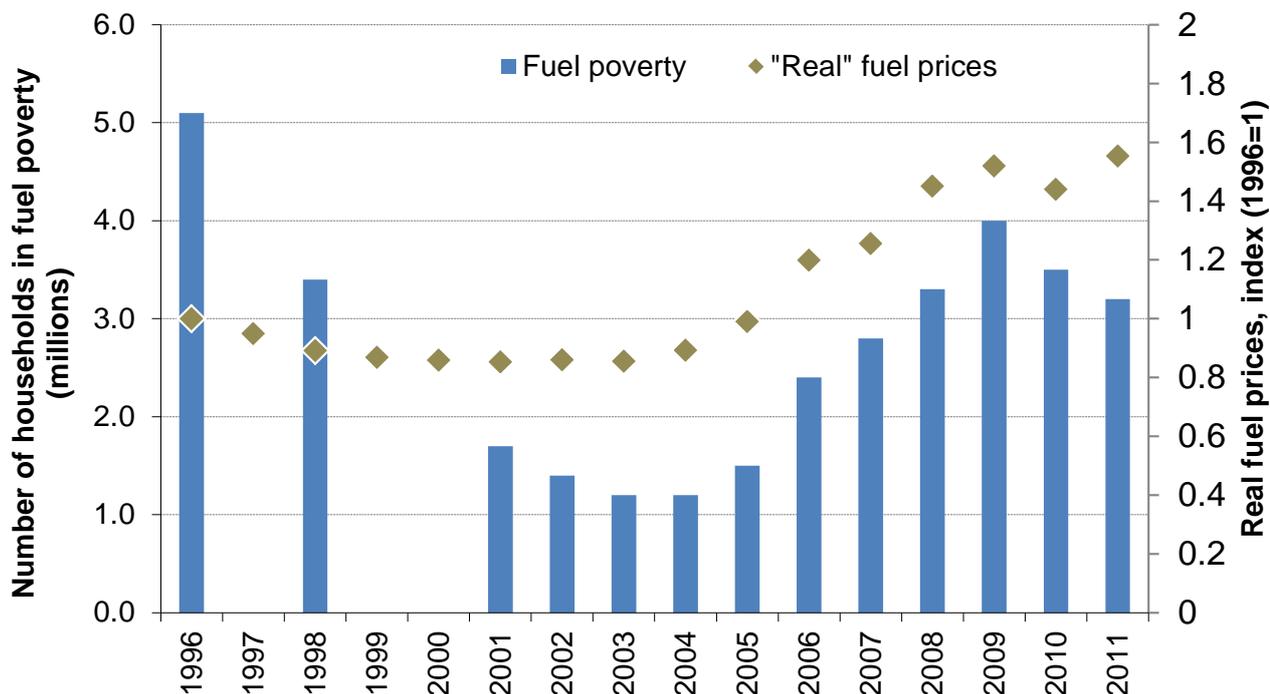
Chart 3.4 shows retail prices of domestic energy since 1996, and compares these against the prices of the “typical” basket of goods and services that make up the Retail Prices Index.

Chart 3.4 – Domestic energy prices¹¹ and the Retail Prices Index, 1996-2011



As this chart shows, 2010 marked the first calendar year in over a decade that domestic energy prices decreased from the previous year. This was despite a rise in general inflation over this period. However, prices rose sharply again between 2010 and 2011. Chart 3.5 highlights the correlation between real terms (i.e. inflation-adjusted) prices and the number of households in fuel poverty under the 10 per cent measure. This shows that fuel poverty levels generally track price changes closely. As prices increased year on year from 2003 to 2009, so did fuel poverty levels. Then, when prices fell in 2010, fuel poverty levels followed suit. 2011 marks the first year where real fuel prices and fuel poverty levels move in different directions, with prices increasing whilst fuel poverty levels fell. The reasons for this are explained below.

¹¹ As measured by the fuel and light component of the Retail Prices Index. Fuel and light comprises electricity, gas, coal and solid fuels and heating oil and other fuels

Chart 3.5 – Fuel poverty levels and real-terms fuel prices, 1996 to 2011

The correlation between prices and fuel poverty is weakened by the fact that each fuel poverty dataset is actually a combination of two consecutive years' worth of data (i.e. the 2011 dataset is a combination of 2010 and 2011 data). This means that the effects of price changes are staggered over two years. Therefore when considering changes in fuel poverty from one year to the next, it is useful to consider price changes in each of the last two years (and likewise for income and energy efficiency changes).

Table 3.1 shows this more clearly, showing that while prices increased quite sharply (by 7.9%) between 2010 and 2011, the combined year price increase, which affects the fuel poverty datasets, is actually considerably less (1.1%). Section 3.5 explains how this, along with other factors, contributed to the decrease in fuel poverty seen in 2011.

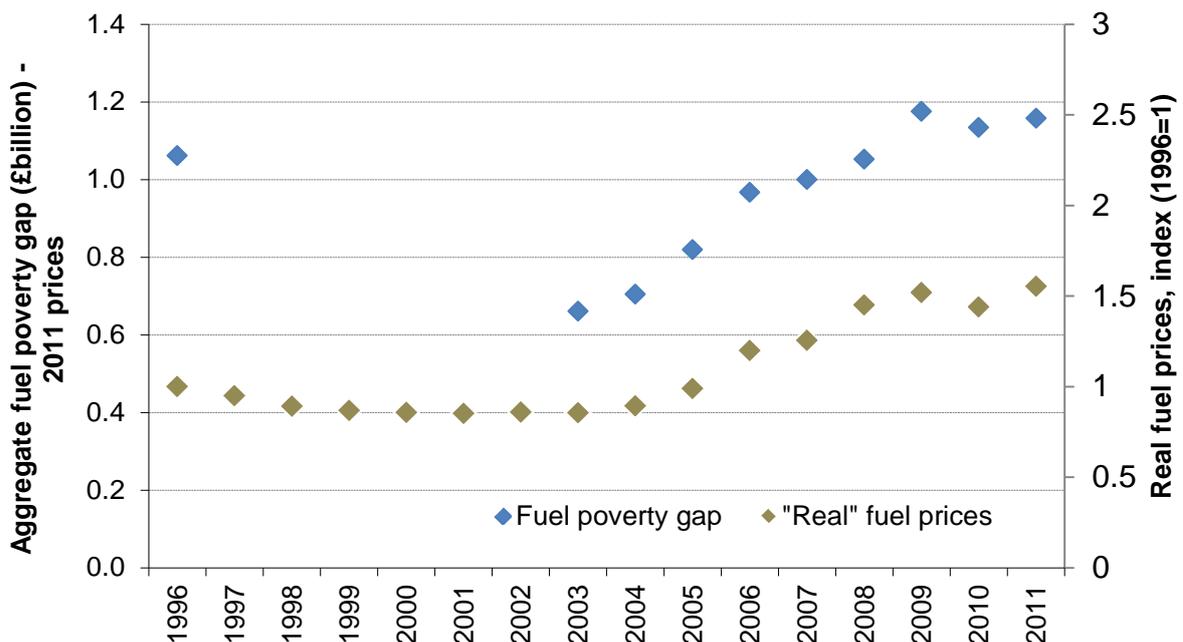
Table 3.1 – Fuel price indices for single and combined years, 2005 to 2011

	Single year prices		Combined year prices	
	Price index	Change from previous year	Price index	Change from previous year
2005	100.0			
2006	121.1	21.1%	110.6	
2007	126.8	4.7%	124.0	12.1%
2008	146.5	15.5%	136.7	10.2%
2009	153.5	4.8%	150.0	9.8%
2010	145.4	-5.3%	149.5	-0.4%
2011	156.9	7.9%	151.2	1.1%

Under the Low Income High Costs (LIHC) measure, overall changes in prices tend to have a greater influence on the aggregate fuel poverty gap than the number of households in fuel poverty. This is because unless price rises affect different households in very different ways, they should generally cause bills to move in a similar direction for all households (see section 1.2). The modelled fuel costs used in the LIHC measure (as with the 10 per cent measure) are based on average prices for each region and payment method. As a result, price changes should affect the modelled fuel costs of most households in similar ways. The relative nature of the LIHC measure therefore means that the number of households in fuel poverty should not change much.

By contrast, the aggregate fuel poverty gap is much more responsive to fuel prices changes. Chart 3.6 illustrates the impact that rising prices and bills have on the depth of fuel poverty i.e. by how much households are fuel poor. It compares the fuel poverty gap from 1996 to 2011 with real terms domestic fuel prices over the same period. This shows that as prices fell in 2010, so did the fuel poverty gap. However, price increases in 2011 caused the aggregate gap to increase again. Prior to this, the aggregate fuel poverty gap increased with prices, year on year, since 2003. A fuller explanation of the impact of price changes on LIHC headcount measure and fuel poverty gap is provided in section 1.2.

Chart 3.6 – The aggregate fuel poverty gap and real fuel prices¹², 1996 to 2011



3.4 Energy Efficiency

The average energy efficiency of households¹³, as indicated by the Standard Assessment Procedure¹⁴ (SAP09), increased in 2011, rising to 56.8 from 55.2 in 2010. Although the measurement of SAP has now changed (from SAP05 to SAP09), making it hard to directly

¹² <http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx>

¹³ Note this figure excludes vacant homes, and therefore differs from the change in SAP of all homes recorded in the EHS annual report

¹⁴ For more information on SAP ratings, see <http://projects.bre.co.uk/sap2005/>

compare this with previous years, this appears to continue a trend of steady SAP improvements in recent years.

Similarly, the proportion of dwellings in SAP band D or above rose from 59 per cent to 64 per cent between 2010 and 2011. This is shown in Chart 3.7.

Chart 3.7 – Proportion of dwellings in each SAP band, 2010 and 2011

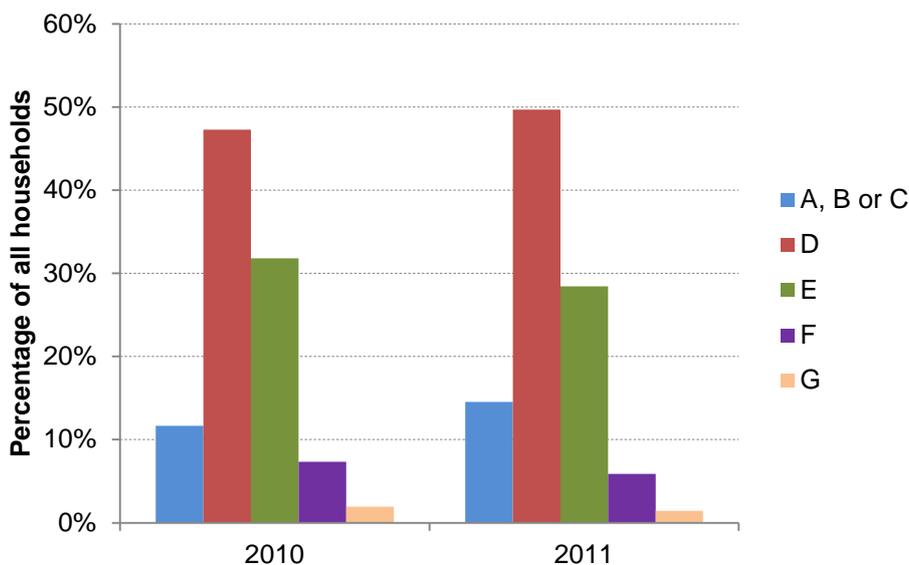
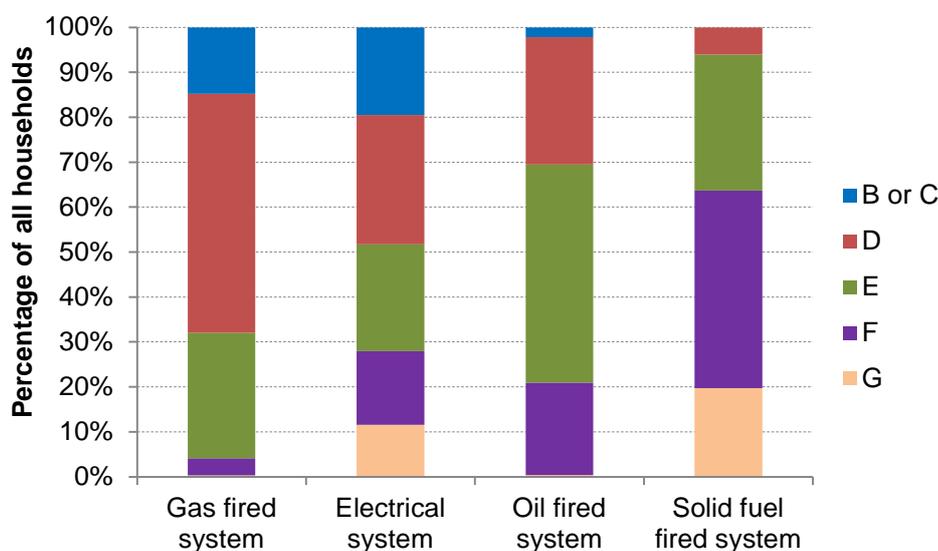


Table 3.2 looks at average SAP ratings by tenure, comparing owner occupied housing with private and social rented housing. It indicates that social housing is generally the most energy efficient, with SAP ratings around seven points higher than the other two groups. Nevertheless, improvements have been made across all tenure groups in the last year. This again appears to be part of a longer term trend.

Table 3.2 – Average SAP ratings by tenure, 2010 and 2011

Tenure	2010	2011
Owner occupied	53.8	55.4
Social rented	61.4	63.0
Private rented	54.1	55.8

It is also interesting to look at the differences in SAP by the main heating fuel used. Chart 3.8 shows this, illustrating the fact that for households with a gas fired system, over two thirds (68%) have a SAP rating of D or better, whilst for households with a solid or oil powered system fewer than a third have SAP ratings this high. This shows that SAP ratings are closely linked to the type of fuel used in the household. This is to be expected, since SAP is influenced by the cost of heating a fixed area, and so heating systems that are more expensive will have lower SAP ratings.

Chart 3.8 – Percentage of households in each SAP band, by main fuel, 2011

3.5 Changes in fuel poverty under the 10 per cent measure, 2010 to 2011

Between 2010 and 2011, fuel poverty in England fell by 334,000 households under the 10 per cent measure. To assess the key reasons for this, we have carried out analysis whereby each of the three main drivers of fuel poverty is held constant, to determine what levels of fuel poverty might have been in 2011 had each driver not changed. Firstly, 2011 prices were applied to the 2010 fuel poverty data, in order to understand the impact of price changes on fuel poverty (also including separately the role of the Warm Home Discount scheme¹⁵). This shows what the level of fuel poverty might have been if only prices had changed over the period.

The same was then done for incomes, applying 2011 incomes and holding prices constant. This gives an indication of the role of income in driving the changes in fuel poverty. Finally, by applying both 2011 prices and incomes to the 2010 dataset, we can attribute any remaining differences between our predicted 2010 fuel poverty level and the actual reported level to changes in energy consumption levels. These changes are likely to mainly reflect energy efficiency improvements, although they will also include the impact of general changes in the housing stock, and the lifestyle (including the amount of time spent in the home) of householders.

Table 3.3 below sets out the picture, starting with a position of 3.5 million fuel poor households in 2010.

¹⁵ The previous Voluntary Agreement, under which suppliers provided social/discounted tariffs was replaced with the Warm Home Discount (WHD) scheme in April 2011. Under the WHD scheme, suppliers have the option to continue to offer discounted/social tariffs or rebates to the types of vulnerable customers who benefited from these under the Voluntary Agreement.

Table 3.3 – Fuel poverty changes under the 10 per cent measure, 2010 to 2011¹⁶

	Fuel poor	Change in % fuel poor (percentage points)	Change in fuel poverty (households)
2010	3.5m		-
Prices		1.2	+ 0.26m
Warm Home Discount scheme ¹⁹		-0.3	- 0.07m
Income		-1.1	- 0.24m
Energy consumption		-1.2	- 0.26m
2011	3.2m		-0.33m

Incomes, prices and energy efficiency all had similarly-sized effects on changes in fuel poverty between 2010 and 2011. On their own, price increases would have put approximately an extra quarter of a million households into fuel poverty, whilst income increases and energy consumption decreases would each have taken about a quarter of a million households out of fuel poverty.

The picture shown above differs from last year. Price increases have had a larger negative effect on fuel poverty levels, which is likely to reflect the fact that prices rose sharply in 2011, after falling in 2010. Although the 2010 half of the combined dataset will have seen decreases in prices (of 5.3% on average, see Table 3.1), the increases in prices for the 2011 half of the dataset were larger (7.9% on average), and were therefore likely to outweigh the 2010 decreases and drive an increase in fuel poverty.

In addition to prices having a greater effect, income changes had a smaller effect on fuel poverty levels than they did in 2010. This is likely to reflect the fact that incomes rose by less for the bottom two income deciles in 2011 than in 2010 (see Chart 3.1). Given that these two groups contain around three quarters of all fuel poor households, any changes to their circumstances are likely to have a considerable effect on fuel poverty.

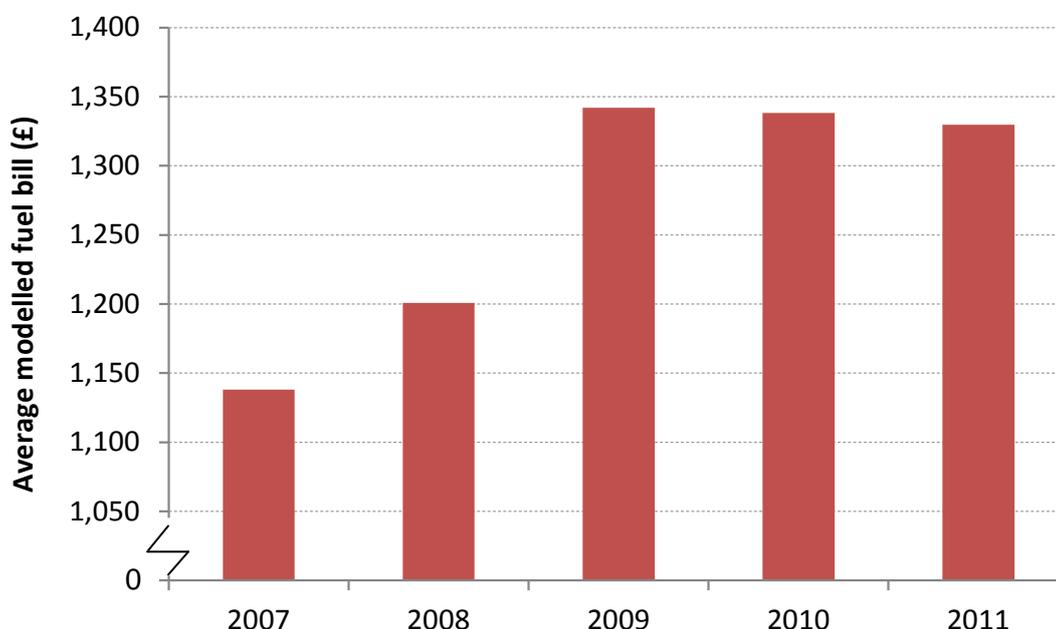
The effect of reduced energy consumption, reflecting improvements in the energy efficiency of dwellings, is higher than last year. Additionally, unlike last year, where the majority of improvements took place in households with gas central heating, in 2011 they were more varied. This is reflected in the 10 percentage point increase in the proportion of these households with a SAP09 rating of D or higher (from 38% to 48%).

The combined effect of price and energy consumption changes can be seen by looking at the average modelled fuel bill in the last few years. This was broadly similar in 2010 and 2011, falling slightly from £1,338 to £1,330 (see Chart 3.9). The lack of change supports the findings in table 3.3, which suggest that the changes in prices and energy consumption roughly cancelled each other out between 2010 and 2011, leaving the net change in fuel poverty mainly due to increased incomes. This is in contrast to previous years, such as 2009 and 2008,

¹⁶ Numbers may not sum due to rounding. The combined impact of incomes and prices on fuel poverty levels may be different to the sum of their individual impacts. Therefore the impact of each factor in the table above will not necessarily sum to the total change in fuel poverty between 2010 and 2011. This is because whilst the individual impacts of prices and incomes are shown, the impact of energy efficiency is calculated by looking at their combined effect and looking at the remaining differences. Thus a discrepancy may exist.

where the large price increases outweighed smaller energy efficiency improvements to drive bills up.

Chart 3.9 – Average modelled fuel bill, 2007 to 2011



As with any attempt to disentangle three non-independent factors, interpreting these results can be difficult. Rising energy prices and incomes will impact on most households. However, energy efficiency improvements will only affect a relatively small subset of households. Therefore, the impact on fuel poverty of efficiency measures will depend largely on the fuel poverty ratio of those households receiving measures. Those households that receive efficiency measures and are only marginally fuel poor are likely to be removed from fuel poverty. However, measuring those that are removed from fuel poverty due to improvements in energy efficiency makes no allowance for those households that are severely fuel poor and become less so (but remain fuel poor) with an efficiency measure, nor those that are not fuel poor before the measure.

3.6 Changes in fuel poverty under the Low Income High Costs (LIHC) measure, 2010 to 2011

Number of households in fuel poverty

Between 2010 and 2011, fuel poverty in England fell by around 100,000 households under the Low Income High Costs (LIHC) measure. Chart 3.10 shows how the number of households in each quadrant of the LIHC matrix changed between 2010 and 2011. While the number of LIHC households decreased, there were increases in the number of households with low incomes and low costs and high incomes and high costs. This may suggest that between 2010 and 2011, some households that would previously have been classed as having low incomes and high costs might have either seen increases in their income, or decreases in their consumption and their costs.

Chart 3.10 – Percentage change in the number of households in each quadrant of the low income high costs (LIHC) matrix, 2010 to 2011

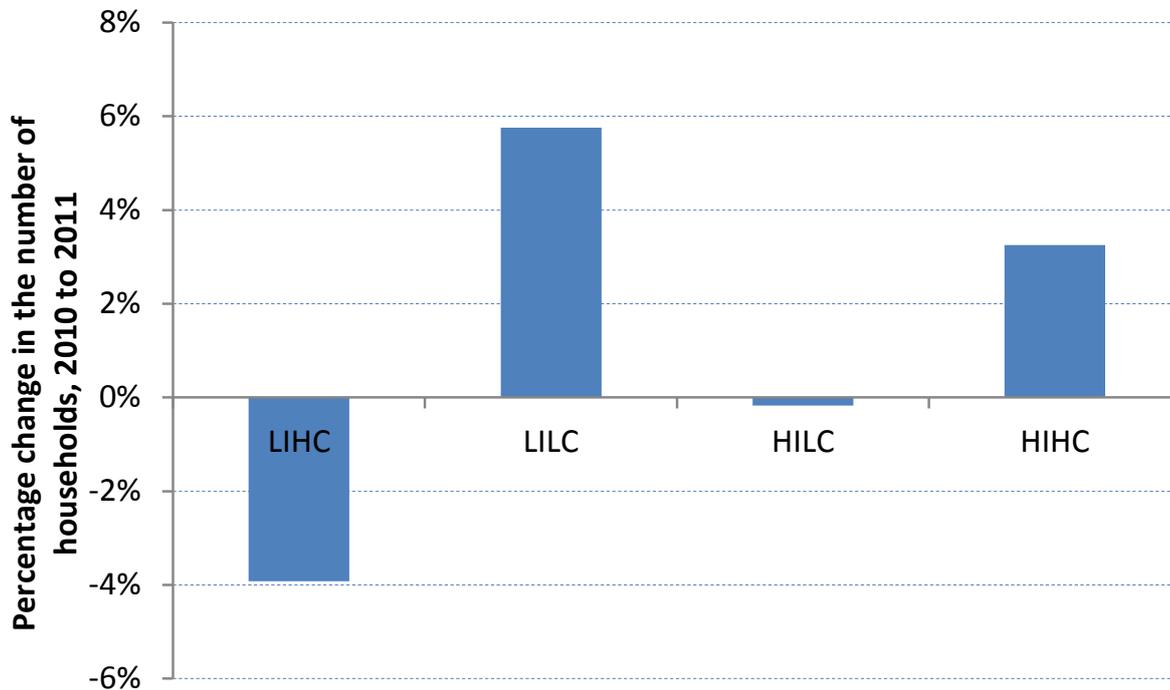
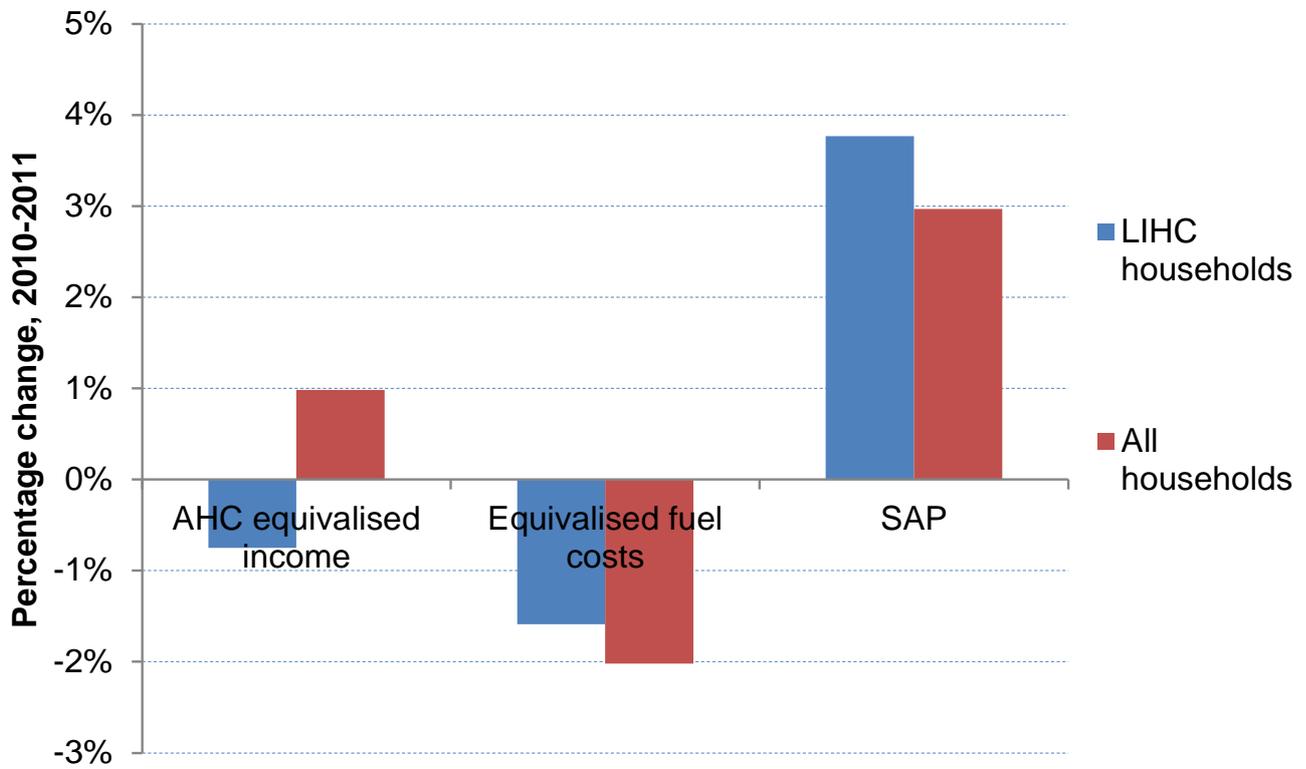


Chart 3.11 shows how incomes, required fuel costs and SAP ratings changed for households in the LIHC group, compared with all households, between 2010 and 2011. The median after housing costs (AHC) equivalised income for LIHC households fell slightly between 2010 and 2011, whilst it rose for the population as a whole. As discussed in section 3.2, this is likely to be due to the disproportionate effect of rises in housing costs on those in the lower income groups. Indeed, housing costs rose by more on average for the LIHC group than any other. Whilst this may not increase the number of households with low incomes and high costs, it is likely to mean that the majority of the households in this group remain there unless their costs fall. Meanwhile, the high income high costs (HIHC) group, for whom a drop in incomes might see some fall into the LIHC group, saw an increase in their incomes on average. This is likely to help avoid a large increase in the number of households in fuel poverty between 2010 and 2011 as a result of income changes.

Chart 3.11 – Percentage change in the incomes, fuel bills and SAP ratings of low income high costs (LIHC) households compared with all households, 2010 to 2011



As Chart 3.11 shows, the median equivalised fuel costs fell for all households between 2010 and 2011. However, they fell by slightly less for households in the LIHC group compared with the population as a whole. As with incomes, whilst this should not increase the number of households with low incomes and high costs, it is likely to mean that those in the LIHC group will remain in the group unless their incomes increase. The low income low costs (LILC) group, for whom a rise in bills might see them fall into fuel poverty, actually saw their bills fall by more than the population as a whole. This suggests that few of them are likely to be pulled into fuel poverty as a result of their bills.

Chart 3.11 also shows that median SAP increased across all households between 2010 and 2011. This is likely to partially drive the reduction in equivalised fuel costs seen in this period. The improvements in SAP were proportionally greater amongst LIHC households than amongst the housing stock as a whole. This may partly reflect the fact that households in this group generally had lower SAP scores to start with, and so had more scope for improvement.

In summary, changes in incomes, fuel costs and SAP ratings amongst LIHC households were not that different from the changes seen amongst all households. This is likely to explain why the overall change in the number of households in fuel poverty was relatively small. Under the 10 per cent measure of fuel poverty, large absolute changes in incomes, energy bills and SAP could have a major impact on the number of households in fuel poverty. By contrast, under the relative LIHC measure this is less likely, unless the changes occur only amongst LIHC households, or those on the fringes of this group.

The fuel poverty gap

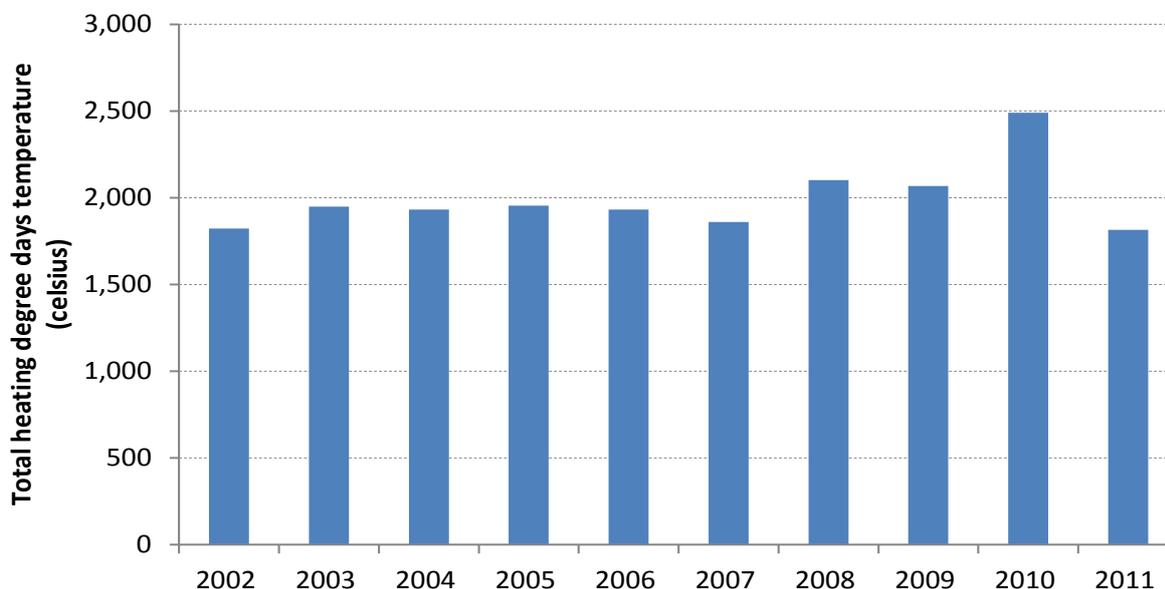
Unlike the number of households in fuel poverty, the aggregate fuel poverty gap is very sensitive to changes in energy prices. For example, if prices double for all households, then the situation becomes comparatively worse for households that have high energy costs, and the costs of these households will become increasingly greater (in pounds, not proportionally) than the median energy costs. Chapter 1 gives a fuller description of how price changes tend to affect the fuel poverty gap.

It is clear from Chart 3.6 that the aggregate fuel poverty gap tracks changes in energy prices very closely. When energy prices fell between 1996 and 2003, the gap also did, whereas when prices generally rose again between 1996 and 2011, the gap rose at a very similar rate. Although changes in energy consumption and energy efficiency improvements are likely to have some impact on the size of the aggregate gap, these effects are likely to be dwarfed by the effect of changing prices.

3.7 The impact of the weather on fuel poverty, 2011

As chart 3.12 shows, the winter months falling in 2011 (i.e. the end of the 2010/11 winter and the start of the 2011/12 one) were mild relative to previous years. This resulted in a much lower number of heating degree days¹⁷ in 2011 when compared with the cold year in 2010, but also relative to the past ten years in general.

Chart 3.12 – Total annual number of heating degree days in the UK, 2002 to 2011

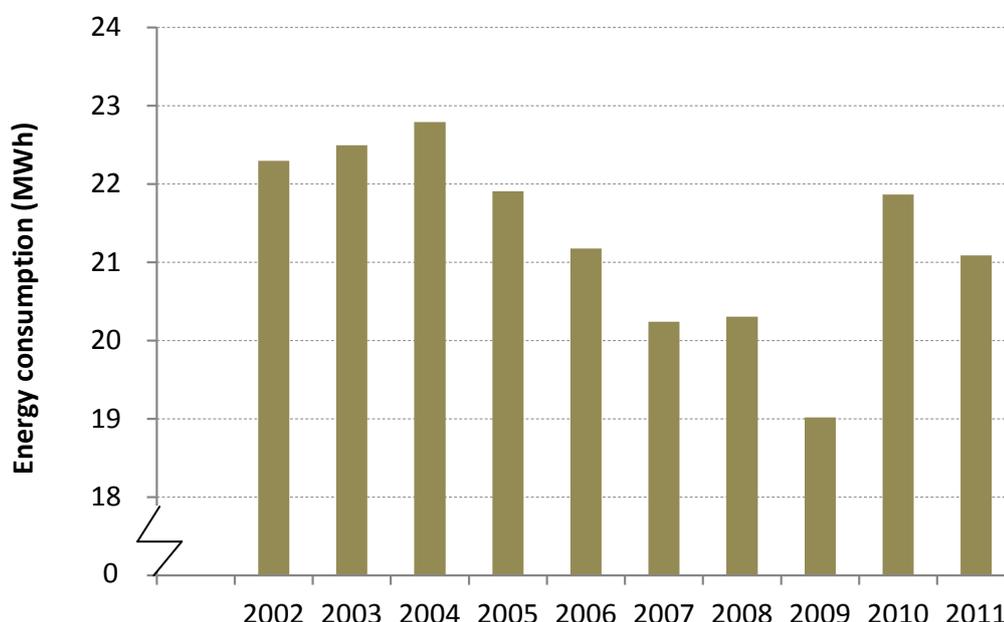


Source: *Energy Trends*, table 7.1

¹⁷ Heating degree days (HDD) are defined relative to a base temperature - the outside temperature above which a building needs no heating. The chart uses 15.5° Celsius. If the average outside air temperature on a day is above this base temperature, no heat is required; if it is below, then the heating requirement that day will be equal to the temperature deficit in degrees. For example, a day with an average temperature of 10°, would score a HDD of 5.5. The HDDs are summed across the year and displayed in the chart.

As a result of the milder winter, average annual household energy consumption was also lower than 2010. This can be seen in Chart 3.13.

Chart 3.13 – Average annual domestic energy consumption, 2002 to 2011



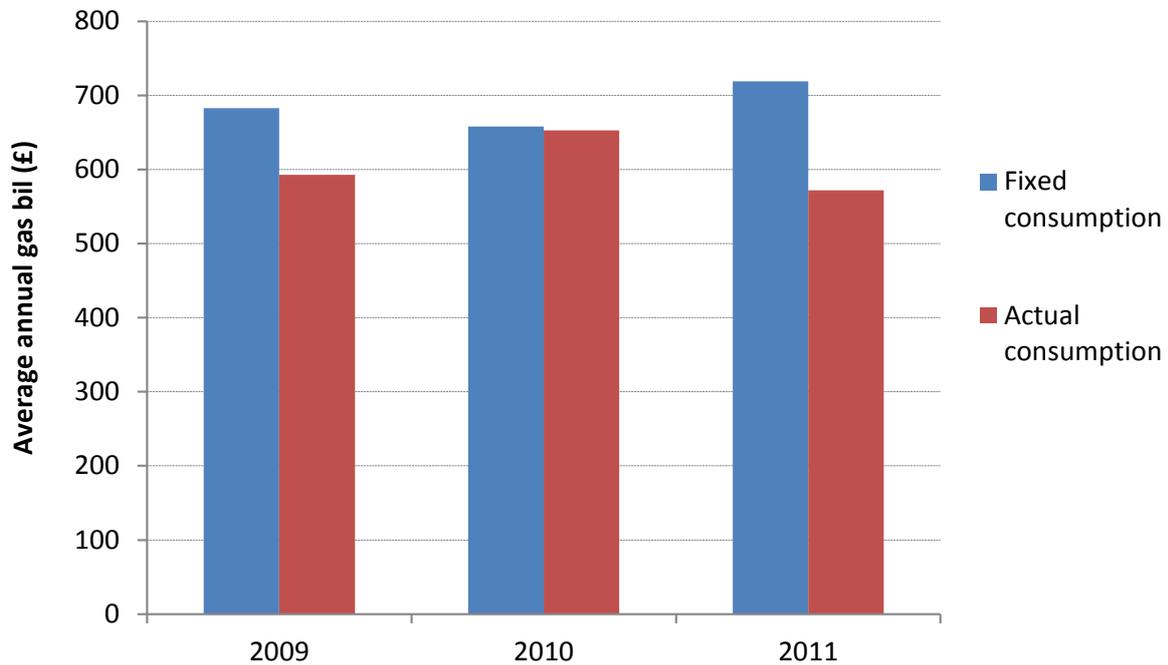
Source: *Energy Consumption in the UK, Table 3.4*

As Section 1.3 explains, the required fuel costs used to calculate fuel poverty are based on the assumption that a household will heat their home to an adequate standard of warmth, defined as 21 degrees Celsius in the main living area and 18 degrees in other occupied rooms. However, although these modelled costs reflect regional differences in temperature, they do not reflect annual variations in temperatures. As a result, the effects of particularly cold or mild winters on domestic energy consumption are not reflected in the required fuel costs of households. It is assumed that the same amount of energy will be required to heat an identical dwelling and household in the same location in consecutive years. In reality, chart 3.13 highlights that this is not the case.

To illustrate this more clearly, chart 3.14 compares average annual gas bills based on ‘fixed’ and ‘actual’ consumption from a recent article in the DECC publication ‘Energy Trends’.¹⁸ While the ‘fixed’ consumption series is based on gas consumption remaining unchanged at 18,000 kWh per year, the ‘actual’ consumption series varies in line with recorded gas consumption. As a result, the ‘fixed’ consumption series only reflects prices changes from year to year, whilst the ‘actual’ consumption series reflects changes in both prices and energy consumption. This chart illustrates the fact that despite a rise in energy prices between 2010 and 2011 (i.e. the fixed consumption series increases), this is outweighed by the much milder weather (plus some energy efficiency improvements) causing a fall in energy consumption between these years, as shown in chart 3.14.

¹⁸ For further details, see:

<https://www.gov.uk/government/publications/energy-trends-march-2013-special-feature-articles-domestic-energy-bills-in-2012-the-impact-of-variable-consumption>

Chart 3.14 – Gas bills based on fixed and actual consumption, 2009-2011

In summary, the modelling of energy bills for fuel poverty calculations uses fixed long run temperatures as a baseline for each region. Therefore short term fluctuations such as the cold year in 2010 and the mild year in 2011 do not affect fuel poverty data, even though they affect actual heating patterns. Therefore, while actual domestic gas consumption rose sharply between 2009 and 2010 before falling again in 2011, the modelled consumption used in the fuel poverty data fell steadily over this period (mainly reflecting improvements in the energy efficiency of homes).

Chapter 4: Analysis of fuel poverty in England

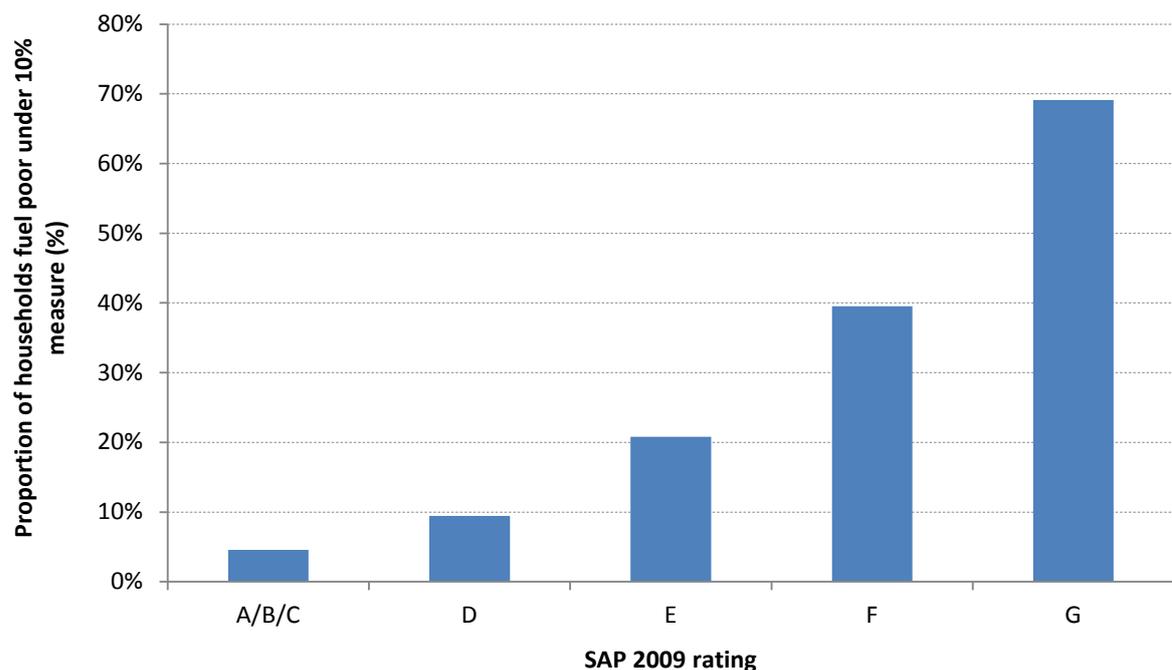
This chapter explores the prevalence of fuel poverty under both the 10 per cent and the Hills' low income high costs measure, by different household and dwelling characteristics, in 2011.

4.1 Energy efficiency and dwelling characteristics

SAP

The energy efficiency levels of dwellings are a key driver in the propensity of a household to be fuel poor (Chapter 3 examines this further). Charts 4.1 and 4.2 shows the fuel poverty rates by different SAP rating bands under the 10 per cent and the low income high cost measures respectively.

Chart 4.1: Fuel poverty under the 10 per cent measure, by SAP rating bands, 2011



The above chart illustrates that the least energy efficient households are the ones most likely to be fuel poor. In 2011, approximately 40 per cent of households living in F rated properties were fuel poor, under the 10 per cent measure, compared to five per cent of households in A, B or C rated properties. Whilst for households in G rated properties, nearly 70 per cent were fuel poor.

A similar pattern in fuel poverty is also seen under the low income high cost measure, with the depth and propensity of fuel poverty increasingly markedly with lower SAP scores. Under the low income high costs measure, 33 per cent of households living in G rated properties were fuel poor compared to three per cent of households living in A, B or C rated properties. The corresponding average fuel poverty gap is also five times higher in G rated properties compared to A-C rated properties (with an average fuel poverty gap of around £1,420 vs. £310 in 2011).

Chart 4.2: Fuel poverty and associated average fuel poverty gap under the Hills' low income high costs measure, by SAP rating bands, 2011

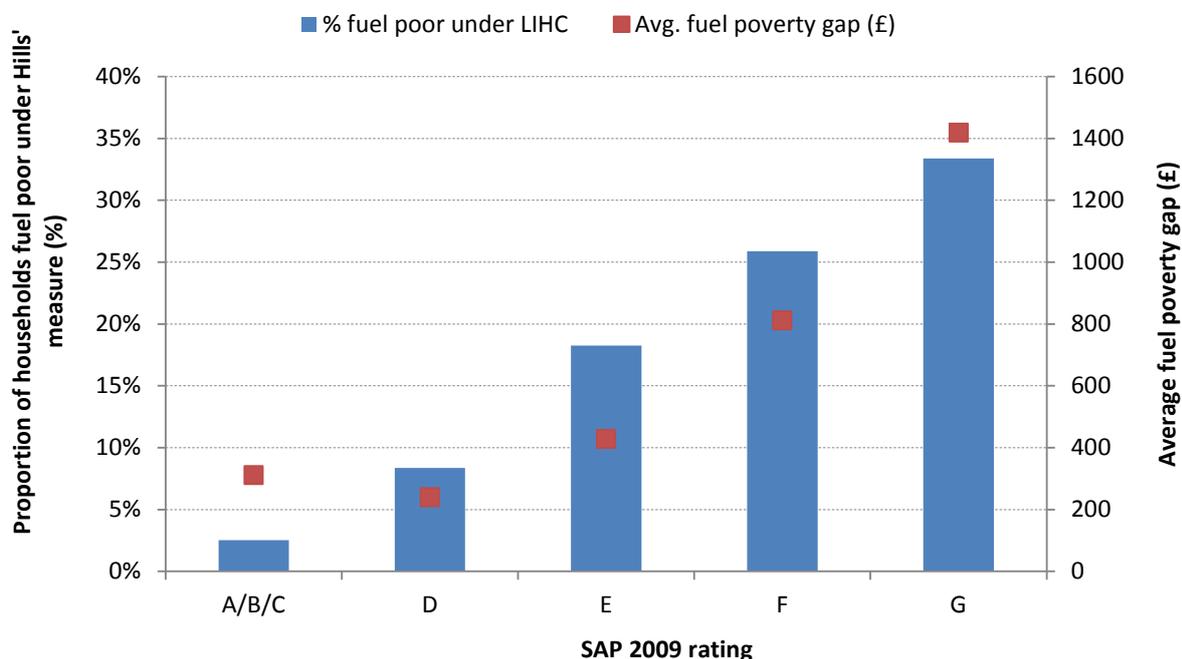
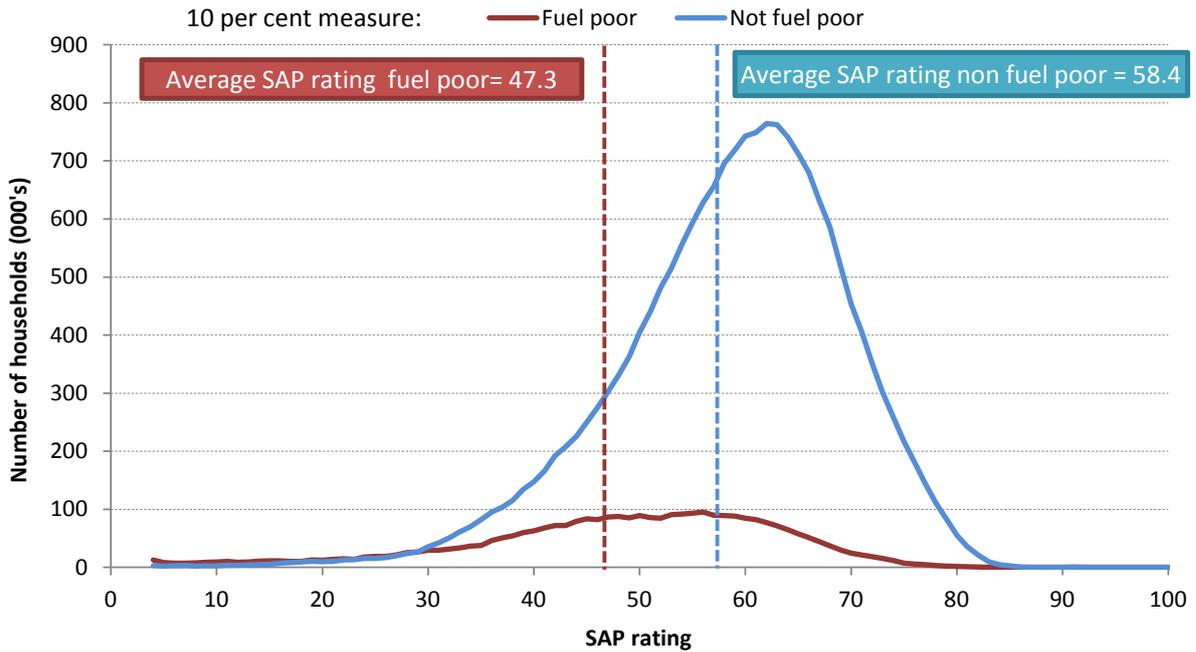


Chart 4.3 below shows the distribution of SAP ratings for both fuel poor and non-fuel poor households under the 10 per cent measure¹⁹. Here it is clearly evident that the fuel poor population have a lower SAP rating in general compared to the non-fuel poor population, with the non-fuel poor population more concentrated towards the higher SAP ratings. In 2011, the average SAP rating among fuel poor households under the 10 per cent measure was 47.3, and among non-fuel poor households, 58.4.

Similarly under the low income high costs measure, fuel poor households (LIHC) and households with high incomes and high costs (HIHC) also have notably lower SAP ratings compared to households in the two, *low* energy costs quadrants. In 2011, the average SAP rating for fuel poor households and households with high incomes and high energy costs was 49.3 and 50.3 respectively, this compares to an average SAP rating of 63.6 for households in the low energy costs quadrants.

¹⁹ Both distributions presented here have been smoothed using a seven point moving average.

Chart 4.3: Distribution of SAP ratings of fuel poor and non-fuel poor households, 2011

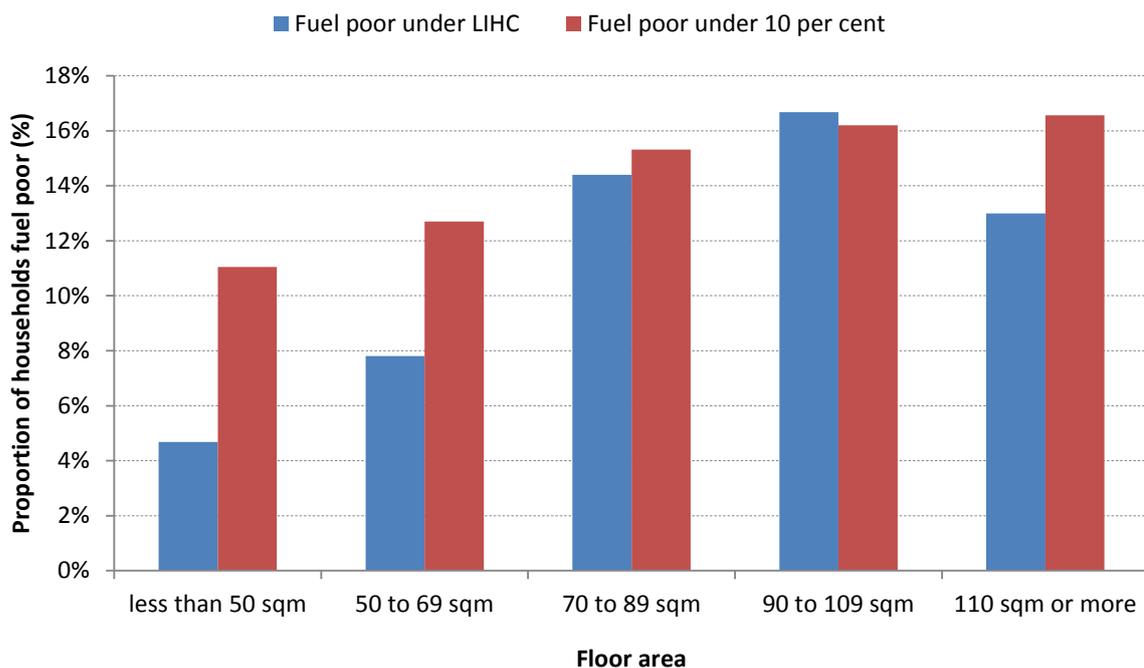


Floor Area

The size of the dwelling and its age are important components in the construct of the SAP measure, and so consequently also influence the propensity of fuel poverty in households. The remainder of this section examines the relationship between fuel poverty and these dwelling characteristics.

Chart 4.4 shows the poverty rates under both the 10 per cent measure and Hills' low income high costs measure by the property size.

Chart 4.4: Fuel poverty by the floor area of the property, 2011



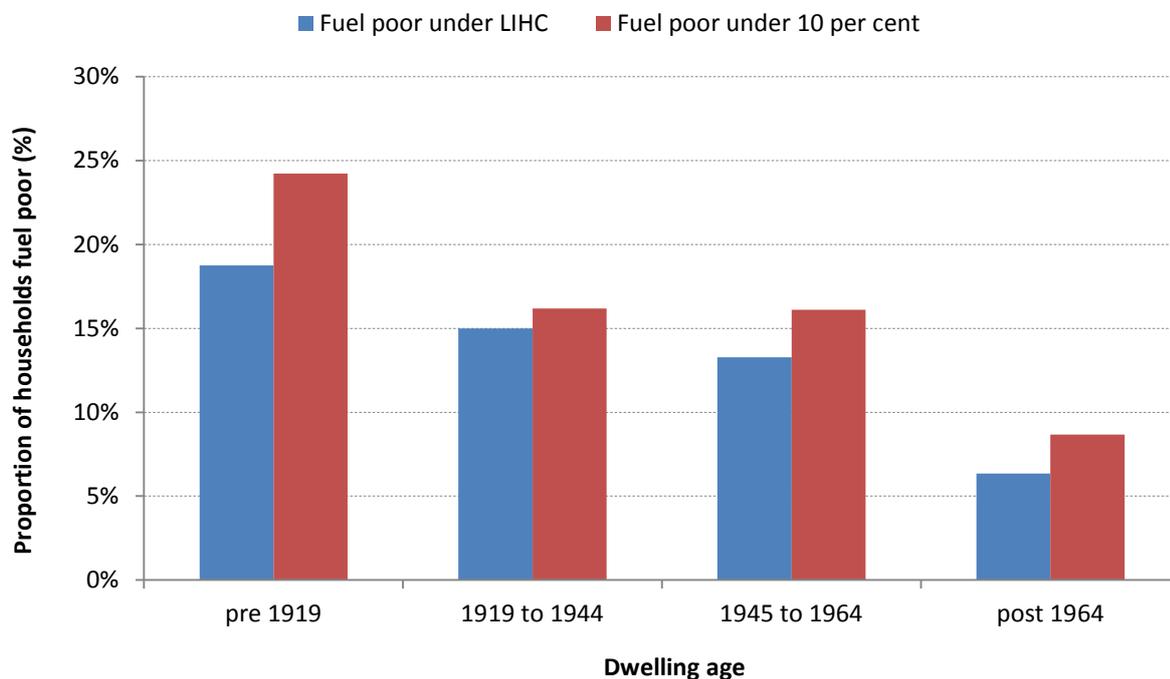
From the above chart it is clear that the propensity to be fuel poor increases with increasing property sizes. Under the 10 per cent measure, these increases are broadly linear, with 17 per cent of households living in the larger property sizes (110m² or more) being fuel poor compared to 11 per cent of households living in smaller accommodation (less than 50m²).

Under the low income high costs measure, a more marked increase is seen for each increasing dwelling size up until the 90-109m² category, with fuel poverty levels increasing from five per cent for households living in properties less than 50m² in size, to 17 per cent for properties between 90-109m². Households living in properties larger than 110m² however, have a fuel poverty rate of 13 per cent. This reflects the nature of the low income and high costs measure, as households living in larger properties tend to also have higher incomes, which take them above the income threshold. The depth of fuel poverty in these larger homes (110m² or more) however, is the most severe, with fuel poor households having almost three times the average fuel poverty gap of households living in smaller properties of less than 50m², with average fuel poverty gaps of £825 and £280 respectively.

Dwelling Age

Much of the larger housing stock, are pre-war properties which generally have lower energy efficiency standards and therefore higher fuel costs. Chart 4.5 illustrates the fuel poverty levels under both the 10 per cent and Hills' low income high costs measure by age of construction of property.

Chart 4.5: Fuel poverty by age of the property, 2011



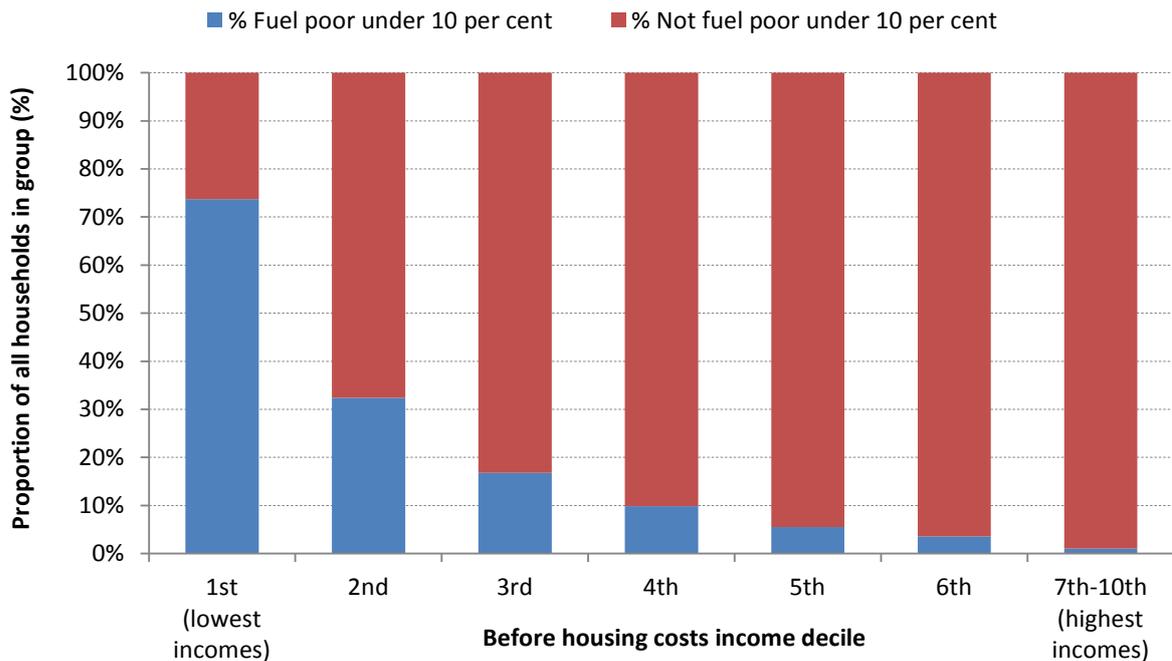
In 2011, households living in properties built prior to 1919 were three times as likely to be fuel poor as households living in properties built post 1964 under both the 10 per cent and the low income high costs measure. The associated average fuel poverty gap under the low income high costs measure also decreases with new dwellings. The average fuel poverty gap in post 1964 properties was £298 compared to £652 in pre 1919 properties.

4.2 Fuel poverty and household income

Income Decile

Household incomes are directly used in calculating both fuel poverty measures and so, are strong determinants of whether or not households are classed as fuel poor. In general, a higher household income reduces the likelihood of the household to be fuel poor. Chart 4.6 below shows this relationship between fuel poverty and income for the 10 per cent measure.

Chart 4.6: Fuel poverty under the 10 per cent measure, by the income decile group, 2011



The above chart shows a reducing proportion of households living in fuel poverty with increasing levels of income, under the 10 per cent measure. Just under three quarters of all households in the lowest income decile live in fuel poverty. This proportion falls to under a third for those living in the second income decile, and a sixth for those in the third income decile group. In 2011, half of fuel poor households are from the lowest income decile, compared to just three per cent from the higher income deciles, seven to ten.

Incomes (after housing costs) are used to delineate the income threshold under the Hills' low income high costs metric, and so by definition, this means that households classed as fuel poor will *only* be from the lower end of the income spectrum. Under the low income high costs measure of fuel poverty in 2011, all fuel poor households came from the bottom four income decile groups. Table 4.1 shows the levels of fuel poverty and the corresponding average fuel poverty gap under the low income high costs measure.

Table 4.1: Levels of fuel poverty under the Hills' low income high costs measure by income decile groups, 2011

After housing costs income deciles	Number fuel poor (000's)	Proportion fuel poor (%)	Avg. Fuel poverty gap (£)
1st decile	963	44%	446
2nd decile	890	41%	430
3rd & 4th deciles*	717	16%	473
All households	2,570	12%	448

* By definition fuel poor households will come from the bottom deciles, and in 2011, the entire fuel population came from the bottom four deciles.

The above table shows that the proportion of households living in fuel poverty under the low income high costs measure also reduces with increasing levels of income. In 2011, 44 per cent of all households in the lowest income decile group were fuel poor. This compares to 41 per cent of all households in the second decile group and 16 per cent of all households in the third and fourth income decile groups. Within the fuel poor population itself, around 37 per cent of all households were from lowest income decile group, 35 per cent from the second income group and a further 28 per cent from the third and fourth combined income decile groups.

Working Status

Economic activity is strongly linked to income and in around 62 per cent of households in the lowest income decile group (before housing costs), the household reference person²⁰ (HRP) was classified as economically inactive in 2011, while a further 15 per cent were unemployed. This compares to 38 per cent economically inactive and four per cent unemployed across all households.

Table 4.2: Levels of fuel poverty by economic activity, 2011

Economic activity	10 per cent measure	Hills' measure	
	Proportion fuel poor (%)	Proportion fuel poor (%)	Avg. fuel poverty gap (£)
Inactive	24%	14%	429
Unemployed	40%	34%	384
Working	7%	9%	482
All households	15%	12%	448

Table 4.2 shows that the fuel poverty rate is highest among the unemployed population for both measures of fuel poverty. This suggests that being unemployed increases the risks of being fuel poor. However, only around a tenth of fuel poor households (under both measures) are unemployed.

²⁰ The Household Reference Person (HRP) is the person in whose name the dwelling is owned or rented or who is otherwise responsible for the accommodation. In the case of joint owners and tenants, the person with the highest income is taken as the HRP. Where incomes are equal, the older is taken as the HRP. This procedure increases the likelihood that the HRP better characterises the household's social and economic status.

4.3 Household characteristics

Household composition

Fuel poverty rates vary notably between different household characteristics for both measures of fuel poverty. However, the patterns seen under these measures are different due to the distinct construct of the measures themselves. In the 10 per cent measure of fuel poverty, the direct (full) income and fuel costs of a typical household are considered in determining whether or not the household is in fuel poverty. Under the Hills' low income high costs measure, the income (this time *after* housing costs) and fuel costs, are equivalised to be representative of the number, and composition of the occupants of the households (as explained in Annex C). In addition, the thresholds used in the low income high costs metric ensure that *only* households on very low incomes and with considerably high fuel costs, are considered as fuel poor. This cut off does not exist under the 10 per cent measure.

Table 4.3 shows that under the 10 per cent measure, single person households are far more likely to be fuel poor than other household types. In the over 60 groups 29 per cent of one person households were fuel poor compared to 15 per cent of couples aged over 60 (with no dependent children). Similarly, in the under 60 groups, 24 per cent of one person households were fuel poor compared to five per cent of couples under the age of 60 (with no dependent children). One reason for this is that single person households tend to have the lowest average annual incomes compared to other groups, with one person households under 60 on an average income of £17,900 per annum and one person households over 60 with an income of around £14,700. This compares to a national average income of £28,800 per annum.

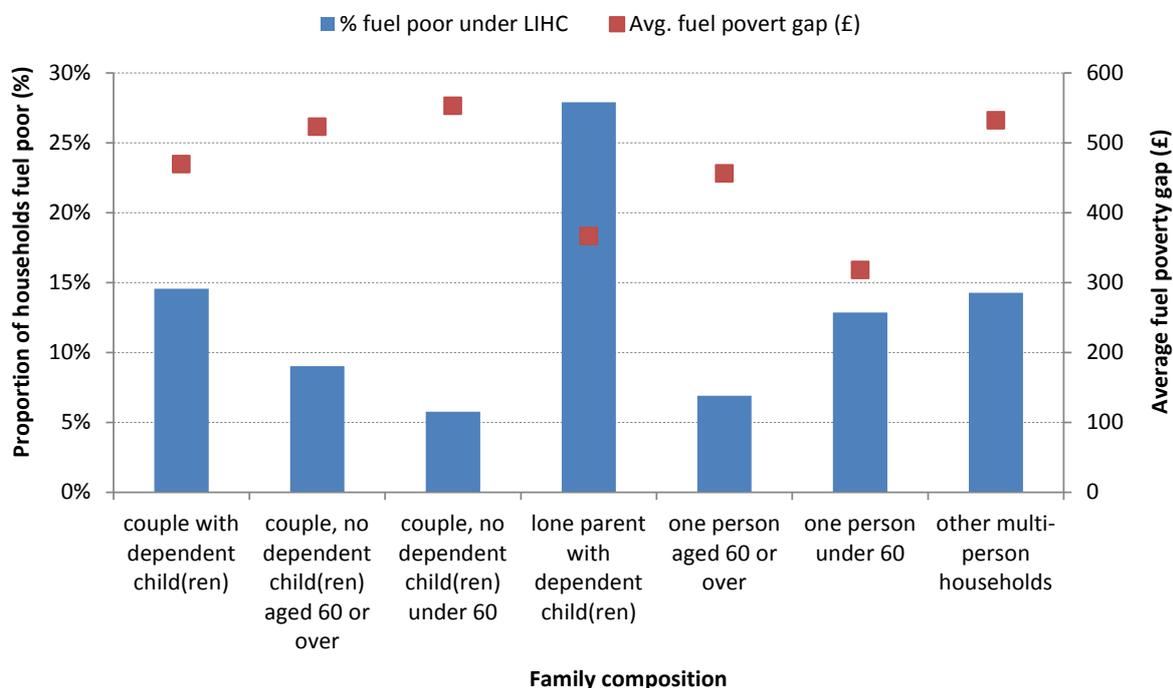
Table 4.3 – Fuel poverty rates and average annual income by household composition, 2011

Household composition	Proportion of households in the population (%)	Proportion fuel poor under 10 per cent (%)	Average annual income (£)
couple with dependent child(ren)	23%	7%	38,200
couple, no dependent child(ren) aged 60 or over	18%	15%	28,300
couple, no dependent child(ren) under 60	17%	5%	40,600
lone parent with dependent child(ren)	8%	14%	19,600
one person aged 60 or over	14%	29%	14,700
one person under 60	13%	24%	17,900
other multi-person households	7%	14%	30,100
All households	100%	15%	28,800

In 2011, half of all fuel poor households under the 10 per cent measure came from single person households, and a further one in five were couples over 60.

The chart below shows the levels of fuel poverty and associated average fuel poverty gaps under the low income high costs measure.

Chart 4.7: Fuel poverty and average fuel poverty gap under Hills' low income high costs, by the household composition, 2011



In this case, over a quarter of all lone parent households are in fuel poverty under the low income high costs measure in 2011, compared to 15 per cent of couples with dependent children. The average fuel poverty gap for lone parent households is however one of the lowest (£367), slightly above that for young, single person households (with a gap of £318). This reflects the relatively lower energy costs incurred by such households who generally tend to occupy smaller, more energy efficient properties.

Larger household types, such as multi-person households and households with dependent children, are also more likely to be fuel poor compared to smaller households. For example, 15 per cent of couples *with* dependent children are fuel poor, compared to seven per cent of couples with no dependent children. Although the propensity of being fuel poor is lower for couples with no dependent children, the *depth* of fuel poverty, as shown by higher average fuel poverty gaps, experienced by the average household in this group is greater than that observed for households with dependent children.

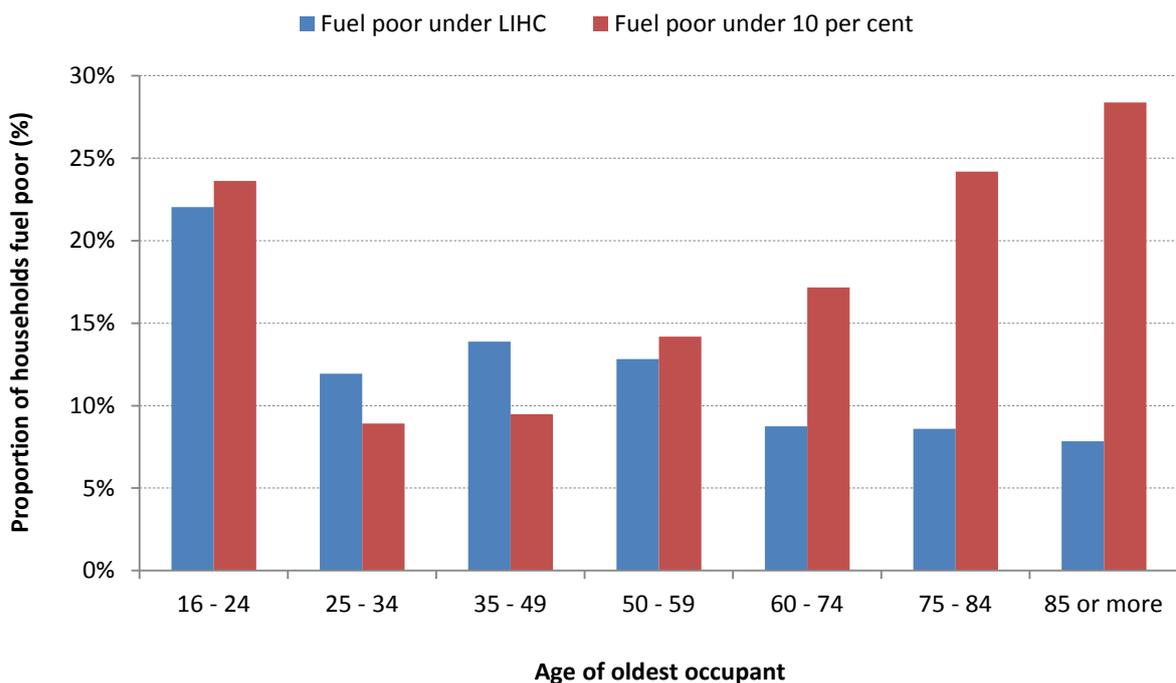
Age

Under the 10 per cent measure, with the exception of households where the oldest person is below 25, the fuel poverty rate increases broadly linearly with the age of the oldest household member (Chart 4.8). Around a fifth of all households, where the oldest person is aged between 60 and 84, were living in fuel poverty in 2011. For those households where the oldest member is 85 or over, around 28 per cent were living in fuel poverty. These patterns are generally aligned with the patterns observed for the average annual income. That is, households with lower incomes, such as 16-24 year olds or the over 60 year olds group, both of which have high proportions of economically inactive HRPs, generally have a greater tendency to be fuel poor.

In contrast, under the low income high costs measure, fuel poverty is highest among 16-24 year olds and lowest among households with older occupants. Under this measure, in 2011, less than one in ten households with someone aged 60 or more were fuel poor. This is one third the rate of the under 25 year olds group. The reason for the increased propensity of being fuel poor in the under 25 year old group, is part due to their lower average earnings and part due to the fact that the majority of this age group (around two-thirds) live in rented accommodation, which tends to be less energy efficient and thus have high fuel costs. In addition, over three-quarters of the over 60 year old age group own the property they live in and so have reduced housing costs and higher disposable incomes compared to all other age groups.

With the exception of households where the oldest person is below 25, the depth of fuel poverty increases as the age of the oldest household member increases. The average fuel poverty gap for households where the oldest member is aged 25-34 was £355. This compares against an average gap of £503 for households with where the oldest member is aged 60 or more. This shows that despite having a reduced likelihood of being fuel poor in the over 60 group, those that are fuel poor, are more deeply in fuel poverty.

Chart 4.8: Fuel poverty by age of the oldest household member, 2011



To illustrate further, table 4.4 shows this distribution of tenure and HRP employment status by the age of the oldest household member.

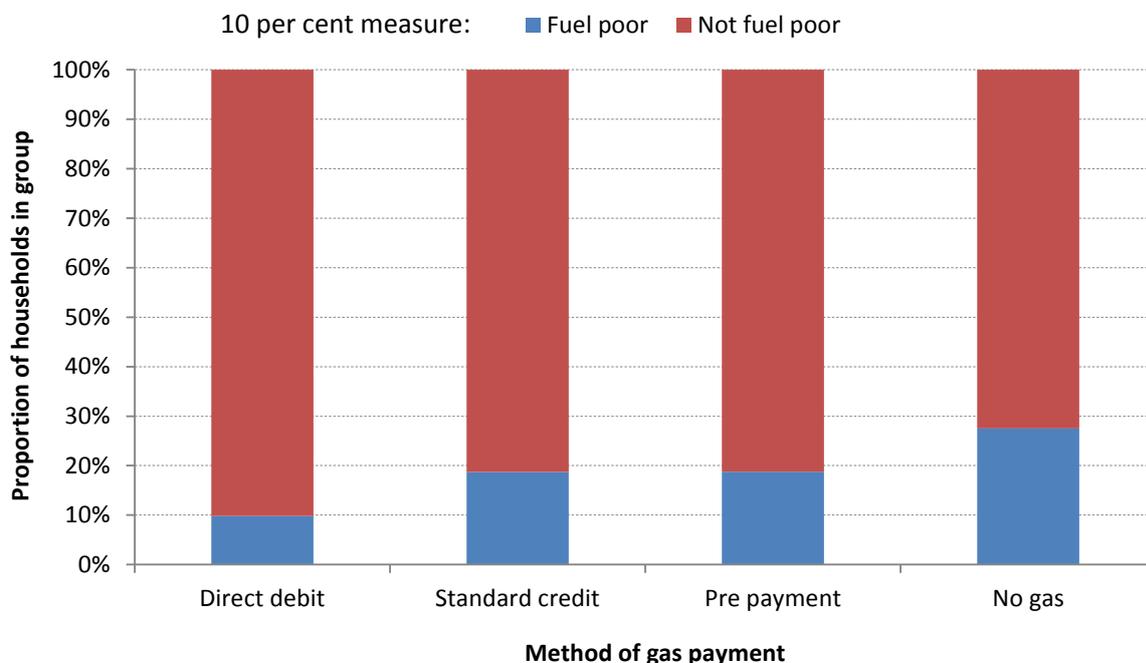
Table 4.4 – Distribution of households by tenure and employment status by the age of the oldest household member, 2011

Age of the oldest household member	Tenure			HRP employment status		
	Owner occupied	Private rented	Social	Inactive	Unemployed	Working
16 - 24	11%	65%	24%	40%	11%	48%
25 - 34	39%	44%	17%	14%	7%	79%
35 - 49	64%	19%	17%	11%	5%	84%
50 - 59	73%	9%	18%	16%	5%	79%
60 or more	77%	6%	18%	76%	1%	24%
All households	66%	17%	17%	38%	4%	59%

4.4 Fuel payment methods

Expenditure on heating is the key element of household energy use when calculating fuel poverty. Therefore the following charts show the proportion of households who are fuel poor by how they pay for their gas consumption, the main heating fuel.

Under the 10 per cent measure, households paying for their gas consumption by direct debit have the lowest fuel poverty rate, with just under one in ten spending more than 10 per cent of their income on fuel costs. Whilst twice as many households paying by either standard credit or using a pre-payment meter were classed as fuel poor in 2011.

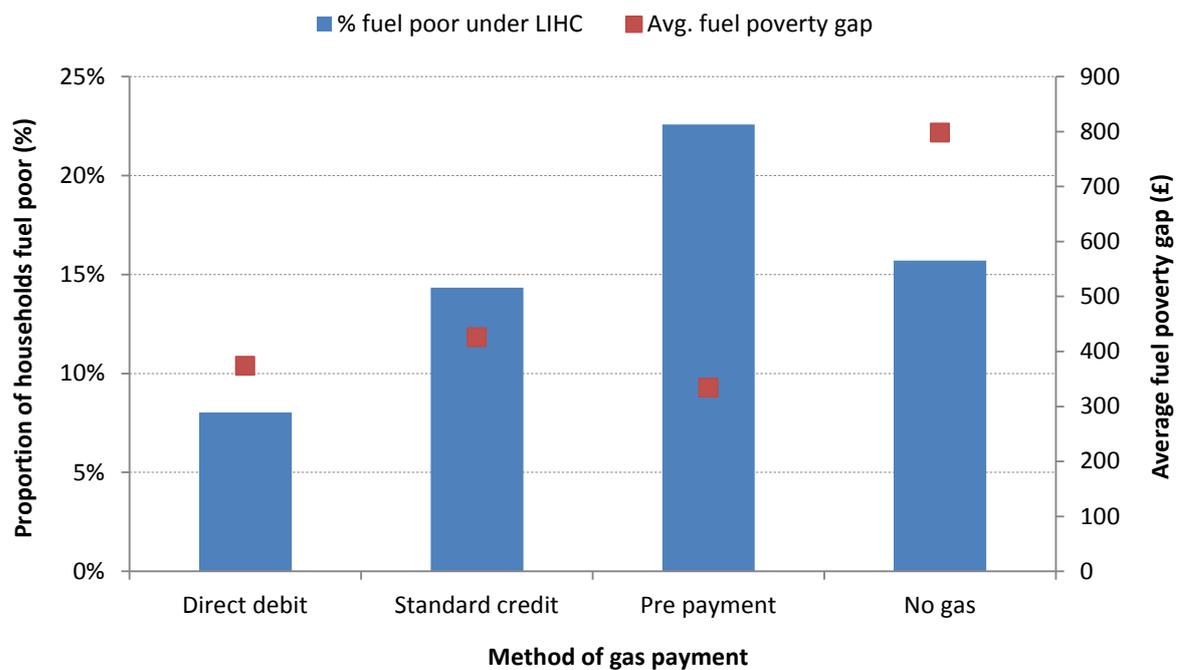
Chart 4.9: Fuel poverty under the 10 per cent measure, by payment method for gas, 2011

However, a relatively small proportion of fuel poor households actually use pre-payment meters for their gas consumption. In 2011, of all fuel poor households under 10 per cent, 14 per cent used pre-payment meters for gas, compared to 11 per cent of the non-fuel poor population using this payment method. Moreover, a significantly smaller proportion of fuel poor

households pay using direct debit, 40 per cent compared to 62 per cent of households who are not fuel poor. Around 24 per cent of fuel poor households do not use gas.

Chart 4.10 shows the fuel poverty rate and associated average fuel poverty gaps by the gas payment method under Hills' low income high costs.

Chart 4.10: Fuel poverty and the associated average fuel poverty gap under Hills' low income high costs, by payment method for gas, 2011



Under the low income high costs measure, households paying for their gas consumption by direct debit have the lowest fuel poverty rate, with around eight per cent in fuel poverty in 2011. This contrasts against 14 per cent of all households paying through standard credit, and 23 per cent of all households using pre-payment meters.

Of all fuel poor households under the low income high costs measure, just over one in five used pre-payment meters for their gas consumption in 2011. This compares to one in ten non-fuel poor households. In contrast, a significantly larger proportion of the non-fuel poor households pay for their gas consumption using direct debit compared to fuel poor households (61% vs. 40%).

4.5 Regional fuel poverty

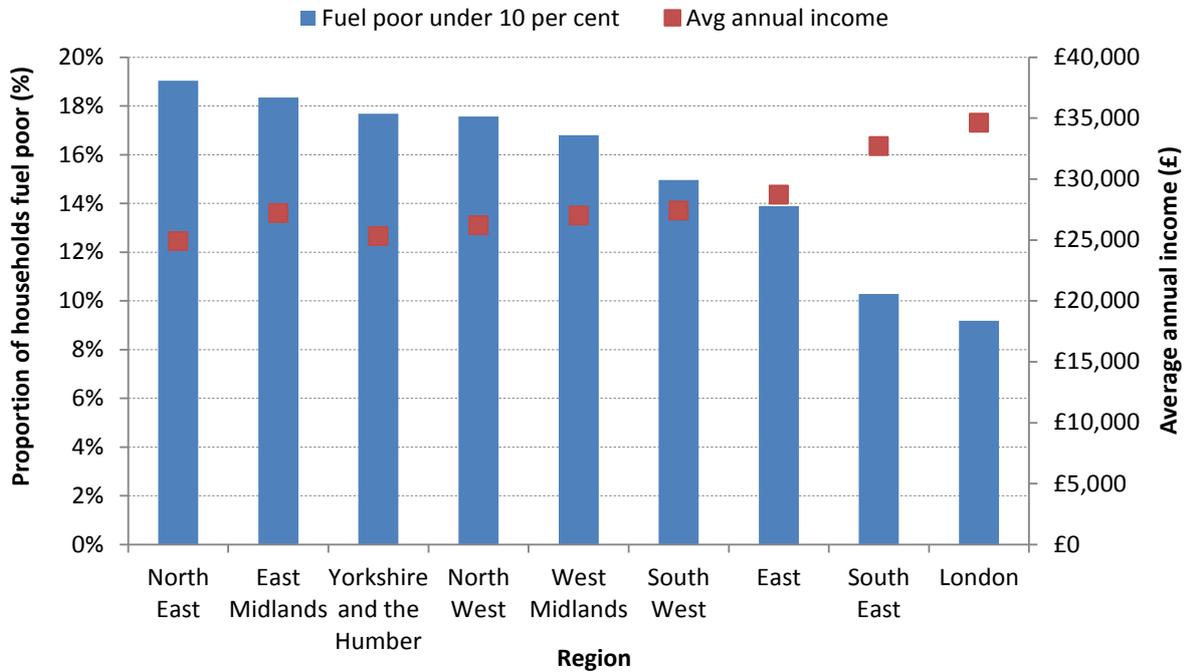
Fuel poverty rates differ notably across the country under both measures.

Under the 10 per cent measure of fuel poverty, in 2011, the North East had the highest fuel poverty rate, with around 19 per cent of households needing to spend more than 10 per cent of their income on fuel costs (Chart 4.11). In contrast, London had the lowest fuel poverty rate at 9 per cent, followed by the South East (at 10%).

Looking at the average annual incomes across the regions, it is clear that there is an inverse relationship between the average income in a region and the associated level of fuel poverty in

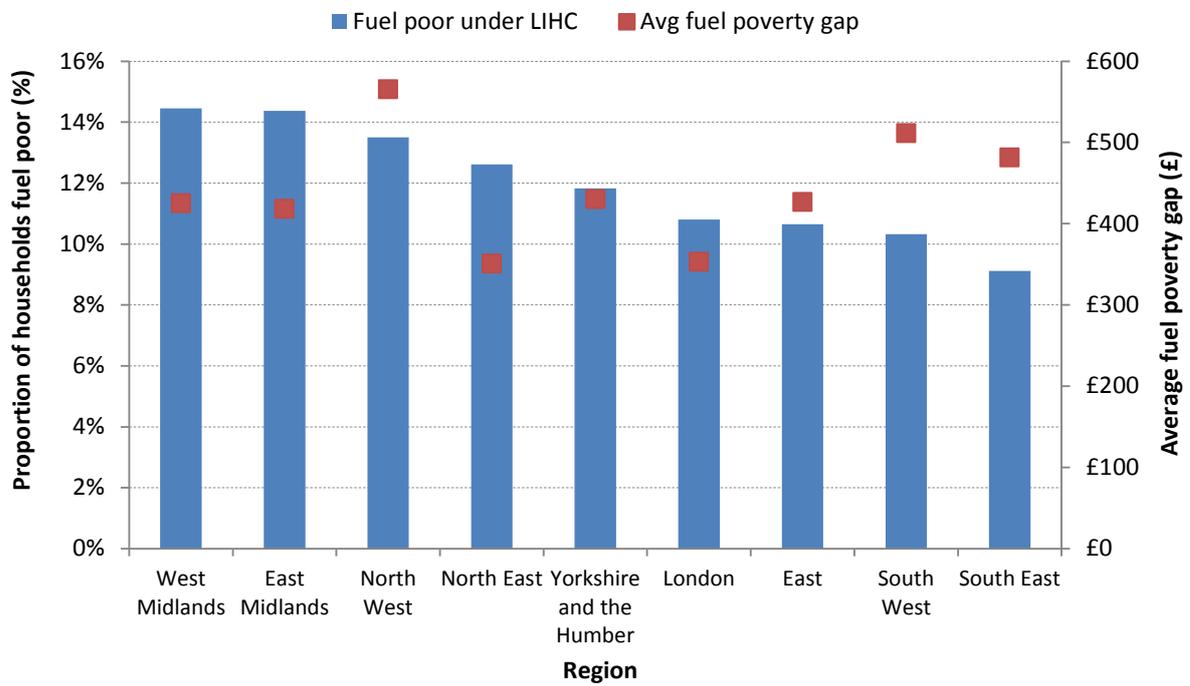
that region. In general, the fuel poverty rates are highest in the regions with the lowest average annual income levels.

Chart 4.11: Fuel poverty under the 10 per cent measure and average annual income by English regions, 2011



Under the low income high costs measure, the highest rate of fuel poverty was seen in the West Midlands followed closely by the East Midlands, with around 14 per cent of households classed as fuel poor. In contrast, households living in the South East and South West have the lowest levels of fuel poverty (at 9% and 10% respectively).

Chart 4.12: Fuel poverty and the associated average fuel poverty gap under Hills' low income high costs, by payment method for gas, 2011



The next chapter will examine the longer term trends behind some of these key drivers to fuel poverty.

Chapter 5: Trends in fuel poverty in England, 2003 to 2011

This chapter considers some of the key changes in fuel poverty between 2003 and 2011 in England, for both the 10 per cent and low income high cost measures of fuel poverty. Trends in energy efficiency and particular household characteristics are examined in further detail here, including how these relate to fuel poverty over this period.

The figures behind the analysis in this chapter are available online at:

<https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/fuel-poverty-statistics>

Overall, the number of households in fuel poverty has reduced since 2010 under both the 10 per cent and the Hills' low income high costs measures. In 2011, 3.2 million households were in fuel poverty under the 10 per cent measure, a fall from 3.5 million in 2010, a decrease of nine per cent. Similarly, the number of households under the low income high costs measure also fell from 2.7 million in 2010 to 2.6 million in 2011, representing a drop of four per cent. Reasons behind the differences are explained in Chapter 3.

5.1 Energy efficiency

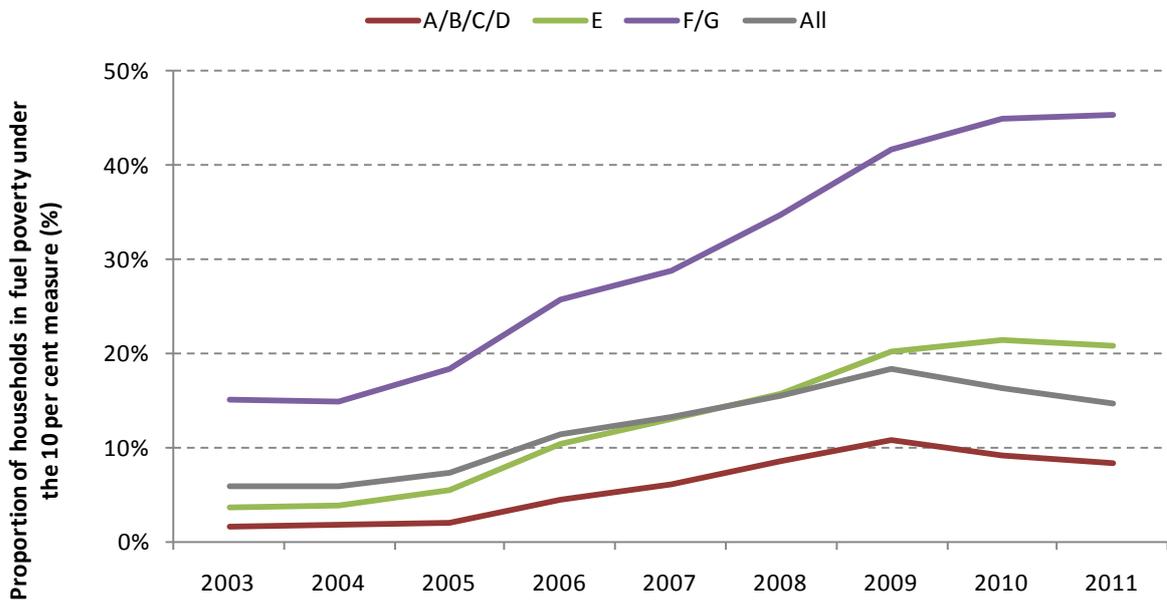
SAP

The SAP rating is a measure of the energy efficiency of a property, and uses a numerical scale of one to 100. Alphabetical bandings between A-G are also used to represent SAP scores. Here, properties with a SAP score of A (the high end of the numerical scale) represent the most energy efficient properties, and those with a SAP score of G (the low end of the numerical scale), represent the least energy efficient properties.

Charts 5.1 and 5.3 below show the fuel poverty rates for both the 10 per cent and low income high costs measures, by the different SAP²¹ bands, between 2003 and 2011.

Under the 10 per cent measure (Chart 5.1), it is apparent that fuel poverty rates are strongly correlated to the SAP score. Households living in the least energy efficient properties (rated F or G) consistently have the highest fuel poverty rates, while those in the more energy efficient properties (rated A, B, C or D), have the lowest. In 2003 15 per cent of households in the least energy efficient properties were fuel poor compared to two per cent of households in the most energy efficient properties. In 2011, the percentage point difference between the two groups increased, with around 45 per cent of F and G properties fuel poor, compared to eight per cent of A-D rated properties. It is also worth noting that when fuel poverty rates fell in general from 2009 to 2011, they still rose notably for households in low SAP rated properties.

²¹ Note the SAP measure was updated in 2009. The analysis in this chapter is based on SAP 2005 scores for the period 2003-2008, and SAP 2009 scores from 2009 onwards.

Chart 5.1: Fuel poverty under the 10 per cent measure by SAP, 2003-2011

Note: The measure changed from 2009 onwards, from SAP 2005 to SAP 2009

Chart 5.2 details the average income of households in each of these SAP bands in 2010. Households' on the lowest average incomes, tend to live in properties with either a particularly high or low SAP rating. Those with high SAP ratings are more likely to live in social housing, which is more energy efficient. The properties with the lowest SAP ratings tend to be rural, and are more likely to be privately rented. A large proportion of SAP G properties are either single people households or contain someone aged 60 or over. In 2011, four in ten of all SAP G rated households contained couples or single people aged 60 or over, compared to 31 per cent for all property types.

Chart 5.2: Average income by SAP banding, 2011

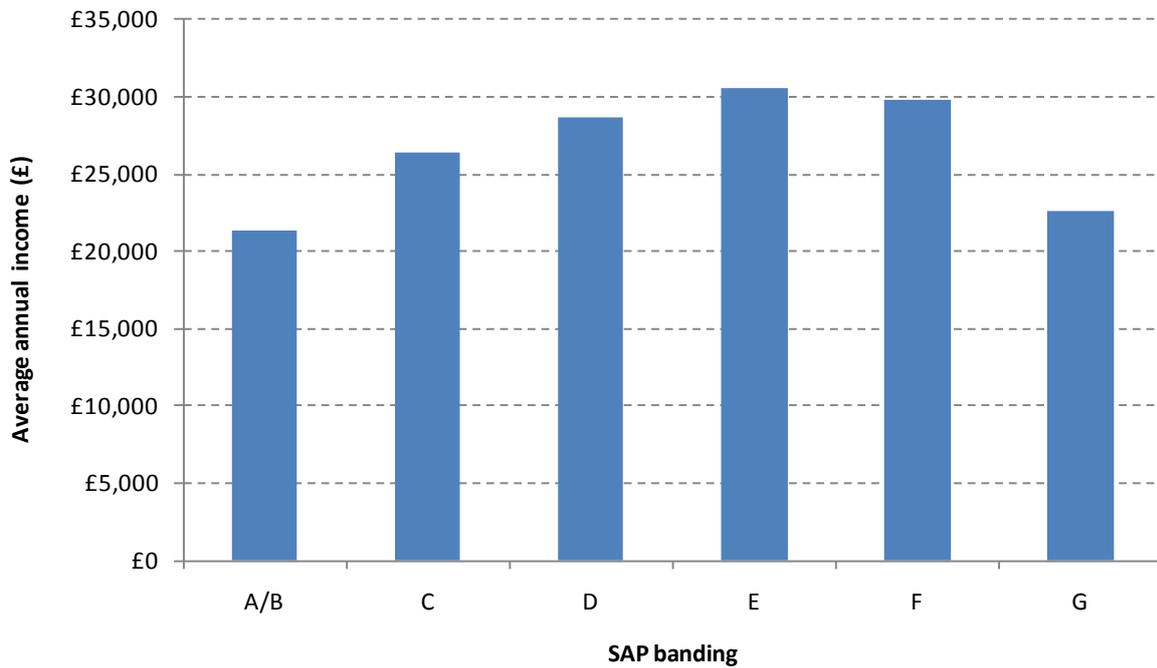
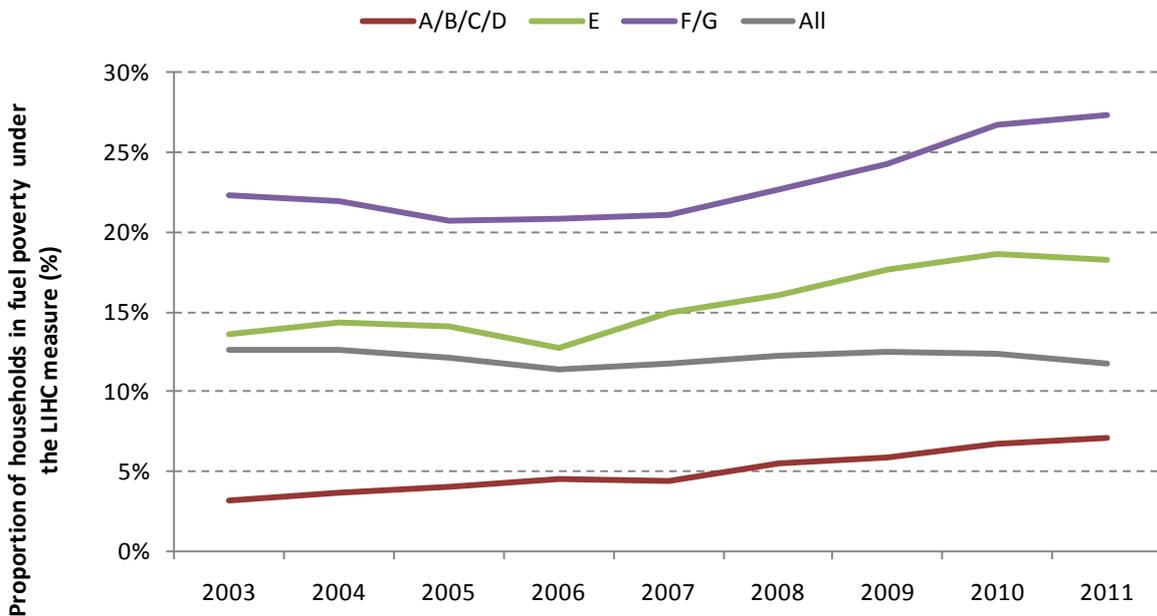


Chart 5.3: Fuel poverty under Hills' low income high costs measure by SAP, 2003-2011



Note: The measure changed from 2009 onwards, from SAP 2005 to SAP 2009

Due to the relative nature of the Hills' measure, the changes seen in Chart 5.3 are more stable. Again, it is apparent that SAP is strongly related to fuel poverty under this measure, with a graduated higher fuel poverty level seen for each deteriorating SAP band over this period. The

proportion of fuel poor households in the least energy efficient properties (SAP F or G) has increased from 21 per cent in 2006 (a recent low) to around 27 per cent in 2011.

Over this period, the average fuel poverty gap increased from £409 in 2003 to £959 in 2011 in the least energy efficient properties. This compares to an increase from £99 to £246 over this period in the most energy efficient households (with SAP ratings of A, B, C or D).

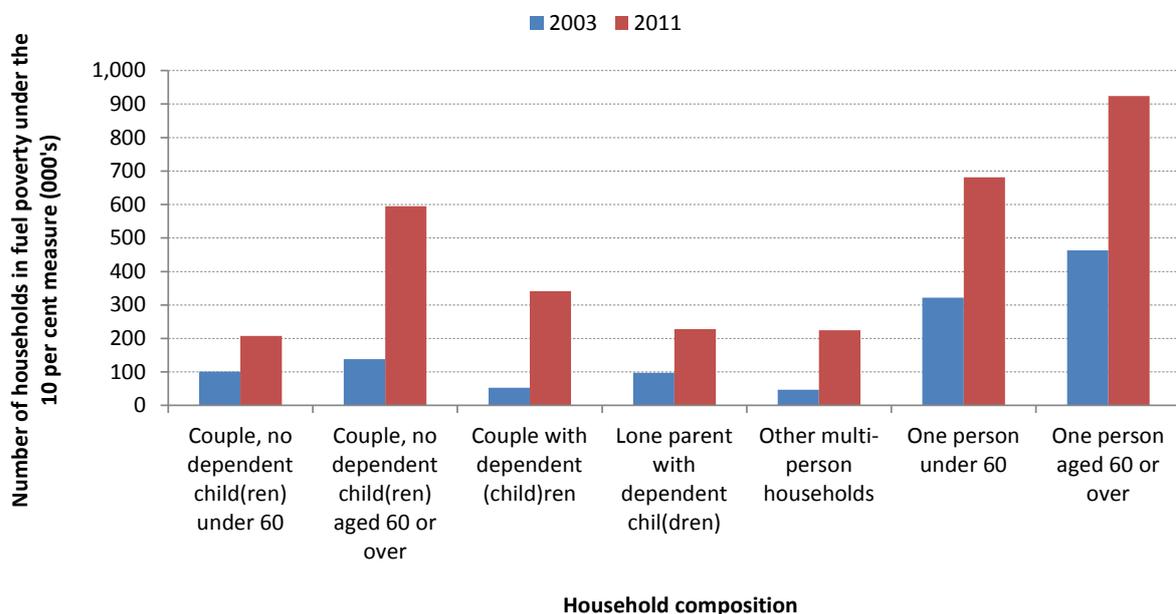
These patterns highlights the importance of improving the energy efficiency in reducing fuel poverty

5.2 Household characteristics

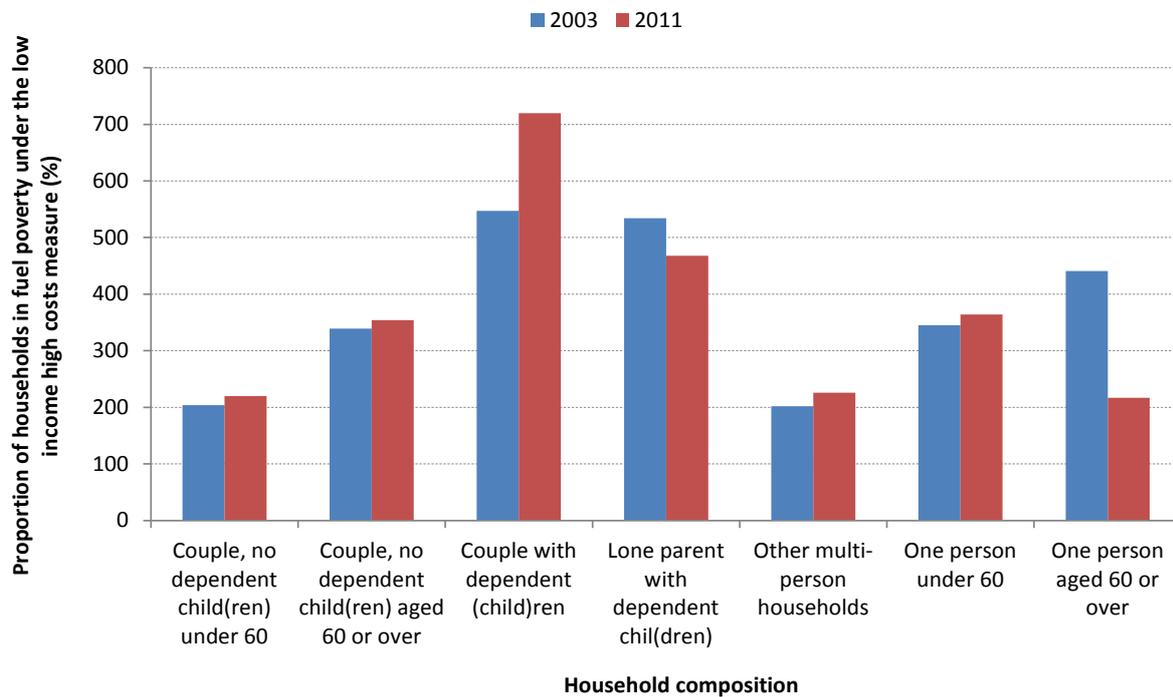
Household composition

Under the 10 per cent measure, fuel poverty levels more than doubled amongst all types of household between 2003 and 2011. The largest increases were seen amongst larger household types, such as couples with children and other multi-person households, with a six and five fold increase seen in their fuel poverty levels respectively. Single person households continue to have the highest fuel poverty rates of all household types, and over the past nine years, levels of fuel poverty have doubled (Chart 5.4).

Chart 5.4: Number of households in fuel poverty under the 10 per cent measure, 2003 and 2011



Under the Hills' low income high costs measure (Chart 5.5), fuel poverty has increased notably for couples with dependent children since 2003, with 173 thousand additional households, representing an increase of four percentage points in fuel poverty. In contrast, older single person households, show the greatest decrease in the level of fuel poverty, with 217 thousand households fuel poor in 2011, compared to 441 thousand in 2003 (a fall of eight percentage points). The reasons for the differences between the two measures are discussed in Chapters 1 and 3.

Chart 5.5: Number of households in fuel poverty under Hills' low income high costs measure, 2003 and 2011

The table below shows the average fuel poverty gaps under the low income high costs measure for each household type, from 2003-2011.

Table 5.1: Time series in average fuel poverty gaps under the low income high costs measure by household composition, 2003-2011

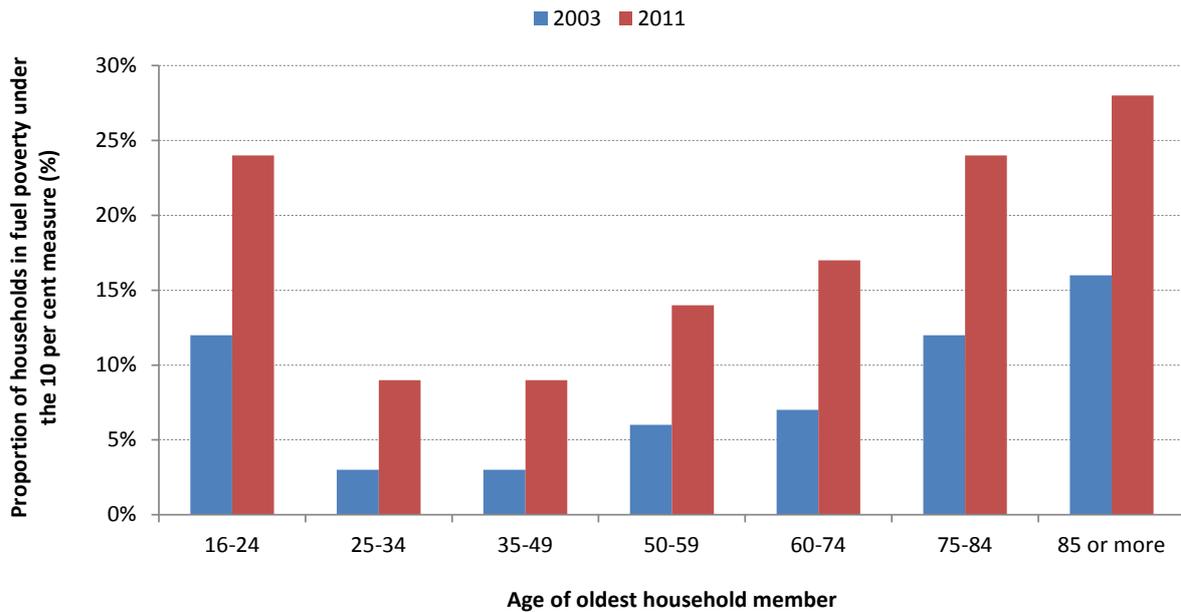
Household composition: Average fuel poverty gap (£) - Real Terms							
Year	Couple, no dependent child(ren) under 60	Couple, no dependent child(ren) aged 60 or over	Couple with dependent (child)ren	Lone parent with dependent chil(dren)	Other multi-person households	One person under 60	One person aged 60 or over
2003	310	238	262	252	309	211	232
2004	328	282	295	267	283	198	230
2005	364	335	367	300	318	247	293
2006	402	398	448	385	439	334	362
2007	357	422	466	374	456	299	340
2008	392	503	473	333	448	304	320
2009	456	480	489	382	549	331	373
2010	410	459	476	390	463	295	450
2011	553	523	470	367	532	318	456

From the above table, it is clear that the average fuel poverty gaps have increased across the board since 2003.

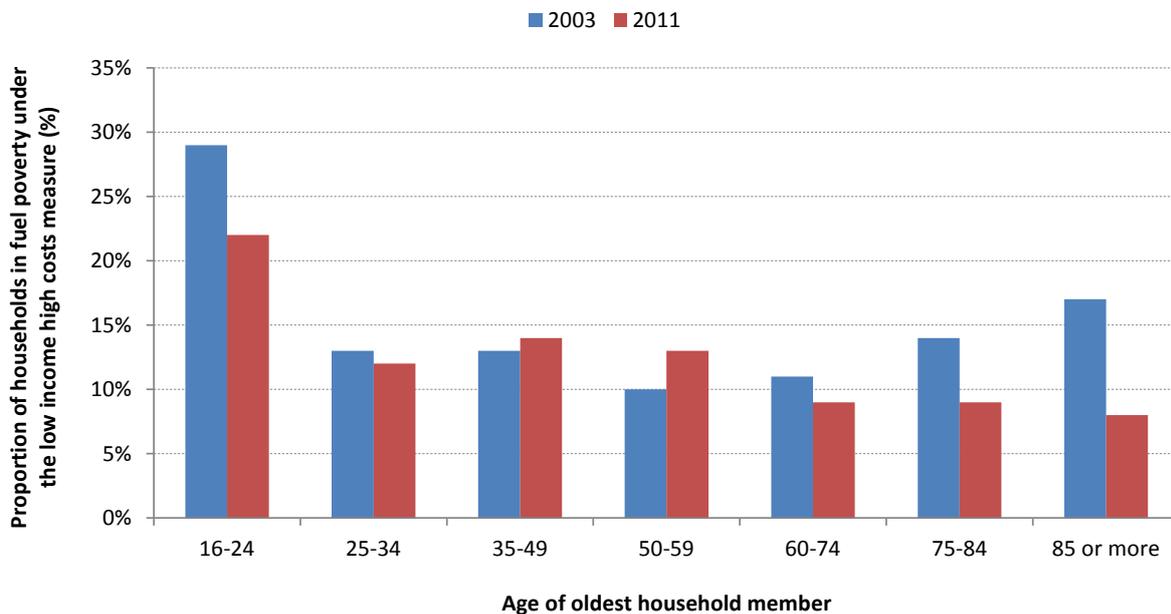
Age

Chart 5.6 shows that levels of fuel poverty under the 10 per cent measure have generally more than doubled across all household age groups (illustrated by age of the oldest occupant) between 2003 and 2011. However, the scale of these increases varies, with three-fold increases (the largest) seen in the groups where the oldest occupant is aged between 25 and 49.

Chart 5.6: Fuel poverty rates under the 10 per cent measure by the age of the oldest occupant, 2003 and 2011



Under the Hills' low income high costs measure however, fuel poverty rates have increased only slightly for households where the oldest occupant is aged between 35 and 59. The remaining age groups have all seen a decrease in their fuel poverty rates (Chart 5.7). Households with occupants aged 85 or more, saw a nine percentage point drop in their fuel poverty rate, from a high of 17 per cent in 2003 to around eight per cent in 2011. The next largest fall was for the 16-24 year old age group, here the fuel poverty rate fell from 29 per cent in 2003 to 22 per cent in 2011. It should be noted that 35-59 year olds have the highest fuel poverty levels, with around 887 thousand households' fuel poor in 2011, a substantial rise from 810 thousand in 2003.

Chart 5.7: Fuel poverty rates under the Hills' low income high costs measure by the age of the oldest occupant, 2003 and 2011**Table 5.2: Time series in average fuel poverty gaps under the low income high costs measure by the age of the oldest occupant, 2003-2011**

Age of oldest occupant: Average fuel poverty gap (£) - Real Terms							
Year	16-24	25-34	35-49	50-59	60-74	75-84	85 or more
2003	258	223	268	258	242	249	275
2004	291	214	270	314	247	271	236
2005	254	266	332	357	318	313	336
2006	293	290	439	434	405	330	512
2007	337	303	422	421	395	395	395
2008	330	326	407	423	427	460	332
2009	361	343	460	428	475	447	394
2010	399	310	429	429	455	462	482
2011	413	355	419	496	464	539	700

The above table shows that despite the largest drop in fuel poverty seen in the over 85 group, the depth of fuel poverty for households in this group has more than doubled since 2003, with an average fuel poverty gap of £700 in 2011.

5.3 Employment status

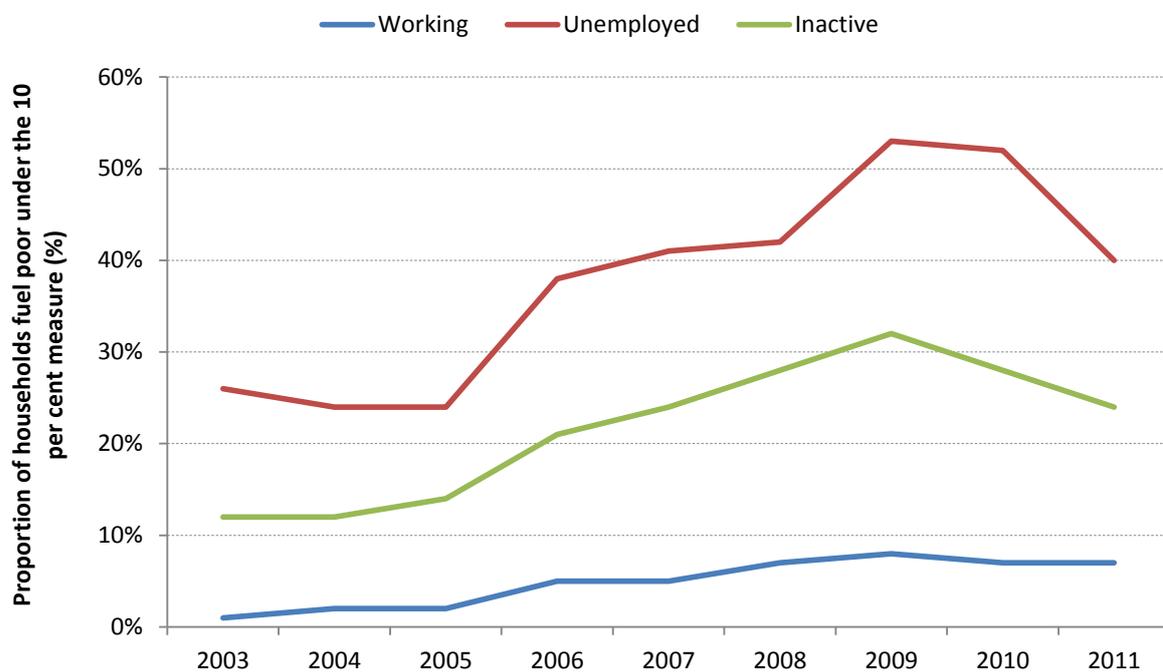
For our purposes, employment is defined as the employment status of the household reference person (HRP) within the English Housing Survey.

The number of fuel poor households under the 10 per cent measure has fallen among households with unemployed or inactive HRPs (with drops of 15% and 14% respectively) since 2010, but increased by five per cent in households with working HRPs. Part of the reason for this shift is due to the increases in average income levels in households with unemployed or inactive HRPs, compared to that of households with working HRPs. Since 2010, annual

average income levels increased by 2.8, 5.1 and 0.3 per cent for households with unemployed, inactive and working HRPs and 1.1 per cent nationally²².

Overall, the fuel poverty rate for unemployed households fell from 52 per cent in 2010 to 40 per cent in 2011, although it is still significantly higher than the recent low of 24 per cent seen in 2005. The fuel poverty rate in inactive households also fell, albeit to a lesser extent, from 28 per cent in 2010 to 24 per cent in 2011. This is still twice the rate seen for inactive households in 2003. Working households have steadily seen their fuel poverty rates rise over this period, from a low of one per cent in 2003, to seven per cent in 2011 (Chart 5.8).

Chart 5.8: Fuel poverty rates under the 10 per cent measure by HRP employment status, 2003-2011



Under the Hills' low income high costs measure, unemployed households continue to have the highest fuel poverty rates of all household employment types (generally, over 20 percentage points higher than that seen in inactive households). In contrast, households with working HRPs, consistently have the lowest rates. The overall trend in fuel poverty rates among unemployed households is also far more erratic than the trends seen in either inactive or working households.

In 2011, the fuel poverty rate in unemployed households fell to 34 per cent (representing 284 thousand unemployed households). This is a drop of 10 percentage points since 2010, and an overall drop of nine percentage points since 2003. Fuel poverty rates among inactive households, steadily declined from a high of 20 per cent in 2003 to around 14 per cent in 2011. In contrast, the fuel poverty rates among working households have increased slightly from seven per cent in 2003 to nine per cent in 2011 (Chart 5.9).

²² These figures are based solely on the 2011 EHS.

Chart 5.9: Fuel poverty rates under the Hills' low income high costs measure by HRP employment status, 2003-2011

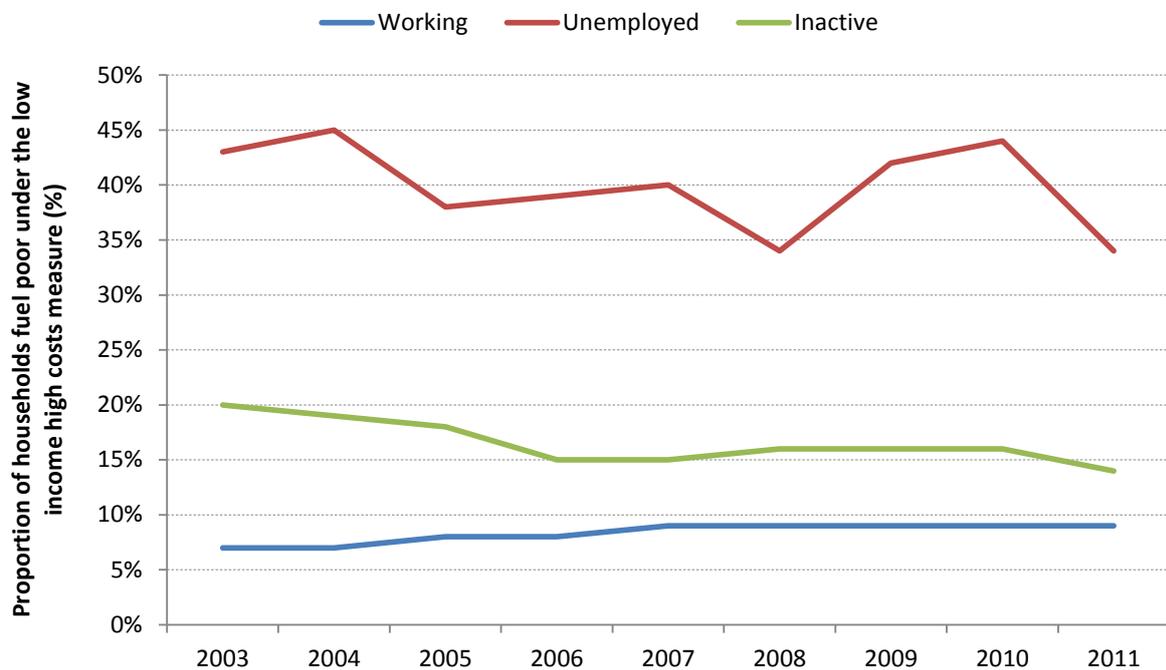


Table 5.3 below shows the average fuel poverty gaps over this period by HRP employment status.

From the table, it is apparent that despite unemployed households having the highest fuel poverty rates, the average fuel poverty gap for this group, is on average, the lowest. Since 2003, the average fuel poverty gap increased by 1.3 for unemployed households and almost doubled for both inactive and working households.

Table 5.3: Time series in average fuel poverty gaps under the low income high costs measure by HRP employment status, 2003-2011

HRP employment status: Average fuel poverty gap (£) - Real Terms			
Year	Working	Unemployed	Inactive
2003	252	297	246
2004	288	252	254
2005	357	298	296
2006	447	415	353
2007	447	330	359
2008	431	294	388
2009	457	423	418
2010	438	438	404
2011	482	384	429

Chapter 6: Sub-regional fuel poverty in 2011

Following a consultation of the key users of sub-regional data in March 2010, DECC found that there was a clear demand for sub-regional fuel poverty statistics to be produced on an annual basis, and are committed to serving this need where possible. Over the past couple of years we have also been able to improve the timeliness of these statistics, such that we now present sub-regional fuel poverty data alongside the national and regional fuel poverty data. This chapter focuses on sub-regional fuel poverty under the 10 per cent measure of fuel poverty. Sub-regional data based on the low income high costs measure of fuel poverty will be published with the release of the additional statistical report.

DECC has recently undertaken a review of the methodology used to produce sub-regional estimates of fuel poverty, in conjunction with the ONS Methodology Advisory Service. This work found that estimates of fuel poverty were robust at local authority level, but were not robust at very low level geographies. As a result, DECC will no longer be providing estimates at Census Output Area (COA) level on request. Estimates of fuel poverty at Lower Super Output Area (LSOA) should also be treated with caution. The estimates should only be used to describe general trends and identify areas of particularly high or low fuel poverty. They should not be used to identify trends over time within an LSOA, or to compare LSOA's with similar fuel poverty levels.

We are continuing to develop our modelling of sub-regional fuel poverty, including providing estimates of the precision of these statistics, and plan to publish more information later in 2013.

6.1 Data Available

For each of the following geographical levels, estimates are available for the total number of households, the number of fuel poor households, and the proportion of households in fuel poverty:

- English Region (former Government Office Region)
- County
- Parliamentary Constituency
- Local Authority
- Lower Super Output Area (LSOA)

These data are available in a spreadsheet, which users can download from the DECC website at: http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/regional/regional.aspx

6.2 Mapping fuel poverty

Maps provide a useful way of comparing fuel poverty across different geographical areas. Figures 6.1 and 6.2 show the proportion of households in fuel poverty in England, at local authority level and LSOA level respectively. At a glance, it is clear that many of the local authorities and LSOAs in London and the South East have lower fuel poverty levels, whilst the northern parts of the country and the Midlands contain many LSOAs with relatively higher fuel poverty levels. This data is consistent with the regional data shown in Chart 4.11, which shows the North East and East Midlands to have the highest fuel poverty rates (19.0% and 18.4% respectively) out of all the regions.

Figure 6.1: Percentage of households in fuel poverty at local authority level, England, 2011

Fuel Poverty in England, 2011

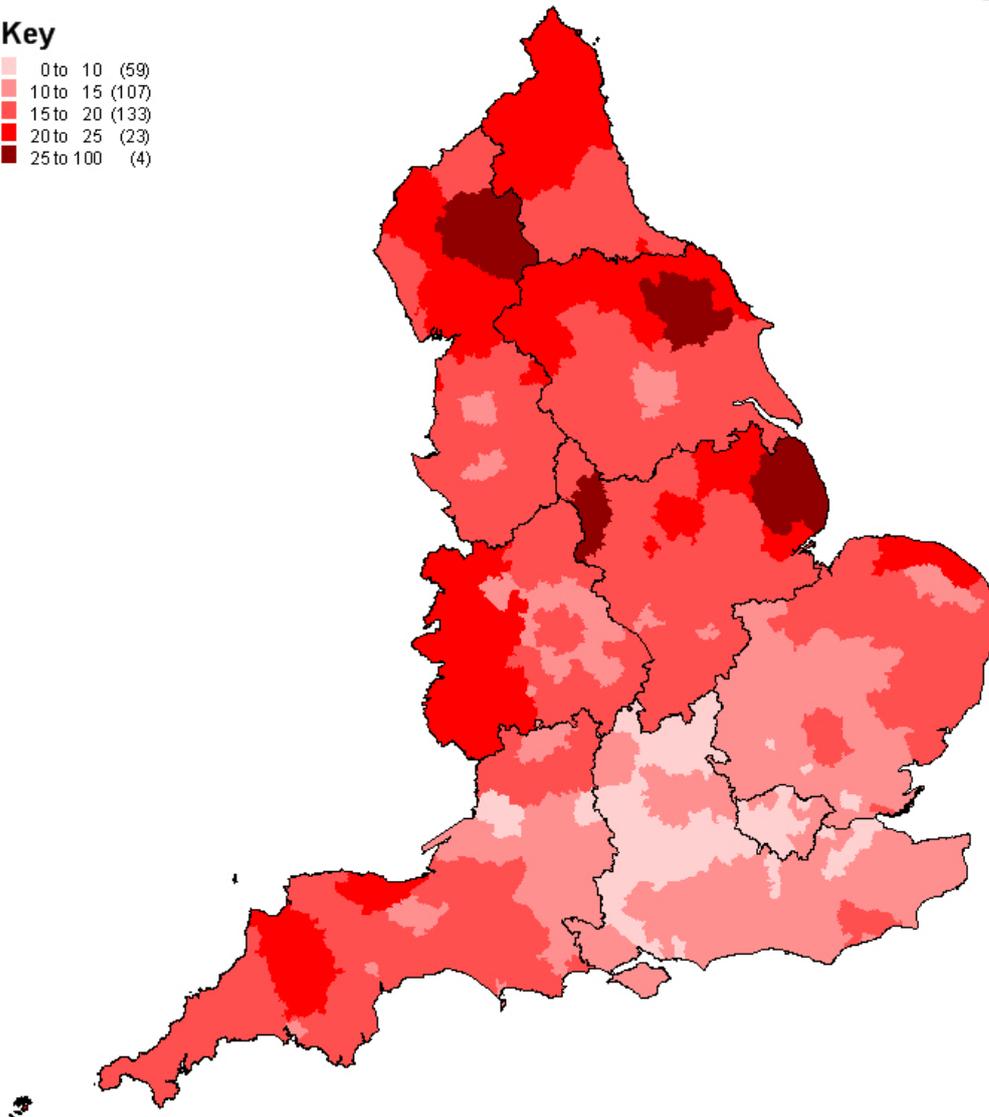
Percentage of households in fuel poverty, by local authority



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Key

- 0 to 10 (59)
- 10 to 15 (107)
- 15 to 20 (133)
- 20 to 25 (23)
- 25 to 100 (4)



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Figure 6.2: Percentage of households in fuel poverty at LSOA level, England, 2011

Fuel Poverty in England, 2011

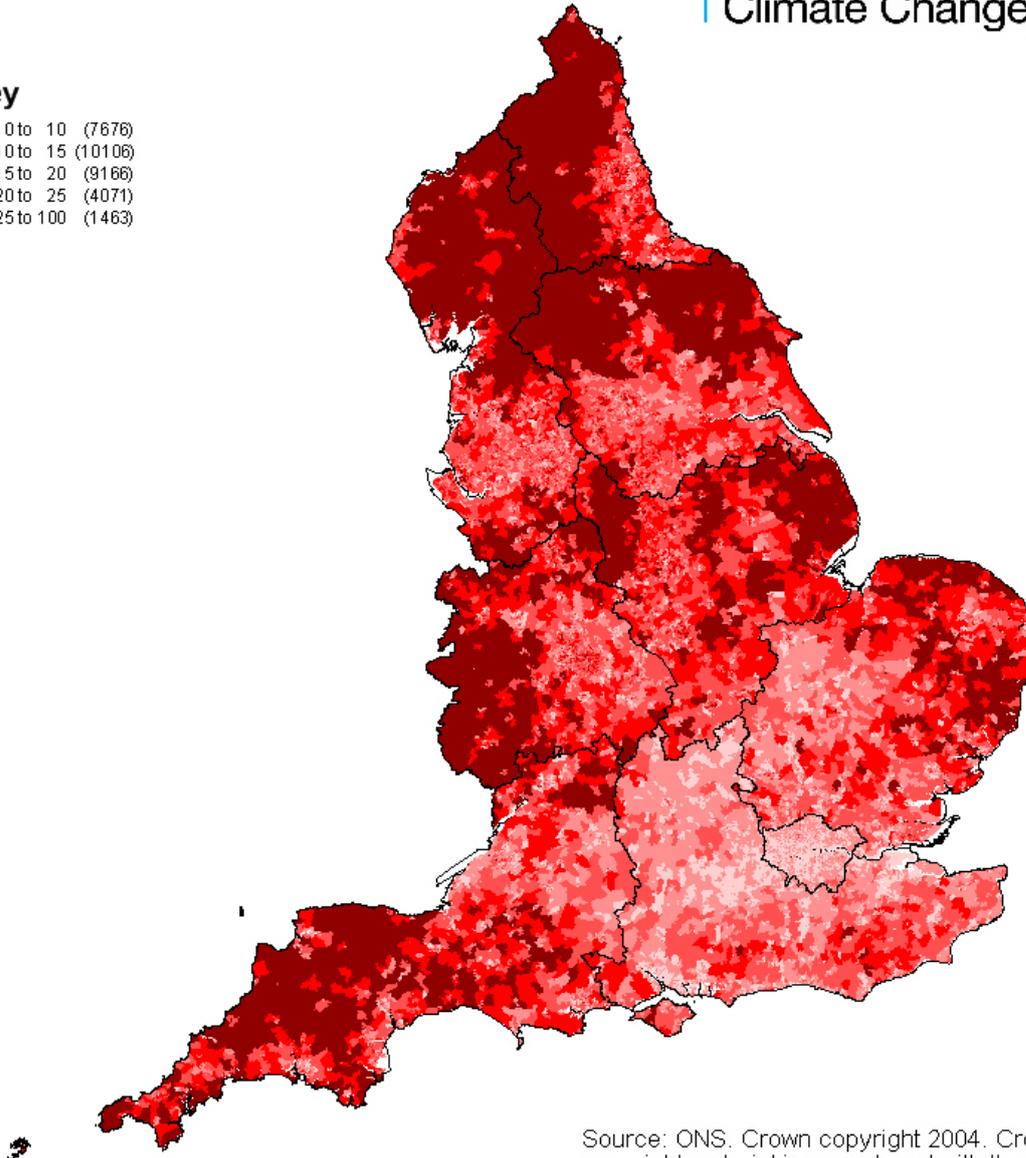
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department
of Energy &
Climate Change

Key

0 to 10	(7676)
10 to 15	(10106)
15 to 20	(9166)
20 to 25	(4071)
25 to 100	(1463)



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For larger maps showing fuel poverty levels in each of the English regions at LSOA level, please see annex B of this report.

6.3 Comparisons with 2010 Data

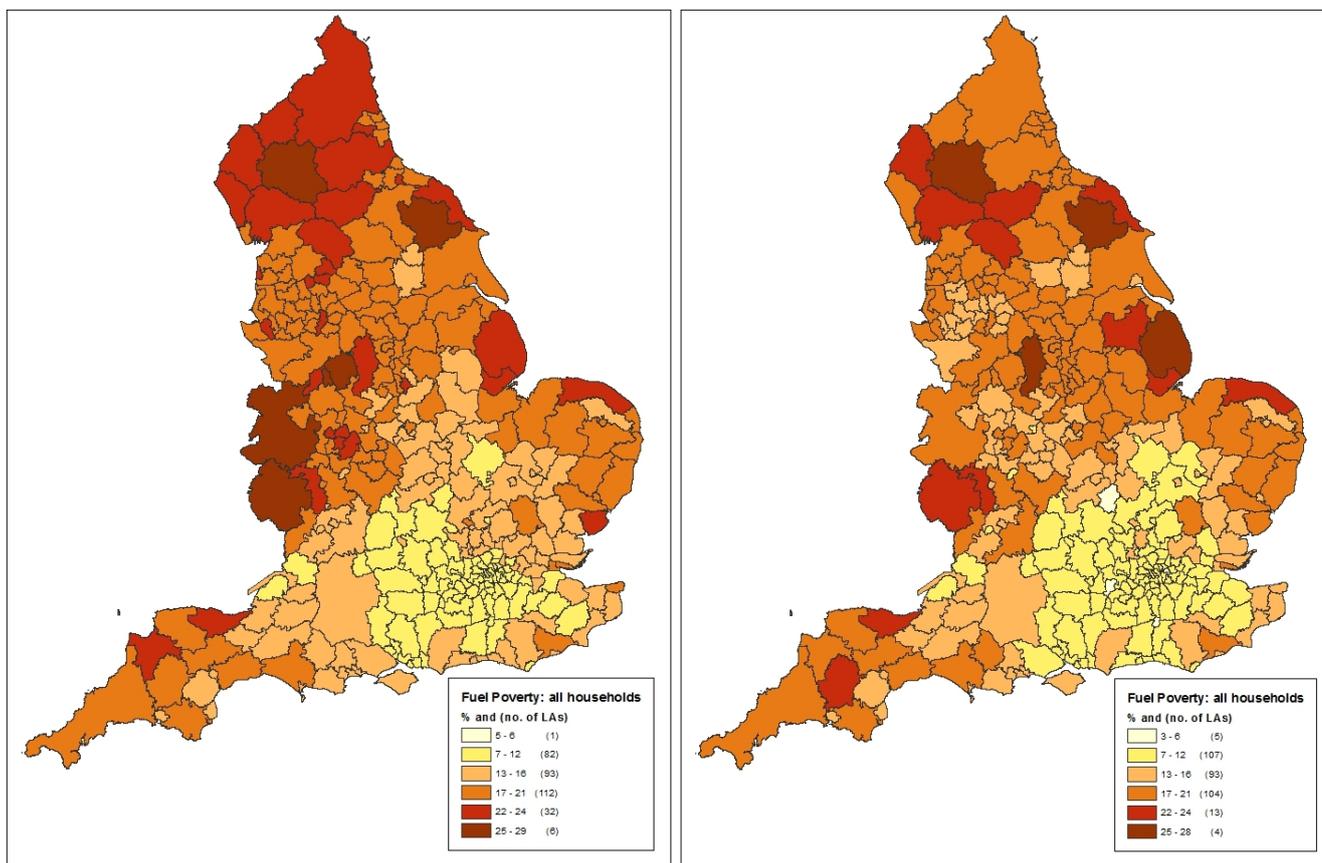
Between 2010 and 2011, 85 per cent of local authorities saw a decrease in the proportion of households in fuel poverty. Nine local authorities saw fuel poverty rates fall by more than 5 percentage points i.e. considerably above average decreases. Of those local authorities that saw increases in fuel poverty, most were fairly small, with only five having an increase of greater than 2 per cent, and none seeing an increase of greater than three per cent. Of all the local authorities, Eden had the highest proportion of fuel poor households (28%), whilst the city of London had the lowest (3%). Caution should be exercised when looking at year on year changes for local authorities, as changes observed may be due to uncertainty in the data unless they are very large.

There are several possible explanations why the levels of fuel poverty have decreased more in some local authorities than others between 2010 and 2011. For example, at a national level fuel poverty in the social rented sector decreased by more than in both the private rented and owner occupied sectors, and so areas with a high proportion of social housing are likely to see bigger decreases in fuel poverty levels.

Generally speaking, the distribution of fuel poverty changed little between 2010 and 2011, with similar areas having the highest and lowest fuel poverty levels (see figures 6.3 and 6.4). However, these figures also show that, as described above, the rates of fuel poverty within local authorities did change, falling in most cases. In part, the fact that changes in fuel poverty at local authority level reflect changes in the figures at regional level is not surprising, since the aggregated local area fuel poverty levels are constrained to match those at a regional level.

Figure 6.3 (left): 2010 Sub-regional fuel poverty model (ranges based on standard deviations of the modelled results)

Figure 6.4 (right): 2011 Sub-regional fuel poverty model (ranges set to match 2010 sub-regional fuel poverty model results)



6.4 Methodology

This section outlines the current methodology used to produce the sub-regional estimates of fuel poverty. As previously mentioned, DECC have been working on developing the small area estimation methodology, using multi-level modelling techniques. A full report on this will be published later in 2013.

The national and regional fuel poverty statistics are based on data from the English Housing Survey (EHS). However, given the sample size of the EHS (around 14,400 households in the combined 2011 dataset), it is not possible to use this data to directly estimate fuel poverty in smaller geographical areas, such as the 326 local authorities. Therefore a logistic regression model is created, matching data from the EHS on whether the household is fuel poor or not (as the binary dependent variable) with data from other sources available for all Census Output Areas, e.g. Census 2001 data (as the independent variables). In this way, the model can be used to predict the levels of fuel poverty for all COAs across England.

In fact, two separate models are created – one for the private sector and one for the social housing sector. This is because of evidence suggesting that there are differences in the distributions of fuel poverty between the private and the social rented sectors. As such, using one model is less likely to adequately account for the variations between the two distributions, and produce less accurate modelling.

The models, produced by BRE at the request of DECC, use a stepwise selection methodology to identify the variables with the most explanatory power for both models. A few of the key predictor variables used in the models include:

- **Dwelling age:** This is a categorical variable which provides an indication of the likely energy efficiency of a dwelling. For example, older dwellings are generally more likely to have solid walls or be listed buildings, which make fitting energy saving measures difficult. Such households are likely to have higher fuel bills in order to heat the dwelling to an adequate level of warmth.
- **English region:** This is a categorical variable which indicates the English Region (former Government Office Region) that a COA is located within. Chapter 6 illustrates the regional differences in levels of fuel poverty.
- **Lifestyle characteristics:** This is a categorical variable which provides an indication of the economic status of the households in a given COA, and therefore the likelihood of households being able to afford to adequately heat their home.

The output from these models is the percentage of households in fuel poverty at COA level. To convert this to a number of households in fuel poverty, we apply this percentage to an estimate of household numbers at COA level, taken from the 2001 Census. Because this data is increasingly out of date, we also use supplementary data at LSOA level from the ONS Neighbourhood Statistics website. On this website, data on the total number of households at LSOA level (split by council tax bands) is available, produced by the Department for Communities and Local Government (DCLG).

The difference between these totals in the 2001 and 2011 data sets was used as an inflation factor to increase the 2001 Census household totals to approximate the number in 2011. These had to then be adjusted slightly in order to ensure that, when summed to the regional or national level, they matched the overall 2011 EHS household totals, as used when compiling the 2011 fuel poverty figures.

Chapter 7: Other data relating to drivers of fuel poverty

This chapter considers other sources of relevant data that are associated with the main drivers of fuel poverty. This includes comparing actual expenditure on fuel with the modelled expenditure used in the measurement of fuel poverty.

A full set of supplementary indicators is available at:

http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx

7.1 Expenditure on fuel

The fuel poverty methodology models the amount of energy each household needs to consume to achieve an adequate standard of warmth²³, and, following on from this, the amount that each household would need to spend to achieve this level of warmth. However, it is useful to compare this with the actual spend on energy by different types of households.

The Living Costs and Food Survey (LCFS) is an annual survey of around 5,500 households in the UK. Information about semi-regular purchases (including utilities) is obtained from a household interview. Table 7.1 below compares the average annual actual expenditure on fuel in 2011 (excluding petrol and diesel used for transport purposes), from the LCFS²⁴ with the average annual modelled expenditure on fuel in 2011, taken from the fuel poverty dataset. In other words, we compare what households in each income decile group need to spend with what they actually spend.

Table 7.1 – Actual and modelled annual spend on fuel, 2011

Income decile group	Average actual annual expenditure on fuel (£)	Modelled average annual spend on fuel (£)	Percentage difference
1st (lowest)	723	1,142	37%
2nd	863	1,109	22%
3rd	946	1,179	20%
4th	1,056	1,233	14%
5th	1,154	1,263	9%
6th	1,180	1,340	12%
7th	1,238	1,388	11%
8th	1,279	1,440	11%
9th	1,394	1,497	7%
10th (highest)	1,648	1,706	3%
All households	1,149	1,330	14%

²³ See Chapter 1 for more information.

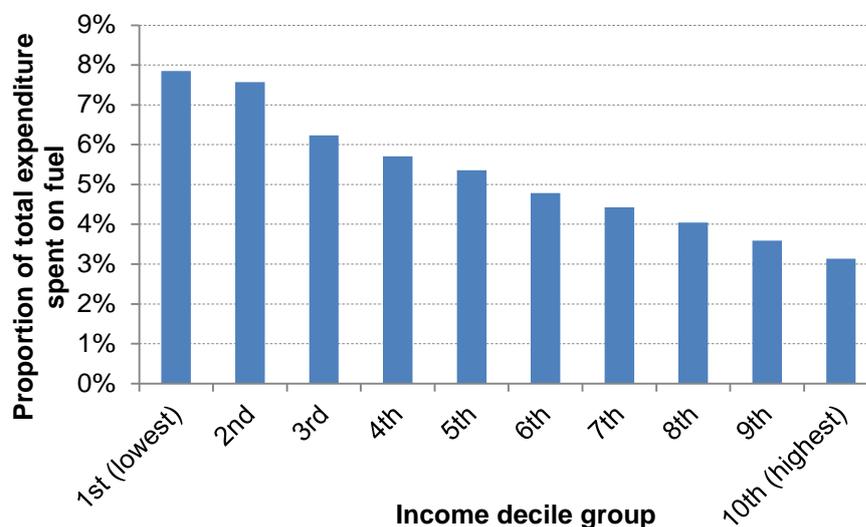
²⁴ In the LCFS, data is published as average weekly spend, therefore these were multiplied by 52 in order to calculate the yearly averages shown in Table 7.1.

Unsurprisingly, households with higher incomes tend to have a higher actual spend on fuel than those with low incomes. As table 7.1 shows, households in the highest income decile group spend, on average, more than twice as much as households in the lowest group. This is likely to reflect both the greater affluence of the higher income households, such that they can afford to heat their homes properly, and also their larger dwellings, which cost more to heat and light than smaller dwellings. Modelled spend is higher than actual spend for all income decile groups, which may indicate that the heating regimes in the fuel poverty model are not reflecting actual use.

The key result from table 7.1 is that the difference between modelled and actual spend is greatest amongst lower income households. For example, in the lowest income decile group, households spent less than two thirds (on average) of what they would need in order to maintain an adequate standard of warmth. However, in the highest income group, households' actual spend is almost the same as their modelled spend. It is difficult to disentangle whether this is due to low income households under heating their homes due to financial constraints, or due to limitations in the modelling. Further work will be undertaken in this area, which will look at the temperatures that households actually heat their homes to.

Although low income households spend the lowest absolute amount on fuel, it accounts for a greater proportion of their overall expenditure than amongst high income households. Around 8 per cent of total expenditure in the lowest income decile group is on domestic fuels, compared to just three per cent in the highest income decile group (see chart 7.1).

Chart 7.1 – Proportion of total expenditure spent on fuel, by income decile group, 2011

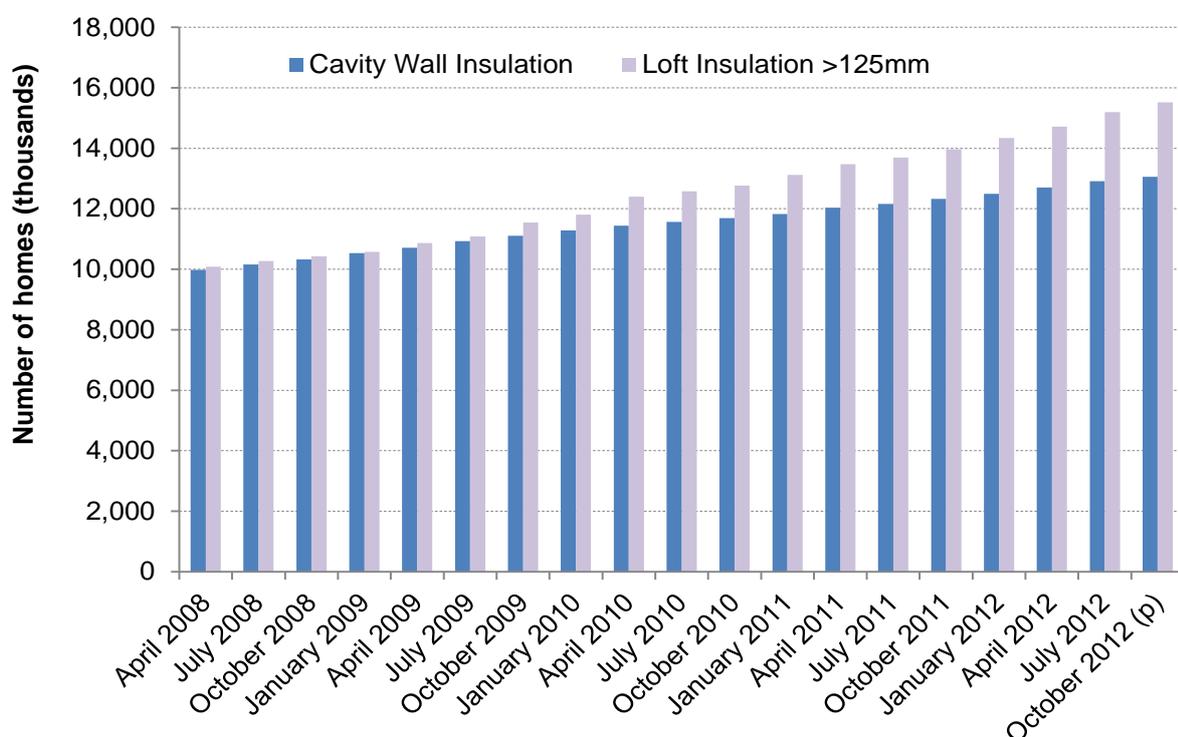


Source: *Living Costs and Food Survey, ONS*

7.2 Energy efficiency measures

One way to remove households from fuel poverty is by improving the energy efficiency of the housing stock, particularly for dwellings lived in by the fuel poor. As discussed in Chapter 5, the average SAP rating of all households has increased between 2003 and 2011. DECC publishes estimates of home insulation levels in Great Britain on a quarterly basis. Chart 7.2 below shows the number of homes with cavity wall insulation and loft insulation (greater than 125mm in thickness).

Chart 7.2 – Number of homes with cavity wall insulation and loft insulation in Great Britain, April 2008 to October 2012²⁵



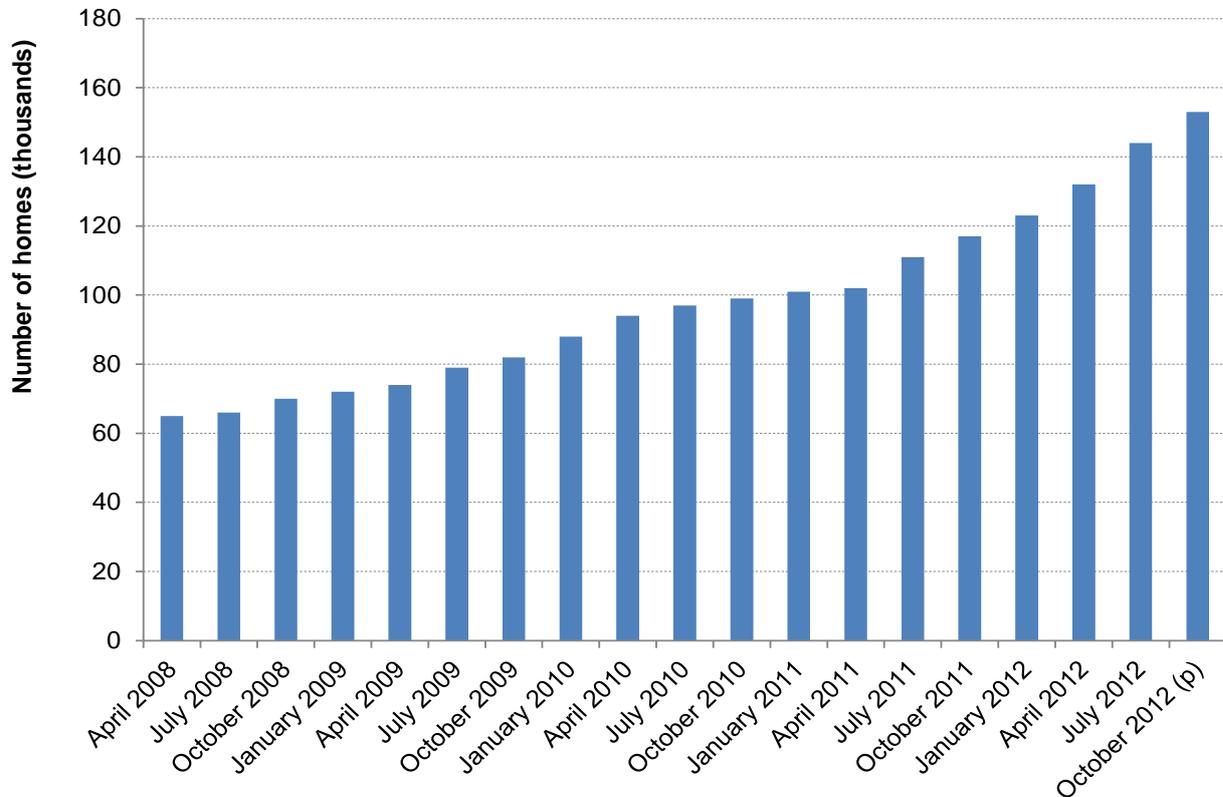
At the start of October 2012, there were a total of 26.9 million homes in Great Britain, of which 23.5 million have lofts. Between April 2008 and October 2012, the number of homes with loft insulation with thickness greater than 125mm increased from 10.1 million to 15.5 million, a rise of 54 per cent. Therefore, in October 2012, around 66 per cent of homes with lofts had loft insulation thicker than 125mm.

Since April 2008, the number of homes with cavity wall insulation increased from around 10.0 million to around 13.1 million, a rise of 31 per cent. In October 2012, there were around 18.9 million homes with cavity walls meaning around 69 per cent of homes with wall cavities had cavity wall insulation.

Chart 7.3 below shows the number of homes with solid wall insulation.

²⁵ Note that this series was annual until quarter 4 of 2008.

Chart 7.3 – Number of homes with solid wall insulation in Great Britain, April 2008 to October 2012



Between April 2008 and October 2012, the number of homes with solid wall insulation has increased from 65,000 to 153,000, representing an increase of 135 per cent. In October 2012, there were 7.9 million homes with solid walls, of which around 1.9 per cent had solid wall insulation²⁶.

More information on these energy efficiency statistics and the methodology used to derive them are available on the DECC website at:

http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/en_effic_stats/en_effic_stats.aspx

²⁶ Solid wall insulation is defined here as internal or external wall insulation installed through Government programmes such as Carbon Emissions Reduction Target (CERT) or Energy Efficiency Commitments (EEC1, EEC2). It does not include households paying for their own solid wall insulation. In addition, in April 2008, about 900,000 homes are known to have other forms of non-cavity wall insulation that fall outside this definition of solid wall insulation.

7.3 Household income distribution

The Department of Work and Pensions (DWP) 'Households Below Average Income' (HBAI) publication will be released in May/June 2013.

Under the 10 per cent measure of fuel poverty, the income used to calculate the fuel poverty ratio is unadjusted. However, in HBAI most of the income measures involve equivalised income, i.e. income that is adjusted for the size and type of household. This equivalisation reflects the fact that a large family needs a higher income than a single person in order to enjoy a comparable standard of living. This means that the HBAI publication is more closely aligned with the Hills measure of fuel poverty than the 10 per cent measure.

In addition to equivalising income, HBAI also includes several relative indicators of fuel poverty, i.e. ones whereby the poverty threshold against which households are measured changes from year to year. These measures are more closely aligned with the Hills measure of fuel poverty, which is also relative. The absolute measures in the HBAI, where the income threshold is fixed, are more closely aligned with the 10 per cent measure of fuel poverty, where the threshold is fixed.

More information is available on these statistics on DWP's website at:

<http://statistics.dwp.gov.uk/asd/hbai/hbai2010/index.php?page=contents>

Annex A: Related data

This is the headline statistical report on the 2011 fuel poverty data. Aside from this report, a range of additional analyses, annexes and data are available that directly link to this report.

- **Detailed tables:** These tables present the 2011 figures on fuel poverty and household numbers, split by a range of dwelling characteristics and demographics. They are available from both the 10 per cent and the low income high cost measure, to download as a spreadsheet.
- **Long term detailed tables:** These tables, which are available to download as a spreadsheet, present trends in fuel poverty between 2003 and 2011, for both 10 per cent and low income high costs. The tables are a compilation of some of the key annual detailed tables (see above) from the last few years.
- **Monitoring Indicators:** This document presents a range of indicators linked to fuel poverty, which can be used alongside this report to provide greater depth to the understanding of changes in fuel poverty. For example, there are indicators that focus on income, fuel bills and housing. The suite of indicators included in this document was discussed and agreed by the Fuel Poverty Methodology Group, and has been continually reviewed since.
- **Fuel Poverty Methodology Handbook:** This is a comprehensive methodology document containing detailed technical information on the modelling of fuel poverty, as well more general information about the fuel poverty data.

All of the above are available on the DECC website at:

http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx

- **Fuel poverty data set:** The full fuel poverty data will be available on the UK Data Archive from August 2013.
- **Sub-regional fuel poverty statistics:** Spread sheets containing 2011 sub-regional fuel poverty data are available to download from the DECC website at: http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/regional/regional.aspx
- The data are available for all Lower Layer Super Output Areas (LSOA) and Local Authorities in England.

The monitoring indicators, described above, contain data from a number of other sources that have overlaps with the fuel poverty data. These include:

- **Households Below Average Incomes (HBAI):** This is published by the Department for Work and Pensions (DWP) and provides information on low income households. More information is available at: <http://research.dwp.gov.uk/asd/index.php?page=hbai>
- **English Housing Survey (EHS):** As described in Section 1.5, this is the main source of dwelling and household data used in compiling the fuel poverty statistics. EHS data is available to download from the UK Data Archive. For more information on the EHS

generally, see:

<http://www.communities.gov.uk/housing/housingresearch/housingsurveys/englishhousingurvey/>

- **Living Costs and Food Survey (LCFS, previously known as the Expenditure and Food Survey):** This is a useful source of information on actual (rather than modelled) spending on a range of household goods and services. The LCFS is compiled by the Office for National Statistics (ONS), and feeds into their Family Spending publications. More information is available at: <http://www.ons.gov.uk/about/surveys/a-z-of-surveys/living-costs-and-food-survey/index.html>
- **Quarterly Energy Prices (QEP):** This quarterly DECC publication reports average annual domestic gas and electricity bills for different regions of the UK and for different payment methods (e.g. standard credit, direct debit and prepayment meters). The data used to compile these tables is the main source of price data used in producing modelled bills in the fuel poverty data. QEP is available on the DECC website at: <http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx>
- **Energy Consumption in the UK (ECUK):** DECC publishes spreadsheets containing various data relating to energy consumption and energy efficiency, split by type of consumer and fuel type. The spreadsheets are available to download on the DECC website at: <http://www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx>
- **Identifying local areas with higher than expected domestic gas use (Energy Trends March 2012):** Analysis aiming to produce a statistical model predicting gas consumption at a local area level using published data. <http://www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx>

Annex B: Sub-regional fuel poverty in 2011, Regional Maps

Figure B1: Percentage of households in fuel poverty at LSOA level, London, 2011

Fuel Poverty in London, 2011

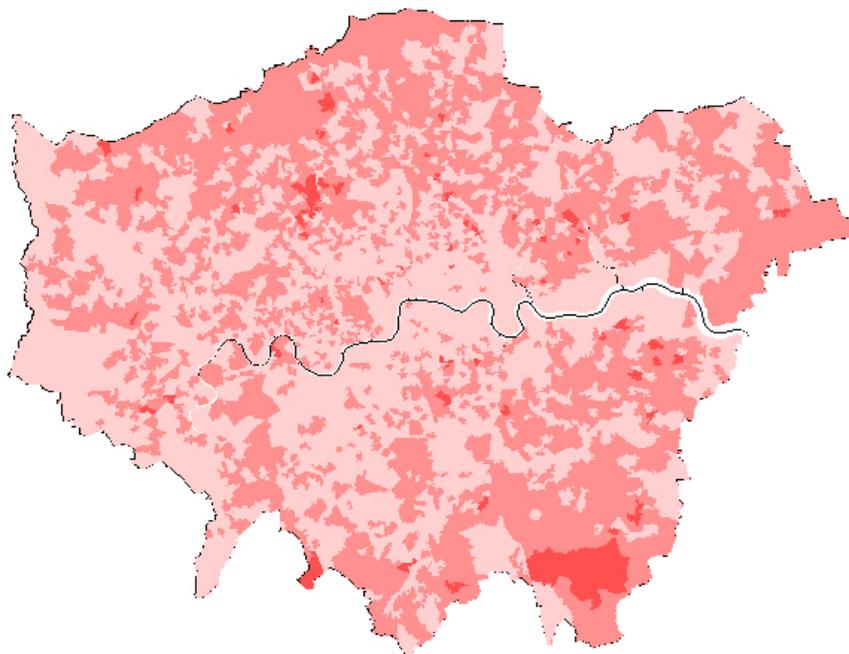
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department
of Energy &
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Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B2: Percentage of households in fuel poverty at LSOA level, South East, 2011

Fuel Poverty in the South East, 2011

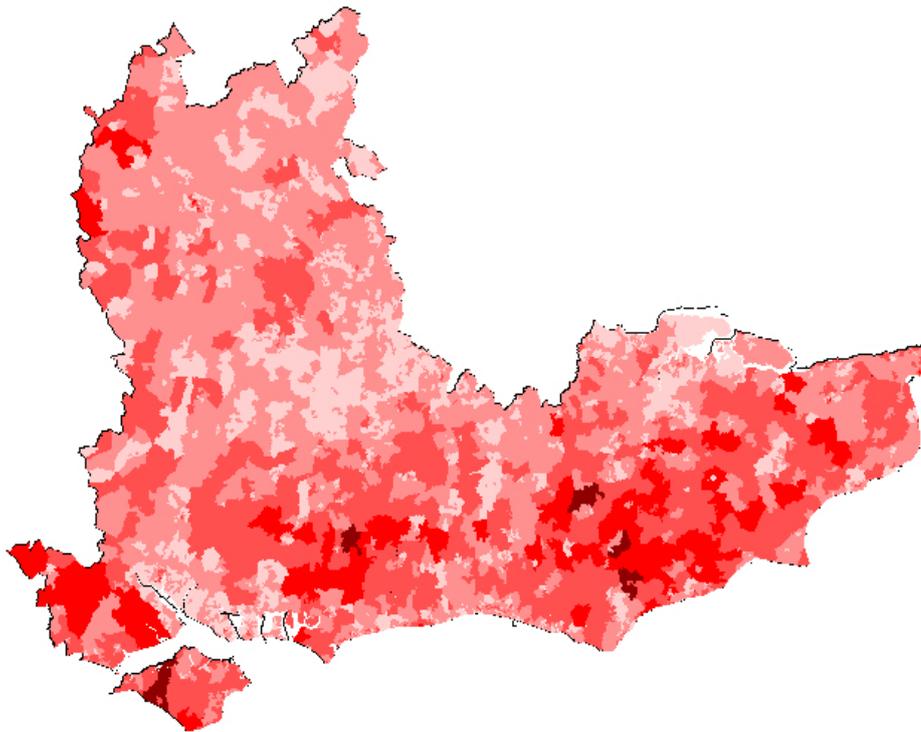
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



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Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B3: Percentage of households in fuel poverty at LSOA level, South West, 2011

Fuel Poverty in the South West, 2011

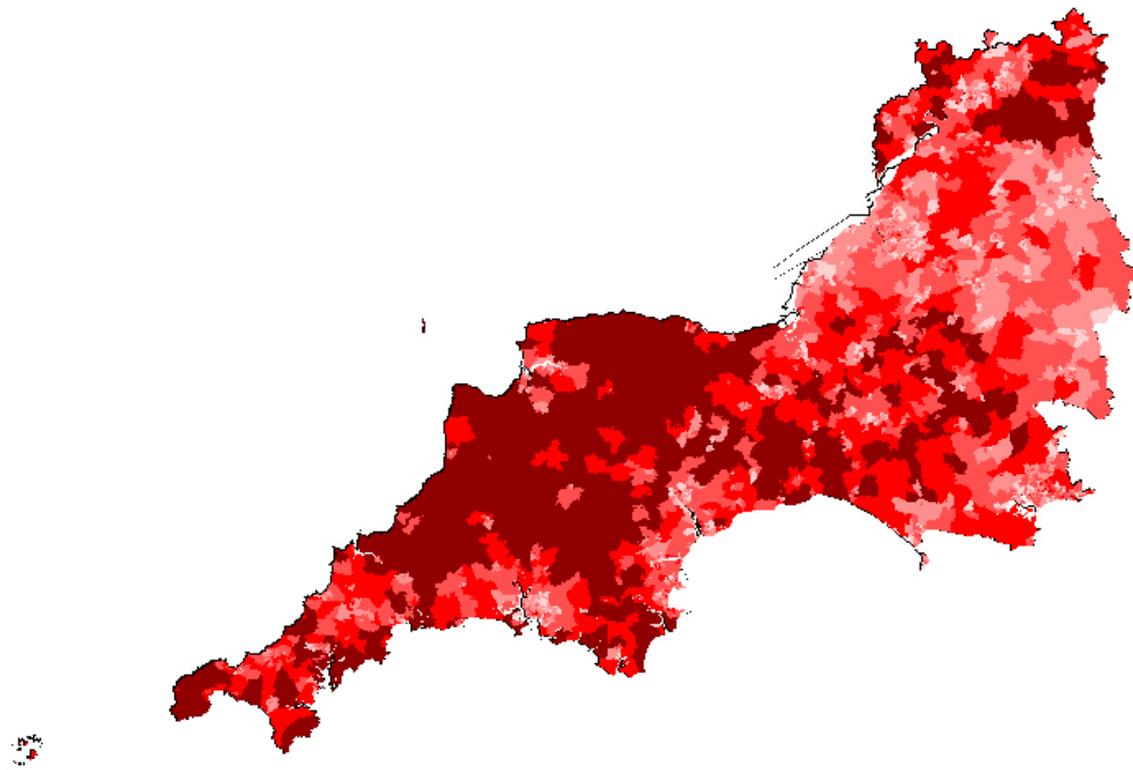
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B4: Percentage of households in fuel poverty at LSOA level, East of England, 2011

Fuel Poverty in the East of England, 2011

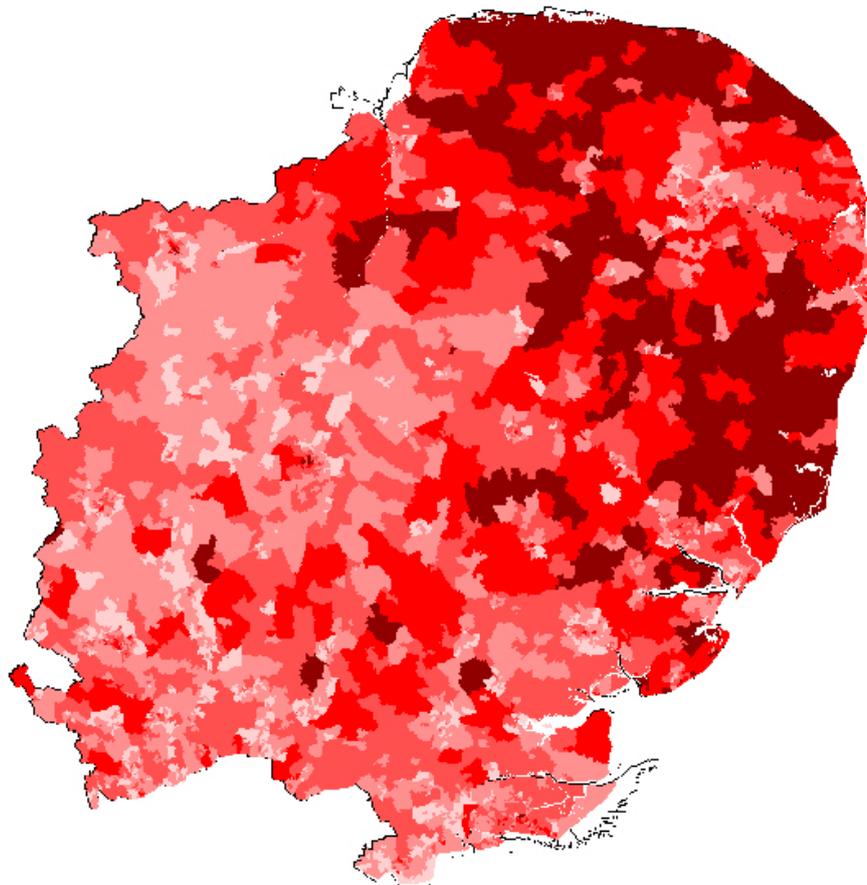
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



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Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B5: Percentage of households in fuel poverty at LSOA level, East Midlands, 2011

Fuel Poverty in the East Midlands, 2011

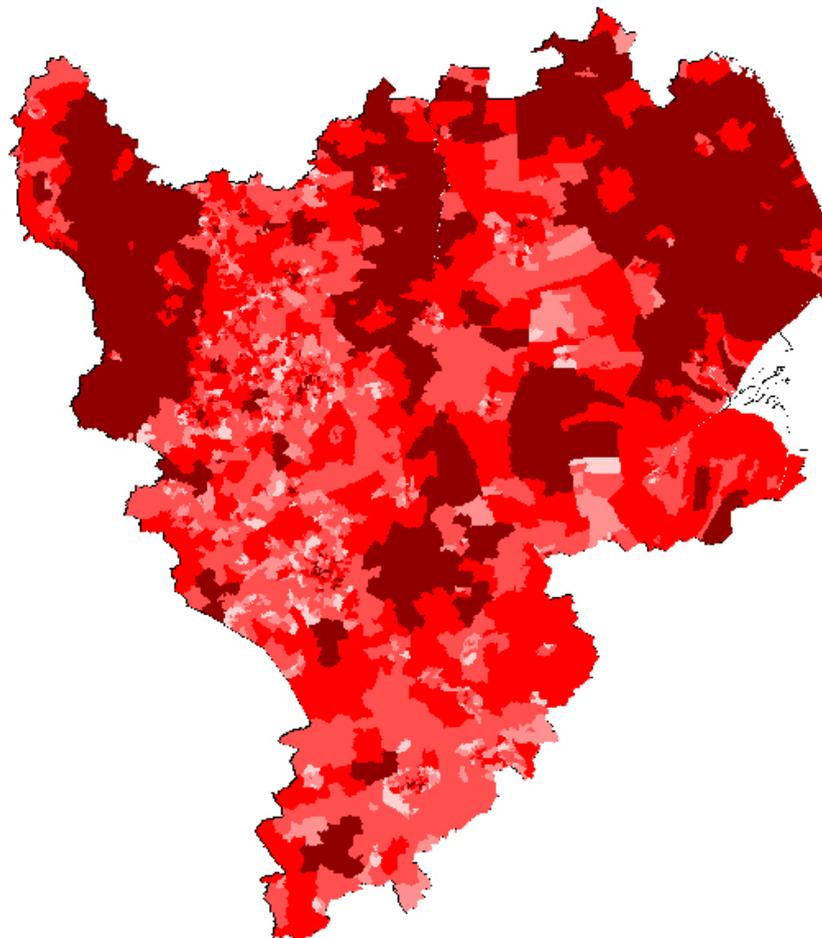
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B6: Percentage of households in fuel poverty at LSOA level, West Midlands, 2011

Fuel Poverty in the West Midlands, 2011

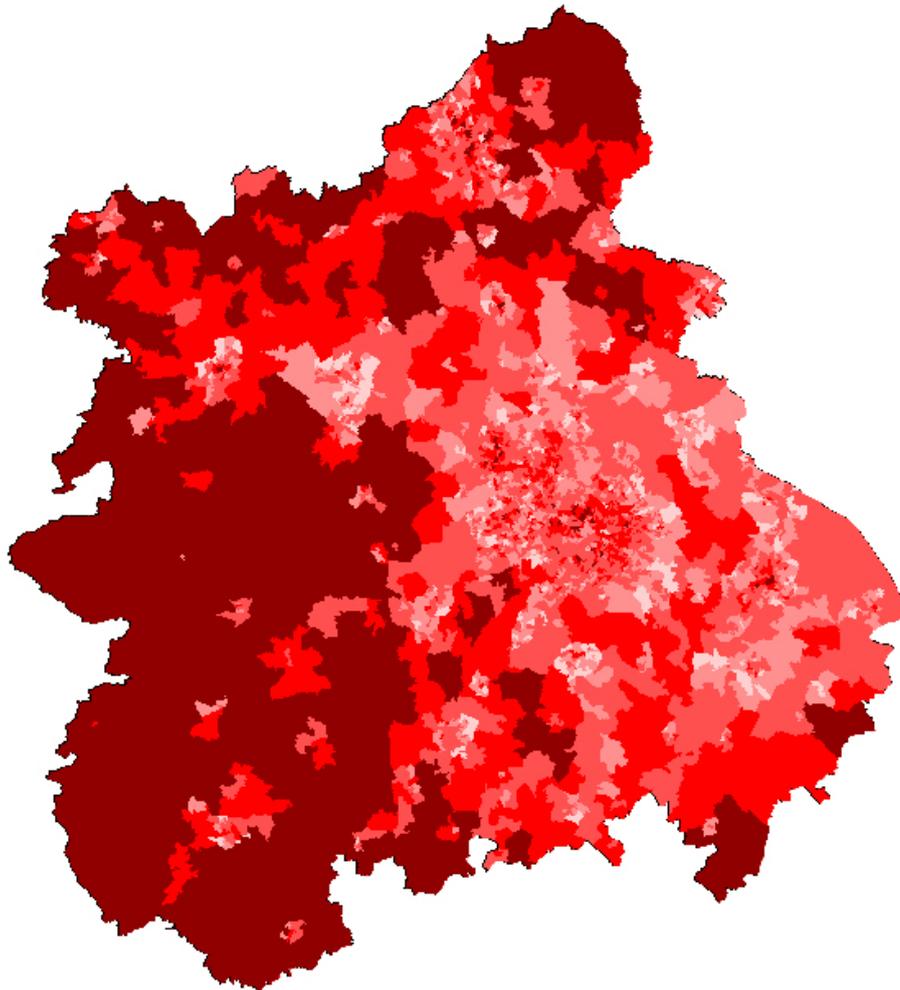
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B7: Percentage of households in fuel poverty at LSOA level, Yorkshire and the Humber, 2011

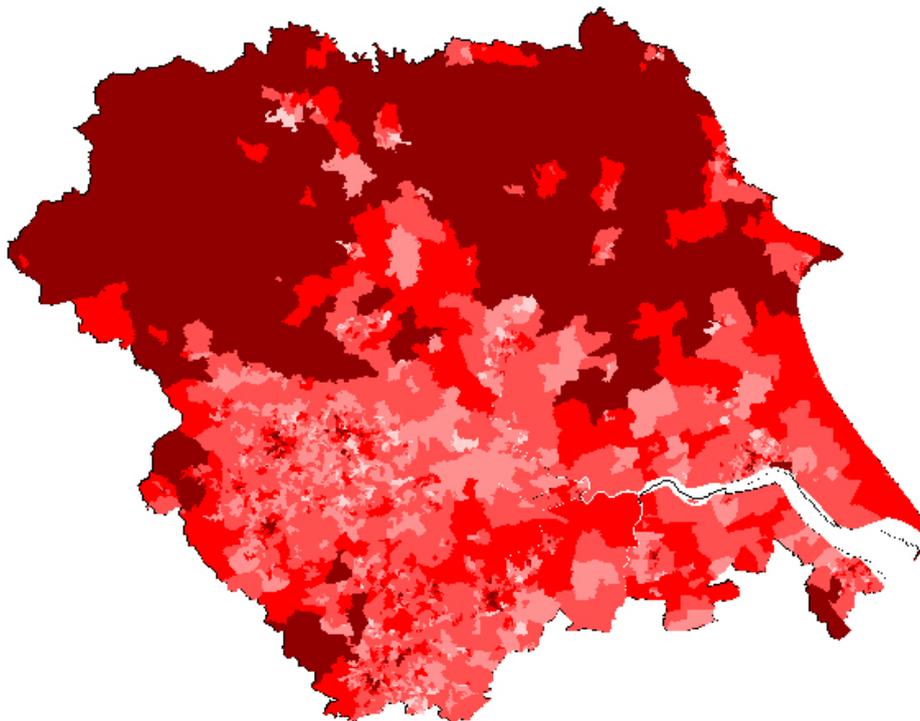
Fuel Poverty in Yorkshire and the Humber, 2011
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department
of Energy &
Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B8: Percentage of households in fuel poverty at LSOA level, North East, 2011

Fuel Poverty in the North East, 2011

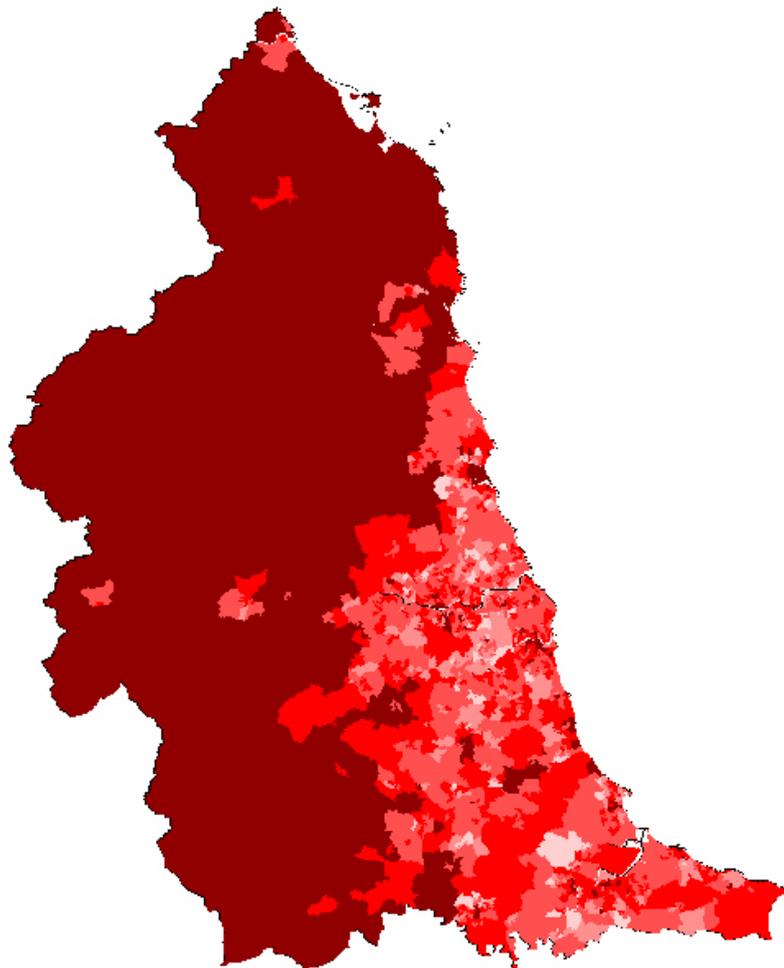
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Figure B9: Percentage of households in fuel poverty at LSOA level, North West, 2011

Fuel Poverty in the North West, 2011

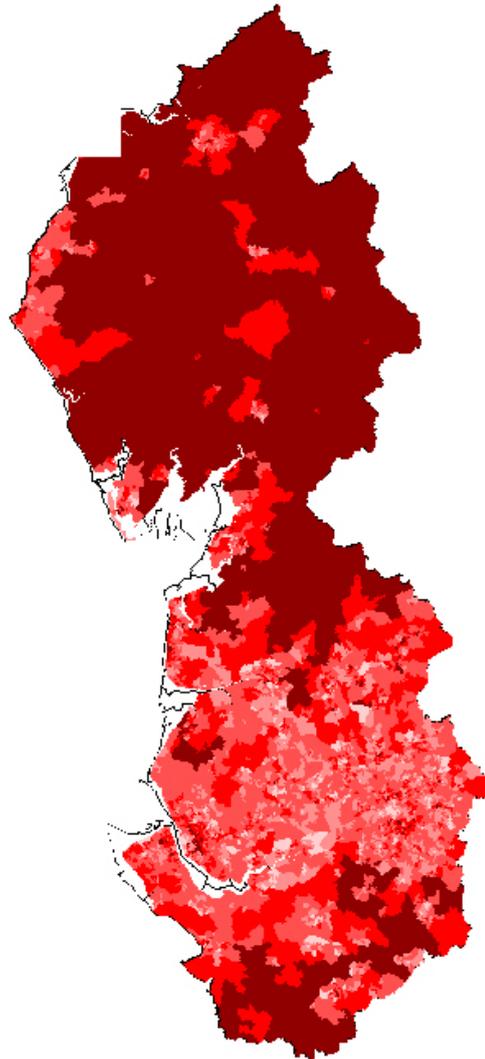
Percentage of households in Fuel Poverty by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 100



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Annex C: Calculating Fuel Poverty under the Low Income High Costs Measure

Calculating the number of households in fuel poverty

This note describes the method used to identify households living in Fuel Poverty under the Hills' Low Income High Costs (LIHC) measure, as proposed by Professor John Hills in his independent review of fuel poverty²⁷. This measure was consulted on following the Hills Review, and is subject to change depending on the Government response to this consultation. Under this measure as it stands, households are considered to be fuel poor if:

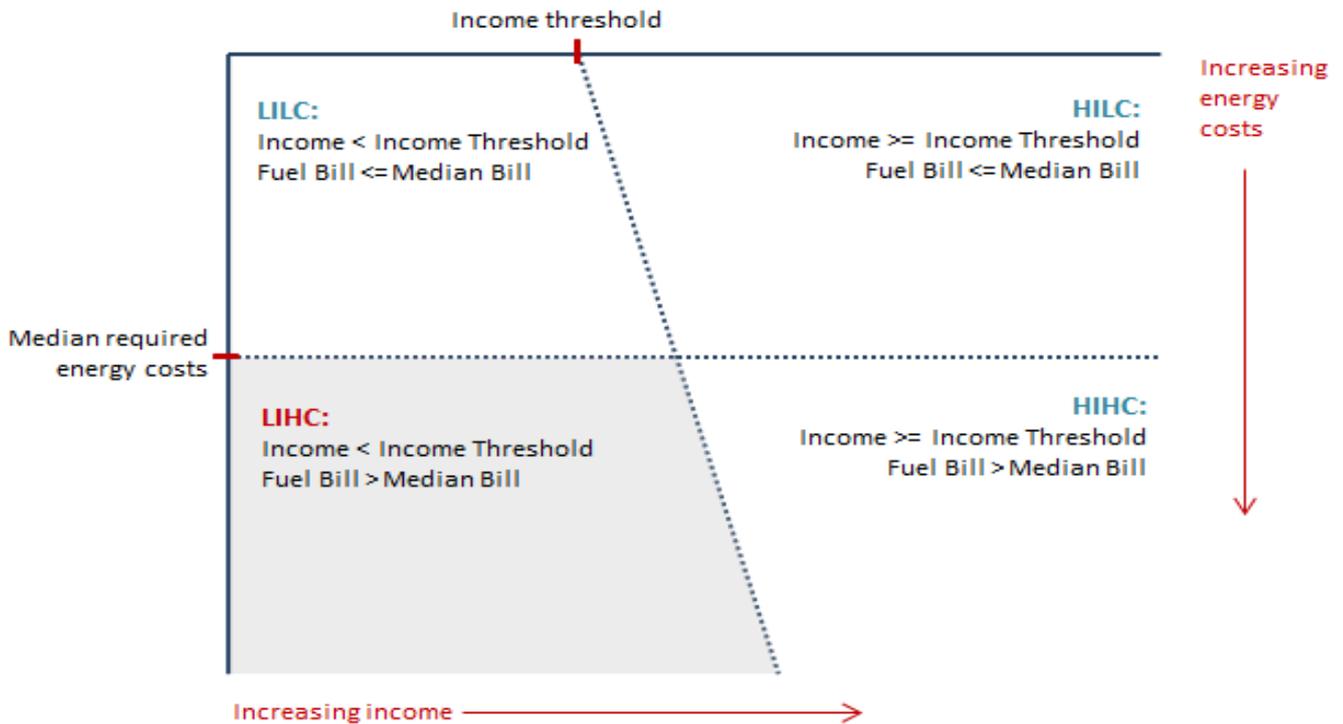
- They have required fuel costs that are above average (the national median level)
- Were they to spend that amount, they would be left with a residual income below the official poverty line.

The depth of fuel poverty is defined as the amount by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs. This is referred to as the fuel poverty gap. The methodology used to calculate the fuel poverty gap for each household is described in section C2 of this annex.

This note describes how to calculate whether a household is classed as having 'low income' and 'high costs'. Figure C1 shows the four possible groups that a household can fall into under this measure.

²⁷ Getting the measure of fuel poverty, Department of Energy and Climate Change (DECC) (<http://www.decc.gov.uk/assets/decc/11/funding-support/fuel-poverty/4662-getting-measure-fuel-pov-final-hills-rpt.pdf>)

Figure C1: The Low Income High Costs Matrix of fuel poverty



Fuel costs - required fuel costs that are above average (the national median level)

1. Take the required fuel costs for the household from the fuel poverty dataset (the “fuelxpn” variable)
2. Use the appropriate equivalisation factor for each household. These are shown in table C1.

Table C1: Equivalisation factors for fuel bills under the Low Income High Costs measure

Household composition	Equivalisation factor
Couple with dependent children	1.15
Couple with no dependent children	1.00
Lone parent	0.94
Single person	0.82
Other multi-person household	1.07

3. Divide the required fuel costs by the equivalisation factor to get the equivalised required fuel costs for that household. Equivalising effectively increases the bills of single person households, and decreases the bills of multiple person households, with the aim of making them comparable.
4. To calculate the fuel cost threshold, simply take the weighted median of all of these equivalised required fuel costs.

5. In other words, half of all households should have “high costs” i.e. above the threshold, and half should have “low costs” i.e. below the threshold.

The threshold for fuel costs is the same for all households.

Fuel cost equivalisation factors

These are based on required fuel cost data from the EHS. Firstly, three years of EHS data are combined (the 2008, 2009 and 2010 datasets). The weights used are the combined 3 year weights produced by the Department for Communities and Local Government (DCLG) in the “3yr_weight890.sav” file.

Calculate the mean fuel costs of each of the household types in table C1. Include only those households within 20 per cent of the median after housing costs (AHC) equivalised income. This is to ensure that only fairly ‘typical’ households are chosen when calculating the average costs. Then index the average costs of each group, with couples with no dependent children being set to 1.00. A dependent child is one aged 18 or under.

The equivalisation factors are not intended to be reviewed on an annual basis. We may, however, consider revisiting them periodically in future, to ensure that they don’t become too dated.

Income - Were they to spend that amount on fuel, they would be left with a residual income below the official poverty line

1. Take the full income variable from the fuel poverty dataset (the “fpfullinc” variable)
2. Subtract housing costs. These consist of:
 - a. Weekly mortgage payments (“mortwkx” variable from the EHS interview file)
 - b. Weekly rent payments (“rentExS” variable from the EHS interview file). This also includes housing benefit. “rentExS” is used rather than the “rentwkx” variable, because “rentwkx” includes the cost of any services that the household pay alongside their rent. We do not want to include these services when subtracting housing costs. “RentExS” allows housing costs to be treated equally for all households.²⁸

Multiply the after housing costs income by the relevant income equivalisation factor. The After Housing Costs (AHC) equivalisation factor should be used, given that we’re dealing with AHC income. The equivalisation factors for each person in the household are shown in table C2 below.

²⁸ The “rentExS” variable is only available for EHS datasets from 2009 onwards. Prior to that, we have had to use “rentwkx” to calculate annual housing costs. There is therefore a small break in the time series between 2008 and 2009.

Table C2: Equivalisation factors for income under the Low Income High Costs measure

	Before housing costs (BHC)	After Housing Costs (AHC)
First adult in the household	0.67	0.58
Subsequent adults (includes partners and children aged 14 or over)	0.33	0.42
Children under 14	0.2	0.2

For example, a couple with two children aged 15 and 9 will have an AHC income equivalisation factor of 1.62 (0.58 for the first adult, 0.42 for the partner, 0.42 for the child aged 15, and 0.2 for the child aged 9).

Equivalising effectively increases the incomes of single people, and reduces the incomes of larger households, again with the intention of making them comparable.

To calculate the income threshold, take the following steps:

1. Take the weighted median of all of the AHC, equivalised incomes in the dataset
2. Calculate 60 per cent of this value. This is partly based on DWP's income measurement (although that is at an individual rather than household level)
3. Add on the equivalised required fuel costs of that particular household

The outcome of this is an income threshold that is higher for households with large bills than those with smaller bills. In other words, households with larger bills require a greater level of income to make sure they are not classed as having "low income". As a result, the income threshold will appear as a diagonal line on diagrams of the measure.

The threshold for income varies depending on the fuel costs of the household.

Income equivalisation factors

The income equivalisation scale used is the same as in the DWP Households Below Average Income (HBAI) statistics. This was devised by the OECD, and is widely used across Europe, including by Eurostat.

The number of people in the household is taken from the "hhsizex" variable in the "interview.sav" file, rather than the "DVHsize" variable in the "people.sav" file²⁹. However, the "interview.sav" file does not include information on the age of every person in the household,

²⁹ The "hhsizex" variable only excludes people living in halls of residence from 2008 onwards, following the change from the EHCS to the EHS. Prior to that, "hhsizex" was consistent with "DVHsize", and so people living in halls of residence were included in our income equivalisation method. There is therefore a small break in the time series between 2007 and 2008.

which is needed to calculate income equivalisation factors (the OECD scale distinguishes between under and over 14s).

Therefore the equivalisation factors are calculated based on information in the “people.sav” file. Then, by subtracting any additional adults that live in halls of residence i.e. the difference between “hhsizex” and “DVHsize” variables, you can work out the equivalisation factor excluding any people at the household that live away in halls of residence. This makes the calculation of income equivalisation factors consistent with the way that fuel bills are equivalised.

Calculating the income equivalisation factor - worked example

A household contains the following people:

HRP – adult female

HRP partner – adult male

21 year old – lives in halls of residence

18 year old – lives in halls of residence

16 year old – lives at home

12 year old – lives at home

hhsizex = 4 (excludes the two living in halls of residence)

DVHsize = 6 (includes the two in halls of residence)

After housing costs equivalisation factor:

HRP – 0.58

HRP partner – 0.42

21 year old – 0.42

18 year old – 0.42

16 year old – 0.42

12 year old – 0.2

Total = 2.46

Subtract the difference between “hhsizex” and “DVHsize”, multiplied by the equivalisation factor for a subsequent adult (all those living in halls of residence will be over 18):

$$= 2.46 - (2 * 0.42) = \underline{\underline{1.62}}$$

The key assumption here is that all individuals living in halls of residence will be over 14 i.e. they all have an equivalisation factor of 0.42, rather than 0.2. We know the number of people living away from home via the difference between the “hhsizex” and “DVHsize” variables. However, we don’t know the age of them. So in order to calculate an equivalisation factor that excludes them, we must assume that they are all over 14, and so have an equivalisation factor of 0.42. This assumption seems safe, as almost all university students living away from home will be over this age.

Summary of income and fuel cost thresholds

Income threshold = 60 per cent of median AHC, equivalised income, plus the equivalised fuel bill of that household

Fuel cost threshold = median, equivalised fuel costs of all households

Figure C2: Worked example - how to calculate whether a household is fuel poor under the Low Income High Costs measure

Worked Example (2011):

EHS case: **J0904416**

Family composition: lone parent household

(one adult & two dependents - one aged >14 and one <14)

Number of people in the household = 3

Fuel Bill = £ 1,984

Total Income = £16,380

Equivalised fuel bill = £1,984 / Equivalisation factor (0.94)
= £2,111

Housing costs = 52*(mortgage repayments + rent repayments)
= 52*(£120 + £0)
= £6,240

AHC Equivalised income = (£16,380 - £6,240)/(Equivalisation factor)
= £10,140 / (0.58 + 0.42 + 0.2)
= £8,450

Here: AHC Equivalised income (£8,450) < Income Threshold (£11,553) &
Fuel bill (£2,111) > Median fuel bill (£1,234)

Therefore the household is considered to be fuel poor under the LIHC measure

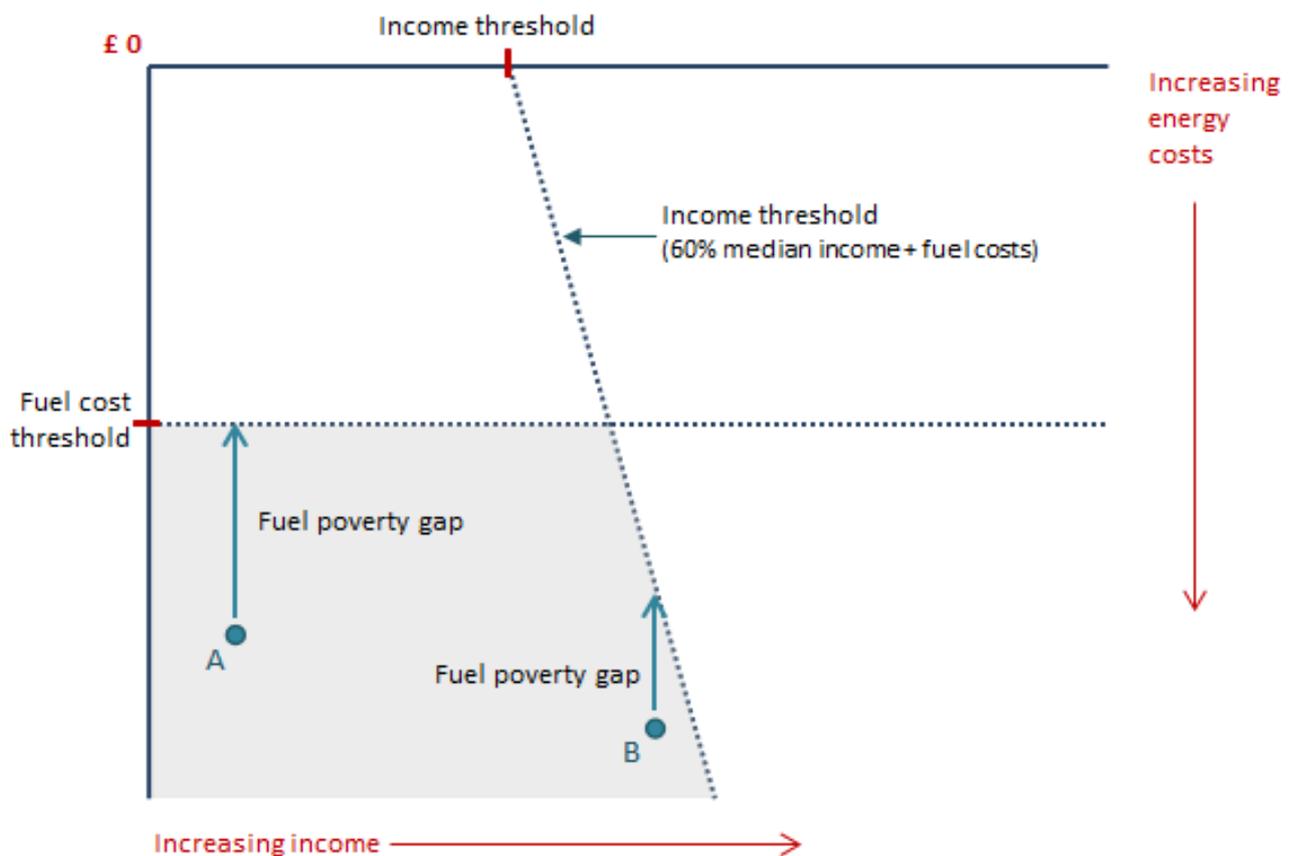
Calculating the fuel poverty gap

This document outlines the methodology used to calculate the *fuel poverty gap*.

Under the Low Income High Costs measure of fuel poverty, the depth of fuel poverty is represented by the 'fuel poverty gap'. This is defined as the amount by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs.

Figure C3 below shows the overlap between the household income³⁰ and fuel cost levels (shaded trapezium area) under which households are considered to be fuel poor. The fuel poverty gap for a particular household is the difference between the household's required fuel costs and what these costs would need to be for them not to be in fuel poverty. This is shown by the vertical arrows for households A and B below.

Figure C3: Fuel poverty gaps under the Low Income High Costs measure



³⁰ Note, the income considered for the LIHC indicator (and throughout this document) is the residual income *after* housing costs.

Calculating the fuel poverty gap

For fuel poor households, the fuel poverty gap can be generalised as:

$$\text{FP Gap} = (y - y_m) - \max \{[x - (x_m + y_m)], 0\}$$

Where:

x = household income

x_m = 60 per cent of median income

y = household energy costs

y_m = median energy costs

In 2011 the English Housing Survey (EHS) dataset shows that:

60 per cent of AHC median income = £11,553

Median required energy costs = £1,234

These are based on equivalised income and equivalised energy costs. For more information about equivalisation, and tables showing the equivalisation factors used for fuel bills and incomes, please see section C1 of this chapter.

Figure C4 illustrates the fuel poverty gaps for two typical fuel poor households, A and B. The first (household A) has an income level below the *overall* threshold of £12,756 (60% median income + median energy costs); and the second (household B) has an income level above this overall threshold. The income (x) and fuel expense (y) for each household is shown in Figure C4 as (x , y).

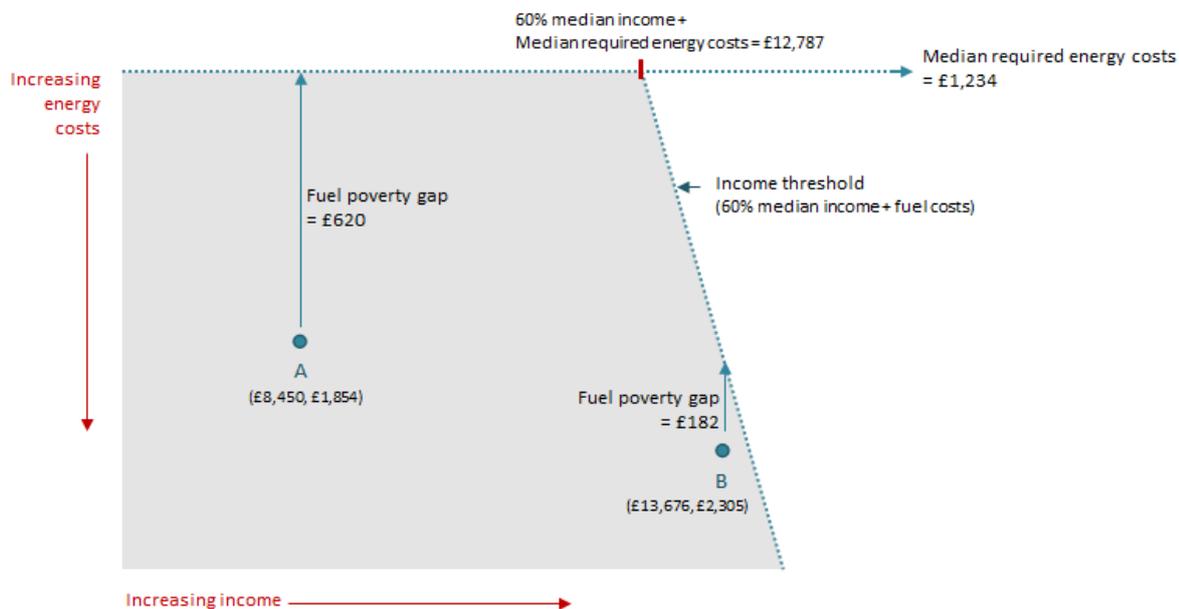
The fuel poverty gap for household A is calculated as follows:

$$\begin{aligned} (\text{FP Gap})_A &= \text{Excess energy costs} \\ &= \text{Household energy costs} - \text{Median required energy costs} \\ &= £1,854 - £1,234 = \mathbf{£620} \end{aligned}$$

The fuel poverty gap for household B is calculated as follows:

$$\begin{aligned}
 (\text{FP Gap})_B &= \text{Excess energy costs} - \text{Extra income above the overall threshold} \\
 &= \text{Household energy costs} - \text{Median required energy costs} - \\
 &\quad [\text{current income} - (60\% \text{ median income} + \text{median energy costs})] \\
 &= (£2,305 - £1,234) - [£13,676 - (£11,553 + £1,234)] = \mathbf{£182}
 \end{aligned}$$

Figure C4: Worked example - fuel poverty gap calculation



Once the fuel poverty gap/s are calculated, the energy cost equivalisation factors (see table C1 in this annex) need to be applied to return the gap to an unequivalised value in pounds. This is done by multiplying by the equivalised gap by the equivalisation factor.

The resulting gap for each individual household can be summed across all fuel poor households to produce an aggregate fuel poverty gap. This gives a sense of the depth of fuel poverty on a national level. In addition, this aggregate gap can then be divided by the total number of fuel poor households to give an average fuel poverty gap. By looking at this for different groups of households, the severity of the problem for them can be compared.

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Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.gov.uk/decc

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