



Department
of Energy &
Climate Change

Fuel Poverty Report – Updated August 2013

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Executive Summary

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

The Government has recently announced its intention to adopt a new definition of fuel poverty. The new definition is based on the Low Income High Costs (LIHC) framework that was recommended by Professor Hills in his Independent review. The main difference between the new definition and the Hills definition is the way in which fuel costs have been equalised. In this report we define fuel poverty using the new Low Income High Costs Indicator, as set out in the Government consultation response:

<https://www.gov.uk/government/publications/fuel-poverty-a-framework-for-future-action>.

This is an update to the fuel poverty statistics published in May 2013, reflecting the new definition, which will form the basis of reporting on fuel poverty in the future.

The report covers:

- statistics on the number of households living in fuel poverty and the aggregate and average fuel poverty gap, in England under the new definition (Chapter 2);
- analysis of the composition of the fuel poor group in 2011 (Chapter 3);
- updated estimates of sub-regional fuel poverty (Chapter 4);
- projections of fuel poverty for 2012 and 2013 (Chapter 5).

Low Income High Cost Indicator: Definition

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

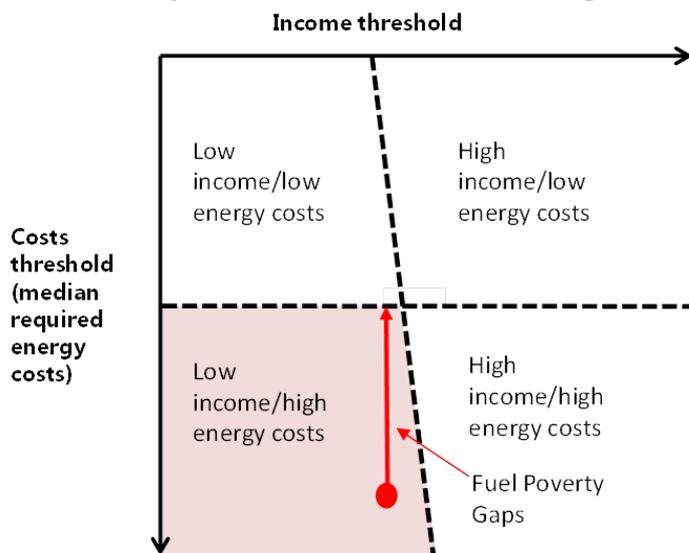
- they have required fuel costs that are above average (the national median level)
- were they to spend that amount, they would be left with a residual income below the official poverty line.

The low income high cost indicator 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) indicator



The main change to the LIHC indicator, since the Annual Fuel Poverty Report published in May, is a change to the methodology used to equalise fuel bills. Fuel bills are now equalised by the number of people in the household, rather than the household composition (e.g. lone parent, couples with dependent children). This is to reflect the fact that different sizes of households will have a different required spend on fuel. For more detail please see Chapter 1.

The Low Income High Cost indicator of fuel poverty

Under the low income high cost indicator, 2.39 million households were fuel poor in England in 2011¹, a decrease of 80 thousand households from 2010. The decrease in fuel poverty in England between 2010 and 2011 was likely to be the result of a reduction in energy use, through improvements in the energy efficiency of housing. This offset the price increases seen in 2011. For more detail see Chapter 2.

As the low income high cost headcount indicator is a relative measure, for it to change substantially between years, 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 aggregate fuel poverty gap has increased in real terms since 2010 by 22 million to £1.05 billion. The average gap (total gap divided by the number of households in fuel poverty) has also increased by £24 to £438 largely reflecting the increase in energy prices.

Developments and future work

This 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.

We are continuing 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 will consult on improvements to the detailed methodology with key stakeholders.

¹ The low income high cost indicator is only available for England.

Chapter 1: Introduction

1.1 What is fuel poverty?

The Government has recently published its new strategic framework and response to the fuel poverty consultation, in which it sets out the new definition of fuel poverty that it will be adopting². In this report we measure fuel poverty using the Low Income High Costs indicator, as set out in the strategic framework.

The indicator used in this report differs slightly to the one proposed in Professor Hills review of Fuel Poverty, published in March 2012³, and which was reported in our annual publication in May 2013⁴. This difference reflects the change made following the Government consultation on the measurement of fuel poverty⁵, and is mainly due to the way in which household fuel bills are equivalised. Under the new measure of fuel poverty, fuel costs are equivalised according to the number of people in a household, rather than the household composition. This is discussed further in Section 1.3.

The Low Income High Costs indicator

Professor Hills' Review recognised that fuel poverty was a distinct issue, but found that there were some fundamental flaws with the existing indicator. This was 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 indicator. 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 (reflected in 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 relatively higher 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.

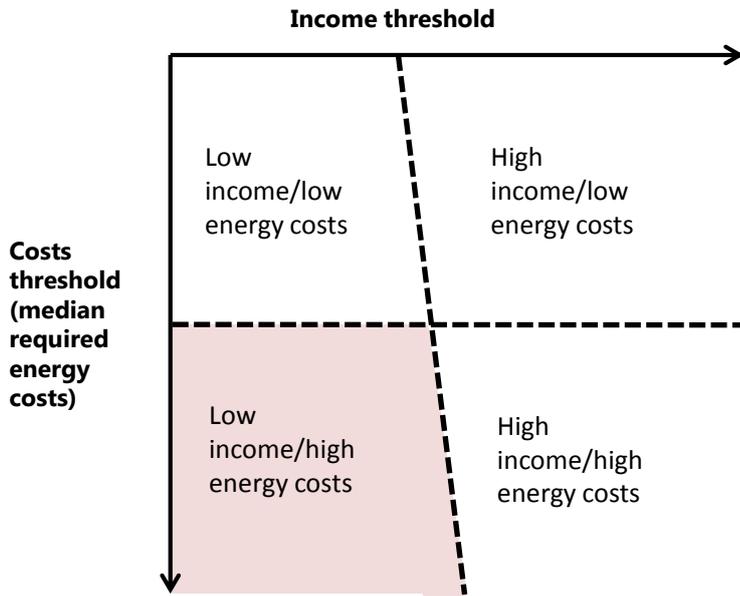
² See <https://www.gov.uk/government/publications/fuel-poverty-a-framework-for-future-action>

³ See <https://www.gov.uk/government/publications/final-report-of-the-fuel-poverty-review>

⁴ See <https://www.gov.uk/government/publications/fuel-poverty-report-annual-report-on-statistics-2013>

⁵ See <https://www.gov.uk/government/consultations/fuel-poverty-changing-the-framework-for-measurement>

Chart 1.1 - Fuel Poverty under the Low Income High Costs (LIHC) indicator



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 be summed to produce an aggregate fuel poverty gap, which gives an understanding of the national scale of the problem. More detail on understanding fuel poverty and how it changes under the new indicator is included in Section 1.4.

Chart 1.2 - The Fuel Poverty Gap

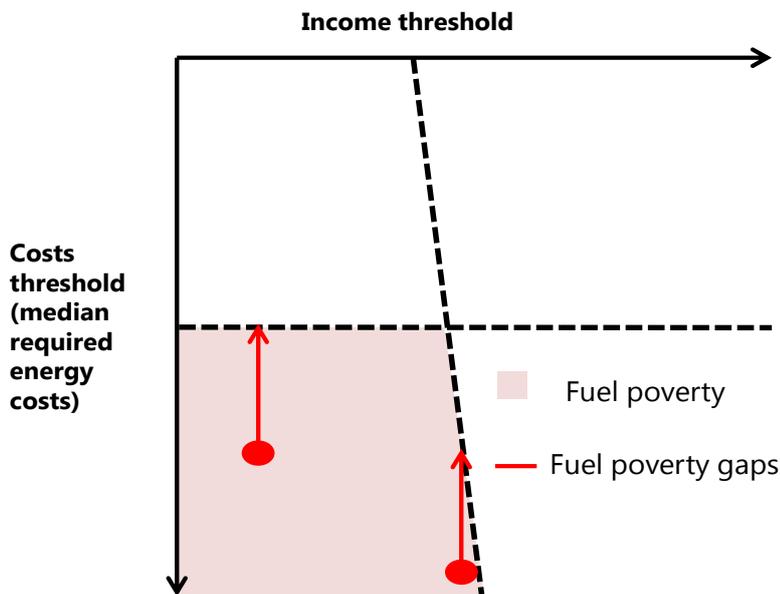
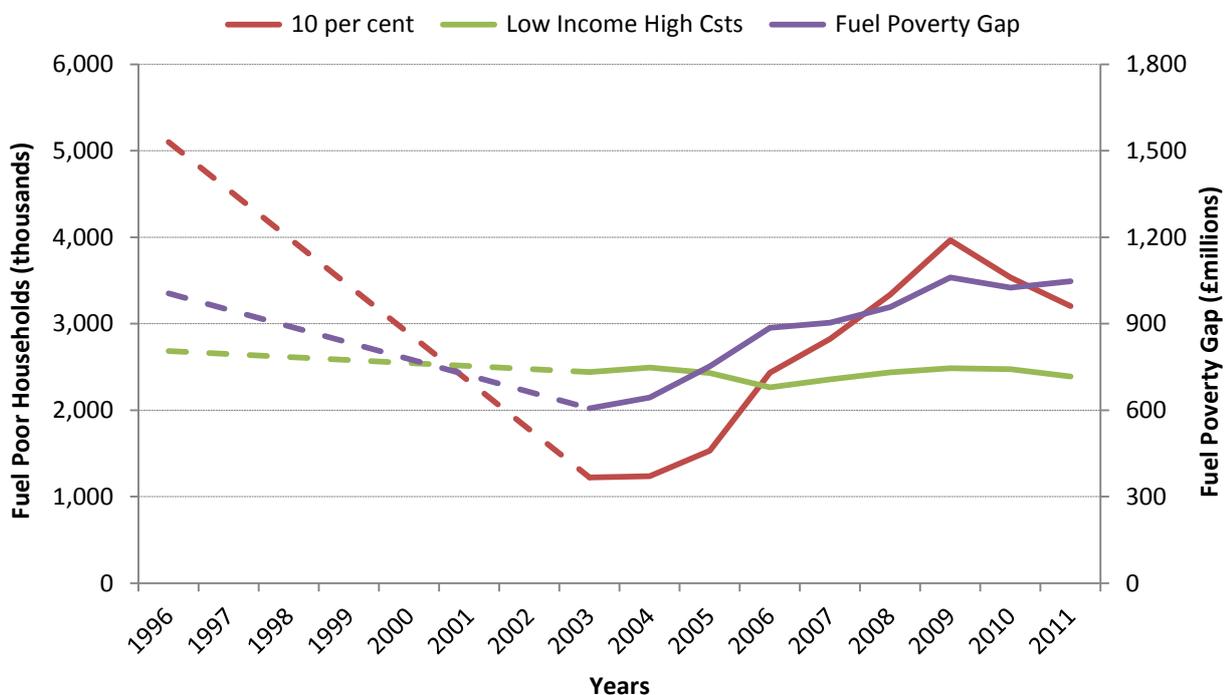


Table 1.1 below shows the number of fuel poor households in England from 1996 onwards under the new low income high costs indicator. For comparative purposes, it also shows the old 10 per cent indicator (see the May report for details of the 10 per cent indicator). Chart 1.3 shows the change in fuel poverty over time under both indicators.

Table 1.1 – Number of fuel poor households (thousands) in England, under the 10 per cent and Low Income High Costs indicators ⁶

England	10 Per cent (000s)	Low Income High Costs (000s)	Fuel Poverty Gap £m (2011 prices)
1996	5,100	2,685	1,005
2003	1,222	2,441	606
2004	1,236	2,492	644
2005	1,529	2,428	752
2006	2,432	2,262	886
2007	2,823	2,357	904
2008	3,335	2,438	957
2009	3,964	2,486	1,060
2010	3,536	2,474	1,024
2011	3,202	2,390	1,047

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



⁶ As reported in the May publication, there have been two minor revisions to the underlying methodology since the Hills Review. People living in halls of residence are excluded from the calculation of the total number of people in the household. This can only be done for the 2008 and later datasets, and affects the income equivalisation factors of some households. Secondly, specified services such as water, sewerage, meals and heating are now always excluded from rent payments, to ensure that the housing costs of all households are comparable. Before 2009, services such as these were included in rent payments, as there was no way of separating them out using survey data.

1.2 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 for the LIHC indicator, compared to 10 per cent.

Incomes

For the low income high cost indicator, 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.

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

Fuel Bills

Both indicators 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 under-heat their home, relative to the recommended adequate standard of warmth.

For the low income high costs indicator, fuel bills are also equivalised. They are equivalised by the number of people in the household, to reflect the fact that different 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 of the May report.

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 Discount⁷ (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 indicator see Annex A.

1.3 Changes to the Low Income High Costs Indicator since the May publication

Following the Government response to the consultation, there has been one main change to the way in which fuel poverty has been measured in this publication, compared with how it was measured in the May publication. This concerns the way in which the energy bills of households are equivalised. In the May publication, energy bills were equivalised according to the household composition, for example a lone parent with dependent/s. However, this means that households with quite different numbers of occupants (and so different energy requirements) are potentially treated in the same way. For example, a lone parent with one child would be compared with a lone parent with four children. As a result of this, the indicator has been modified, such that in this publication energy bills are equivalised according to the number of people in the household (see section 1.2).

In its response to the consultation, the Government retained its decision to remove housing costs from the calculation of incomes for the main indicator of fuel poverty. However, in recognition of the fact that some stakeholders would still find an indicator based on Before Housing Costs (BHC) income useful, in Chapter 2 we also present the number of households in fuel poverty, and associated fuel poverty gap, under a scenario where housing costs are not subtracted from income.

⁷ 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>

In this publication we also publish data on a number of other supplementary indicators of fuel poverty. These are as follows:

- The new Low Income High Costs indicator (headcount and gap), with Disability Living Allowance/Attendance Allowance subtracted from income.
- The proportion of Low Income High Costs households with an E, F, or G SAP rating.
- The number of Low Income High Costs households with uninsulated cavity walls.
- The number of Low Income High Costs households with uninsulated lofts.
- The number of Low Income High Costs households with non-condensing boilers.
- The proportion of Low Income High Costs households with uninsulated cavity walls (of those that have cavity walls).
- The proportion of Low Income High Costs households with uninsulated lofts (of those that have lofts).

1.4 Understanding changes in fuel poverty

Under the 10 per cent indicator, 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 indicator. Whereas an increase in income is likely to reduce the extent of fuel poverty under 10 per cent, under the low income high cost indicator, 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 indicator tends to be very responsive to changes in prices, such that these usually dominate the indicator, outweighing other factors such as income and energy efficiency. Under the LIHC indicator, the fuel poverty gap is the element 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 indicator is largely due to the relative nature of the indicator. 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

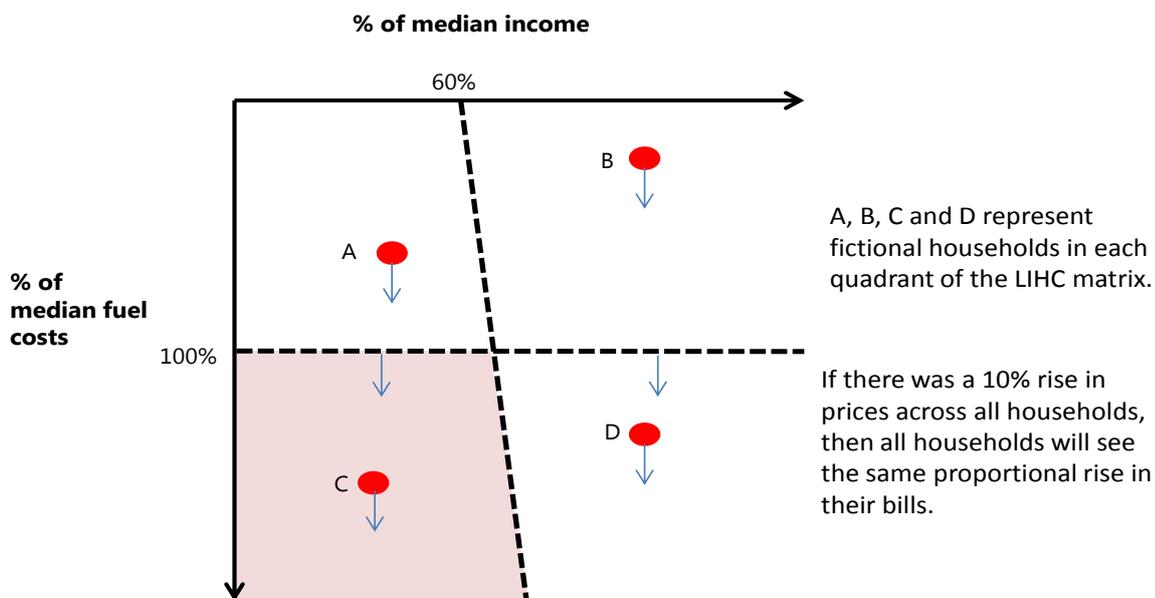
cent higher than the median, assuming all other factors stay the same. As a result, the fuel poverty status of the household is unlikely to change, unless the extra costs of fuel bring their income below the threshold.

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 indicator (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 indicator goes down (shown in Chart 1.3).

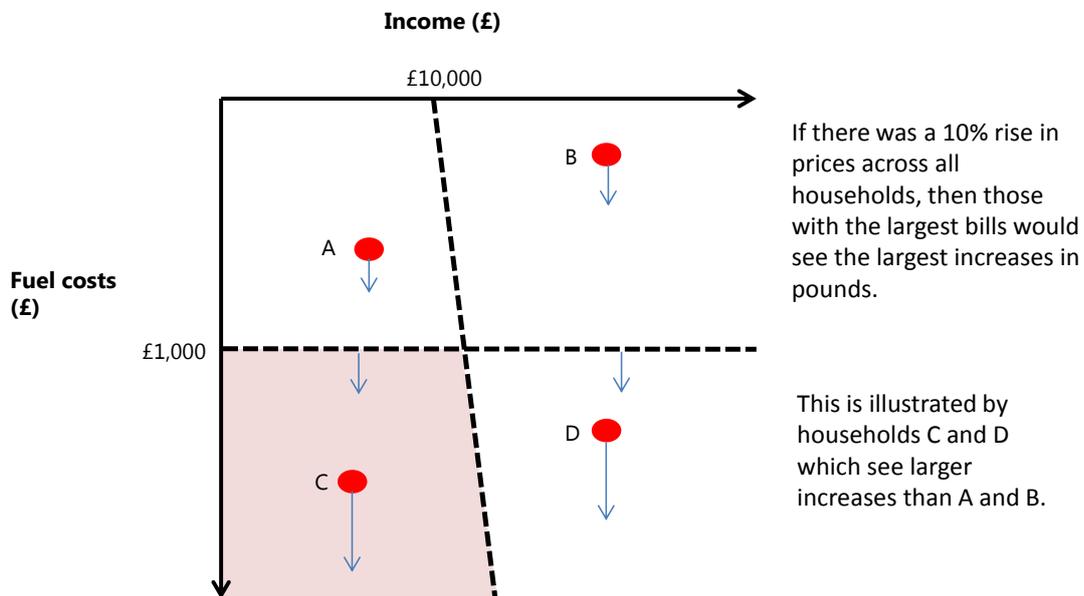
Chart 1.4 and 1.5 highlight the different responses of the fuel poverty low income high cost headcount indicator and gap under a scenario where prices rise by ten per cent. Under the headcount indicator, the bills of all households should increase by the same amount in proportional terms. Under the fuel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



1.5 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 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. However, the Welsh and Scottish Governments have recently produced estimates of fuel poverty under the Low Income High Costs indicator as proposed in the Hills Review.

For further details please see the May 2013 fuel poverty report:

<https://www.gov.uk/government/publications/fuel-poverty-report-annual-report-on-statistics-2013>

1.6 Other developments since the last publication (May 2013)

This report is based on the new Low Income High Cost indicator, as announced by Government at the start of July 2013. Because fuel poverty under the 10 per cent indicator was included in the previous publication in May, it has not been included here. As a result, this report is shorter than the previous report.

Sub-regional estimates of fuel poverty are provided for the new LIHC indicator of fuel poverty (see Chapter 4). These are in addition to the sub-regional estimates of fuel poverty produced for the 10 per cent indicator in the previous report. Work is continuing 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 English Housing Survey (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, we will be looking at the temperatures people heat their homes to, 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 via the UK Data Archive, alongside the EHS, in late August 2013. 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

1.8 Future reporting

The next report will be published in May 2014 and will focus on the Low Income High Cost Definition, as set out in this report, and the 10 per cent indicator of fuel poverty.

Chapter 2: Summary of Fuel poverty in England, 2011

2.1 Fuel poverty in England under the Low Income High Cost indicator

In 2011, the number of fuel poor households in England was estimated at around 2.39 million, representing approximately 11 per cent of all English households. This is a fall of around 80 thousand (3%) when compared with 2010. The aggregate fuel poverty gap increased marginally in 2011 from £1.02 billion to £1.05 billion (approximately 2%), and the average gap (defined as the total gap divided by the number of households in fuel poverty) also rose by £24 to £438.

Chart 2.1 shows the number of households that were living in fuel poverty in England between 2003 and 2011, and Table 2.1 gives the numbers behind the chart.

Chart 2.1 - Fuel Poverty in England, 1996 to 2011

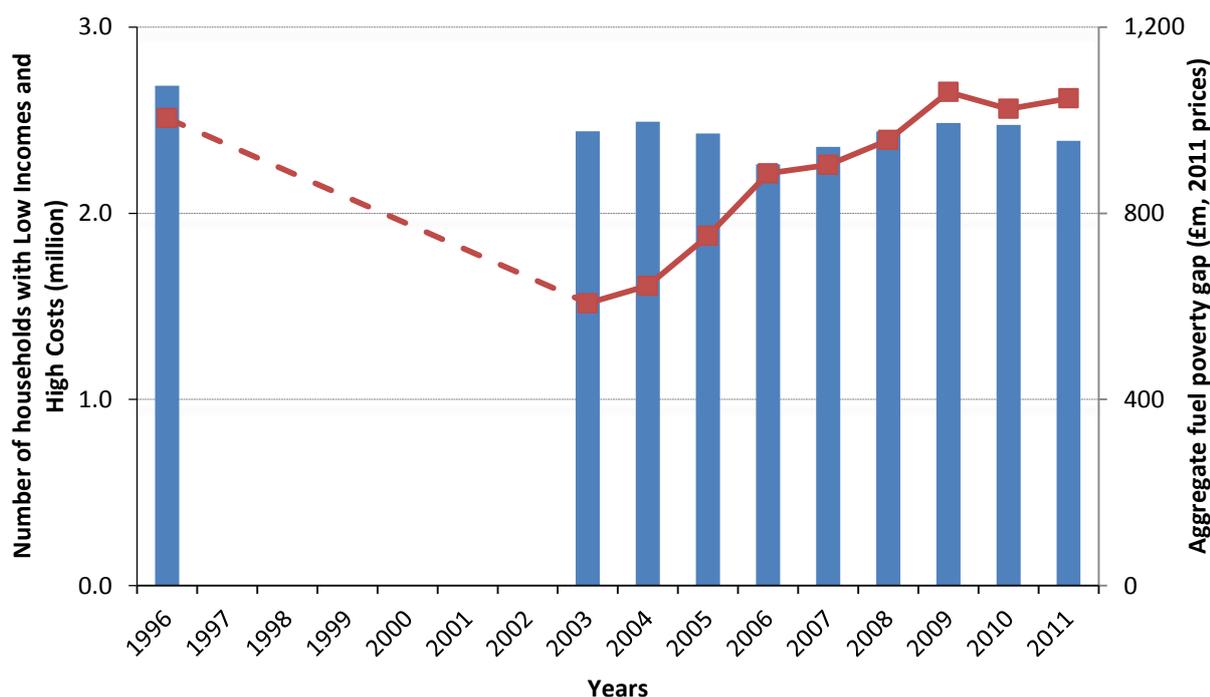


Table 2.1 - Fuel Poverty in England, 1996 to 2011

	1996	2003	2004	2005	2006	2007	2008	2009	2010	2011
Households with LHC (millions)	2.69	2.44	2.49	2.43	2.26	2.36	2.44	2.49	2.48	2.39
Aggregate Fuel Poverty Gap (£million)	1,005	606	644	752	886	904	957	1,060	1,024	1,047
Average Fuel Poverty Gap (£million)	374	248	259	310	391	384	393	427	414	438

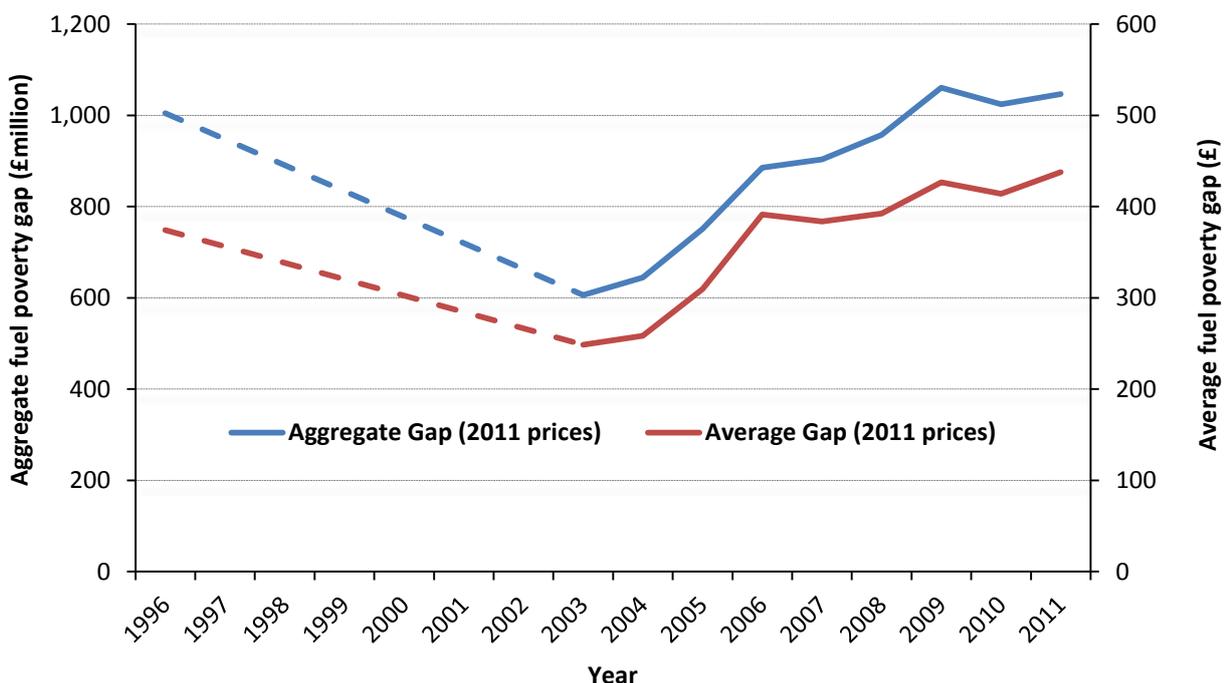
The number of households with low income and high costs (LIHC) has remained relatively stable over time. The fuel poverty gap has however increased over time in response to prices. Between 2004 and 2009 energy prices increased substantially: domestic electricity prices rose by around 56 per cent and gas prices increased by around 97 per cent (both in real terms). Over the same period the fuel poverty gap (in 2011 prices) rose from £644 million to £1 billion. In 2010, electricity and gas prices declined by approximately five and eight per cent respectively. This is reflected in a slight reduction in the fuel poverty gap.

In 2011, the number of households in fuel poverty remained broadly similar to 2010, falling by around 80,000 households. The reasons for this are similar to those described for the low income high costs indicator in the May publication. Once again, the key factor is how the key drivers of fuel poverty change for households with low incomes and high costs, relative to other households.

Firstly, AHC incomes remained broadly similar between 2010 and 2011 for those in the LIHC group, falling very slightly compared with a slight increase for the overall population. Secondly, modelled fuel costs fell by a similar amount for both LIHC households and the overall population. Finally, SAP ratings increased by slightly more for LIHC households than the overall population. The last factor is likely to have led to the small reduction in the number of fuel poor households between the two years, where improvements in energy efficiency in the LIHC group may have caused some households previously classed as fuel poor to move across the energy cost threshold, such that they are no longer classed as having high costs.

Between 2010 and 2011, the aggregate and average fuel poverty gap increased. This was largely due to price rises between the two years, which are the key driver of trends in the gap. However, these price rises were relatively small due to the effect of the combined year dataset, with only the 2011 half of the dataset experiencing increases. As a result, the price rises were outweighed by energy efficiency improvements, and so median energy costs fell between the two years. For more information, please see Chapter 3 of the May 2013 annual fuel poverty publication.

Chart 2.2 - Aggregate and average fuel poverty gaps, England, 1996 to 2011



2.2 Supplementary Indicators

To accompany the new indicator of fuel poverty, a range of supplementary indicators have been developed which focus more on ‘real world outcomes’, such as energy efficiency in low income households.

Measuring Fuel Poverty Before Housing Costs

Income under the low income high costs approach is measured on an after housing costs (AHC) basis, meaning that any rent or mortgage payments are deducted. The rationale for this is that money that needs to be spent on housing costs is not part of a household’s disposable income, and thus cannot be spent on their fuel bill. Deducting housing costs from income reduces the income of households with mortgage and rent payments, and can result in some of them moving into fuel poverty. Meanwhile, households that own their home outright are less likely to be fuel poor, as their income will be relatively higher than those with high housing costs.

The first supplementary measure is based on before housing costs income. Table 2.2 shows that the number of households in fuel poverty and the aggregate gap are both lower if income is used without any housing costs being deducted. This implies that in many cases, housing costs have the effect of pulling a subset of households just below the income threshold and into fuel poverty. When these housing costs are not deducted from income, these households are on the other side of the income threshold (i.e. not classed as low-income), leaving behind a group of households more deeply in fuel poverty.

Table 2.2 - Fuel poverty under the low income high costs indicator, including and excluding housing costs from income, 2011

	After housing costs income (main measure)	Before housing costs income	Difference
Households with LIHC (millions)	2.39	2.06	-16%
Aggregate Fuel Poverty Gap (£million)	1,047	935	-12%
Average Fuel Poverty Gap (£)	438	455	4%

Measuring Fuel Poverty Without Disability Benefits

Recommendation five in Hills’ review of fuel poverty suggested that disability benefits should be subtracted from household income when calculating fuel poverty. It is argued that, like housing costs, disability benefits are not part of a household’s disposable income, as the extra income is needed to achieve the same standard of living as other non-disabled households.

Disability benefits are included in the headline measure of fuel poverty, as to remove them would represent a move away from current Government practice, as standard measures of income poverty do not take account of the additional costs associated with disability. In addition, although there are clearly some additional costs associated with disability, research shows that these vary greatly in level and nature, and there is no general agreement on how to measure them. Nevertheless, Table 2.3 below shows fuel poverty levels with these benefits excluded, to give an indication of the effect of their inclusion.

The benefits excluded are Disability Living Allowance and Attendance Allowance. The number of households in fuel poverty increases from 2.39 to 2.46 million, and the aggregate gap increases by three per cent to £1.075 billion. The average gap per household however, remains very similar at £437.

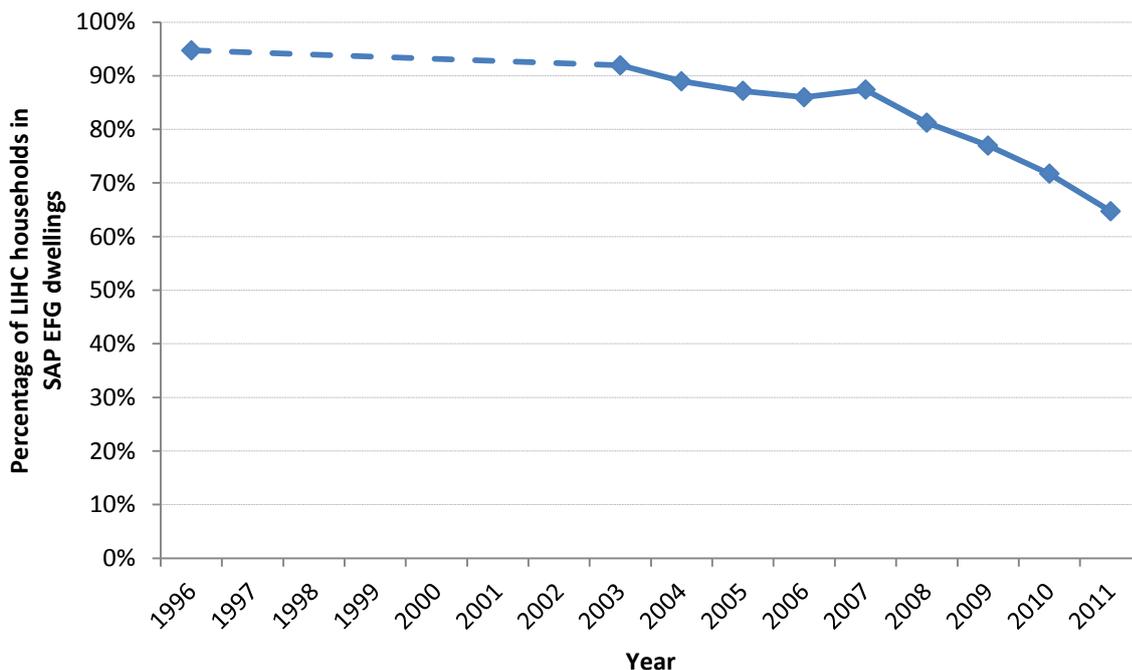
Table 2.3 - Fuel poverty under the low income high costs indicator, including and excluding disability benefits from income, 2011

	Disability benefits included in income (main measure)	Disability benefits excluded from income	Difference
Households with LIHC (millions)	2.39	2.46	3%
Aggregate Fuel Poverty Gap (£million)	1,047	1,075	3%
Average Fuel Poverty Gap (£)	438	437	0%

Low Income High Costs and Energy Efficiency

Several of the indicators that were suggested during the fuel poverty consultation focused on energy efficiency. The first involves the proportion of low income-high costs households that are living in properties with a SAP rating of E, F or G⁸. These are the lowest SAP ratings, and tend to reflect the least energy efficient properties or those with the most expensive heating systems. As shown below, there has been a reduction in the number of LIHC households with these low SAP ratings by 30 percentage points, from 95 per cent in 2003 to 65 per cent in 2011.

Chart 2.3 - Proportion of LIHC households in SAP EFG properties, 1996 to 2011



⁸ All SAP ratings are based on the SAP09 methodology.

While there has been a clear improvement in the SAP ratings of low-income high cost households, they still remain below those of non-fuel poor households. Table 2.4 shows that the average SAP rating of fuel poor households was 48 in 2011, almost 10 points below the average of households not in fuel poverty. A score of 48 is equivalent to a SAP rating of E (anything between 39 and 54 is given an E rating).

Table 2.4: Average SAP ratings of LIHC and non-LIHC households in England, 1996 to 2011

Year	Fuel poor households	Non-fuel poor households	All households
1996	35.0	46.3	44.7
2003	39.2	48.9	47.8
2004	40.6	49.6	48.5
2005	41.3	50.0	49.0
2006	41.7	50.6	49.6
2007	42.0	51.7	50.6
2008	43.6	52.9	51.8
2009	45.0	54.5	53.4
2010	46.5	56.3	55.2
2011	48.4	57.8	56.8

The following table shows the prevalence of energy efficiency measures in fuel poor households. This includes insulated cavity walls, insulated lofts, and condensing boilers. Condensing boilers are more efficient than other types, and generally cheaper to run.

Table 2.5: Number and proportion of LIHC households without insulation measures and condensing boilers, England, 1996 to 2011

Year	1996	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of LIHC households with uninsulated cavity walls (thousands)	1,244	1,065	1,039	951	788	866	826	813	780	706
Number of LIHC households with uninsulated lofts ¹ (thousands)	2,023	1,642	1,624	1,481	1,367	1,449	1,442	1,386	1,349	1,287
Number of LIHC households with a non-condensing boiler (thousands)	n/a	n/a	n/a	n/a	1,742	1,784	1,748	1,661	1,554	1,392
Proportion of LIHC households with uninsulated cavity walls ²	90%	77%	74%	70%	65%	67%	62%	60%	58%	56%
Proportion of LIHC households with uninsulated lofts ³	85%	73%	70%	65%	64%	65%	62%	59%	58%	57%

¹ Uninsulated lofts are those with less than 125mm of insulation

² Of those households that have cavity walls

³ Of those households that have a loft

Chapter 3: Analysis of fuel poverty in England

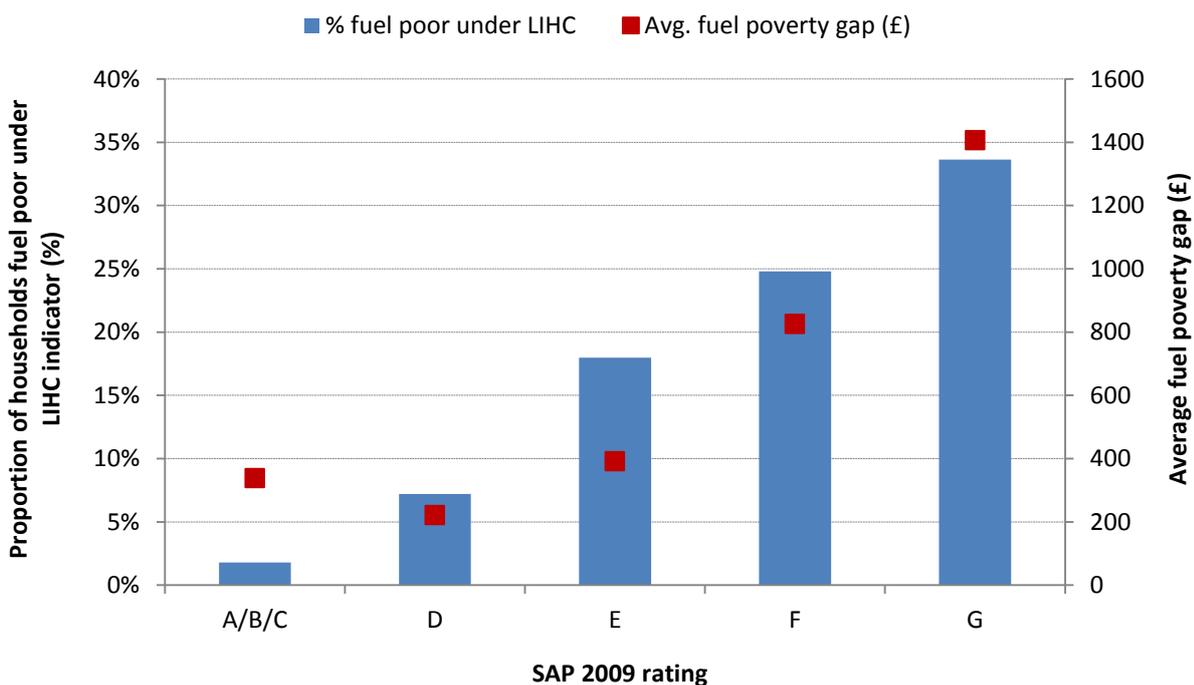
This chapter explores the prevalence of fuel poverty by different household and dwelling characteristics in 2011.

3.1 Energy efficiency and dwelling characteristics

SAP

The energy efficiency of dwellings is a key driver of the likelihood of a household being fuel poor, as it strongly determines the fuel costs incurred by the household. Chart 3.1 shows the fuel poverty rates by different SAP rating bands (based on SAP09 methodology) under the low income high cost indicator.

Chart 3.1: Fuel poverty and associated average fuel poverty gap by SAP rating bands, 2011



The above chart shows that the depth and likelihood of fuel poverty increases markedly with lower SAP scores. In 2011, 34 per cent of households living in G rated properties were fuel poor compared to only two per cent of households living in A, B or C rated properties. The corresponding average fuel poverty gap is also four times higher in G rated properties compared to A-C rated properties (with an average fuel poverty gap of around £1,406 vs. £339 in 2011).

Chart 3.2 – Distribution of SAP ratings of fuel poor and non-fuel poor households under the LIHC metric, 2011

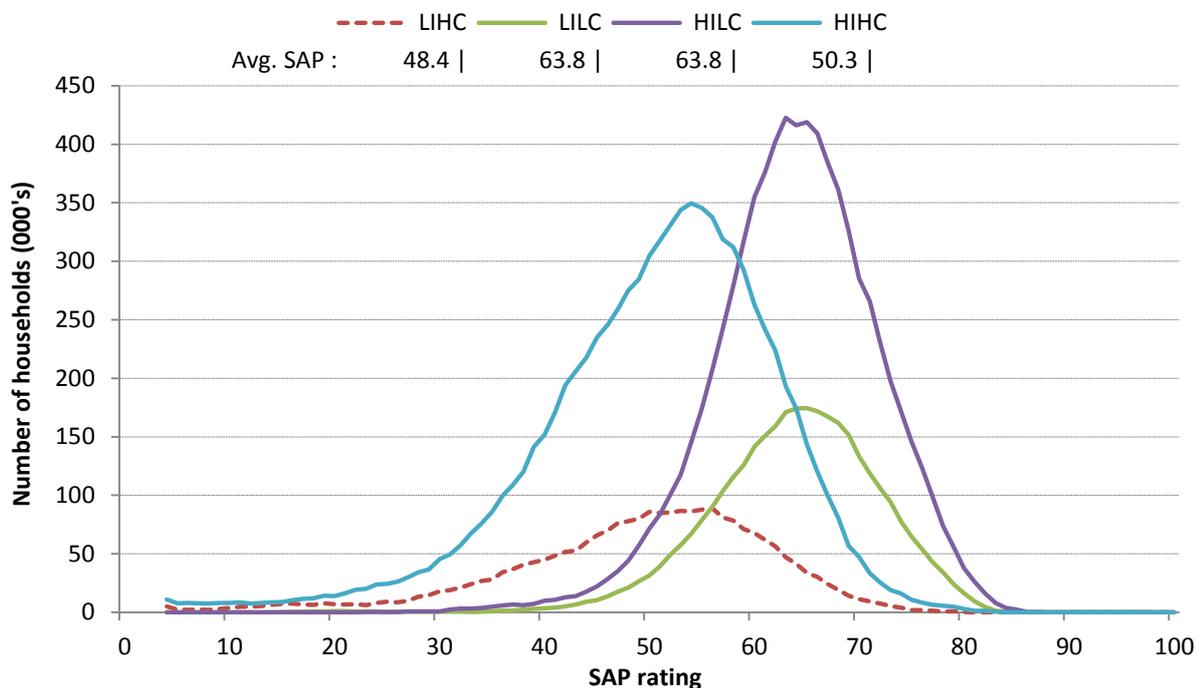


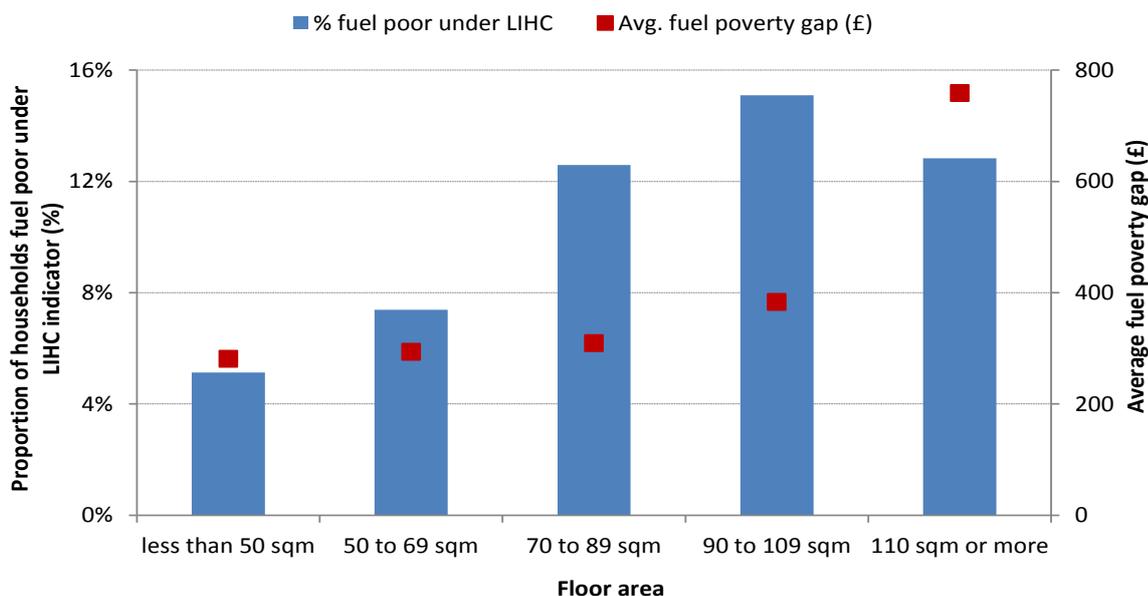
Chart 3.2 shows the distribution of SAP ratings across households in all four quadrants⁹. It shows that fuel poor households (LIHC) and households with high incomes and high costs (HIHC) have notably lower SAP ratings compared to households in the two low energy costs quadrants. In 2011, the average SAP rating for fuel poor households and households with high incomes and high energy costs was 48.4 and 50.3 respectively. This compares to an average SAP rating of 63.8 for households in the low energy costs quadrants.

Floor Area

The likelihood of being fuel poor increases with large dwelling size, up until the 90-109m² category (Chart 3.3), with fuel poverty levels increasing from five per cent for households living in properties less than 50m² in size to 15 per cent for properties between 90-109m². Households living in properties larger than 110m² have a slightly lower fuel poverty rate of 13 per cent. This reflects the nature of the low income and high costs indicator, as households living in these larger properties tend to also have higher incomes (median income for households occupying properties larger than 110m² was around £37,000 in 2011; and for properties smaller than 110m², around £21,000), which takes them above the income threshold. However, the depth of fuel poverty in these larger homes (110m² or more) is more severe, with the average fuel poverty gap being almost three times greater than households living in smaller properties (less than 50m²), with average fuel poverty gaps of £760 and £280 respectively.

⁹ The distributions presented here have been smoothed using a 7 point moving average.

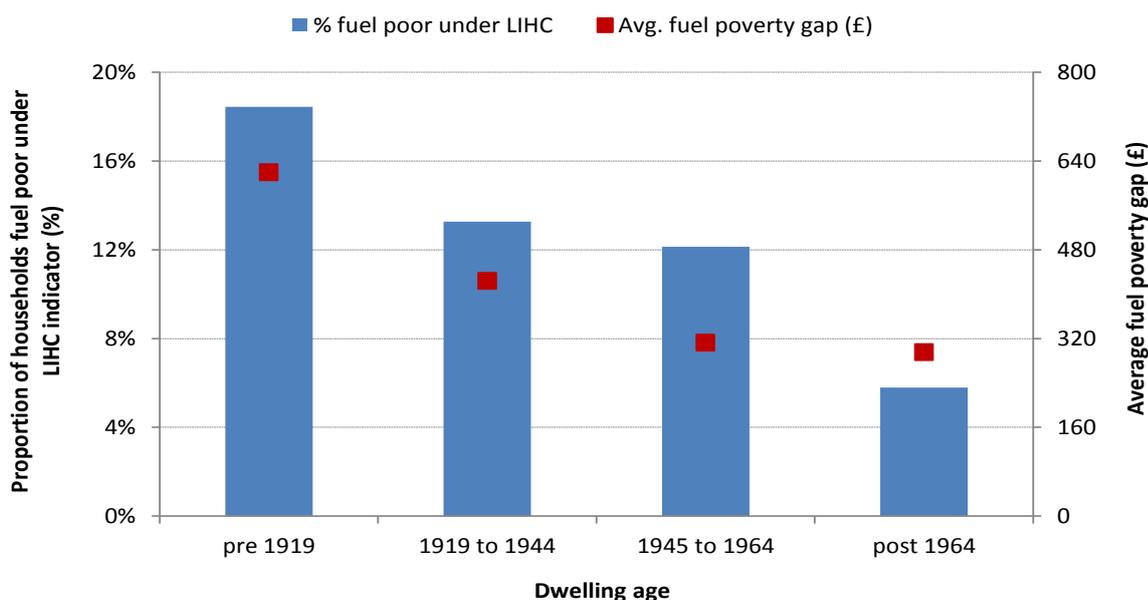
Chart 3.3 – Fuel poverty and associated average fuel poverty gap by floor area, 2011



Dwelling Age

Much of the larger housing stock consists of pre-war properties¹⁰ which generally have lower energy efficiency standards and so higher fuel costs. Therefore unsurprisingly the proportion of households living in fuel poverty increases with the age of the property (Chart 3.4). In 2011, 18 per cent of households living in properties built before 1919 were fuel poor, along with 13 per cent of households living in properties built between 1919 and 1964. This compares to six per cent of households living in properties built after 1964.

Chart 3.4 – Fuel poverty and associated average fuel poverty gap by age of the property, 2011



¹⁰ English Housing Survey Home Report, 2011

3.2 Fuel poverty and household income

Income

Household incomes (after housing costs) are used to delineate the income threshold under the 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. In 2011, all fuel poor households came from the bottom four AHC equivalised income decile groups. Table 3.1 shows the levels of fuel poverty and the corresponding average fuel poverty gap for these decile groups.

Table 3.1: Fuel poverty and associated average fuel poverty gap under the low income high costs indicator by income decile group (after housing costs, equivalised), 2011

After housing costs income deciles	Number fuel poor (000's)	Proportion fuel poor (%)	Avg. Fuel poverty gap (£)
1st decile	925	42%	429
2nd decile	815	37%	424
3rd & 4th deciles*	650	15%	468
All households	2,390	11%	438

* 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 indicator reduces with increasing levels of income. In 2011, 42 per cent of all households in the lowest income decile group were fuel poor, compared to 37 per cent of all households in the second income decile group and 15 per cent of all households in the third and fourth combined income decile groups. Within the fuel poor population itself, around 39 per cent of all households were from the lowest income decile group, 34 per cent from the second group and a further 27 per cent from the third and fourth combined income decile groups.

Working Status

Table 3.2 shows that the fuel poverty rate is highest among the unemployed population, with a third of all unemployed households (approximately 262,000 households) living in fuel poverty in 2011. This suggests that being unemployed increases the risks of being fuel poor, although interestingly, only 11 per cent of fuel poor households are unemployed, compared to four per cent of all households.

Also, the depth of fuel poverty experienced by unemployed households is the lowest (as shown by the smaller gap in Table 3.2). This is due to the fact that a large proportion of unemployed households occupy social housing, which generally tend to be smaller and more energy efficient, thus costing less to heat.

Table 3.2: Fuel poverty and associated average fuel poverty gap under low income high costs by economic activity

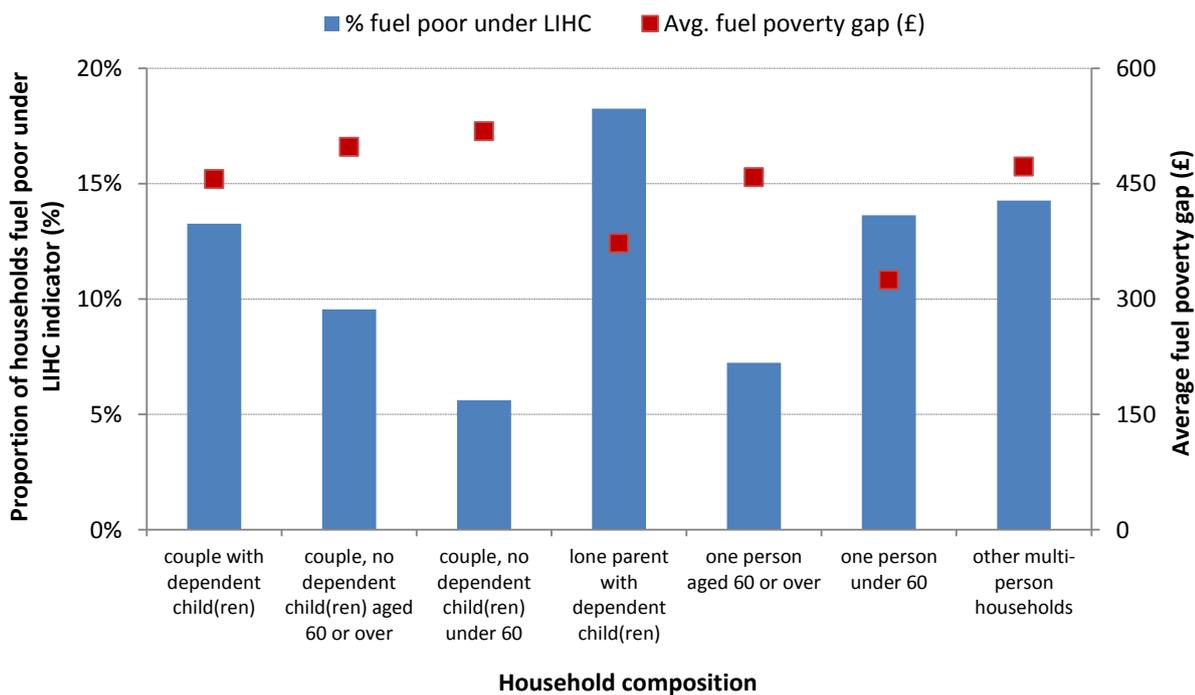
Economic Activity	Proportion fuel poor (%)	Avg. fuel poverty gap (£)
Inactive	13%	420
Unemployed	32%	370
Working	8%	472
All households	11%	438

3.3 Household characteristics

Household Composition

Fuel poverty rates vary markedly across different household characteristics. Chart 3.5 below shows fuel poverty rates by different household composition groups, along with their average fuel poverty gaps in 2011.

Chart 3.5 – Fuel poverty and associated average fuel poverty gap by household composition, 2011

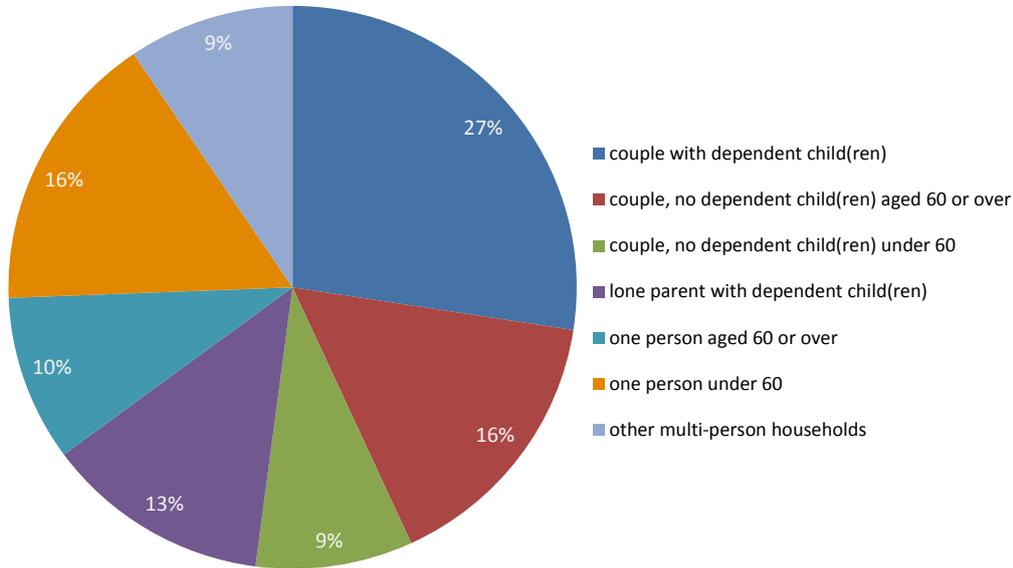


The above chart shows that around 18 per cent of lone parent households were fuel poor in 2011, compared to 13 per cent of couples with dependent children. The average fuel poverty gap for lone parent households is, however, one of the lowest (£373), with only the gap for one person households under 60 being smaller (£325). 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, 13 per cent of couples *with* dependent children were fuel poor in 2011, compared to eight 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 the higher average fuel poverty gaps, experienced by the average household in this group is greater than that observed for households with dependent children.

The following chart shows the fuel poor population by household composition.

Chart 3.6 – Fuel poor households by their household composition, 2011

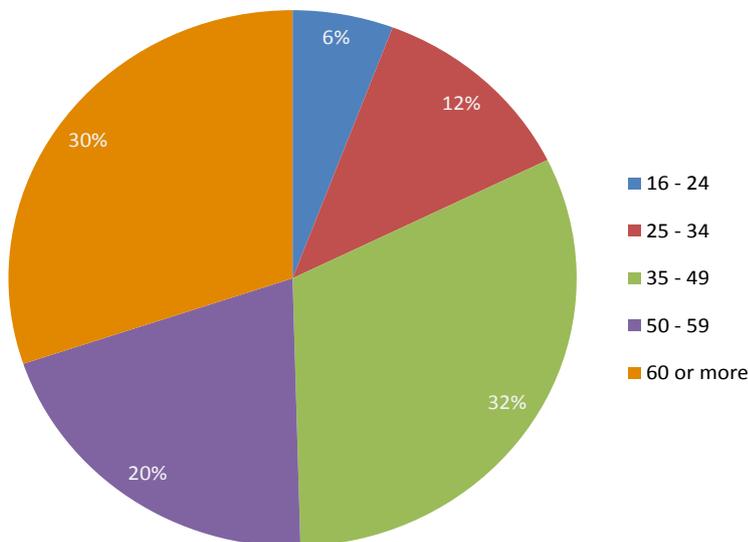


Around half of all fuel poor households in 2011 were couples with no dependent children or single person households, despite the prevalence of fuel poverty among these household types being generally lower. This reflects the fact that these types of households make up a large proportion of the population. Couples with dependent children accounted for just over one quarter of all fuel poor households, while lone parent households and multi-person households accounting for 13 and nine per cent of all fuel poor households respectively.

Age

Chart 3.7 shows the breakdown of fuel poor households by the age of their oldest occupants.

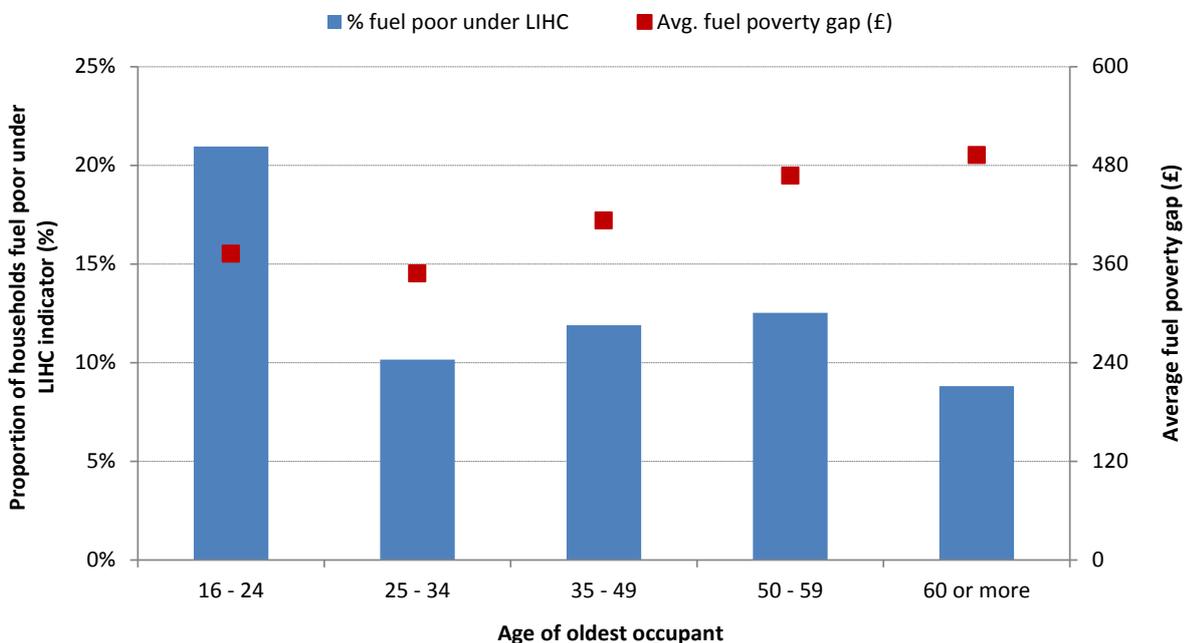
Chart 3.7 – Fuel poor households by age of the oldest occupant, 2011



Looking at the breakdown of the fuel poor population by age, it is apparent that around half of all fuel poor households had someone aged 50 or over in 2011. In contrast, around six per cent of all fuel poor households had an oldest household member aged between 16 and 24 (around three per cent of the all households have someone aged between 16 to 24).

Chart 3.8 below shows how the proportion of households in fuel poverty varies by the age of the oldest occupant in the household, along with the associated average fuel poverty gaps in each group. From the chart it is clear that fuel poverty is most prevalent amongst the under 25 year olds, with around 21 per cent of this group living in fuel poverty in 2011. This compares to nine per cent of the over 60 year old group. This increased likelihood of being fuel poor in the under 25 year old group is likely to be partly due to their lower average earnings, and partly due to the fact that the majority of this age group (around two-thirds) live in privately rented accommodation, which tends to be less energy efficient and thus lead to higher fuel costs. In contrast, over three-quarters of the over 60 year old age group own the property they live in, often resulting in lower housing costs, and in turn, higher disposable incomes compared to all other age groups. To illustrate further, Table 3.3 shows the distribution of tenure and the employment status of the main household reference person (HRP) by the age of the oldest household member.

Chart 3.8 – Fuel poverty and associated average fuel poverty gap by age of oldest household occupant, 2011



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. In 2011, the average fuel poverty gap for households where the oldest member was aged 25-34 was £348, and for households with someone aged over 60 was £493. This shows that despite the older group having a reduced likelihood of being fuel poor, those that are fuel poor are more deeply fuel poor.

Table 3.3 – 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%

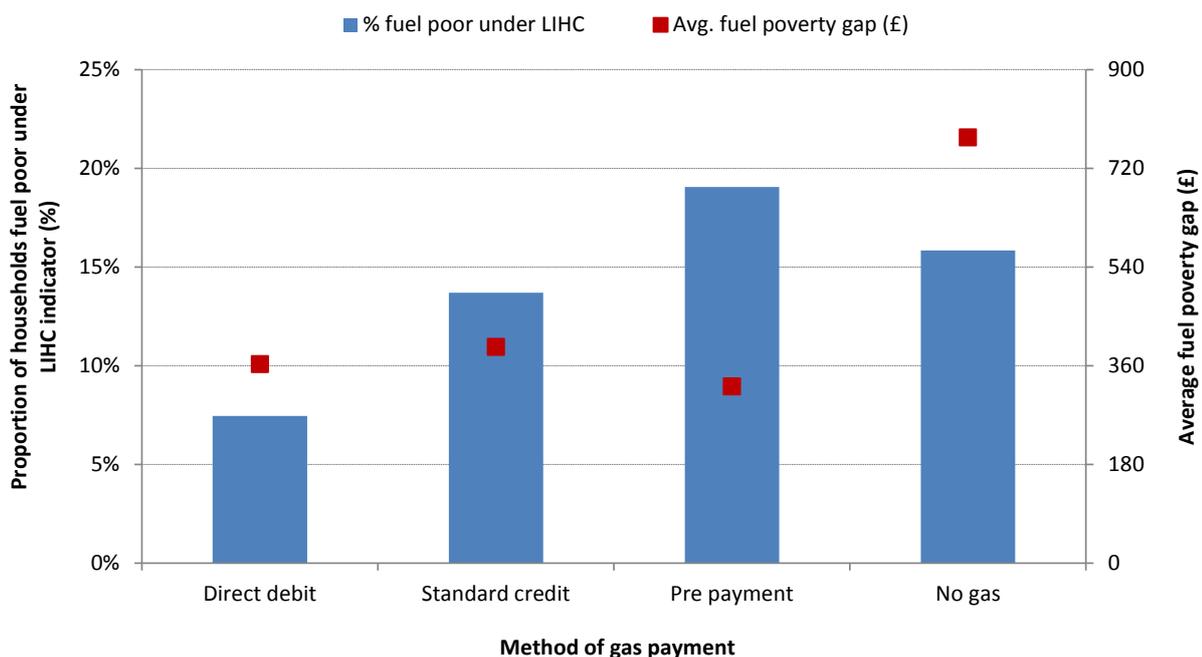
3.4 Fuel payment types

Method of Gas Payment

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

Households paying for their gas by direct debit have the lowest fuel poverty rate, with around seven per cent in fuel poverty in 2011. This contrasts against 14 per cent of all households paying by standard credit, and 19 per cent of all households using pre-payment meters. In 2011, the average fuel poverty gap was greatest for households paying by standard credit and least for households using pre-payment meters (£394 and £322 respectively). For households using direct debit, the gap was £363.

Chart 3.9 – Fuel poverty and associated average fuel poverty gaps by payment method for gas, 2011

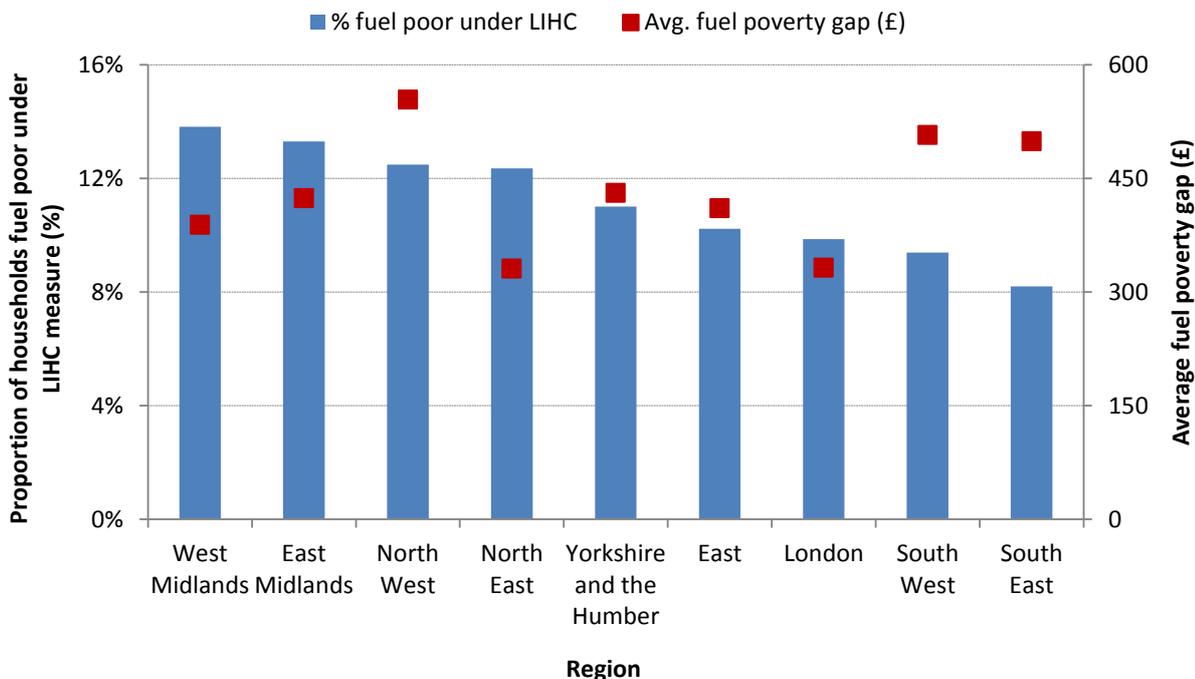


Of all fuel poor households, one in five used pre-payment meters for their gas consumption in 2011. This compares to one in ten non-fuel poor households. On the other hand, a significantly larger proportion of the non-fuel poor households pay for their gas consumption using direct debit compared to fuel poor households (61% vs. 40%). In addition, a higher proportion of the fuel poor population did not use gas in 2011 compared to the non-fuel poor population (18% vs. 12% respectively).

3.5 Regional fuel poverty

Fuel poverty rates differ notably across the England¹¹, as seen in Chart 3.10 below. In 2011, the highest rate of fuel poverty was seen in the West Midlands, followed closely by the East Midlands (with fuel poverty rates of 14% and 13% respectively). In contrast, households living in the South East and South West have the lowest levels of fuel poverty (at 8% and 9% respectively).

Chart 3.10 – Fuel poverty and associated average fuel poverty gaps by region, 2011



In general, regions with the higher fuel poverty rates (the Midlands and the North), tend to also have lower average incomes compared to London and the South, where proportionally, fewer households are in fuel poverty. This drives more households into fuel poverty. However, a general combination of smaller dwelling sizes, better insulation measures and greater access to the gas network in these regions, work to compensate the severity of the fuel poverty experienced, and so they have some of the lowest fuel poverty gaps.

¹¹ Detailed information on regional statistics can be found at: <https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/fuel-poverty-sub-regional-statistics>

Chapter 4: Sub-regional fuel poverty in 2011

This chapter focuses on sub-regional fuel poverty under the Low Income High Costs indicator of fuel poverty. This is the first time that sub-regional figures have been provided under the Low-Income High Costs indicator of fuel poverty. Sub-regional figures under the 10 per cent indicator of fuel poverty were published in May 2013:

<https://www.gov.uk/government/publications/fuel-poverty-report-annual-report-on-statistics-2013>

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.

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

4.2 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 the South East and South West have lower fuel poverty levels, whilst the Midlands and the North have higher rates of fuel poverty. This data is consistent with the regional data shown in Chart 3.11, which shows the West Midlands and East Midlands have the highest fuel poverty rates (14% and 13% respectively) out of all the regions.

Figure 4.1 - Percentage of households in fuel poverty at local authority level, England, 2011

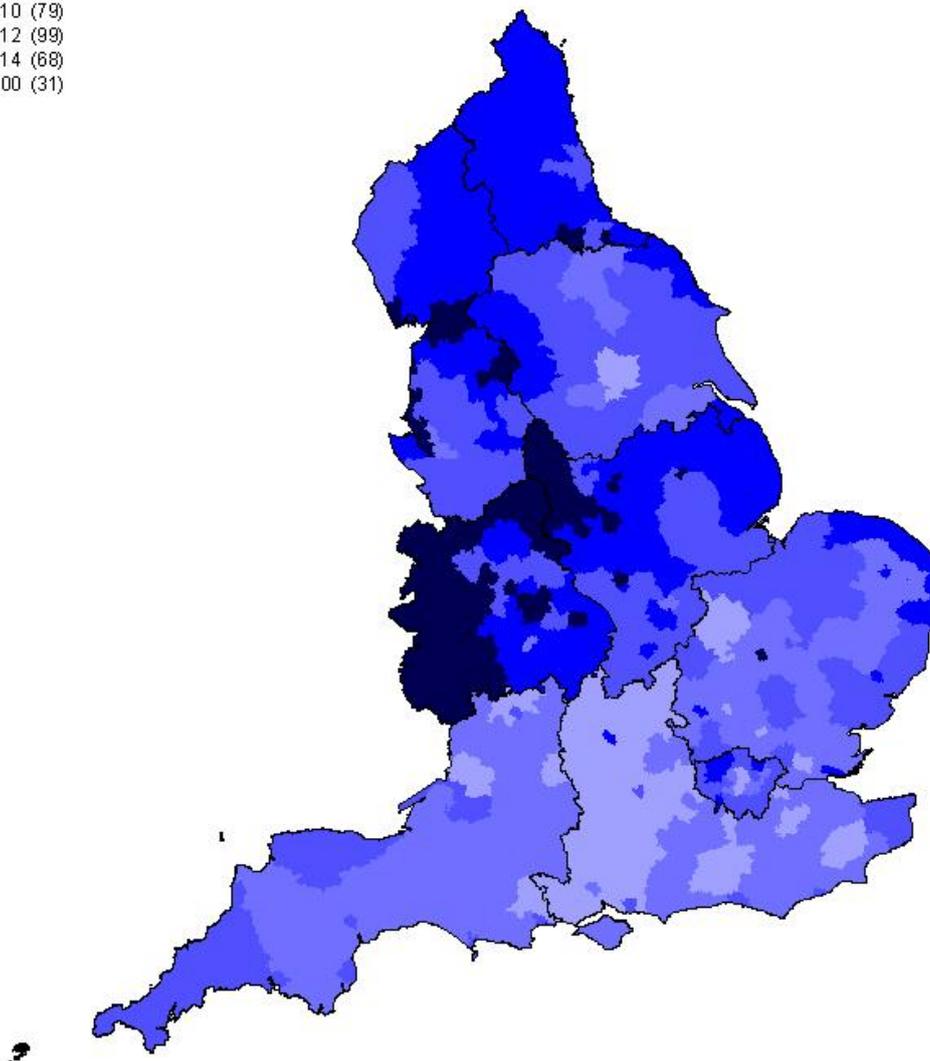
Fuel Poverty in England, 2011

Percentage of households in fuel poverty under the Low Income High Costs measure, by local authority



Key

0 to 8 (49)
8 to 10 (79)
10 to 12 (99)
12 to 14 (68)
14 to 100 (31)



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Figure 4.2 - Percentage of households in fuel poverty at LSOA level, England, 2011

Fuel Poverty in England, 2011

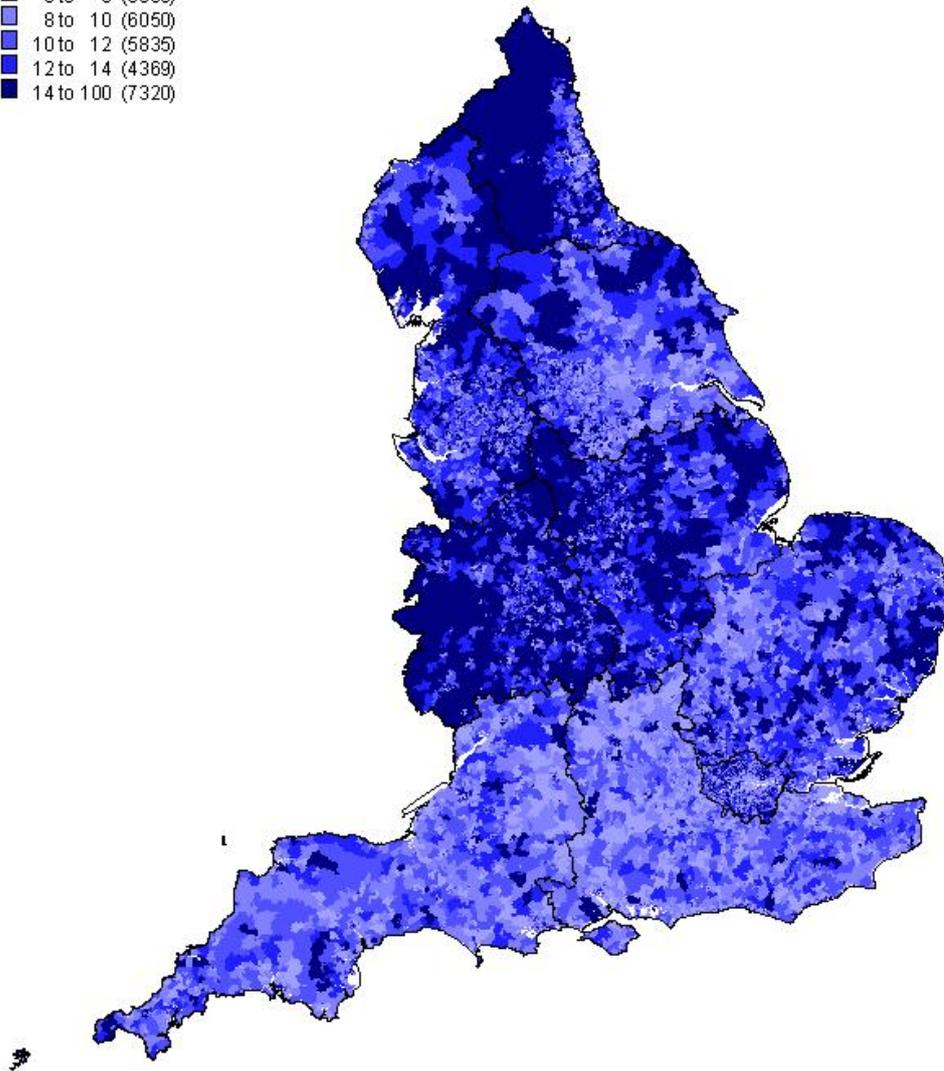
Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

Key

- 0 to 8 (8908)
- 8 to 10 (6050)
- 10 to 12 (5835)
- 12 to 14 (4369)
- 14 to 100 (7320)



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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.

4.3 Comparison with sub-regional estimates under 10 per cent

Broadly, the LIHC indicator shows a similar pattern to that seen under the 10 per cent indicator, with the Midlands and North West having a larger number of LSOAs with higher rates of fuel poverty, and London and the South East having the highest number of LSOAs with relatively low rates of fuel poverty.

Under the LIHC indicator, Blackpool Local Authority had the highest proportion of fuel poor households, while the City of London Local Authority had the lowest (18.0% and 2.5% respectively). Under the 10 per cent indicator the City of London Local Authority also had the lowest rate of fuel poverty (3.4%).

The LIHC indicator is only available at sub-regional level from 2011, so it is not possible to look at changes over time. This will be included in next year's annual report.

4.4 Methodology

This section outlines the current methodology used to produce the sub-regional estimates of fuel poverty under the LIHC indicator. 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, and then these are then aggregated to LSOA and higher level geographies. A single model has been created to reflect the level of fuel poverty across all tenures.

The model, produced by BRE at the request of DECC, uses a stepwise selection methodology to identify the variables with the most explanatory power. A few of the key predictor variables used in the model 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 3 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 this model 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 5: Projections

5.1 Introduction

This chapter presents projections of fuel poverty for 2012 and 2013 based on the low income-high cost indicator of fuel poverty. This is the first time projections based on the new indicator of fuel poverty have been presented.

5.2 Methodology

A new methodology for projecting fuel poverty was used this year. The methodology adopted is similar to that used in the DECC publication Fuel Poverty: A Framework for Future Action

(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf).

The projection model uses the 2011 EHS dataset as the baseline. Projections of fuel poverty are primarily based on three factors:

- Changes in incomes, in nominal terms.
- Changes in energy prices;
- The estimated change in household's required energy costs, due to the installation of new energy efficiency measures or direct energy bill support.

The key outputs from the projections model are the number of households in fuel poverty, the aggregate fuel poverty gap and the average fuel poverty gap. The assumptions that underpin these projections are set out in more detail below.

Incomes

Projecting disposable income involves combining information on the different types of household income, such as earnings, benefits and savings, and applying the relevant projected rates of change to them. Incomes from each of these sources are expected to change at different rates, as they are dependent on different factors. For example, earnings depend on activities in the labour market, whereas savings depend on interest rates.

As such, a summary of the different income types and the source used to project their future change is provided in Table 5.1. Each element is projected in cash terms, in line with the Office of Budget Responsibility Economic and Fiscal Report (OBR)¹², in order that we can compare with the actual out-turn next year.

¹² See the charts and tables in the OBR fiscal outlook:

<http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-march-2013/>

Table 5.1 - Projecting the different components of income

Type	Method of projection
Earnings	Percentage change in nominal earnings from OBR (2013) ¹³
Investment and savings	The percentage change in GDP from OBR (2013) is applied to both investments and savings. GDP is used because the savings rate that each household receives will vary by their choice of bank/building society etc. so we use the nominal GDP rate as a proxy for interest rates.
Other private income	These include a wide range of relatively small income sources e.g. cash gifts from other family members. These are uprated by the Consumer Price Index (CPI) (a measure of inflation).
Benefits (including housing related) and tax credits	These are uprated by the CPI for the previous September, in line with Government policy for uprating benefits.

Housing costs (mortgage and rent payments) are uprated by the Retail Price Index (RPI). Housing costs are then deducted from income to calculate After Housing Costs Income.

Energy Prices

For the 2012 projections, published price data is available, and this is applied to the 2011 dataset. Components of the RPI have been used for non-metered fuels, whilst DECC’s estimated gas and electricity bills are used for metered fuels. For the 2013 projections, published RPI data for January – May is combined with estimated changes in fuel prices for the rest of 2013. This is done for both metered and non-metered fuels. Estimates for biomass fuels are taken from the July 2013 Renewable Heat Incentive Impact Assessment.¹⁴

Energy Efficiency

The Government energy and climate change policy package is designed to reduce energy costs for those households that receive support, mainly through the installation of energy efficiency measures and/or direct energy bill support. Assumptions are made in the projections about which households receive support and the number of measures allocated.

¹³ See: Office for Budget Responsibility. (2013). *Outlook Report*. Available at: <http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-march-2013/>

¹⁴ See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211978/Domestic_RHI_Impact_Assessment.pdf

For policies that have delivered measures to date, such as the Carbon Emissions Reduction Target (CERT), we have used observed delivery statistics. For policies which there is no or partial delivery data, we have used projected installation patterns for each of the major measures from the most recently published policy impact assessments. See Tables 5.2 and 5.3 for details of the measures estimated to be delivered under these policies in 2012 and 2013.

Many of the policies are intended to deliver measures across Great Britain. For the purpose of these projections, the numbers have been scaled down to represent England only (around 86% of the GB total). The methodology does not take any account of improvements in the energy efficiency of appliances, as this is not accounted for in the fuel poverty methodology. It also does not include the impact of DIY measures to improve energy efficiency.

Table 5.2 - Estimated uptake of insulation and heating measures ('000s) from government policies in England, 2012

2012	Loft	CWI	SWI	Replacement Boiler	Central Heating	Renewable Heat ¹	Solar PV	Bill Rebates	Condensing Boilers
Warm Front	3,000	1,000		23,000	8,000	0			
CERT	2,186,000	844,000	16,000			2,000			
CESP	4,000	1,000	11,000	37,000	9,000	1,000			
Green Deal and Carbon ECO*									
ECO Affordable Warmth*									
RHI*									
FITs							413,000		
WHD								1,251,000	
Building Regulations									572,000

* No delivery in 2012

¹ Includes ground source heat pumps, air source heat pumps, biomass boilers and solar thermal.

Table 5.3 - Estimated uptake of insulation and heating measures ('000s) from government policies in England, 2013

2013	Loft	CWI	SWI	Replacement Boiler	Central Heating	Renewable Heat ¹	Solar PV	Bill Rebates	Condensing Boilers
Warm Front	5,000	3,000		21,000	5,000				
CERT*									
CESP*									
Green Deal and Carbon ECO	98,000	279,000	36,000						
ECO Affordable Warmth	44,000	30,000		75,000	22,000				
RHI						7,000			
FITs							595,000		
WHD								1,569,000	
Building Regulations									1,143,000

* No delivery in 2013

¹ Includes ground source heat pumps, air source heat pumps, biomass boilers and solar thermal.

5.3 Modelling Impacts on Fuel Poverty

The projection model is in two parts.

The micro-simulation model

Firstly a ‘micro-simulation model’ is used to allocate the measures to households. The policy inputs (above) specify the number and type of measures that are installed as well as the types of households that can receive measures. For example, Affordable Warmth (AW) measures can only go to households which are modelled as being AW eligible. In addition, there are physical restrictions, such that cavity wall insulation can only go to households with unfilled cavity walls.

Each household that is allocated a measure is also allocated an associated reduction in their kilowatt hour (kWh) energy consumption. The amount of energy saved depends on a variety of characteristics, such as: build type (e.g. end terrace, flat, etc.), depth of roof insulation, dwelling age, boiler age, water heating source, main heating fuel and main water heating fuel. There are also different savings factors for different fuel types and fuel use (for example, heating, cooking and lighting). The energy saving factors are based on the BREDEM model, which is used in the calculation of fuel poverty.

The micro-simulation model is run 100 times, with a representative iteration then chosen by looking at the iteration that gives an ‘average’ saving impact or distribution. This then feeds into the second part of the model.

Calculating fuel poverty

The second part of the model calculates each household’s energy consumption in the year under consideration. This is based on their initial energy consumption, as reported in the EHS 2011, combined with the ‘energy savings factor’ (i.e. the change in energy requirement that results from the measures that are delivered). This is then combined with the relevant energy prices, for the year under consideration, to create a new energy bill.

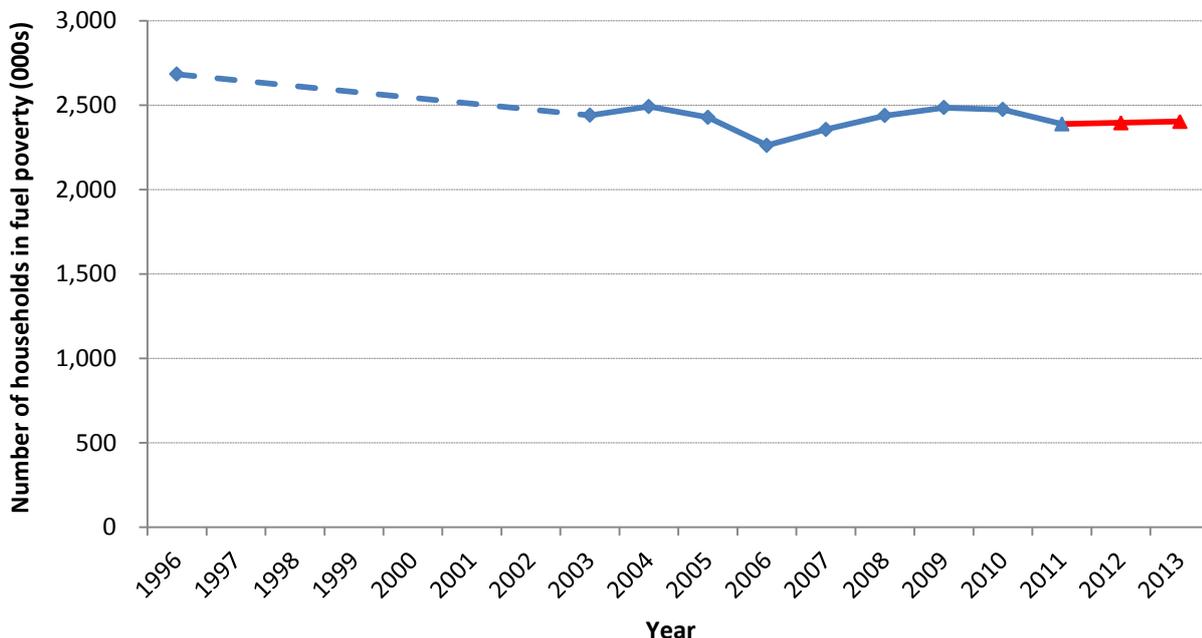
Income for each household is also up-rated to the year of projection, using the methodology described in Section 5.2. Finally, household incomes are adjusted to reflect any additional income from feed in tariffs and/or RHI tariff payments, and the final energy bill is calculated by reflecting the impact of Warm Home Discount rebates and Green Deal repayment charges for relevant households.

A new energy threshold and median income are then calculated for each projection year. It is then possible to calculate the number of households in fuel poverty and the fuel poverty gap.

5.4 Projected levels of fuel poverty in England, 2012 and 2013

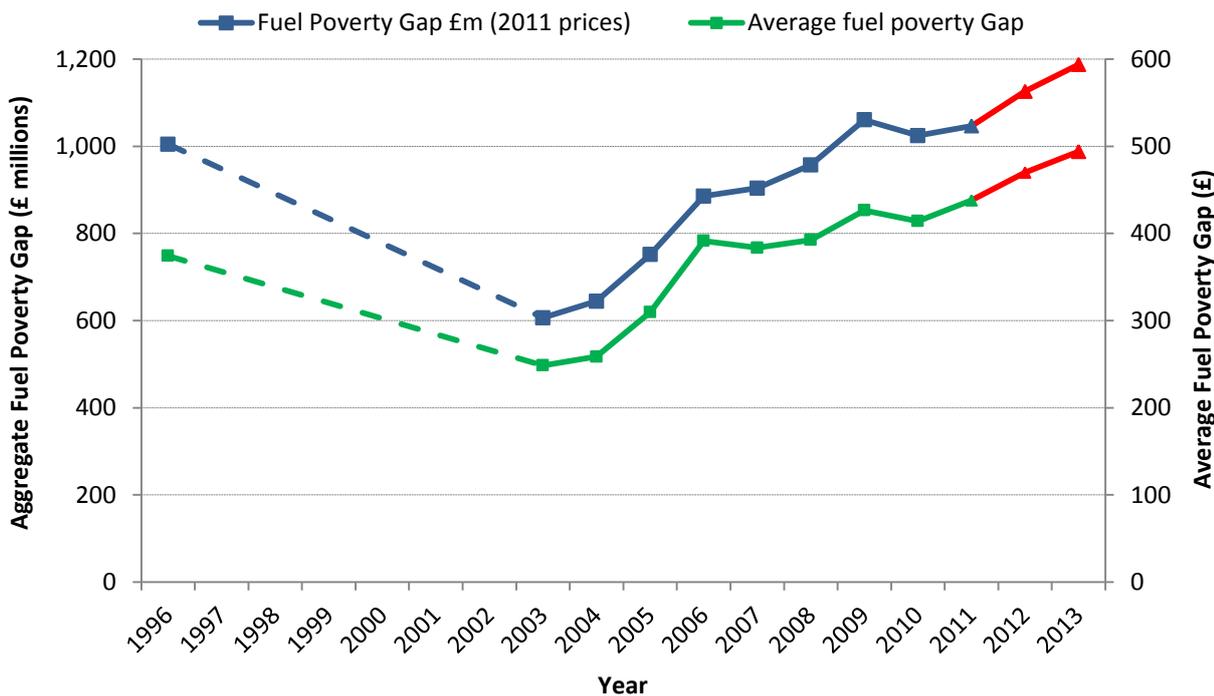
Chart 5.1 shows the projected number of households in fuel poverty in 2012 and 2013. The number of households in fuel poverty is projected to remain at the same level in 2012 before increasing marginally in 2013.

Chart 5.1 - Number of households in fuel poverty 1996 to 2011, and projections for 2012 and 2013



The aggregate and average fuel poverty gap is projected to increase in 2012 and 2013. The aggregate gap is projected to increase from £1 billion in 2011, to £1.2 billion in 2013, and the average gap is projected to increase from £438 in 2011 to £494 in 2013.

Chart 5.2 - Aggregate and average fuel poverty gap 1996 to 2011, and projections for 2012 and 2013



As noted previously, the projection for 2013 depends on prices that are, as yet, unknown. This uncertainty will have an impact on the accuracy of the projection against the outturn. For the purpose of this projection we have assumed that average prices for gas and electricity will increase by around seven per cent in early autumn. In addition, while the projections include the impact on energy efficiency of major Government programmes, they do not include an assessment of the impact of 'do it yourself' type improvements on households energy costs.

The extent to which the actual fuel poverty levels for 2012 and 2013 will differ from the above projections will depend on a number of important and, until the results of survey data from those years are compiled, uncertain factors. These include:

- Any price changes that apply for the remainder of the period (up to the end of 2013);
- Actual income changes;
- Any changes in the fuels used in households, and therefore the energy costs households experience;
- The impact of social and discounted tariffs;
- Changes to the structure and type of households;
- The overall number of households in England;
- The number of energy efficiency measures delivered;
- The actual impact of energy efficiency improvements on households;
- The economic climate and the degree to which employment levels change.

For the reasons above, care should be taken when interpreting the projections of fuel poverty presented here.

Annex A: Calculating Fuel Poverty under the LIHC Indicator

A1: Calculating the number of households in fuel poverty

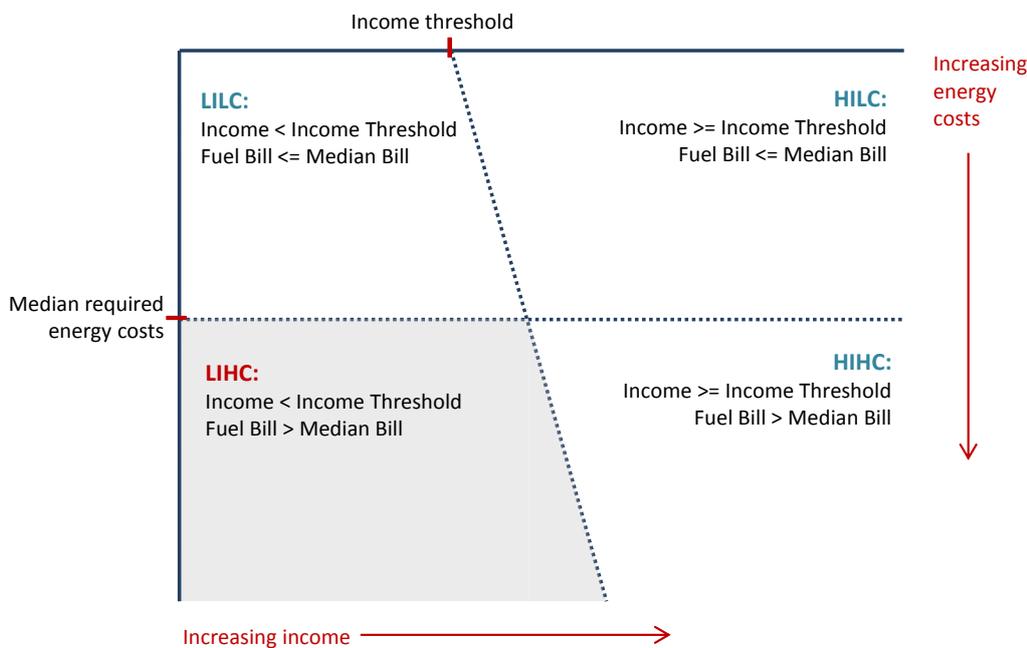
This note describes the method used to identify households living in Fuel poverty under the new Low income High Costs (LIHC) indicator, as set out in the Government response to the consultation on fuel poverty measurement¹⁵. Under this indicator, households are considered to be fuel poor if:

- 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 A2 of this annex.

This note describes how to calculate whether a household is classed as having ‘low income’ and ‘high costs’. Figure A1 shows the four possible groups that a household can fall into under this indicator.

Figure A1: The Low Income High Costs Matrix of fuel poverty



¹⁵ See <https://www.gov.uk/government/publications/fuel-poverty-a-framework-for-future-action>

Fuel costs threshold

Households with 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 “fuelexpn” variable)
2. Use the appropriate equivalisation factor for each household. These are shown in Table A1 below.

Table A1 - Equivalisation factors for fuel bills under the Low Income High Costs indicator

Number of people in the household	Equivalisation factor
1	0.82
2	1.00
3	1.07
4	1.21
5+	1.33

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.

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.

Note, 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 median fuel costs of 1, 2, 3, 4 and 5+ person households in this dataset¹⁶, and index them, with 2 person households being set to 1.00. Adults and children are treated equally, i.e. the equivalisation factors do not make any distinction between a household with 2 adults and 2 children, and a household with 4 adults.

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 do not become dated.

Unlike in the final report of the Hills Review, the equivalisation factors are not based on only the mean fuel costs of households within 20% of median income. Instead, we use the median fuel costs of all households in each household size group. This should have a similar effect in terms of minimising the impact of outliers on the average costs of each group.

¹⁶ Based on the “hhsizex” variable from the EHS “Interview” file.

Income threshold

Household fuel spend leaves them 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.¹⁷
3. 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 are dealing with AHC income. The equivalisation factors for each person in the household are shown in Table A2 below.

Table A2 - Equivalisation factors for income under the Low Income High Costs indicator

	Before Housing Costs (BHC)	After Housing Costs (AHC)
First adult in the household	0.67	0.58
Subsequent adults (Inc. partners and children aged over14)	0.33	0.42
Children under 14	0.20	0.20

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.

4. To calculate the income threshold, take the following steps:
 - a) Take the weighted median of all of the AHC, equivalised incomes in the dataset
 - b) Calculate 60% of this value. This is partly based on DWP’s income measurement (although that is at an individual rather than household level)
 - c) 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.

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

Income equivalisation factors

¹⁷ 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 & 2009.

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” file¹⁸. However, the “interview.sav” file does not include information on the age of every person in the household, 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):

$$= 2.46 - (2 \times 0.42) = \mathbf{1.62}$$

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

¹⁸ 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.

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% of median AHC, equivalised income, plus the equivalised fuel bill of that household

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

Figure A2: 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 (1.07)
= £1,854

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 (£1,854) > Median fuel bill (£1,203)

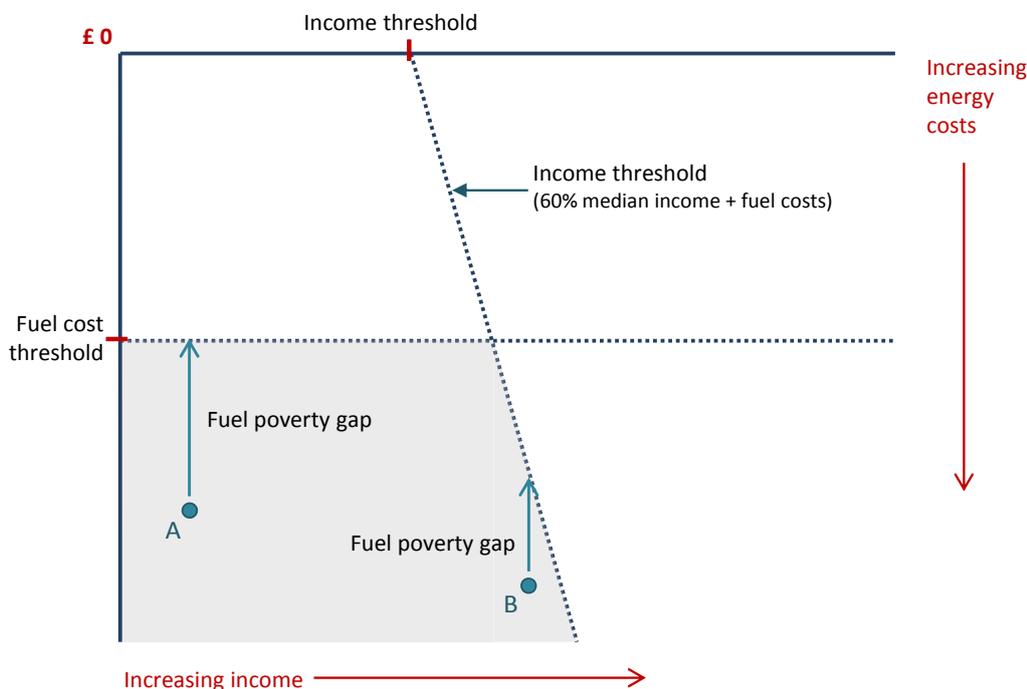
Therefore the household is considered to be fuel poor under the LIHC measure

A2: Calculating the fuel poverty gap

Under the Low Income High Costs indicator 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 A3 below shows the overlap between the household income¹⁹ 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 A3 - Fuel poverty gaps under the Low Income High Costs measure



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% of median income
- y = household energy costs
- y_m = median energy costs

¹⁹ Note, the income considered for the LIHC indicator (and throughout this document) is the residual income after housing costs.

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

- **60% of AHC median income = £11,553**
- **Median required energy costs = £1,203**

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 A4 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 A4 as (x, y).

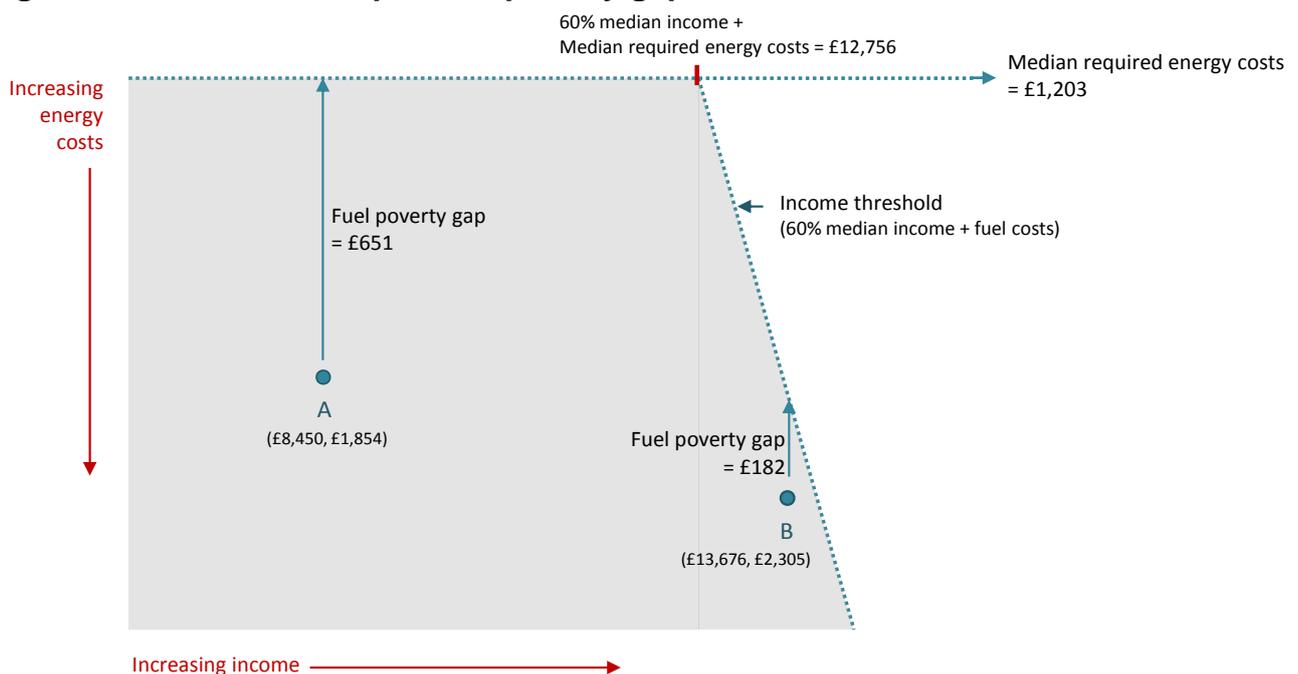
The fuel poverty gap for household A is calculated as follows:

$$\begin{aligned}
 (\text{FP Gap})_A &= \text{Excess energy costs} \\
 &= \text{Household energy costs} - \text{Median required energy costs} \\
 &= £1,854 - £1,203 \\
 &= \mathbf{£651}
 \end{aligned}$$

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

$$\begin{aligned}
 (\text{FP Gap})_B &= \text{Excess energy costs} - \text{Extra income above the overall threshold} \\
 &= \text{Household energy costs} - \text{Median required energy costs} - \\
 &\quad [\text{current income} - (60\% \text{ median income} + \text{median energy costs})] \\
 &= (£2,305 - £1,203) - [£13,676 - (£11,553 + £1,203)] \\
 &= \mathbf{£182}
 \end{aligned}$$

Figure A4 - Worked example: fuel poverty gap calculation



Once the fuel poverty gap/s are calculated, the energy cost equivalisation factors (see Table A1 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.

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

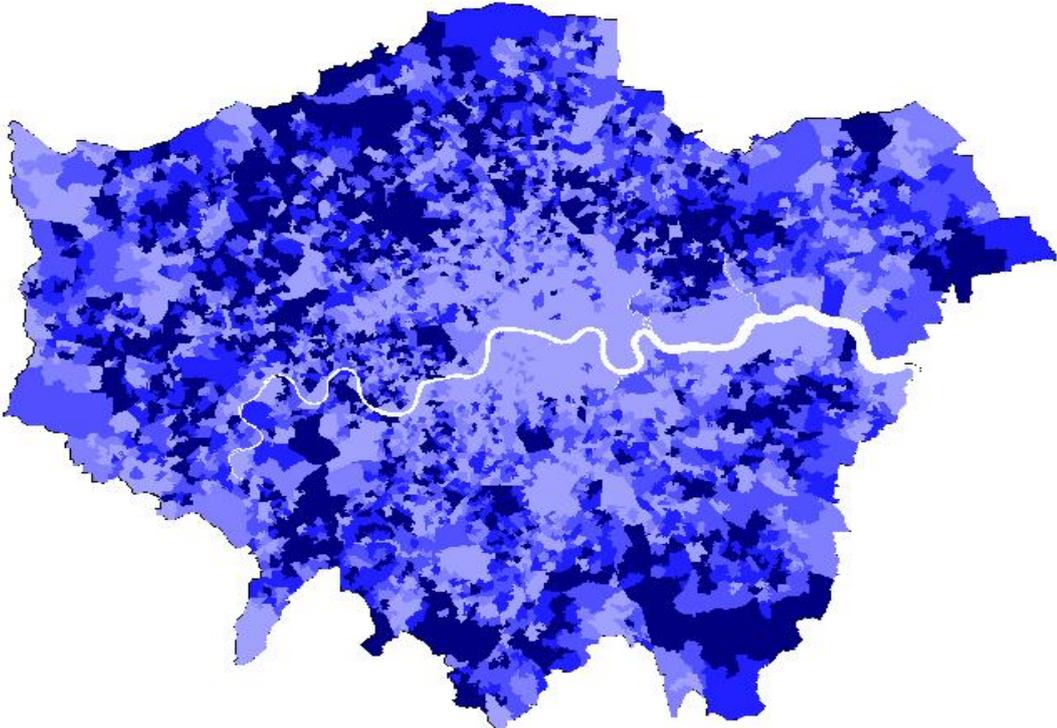
Figure B1 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, London, 2011

Fuel Poverty in London, 2011

Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



- Key**
- 0 to 8
 - 8 to 10
 - 10 to 12
 - 12 to 14
 - 14 to 100



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Figure B2 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, South East, 2011

Fuel Poverty in the South East, 2011

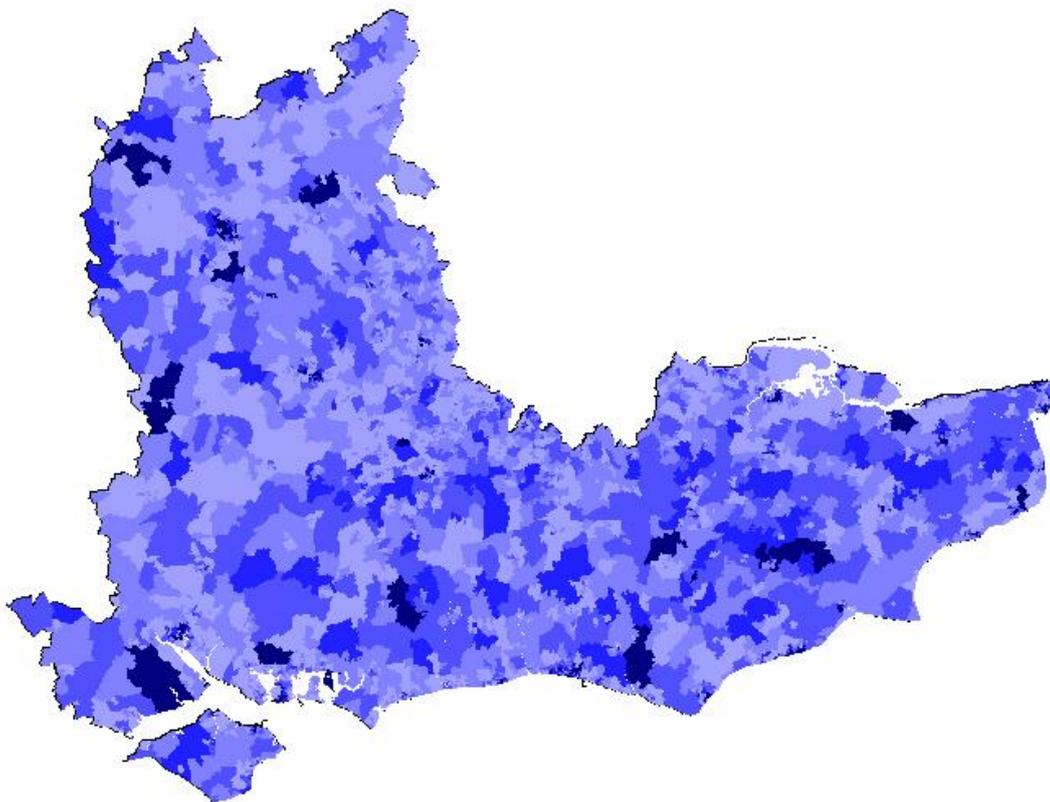
Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



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Key

- 0 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- 14 to 100



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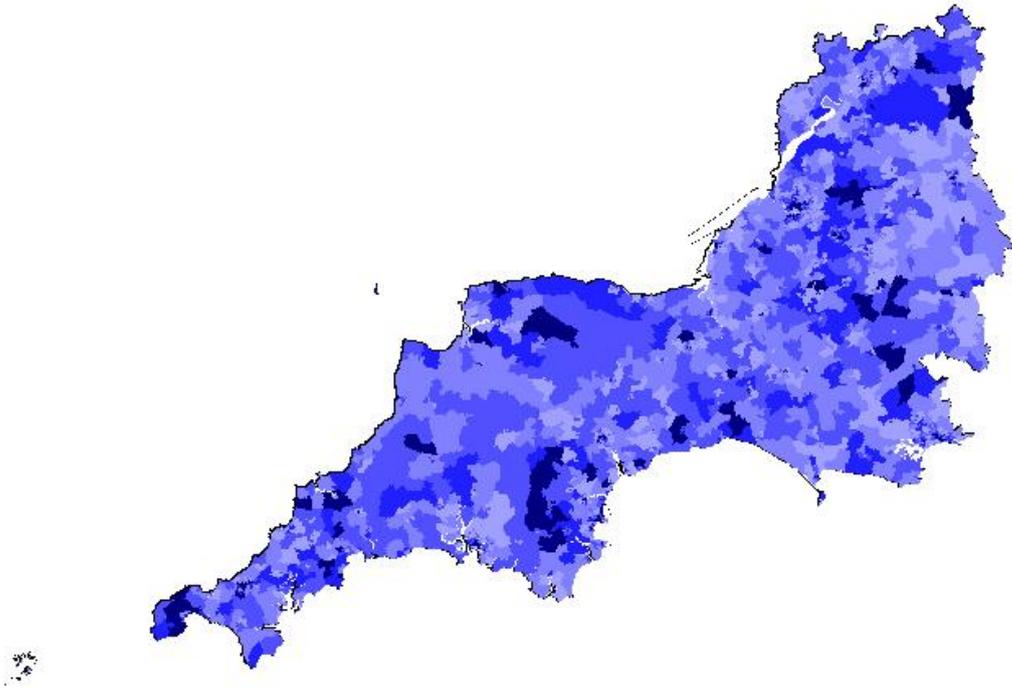
Figure B3 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, South West, 2011

Fuel Poverty in the South West, 2011

Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



- Key**
- 0 to 8
 - 8 to 10
 - 10 to 12
 - 12 to 14
 - 14 to 100



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Figure B4 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, East of England, 2011

Fuel Poverty in the East of England, 2011

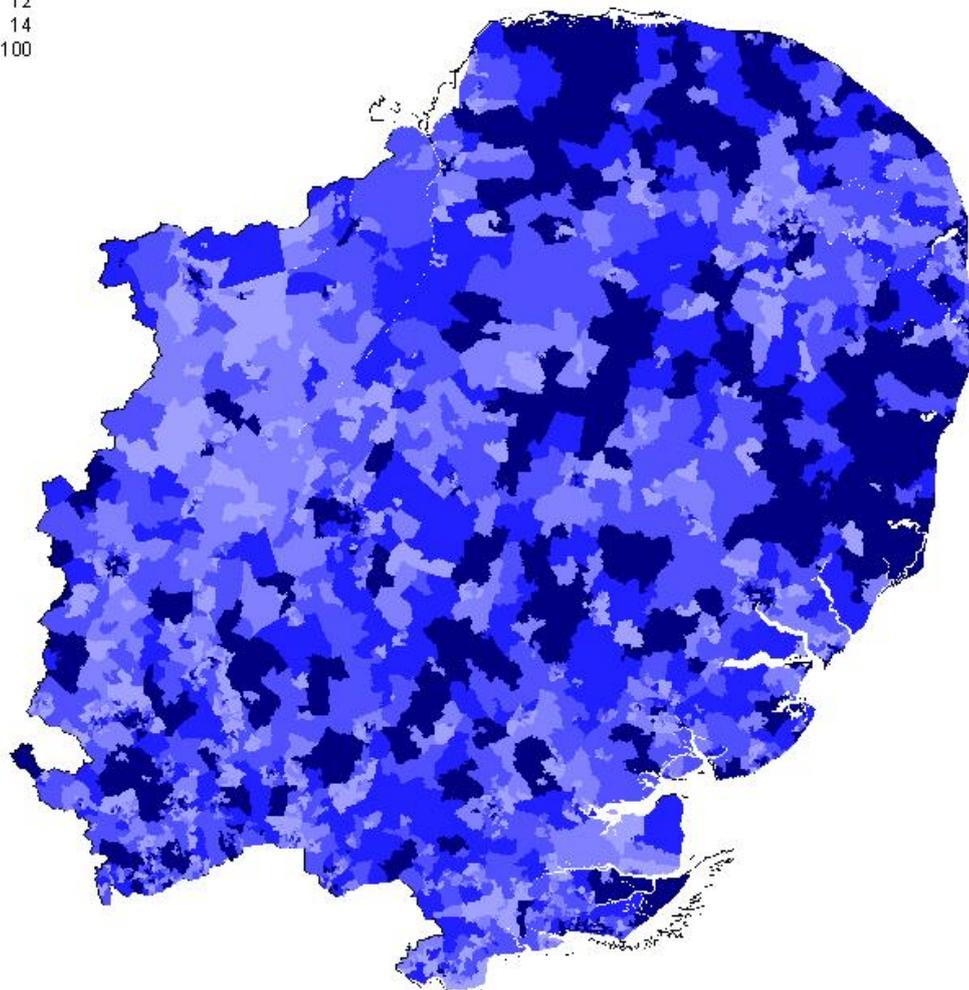
Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



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Key

- 0 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- 14 to 100



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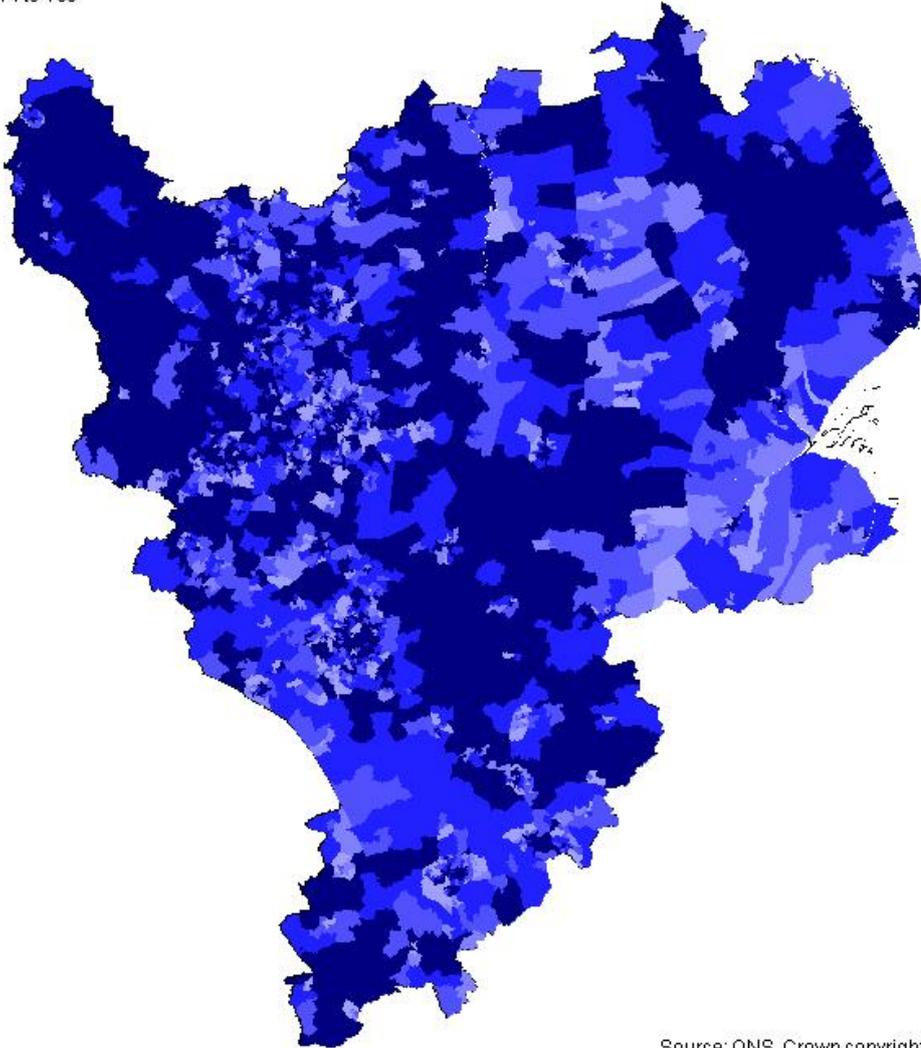
Figure B5 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, East Midlands, 2011

Fuel Poverty in the East Midlands, 2011

Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



- Key**
- 0 to 8
 - 8 to 10
 - 10 to 12
 - 12 to 14
 - 14 to 100



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Figure B6 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, West Midlands, 2011

Fuel Poverty in the West Midlands, 2011

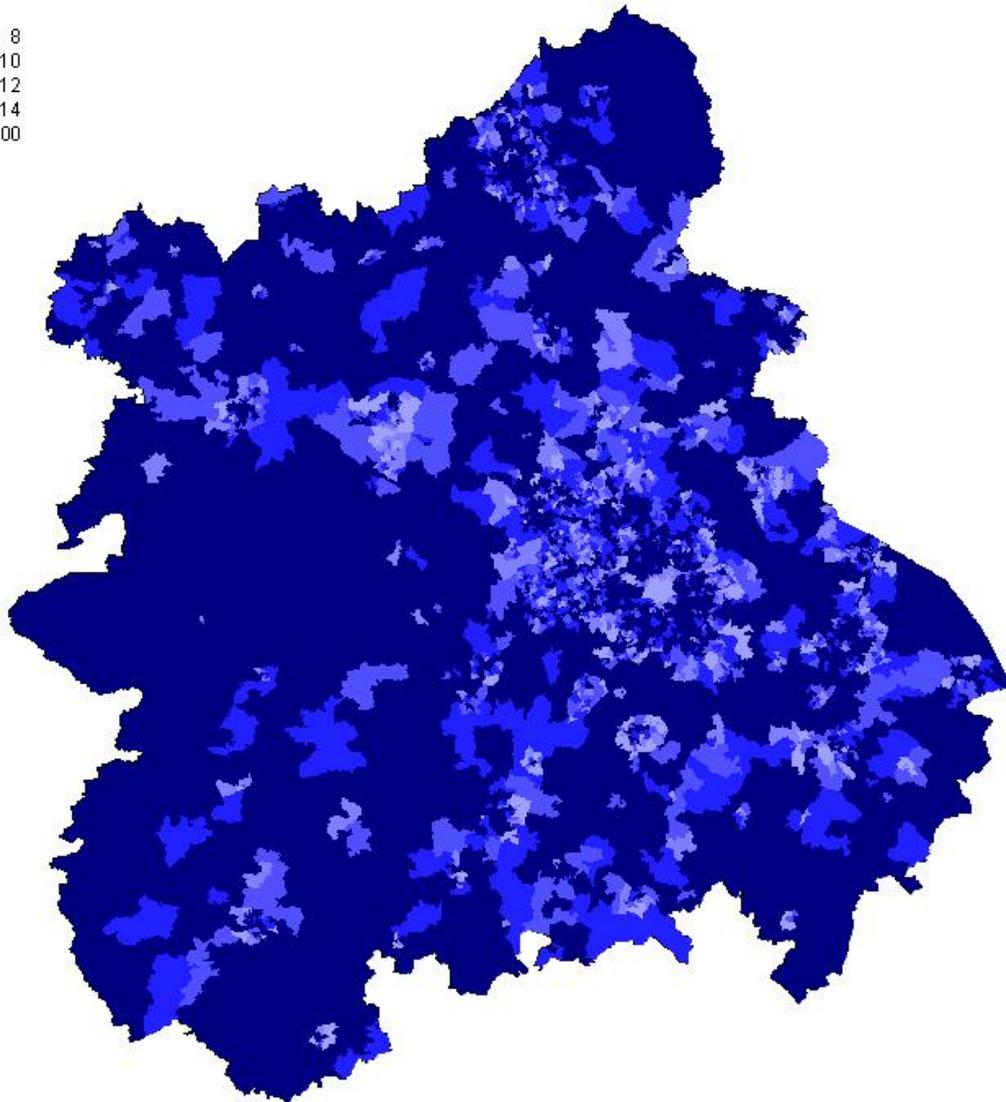
Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



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Key

- 0 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- 14 to 100



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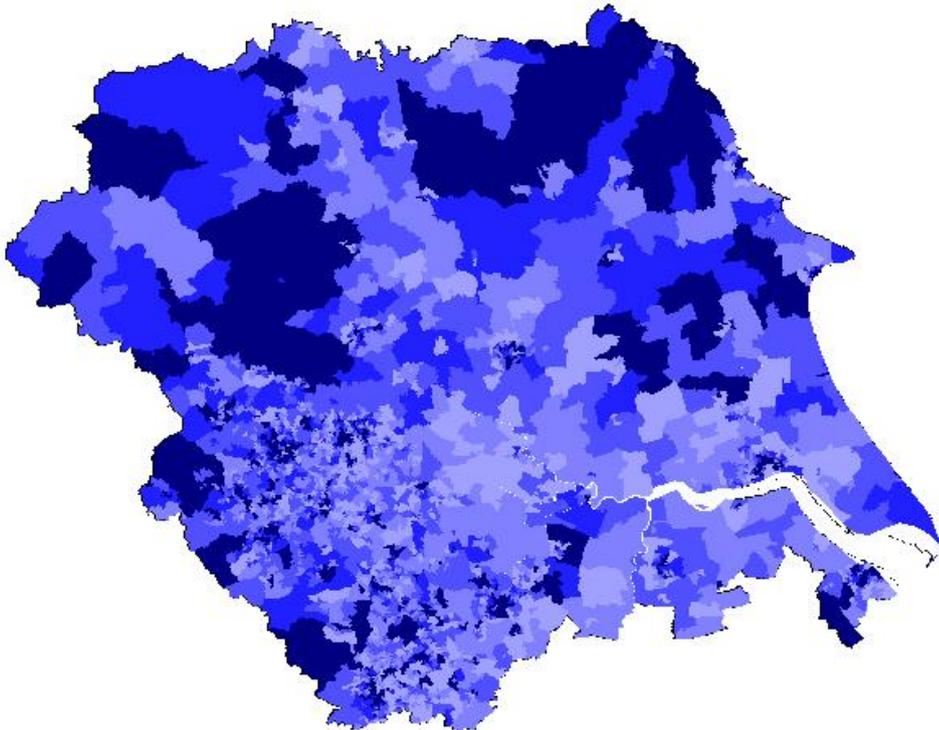
Figure B7 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, Yorkshire and the Humber, 2011

Fuel Poverty in the Yorkshire and the Humber, 2011

Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



- Key**
- 0 to 8
 - 8 to 10
 - 10 to 12
 - 12 to 14
 - 14 to 100



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Figure B8 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, North East, 2011

Fuel Poverty in the North East, 2011

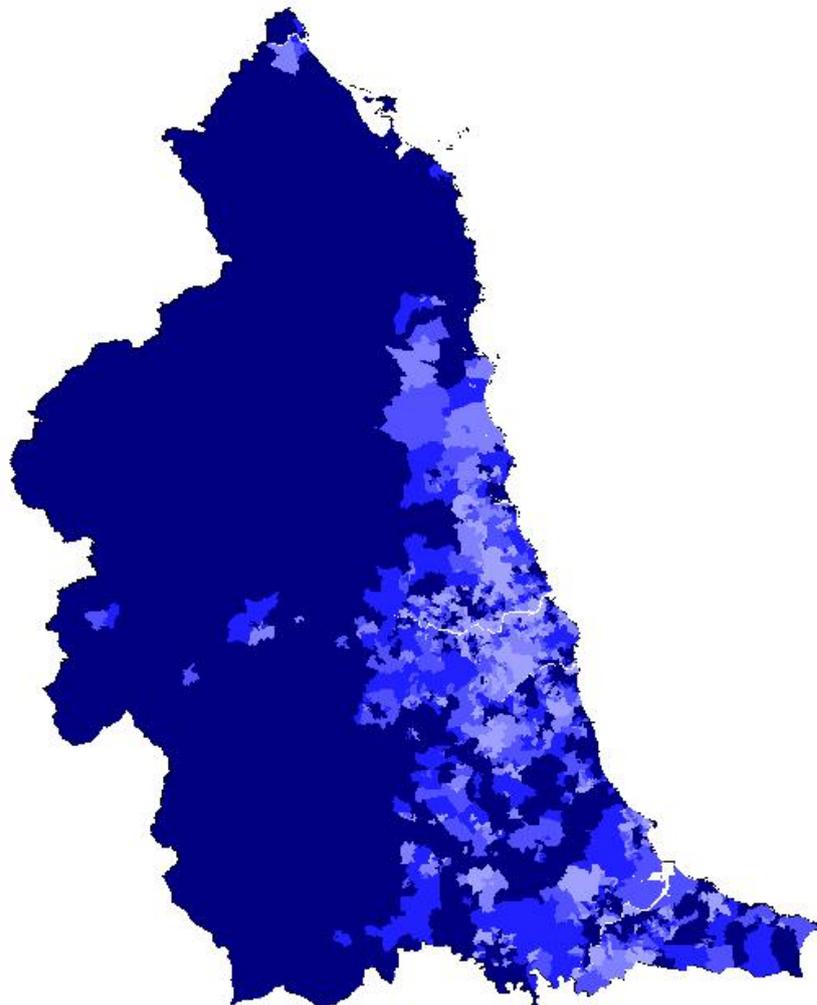
Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



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Key

- 0 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- 14 to 100



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Figure B9 - Percentage of households in fuel poverty under the Low Income High Costs indicator at LSOA level, North West, 2011

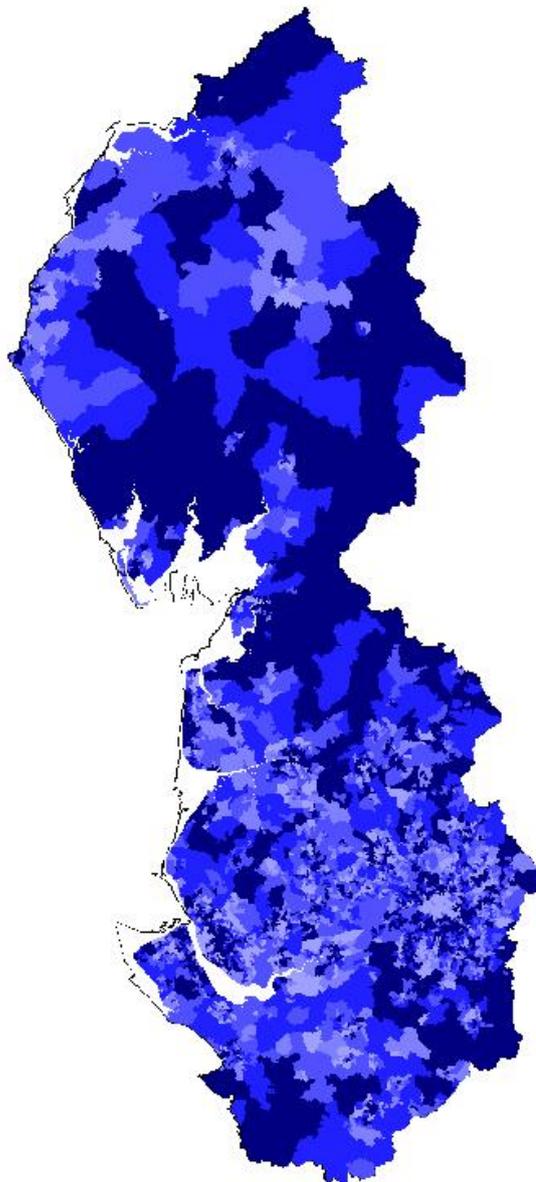
Fuel Poverty in the North West, 2011

Percentage of households in Fuel Poverty under the Low Income High Costs Measure by Lower Super Output Area (LSOA)



Department of Energy & Climate Change

- Key**
- 0 to 8
 - 8 to 10
 - 10 to 12
 - 12 to 14
 - 14 to 100



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