Fuel poverty: the problem and its measurement

Report

Hills Fuel Poverty Review

CASE
Centre for Analysis of Social Exclusion

Fuel Poverty

The problem and its measurement

Interim Report of the Fuel Poverty Review

John Hills

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Foreword

The cost of heating has increased dramatically, not just recently with the announcements of significant price increases from all of the six suppliers who supply 99 per cent of households with energy, but over the last seven years. This has added to the pressure on all household budgets, but particularly for those with lower incomes and with homes that are hard to keep warm. Exceptionally cold months at the start and end of 2010 made this even harder, raising increased concerns for the health of those who could not afford to keep warm. At the same time, domestic heating and energy use are one of the biggest contributors to the country's carbon emissions, and one which offers the best prospects for reducing them through better insulation and more efficient heating systems. However, those with low incomes are not in a position to cover the capital costs of those investments.

These problems come together under the label of 'fuel poverty', an issue which has been a concern since the 1970s, but which was the focus of an Act of Parliament in 2000. This committed governments to its elimination within sixteen years.

In March this year, the Secretary of State for Energy and Climate Change, Chris Huhne MP, invited me to undertake an independent review from first principles of the problem of fuel poverty and the way in which we measure it. The terms of reference are given in Annex A, but in essence they focus on three main issues:

- Whether fuel poverty is, in fact, a distinct problem, or simply a manifestation of more general problems of poverty.

- If we consider that fuel poverty is a distinct problem, how is it best measured, and does the current approach to doing this capture the problems most effectively?

- What are the implications of this for the way we understand the effectiveness of the range of policy approaches to reducing it.

This interim report addresses the first of these two areas.

That fuel poverty remains a serious problem is clear from the evidence we review. It is so from three overlapping perspectives:

- For those concerned with poverty. For instance, our calculations suggest that the total 'fuel poverty gap' to households in or on the margins of poverty from facing costs to keep warm above those for typical households with

much higher incomes added up to £1.1 billion in 2009.

- Living in cold homes has a series of effects on illness and mental health. But the most serious is its contribution to Britain's unusually high rates of 'excess winter deaths'. There are many contributors to this problem, but even if only a tenth of them are due directly to fuel poverty, that means that 2,700 people in England and Wales are dying each year as a result – more than the number killed in traffic accidents.

- For those concerned with climate change and carbon reduction. It is essential that we improve the energy efficiency of the whole housing stock. Those on low incomes in the worst housing cannot afford the immediate investment needed and need assistance from elsewhere.

Doing something about these problems is obviously the priority. However to support action we need good measurement, for the series of reasons we discuss. Bad measurement can hinder. Getting to grips with the advantages and disadvantages of the current measure and of alternatives to it, technical as the issues may seem, is therefore also important and is one of the main subjects of the report.

The review team and I would welcome responses to the consultation issues we raise at the end of the report, essentially on whether people agree with the analysis we have put forward here. A final report to be submitted by the end of January 2012 and published shortly afterwards will reach final conclusions on these issues, but also address what is in many ways the key question: in the light of this analysis, which policies offer the most effective approaches to first reducing and then eliminating fuel poverty?

The evidence many organisations have submitted and the discussions which I and the team supporting me have had with those with a wide range of expertise have already been invaluable. With such high stakes in both understanding and tackling the problem, I hope that the consultation that will follow this report will give time for careful consideration of the issues it raises, which we can then consider in making final recommendations. I am very grateful to all of those who have already been part of this process and look forward to further discussions.

I am also grateful to the Department for Energy and Climate Change for the way it has supported this review while fully respecting its independence. But most of all I am deeply grateful to the review team, Fern Leathers, Jen Offord, Jamie Torrens, Sam Jenkins and Damon Wingfield, led by Gareth Baynham-Hughes, who have carried out the research and analysis on which this report is based as well as to Phil James, Chris McKee, Laura Williams and Alison Colquhoun in assisting them with preparing this report, for their painstaking and unfailingly cheerful support. Any errors and misunderstanding that remain are my own.

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Abbreviations glossary

AES	Annual Energy Statement
AHC	After Housing Costs
BHC	Before Housing Costs
BRE	Building Research Establishment
BREDEM	BRE Domestic Energy Model
CASE	Centre for Analysis of Social Exclusion
CERT	Carbon Emissions Reduction Target
CESP	Community Energy Saving Programme
CMDs	Common Mental Disorders
CPI	Consumer Prices Index
CRSP	Centre for Research into Social Policy
CSE	Centre for Sustainable Energy
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DWP	Department for Work and Pensions
EAG	Energy Affordability Gap
ECO	Energy Company Obligation
EHCS	English Housing Condition Survey
EHS	English Housing Survey
EST	Energy Saving Trust
EU SILC	European Union Statistics on Income and Living Conditions
EWDs	Excess Winter Deaths
FITs	Feed In Tariffs
FRS	Family Resources Survey
HBAI	Households Below Average Income
HEES	Home Energy Efficiency Scheme
ISMI	Income Support for Mortgage Interest
LCFS	Living Costs and Food Survey
MIS	Minimum Income Standards

NatCen	National Centre for Social Research
NDPB	Non-Departmental Public Body
NEA	National Energy Action
NGO	Non-Governmental Organisation
NHS	National Health Service
Ofgem	Office of the Gas and Electricity Markets
OFT	Office of Fair Trading
ONS	Office for National Statistics
RHPP	Renewable Heat Premium Payment
RO	Renewables Obligation
RPI	Retail Prices Index
SAP	Standard Assessment Procedure
VAT	Value Added Tax
WHECA	Warm Homes and Energy Conservation Act 2000
WHO	World Health Organisation

Executive summary

Introduction

This report contains interim findings and issues for consultation from the review of fuel poverty and its measurement commissioned by the Secretary of State for Energy and Climate Change. The terms of reference for the review are presented in Annex A to the report. The remit of the review is for England, although its conclusions may also be of interest to the devolved administrations, and possibly more widely. The report draws on discussions with and evidence kindly submitted to the review by a wide range of individuals and organisations concerned with fuel poverty and with tackling it, and on detailed analysis by the review's secretariat.

This report examines issues around whether 'fuel poverty' constitutes a distinct problem, and the implications of the problems identified for its measurement. A final report to be submitted early in 2012 following responses to this report and further analysis will present final conclusions on these issues and on their implications for understanding the effectiveness of different policy approaches to the problem.

As discussed in more detail in Chapter 1, fuel poverty is an issue which has concerned campaigners since the 1970s or before and which became the subject of legislation in the Warm Homes and Energy Conservation Act of 2000 (WHECA). This Act lays down that,

> *For the purposes of this Act, a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost.*

It also required the Government to publish within twelve months,

> *a strategy ... for ensuring, by means including the taking of measures to ensure the efficient use of energy, that as far as reasonably practicable persons do not live in fuel poverty.*

The Act set a maximum target date for this of 15 years after publication of the strategy, so the *UK Fuel Poverty Strategy* published by the then government and devolved administrations in 2001 resulted in a date of 2016 for fuel poverty to be eliminated (in Wales the target date is 2018). The strategy set an intermediate target for 2010 for the elimination of fuel poverty within 'vulnerable groups'.

The Act itself did not, however, set out how fuel poverty and progress towards its elimination should be measured. The 2001 strategy document adopted a particular

definition of what constitutes fuel poverty, drawn from previous research on the issue, and governments have reported on progress against this indicator since then. The most recent analysis, published in July 2011, suggested that 4.0 million households in England were living in fuel poverty in 2009, with a projected rise to 4.1 million in 2011. This compares with 5.1 million households in 1996, but a low point of 1.2 million in 2003 and 2004.

In essence, the current approach defines a household as being in fuel poverty if it would need to spend more than 10 per cent of its income to achieve an 'adequate' level of warmth through the year and on other energy costs. The report examines in Chapters 1 and 5 the characteristics of the precise measure used in more detail, but its key features are that:

- It depends on a *modelled* assessment of what it would cost to heat a home to particular temperatures, based on data from yearly structural surveys of a sample of homes and interviews with the people living in them, plus an allowance for other energy costs, based mainly on the average energy use of households for the number of people in the household and their dwelling size. It does not use *actual* spending, as that might reflect very low costs for those who are living at low temperatures, or very high costs for those who are wasteful in their use of energy.

- In 2009 space heating accounted for 56 per cent of this assessment on average, and water heating for 10 per cent. The remaining third related to other uses (cooking, lights and appliances).

- It is based on the *ratio* between required spending and household income. The higher required spending and the lower income, the greater this ratio (particularly if income reported in the survey is very low).

- It uses a particular *threshold*, 10 per cent, whose origins are that in 1988 this was twice median fuel spending as a share of income (that is, half of households then spent 5 per cent or less of their income on fuel, and half spent more).

While this definition has remained unchanged since it was officially adopted in 2001, it is notable that the 2010 Energy Act additionally refers to reducing fuel poverty as potentially involving reductions in its *depth* – the difference between required spending and the threshold for being counted as fuel poor – as well as its *extent* (the numbers affected).

Is fuel poverty a distinct problem?

The first question for the review was to assess whether there actually is a distinct problem of 'fuel' poverty, requiring particular strategies, or whether it is simply a manifestation of low incomes in general. There are many other items – some of them equally important – that people on low incomes find it hard to afford, but we do not have specific 'food poverty' or 'clothes poverty' indicators or targets. Some of those giving evidence to the review suggested that measuring fuel poverty was as important in illustrating the *impact* of poverty, as it was in constituting a separate problem.

However, the overwhelming argument of those submitting evidence was that it does constitute a distinct problem. We survey this evidence (summarised in Annex D) and other material we have collected in Chapters 2 and 3 of the report, looking in detail at both its causes and its effects. Reviewing this in Chapter 4 we agree that fuel poverty is a

distinct – and serious – problem. Fuel poverty is of major concern from three different but related perspectives: for those whose primary concern is poverty and its reduction; for those concerned with health and well-being; and for those concerned with climate change and reduction of carbon emissions.

The poverty perspective

The amount households have to spend is only ever an imperfect measure of the standard of living they can achieve, but for many things the same cash amount can translate into similar items in a shopping basket, meeting their needs in similar ways. The greatest exception to this is housing, because of the huge variations in rents and house prices across the country and the difficulty people would face in moving. Official measures of incomes and poverty rates take account of this by looking at them both before and after deducting housing costs. Equally, larger households need greater incomes to achieve the same standard of living, so conventional poverty measures adjust incomes to allow for household size.

As we discuss in Chapter 2, households also face widely varying costs to achieve the same level of warmth. These costs are often experienced in ways over which households have little immediate control. Further, bringing about change would need capital investment well beyond what they could afford. The primary reason for this is the poor level of insulation of much of the country's housing stock, and the high costs resulting from the heating systems of some households, for instance if they are in rural areas or high blocks of flats off the gas grid, or have inefficient heating systems. As an example of the scale of this problem, the most recent fuel poverty assessment was based around a calculation implying that in 2009 the median required fuel bill for couples without children was nearly £1,300 to achieve an adequate standard of warmth. However, a sixth would have needed to spend more than £1,750, and 9 per cent more than £2,000. This degree of variation in the fuel bills faced by similar households across the country is not to be found in relation to other spending requirements. For instance, although certain differences in the price of food for similar households exist, perhaps reflecting regional price differences, the disparity is much less significant.

For those interested in establishing whether households have a lower standard of living because of their high heating costs, and so may be pushed into poverty, there is therefore a case for adjusting the way in which we measure incomes to allow for this. Some of the suggestions made to the review for measurement approaches that look at the 'residual income' people would be left with for their other needs after paying their fuel costs (see Section 6.4) follow from this kind of concern.

Beyond the physical reasons why some may need to spend more to achieve the same level of warmth, a recurrent concern has been that some of the 'poor pay more', as a result of payment methods or contracts that are considerably less good than those achieved by others. While the premium paid by those on pre-payment meters by comparison with those on standard tariffs has now largely disappeared, those on low incomes are least likely to be on the cheapest direct debit tariffs (see Chapter 2). It is often those with the greatest ability to make price comparisons – including through the internet – who end up with the best deals. The current market in energy contracts does not necessarily serve those on low incomes well. It is disturbing that Ofgem has found that almost as many of those on pre-payment meters who switched suppliers as a result of doorstep sales did so to a *more* expensive contract than the one they had before as switched to a cheaper one. The

current measurement of the extent of fuel poverty allows for variations in prices between regions and payment type, but does not allow for these sorts of differences. Evidence on the overall effect of these problems is scarce, but new analysis by the review team reported in Section 2.3 suggests that if the poorest 30 per cent of customers in 2009 were, in fact, on the highest tariffs within each category, fuel poverty would have been up to 7 per cent higher than reported.

As a corollary of these poverty-related concerns, in terms of practical policy, the problem of low thermal efficiency of the housing occupied by some households on low incomes means that there may be cost-effective and long-term ways of improving their standard of living through investment in energy efficiency, as well as through improvements in income. From some perspectives, giving such assistance 'in kind' is also politically more acceptable than simply increasing cash transfers through improving benefits or tax credits. The final report of the review will look at the evidence on the impacts of past interventions which have tried to achieve this. The implication of this kind of concern is that interventions should be targeted on households that both have low incomes *and* have energy inefficient homes.

Health and social effects of living at low temperatures

Much of the original concern about fuel poverty stemmed from concerns about the health of those living at low temperatures. In Chapter 3 we review some of the most persuasive evidence on this. In interpreting this evidence, it is important to note that the ill-effects of cold come both from internal temperatures when people are indoors and from external temperatures when they are outdoors. In addition, and in contrast to evidence on many other adverse features of people's lives, there is much less of a socio-economic gradient for some of these outcomes than might be expected: they do not only result from low incomes.

Key elements in the evidence include:

- There are specific health consequences of exposure to low temperatures and the drivers of fuel poverty are significant factors in determining the temperatures at which individuals live (Sections 2.5 and 3.2). Health impacts caused by exposure to cold tend to relate to cardiovascular and respiratory problems at temperatures below 12°C and 16°C respectively. Low temperatures are also associated with diminished resistance to infections and the incidence of damp and mould in the home (which are also associated with lower standards of energy efficiency). These effects are most important for the youngest children and increase for the most elderly.

- Most dramatically, the UK has a higher rate of 'excess winter deaths' than other countries with colder climates (Section 3.3). While the number in England and Wales has fallen from around 40,000 per year in the 1970s to around 27,000 per year in the last decade, this is comparable to more than ten times the number of transport-related deaths in 2009.

- There is clear evidence of an increased risk of cardiovascular-related death following days when the maximum outdoor temperature falls below 20°C. Low indoor temperatures appear only to be part of the explanation, however. Expert opinion suggests that around half of excess winter deaths may be attributable to indoor temperatures.

- This problem is significantly greater for those living in the coldest quarter of homes than those in the warmest quarter of homes. Using this difference, recent analysis attributes about a fifth of excess winter deaths to living in cold homes. Even if only half of this is due to fuel poverty, that would still mean 2,700 deaths – more than the number who die on the roads – every year.

- Beyond each premature death, there will be many more health-related incidents and associated costs to the NHS.

Precisely what temperature is needed to avoid these ill effects is, however, unclear (see Section 3.6). The UK Fuel Poverty Strategy set minimum temperature thresholds at 21°C in the main living room and 18°C in all other rooms, and this is embodied in the heating regime for measuring fuel poverty under the current definition. It is often said that these are the minimum temperatures to which houses should be heated to avoid negative health impacts, and that they are laid down by the World Health Organisation (WHO). In fact both the health evidence and WHO's recommendations are less clear-cut. The origin of most of the references appears to be a 1987 WHO review which found "no demonstrable risk" within a temperature range of between 18°C and 24°C. We note that 21°C is simply the midpoint of this range. Given also that those with average and higher incomes do not appear to heat their homes to the official thresholds (see Section 2.5), we discuss below the extent to which the current fuel poverty measure is sensitive to these assumptions. From this perspective, it is very unhelpful for policy-making that data on *actual* temperatures inside homes are now 15 years old.

Beyond physical health, the evidence we review suggests:

- There is a link between low temperatures and poor mental health, with those living at low temperatures more likely to be stressed and subject to common mental disorders (Section 3.4). The direction of causation is unclear, however.

- Social isolation amongst adults is associated with cold homes, while there appears to some association between cold homes, truancy, negative impacts on educational attainment and risk of anti-social behaviour amongst adolescents (Section 3.5).

- People with hard to heat properties may trade off other necessities to keep warm, at the most dramatic facing a choice of 'heat or eat' (with some evidence of reduced food spending at times of the very lowest temperatures by pensioners with the lowest incomes; see Sections 2.5 and 3.7).

All of these problems are very good reasons for trying to ensure that people can and do keep warm. Their implications for measurement of the problem suggest a focus on establishing who *is* living at a too low a temperature, on *actual* spending on energy being below the amount required to keep warm enough, and on outcomes such as excess winter deaths or cold-related health problems. The overlap between low incomes and high heating costs which lies at the core of fuel poverty is *one* of the drivers of this, but there are other drivers as well, and they do not only affect people on low incomes.

Carbon reduction and energy saving

The third perspective increasing concern about fuel poverty is its relationship with the national priority of reducing carbon emissions and energy consumption in general. Greenhouse gas emissions from domestic fuel consumption of UK households are currently 26 per cent of the national total (on an end-user basis). Improving domestic energy efficiency is one of the most promising contributors towards the 34 per cent carbon emission reductions by 2020 established by the 2008 Climate Change Act and for the targets beyond to which the current government (like its predecessor) is committed.

In this context, current policy developments have some immediate implications. We show how government policies both increase and decrease potential energy bills (Section 2.4). For example, 'products policies', which enforce better energy efficiency standards on producers of appliances, should reduce energy costs for all households. Here there should be a positive distributional impact, with the greatest proportionate benefit arising for low income households.

By contrast, those energy and climate policies that lead to higher prices will largely have a regressive impact. The net effect of these policies will depend on how their benefits are distributed (that is, who will receive the energy efficiency improvements they finance). DECC analysis in 2010 on one set of assumptions for this suggest a net cost by 2020 equivalent to 0.8 per cent of income for the poorest fifth of households, but break-even for the richest fifth (Figure 2.14). Whether this regressive outcome – which would tend to increase fuel poverty – occurs depends on both more recent developments (such as the Warm Home Discount) and decisions yet to be taken.

One of these decisions relates to a significant part of the current strategy to reduce carbon emissions – the forthcoming Green Deal and the Energy Company Obligation (ECO). Under this framework, people will be able to carry out energy efficiency improvements whose capital costs are met through a combination of up-front ECO funding (paid for by energy suppliers and recovered from energy bills in general) and a Green Deal finance charge (added to the particular property's energy bills). Eventually, once the capital costs have been repaid, people will benefit from lower bills. However, almost by definition, this approach can only help people affected by fuel poverty to a limited extent in the short run: if they cannot easily afford their existing bills, substituting part of a bill with a repayment charge that offsets this saving would not solve their problem, even if it had national benefits. Lower income households will therefore need higher levels of up-front subsidy or even full subsidy in order to allow them to improve the energy efficiency of their dwelling. The way ECO resources are split between measures directly benefiting the potentially fuel poor and measures aimed more generally at carbon reduction will therefore be crucial for the net effect of the policy package on distribution and on fuel poverty.

This discussion illustrates three general issues for those whose concern is with carbon reduction:

- It is important to understand the distributional consequences of carbon mitigation policies. Exacerbating fuel poverty could be one of those, unless this is offset in other ways.

- If this is not done, the adverse effects on those with low incomes could be a barrier to implementation of policies which have overall benefits.

- Improving domestic energy efficiency will be an important part of overall carbon reduction, but those on low incomes are unlikely to be able to afford or achieve this without assistance.

All of this suggests that a corollary of climate change mitigation policies must be a focus on those with low incomes with high fuel spending, and on those living in energy inefficient homes in particular.

Synthesis

This discussion, and the evidence reviewed in more detail in the report, explains why fuel poverty is – and should be – a concern within different policy debates. Its causes, impacts and solutions make fuel poverty a distinct problem. It comes at the overlap of different concerns, some with poverty in general, others with health, and others with domestic energy inefficiency. Tackling it therefore offers a potential 'win-win-win' for different agendas.

A corollary of this is that the distinct problem that needs to be measured from all these perspectives is in some form the *overlap* between low incomes and high required fuel spending. In this light, the wording of the Warm Home and Energy Conservation Act is entirely appropriate: we are concerned with individuals in households "living on a lower income in a home which cannot be kept warm at reasonable cost." The implications of this for assessing the current definition and modifications or alternatives to it are discussed below.

How measurement can help (or hinder)

For any social problem of this kind there are several ways in which measurement – appropriate indicators – can help (see Section 4.2):

- It can monitor *trends*, reflecting changes in the underlying factors driving it.
- More precisely, it can indicate what is happening to its *extent* and its *depth* (and possibly its *persistence*).
- It can help *identify* the kinds of people affected, so they can be targeted by interventions and/or offered appropriate assistance and support, both for overall policy design, and for finding them on the ground.
- By judging the effectiveness of alternative interventions, both at the design stage and after implementation, it can support policy *design and assessment* to choose the most effective policy mix for people in different circumstances.

It is immediately apparent that one single indicator may struggle to do all of this at once.

As far as trends are concerned, one would expect changes in an indicator to reflect the scale of changes in the underlying drivers of the core problem. So in this case, one would expect a fuel poverty measure to improve if: there were fewer people in poverty; if the energy efficiency of the homes of those on low incomes improved; and if the cost of fuel to those at risk of fuel poverty fell. However, a single measure may not by itself give an adequate description of what is going on. In particular, we may well want, as suggested by the 2010 Energy Act, to distinguish between *extent* – how many people are affected – and *depth* – how badly those people are affected. When measuring poverty in general, we distinguish between 'headcount' measures of the numbers of people below a poverty line, and 'poverty gap' measures indicating how far below that line people fall. It would, for instance, be judged by most people to be an

improvement if those who were poor moved much closer to the poverty line, even if only some of them crossed it. We may also be interested in how long people are affected – is the problem persistent, or are many people affected over time, but only intermittently?

The current fuel poverty indicator

Chapter 5 of the report looks at the way in which fuel poverty has been measured and at how what it shows relates to these kinds of criteria. Before summarising some of the problems with the indicator as it stands, it is important to note its two key advantages. First, it is based on a combination of people's incomes, energy requirements and energy costs, and so is sensitive to some degree to all three, as required. Second, it is based on a detailed assessment of a household's *need* to spend, given their characteristics and those of where they live, and so avoids some of the problems that might be faced by a simple focus on actual spending. These are important advantages that should be preserved if the indicator is modified or supplemented.

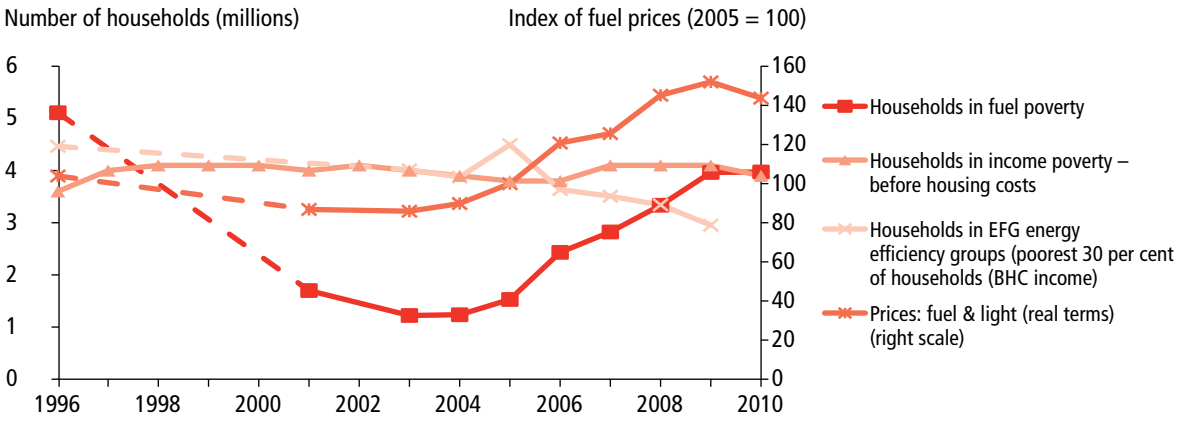
However, the current definition is also open to a number of criticisms. Some of these relate to the precise way it is calculated, and some to its fundamental form, being based on the *ratio* between required spending and income.

In terms of its calculation, a key feature is the fixed threshold of 10 per cent for the share of income taken by required fuel costs. This is derived from an original calculation that in 1988 the median household spent 5 per cent of its net income on fuel, and that twice this ratio might be taken as being 'unreasonable'. This threshold is therefore fixed, and does not move as the spending and behaviour of households in general changes. The factor of *twice* the median level is also essentially arbitrary, although it is always hard to establish such criteria precisely, and the important issue is whether findings are unduly sensitive to such choices. In this case they are, as what the indicator shows is essentially the 'tail' of the distribution of costs in relation to incomes (see Figure 1.1 in Chapter 1). The number counted as 'fuel poor' is therefore very sensitive to the precise level of the threshold.

Further, as fuel prices change, the distribution of spending moves in relation to this fixed threshold, and the numbers counted as fuel poor can change very rapidly. This can be seen in Figure ES.1. This shows the number of English households counted as fuel poor, characterised by the rapid decline between the start of the series in 1996 and 2003, followed by an almost equally rapid increase since 2004. For an indicator being used to assess the *trend* in the problem as described above and in the evidence submitted to us, this gives immediate pause for thought. Did the underlying problem of fuel poverty *really* improve by nearly four-fifths in just seven years – suggesting that it was well on the way to being solved with little further action needed? Equally, have things deteriorated quite so fast in the last six years to suggest that the problem has more than trebled?

The chart also shows the three key drivers of fuel poverty. First, it shows the number of English households in poverty, as conventionally presented by the Department for Work and Pensions (DWP). This number was relatively constant over the period (although the percentage of individuals in poverty in the UK fell somewhat, see Figure 2.1). Second, it shows how many of the homes of the 30 per cent of households with the lowest incomes had the lowest energy efficiency ratings (E, F, and G energy efficiency groups). This fell from 4.5 million in 1996 to 3.0 million in 2009. If this was all that had happened, one might expect that fuel poverty

Figure ES.1: *Fuel poverty, income poverty, energy efficiency and fuel prices, 1996 – 2010, England (except prices – UK data)*



Source: Fuel Poverty Statistics (DECC), Fuel & light Index Statistics ONS (scaled to real terms) HBAI statistics (DWP)

would have fallen over the period, and to have done so fairly steadily. The explanation of the 'V' shape of the official fuel poverty measure lies in the third factor, real fuel prices, which fell until 2003, but have risen very sharply since. The particular way in which the current fuel poverty indicator is constructed means that it is the price index that dominates. But this means that over the period, the underlying changes in poverty and energy efficiency for low-income households have been masked.

One indicator of the sensitivity of the measure to price changes is the fact that, had the assumptions about fuel prices in the 2001 strategy been correct, fuel poverty would have been in the range 1.0 million-1.6 million in 2010, not the actual figure of 4.0 million.

The use of a ratio to determine the extent of fuel poverty leads to other potential limitations:

- In contrast to the focus of WHECA, some households with high (above average) incomes can be counted as 'fuel poor'.
- It is highly sensitive to low reported incomes. Even surveys focused on income recording suffer from some mis-reporting of very low incomes – for example some people record zero or negative incomes – but this is a more serious problem for those with wider scope such as the survey used.
- It is also sensitive to the temperature thresholds used. For instance, using a living room temperature of 18°C, not 21°C, would reduce the number of households by nearly 1 million in 2009. Conversely, using a higher temperature, as in Scotland for pensioners, would increase it.

One criterion for measurement is whether it can show the *depth* of the problem for those affected by it. In this case, although it is not usually the main focus of analysis, one indicator is the extent to which people's required spending on fuel exceeds the 10 per cent threshold. DECC publishes some figures that present this. As discussed in Section 6.3,

however, these numbers are affected by the presence of some households with very low reported incomes, which imply very high 'fuel poverty ratios', almost regardless of the level of their required fuel spending. Such low incomes can either reflect misreporting, or are genuine, but show that there are households whose current income falls so far short of the poverty line that they have severe problems affording *all* necessities, rather than necessarily having a particular problem relating to exceptional heating costs.

An indicator might help with the *identification* of those affected in a way that would help those implementing programmes on the ground to find people who might benefit from programmes designed to counter fuel poverty. Many of the submissions to the review were clear that the current indicator is not helpful for this purpose, and indeed would be very hard to calculate on the doorstep. Instead, local authorities and others delivering programmes use proxy indicators, generally reflecting a combination of low income and poor energy efficiency.

Finally, an indicator can help the *design and assessment* of effective policies. One feature of the current measure is that it is a ratio – required fuel spending divided by income. A consequence of this is that it is far more sensitive to changes in spending than it is to changes in income. Near the 10 per cent threshold, for instance, a cut of £10 in required fuel spending will have as great an effect in moving someone out of fuel poverty as a £100 rise in income. Policy-makers may see the former as more effective, although the household would probably have preferred the increase in income. From the outside, the design of the new Warm Home Discount seems to reflect this concern, directly reducing the fuel bills of qualifying households by £120-£140 per year, and so having more effect on measured fuel poverty than would an equivalent increase in state benefits, for example.

Alternative indicators of fuel poverty

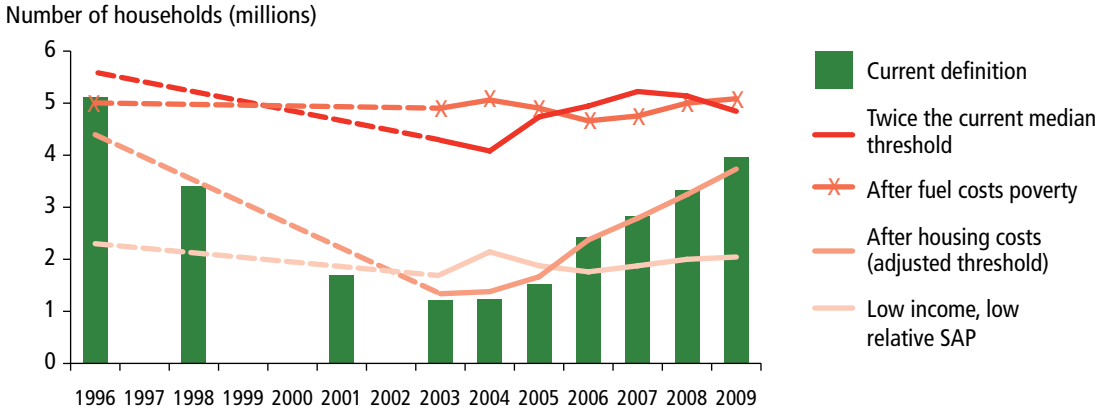
There are therefore issues about whether the fuel poverty indicator, as it is currently designed, adequately fills the roles it might serve. There are, however, problems with *any* indicator of problems of this kind, and alternatives may perform worse. Chapter 6 of this report therefore looks at a range of six other potential ways of measuring fuel poverty. The first three look at modifications to the current approach:

- A variant of the current indicator based on 'after housing costs' incomes, rather than on the 'full income' on which the main official series currently depends.
- An indicator based on the spending ratio *relative* to median spending in that year (rather than to fuel spending as it was 23 years ago).
- A supplementary 'fuel poverty gap' indicator, as is, for instance, used in the USA (although based on spending need, rather than actual spending, as there).

Three more variants are considered, reflecting more fundamental changes:

- A residual income indicator – examining which households would be below a poverty line 'after fuel costs', if the line were adjusted in line with their required fuel spending.
- A direct measure of the number of households that simultaneously have low incomes (i.e. are in poverty according to the official indicator, after allowing for housing costs) and live in

Figure ES.2: *Number of households in fuel poverty under all indicators compared, selected years 1996 – 2009, England*



Source: Fuel poverty dataset, 1996 – 2009, (DECC), English Housing Survey, 1996 – 2009, (DCLG)

Note: there have been some changes in the methodology used to calculate fuel poverty statistics from year to year, which affect all the time series presented here. See Annex B for details of these changes.

energy inefficient homes, based on the 'SAP' rating.

- Subjective indicators of whether households have difficulty in affording adequate heating or with paying their bills.

Aggregate trends in the numbers in fuel poverty under the main variants examined are shown in Figure ES.2.

Each of the six approaches has advantages, but also some shortcomings, which are discussed in more detail in the report. In particular:

- Measuring income after housing costs arguably gives a better picture of the true affordability of fuel bills (Section 6.1). However, logically, the threshold used should also be adjusted to be based on after housing costs income. This means that aggregate trends are little changed, but there is a good case that the composition would be more appropriate, especially the regional distribution of fuel poverty.

- Using a spending threshold within the current ratio indicator that changes over time with median spending patterns would remove the extreme sensitivity of the current definition to fuel prices (Section 6.2). However, it could be argued that it would be inappropriate to remove *all* sensitivity to them. In total it would identify more households as fuel poor at the start and end of the period, and show a low-point in 2004.

- Using a 'fuel poverty gap' can give a very helpful sense of the depth of fuel poverty, measured both in pounds per household and in aggregate (Section 6.3). It could supplement an indicator showing the extent of fuel poverty. Fuel poverty gap data at a household or population group level could also help policy-making and delivery. However, basing a fuel poverty gap on the current

fuel poverty ratio indicator could put additional emphasis on observations that may not be accurate, and if used to generate an aggregate fuel poverty gap its extreme sensitivity to price changes is compounded.

- In essence, residual income indicators looking at who is poor 'after fuel costs', in the same way as we do 'after housing costs', are a more sophisticated measure of the extent of *poverty*, not a specific measure of *fuel poverty* (Section 6.4). They identify nearly *all* households that are low income, regardless of their energy requirements relative to others. The numbers identified as poor 'after fuel costs' therefore follow those in poverty overall (as measured after housing costs), remaining around five million across the period. This kind of approach does have an advantage in terms of identifying the impact of high fuel costs for those on the margins of poverty, by identifying those who are pushed into poverty by higher than average required fuel costs.

- In many ways, looking at which households are affected by a *combination* of energy inefficiency (relatively low SAP) *and* low incomes better reflects the spirit of WHECA, and what many regard as the core issue underlying fuel poverty than the other approaches examined (Section 6.5). The series shows a small improvement over the period. However, the SAP rating of a dwelling is only an imperfect indicator of what constitutes reasonable costs, and does not reflect changes in one of the drivers of fuel poverty – energy prices – at all.

- Using households' subjective description of the position they are in is a markedly different approach from the current one and others we examine (Section 6.6). One advantage of subjective indicators is to cross-check the trends shown by other approaches (and it is striking that there has been a wide discrepancy from trends in the current indicator). However, individual perceptions may be very different from those of society as a whole, and many (particularly elderly) people may be reluctant to say that they face particular problems – 'mustn't grumble'. Responses also vary depending on precisely what question is asked. Such questions are probably most useful as a way of complementing other more objective indicators, and it would be helpful to incorporate relevant questions into the survey used to derive them.

Each of these suggestions therefore brings important insights into the issue addressed by the review, but still has shortcomings. We therefore examine in Chapter 7 whether it is possible to construct an indicator that builds on the advantages of both the current definition and of some of the alternatives described above.

One attraction of looking directly at the number of people who *both* have low incomes *and* live in energy inefficient homes is that it reflects the intention of WHECA, that is, focusing on the overlap between the two. This captures what makes the problem of fuel poverty distinct from several perspectives. However, just looking at energy inefficiency (as in Section 6.5) fails to allow for other factors that affect households' need to spend. The approach we examine therefore is to look at households who have both *low incomes* (as conventionally measured by the Department for Work and Pensions) and *high costs* (as measured in the current fuel poverty definition).

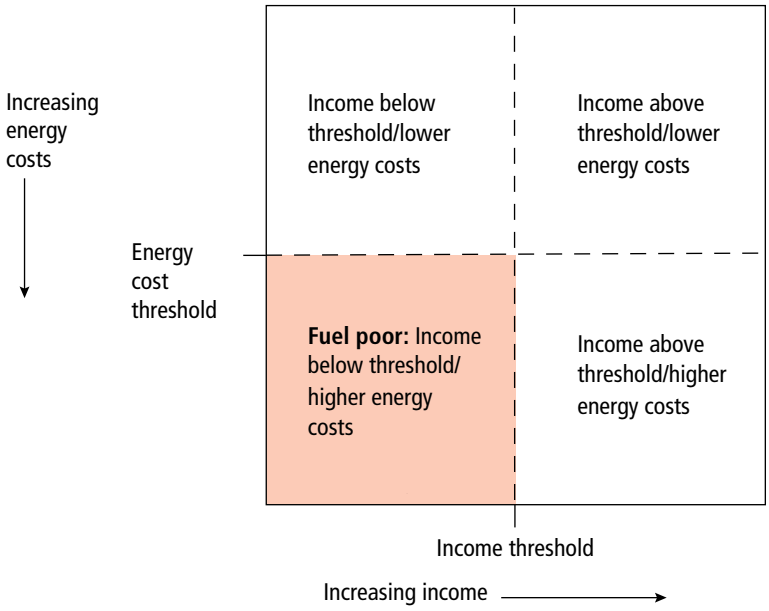
The simplest way of thinking about this indicator is illustrated by Figure ES.3. Essentially WHECA implies that the households of concern are those that have *both* a 'lower income', that is have incomes below some threshold, *and* required costs above a 'reasonable' level. This is those households in the lower left quadrant of the diagram. All of those with incomes below the income threshold – the two left-hand quadrants – are of concern in terms of their risk of being in poverty. All of those with required energy costs above a reasonable level – the two lower quadrants – are of concern because of their potential contribution to overall energy consumption and carbon emissions. But it is those for whom these two problems overlap that are affected by the specific and additional problem of fuel poverty as people normally understand it. Our final report will look at how different policies might affect the households in different quadrants.

Furthermore, just as the extent to which people's incomes fall short of a poverty line gives a 'poverty gap' indicator of the depth of poverty, so the extent to which their required costs exceed a reasonable level will give a indicator of the depth of fuel poverty, what one might call the 'fuel poverty gap'.

There are, of course, many different ways in which thresholds for 'lower income' and 'reasonable costs' could be set, but the example we explore has the following characteristics:

- The arguments in the evidence presented to the review for looking at incomes *after housing costs* are persuasive, so we use them.
- In line with current best practice, incomes are measured in the same way as DWP does for its Households Below Average Income (HBAI) analysis, in particular adjusted for household size and composition.
- Fuel costs are calculated as those required to achieve acceptable warmth, in the same way as they are for the

Figure ES.3: *Fuel poverty defined as the overlap between low income and high energy costs*



current fuel poverty indicator (focusing on need, not actual spending).

- It looks at household energy costs *relative* to a threshold based on the median spending needs of the population as a whole (see Box 7.2 in Chapter 7 for a discussion of the rationale for this).

- It takes account of the way in which those with high fuel costs can be pulled *into* poverty.

- It embodies a separate indicator of the *depth* of fuel poverty – a 'fuel poverty gap' – for fuel poor households on average and in aggregate, alongside the conventional indicator of its extent.

Although we have not been able to do this here, ideally the costs used should reflect the prices actually paid by people at risk of fuel poverty (that is, the actual tariffs they are charged). It would also be better to look at the number of *people* affected by fuel poverty, than the number of *households*, removing the way in which the current indicator gives less weight to the problems of larger households, particularly those with children.

On this basis, a calculation of who would be counted as fuel poor would then be those who:

- **Had required fuel costs that were above the median level; *and***

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

This gives the more detailed interpretation shown in Figure ES.4. This definition reflects how some people with slightly higher incomes are pushed into poverty by the high level of their required costs – (represented by the triangular area on the right of the shaded area). If energy prices are high, there will be more people in this position, and the income

Figure ES.4: *Calculation of the 'fuel poverty gap'*

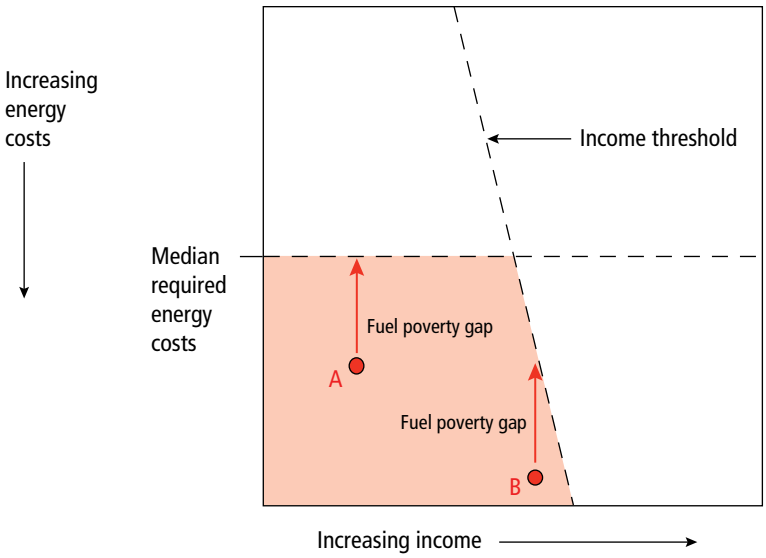
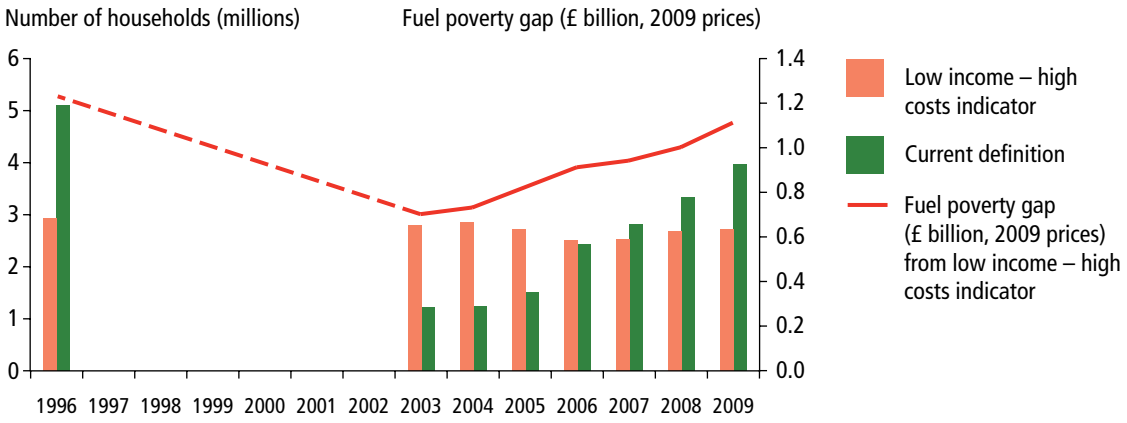


Figure ES.5: *Number of households in fuel poverty under current indicator and low income high cost indicator, 1996 and 2003 – 2009, England*



Source: Fuel poverty data, 1996 and 2003 – 2009 (DECC)

threshold itself will be higher, as median required spending would rise. These factors would mean more people would be counted by the indicator as 'fuel poor' if energy prices rose in relation to incomes, but the count of the number affected would be much less sensitive than under the current formula. The figure shows how the 'fuel poverty gap' – the difference between required costs and median required costs – could be calculated. This will also change as fuel prices change.

Note also that the choice of median required costs to define 'reasonable costs' means that the threshold moves in line with costs for the population as a whole (as suggested by those proposing a relative version of the current ratio indicator discussed in Section 6.2). Given that those on low incomes are counted as being in poverty if their total income is below 60 per cent of the national median, using median costs as the threshold is in fact quite a high threshold for those with such low incomes, who are likely to be living in smaller properties than the national average. They are getting by on incomes well below those of most others, but are counted here as having unreasonable costs only if their energy costs exceed the national average.

Figure ES.5 shows how the number of households and of individuals and the fuel poverty gap implied by this definition would have moved since 1996 by comparison with the numbers shown by the current defintion. In 1996, 2.9 million households would have been classed as 'fuel poor', falling to 2.8 million in 2004 and 2.7 million in 2009. The *average* number of households classed as fuel poor over the period would be very similar to those counted by the current definition. However, the slow downward trend it shows may give a much better representation of the scale of the underlying problem than the 'V' shape from the current definition. It is the average fuel poverty gap that moves with energy prices – falling from £413 in 1996 (at 2009 prices) to £256 in 2004, but rising to £409 in 2009 (an aggregate amount of £1.1 billion).

Chapter 7 of the report discusses this indicator in more detail suggesting that it has a number of advantages by comparison with the current definition, while retaining its fundamental basis in an assessment of required energy spending:

- It allows separate calculation of the extent of fuel poverty (the number fuel poor) and the depth of the problem (the fuel poverty gap), rather than conflating them.

- Calculating the extent of fuel poverty in this way is more robust than the current definition, both to data problems (such as mis-reporting of low incomes) and to the assumptions used in calculating required spending (such as the precise temperatures used).

- Because the indicator is much more stable in who is identified as fuel poor, it is also much more stable in which people are identified as being at risk of fuel poverty than the current indicator. Under the current definition, many households with low incomes and relatively high energy requirements were counted as not being fuel poor in 2004 (Figure 7.5).

- Correspondingly, interventions that were targeted at households that might have been thought in common sense terms to be at risk were assessed as benefiting people outside the target group, potentially giving a misleadingly gloomy assessment of their effectiveness. An overlap indicator should avoid this problem.

- The use of a fuel poverty gap indicator also allows the impact of some interventions to be seen, even if they do not quite bring someone across the line that would bring them out of fuel poverty.

- However, the impact of interventions that only affect incomes without taking a household across the threshold would reduce the depth of poverty, as conventionally measured, not generally the depth of *fuel* poverty.

- There are some households with very low reported that are currently classed as fuel poor, even though they have very energy efficient homes. They are clearly a high priority for assistance to take them out of deep poverty, but it is not clear that it is helpful to class them as fuel poor. They would not be counted as such under this alternative.

Conclusions

The evidence we have examined and presented confirms that fuel poverty is a distinct and serious problem. It deserves and requires attention, as recognised by Parliament when it adopted the Warm Homes and Energy Conservation Act 2000.

The Act captures, in our view correctly, the core of the problem as being the overlap between low income and high costs. As it states, a household is affected by fuel poverty if it has a lower income and faces above reasonable costs – which will often be for reasons outside its control – to achieve adequate warmth. Fuel poverty is a priority for a range of coinciding concerns, including poverty alleviation, health and well-being, energy efficiency and carbon saving:

- Our calculation is that households in or on the margins of poverty faced extra costs to keep warm above those for typical households with much higher incomes adding up to £1.1 billion in 2009.

- Living in cold homes has a series of effects on illness and mental health. But at the top of the iceberg of these effects is the way in which Britain has unusually high rates of 'excess winter deaths'. Even if only a tenth of them are due directly to fuel poverty, that means that 2,700 people in England and Wales are dying

each year as a result – more than the number killed in traffic accidents.

- It is essential that we improve the energy efficiency of the whole housing stock. But those on low incomes in the worst housing can neither afford the immediate investment needed nor afford later repayments without additional help.

Doing something about these problems is obviously the priority. However to support action we need good measurement. Although the current definition has the key strength that it focuses on required, not actual, energy spend, its precise form – based on a ratio against a fixed threshold – gives it certain weaknesses. It generates, for instance, a pattern of trends over the last fifteen years – a rapid decline followed by an equally rapid rise – which does not reflect what happened in the underlying causes of the problem, and is not always helpful in designing or evaluating policy. It is also highly sensitive to the assumptions and data on which it is based.

After examining a series of possible modifications or alternatives to the current approach, we conclude that while they each bring insights into understanding the problem, they also have weaknesses. We have therefore put forward an alternative approach to measuring fuel poverty, drawing on these insights, which more directly measures what is described in the Act and in everyday discussion of what fuel poverty is and how to tackle it – looking at those who both have low incomes and high costs.

Looked at in this way, the underlying problem of fuel poverty did not almost disappear in the early 2000s, but nor has progress almost entirely been reversed. This is not necessarily a huge comfort: a reduction only from 2.9 million to 2.7 million households (and from 5.1 million to 4.8 million individuals) affected by such a serious problem over thirteen years is deeply disappointing, as is the major increase in the depth of the problem in the last six years, as measured by the fuel poverty gap. It is hardly on track for its elimination in five years' time.

As the report explains, there are different ways of looking at this problem, and different choices that could be made if the approach we propose was implemented. We would welcome views on the analysis and ideas presented in this report. We have included some specific questions for consultation in Chapter 8. In the final report we will discuss the responses to these and how they inform our final recommendations. We will also consider the implications of our approach for understanding the effectiveness of the range of policy interventions available to tackle fuel poverty.

CHAPTER 1

Review background and fuel poverty in context

1.1 The independent review of fuel poverty

Background to the review

1. According to the Department of Energy and Climate Change (DECC):

   Fuel poverty means being unable to afford to keep warm. We consider a household to be in fuel poverty if it needs to spend more than 10 per cent of its income on fuel for adequate heating.[1]

2. On March 14 2011, the Secretary of State for Energy and Climate Change, Chris Huhne MP, announced the appointment of Professor John Hills to lead an independent review of the fuel poverty definition and target.[2] The Government had set out its intention to establish such a review at the time of the comprehensive spending review in October 2010, saying,

   To ensure the available resources are focused most effectively in tackling the problems underlying fuel poverty, the Government intends to initiate an independent review of the fuel poverty target and definition [...][3]

Terms of reference

3. The remit of the review is set out in Annex A. In essence, the review has been asked to examine fuel poverty from first principles, including its causes and impacts, and to consider whether the current or alternative ways of measuring fuel poverty best assist policy formulation and delivery. The review is independent. It relates only to England, but we hope its findings may be of interest more widely.

The conduct of the review to date

4. The review has received a wide range of evidence from a broad group of stakeholders, including the Fuel Poverty Advisory Group (FPAG), charities and other Non-Governmental Organisations (NGOs), academics, Government departments and the devolved administrations. A call for evidence was held from 14 March 2011 until 6 June 2011.[4] A summary of

1 http://www.decc.gov.uk/en/content/cms/funding/fuel_poverty/fuel_poverty.aspx

2 http://www.decc.gov.uk/en/content/cms/news/pn11_044/pn11_044.aspx

3 HM Treasury press release, 20 October 2010, available at: http://www.decc.gov.uk/en/content/cms/news/csr_hmt_releas/csr_hmt_releas.aspx

4 See: http://www.decc.gov.uk/assets/decc/What%20we%20do/Supporting%20consumers/Addressing%20fuel%20poverty/1401-fuel-poverty-review-a-call-for-evidence.pdf

the replies received is set out in Annex D. In addition, the review secretariat and Professor Hills have held a series of meetings with stakeholders, including a workshop event in London on 18 July 2011.[5]

5. The review team has also reviewed a great deal of relevant published evidence. A selected list of reference material is available in Annex C although we have considered a wide range of other material.

About our interim findings

6. The publication of this document marks the end of the first phase of the review. The interim findings focus on:

   - the history of fuel poverty and the context of this review (Chapter 1);
   - the causes (Chapter 2) and impacts (Chapter 3) of fuel poverty;
   - perspectives on fuel poverty and why measurement matters (Chapter 4);
   - the current fuel poverty indicator (Chapter 5); and
   - alternative options for measuring fuel poverty (Chapters 6 and 7).

   Our conclusions and questions for consultation are set out in Chapter 8.

7. A final report will be published in early 2012. As well as making final recommendations in the light of the responses made to these interim findings, it will consider the implications of the approach to fuel poverty measurement it recommends in terms of understanding the effectiveness of different policy interventions.

5 A note of this event is available at: www.decc.gov.uk/hillsfuelpovertyreview.

1.2 Fuel poverty in context

From broad concern to statutory duties

8. While energy price rises for domestic customers have hit the headlines with increasing regularity in recent months, the fact that certain households cannot meet their energy costs and keep adequately warm is far from being a new issue. Concerns about the affordability of fuel bills in general and warmth in particular were raised in the 1970s, for example, at the time of the oil price shock.

9. In 1979 two economists at the Department of Health and Social Security, Baron Isherwood and Ruth Hancock, made an effort "to identify those consumers for whom the payment of fuel bills raises difficulties and to examine their characteristics in terms of income, age etc."[6] Their work appears to be the first time the idea of examining the proportion of income spent on fuel as an indicator of the problem was floated. They did this to show that fuel spending and housing costs were more variable than other spending items (using an – essentially arbitrary – threshold of twice median spending to do so).

10. In 1983 Jonathan Bradshaw and Sandra Hutton, writing in the *Journal of Economic Psychology*, gave their own description of the problem, arguing that fuel poverty was a broad relative concept concerning the ability of households to afford customary levels of warmth. And in 1991 Brenda Boardman published the landmark

6 Hancock, R and Isherwood, B. (1979). *Household Expenditure on Fuel: Distributional Impacts*. London: DHSS. (Not officially published.)

book *Fuel Poverty* offering a detailed examination of the area and setting out the '10 per cent' indicator that, two decades later, is the basis for the official definition set out in the UK Fuel Poverty Strategy.

11. The full history of fuel poverty – both its definition and the policy measures taken to address it – are explained elsewhere.[7] Below we focus on some of the key points for the review, starting with the adoption in 2000 of legislation designed to bring an end to fuel poverty.

Warm Homes and Energy Conservation Act 2000

12. In 2000, Parliament passed the Warm Homes and Energy Conservation Act (WHECA). The full text of the Act is shown in Annex B. The geographical scope of the Act is England and Wales, with duties on the Secretary of State (in England) and the National Assembly (in Wales), and their respective powers, set out in the Act's provisions. See Box 1.1 for a description of the situation in Scotland and Northern Ireland.

13. In Westminster, WHECA was passed with cross-party support, having been proposed by David Amess MP as a private member's Bill. It continues to provide the legislative context for fuel poverty policy-making in England and Wales.

14. The first provision of the Act sets out the meaning of fuel poverty:

> *For the purposes of this Act, a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost.*

15. The Act therefore defines the issue as the combined impact of having a lower income and facing an unreasonable cost to keep warm. The Act does not, however,

7 See in particular Boardman, B. (2010). *Fixing Fuel Poverty*. London: Earthscan.

Box 1.1: Fuel poverty in Scotland and Northern Ireland

Scotland: The Housing (Scotland) Act 2001 provides the legal context for action to address fuel poverty. It led to the publication of the 2002 Scottish Fuel Poverty Statement which said, "We are committed to ensuring, so far as reasonably practicable, that people are not living in fuel poverty in Scotland by November 2016." This situation therefore very closely mirrors the legal position in England.

Northern Ireland: There is no statutory requirement to address fuel poverty in Northern Ireland. The 2001 UK Fuel Poverty Strategy set out a political commitment to eliminate fuel poverty in Northern Ireland by 2016, subsequently reaffirmed in *Ending Fuel Poverty: A Strategy for Northern Ireland* (2004). Northern Ireland produced a new fuel poverty strategy called *Warmer, Healthier Homes* in March 2011. While this will address all three primary factors contributing to fuel poverty, a major focus will be on removing energy inefficiency as a cause of fuel poverty.[8]

8 Furthermore, Professor Christine Liddell has conducted a major review of the definition of fuel poverty at the request of the Department for Social Development (DSDNI). See http://eprints.ulster.ac.uk/19994/1/FuelPovertyReport(WEB)-5Sept2011.pdf

further define either "lower income" or "reasonable cost". Instead, it gives the Secretary of State the power to define these terms through secondary legislation, while also allowing the meaning of fuel poverty to be amended through the same means.[9] It might be noted that the Act primarily refers to individuals as opposed to households.

16. A key feature of the Act is the requirement to publish, within one year of its entry into force, a strategy setting out policies to ensure that "as far as reasonably practicable persons do not live in fuel poverty." This is often referred to as the 'eradication of fuel poverty.' The Act goes on to stipulate that this strategy must:

    (a) describe the households to which it applies;

    (b) specify a comprehensive package of measures for ensuring the efficient use of energy, such as the installation of appropriate equipment or insulation;

    (c) specify interim objectives to be achieved and target dates for achieving them; and

    (d) specify a target date for achieving the objective of ensuring that as far as reasonably practicable persons in England or Wales do not live in fuel poverty.

17. For point (d) above, the Act requires the target date to be no later than 15 years after the publication of the strategy. Since the Government published its strategy for England in November 2001[10] the effective date for the eradication of fuel poverty in England is November 2016.[11]

18. Among its other procedural provisions, the Act gives the Secretary of State a duty to "take such steps as are in [his] opinion necessary to implement the strategy." A series of duties to monitor and review the strategy, to provide progress reports from time to time and to publish any revisions made by the Government to the strategy is also included in the Act.

The 2001 UK Fuel Poverty Strategy

19. Responding to the entry into force of WHECA, the then Government prepared and published a draft UK fuel poverty strategy. Following a consultation exercise, the final strategy was published in November 2001. As a UK document, agreed with the devolved administrations, the strategy has a broader geographical scope than WHECA. The strategy established a technical definition of fuel poverty, going beyond the definition enshrined in WHECA, to define the households to which the strategy applied. It also set out an interim goal of "ending the blight of fuel poverty" for "vulnerable" households by 2010.[12] Box 1.2 provides a summary of the strategy's stated objectives.

The policy framework described by the strategy

20. A large part of the strategy was given over to a description of the policies already in place or planned to deliver its over-arching

9 This power has not been used.

10 Defra, DTI. (2001). The UK Fuel Poverty Strategy. London: Defra/DTI. Available at: http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/addressing%20fuel%20poverty/strategy/file16495.pdf

11 In October 2008, the Queen's Bench Division of the High Court heard a case for judicial review relating to WHECA. In essence, the plaintiffs argued that the Government was making slow progress and failing in its statutory duty. The case and ensuing appeal were unsuccessful. For further detail, see Annex B.

12 "Vulnerable" refers to older people (i.e. 60 or over, children and people with a long-term illness of disability.

policy aims. The strategy divided policy interventions into three broad categories: energy efficiency measures, energy market measures and social exclusion measures.

21. In relation to energy efficiency, the strategy described the then Government's "Warm Front" programme, replacing the Home Energy Efficiency Scheme (HEES), and drew attention to the role of the supplier obligation known as the Energy Efficiency Commitment. It also referred to Local Authority action (including the Decent Homes programme for social housing), to advice services from the Energy Saving Trust (EST) and to the role of National Energy Action, which continues to operate in this area (and which has provided valuable evidence to this review).

22. Energy market measures set out in the strategy included the impact of the liberalisation of energy markets in the UK, which was expected to generate downward pressure on domestic fuel bills.[13] The strategy also underscored the relevance of the Utilities Act 2000 in terms of protecting consumers. It highlighted the role energy companies could play in lowering bills for vulnerable customers, alongside the assistance offered by the Social Action Plan established by Ofgem, the market regulator.[14] This Plan was designed to make sure that consumers could access a range of tariff options and payment methods to suit their circumstances, as well as appropriate advice and help with debt management and energy efficiency from suppliers.

23. The strategy also aimed to reduce social exclusion as a contribution to eliminating fuel poverty. In terms of raising household income it highlighted the role of Winter Fuel Payments, Cold Weather Payments, the Minimum Income Guarantee for pensioners, introduced in 1999, and tax credits such as the then Working Families Tax Credit. The strategy also referred to health-focused policies designed to reduce health inequalities and to tackle the determinants of ill-health, including fuel poverty.

13 Chapter 5 explains what the fuel poverty trend would have looked like had the projections proved accurate.

14 Ofgem – the Office for Gas and Electricity Markets – is the regulator of the electricity and gas markets in Great Britain. See www.ofgem.gov.uk for more information.

Box 1.2: Fuel poverty policy objectives and targets

"The goal of the Government and the Devolved Administrations is to seek an end to the problem of fuel poverty. In particular, an end to the blight of fuel poverty for vulnerable households by 2010. Fuel poverty in other households will also be tackled once progress is made on the priority vulnerable groups."

"Once progress has been made on the priority vulnerable groups, the focus will be widened to include those healthy adult householders in fuel poverty. While they are at less risk of ill health, these householders still suffer from the other problems associated with fuel poverty."

Source: UK Fuel Poverty Strategy 2001

Targets set by the strategy

24. The strategy attracted some criticism in 2001 for failing to set an explicit target date for the fulfilment of the main aim of WHECA, that is, the eradication of fuel poverty as far as reasonably practicable. The terms of WHECA mean that, by default, the latest date for achieving this target is 2016. However, the strategy did set out an interim target – the elimination of fuel poverty in "vulnerable" households by 2010. At the time of the strategy's publication, some 80-85 per cent of fuel poor households fell within this far-reaching definition. The strategy stated that the focus of activity would broaden to remaining fuel poor households after the 2010 target date.

25. For England, the strategy also established an interim target that by 2004, 800,000 vulnerable households would be assisted through Warm Front and that the number of "non-decent" social sector properties would be reduced by one third. The third annual progress report[15] stated that by 2005, Warm Front had assisted over 1 million households and that the number of non-decent homes had fallen by 13 per cent, according to the 2003 English House Condition Survey (EHCS), since 2001.

The definition of fuel poverty set out in the strategy

26. Crucially for this review, to define fuel poverty the strategy introduced a fuel poverty ratio measure: a fuel poor household is one that would need to spend more than 10 per cent of its income to maintain a 'satisfactory' heating regime. Put another way, a household is fuel poor if its fuel poverty ratio (required fuel costs divided by income) is greater than 0.1.

27. The threshold was fixed at 10 per cent since this was twice median fuel spending as a share of income in 1988.[16] In other words, one half of households then spent 5 per cent or less of their income on fuel, the other half spent more. (As set out in the strategy, 10 per cent was also, coincidentally, the actual average level of spending by the poorest three-tenths of households in 1988.) More detail on the implications of these elements of the definition is set out in Chapter 5.

28. In fact, the strategy set out two technical definitions, which measured income in different ways. The first definition – used for the purposes of target setting – measures income net of income tax and national insurance but including housing benefit and Income Support for Mortgage Interest (ISMI). This is referred to as the 'full income definition'[17]. The second definition does not include housing benefit and ISMI and is referred to as the 'basic income definition'. Using the basic measure of income – which would often show lower incomes – can give higher fuel poverty ratios and therefore classes more people as fuel poor for any particular threshold ratio.

29. Common to both definitions is a needs-based approach to calculating energy requirements. The strategy made the case for this approach as follows:

> *Importantly, the definition focuses on what people would need to spend, rather than what they actually spend on heating. This is because fuel poor*

15 Defra, DTI. (2005). *The UK fuel poverty strategy: 3rd Annual Progress Report*. London: Defra, DTI. Available at: http://www.bis.gov.uk/files/file10717.pdf

16 As set out earlier, the idea of taking twice the median as a threshold appears to emanate from Hancock and Isherwood's 1979 paper.

17 In addition, the 'basic income' definition excludes Council Tax Benefit, while the 'full income' definition includes this benefit and deducts the Council Tax payable.

households have to balance the need for fuel and other essentials, and very often cannot heat their homes properly.

30. Chapter 5 below gives details of the model that provides the technical basis for measuring fuel poverty under these definitions. Note that the assessment of energy use needed in households includes an allowance for energy use in the home other than for space and water heating (i.e. cooking, lighting and appliances).[18] Space heating accounted for 56 per cent of the average modelled bill in 2009. Water heating – 10 per cent – and all other energy uses – 34 per cent – are the remaining components.

18 The reasons for doing this, as given in the strategy, are i) that not including such an allowance would change the numbers of people in fuel poverty and ii) that cooking could be argued to be essential.

Monitoring the strategy

31. Since its first publication in 2001, the strategy has been revised occasionally, as required by the Act. None of these revisions has affected the objectives, targets or definitions set out initially. The most recent revision was introduced in 2011 to reflect changes to the eligibility criteria for Warm Front.

32. Since 2002, the Government has published a series of reports on progress. The most recent progress report, the seventh, was

Box 1.3: Fuel Poverty Advisory Group

In the consultation on the draft UK fuel poverty strategy, the Government announced its intention to establish the Fuel Poverty Advisory Group (FPAG). The Group is now constituted as an advisory Non-Departmental Public Body (NDPB) sponsored by DECC. The Group consists of senior representatives of relevant organisations, including energy suppliers, consumer groups, charities and other NGOs. The role of FPAG is:

- to consider and report on the effectiveness of current policies aiming to reduce fuel poverty;
- to consider and report on the case for greater co-ordination;
- to identify barriers to reducing fuel poverty and to developing effective partnerships – and to propose solutions;
- to consider and report on any additional policies needed to achieve a reduction in fuel poverty;
- to encourage key organisations to tackle fuel poverty;
- to consider and report on the results of work to monitor fuel poverty.

FPAG is therefore an important part of the accountability system that has been put in place as part of the Government response to its duty under WHECA. FPAG's annual reports provide independent commentary on the Government's progress. The series of reports since 2002 is available on the DECC website, with the most recent report published in July 2010.

Throughout the review, FPAG's members and its Chair, Derek Lickorish, and Vice-Chair, Gill Owen, have been active contributors and have provided very useful evidence.

published in 2009.[19] Since 2009, a separate statistical report has also been published on an annual basis. As will be seen, the Government was initially able to report considerable progress in terms of reducing the number of households found to be fuel poor under the published definitions; since 2004 the number of households has been rising.

Other relevant legislation

33. There is a range of additional legislation, including European legislation, that provides a backdrop to consideration of fuel poverty in England. In terms of energy market regulation, among the most significant Acts are the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Acts of 2004, 2008 and 2010. At the time of printing, a further Energy Bill is awaiting Royal Assent.

34. Of particular note for this review is the Energy Act 2010[20] which introduces the concept of reducing both the extent and depth of fuel poverty. The Act does so by saying:

> *Fuel poverty is reduced if –*
>
> *The number of people living in fuel poverty is reduced, or*
>
> *The extent to which any person is living in fuel poverty is reduced.*

35. The first part of this relates to the overall **extent** of the problem i.e. the total number of people affected. The second part relates to what this review considers to be the **depth** of the problem i.e. the degree to which an individual is affected. The Act goes on to say how both of these should be defined[21]. The definition of "living in fuel poverty" is the same as that used in WHECA. The following definition is used for reducing the depth of fuel poverty faced:

> *The extent to which a person is living in fuel poverty is reduced if the difference between the cost of keeping the person's home warm and what would be a reasonable cost for doing so is reduced.*

The significance of considering both the extent and depth of fuel poverty is discussed in Chapters 5, 6 and 7.

36. Other legislation of relevance to fuel poverty includes the Climate Change Act 2008 and certain European Union Directives. Further details can be found in Annex B.

1.3 Fuel poverty statistics

37. The final part of this introduction describes what official statistics have suggested the level of fuel poverty in England to have been since 1996. In Chapter 5 of this report, the current definition of fuel poverty is examined in detail and information provided about who is found to be fuel poor under this definition. This section gives a brief picture of the overall levels of fuel poverty found in England.

19 DECC. (2009). *UK Fuel Poverty Strategy: 7th Annual Progress Report*. London: DECC. Available at: http://www.decc.gov.uk/assets/decc/statistics/fuelpoverty/1_20091021091505_e_@@_ukfuelpovertystrategy7annreport09.pdf

20 See http://www.legislation.gov.uk/ukpga/2010/27/contents

21 Legally speaking, the definitions given are for the purposes of the Energy Act itself. They provide a useful broader insight for this review.

38. The latest official fuel poverty statistics were published by DECC in July 2011, providing information on fuel poverty numbers until 2009.[22] It is worth noting, particularly when looking at fuel poverty statistics presented as a time series, that there have been changes to the measurement of fuel poverty over the last few years that will have had an effect on the numbers compiled throughout this report. These changes are generally either amendments to the English Housing Survey, or to the methodology used to model bills or income. See Annex B for a detailed description of the main changes that have taken place.

22 DECC. (2011). Annual report on fuel poverty statistics. London: DECC. Available at: http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/2181-annual-report-fuel-poverty-stats-2011.pdf

39. As can be seen in Table 1.1, the number of fuel poor households in England according to the current definition was at its highest at the start of the period in 1996, with 5.1 million households in fuel poverty. In the period 1996-2003 there was a rapid reduction in the number of households in fuel poverty to 1.2 million. By 2004, the level of fuel poverty in England had therefore officially fallen by three-quarters from 1996 levels. However, since 2004, fuel poverty has increased as rapidly, with the number of households in fuel poverty in 2009 (4.0 million) the highest level since before 1998. DECC's projection for 2011 suggests that fuel poverty will have increased further, to 4.1 million households, more than three times as high as in 2004 (but still a fifth less than in 1996).

Table 1.1: *Number and percentage of households in fuel poverty, 1996 to 2011, England*

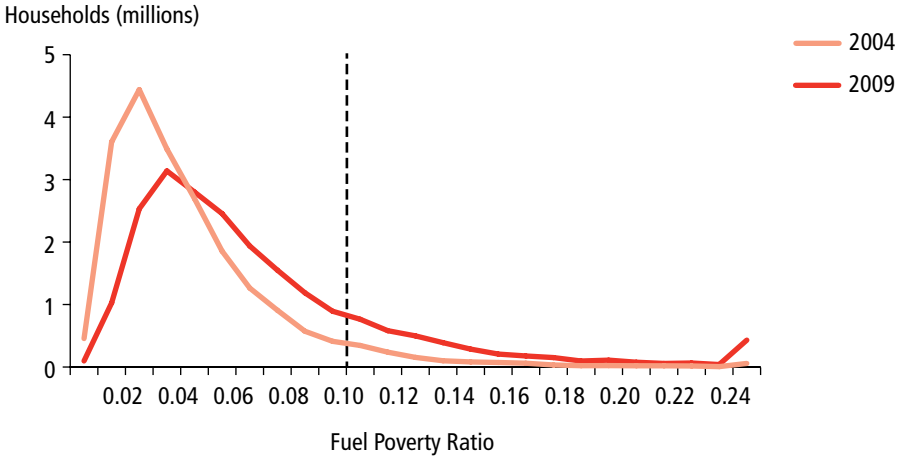
Year	Number of households in fuel poverty (millions)	% of households in fuel poverty	Number of vulnerable households in fuel poverty (millions)*	% of vulnerable households in fuel poverty
1996	5.1	26.0	4.0	30.0**
2001	1.7	8.1	1.4	9.8
2003	1.2	5.9	1.0	6.6
2004	1.2	5.9	1.0	6.4
2005	1.5	7.2	1.2	7.8
2006	2.4	11.5	1.9	12.8
2007	2.8	13.2	2.3	14.6
2008	3.3	15.6	2.7	17.5
2009	4.0	18.4	3.2	20.7
2010 (projected)	4.0			
2011 (projected)	4.1			

* "Vulnerable" means people with a long-term illness or disability, people 60 or over and children

** This is an approximate value

Source: Fuel poverty statistics (DECC)

Figure 1.1: *Fuel poverty ratios (required spend on energy as a proportion of income), 2004 and 2009, England*



Source: Fuel Poverty data (DECC)

40. Figure 1.1 shows the distribution of fuel poverty (by fuel poverty ratio) in 2004 and 2009. In this period the distribution of fuel poverty ratios shifted to the right. This means that the number of households whose required spending exceeds the fixed threshold of 10 per cent is bigger. The modal fuel poverty ratio (the densest part of the distribution) has moved from 3 per cent of income in 2004 to 4 per cent in 2009 while the median ratio has changed from 3.5 per cent in 2004 to 5.5 per cent in 2009 (i.e. half of households' modelled bills equated to more than 5.5 per cent of income in 2009 and half less). The mean ratio was 4.6 per cent in 2004 and 7.4 per cent in 2009.

Chapter 1 summary

The key elements of this Chapter are:

- Fuel poverty has been a social policy concern for a number of decades. The adoption of the Warm Homes and Energy Conservation Act (WHECA) 2000 marked a milestone in recognising the issue.
- The Act defines the core issue as the combined impact of having a lower income and facing an unreasonable cost of warmth.
- The adoption of the Act was followed by publication of the 2001 UK Fuel Poverty Strategy, which set out the Government's policy framework for ensuring that as far as reasonably practicable no-one lived in fuel poverty by 2016 (in England). It established a target (which was not reached) of eliminating fuel poverty for vulnerable households by 2010.
- The strategy also contained the current fuel poverty ratio. It defined a fuel poor household as one that needs to spend more than 10 per cent of its income to maintain a satisfactory heating regime.
- The 10 per cent threshold was fixed at this level on the basis that this was twice median fuel spending as a share of income in 1988.
- The spending requirement used to calculate the extent of fuel poverty is based on an assessed need to spend, not actual spending. In 2009 space heating accounted for 56 per cent of this assessment on average, and water heating 10 per cent. 34 per cent related to other uses (cooking, lighting and appliances).
- The Energy Act 2010 additionally defines "reducing fuel poverty" as reducing either the number of people who are fuel poor or the difference between needed spend and reasonable costs. This reflects a distinction between the *extent* of fuel poverty and its *depth*.
- Under the current measure of fuel poverty, the number of English households affected fell by three-quarters from 5.1 million households in 1996 to 1.2 million in 2004. The number of households then rose more than threefold, reaching 4.0 million in 2009.

CHAPTER 2

Causes of fuel poverty

1. We have seen how the Warm Homes and Energy Conservation Act 2000 (WHECA) – and indeed the Energy Act 2010 – define fuel poverty as a dual issue: the condition arises where a household has a "lower income" as well as "unreasonable costs". It is now appropriate to consider what these terms might mean and what lies behind them.

2.1 Principal drivers of fuel poverty

2. Responses submitted to the Review overwhelmingly agreed that there are three main drivers of fuel poverty:

   - low income;
   - energy efficiency;
   - fuel prices.

   These three drivers act in different ways on the elements of fuel poverty set out in WHECA, and are discussed below.

3. WHECA establishes being on a "lower income" as a precondition of a household as being in fuel poverty.[23] We examine later the implications for measurement of fuel poverty of the choice of approach to income measurement. To illustrate recent trends in the number of people with low income, Figure 2.1 shows data from the Households Below Average Income (HBAI) series published by the Department of Work and Pensions (DWP). Over the whole period since 1994/95 poverty has fallen slowly if measured relative to contemporary living standards (whether this is done before or after allowing for households' housing costs). Against a fixed absolute standard it has more than halved.

4. This review cannot explore in any detail the issues surrounding income distribution, wealth and poverty in England.[24] The causes of income poverty are manifold and the cash amount households have to spend is only ever an imperfect measure of the standard of living they can achieve. A core issue for this report is the extent to which those on lower incomes face high costs in achieving particular standards of warmth.

23 As will be seen in Chapters 5 and 7 the current definition used for measurement does not necessarily reflect this in full.

24 See Hills, J. et al. (2010). *An Anatomy of Economic Inequality, the report of the National Equality Panel* London: Government Equalities Office/CASE. And Hills, J., Sefton, T. and Stewart, K. (eds) (2009). *Towards a More Equal Society? Poverty, inequality and poverty since 1997*. Bristol: The Policy Press.

Figure 2.1: *Poverty rates, 1994/95 to 2009/10, UK*

Source: HBAI: An analysis of income distribution 1994/95 and 2009/10, May 2011 (DWP). Before 98/99 data refers to GB.

5. Reflecting this, the other key element of WHECA is the inability to keep warm at reasonable cost. In theory a household's energy costs will be a combination of their needs (which reflect the energy efficiency of a property) and household preferences and behaviours, and fuel prices. In practice, while many households can use energy in a relatively unconstrained manner, others may have to limit use because of limited resources, so that the amount of energy they use does not reflect what others might see as their needs.

6. Needs and prices reflect a number of other factors. Needs – for instance to maintain a particular minimum temperature in a home – will reflect the energy efficiency of a dwelling, its size and the size of the household, the energy system in place, the amount of time during which a dwelling is occupied and so on. The price paid by households also reflects a range of factors, including geographical location, the amount and type of fuel used and the payment method.

7. The rest of this Chapter considers energy costs further, looking first at energy use in relation to need and the factors that lock households into high energy costs.

2.2 Ability to turn income into heat

8. Across English households there is great variety in the amount of expenditure needed to deliver the same standard of warmth. For example, DECC estimates that in 2009 the median required fuel bill for couples without children was nearly £1,300 to achieve an adequate standard of warmth[25] in 2009. But 16 per cent needed to spend more than £1,750 and 9 per cent more than £2,000.

25 Chapter 3 discusses the origins of the standard heating regime used and Chapter 5 sets out how the regime is used when modelling fuel bills.

9. A household's ability to turn income into heat reflects three main factors:

   - dwelling characteristics – this covers the type of dwelling and its thermal efficiency;
   - how energy bills are paid – this covers both payment method and tariff;
   - the impact on household bills of certain Government policies – this includes not just taxation (such as the reduced rate of VAT on fuel), but also the distributional impact of the cost of a range of social and environmental policies not directly funded through taxation.

Thermal efficiency of homes

The relationship between SAP and energy costs

10. The thermal efficiency of the dwelling is one of the key determinants of household energy costs. An inefficient dwelling requires a larger amount of energy compared to a more efficient dwelling to maintain a specific internal temperature and, all things being equal, a person living in an inefficient dwelling will face a higher energy bill.

11. The energy efficiency rating of a dwelling is often expressed in terms of the building's Standard Assessment Procedure (SAP) rating (see Box 2.1 for details). For a particular dwelling, a higher SAP rating indicates a greater level of thermal efficiency and a lower required energy bill.

12. Figure 2.2 shows the relationship between the SAP rating and annual energy costs for a typical semi-detached, cavity wall dwelling that is attached to the gas grid.[26] The curve highlights the very significant impact that the thermal efficiency of the dwelling can have on household energy costs. A semi-detached property with no insulation and no central heating system[27] would have a SAP rating of 1 and an estimated annual energy bill (excluding costs for appliances etc) of around £1,700, at 2003-05 energy prices. The same property with loft and cavity wall

26 Based on the SAP 2005 methodology. For further details of SAP 2005 methodology, see: http://projects.bre.co.uk/sap2005/

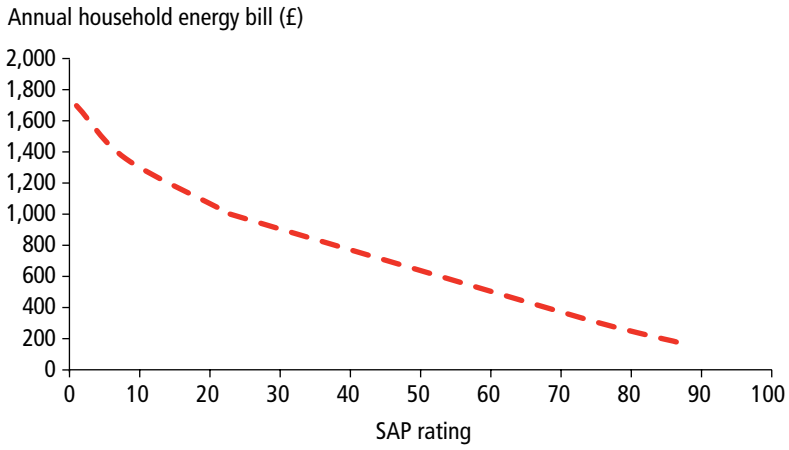
27 For this property the SAP methodology assumes that the property is heated using portable electric heaters.

Box 2.1: the Standard Assessment Procedure

The Standard Assessment Procedure (SAP) is the Government-recommended measure used for assessing the energy performance of dwellings. The SAP rating of a dwelling is an indicator of energy consumption per unit of floor space and includes the costs associated with space heating, water heating, ventilation and lighting, less any cost savings from self-generated energy. The rating is adjusted to the floor area so that the rating is independent of the dwelling size. The SAP rating is expressed on a scale of 1 to 100, where higher numbers denote greater thermal efficiency and lower energy costs.

The SAP assessment assumes a heating regime where the main living area is heated to 21°C and all other habitable rooms are heated to 18°C. However, the calculation of the SAP rating is independent of household characteristics (i.e. the calculation does not take account of household size or composition).

Figure 2.2: *The relationship between SAP and required household energy costs for a typical cavity walled, semi-detached house on the gas grid (based on average energy prices 2003 – 2005)*



Source: BRE. Costs exclude appliances etc.

insulation, double glazing and gas central heating would have a SAP rating of 73 and an annual energy bill of about £350 (again, excluding the costs of appliances).

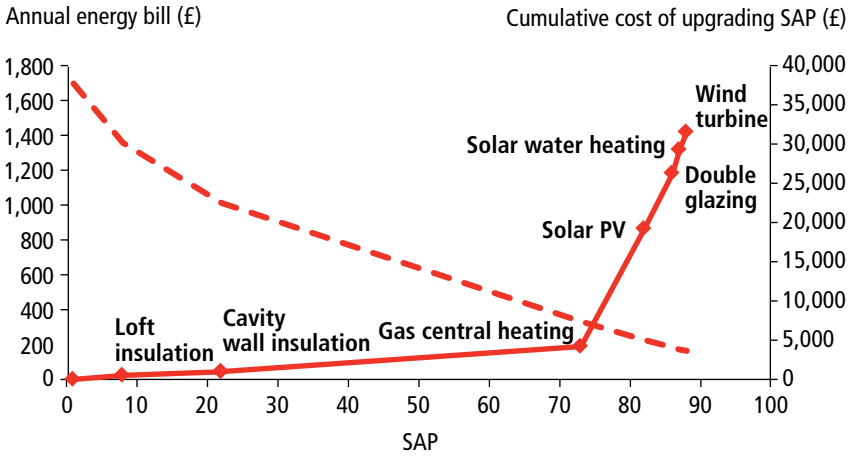
13. Making improvements to a dwelling's SAP rating requires capital investment. Figure 2.3 shows the costs of improving the SAP rating of the same semi-detached dwelling – where the improvements to the home are made in order of cost-effectiveness – and how these improvements will affect fuel costs. This shows that there are some relatively cost-effective ways of making a sustained reduction to the cost of heating through energy efficiency improvements. For example, basic insulation and a heating system result in a very significant improvement in SAP at an overall cost of around £4,000. However, many low-income households lack the means to be able to make these improvements and are, therefore, locked-in to high energy costs.

14. The curve also shows that it is possible to make further improvements to thermal efficiency beyond what is achievable through the most cost-effective measures. However, the incremental impact of such improvements on SAP is both smaller and increasingly expensive.

15. The relationship between SAP and energy costs (and the capital costs of making improvements to household SAP) varies across dwelling types. On average, larger houses[28] and houses that are not attached to the gas grid (and use more costly heating fuels or electricity) will face higher energy costs. Figure 2.4 shows the costs of improving the SAP rating of a typical cavity wall detached property that is on the gas grid. In addition, there are some dwellings where the structure of the building will make it more costly to make improvements to the SAP rating. For example, it is significantly more expensive to insulate

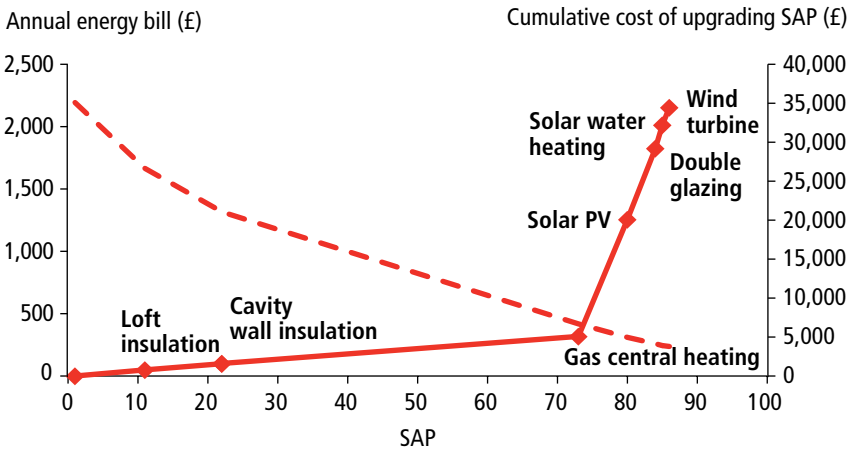
28 SAP rating is a measure of energy cost per m^2 of floor space. As such a large house at a particular SAP rating will have a higher notional energy bill than a smaller house with the same SAP rating.

Figure 2.3: *The cost of improving the SAP rating and the resulting impact on the household energy bill for a typical cavity-walled, semi-detached property on the gas grid (average prices 2003-2005)*



Source: BRE

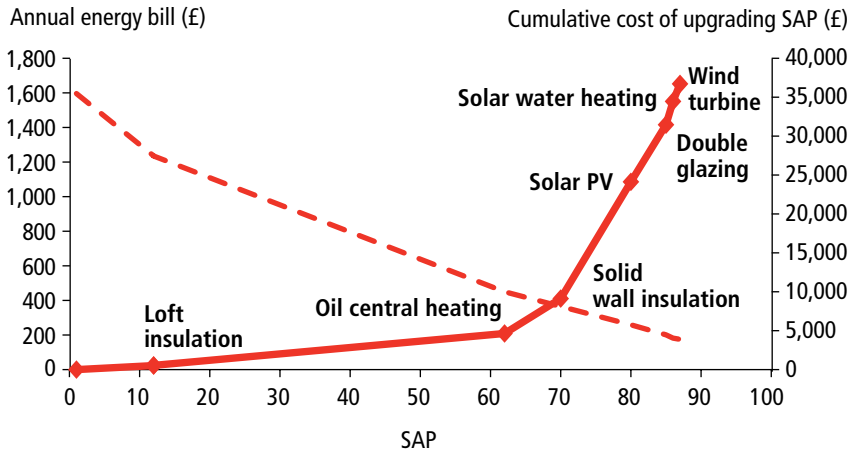
Figure 2.4: *The cost of improving the SAP rating and the resulting impact on the household energy bill for a typical cavity-walled, detached property on the gas grid (average prices 2003-2005)*



Source: BRE

solid wall dwellings compared to dwellings with cavity walls. It also tends to be more expensive to install new heating systems for off-grid properties. As shown by Figures 2.5 and 2.4, an investment of £9,000 is needed to reduce the bill to around £500 (2003-05 prices) in an off-grid terraced property with solid walls, compared to an investment of £4,000 to achieve a bill of around £400 in an on-grid detached property with cavity walls.

Figure 2.5: *The cost of improving the SAP rating and the resulting impact on the household energy bill for a typical solid wall, terraced property off the gas grid (average prices 2003-2005)*



Source: BRE

The housing stock

16. Household energy costs are determined by both the size and the SAP rating of the dwelling. This section looks at the housing stock with respect to these characteristics to determine whether there are particular groups of householders that are living in expensive to heat dwellings.

17. Table 2.1 shows average house size across different income groups. The data suggest that lower income households tend to live in smaller houses and would therefore, other things being equal, have lower energy requirements than higher income households.

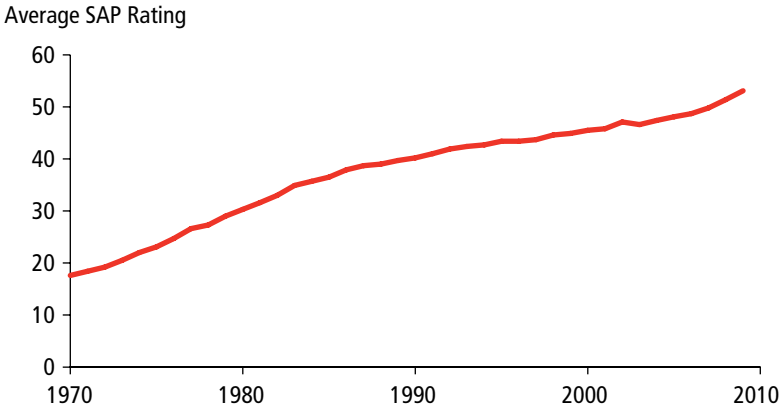
18. There has been a steady increase in the thermal efficiency of the housing stock over the past four decades. Figure 2.6 shows that the average SAP rating of a dwelling in England rose from around 18 in 1970 to around 53 in 2009. This is in many ways a major success. However, these average figures mask some significant differences between different house types and tenures. The average SAP rating in 2009 amongst owner occupiers and private renters was 51 and 52 respectively. Houses in the social

Table 2.1: *Average floor space by income group in 2009, England*

	Income group									
	Bottom	2	3	4	5	6	7	8	9	Top
Average dwelling floor space (m^2)	80	79	78	83	85	88	94	98	104	125

Source: English Housing Survey (DCLG)

Figure 2.6: *Trend in the average SAP rating of the housing stock in England, 1970 to 2009 (based on 2005 methodology)*



Source: Energy consumption in the UK (DECC)

sector – where the Government's Decent Homes programme has had a major impact on the thermal efficiency of the stock – have an average SAP rating of 61.

19. Across all tenures, there are certain housing characteristics (e.g. off gas grid, solid wall) that make the home more costly to heat and more expensive to upgrade. As we might expect, the average SAP rating is lower in off-grid dwellings – the average SAP rating of off-grid dwellings in England in 2009 was 41 compared to 55 for households that are on the gas grid.

20. Table 2.2 shows the average SAP ratings of the housing stock in England split by tenure and household income group. It shows quite clearly the difference in the average SAP ratings between households that are on and off the gas grid and also the relatively high SAP ratings of social housing. Interestingly, the data do not suggest that, within different tenures, there is a social gradient with respect to thermal efficiency of dwellings (i.e. on average, low income owner occupiers do not appear to live in lower SAP properties compared to owner occupiers in higher income groups).

Table 2.2: *Trend in average SAP across income groups (based on SAP 2005 methodology), 2009, England*

House type	Share of total housing stock (%)	Average SAP across group	SAP of Equivalised AHC Income group									
			Bottom	2	3	4	5	6	7	8	9	Top
On gas grid	**87**	**55**	**57**	**57**	**57**	**55**	**55**	**55**	**55**	**53**	**54**	**53**
Of which:												
Social housing	15	63	62	63	62	63	63	63	62	62	64	*
Private rented sector	12	55	55	55	55	55	53	55	57	57	57	57
Owner-occupiers	60	53	54	53	54	53	53	54	54	53	53	53
Off gas grid	**13**	**41**	**41**	**43**	**43**	**41**	**43**	**36**	**42**	**41**	**41**	**41**
Of which:												
Social housing	3	53	51	54	52	55	57	50	55	*	*	*
Private rented sector	3	39	38	39	38	37	38	35	47	41	42	41
Owner-occupiers	8	38	32	35	37	35	38	35	39	40	40	40

* suppressed due to small sample size

Source: English Housing Survey, 2009, DCLG. Groups are by household income adjusted for household size.

The evidence presented in this section shows how dwelling size and SAP rating affect the size of the household energy bill. Investments in energy efficiency can greatly improve SAP ratings but for some kinds of property it is easier to achieve gains than others. The household data from the English Housing Survey suggests that the size of the dwelling is related to income (where, on average, poorer households tend to live in smaller dwellings). However, within tenure groups, there does not appear to be a strong relationship between income and SAP rating (i.e. poorer households do not appear to be living in lower SAP dwellings). The data do suggest, however, that households that are off the gas grid tend to have lower SAP ratings than households that are attached to the grid and that the SAP rating of social housing tends to be relatively high. Average SAP ratings have improved substantially over the last forty years.

2.3 The cost of energy

21. The second factor in people's ability to turn their income into heat is how they engage with the energy market. Whilst the wholesale price of fuel makes up the single largest component of any bill (54 per cent for gas, 46 per cent for electricity),[29] other factors also play a part in determining a household's final bill: how they pay their energy bills, what tariff they are on, and whether they switch energy supplier regularly. All of these can make a considerable difference to a household's annual fuel bill. Another key difference is whether households are connected to the gas grid.

22. 91 per cent of English households use either gas or electricity (or a combination) to meet their energy requirements. Since the market was liberalised in the 1990s, six main suppliers have dominated the market, accounting for 99 per cent of all gas and electricity supplied. There has been a limited number of new entrants in the last 10 years. The liberalisation of the market allowed consumers to switch between suppliers in search of the best deal. In practice the experience of consumers has been mixed.

23. In contrast the market for supplying fuel to those off the gas grid (heating oil, LPG, etc.) is characterised by hundreds of small suppliers. The market is not subject to a specific regulatory regime.

24. This section first looks at the experience of consumers who use gas and electricity, including how they pay their bills, the different tariffs available and whether consumers actively engage in the market to switch provider on a regular basis (and the benefits of doing so) – and so who pays what. We then turn to off-grid energy considerations.

Payment methods

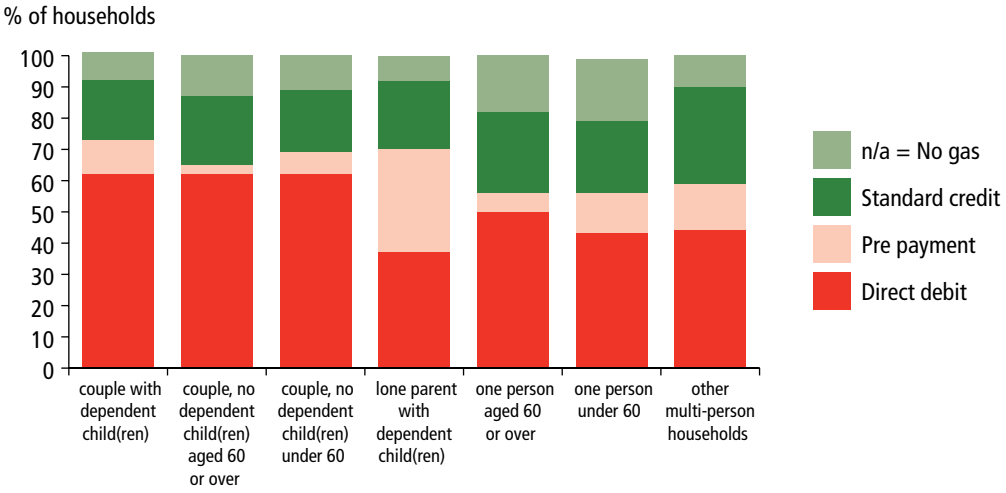
25. The transition of gas and electricity supply to a competitive market has delivered greater choice in the tariffs available. But it is important to understand whether consumers take advantage of these and what happens when they switch supplier, tariff or payment method.

26. At present, there are three main payment methods: standard credit (i.e. quarterly bills), direct debit and prepayment meter. The use of these methods varies widely between household type, as shown by Figure 2.8. All households are most likely to use direct debit. Using prepayment meters is most prevalent amongst lone parents (33 per cent). In each population group, between 19 and 31 per cent use standard credit.

27. Figure 2.8 shows how payment methods are spread across and within income groups (in this case, incomes have not been adjusted for household size and composition, or housing costs). It can be seen that, although direct debit is the most commonly used payment method in all income groups, low income groups are more likely to use either prepayment or standard credit methods than those on a higher income (45 per cent in the lowest tenth compared to 18 per cent in the highest tenth). In addition, those in the lower income groups are more likely to not have access to the gas grid, meaning they will be using more expensive fuels such as electricity or heating oil.

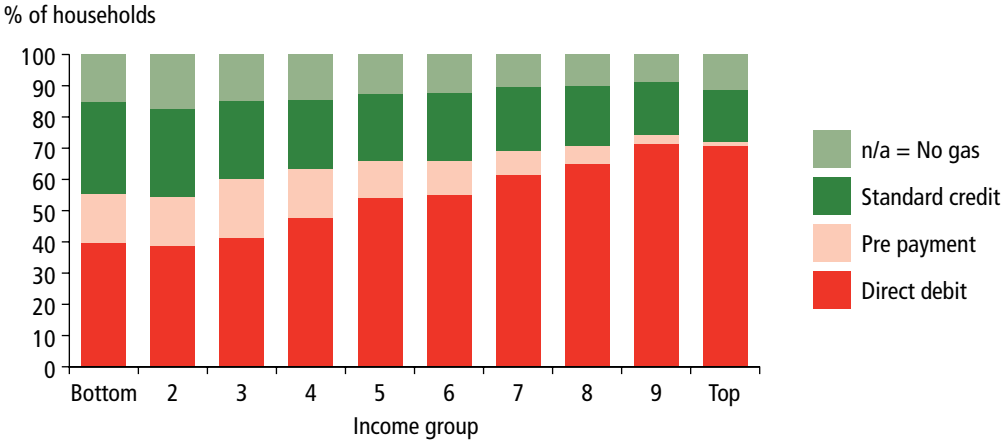
29 DECC. (2010). *Estimated impacts of energy and climate change policies on energy prices and bills*. London: DECC.

Figure 2.7: *Payment method for gas by household type, 2009, England*



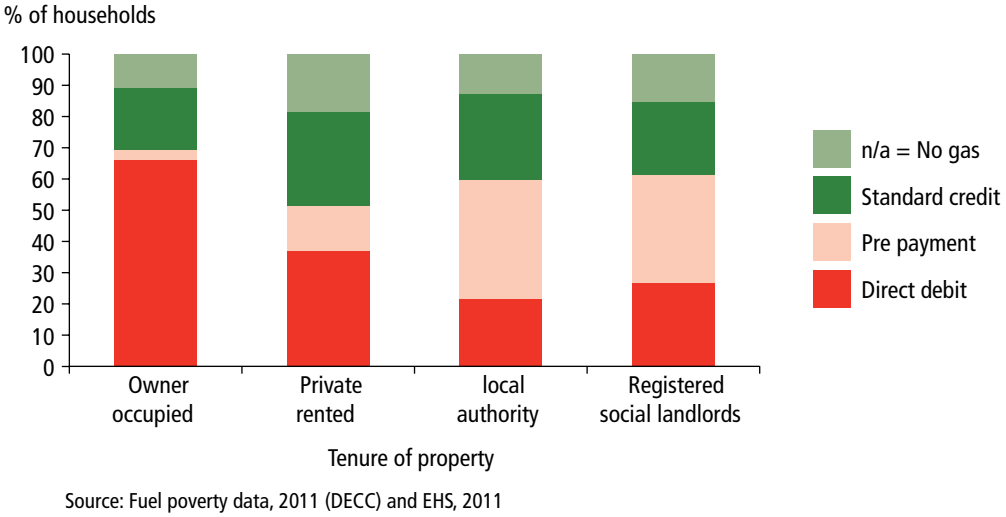
Source: Fuel poverty data, 2011 (DECC) and EHS, 2011

Figure 2.8: *Payment method for gas by income group, 2009, England*



Source: Fuel poverty data, 2011 (DECC) and EHS, 2011

Figure 2.9: *Payment method for gas by tenure, 2009, England*



Source: Fuel poverty data, 2011 (DECC) and EHS, 2011

28. There are also clear variations in payment methods when examined by tenure. Within the social housing sector (local authority or registered social landlords), 33-37 per cent of households use prepayment meters; the majority of owner occupied households (63 per cent) use direct debit.

29. The way in which payment methods are spread between different types of household is significant because of the link between payment method and the cost of the energy used. For example, traditionally, prepayment meters have tended to be more expensive than either standard credit or direct debit methods of paying bills. This means that, given the distribution of payment methods shown above, one third of lone parents and one third of social housing households – and more generally lower income households – have faced some of the most expensive unit costs.

30. According to energy suppliers, a factor in the price differentials between payment methods is the different costs faced by the supplier for each method. Prepayment meters have greater costs associated with buying and servicing the meter, as well as a specialised administrative system for the allocation of payments from customers to suppliers. Visits to customers' homes may be required to recalibrate the meter when prices change. For both standard credit and prepayment there are costs associated with the recovery of fuel bill debt (in the case of prepayment meters, these are debts that have previously been incurred under other payment methods).

31. The Ofgem energy supply probe of 2008 looked at electricity and gas supply costs across all suppliers.[30] It found that there were cost differentials between prepayment, standard credit and direct debit reflecting these different factors. These were as much as £88 between prepayment and direct debit and £25 between standard credit and direct debit. However, average actual tariff differentials were found to be higher. Between prepayment and direct debit, this was as much as £125. The difference between standard credit and direct debit amounted to £80.

32. Since the Ofgem probe, there has been some standardisation of prices between the different methods (standard credit and prepayment in particular had roughly equal bills by 2010), though direct debit remains the cheapest. This can be seen in Figure 2.10. The figure also shows the way in which standardised electricity bills fell in real terms from 1998 to 2004, but have since increased by about half. Gas bills fell only slightly between 1998 and 2004, but had nearly doubled by 2009.

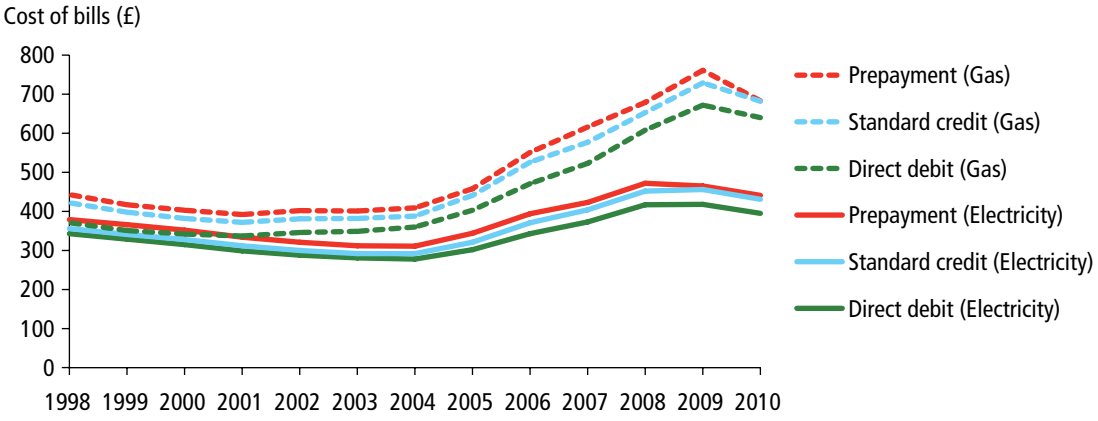
Tariffs and switching

33. For each of the payment methods discussed, there is a wide array of tariffs to choose from, reflecting the impact of market liberalisation. There has been a marked proliferation in recent years. In January 2007, there were around 175 on-line and off-line tariffs available; at the beginning of 2011, there were nearly 400.[31]

30 Ofgem. Energy Supply Probe (2008). See: http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf

31 Ofgem. Retail Market Review (2011). See: http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR_FINAL.pdf

Figure 2.10: *Average annual standardised domestic gas and electricity bills 1998 – 2010, England and Wales (2010 real prices)*



Source: Quarterly Energy Prices, March 2011 (DECC)

34. It is essential to understand whether consumers are taking advantage of the choice available to them and to understand the impact of the proliferation of tariffs on certain population groups. In other areas proliferation of a large range of complex pricing structures has been found to act against consumer interests, with too many options making it more difficult for people to make a choice.[32]

35. There is evidence to suggest that the availability of choice in this case, too, has not helped consumers to navigate the market and that, for some, the proliferation of choice has had a detrimental effect. An Office of Fair Trading survey of consumer attitudes to price information found that consumers felt complex pricing was encountered more often in gas and electricity supply than in any other sector.[33] 75 per cent of customers objected to the way in which prices were presented and 61 per cent found it difficult to choose a supplier. The reasons were given as:

- the market was too confusing and complicated (40 per cent);
- these were too many options (21 per cent);
- it was too difficult to calculate the amount due (40 per cent);
- it was difficult to choose because the suppliers used different terms to describe the same thing (37 per cent);
- price comparison sites were too confusing (16 per cent).

32 See Pensions Commission. (2005). *A new pensions settlement for the 21st century: the 2nd Report of the Pensions Commission* pp. 373-377. London: Pensions Commission. Available at: http://www.webarchive.org.uk/wayback/archive/20070802120000/http://www.pensionscommission.org.uk/publications/2005/annrep/annrep-index.html

33 See Annexe H to Office of Fair Trading. (2010). *A consumer's view of pricing advertising*. London: Office of Fair Trading. Available at: http://www.oft.gov.uk/OFTwork/markets-work/completed/advertising-prices/

36. This difficulty in navigating the market is reflected in the rates of people switching provider. While at least 75 per cent of GB consumers who take both gas and electricity have switched energy supplier at least once, equivalent to just under 20 million households, the headline figures mask very different switching behaviours. Only a small proportion of households (17 per cent) regularly shops around for the best deal, and these are most likely to be those households in full-time employment on higher incomes. Most either switch in response to a direct approach from an energy company (either by phone or on the doorstep)[34] or never switch at all. The reasons cited for not switching were: consumer behaviour (e.g. loyalty to a supplier, lack of interest, scepticism about the advantages of switching), supplier behaviour (e.g. debt blocking and lack of simple information) and technical issues (e.g. the lack of internet or a bank account).[35]

37. The House of Commons Energy and Climate Change Select Committee has found that some energy consumers have found interacting with the market disconcertingly complex. Even the Minister of State, Charles Hendry MP, "had been so confused by tariff options when trying to switch that he decided to stick with his current tariff."[36] According to the Office of Fair Trading survey most (70 per cent) consumers said they felt reasonably confident about switching.[37] Nevertheless, the evidence suggests that tariff complexities are a potential barrier to switching for a small but significant proportion of consumers.

38. On the other hand, the evidence worryingly suggests that the assumption that switching leads to lower prices does not always hold true. Again, this has been highlighted by the Energy and Climate Change Committee. Using figures from Ofgem and additional evidence gathered during an enquiry on the Ofgem Retail Review, the Committee showed that while approximately 60 per cent of consumers who switched tariffs succeeded in reducing their bills, 40 per cent of consumers were worse off.

39. Ofgem's own review found that for those who switched, the average net saving was 1-2 per cent for gas customers and 3-4 per cent for electricity customers. In general, customers who switched as a result of their own enquiries made greater savings than those who switched as a result of a doorstep sale. In the case of prepayment meters, Ofgem found a tendency towards higher churn rates. However, despite switching more often, the number of customers found to be worse off after switching was very high, at 48 per cent for electricity and 46 per cent for gas. As we have seen, it is low-income households who are most likely to be on prepayment meters.

40. From a fuel poverty perspective, the impact on low-income households of the operation of the domestic market is clearly important. Switching rates are lowest amongst older and lower income households as well as those on standard

34 Doorstep selling has been in the spotlight in 2011 and three suppliers – Scottish and Southern Electricity, British Gas and EDF Energy have announced they are ending or suspending the practice.

35 For those on a prepayment meter, there are additional barriers to being able to switch from a prepayment meter to either standard credit or direct debit. The most significant of these are the upfront charges demanded by some energy suppliers to cover the cost of switching from a meter. In addition a deposit may also be required. These are often beyond the means of many low income customers.

36 See: http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1046/11062203.htm

37 See Annexe N to *Office of Fair Trading.* (2010). *A consumer's view of pricing advertising*. London: Office of Fair Trading. Available at: http://www.oft.gov.uk/OFTwork/markets-work/completed/advertising-prices/

credit. This reflects the greater concern among low-income groups about the effects of switching, with many citing concern that something would go wrong if they switched and they would subsequently be less able to deal with the consequences of a unexpectedly high bill.[38]

Significance of tariffs[39]

41. Some of the variation in tariffs is allowed for in DECC's calculations of whether households are in fuel poverty. Specifically, the model is based on values for average tariffs by region and payment type. The model does not allow for variations within these groups. As a measure of the potential impact of tariff variation, if all households with the lowest three tenths of incomes paid the lowest tariffs[40] (the fifth percentile level within each payment type and region), fuel poverty in 2009 would have been 15 per cent lower than calculated using the average for the groups. If, in fact, the poorest 30 per cent of households paid the highest tariffs (the ninety-fifth percentile for each group), fuel poverty would be 7 per cent higher than officially calculated.[41] We hope that data will become available allowing a more accurate investigation than is currently possible of the extent to which the poor may pay more for energy.

38 Ofgem. Energy Supply Probe (2008). See: http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf

39 In our final report we will examine issues around tariff structures, including suggestions made to us that a move to a 'rising block tariff' would help reduce fuel poverty.

40 Excluding fixed and social tariffs.

41 Calculations for the Hills Fuel Poverty Review. This impact is the theoretical maximum impact of a variations in tariff scenario. The calculation does not take account of possible impacts on the market, and availability of tariffs. For instance, if a large number of customers switched to lower tariffs, one would expect tariffs overall to increase to offset this, at least in part.

Off-grid energy

42. Not all households have access to the gas grid and instead rely on other heating fuels or electricity for warmth (2.9 million or 13 per cent of English households in 2009). These households tend to be located in rural areas with no gas grid (32 per cent of households in rural areas are off the gas grid), although there is also a smaller but still significant number of households off the gas grid in urban areas (8 per cent, falling to 2 per cent if flats are removed from the population).[42]

43. These households instead use either heating oil (0.8 million), solid fuel (0.2 million), community heating schemes (0.2 million), LPG (0.1 million), or electricity (approximately 1.5 million). Using heating fuels and electricity to heat a domestic property tends to be more expensive than using gas, with the average modelled bill for an off-grid property estimated by DECC to be £1,580, compared to an average bill for a property on grid of £1,300.

44. As a result, and as Figure 2.11 shows, there tends to be a higher proportion of people in fuel poverty under the current definition amongst those who are off-grid. In rural areas, where over half of those in fuel poverty are off the gas grid, this is the result of the higher than average bills and lower than average SAP rating. Those off the gas grid also have lower than average incomes.

45. Unlike gas and electricity markets, there are hundreds of suppliers in the domestic off-grid heating fuel market. Prompted by concerns raised earlier in 2011 regarding the high price of heating oil, the Office of

42 Many of the homes using electricity for warmth are found in tower blocks where gas cannot be installed. Data from DECC fuel poverty statistics (2011) and DCLG EHS data (2009).

Fair Trading has undertaken a study into the functioning of the off-grid market, which is being published at around the same time as this report.

Payment method, tariff and fuel type can all have a (significant) impact on a household's final fuel bill. All types of tariff have become much more expensive since 2004. The difference between prepayment meter and standard credit costs has narrowed, but those on low incomes remain least likely to be on the cheapest, direct debit, tariffs. In theory, there are opportunities to switch payment method, tariff or supplier but in practice only a small proportion of consumers are taking advantage of this opportunity. Difficulties in accessing the best deals (e.g. because of lack of internet access) are exacerbated by the complexity of the market which can make it difficult to navigate. The evidence suggests that these barriers disproportionately affect those on the lowest incomes. Where customers on prepayment meters have switched supplier as a result of a doorstep sale, almost as many have switched to a worse as to a better tariff. For those off the gas grid, either in rural areas or in tower blocks, energy costs are substantially higher than for others.

Current modelling of fuel poverty assumes that households pay average tariffs for their region and payment method. If low-income households in fact face worse tariffs, this would understate fuel poverty, although a maximum effect would be around 7 per cent at 2009 levels.

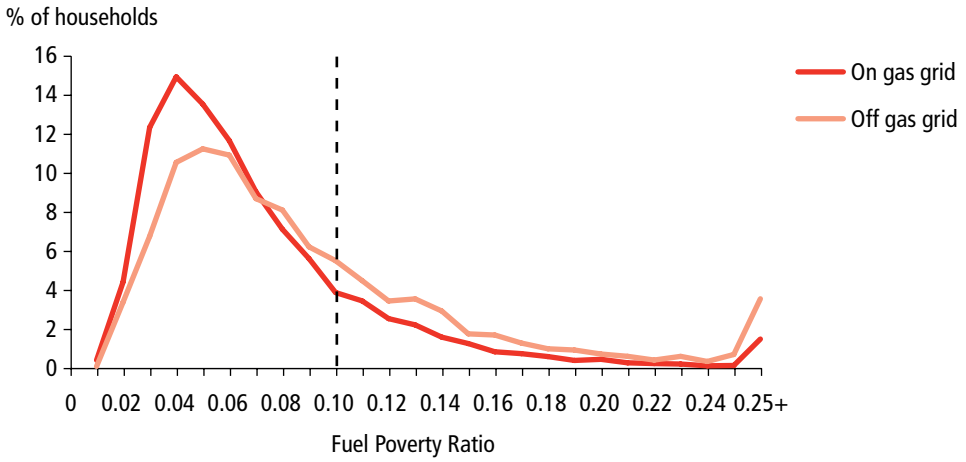
2.4 The impact of government policies on energy bills

46. A third factor in a household's ability to turn income into heat is the range of policies that the Government has put in place to reduce carbon emissions, both in terms of increased energy efficiency and a decarbonised electricity system. Policies can impact on household energy bills through one or both of:

- energy tariffs: many climate and energy policies put obligations on energy suppliers (e.g. the Renewables Obligation (RO) requires that a certain proportion of electricity generation is from renewable sources, while the Carbon Emission Reduction Target (CERT) requires energy suppliers to make carbon reductions in the household sector) and energy suppliers will generally recoup the costs of these policies through higher energy prices; and

- the thermal efficiency of buildings and appliances: some policies (e.g. Feed-in Tariffs (FITs), the Renewable Heat Premium Payment (RHPP) and the forthcoming Green Deal) will deliver energy efficiency and renewable heat measures to households. These measures will help to improve the thermal efficiency of the housing stock and, for the households that receive measures, will reduce energy costs. Also, policies and standards that are put in place to improve the energy efficiency of products (e.g. refrigerators and boilers) will help to reduce household energy consumption and energy bills.

Figure 2.11: *Off and on gas grid fuel poverty ratios in 2009, England*



Source: Fuel poverty statistics, 2011 (DECC)

In addition, decisions about the taxation of energy (e.g. the reduced rate VAT on domestic energy use of 5 per cent) also have an impact on household energy bills. The following paragraphs examine the evidence on the impact of other Government policies on tariffs and on the thermal efficiency of buildings, focusing on the impact of policies on lower income households.

Impact on prices

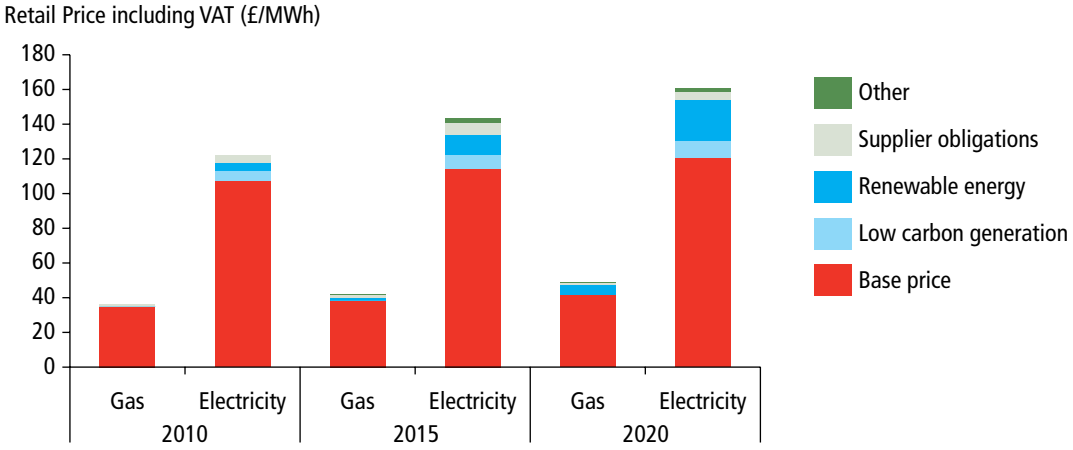
47. Energy suppliers are expected to recoup the costs of climate and energy policies through higher energy prices. Figure 2.12 shows some estimates that were published by DECC alongside the 2010 Annual Energy Statement (AES) on the gross impact of the climate and energy policy package on domestic gas and electricity prices up to 2020.[43] The estimates suggest that policies will increase both gas and electricity prices in the domestic sector and that the magnitude of that impact will increase as 2020 approaches. However, savings from energy efficiency measures will also grow (see paragraphs 50 and 51).

48. Since these estimates were published the policy landscape has evolved, which means that the figures are now somewhat out of date. For example, the Renewable Heat Incentive is now funded from general taxation rather than through energy bills and there are new policies that the Government is developing (such as the Green Deal and Electricity Market Reform) that did not form part of the 2010 analysis. The Government is expected to publish a new set of projections alongside the 2011 AES which will correct for these issues, and which should therefore be available for our final report. However, the 2010 analysis does give a useful indication of the magnitudes of DECC policies on energy prices and of the importance of distributional questions.

49. Energy suppliers probably recover the cost of these policies in different ways. However, whether they spread the costs evenly across each unit of consumption or through a

43 DECC policies have been grouped into: (1) low carbon generation: which includes the CCS levy and EU ETS; (2) renewable energy: which includes RHI, RO and FITs; (3) supplier obligations: which includes CESP, CERT and a future supplier obligation (now known as ECO); and (4) other: which includes better billing, smart meters and energy security.

Figure 2.12: *Estimated impact of policies on average gross household gas and electricity prices in real terms*



Source: Annual Energy Statement, 2010, (DECC)

lump sum across each bill, the impact will be regressive in the sense that fuel costs generally make up a larger proportion of total expenditure for low-income households compared to households on higher incomes.

Impact on bills

50. Some government policies, including those financed by the costs shown in Figure 2.12, put downward pressure on energy bills. Figure 2.13, also based on the analysis published by DECC alongside the AES 2010, sets the average energy price increase due to policies in 2020 against the impact of factors that should reduce energy bills. These include technological factors (e.g. policies such as CERT and FITs that improve the thermal efficiency of dwellings) and behavioural factors (e.g. smart meters and better billing policies that help consumers to use energy in a more efficient way).

51. By far the largest impact in terms of mitigating price impacts comes from products policies. These capture the impact of EU minimum standards and labelling on the energy efficiency for a range of household products. Product policies are different from the other mitigation policies that are shown in the chart as the savings from product policies will occur irrespective of the level of gross costs that are being added to energy bills. It could be argued, therefore, that the savings from product policies should not be reflected in this analysis. For this reason, the chart shows the savings from product policies separately in the second bar. It is clear that the impact of the DECC policy package would look rather different if these savings were excluded. As it stands, the DECC analysis suggests that the net effect of the climate and energy policy package will increase the average household energy bill by 1 per cent (£13) in 2020. This number would increase to 10 per cent (£135) if the impact of product policies were to be excluded.[44]

44 It is important to note that taking the impact of product policies out of these estimates would mean assigning them to the baseline bill (i.e. the reduction in the base bill would offset the level of the increase in policy impact) and would not, therefore, change the estimate of the overall bill in 2020. It is clear that, irrespective of where the savings are counted, product policies are expected to have a significant effect in terms of helping to offset the regressive impacts of the policy package.

52. Looking at average bill impacts masks very significant differences in the impact of these policies across different households. While all households will pay for the costs of policies through higher energy bills, only some households will receive energy efficiency and renewable energy measures. As such, the policy package creates a number of winners and losers.

53. DECC has estimated the impact of the climate and energy policy package across households at different points in the income distribution, as shown in Figure 2.14.[45] The analysis assumes that some households will receive insulation measures through supplier obligations (i.e. CERT, Community Energy Saving Programme (CESP) and a future supplier obligation that was assumed to deliver solid wall insulation) and that the policies will be delivered across different income groups (e.g. CERT measures are spread across households in the so-called priority group – pensioners and households containing someone on one of a range of benefits – and a non-priority group).[46] It is assumed that, due to the associated up-front costs, renewable energy measures will only be taken up by higher-income households. Estimates for both Figures 2.13 and 2.14 do not include the impact of the Warm Home Discount, which came into force in April 2011.

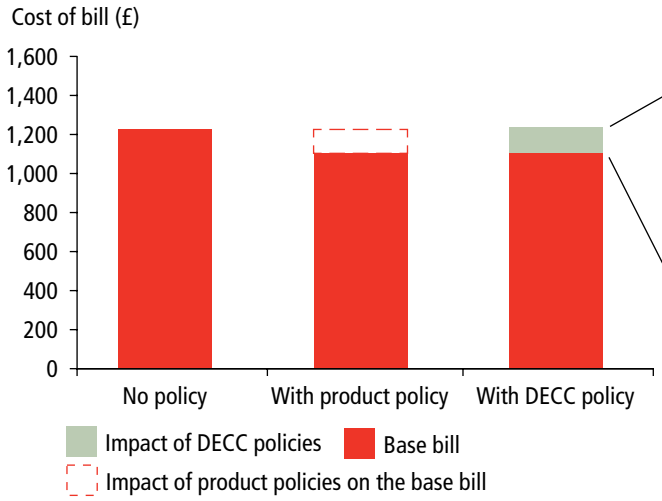
54. The results suggest that, on these assumptions, the poor would bear the largest proportional losses from the climate and energy policy package. For those households that do not receive any measures, the policy package is expected to cost around an additional 2 per cent

45 As estimated using announced policy measures in August 2010.

46 For CERT, 40 per cent of emissions reductions must be delivered in the priority group.

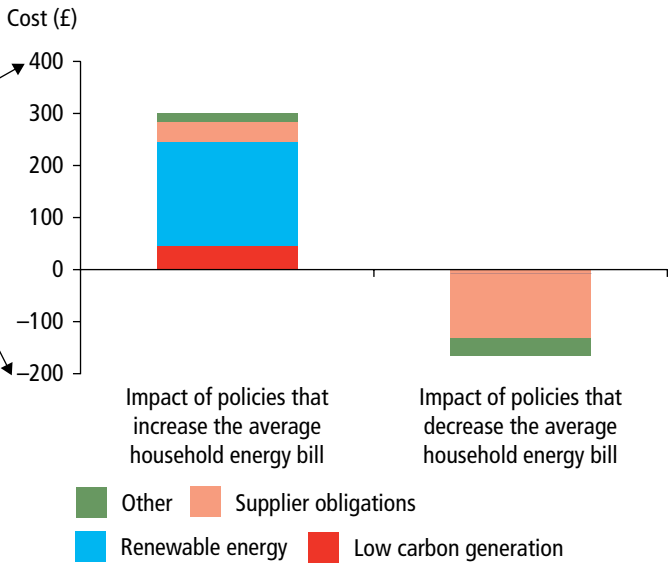
Figure 2.13: *Estimated impact of policies on average domestic energy bill in 2020 (2009 prices)*

Estimated final average household energy bill in 2020



Source: Annual Energy Statement, 2010, (DECC)

Estimated impact of DECC policies on an average household energy bill in 2020



Source: Annual Energy Statement, 2010, (DECC)

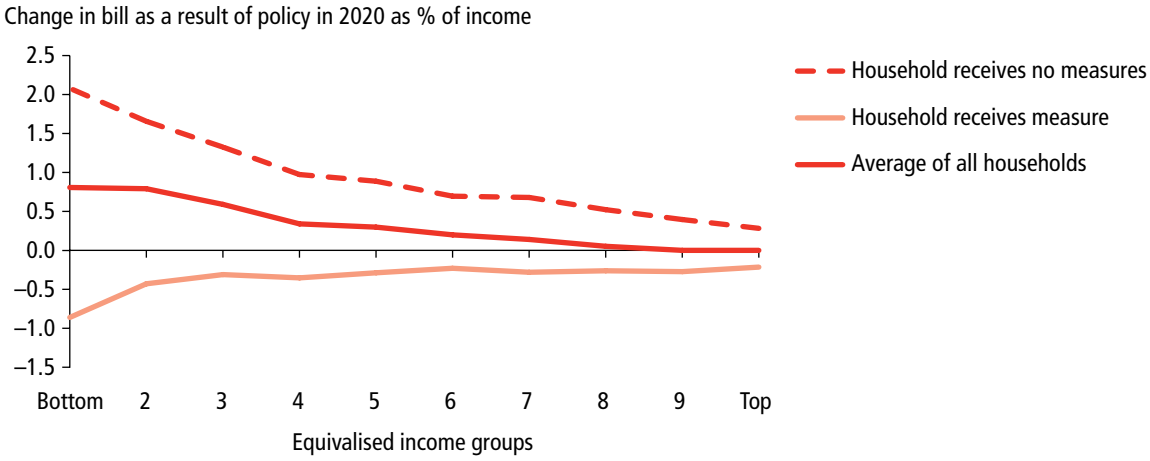
of income for the lowest income group (which is around an additional £140 per year) and around 0.3 per cent of income for households in the top income group (around £180 per year). These estimates include the effect of the products policies discussed above – the estimated bill impacts of the policy package would be significantly larger if these estimates were to be stripped out.

55. Allowing for the assumed distribution of benefits from the measures financed by the package, the net impact is an average loss of around 0.8 per cent of income for the poorest fifth of households, but approximately break-even for the richest fifth of households.

56. This discussion highlights the distributional impacts that can result from policy design. It is important that these impacts are well understood and quantified as, in the absence of mitigating action, the DECC analysis suggests the costs of meeting climate and energy goals could have a negative impact on fuel poverty (under the assumptions made in the 2010 analysis). This was a point that was made in the Fuel Poverty Advisory Group (FPAG) response to the call for evidence. The FPAG response argued that more work was needed in order to fully understand the implications for fuel poor households (who, for example, tend to take greater amounts of the potential bill savings from efficiency measures as comfort) of the move to a low carbon economy.

57. The actual distribution of benefits resulting from the policies will depend on decisions yet to be made, in particular, how the resources from the new Green Deal and Energy Company obligation are split between those more directly benefiting the potentially fuel poor and those aimed more generally at carbon reduction. As well as threatening to increase fuel poverty, a failure to protect low-income households could, insofar as it limits public acceptability of policies that are funded and delivered through energy suppliers, become a barrier to the achievement of climate and energy objectives. Given the significance of these

Figure 2.14: *Estimated impact of policies on an average domestic energy bill as a share of income in 2020, UK*



Source: DIMPSA model (CSE and DECC).
Note: See text for the assumed basis for the distribution of benefits of measures.

objectives, it is important that policies are designed in such a way as to ensure that improvements to the energy efficiency and heating needs of dwellings of those on the lowest incomes can be supported, and the potentially regressive effects shown in Figure 2.14 avoided. This is particularly the case given that this type of household is unlikely to be able to afford to fund improvements without assistance.

Government policies both increase and decrease potential energy bills and these factors impact on income groups in different ways. Products policies should reduce energy costs for all households, having the greatest proportionate effect on low income households. By contrast, the impact of higher prices resulting from the Government's energy and climate change policies will be regressive. The net effect will depend on how the *benefits* of those policies are distributed. DECC analysis on one set of assumptions for this suggests a net cost equivalent to 0.8 percent of income for the poorest fifth of households, but break-even for the richest fifth. Whether this regressive outcome – which would tend to increase fuel poverty – occurs depends on decisions yet to be taken.

2.5 Energy use relative to need

58. We have seen what factors impact on the ability of households to heat their homes. We now turn to energy use behaviour, examining the extent to which observed behaviours of energy use amongst households conform to their notional energy needs (i.e. the amount of energy that a household would require in order to heat their home to an adequate standard as described by the fuel poverty methodology.)[47] First, we examine all household energy use (including energy for heating and non-heating). Then we discuss the evidence on internal temperatures.

Heating and non-heating uses of energy

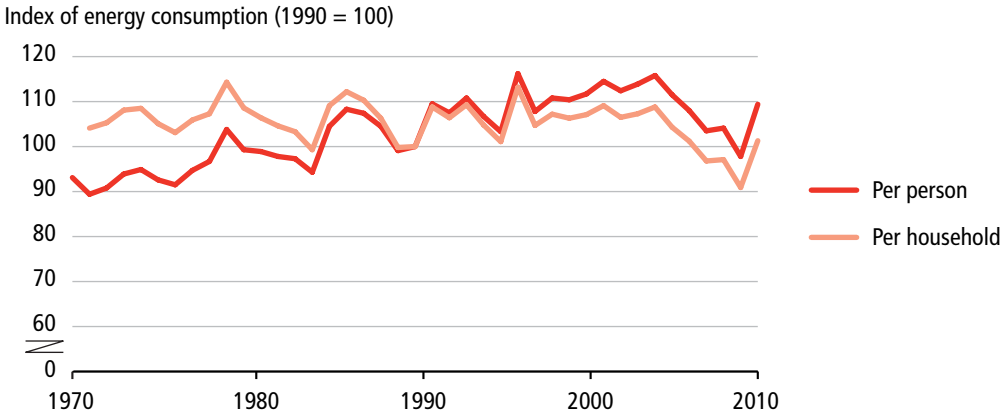
59. Aggregate energy consumption in the domestic sector has increased by about a third since 1970. This has been largely driven by an increase in population, household numbers, real incomes and ownership of electrical appliances. However, as a result of improvements in the average SAP rating of dwellings and in the energy efficiency of appliances, the average energy use *per household* has been more or less static since 1970 (as is shown in Figure 2.15).

60. Table 2.3 uses 2009 data from two sources to examine how patterns of actual energy use compare to energy need as produced by the fuel poverty model. The data show that, on average, the poorest tenth of households consume only around two-thirds of their notional requirement. While the extent of the difference falls as household incomes rise, it is striking that even households in the top half of the income distribution, who are relatively unconstrained in terms of energy use, appear to be consuming significantly less than the level implied by the model underlying the fuel poverty definition. This suggests that the current modelling overstates energy requirements compared

47 Further detail of the fuel poverty methodology – including discussion of the assumed heating regimes – can be found in Chapter 5.

to contemporary behaviour, even of those who are relatively well-off. As the modelling is based on actual spending for non-heating costs, this implies that typical – not just low income – households heat their houses to lower temperatures than the modelling assumes.

Figure 2.15: *Average household energy consumption per person and per household, 1970 – 2010, UK*



Source: Energy Consumption in the UK, 2011 (DECC)

Table 2.3: *Household energy use by gross income groups (unequivalised) – notional versus actual, 2009, England*

Income group	Average annual household energy requirement (£)	Average annual household energy bill (£)	Ratio of actual expenditure to energy requirement (%)
Bottom	1,278	847	66
2	1,262	933	74
3	1,334	984	74
4	1,379	1,067	77
5	1,437	1,116	77
6	1,465	1,148	78
7	1,501	1,220	81
8	1,583	1,279	81
9	1,663	1,388	83
Top	1,900	1,559	82

Source: Fuel poverty data, 2009 (DECC), Living Cost and Food Survey, 2009 (ONS)

61. A focus on average energy use and requirements does, however, hide a very significant level of variability within income groups. One study found that energy consumption varied by as much as six times within the lowest income group.[48] It is clear from Figure 2.16 that, within each group, there are some high-use households that are likely to be consuming energy at a level that is closer to, or even above, the level prescribed by the fuel poverty definition.

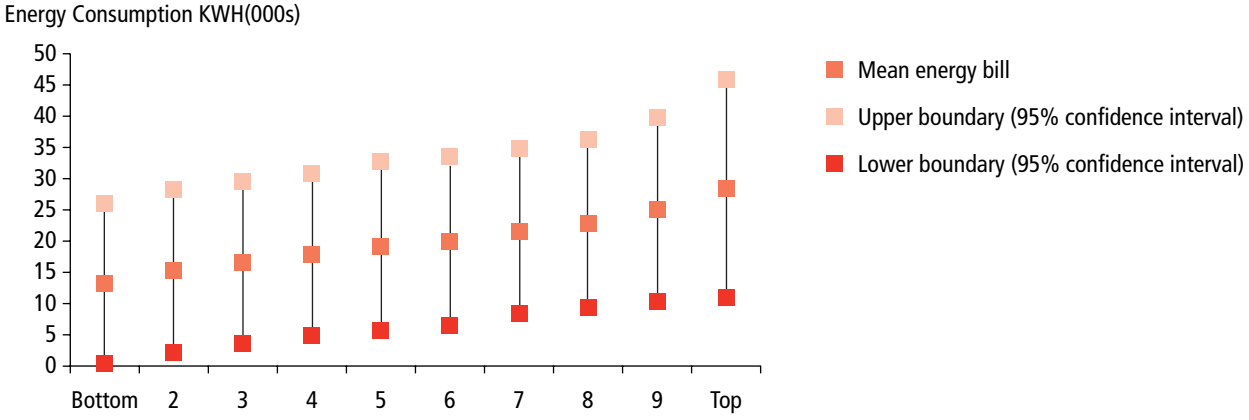
48 Those at the 80th percentile of energy consumption in the lowest (equivalent income) decile group consume nearly six times as much energy as the 20th percentile of the group. See Ekins, P & Dresner, S. (2004). *Green Taxes & Charges: Reducing their impact on low income households*. York: Joseph Rowntree Foundation. Available at: http://www.jrf.org.uk/sites/files/jrf/1859352472.pdf

Internal temperatures

62. Figures published by DECC of modelled 24-hour average internal temperatures[49] suggest that dwellings – even though still cooler than assumed by the modelling – are kept warmer today than in the 1970s (see Figure 2.17). The estimates suggest that the average internal temperature in centrally heated houses increased from around 14°C in 1970 to around 17°C in 2009.

49 Estimates of the average internal temperature is based on a 24 hour average over eight winter months (October to May inclusive). These data are not measured but are obtained from the Cambridge Housing Model, which is based on SAP2009/BREDEM and which estimates achieved internal temperature as a function of detailed descriptions of insulation and heating systems from the English Housing Survey, known energy use from *Digest of UK Energy Statistics*, and heat gains from the sun and internal gains.

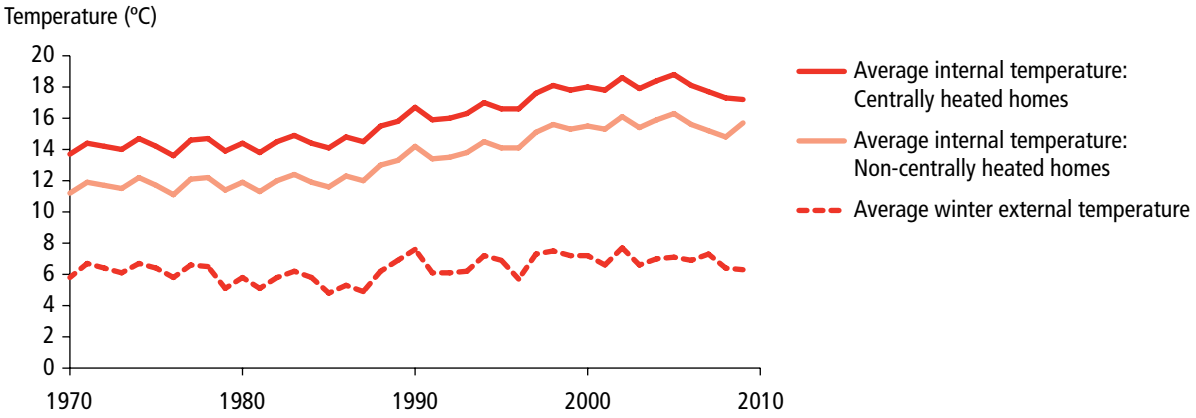
Figure 2.16: *Actual energy consumption by income group, 2010, UK*



Source: DIMPSA 2010 (CSE and DECC).

Note: The upper and lower boundaries in this chart show the 95% confidence interval for this data. In other words, when the energy consumption of every household is taken into account, we would expect 95% of the households to lie within the upper and lower bounds shown.

Figure 2.17: *Modelled 24 hour average indoor and outdoor winter temperatures, 1970 - 2009, UK*



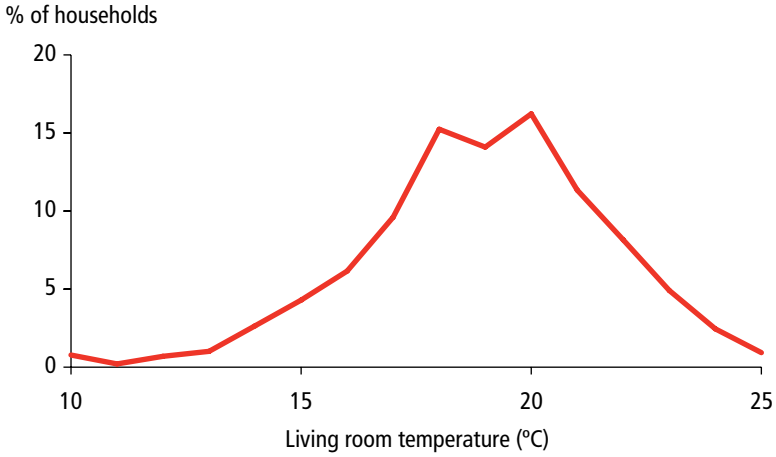
Source: Domestic Energy Fact File, analysis by BRE and Cambridge Architectural Research.

63. There is, unfortunately, limited evidence on *actual* internal temperatures. Data on thermal conditions within households were previously collected as part of the English Household Conditions Survey (EHCS). The 1996 EHCS was the last occasion when the survey included data on internal temperatures (EHCS interviewers measured temperatures in the living room and hall, as well as external temperature readings, during the winter months). It is unhelpful for policy-making in this area that this important indicator is now 15 years out of date.[50]

64. The survey suggested that, on average, households were not heating their homes to the levels that are set out in the SAP and fuel poverty definitions (i.e. 21°C in the living room and 18°C in other occupied rooms). Average reported daytime temperatures were 19.1°C in the living room and 17.9°C in the hall. However, there was a degree of variability around these average figures, with a number of households heating their homes to much higher and lower temperatures (the distributions of living room and hall temperatures are shown in Figures 2.18 and 2.19).

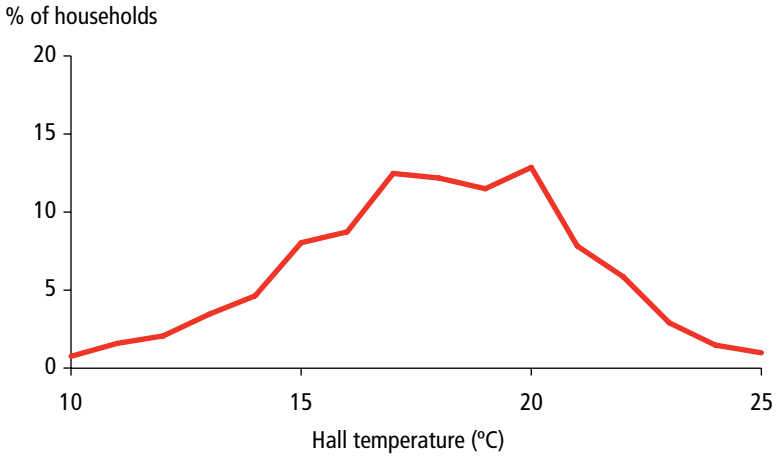
50 For this reason we strongly welcome the ongoing Energy Follow Up Survey. See http://www.decc.gov.uk/en/content/cms/about/science/activities/reductions/reductions.aspx

Figure 2.18: *Distribution of living room temperatures, 1996, England*



Source: English House Condition Survey, 1996 (DCLG)

Figure 2.19: *Distribution of hall temperatures, 1996, England*



Source: English House Condition Survey, 1996 (DCLG)

65. Reports of the temperature data collected under the EHCS have also investigated the relationship between dwelling/household characteristics and internal temperatures. Some of the key results for 1991, published in 1996, are presented in Tables 2.4 and 2.5. The data suggest that average internal temperatures tended to decrease with the age of the dwelling (average living room temperatures were around 1°C lower in pre-1919 dwellings than post-1980 dwellings) and increased with the energy efficiency rating of the home (average living room temperatures for dwellings with a SAP below 30 was 1.1°C lower than dwellings with a SAP above 60).

66. The temperature data also suggest that employment status and household income had an impact on internal temperatures. Household temperatures tended to be lower in households where no adult is employed. Living room temperatures in households in the top income band were on average 0.5°C higher than households in the bottom income band.

Table 2.4: *Average living room and hall temperatures by dwelling characteristics, 1991, England*

	Average living room temperature °C	Average hall temperature °C
Dwelling age		
Pre-1919	18.7	17.2
1919-1944	18.9	17.3
1945-1964	19.1	17.8
1965-1980	19.5	18.5
Post-1980	19.7	19.0
SAP rating		
Less than 30	18.4	16.6
30-40	18.9	17.7
40-50	19.3	18.1
50-60	19.2	18.2
Over 60	19.5	18.4

Source: English Housing Condition Survey, 1996 (DCLG)

Table 2.5: *Average living room and hall temperatures by household characteristics, 1991, England*

	Average living room temperature °C	Average hall temperature °C
Employment of head of household		
Working full time	19.2	18.0
Working part time	18.4	16.8
Unemployed	18.4	16.9
Retired	19.4	18.0
Full time education	18.2	17.5
Other inactive	19.0	17.6
Net income of household		
Under £4,500	18.8	17.2
£4,500 - £8,500	19.1	17.5
£8,500 - £13,500	19.0	17.7
£13,500 - £19,500	19.3	18.0
Over £19,500	19.3	18.4

Source: English Housing Condition Survey, 1996 (DCLG)

67. A further 2001 study – *Cold Comfort*[51] – found low incomes, age of the home, presence of central heating, and heating costs to be significant determinants of how warm a home is, even when other possible influences are taken into account. As Table 2.6 shows the age of the building itself was found to be the most significant individual factor with post-1964 dwellings around 1°C warmer than pre-1960 dwellings. While factors relating to the thermal performance of the home were found to have a greater effect on internal temperatures than income, again a quarter of homes with the lowest heating costs were 1°C warmer.[52] One surprising result was the lack of correlation between cold homes and socio-economic group[53] although income itself was a significant predictor of low indoor temperatures.

68. Another more recent study, based on households that received measures under the Government's Warm Front Scheme, collected living room and bedroom temperature data from households during the winters of 2001/02 and 2002/03[54] This study highlighted the importance of the thermal efficiency on decisions about internal temperature. The data show that internal temperatures were strongly related to household SAP rating and that households tended to 'take-back' some efficiency savings through higher temperatures rather than realising bill savings. The Warm Front study found that, on average, households that received energy efficiency and heating measures through the scheme increased living room temperatures from around 17.9°C to

51 Wilkinson et al. (2001).

52 Energy efficiency, measured by SAP, was not a significant predictor of indoor temperature when included alongside the age of the house, but was individually significant.

53 Socio-economic group was defined by professional status.

54 Households eligible for the Warm front scheme in England.

19.6°C (and increased average bedroom temperature from around 15.9°C to around 18.3°C).

How do people cope with the difficulties of achieving a reasonable standard of thermal comfort?

69. Whether people are heating their homes to the temperature standard set out in the fuel poverty methodology or not, we know that high fuel costs mean that households are faced with difficult trade-offs.

70. Households are faced with a choice:

- To heat their home to their preferred level, and forgo other expenditure in order to do so, or go into debt. There is some evidence of a 'heat or eat' trade-off, but only for the lowest income households. Work by the Institute for Fiscal Studies tested the extent to which there is a 'Heat or Eat' trade-off in the UK.[55] It looked at expenditure data for pensioner households to see how spending on food and energy responded to unexpected temperature shocks. It found that, on average, households in all income groups responded to cold snaps by increasing expenditure on fuel. However, it also found that a reduction in food spending was only observed during the most severe cold weather and amongst the poorest, older households. The reduction in food expenditure is evident only among the poorest quarter of older households when the temperature is more than 2°C colder than would be expected for that time of year. It concluded that the lack of a stronger heat versus eat trade-off

55 Beatty, T., Blow, L & Crossley, T. (2011). *Is there a heat or eat trade off in the UK?* Institute of Fiscal Studies. Available at: http://www.ifs.org.uk/wps/wp1109.pdf

Table 2.6: *Selected significant predictors of indoor temperature*

	Increase in hall temperature (°C) relative to baseline group
Net household income	
Lowest quarter of households	0
2nd quarter	0.08
3rd quarter	0.07
Highest quarter	0.25
Age of building	
Pre - 1900	0
1900 - 44	-0.06
1945 - 64	0.15
1965 - 80	1.08
Post - 1980	1.2
Central heating	
Yes	0
No	-1.13
Minimum standard heating costs	
Quarter of households with lowest costs	0
2nd quarter	-0.57
3rd quarter	-0.72
Quarter of households with highest costs	-1.1

Source: Wilkinson et al. (2001). Based on EHCS, 1996 (DCLG)

Table 2.7: *Standardised indoor temperatures by property and household characteristics*

Household characteristic	Change in living room temperature relative to baseline group (°C)	Change in bedroom temperature relative to baseline group (°C)
Required energy consumption[56]		
Low	0	0
Medium	-0.36	-0.31
High	-1.37	-1.55
SAP rating (quartile)		
≤41 (least efficient)	0	0
42-56	1.27	1.60
57-69	1.59	2.19
≥70 (most efficient)	2.24	2.56
Difficulty paying bills		
No	0	0
Fairly or very difficult	-0.67	-0.52

Source: Adapted from Oreszczyn et al. (2006)[57]

56 Defined as the amount of energy required to keep indoor temperatures constant for a 1°C drop in temperature. 'Low' is defined as 250 Watts, 'Medium' as 250 – 499 Watts, and 'High' as more than 500 Watts.

57 Oreszczyn, T., Ridley, I., Hong, S &Wilkinson, W. *Warm Front Study Group* (2006). *Determinants of Winter Indoor Temperatures in Low Income Households in England*. Energy and Buildings, 38; 245-252.

may have been down to the fact that food and fuel budgets have fallen as a share of expenditure over time (which gives households more scope to absorb an energy price shock) and greater use of direct debit to pay for energy (which tends to smooth energy expenditure over time).

- To turn down or (in extreme cases) turn off their heating. The Centre for Sustainable Energy report *You just have to get by*[58] illustrated these choices which included: heating only one room, turning the heating on for fewer hours than they would have liked, putting on more clothes and in some cases turning the heating off altogether.

71. Chapter 3 considers the impacts of such trade-offs.

58 Anderson, W., White, V. and Finney, A. (2010.) *You Just Have To Get By*. Bristol: Centre for Sustainable Energy. Available at: http://www.cse.org.uk/downloads/file/you_just_have_to_get_by.pdf

Data on actual household energy use suggest that the modelling underlying the fuel poverty definition overstates energy requirements compared to contemporary behaviour, even of those who are relatively well off. Households with the top half of incomes consume a fifth less than the predicted amount. However the shortfall for the poorest tenth of households is a third, suggesting that lack of income is leading to lower temperatures than contemporary norms. It is unhelpful for policy-making that data on actual temperatures inside homes are now 15 years old. That 1991 data showed that those in older dwellings and poorly insulated ones were living at temperatures 1°C cooler than in more recently built and better insulated ones. Households in the poorest income band were living at temperatures 0.5°C below those in the top income band. The poorest pensioner households have been found to reduce food spending during the coldest weather.

Chapter 2 summary

This Chapter has looked at the underlying causes of fuel poverty and who they most affect, as well as energy use. The main findings, summarised in more detail after each section, are:

- Poorer households live in smaller dwellings, reducing potential energy bills. Social housing is also more energy efficient than private housing. Being off the gas grid is a major factor increasing energy costs. Within tenures, energy efficiency (SAP rating) is not strongly linked to income.
- Those on low incomes are least likely to be on the cheapest, direct debit, tariffs. Where customers with prepayment meters have switched supplier following a doorstep sale, almost as many switched to a worse as to a better deal.
- The net effect of government policies on different income groups will depend on how the interventions financed by some of those policies are distributed. On assumptions made by DECC in 2010, the net effect would be a loss on average for low-income households, tending to increase fuel poverty. Whether this actually occurs depends on decisions yet to be taken.
- We do not know what temperatures households are now living at. Data on actual energy use suggest that even better-off households do not live at the temperatures assumed in modelling fuel poverty. However, the poorest tenth of households appear to be living at lower temperatures than contemporary norms.

CHAPTER 3

Impacts of fuel poverty

1. We have seen that, as a reflection of their income and energy costs, different households are faced with different decisions or trade-offs to make. For some, there is considerable flexibility in exercising this choice. For others, circumstances dictate. In the context of fuel poverty, there are two outcomes of concern: either a low income household may have to reduce its energy spending and does not keep adequately warm, or it prioritises energy spending but reduces spending elsewhere, potentially causing other kinds of deprivation. This chapter examines each of these broad impacts in turn. At this stage we examine only the evidence relating to the existence of impacts, rather than impacts of possible interventions aimed at alleviating them. We will consider possible interventions to tackle fuel poverty in our final report.

3.1 Health impacts

2. The vast majority of the evidence of health impacts linked to fuel poverty relates to living at low temperatures. This is not the same as direct health consequences of the interaction between low income and high heating costs, but there is compelling evidence that the drivers of fuel poverty are strongly linked to living in low temperatures.

3. The Marmot Review Team's recent review of the health impacts of living in cold homes provides a comprehensive overview of the evidence linking fuel poverty-related factors to poor physical and mental health, as well as the effect of interventions to mitigate them, at both a national and regional level.[59] The following three sections focus only on national level research on the health implications of low temperatures. Where fuel poverty-related factors give rise to health impacts that are not related to temperature, we summarise the evidence within those sections rather than here.

4. Health outcomes relating to temperature are broad, ranging from readily observable effects, such as mortality, to less immediately discernible mental health problems. Low temperatures create conditions which increase the likelihood of cardiovascular events, resulting in

59 Marmot Review Team. (2011). *The Health Impacts of Cold Homes and Fuel Poverty*. London: Friends of the Earth and the Marmot Review Team. Available at: http://www.marmotreview.org/AssetLibrary/the%20health%20impacts%20of%20cold%20homes%20and%20fuel%20poverty%20-%20marmot%20team%20foe%20-%20may%202011.pdf

poor physical health and in some cases death, particularly for older people[60]. In conjunction with other factors, cold exacerbates the risk of respiratory disease, with similar physical health consequences. Physical discomfort resulting from cold, in addition to anxiety and stress relating to the cost of keeping warm, results in stress that can in turn create mental health issues relating to anxiety and depression.

5. As we saw in Chapter 2 there is a clear link between the drivers of fuel poverty and temperature-related health impacts. Low incomes, high heating costs and poor energy efficiency are strongly associated with cold homes, and low indoor temperatures have a strong effect on the risk of poor health outcomes, particularly mortality. However, low indoor temperatures are not the only reason behind these outcomes. Other housing related factors, such as ventilation, and their interaction with temperature are significant, as are individual attitudes to heating indoors and wrapping up outdoors in winter, and the role of seasonal infections such as influenza. The drivers of fuel poverty are important for only some of these cold-related health impacts and they do not fully explain why these health outcomes occur. However, the evidence is clear that for a number of health impacts fuel poverty has a significant influence on the scale of the problem.

3.2 Cold related morbidity

6. Concern around the links between living at low temperatures and poor physical health has existed for some time, particularly in relation to vulnerable and disadvantaged groups. In conjunction with concerns around housing standards more broadly, the temperature-health link has influenced Government policy, in particular the introduction of the Decent Homes Standard under the previous Government, which includes provision of a "reasonable degree of comfort"[61] and, as discussed in Chapter 1, the Warm Front Scheme.

Links between low temperatures and poor health

7. The evidence indicates that the direct relationship between low temperatures and physical morbidity is complex. Indeed, it is often in conjunction with other compounding factors, such as humidity and levels of clothing insulation, that temperature-related health impacts occur. Nevertheless, there is a body of persuasive evidence that links low temperatures with a number of health impacts, ranging from minor infections to serious medical conditions that can ultimately prove fatal.

8. The strongest evidence relates to perhaps the most serious conditions: cardiovascular and respiratory illnesses. The occurrence of these conditions in relation to temperature is widely quoted as:

   - below 16°C – respiratory problems;
   - below 12°C – circulatory problems; and
   - below 5°C-6°C – risk of hypothermia.[62]

60 The evidence we review largely relates to *low* temperatures. As exceptionally hot weather becomes more common, heat-related health problems – and people's ability to avoid them – will become a growing problem.

61 Department for Communities and Local Government. (2006). *A Decent Home: Definition and Guidance for Implementation*. London: Department of Communities and Local Government. Available at: http://www.communities.gov.uk/documents/housing/pdf/138355.pdf

62 For example see: The Marmot Review Team. (2011).

9. The basis for these thresholds appears to be a comprehensive 1987 World Health Organisation (WHO) report on low temperatures and health, which refers to studies on the physiological effects of low temperatures.[63] The study compared the blood pressure of subjects at different indoor temperatures between 6°C-23°C and found significant increases in the blood pressure of elderly people at indoor temperatures of 6°C, 9°C and 12°C (but not 15°C).

10. Another study[64] found an increase in coronary event rates across Europe corresponding to falls in temperature, though these rates tend to be higher in warmer countries (we explore this further in section 3.3 on excess winter deaths). This is supported by several more recent studies that also found that lower temperatures can lead to thickening of the blood,[65] which, as with increased blood pressure, increases risk of cardiovascular problems.

11. The evidence reviewed in the WHO report on respiratory problems experienced in cold temperatures is less clear cut. Whilst there is evidence suggesting that respiratory problems may begin to occur at temperatures below 16°C, it seems that this is only thought to be a significant problem where levels of relative humidity are not at optimum levels.[66] Humidity is thought to cause a number of different physiological responses detrimental to human health. For example, high humidity may increase the spread of droplet infection and may also be detrimental because of the cooling effect of damp clothing and footwear experienced in colder temperatures. For its part, low humidity may reduce resistance to infections such as colds, by drying out protective oral and nasal mucosa.[67] It would appear, therefore, that it is the interaction between lower temperatures and humidity that increases the risk of respiratory problems.

12. The WHO report also suggests that the effect of low temperatures alone on reducing resistance to infections such as colds and influenza is not clear cut, and that "objective data are lacking of a causal relationship between body chilling and subsequent respiratory illness." Again, humidity levels were found to have a significant impact.

13. The view that it may be the interaction between cold temperatures and other environmental factors that causes respiratory disease is supported by a 2001 study on linking housing characteristics to excess winter deaths.[68] This study found a clearer correlation between low temperatures and mortality related to cardiovascular disease than low temperatures and mortality related to respiratory disease. However, sub-zero outdoor temperatures can impair the

63 Word Health Organisation. (WHO) (1987). *Health Impact of Low Indoor Temperatures: Report on a WHO meeting*. Copenhagen: World Health Organization. Available at: http://tinyurl.com/3ghblbm

64 Barnett,A.G., Dobson, A.J., McElduff, P. Salomaa, V., Kuulasmaa, K. and Sans, S. (2005). Cold periods and coronary events: an analysis of population worldwide. *Journal of Epidemiology of Community Health*. 59, 551-557.

65 For example see: Stout, R.W., Crawford, V.L.S., McDermott, M.J., Rocks, M.J & Morris, T.C.M. (1996). Seasonal Changes in Haemostatic Factors in Young and Elderly Subjects. *Age and Ageing*, 25, 256-258; Keatinge, W.R., Coleshaw, S.R.K., Cotter, F., Mattock, M., Murphy, M. & Chelliah, R. (1984). Increases in platelet and red cell counts, blood viscosity, and arterial pressure during mild surface cooling: factors in mortality from coronary and cerebral thrombosis in winter. *British Medical Journal*, 289, 1405-1408.

66 According to the WHO (1987) report, 20-70% relative humidity levels are "compatible with health."

67 WHO. (1987).

68 Wilkinson, P., Landon, M., Armstrong, B., Stevenson, S., Pattenden, S., McKee, M. & Fletcher, T. (2001). *Cold Comfort: The Social and environmental determinants of excess winter deaths in England, 1986-96*. Bristol: The Policy Press.

functioning of the respiratory system and can exacerbate respiratory illnesses such as bronchitis and exercise-induced asthma in children.[69]

14. A smaller body of evidence suggests that low indoor temperatures are believed to increase the likelihood of accidents in the home, such as trips and falls, as a result of loss of dexterity due to cold-induced muscles seizures. Additionally, cold indoor temperatures are thought to exacerbate pain experienced by arthritis sufferers.[70] However, there appears to be limited clinical evidence available to support a direct causal relationship between low indoor temperatures and these impacts.

15. This review has found limited evidence concerning the specific length of exposure to low temperatures that leads to negative health impacts, aside from that which relates to excess winter deaths, which is explored later in this chapter.

Who is vulnerable to cold related morbidity?

16. In general, the evidence suggests that there are three main groups of people who are most vulnerable to the health impacts of cold homes:

    - elderly people;
    - very young children; and
    - people with a long term sickness or disability.

17. A number of medical studies[71] show that elderly people are at higher risk of raised blood pressure and blood coagulation, both of which, we have seen, can be exacerbated by low temperatures and may lead to cardiovascular events. Further, elderly people tend to lead more sedentary lifestyles and spend more time in the home than younger members of the population. In addition, elderly people may not feel discomfort until temperatures are particularly low because of a deterioration of peripheral temperature perception, which could mean that they sit for longer periods of time in lower temperatures than other adults simply because they are not aware of how cold it is.[72] As with the elderly, those suffering from long term illness or disability are likely to spend more time in the home and lead more sedentary lifestyles. A number of responses to the call for evidence, including from Macmillan Cancer Support, suggested that those suffering long term illness or disability may be at greater risk because of pre-existing conditions (see Box 3.1).

18. In addition to these groups, there is some evidence to suggest that children could be at a higher risk than the general population of detrimental health impacts from living in cold homes. In general, younger children tend to have weaker immune systems than adults and therefore may be more likely to pick up infections and be more susceptible to respiratory problems such as asthma. While the direct influence of cold temperatures on such health impacts is not entirely clear, a 2008 study by the National Centre for Social Research (NatCen) looking at the health and social impacts of three self-reported types of poor housing

69 WHO. (1987).

70 Gilbertson, J., Stevens, M., Stiell, B. & Thorogood, N. (2006). Home is where the hearth is: Grant recipients' views of England's Home Energy Efficiency Scheme (Warm Front). *Social Science and Medicine*, 63, 946-956.

71 Stout et al. (1996), Keatinge et al. (1984).

72 WHO. (1987)

Box 3.1 Vulnerability

Different groups of people are vulnerable to different impacts of fuel poverty. The elderly are particularly vulnerable to health impacts, including excess winter deaths; adolescents may be vulnerable to adverse social impacts, such as anti-social behaviour or relatively poor educational attainment.

People with pre-existing health conditions such as cancer may also be particularly vulnerable to the impacts of low temperatures. Although evidence on this type of vulnerability is more sparse, Macmillan Cancer Support told us that 85 per cent of health care professionals who took part in a survey believed that feeling cold can affect a cancer patient's recovery. Furthermore, the same survey showed that 77 per cent of health workers reported evidence of patients experiencing pain as a result of low temperatures.[73]

As well as being particularly vulnerable to the impacts of fuel poverty, the elderly and those living with long term illness or disability may also be particularly vulnerable to being fuel poor in the first place. This is because they are more likely to have low incomes, and may have greater energy requirements associated with their condition, or because they lead more sedentary lifestyles or spend more time in the home.

We have also heard from a number of stakeholders about the particular vulnerability of rural households to fuel poverty. This is because many rural areas may be off the gas grid and households may live in hard to reach properties which tend to be older and less efficient or hard to treat. Additionally, average incomes tend to be lower, the nature of work available may be seasonal and high travel costs may be incurred as a result of living in a rural area. Some stakeholders commented that the rural fuel poor are more hidden than in other areas because the income domain of the multiple deprivation index captures the proportion of households in receipt of means-tested benefits and the diverse nature of the incomes within rural areas may mask this.

Vulnerability is therefore an issue which cuts across population groups and income groups. This poses a policy delivery dilemma: policies targeted at the vulnerable may suffer reduced effectiveness in terms of tackling fuel poverty; policies targeted at the fuel poor may mean that some vulnerable people are left without support. We expect to consider this issue further in our final report.

on children[74] found that those persistently living in inadequately heated housing or housing in a state of poor repair (including housing with damp or mould) were more than twice as likely to suffer from chest problems, asthma or bronchitis as those who did not live in bad housing.[75]

19. However, further analysis of the same data looking at independent relationships between aspects of bad housing and respiratory health problems found no

73 Macmillan Cancer Support, Survey of Health and Social Care Professionals. (2009). Available at: http://www.macmillan.org.uk/Documents/Aboutus/newsroom/factsheets2011/Fuelpoverty.pdf

74 Inadequately heated accommodation, accommodation in poor state of repair (including the presence of damp or mould) and overcrowded accommodation.

75 Barnes, M., Butt, S. & Tomaszewski, W. (2008). *The Dynamics of Bad Housing: The impacts of bad housing on the living standards on children*. London: National Centre for Social Research.

specific relationship with self-reported inadequate heating.[76] It is not clear whether this is because of a disconnect between self-reported inadequate heating and actual indoor temperatures, or whether temperature alone does not cause respiratory illness. Children who had been exposed to housing in a poor state of repair (including mould or damp) were found to be significantly more likely to report other kinds of poor physical health, but no significant relationship was found with chest or breathing problems. Therefore while children living in self-reported low temperatures and self-reported poor housing conditions are more likely to report respiratory health problems, there is insufficient evidence to attribute this directly to low indoor temperatures or the presence of damp or mould in the home.

How do the drivers of fuel poverty increase the risk of cold related morbidity?

20. We have seen that the relationship between low temperatures and morbidity is complex and that there are important interactions with other factors such as humidity. However, it is clear that low temperatures are an important factor in determining health outcomes, in particular for certain groups of the population.

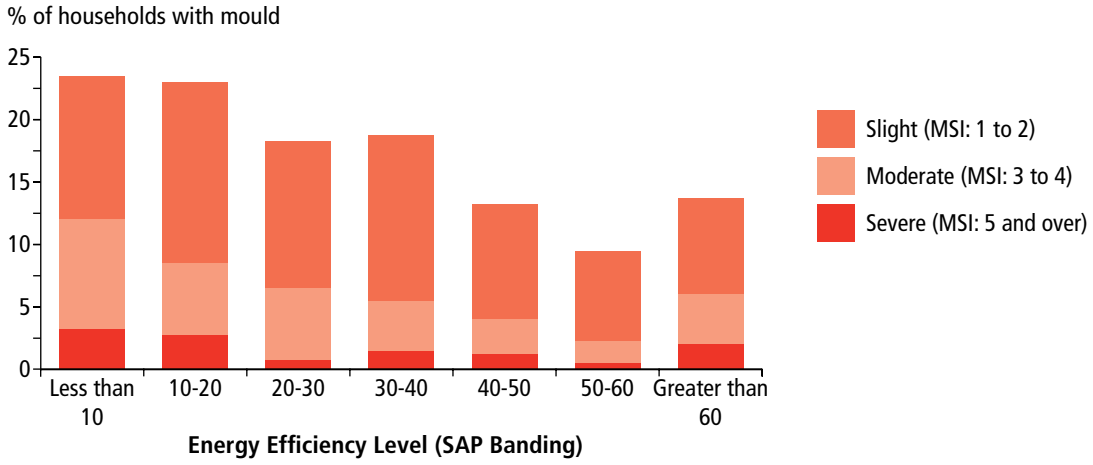
21. We saw in Chapter 2 (section 2.5) that a number of factors directly relating to the drivers of fuel poverty were found to be significant determinants of indoor temperatures. A plausible chain of causation exists therefore from the drivers of fuel poverty to negative health outcomes, in particular cardiovascular events, via low indoor temperatures. The extent to which certain health impacts can be attributed to the drivers of fuel poverty requires further research, but there is currently sufficient evidence to suggest that there is a causal relationship to some degree.

22. The interaction of low temperatures with high humidity levels may also encourage mould and dust mite growth, which can lead to or exacerbate respiratory illnesses such as asthma. The presence of mould is generally more prevalent in less energy efficient homes, with around a quarter of all homes with a SAP rating below 20 reporting some level of mould growth (Figure 3.1). Among Warm Front eligible households, the presence of mould in the dwellings of low-income households was found to be significantly correlated with low energy efficiency, older buildings, self-reported difficulty in paying bills, and relative dissatisfaction with the dwelling's heating system.[77] The quarter of households living in the least energy efficient homes were twice as likely to report mould growth as those living in the most efficient quarter. Similarly, the proportion of households that reported the presence of mould and difficultly in paying their bills was twice that of households reporting the presence of mould and no difficulty in paying bills. This pattern was also found in households dissatisfied with their heating system when compared to those that were satisfied, and in those living in homes built pre-1930 when compared to those built after 1966.

76 Barnes, M., Butt, S. & Tomaszewski, W. (2011). The duration of bad housing and children's well-being in Britain. *Housing Studies*, 26 (1), 155-176.

77 Oreszczyn, T., Ridley, I., Hong, S. H., Wilkinson, P. and Warm Front Study Group. (2006). Mould and winter relative indoor humidity in low income households in England. *Indoor and Built Environment*, 15 (2), 125-135.

Figure 3.1: *Percentage of households with mould, by energy efficiency rating, 1996, England*



Source: EHS 1996, Oreszczyn et al. (2006)

The relationship between low temperatures and physical health impacts is complex, but there is a body of evidence that shows a clear link between the two, while the drivers of fuel poverty are significant factors in determining the temperatures at which individuals live. Exposure to cold temperatures can have negative impacts on health, primarily for older people and the very young. Health impacts caused by exposure to cold tends to relate to cardiovascular and respiratory problems at temperatures below 12°C and 16°C respectively, though respiratory problems occur with other contributory factors, such as where humidity levels are above or below optimum. Low temperatures are also associated with diminished resistance to infections and the incidence of damp and mould in the home, which are associated with respiratory problems. The drivers of fuel poverty are associated with both living at lower temperatures and the presence of mould in the home.

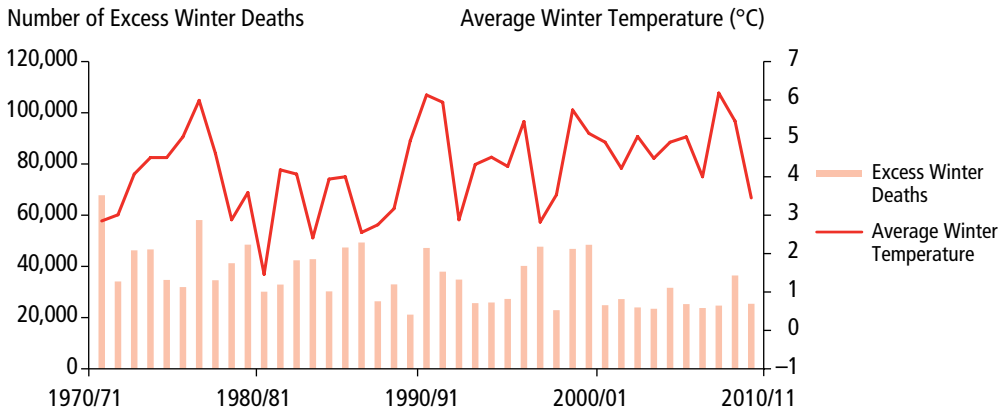
3.3 Excess winter deaths

23. The impact of fuel poverty that has raised the greatest concern is the association with winter deaths. In fact, the association of increased mortality with lower external temperatures has long been established and is officially measured in the form of 'excess winter deaths' (EWDs).[78]

24. The number of EWDs has historically varied widely from year to year (Figure 3.2), but the trend has been slowly declining over recent decades and in the last 10 years variation between years has also reduced. In fact in recent years we have seen lower levels of EWDs than earlier decades.

78 The official Office for National Statistics formula for calculating excess winter deaths compares the number of deaths in winter (November to March) with non-winter periods (preceding August to November; following April to July).

Figure 3.2: *Excess winter deaths and average winter temperatures, 1970/71 – 2009/10, England and Wales*



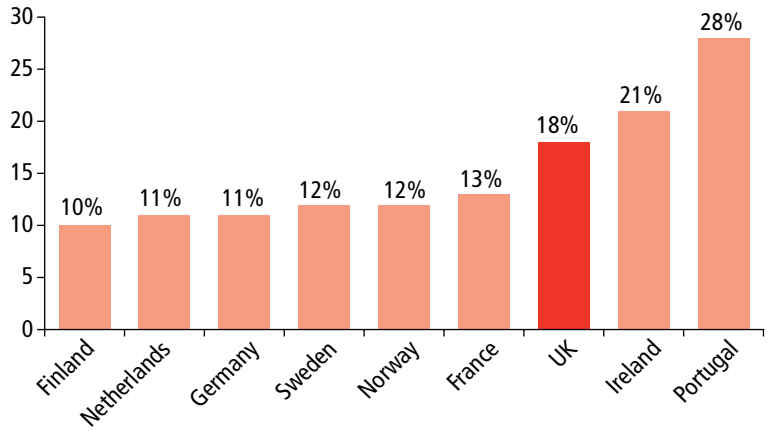
Source: Office for National Statistics (EWDs), the Met Office (temperature)

25. Although the average number of EWDs in England and Wales has fallen from around 40,000 per year in the 1970s to around 27,000 per year in the years since 2000, the latter figure remains significant – more than ten times the number of deaths recorded from transport accidents in 2009.[79]

26. Compared to other western European countries, the UK has a high rate of excess winter mortality. From 1988-1997, on average 18 per cent of the UK's winter deaths were excess, compared to the 10-12 per cent observed in typically colder countries such as Finland, Sweden and Norway (Figure 3.3). In England specifically, the average percentage of winter deaths classed as excess in the 10 years to 2009-2010 remained relatively

79 Office for National Statistics. (2010a). *Death registrations summary tables (Table 1)*. Available: http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-39659. The number of deaths recorded as being caused by transport accidents in 2009 was 2,333.

Figure 3.3: *Average proportion of winter deaths that are excess, 1988-1997, selected European countries*



Source: Drawn based on calculations by Healy (2003)

high at 16.6 per cent.[80] If similar rates were achieved in England as in neighbouring Northern European countries in the 1990s, EWDs in 2009-2010 would have been reduced by 7,000-10,000 cases.

What causes EWDs and who is vulnerable?

27. The primary direct causes of EWDs are circulatory and respiratory diseases.[81] In 2008-2009 (the most recent year for which statistics by cause of EWDs are available) these factors accounted for 73 per cent of cases.[82] Deaths relating to hypothermia, the cause of death directly attributable to cold, are typically low.

28. The largest single group affected by EWDs are the over 65s (Figure 3.4), who have accounted for over 90 per cent of excess deaths in each of the last 20 years.[83] In particular, the over 85s are worst affected, accounting for the largest proportion of EWDs regardless of the primary cause.

29. The evidence suggests that the risk of death in winter is increased due to two main compounding factors: influenza and temperature. The links between lower temperatures and increased susceptibility to circulatory and respiratory illnesses in lower temperatures were outlined in section 3.2, where it was shown that temperature can increase the risk of physical health impacts that can result in EWDs. However, the temperature-mortality relationship is not straightforward and EWDs are not purely a result of low temperatures. In years with low average winter temperatures there is not always the rise in EWDs that might be

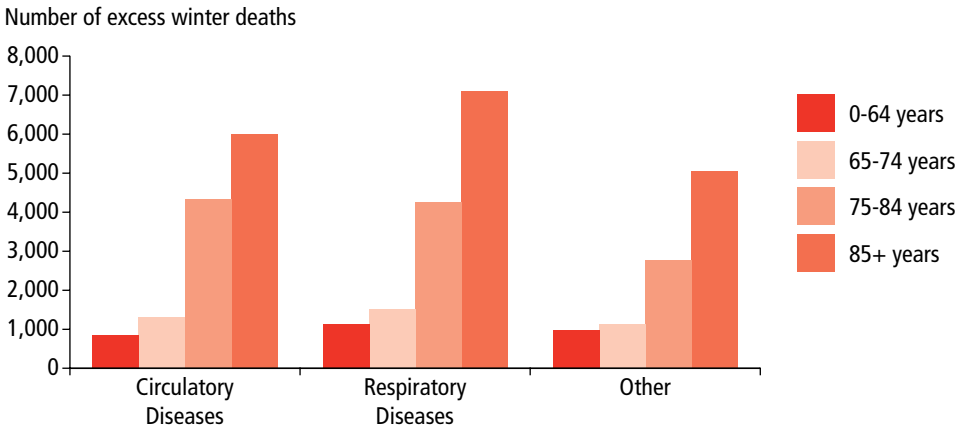
80 Own calculations based on Office for National Statistics. (2010b). *Excess winter mortality by Age and Region*. Available: http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-47566

81 This is suggested by a number of studies, including Wilkinson et al. (2001; 2004), Aylin et al. (2003), and Hajat et al. (2006).

82 Own calculations based on Office for National Statistics. (2010c). *Excess winter mortality in England and Wales, 2009/10 (provisional) and 2008/09 (final).* Available: http://www.statistics.gov.uk/pdfdir/deaths1110.pdf

83 Own calculations based on Office for National Statistics. (2010b).

Figure 3.4: *Number of excess winter deaths by cause and age group 2008/09, England and Wales*



Source: Office for National Statistics, 2010

expected. Indeed the opposite is also true for a number of years with mild winters without significant falls in EWDs.

30. Part of the reason for this is that EWDs appear to be related more to the number of very cold days people are exposed to, rather than the average temperature throughout the winter period. The Eurowinter Group compared two regions with similar average winter temperatures – London and a group of cities in Northern Italy – and observed that from 1988-1992 London experienced over 115 days below 18ºC more than Northern Italy.[84] London also experienced four times as many EWDs on days where the temperature dropped below 18ºC over the same time period. This indicates that despite having similar average winter temperatures, London had a higher number of cold days, and more EWDs for each of those cold days experienced.

31. The other reason for this apparent lack of correlation between average temperatures and EWDs is the role of influenza. For older people, the risk of death varies from month to month throughout each year, but when the role of influenza is taken into account, this monthly variation in death risk is reduced by around 25 per cent.[85] When low temperatures are also taken into account, the reduction in risk of seasonal mortality is even greater at around 70 per cent. This implies that most of the seasonal changes in death risk seem to be related to cold, with influenza and other risk factors bearing a smaller influence.

32. The independent effect of temperature on cardiovascular-related excess winter deaths is evident: cardiovascular deaths begin to rise as maximum daily outdoor temperatures drop below 20ºC, with higher than expected deaths occurring at lower temperatures (Figure 3.5). The direct link between temperature and EWDs from respiratory illness is less clear. This suggests that the winter rise in respiratory death is more a consequence of respiratory infection being affected indirectly, rather than directly, by temperature.[86]

33. While we can be clear that temperature appears to be the most significant single factor influencing the number of EWDs, the relative importance of indoor temperatures, outdoor temperatures and how households behave, are more difficult to establish. It has been estimated that mortality increases by around 2 per cent for every 1ºC fall in outdoor temperature below 19 ºC.[87] The Eurowinter Group, combining information on characteristics of both dwellings and household behaviour (both indoors *and* outdoors), found that for every 1ºC fall in living room temperature the number of deaths increased by 0.3 per cent when outdoor temperatures were 7ºC.[88] They also found significant effects independently for the level of heating in the home, the thermal properties of clothing worn and type of activity undertaken when outdoors in cold temperatures. This suggests that while indoor temperatures are a significant factor in determining the level of excess winter death, they are only part of the explanation and behaviour out of the home is also important. Wearing items such as hats, anoraks and gloves and undertaking

84 The Eurowinter Group (1997). Cold exposure and winter mortality from ischaemic heart disease, cerebrovascular disease, respiratory disease, and all causes in Warm and Cold regions of Europe. *The lancet*, 349, 1341-46.

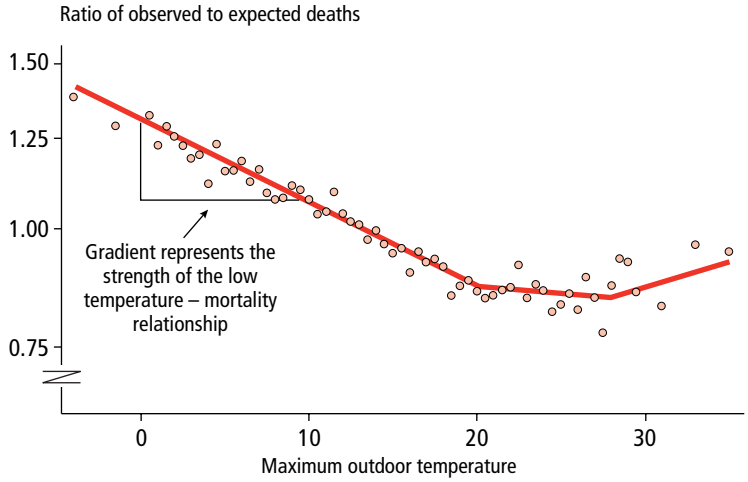
85 Wilkinson, P., Pattenden, S., Armstrong, B., Fletcher, A., Kovats, S. R., Mangtani, P. & McMichael, A. J. (2004). Vulnerability to winter mortality in elderly people in Britain: population based study. *British Medical Journal*, 329 (7467), 647-653.

86 Wilkinson et al. (2001).

87 Wilkinson et al. (2001).

88 The Eurowinter Group. (1997).

Figure 3.5: *The relationship between daily maximum temperatures and risk of mortality in England, 1986 – 1996*[91]



Source: Wilkinson et al (2001)

Note: The red dots represent the risk of death at maximum daily outdoor temperatures relative to the annual average.

outdoor exercise may significantly reduce mortality risk too.

34. The relative importance of indoor and outdoor temperatures is further complicated by correlations between behaviours that reduce the risk of winter mortality both inside and outside the home. The Eurowinter Group found that:

    - households with warm living rooms were also more likely to have warm bedrooms; and
    - people living in warmer households were also more likely to wear warm clothing when going outdoors in low temperatures.

35. Expert opinion submitted to the review[89] has suggested that it is reasonable to assume that internal and external temperatures each account for around half of temperature related excess winter mortality, which is consistent with a broader consensus established at a WHO expert meeting in 2006.[90] It does however remain difficult to assess the precise extent to which excess deaths are attributable to outdoor and indoor temperatures.

36. There is surprisingly little evidence to suggest that the existence of pre-existing medical conditions increases the risk of winter mortality. To our knowledge only one study has examined their role and this was able to investigate only a limited number of pre-existing illnesses. Existing respiratory conditions were found to increase the risk of death from cardiovascular illness, although the physiological link between the two was unclear. No link was found between EWDs and pre-existing cardiovascular conditions, smoking and frailty.[91]

89 Professor Paul Wilkinson speaking at the academic symposium on 24 May 2011 and Professor Christine Liddell speaking at the stakeholder workshop held on 18 July 2011.

90 WHO Office for Europe. (2006). *Housing, Energy and Thermal Comfort*. Available: http://www.euro.who.int/__data/assets/pdf_file/0008/97091/E89887.pdf

91 Wilkinson et al. (2004).

How do the drivers of fuel poverty increase the risk of cold-related deaths?

37. Chapter 2 set out the drivers of fuel poverty found by Wilkinson and others[92] to be significant predictors of low indoor temperatures. The same study also found that the coldest 25 per cent of homes have a notably higher risk of death than the warmest 25 per cent of homes (Figure 3.6), establishing a potentially causal pathway from the drivers of fuel poverty (low income, high fuel costs and poor energy efficiency), to low temperatures, and to a significant proportion of excess winter deaths in England. Further, analysis recently undertaken by the Marmot Review Team based on this data attributed about a fifth (21.5 per cent) of the total number of EWDs to the coldest quarter of housing from 1986 -1996.[93] Given that the evidence suggests that not all EWDs are a result of low indoor temperatures (i.e. related to housing) – a figure of around 50 per cent has been suggested – for the coldest quarter of homes to be attributed around a fifth of all EWDs would suggest that the coldest homes are responsible for a disproportionately high number of excess winter deaths. Not all of these deaths will be a result of the drivers of fuel poverty as some homes will be cold for other reasons. But even if only half of them were fuel poverty related, that would mean a tenth of all excess winter deaths. At the rates of the last ten years, that would mean 2,700 or more deaths a year, more than the number of transport-related deaths.

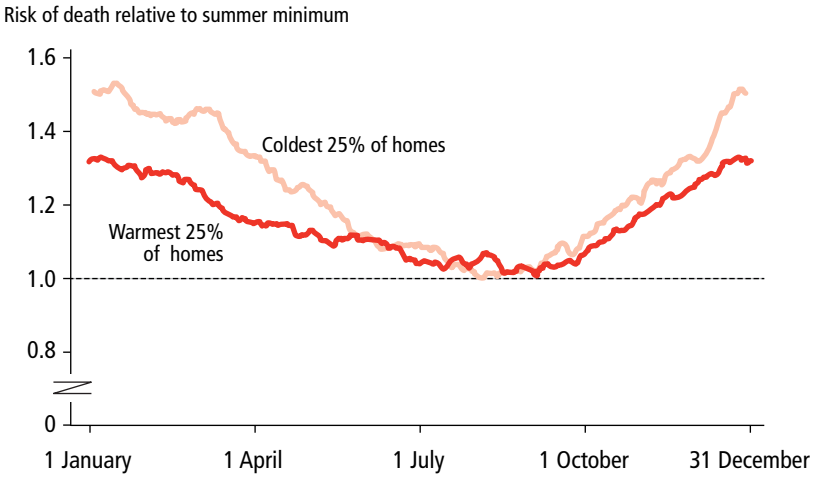
38. Further to this, as explored earlier in this chapter, beyond each premature death there will be many more health-related incidents and associated costs to the NHS. For example, Christine Liddell estimates that for every £1 spent on energy efficiency measures, the NHS makes a saving of 42p.[94]

92 Wilkinson et al. (2001).

93 The Marmot Review Team. (2011). This is the number of EWDs observed in the coldest quarter of homes, over and above the number observed in the warmest quarter, expressed as a proportion of all EWDs.

94 Liddell, C. (2008). *The Impact of Fuel Poverty on Children*. Belfast: Save the Children.

Figure 3.6: *Seasonal fluctuation in mortality in cold and warm homes in England, 1986 – 1996*



Source: Wilkinson et al (2001)

The UK has a higher rate of excess winter deaths than other countries with colder climates such as Finland, Sweden and Norway. While the average number of excess winter deaths per winter in England and Wales has fallen from around 40,000 in the 1970s to around 27,000 in the last decade, this remains a significant number – comparable to more than ten times the number of transport-related deaths in 2009. A number of factors can influence the risk of death in winter, influenza in particular, but the evidence suggests that low temperatures are the biggest single cause of excess deaths. There is clear evidence of an increased risk of cardiovascular-related death following days when the maximum outdoor temperature falls below 20°C (the average temperatures on these days will have been lower). Low indoor temperatures appear to be only part of the explanation, however. Behaviour and the warmth of clothing worn when outside in low temperatures also have an effect. Expert opinion suggests that around half of excess winter deaths may be attributable to indoor temperatures and half to outdoor temperatures. Recent analysis attributes about a fifth of excess winter deaths to living in cold homes. Even if only half of this in 2009 is due to fuel poverty, that would still mean 2,700 deaths – more than die on the roads – every year. Each of these deaths will be associated with a much greater number of non-fatal health conditions and subsequent demands on the NHS.

3.4 Mental health impacts

39. The health impacts of living in cold homes are not confined to physical ones. A number of recent studies make a convincing case for a link between living at low temperatures and mental well-being in adults.

40. The majority of the studies reviewed here rely on surveys that do not contain temperature records or energy bill information for the homes of the respondents. As a result, most of the findings are based on links between subjective measures of whether a home is inadequately heated or costly to heat and indicators of mental health status

(see Chapter 6 for an illustration of the difference between subjective measures of fuel poverty and the current definition). While this may mean that the conclusions drawn here are not necessarily directly comparable with the temperature-related physical health impacts reviewed in the previous two sections, it can be argued that a householder's perception of how cold their home may be is the appropriate measure when it relates to the effect it has on their mental well-being.

What types of mental health issues are related to living in cold homes? Who is affected?

41. The most convincing evidence links issues associated with living in cold homes with three broad mental health-related outcomes, two direct and one indirect:

    - Discomfort and stress – living at low levels of thermal comfort causes householders physical discomfort directly, which can be emotionally distressing, reducing the level of the household's well-being and potentially leading to wider mental health issues;

    - Common mental disorders (CMD)[95] – factors related to cold temperatures could, in part, directly contribute to the occurrence of common mental disorders. Further, households where a mental disorder was diagnosed may also be more exposed to risks related to physical health impacts, including mould and low indoor temperatures; and

    - Indirect mental health impacts relating to social problems – inadequately heated homes can give rise to a range of issues associated with negative social consequences for children, such as poor educational attainment and truancy, which may have potential knock-on effects for mental health. Given this overlap with wider social consequences, these issues are reviewed in the next section.

42. Whilst there is strong evidence of a direct link between poor mental health and living in a cold home for adults, we have not seen evidence in relation to the mental health of children specifically. This is unsurprising as the data used in the studies reviewed are typically based on household surveys, where the respondent is almost exclusively an adult. Within this adult group the data do not allow us to compare outcomes across household types. This is not to say that children do not suffer mental health impacts relating to cold homes, but emphasises gaps in survey data.

43. The evaluation of Warm Front in England found that high stress levels were significantly correlated with low levels of thermal comfort in the home (Figure 3.7).[96] This was found to still be the case for those reporting that their home was "much too cool", even when a range of household characteristics that might affect temperature perception, such as age, tenure, area and whether the survey was taken in winter, were taken into account. Households who reported that their bedroom and/or living room were "much too cool" were almost twice as

95 The term common mental disorder encompasses a number of conditions relating linked mainly to anxiety and depression. For an overview see Harris, J., Hall, J., Meltzer, H., Jenkins, R., Oreszczyn, T. & McManus, S. (2010). *Health, mental health and housing conditions in England*. p. 44 London: National Centre for Social Research. Available: http://www.natcen.ac.uk/media/660077/health-mental-health-and-housing-conditions-in-england.pdf

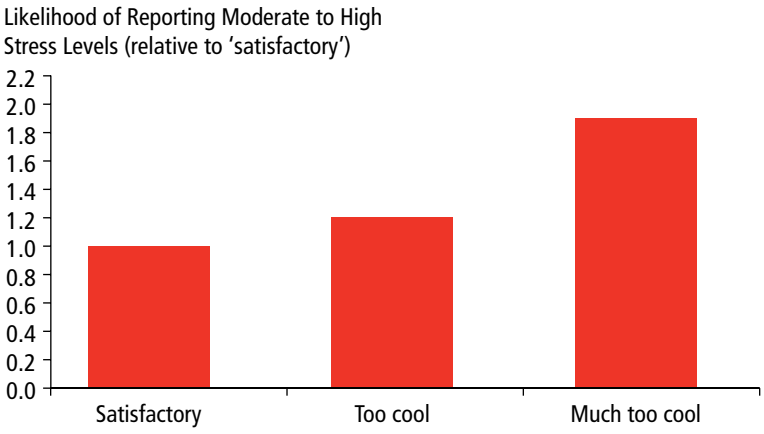
96 Green, G. & Gilbertson, J. (2008). *Warm Front, Better Health: Health Impact Evaluation of the Warm Front Scheme*. Sheffield: Centre for Regional, Economic and Social Research. Available at: http://www.shu.ac.uk/_assets/pdf/cresr-WF_final+Nav(2).pdf

likely to self-report high or moderate stress levels. The association between stress and recorded temperatures was found to be less strong than that between stress and self-reported comfort levels, which suggests that perception of cold may be more important than actual temperatures in terms of mental health effects.

44. Stress was also found to be the strongest predictor of poor mental health. Compared to households reporting "no stress", those with high stress levels (resulting from all possible factors, not just cold) were around 25 times more likely to report suffering from anxiety or depression and around 21 times more likely to report psychological distress.

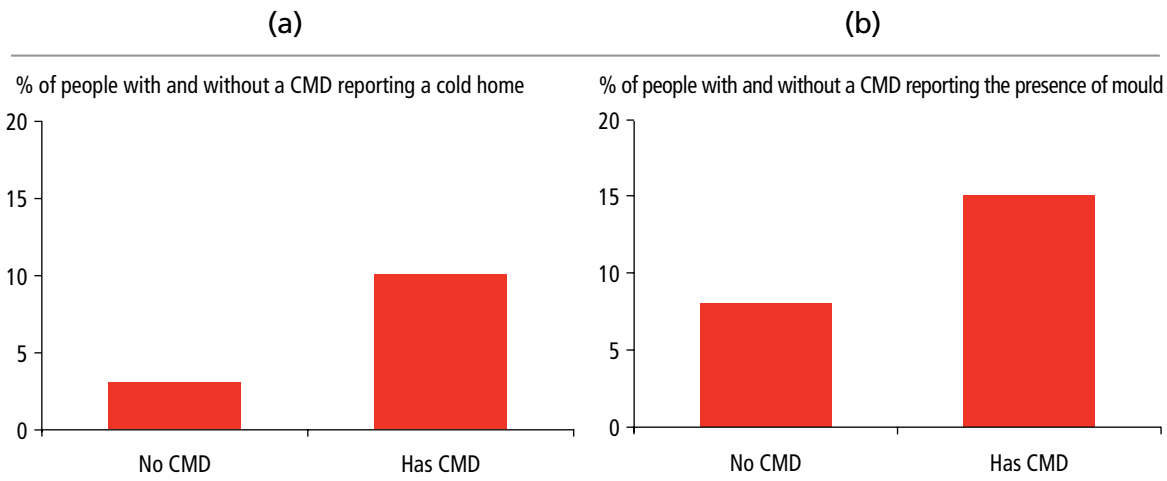
45. The incidence of self-reported cold homes has been shown to be more than twice as prevalent in households where an occupant suffers from a common mental disorder than in homes where no disorder is reported (Figure 3.8(a)). This indicates a clear association between under-heated homes and mental disorders. The same study found that households in which an occupant suffered from a common mental disorder were also around twice as likely to report the presence of mould in their homes (Figure 3.8 (b)), which can increase the risk of respiratory illness and further compound the risk of negative health consequences from living in a cold home (see section 3.2 above on cold-related morbidity).

Figure 3.7: *The relationship between perceived low temperatures and reported stress in Warm Front eligible households, 2001/02–2002/03, England*



Source: Green and Gilbertson (2008)

Figure 3.8: *Association of common mental disorders (CMD) with (a) self-reported cold homes, and (b) presence of mould in the home, 2007, England*



Source: Harris et al (2010)

46. When a number of other factors that may affect the occurrence of mental problems were accounted for, cold homes and the presence of mould were found to be significant influences on whether an individual suffers from a common mental disorder (Figure 3.9), suggesting a direct relationship between the presence of mental health issues and cold or damp homes.

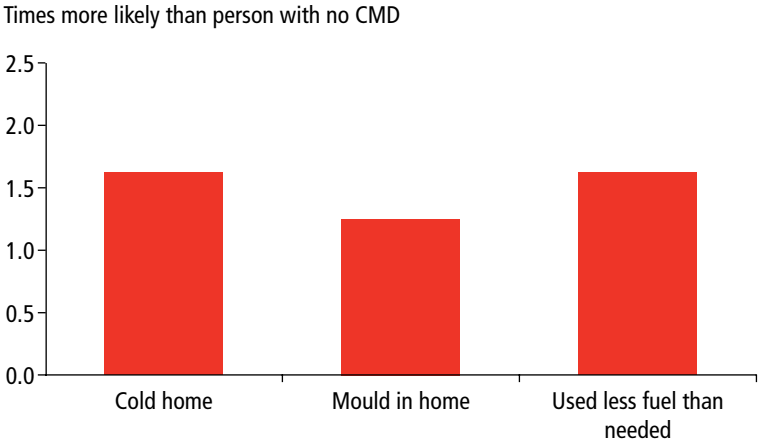
47. While there is clearly an independent relationship between self-reported cold homes and mental health problems, it is not definitively clear whether low indoor temperatures cause an increased risk of common mental disorder, as it is also possible that having a mental disorder may directly or indirectly increase the risk of living in a cold home.

How are the drivers of fuel poverty related to poor mental health outcomes?

48. The significance of characteristics such as income, age, energy efficiency of a dwelling and heating costs in predicting low indoor temperatures was established in Chapter 2. While a causal chain from the drivers of fuel poverty to poor mental health outcomes cannot be directly established on the current evidence, their strong association is clear.

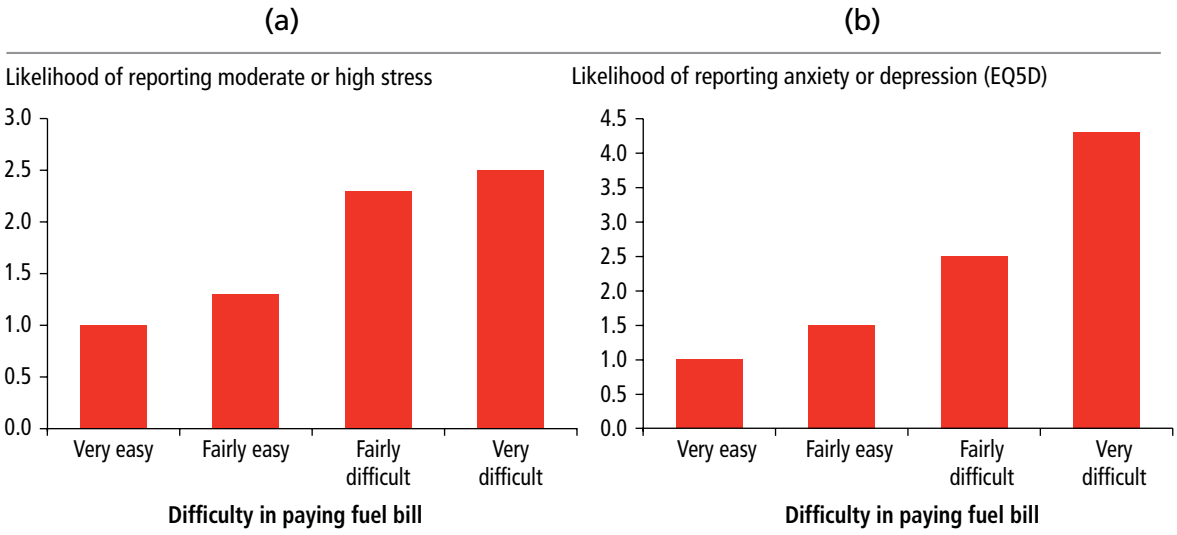
49. Difficulty in paying household energy bills is one possible effect of the overlap between the drivers of fuel poverty and has been found to be correlated with stress and anxiety or depression. Warm Front-eligible households struggling to pay their fuel bills were found to be around 2.5 times more likely to report moderate or high stress levels than those who reported being able to pay without difficulty (Figure 3.10(a)). An even greater difference was found between the same groups in terms of how likely they were to report anxiety or depression (Figure 3.10(b)). Further, the prevalence of being unable to meet the desired level of heating fuel use was observed to be twice as great in homes where a common mental disorder has been reported than those households without (Figure 3.11).

Figure 3.9: *Relationships between cold homes, presence of mould and level of fuel use with the occurrence of common mental disorders (CMD), 2007, England*



Source: Harris et al (2010)

Figure 3.10: *The relationship between difficulty in paying fuel bills with (a) self-reported stress levels, and (b) self-reported anxiety or depression, 2007, England*



Source: Green and Gilbertson (2008)

50. The link between low temperatures and mental health indicators reviewed in this section suggests that there is a strong relationship between the drivers of fuel poverty and poor mental health outcomes. The health impacts of cold homes and their underlying causes therefore go beyond cold related morbidity and mortality, and mental health impacts should be considered a separate problem relating to the drivers of fuel poverty.

There is clear evidence of a link between low temperatures and poor mental health outcomes. Those households that report living at low temperatures are more likely to be stressed, and high stress levels increase the risk of anxiety and depression. Living at low temperatures has been shown to have an independent and significant relationship with the prevalence of common mental disorders. Self-reported under-consumption of heating fuel and the prevalence of mould have also been found to have independent relationships with poor mental health outcomes. Overall this indicates that low temperatures and the underlying drivers of fuel poverty are directly linked to mental health, although the direction of causation is unclear.

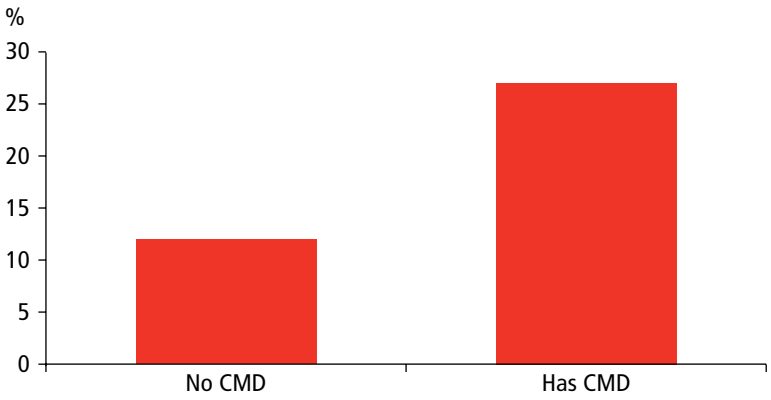
3.5 Social impacts

51. Concern around the impacts of fuel poverty extends beyond those related to physical and mental health. The 2001 UK Fuel Poverty Strategy[97] identified a number of wider social impacts that living in a cold home may cause for both adults and children. Such impacts were also highlighted in some responses to the review's call for evidence. Few studies have investigated this relationship, particularly at a national level, but those that have, do indeed suggest a link, although the extent to which cold homes cause negative social outcomes remains unclear.

52. As with the relationship between cold homes and mental health, the evidence collected by this review in relation to social impacts relies on subjective data. This means perceived experience of adverse impacts and living at low temperatures is self-reported. While this may be appropriate, given that a number of social outcomes such as social isolation are subjective by nature, the findings may not be directly comparable to the objective findings in relation to physical health impacts. In addition, it is difficult to establish a causal relationship between low indoor temperatures and perceived social impacts in a number of instances where results are reported for generally low income households. This is because the impacts as a result of low temperatures are not isolated from other factors that

97 Department for Trade and Industry and Department for Environment, Food and Rural Affairs. (2001). *The UK Fuel Poverty Strategy*. Available at: http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/addressing%20fuel%20poverty/strategy/file16495.pdf

Figure 3.11: *The proportion of households reporting less than required fuel use in households with and without the presence of a common mental disorder, 2007, England*



Source: Harris et al (2010)

Box 3.2: Excerpt from interview

"I suffer with low blood pressure. So at the moment because I am cold and I don't feel too good anyway, I tend to sort of dip further and further into it, further and further down, and I get to the point where I just turn off the buzzer for downstairs for people to get in, so if they come round – ah, forget it I don't want anyone to come round. So I shut myself away."

Source: Anderson et al (2010)

could affect social outcomes, which makes it difficult to establish whether the impacts are due to living in cold homes or, rather, are symptomatic of income poverty more generally.

53. The UK Fuel Poverty Strategy highlighted social isolation (for example, the fuel poor may not be able to afford to socialise or may be reluctant to invite friends or family to their homes) as a core social impact associated with cold homes. Indeed, in its response to the review's call for evidence, Age UK highlighted the impact of social isolation and exclusion on the elderly, which diminishes the "quality of life and self-confidence of our older population". One may naturally associate social isolation with poverty more widely, in that those who lack the means to undertake certain social activities may suffer adverse consequences as a result. There are, however, some persuasive arguments as to why social isolation could be related to cold homes rather than solely to a lack of money.

54. A study[99] carried out by the Centre for Sustainable Energy (CSE) and the University of Bristol found evidence of a significant number of low-income households resorting to methods of coping with low temperatures that restricted social interaction. However, one limitation with regard to this evidence (in addition to those around measuring subjective judgements), is that those interviewed were income poor rather than necessarily fuel poor, which makes it more difficult to separate out impacts of fuel poverty and those related to income poverty.

55. Households interviewed reported that in the winter they would try to avoid leaving the house and getting cold, because they knew they would find it difficult to warm up again once they returned home. However, this does not appear to lead to social activities occurring within the home instead: 26 per cent of those reporting that their home was "much colder" than desired also reported that they did not feel able to invite friends or family to their home.[100] Conversely, other households tried to avoid spending time in the home if it was cold, with 15 per cent of those living in a home that was "a bit colder" or "much colder" than they would like reporting that they spent as much time as possible away from home.[101]

98 Macmillan Cancer Support, Survey of Health and Social Care Professionals. (2009). Available at: http://www.macmillan.org.uk/Documents/Aboutus/newsroom/factsheets2011/Fuelpoverty.pdf

99 Anderson, W., Finney, A. and White, V. (2010). *"You just have to get by": Coping with low incomes and cold homes*. Bristol: Centre for Sustainable Energy. Available at: http://www.cse.org.uk/downloads/file/you_just_have_to_get_by.pdf

100 Anderson et al. (2010)

101 Anderson et al. (2010)

56. As well as this, households cutting back on energy use in order to make ends meet employed other means by which to preserve warmth in their homes, such as going to bed early or closing curtains during the day.[102]

57. While this review has found some evidence around social impacts on adults, it does not disaggregate between different social groups and so we cannot make a reliable judgement about which groups are most at risk. On the other hand, there is evidence to suggest some specific impacts on children and adolescents.

58. There is evidence of an *association* between a number of adverse social impacts on adolescents and inadequate levels of heating. A NatCen study found that 13 per cent of secondary school children who had lived in persistently inadequately heated homes had been truant from school in the past year, compared to 3 per cent of children who did not live in bad housing.[103] 10 per cent had no quiet place to do their homework, compared to 4 per cent who did not live in bad housing, and 10 per cent had been expelled or suspended from school, compared to 3 percent of the children who did not live in bad housing.

59. However, as with mental health impacts of self-reported inadequate heating, when further analysis was undertaken to assess the independent relationships with adverse social outcomes, no significant relationships of interest were found.[104] It is not clear whether this is because of a disconnect between self-reported and actual indoor temperatures, or whether low temperatures alone are not enough to cause these impacts.

60. There is therefore some suggestion of an association between inadequate heating and adverse social outcomes for children, but, we are unable to observe the relationship with actual indoor temperatures. Further, the current absence of appropriate longitudinal studies means that it is not possible to assess the long term impact on children's lives from negative social outcomes as a youngster, which may be wide ranging and vary in degrees of severity in adulthood.

Measurement of adverse social outcomes of living in cold homes is complex due to the subjective nature of the experience of these impacts in comparison to more objective health impacts. There is evidence of an association between cold homes and negative social impacts such as social isolation amongst adults and certain problems for adolescents, although there is currently insufficient evidence to link these *directly* to cold homes or the drivers of fuel poverty.

102 Anderson et al. (2010)

103 Barnes et al. (2008).

104 Barnes et al. (2011).

3.6 How warm should our homes be?

61. The analysis of fuel poverty impacts in this chapter so far highlights a demonstrable link between low temperatures – often combined with other factors such as humidity and behaviour – and a range of negative health and social consequences. As a principle, ensuring that internal temperatures do not drop below given temperature thresholds is desirable in order to reduce or even eliminate adverse consequences linked to cold. A key issue is determining what the level of this threshold should be.

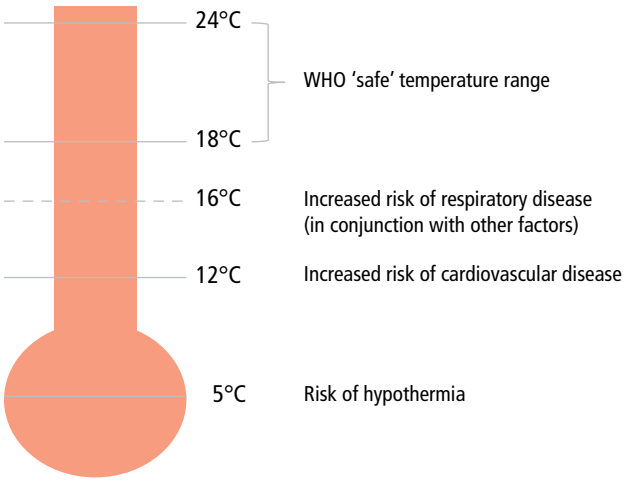
62. The 2001 UK Fuel Poverty Strategy[105] set out a standard of adequate thermal comfort based on internal temperatures at which it is considered that most people will not be at risk of suffering adverse health impacts. These were specified as 21°C in one main living area and 18°C in all other areas of the home for 9 or 16 hours a day, depending on the amount of time spent in the home.

63. Many, including amongst those submitting evidence to the review, believe that these temperature standards have been laid down by the World Health Organisation (WHO). In fact, they draw on the results of a comprehensive 1987 WHO report on low temperatures and health, which did not recommend an ideal temperature at which the general population would suffer no detrimental health impact. Rather, the report concluded that the evidence suggests that there is "no demonstrable risk of harm" within a temperature range of 18°C-24°C, but that infants, the elderly, sick and disabled may be particularly affected by low temperatures. As such, the report said that the homes of people within these groups should be heated (or be capable of being heated) 2°C-3°C higher than those of healthy adults.[106] It went on to state that evidence relating

105 DTI and Defra. (2001).

106 WHO. (1987). *Health Impact of Low Indoor Temperatures*. Available at: http://www.theclaymoreproject.com/uploads/associate/365/file/Health%20Documents/WHO%20-%20health%20impact%20of%20low%20indoor%20temperatures%20(WHO,%201985).pdf

Figure 3.12: *Suggested temperatures at which detrimental health impacts occur*



Source: Compiled by the Review using various sources, (see preceding section on cold related morbidity)

to an optimum indoor temperature for the general population proved largely inconclusive and noted the interactions between temperature and humidity in determining safe internal environments.

64. Evidence linking housing, temperature and thermal comfort was revisited by the WHO in 2007.[107] The review ultimately drew broadly similar conclusions and recommended that it would be beneficial to undertake further work on the scientific validity of the existing temperature recommendations and exposure to cold, particularly for specific rooms in the home.

65. In conclusion, it has not been possible to identify from the evidence collected during the review the specific source or rationale for selecting what is often referred to as the optimum indoor temperature of 21°C, although its origin may well be that it is the midpoint of the WHO's range of safe temperatures.

66. The evidence is also inconclusive in relation to a minimum indoor temperature standard, which is reflected in differences between temperature standards in recommendations used by different organisations for different purposes. For instance the Health and Safety Executive's Approved Code of Practice recommends that 16°C should be the minimum indoor temperature in places of work, where the nature of the work is sedentary.[108] This is the temperature at which evidence explored earlier in this chapter indicates that risks to health can begin to increase in combination with other environmental factors.

67. Considering actual household behaviour rather than recommended temperatures, we saw in Chapter 2 that on average people in England tend to heat their homes to temperatures towards the lower end of the WHO range. Indoor temperatures have not been surveyed on a nationally representative scale since 1996. However, data from the 1980s and 1990s show that when outdoor temperatures are 5°C, households tended to heat their homes to 17°C-19°C , on average.[109] This was found to be true even for those who would not be expected to be constrained by income or by energy efficiency levels of their homes. This finding re-emphasises the suggestion highlighted in Table 2.3 in Chapter 2 on actual compared to notional spend by income decile group that households that are not financially constrained on average do not choose to achieve the temperature standards set out in the current fuel poverty methodology. The same appears to be true for low-income households even in thermally efficient homes. Households that had received packages of heating and insulation measures under Warm Front in England were observed to heat living rooms to 19.6°C and bedrooms to 18.3°C on average.[110] These same households reported comfortable living room temperatures of 19.2°C on average, although there was a wide range of variation around this figure.

68. The evidence reviewed earlier in this chapter indicates that significant risks to physical health for the general population tend to occur at temperatures below 16°C, at which point the risk of respiratory illness is thought to increase, with a further increase in risk of circulatory illness at

107 WHO. (2007). *Housing, Energy and Thermal Comfort: A review of 10 countries within the WHO European Region*. Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/97091/E89887.pdf

108 Health and Safety Executive website: http://www.hse.gov.uk/contact/faqs/temperature.htm

109 Wilkinson et al. (2001).

110 Green & Gilbertson. (2008).

temperatures below 12°C. As set out earlier in this chapter, while the evidence is strong in some areas on temperature thresholds and physical health, in particular the relationship between temperature and risk of seasonal mortality as maximum outdoor temperatures drop below 20°C, the wider evidence linking specific temperatures to mental health and broader social impacts is less clear. This makes it challenging to identify specific temperature thresholds at which households experience no adverse effects from the cold and suggests that to do so would require further research into these linkages. This view has also been expressed in submissions to this review. The UK Public Health Association noted in its evidence that "we are still well short of properly understanding the full links between health and fuel poverty."

69. In sum, the evidence indicates that the relationship between health and thermal comfort is more complicated than setting a minimum temperature threshold. It is the interaction between low temperatures and other factors that can affect health and social outcomes and the variation in potential thresholds for different impacts makes setting a single threshold highly complex. As such, it seems reasonable to conclude that the WHO's range was intended to be used as a guideline rather than a firm recommendation.

70. In Chapter 2 we suggested that typical households with relatively unconstrained budgets appear to heat their homes to lower temperatures than those underlying the current fuel poverty indicator, while the basis for the precise temperatures used within the methodology is less clear-cut than many suppose. At the same time, the evidence we have examined suggests that different people will find different temperatures comfortable and necessary for health, depending on age and a range of other factors. We examine the sensitivity of the current fuel poverty indicator to the temperature assumptions it is based on in Chapter 5.

The UK Fuel Poverty Strategy sets minimum temperature thresholds at 21°C in the main living room of a household and 18°C in all other rooms. It is often said that these are the minimum temperatures to which houses should be heated, to avoid negative health impacts, and that they are laid down by the World Health Organisation. In fact both the health evidence and the WHO's findings are less clear-cut. We also find that those with average and higher incomes do not appear to heat their homes to the official thresholds. Given this we discuss later in the report the extent to which the current fuel poverty measure is sensitive to these assumptions.

3.7 Impacts of forgoing other essentials in order to keep warm

71. The alternative for a fuel poor household to forgoing warmth and living in a cold home is heating the home adequately but cutting back on other household expenditure.

72. The evidence reviewed here suggests that there are three main strategies for households that seek to cut back on other forms of household expenditure, which are:

- reduce expenditure on other essential goods, e.g. food and suffer potential health consequences;

- reduce expenditure on other goods such as socialising or new clothes and suffer social exclusion; or
- incur debt as a result of spending more than the household can afford to pay without cutting back on other goods, including energy.

73. We have found only limited clear evidence on the scale of possible negative effects of cutting on household expenditure in these ways. Where studies exist, their link to the drivers of fuel poverty is typically in relation to low income only. Further, it is not clear if households that experience these negative impacts do so as a consequence of keeping their homes warm and having to make trade-offs as a result, or whether they also forgo some level of warmth and still make these trade-offs.

74. Evidence from the USA[111] suggests that poor nutritional outcomes are linked the 'heat or eat' trade-off described in Chapter 2, while there is also evidence of links between debt and poor mental health in Britain. We have, however, found no nationally representative evidence of negative consequences arising directly as a consequence of cutting back on goods such as clothes or socialising. This is not to say that there are no negative impacts that result from cutting back in this way, but more that there is insufficient evidence to link specific impacts to trading off heating with these items.

Heat or eat?

75. Chapter 2 outlined evidence suggesting that some low income households cut back on other essential goods in order to pay for higher energy bills. For example, one study reported that 35 per cent of low-income households indicated that they had cut back on food in the last 12 months in order to make ends meet, a similar proportion to those who reported having cut back on their heating for the same reasons.[112]

76. Low-income households may find it is easier to reduce their spending on food than to reduce energy costs or to fund improvements to their homes that would reduce the costs of energy bills. However, reducing either the amount or quality of food can, of course, be detrimental to health.

77. A study on the nutritional status of poor families conducted in the USA[113] found that household spending on food decreased during cold months for poor families, but not richer families. The study found a strong correlation between seasonal nutritional outcomes and expenditure patterns for poor families.

78. The study found that the calorie intake of a number of low-income household types was reduced by around 10 per cent during winter months, including for children in low income households. It has further been suggested elsewhere that given that the period in which the body goes through the most rapid growth is between the ages of 0-3 years, it is possible that scarcity of food between these ages may be particularly detrimental for children in low income households.[114]

111 Bhattacharya, J., DeLeirre, T., Haider, S. and Currie, J. (2003). Heat or eat? Cold weather shocks and nutrition in poor American families. *American Journal of Public Health*, 93 (7), 1149-1154, and Frank, D.A., Neault, N.B., Skalicky, A., Cook, J.T., Wilson, J.D., Levenson, S., Meyers, A.F., Heeren, T., Cutts, D. B., Casey, P.H., Black, M.M. and Berkowitz, C. 2006. Heat or eat: the low income home energy assistance programme and nutritional health risks among children less than three years of age. *Pediatrics*, 118 (5), 1293-1302.

112 Anderson et al. (2010).

113 Bhattacharya et al. (2003).

114 Frank et al. (2006).

79. A further study[115] conducted in the United States by the Children's Sentinel Nutrition Assessment Project found further evidence of negative nutritional outcomes for low income families which may have high heating costs. Once other factors such as age, employment status and receipt of other state benefits had been controlled for, children under three years of age in low-income households that received an energy subsidy were less likely to be malnourished and were also less likely to be hospitalised following a visit to Accident and Emergency.

Debt

80. For households facing high fuel costs with constrained budgets, the choice is in many cases to cut back on expenditure or incur debts if they wish to maintain adequate levels of warmth.

81. This could mean building up debt with their energy supplier or using credit elsewhere in order to cover their fuel costs, with the order in which debts accrue varying from case to case. A recent small scale study, conducted by the University of Loughborough and funded by the Joseph Rowntree Foundation, of household debt amongst low-income families suggested that half of the participants were in arrears with their household bills and indeed this was the most common form of debt amongst participants.[116]

82. Apart from the financial impacts of unsustainable debt (such as inability to access credit due to poor credit rating), there is some evidence to suggest that debt can also have a detrimental effect on mental and emotional well being, with potential knock-on effects (see Section 3.4 above).

83. A recent small scale survey conducted by the Consumer Credit Counselling Service of 372 of its clients, found that 45 per cent of those surveyed reported that debt had a "very negative impact" on their health, a third reported that debt had negatively impacted on their relationship with their partner, while two-thirds indicated that worry about debt affected their ability to carry out their work duties.[117]

84. These findings, based on a small sample, allude to predominantly mental health outcomes relating to debt. At a national level, there is evidence to suggest a clear association between indebtedness and mental health, even though the causal chain is difficult to prove. A study conducted by the University of Warwick found a strong association between debt, including fuel debt, and mental health.[118] While the prevalence of a range of mental health conditions was found to be associated with both debt and low income, the link with debt remained strong when low income was taken into account, while the association with low income was reduced when debt was controlled for. This

115 Frank et al. (2006).

116 Dearden, C., Goode, J., Whitfield, C. and Cox, L. (2010). *Credit and debt in low income families*. York: Joseph Rowntree Foundation. Available at: http://www.jrf.org.uk/sites/files/jrf/credit-debt-low-incomes-full.pdf

117 Consumer Credit Counselling Service. (2010). *Survey into the human impact of debt problems*. Available at: http://www.cccs.co.uk/Portals/0/Documents/media/pressreleases/Human-impact-of-debt-survey-press-release.pdf

118 Jenkins, R., Bhugra, D., Bebbington, P., Brugha, T., Farrell, M., Coid, J., Fryers, T., Welch, S., Singleton, N. and Meltzer, H. (2008). Debt, income and mental disorder in the general population. *Psychological Medicine*. 38, 1485-1493.

indicates that the chain of causation could potentially be from income (not exclusively low income), to debt, to poor mental health, with debt the more influential factor on mental health outcomes.

Households that face severe financial constraints are forced to make trade-offs between other expenditure in order to heat their homes adequately or incur debts. Debt can be a problem in practical terms by impinging on credit ratings and costs of financial services thus limiting a household's borrowing capacity. It can also lead to stress and anxiety. Likewise, there are negative impacts associated with decreasing other household expenditures in order to fund fuel bills. For example, decreasing expenditure on food can lead to worse diets and subsequent health consequences.

Chapter 3 summary

The main findings of this chapter are:

- Exposure to cold temperatures can have negative health impacts, particularly for the very young and the elderly.
- Those health impacts most commonly associated with the cold are cardiovascular problems, which tend to occur at temperatures below 12°C and respiratory problems, at temperatures below 16°C in conjunction with other environmental factors.
- The adverse health impacts suffered by those exposed to cold temperatures can be fatal. There have been on average around 27,000 excess winter deaths in England and Wales each year since 2000. Not all of these are a result of cold homes or the drivers of fuel poverty, but it is clear that these are important factors. If only a tenth of them are attributable to fuel poverty, that would still be more than the number who die on the roads each year.
- In addition to the physical impacts, there is a body of evidence to suggest that cold homes are directly related to mental health problems.
- The social problems associated with cold homes seem to be different for older and younger people, with older people facing more issues around social isolation and exclusion and adolescents potentially facing problems relating to education and anti-social behaviour.
- The basis for the precise temperature thresholds underlying the current fuel poverty measure – 21°C in living rooms and 18°C elsewhere – is less clear-cut than often supposed.
- Households choosing to heat their homes to a comfortable and healthy level may need to make other trade-offs, for example cutting expenditure on food which can lead to a worse diet and have health consequences, or they may fall in to debt, which is associated with higher increased likelihood of mental illness.

Perspectives on measuring fuel poverty

1. Having examined the context behind fuel poverty and its causes and impacts, we now turn to the question of measuring fuel poverty which is central to the terms of reference for our review.

4.1 Perspectives on fuel poverty as a distinct problem

2. Our analysis of the causes and impacts of fuel poverty suggests that fuel poverty is – and should be – a concern within different policy debates. Different perspectives can be seen in the debate on measuring fuel poverty, reflecting people's starting positions, over-riding concerns and desired outcomes. This section briefly considers these different perspectives and what they imply for measuring fuel poverty.

The poverty perspective

3. The review was asked to consider whether fuel poverty is distinct from income poverty. It is clear that there is considerable overlap between those in fuel poverty and those in income poverty. Indeed some stakeholders argue that fuel poverty is not distinct: "No-one who is otherwise well off has problems meeting their fuel bill."[119] Having analysed the evidence in the round our view is that poverty and fuel poverty are not the same, although disentangling the two is not by any means straightforward.

4. Chapter 2 looked at the drivers of fuel poverty and found that while low income was a key predictor of fuel poverty, other factors such as energy efficiency and size of a home also played a role. These factors produce variations in homes which "mean households have an unequal ability to turn convert income into heat"[120] for households who might otherwise have very similar incomes and composition.

5. We have shown how variations in the characteristics of dwellings, households and fuel markets mean spending to achieve a given level of warmth varies considerably. In terms of one of the most influential approaches to understanding poverty and inequality – Amartya Sen's 'capability' theory – what we are fundamentally interested in is what important things people are able to do or to be, rather than just their cash income. In this case the 'capability' is the ability to live at an acceptable level of warmth. As we have seen, there are wide variations in the incomes people need to achieve this. Not

119 Milton Keynes Council, submission to the Call for Evidence.

120 Consumer Focus, submission to the Call for Evidence.

only do households face very different costs, but they are more likely to be locked into those variations in costs than for other goods and services, where accessing alternatives is more straightforward for most (though not all) households. Addressing these variations requires a level of capital investment that will often be beyond what is affordable for those on the lowest incomes.

6. In these circumstances, it is easy to see why many would approach fuel poverty from a perspective of concern about poverty in general. Those concerned about poverty therefore may want to allow for cost variations in comparing the positions of different households. In other words, there is a clear interest in establishing whether some households have a lower standard of living because of high heating costs and may even be pushed into poverty by them. The problem is similar to that caused by high housing costs, where official indicators of poverty look at income both before and after housing costs. From a measurement perspective, one might similarly adjust the way in which incomes are measured to allow for necessary fuel costs. In effect, one might measure residual income – after fuel costs income – compared to an income standard such as the poverty line. Another approach would be to measure what necessities people go without, or the difficulties they have in paying their bills, if they have high heating costs – that is, to look at at the deprivation levels in other respects associated with high heating costs.

7. A further reason for concern from a poverty perspective is the effect of fuel price inflation on those with low incomes. In measuring changes to real incomes, the Retail Price Index (RPI) is traditionally used as the index, while the Consumer Price Index (CPI) is now used to adjust benefit levels. However fuel constitutes a larger proportion of income for those on low incomes, so the impact of fuel price changes will be greater for them. At times of rapid fuel price increases, changes in the cost of living for the poor will be understated by both the RPI and CPI.[121] Looking at changes in incomes after fuel costs would be one way of avoiding this problem.

8. As a corollary of these measurement issues, in terms of practical policy, the problem of low thermal efficiency of the housing occupied by some households on low incomes means that there may be cost-effective and long-term ways of improving their standard of living through investment in energy efficiency. Increasing incomes can make dealing with high bills more manageable, but improving the energy efficiency of a home can also provide a permanent and sustainable solution to prevent unreasonable costs:

   > *With fuel poverty the real differentiating cause is the energy efficiency of the home as a result of insufficient capital expenditure improving the calibre of the home.*[122]

9. From some perspectives, giving such assistance 'in kind' is also politically more acceptable than simply increasing cash transfers through improving benefits or tax credits. The final report of the review will look at the evidence on the benefits of past interventions which have tried to achieve this. The implication of this kind of concern is that interventions should be targeted on households that have both low incomes and energy inefficient homes.

121 Levell, P. and Oldfield, Z. (2011). *The Spending Patterns and Inflation Experience of Low-Income Households over the Past Decade*. London: Institute of Fiscal Studies.

122 Boardman, B. (2010). *Fixing Fuel Poverty: challenges and solutions*. London: Earthscan.

The health and well-being perspective

10. Much of the original anxiety about fuel poverty stemmed from health concerns about those living at low temperatures. We reviewed some of the most persuasive evidence for this in Chapter 3, which looked at the specific and immediate health impacts.

11. A large proportion of the evidence of health impacts relates to living in cold homes, rather than directly to fuel poverty. However, as we saw in Chapter 2, those with low incomes, and those in the least energy-efficient properties do live on average at lower temperatures than others, with energy efficiency having the larger effects. Living in cold homes exposes inhabitants to a greater risk of cold-related morbidity and mortality, suggesting that risk of death is higher in homes where is is more difficult to turn income into warmth.

12. The level of excess winter deaths which may be attributable to fuel poverty is in itself a major health issue. But this is only the most visible element of concerns relating to health and to demands on the NHS. There are therefore very good reasons, from a health perspective, for trying to ensure that people can and do keep warm.

13. The implications for measurement of the problem suggest a focus on establishing who is actually living at too low a temperature, on actual spending on energy being below the amount required to keep warm enough and on outcomes such as excess winter deaths or cold-related health problems. The overlap between low incomes and high heating costs which lies at the core of fuel poverty is *one* of the drivers of this. But there are others – and they do not only affect people on low incomes.

The carbon reduction and energy saving perspective

14. Especially since the adoption of the Climate Change Act 2008, the national priority of reducing carbon emissions and increasing energy efficiency has been an important reason for concern about fuel poverty. Greenhouse gas emissions from domestic fuel consumption are currently 26 per cent of the national total (on an end-user basis).[123] Improving domestic energy efficiency is one of the most promising contributors towards the 34 per cent carbon emissions reduction established in the Act for 2020 and for the targets beyond. As a result:

    - it is important to understand the distributional consequences of carbon mitigation policies since exacerbating fuel poverty could be one result, unless this is offset in other ways (see Section 2.4);

    - the adverse effects on those with low incomes could be a barrier to implementation of policies that have overall benefits;

    - improving domestic energy efficiency is an important part of overall carbon reduction but those on low incomes are unlikely to be able to afford or achieve this without assistance.

15. All of this suggests that a corollary of climate change mitigation policies must be

123 Carbon emissions can be measured by source and by end-user. For the purpose of carbon budgets, emissions are defined by source. However, it is more appropriate here to consider end-user emissions since this covers the impact of all energy use in the home, including electricity. See: http://www.decc.gov.uk/assets/decc/Statistics/climate_change/1515-statrelease-ghg-emissions-31032011.pdf

a focus on those with low incomes with high fuel spending and on those living in energy inefficient homes in particular. This will be examined further in our final report. For some the emphasis is on energy efficiency, regardless of income, and therefore on improvements to SAP levels across the country. From the point of view of measuring fuel poverty, the carbon perspective implies a focus on measuring energy efficiency levels, together with a lack of ability to self-finance investments to improve them.

This brief discussion of the perspectives involved – and the evidence reviewed in detail in earlier chapters – explains why fuel poverty is an issue for several policy spheres. Its causes, impacts and solutions make fuel poverty a distinct problem and are all reasons why it is important to think about fuel poverty as a separate issue requiring a separate approach. Fuel poverty comes at the overlap of different concerns, some with poverty in general, others with health, and others with domestic energy efficiency. Tackling it therefore offers potential benefits in each and all of these agendas.

A corollary of this is that the distinct problem that needs to be measured from all of these perspectives is in some form the *overlap* between low incomes and high required fuel spending. In this light, the wording of the Warm Homes and Energy Conservation Act (WHECA) is entirely appropriate: we are concerned with individuals in households "living on a lower income in a home which cannot be kept warm at reasonable cost." The implications of this for assessing the current definition and modifications or alternatives to it are discussed in later chapters .

4.2 Principles for measuring fuel poverty

Why measuring matters

16. Given the different perspectives that can be brought to the measurement of fuel poverty – and given the likely difficulties in finding a single indicator that will satisfactorily capture all the issues– it is important to examine why it matters that fuel poverty is accurately measured.

17. We are clear, for the reasons given below, that the definition of fuel poverty matters. However, not everyone shares this view. Certainly, some evidence was received during the course of the review suggesting that a focus on measuring, as opposed to tackling, fuel poverty was irrelevant: "the urgent priority is to review existing policies and programmes."[124] There were two main reasons given for this. First, that fuel poverty is a real problem affecting real people – giving assistance to those in need should come before an academic exercise looking at how to define the problem. In other words, worrying about measuring fuel poverty is a distraction from the action needed to eradicate the problem. Second, that there is no need to measure fuel poverty in any detail because sufficiently ambitious policies to improve the housing stock in England (and the UK) would offer all households a degree of additional protection from the risk of being in fuel poverty – in this context, knowing who the fuel poor are and where they live would not be important. Given the divergence of views, it is important to set out why measuring fuel poverty reliably matters.

18. First, there is a statutory target: to ensure that no-one lives in fuel poverty as far

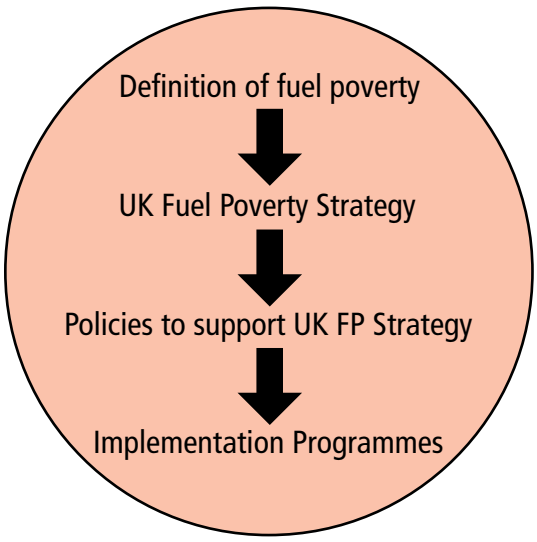
124 National Energy Action, submission to the Call for Evidence.

as reasonably practicable by 2016. The question of how fuel poverty is defined is fundamental to fulfilment of this target: without a definition, how will anyone know whether the target has been met? Beyond this, if the definition is to give a reliable indication of whether or not the target has been met, the definition itself must be reliable. Whether or not the current indicator of fuel poverty achieves these goals, or indeed whether any indicator of fuel poverty could do so, is the subject of Chapters 5, 6 and 7.

19. One serious difficulty at present is the disconnect between the definition of fuel poverty and the policies being taken forward to reduce it. Professor Christine Liddell, in her review of fuel poverty for Northern Ireland,[125] uses the scheme shown in Figure 4.1 to show the ideal relationship between the definition of a problem, a strategy to address it, the development of policies to deliver the strategy and delivery of these policies on the ground.

125 Liddell, C, Morris, C, McKenzie, Paul and Rae, Gordon. (2011) .*Defining Fuel Poverty in Northern Ireland: A preliminary review*. Belfast: DSDNI. Available at: http://eprints.ulster.ac.uk/19994/1/FuelPovertyReport(WEB)-5Sept2011.pdf

Figure 4.1: *Relationship between definition, strategy, policy and implementation*



20. We would go one stage further: there should be a link between the implementation programmes delivered on the ground and the definition itself, in the form of measurement. With an effective definition, we would expect that programmes with an impact on the underlying causes of fuel poverty would lead to a reduction in fuel poverty as measured. This is not necessarily the case at present.

How indicators can help and hinder

21. Having set out why we believe an effective indicator of fuel poverty is important it is necessary to consider the specific ways in which indicators can contribute. For any social problem of this kind there are several ways in which measurement can help:

- it can measure trends;
- it can indicate what is happening to a problem's extent, depth and persistence;
- it can help identify the kinds of people affected;
- it can support policy design and delivery.

Measuring trends, extent, depth and persistence

22. As far as trends are concerned, it is important for a definition to allow an assessment of the evolution of an issue i.e. to answer the question, is it getting better or worse over time? More specifically, one would expect changes in an indicator to reflect the scale of changes in the underlying drivers of the core problem. So in this case, one would expect a fuel poverty indicator to improve if:

    - there were fewer people in poverty;
    - the energy needs of households – especially those on low income – improved; and
    - the cost of fuel – especially for those at risk of fuel poverty – fell.

23. At the same time, in order for an indicator to be helpful in demonstrating trends, it must paint an accurate picture of what is actually happening. Any indicator must therefore not be inappropriately sensitive to the scale of changes in the underlying drivers because this could lead to distortions. An indicator that paints too rosy a picture could lead to complacency amongst policy makers. An indicator that paints too gloomy a picture could lead to what are, in fact, effective policies being undervalued.

24. Linked to the question of the overall trends demonstrated by an indicator is the question of distinction between showing the extent of a problem – how many people it affects – and its depth – how badly those people are affected. With general poverty measurement, a distinction is made between 'headcount' indicators of the numbers of people below a poverty line and 'poverty gap' indicators showing how far below that line people fall. It would, for instance, be judged by most people to be an improvement if those who were poor moved much closer to the poverty line, even if few of them crossed it. As explained in Chapter 1, the Energy Act 2010 sets out the concept of the depth of fuel poverty faced by households, insofar as it defines a reduction in the difference between the cost of keeping a home warm and what would be a reasonable cost for doing so as a reduction in fuel poverty.

25. It is also likely to be of interest how long people are affected by a problem – is the problem persistent, or are many people affected over time, but only intermittently? This should be possible in theory for most indicators. However, in practice to do so requires longitudinal data, which are generally not captured at present.[126]

Identifying the people affected and supporting policy design and delivery

26. In terms of designing interventions to tackle a problem and then implementing them, indicators are needed which allow us to:

    - identify the kinds of people affected, so that they can be targeted by interventions and/or offered appropriate assistance and support, both in terms of overall policy design and for finding them on the ground;
    - judge the effectiveness of alternative interventions for particular groups

126 See Sefton, T. (2004). *Aiming High – An evaluation of the potential contribution of Warm Front towards meeting the Government's fuel poverty target*. CASE Report 28, London: LSE. This used longitudinal data from EHCS for 1991 to 1996 on the dynamics of fuel poverty based on need to spend. For later years longitudinal data were only available for spending on fuel, not on need to spend.

in advance, in order to choose the most effective policy mix for people in different circumstances; and

- measure their impacts afterwards.

27. From this perspective, the definition of fuel poverty is intrinsic to successful policy making and policy delivery to fulfil WHECA and eradicate fuel poverty as far as reasonably practicable. It may be, as some suggested to us, that the current definition of fuel poverty is not used to any great extent by anybody trying on the ground to deliver adequate warmth at an affordable cost for all. However, far from suggesting the definition of fuel poverty is therefore irrelevant, this could suggest there is a weakness in the way the current indicator is constructed.

28. The next three chapters examine a range of possible definitions of fuel poverty, starting with an examination of the current definition.

In understanding the problem an effective indicator can contribute by:

- helping to monitor trends accurately, reflecting changes in the underlying factors driving it;
- indicating the depth and extent (and possibly the persistence) of the issue;
- helping to identify those affected;
- judging the design of alternative interventions both at the design stage and after implementation.

Chapter 4 summary

This chapter has looked at the different perspectives on fuel poverty, why measuring matters and what qualities any indicator of fuel poverty should exhibit. The main conclusions are:

- Fuel poverty is indeed a distinct problem for several different policy spheres, including dealing with poverty, health concerns, and the reduction of carbon emissions.
- It is the overlap between low incomes and higher required fuel spending where these concerns come together.
- Accurate measurement of the problem is important for the successful design and delivery of policy and for assessing progress.

The current definition of fuel poverty

The current definition – the fuel poverty ratio

1. As set out in Chapter 1, a household is currently officially deemed to be facing fuel poverty if it would *need* to spend more than 10 per cent of its income on maintaining a satisfactory heating regime. This represents the fuel poverty ratio:

$$\textit{Fuel poverty ratio} = \frac{\textit{Required fuel costs (i.e. required usage x price)}}{\textit{Income}}$$

2. The 10 per cent threshold means that households with a ratio in excess of 0.1 are classed as fuel poor. This section explains the technical methodology behind this definition.

3. The main source of data used in estimating fuel poverty in England is the annual English Housing Survey (EHS), compiled by the Department for Communities and Local Government (DCLG).[127] The EHS involves an interview survey with the people that live in each dwelling included in the survey, and a physical survey of the dwelling itself. In 2010-2011, the sample size was approximately 16,000 householders for the interview survey. Half of their dwellings were the subject of the physical survey. In presenting the results, the survey is weighted to be representative of England, with each household assigned a weighting that, when combined with all other households, sums to the number of households in England.

4. The combined interview and physical surveys record a comprehensive range of information about the dwelling and householders. This includes the predominant structure of the dwelling, type of walls, insulation features, fuels used, the householder's lifestyle (in particular the amount of time spent at home) and the income of each person within the household.

5. The BREDEM[128] model is used to estimate required household energy consumption. The modelled bill for each household is produced by combining this figure with an average tariff for that household.

127 The EHS was formed in 2008 from by combining the old Survey of English Housing (SEH) and the English House Condition Survey (EHCS).

128 BRE's Domestic Energy Model (since 1997, the former Building Research Establishment has been known simply as 'BRE'). The model produces annual modelled consumption for space heating, lights and appliance usage, water heating and cooking.

6. In terms of modelling energy consumption, the key task is to generate the level of consumption needed to reach a particular indoor temperature and other standards of energy use. The dwelling and household characteristics obtained through the EHS are the basis for this. The core of the calculation is the use of a detailed model to estimate the energy required to achieve a standard of warmth given factors such as the size, insulation standards, construction material and heating system of the house. This is currently specified as a temperature of 21°C in the main living area and 18°C in all other areas of the home.

7. The amount of time a household needs to heat their home for, defined as a 'heating pattern', is estimated and assigned to each household dependent on the amount of time householders spend in the home. The patterns are summarised in Table 5.1 below. Households whose members are all fully employed and households that are empty during the day are assigned a partial heating regime (i.e. it is assumed that the dwelling does not need to be heated during the daytime in the week). A household with unemployed members, pensioners or others that may be at home during the day is assumed to need to heat their dwelling throughout the day. Similarly, dwellings that are 'under-occupied' (for example a four bedroom house that contains a single adult) are assumed to not need to heat all rooms.[129] The modelled space heating for these households assumes that about half the home is heated.

8. In addition to space heating, the energy consumption requirement also includes modelled consumption of energy used for heating water, powering lights and appliances and cooking. While space

129 The same is not the case in Scotland, where the equivalent modelling does not reduce energy need to reflect under-occupancy. The arguments given for this different approach are two-fold: first, that it is often not possible to turn off the heating in some rooms but not others; second, that the condition of the house may suffer (e.g. from damp) if some parts are under-heated.

Table 5.1: *Heating standards*

		Standard	Full	Partial Standard	Partial Full
Heating pattern	Weekday	9 hours	16 hours	9 hours	16 hours
	Weekend	16 hours	16 hours	16 hours	16 hours
Heating extent		Whole house	Whole house	Half house	Half house
Demand temperature	Primary living area	21°C	21°C	21°C	21°C
	Secondary living area	18°C	18°C	18°C	18°C
Example		Employed couple living in a two-bedroom flat	Pensioner living in a one-bedroom bungalow	Employed couple with one child, living in a three-bedroom home	Unemployed single person living in a large two-bedroom home

Source: Fuel poverty heating standards (DECC)

heating is modelled according to need, consumption of energy for other uses is based on an average actual consumption. For example, the method used to model the amount of energy required for lights and appliances is based solely on the number of people in the household and the floor area of the property. For its part, the hot water requirement is based on an average value based on household occupants that is then inflated, on the basis of a 2005 report[130], by 20 per cent. All of the technical details of the methodology are set out, with references, in a handbook developed by DECC/BRE.[131]

9. To establish household costs, the modelled consumption data must be combined with price and tariff data. Prices and tariffs for gas and electricity are collected from all suppliers by DECC and subsequently averaged across each region and payment type (e.g. prepayment meter, direct debit etc). The appropriate modelled tariff is then assigned to each household in the EHS. For other fuels (such as oil and solid fuels), regional prices are provided by the Office for National Statistics (ONS). The same price data are used by ONS when compiling the Consumer Prices Index and Retail Prices Index.

10. Within BREDEM, a tariff is assigned based on the type of fuel used, the region in which the household is located and the payment method used (as reflected in the EHS). Section 2.3 of Chapter 2 discussed the extent to which the problems of fuel poverty may be exacerbated by low income households having less favourable tariffs than the model assumes.

11. Income is calculated from the interview survey, using a range of questions addressed to the household reference person[132] about his or her income and that of others living in the household. The current indicator uses a 'full income' definition, which counts all sources of income the household members receive, including benefits and savings. It is calculated net of income tax and National Insurance contributions; it is not adjusted for housing costs or the size and composition of the household.

12. The income data collected in the English Housing Survey, in common with other income surveys, are subject to potential misreporting. We know that the very lowest incomes reported to surveys can reflect both genuinely extremely low incomes (people who are, at least for a time, living in extreme poverty) and misreporting. For instance, analysis of reported incomes for families with children to the Family Resources Survey (FRS) found that in other respects, those with reported incomes below about £50 per week actually had standards of living comparable to those with incomes of between £250-£500 per week.[133] This suggests that some of those in the bottom 3 per cent or so of the reported income distribution may be misreporting their incomes.[134]

13. These generic concerns are more acute for the English Housing Survey given the survey size and the fact it is not focused on income measurement in the same way as, for instance, the FRS. To deal with this,

130 BRE on behalf of Defra and DTI. (2005). *Estimates of hot water consumption from the 1998 EFUS. Implications for the modelling of fuel poverty*. London: Defra/DTI. Available at: http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file16568.pdf

131 DECC. (2010). *Fuel Poverty Methodology Handbook*. London: DECC. Available at: http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/614-fuel-poverty-methodology-handbook.pdf

132 The highest income householder.

133 Brewer, M, O'Dea, C., Paull, G. and Sibieta, L. (2009). The living standards of families with children reporting low income. *DWP research report 577*. London: DWP. The data analysed were for 2004-05 to 2006-07.

134 Hills, J (chair) et al. (2010). *An Anatomy of Economic Inequality in the UK: Report of the National Equality Panel* London: Government Equalities Office/CASE, p 48. Available at: http://sticerd.lse.ac.uk/dps/case/cr/CASEreport60.pdf

under the methodology used some of the very lowest (and negative) reported incomes are set to Income Support levels for modelling fuel poverty. This is not an unreasonable approach but still leaves a question mark over some of the lowest incomes used in the modelling.

14. Table 5.2 shows the average modelled fuel bill in England in 2009 using the EHS and BREDEM. Note that space heating, the main focus of most discussion of fuel poverty, is only 56 per cent of the average modelled fuel bill.

15. The methodology set out above is regularly monitored by the Fuel Poverty Methodology Group.[135] In April 2005, the results of a peer review of the methodology were published.[136] The review, written by Tom Sefton and John Chesshire, was restricted to considering the methodology within the existing definition of fuel poverty. The review was comprehensive and led to a number of technical recommendations. These related, for example, to the need to improve the imputation of incomes where income data are missing, how to handle certain benefits in terms of income measurement, and whether to apply an uplift to the hot water calculation in the methodology. The methodology now in use was modified to reflect the majority of the peer review's recommendations. The peer review also commented on options for improving the methodology in more fundamental ways. This included, for example, suggesting an examination of the case for measuring incomes after housing costs. This is covered below in Chapter 6, Section 6.1.

135 The role of the Group is set out in the handbook to the methodology referred to above.

136 Sefton, T and Cheshire, J. (2005). *Peer review of the methodology for calculating the number of households in fuel poverty in England: final report to DTI and Defra*. London. Available at: http://www.decc.gov.uk/assets/decc/statistics/fuelpoverty/1_20100319143215_e_@@_file16566.pdf

Table 5.2: *Average modelled fuel bill, 2009, England*

	Average modelled bill	% of average modelled bill
Total	£1,342	100%
Of which		
Space heating	£748	56%
Water heating	£139	10%
Lighting and appliances	£394	29%
Cooking	£61	5%

Source: DECC

Current composition

16. Under the current definition, single pensioner households account for the largest proportion of fuel poor households, in both 2004 and 2009 (see figures B.4 and B.5 in Annex B). Single working age households represent the next biggest proportion of households identified by this measure. Taken together, families with dependent children comprise 12 per cent of the fuel poor in 2004 and 18 per cent in 2009. Couples without children account for 20 per cent of the fuel poor in 2004 and 26 per cent in 2009. Finally, pensioner households accounted for 48 per cent of fuel poor households in 2004 and 49 per cent in 2009.

17. In terms of regional breakdown, this indicator is rather stable (Figures B6 and B7). The North West region accounts for around 15 per cent of fuel poor households in both years. By contrast, in 2009 the North East accounted for only 7 per cent of fuel poor households. Annex B provides more information on the composition of the fuel poor under this indicator and the alternatives set out in Chapters 6 and 7.

Strengths of the current indicator

18. As the call for evidence showed, the current definition of fuel poverty is considered by many to be a reasonable and effective indicator.[137] A number of respondents expressed a strong view that it should not be changed. Among the reasons for this was marked support for certain of its characteristics, including its straightforwardness (i.e. it is easy to understand), its objectivity (i.e. the indicator is based on need not actual behaviour) and its responsiveness to major drivers of fuel poverty (i.e. income, fuel prices and energy efficiency).

19. On the face of it, the current definition of fuel poverty is easy to understand and explain. However, it should be noted that its simplicity is somewhat superficial. It is clear from the 50-page handbook to the calculation used under the current methodology that many assumptions have to be made to generate the required outputs. Indeed, assumptions are made at every stage of the calculation.[138] While the result is far from fatally compromised – the fuel poverty annual statistics have the status of Official National Statistics because of their quality and accessibility – the reality of the calculation is far more complex than a brief description of the indicator hints at.

20. What is more, while a complex technical model lies behind the calculation, further decisions are taken that have an impact on the reported scale of fuel poverty as well as on its composition. For example, incomes are not adjusted for household size and composition (i.e. income data are 'unequivalised'), and income is measured before, rather than after, housing costs. Changing either (or both) of these facets of the definition would mean identifying different numbers and types of fuel poor households and where they are found to be geographically located. Such details make for a definition that is in reality not so simple, although this does not necessarily mean that it is flawed.

21. Objectivity is a characteristic of the current definition that is frequently welcomed. It is certainly the case that, being based on *modelled* energy needs rather than *actual* energy spending, the indicator offers an important degree of objectivity. It has long been contended that, since actual spending may be distorted by financial constraint (i.e. some people cut back on heating to make ends meet) – or its reverse, profligacy – measuring fuel poverty on such a basis would be inappropriate. Although this review has not conducted an exhaustive empirical assessment of the accuracy of this assessment, there is sufficient evidence in Chapters 2 and 3 above to suggest this is likely to be the case. Furthermore, the review has not found any evidence suggesting that actual spending is a reliable measure of need.

22. DECC is currently exploring the possibility of matching data from the EHS with actual household energy consumption data through a pilot study which may provide the sort of empirical evidence needed to test the contention. We acknowledge that findings from this pilot may not be available for our final report. They should be explored further once available to understand the relationship between actual and modelled consumption.

137 As far as possible, we use the word 'indicator' to describe a way of measuring fuel poverty, since the word 'measure' may also denote an intervention.

138 Income measurement, energy required for space heating, energy required for water, energy required for lighting and appliances, energy required for cooking, heating standards, temperatures achieved, effectiveness of energy efficiency measures and so on.

23. The reasons behind the focus on required rather than actual spending remain powerful, so we believe that a needs-based approach should be retained for the measurement of fuel poverty.

24. As for responsiveness to the key drivers of fuel poverty, it is clear that the current definition does to different degrees reflect changes in household income, energy prices and energy efficiency. Indeed, the annual National Statistics publication produced by DECC shows how much of the change in the reported fuel poverty numbers from one year to the next can be accounted for by each of these factors. It is clearly desirable to understand the impact on the ground of changes in these factors (and, potentially, others such as property size/occupancy levels). It would not be tenable to propose an indicator of fuel poverty that was impervious to these factors. The question is whether the current indicator responds appropriately to these factors.

Weaknesses of the current indicator

25. Following in-depth analysis conducted during the review we believe that the current definition is open to a number of criticisms. Some of these relate to the precise way the indicator is calculated and others to the indicator's fundamental form, being based on the ratio between required spending and income.

The fixed threshold

26. A key feature of the current definition is the fixed threshold of 10 per cent for the share of income taken by required fuel costs. The review has found no clear rationale for this particular threshold. It appears to derive from an original calculation that in 1988 the median household spent 5 per cent of its net income on fuel (see Chapter 1) and that twice this ratio might be taken as being 'unreasonable'. The fact that the poorest 30 per cent of households also spent 10 per cent of their income on domestic energy in 1988 was taken as corroboration of the 10 per cent figure.

27. However, the choice of doubling median spending would appear to be an essentially arbitrary choice and the 5 per cent figure has become fixed, rather than being adjusted in line with changing spending. Actual spending on domestic energy by the median household has varied substantially in the period since 1988, yet the 10 per cent threshold has remained fixed since 2001 (and is used in calculations for fuel poverty for earlier dates). Indeed some of those giving evidence suggested that a relative indicator adjusted in line with the contemporary median would be more appropriate. We investigate this suggestion further in Section 6.2 in the next chapter.

28. There may be no avoiding an arbitrary judgement when it comes to fixing such thresholds. What matters is the impact of the judgement made. The choice of threshold affects the number and type of households found to be fuel poor. The same applies to decisions on technical aspects of the calculation, such as measuring income before or after housing costs, or equivalising income, or, for that matter, imputing incomes for those households reporting zero or negative incomes. However, the form of the current indicator makes it highly sensitive to the precise placement of the threshold. Essentially what the indicator shows is the 'tail' of the distribution of costs in relation to income (see Figure 1.1 in Chapter 1). This makes the number of households counted as fuel poor very sensitive to whether the threshold

is cutting off the tail or cuts through a denser part of the distribution.

Sensitivity to price changes

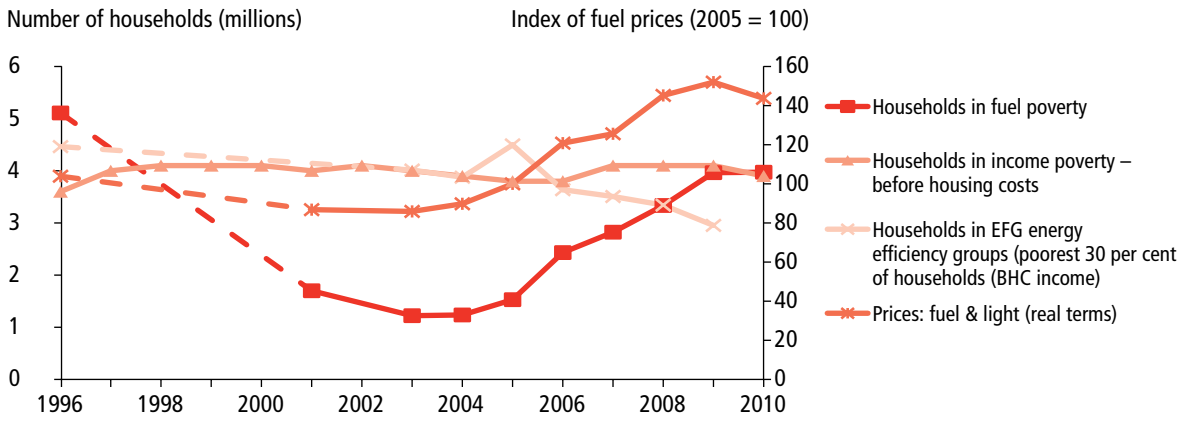
29. As fuel prices change, the distribution of spending moves in relation to this fixed threshold and the number of households counted as fuel poor can change very rapidly. This can be seen in Figure 5.1.

30. This figure gives us immediate pause for thought: did the underlying problem of fuel poverty really improve by nearly four-fifths in just seven years? If so, this would make Government programmes to address this problem some of the most successful social policies ever delivered. Equally, have things deteriorated quite so fast in the last six years to suggest that the problem has more than trebled?

31. The chart also shows the three key drivers of fuel poverty. First, it shows the number of households in poverty (before housing costs, as reported by DWP); second, it shows the number of low income households with the lowest energy efficiency ratings (E, F and G); third, it shows fuel and light prices. In terms of income, the overall number of households in poverty in England was more or less flat throughout the period in question, ranging from 3.6 million households in 1996 to a maximum of 4.1 million households throughout the rest of the period.[139] The number of low income and low energy-efficient households fell noticeably, from 4.5 million in 1996 to 3.0 million in 2009 – a fall of one third. If these had been the only changes to take place in this time, one might expect that fuel poverty would have fallen fairly steadily over this period. The explanation of the 'V' shape reported by the current indicator lies in the evolution in real fuel prices, which fell from their 1996 levels until 2004 but which have risen sharply since then, being 44 per cent higher in 2010 than 2005. In other words, under the current definition, fuel prices dominate. While increasing fuel prices make the severity of fuel poverty worse

139 As we saw in Figure 2.1, in percentage terms there was a small fall in the number of individuals in relative poverty across the UK as a whole over the period, but a rapid fall against an absolute standard.

Figure 5.1: *Fuel poverty, income poverty, energy efficiency and fuel prices, selected years 1996 – 2010, England (except prices – UK data)*



Source: Fuel Poverty Statistics (DECC), Fuel & light Index Statistics ONS (scaled to real terms) HBAI statistics (DWP

Note: there have been some changes in the methodology used to calculate fuel poverty statistics from year to year, which affect all the time series presented here. See Annex B for details of these changes.

(and have an affordability impact for every household), it is necessary to consider whether it is appropriate for the indicator of the extent of fuel poverty to be so responsive to fuel price changes.

32. The picture shown in Figure 5.1 highlights the way that the current indicator may mask the impact of changes to the energy efficiency of the housing stock and to income levels. Chapter 2 and Figure 5.1 show there has been a real and marked improvement to average SAP levels in the UK over recent decades as well as a small reduction in poverty rates. However, the extent of improvement in domestic energy efficiency is only really discernible under the current indicator for households close to the 10 per cent fuel poverty threshold in each year. For example, the impact of measures to improve household energy efficiency which reduce a household's very high fuel poverty ratio will not show up in the headline measurement under the current indicator.

33. In terms of considering what could be done about the problem, this can be a major concern. Any assessment of the effectiveness of policies is affected by the operation of the definition. Under the current indicator, a policy designed to improve energy efficiency in lower income and severely fuel poor households can appear mis-targeted if it does not have a discernible impact on the headline fuel poverty levels.[140]

Depth and extent

34. An additional concern, given the sensitivity of the indicator to fuel prices, is that the core problem of fuel poverty is diluted by rising prices and rising numbers of fuel poor households. As prices increase and more and more households are counted as fuel poor, those within the group include both those who are severely and those who are marginally affected. Although in practical terms it would be desirable to reduce the depth of fuel poverty, because any improvement in a household's situation is welcome, under the current indicator there may be no credit for doing so. This is because what counts is whether a household crosses the threshold in or out of fuel poverty; the policies that may be incentivised are therefore those that impact on the households on the margins of fuel poverty, rather than those with the most severe problems.

35. An ideal definition of fuel poverty would therefore capture how deep in fuel poverty households are alongside the headcount number of households in fuel poverty. A problem with the existing indicator may be that it is, in effect, trying to encapsulate both of these dimensions in one number.

36. Alongside the issue of the dilution of the problem when prices are high, there is the issue of underestimating the scale of the core problem when fuel prices are low. Government progress reports on fuel poverty throughout the first half of the 2000s indicate an expectation that fuel poverty would be eradicated by the programmes in place at the time to boost incomes and reduce domestic energy inefficiency. However, such expectations were not just based on expected outcomes from policies delivered on the ground: they were also based on what proved to be a highly optimistic assessment of the likely evolution of fuel prices. Had the energy price predictions used at the time of publication of the UK Fuel Poverty Strategy in 2001 been correct, our calculations suggest that the level of fuel poverty under the current

140 In the final report we will examine the extent to which earlier assessments of the impact of Warm Front were affected by this problem.

indicator would have been in the range 1.0 milion–1.6 million households in England in 2010 compared to the projected figure of 4.0 million published by DECC in July 2011. This suggests that the reported figures may have masked the true nature and scale of the fundamental problem and changes in it.

High incomes

37. An additional problem with the current indicator is that it does not include a cut off for households with high incomes. There are therefore significant numbers of households with relatively high incomes found to be fuel poor under the current indicator (reflecting the high modelled costs of heating their sometimes large homes). However, this is not in line with the terms of WHECA, which states that a household should have "lower income" if it is to be classified as fuel poor. Nor does it reflect the views of those who are tackling the problem, such as National Energy Action (NEA), who in their evidence to us described fuel poverty and low incomes as "inextricably linked."

Policy assessment and the ratio basis of the indicator

38. Another concern about the operation of the ratio basis of the current definition is that it leads to more emphasis being put on fuel bill changes. In his submission to the review, Dr Richard Moore gives a useful example. A household with an annual fuel bill of £1,000 and income of £10,500 would not be fuel poor (fuel poverty ratio of 0.095). However, the same household, following a bill rise of £200 and an income rise of £1,000 would be counted as fuel poor (fuel poverty ratio of 0.104), despite having £800 of additional income remaining after paying the bigger bill.

39. Several of those who submitted evidence (such as British Gas) also pointed to the way the ratio at the heart of the current indicator means there is an asymmetry between the factors having an effect on fuel poverty numbers. The ratio at the heart of the current indicator means, in effect, that reducing someone's fuel bill by £10 has the same effect as increasing income by £100 at least for those households on the margins of fuel poverty. This is because fuel bills are at the top of the fraction (numerator) rather than the bottom (denominator). Conversely, each £10 increase in fuel bills leads to a requirement to increase income by £100 to avoid that household falling into fuel poverty.

40. It follows that the use of the ratio may have important implications for policy-making.[141] It can be noted here that this situation provides an incentive for policies focused on reducing bills rather than increasing incomes. From the outside, the design of the new Warm Home Discount[142] seems to reflect this, in that it directly reduces the fuel bills of qualifying households (by £120-£140) thereby having a greater effect on measured fuel poverty than an equivalent increase in benefits would have.

Sensitivity to low reported incomes

41. The question of income measurement discussed above in describing the current methodology is significant. Mis-reporting of incomes may seem a technical issue, but for an indicator based on a ratio, where very low incomes imply a very high ratio, this has potentially serious effects. For some of those with the very highest ratios

141 Assessment of policy effectiveness will be the subject of our final report.

142 The Warm Home Discount is a four-year scheme that runs from April 2011 to March 2015 to help low income and vulnerable households with energy costs. It will be worth up to £1.1 billion over the next four years and DECC expects it to assist around 2 million low income and vulnerable households each year.

– apparently the deepest in fuel poverty – their position could be the result of mis-measurement. This problem is exacerbated if the income measure used is after housing costs or if the ratio approach is used to identify the depth of fuel poverty (see sections 6.1 and 6.3 in the next chapter).

Sensitivity to temperature standards

42. Another sensitivity within the current definition – again caused by its ratio approach and use of a fixed threshold – relates to temperature standards. We have set out above the four archetypes for heating patterns used in the calculation methodology (Table 5.1). Each of these presupposes a 'target' temperature of 21°C in the main living room and 18°C elsewhere. Calculations undertaken for the review suggest that each reduction in the target temperature for the main living room of 1°C would reduce the extent of fuel poverty by 300,000 households in 2009.[143] Increasing target temperatures would conversely increase the extent of the problem.

43. As we saw in section 3.6, the basis of the temperatures used in the modelling is less clear-cut than often supposed in terms of health risks and they do not appear to match contemporary behaviour. Being so sensitive to the assumption is therefore a weakness.

Treatment of housing costs

44. Measuring income after housing costs was a priority for many stakeholders in their response to the call for evidence. Some argued this was the sole change required to the current definition. For its part, the Association for the Conservation of Energy suggested in its evidence that the accepted definition of fuel poverty before the publication of the 2001 UK Fuel Poverty Strategy had in fact measured income after housing costs and that the shift to a before housing costs basis had been a "deception."

45. The argument put forward is that the emphasis put on necessary fuel costs as a share of full income in the presentation of fuel poverty statistics understates the problem of paying for fuel for those with high housing costs. The disposable income out of which they can pay for fuel will be that left after they have paid their rent, for instance. Because of the interest in this approach, we consider this option in Section 6.1 below.

Consistency with policy on the ground

46. As a final consideration, it is worth considering the use of the definition by practitioners in the field. It has been suggested to us that the current definition of fuel poverty cannot be used in practice to identify the fuel poor on their doorstep. For the reasons we discussed in Chapter 4, this is a potential barrier to effective policy delivery. To be sure, it is not particularly straight-forward for *any* indicator of a problem such as fuel poverty to be used to identify specific individuals or individual households affected. This is why those delivering policy have developed proxies for finding those affected. But in the case of the current indicator, it is not clear how proxies – such as SAP rating to act for energy needs or benefit eligibility to act for income levels – can be related to the ratio and the 10 per cent fixed threshold.

47. The next chapter therefore examines options for building on the strengths of the current definition and addressing its weaknesses.

143 Our calculations show that reducing the temperature standard for the main living room would have reduced the number of households in fuel poverty in 2009 from 4.0 million (21°C) to 3.7 million (20°C), 3.4 million (19°C) or 3.1 million (18°C).

Chapter 5 summary

The key findings of this chapter in relation to the way the current definition is calculated are:

- The main source of data for the current definition of fuel poverty is the English Housing Survey (EHS), whose outputs are used with the BREDEM model to generate the fuel poverty numbers.
- This models the amount of energy required to achieve a given temperature standard and combines this with an assessment of needs for water heating, lighting and appliance use and cooking. In 2009 space heating accounted for 56 per cent of the mean modelled bill and water heating for 10 per cent.
- This calculation also allows for different occupancy patterns and for the average prices paid depending on region and payment method.
- For each household a fuel poverty ratio is calculated by dividing modelled fuel bills by household income reported to the EHS. A ratio greater than 0.1 means a household is deemed to be in fuel poverty.

The discussion on the strengths and weaknesses of the current definition can be summarised as follows:

- The most important strength of the current definition is its focus on modelled needs, rather than actual spending. It takes account of the key drivers of fuel prices, energy efficiency and household income levels.
- However the definition suffers from a number of potential weaknesses. First, central to it is the use of a fixed threshold for required spending on fuel as a proportion of income. This is 10 per cent, derived from the fact that this was twice actual median spending in 1988. It does not adjust to reflect contemporary behaviour. The form of the definition makes it very sensitive to the threshold chosen.
- Movements in recorded fuel poverty over time are dominated by changes in fuel prices. As a result it fell dramatically in the early 2000s and then rose equally rapidly after 2004. If the assumptions made about fuel prices in the 2001 strategy had been correct, fuel poverty would have been 1.0 million–1.6 million in 2010, not the projected figure of 4.0 million. Price effects mask the improvements in energy efficiency and tackling poverty. At times of low prices it can make some policies appear mis-directed.
- The current definition focuses on the extent of fuel poverty, rather than also on its depth. In the next chapter we examine how well it could be supplemented by an indicator of the depth of fuel poverty (Section 6.3).

Chapter 5 summary (continued)

- In contrast to the focus of the 2000 Act, some households with high (above average) incomes can be counted as fuel poor.
- The use of a ratio means that to escape fuel poverty reducing someone's bill by £10 can have as much effect as increasing their incomes by £100. This may affect policy choices.
- The ratio measure is highly sensitive to low reported incomes. Even surveys focused on income recording suffer from some mis-reporting of very low incomes, but this is a more serious problem for those with wider scope such as the EHS.
- The indicator is also very sensitive to assumptions used in calculating energy needs. These include the temperature thresholds used. For instance, using a living room temperature of 18°C, not 21°C, would reduce the number by nearly 1 million in 2009. Increasing the temperature standards, for example by adopting Scottish standards for pensioners, would increase the number of fuel poor households.
- The major weakness identified by stakeholders was the use of income before deducting housing costs. We investigate in the next chapter the impact of focussing on household's income after housing costs.
- The current definition does not necessarily match the proxy indicators used by those delivering policy on the ground.

No indicator of this kind is immune from criticism. The next chapter therefore examines some modifications of alternatives to the current definition to see whether they would be any more robust.

Options for measuring fuel poverty

1. In the light of some of the issues raised in the last chapter, this chapter examines a range of different options for measuring fuel poverty. Some of these have been suggested by those giving evidence to the review and others follow from our own analysis.

2. We consider amendments to the current fuel poverty definition:

   - changing the measurement of incomes so that it takes into account housing costs (option A);
   - providing a dynamic threshold for fuel poverty (option B);
   - a supplementary fuel poverty gap indicator (option C).

3. We then consider more fundamental changes to the way of measuring fuel poverty:

   - an after fuel costs indicator of poverty (option D);
   - the overlap of low income and low SAP (option E);
   - subjective measurement (option F).

4. This chapter examines each indicator individually, setting out how each would work, modelling the number of households that each would identify as fuel poor, and assessing the advantages and weaknesses of each.

6.1 Option A: A fuel poverty ratio with income measured after housing costs

5. A common proposal made in the course of the review was to retain the current definition but to measure income After Housing Costs (AHC). Some respondents to our call for evidence suggested this was the only change required. In essence, it is argued that measuring income in this way would give a truer picture of a household's disposable income and therefore the affordability of fuel bills, given that housing costs are usually effectively met first, before other consumption.

How it works

6. This indicator shares all the features of the current methodology for calculating

fuel poverty, save for the way it measures income. The overall effect is to give a national picture of the level of fuel poverty once housing costs have been accounted for.

7. Data on housing costs are available from the English Housing Survey (EHS). For the purpose of the review, housing costs have been simplified to mortgage payments and rent. In practice, they go beyond this. We do not include in our analysis water rates, community or council water charges structural insurance premiums or gound rent and service charges.[144]

8. In calculating net incomes, mortgage payments should in principle be restricted to interest payments on the mortgage loan only, rather than the capital repayment, which can be seen as a form of investment. However, we have not been able in our calculations to make the split, since the EHS does not separate the two. As a result of this, housing costs will be exaggerated (and income lower) for some households paying off a mortgage.

144 The data required to do so are not contained within the English Housing Survey.

9. Compared to a BHC approach, measuring income on an AHC basis reduces household income for all households that do not own their home outright – for those that do, income remains unchanged. Therefore, adopting the 10 per cent ratio with an AHC income variable will lead to a rise in fuel poverty compared to Before Housing Costs (BHC). One could argue, however, that it would be better to adopt the original logic of the definition and so to base the threshold on twice median spend as a share of *AHC* income in the base year (1988). Doing so would give a higher threshold (13.6 per cent) and lead to a different effect on the numbers counted as fuel poor.

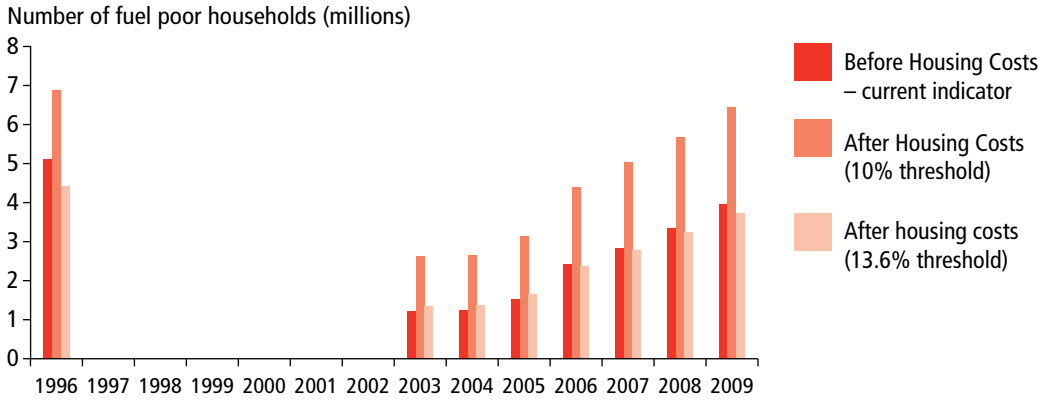
Modelling the indicator

10. This discussion leads to two possible options for an AHC indicator and we have modelled the results for both of them:

    (a) retain a 10 per cent fuel poverty threshold but with income measured AHC;

    (b) calculate a new fuel poverty threshold based on twice the median spend on energy as a proportion of income measured

Figure 6.1: *Number of households in fuel poverty, using before and after housing costs income, 1996, 2003 – 2009, England*



Source: Fuel Poverty Dataset, 1996 and 2003 to 2009, (DECC), Living Costs and Food Survey, 1996 and 2003 to 2009, (ONS)

AHC from the 1988 Family Expenditure Survey.

Figure 6.1 shows the number of households captured under each of these approaches, alongside the number of households captured by the current indicator of fuel poverty (10 per cent of income before housing costs).

Composition

11. Detailed information about the breakdown by household type and region under this indicator are provided in Annex B. In 2004, compared to the current definition, this indicator sees a fall in the proportion of single pensioners (lower under this indicator) and also in that of single working age adults. There are also more families with children (couples and lone parents) identified by this indicator than the current one. These changes probably reflect the fact that housing costs are higher on average for working age households compared to pensioner households. The pattern, but not the scale, of difference between the two indicators is similar in 2009. This effect is due to the operation of the fixed threshold which reflects the density of certain household types in the overall distribution of households.

12. In terms of English regions, this indicator sees an increase, compared to the current indicator, in the proportion of households captured that are in London. This reflects higher housing costs in these regions.

Pros and cons

13. We agree with the view expressed by many responding to the call for evidence that there is a good case for measuring income after housing costs. The income needed to cover housing costs cannot be spent on heating and powering the home and it is fair to reflect this. Even more than fuel costs, many households find it hard to adjust their housing costs, which is why DWP presents poverty statistics both before and after housing costs.

14. As an adjustment of the current indicator – albeit one that goes beyond a mere technical adjustment – this approach shows the same qualities as the current definition, set out in Chapter 5, and therefore many of the same advantages and disadvantages. As the chart shows, if the same 10 per cent threshold is applied to after housing costs income, this indicator counts more households as being fuel poor than the current indicator, but with similar trends over time. However if the spirit of the original definition is followed, logic suggests that the threshold should be based on median spending as a share of AHC income in 1988 (13.6 per cent) as well. This implies slightly *lower* numbers than the current indicator in 2009.

15. However, as set out and in Annex B, even if the aggregate numbers are similar, the composition of who is classed as fuel poor changes – more households in London are brought into fuel poverty under the after housing costs approach, and fewer households that own their property outright are classed as fuel poor.

16. The indicator requires accurate recording of housing costs. Models would need to be constructed to convert data recorded in the EHS to allow a more refined calculation. It should also be noted that this approach produces even more very low – indeed negative – reported incomes. It therefore generates even more extreme – even undefined – fuel poverty ratios. This is an added limitation.

Using after housing costs income arguably gives a better picture of disposable income and therefore of the true affordability of fuel bills. This is shown in the composition breakdown, including the shift in regional emphasis to London. Logically, the threshold used should also be adjusted to be based on AHC income. This means aggregate trends are little changed, but there is a good case that the composition would be more appropriate. Apart from this, however, the indicator would have much the same advantages and disadvantages as the current definition, but with an added limitation in terms of the treatment of very low and negative incomes.

6.2 Option B: A fuel poverty ratio with a dynamic threshold based on twice median spending

17. We described in Chapter 5 how the original intention behind choosing a fuel poverty threshold of 10 per cent under the current definition was to measure unreasonable fuel costs relative to average energy bills and income at the same time. This threshold was intended to be relative to both the energy bill and income of the median household (it also happened to match the average across the poorest 30 per cent of households).[145]

18. In practice, the fuel poverty threshold has been constant at 10 per cent, which in 1988 was twice the median spend on fuel as a proportion of income. This means that in each year for which numbers have been estimated, whether a household is fuel poor or not has been dependent on its required fuel costs and income compared to averages in 1988, rather than being relative to the circumstances and behaviour of contemporary households.

How it works

19. It was noted by some giving evidence to the review that the measurement of fuel poverty is currently absolute not relative, but the latter could be considered. Taking this approach the intention would be to capture those who needed to spend a lot – had 'unreasonable costs' – relative to actual spending by typical households at the time. This would mean recalculating the fuel poverty threshold in each year. This could be done by calculating, on an annual basis, twice the median proportion of income spent on fuel by the average household. Box 6.1 describes why we do not think it would be helpful to use a relative threshold based on the actual spending of the poorest 30 per cent.

20. To set a fuel poverty threshold each year based on twice the median energy bill as a proportion of income, individual household actual fuel bills would first be expressed as a proportion of their income. The average (median) proportion of income spent on energy, before housing costs

145 See Annex D of the UK Fuel Poverty Strategy 2001. See also Boardman, B. (2010). *Fixing Fuel Poverty: Challenges and Solutions*. London: Earthscan.

Box 6.1: Making the current definition dynamic: average energy spend of the poorest 30 per cent of households

Setting a fuel poverty threshold relative to the average income and energy bill of the poorest 30 per cent of households would imply that how much income this group spends on energy on average is 'reasonable'. This is contentious, as low income is correlated with low energy use.[146] The question has previously been raised whether the average actual energy bills of a group of households likely to be heating their homes to a less than desirable level should be used as a benchmark.[147]

Further, this approach would be conceptually out of step with other official relative indicators, such as income poverty, which assess whether a household has an adequate level of income relative to the average (median) household, not whether a household has sufficient income relative to the poorest households.

The questionable rationale for setting a threshold in this way and its inconsistency with the wider consensus on developing relative indicators led us to the decision to not consider this approach further.

are considered, would then be selected and doubled to establish the fuel poverty threshold for that year (Table 6.1). This threshold would then be used, as under the current definition, to determine which households were in fuel poverty based on their income and required energy bill which is calculated, as now, from the English Housing Survey.

Modelling the indicator

21. This twice median spend indicator makes only a small change to the practicalities of the existing approach to fuel poverty modelling. It generates a more stable indicator of fuel poverty over time (Figure 6.2), because the fuel poverty threshold is recalculated in line with changes in the fuel spending behaviour of and energy prices faced by the median household. For

Table 6.1: *Fuel poverty threshold based on twice median fuel spend as a percentage of income, 1995-1996 to 2009, England*

Year	Spend on fuel as a proportion of income (%)	Twice fuel spend as a proportion of income (%)
1995/96	4.8	9.5
2000/01	3.4	6.7
2002/03	3.1	6.1
2003/04	3.1	6.2
2004/05	3.1	6.3
2006	3.7	7.4
2007	3.8	7.6
2008	4.1	8.1
2009	4.5	9.0

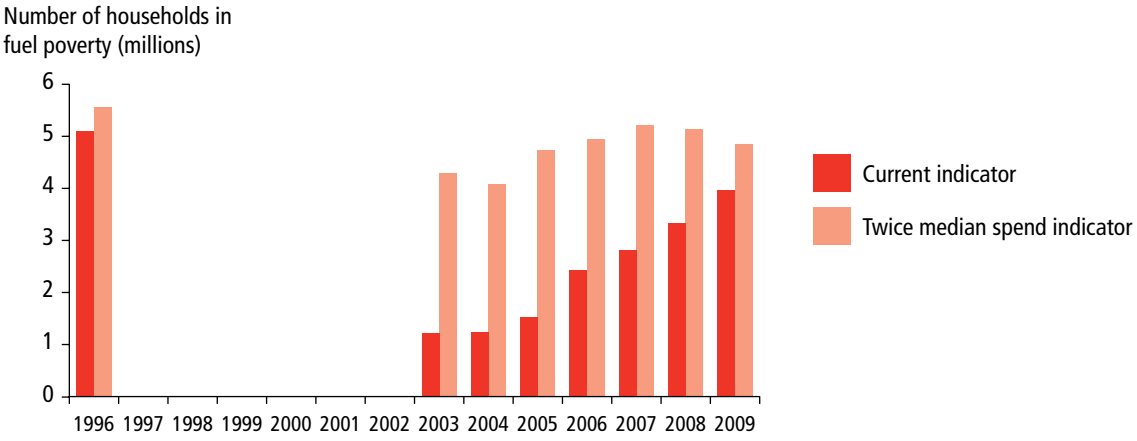
Source: Living Costs and Food Survey, 1996–2009 (ONS).

Note: The predecessor survey to the LCFS, the Expenditure and Food Survey, changed from collecting data on a financial year basis to calendar year basis from 2006.

146 For example, see White, V., Roberts, S. and Preston, I. (2011). *Understanding 'High Use Low Income' Energy Consumers*. Bristol: Centre for Sustainable Energy. Available at: http://www.ofgem.gov.uk/Sustainability/Cp/CF/Documents1/High%20use%20low%20income%20energy%20consumers_Final%20Report%20Nov%2010.pdf

147 Boardman. (2010).

Figure 6.2: *Number of households in fuel poverty under the current indicator (fixed threshold) and relative indicator (twice median spend), 1996 and 2003 – 2009, England*



Source: Fuel Poverty Dataset, 1996 and 2003 to 2009, (DECC), Living Costs and Food Survey, 1996 and 2003 to 2009, (ONS)

instance, if all household behaviour stayed the same and all energy prices halved, the same number and composition of households would be fuel poor as before the price change because of the relative nature of the measurement. For the number of fuel poor households to change, the income, energy bill, or actual behaviour of some households compared to the median household would have to change. Based on this relative twice median fuel poverty threshold, an estimated 4.8 million households would be in fuel poverty in 2009, compared to nearly 4 million under the current definition. The big difference is the numbers reported for 2003 and 2004: the dramatic reduction seen under the current definition is greatly attenuated.

22. Setting a threshold calculated using twice actual median fuel spending against *modelled* required fuel bills (as a proportion of income) raises a question of consistency (which also applies to the current definition). We saw in Chapter 2 that on average actual household fuel spending is lower than modelled fuel bills suggest they should be to reach a certain level of warmth. This means that using twice the actual median fuel spend would result in a lower fuel poverty threshold than if modelled fuel bills were used instead. As a result, we would expect more households to be classed as fuel poor under this approach than if the threshold were set on twice the median *modelled* fuel bill as a percentage of income. On a consistency basis, one could argue that it would be appropriate to use twice the median *modelled* fuel bill to set the threshold. However, given that the current definition of fuel poverty set the threshold based on actual spending, we retain this approach in this dynamic version. Similarly, we retain the use of before housing costs income in modelling this option. Income could equally be measured after housing costs.

Composition

23. See Annex B for full details of the household type and regional composition of this indicator. In summary, in 2004, the proportion of couples with child(ren) captured by this indicator is nearly twice that of the current definition – similar to the AHC indicator – while the proportion that are lone parent households increases

to a slightly lesser degree. Pensioner couples are higher as a proportion of the total households identified, while the proportion that are single pensioners falls but by considerably less than was the case under the after housing costs approach. A much smaller proportion are single people under 60 – around a third lower than under the current definition. By 2009 the picture painted by this indicator has changed little, with the composition being very similar to the situation under the current approach. This is entirely to be expected: in 2009 the twice median value was rather similar to the fixed threshold under the current definition of 10 per cent.

Pros and cons

24. This approach requires only a small adjustment to the existing calculations, although it leads to rather different results. Some additional data collection would be required to model it, as actual energy bills and income are required to determine the fuel poverty threshold, whereas the current definition only requires modelled bills and income. These spending data are currently available from the Living Costs and Food Survey.

25. This option retains the focus of the current definition on the key drivers of fuel poverty – income, prices and (indirectly) energy efficiency, but the relative nature of the approach means that it is less sensitive to large shifts in energy prices.[148] It means that when prices fall for all households, those that face high costs relative to others are still captured as being in fuel poverty. Similarly, when prices rise for all households, those who have relatively low costs at that time will not be classed as fuel poor.[149] This would mean that the composition of who is measured as being fuel poor would not tend to change as significantly year on year as it does under the current approach, potentially making it easier to identify which groups of households are affected and should be the focus of policy.

26. The relative nature of the twice median indicator has a further advantage in that it would reflect widening inequalities in incomes and/or energy efficiency of the housing stock. This means that if the energy efficiency of some sections of the housing stock improved, but for others it did not, this would be at least partially reflected in the indicator. Similarly, if the incomes of some groups of households increased at a faster rate than others, this would also be captured. This means that significant reductions in fuel poverty would have to be as a result of improved thermal efficiency or major cuts to prices and/or increases in income, at a faster than average rate, for those households with high fuel costs relative to their incomes.

27. Further, one might argue that since the 10 per cent threshold was based on a relative comparison to begin with, it should have always been a relative indicator. This would make the 'twice median spend' approach a more consistent application of the logic underlying the current definition.

28. The stability in fuel poverty numbers that results from this approach could be considered a strength. Compared to the

148 In fact, it may be affected very little by fuel prices.

149 This could also better capture the persistence of fuel poverty, as those groups of households who remain on low incomes and is significantly less energy efficient homes than the average are likely to be classed as fuel poor even if overall energy prices fell significantly. It would not currently be possible to track whether the same specific households remain in fuel poverty, as the longitudinal data do not exist. However, it would be possible to see to what extent broad groups of households (for example, older people or young families) are classed as being fuel poor year to year.

major variations in fuel poverty in the last decade under the current approach, this option would seem to paint a more reliable picture of the underlying issues that lead to fuel poverty. However, not everyone would agree this is a strength. For example, in his evidence to the review Dr Richard Moore contends that the stability of this indicator is a weakness, insofar as it "masks the fact that a great many more households will have had genuine difficulty in meeting their fuel costs" in years of high fuel prices. He also argues that a relative approach might be appropriate for measuring income poverty, but cannot be taken as automatically appropriate for fuel poverty, given the volatility of fuel prices (compared to the relatively more modest fluctuations in income levels). One approach to dealing with this objection, in part at least, would be additionally to focus on the depth of fuel poverty. We consider this in the next section.

29. What is clear is that the approach still has many of the other weaknesses of the current definition outlined in Chapter 5. First, it is based on a relatively arbitrary judgement that more than twice rather than, say, three times or one and a half times the average proportion of income spent on fuel is unreasonable – although it is true that all thresholds that determine what is reasonable require a degree of subjective judgement. It remains a headcount indicator, and does not by itself reflect the depth of fuel poverty. While the greater stability in who is classed as fuel poor may help in identifying them on the ground, it would still require detailed assessment of incomes and costs to do so accurately. The policy incentives relating to the ratio of energy bill to income under the current definition are also retained. This means that interventions that seek to reduce fuel bills affect the indicator more than increases in income of the same value. Finally, the indicator also retains the possibility of classing some high income households as fuel poor, which does not closely reflect the Warm Home and Energy Conservation Act (WHECA) definition of a fuel poor household.

Using a threshold that changed over time would remove the extreme sensitivity of the current definition to fuel prices, which is one of its major weaknesses. However, one objection could be that it would be inappropriate to remove *all* sensitivity to price levels. As a ratio indicator, it would remain affected by many of the other problems that this causes with the current definition.

6.3 Option C: Using the fuel poverty ratio to measure a fuel poverty gap

30. One problem with the current definition (and with the modifications as discussed in Sections 6.1 and 6.2) is that it does not attempt to measure the depth of fuel poverty as a distinct issue (although it is possible to argue that the current approach attempts to measure depth and extent simultaneously). Perhaps for this reason, it has been suggested that a supplementary indicator giving a specific and separate sense of the depth of fuel poverty could be useful in helping to identify and prioritise particular groups. One way of doing this is to look at a 'fuel poverty gap'. This is similar to the US 'energy affordability gap' approach described in Box 6.2.

How it works

31. The 'fuel poverty gap' is effectively the difference between what modelled bills are and what they should be to avoid fuel poverty. The Energy Act 2010 describes closing this gap as one way of "reducing fuel poverty" and refers back, at the same time, to WHECA and the notion of reasonable costs. Using this terminology, one could take reasonable costs to be 10 per cent of income. One way of measuring the fuel poverty gap is therefore to measure the difference between a household's modelled energy bill and a bill representing 10 per cent of income (where the former is greater).

32. A fuel poverty gap can be calculated per household and then summed to give an aggregate gap per group of the population. Under this calculation, any household with a reported zero or negative income would have a default fuel poverty gap set equal to their modelled fuel costs. The data needed for this calculation are available from the current fuel poverty dataset.

Modelling the indicator

33. As shown in Table 6.2 we have modelled the median, mean and aggregate fuel poverty gap for England for the period 1996 to 2010 using the current definition. The median fuel poverty gap measured this way would have nearly halved in real terms from £292 in 1996 to £164 in 2004, but then increased to above £300 after 2007. This is in line with what one might expect from price changes. However the aggregate gap moves much more

Box 6.2: The Energy Affordability Gap

The Energy Affordability Gap (EAG) is an approach that was developed by the US consulting firm Fisher, Sheehan and Colton. The approach calculates the gap between 'affordable' energy bills and actual bills.

The EAG is calculated according to the following formula:

Energy Affordability Gap = Actual Home Energy Bill – Affordable Home Energy Bill

Where:

'Actual Home Energy Bill' is a modelled bill where household energy costs are calculated as a function of energy use intensity, tenure, house size, household size and type of heating fuel; and

'Affordable Home Energy Bill' is set at 6 per cent of gross household income.

The EAG gives an indication of the extent to which households are over-extending themselves with respect to energy costs. The indicator is used both at a household and aggregate level.

This is a relatively simple and intuitive indicator that gives a sense of the depth of the energy affordability problem. The key limitation of this sort of approach is that it is based on actual energy consumption and, as such, it registers a reduction in actual energy consumption as an improvement in the affordability of energy. There are some situations where this would be correct (e.g. a reduction in energy consumption that results from the installation of an improvement in the efficiency of a dwelling). In other situations (e.g. where a household is self-rationing energy use due to reasons of hardship) this would be incorrect, for the reasons discussed in Chapters 1 and 2.

dramatically – the effect of fuel prices on numbers compounding the effect on the gap – from £300 million in 2004 to £1.9 billion in 2009.

Pros and cons

34. The great advantage of this approach is that it gives a specific impression of the depth of fuel poverty and how this changes over time. The fuel poverty gap helps to put a figure in pounds and pence on how households are affected by fuel poverty. It can do this in terms of a single number per household, per population group or for England as a whole. The indicator is highly reactive to changes in fuel prices, painting a picture of dramatically deepening fuel poverty since 2004. It could meet the requirements of the 2010 Energy Act to look at the depth as well as the extent of fuel poverty.

35. What is more, the fuel poverty gap shows the impact of energy efficiency measures: all things being equal, energy efficiency improvements act to reduce the fuel poverty gap. The effect of such measures may be, in practice, offset by price increases (or reinforced by falling prices), but it is theoretically possible to isolate the impact of both energy efficiency and price factors and present them separately in pounds and pence under this approach.

36. For these reasons, a fuel poverty gap approach offers the potential to understand fuel poverty better. Fuel poverty gap information might also help with targeting, in the sense that policies could be directed at those groups of the population with the highest gaps.

37. However, basing a fuel poverty gap indicator on the current ratio-based definition has two substantial problems.

Table 6.2: *The fuel poverty gap 1996 to 2009, England*

Year	Number of households in fuel poverty (millions, current measure)	Aggregate fuel poverty gap £billion (2009 prices)	Mean fuel poverty gap per household £ (2009 prices)	Median fuel poverty gap per household £ (2009 prices)
1996	5.1	1.3	252	292
2001	1.7	0.6	335	218
2003	1.2	0.3	256	170
2004	1.2	0.3	265	164
2005	1.5	0.5	318	205
2006	2.4	1.0	417	276
2007	2.8	1.3	444	307
2008	3.3	1.5	451	311
2009	4.0	1.9	490	335

Source:Fuel poverty data 1996, 2001, 2003-2009, (DECC)

First, at the individual level the use of an average fuel poverty gap puts more weight on those with the highest ratios. These will include very low reported or even misreported incomes. It could give weight to some observations in which we do not have confidence. This can partly be avoided by using the median gap. However construction of an aggregate gap is vulnerable to this problem and it also effectively double counts the impact of price changes. The headcount indicator is already dominated by fuel prices, leading to rapid fluctuations in the number of fuel poor. Since the fuel poverty gap then shows the impact of price changes too, this driver of fuel poverty is given even more weight. That is why the aggregate gap, measured in this way, increased more than five fold from 2004 to 2009 in Table 6.2.

Using a fuel poverty gap could give a very helpful sense of the depth of fuel poverty measured in £s at household and aggregate level. It could supplement an indicator showing the extent of fuel poverty. Fuel poverty gap data at a household or population group level could help policy making and delivery. However, basing a fuel poverty gap on the current fuel poverty ratio indicator puts most weight on observations that may not be accurate. If used to generate an aggregate gap it compounds its extreme sensitivity to price changes.

6.4 Option D: After Fuel Costs Poverty

38. One of the problems identified in Chapter 5 relating to the current fuel poverty definition is that, while it may capture a number of households with high energy requirements, not all of these households have low incomes. Some of the households captured could be expected to be able to absorb the cost of higher bills within their relatively high absolute levels of income. By contrast, for households on low incomes, unreasonable fuel costs would have to be traded-off with other essential expenditure.

39. The official definition of a household living in income poverty is one whose net income (allowing for household size and composition) is less than 60 per cent of the median household income. This is used because it is considered that those living below this income will be unable to afford basic and essential living costs and more generally unable to participate in contemporary society.

40. An alternative way of measuring poverty is to calculate the minimum amount needed to pay for particular defined essential household expenditures, such as mortgage payments or rent and other utilities, and then to deduct these from households' net income to see whether or not they are able to meet those essential expenditures.[150] Some of those working with this approach have suggested that it might offer a way of capturing those who face high fuel costs while being on low incomes. Instead of using a standard figure for fuel costs, the number used could reflect the households needs and energy efficiency of the property.

41. Using this 'Minimum Income Standards' approach (see Box 6.3) would be a major departure for official poverty indicators. However one could use the same idea within the current official approach to poverty measurement. Just as DWP calculates poverty after housing costs, so one could calculate 'after fuel costs' poverty, allowing for fuel spending needs calculated in the same way as they are for the current definition. This would be justified on the basis of the analysis in Chapter 2 in particular: fuel costs can be outside the control of individual households and prices vary by area (particularly where choice is restricted to off-grid fuels).

How it works

42. To implement this approach, we need data on household income and on the thermal performance of dwellings in order to model the amount of energy the household requires. These are the same data as needed for the current definition. There is a choice of sources for income data, but the only survey where income data is available in combination with house condition

150 As suggested by Richard Moore in a paper submitted to the review's Call for Evidence.

Box 6.3 Minimum Income Standards[151]

Within the context of after fuel costs measurement, one variation would be to look at the total expenditure required in a given household for non-energy necessities and see whether the residual income is sufficient to meet modelled fuel costs/needs. The University of York and the Loughborough University Centre for Research in Social Policy in conjunction with the Joseph Rowntree Foundation have developed a Minimum Income Standard (MIS) which seeks to do this by setting out minimum expenditure for a number of different household types leading to a minimum income needed to meet these requirements.

One way of measuring fuel poverty would be to use the MIS in conjunction with income data from the EHS and the modelled fuel bill, as now, from BREDEM to see to what extent fuel bills are affordable once other necessary expenditure has been subtracted from income. This might also allow the depth of fuel poverty to be estimated e.g. the scale of other expenditure that would need to be foregone in order to meet the fuel bill.

This way of estimating fuel poverty assumes all other expenditure needs have been met in full and relies on accurate income reporting.

information is through the English Housing Survey.

43. Under this approach, households whose income falls below a certain threshold after housing and fuel costs are deducted are classified as 'after fuel costs poor'. As well as capturing all those households whose income is below the income threshold (i.e. the majority of those already under that threshold), this would also capture those people who – were they to prioritise energy spending – would be pushed into income poverty because of the level of costs faced. This indicator might help to understand the depth of 'after fuel costs poverty' experienced by households.

Modelling the indicator

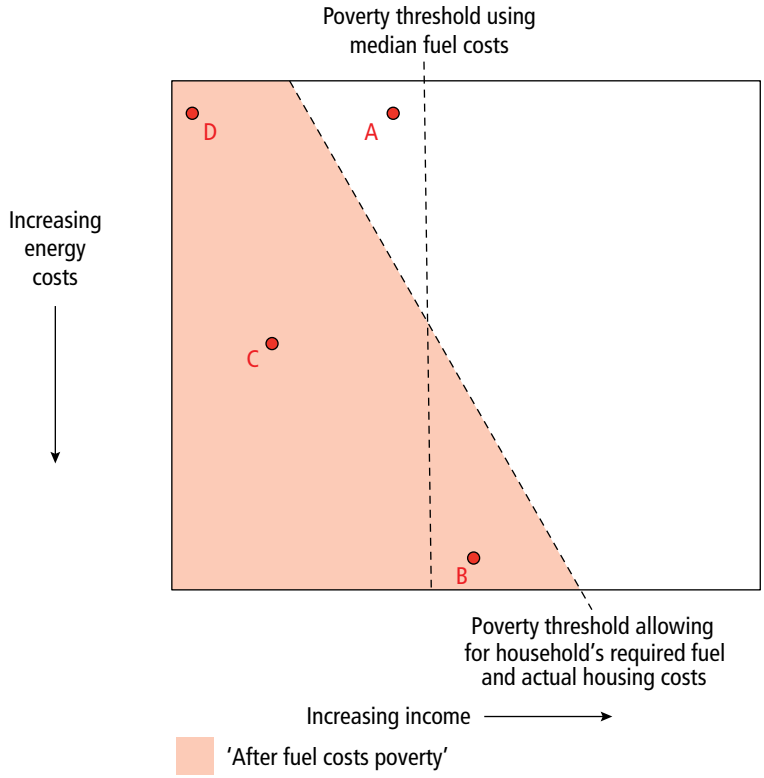
44. Figure 6.3 provides a conceptual graph for this approach.

45. In modelling this indicator, we have set an income threshold in a similar way to the current official poverty definition, using 60 per cent of the median household disposable income after housing and modelled fuel costs. We have then adjusted this for household size and composition (as with DWP's HBAI analysis). The choice of threshold is essentially a matter of judgement, but for the comparative analysis below, it is most convenient to work with the current poverty line.

46. Because the threshold is relative to the median household income after housing and modelled fuel costs, some households on the margins of poverty but with high costs are pushed into poverty by their fuel bills (e.g. Household B in Figure 6.3). This captures one of the issues at the heart of concerns about fuel poverty. However, by the same token, some households (like household A in the figure) with relatively low required fuel costs are no longer counted as being poor. The majority of

151 See: http://www.minimumincomestandard.org/

Figure 6.3: *Conceptual graph of 'after fuel costs poverty'*



households that would be classed as poor before adjusting for fuel costs (such as household C in the figure) would also be classed as poor after fuel costs.

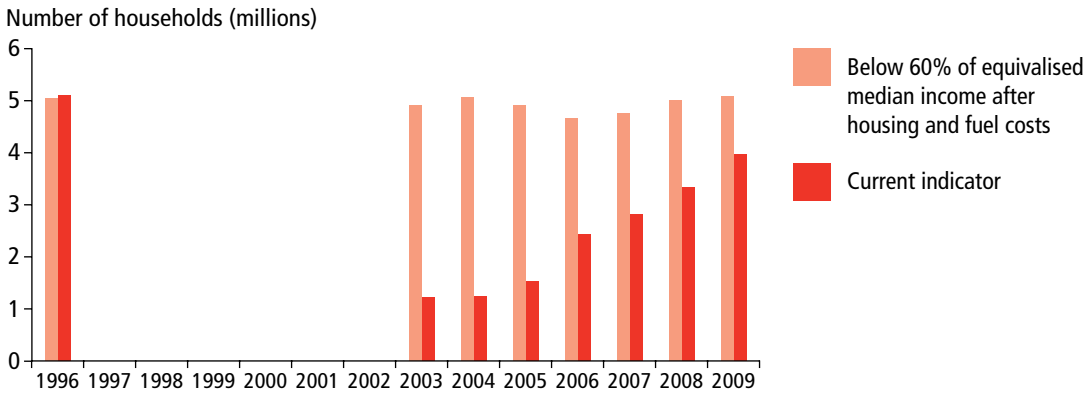
47. Figure 6.4 shows us that the numbers counted as after fuel costs poor under this indicator would have been fairly stable between 1996 and 2009. In fact the numbers would be very similar to the number of households classed as poor on conventional poverty indicators (as applied to this dataset).

48. Income is the dominant factor of this approach, rather than fuel bills. Therefore, changes in income distribution will have a greater impact on the numbers of fuel poor. Theoretically, a household living in income poverty could have a negligible fuel bill but still be after fuel costs poor (such as household D in Figure 6.3). As such, bills will push only those on the margins of income poverty into or out of fuel poverty.

Composition

49. Compared to the current indicator, this indicator leads to stark changes in the composition of those identified (see Annex B). This is particularly apparent in three household types: couples with children; single pensioners and single people under 60. This is because this indicator uses a measure of income that is adjusted for household size and composition. 'Equivalising' income in this way shifts the distribution towards larger households, an effect that is likely to be enhanced because such households tend also to have relatively high housing costs. The 2009 figures show a similar

Figure 6.4: *Number of households in fuel poverty under current indicator and 'after fuel costs' poverty indicator, 1996 and 2003 – 2009, England*



Source: Fuel poverty data, 1996 and 2003 – 2009 (DECC)

composition by household type. There is some variation in the case of pensioner couples with no dependent children and single working age households with no children. These results should be expected: at times of high prices those with relatively stable and modest incomes could easily fall the other side of the threshold.

50. Because income levels are measured net of housing costs under this indicator, the regional breakdown changes compared to the current definition. Specifically, higher housing costs in London mean that this region accounts for a higher proportion of households identified under this indicator.

Pros and cons

51. From the perspective of those concerned by affordability and poverty, this approach correctly identifies those who are most likely to be making trade-offs between essential goods. This is because it shows us which households are in poverty and those that are pushed into poverty by their fuel costs. It also excludes those with low costs that are only just below the poverty line. In effect, this amounts to a more sophisticated way of measuring the extent of poverty.

52. On the other hand, whilst this approach successfully identifies those who would not ordinarily be considered as income poor but whose excessive fuel costs push them into poverty it is more sensitive to household income than energy efficiency of the home which is another key driver of fuel poverty.

53. To the extent that this indicator identifies nearly all households that are low income, regardless of fuel requirements relative to others, this approach does not seem to reflect the distinct nature of fuel poverty as a policy concern either as defined in WHECA or as emerged from the discussion in Chapter 4. For example, under this indicator, a household (such as household D in Figure 6.3) would be classed as fuel poor even though it lived in a near zero carbon home were its income levels far enough below the threshold set for income. It seems more helpful to see such a household as being severely poor in the conventional sense, rather than specifically 'fuel poor'.

54. This option could provide information to policy makers on both the number of people who are poor after allowing for fuel costs and the depth of their poverty, since it would capture those households with the lowest disposable income levels. This might enable better targeting of policies, because they could be focused on those who have the greatest 'poverty gap', or in other words, are experiencing the deepest poverty. However, this once again moves in the direction of considering fuel poverty to be, at heart, simply a poverty issue.

55. At the same time, this indicator would usefully highlight those who are effectively pushed into income poverty by what we would consider to be unreasonably high costs compared to what an average household should be spending, based on its size and composition. As highlighted in Chapter 4, this is a key issue in distinguishing fuel poverty from income poverty.

There is a focus within this option on income levels and poverty, such that the distinction between being poor and fuel poor is virtually lost. Essentially this kind of approach is a more sophisticated way of measuring fuel poverty, not a specific measure of fuel poverty. However, it does have an advantage in terms of identifying the impact of high fuel costs for those on the margins of fuel poverty in that it captures those who are pushed into poverty by higher than average energy costs

6.5 Option E: Low income and low SAP overlap

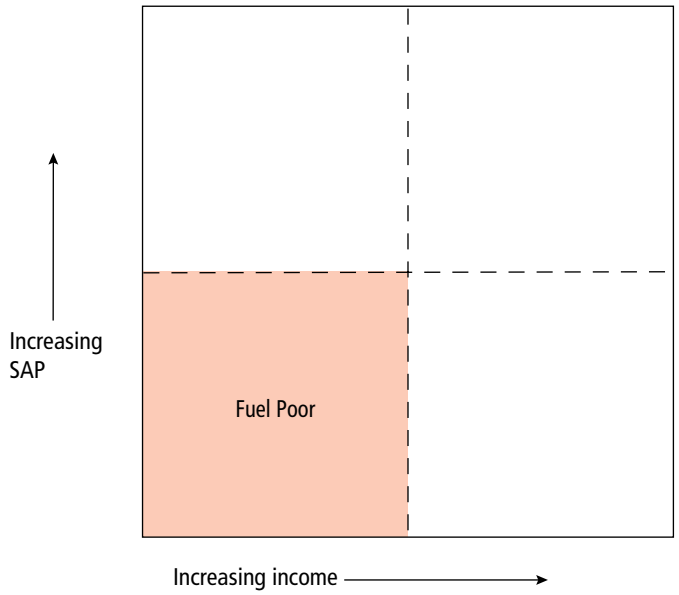
56. This approach focuses directly on the group of households that have *both* low incomes *and* energy inefficient dwellings. As such, the approach would bring the definition of fuel poverty closer to the notion of fuel poverty that is set out in WHECA. It would also align with the way that many stakeholders frame the issue (the issue of the overlap between inefficient houses and low incomes was a theme that came up in many responses to the call for evidence). In addition, this sort of 'overlap' indicator would align more closely with the way in which support is targeted on the ground (where support is increasingly targeted at energy inefficient households that receive means-tested benefits).

How it works

57. Figure 6.5 shows how this approach might work. Households would be classified as being in fuel poverty where both household income was low and where the SAP rating of the dwelling was below a specified threshold.

58. If used in practice, this indicator would require the establishment of an income threshold and a SAP threshold. For low income, this could be relatively simple. For example, one option would be to use the 60 per cent threshold of after housing costs (AHC) median income, as reported in the Households Below Average Income statistics. Setting a SAP threshold would require a judgement to be made about the level that could prevent higher than average or otherwise 'unreasonable' costs. Furthermore, this threshold could be relative or absolute.

Figure 6.5: *Fuel poverty defined as the overlap between low income and SAP*



Modelling the indicator

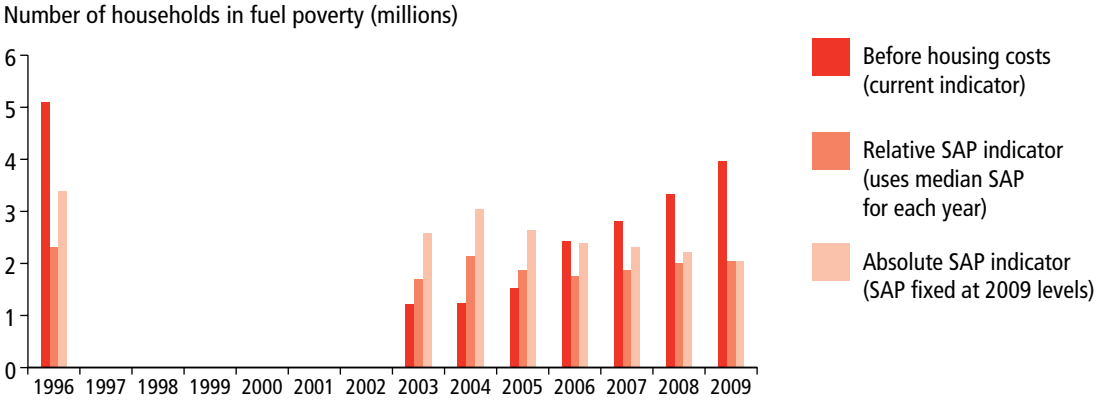
59. We have modelled this indicator using an income threshold set at 60 per cent of median equivalised AHC income and a SAP threshold set at the average level in each year for all dwellings. This shows how many poor households are living in homes that have greater energy needs than the contemporary median (even though they have much lower incomes than the median). We also model the numbers of poor households that have been living in homes below a *fixed* SAP threshold of 55 (the median SAP in 2009).

60. Figure 6.6 shows how the number of fuel poor households as defined by the low income and low SAP indicator (based on the SAP and income thresholds described above) would have evolved since 1996. The estimates suggest that the indicator would be relatively stable and that, under the relative SAP thresholds, it would have shown modest reduction in the number of fuel poor households since 1996. This reflects the small reduction in poverty and the improvement in the relative energy efficiency of the housing stock for low income households. By contrast, against a fixed SAP threshold of 55, the number of poor households also in very energy inefficient homes would have been shown to fall much more rapidly over the period, from 3.4 million to 2.0 million.

Composition

61. One would not necessarily expect the composition of households under the low SAP low income indicator to reflect the current indicator especially closely given that it represents a very different interaction and does not react to price changes in the same way. As with some other alternative indicators, a pattern emerges in which, in 2004, those classed as fuel poor comprised a greater proportion of couples of working age with children and a smaller proportion of single

Figure 6.6: *Number of households in fuel poverty under current indicator and low income low SAP indicator, 1996 and 2003 – 2009, England*



Source: Fuel poverty data, 1996 and 2003 – 2009 (DECC)

pensioners (see Annex B). Lone parents also make up a greater proportion of the households captured. These results reflect what we know to be the pattern of income for these households. By 2009, there is a proportional decrease in pensioner households identified by the indicator.

Pros and cons

62. This is a simple and intuitive approach that reflects reasonably closely the original definition set out in WHECA by capturing low incomes and the main driver of unreasonable costs. Defining a SAP threshold as a proxy for what is meant by reasonable costs helps to avoid the problem with the after fuel costs poverty approach, examined in Section 6.4, where a large number of low-income households with low energy requirements would be captured. While these households are undoubtedly in poverty, their relatively low energy requirement makes it difficult to argue that they are also specifically in fuel poverty.

63. Central and local government action on fuel poverty is increasingly targeted at groups of low-income households or households that are in the overlap between low income and poor thermal efficiency. Defining the fuel poor as the overlap between low incomes and poor housing would mean that the targeting of policies could be more closely aligned to the group of households that are captured by the indicator.

64. On its own, however, the low income and low SAP indicator would not precisely identify affected households on the ground (although SAP bands within the overlap could be identified). As is the case under the current approach, determining the fuel poverty status of a particular household would still require detailed information about the household circumstances and the thermal efficiency of the dwelling.

65. The key weakness with this approach is, however, that the SAP rating of a dwelling is an imperfect indicator of what

constitutes "reasonable costs" and, as a consequence of this, it displays a number of less desirable qualities. These are:

(a) The use of SAP as the proxy for reasonable costs would result in the indicator capturing some households that would actually have relatively modest energy requirements. For example, some low-income households in small, low SAP dwellings (e.g. flats) could be captured under this approach. Others might have relatively low needs compared to others because, for instance, they were out all day at work. It would be difficult to justify households with very low absolute energy requirements being the focus of fuel poverty policy. At the same time, others staying at home all day in a larger, relatively high SAP properties would be excluded, even though they might be facing high energy costs.

(b) The SAP rating of a dwelling is a measure of the energy consumption per unit of floor space and is, therefore, unaffected by changes in energy prices. In turn, the indicator would not be affected at all by trends in energy prices on the level of fuel poverty. This is highlighted by Figure 6.6, where the trend in the number of households counted does not appear to reflect the rapid increase in energy prices.

(c) Just as the indicator would not reflect external changes in energy prices, it would also not show the impact of policies – such as the Warm Home Discount – that directly reduced energy prices or tariffs and, as such, might provide a disincentive to their use.

66. These are precisely the reasons why the current definition is based on an elaborate calculation of need to spend, not just on energy efficiency.

67. As we have modelled it the low income and low SAP indicator is a pure headcount indicator. It would capture the number of households that are in fuel poverty but would not measure the depth of fuel poverty. The approach would not, therefore, identify the worst affected fuel poor households. Nor would it reflect improvements in income or SAP that failed to move the household beyond either of the thresholds (although income schemes such as Winter Fuel Payments would have some positive impact). However, it would be possible to count how many poor households live in properties progressively further below the threshold. This would equate, in a certain sense, to the depth of fuel poverty and could be aggregated to give a national picture.

In many ways, using a combination of low energy efficiency and low income reflects the spirit of the Warm Home Energy Conservation Act, and what many regard as the core issue underlying fuel poverty better than the other approaches examined. Although more information would be needed on household circumstances and the thermal efficiency of the dwelling, it would be easier to use proxies to target policies for this type of definition than others we examine. However the SAP rating of a dwelling is only an imperfect indicator of what constitutes reasonable costs. The indicator would not reflect changes in one of the drivers of fuel poverty – energy prices – at all. It is for this reason that the existing definition goes beyond energy efficiency by itself to calculate households' needs to spend allowing for factors such as size of dwelling, occupancy patterns and fuel prices.

6.6 Option F: Subjective measurement of fuel poverty

68. The current definition works on the basis of an objective assessment of energy need. There is therefore no allowance made for how households choose to use energy, reflecting tastes and preferences. While, as has been shown above, a significant minority of households have relatively little room for manoeuvre when it comes to energy management in the home, most households have a range of options and choices. It is therefore worth considering whether it is possible to measure fuel poverty on a subjective basis, that is looking at whether people *say* they have problems affording heating. Doing so would mean using an indicator whose characteristics are fundamentally different from those of the others examined in this chapter.

How it works

69. Under such a definition, a household would be deemed to be in fuel poverty if its occupiers reported that they could not keep affordably warm. Making such an assessment of fuel poverty would require a national survey to be conducted in which relevant questions were asked.

70. In fact, one of the predecessor surveys to the English Housing Survey, the English House Condition Survey (EHCS), included questions permitting an assessment of subjective fuel poverty to be made (see below). The EU Survey of Income and Living Standards (EU SILC) also provides an insight into self-reported fuel poverty. Further approaches to subjective measurement, such as the Department for Work and Pensions efforts to measure material deprivation amongst different population groups, are also relevant.

71. In each case, one crucial aspect is the choice of questions used to garner the views of those surveyed.

Modelling the indicator

72. The subjective indicator is a headcount measure: a certain number of fuel poor households will be identified and that number can be measured over time. Unfortunately, whereas for other alternative indicators we have been able to make calculations to assess what their levels would have been in the past to compare with the current definition, we cannot do this for a subjective indicator because it depends on the questions which happen to have been asked previously.

Previous estimates of self-reported fuel poverty

73. Table 6.3 sets out information from a number of surveys through which self-reported fuel poverty has been measured.

74. The data from the EHCS show that, over the period 2004 to 2007, the proportion of households that were in self-reported fuel poverty rose from 6.4 per cent to 7.7 per cent. Under the current definition, fuel poverty rose from 5.9 per cent to 13.2 per cent in the same period, with a leap of 4.3 percentage points between 2005 and 2006. The data for EU SILC show that the UK has lower levels of self-reported fuel poverty than the EU-15 countries. The EU SILC figures for the UK show a dip in 2006 and 2007, but then a rise to much the same level in 2009 as in 2005. This contrasts somewhat with the EHCS pattern, but both are very different from the rapid growth under the current definition.

75. In May 2011, DWP published its first dataset on material deprivation amongst the pensioner population as part of its annual Households Below Average Income publication.[152] The results, which relate to 2009-2010, are shown below in Table 6.4. One specific question asked was: "Is your home kept adequately warm?" As can be seen, if this question is taken to relate to self-reported fuel poverty, the survey found 3 per cent of pensioners were identified, which is very much lower than the level under the current definition, under which 26 per cent of English pensioners were found to be fuel poor in 2009. The results for other questions "Without cutting back on essentials are you able to pay regular bills like electricity, gas or Council tax?" and "Do you have a damp free home?" are similar, although slightly higher.

76. The most obvious feature of the available subjective data is the relative steadiness over a period when fuel prices, and therefore fuel poverty as measured by the current definition, changed markedly. This could suggest that the impact of price rises on households is overstated in the current definition and that, on balance, those households that could keep adequately warm when prices were low could also keep warm when prices were higher. This suggests that the core of the problem is those households that cannot keep warm whatever the price of fuel. However, the reason for the trends in self-reported fuel poverty cannot be clearly isolated. It could be that rises in incomes or energy efficiency improvements over this period had a sufficient offsetting effect on household perceptions, but not on the official statistics.

152 Available at: http://research.dwp.gov.uk/asd/hbai/hbai2010/pdf_files/full_hbai11.pdf

Table 6.3: *Self-reported fuel poverty from varioius sources, 2003-2009, England, UK, EU-15*

Year	(a) Current fuel poverty figure (%)	(b) EHCS self-reported fuel poverty (%)	(c) EU SILC self-reported fuel poverty (%)		d) Pensioner material deprivation self-reported fuel poverty (%)
	England	England	UK	EU-15	UK
2003	5.9	6.8	–	–	–
2004	5.9	6.4	–	–	–
2005	7.2	6.6	5.7	7.6	–
2006	11.5	7.2	4.8	7.7	–
2007	13.2	7.7	4.4	7.3	–
2008	15.6	–	6.0	7.2	–
2009	18.4	–	5.8	6.9	3.0

Source: DECC (2010) for (a); DCLG for (b) (2009); EU SILC for (c) (20111); and HBAI (DWP) for (d) (2011)

Notes: For EHCS, this is the total proportion of households who said they could not keep comfortably warm in their living room in winter. For EU SILC data are provided in relation to an "inability to keep adequately warm" based on an update published on 15 September 2011.

Table 6.4: *Pensioner responses to questions potentially relating to fuel poverty, 2009-2010, UK*

		Income groups (net equivalised household income, BHC)					
		Bottom fifth	2nd fifth	3rd fifth	4th fifth	5th fifth	All pensioners
Home kept adequately warm	Yes (%)	95	96	97	97	99	97
	No (%)	5	4	3	3	1	3
Able to pay regular bills without cutting back on essentials	Yes (%)	95	95	97	98	99	96
	No (%)	5	5	3	2	1	4
Damp free home	Yes (%)	94	94	95	95	97	95
	No (%)	6	6	5	5	3	5

Source: HBAI, 2011 (DWP)

77. Table 6.5 considers further the breakdown of self-reported fuel poor households and 'officially' fuel poor households in 2007. As can be seen, the subjective indicator finds people who are not fuel poor under the official definition who self-report as fuel poor (5.9 per cent of all households) as well as people who are fuel poor under the official definition who do not self-report as fuel poor (11.4 per cent). Insofar as some of those who self-report fuel poverty are, objectively, not low-income households, or at least not deemed to be in fuel poverty, this would seem to be a weakness. It is not unusual for there to be a great difference between the households calculated statistically as being poor and those who say they are in poverty, but there is a relatively weak correspondence in this case.[153]

153 For instance, nearly half of those saying they were themselves poor were also below a low income threshold in 1999. (See Bradshaw, J. and Finch, N. (2003). Overlaps in dimensions of poverty. *Journal of Social Policy*, 32, 4, pp 53-525. Cambridge: Cambridge University Press.) In Table 6.5, less than a quarter of those saying they were not able to keep comfortably warm were officially classed as being in fuel poverty.

Pros and cons

78. Perhaps the main advantage of this approach to fuel poverty measurement is that it focuses on the problem where people themselves feel it. Some might argue that there is no advantage in considering a household to be suffering from a problem where that household itself does not feel that to be the case. In the case of fuel poverty, it could be reasonable to ask what is the benefit of classifying a household as being fuel poor because it cannot meet the temperature standard specified without spending more than 10 per cent of its income when that standard does not reflect their tastes and where they find a lower amount of spending is deemed to be acceptable.

79. On the other hand, there is a strong case in favour of an objective approach, reflecting the perspectives set out earlier in the chapter. In terms of carbon reduction, households that do not feel fuel poor may nevertheless be highly energy inefficient and there is a national interest in ensuring that their dwellings are improved. From

a health and well-being perspective, it is important to recognise the evidence that there are health risks of living at certain temperatures. Even if people feel they are comfortable living at low temperatures, there could be health implications. Older people have poor peripheral temperature perception – they may not feel their homes to be as cold as they actually are. There is also the poverty perspective: if the average person can afford to heat their homes to an objectively set standard, that *option* to meet a basic need should also be available to the poor, regardless of their preferences and tastes.

80. As set out above, the choice of question to unearth attitudes to energy use in the home is vital. For its part, the DWP material deprivation indicator contains the three questions whose results are shown in Table 6.4 each of which could point at fuel poverty while generating different responses.

81. For example, responses may reflect so-called 'conditioned expectations' whereby a response is governed by what someone feels it is reasonable to say based on assumptions about what they can rightly or fairly expect, or their past, possibly deprived, experiences, rather than what the rest of the population would judge to be their needs. This could partly explain the stability of these indicators.

82. The review also received evidence suggesting that there is the risk of stigma attached to 'admitting' to having difficulties in meeting energy bills or needs. Some respondents also argued that the issue of 'tackling fuel poverty' should be referred to as 'providing affordable warmth' so that policies could be more effectively delivered on the ground.

83. While one would expect that subjective assessments of fuel poverty would be influenced by a range of factors, it is not clear quite how the drivers of fuel poverty identified in Chapter 2 would be reflected. While income levels might drive the numbers, this could easily be offset by cultural values. The impact of fuel prices might be expected to be reflected – though as shown above this was not especially the case during the last decade. It is possible that fears about high fuel prices might drive perceptions rather than amounts actually paid. Finally, it is also difficult to see how energy efficiency improvements within the housing stock might reliably feed into the results.

Table 6.5: *Self-reported fuel poverty compared to the current definition of fuel poverty, 2007, England*

Able to keep comfortably warm in living room in winter	Not in fuel poverty (%)	In fuel poverty (%)	Total (%)
Yes (%)	80.9	11.4	92.3
No (%)	5.9	1.8	7.7
Total	86.8	13.2	100

Source: EHCS, 2009 (DECC)

84. One way of managing the risks of a subjective approach to measurement would be to invest in the construction of a survey that might be more robust through the development of a battery of relevant questions. Such a survey might also be able to tell us something about the depth of fuel poverty if it gave choices about how strongly respondents agree with a statement. A longitudinal survey would allow persistence to be measured. However, such a system would come at a cost, both in terms of survey design and survey deployment.

85. There is one practical advantage of this approach: it could be used on the doorstep

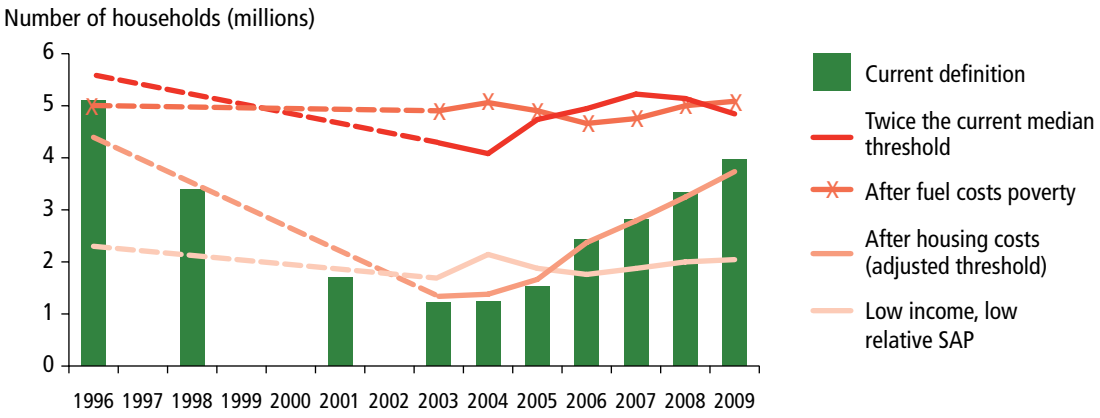
to identify those needing assistance, without a complicated requirement to assess household income or energy efficiency to deem someone to be fuel poor. However, this presupposes that householders respond honestly and reliably to questions asking whether or not they can keep their home adequately warm. People are often reluctant to identify themselves as 'poor', perhaps to avoid a perceived stigma. Alternatively, if it was known that a positive answer generated resources, some might be tempted to say they did have problems. At a national level such problems could well make policy-makers reluctant to see subjective indicators as robust enough to shape policy.

Using households' subjective description of the position they are in is a markedly different approach from the current one and other options examined here. One advantage of this approach is to cross-check the trends shown by other measurement approaches, and it is striking that recent trends in relevant responses are very different from those in the official fuel poverty series. However, individual perceptions may be very different from those of society as a whole, and people (particularly elderly people) may be reluctant to say that they face a particular problem. Responses also vary depending on precisely what question is asked. Such questions are most useful as a way of complementing more objective approaches, giving a reality check on them. From this point of view it would be helpful to re-incorporate questions about self-reported fuel poverty into the EHS.

6.7 Overview of aggregate numbers of households

86. For comparative purposes following the individual explanations of each indicator, Figure 6.7 below shows how the 'V' shape of the fuel poverty problem as depicted by the current definition compares to the trend identified by the main options explored in detail above.

Figure 6.7: *Number of households in fuel poverty under all indicators compared, selected years 1996 – 2009, England*



Source: Fuel poverty dataset, 1996 – 2009, (DECC), English Housing Survey, 1996 – 2009, (DCLG)

Note: there have been some changes in the methodology used to calculate fuel poverty statistics from year to year, which affect all the time series presented here. See Annex B for details of these changes.

Chapter 6 summary

This chapter has considered modifications to the existing definition and alternative ways of measuring fuel poverty.

In terms of composition, each indicator identifies households as fuel poor in ways one might expect given their respective design features. For example, those definitions that measure income after housing costs tend to consist of a greater proportion of families compared to the current before housing costs definition.

The regional breakdown is also affected most noticeably by income measurement after housing costs: London accounts for a greater proportion of the households captured than when before housing costs income is used.

Perhaps of more significance, each of the indicators examined has given rise to a set of particular insights:

- looking at income after housing costs, rather than before, arguably gives a better picture of a household's disposable income and affordability of its fuel bills;
- using a spending threshold that changes over time based on contemporary behaviour of society as a whole has appeal in principle, and would remove the extreme sensitivity of the current definition to price changes;
- some form of fuel poverty gap indicator would give a very helpful sense of the depth of fuel poverty by supplementing indicators on its extent;
- examining the number of households who are in after fuel costs poverty helpfully focuses on those who are pushed into poverty by the scale of their bills;
- looking directly at the number of households with both low income *and* living in energy inefficient (low SAP) homes reflects both the spirit of WHECA and popular perceptions of the problem;
- subjective indicators of fuel poverty could supplement other approaches and provide a cross-check on the trends shown.

However we have also seen that all of these options have drawbacks. Amendments to the current approach address specific issues but remain subject to the underlying problems associated with using a ratio. A depth indicator based on the current definition is very sensitive to very low reported incomes and shows trends in aggregate 'fuel poverty gaps' that are even more sensitive to price levels than the current indicator. Looking at poverty after fuel costs is essentially a more sophisticated measure of poverty, not of the particular issue of fuel poverty. A simple low income low relative SAP overlap indicator ignores the other elements driving households costs. Subjective indicators are affected by issues of stigma and doubts about their robustness.

Building on the analysis in this chapter, Chapter 7 therefore examines whether it is possible to construct an indicator that can exploit the advantages both of the current definition and some of the alternatives we have examined.

CHAPTER 7

Examining the overlap between low incomes and high costs

1. No single way of measuring the scale of a social problem will be without its flaws. As we saw in Chapter 5, the current fuel poverty indicator, despite its key strengths, has several. Most of these relate to the way it is based on a ratio of spending need to income, compared to a fixed threshold. This explains the way that fuel prices dominate the trends it reveals and its sensitivity to the precise assumptions used in its construction. Using different income measures or adjusting the threshold in line with contemporary spending patterns would have advantages but would not change this fundamental problem.

2. Of the other approaches examined in Chapter 6, the idea of looking directly at the number of people who have both low incomes and live in energy inefficient homes (option E) has the great attraction of reflecting the wording of the Warm Homes and Energy Conservation Act 2000 (WHECA), that is, focusing on the overlap between the two. As we saw in Chapter 4, this captures what makes fuel poverty distinct from several perspectives. However using energy inefficiency (low Standard Assessment Procedure (SAP) ratings) by itself fails to capture the other factors that affect households' need to spend. These are better captured by the way in which required spend is calculated within the current definition.

3. It is therefore potentially rewarding to examine whether there is a way of combining these two approaches, which is what we do in this Chapter. We look at an indicator which shows the number of people or households who have *both* low incomes relative to the rest of society *and* a high need to spend relative to others, using, for the latter, the same approach as the one that underpins the current definition.

4. The approach we show draws on insights from the suggestions explored in Chapter 6 in four other ways:

   - it uses an *after* housing costs measure of income;
   - it looks at household costs *relative* to the median spending needs of the whole population in the same year;
   - it takes account of the way in which those with high fuel costs can be pulled *into* poverty;

- it embodies a separate indicator of the *depth* of fuel poverty – 'the fuel poverty gap' – for fuel poor households on average and in aggregate, alongside a conventional indicator of its extent.

5. The analysis below suggests that this would come closer than other approaches to capturing WHECA's focus on, 'household(s) living on a lower income in a home that cannot be kept warm at a reasonable cost', as well as the Energy Act 2010's focus on both the numbers in fuel poverty and how badly affected households are.

A Low income – High Costs indicator

How it works

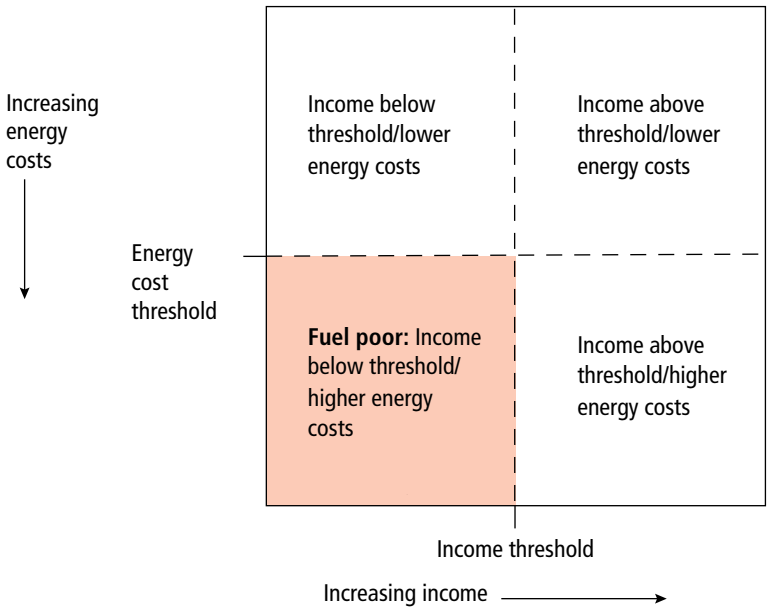
6. Figure 7.1 shows in broad terms how this approach might work. Households are defined as fuel poor where their household income is low and where their required energy spending in order to achieve an adequate standard of warmth is above a specified threshold. Fuel poverty is therefore represented by the shaded area in Figure 7.1. This is analogous to the approach shown in Figure 6.5, but focusing on costs, not just on SAP ratings.

7. Using an indicator of this kind would require the setting of thresholds for 'lower' income and 'unreasonable' costs. As for all indicators that have been reviewed, this would require some judgement to be made and many combinations are possible. We therefore look first at some of the issues involved.

Setting the energy cost threshold

8. The energy cost threshold we use below is based on the median required spending of all households. In other words it takes costs for a low-income household as being 'unreasonable' if they exceed what households in general – who have much higher incomes and generally larger homes – would need to spend. Importantly, within

Figure 7.1: *Fuel poverty defined as the overlap between low income and high energy costs*



these calculations, we adjust modelled bills for household size and composition. This reflects the idea that the amount it is 'reasonable' to expect a small household to spend is different from that for a large household. The particular adjustment we use in the approach below matches the one we use in setting the income threshold, but other approaches are possible.[154] By implication this approach suggests that reasonable costs are at or below median costs, while unreasonable costs are above the median. The reasons for taking this approach are discussed in Box 7.2 below.

9. One key implication of this relative approach is that by themselves rising prices do not change the position of particular households relative to the threshold. We may all see price rises as 'unreasonable' but that does not mean that we all become fuel poor. Instead, the effects of rising (or falling) prices affect the proposed indicator in two ways:

   (a) they increase (or reduce) the 'fuel poverty gap';

   (b) they pull some households just above the income threshold into (or out of) fuel poverty.

10. Although we adopt a specific approach to the fixing of thresholds for the modelling in this report, there are a number of ways in which the reasonable cost threshold could be set. Some alternatives are presented in Annex B and they are the subject of specific consultation questions. This is a complex area and we welcome views.

Setting the income threshold

11. In setting a threshold for what constitutes a 'lower' income an obvious starting point is the kind of approach explored in Section 6.4 above in measuring after fuel costs poverty (see Figure 6.3). First, we look at household income after deducting housing costs (adjusted for household size and composition as in DWP's Households Below Average Income (HBAI) analysis). Under our approach, we add each household's modelled fuel costs to DWP's (After Housing Costs) poverty line to give the household's income threshold. We then compare the household's income with this threshold. It is very hard to see how it could be argued that anyone below this line was not on a 'lower income'; indeed a case could be made for a more generous threshold, but this one is consistent with other official approaches to poverty measurement.

The combined thresholds

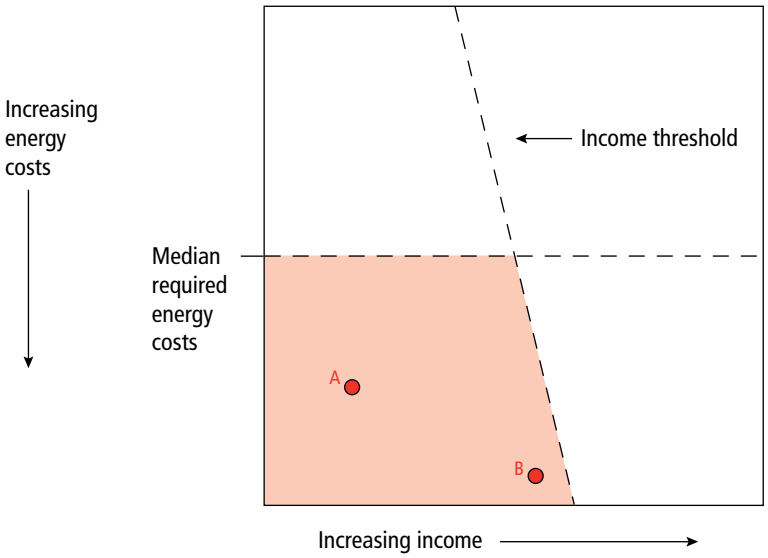
12. Figure 7.2 provides a conceptual graph of the resulting picture, which is a development of the simpler version in Figure 7.1. Households that are below the conventional 60 per cent of median income poverty line and have energy costs above the threshold (such as Household A) are classified as fuel poor. So are some households with high energy costs that would be just above a conventional poverty line (such as household B). The line showing the income threshold slopes because of the impact of allowing for required fuel costs.

13. Put simply, setting the income and reasonable cost thresholds as described above would mean that households would be considered fuel poor where:

    (a) they had required fuel costs that were above the median level; and

154 See Box 7.1 below and Annex B.

Figure 7.2: *Fuel poverty defined as the overlap between high energy costs and low (after housing and energy costs) income*



(b) were they to spend that amount, they would be left with a residual income below the official poverty line.

14. Under this approach, if energy prices are high, there will be more people pushed below the income threshold as required fuel spending rises.

15. Behind the broad principle on where to set the thresholds, there are some specific decisions needed to implement the approach. Our analysis is based on:

    (a) measuring incomes adjusted for household size and composition (equivalised) – this is in line with current best practice and matches the approach taken by DWP for its HBAI analysis;

    (b) measuring incomes after housing costs;

    (c) modelling energy costs to reflect required needs to achieve adequate warmth (as currently) rather than using actual spending;

    (d) adjusting the modelled fuel bill for household size and composition, alongside the adjustment made for incomes.

16. In principle, it would be better to count the number of *people* affected by fuel poverty, rather than the number of *households*, in line with the HBAI analysis. This would remove the way in which the current measure gives less weight to the problems of larger households, particularly those with children. For the moment, for comparative purposes we continue to show results for households. We compare trends for individuals and households in Figure 7.8 below. For its part, Box 7.1 discusses the issues involved in adjusting for household size and composition.

Box 7.1: Adjusting incomes for household size and composition

One of the issues in analysis of household incomes is always how to allow for household size and composition. Most people would agree that a family of four will not be as well off or able to have the same standard of living as a single person with the same cash income. Ranking them in the same place in terms of whether they are rich or poor is not therefore appropriate.

In its analysis of poverty and income distribution, the Department for Work and Pensions – in line with international and academic best practice – adjusts household incomes to allow for this problem. The process is technically known as 'equivalisation' and the adjusted incomes are sometimes called 'equivalent incomes' or 'equivalised incomes'.

This is an issue for understanding fuel poverty in two ways. The first is simply presentational. We often want to understand how households in different circumstances are affected by aspects of the problem, including by income group. Where possible in earlier chapters we have therefore presented results by income group ranked in terms of adjusted or equivalent incomes, rather than just by total household income. This gives a better picture of, for instance, the relative income positions of those with more or less energy efficient homes.

The second is more fundamental. When looking at how income should be taken into account in determining whether a household should be counted as fuel poor or not, the issue arises as to whether that income should be adjusted for household size and composition. With the current ratio-based definition, this has not been such a prominent issue. If incomes were adjusted for family size, there would be a strong case for doing the same to assessed energy needs. Making the same adjustment to both sides of the fraction would cancel out and make no difference to the calculation. We did not, therefore, explore suggestions of this kind further in Chapter 6.

However, with the approach suggested in this Chapter, the question does arise. We have based our assessment here as to whether households have low incomes or not on the basis of incomes *adjusted* for household size and composition, in line with best practice within poverty measurement, giving results that are consistent with other official analysis.

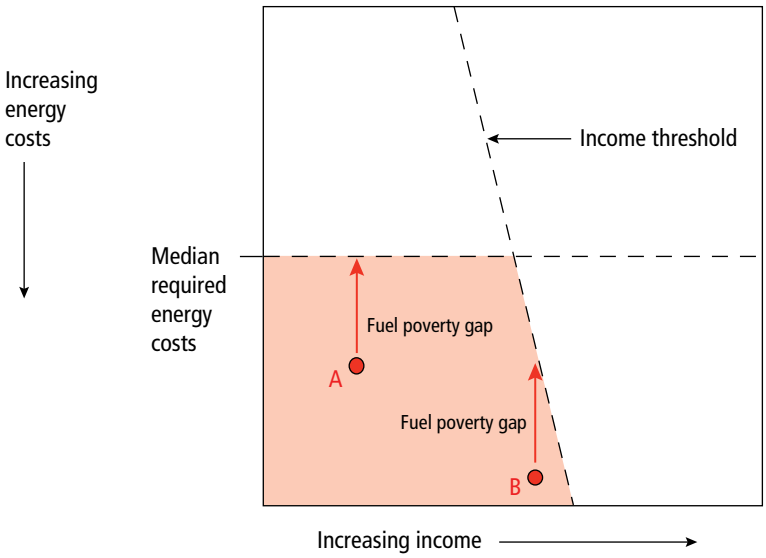
The further question then arises as to how to reflect household size and composition in relation to costs. Our analysis suggests that we should do this by adjusting modelled bills using the same adjustment factors as we use for incomes. However, other choices are possible and we discuss some of the issues involved in the notes to this Chapter in Annex B. We would welcome views on this.

The fuel poverty gap

17. We have already argued that it would be useful to have a measure of the depth of fuel poverty alongside the extent. One of the consequences of the approach being set out is that it allows us to calculate a 'fuel poverty gap' without the sensitivity to very low and mis-reported incomes that affected the analogous indicator we explored in Section 6.3.

18. For a particular household, the fuel poverty gap would be the difference between its required costs and the threshold for reasonable costs, as shown for household A

Figure 7.3: *Calculation of the 'fuel poverty gap'*



in Figure 7.3. Where a household is one of those drawn into fuel poverty by the high level of its fuel costs (such as household B), the fuel poverty gap would be the reduction in fuel costs needed to bring it above the income threshold line. These gaps show the extent to which the energy costs for these households exceed the reasonable cost threshold and, therefore, provides a sense of the depth of the problem for them.[155]

19. These individual fuel poverty gaps for each household can be summed to produce an aggregate fuel poverty gap, giving an idea of the scale of the national problem.

Modelling the measure

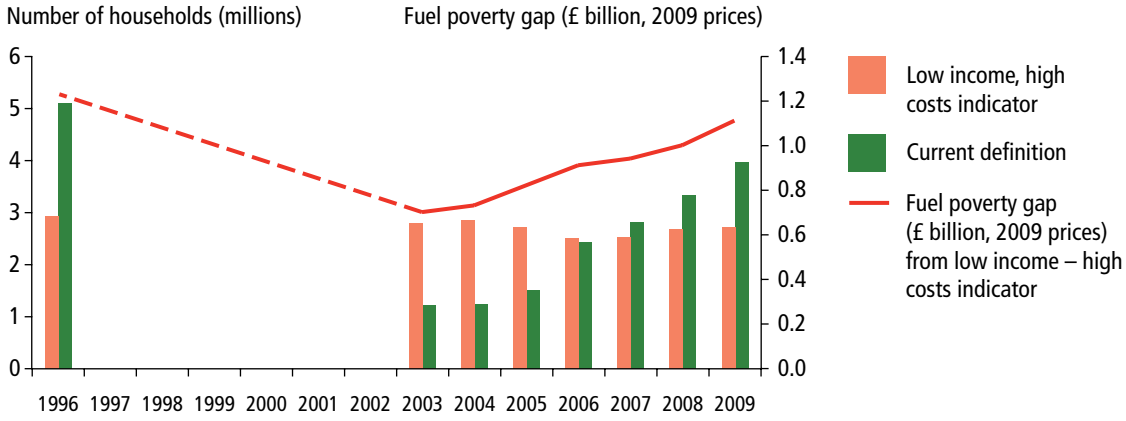
20. Figure 7.4 shows how many households would have been identified by this indicator, as well as the aggregate 'fuel poverty gap', alongside the current measure for selected years since 1996.

155 Please see Annex B for an explanation of how the adjustment made for household size and composition is taken into account when calculating fuel poverty gaps.

In 2004 2.8 million households would have been fuel poor using this indicator, compared to 1.2 million under the current definition. In 2009 the number would have fallen slightly to 2.7 million households, compared to nearly 4 million under the current definition. In 1996 the number would have been 2.9 million, compared to 5.1 million under the current definition.

21. The estimates suggest that the low income and high costs is a relatively stable measure. It counts a very similar *average* number of households as fuel poor over the period to the current definition but without its dramatic fluctuations. The small fall in the number of households over time reflects the reduction in poverty since 2001 and the improvement in the relative energy efficiency of the housing stock for low-income households. Changes in fuel prices have some effect on the numbers counted in fuel poverty: at the margin some households will have been pulled into fuel poverty since 2004, offsetting the other improvements.

Figure 7.4: *Number of households in fuel poverty under current indicator and low income high cost indicator, 1996 and 2003 – 2009, England*



Source: Fuel poverty data, 1996 and 2003 – 2009 (DECC)

22. The figure also shows the size of the (aggregate) fuel poverty gap measured in the way described. This was £1.1 billion in 2009, representing the extent to which households in or on the margins of fuel poverty would have to pay higher costs to keep warm than typical households with much higher incomes. It is this indicator that captures the effects of changing fuel prices: the aggregate gap measured in real terms is 52 per cent higher in 2009 than it was in 2004 and is on a par with its 1996 level.

23. One of the tests for each of the approaches we have examined is how effectively they reflect the drivers of fuel poverty. In this case the *number* of households counted as fuel poor is most affected by changes in the level of poverty and by the energy efficiency of the homes in which those with low incomes live. Fuel prices do affect the numbers counted as fuel poor, as high prices bring more households below the income threshold. However, it is principally the fuel poverty gap that shows the way in which the problems faced by fuel poor households worsen as prices rise.

Composition

24. Unlike for the other indicators we investigate, in modelling this approach we adjust both income and costs for household size and composition (see Box 7.1). As we have seen, the approach gives a higher absolute number of fuel poor households in 2004 than was found under the current indicator. Compared to the current indicator those counted as fuel poor include a larger proportion of families with children and a smaller proportion of single person households, although the overall effect is less marked than for other options (see Annex B, Figures B.4 and B.5). By 2009, a larger proportion of those counted as fuel poor are single people aged under 60 and a smaller proportion are older, single people. This is likely to be due to changes in relative incomes, including falling pensioner poverty.

25. From a regional perspective, under this indicator those regions with relatively high housing costs, such as London, account for a larger proportion of fuel poor households than under the current definition. This

is the effect of measuring incomes after housing costs. However, the North West remains the region accounting for the highest proportion of fuel poor households. See Annex B, Figures B.6 and B.7.

Fuel poverty under the current and alternative definitions

26. The relationship between this indicator of households with low incomes and high costs and the current definition can be seen in more detail in Figures 7.5 and 7.6. These show – for a random sub-sample for presentational reasons – the way in which the two indicators would classify households within the housing surveys in 2004 and 2009. The households are plotted to show their incomes in relation to the median (along the horizontal axis) and their costs in relation to the median (along the vertical axis). The [solid bars] show the low income-high costs boundary (extending to higher relative incomes in 2009 because fuel prices were higher relative to incomes). The households within this boundary represent 2.8 million from the whole population in 2004 and 2.7 million in 2009. The small fall results from improvements in poverty and the energy efficiency of the homes of poor households. At the same time, the fuel poverty gap rises from £730m to £1.1 billion in real terms.

27. The charts also indicate as black dots those that would be classed as fuel poor on the current definition and as white dots those that would not. In 2004 only those households with very high relative costs and low incomes or with the very lowest reported incomes were classed as fuel poor under the current definition, together with a few of those with very high relative costs and higher incomes. Many of those below the (far from generous) income threshold and with costs above or well above the national median were not counted as fuel poor by the current definition.

28. By contrast, in 2009, most – but not all – of those with low incomes and high costs were officially counted as fuel poor. In addition many of those with the lowest reported incomes were classed as fuel poor under the current definition , even if they had very low required heating costs.[156] There are also households with incomes well above the poverty lines – some approaching or even above median income – that are classed as fuel poor because of the very high relative costs of their homes.

29. It is helpful to consider the situations of households in different quadrants of Figures 7.5 and 7.6 (shown in simplified form in Figure 7.7).

    (a) Those in the top right quadrant (A in Figure 7.7) have both required spending below the median and incomes above the income threshold. They are not classed as fuel poor under either definition (unless prices rise very high under the current definition) and would not be classed as such by many of those concerned with the problem of fuel poverty.

156 The figures show the effective minimum level of required fuel spending under the current methodology; even someone in a home with a SAP of 100 would be counted as needing to spend amounts, based on the national average, on appliances etc. That is why virtually no households are assessed as having required fuel costs below 40% of the national median.

Figure 7.5: *Households classed as fuel poor under the current definition and with low incomes and high costs, 2004*

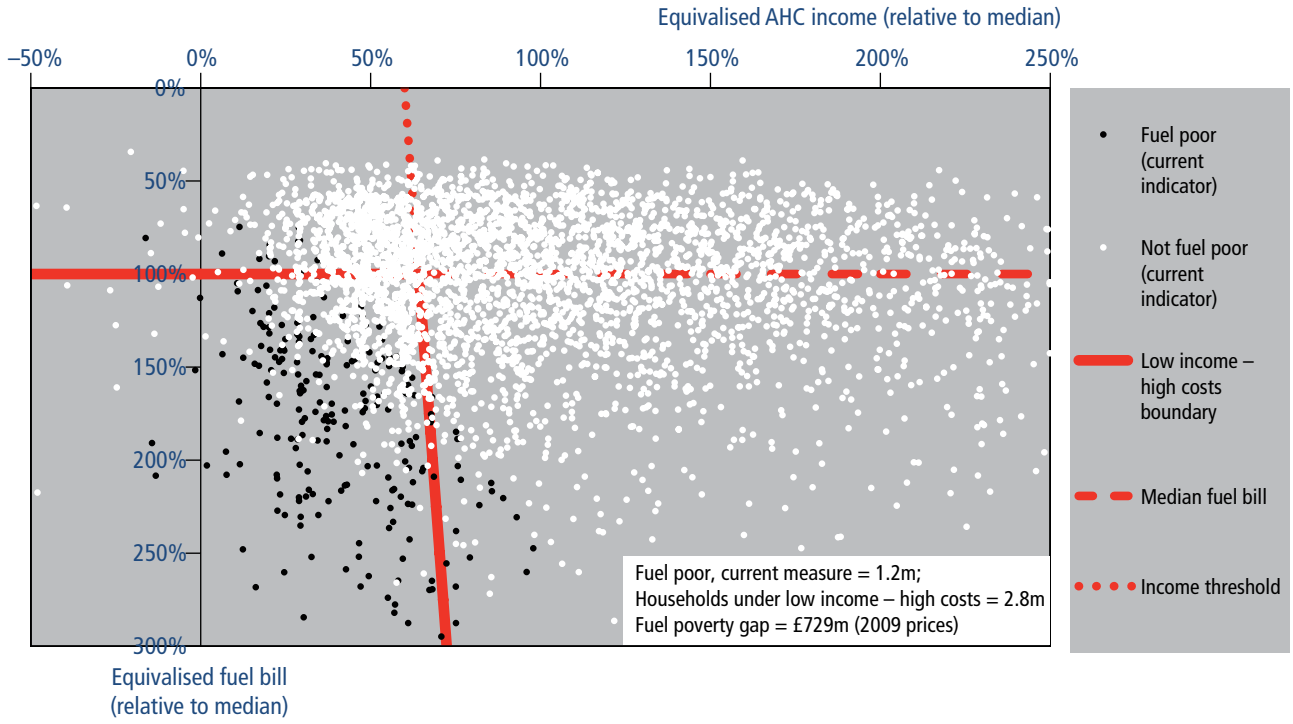


Figure 7.6: *Households classed as fuel poor under the current definition and with low incomes and high costs, 2009*

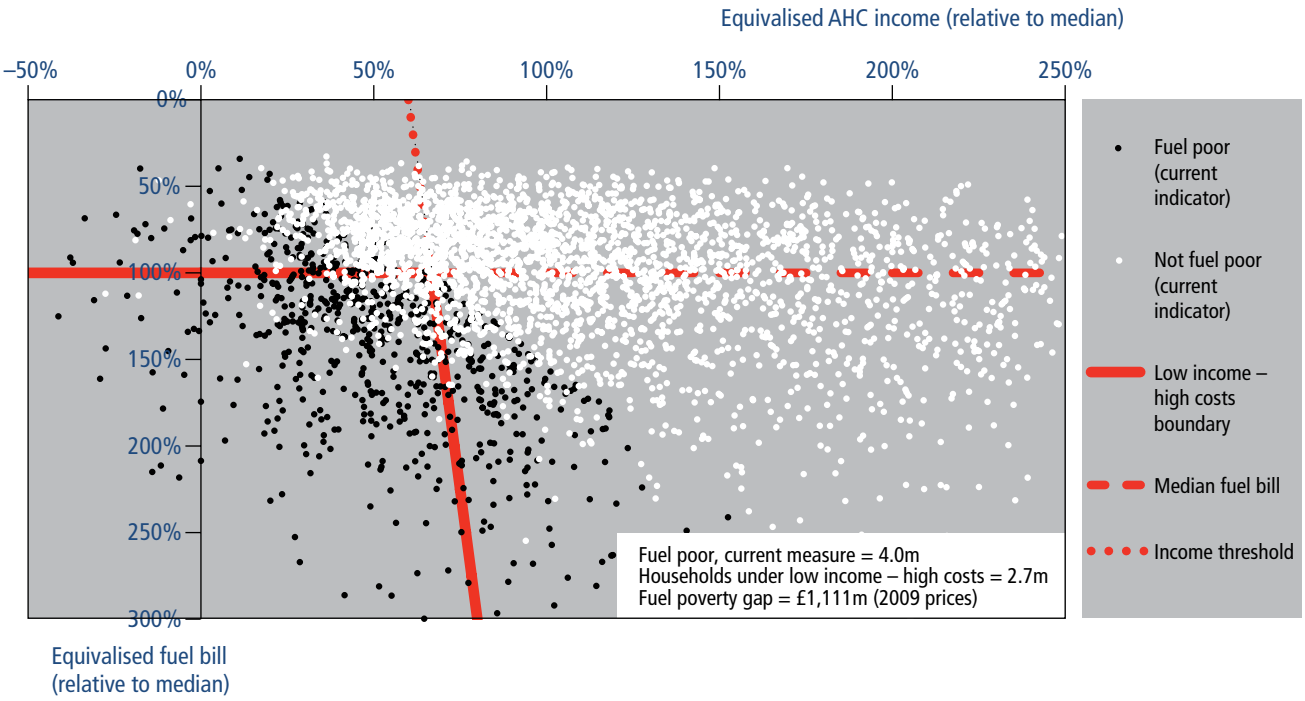
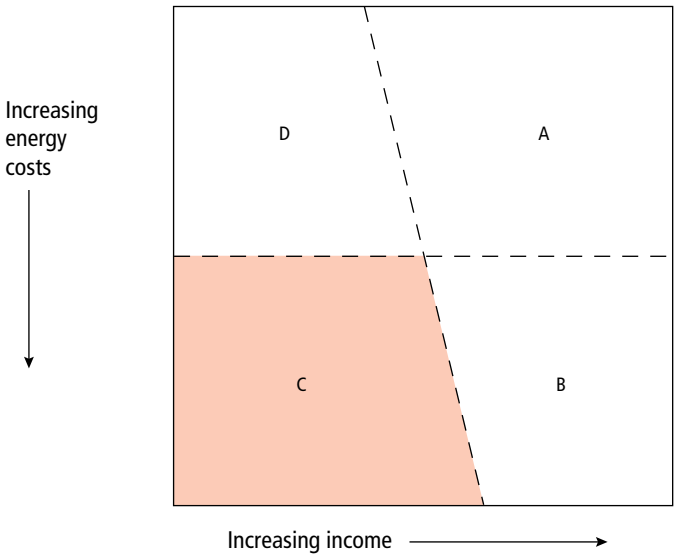


Figure 7.7: *Households with different combinations of incomes and costs*



(b) Those in the bottom right quadrant (B) have costs above the median level but do not have low incomes (depending on how this is defined). One would expect them to be the focus of policies designed to improve energy efficiency, but it may come as a surprise that some of them would currently be classed as fuel poor despite their moderate income levels.

(c) Those in the bottom left quadrant (C) are those with both relatively low incomes and relatively high costs. These are the households that are most obviously the target of policies to address fuel poverty and are the ones classed as fuel poor under the low income high costs definition. It may again come as a surprise that many of them were *not* classed as fuel poor under the current definition in 2004.

(d) Those in the top left quadrant (D) have low incomes but relatively low spending required to keep warm. Some of them have very low (reported) incomes – indeed even negative ones (after allowing for housing costs). Where incomes fall well below the poverty line – below 60 per cent of the national median – some are classed as fuel poor under the current definition in 2009. A few with even exceptionally low required fuel spending are also classed as fuel poor in 2009 under that definition because of their very low or minimal reported incomes. Such households are clearly a very high priority for assistance of some kind: they are deep in poverty, for instance, not receiving the benefits to which they are entitled, or only entitled to benefits that leave them well short of the poverty line. What is not clear, however, is whether it is helpful to class them as fuel poor. They do not – on the face of it – fit WHECA's description of having above reasonable costs to keep warm. There is rather little that further energy efficiency improvements can do to help. Rather, they urgently need higher incomes.

The number of individuals affected

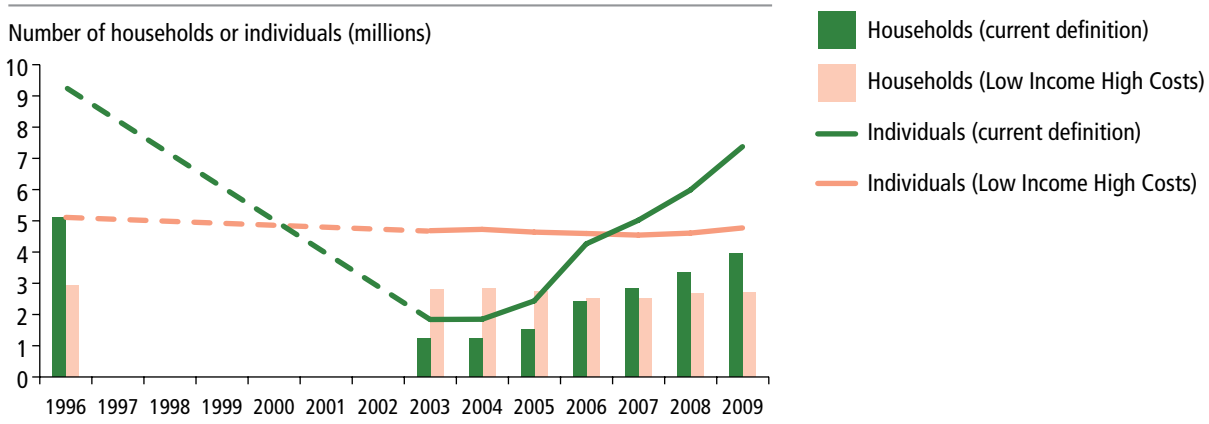
30. The figures shown in Figure 7.4 related to the numbers of *households* counted as fuel poor under each approach in order to allow comparison. However, it can be argued that it is more appropriate to look at changes in the number of *individuals* who are affected. This would give more weight to trends affecting larger numbers of people and would be more consistent with other poverty indicators. The results of the analysis we have conducted in relation to the current definition and the low income – high costs indicator can be seen in Figure 7.8. As can be seen, in 1996 the current definition identified 9.3 million individuals as fuel poor. By 2009 this figure was 20 per cent lower at 7.4 million, having dipped to 1.8 million in 2003. By contrast, the low income – high costs indicator would have found 5.1 million people to be living in fuel poverty in 1996, 4.7 million in 2003 and 4.8 in 2009 (9 per cent of the population and a fall of about 6 per cent since 1996).

Pros and cons

31. By capturing the set of households that have a combination of low income and relatively high costs, this approach aligns most closely with the definition of fuel poverty set out in WHECA.

32. As is shown by the trend in Figure 7.4 above, the headcount measure (i.e. the number of households that have low incomes and face relatively high costs) suggests that the number identified has changed only slowly over time, as have their characteristics (see Tables B.1 and B.2 in Annex B). This consistency would be helpful for policymakers and those delivering policy as they could be more confident that policies would continue to be targeting the correct group of households. The stability in the trend may also more fairly reflect the underlying situation in English households: it is not at all obvious that the structural problem of fuel poverty was reduced by three-quarters from 1996-2004 or that it has increased by more than three times since then, as implied by the 'V-shaped' trend under the current definition. The use of a relative

Figure 7.8: *Number of households and individuals in fuel poverty under the current definition and the Low Income High Costs indicator, 1996-2009, England*



Source: Fuel poverty dataset (DECC), English Housing Survey (DCLG)

Note: The dotted lines provide a straight-line trajectory between years where there are no additional data points.

cost threshold is one of the reasons for the more stable picture given by this approach (see Box 7.2).

33. Another advantage of this approach compared to the current definition is that it would be more robust to the issue of low reported incomes within the EHS. A large number of households within the EHS report very low (or zero) incomes. That some of this is due to under-reporting is a known weakness in the EHS data and one which has the implications for fuel poverty as currently defined which we explored in Chapter 5. The combination of a very low reported income and a fuel poverty definition that is based on a ratio means that this group of households will be classified as fuel poor almost irrespective of the energy efficiency of their homes, as can be seen in Figure 7.6. By moving away from a ratio approach, the low income high costs measures would avoid this problem.

34. However, as was the case with all of the options that have been discussed above, this approach would not help with the precise identification of fuel poor households on the ground, as determining whether a household is fuel poor would still require detailed information on the dwelling and household circumstances.

Box 7.2: Relative or absolute cost thresholds

A key issue which arises with this approach – with important implications – is whether the threshold used to define reasonable costs is set in relative or absolute terms. The way in which we define it within the modelling work presented here is in relative terms. We take it as being determined by the median level of spending need for all households, as produced by the modelling underlying the current fuel poverty calculations.

This has a number of powerful advantages:

- As a relative measure it means that as, for instance, the energy efficiency of the housing stock in general improves, so median required spending would fall, and with it the threshold. So, if lower income households failed to keep up with this, more of them would be counted as being in fuel poverty. This seems appropriate.

- Technically, it means that which households are counted as being fuel poor would be much more robust to the precise assumptions of the modelling than they are now. Issues and uncertainties around factors such as which non-heating costs are included, or the precise temperatures underlying the calculation of required fuel spending would affect both the calculation for an individual household, and the median for all households and so the threshold, in the same way. Any errors would largely cancel out. This contrasts with the comparison of required fuel costs with a fixed threshold (or indeed one based on an external number, such as current actual average spending), which is very sensitive to these assumptions.

- The effects of changing fuel prices are seen mainly through the size of the fuel poverty gap. While some households are pushed into fuel poverty by rising prices under the approach discussed in this Chapter, it is the increasing depth of fuel poverty that is the main effect.

Box 7.2: Relative or absolute cost thresholds (continued)

It would be possible to argue, however, that the reasonable costs threshold should be a fixed amount, specified in pounds per week in some way. While in some ways easier to explain, this would, however recreate many of the difficulties with the current definition, explored in Chapter 5. In particular, as prices rose and fell, large numbers of households would be classed as moving in or out of fuel poverty, even though their incomes and energy efficiency of their homes remained constant. It is also a little hard to define what that threshold should be, except by reference to the costs faced by typical households in some way.

We have therefore both set out and modelled the low income high costs indicator using a relative threshold for costs, not an absolute one.

Having done that, there is a further decision, which is what the threshold should be relative to. We have used median equivalised required spending as this reflects what is happening to typical households. Using the average (mean) would mean that the threshold would be affected by, for instance, very large or expensive properties in a way that would not seem to accord with most people's notion of what was reasonable. Equally, we have used 100 per cent of median spending. Some other multiple could in practice be used, but it is a little hard to see what the rationale for a different choice might be.

At the same time the criteria often used may be proxies for the issue shown. For example, a SAP proxy (for reasonable costs) and benefit eligibility proxy (for lower income) are relatively likely to place a household in the correct quadrant of the grid. By comparison, such proxies are less likely to lead to the calculation of the correct fuel poverty ratio. We shall investigate this further in our final report.

35. The use of calculated costs required to achieve warmth as in the current approach helps to overcome some of the problems of the low income and low SAP measure (Section 6.5). For example, the measure will only capture households that are facing relatively high costs. By contrast, the SAP-based threshold would identify a number of households in smaller dwellings that actually have relatively modest energy requirements.

36. As we saw in Figure 7.4 above, the fuel poverty gap and the headcount indicator taken together reflect the impact of changing energy prices on fuel poor households. This can track the depth of the fuel poverty problem both in aggregate and for individual households.

37. In addition, the combination of the headcount and fuel poverty gap measures will reflect the impact of all policies which impact on the household energy bill, in that the fuel poverty gap indicator will capture the impacts of interventions that reduce household energy costs of fuel poor households, even if they do not move them over the reasonable costs threshold.

38. It is important to note that these indicators do not generally capture changes for low income households that only affect their incomes and not their costs, unless

the income change for a given household carries it across or close to the low income threshold and out of fuel poverty.[157] What does happen is a reduction in *poverty gaps*, as conventionally measured, showing up, for instance, as a reduction in the number of households counted by DWP as being in severe poverty. Where a change in income does carry households across the income threshold, there would also be a reduction in the extent of fuel poverty.

157 Some households carried to just below the income threshold, but not across it, could however see a reduction in their fuel poverty gap.

Chapter 7 summary

An indicator based on looking at the number of households with both low incomes (relative to median incomes) and high required fuel costs (relative to median required fuel costs) has several advantages by comparison with the current definition:

- It allows separate calculation of the extent of fuel poverty (the number fuel poor) and the depth of the problem (the fuel poverty gap), rather than conflating them.
- The number of households classed as fuel poor would have averaged just under 3 million under both definitions since 1996 (see Figure 7.4). The number of individuals affected averaged around 5 million under both definitions (Figure 7.8). However the slow downward trend in the number with low incomes and high costs may give a much better representation of the scale of the underlying problem than the 'V' shape from the current definition.
- The impact of changing fuel prices on the depth of the problem for those affected is captured by the average fuel poverty gap, which falls from £413 in 1996 (at 2009 prices) to £256 in 2004, but rises to £409 in 2009 (an aggregate amount of £1.1 billion).
- Calculating the extent of fuel poverty in this way is more robust than the current definition, both to data problems (such as misreporting of income) and to the assumptions used in calculating required spending (such as the precise temperatures used).
- Because the measure is much more stable in terms of who is identified as fuel poor, it is also much more stable in terms of which groups of people are identified as being at risk of fuel poverty than the current measure.
- Under the current definition, many households with low incomes and relatively high energy requirements were counted as not being fuel poor in 2003 and 2004. Correspondingly, interventions that were targeted on households that might have been thought in common sense terms to be at risk were assessed as benefiting people outside the target group, potentially giving a misleadingly gloomy assessment of their effectiveness.
- The use of a fuel poverty gap measure also allows the impact of interventions to be seen, even if they do not quite bring someone across the line that would bring them out of fuel poverty. However the impact of interventions that only affected incomes without taking households across the threshold would reduce the depth of poverty as conventionally measured, but not generally the depth of *fuel* poverty.

CHAPTER 8

Conclusion and questions for consultation

1. The evidence we have examined and presented confirms that fuel poverty is a distinct issue and a serious problem. It deserves and requires attention, as recognised by Parliament when it adopted the Warm Homes and Energy Conservation Act 2000, although progress since then has been slow.

2. The Act captures, in our view correctly, the overlap between two basic factors: income and costs. As it states, a household is affected by fuel poverty if it has a lower income and faces above reasonable costs – which will often be for reasons outside its control – to achieve adequate warmth. Fuel poverty is a priority for a range of coinciding concerns, including poverty alleviation, health and well-being, energy efficiency and carbon saving.

3. The fact that people with high heating costs cannot maintain, for the same level of income, the same standard of living as others, is a concern for those who approach fuel poverty from the perspective of a focus on poverty in general. This is especially the case given that the factors that lead to those high heating costs are beyond the control of some households. The nature, location, size and characteristics of the dwelling, lack of access to lower cost fuel through being off the gas grid, and difficulties in getting the best prices are all factors that can lock households into high costs. Our calculation is that households in or on the margins of poverty faced extra costs to keep warm above those for typical households with much higher incomes added up to £1.1 billion in 2009.

4. Linked to this concern is the fact that doing something about the costs side of the equation – largely this means improving energy efficiency – can be a cost-effective and sustained way of improving living conditions for those on low incomes.

5. The health issues associated with living in the cold are another preoccupation for those concerned by fuel poverty. Not all of the health concerns relate to cold indoor temperatures – exposure to the cold outdoors is also important. And not all cold indoor temperatures are linked to fuel poverty. But as we discuss in Chapter 3 even if, on a conservative estimate, only a tenth of excess winter deaths are linked to cold indoor temperatures caused by fuel poverty, this is more than the level of fatal road accidents. Beyond mortality caused by fuel poverty, there is evidence of negative physical and mental health impacts of fuel poverty. Reducing the incidence of health and well-being problems caused by fuel

poverty would reduce demands on the NHS, although the scale of these benefits is not easy to calculate.

6. The issue of fuel poverty also ties in strongly with the urgent need to tackle climate change, as part of which a priority is to improve energy efficiency standards in UK homes in order to reduce greenhouse gas emissions. But climate change policy delivery is made more difficult by the existence of fuel poverty. If the price mechanism is used to encourage carbon reduction, some low-income householders face disproportionate costs, but the capital investment needed to bring about efficiency improvements and carbon savings is beyond them. If carbon emissions from these households are to be reduced, assistance will be needed. Once made, interventions should have a sustained impact on the costs they face and then in a combination of warmer homes and their own carbon reductions.

7. For all these reasons, fuel poverty is clearly a distinct problem.

8. Given this conclusion, the question then follows of how to measure the problem. While doing something about it is obviously the priority, measurement matters, so that changes in the scale and depth of the problem can be understood, policies designed effectively to address it, and the impact of interventions made ascertained.

9. In Chapters 5, 6 and 7 we set out the pros and cons of the current definition and of a range of modifications and alternative approaches. The current approach has a key strength: its focus on required, not actual, energy spend. In any modification of the definition this should be retained. However, the precise form of the indicator – based on a ratio against a fixed threshold – gives it certain weaknesses. It generates, for instance, a trend over the last fifteen years – a rapid decline followed by an equally rapid rise – which does not reflect what happened in the underlying causes of the problem. This is because while the indicator is affected by each of the three drivers (household income, energy efficiency and fuel prices) of fuel poverty, it is dominated by fuel prices to the extent that the impact of changes in the others can barely be discerned. One way of understanding this weakness is by considering that the trends generated by the current definition reflect two aspects of the problem – its extent and its depth – simultaneously. It would be more helpful to separate them.

10. We also discuss how the ratio basis of the current definition and its measurement against a fixed threshold make its results highly sensitive to the precise assumptions made in relation to the data on which it is based.

11. After examining a series of possible modifications and alternatives to the current approach in Chapter 6, we conclude that while they each bring insights to understanding the problem, they also have weaknesses. We therefore explore in Chapter 7 whether there is a way of building on the strengths of the current definition, but to use the information on which it is based in a different way. This is to look more directly at what is described in WHECA and in everyday discussions of what fuel poverty is and how to tackle it: to focus on households which both have low incomes and have high costs.

12. This kind of 'Low Income-High Costs' indicator would use the existing datasets and needs-based energy model both to show the number of households and individuals affected by fuel poverty, and to show the depth of the problem – their

individual and collective fuel poverty gaps. Under this approach, fuel poverty exists where a household has above reasonable costs of warmth and where meeting those costs would push it below an income threshold. To show its results, we have modelled this indicator using specific thresholds for income and costs, but other choices could be made.

13. Like the current definition, this approach responds to changes in income, energy efficiency and fuel prices. However, it does so in a way which more evenly reflects all three drivers. For example, the impact of fuel price increases is shown in an increased fuel poverty gap and in a number of households on the margins being pushed into fuel poverty. However, price increases do not dominate or lead to great swings in the number of fuel poor households identified. At the same time if prices fell, the core extent of the fuel poverty problem would remain visible but the fuel poverty gap would show how the depth of fuel poverty for individual households was reduced.

14. Using the data available, this approach would suggest that the extent of fuel poverty has been on a slow downward trajectory since 1996, but with a wide fluctuation in fuel poverty gaps, at their lowest in 2003 and at essentially the same peak levels in 1996 and 2009. We believe this reflects the structural issues at the heart of fuel poverty. Our understanding of the evidence suggests that the extent of the fuel poverty problem had not been reduced by three-quarters by 2004, compared to 1996. But equally it has not increased by more than three times since 2004.

15. Compared to the current definition, the *average* level of fuel poverty over the last fifteen years shown would be similar under the low income-high costs indicator. However at times some households that are currently classed as fuel poor would not be so under this approach. In particular, there are some households with such low reported incomes that they would currently be classed as fuel poor, even if they had very energy efficient homes. Such households are clearly a very high priority for assistance of some kind: they are deep in poverty, for instance, because they are not receiving the benefits to which they are entitled, or are only entitled to benefits that leave them well short of the poverty line. What is not clear, however, is whether it is helpful to class them as 'fuel poor'. They do not – on the face of it – fit the WHECA description of having above reasonable costs to keep warm. There is rather little that further energy efficiency improvements can do to help. Rather they urgently need higher incomes.

16. Looked at in this way, the underlying problem of fuel poverty did not almost disappear in the early 2000s, but nor has progress almost entirely been reversed. This is not necessarily a huge comfort: a reduction only from 2.9 to 2.7 million households (and from 5.1 to 4.8 million individuals) affected by such a serious problem over thirteen years is deeply disappointing, as is the major increase in the depth of the problem in the last six years, as measured by the fuel poverty gap. It is hardly on track for its elimination in five years' time.

17. As we have explained , there are different ways of looking at this problem, and different choices that could be made if the approach we propose were implemented. We would welcome views on the analysis and ideas presented in this report, and give some specific questions for consultation

in Box 8.1. In the final report we will discuss the response to these, how they inform our final recommendations, and look at the implications of the definition for understanding the effectiveness of the range of policy interventions available to tackle fuel poverty.

Box 8.1 Consultation on the interim report

Above we have set out our view that fuel poverty is a distinct and serious problem which is well described by the Warm Homes and Energy Conservation Act (WHECA). We have also argued that the current definition used to assess changes in the problems has some serious weaknesses alongside its various strengths. We have therefore discussed and analysed modifications and alternatives to it, including the combination of a Low Income-High Costs and fuel poverty gap indicator. We would welcome views on the analysis we have presented and the conclusions drawn from it.

In our final report we will make recommendations on the issues explored in this report, and look at issues covered by the review's terms of reference that have not been explored in this report, notably implications for assessing the effectiveness of policies.

Consultation questions

We welcome general views on the report, but in particular we would be interested in responses to the following questions:

a. Do you agree with the conclusion that the problem of fuel poverty is, as set out in WHECA, centred around the combination of low incomes and required energy costs above reasonable levels?

b. Does Chapter 3 set out a comprehensive analysis of health and well being impacts associated with fuel poverty? Is there further compelling evidence relating to those impacts discussed or others that the review would benefit from considering?

c. Do you agree with our analysis of the strengths and weaknesses of the current fuel poverty indicator, as set out in Chapter 5, and of modifications and alternatives to it in Chapter 6?

d. Do you agree with our analysis of the strengths and weaknesses of the approach based on a Low Income-High Costs indicator and fuel poverty gap, as set out in Chapter 7?

e. Do you have any views on the thresholds the review has used for the preferred indicator, as set out in Chapter 7 (and discussed further in Annex B)?

Box 8.1 Consultation on the interim report (continued)

Responding to the consultation

Responses to these questions or further submissions of evidence should be sent to the review team no later than 18 November 2011. Submissions should be sent to:

Hills Fuel Poverty Review Secretariat
c/o Department of Energy and Climate Change
3 Whitehall Place
London
SW1A 2AW

Or

hillsfuelpovertyreview@decc.gsi.gov.uk

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Terms of reference

Independent Review

The terms of reference for the review are:

1) To consider fuel poverty from first principles: to determine the nature of the issues at its core, including the extent to which fuel poverty is distinct from poverty, and the detriment it causes.

2) As appropriate and subject to the findings under (1), to develop possible formulations for a future definition and any associated form of target, which would best contribute to:

- addressing the underlying causes identified;
- helping Government focus its resources (which are set out in the Spending Review for the period to 2014-15) and policies on those who need most support;
- measuring the cost-effectiveness of different interventions in contributing to progress towards any target; and
- developing practical solutions, particularly around identification and targeting of households and measuring progress resulting from Government action.

The review is independent of Government.

The review relates only to fuel poverty as regards England.

Chapter notes

B.1 Review Background and Fuel Poverty in Context (Chapter 1)

The Warm Homes and Energy Conservation Act 2000

1. The full text of the Act is as follows:

Warm Homes and Energy Conservation Act 2000

An Act to require the Secretary of State to publish and implement a strategy for reducing fuel poverty; to require the setting of targets for the implementation of that strategy; and for connected purposes.

[23rd November 2000]

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1 Meaning of "fuel poverty"

(1) For the purposes of this Act, a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost.

(2) The Secretary of State (as respects England) or the National Assembly for Wales (as respects Wales) may by regulations—

(a) specify what is to be regarded for the purposes of subsection (1) as a lower income or a reasonable cost or the circumstances in which a home is to be regarded for those purposes as being warm, or

(b) substitute for the definition in subsection (1) such other definition as may be specified in the regulations.

(3) Before making regulations under subsection (2), the Secretary of State or the National Assembly for Wales shall consult—

(a) persons appearing to the Secretary of State or the Assembly to represent the interests of persons living in fuel poverty, and

(b) such other persons as the Secretary of State or the Assembly thinks fit.

(4) Regulations under subsection (2) shall be made by statutory instrument; and a statutory instrument containing such regulations made by the Secretary of State shall be subject to annulment in pursuance of a resolution of either House of Parliament.

2 Strategy relating to fuel poverty

(1) It shall be the duty of the appropriate authority to prepare and publish, before the end of the period of twelve months beginning with the relevant commencement, a strategy setting out the authority's policies for ensuring, by means including the taking of measures to ensure the efficient use of energy, that as far as reasonably practicable persons do not live in fuel poverty.

(2) The strategy must—

(a) describe the households to which it applies,

(b) specify a comprehensive package of measures for ensuring the efficient use of energy, such as the installation of appropriate equipment or insulation,

(c) specify interim objectives to be achieved and target dates for achieving them, and

(d) specify a target date for achieving the objective of ensuring that as far as reasonably practicable persons in England or Wales do not live in fuel poverty.

(3) The target date specified under subsection (2)(d) must be not more than fifteen years after the date on which the strategy is published.

(4) In preparing the strategy or any revision of the strategy, the appropriate authority shall consult—

(a) local authorities or associations of local authorities,

(b) persons appearing to the appropriate authority to represent the interests of persons living in fuel poverty,

(c) the Gas and Electricity Markets Authority and the Gas and Electricity Consumer Council, and

(d) such other persons as the appropriate authority thinks fit.

(5) The appropriate authority shall take such steps as are in its opinion necessary to implement the strategy.

(6) The appropriate authority shall—

(a) from time to time assess the impact of steps taken under subsection (5) and the progress made in achieving the objectives and meeting the target dates,

(b) make any revision of the strategy which the authority considers appropriate in consequence of the assessment,

(c) from time to time publish reports on such assessments.

(7) If the appropriate authority revises the strategy, it shall publish the strategy as revised.

(8) In this section—

"the appropriate authority" means—

(a) as respects England, the Secretary of State, and

(b) as respects Wales, the National Assembly for Wales;

"the relevant commencement" means—

(a) as respects England, the day on which this Act is passed, and

(b) as respects Wales, the day on which this section comes into force as respects Wales.

(9) In relation to any time before the commencement of section 3(1) of the Utilities Act 2000, the reference in subsection (4)(c) to the M1Gas and Electricity Markets Authority and the Gas and Electricity Consumer Council shall have effect as a reference to the Director General of Gas Supply and the Director General of Electricity Supply.

3 Expenses

There shall be paid out of money provided by Parliament—

(a) any expenses of the Secretary of State under this Act; and.

(b) any increase attributable to this Act in the sums payable under any other Act.

4 Interpretation, short title, commencement and extent.

(1) In this Act "local authority" means—

(a) in relation to England, the council of a county, district or London borough, the Common Council of the City of London or the Council of the Isles of Scilly, and

(b) in relation to Wales, the council of a county or county borough.

(2) This Act may be cited as the Warm Homes and Energy Conservation Act 2000.

(3) Section 2 shall not come into force as respects Wales until such day as the National Assembly for Wales may by order made by statutory instrument appoint.

(4) This Act extends to England and Wales only.

WHECA – judicial review

2. A case for judicial review of WHECA was brought in 2008 against a backdrop of rising fuel poverty numbers. Friends of the Earth and Help the Aged[1] maintained that the Government – the defendants[2] – had failed to meet their duties under subsections 2(5) and 2(6) of WHECA. They argued that the Act gave the defendants flexibility in terms of "selecting the route but not the destination" in terms of the Act and the 2001 Strategy. They accused the Government of "diluting an imperative into a broad policy discretion" and of "not doing what is reasonably practicable to achieve the targets because of budgetary constraint in allocating funds to possible measures."

3. The Government argued that it was "already taking all measures which were reasonably practicable to meet the 2010 and 2016 targets set out in the strategy" and that it was not "reasonably practicable" to take all of the measures that would be required to eradicate fuel poverty, as such measures "are not necessarily cost effective" and "the resources are not available to pay for them all at the present time."

1 The successor organisation to Help the Aged is Age UK.

2 At the time of the original case in 2008, the defendants were the Secretaries of State at Defra and BERR. At the time of the appeal, the sole defendant was the Secretary of State at DECC.

4. In his judgment[3] The Hon Mr Justice McCombe dismissed the claimants' argument that the Government had breached its duty under WHECA by taking budgetary considerations into account. He concluded,

> *Parliament obliged the Secretary of State to formulate a policy strategy to ensure, so far as reasonably practicable, the desired objectives. It required him to publish his aspirations by way of targets. It then required the government to take the steps which in its opinion were necessary to implement the policy strategy. Government took up the challenge by (amongst other things) specifying that it would try, so far as reasonably practicable, to achieve the targets. In doing so, it imported a statutory duty to make those efforts. It did not assume a statutory duty to achieve the desired results, whatever the cost.*

5. In July 2009, the civil division of the Court of Appeal heard an appeal against the original judgement. This appeal was dismissed.[4]

Further information on the legislative context

6. Chapter One introduced some of the legislation that is relevant to fuel poverty. The following sub-section provides additional information.

Energy market regulation

7. There is a range of regulation in place affecting the energy market.

8. Of prime relevance, and framed through this legislation, is the role of Ofgem in regulating the energy markets. The Authority's principal objective is:

> *to protect the interests of existing and future consumers in relation to gas conveyed through pipes and electricity conveyed by distribution or transmission systems. The interests of such consumers are their interests taken as a whole, including their interests in the reduction of greenhouse gases and in the security of the supply of gas and electricity to them.*[5]

9. When performing its duties, Ofgem must also "have regard to the interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas."[6]

10. Ofgem must also have regard to environmental and social guidance published by the Secretary of State. The most recent version of this guidance was issued in January 2010. The guidance sets out the Government's expectation that Ofgem will "take a strong lead in co-ordinating and ensuring that consumers on low incomes (or who are otherwise vulnerable to fuel poverty) are able to benefit from competitive markets."[7]

11. Specific measures listed in the guidance are:

    - the promotion of transparent charging;
    - ensuring there are no unnecessary barriers to switching;

3 http://www.bailii.org/ew/cases/EWHC/Admin/2008/2518.html

4 http://www.bailii.org/ew/cases/EWCA/Civ/2009/810.html

5 http://www.ofgem.gov.uk/About%20us/Authority/Pages/TheAuthority.aspx

6 Utilities Act 2000. Available at: http://www.legislation.gov.uk/ukpga/2000/27/contents

7 Available at: http://www.decc.gov.uk/en/content/cms/meeting_energy/markets/regulation/regulation.aspx

- ensuring that consumers do not suffer undue economic disadvantage as a result of their payment method;
- addressing issues which have a particular impact on low income and vulnerable consumers and those in receipt of Pension Credit;
- working to reduce levels of disconnections and arrears and to eradicate mis-selling;
- monitoring energy supply companies' social programmes;
- developing incentive mechanisms to encourage gas network extensions where appropriate.

Climate Change Act 2008

12. This Act[8] became law in late 2008 and established a legally binding target of at least an 80 per cent cut in UK greenhouse gas emissions by 2050 as well as a target of a reduction of at least 34 per cent by 2020, both against a 1990 baseline. Underpinning the delivery of this target is a system of carbon budgets that puts a limit on emissions over five-year periods. The first three budgets (2008-12, 2013-17 and 2018-22) were set in May 2009. In 2011, the Government made initial proposals for the fourth carbon budget (2023-27) which are currently going through Parliament. The Government must report to Parliament its policies and proposals to meet the budgets.

13. The Act also created the Committee on Climate Change (CCC), an independent, expert body that advises the Government on the level of carbon budgets and on where cost-effective savings can be made. The CCC submits annual reports to Parliament on the UK's progress towards targets and budgets.

14. There is a specific provision in the Act relating to fuel poverty. The Act states that the Secretary of State, when taking decisions on carbon budgets, and the Committee on Climate Change, when considering its advice on such decisions, must take into account "social circumstances, and in particular the likely impact of the decision on fuel poverty."

European legislation

15. In 2009, the European Parliament and the Council of Ministers adopted a range of legislative measures based on proposals from the European Commission as part of its so-called third package of energy market measures. Of particular relevance to the issue of fuel poverty are two Directives – one relating to gas[9] and one relating to electricity[10] – which contain similar provisions on consumer protection, including protection of vulnerable consumers. The Directives refer to the issue of "energy poverty" and require Member States to take certain types of measure, as illustrated by this section taken from the electricity Directive:

> *Article 7*
>
> *Member States shall take appropriate measures to protect final customers, and shall, in particular, ensure that there are adequate safeguards to protect vulnerable customers. In this context, each Member State shall define the concept of vulnerable customers which*

8 Available at: http://www.legislation.gov.uk/ukpga/2008/27/contents

9 Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC

10 Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC

may refer to energy poverty and, inter alia, to the prohibition of disconnection of electricity to such customers in critical times. Member States shall ensure that rights and obligations linked to vulnerable customers are applied. In particular, they shall take measures to protect final customers in remote areas. They shall ensure high levels of consumer protection, particularly with respect to transparency regarding contractual terms and conditions, general information and dispute settlement mechanisms. Member States shall ensure that the eligible customer is in fact able easily to switch to a new supplier. [...]

Article 8

Member States shall take appropriate measures, such as formulating national energy action plans, providing benefits in social security systems to ensure the necessary electricity supply to vulnerable customers, or providing for support for energy efficiency improvements, to address energy poverty where identified, including in the broader context of poverty.

16. In its consultation document relating to the transposition of these Directives into UK law[11] DECC explained that the current policy and legal framework in the UK met the requirements of these Directives in these areas. It explained that the 2001 UK Fuel Poverty Strategy defined vulnerability, as required by the EU legislation, and pointed to additional elements of the UK's framework, such as Ofgem's statutory duties (see above). Whereas for certain Member States, it will be necessary to prepare new national measures to address "energy poverty", it can be seen that this new European legislation does not significantly alter the policy landscape in England, where the issue has been subject to domestic policies for more than a decade.

17. The review team understands that there is an effort underway within the European Commission to develop a measure of "energy poverty" that can apply across the European Union. We hope that the European Commission will find material of interest in this report in developing such a measure.

Changes to fuel poverty measurement

18. Changes to the measurement of fuel poverty are made annually. In general, there are two types of changes:

    - amendments to the English Housing Survey (EHS) that in turn affect the input data for the fuel poverty calculation;

    - improvements in the precise methodology used to model bills or income, as endorsed by the Fuel Poverty Methodology Group.

19. Changes to the EHS happen routinely and tend to have a fairly small effect on the fuel poverty numbers. For example, in recent years, DCLG improved the recording of income from savings in the EHS, by changing the bands available for interviewees to choose from. This will have had a very small impact on DECC's measurement of fuel poverty.

20. Changes in the modelling methodology itself can have a larger impact and tend to happen less frequently, for example as a

11 The consultation is available at: http://www.decc.gov.uk/assets/decc/consultations/eu-third-package/586-eu-third-package-condoc2.pdf. It is understood that DECC will confirm this position when it informs the European Commission of how the UK has transposed the Directives into UK law.

result of the peer review recommendations, or when new research brings to light evidence that can improve the current method. For example, changes to the imputation of low incomes in 2006, which became more aligned with DWP's Households Below Average Income statistics. The list below summarises some of the main changes that have been made since the peer review of methodology in 2004.

2005 changes

21. Changes to modelling of fuel consumption, with the addition of an algorithm to better allow for 'thermal bridging'. DECC quantified this as a large impact on fuel poverty, increasing modelled fuel consumption for space heating for all households and leading to a rise at the time (holding other things equal) of more than 100,000 households in the existing measurement of fuel poverty. The impact is likely to vary with the measurement, and one that places additional emphasis on fuel costs will show a larger impact than one that reduces their emphasis.

2006 changes

22. Changes to the period of the source data for average prices for metered fuels to bring the period in to line with the EHS collection period. This coincided with a period of large price rises, in turn increasing the number of fuel poor households in 2006 by over 100,000.

23. Changes to the method of income imputation for low income households, resulting in fewer imputations to income and more households with very low incomes (including for the first time some households with zero and negative incomes). Although this had only a small impact on fuel poverty in the year of introduction, the overall effect was to reduce average incomes compared with the old method, and in general lead to a rise in fuel poverty, and the depth (or severity) of fuel poverty. Therefore, this change would also affect the size of any fuel poverty gap that incorporates income.

2007 changes

24. Introduction of the half house, standard heating regime. Previously households were assigned one of three heating regimes, and assumed to heat their whole house for either the whole day or only part of the day, or to heat half of their house for the whole day. The new regime assumed that employed households living in a property large for their needs would heat only part of the dwelling for part of the day. This led to a small reduction in total energy consumption and therefore fuel poverty.

25. Some improvements to the recording of income from savings and benefits

2008 changes

26. Changes to the source data used for producing average prices for non metered (coal and solid fuel and heating oil) fuels. This had only a very small impact on modelled bills.

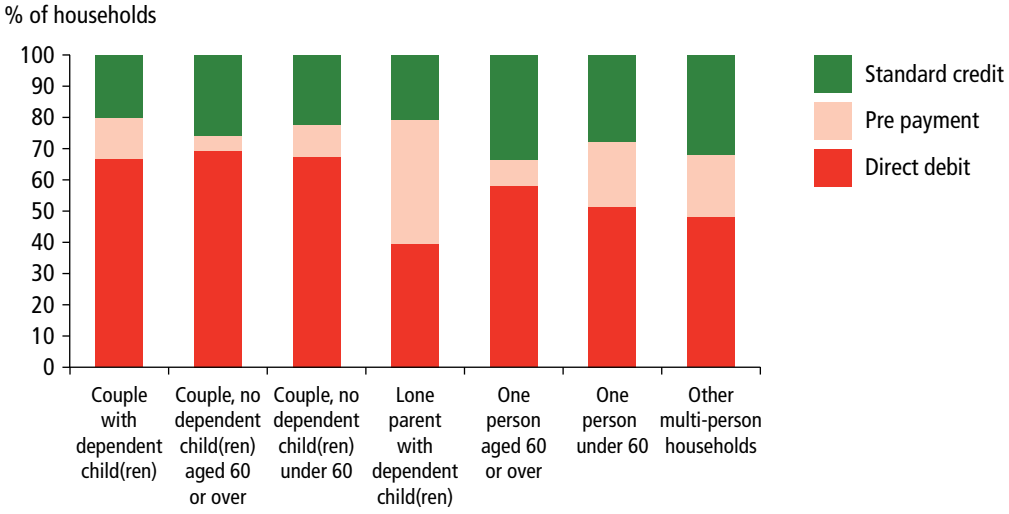
27. A further complication is the way that changes are made. The fuel poverty data are based on two years of EHS data combined with the oldest year in each combined dataset remaining unchanged from the previous year. Therefore changes in methodology will only affect one half of the data in the year of introduction, and will take two years to fully impact on the data. Changes in the methodology

will mean that holding everything else constant, the level of fuel poverty will change. This will affect the official level of fuel poverty as published by DECC and will also impact on the alternative measurements we have compiled in this report.

B.2 Payment methods for electricity (Chapter 2)

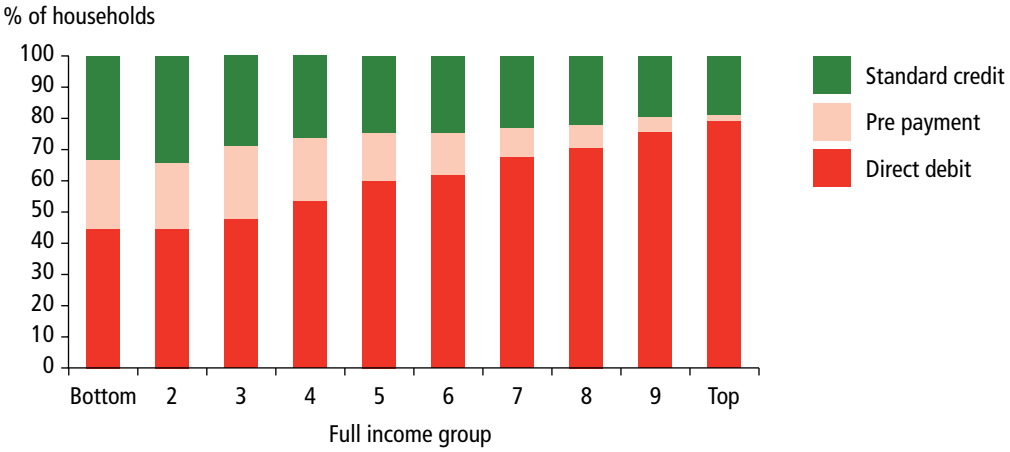
28. Figures 2.7, 2.8 and 2.9 in Section 2.3 showed payment methods for gas for UK households by household type, income group and tenure. Below are the corresponding charts for electricity.

Figure B.1: *Methods of payment for electricity by household type, 2009, England*



Source: Fuel poverty statistics, 2011, DECC

Figure B.2: *Methods of payment for electricity by income group, 2009, England*



Source: Fuel poverty statistics, 2011, (DECC)

Figure B.3: *Methods of payment for electricity by tenure, 2009, England*

Source: Fuel poverty statistics, 2011, (DECC)

B.3 Composition under each indicator (Chapters 5, 6 & 7)

29. This Annex provides details on the composition by household type and by region for each indicator examined in this report. It would be more appropriate to count the number of individuals affected by this problem – in the spirit of WHECA – but we present this information by number of households for comparative purposes. Evidently, if one indicator finds proportionally more multi-person households than another one, the total number of people affected will be higher under the former.

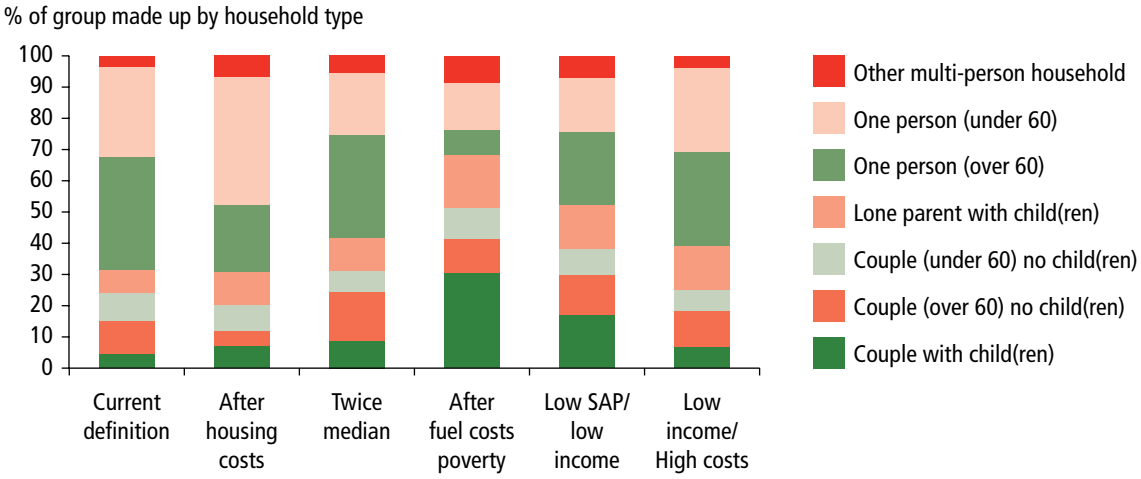
30. It is worth recalling that each indicator identifies the extent of the problem differently and in different ways. The breakdowns given here need to be considered in the perspective of varying overall numbers (see Figures 6.7 and 7.4). Further, although a comparison of the household composition under each measure is of some interest, particularly in comparison to the current indicator of fuel poverty, there is no sense in which any particular distribution should be seen as desirable. It is our view that the right indicator will identify the right household types. At the very least, an indicator designed to reflect the core problem, with thresholds and other characteristic elements fixed accordingly, is likely to lead to the correct identification of the type of household affected.

31. Understanding composition by household type is a key element of effective policy design. Different types of household can be targeted in practice in different ways, for example on the basis of broad benefit eligibility, the approach currently preferred by the Government. So, where an indicator captures a large proportion of pensioner households, there would be an incentive to use eligibility for given pensioner benefits to be used as a proxy means of targeting fuel poverty policy. We will examine the targeting of fuel poverty policies in our final report and expect to show the extent to which the current proxies used in policy design would identify the same households as those identified as fuel poor under our proposed indicator.

Composition by household type

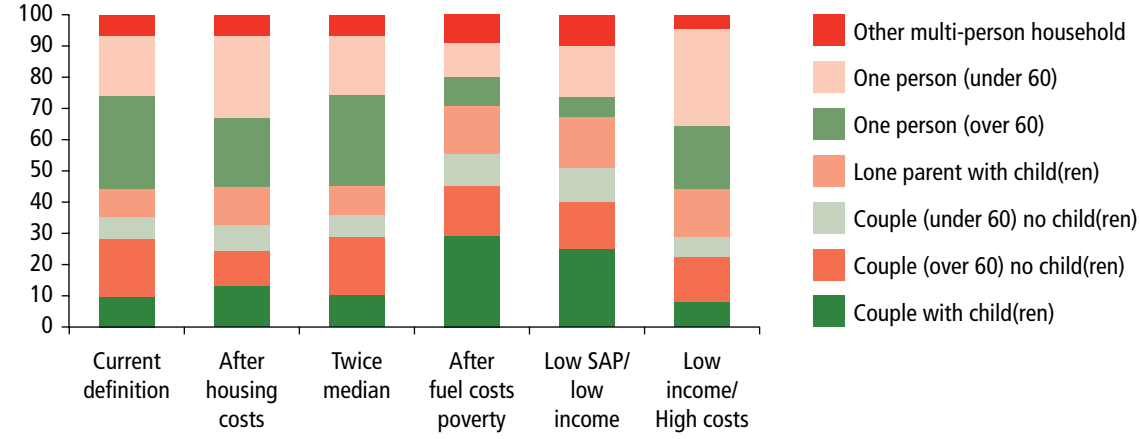
32. Figure B.4 and Figure B.5 show total number of households captured by each indicator broken down by household type in 2004 and 2009. The detailed numbers underpinning these figures are then given in Table B.1 and Table B.2.

Figure B.4: *Proportion of households by type identified by each indicator, 2004, England*



Fuel Poverty datasets, 2004 and 2009 (DECC)

Figure B.5: *Proportion of households by type identified by each indicator, 2009, England*



Fuel Poverty datasets, 2004 and 2009 (DECC)

Table B.1: Number of households (000s) identified by each indicator by household type, 2004, England

	Couple with child(ren)	Couple (over 60) no child(ren)	Couple (under 60) no child(ren)	Lone parent with child(ren)	One person (over 60)	One person (under 60)	Other multi-person household	TOTAL
Current definition	54	134	108	91	450	356	44	1,236
After housing costs	96	67	113	150	296	564	94	1,379
Twice median	355	630	277	444	1,340	811	224	4,081
After fuel costs	1,107	572	394	895	909	831	353	5,061
Low SAP/low income	359	278	180	297	506	369	154	2,143
Low income/High costs	187	334	188	408	854	762	115	2,847

Fuel Poverty datasets, 2004 and 2009 (DECC)

Table B.2: Number of households (000s) identified by each indicator by household type, 2009, England

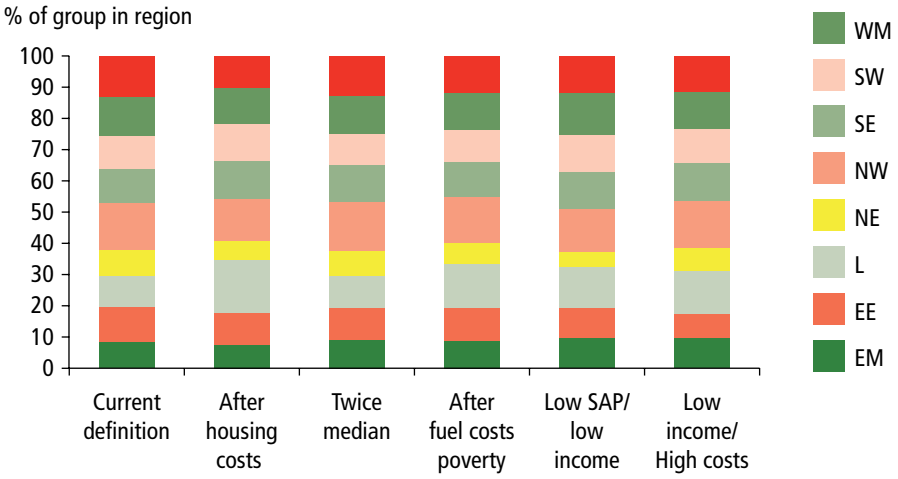
	Couple with child(ren)	Couple (over 60) no child(ren)	Couple (under 60) no child(ren)	Lone parent with child(ren)	One person (over 60)	One person (under 60)	Other multi-person household	TOTAL
Current definition	381	733	281	347	1,184	763	275	3,964
After housing costs	485	425	300	466	815	983	261	3,735
Twice median	494	891	350	444	1,412	916	337	4,844
After fuel costs	1,122	683	469	968	457	937	450	5,086
Low SAP/low income	508	312	218	335	132	332	207	2,044
Low income/High costs	216	394	172	415	555	836	128	2,716

Fuel Poverty datasets, 2004 and 2009 (DECC)

Composition by region

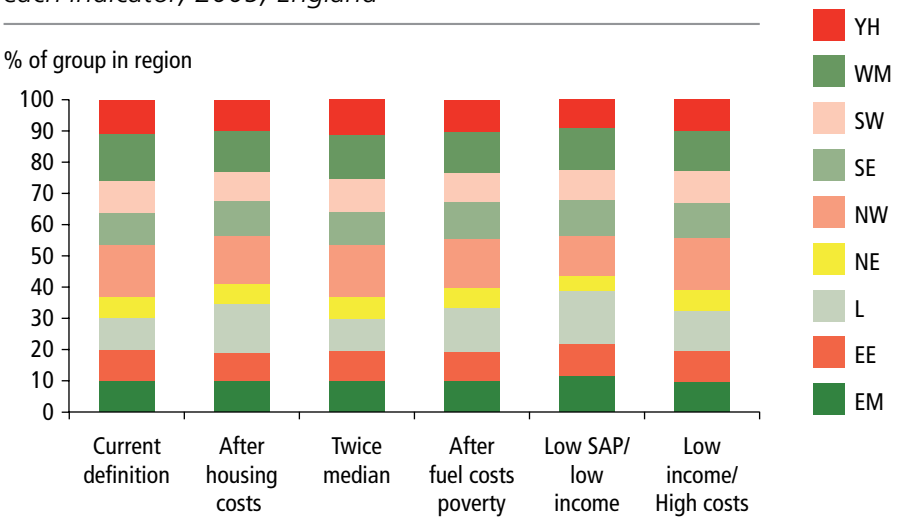
33. Figure B.6 and Figure B.7 show total number of households captured by each indicator broken down by English region in 2004 and 2009. The detailed numbers underpinning these figures are then given in Table B.3 and Table B.4.

Figure B.6: *Proportion of households by region identified by each indicator, 2004, England*



Source: DECC (for current definition); own calculations for other indicators

Figure B.7: *Proportion of households by region identified each indicator, 2009, England*



Source: DECC (for current definition); own calculations for other indicators

Table B.3: Number of households (000s) identified by each indicator by region, 2004, England

	EE	EM	L	NE	NW	SE	SW	WM	YH	TOTAL
Current definition	141	141	119	103	190	133	134	153	163	1,236
After housing costs	141	103	233	85	182	171	164	156	145	1,379
Twice median	409	371	420	329	639	481	408	493	531	4,081
After fuel costs	483	397	902	321	718	616	480	573	570	5,061
Low SAP/low income	208	205	281	101	301	249	251	290	257	2,143
Low income/High costs	271	223	390	208	430	350	309	333	334	2,847

Source: DECC (current definition); own calculations for other indicators

Key: EE – East of England; EM – East Midland; L – London; NE – North East; NW – North West; SE – South East; SW – South West; WM – West Midlands; YH – Yorkshire and Humber

Table B.4: Numbers of households (000s) by region identified by each indicator, 2009, England

	EM	EM	L	NE	NW	SE	SW	WM	YH	TOTAL
Current definition	388	398	402	272	649	411	411	589	444	3,964
After housing costs	364	347	584	230	576	419	355	483	378	3,735
Twice median	464	475	502	330	812	525	501	690	544	4,844
After fuel costs	475	447	918	281	749	621	462	620	512	5,086
Low SAP/low income	213	231	345	102	258	242	196	273	184	2,044
Low income/High/costs	253	274	348	187	444	305	281	355	270	2,716

Source: DECC (current definition); own calculations for other indicators

Key: EM – EE – East of England; East Midland; L – London; NE – North East; NW – North West; SE – South East; SW – South West; WM – West Midlands; YH – Yorkshire and Humber

B.4 Low income high cost indicator thresholds (Chapter 7)

Threshold setting under this indicator

34. Chapter 7 set out a possible definition of fuel poverty based on the overlap between lower income and unreasonable costs. As discussed in the chapter, the definition requires two thresholds to be set, one for income and one for costs.

35. Our approach to the income threshold is based on after housing costs incomes, adjusted for household size and composition, as used in DWP's HBAI analysis. We take a 'lower income' to mean below a threshold based on 60 per cent of median income after housing costs, plus each household's modelled energy bill. This value will be affected by changes in fuel prices and in energy efficiency standards in homes. As such, the threshold will change over time. Although there would be other ways of setting this threshold, we do not examine them here.

36. The approach we have taken to the calculation of the costs threshold is set out in some detail in Chapter 7. However, below we consider a range of possible approaches to this issue. We also comment further on certain aspects of the way we have conducted our calculations. The judgement involved is important and we would therefore particularly welcome views on this issue.

Options for setting the threshold between reasonable and unreasonable costs

37. How the threshold for reasonable costs relates to household size is a big issue. There are various options for setting the thresholds for unreasonable energy costs. These include (but are not limited to):

    (a) a common unadjusted threshold (e.g. the median modelled energy bill for all households);

    (b) thresholds set by what modelling shows to be the median value for each household type; and

    (c) thresholds derived from the median equivalised modelled bill (the option we use in Chapter 7) or in some other way.

38. The following sections set out how these thresholds might work alongside some of the pros and cons of each approach.

A common unadjusted threshold

39. One option would be to set the threshold on the basis of the median modelled energy bill for all households.

40. A single threshold of this nature would not reflect the needs of different household types very well as it applies the same test of reasonableness to small and large households.

41. For example, suppose that the median modelled household energy bill is £800 for a single person, £1,500 for a family of four and £1,200 for all households. Suppose that there are two households: one is a single person in a low energy-efficiency home, with a modelled energy bill of £1,100 and the other is a family of four in an energy-efficient home with a modelled energy bill of £1,300. The use of a single threshold for unreasonable costs set at £1,200 would mean that the one-person household is not classed as facing unreasonable costs whereas the family of four is. This is in spite of the fact that the family of four faces low costs relative to similar types of households (and vice versa for the one-person household). This suggests that we may want to consider a more sophisticated costs threshold that takes account of household size and composition (and, therefore, household needs).

Thresholds set by what modelling shows is the median energy bill for each household type

42. One option to reflect the varying needs of different households would be to set different thresholds for each household type. For example, the threshold for unreasonable costs for a one-person household could be based on the median modelled energy cost for all one-person households.

43. Based on the simple two household examples used above this would mean that the threshold for a one-person household would be set at £800 and the threshold for a family of four would be £1,500. These thresholds would mean that the low energy efficiency one-person household is facing unreasonable costs (£1,100 compared to £800, giving a fuel poverty gap of £300) and the more energy efficient family of four is not (£1,300 compared to £1,500).

44. There are two main problems with this approach. First, it would require the calculation, in effect, of a wide range of thresholds, reflecting the diversity of household size and composition in England. This would include household types with relatively few observations. Second, within any given household type, one half of households would always have unreasonable costs. This could lead to some perverse findings. For instance, many lone parents live in relatively energy efficient social housing. For such households the median bill may be rather low compared to similarly sized households of other types.

Thresholds based on the median adjusted modelled bill

45. Another way to take account of the needs of different households would be to adjust the modelled bills using some form of equivalence scale. Equivalence scales are commonly used when comparing the incomes of different households where they are used to adjust net household income to reflect household composition. Of relevance here, they also have the advantage of overcoming difficulties relating to sample size.

46. Official poverty and income distribution statistics use the OECD equivalence scale in which a couple with no children is taken as the benchmark with an equivalence scale of 1.0 and a single adult household has an equivalence scale of 0.58 (i.e. the single person household only requires 58 per cent of the income of the couple without children to attain the same standard of living).

47. Relating this idea to the notion of reasonable costs under the low income – high costs indicator would mean applying equivalence factors to the modelled energy bills for all households, from which the median would then be taken. Household equivalence factors would then be applied to the median figure to give a different cost threshold for each different household (by size and composition). The modelled energy bill for each household would then be compared with the appropriate equivalised threshold. So a single person household's bill would be compared with the equivalised threshold for a single person household. Where the modelled bill is higher than the equivalised threshold, the household faces unreasonable costs and would be in fuel poverty if household income fell below the income threshold. For such households, the difference between the modelled bill and the equivalised threshold is the fuel poverty gap.[12]

48. For example, suppose again that the equivalised median modelled household energy bill is £1,200 and that we use the OECD equivalisation After Housing Costs factors to adjust the threshold to reflect different household types. For a single person household (equivalisation factor of 0.58) the threshold becomes £696 (£1,200 x 0.58). For the family of four (equivalisation factor of 1.4, assuming two adults and two children under the age of 14) the threshold becomes £1,680 (£1,200 x 1.4). The low-efficiency one-person household would therefore be facing unreasonable costs (a bill of £1,100 compared to the threshold of £696) and, assuming income below the threshold, would have a fuel poverty gap of £404. The family of four would not be facing unreasonable costs (a bill of £1,300 compared to the threshold of £1,680).

49. The key advantage of equivalising the modelled bills is that the judgement about whether a household is facing reasonable costs allows for the varying needs of different household types, avoiding the problems with the first option, albeit at the cost of some added complexity. It could also be argued the OECD After Housing Costs equivalisation factors (as used for the modelling in Chapter 7) are not necessarily appropriate. It may be that the additional energy spending that is required to take account of each additional member of the household would not be the same as the additional amount of income that is required for additional household members to maintain an overall standard of living. Equivalising the modelled bills could then require a bespoke set of factors created for this purpose, but this would add considerable complication.

50. For the purposes of checking the extent to which fuel poverty concerns the relativity between incomes and required fuel spending in some form there is also an intuitive appeal in using the same way of adjusting for household size in looking at both incomes and costs. Indeed using different scales could produce some anomalous results.

12 For technical convenience, in our modelling of the low income – high costs indicator we make these calculations in a slightly different way, but with exactly the same end-result. This consists of comparing each household's *equivalised* modelled bill to the median equivalised modelled bill. Where the former is higher than the latter, the household is taken as facing unreasonable costs. If household income is also below the threshold, the household is then classed as being in fuel poverty and the difference between its equivalised modelled bill and the median equivalised modelled bill is the fuel poverty gap, in terms of equivalised costs. We then convert the fuel poverty gaps back into cash amounts, reversing the equivalisation process. However, as a way of describing the process, the explanation above is intuitively somewhat easier to follow.

Bibliography

Anderson, W., Finney, A. and White, V. (2010). *"You just have to get by": Coping with low incomes and cold homes*. Bristol: Centre for Sustainable Energy.

Aylin, P., Morris, S., Wakefield, J., Grossinho, A., Jarup, L. and Elliot, P. (2001). Temperature, housing, deprivation and their relationship to excess winter mortality in Britain, 1986-1996. *International Journal of Epidemiology*, 30(5), 1100-1108.

Barnes, M., Butt, S. and Tomaszewski, W. (2008). *The Dynamics of Bad Housing: The impacts of bad housing on the living standards of children*. London: National Centre for Social Research.

Barnes, M., Butt, S. and Tomaszewski, W. (2011). The duration of bad housing and children's well-being in Britain. *Housing Studies*, 26 (1), 155-176.

Barnett,A.G., Dobson, A.J., McElduff, P., Salomaa, V., Kuulasmaa, K. and Sans, S. (2005). Cold periods and coronary events: an analysis of population worldwide. *Journal of Epidemiology and Community Health*, 59(7), 551-557.

Beatty, T., Blow, L and Crossley, T. (2011). *Is there a heat or eat trade off in the UK?* London: Institute of Fiscal Studies.

Bhattacharya, J., DeLeirre, T., Haider, S. and Currie, J. (2003). Heat or eat? Cold weather shocks and nutrition in poor American families. *American Journal of Public Health*, 93 (7), 1149-1154.

Boardman, B. (1991). *Fuel Poverty: From Cold Homes to Affordable Warmth*. London: Belhaven Press.

Boardman, B. (2010). *Fixing Fuel Poverty: challenges and solutions*. London: Earthscan.

Bradshaw, J. and Hutton, S. (1983). Social Policy Options and Fuel Poverty. *Journal of Economic Psychology*, 3 (3-4), 249-266.

Bradshaw, J. and Finch, N. (2003). Overlaps in dimensions of poverty. *Journal of Social Policy*, 32, 4, 53-525.

BRE on behalf of Defra and DTI. (2005). *Estimates of hot water consumption from the 1998 EFUS. Implications for the modelling of fuel poverty*. London: DEFRA/DTI.

Brewer, M., O'Dea, C., Paull, G. and Sibieta, L. (2009). The living standards of families with children reporting low income. *DWP research report 577*. London: DWP.

Consumer Credit Counselling Service. (2010). *Survey into the human impact of debt problems*. (Not officially published).

Dearden, C., Goode, J., Whitfield, C. and Cox, L. (2010). *Credit and debt in low income families.* York: Joseph Rowntree Foundation.

Department for Communities and Local Government. (2006). *A Decent Home: Definition and Guidance for Implementation*. London: DCLG.

Department for Environment, Food and Rural Affairs and Department of Trade and Industry. (2005). *The UK Fuel Poverty Strategy: 3rd Annual Progress Report*. London: Defra, DTI.

Department of Energy and Climate Change. (2009). *UK Fuel Poverty Strategy: 7th Annual Progress Report*. London: DECC.

Department of Energy and Climate Change. (2010). *Fuel Poverty Methodology Handbook*. London: DECC

Department of Energy and Climate Change. (2011). *Annual report on fuel poverty statistics*. London: DECC.

Department of Trade and Industry and Department for Environment, Food and Rural Affairs. (2001). *The UK Fuel Poverty Strategy.* London: Defra, DTI.

Ekins, P. and Dresner, S. (2004). *Green Taxes & Charges: Reducing their impact on low income households*. York: Joseph Rowntree Foundation.

Frank, D.A., Neault, N.B., Skalicky, A., Cook, J.T., Wilson, J.D., Levenson, S., Meyers, A.F., Heeren, T., Cutts, D.B., Casey, P.H., Black, M.M. and Berkowitz, C. (2006). Heat or eat: the low income home energy assistance programme and nutritional health risks among children less than three years of age. *Pediatrics*, 118 (5), 1293-1302.

Fuel Poverty Advisory Group (for England). (2010). **Eighth annual report 2009**. London: DECC.

Gilbertson, J., Stevens, M., Stiell, B. and Thorogood, N. (2006). Home is where the hearth is: Grant recipients' views of England's Home Energy Efficiency Scheme (Warm Front). *Social Science and Medicine*, 63(4), 946-956.

Green, G. and Gilbertson, J. (2008). *Warm Front, Better Health: Health Impact Evaluation of the Warm Front Scheme*. Sheffield: Centre for Regional, Economic and Social Research.

Hajat, S., Kovats, R.S. and Lachowycz, K. (2007). Heat-related and cold-related deaths in England and Wales: who is at risk? *Journal of Occupational and Environmental Medicine*. 64(2), 93-100.

Hancock, R. and Isherwood, B. (1979). *Household Expenditure on Fuel: Distributional Impacts.* Department of Housing and Social Security. (Not officially published).

Harris, J., Hall, J., Meltzer, H., Jenkins, R., Oreszczyn, T. and McManus, S. (2010). *Health, mental health and housing conditions in England*. London: National Centre for Social Research.

Hills, J., Brewer, M., Jenkins, S., Lister, R., Lupton, R., Machin, S., Mills, C., Modood, T., Rees, T. and Riddell, S. (2010). *An Anatomy of Economic Inequality in the UK, Report of the National Equality Panel* London: Government Equalities Office/CASE.

Hills, J., Sefton, T. and Stewart, K. (eds) (2009). *Towards a More Equal Society? Poverty, inequality and poverty since 1997*. Bristol: The Policy Press.

Jenkins, R., Bhugra, D., Bebbington, P., Brugha, T., Farrell, M., Coid, J., Fryers, T., Welch, S., Singleton, N. and Meltzer, H. (2008). Debt, income and mental disorder in the general population. *Psychological Medicine*. 38(10), 1485-1493.

Keatinge, W.R., Coleshaw, S.R.K., Cotter, F., Mattock, M., Murphy, M. and Chelliah, R. (1984). Increases in platelet and red cell counts, blood viscosity and arterial pressure during mild surface cooling: factors in mortality from coronary and cerebral thrombosis in winter. *British Medical Journal*, 289(6456), 1405-1408.

Levell, P. and Oldfield. Z. (2011). *The Spending Patterns and Inflation Experience of Low-Income Households over the Past Decade*. London: Institute of Fiscal Studies.

Liddell, C., Morris, C., McKenzie, P. and Rae, G. (2011). *Defining Fuel Poverty in Northern Ireland: A preliminary review.* Belfast: DSDNI.

Liddell, C. (2008). *The Impact of Fuel Poverty on Children*. Belfast: Save the Children.

Marmot Review Team. (2011). *The Health Impacts of Cold Homes and Fuel Poverty*. London: Friends of the Earth and the Marmot Review Team.

Office of Fair Trading. (2010). *A consumer's view of pricing advertising*. London: OFT.

Oreszczyn, T., Ridley, I., Hong, S., Wilkinson, W. and Warm Front Study Group. (2006). Determinants of Winter Indoor Temperatures in Low Income Households in England*. Energy and Buildings*, 38(3), 245-252.

Oreszczyn, T., Ridley, I., Hong, S. H., Wilkinson, P. and Warm Front Study Group. (2006). Mould and winter relative indoor humidity in low income households in England. *Indoor and Built Environment*, 15 (2), 125-135.

Pensions Commission. (2005). *A new pensions settlement for the 21st century: the 2nd Report of the Pensions Commission*. London: Pensions Commission.

Sefton, T. and Chesshire, J. (2005). *Peer review of the methodology for calculating the number of households in fuel poverty in England: final report to DTI and Defra*. London: DTI and Defra.

Sefton, T. (2004). *Aiming High – An evaluation of the potential contribution of Warm Front towards meeting the Government's fuel poverty target.* CASE Report 28, London: LSE.

Stout, R.W., Crawford, V.L.S., McDermott, M.J., Rocks, M.J and Morris, T.C.M. (1996). Seasonal Changes in Haemostatic Factors in Young and Elderly Subjects. *Age and Ageing*, 25(3), 256-258.

The Eurowinter Group. (1997). Cold exposure and winter mortality from ischaemic heart disease, cerebrovascular disease, respiratory disease, and all causes in warm and cold regions of Europe. *The Lancet*, 349(9062), 1341-46.

White, V., Roberts, S. and Preston, I. (2011). *Understanding 'High Use Low Income' Energy Consumers*. Bristol: Centre for Sustainable Energy.

Wilkinson, P., Landon, M., Armstrong, B., Stevenson, S., Pattenden, S., McKee, M. and Fletcher, T. (2001). *Cold Comfort: The Social and environmental determinants of excess winter deaths in England, 1986-96*. Bristol: The Policy Press.

Wilkinson, P., Pattenden, S., Armstrong, B., Fletcher, A., Kovats, S. R., Mangtani, P. and McMichael, A. J. (2004). Vulnerability to winter mortality in elderly people in Britain: population based study. *British Medical Journal*, 329 (7467), 647-653.

World Health Organization. (1987). *Health Impact of Low Indoor Temperatures: Report on a WHO meeting*. Copenhagen: World Health Organization.

World Health Organisation. (2006). *Housing, Energy and Thermal Comfort*. Copenhagen: World Health Organisation.

World Health Organisation. (2007). *Housing, Energy and Thermal Comfort: A review of 10 countries within the WHO European Region.* Copenhagen: World Health Organisation.

Summary of the responses to the call for evidence

Background

1. In March 2011, the review launched a call for evidence asking for submissions of relevant evidence in order to inform our work. The review was asked to consider fuel poverty from first principles, to determine the nature of the issues at its core, the extent to which fuel poverty is distinct from poverty, and the detriment it causes. Secondly, and subject to those findings, the review was asked to develop possibly formulations for a future definition and any associated form of target. With that in mind the call for evidence asked for contributions to those areas.

2. Specifically, the call for evidence asked for evidence relating to:

   - the nature of the issues at the core of fuel poverty;
   - what makes fuel poverty distinct from poverty defined in various ways;
   - the impact of fuel poverty, its extent and who it most affects;
   - whether the current definition and target for fuel poverty allow the issue at its core to be tackled effectively and, if not, how the definition and associated target might be amended to address this;
   - whether, and to what extent, the current definition of fuel poverty allows Government to focus resources and policies on those who most need support;
   - the cost effectiveness of measures to address fuel poverty (including measures impacting on income, fuel bills and thermal efficiency of homes);
   - how, under any definition, the fuel poor can be best identified and help targeted to them.

3. More than 60 organisations or individuals responded to the call for evidence. They are listed in Appendix 1, except where they have requested their response to be anonymous. This is a summary of the responses received.

Causes and Impacts

4. On the causes of fuel poverty, respondents identified three main drivers of fuel poverty: low income, energy inefficient homes and high fuel costs. The majority

agreed that it was the combination of these factors that led to a household being in fuel poverty.

5. Respondents also identified a variety of additional contributory and exacerbating factors including:

    - an ageing population;
    - growth of the private rented sector (where housing standards tended to be lower and there was less incentive to undertake home improvements);
    - lack of awareness of and ability to access the best deals in the energy market;
    - lack of awareness of and access to new technology;
    - lack of protection for low income customers in the competitive market;
    - under-occupancy (which was a growing trend);
    - shifts in household income (particularly temporary changes caused by unemployment);
    - impacts of climate change on seasonal temperatures;
    - lack of awareness of available assistance (and a reluctance to access it).

Who is most affected by fuel poverty?

6. Respondents felt that all ages were thought to be affected, but pointed out that the specific impacts varied with age. They identified certain groups likely to be more at risk:

    - low income households, especially lone parents, pensioners, those living with long term illness or disability and carers. Some households with incomes above those considered to be "low" are also pushed into poverty by high bills;
    - rural households, whose homes are typically harder to treat, are more likely to be off the gas grid, have lower than average wages or be in seasonal employment and incur high travel costs;
    - Households in the private rented sector, where there may be barriers to the installation of energy efficiency measures, legal issues for leaseholders of flats and hard to treat homes.

What are the impacts of fuel poverty?

7. Respondents highlighted a range of impacts, both physical and non-physical.

8. Although one respondent noted that there is still a lack of understanding around health impacts, many were supportive of the findings of the Marmot Review. Specific impacts cited were:

    - 200,000 unnecessary hospital admissions each year;
    - long term adverse impacts on the health and wellbeing of individuals going without food and other essentials in order to heat their homes;
    - increased susceptibility to cardiovascular and respiratory disease;
    - children from cold homes were said to be more than twice as likely to suffer respiratory problems.

9. The social impacts cited by respondents included:

   - stigma and isolation;
   - negative impact on financial well-being;
   - children at greater risk of long term socio-economic detriment e.g. more days off school, negative impact on educational attainment, mental health problems in adolescents;
   - an association between crime and fuel poverty.

Is fuel poverty distinct from income poverty?

10. Respondents felt there were strong links between income poverty and fuel poverty. All acknowledged that there was not an exact correlation between the two but differed as to whether this was because fuel poverty was a subset of income poverty, or a distinct and separate issue.

11. Some felt it was a subset of income poverty rather than a specific issue in its own right: "no-one is fuel poor who is otherwise well off" (Milton Keynes Council) or that it was "a symptom of general poverty" (E-On).

12. Others felt that fuel poverty could not be explained in income terms alone: "Income is an extremely important factor in fuel poverty…[but] it is not the only factor" (Citizens Advice Bureau). Respondents highlighted the link to energy inefficiency, the immediate and specific risk of health implications (Bromford Group), the link to energy prices and the lack of control households had over their ability to turn income into heat ("variations in homes means households have an unequal ability to convert income into adequate warmth" – Consumer Focus) as reasons for fuel poverty. Another respondent felt that fuel poverty was more hidden than income poverty, as it can be more easily disguised (e.g. by only heating a property when friends or family visit).

13. Respondents highlighted that the interventions for tackling fuel poverty tended to be different from those used to address income poverty. For example energy efficiency measures can help where income maximisation might not work e.g. for pensioners: "The distinguishing characteristic of fuel poverty is that it includes the energy efficiency of the home… Working to reduce fuel poverty through energy efficiency programmes could make a significant difference" (AgeUK).

Definitional issues

14. Many respondents argued that the existing definition was either fit for purpose, or that focusing on definitional issues served as a distraction from addressing the issue of fuel poverty through practical action.

15. Others felt that "the existing working definition of fuel poverty does not provide a framework for government that facilitates an optimal focus of resources and policies where support is most needed" (Scottish Power).

16. Several respondents, even where they felt the definition was broadly appropriate, proposed areas where it could be improved. Some argued that key features of the current definition should be retained. These can be summarised as follows:

- Need to spend: several respondents stressed the importance of retaining a 'need to spend' approach, because of the issue of under-heating and because it was objective. However some worried that the current 'need to spend' model did not reflect vulnerabilities effectively.

- After Housing Costs: Several respondents argued for the measurement of income in the definition to be calculated on an After Housing Costs basis, as this would better reflect a household's disposable income. Some felt this would help targeting the households most at risk of fuel poverty.

- Equivalisation: A few respondents raised the issue of equivalisation of income (a measure of household income that takes account of different household sizes and composition). This would allow for comparison with other poverty measures and was likely to identify more working age families as being fuel poor. Others argued that this was unnecessary.

17. Some respondents pointed out more general issues with the current definition:

    - Sensitivity to energy price changes: Several respondents highlighted the sensitivity of the current model to changes in energy prices, which given the increasing fluctuations in price made the definition unsuitable.

    - The ratio problem: A few submissions highlighted that a ratio implied an incentive for a short term reduction in bills rather than longer-term, cost effective energy efficiency measures.

18. A few respondents argued strongly that actual spending should be assessed, with temperatures, in order to build an understanding of actual behaviour and costs.

19. Respondents also put forward views on various technical elements BRE model used in the current definition to estimate the scale of fuel poverty:

    - Temperature standards: some expressed concern that the temperature standards should not be changed without strong supporting evidence. However some felt that the standards needed to be examined to ensure they met the needs of the most vulnerable.

    - Average tariffs: use of average tariffs would tend to underestimate costs so there is a need to understand how much people are actually paying.

20. Whilst several respondents argued that the current definition is fit for purpose, many of these also acknowledged that there were issues with the current way of measuring fuel poverty. On balance, they did not feel that these mattered enough to warrant modification of the current definition.

21. There was some support for the measure to capture fuel poverty on a relative basis, including to reflect best practice and for the form to be comparable to other poverty measures. Others felt the definition should be developed to reflect the severity/depth of fuel poverty, and also to allow for recognition of progress or 'distance travelled'.

22. A couple of respondents also suggested an "at risk" category for those who fell just below the current threshold and were therefore not counted as fuel poor but were nonetheless at risk.

Interventions and targeting

Targeting

23. There were different opinions on what the definition should be used for. Some felt it was only an overall measure of the scale of the problem and not intended to be used for target setting or practical policy making.

24. Some noted that while the definition was fit for purpose, the targets were unrealistic and should be reassessed. As fuel prices will continue to push up fuel poverty numbers so targets should be set relating to annual fluctuations or specific outputs.

25. A few noted that while the definition could model the scale of fuel poverty at a national level, it could not be used on the doorstep by potential delivery agents, such as local councils or doctor's surgeries to identify those in fuel poverty.

26. One very frequently cited suggestion in the responses was for greater data sharing, although respondents did not necessarily agree on what needed sharing, or who it should be shared with. Many cited the sharing of Department for Work and Pensions data in relation to the Warm Home Discount as a model to follow. Others felt that Local Authorities had a key role to play.

Alternative definitions

27. A few proposed some alternative or supplementary ways of measuring fuel poverty, though many highlighted the difficulties in using effective proxies:

- SAP: the most common proposal was for a SAP related element to be include in a future definition of fuel poverty, recognising the interaction of income with energy efficiency levels.

- Affordable warmth: some respondents felt that the term 'fuel poverty' stigmatized people and could be having an impact on uptake of interventions. Renaming the problem 'affordable warmth' would remove the stigma, making uptake of policy programmes more appealing and therefore more effective.

- Minimum Income Standards: One respondent, building on the work of the Joseph Rowntree Foundation and the Centre for Research into Social Policy, proposed using a minimum income standards approach to measuring fuel poverty. A variant of this, an Affordability Index was also proposed. Under the index, assumptions would be made about likely occupancy of a given household, the minimum state income for such a households and therefore the level of SAP that would be affordable.

Interventions

28. The call for evidence also asked for views on the most cost effective interventions.

29. When responding on the effectiveness of measures, many suggested that the impact of Government policies was regressive as those on lower incomes ended up paying a greater proportion of their income than others on a higher income. Several also felt that many of the policies for addressing the issue treated the symptoms of fuel poverty rather than the underlying causes.

30. Specific comments on various measures, both current and future, included:

    - The eligibility criteria for the Winter Fuel Payment (which is currently extended to all pensioners, but no other groups) should be changed to remove well-off recipients and extended to less well-off non-pensioners (e.g. those in receipt of the Cold Weather Payment).
    - Many were concerned that the Green Deal would not help to tackle fuel poverty.
    - The introduction of a minimum standard for the Private Rented Sector was welcomed by many as an effective policy, though a few felt the date for compliance should be brought forward.
    - A couple noted that Warm Front had been effective (and were concerned that it was ending with no successor policy in place).

31. In terms of the most effective solutions, the most frequently cited measure was energy efficiency improvements: "Capital investment can deliver a permanent and sustainable solution" (FPAG). Respondents were also supportive of area based approaches. Income maximisation through benefit entitlement checks, though resource intensive, could have significant results (increasing income by up to £3,000).

32. Other suggestions included:

    - (higher) standards for the private rented sector i.e. to a higher level than those already announced;
    - recovery of the cost of environmental programmes on a consumption basis;
    - fufilling microgeneration potential in fuel poor homes;
    - rebates for fuel bills – in some cases it was suggested that these go directly to the energy supplier;
    - free fuel allowance scaled according to household size;
    - referral schemes and training frontline staff (the role of the NHS);
    - educational initiatives: use of technology/how to reduce bills/impact of cold homes on health;
    - Rising Block Tariffs;
    - fair trade tariff;
    - simplification of tariff information;
    - a CERT extension/super priority group.

33. Finally, Scottish and Southern Energy (and others) made a suggestion for a Fuel Poverty Agency. (We understand this is now being examined in detail by FPAG.)

34. Many suggested ways in which government policies could be made more effective. These included improving co-ordination – for example, tackling fuel poverty in conjunction with child poverty, financial exclusion and unemployment – and factoring in savings to the NHS as well as carbon emissions reductions.

Appendix 1: List of respondents to the call for evidence

Action with Communities in Rural England (ACRE)

Age UK

Association for the Conservation of Energy

British Gas/Centrica

British Heart Foundation

Bromford Group

Calor Gas

Carers UK

Carillion

Changeworks Resources for Life

Citizen's Advice

City of York Council

Consumer Focus

County Durham Fuel Poverty Partnership

Cumbria Affordable Warmth Project

Durham County Council

Ealing Council

East Riding of Yorkshire Council

EDF Energy

End Fuel Poverty Coalition

Energy Action Scotland

E.ON

Fuel Poverty Action Group

Herefordshire Council

Housing Action

Independent Age

Islington Council

John Meldrum

Keyhouse

Leeds City Council

Professor Christine Liddell

Local Government Group

Macmillan Cancer Support

Mayor of London

Milton Keynes Council

Dr Richard Moore

National Housing Federation

National Pensioners Convention

National Energy Action

North West Carbon Action Network

Northern Housing Consortium

Northern Ireland Fuel Poverty Group

Ofgem

Ofwat

Orbit Heart of England

Rights to Warmth

Rotherham NHS

Rushmore Healthy Living

RWE nPower

Save the Children

Scottish & Southern Energy

Sustainable Uist

The Environment Centre

UK Business Council for Sustainable Energy

UK Public Health Association

Universal Benefit society

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