John Hills

Getting the measure of fuel poverty: final report of the Fuel Poverty Review

Report

Hills Fuel Poverty Review

CASE
Centre for Analysis of Social Exclusion

Getting the measure of fuel poverty

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CASE report 72

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Contents

Foreword		2
Abbreviations glossary		4
Summary and Recommendations		6
Chapter 1:	The review so far	24
Chapter 2:	Adjustments to the Low Income High Costs indicator	50
Chapter 3:	Finding the fuel poor	70
Chapter 4:	Principles for tackling fuel poverty	96
Chapter 5:	Policies for tackling fuel poverty	104
Chapter 6:	Projections of trends in fuel poverty	130
Chapter 7:	Making further progress	144
Chapter 8:	Conclusions	174
Annex A:	Annex to Chapter 1	178
Annex B	Annex to Chapter 2	180
Annex C:	Annex to Chapter 6	196
Annex D:	Annex to Chapter 7	212

Foreword

In February 2012, as this report was being completed, official statistics showed that in 2010 UK carbon emissions rose for the first time in seven years, driven primarily by increased use of gas for heating homes during especially cold winter months. We do not know how many of the people who turned up the heating did so because they could afford to and how many had to make sacrifices elsewhere. Nor do we know how many stayed cold. We do know that no matter their income, households faced very different costs to achieve the same level of warmth, largely due to the varying energy efficiency of their homes.

It is now recognised that before the end of the decade something like a revolution in our housing stock is required to address this energy inefficiency that has been a fact of life for too long. This revolution is needed at a time when the wider economic picture is, to say the least, difficult. The Government's policy framework centres on innovative financing of energy saving measures, particularly through the 'Green Deal' which aims to allow millions of homes and businesses throughout the UK to make energy efficiency improvements.

But while improving the energy efficiency of the housing stock as a whole is a vital objective, this must not come at the price of leaving our worst remaining homes lived in by families on the lowest incomes. Some argue there is a tension between fuel poverty and climate change policies. Certainly, some people live in homes that are too cold and making them warmer could increase their carbon emissions. But any tension cuts both ways. The continuing existence of fuel poverty, especially on the potential scale we outline in this report, is an obstacle to delivery of our carbon objectives as well as a source of health problems and a compounding of the problem of poverty. This does not mean that low carbon efforts should be put on hold while fuel poverty is tackled. Quite the reverse. But it is clear that the impact of policies on those in fuel poverty must be considered so that they are not left behind as we make the changes needed to meet our carbon emission obligations.

Tackling fuel poverty offers a multiple pay-off: better living standards and conditions for people with low incomes, an improved and more energy efficient housing stock, fewer winter deaths and reduced costs for the NHS. This is no doubt what Parliament had in mind when it agreed in 2000, with all-party support, that fuel poverty should be eradicated as far as reasonably practicable within 15 years. That things are moving in the opposite direction – on the projections we present here – is profoundly disappointing.

In this context, some may find the focus here on measuring the problem an odd priority. But understanding the impact of policies and expenditure in this area is an essential first step to effective action. Flaws in the current indicator have distorted policy choices, misrepresented the problem and bred two drivers of inaction – complacency at times and pessimism about the impact of policy at others. Improving measurement can focus attention on the core problem – recognised in the Warm Homes and Energy Conservation Act 2000 – of being faced with getting by on a low income while being locked-in to unreasonable energy costs, including those where people, because they are on low incomes, end up paying the highest prices.

This report sets out an alternative measurement framework which, by separating out the extent and depth of the problem faced by households, is designed to lend itself to better application, improved policy development and more effective policy delivery. It pinpoints those who, alongside the most vulnerable, are priorities for action – those most deeply in fuel poverty. It also embeds a concern for distributional equity and improving standards, with sustained improvements to energy efficiency levels the most effective long-term approach, by virtually every indicator. I hope it will act as an effective driver of action in both the short and long term.

In writing this report I have been hugely assisted by those who submitted evidence in the summer of 2011 and who responded to the interim report published in October 2011. But it has only been possible because of the colossal – and always cheerful – efforts of the team that has worked with me on it: Gareth Baynham-Hughes, Fern Leathers and Jen Offord, who have worked more than full-time on it since the review started, and Damon Wingfield, Jamie Torrens, Sam Jenkins, Chris McKee and Phil James who have also devoted considerable proportions of the last year to it. The depth of analysis presented here would have been impossible without each of them. I am also very grateful to the Economic and Social Research Council for their forbearance in agreeing to adjust the timing of my current professorial fellowship, to allow this review to take place at the same time.

Not everyone will share each judgement I make about the way I believe fuel poverty should be measured and it is important that those involved in the debate have a chance to react to these proposals. But I hope that arguments of detail will not divert from the key task: tackling a problem which, while larger in scale than may would have hoped, does have solutions.

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March 2012

Abbreviations glossary

AES	Annual Energy Statement
AHC	After Housing Costs
BHC	Before Housing Costs
BRE/Bredem	Building Regulations Establishment
CBA	Cost Benefit Analysis
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CERT	Carbon Emissions Reduction Target
CESP	Community Energy Saving Project
CMDs	Common Mental Disorders
CRSP	Centre for Research into Social Policy
CSE	Centre for Sustainable Energy
CWP	Cold Weather Payment
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DLA	Disability Living Allowance
DWP	Department for Work and Pensions
ECO	Energy Company Obligation
EEC	Energy Efficiency Commitment
EHCS	English Housing Condition Survey
EHS	English Housing Survey
EPC	Energy Performance Certificate
EST	Energy Savings Trust
EWDs	Excess Winter Deaths
FITs	Feed In Tariffs
GHG	Greenhouse Gas
HBAI	Homes Below Average Income
IMD	Index of Multiple Deprivation
LIHC	Low Income High Costs
MIS	Minimum Income Standards

NEA	National Energy Action
NGO	Non Governmental Organisation
NHS	National Health Service
NPV	Net Present Value
OBR	Office of Budget Responsibility
Ofgem	Office for Gas and Electricity Markets
ONS	Office for National Statistics
RBT	Rising Block Tariff
RHI	Renewable Heat Incentive
RHPP	Renewable Heat Premium Payment
RO	Renewables Obligation
SAP	Standard Assessment Procedure
SWI	Solid Wall Insulation
VAT	Value Added Tax
WFP	Winter Fuel Payment
WHD	Warm Home Discount
WHECA	Warm Homes and Energy Conservation Act
WHO	World Health Organisation

Summary and Recommendations

Introduction and overview

1. This report marks the end of the independent review of fuel poverty commissioned by Chris Huhne MP, then Secretary of State for Energy and Climate Change, in March 2011.

2. The terms of reference for the review called, in essence, for an examination of three issues:

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

   - If it is distinct, how it is best measured and whether the current approach to doing this captures the problems most effectively.

   - The implications of measurement for the way we understand the effectiveness of the range of policy approaches to reducing it.

3. Following an extensive review of the evidence and consultations with stakeholders and having conducted our own detailed analysis, we published an interim report in October 2011. This covered the first two of these issues, presented our initial ideas, and set out a number of questions for further consultation. We are very grateful to the considerable number of organisations and individuals who responded to that consultation for their responses and the often very detailed attention which they had paid to our analysis and consultation questions. While the overwhelming balance of the consultation responses supported the core arguments presented in the interim report, some of them also raised some important issues which have helped us develop and refine our final proposals.

4. This report presents our final conclusions on the issues covered by the interim report. As we previously argued in Chapter 4 of the interim report, fuel poverty is not only a distinct, but also a serious national problem. However, the way in which its scale has been measured officially has had significant flaws, giving a misleading impression both of trends and of the effectiveness of policies to tackle it. This is mainly because the official indicator is based on comparing the ratio between households' energy spending needs and their income against a fixed threshold. This makes it unduly sensitive to changes in price levels as well as to technicalities within its calculation. The trends it reports do not reflect well those in the underlying problems, and its definition can encompass households that clearly are not poor. Part of the difficulty is that while a single indicator, it attempts to reflect both the extent and depth of the problem.

5. We therefore propose an alternative approach to measurement, focused on the way in which the problem is described in the Warm Homes and Energy Conservation Act 2000 (WHECA). This Act says – correctly, in our view – that we should be concerned about individuals in households

"living on a lower income in a home that cannot be kept warm at reasonable cost." In our interim report we set out a specific alternative framework for measuring fuel poverty, focused both on the number of households and people with low incomes and high costs and on the depth of the problems they face – what we call the 'fuel poverty gap'.

6. In Chapter 2 of this report we explain the final form that we suggest this indicator should take. Having considered the responses to our interim report very carefully, we believe that the framework for the indicator as originally designed was broadly correct although there was scope for improvement. In particular, we have made an important modification in terms of how to allow for household size and composition when considering what it is 'reasonable' for a given household to have to spend on energy in the home.

7. We have also considered the way in which the level of the threshold for reasonable costs could be set. We have examined a number of alternative options and proposals, but have concluded that retaining the median contemporary modelled energy requirement is the most robust level at which to set the boundary between 'reasonable' and 'unreasonable' costs. This decision has a number of implications, including the fact that the relative nature of our preferred indicator makes the literal eradication of fuel poverty extremely challenging (although not impossible). We discuss the implications of this and of alternative approaches below.

8. Using our framework, the main part of this report examines the implications of our approach for understanding the effectiveness of different policy approaches to tackling fuel poverty. It was not the remit of the review to produce a master plan for doing this. Rather our aim is to allow those who are central to the debate over policy both inside and outside government to understand what it would take to achieve particular aims and what can be achieved within particular resources.

9. Our analysis sets out the daunting scale of the challenge that would remain in 2016 given the current policy mix and framework, and official expectations for incomes and energy prices. On the central projection for our preferred measure, 8.5 million individuals within 2.9 million households will still be in fuel poverty, with an aggregate fuel poverty gap of over £1.7 billion, compared to a gap of £1.1 billion in 2009. This is a very long way from the elimination of fuel poverty that was the aim of WHECA and of the 2001 strategy for achieving it.

The problem of fuel poverty

10. We set out in detail in our interim report (Chapters 3 and 4), the reasons why fuel poverty is a distinct and serious problem from several perspectives. We have seen nothing in the responses to that report which challenges this conclusion. Indeed some respondents suggested that our description understated its gravity. The issue is of concern:

    - From a poverty perspective: the households with high energy costs living in poverty or on its margins in 2009 faced extra costs to keep warm above those for typical households with much higher incomes adding up to £1.1 billion. These costs are largely outside the control of those households – given the capital investment that would be required to reduce them – except through trading off the temperatures at which they live against other necessities, exacerbating the difficulties faced by all on such low incomes.

    - From a health and well-being perspective: living at low temperatures as a result of fuel poverty is likely to be a significant contributor not just to the excess winter deaths that occur each year (a total of 27,000 each year over the last decade in England and Wales), but to a much larger number of incidents of ill-health and demands on the National Health Service and a wider range of problems of social isolation and poor outcomes for young people.

- From a carbon reduction perspective: not only is the energy inefficiency of the homes of those living in fuel poverty a direct concern in terms of reducing carbon emissions, but fuel poverty also acts as a barrier to the implementation of other policies to mitigate climate change, since those on low incomes are least able to afford any increase in prices that may result from them.

11. One implication of this analysis is that the core problem from all three perspectives is one of the *overlap* between low income and the energy inefficiency of the homes people live in. This is precisely the problem described in the Warm Homes and Energy Conservation Act 2000 (WHECA), as affecting those "living on a lower income in a home that cannot be kept warm at reasonable cost."

Measuring fuel poverty

12. The central task for this review was to examine the way in which trends in fuel poverty and identification of those at risk from it have been measured and to suggest whether there might be a better alternative. In Chapter 5 of our interim report we set out in detail why we thought that the current official indicator – despite having important strengths – was flawed as a way of understanding both trends in the problem and who is at risk from it, and by implication of comparing the effectiveness of different policy approaches. As one example of these problems, it does not seem correct to suggest – as the current indicator does – that the scale of fuel poverty was reduced by four-fifths between 1996 and 2003, nor that it more than trebled between 2003 and 2009. Nor does it seem correct that some households with moderate or even higher incomes are counted as 'fuel poor' at times when energy prices are high, or that some households in poverty and with relatively high energy costs are counted as not being fuel poor at times when prices are low.

13. These problems arise not from any fundamental flaws in the elaborate exercise that is carried out each year to establish what the energy needs of low-income households are, but from the particular mathematical way in which those needs are compared with incomes reported to the survey on which the assessment is based. This is to compare the ratio between the two with a fixed threshold, set at 10 per cent (on the basis of spending patterns 24 years ago). The result is an indicator that is highly sensitive to factors such as fuel prices, the precise assumptions made for what are seen as adequate temperatures for people to live at, and the incomes reported to a survey that is mainly not focussed on income measurement.

14. It is of course a major step to recommend changing the indicator used to monitor such an important problem. In doing so our motive is not to underplay the problem. Indeed it is precisely because the gravity of the problem is so great that appropriate measurement is important, avoiding feeding either misplaced complacency about progress or undue pessimism about whether policy is effective and focused on the correct targets.

15. Given the problems with the current indicator, we recommend that it ceases to represent the official indicator of fuel poverty. However, as the alternative approach we recommend below uses the same data and underlying modelling, it would be desirable to continue to publish the results in the current form for information purposes for some years at least.

Recommendation 1: The Government should change its approach to fuel poverty measurement away from the current '10 per cent' ratio indicator.

16. The same data underpinning the current official indicator should be used to construct a more appropriate framework for the measurement of fuel poverty. Specifically we recommend that the Government should adopt a new approach based on directly measuring the overlap between low income and high costs.

Recommendation 2: The Government should adopt a new indicator of the extent of fuel poverty under which households are considered fuel poor if:

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

The Government should count the number of individuals in this position as well as the number of households they live in.

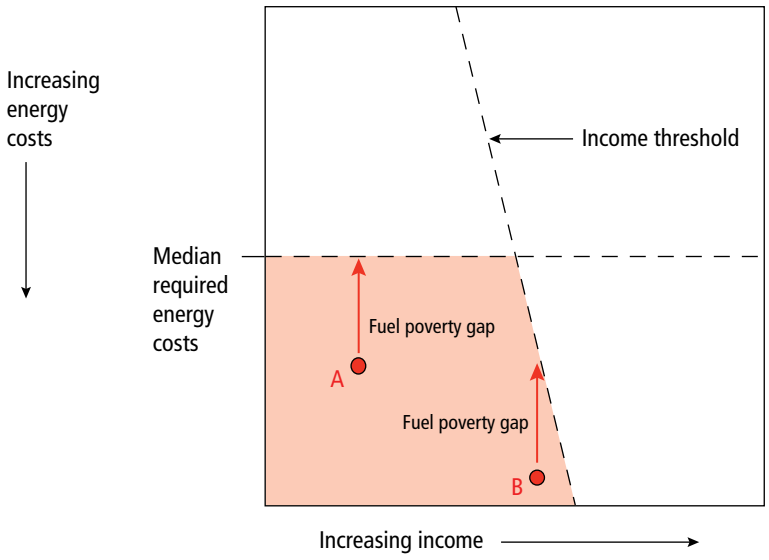
17. In addition to the 'headcount' series affected by fuel poverty, an integral part of the assessment of the problem should be an indicator of the depth of the problem.

Recommendation 3: The Government should adopt a new indicator of the depth of fuel poverty as represented by the average and aggregate 'fuel poverty gap', defined as the amounts by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs.

18. This formulation is illustrated by Figure SR.1, with the shaded area in the bottom left hand corner representing the population that has both low incomes and high costs and the length of the vertical arrows representing the size of the fuel poverty gap for particular households within it.

19. The two key elements within this are the income threshold and the 'reasonable costs' threshold. We proposed a way of setting the income threshold in our interim report which has been uncontroversial. Indeed, the proposal to measure income after housing costs and adjusted for household size and composition was widely supported. The threshold itself should be set in parallel to the Government's general approach to the measurement of low income used in the Households Below Average Income series. This should include an allowance for each household's required energy costs, reflecting the way in which fuel bills can draw some people into poverty.

Figure SR.1: *Recommended indicators of the extent and depth of fuel poverty*



Recommendation 4: The Government should measure incomes for fuel poverty purposes after housing costs and adjusted for household size and composition. The threshold should be set at 60 per cent of median income plus calculated household energy requirements.

20. By contrast, the responses to our consultation suggested that the way we proposed to set the threshold for reasonable costs was more controversial. In the light of the comments made, we agree that part of our initial proposal – that costs should be compared between households using the same adjustment factors as for incomes – was incorrect. This has the unintended effect of identifying too many smaller households as being fuel poor and too few larger ones. We discuss this set of issues in detail in Chapter 2 and its Annex and consider one interesting set of alternative proposals based on defining reasonableness in relation to energy requirements measured in £ per m^2 (rather than total costs per household adjusted for its type and size). We suggest however that making *no* adjustment for household size and composition would also be incorrect. We conclude that a *specific* set of adjustment factors should be used reflecting actual spending on fuel by different kinds of household with similar living standards. These are set out in Table 2.1 of Chapter 2.

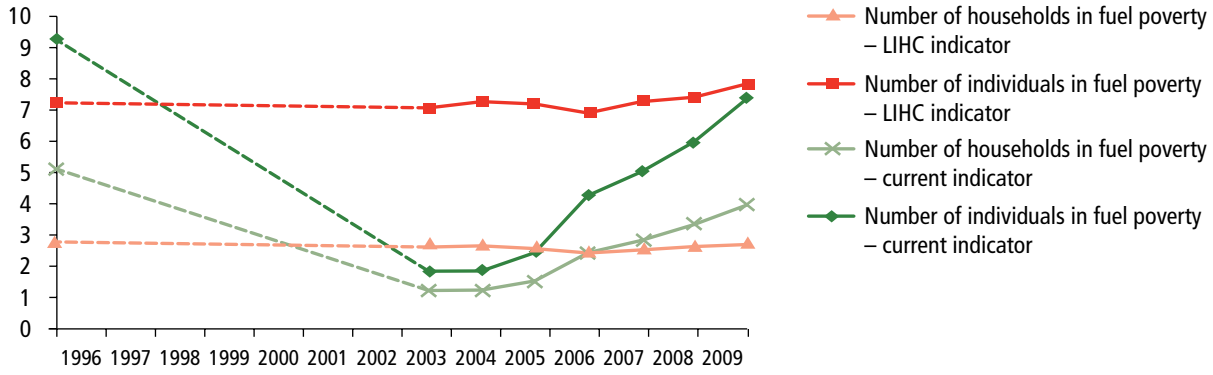
21. Some respondents to the consultation also argued that our suggestion that the threshold for reasonable costs should be based on median required spending for all households was too unambitious. We are sympathetic to the concerns driving this position. However, we cannot see any way to establish a firm rationale for a different – higher or lower – proportion of median costs than the 100 per cent we originally proposed. On the one hand this is already a challenging threshold – identifying as many households and more individuals as having low incomes and high costs as the current official indicator on average over the last 13 years. On the other, it is hard to argue that it is 'reasonable' for households on incomes that are much lower than the national average to have to spend *more* than a typical household.

22. Some stakeholders also voiced concerns that setting the costs threshold at the level of contemporary median required costs created a 'moving target' problem under which the eradication of fuel poverty would become almost impossible. It is certainly true that our proposed relative indicator is sensitive to the potential problem of low-income households being left behind the rest of the population as contemporary standards improve, but we view it as an advantage that this risk is captured. We have considered – and present analysis on – alternatives to this approach, including the idea of setting the threshold in relation to the energy requirements of the best homes. However, we could not find a firm basis for such approaches.

Recommendation 5: The Government should set the reasonable costs threshold at the level of the contemporary median energy requirements for the population as a whole. The modelled bills for individual households should be adjusted for household size and composition – using a specific set of adjustment factors – when comparing them to this threshold.

23. We recognise that if targets are set on the basis of literal eradication of the problem, this is very hard (although not impossible) to achieve using a relative measure such as the one we propose. We therefore provide analysis of measurement approaches based on fixed energy standards. These approaches suffer from drawbacks, notably the fact that any absolute standard runs the risk of becoming out-of-date. In addition, standards based simply on energy efficiency of homes omit the effects of other cost factors such as occupancy patterns and the tariffs people pay. We therefore also considered whether a satisfactory 'absolute' version of the LIHC could be constructed. We show the results of this approach in Chapter 2 and its Annex, but found it hard to produce a consistent time series. It is also rather complex to explain.

Figure SR.2: *Number of households and individuals in fuel poverty under the proposed LIHC indicator and current indicator, 1996 and 2003-2009, England (millions)*



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

24. The approach that we find most consistent with our overall analysis is to use the relative LIHC indicator and fuel poverty gap for both measurement and objective-setting purposes, while recognising that elimination is unlikely to mean literally reducing the problem to zero. There is a form of precedent for this in relation to the legal requirement to eliminate child poverty by 2020 which we explore in this report. Whilst the relative approach would mean that there may always be some low-income households with costs above the median threshold, we suggest the key indicator should be the scale of the aggregate fuel poverty gap. If this is reduced to a low level, then no low-income household can be left *very far* above the threshold.

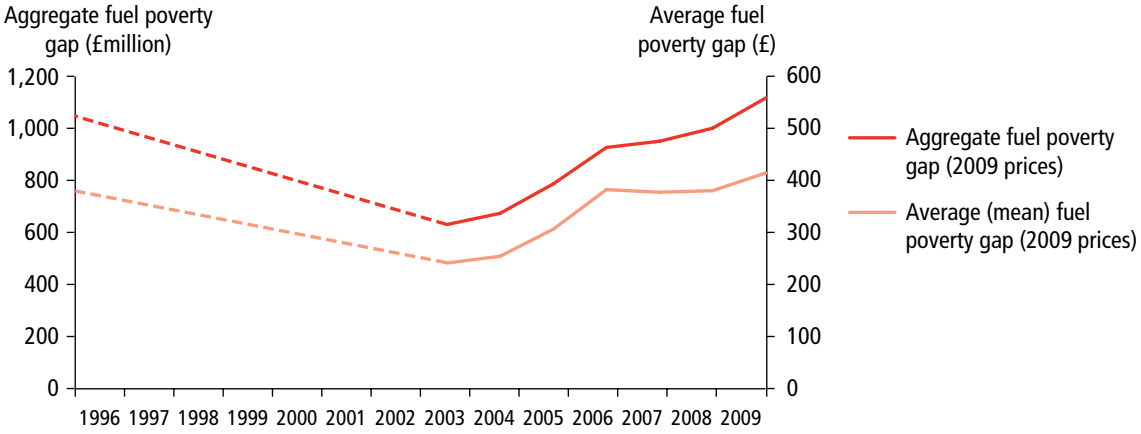
25. Using the fuel poverty gap in this way would have the additional advantages of putting most weight on monitoring the depth of the problem and focusing attention on tackling the hardship faced by those most severely affected. It would not lose its relevance over time and would maintain pressure to avoid low-income households being left behind as the rest of the housing stock is made more efficient. It would also provide a bridge between policy development and delivery on the ground – which we explore below.

Recommendation 6: The Government should use the LIHC indicator and fuel poverty gap as the basis for operational target setting. The fuel poverty gap in particular gives the best focus on the scale of the problem and progress in tackling it.

26. The result of these proposals in terms of the picture they would have shown since 1996 can be seen in Figure SR.2. The series showing the extent of fuel poverty measured on this 'Low Income High Costs' (LIHC) basis shows only a small decline in the number of *households* affected over the period, contrasting with the dramatic 'V' shape of the current official series. The two series have a very similar average over the period as a whole. The number of *individuals* identified by the LIHC indicator has grown slightly over time, as the kind of household most at risk has moved towards larger ones. In this case the number of individuals identified by our preferred indicator remained higher in 2009 than those identified by the current official series.[1]

1 As we note in Chapter 2, the number of households identified in this way is very similar to that presented in the interim report, but the number of individuals is significantly higher as a result of the changed way in which we are allowing for household size.

Figure SR.3: *Aggregate and average fuel poverty gaps under the proposed LIHC indicator, 1996 and 2003-2009, England*



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

27. What has driven this trend? The LIHC indicator shows the impact of factors that have been pushing in opposite directions. The general improvement in energy efficiency – even in relative terms – of low-income households has tended to reduce fuel poverty. However, since 2004, these improvements have tended to be offset by rising prices, which means that more households on the margins of poverty have been pushed below the income threshold by their increased energy costs.

28. However, the main effect of changing prices over time has been on the depth of fuel poverty for those affected by it, as measured by the fuel poverty gap, both on average and in aggregate, shown in Figure SR.3. These fell in real terms between 1996 and 2003, but have both since increased, with the aggregate size of the problem reaching £1.1 billion by 2009, an average of £414 for each of the 2.7 million households affected. The aggregate fuel poverty gap in 2009 is higher – given the adjusted factors we use for setting the costs threshold – than it was in 1996, and more that three-quarters higher than it was in 2003, when fuel prices were at their lowest.

Technical considerations

29. In the course of this review we have benefited greatly from the considerable amount of effort and expertise which has gone into assessing the energy requirements of different kinds of household. There remain, however, three important gaps in the available data.

30. First, it is correct that the focus should be on energy needs not actual spending, as the latter may reflect, for instance, people who spend little because they are living in the cold, precisely the problem that health concerns mean we want to avoid. But – as recent work by the Centre for Sustainable Energy and Loughborough University has demonstrated – it can be very enlightening to compare modelled needs and actual spending patterns, precisely to identify which kinds of household are in this kind of position. At present, it is only possible to do this though econometric analysis, embodying assumptions about how the patterns revealed by different surveys for spending and for need are related. It would be very valuable to be able to conduct this kind of comparison for the same households. This should become possible over the next year using data from DECC's Energy Follow-up Survey.

Technical Recommendation 1: The Government should compare data that are due to become available in future on actual consumption patterns in homes with modelled spending requirements for the same households in order to identify the kinds of household that are at greatest risk of living at low temperatures and to provide information that would allow refinement of the way in which energy needs are currently modelled.

31. One fact which is already apparent from what we know of contemporary spending patterns is that even middle and high-income households do not spend as much as the modelling of energy needs suggests. The most likely explanation of this is that contemporary households, even when their resources are not especially constrained, do not keep their houses at as high a temperature as is assumed in the modelling. As we discussed in the interim report, the basis for those temperature standards is less firm than many have supposed. One of the features of the relative approach we have proposed for assessing which households have high costs is that it is fairly robust to the precise temperature standards used (unlike the current approach, which is highly sensitive to them). However, it would still be preferable if the temperature standards used in the general modelling reflected those chosen by contemporary middle-income households. Unfortunately we do not have data on the temperatures at which people are living that is more recent than 1991. This needs to be addressed and then used to inform the modelling of energy needs.

Technical Recommendation 2: The Government should reinstate a component to its surveys that allows an up-to-date assessment of contemporary behaviour in terms of the temperatures of people's homes. The information this provides should be used in the development of the fuel poverty measurement methodology.

32. At the same time, we believe there is a need for further research to understand the physiological, psychological and other impacts of living at certain temperatures in order to have confidence in the appropriateness of the temperature standards used, especially for people vulnerable to these impacts.

Technical Recommendation 3: Once this is done the evidence of the health effects of cold temperatures should be examined to establish whether it implies the need for separate temperature standards that allow for the particular vulnerability of the elderly and infants, and of some groups affected by disability and long-term illness.

33. A third data gap which we discussed in our interim report was that the modelling of the prices paid by households can at present only allow imperfectly for the ways in which those most at risk of fuel poverty may be on worse tariffs than others, that is, that the poor may be paying more. Data allowing a more direct assessment of the tariffs faced by particular households should become available later in 2012, as part of the Energy Follow Up Survey. At present neither the additional problems that this causes, nor the impact of interventions that reduce them, can be accurately assessed.

Technical Recommendation 4: Based on data available in future, the Government should examine the case for a more direct assessment of the tariffs actually paid by low-income households within the fuel poverty measurement methodology.

34. Another issue of concern in the way fuel poverty is calculated is the classification of extra costs benefits such as the Disability Living Allowance as general income, implying that households entitled to them are better off than those who are not, when they in fact reflect the requirement for extra income to achieve the same standard of living as others.

Technical Recommendation 5: Government should assess whether removing extra cost benefits such as Disability Living Allowance from the calculation of income in the fuel poverty measurement methodology would be appropriate.

Identifying people at risk of fuel poverty

35. It is important that the measurement approach used by Government to understand fuel poverty can be linked through to the way policy interventions are designed and targeted at fuel poor households. There are certain principles that need to be considered in this context. For instance, it would be prohibitively expensive – and intrusive – to carry out a full property and income assessment to understand the fuel poverty status of all households. The experience gained from means-testing in other policy areas also suggests a need to avoid devising eligibility criteria which result in sharp cliff edges, such as the entitlement to assistance that depends on receipt of a narrow range of income-tested benefits.

36. In attempting to identify fuel poor households it would be naive to suggest that policies aimed at removing problems faced (in 2009) by 2.7 million households could be dealt with only by treating 2.7 million homes. In practical terms, a wider group will inevitably be targeted, adding of course to the cost of tackling the core problem. However, this is an area where assistance straying over a strict boundary of eligibility should not necessarily be seen as a problem – and can be a virtue. If a household is helped that is in poverty but has costs that are below the threshold, the help given can make an important difference to living standards and conditions. Similarly, if a household is helped that has an income above our threshold, but has high energy costs, that can still make a difference in terms of national energy efficiency and reduction of carbon emissions. Not being too stringent about precision targeting makes additional sense when one recognises that some households will move in and out of fuel poverty as other circumstances change, for example with the birth of a child.

37. Bearing in mind these principles, one of the great strengths of the framework we propose – and of the fuel poverty gap in particular – is that it becomes possible to make a bridge between the aggregate numbers and trends shown by the fuel poverty statistics and the ways in which practical policies can be directed on the ground to those most at risk. We explore the results of doing this in detail in Chapter 3. Several of the findings are instructive for policy design. For instance, 90 per cent of the fuel poverty gap is accounted for by households with low incomes also living in homes that have energy ratings of E, F and G.

38. One limitation is that the traditional proxy for low income of means-tested benefits receipt accounts for only 62 per cent of LIHC households and 62 per cent of the fuel poverty gap. However we show that within this group a small set of physical characteristics, which can be ascertained without an in-depth physical survey, could account for households with more than half the total fuel poverty gap. These are having oil, solid fuel or portable heating, living in a rural property off the gas grid, having solid walls, or being built before 1945. However, even this most effective set of simple proxies would still identify more than twice as many households as were actually LIHC, without further screening.

39. Identifying the remaining half of the fuel poverty gap is much harder, particularly the 38 per cent of the fuel poverty gap accounted for by low-income households who do not receive benefits. The implication is that while relatively simple proxies can pick up many of those most at risk in a fairly accurate manner, to find the full population at risk would need more detailed investigation.[2]

2 It was beyond the scope of the review to assess the practical strengths of different delivery approaches and tools for targeting on the ground. Box 3.2 in Chapter 3 and Section 5.2 describe some of the issues raised with us.

40. A further benefit of the LIHC approach is that it provides a clear insight into the households which should be prioritised for assistance. The use of a fuel poverty gap to supplement the headcount indicator can provide a way of identifying those who are deepest in fuel poverty and therefore a priority for action. In this way, assistance can be prioritised for those who face the worst trade-offs between paying energy bills and other spending that can lead to adverse health and social impacts. Doing so will also have the biggest impact on the aggregate fuel poverty gap. Under a tiered approach of this kind the same households would remain the focus for interventions however the reasonable costs threshold was drawn.

41. Certain groups of people are more vulnerable to being fuel poor, because they have higher energy requirements. Some of the factors driving these higher costs (such as needing to spend more time in the home) are captured in the way energy costs are modelled and households with vulnerable people will be identified as fuel poor. However this does not necessarily capture those who are most vulnerable to the impacts of fuel poverty and of cold homes.

42. The three main groups of people likely to experience particularly negative health impacts of fuel poverty are the elderly, infants, disabled people and those living with long term sickness. 34 per cent of fuel poor households contain someone with a disability or long-term illness, 20 per cent have a child aged 5 or under, and 10 per cent a person aged 75 or over. Given their vulnerability to the impacts of fuel poverty, these groups are an obvious priority for interventions that make it easier to keep warm, even if they do not have the very greatest fuel poverty gaps.

Current policies for tackling fuel poverty

43. The current focus of fuel poverty measurement has been a single indicator of the extent of the problem. Any move away from this poses a challenge for those familiar with this evaluation approach. This is particularly the case because our proposed measurement approach has two key novel features. First, we propose a relative approach which attempts to track the experience of people with low incomes living with high costs compared to those with average incomes. Second, we propose a measurement of the depth of the problem alongside the extent.

44. We show in Chapter 4 in principle how different kinds of policy – price-based, energy efficiency-based or income-based – can affect the number of households with different combinations of high and low costs and incomes. We also discuss the effects of whether interventions are funded by taxes or by energy consumers. While tax-funding does not generally change the impact of particular kinds of intervention, funding from energy consumers can increase the fuel poverty gap of those who do not benefit from them.

45. A major benefit of the measurement framework is that it facilitates a better understanding of the type of policies that would benefit particular kinds of household and the impact on them relative to all other households. It also supports an understanding of the lifetime effects of policies. This combination means that the LIHC framework can provide a helpful tool for policy-makers when considering the trade-offs they have to make when shaping policies.

46. A detailed consideration of the existing policy framework in Chapter 5 shows that the current package of measures acts on all of the three key drivers of fuel poverty – prices, energy efficiency and income – having a variety of impacts. Figures SR.4(a) and (b) summarise the policy position in 2009, and that planned for 2016, in terms of levels

of spending on policies acting in some way on fuel poverty. The size of the circles represents the scale of spending in the two years.

Figure SR.4a: *Levels of funding for fuel poverty related policies – 2009*

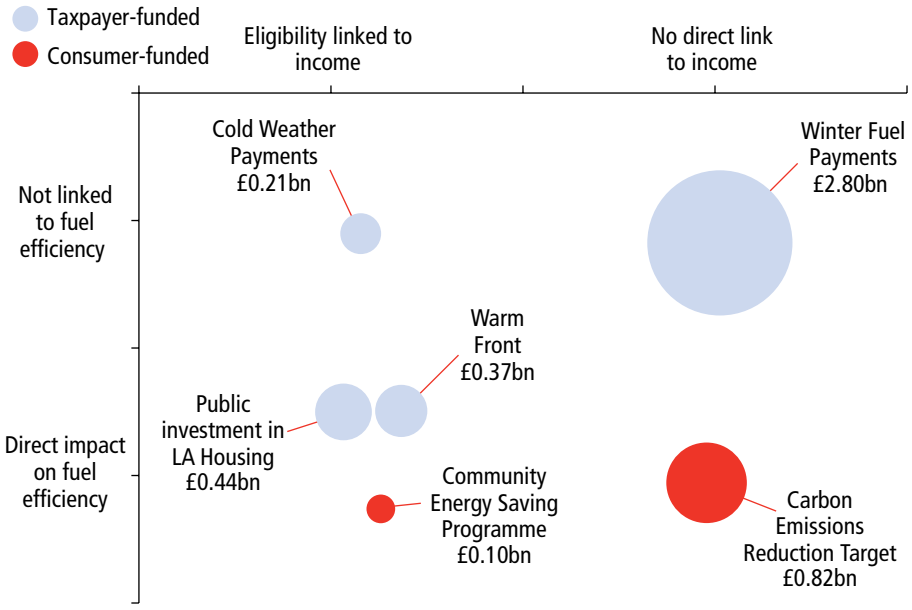
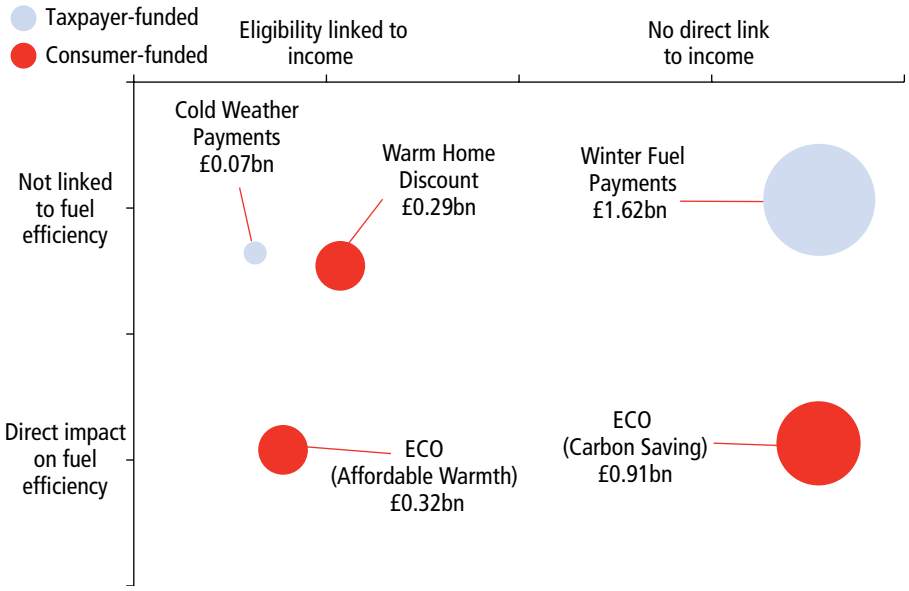


Figure SR.4b: *Levels of funding for fuel poverty related policies – 2016 (2009 Prices)*



47. These policies have two main sources of funding – the Exchequer (Warm Front, Winter Fuel Payments, for instance, as shown in blue in Figure SR.4) and the consumer (CERT and CESP, for instance, as shown in red in Figure SR.4). The policies also target different types of households. Present policies such as CESP, Cold Weather Payments and Warm Home Discount are focused on low-income households, but not necessarily those with higher than typical energy costs in the latter two cases. CERT, ECO and Winter Fuel Payments are more widely spread over the population. Those receiving assistance under CERT and ECO may well have high costs.

48. As shown in Figure SR.4b, the position is expected to change by 2016 – the focus of the projections we publish in this report – with two principal fuel poverty policies expected to be in place, the Warm Home Discount and the Affordable Warmth element of the Energy Company Obligation (ECO), both of which will be funded by all consumers through additions to their bills (offset for those receiving benefits).

49. We show (in Chapter 5) how the distributional impact of the ECO is currently expected to be regressive, potentially limiting its impact on fuel poverty. In order to remove this regressive effect, our (rather unrefined) modelling suggests that a much greater proportion of the budget for ECO than currently planned – more than half rather than about one quarter – would need to be directed towards Affordable Warmth.

50. The current fuel poverty package – and the planned policies for 2016 – could be supplemented by a range of additional policies. While we cannot cover these in any great detail, we show that there could be a role for policies relating to minimum standards of energy efficiency, as recently introduced for the private rented sector (although it is clear that only aiming for an EPC rating of E will leave many private tenants still in fuel poverty). These could also include public provision of key related information, equity release (but in rather limited circumstances), and in the long run 'rising block tariffs' (but only after the core drivers of fuel poverty had been better addressed).

Future trends in fuel poverty

51. Given that we are looking at something that is the result of the interaction of a series of different factors that do not follow linear trends, we should perhaps respect the advice from Sam Goldwyn to "never make forecasts, especially about the future." We do, however, attempt to make projections of fuel poverty levels in 2016. The results we present fully in Chapter 6 cannot be taken as definitive, because of specific difficulties in making detailed assumptions about employment and income changes, as well as uncertainties about future incomes and prices. We therefore present different scenarios to test sensitivities to future trends in fuel prices and incomes. The projections should be understood as indications of the broad direction of change rather than as precise forecasts.

52. A particular caveat is that our projections are based on the 2009 dataset from the English Housing Survey. We apply a range of assumptions to these data, from sources including the Office for Budgetary Responsibility (for income growth) and DECC (for fuel price changes). One of the factors which matters most for our purposes – but which is not an issue for more general predictions of future incomes – is the energy efficiency of the homes of those experiencing income changes such as from becoming unemployed. There is no easy way of projecting what the interaction between the income and energy efficiency distributions will be. Nor can we model the effects of reforms to the structures of the tax and benefit systems since 2009. As a result, our projections are, if anything, likely to be over-optimistic in terms of the numbers with low incomes.

53. With those health warnings, Figure SR.5 presents our baseline projections for fuel poverty, taking into account the projected impact of current and

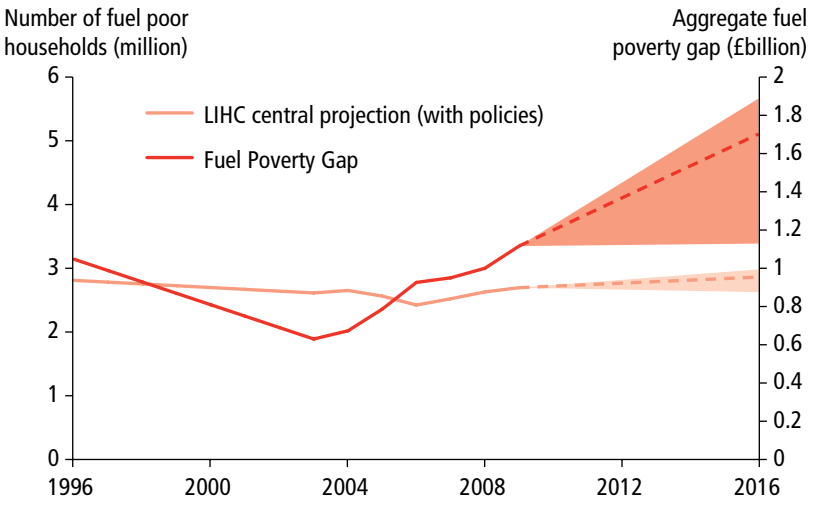
future policies since 2009. The figure shows our central projections for the numbers of households and individuals with low incomes and high costs, together with their sensitivity to different assumptions about future fuel prices and incomes. The figure also presents a similar baseline projection of the depth of fuel poverty in terms of the aggregate fuel poverty gap. Again, the sensitivity to different assumptions is shown.

54. These projections will be profoundly disappointing to all those concerned with fuel poverty and aware of the serious problems it causes. Far from being eliminated in 2016 it will still affect between 2.6 million and 3.0 million households (containing between 7.8 and 8.9 million individuals) when measured using our preferred indicator. Our central projection is that the key indicator of its scale, the fuel poverty gap, will have risen to £1.7 billion, compared to £1.1 billion in 2009. The overall impact of policy is that this number will be a tenth – but only a tenth – lower than it would otherwise be. Even in the most optimistic scenario for prices and incomes the fuel poverty gap will remain roughly the same in 2016 as in 2009.

55. Within these projections, the current climate change and energy policy package is expected to have a small but downward impact on the aggregate level of fuel poverty measured by the LIHC indicator and on the fuel poverty gap. Policies that focus support on LIHC households (such as Warm Front, the Affordable Warmth part of ECO and, to a lesser extent, Warm Home Discount) are expected to improve the relative position of the fuel poor and reduce the extent and depth of fuel poverty. Conversely, those policies that do not focus support on LIHC households (such as FITs and the Green Deal Carbon Obligation) are not expected to improve the relative position of the fuel poor and may increase both the numbers in and depth of fuel poverty.

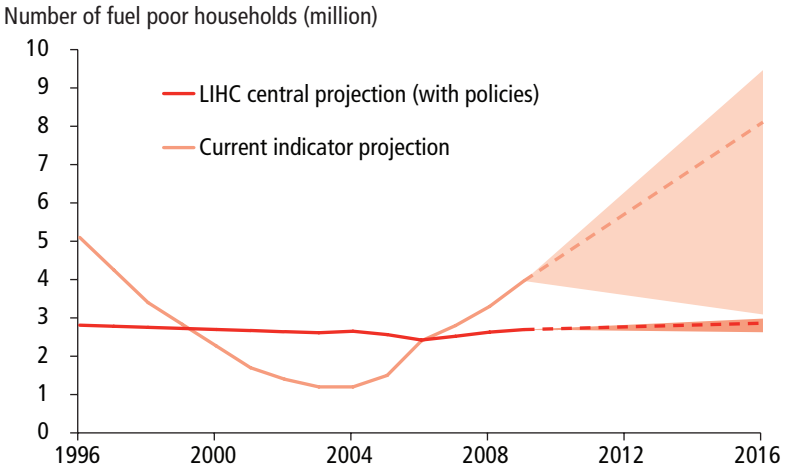
56. Figure SR.6 compares the ranges of the projected number of households in fuel poverty under our preferred LIHC indicator with those that would

Figure SR.5: *Projected levels of fuel poverty under the LIHC indicator and fuel poverty gap, 1996-2016, England*



Source: Fuel Poverty Review

Figure SR.6: *Projected fuel poverty headcount under the LIHC indicator and the current indicator, 1996-2016, England*



Source: Fuel Poverty Review

be shown the current official indicator. The figure shows the very great sensitivity of the current indicator to energy prices and incomes. With the most pessimistic assumptions, by 2016 it will class 9.2 million households – 43 per cent of all households – as being in 'fuel poverty'. On the most optimistic scenario for prices and incomes, only a third as many, 3.1 million households, will be in fuel poverty, a reduction of one quarter from 2009. On the central projection, 8.1 million households will be 'fuel poor'. The sensitivity of this indicator to prices and the way it includes higher-income households when prices are high do not seem to be helpful characteristics.

57. We believe there are good reasons for using a measure which takes account of all the influences on household costs and which uses a standard set relative to contemporary norms. But we also explore potential future trends in the number of households living in homes with energy efficiency below particular *fixed* standards. As one would expect, such measures do show continuing improvement over time against their fixed standards. However, on none of them would the number of households with low incomes and low SAP be reduced to zero by 2016 on our central projection. Taking median standards as they were in 2009 there will still be 2.3 million low-income households living in homes with a SAP level below the standard. Half of those households, 1.1 million, will still be below the standard reached by the median household more than a decade ago. On a higher standard, based on the boundary between EPC levels C and D, the number will still be 4.7 million households. It is particularly disappointing that even against these standards, unaffected by energy prices, the projections suggest slower progress between 2009 and 2016 than achieved between 2003 and 2009. We also look at the variant of the LIHC indicator where the cost threshold is unaffected by general energy efficiency improvements. This shows only a small fall between 2009 and 2016, with the rate of improvement also slower than before 2009.

Making further progress

58. Against this perturbing background we then go on, in Chapter 7, to look at how additional policy effort could contribute to tackling fuel poverty. We analyse three broad types of interventions: policies that tackle energy prices, through delivering bill rebates; policies that aim to improve thermal efficiency through delivering subsidised insulation and heating systems to certain households; and policies that act on incomes by delivering direct income support. We then test these against a number of key criteria: their immediate impact on fuel poverty; their long term cost-effectiveness; their distributional impact; their impact on carbon emissions; and their net associated benefits as measured by official cost-benefit analysis approaches. We distinguish between policies that are Exchequer-funded (such as Warm Front) and those that are supplier-funded through additions to bills (such as Warm Home Discount or ECO). We also compare those that are narrowly targeted on low-income households with high costs (such as Affordable Warmth) or are more broadly targeted on all high costs households (such as the Carbon Obligation in ECO).

59. For each of these – which between them cover all of the main drivers of fuel poverty – we look at the short and long-term impacts in 2016 of interventions with standardised costs of £500 million, which allows us to compare and contrast

Table SR.1: *Summary of archetypal modelling for making further progress in 2016*

Archetype	Proportion of recipients that are LIHC (%)	Short term change in fuel poverty gap (£ million)	Life-time change in fuel poverty gap (£ million)	Total change in greenhouse gas emissions ($MtCO_2$)	Non equity-weighted NPV (£ million)	Equity weighted NPV (£ million)
Supplier-funded, narrowly targeted energy efficiency	55	-50	-2,930	-4.92	590	1,900
Exchequer-funded, narrowly targeted energy efficiency	55	-70	-2,630	-3.40	310	1,730
Exchequer-funded, broadly targeted energy efficiency	18	-20	-680	-3.76	360	860
Supplier-funded broadly targeted efficiency policy	13	+20	-390	-6.76	990	1,360
Exchequer-funded rebate policy	28	-70	-70	+0.58	50	600
Supplier-funded rebate policy	28	-40	-40	+0.35	100	490
Increase in means-tested benefits	28	-3	-3	<+0.01	<10	550
Increase in Winter Fuel Payment	10	<-1	<-1	+0.58	60	420

Source: Tables 7.15, 7.16 and 7.17. The impacts of larger interventions would not necessarily be in proportion to those shown for this scale of intervention, particularly for those focused on improving energy efficiency. The figures show the impact of interventions with a standardised cost of £500 million.

Note: The figures for the lifetime changes in the fuel poverty gap are not discounted, but those incorporated in the last two columns are.

the impact of the range of policies on both the LIHC headcount and fuel poverty gap indicators, and so their cost-effectiveness. Table SR.1 summarises our findings.[3] The interventions are ordered in terms of their lifetime cost-effectiveness in reducing the fuel poverty gap.

60. This analysis is, of course, abstract. However it allows us to draw some conclusions about the relative impact and cost-effectiveness of alternative policy approaches. It suggests that policies that improve thermal efficiency of the housing stock tend to be the most cost-effective. They have persisting benefits in reducing fuel poverty, reduce greenhouse gases, and have very substantial net societal benefits. Narrowly targeted supplier-driven policies (such as Affordable Warmth within ECO) have the largest effects on fuel poverty, on the assumption that suppliers do react to their incentive to maximise cost-effectiveness. However, broadly targeted supplier-based interventions – while being the most effective in reducing greenhouse gas emissions – would have much more limited effects on fuel poverty, and would worsen it for some, because of the impact of higher prices on low-income households. Increasing the share of Affordable Warmth within ECO would therefore have more positive effects on fuel poverty while still having favourable effects on greenhouse gas emissions and even greater net societal benefits on an equity weighted basis.

61. However, upgrading the thermal efficiency of the housing stock will be a gradual process. Other short-term interventions such as price subsidies may therefore need to continue to be part of the policy mix. In terms of making the fastest progress towards fuel poverty objectives, the analysis shows that policies should be focused on LIHC households.

3 The results are explained and explored in more detail in Section 7.4 of the report. It is explained there that while some of the results are 'scalable' – for example twice the amount spent on rebates or benefits would result in a doubling of the NPV and GHG impacts – this is unlikely to be the case in terms of the fuel poverty impacts. This is especially the case for supplier-driven energy efficiency programmes, where the modelling assumes that the most effective interventions are made first.

Conclusion

62. At the end of this nine-month review of fuel poverty we have reached the clear conclusion that fuel poverty is a major social problem, causing considerable hardship and negative health impacts, as well as impeding efforts to reduce carbon emissions. It is also widespread. Using the latest official data our recommended indicator shows that more than 7 million people were affected in England in 2009, living in nearly 3 million homes. The fuel poor faced costs which were £1.1 billion higher than would be the case if their bills were at the level faced by typical households (generally living in larger homes and with bigger incomes).

63. What is more, we predict a deteriorating, and therefore profoundly disappointing, situation by 2016. While it is clear that the current policy framework is having a positive impact, this is limited to a 10 per cent lower fuel poverty gap in 2016 than we might expect to see in the absence of policies. This is far from enough to offset the general rate of increase from 2009, so that by 2016 there could be nearly 200,000 more households in fuel poverty and a fuel poverty gap more than 50 per cent larger.

64. Despite the scale of the challenge, it is our hope that this review will help drive forward action in future years. Effective action that makes a lasting difference will require participation at every level of Government, across the private sector and civil society. We know from our work on this review that the community of people who want to see the blight of fuel poverty addressed is dedicated to the cause and desperate for progress.

65. We do not expect all of the judgements we have reached to go unchallenged. And there should be an opportunity for others to debate our proposals. Although the degree of support for the overall framework was shown to be very strong in the consultation, it may be the case, for example, that some would prefer to draw the thresholds for the indicator in a different way. For us, what is

important is that perfectly valid arguments about details should not risk losing momentum.

66. In that context, we hope that our work provides a new body of evidence to underpin a course for effective future action. We believe that our measurement framework opens up, for the first time, a clear means of identifying and finding those affected, understanding who should be the priority, assessing the effectiveness of policies, target-setting, and accountability. This should be of use to all parties who want to see progress in the short and long-term.

67. Making this happen requires a reinvigorated strategy. We believe that the case for this is very strong. First, the framework for measurement underlying the 2001 strategy is inappropriate and does not effectively support policy-making and delivery. Second, on current trends and policies, fuel poverty will not be eradicated by 2016, however it is measured. Third, the context has changed since 2001, with combating climate change a still more urgent national priority, while the economic and fiscal crisis leaves more households vulnerable to the effects of energy prices that have risen, rather than fallen as was assumed in 2001.

68. The Government must decide how to respond to this daunting challenge. Within government, although DECC has the clearest interest in fuel poverty, tackling it cannot be the task of a single Department. The problem is one affecting health, poverty, communities, and climate change. Tackling it successfully will require many parts of Government to be involved.

69. Our analysis shows that interventions, targeted on the core of the problem, can make a substantial difference. We hope that the framework we have developed provides some of the tools that will allow this to be done most effectively.

Recommendation 7: The Government – not just DECC but also other Departments– should set out a renewed and ambitious strategy for tackling fuel poverty, reflecting the challenges we lay out in this report and the framework we have developed for understanding them.

CHAPTER 1

The review so far

1.1 The independent review of fuel poverty

Background to the review

1. In March 2011, Chris Huhne MP, then Secretary of State for Energy and Climate Change, announced the appointment of Professor John Hills to lead an independent review of the fuel poverty definition and target.

2. The meaning of the term 'fuel poverty' is given in the Warm Homes and Energy Conservation Act 2000 (WHECA) as follows:

   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.

3. WHECA establishes a requirement for a strategy to be published to lead to the eradication of fuel poverty as far as reasonably practicable within fifteen years. Because the UK Fuel Poverty Strategy[4] was published in 2001, the date for the eradication of fuel poverty as far as reasonably practicable in England is November 2016, less than five years' time.

The conduct of the review to date

4. The review's Terms of Reference are set out in Box 1.1. In summary, the review was asked to examine the question of 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. It was also been asked to consider cost-effectiveness of policies in relation to the measurement approach taken.

5. Following a call for evidence held in early summer 2011 and extensive engagement with a wide range of stakeholders, the interim report of the review was published in October 2011.[5] This focused on the causes and impacts of fuel poverty, its distinctive character and options for measurement. A consultation on the interim report was held, finishing on 18 November 2011, to which there were more than 60 responses. The review team is indebted to those stakeholders who have contributed to this exercise, and the range of government departments engaged, for the considerable care and attention which those responding have given.

4 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

5 Hills, J. (2011). *Fuel Poverty: The Problem and its Measurement*. London: DECC and LSE. Available at: http://www.decc.gov.uk/assets/decc/11/funding-support/fuel-poverty/3226-fuel-poverty-review-interim-report.pdf and at http://sticerd/lse.ac.uk/case (Case report 69)

Box 1.1: Terms of Reference

The terms of reference for the review were:

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.

About our final report

6. The publication of this document marks the conclusion of the independent review. This report is structured as follows:

   - Chapter 1 offers a recap of the interim report, a summary of the consultation held and an update of some of the key evidence on the distributional impact of the current climate and energy policy package.
   - Chapter 2 looks at issues raised regarding the construction of the Low Income High Costs (LIHC) indicator proposed in the interim report, in particular how to set the energy costs threshold for households with different compositions. It concludes by setting out the final version of the indicator used as the basis for analysis in the rest of the report.
   - Chapter 3 considers the issue of targeting policies towards the fuel poor and examines the composition of the population with low incomes and high energy costs in detail as well as the proxies that could be used to find the fuel poor. It considers issues relating to those who are vulnerable to the impacts of fuel poverty.
   - Chapter 4 discusses the effect in principle of policies designed to tackle fuel poverty under the framework of our preferred approach to fuel poverty measurement.
   - Chapter 5 examines policies for tackling fuel poverty, including existing ones and others that may be used in the future.
   - Chapter 6 projects forward to 2016, quantifying the impact of projected changes in incomes and energy prices and of the existing policy package for tackling fuel poverty using different indicators

including our measure of the depth of the problem, the fuel poverty gap.

- Chapter 7 examines how effective different kinds of policy approach might be in terms of their impact on the extent and depth of fuel poverty, their cost-effectiveness, their effect on greenhouse gas emissions and overall societal benefits.

- Finally, Chapter 8 offers an overall conclusion.

The whole report and its conclusions are summarised in the Summary and Recommendations at the front of this volume.

1.2 The review's interim report

Fuel poverty as a distinct problem

7. The interim report examined the question of the 'uniqueness' of the fuel poverty problem – that is, the extent to which fuel poverty can be considered distinct from income poverty – and concluded that fuel poverty is not synonymous with general poverty. As well as this, the report also concluded that fuel poverty is a serious problem, affecting millions of households and individuals in England.

8. There are three over-arching perspectives that lead to concern about fuel poverty: poverty; health and well-being; and cutting carbon emissions.

The poverty perspective

9. Looking at things from the poverty perspective means examining the pressures on household budgets caused by a given fuel requirement, understanding what creates this requirement, how people get locked-in to high fuel costs, and considering whether there is a 'poverty premium' that leads to higher prices for poorer households.

10. Cash income is an imperfect measure of a household's standard of living, although in many cases the same amount of cash can translate into a similar shopping basket. There is one obvious exception – housing – where costs can vary widely across the country, having a major impact on disposable income. We argue that spending on fuel is in a similar category: similar households with similar essential requirements (heating, hot water, lighting etc.) can find themselves in very different positions in respect of their fuel needs. Various factors might lock households in to high energy costs, of which the most significant are a low standard of energy efficiency and a lack of access to capital to make the necessary improvements (or to move to a more energy-efficient property).

11. Figures show that in 2009 the median required fuel bill for couples without children was nearly £1,300 to achieve a set standard of warmth.[6] But a sixth of such households would have needed to spend more than £1,750 to achieve the same standard and nearly one tenth would have needed to spend over £2,000 – more than half as much again.

12. In terms of the poverty premium, there are two principal considerations: first, whether poorer households face higher unit prices for their energy; second, whether the fact that poor households spend more of their income as a proportion on fuel than richer households leads to further negative distributional impacts.

13. It is certainly the case that fuel bill payment methods and contracts mean that households pay different prices for their fuel. There is a widespread concern that customers on prepayment meters – typically lower-income households, including households repaying energy debts – pay higher tariffs than those on other tariffs. Recently this disparity has started to reduce with prices gradually converging with those for standard quarterly billing (see Chapter 2 of our interim report). However

6 As we noted in our Interim Report (Table 2.3), typical households actually consume only around 75-80 per cent of the amounts calculated as needed to reach the set temperature and energy use standards. Actual average bills in 2009 were therefore significantly lower than this.

both payment methods remain more expensive than direct debit, while the cheapest tariffs are not universally available – they tend to be offered on-line and require payment by direct debit.[7] Moving from a prepayment tariff to a standard credit or direct debit tariff also requires meter replacement, the costs of which can be steep and potentially out of reach for many households.[8] There is evidence that doorstep sales had led to some poor households switching to more, rather than less, expensive deals at an alarming rate (nearly 50 per cent). In this regard we welcome the decision of certain energy suppliers to suspend door-to-door sales.

14. The higher proportionate spending on fuel by poorer households means that fuel bills are essentially regressive in nature. Government policies affecting the bills people pay can therefore have a different impact on low-income households from that on better-off households. This distributional impact can be both positive and negative, depending on the precise policies in question, how they are paid for and which households stand to benefit from them. Since our interim report was published, which used analysis from 2010, the Department of Energy and Climate Change (DECC) has updated its analysis of the impact of policies on fuel prices and bills. We report on this further below (see Section 1.4). Some recent Government decisions have affected the distributional picture in a positive way, precisely because they have changed the way in which certain policies are funded and have also improved assistance for some of the poorest households. However, there remains a large number of low-income households whose potential contribution to policy through their fuel bills outweighs the benefits that will accrue to them. The need for Government to understand the distributional impact of this set of policies is a further essential characteristic of the fuel poverty problem.

The health and well-being perspective

15. The health and well-being perspective was at the heart of much of the original concern about fuel poverty and continues to be foremost in the minds of many of those agencies and organisations working in this field. Among the concerns most often discussed is the prevalence of excess winter deaths in England (and the UK more generally). Since publication of the interim report, headline figures on such deaths during the initially very cold winter in 2010/11 have been published – see Figure 1.1. These show that despite lower temperatures than in other recent years, the number of excess winter deaths was no higher than the average for the last decade.

16. This is evidence that there are many factors driving the rate of excess winter deaths. In our interim report, we put forward a suggestion that some 10 per cent of excess winter deaths could conservatively be attributed directly to fuel poverty.[9] As we set out below, some stakeholders argued in their response to our consultation that we were *too* conservative in this estimate. There are certainly a wide range of estimates of the number of excess winter deaths caused by low indoor temperatures and by fuel poverty more specifically.[10] But even our conservative figure implies thousands of deaths each year.

17. What is more, mortality is only part of the problem: more general morbidity caused by fuel poverty is also of real concern. There are specific health consequences of exposure to low temperatures, relating to cardiovascular problems (at temperatures below 12°C) and respiratory problems (at temperatures below 16°C) in particular. Low temperatures are also associated with diminished resistance to infections and the incidence of damp

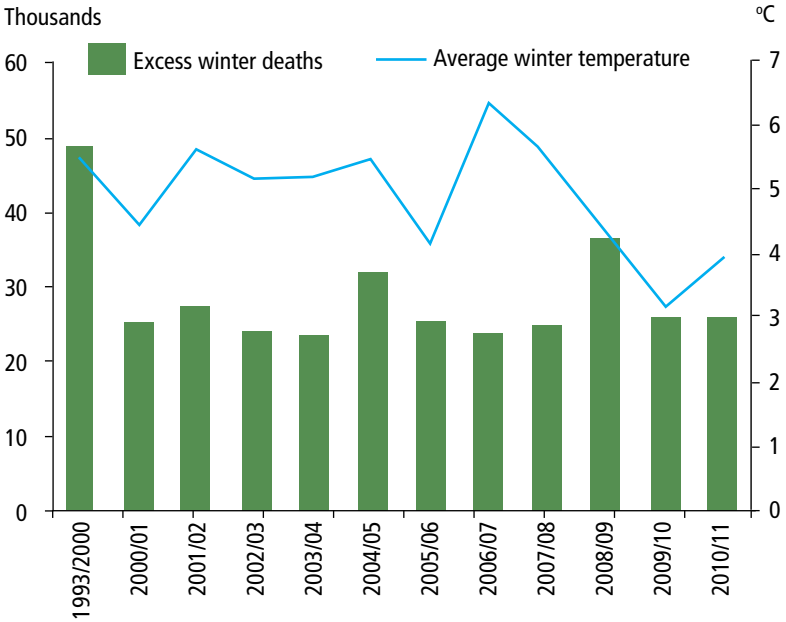
7 At the time of writing, energy suppliers are considering simplifications to tariff structures and Ofgem has recently concluded on a proposal to simplify tariff structures.

8 Energy suppliers may levy a charge of more than £100 to replace the electricity and gas meters of a prepayment customer, may require deposits to be paid (of over £100 per meter) and may make moving to a credit meter subject to credit checks.

9 Own calculation based on evidence from Sir Michael Marmot's 2011 report on the impact of cold homes see Marmot Review Team. (2011). The *Health Impacts of Cold Homes and Fuel Poverty*. London: Friends of the Earth and the Marmot Review Team.

10 See for example: WHO. (2011). *Environmental Burden of Disease Associated with Inadequate Housing*. Copenhagen: WHO.

Figure 1.1: *Excess winter deaths in England and Wales, 1999/2000-2010/11*



Source: Office of National Statistics and The Met Office

Notes: 1) Excess Winter Deaths figures are based on deaths occurring in each period. 2) Mortality data include non-residents who died in England or Wales. 3) Mean winter temperature is calculated using average monthly temperatures from December to March.

and mould in the home (also associated with poor energy efficiency). Many of these health effects are of most concern for the youngest children and eldest pensioners.

18. Of course, in addition to the costs of poor health to individual people, medical treatment associated with cold-related deaths and illness comes at a cost to the NHS. At present, we are unaware of a robust methodology enabling us to establish a firm link between health effects directly attributable to fuel poverty and the resulting costs to the health service. As a consequence, perhaps the most significant gap in our analysis of policies in Chapter 7 is that we are not able to quantify the cost savings that could be made by the NHS by alleviating fuel poverty.[11] We agree with those who suggested that the Government should make an urgent effort to quantify these costs.

19. Precisely what temperature is needed to avoid these ill effects is, however, rather unclear. The 2001 UK Fuel Poverty Strategy set minimum temperature thresholds at 21°C for the main living room and 18°C for other rooms. These standards are embodied in the current fuel poverty methodology. 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 set by the World Health Organisation (WHO). In fact, both the evidence and the WHO stance are less clear cut. 21°C seems to be the mid-point of a temperature range (18°C to 24°C) where there was "no demonstrable risk", according to a WHO review published in 1987.[12] From this perspective, it is very unhelpful for policy-making that data on actual temperatures in homes are now more than 15 years old.

11 There are studies which have estimated the reduction in risk following energy efficiency interventions, for example see Liddell, C. (2008). *The Impact of Fuel Poverty on Children*. Belfast: Save the Children and Nicol, S. Roys, M. Davidson, M. Summers, C. Ormandy, D. and Ambrose, P. (2010). *Quantifying the Cost of Poor Housing*. Watford: BRE.

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

20. Beyond physical health, there is evidence to suggest links between low temperatures and poor mental health, between cold homes and social isolation amongst adults and between low indoor temperatures and truancy, educational attainment and anti-social behaviour amongst adolescents. We refer in Section 1.3 below to the views of stakeholders relating to certain additional health and well-being impacts, including increased fire risks, domestic accidents and food poisoning.

The carbon perspective

21. The carbon perspective is also increasing concern about fuel poverty. There are two particular issues for those whose prime concern is with carbon reduction. First, it is important to understand the distributional consequences of carbon mitigation policies. As explained above, exacerbating fuel poverty could be one side-effect of mitigation attempts, unless this is offset in other ways, thereby representing a barrier to their implementation. Second, bringing about the energy efficiency improvements needed to meet national objectives is likely to require assistance for those with low incomes, since they are unlikely to be able to afford such measures themselves.

Fuel poverty as an overlap issue

22. In conclusion, the review finds that fuel poverty is a distinct problem. It is an issue of concern within different policy debates. If progress can be made, there is the prospect of a 'win-win-win' through the contribution to poverty, health and well-being and carbon aims. If progress is not made, all three areas are damaged.

23. The common problem from each perspective results from the overlap between low incomes and high required fuel spending. In the light of this, the wording of WHECA seems to us to be entirely appropriate: we are concerned with individuals in households "living on a lower income in a home that cannot be kept warm at reasonable cost." But, as set out in our interim report, this is not what the current indicator measures.

Measuring fuel poverty

24. At the core of the review's terms of reference is a requirement to turn from an understanding of fuel poverty from first principles to a consideration of how fuel poverty should be measured. The measurement of a phenomenon such as fuel poverty is vital to our understanding of how it is evolving, how many people are exposed and the effectiveness of Government action to address it. A good indicator can be used to help identify the kinds of people affected by a problem so that they can be targeted for support, and to choose between different approaches.

The current indicator

25. At present, the official measurement of fuel poverty is through the use of a definition set out in the UK Fuel Poverty Strategy 2001. This states that a household is fuel poor if it would need to spend more than 10 per cent of its income to achieve adequate energy services in the home. Under this approach, data from the English Housing Survey are put into an energy use model (known as BREDEM) and combined with prices to model a required bill for English households. The requirements are taken to include space heating, water heating, lights, appliances and cooking. In 2009, 56 per cent of the average (mean) modelled household bill went towards space heating, for which the model sets temperature standards (21°C in the main living room and 18°C in other rooms, for a certain number of hours per day, subject to some variations in the case of under-occupied homes).[13] The remainder of the bill relates to non-heating energy requirements which are closely related to the size of the home and number of occupants.

13 In the case of under-occupied homes, the model assumes that only half the home is heated. Heating patterns used in the model reflect the occupation pattern of each home such that the needs of households where people spend more time at home are taken into account. A fuller description of this model is available in our interim report (pp 98-101) and the full model is described in an on-line manual: *Fuel Poverty Methodology Handbook* (2010). London: DECC. Available at: http://www.decc.gov.uk/assets/decc/statistics/fuelpoverty/614-fuel-poverty-methodology-handbook.pdf).

26. This amounts to comparing a household's fuel poverty ratio, which can be expressed as follows, against the 10 per cent threshold:

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

Under the current indicator, income is measured before allowing for housing costs and is not adjusted for household size or composition.

27. The current indicator's main strength is that it models fuel requirements and does not use actual consumption data. This means that households whose actual expenditure is low because they cannot afford enough fuel to be warm are not wrongly considered not to be in fuel poverty; it also means that households who have high expenditure while wasting energy are not wrongly considered to be fuel poor.[14] Another strength is that, because it is based on a combination of people's incomes, energy requirements and energy costs, it is sensitive to some degree to all three.

28. Regardless of how we design the fuel poverty indicator, there are ways in which the modelling could more accurately reflect households' costs. Modelling of the prices paid by households can at present only allow imperfectly for the ways in which those most at risk of fuel poverty may be on worse tariffs than others – that is that the poor may be paying more. Data allowing a more direct assessment of the tariffs faced by particular households should become available towards the end of the year as part of the Energy Follow Up Survey. At present neither the additional problems that this causes, nor the impact of interventions that reduce them, can be accurately assessed.

29. Aside from this problem, there are more fundamental weaknesses of the current indicator, set out in Chapter 5 of our interim report, that undermine its suitability for use as the main indicator for understanding the impact of Government policy on fuel policy or, indeed, for helping to develop and deliver that policy. Some of our criticisms of the indicator relate to the precise way in which it is calculated and some to its fundamental, ratio-based form. In the consultation on our interim report (see Section 1.3 below) most respondents shared our analysis of the weaknesses of the indicator.

30. The indicator's key mathematical feature – a fixed threshold of 10 per cent for the share of income taken by required fuel costs – 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.' The factor of twice the median level is essentially arbitrary, although it is always hard to develop such factors very precisely.

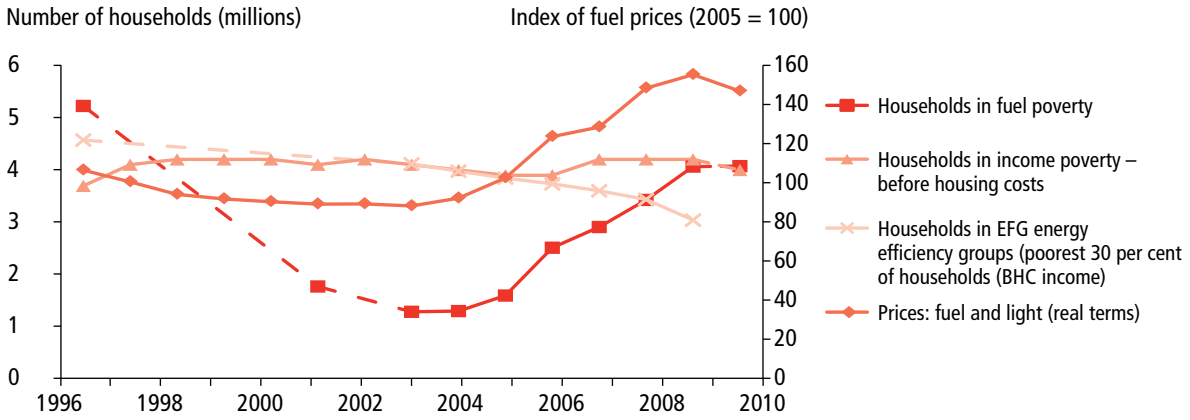
31. One consequence of this formulation is that it is possible for households with quite high incomes to be classed as being in fuel poverty. Equally some households with relatively low required energy spending living in highly energy-efficient homes may also be counted as fuel poor if they report very low incomes to the survey. This does not reflect what was suggested by WHECA. A further problem is that the indicator is very sensitive to technical issues, such as the rate of misreporting of low incomes in the survey used, or the particular temperature standards used in the calculation.[15]

32. More seriously for understanding trends, the indicator's form means that it reacts in an unduly sensitive way to changes in fuel prices. To be sure, any headline indicator of fuel poverty must be sensitive to fuel prices. The degree of sensitivity under the 10 per cent indicator would, however, appear to be excessive, thus distorting trends. We argued in our interim report that the extent of fuel

14 Although we use modelled energy bills for the reasons set out above, it is worth noting that this has implications for the way in which certain policy interventions aimed at changing household behaviour regarding energy use are reflected in the Low Income High Cost Indicator. This is discussed further at the end of Chapter 5.

15 As an expression of this, we calculated that reducing the temperature standard for the main living room from 21°C to 18°C would mean nearly 1 million fewer households would be classed as being in fuel poverty in 2009. The interim report also set out how, even in detailed incomes surveys, there is mis-reporting of incomes at the lower end. The English Housing Survey is not first and foremost an income survey and the reliability of its information on the lowest incomes may be affected.

Figure 1.2: *Fuel poverty, income poverty, energy efficiency and fuel prices, 1996 – 2010, England (except prices – UK data)*



Source: Fuel Poverty Statistics (DECC), RPI 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.

poverty was understated in the mid 2000s when fuel prices were low and that the structural problem of poor people locked-in to energy inefficiency remained more severe than official figures showed. It was not a reflection of the underlying problem to suggest that its scale had fallen by four-fifths in just seven years from 1996 to 2003. Conversely, the speed of deterioration in the problem was overstated as prices rose.

33. As shown in Figure 1.2, the current indicator describes a V-shaped trend in fuel poverty numbers since 1996. Although a few respondents believe this is accurate (see Section 1.3), most agree with us that this is not a fair representation of the reality over this period.

34. Figure 1.2 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. Second, it shows how many of the homes of the poorest 30 per cent of households 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 fuel poverty to 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. Over the period shown the impact of price changes is enough to completely mask the underlying changes in poverty and energy efficiency for low-income households.

Alternative indicators of fuel poverty

Options we have ruled out

35. Of course, no indicator of a problem such as fuel poverty is likely to be perfect and other indicators may perform worse than the current one. Chapter 6 of our interim report examined a number of alternative approaches.

Below is a summary description of these options highlighting certain insights, or desirable features, they bring, as well as some disadvantages.

36. First, we looked at three variations on the current definition:

- Measuring income *After Housing Costs* (Option A in Chapter 6 of our interim report).[16] We found this would help provide a better understanding of the impact of fuel prices on household disposable income. However, it would have many of the same disadvantages as the current indicator, with added sensitivity to very low or negative reported incomes.

- Using a threshold equating to *twice the contemporary median* energy expenditure, rather than the fixed 1988 level (Option B). We found this would paint a picture of how many households have high required spending on domestic energy compared to typical households. It would also be a relatively stable measure of the problem. However, as a ratio indicator it would remain affected by many of the problems that this causes with the current indicator, in terms of which households are identified.

- Supplementing the current indicator with a *fuel poverty gap* representing how much lower a household's bill would have to be for it to not represent more than 10 per cent of income (Option C). The amount for each household could be summed to give an aggregate gap as well as an individual gap. This approach was found to provide an understanding of the depth of fuel poverty, alongside the extent of the problem. However, basing a fuel poverty gap on the current fuel poverty indicator would put most weight on observations that may not be accurate. If the ratio indicator were used to generate an aggregate gap its extreme sensitivity to price changes would be compounded.

16 We argued that there would be a need to adjust the 10 per cent threshold – to 13.6 per cent – if this approach were taken, so that the threshold represented twice median *after* housing costs expenditure on fuel in 1988.

37. Moving away from the confines of the current indicator we then considered more radical options:

- An *after fuel costs poverty* approach where a fuel poverty line is taken as 60 per cent of median income after deducting both fuel and housing costs (Option D). This approach would provide an insight into the impact of high fuel costs for those on the margin of income poverty. However it would idenfity nearly all households on a low income as being fuel poor, regardless of their energy requirements. Essentially this kind of approach is a more sophisticated way of measuring poverty, not a specific measure of fuel poverty.

- Identifying fuel poverty as the combination of *low income and low energy efficiency* measured either in absolute or relative terms (Option E). This would focus on low-income households and exclude relatively well-off households. However, the SAP ratings for energy efficiency are only an imperfect indicator of required costs and do not adequately reflect changes in key drivers of fuel poverty such as energy prices, including specific prices paid by those on low incomes, or occupancy patterns.

- Finally, the interim report looked at *subjective measurement* (Option F) of fuel poverty. While useful in complementing other more objective measures, we found this approach would not provide a solid enough guide for policy-making.

Our preferred option – a Low Income and High Costs (LIHC) indicator

38. Building on the insights gained from looking at this range of options, we developed in our interim report a new Low Income High Costs (LIHC) indicator which we suggested offers considerable scope for improving our understanding of fuel poverty and helping to design and deliver more effective policy. It should be stressed that our approach includes not only a headcount indicator of the number of people affected but also a fuel poverty gap indicator to understand the depth of the problem at household and national level.

39. The simplest way of thinking about this indicator is illustrated by Figure 1.3.

40. This shows that the households of concern as laid out in WHECA are those that have **both** a lower income, that is they fall below an income threshold, and required costs above a 'reasonable level.' These are the households in the bottom left quadrant of the figure.

41. All of the households to the left of the income threshold are of concern because of their low income levels; all of the households above the costs threshold are of concern because they have high modelled costs, generally reflecting energy inefficiency. Compared to the households in the top left quadrant, the fuel poor have an additional problem of being locked-in to high bills. Compared to the households in the bottom right quadrant, the fuel poor have an additional problem of having a low income.

42. This approach counts directly the number of households affected by the problem described in WHECA, that is those with a low income and with high costs. More precisely, we suggested that households should be counted as fuel poor if:

    a) They had required fuel costs that were above the median level; and

    b) Were they to spend that amount they would be left with a residual income below the official poverty line.

    This includes those on the margins of poverty who are pushed into fuel poverty by their very high energy requirements (giving a sloping edge to the quadrant of concern, as shown in Figure 1.4 below).

43. The extent to which people's incomes fall short of a poverty line is sometimes known as the 'poverty gap'. By analogy, the extent to which costs go above the reasonable costs line can be considered an 'energy gap'; for those in the bottom-left quadrant, this represents a 'fuel poverty gap'. This 'fuel poverty gap', as shown in Figure 1.4, is an integral part of our preferred approach, not merely a possible additional measure. Although all the households in the shaded area are classed as fuel poor, they are not all facing the same degree of fuel poverty. The fuel poverty gap, by giving an indicator of the depth of fuel poverty, can be used to identify those households that may be having to make the

Figure 1.3: *Fuel poverty defined as the overlap between low income and high energy costs*

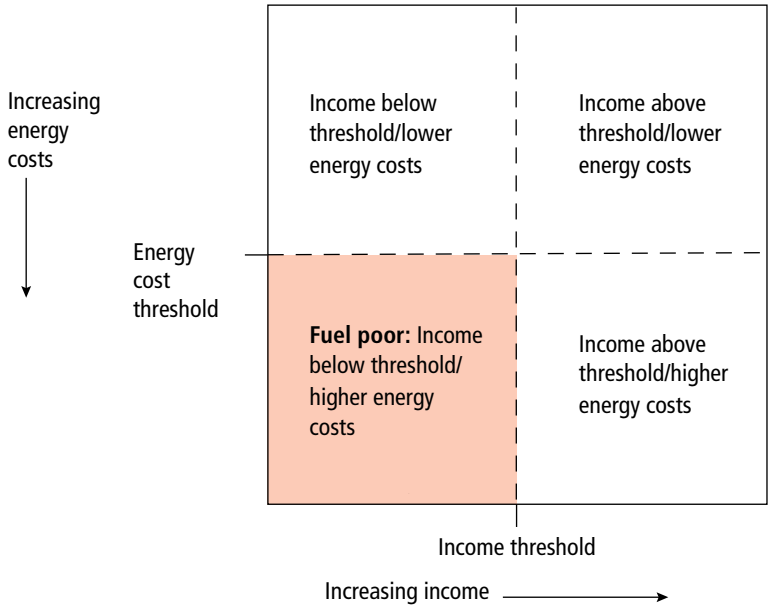
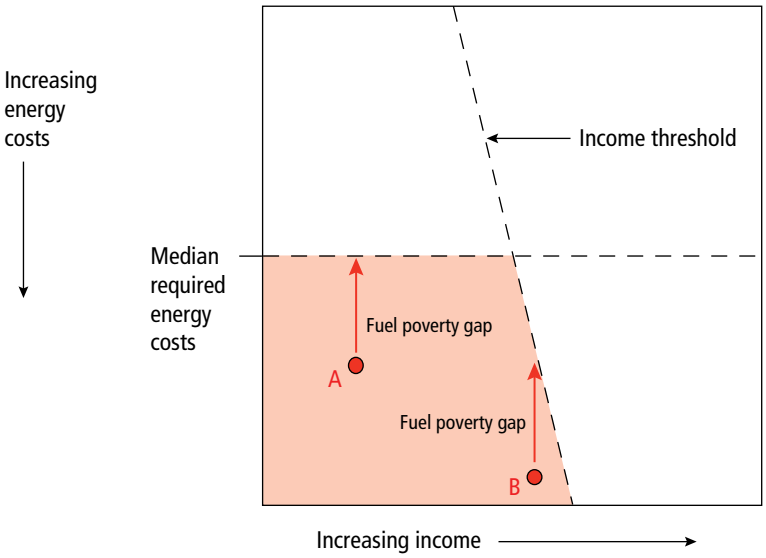


Figure 1.4: *Calculation of the 'fuel poverty gap'*



most difficult (or dangerous) trade-offs regarding their fuel bills, and that are the greatest priority for action, as we discuss in Chapter 3.

44. As discussed below, the principles of this approach were broadly supported by the respondents to the interim report. There are however many ways in which the thresholds for 'lower income' and 'reasonable costs' could be set. In our interim report we established illustrative thresholds as follows:

    - for reasonable costs, we used a threshold of the median modelled bill, after adjustment for household size and type.[17]

    - for income, we used a threshold of 60 per cent of median after housing costs equivalised income plus the individual household's adjusted modelled bill (this gives the sloping threshold seen in Figure 1.4).

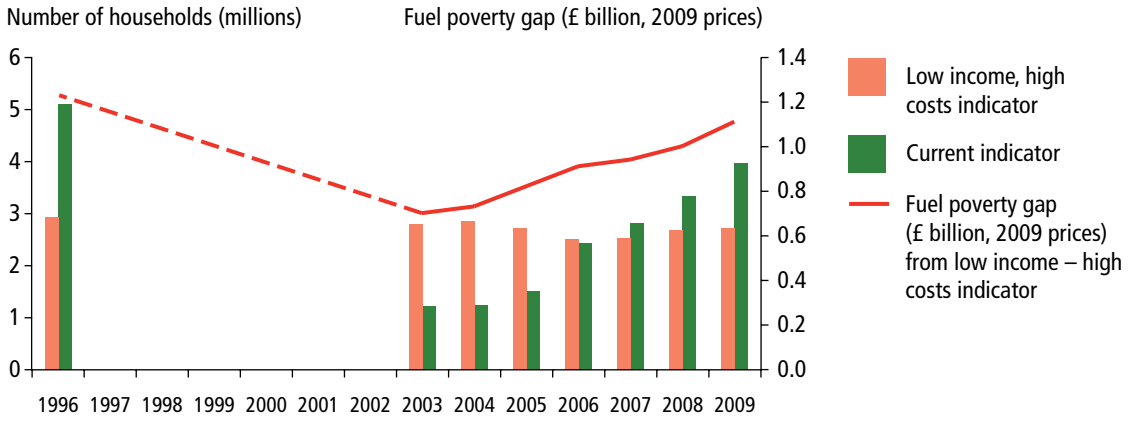
45. By taking this approach to the income threshold, the measure picks up those households who are pushed below the poverty line by their high costs. This also means that, as prices rise, more fuel poor households are identified (and the fuel poverty gap for each of them gets worse).

46. Using the data available, we modelled what this indicator would have shown for the period 1996-2009. The results are available in Figure 1.5, which also compares the headcount measure in terms of numbers of households with the trend under the current indicator.

47. As can be seen, the LIHC indicator paints a relatively stable picture of the number of households shown to be fuel poor; it also shows how the fuel poverty gap responds to price changes throughout this period, with a substantial increase from 2004 to 2009.

17 The bills are modelled under this approach, as before, using the English Housing Survey and BREDEM.

Figure 1.5: *Number of households in fuel poverty under current indicator and interim report Low Income High Cost indicator, 1996 and 2003 – 2009, England*



Source: Interim Report based on fuel poverty data, 1996 and 2003 – 2009 (DECC)

48. Under this approach, all things being equal, the fuel poverty gap and the fuel poverty headcount would reduce if the homes of the fuel poor were made more energy efficient and/or if their bills were reduced in some other way. If energy efficiency standards remained unchanged and there were no assistance for meeting bills but prices rose, the fuel poverty headcount would rise (though more slowly than prices) as would the fuel poverty gap (rather faster than prices).[18]

49. There is a technical but significant issue in relation to setting a reasonable costs threshold. This is the question of 'equivalisation' – whether and how to allow for household size and type in setting the thresholds. Equivalisation seeks, in effect, to set all households sizes and types on the same basis compared to a standard. What might be a 'reasonable' bill for a large household could be 'unreasonable' for a small one. In our interim report we argued that both income and cost thresholds should be adjusted for household size. We used the *same* adjustment factor for each.[19] In Chapter 2 we examine the implications of this approach in light of the consultation responses and propose a significant modification to it.

50. A second feature of the cost threshold we proposed was that it should relate to costs for the population as a whole. This implies that if energy efficiency standards improve in general, but not within fuel poor homes, the problem of fuel poverty, particularly the fuel poverty gap, will worsen as they get left behind. This is akin to the relative measurement of poverty: as average incomes rise, if incomes within the poorest households do not rise, poverty is seen to be deepening. The result is an indicator which achieves two important aims:

    - it encourages a virtuous policy cycle where energy efficiency improvements are always prioritised in lower-income homes to ensure standards do not fall behind those of the general housing stock improves;

18 The fuel poverty gap increases slightly faster than prices because more people are identified as fuel poor, which means the price change is compounded. However, under the LIHC approach these effects are much more limited than under the current fuel poverty ratio indicator.

19 See Section B4 of Annex B of the Interim Report. The specific scales used were those used by DWP for adjusting After Housing Costs income in its Household Below Average Income (HBAI) analysis.

- it hard-wires a concern for the distributional impact of policies, since regressive policies will tend to worsen the fuel poverty gap (and headcount) unless countered in some way.

51. In Chapter 2 we also discuss issues arising from the consultation around this relative approach and its implications.

52. The advantages of this approach can be summarised as follows:

- it allows separate calculation of the *extent* of fuel poverty (the fuel poverty headcount) and the *depth* of the problem (the fuel poverty gap) rather than conflating them;

- calculating the extent of fuel poverty in this way, relative to the calculated requirements of the mainstream population, is more robust than the current approach, both in terms of avoiding data problems (linked, for example, to mis-reporting of incomes) and sensitivities to technical choices (such as the temperature standards included in the model);

- because the indicator is more stable in terms of who is identified as fuel poor it is also more stable in assessing the effectiveness of interventions and how well they are targeted on those at risk of fuel poverty.

- the fuel poverty gap allows the impact of some interventions to be seen even if they do not bring someone across the line and out of fuel poverty;

- the impact of interventions that only affect incomes without taking a household across the threshold would reduce the depth of conventional poverty, but not of fuel poverty;

- there are some households with very low reported incomes currently classed as fuel poor even though they live in very energy-efficient homes; if they do indeed have such low incomes, they are a very high priority for assistance to take them out of deep poverty, but it is not clear that their energy bills are at the core of their financial problems.

In concluding our interim report we argued that fuel poverty is indeed a distinct and serious problem that deserves and requires attention, as recognised by Parliament in its adoption of WHECA. The Act captures, in our view correctly, the core of the problem as the overlap between low income and high costs.

We argue that fuel poverty is a priority for a range of coinciding concerns, including poverty alleviation, health and well-being, energy efficiency and carbon saving:

- we calculated that the fuel poverty gap in England in 2009 was £1.1 billion, representing the excess costs faced by households in or on the margins of poverty who are living in low-standard homes;
- living in cold homes has a series of physical and mental health impacts leading to ill health (whose costs the Government should make an urgent effort to quantify) and deaths as well as social impacts;
- for carbon reduction reasons it is essential that the energy efficiency of the whole housing stock is improved, but those on low incomes in the worst housing can neither afford the immediate investment needed nor afford later repayments without additional help.

While the priority must be action to address these issues, there is also a need for good measurement. Despite some strengths – especially its basis in a modelled assessment of household energy requirements – the current indicator suffers from serious weaknesses.

We believe that an alternative approach to measuring fuel poverty, drawing on the insights we obtained from considering a range of other approaches, would be to focus attention directly on those households with both 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 been reversed as rapidly as suggested by the current indicator.

While there are many ways in which thresholds for income and costs might be set, a relative approach of the kind we proposed in our interim report would have a number of technical advantages, create pressure towards constantly improving energy efficiency standards, and hard-wire a concern for distributional impacts into policy-making and delivery.

1.3 Responses to the consultation

53. The interim report asked for views on the analysis and the conclusions we reached. We received over 60 submissions in response and are grateful to all those who responded for taking the time to do so.[20] In this Section we summarise the responses received. Thereafter, in Chapter 2 we consider their implications for the precise form of LIHC indicator we propose.

Causes and impacts of fuel poverty

54. The consultation asked whether respondents agreed with the conclusion that the core problem of fuel poverty was the one described in the Warm Homes and Energy Conservation Act 2000. It also

20 The full list of respondents to the consultation is set out in the Annex to this chapter.

asked whether Chapter 3 of the interim report set out a comprehensive analysis of health and well-being impacts associated with fuel poverty.

55. Respondents agreed that the problem of fuel poverty was that described in the Warm Homes and Energy Conservation Act 2000, that is a person living in a household that cannot keep warm at reasonable cost. Respondents also generally agreed that the causes of fuel poverty were those set out in Chapter 2 of the interim report: a combination of low income, energy inefficiency and energy prices. However some gave greater weight to energy inefficiency caused by the inefficiency of the housing stock or maintained that increasing energy prices were the dominant factor in causing fuel poverty.

56. With few exceptions responses also welcomed the report's conclusion that fuel poverty was a serious issue and distinct from income poverty.

57. In terms of the impacts of fuel poverty, it was felt that the review had identified the main sources of evidence and had usefully set out both the range of health and non-health impacts, particularly as these related to morbidity and mortality.

58. A few respondents highlighted further evidence which they argued should be taken into account (although one respondent noted and accepted the rationale for only using evidence based on national level research). Two responses highlighted the link between fuel poverty and increased fire risks in the home, while others highlighted the hygiene and other impacts when people/households are faced with unreasonable costs.

59. The interim report highlighted that the basis for the recommended temperature standards was less clear-cut than had previously been supposed. In response, some argued this should not lead to changes to the standards. One response put forward a suggestion that temperature standards should instead be 19 degrees, while another response counselled caution at drawing conclusions from evidence which ranged from spot temperatures to 24 hour averages.

60. Responses also welcomed the recognition of those who were particularly vulnerable to fuel poverty and called for the final report to examine these in more detail. We take this idea forward in Chapter 3.

61. A few responses also highlighted the detrimental effect of debt caused by fuel poverty, which was less well understood but, they suggested, should be considered in more detail.

Assessment of the current definition and options for an alternative

Current definition

62. The consultation requested views on our analysis of the strengths and weaknesses of the current fuel poverty indicator. The majority of responses agreed with our assessment of the current definition. It was recognised that the original decisions on where to set the threshold were essentially arbitrary and also that its form meant the indicator was very sensitive to those assumptions (in particular energy prices). However some felt that our critique was subjective in places, or that the weaknesses identified were not of sufficient scale to warrant being a cause for concern. While many agreed that the current measure was overly sensitive to energy prices, one or two disagreed and felt this was an important feature of the definition that should be retained.

63. One of the weaknesses of the current measure identified by the interim report was that it counted people as fuel poor who were relatively well off. Many respondents agreed that this was a flaw as such households were not a priority for assistance.

64. One response did not support the assessment in the report of the issue of under-reporting of incomes and thought our concern was unwarranted.

Modifications and alternative approaches

65. Respondents did not tend to comment in detail on our assessment of the alternative options and no-one put forward any completely new options. One variant of the current definition was considered by a small number of respondents, that is retaining the current official indicator of fuel poverty but modifying it to introduce an income threshold.[21] Some respondents proposed an important variant on the LIHC approach – see below.

66. There was widespread support for income to be measured After Housing Costs, as this was a much more accurate measure of disposable income (though respondents did not suggest that this was the only modification that needed to be made). One response suggested that food costs should be reflected as this was also essential expenditure.

67. Many felt that a low income low SAP measure captured the crux of the problem (as well as being what people on the ground tended to use as a proxy for fuel poverty), but agreed with our assessment that, while it got closer to the WHECA definition, it did not capture the impact of changing energy prices or the differing heat requirements that households have (for example those who are in the house all day).

The Low Income High Costs approach

68. The consultation requested views on the new approach to measurement of fuel poverty set out in Chapter 7 of the interim report, the Low Income High Costs (LIHC) indicator. Respondents generally agreed with the overall approach of focusing on the combination of high energy costs and low income on the basis that this more accurately measured the core of the problem. Some felt that this way of measuring the problem was more in line with what was actually happening on the ground, and the indicator would lend itself to proxies being used to identify households at risk more easily.

69. Others however felt that the LIHC indicator was just as complicated as the current definition, and therefore was not an advance on the current situation. This echoed a feeling among several responses that the LIHC indicator would be impossible to use on the ground. Chapter 3 looks at this issue, discussing the development of proxies and ways of targeting to identify the fuel poor.

Thresholds

70. The interim report explained how we set two thresholds needed for our indicator: the costs threshold and the income threshold. In the report we recognised that other approaches for fixing these thresholds were possible and sought views on this.

Income

71. In our report, we established the income threshold as the conventional equivalised after housing costs poverty line plus a household's equivalised modelled energy bill.

72. Those that commented agreed that using the DWP's Households Below Average Income poverty line as the basis for the threshold was the right approach. They also agreed with allowing for each household's fuel costs (as well as its housing costs) to give a better sense of disposable income. One response preferred the 'Minimum Income Standards' approach in principle but demonstrated how this in fact matched very closely the income threshold we had set and captured the same households to a very large extent.

Energy Costs

73. In our interim report, we set the energy costs threshold as the median equivalised modelled cost. This was more controversial. Many respondents agreed with the concept of using a relative

21 We set out briefly in the Annex to Chapter 2 why we do not favour this approach which would address only one of the weaknesses with the official definition that we identified in Chapter 5 of our interim report.

threshold – what matters is where households are in relation to others. But others objected to this, on the basis that it would become too stringent over time, making eradicating fuel poverty nearly impossible. Alternatively others felt it implied too low a threshold due to the poor energy efficiency of the current housing stock in the UK, leading to a high median bill which, even at 2009 prices, was likely to be out of reach for many.

74. A few respondents were concerned that a relative measure based on median fuel costs would not reflect the impact of changing energy prices on households expenditure. As energy prices increased, households could be spending a significantly larger proportion of their income on energy but, as they lived in relatively energy-efficient homes, they would not be counted as fuel poor despite the change in their circumstances. This was argued to be a weakness.

75. Respondents proposed other approaches to setting an energy cost threshold. One of these was based on a calculation of unit fuel costs, measured in £ per square metre. We refer to this further in Chapter 2 and examine it in the Annex to that Chapter. Among other responses, the details varied, although a number of responses suggested setting a threshold on the basis of the fuel requirement of the most energy efficient homes.

Equivalisation

76. The LIHC indicator uses thresholds for both incomes and costs that are adjusted for household size and composition, or 'equivalised'. This is on the basis that larger families need more cash income to have the same standard of living as smaller ones, but at the same time, the level of costs that may be 'reasonable' for a large household may not be so for a small one. As with the level of the thresholds, we acknowledged that there could be different ways of approaching this. The concept of equivalising income using the factors applied by DWP was generally felt to be the right approach. While few respondents commented specifically on equivalising fuel bills, those that did argued that using the same OECD income factors was inappropriate. Doing so overstated the additional expenditure required for each additional person in a household and resulted in the measure identifying more single person households as having high costs. On reflection we agree that the OECD income factors do not accurately reflect how heating, space and other energy requirements vary between households, and are grateful for the alternative suggestions put forward. We explore this in detail in Chapter 2.

Implications for Government policy

77. Several respondents expressed concern that the LIHC approach would unjustifiably favour income-based policies over energy efficiency ones. Conversely a couple of respondents felt the opposite was true. They also expressed concern that this would put carbon reduction targets and fuel poverty policies in conflict with one another. One reason for this perception could be a lack of confidence in how the threshold and policies would interact – after all, the approach set out is very different from anything previously used. We examine this series of issues in Chapters 4 and 7 explaining how different kinds of policies affect the problem measured in this way.

Other issues

Fuel poverty gap

78. In general, responses to the consultation welcomed the inclusion of an indicator of the depth of poverty to supplement a measure of the extent. This was felt to be a useful addition to a headcount measure, and could be useful in identifying groups which should be a priority for assistance as well as the types of measures that might be needed. Respondents did not comment in detail on the fuel poverty gap, though a couple commented that they were unsure how this would work in practice.

Use of the term 'fuel poverty'

79. Several responses to the consultation and the original call for evidence expressed the view that the term 'fuel poverty' was not accurate or (more frequently) that there was a stigma associated with it that was unhelpful, particularly in relation to take up of policies on the ground. Some suggested alternatives such as 'energy precariousness' or 'affordable warmth', but it was acknowledged that coming up with an alternative was not straightforward.

Counting individuals or households

80. The interim report put forward the view that we should be measuring the number of individuals who are caught by fuel poverty, rather than just the number of households. Only a few respondents commented on this proposal. Those that did generally felt this made sense and was more in line with the way other poverty indicators worked. However, one respondent had some reservations about this approach suggesting that this would create incentives to target alleviation measures at multi-person households, regardless of whether or not they were vulnerable, because this would have the greatest impact on reducing numbers.

Responses to the consultation varied from quite brief responses to detailed assessments of the proposed LIHC measure. The assessment of the causes and impacts of fuel poverty was felt to be comprehensive, though a few responses felt we had omitted some relevant evidence on the impacts. Our assessment that the Warm Homes and Energy Conservation Act definition of fuel poverty continued accurately to describe the problem was welcomed. In general there was a large degree of support for the principles of our proposed framework that focused on the overlap between low incomes and high energy costs. However the responses to some of the detailed questions that arise under such an approach were more mixed. Our proposed approach to setting the income threshold was supported, but the approach to the costs threshold was more controversial, particularly in relation to its adjustment for household size, and how its level is set. We explore these issues in more detail in Chapter 2.

1.4 New evidence

81. In the interim report, we noted that there were various reports due to be published which would either update the existing evidence base, or which would be of relevance to the review but were not available in time to be included in the interim report.

Distributional impact of Government climate and energy policies

82. In Chapter 2 of our interim report, we considered the impact of Government climate and energy policies on energy prices and consumer bills. We summarised data, published by DECC in 2010, on the scale of the impact and explained that more recent data should be available by the time of our final report. The following section summarises the Government's latest analysis.

Impact on prices

83. A number of policies, such as the Renewables Obligation, the EU Emissions Trading System, Feed-In Tariffs, and carbon reduction initiatives such as CERT and CESP, increase costs for energy suppliers who are expected to recoup them through higher

energy prices. Of course, not all climate and energy policies are funded in this way, and since the 2010 assessment of the impact of policies on prices and bills was published, a number of decisions have been taken that change the overall picture. For example, the Renewable Heat Incentive (RHI) will now be funded through general taxation rather than through a levy on energy suppliers; funding options for the Government's Carbon Capture and Storage (CCS) commitments are also being considered as an alternative to an additional levy. The Government has also announced a major reform of the electricity market which it believes will lower prices in the long term by increasing certainty for investors and thereby reducing the cost of capital and other costs.[22]

84. DECC's 2011 assessment of the impact on prices is as set out in Table 1.1. As before, the assessment reflects on the prices of energy with and without a package of policy measures. It shows that DECC's central projection implies that the package of policies increases the price of gas by 7 per cent and the price of electricity by 27 per cent by 2020.[23]

22 The Government expects to legislate for electricity market reform in the current Parliament.

23 The policy package that is anticipated to contribute to these price increases by 2020 consists of: Feed-in-Tariffs, Electricity Market Reform, the Renewables Obligation, the Carbon Price Floor, the EU Emissions Trading Scheme, Smart Meters, Warm Home Discount, and the Energy Company Obligation. Some of these are anticipated to affect both gas and electricity prices (such as the ECO), while others will likely only affect electricity prices (such as the EU ETS). Current policies such as CERT and CESP will come to an end before 2020 and therefore no longer affect energy prices.

85. In December 2011, the Committee on Climate Change (CCC) published its own assessment of the impact of the cost of meeting carbon budgets on electricity and gas prices.[24] Its assessment is similar to that of DECC in relation to electricity: a price of 17.8p/KWh in 2020. For gas, the CCC projects a price of 4.7p/KWh in 2020 – the same as the DECC projection.

Impact on bills

86. However, prices translate through to bills as a function of the amount of energy used. Because certain policies have the effect of reducing energy demand, the scale of policy impact on bills can be mitigated, Some policies – such as Warm Front, Feed-In Tariffs and CERT – improve the energy efficiency of dwellings to reduce bills. Others help consumers to use energy more efficiently – such as better billing and smart meters. Finally, others – principally the Warm Home Discount – offer a direct fuel subsidy for eligible households. For those households who receive these benefits, there are considerable reductions in bills. What matters is the net impact of higher prices and of the measures they finance.

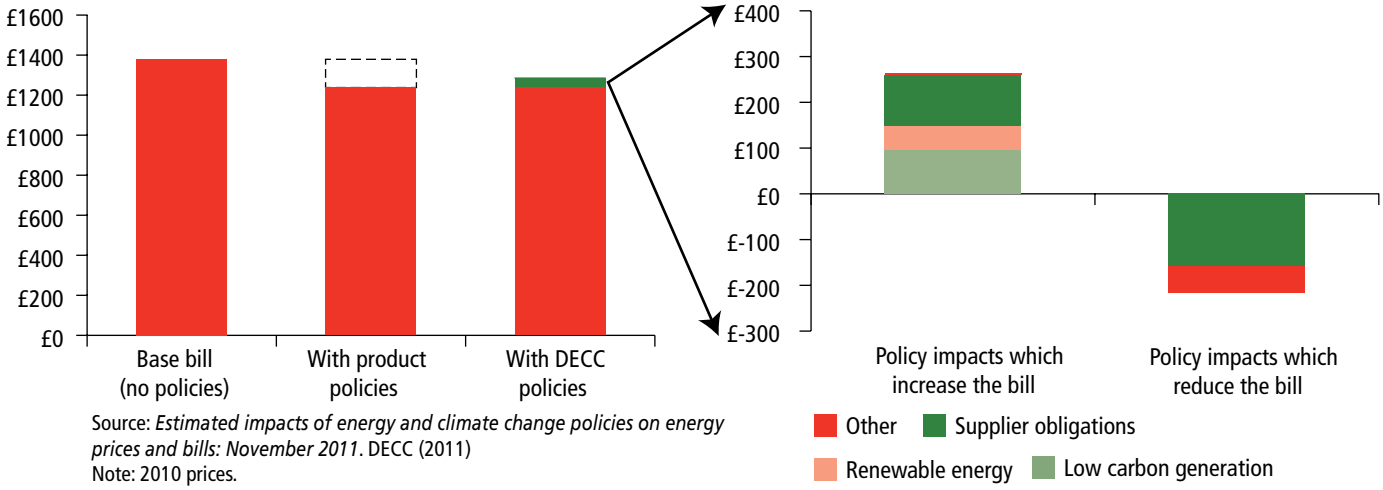
24 Committee on Climate Change (2011). *Household Energy Bills – Impacts of meeting carbon budgets*. London: CCC.

Table 1.1: *Estimated impact of energy and climate change policies on average household energy prices (including VAT)*

	Prices (pence/KWh)			
	Gas		Electricity	
	2011	**2020**	**2011**	**2020**
Estimated average price without policies	3.9	4.4	13.0	14.4
Estimated impact of policies	0.2	0.3	1.9	3.9
Estimated average price with policies	4.1	4.7	14.9	18.3
Impact on baseline (%)	*5*	*7*	*15*	*27*

Source: *Annual Energy Statement* DECC (2011)
Note: 2010 prices.

Figure 1.6: *Estimated impact of policies on average domestic energy bill in 2020*



Source: *Estimated impacts of energy and climate change policies on energy prices and bills: November 2011*. DECC (2011)
Note: 2010 prices.

87. The latest DECC assessment attempts to quantify the overall net impact. For our own analysis, we adopt the same approach as in our interim report in relation to product policies. That is, we include the impact of these policies in the baseline, rather than alongside other climate and energy policies. This is because the savings from these policies should occur irrespective of the level of gross costs that are added to energy bills. This means that the overall impact of the policy framework looks rather different under our analysis than under the Government's analysis. As we noted in our interim report, regardless of how the impact of product policies is presented, it is clear that such policies can have a very significant impact on the overall bills faced by households, especially in terms of electricity bills.

88. Figure 1.6 shows the estimated impact of policies on average domestic energy bills in 2020 broken down by policy type. We use four categories: supplier obligations, renewable energy, low carbon generation and other.[25] It shows that by 2020, the average domestic energy bill is expected to be 4 per cent higher than it would be without policies. If product policies were also included as part of the policy package, energy bills would be 7 per cent lower in 2020 with the policy package compared to bill levels without the package. If product policies were also included as part of the policy package, electricity bills would be 16 per cent lower in 2020 with the policy package compared to bill levels without the package.

89. As we noted in our interim report, the average bill impact is rather different from the impact for different individual households since there are both winners and losers under the policies.[26] DECC has estimated the impact of the policy package at different points in the income distribution. The analysis assumes that different households will get access to different policies, depending on the dwelling they live in (only homes with a cavity wall can receive cavity wall insulation under CERT, for example), whether they fulfil a policy's eligibility criteria (such as receiving a qualifying state benefit to receive a Warm Home Discount rebate), or whether they have the characteristics of an 'early adopter' household (some households, typically

25 The groups can be understood as follows: Low carbon generation – CCS Levy and EU ETS; Renewable energy – RHI, RO and FITs; Supplier obligations – CESP, CERT, ECO; Other – better billing, smart meters and energy security.

26 See Section 2.4 of the interim report.

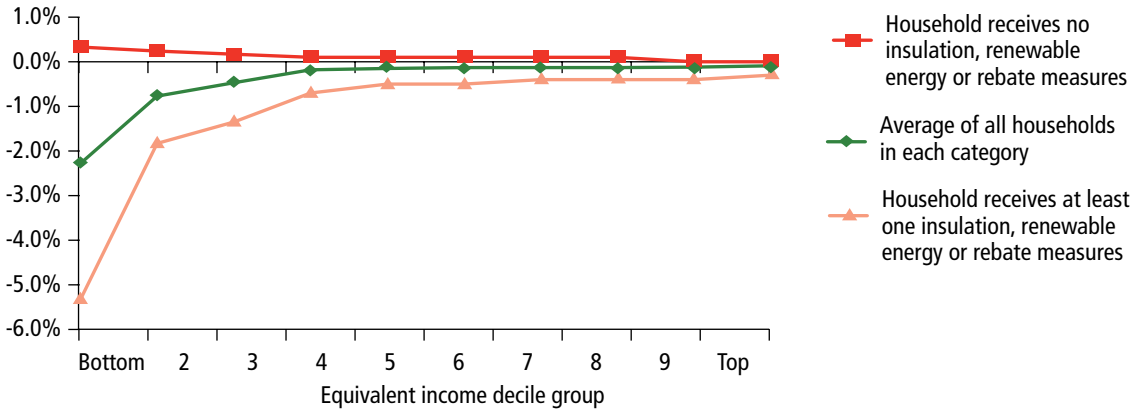
with higher incomes, are assumed to be more likely to take up new technologies, such as renewable energy measures or Feed-in-Tariffs). Importantly the way DECC has undertaken this analysis includes improvements in appliance efficiency as a result of 'products policy' within the analysis.

90. There has been a major change compared with the 2010 analysis in the overall distributional impact, as shown in Figure 1.7. This mainly reflects the introduction of the Warm Home Discount, changes to the assumed structure of ECO and the decision to switch to Exchequer funding for the RHI and CCS. This is to be welcomed from the perspective of tackling fuel poverty since there is, of course, a strong correlation between fuel poverty and income levels under any indicator. The latest figures suggest that the net impact of all the policies together on the poorest households is, on average, beneficial by 2020. These households could see average reductions, measured as a proportion of income, of more than 2 per cent. Households with the lowest tenth of incomes could see bills that are the equivalent of more than 5 per cent of their income lower than they would otherwise be, if they benefit from at least one insulation, renewable energy or bill rebate measure.

91. Even for those households who get no direct benefits from the policy package the picture has improved compared to the 2010 assessment. Whereas the 2010 analysis suggested bill levels could be more than 2 per cent higher as a proportion of income on average for the poorest households receiving no measures, the 2011 analysis suggests this impact is now barely 0.2 per cent of income. Essentially the average upward effect on bills for these households shown in Figure 1.7 is offset by the assumed impact of products policies, that is that appliances and other products will be more efficient than they would be without regulation.

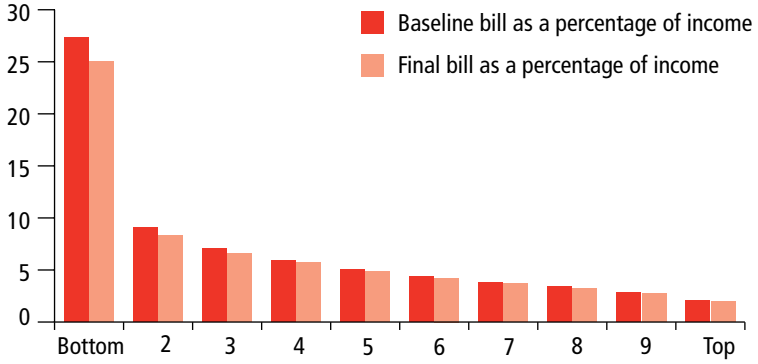
92. The overall impression given by the latest DECC analysis is therefore of an improved situation when considered from a fuel poverty perspective. Nevertheless it should be remembered that the majority of households will be on the line of the graph relating to households receiving no benefits. Indeed, some 65 per cent of households will fall into this category. The overall picture is positive because of the large scale of benefits that accrue

Figure 1.7: *Estimated impact of policies (including product policies) on average domestic fuel bills as a percentage of income in 2020, UK*



Source: *Estimated impacts of energy and climate change policies on energy prices and bills: November 2011*. (DECC)

Figure 1.8: *Energy bill as a percentage of disposable income in 2020 with and without energy and climate change policies by equivalised income group*



Source: *Estimated impact of energy and climate change policies on energy prices and bills: November 2011*. (DECC)

to the winners. It is also worth underlining that this analysis includes benefits from a range of policies including products policies. Furthermore, the picture in 2020 is coloured by the impact of policies that are being phased out but whose benefits will continue to accrue into the future (for example, CERT comes to an end in 2012, but the effect of the measures whose installation it led to will continue to be felt in 2020).

93. Later chapters will look at the impacts of specific policies including future policies. For example, in Chapter 5 we consider the distributional impact of a range of policies, including the forthcoming Green Deal and ECO (see Box 5.2). Our projections (Chapter 6) and work on the impacts of particular types of policies (Chapter 7) also illustrate the distributional – and fuel poverty impact – of current and future policies.

94. Another important consideration is the scale of energy bills faced by different households across the income distribution. As can be seen in Figure 1.8, energy bills fall as a proportion of income as income rises. This is to be expected. There are at least two important implications. First, energy bill increases are likely to have a regressive effect overall. Second, energy requirements are most likely to squeeze out other spending – or be squeezed by other spending – at the lower end of the income scale.[27]

95. The Committee on Climate Change (CCC) publication of December 2011 on the cost of meeting carbon budgets also considers the likely level of domestic fuel bills in 2020. Its calculations are focused on the vast majority of energy customers, that is dual fuel customers, and are not therefore directly comparable with the DECC figures. In addition the CCC does not provide direct analysis of the different impacts on income decile groups.

96. The CCC finds that the typical duel fuel customer can expect a household bill of £1,250 in 2020 compared to a bill of £1,060 in 2010 (both figures are in real 2010 prices). The CCC suggests that this includes £130 per household for measures to support low-carbon investments and around £60 for supporting energy efficiency improvements in homes. The CCC goes on to suggest further reductions could be delivered by enhancing the markets for energy efficient appliances and reducing gas use through further insulation and

27 See for instance Beatty, T., Blow, I and Crossley, T. (2011) *Is there a heat or eat trade off in the UK?* London: Institute of Fiscal Studies.

heating controls such that the total bill in 2020 is £1,085. This would be very similar to the CCC's figure for bills in 2010 of £1,060 (again, both figures are in real 2010 prices).

97. Although the CCC does not focus its analysis on impacts of prices and bills on different types of household, it does refer to the needs of households for whom electricity is the main heating fuel. It argues that such households could be more exposed to price rises and that the Government should develop policies to protect such vulnerable households. It says:

This could be through greater targeting of these households for energy efficiency measures [...] or renewable heat measures [...]. Tax revenues from the carbon price could allow such measures without negatively impacting the fiscal balance.

98. This analysis of the distributional impact of prices and bills supports the conclusion we drew in our interim report that the distributional impacts of policy design and delivery need to be fully understood and quantified. Only through rigorous assessment of these impacts can future policies be drawn up and delivered that have the desirable impact of assisting those households in fuel poverty.

99. We discuss in Chapters 2, 4 and 5 how our preferred indicator of fuel poverty would help to embed a concern for distributional impact into policy-making. We also discuss in Chapters 5, 6 and 7 how decisions on *new* policies, specifically the Green Deal and Energy Company Obligation, affect this picture and how, without care and attention, such policies could lead to further marginalisation of some of the most vulnerable and most deeply fuel poor households in England. Finally, given that it has been suggested that energy suppliers should be required to pass on the costs of policies on a consumption basis – in order to encourage further energy efficiency and to ensure that those who waste energy pay the price of their excessive consumption – we consider in Chapter 4 what this would mean for fuel poverty.

Understanding fuel expenditure: fuel poverty and spending on fuel

100. The interim report also noted the need for better information on the relationship between actual fuel expenditure and modelled requirements. Since the interim report was published, the Joseph Rowntree Foundation, the Centre for Sustainable Energy (CSE) and Consumer Focus have published the results of a project aiming to get a better understanding of consumer's expenditure on fuel.[28]

101. The study draws on a range of data including the Living Costs and Food Survey and the English Housing Survey (EHS) and uses actual spending from the former to estimate actual consumption for households recorded in the EHS. Actual bills can then be estimated for households in the EHS.

102. The study suggests that households in general consume substantially less than their 'required' bill suggests. On average, households consume only around two-thirds of what they are calculated to need.

103. In understanding under-consumption, the report points to three main groups. People on low incomes are more likely than average to have consumption much lower than need (even though, on average, they do not have high needs), as are single person households. The other group is the highest income tenth of households. They are likely to under-consume relative to calculated need in part due to their relatively large dwellings. Single person households of any age are more likely to under-consume than any other groups, particularly if they are on low incomes or in hard to heat homes. Families with children are found to be least likely to under-consume in these terms. However, and as we noted in our interim report, there is considerable variation in consumption within income groups so that there are also households whose actual consumption is much higher than calculated need.

28 The full report can be found at: http://www.cse.org.uk/downloads/file/understanding-fuel-expenditure.pdf

104. The study's findings usefully confirm what was already suspected regarding required and actual spending, as well as giving more information on the types of households that are likely to under-heat their homes. However, because data have to be combined from different surveys for spending and energy requirements the approach still cannot compare the two for the *same* households, which is what is really needed. It will be interesting to observe the results of work DECC currently has underway that may support these findings. A project is underway to match actual metered energy consumption for gas and electricity to modelled consumption for households participating in the EHS that give their permission. DECC is also recording information in temperatures in the home and actual tariffs as part of the Energy follow up survey.

The updated DECC analysis supports the conclusion we drew in our interim report that the distributional impacts of policy design and delivery need to be fully understood and quantified. We discuss in Chapters 2, 4 and 5 below how our preferred indicator of fuel poverty would help to embed a concern for distributional impacts into policy-making.

Taking into account some new policies, such as the Warm Home Discount and the current design of ECO, DECC's 2011 distributional analysis presents a much more positive pattern on average than its 2010 analysis. However, significant numbers – indeed a majority of low-income households – are shown as making small losses, even taking into account the benefits of products policies. We discuss in later chapters how new policies could play into this picture and how, without careful design, such policies could lead to further marginalisation of some of the most vulnerable and most deeply fuel poor households in England.

Finally, a recent Centre for Sustainable Energy study confirmed that actual consumption of energy tends to be significantly lower than modelled requirements and pointed to three groups in particular where this was the case: those on a low income, single person households and those with the highest tenth of incomes. We look forward to the outcome of the DECC work currently underway which will use data from actual bills to investigate this further.

Chapter summary

In this chapter we have recapped the conclusions of our interim report, which found that:

- Fuel poverty is a distinct and serious problem from a number of perspectives, including poverty, health and carbon reduction, that deserves and requires attention.
- The Warm Homes and Energy Conservation Act 2000 correctly captures the core of the problem as the overlap between low income and high energy costs.
- The current official indicator, based on required energy spending exceeding a threshold of 10 per cent of income, has some strengths but also has serious weaknesses including its undue sensitivity to energy prices and the way it identifies which households are fuel poor.

Our interim report therefore put forward an alternative approach which focused on the overlap between high energy costs and low income, supplemented by a fuel poverty gap to measure the depth of fuel poverty as well as its extent.

Responses to the consultation on the interim report welcomed our review's evidence on the causes and impacts of fuel poverty and our confirmation of the core problem as being people living in households that both have both low incomes and face higher than reasonable costs to keep warm. Following from this there was support for the basic structure of our Low Income High Costs measure and the introduction of a fuel poverty gap. The income threshold was also supported, but some expressed concern regarding the way in which the cost threshold had been set, and how energy bills had been adjusted to take account of the size and composition of households. These issues are therefore explored in further detail in Chapter 2.

New evidence relevant to the review has been published since the interim report. Of most significance is the analysis of the distributional impacts of DECC policies published in the Annual Energy Statement 2011. This showed that the net distributional impacts of policies had improved compared to the previous year's analysis. We look in later chapters at the distributional impacts of specific future policies including the Green Deal and ECO.

Recommendations

1. The Government should change its approach to fuel poverty measurement away from the current '10 per cent' ratio indicator.

2. The Government should adopt a new indicator of the extent of fuel poverty under which households are considered fuel poor if:

   - They have required fuel costs that are above the median level; and

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

   The Government should count the number of individuals in this position as well as the number of households they live in.

3. The Government should adopt a new indicator of the depth of fuel poverty as represented by the average and aggregate 'fuel poverty gap', defined as the amounts by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs.

4. The Government should measure incomes for fuel poverty purposes after housing costs and adjusted for household size and composition. The threshold should be set at 60 per cent of median income plus calculated household energy requirements.

Technical recommendations

1. The Government should compare data on actual consumption patterns in homes that are due to become available in future with modelled spending requirements for the same households in order to identify the kinds of household that are at greatest risk of living at low temperatures and to provide information that would allow refinement of the way in which energy needs are currently modelled.

2. The Government should reinstate a component to its surveys that allows an up-to-date assessment of contemporary behaviour in terms of the temperatures of people's homes. The information this provides should be used in the development of the fuel poverty measurement methodology.

3. Based on data available in future, the Government should examine the case for a more direct assessment of the tariffs actually paid by low-income households within the fuel poverty measurement methodology.

CHAPTER 2

Adjustments to the Low Income High Costs indicator

1. This chapter looks in more detail at some of the elements of the Low Income High Costs (LIHC) approach. Section 1.3 above set out the response to our consultation on the interim report. One area where we requested views and which provoked the greatest amount of debate was in relation to energy costs. There were two main issues: first, having equivalised income, whether and how to equivalise energy costs in order to take account of what it is reasonable for households of varying size and composition to spend on keeping warm and other energy needs; and, second, how to then set the energy costs threshold.

2. We examine these issues in Sections 2.1 and 2.2 below. In Section 2.3 we explore the precise form of LIHC indicator to be used. Section 2.4 then picks up on this and considers how this should relate to the form of any target used.

3. Elements of the discussion in this chapter are rather technical so some readers may wish to move directly to the section summaries. More detailed discussion can be found in the Annex to this Chapter.

2.1 Equivalisation of energy costs

4. The examination we have conducted during the course of our review of the current fuel poverty methodology revealed that the issue of income equivalisation – that is, adjusting household incomes for composition – had been under discussion for some time.[29] It became clear that equivalisation would also be an important issue in the context of our LIHC indicator. As explained above, the indicator we have developed equivalises not only the income side of the equation, but also the modelled bills. In effect this means different cost thresholds for households of different size and composition. This element of the indicator has been the subject of some debate since our interim report was published.

Why adjust for household size and composition?

5. The decision to consider income on an equivalised basis reflects the fact that people with different household sizes need different resources to attain equivalent standards of living.[30] The requirements do not simply increase in proportion to the number of people in the household, because there are economies of scale, and households do not need as much income for each additional child as they do for each additional adult.

29 The Sefton and Chesshire peer review conducted in 2005 did not recommend equivalising incomes within the current methodology. It is known that there is a divergence of views on this issue.

30 This argument has not been disputed in relation to the low income high costs indicator. It is more questionable whether it applies within the existing 10 per cent indicator. For what it is worth, we believe it is right not to equivalise incomes under the current indicator, where the comparison is with unadjusted costs. When looking at the ratio between costs and income, making the same adjustment for household size and composition to both the top and bottom of the fraction would, of course, give the same result as the current calculation.

6. Based on overall consumption needs and patterns, the Department for Work and Pensions (DWP) has developed a series of equivalisation factors for income which, after allowing for housing costs, suggests that a single person needs only 58 per cent of the income of a couple in order to have the same standard of living. A couple with one child under 14 is deemed to need 120 per cent of the income of a couple without children to achieve the same standard of living.

7. Taking an example, in 2009/10 the after housing costs poverty line was £214 per week, based on a couple without children. But for a single person, that value was £124 – that is, 58 per cent of £214. In this case, the absolute levels of income are very different but are deemed to lead each household to have an equivalent standard of living. In this way, equivalisation helps order each household in the country by what their income means in terms of the standard of living they can afford. In principle this is clearly right and the way we defined a 'low income' threshold within the interim report was not controversial.

8. Within our indicator, we take the further step of equivalising the modelled bill for each household. The rationale for doing this is similar: we want to be able to understand what it is 'reasonable' or 'unreasonable' for each household to spend on energy given their household composition and given that we are focusing, by definition, on those with low incomes.

9. The reason why the poverty line (in terms of unadjusted income) is higher for a larger household than for a small one is that the large one will have to spend more on each consumption item to achieve the same standard of living. This will – at least to some extent – apply to its energy needs as to other items such as food. This suggests, as we argued in the interim report, that it would be wrong to use the same energy cost threshold for different sizes and types of household. But it is also clear that energy needs do not rise directly in proportion to household size: a couple will, for instance, share living space, and so their space heating requirements will not be twice those of a single person. What is needed is an adjustment process that is somewhere between the fixed and the per capita approach.

How to adjust for household size and composition?

10. The solution we proposed in the interim report (for reasons set out in its Annex B.4) was to use the same adjustment factors for required energy costs as we were using to adjust incomes, that is the DWP's after housing costs income equivalisation factors (themselves adapted from factors used by the Organisation for Economic Cooperation and Development). This suggestion was, however, one of the most disputed elements of our proposals within the consultation responses.

11. A number of stakeholders argued that this led to too low a threshold for small households relative to that for large ones and so meant that the indicator would be more likely to count single person households as having high costs, and therefore being in fuel poverty, than large ones. In the words of one respondent, it implied a "charter for under-occupation." This led to a proposal from some stakeholders for the measurement approach to focus on unit costs, measured in £ per m^2, rather than total costs. At the same time, the same stakeholders acknowledged that adjusting modelled bills is an important part of the calculation for the LIHC indicator given the desire to compare across all household types within a common framework.

12. In the light of these reactions we have reconsidered our approach to energy costs. We accept that there are problems with using equivalisation factors that are not specific to spending on domestic energy. We recognised in our interim report that specific equivalisation factors could be desirable (see Section B4 of Annex B of that document) but could not see a straight-forward way of delivering them. We have now been able to look at this again and we set out here how we have undertaken this exercise.

13. If energy needs were like all other requirements within a household's (non-housing) expenditure, it would indeed be 'reasonable' for a single person to be spending 58 per cent of a couple's spending. But within the calculation of the equivalisation scales, different elements within a basket of goods will make different contributions. Some will not have economies of scale for most households (for example, bread and milk) while others will (for example, a wide range of household items, from carpets to vacuum cleaners).

14. Within the sphere of energy requirements, there is a mix. It does not cost more to heat the bedroom in a one-bedroom flat occupied by two people rather than one person. But a couple will use more hot water. In addition, a tipping-point is reached where more people need more space. There is therefore a difference between typical energy requirements given a particular dwelling and specific energy needs given a particular household. This means that, while the DWP's income factors might not be appropriate, it would equally be wrong to assume that energy costs do not need to be adjusted.

15. As an alternative to the use of DWP's income factors, we have developed an approach to the equivalisation of modelled bills that reflects the modelled spending requirements of each household type, based on the data from the English Housing Survey. This allows us to account for the fact that different sizes and types of household will have different energy requirements. However, it is also important to remember that there is considerable variation in energy requirements within those household types. For example, those on high incomes may live in different types of homes and have different energy efficiency standards compared with those on lower incomes. For this reason, we base our equivalisation factors only on those households in each group that have an income that is near the overall median income.

16. As explained in the Annex to this Chapter we have approached this problem by looking at modelled spending patterns in different types of households with incomes near the overall median, and therefore similar living standards. The result is a new set of equivalisation factors as set out in Table 2.1.

17. We discuss the effects of this change in Section 2.3 below, but it has a number of important implications. Perhaps the most significant is that it changes the composition of those households with low income and high costs. Our original version of the indicator found 2.7 million households to have low incomes and high costs in 2009, representing some 4.8 million individuals. This compared to 4.0 million households and 7.4 million individuals under the current 10 per cent indicator. This new version of the indicator also identifies 2.7 million households as having low incomes and high costs. However, because the new way of setting the energy costs threshold is more likely to count large households as having high costs, those households contain 7.8 million individuals. We discuss this further below.

Table 2.1: *Proposed new cost equivalisation factors for fuel bills*

Household type	Factor
Couple with dependent children	1.15
Couple without dependent children	1.00
Lone parent	0.94
Single person	0.82
Other multi-person household	1.07

Source: Calculations by the Fuel Poverty Review based on English Housing Survey (2009)

18. As referred to above, some stakeholders proposed an alternative to equivalisation based on measurement of unit costs. This proposal measures unit costs, in £ per m^2, rather than total costs adjusted for household size. The case for doing this centres around the fact that, on average, unit fuel costs are fairly similar between households of different size and composition, with typical variation from the average for couples with two children being only 3 to 5 per cent (and no more than 10 per cent). This could be a fairly straight-forward approach but, as we discuss in the Annex to this

Chapter, it has certain downsides, particularly that it makes no allowance at all for the number of people in the household, and the fact that people can find it hard to move. This could lead to some unexpected treatments of, for instance, those who lose a household member (e.g. on the death of a partner). Much of the variation seen under this approach is due to household size. This measure has a much weaker correlation with SAP than our preferred approach. On balance we therefore prefer our original approach, but with the adjusted equivalisation factors shown above. However, we include some detailed consideration of the pros and cons of a unit costs approach – and a comparison to the equivalisation method we propose – in the Annex to this Chapter.

19. Against this background, we therefore adopt for the purposes of the remainder of this report an approach to our LIHC indicator which is as follows:

- The overall structure of the indicator is as we developed it in the interim report and as described in Chapter 1;
- The income threshold is set as proposed in the interim report by adding equivalised bill values to the standard after housing costs poverty line (of 60 per cent of median AHC income).
- However, the factors used to adjust for household size and composition when comparing energy requirements with the threshold are those shown in Table 2.1, relating specifically to energy spending.

Adjusting incomes for household size and composition has a clear and familiar logic. Adjusting bills in a similar way is a new approach but one with a similar purpose. When attempting to understand the reasonableness of costs, some kind of adjustment for household size and composition is necessary. We accept that the factors used in the calculations presented in the interim report were not appropriate and that specific adjustment factors for energy costs are needed. We have therefore derived new factors which we believe address this problem, while retaining the important advantages of the overall approach.

Section 2.2: Setting the energy costs threshold

20. Having taken a decision on how best to assess costs for particular households within our fuel poverty matrix, we now need to discuss where to draw the threshold for reasonable costs.

The proposal in the interim report

21. Our proposal was to set a threshold equivalent to the median equivalised modelled bill – that is, the level of costs where 50 per cent of all households have lower bills and 50 per cent of households have higher bills. This changes over time: given the trend in energy efficiency improvements we would expect the bill to fall over time, offset by increases in prices (and in other factors that affect modelled assumptions).

As already explained in Chapter 1, the basis for taking the median modelled threshold is a desire to understand energy requirements across all households throughout England by comparison to contemporary norms, in this instance as represented by the overall median. In essence, this is equivalent to saying that it is unreasonable for low-income households to have to pay more to keep warm than typical households on much higher incomes.

22. The median modelled bill is fundamentally driven by two factors: energy requirement (an expression of energy efficiency and needs) and energy prices. The overall energy efficiency of the English housing stock is therefore a primary driver of the level of the median bill. If our housing stock were more energy efficient, the median modelled requirement would

be much lower than its 2009 value of £1,270.[31] Setting the threshold at the median does not mean that any household with lower requirements is of no concern, nor that it is acceptable for there to be so many homes in England with relatively low energy efficiency. Rather, the median is an appropriate level of spending for comparative purposes. Any household above that threshold has requirements that are above contemporary norms.

23. In terms of the risk of certain households falling behind these norms, the selection of the median as our threshold means that any homes where energy efficiency is not improved, or where there is a change from year-to-year in needs, for example because of entering retirement and spending longer at home, could be shown as deeper in fuel poverty. Capturing this risk is an advantage of our indicator: if the homes of richer households are improved faster than the homes of poorer households, fuel poverty will get worse. Although the same logic suggests that a deterioration in efficiency levels in richer households would apparently 'improve' fuel poverty, recent trends are for the reverse and for energy efficiency to improve overall (by an average of 1 SAP point per year[32]). There is also a significant policy push for this to continue to be the case through the Green Deal, regulation of new building standards and other initiatives.

24. Similarly, the operation of the median means that, with general improvements across the housing stock, new households could fall into fuel poverty for the first time. This would be because they were not keeping up with contemporary norms of energy efficiency. This has been criticised by some stakeholders, who by implication favour a more absolute standard in terms of energy efficiency (as discussed further below). However, for policy purposes, it seems to us that it is important to know which homes across the whole housing stock are falling behind and so should be targeted through future policy interventions.

25. One consequence of choosing the median is that across the whole housing stock half of all households will always have lower than typical costs and half will have higher than typical costs. In the very long term, average energy efficiency might reach such a high level that it would no longer be meaningful to consider fuel poverty in this way. For example, if every home were between SAP 90 and SAP 100, finding half the population to have higher than typical costs would not be so important – and indeed their related fuel poverty gaps would become very low. At such a point in time, the distinction between fuel poverty and general poverty, as described in the review's work to date, might have disappeared. We are, however, a very long way from that point.

Other options

26. The question of thresholds was discussed in some detail in some of the consultation responses to our interim report and we consider some of the issues raised here.

27. The issues raised reflect three kinds of concern:

    a. Some respondents believe that what matters is the **absolute** level of spending that households require, not their position **relative** to other contemporary households. With the relative approach we advocate, a general increase in fuel prices will result in a greater fuel poverty gap and will pull in some more households falling below the income threshold, but it would not push households with below median required costs above the cost threshold. With an absolute threshold, price changes would have a much more dramatic effect on the headcount numbers.

    b, Others argue that suggesting that it is 'reasonable' for low-income households to spend as much as a median household on a much higher income is not right and so the threshold should be set at a **lower** level. In other words, a median spending threshold is too **high**.

31 Modelled bills are significantly higher than actual spending on average, as discussed in Chapter 1 and in Table 2.3 of our Interim Report.

32 See Figure 2.6 in the interim report.

c. Others – including some of the same respondents – argue, however, that over time a threshold linked to contemporary typical spending requirements will, in fact, become too **low**, as overall energy efficiency improves, reducing the median spending requirement as it does. This 'moving target' problem makes complete eradication of fuel poverty very difficult. As an alternative, some respondents advocate setting the threshold as some ratio (greater than 1) of the spending requirements of households in more energy efficient homes. Over time, as it is hard to improve the efficiency of the already-best homes rapidly, such a threshold would be easier to beat, making eradication of fuel poverty more feasible.

28. We now look in turn at each of these options.

Option (a): Fixing the threshold at an absolute level of costs

29. We look first at an approach to threshold setting that would reflect the concern set out in (a) above.

30. One of the consequences of adopting a relative approach to the threshold for reasonable costs is that it moves over time and in parallel with energy prices changes. Therefore, as prices change, unless other factors have an over-riding impact, a household with 'reasonable costs' could be faced with a bill that is higher in absolute terms than a bill that was previously considered 'unreasonable' for another household.

31. For example, assume that the median costs threshold is £1,200 in Year 1. Household A has a modelled bill of £1,150, found to be reasonable. Household B has a modelled bill of £1,250, found to be unreasonable. Now assume that prices go up across the board by 10 per cent in Year 2. The threshold would rise to £1,320. Household A's bill would be £1,265, still 'reasonable', because it is below the median level, but higher than Household B's bill for the previous year which was 'unreasonable'.

32. One way of avoiding this scenario, which is counter-intuitive for some, would be to set an absolute threshold at a given level of costs (adjusted only for general inflation). As energy prices changed relative to other prices and modelled bills for households went above this fixed threshold, more households would be faced with 'unreasonable' costs and, assuming they are poor, would be identified as being in fuel poverty.

33. Taking the previous example, the threshold could be set and fixed over time at £1,200, the median level for Year 1. In Year 2, both household A and household B would be fuel poor, with costs above this level.

34. It becomes immediately apparent that this approach would make the measurement of fuel poverty very sensitive to prices. This might be in tune with some people's expectations, but it has implications for the reliability of any indicator. For a start, rapid increases in prices would lead to rapid increases in the number of fuel poor households, changing not only the measured scale of the problem, but also the types of household affected. This would have implications for the chances of success when using policy delivery proxies, and would add to the target group for policy interventions a group of households with better than currently typical energy efficiency. It is this kind of extreme sensitivity to price changes which is one of the major drawbacks to the current official indicator.

35. There is also a significant issue in choosing which level of prices to pin the threshold to. As a measure of the significance of this choice, we have modelled the impact of fixing the reasonable costs threshold at the median level, as measured in £s, for both 2004 and 2009. The results are shown in Table 2.2. As can be seen, fixing the threshold at the median bill for 2004 (£674) would lead to a fuel poverty headcount (in terms of both individuals and households) in 2009 that is double what it would be if the 2009 threshold (£1,270) were used. The trends painted by each measure are rather different, with the number of households in fuel poverty

Table 2.2: *Number of fuel poor households and individuals under the Low Income High Costs indicator using different absolute thresholds for reasonable costs, 1996, 2004, 2009, England*

Threshold	Number of households			Number of individuals			Aggregate fuel poverty gap		
	1996	2004	2009	1996	2004	2009	1996	2004	2009
Median equivalised fuel bill 2004	3.8	2.7	5.7	9.7	7.3	15.1	1.5	0.7	3.5
Median equivalised fuel bill 2009	0.5	0.2	2.7	1.2	0.6	7.8	0.2	0.1	1.1

Source: Fuel poverty data, 1996, 2004 and 2009 (DECC)

Note: The income threshold used in both cases is 60 per cent of median equivalised after housing costs income plus each individual households' modelled fuel bill.

more than doubling over the period 2004-2009 under a 2004 threshold but increasing more than twelve times over the same period against a 2009 threshold.

36. It is hard to develop a rationale for preferring one baseline year over another so this choice would ultimately be arbitrary. It should also be remembered that any reference year would increasingly lose relevance to the situation on the ground. For example, the level of fuel prices seen in the mid-2000s may well not be experienced again. If fuel prices are permanently higher for all households, judging their reasonableness against an outdated baseline seems perverse. At the least, there would need to be some form of periodic rebasing of the threshold.

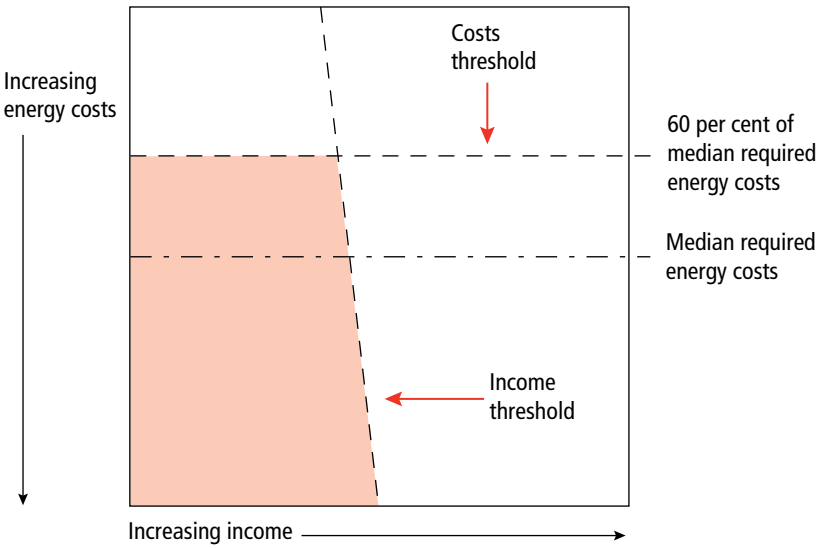
37. Further, a fuel poverty gap measure would be extremely sensitive, to the extent that its value as a measure of the depth of fuel poverty would be damaged as it would be overwhelmed by the impact of price changes rather than responding discernibly to other factors such as improvements in the housing stock. Again this was a major problem with applying a fuel poverty gap measure alongside the current indicator, as set out in our interim report (see Section 6.3 of that document). As Table 2.2 above shows, between 2004 and 2009, the fuel poverty gap measured against a 2004 absolute threshold would increase five-fold and against a 2009 threshold would increase more than ten-fold.

38. We therefore believe that an absolute approach of this kind, involving the fixing of a reasonable costs threshold in £s, irrespective of current energy costs should be avoided. There is a separate issue, however, of whether some form of indicator using a threshold that is unaffected by general energy efficiency improvements could be used. We discuss this further under Option (c) below.

Option (b): A lower threshold than the contemporary median

39. Turning now to the issue reflected in (b) above – in other words, that the median threshold is too high – some respondents argued that the median modelled bill in 2009 (at £1,270) was not, in fact, an acceptable level of costs and that instead the cost threshold should be reduced, with 60 per cent of median requirements being one proposal. This would in some sense parallel the approach taken in setting the official poverty line. It is shown conceptually in Figure 2.1.

Figure 2.1: *Fuel poverty as the overlap of low income and high costs with the costs threshold set at 60 per cent of median*



40. Such an approach would, of course, count many more households as having low incomes and high costs. Indeed, rather than there being 2.7 million households counted as being in this category (when 100 per cent of the median is used), 5.5 million households would be classed in this category. This amounts to 95 per cent of all low-income households.

41. Views will inevitably vary of what represent 'reasonable costs' and with them the number and proportion of low-income households whose energy requirements are seen as being of greatest concern. For those pressing hardest for the greatest scale of action, a low threshold might be seen as most appropriate. For those balancing policy concerns competing for limited public resources with action in this area, a higher threshold than we have proposed might be seen as more appropriate. We find it hard, however, to establish a firm rationale for a different – higher or lower – proportion of median costs than the 100 per cent that we have used. On the one hand this is already a challenging threshold – identifying as many households as having low incomes and high costs as the current official fuel poverty measure on average over the last 13 years. On the other, it is hard to argue that it is reasonable for households on incomes that are much lower than the national average to have to spend more than a typical household.

42. It should also be noted that setting a threshold at a lower than 100 per cent of contemporary median costs would make the stringency of the threshold and hence the difficulty of eradicating the problem even greater over time, making the issues described in paragraph 27(c) even harder.

43. In addition it is important to note that even for those who favour a lower threshold, households with costs above 100 per cent of the median would still be the top priority for action: they would still have the greatest fuel poverty gaps against a lower threshold. The issue is not whether their problems should be tackled first, but whether others should be tackled as well.

44. We do not therefore see any firm grounds for moving away from a threshold based on 100 per cent of the median, if that is used as the basis for assessing reasonable costs. However there is a separate issue about what this implies about changes in the threshold over time, which we now turn to.

Option (c): A threshold that changes less rapidly than the median over time

45. Another kind of alternative proposed to us was aimed at reducing the 'moving target' problem as described in paragraph 27(c) above. Against a threshold based on the contemporary median, it is very hard to literally eradicate fuel poverty as this requires all low-income households to be in the least expensive half of homes. A proposal intended to reduce this problem would be to set the threshold as a multiple (greater than 1) of the energy requirements of the most energy efficient properties identified in some way.

46. There would be many ways of doing this, capturing more or fewer households. One might take the median bill of the best performing 5 per cent homes and set a threshold that is twice that value. As it happens, in 2009, twice the median modelled bill of the best 5 per cent of homes[33] generates a threshold of £1,266, which is very close to the median modelled bill of £1,270. This concept is shown in Figure 2.2.

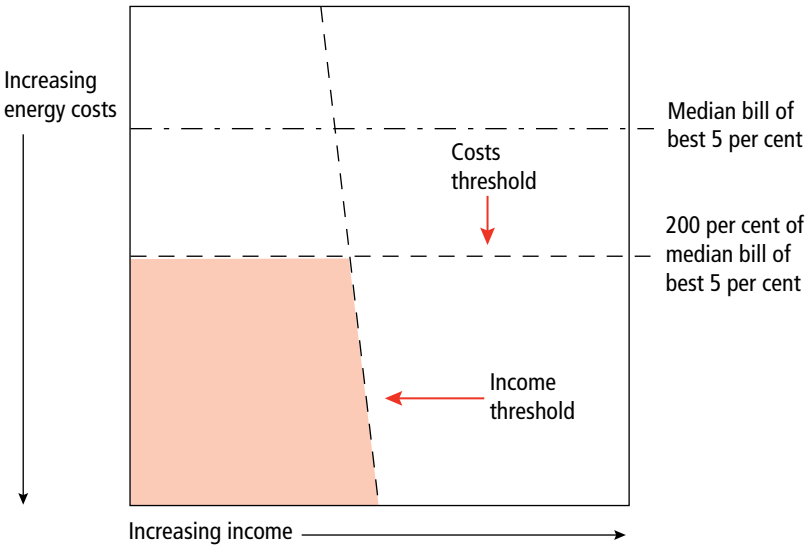
47. Although this is a relative measure in one sense, it is an absolute measure in another. This is because the median bill of the best performing 5 per cent is likely to change only as a function of prices rather than general efficiency improvements, which are more likely to happen in other parts of the housing stock. It might *currently* count the same proportion of households as having high costs as using 100 per cent of the median, but over time the threshold would be expected to fall less rapidly.

48. The effect of this kind of approach is to reduce the 'moving target' problem as existing fuel poverty is tackled. This could be welcome for policy-makers and it would make it easier to completely eradicate fuel poverty. This is because, compared to the use of the median bill as a threshold, it is easier to affect the distribution of household energy efficiency so that no homes are several times worse than the best homes.

49. However, there are two broad problems with this approach. First, a reference group must be defined,

33 Here, 'best' means most energy efficient as measured by SAP. When taking a measure against a very small sample, such as just 5 per cent of the stock, there might of course be problems of robustness and great sensitivity to the way in which the non-heating elements of modelled energy requirements were derived.

Figure 2.2: *Fuel poverty as the overlap of low income and high costs with the costs threshold set at 200 per cent of the median bill of the best 5 per cent of homes*



as well as the factor to be applied to the group's requirement. These are essentially arbitrary choices. Should the reference group be the best 5 per cent, or 10 per cent or 30 per cent? Should the factor applied to that group's requirements for threshold setting be 100 per cent, 150 per cent or 200 per cent? These two go hand in hand – the lower the median bill used as a starting point, the higher the factor one might expect to be applied. But again we cannot see a firm basis for these important judgements other than what they lead to in terms of the number and type of households identified as fuel poor.

50. The second problem – perhaps as significant – is that it would not show the distributional benefits that a moving threshold would. If all richer households were to improve their energy efficiency standard, but there was no improvement in poorer households, there might be no difference in the number of households counted as fuel poor under this approach. In other words, there would be no effect if poor households fell behind contemporary norms. While this may seem appropriate for some, this feature seems undesirable, leading us to continue to prefer the simpler option of basing the threshold on contemporary median costs as we originally proposed.

51. We recognise that a decision to retain our originally proposed threshold has implications for the use of the LIHC framework, in particular in terms of target setting. This is because it is very hard – though not impossible – to eliminate fuel poverty completely using a relative measure. This is something we return to in Section 2.4 below.

In our interim report we proposed a reasonable costs threshold based on the median bill, as a measure of contemporary standards against which to judge the relative position of the fuel poor. This confers one advantage of particular value: it captures the risk of fuel poor households falling behind improvements we expect to see more generally in the housing stock.

This is not the only choice. Some stakeholders have argued for an absolute threshold – adopting a fixed threshold for energy costs that is only adjusted over time for general inflation. However, this would be highly sensitive to fuel price changes, amplifying some of the problems with the current indicator. Others argued that the median threshold was too *high* and therefore not ambitious enough. This led to calls for the threshold to be much lower, based on a proportion (less than 1) of the median bill. Others argued the threshold we proposed would become too *low* over time, making literal eradication of fuel poverty very difficult. In this chapter we have considered options following from these points, but have not found a firm basis for them.

We therefore continue to believe that the most appropriate reasonable costs threshold is the contemporary median modelled bill. While this choice is not the only justifiable one, we believe it best represents the problem of fuel poverty, as seen from first principles. It is also the least arbitrary of the approaches we have considered.

This decision, alongside the decision on equivalisation set out in Section 2.1, combine with our definition of the low income threshold to give us our core indicator of the extent of fuel poverty:

Continued

Households should be considered fuel poor if:

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

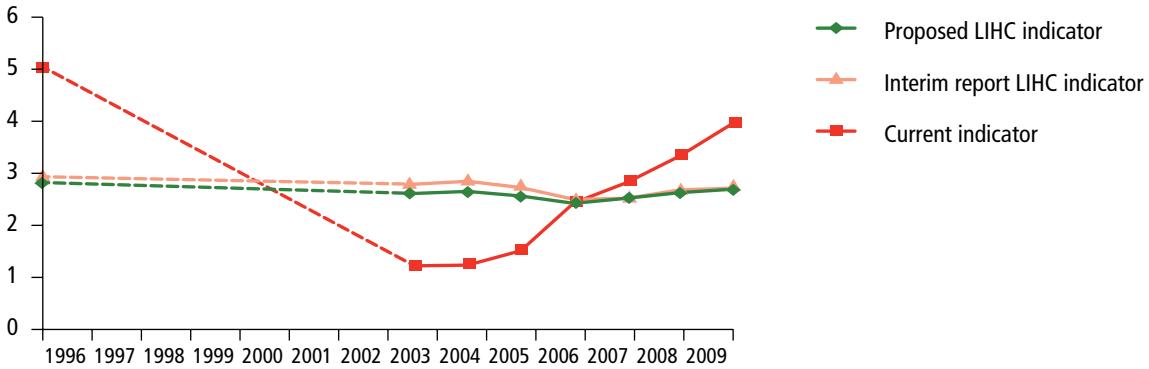
Central to this approach is the way in which it allows the calculation of the fuel poverty gap, both to indicate the depth of the problem affecting individual households and to show how its overall scale is changing over time.

The implications of this approach for target-setting are explored in Section 2.4.

2.3 What the final version of the LIHC indicator shows

52. The discussion above (supplemented by the detailed analysis presented in Parts B and C of the Annex to this Chapter) leads us to conclude that the fundamental form of the LIHC indicator should be as set out in the interim report, but with an important modification to the way in which we allow for household size and composition when examining whether required costs exceed the threshold. We now turn to an explanation of what this implies for our understanding of fuel poverty from 1996 to 2009, including noting where the results differ from those presented in the interim report.

Figure 2.3: *Number of households with low incomes and high costs, 1996 and 2003-2009, England (millions)*

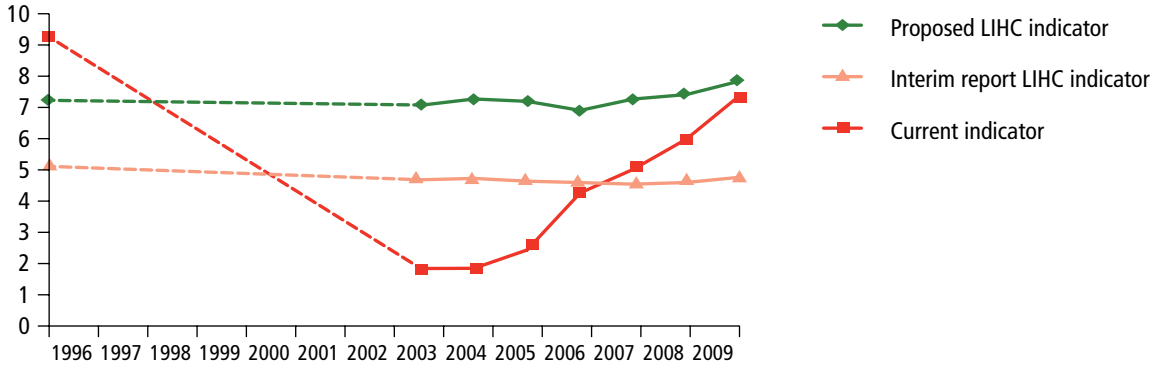


Source: Fuel poverty data, 1996 and 2003-2009 (DECC)

53. Figure 2.3 shows the number of fuel poor households under three indicators: the current official indicator, the LIHC indicator used in our interim report and the LIHC indicator with new equivalisation factors.

54. It can be seen that the trends under the two versions of the LIHC indicator are very similar. In general, the new indicator gives very slightly lower numbers of fuel poor households than the previous version. This contrasts starkly with the

Figure 2.4: *Number of individuals with low incomes and high costs, 1996 and 2003-2009, England (millions)*



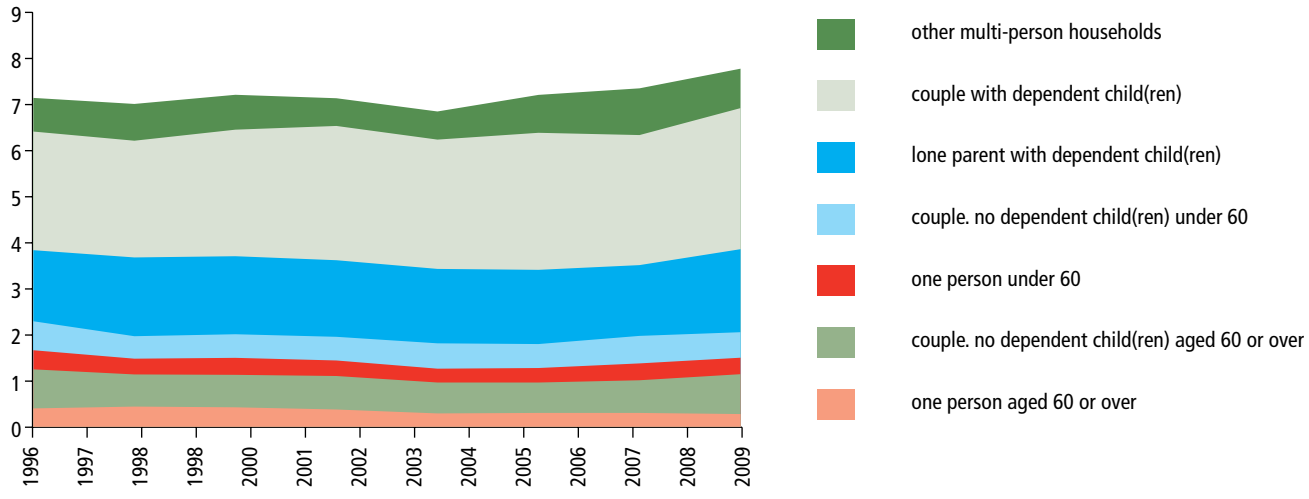
Source: Fuel poverty data, 1996 and 2003-2009 (DECC)

V-shaped trend described by the current 10 per cent indicator. As before the *average* number of households classed as fuel poor over the period as a whole would be very similar to the current official indicator.

55. However, the picture for individuals is different from households, as shown in Figure 2.4. The two versions of the LIHC indicator give relatively stable assessments of the number of fuel poor individuals over time, but at very different overall levels. The new version of the indicator actually suggests more *individuals* were fuel poor in 2009 than the current indicator.

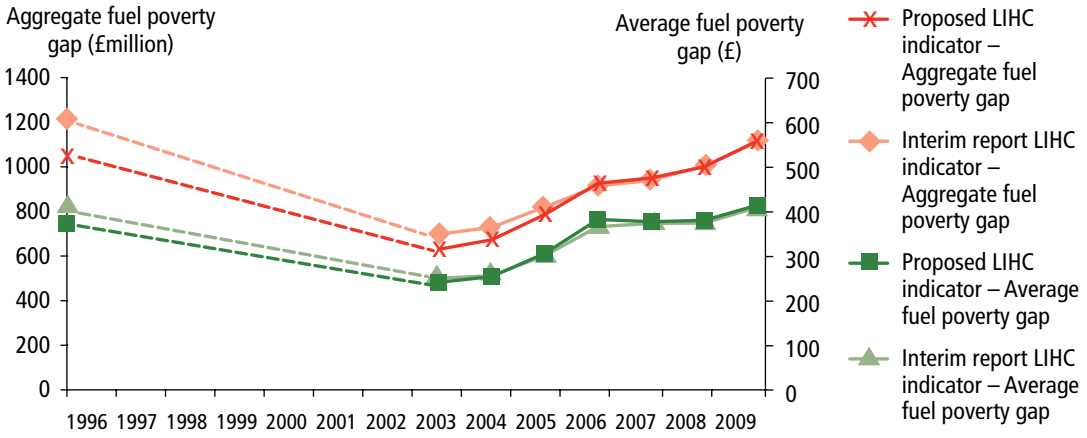
56. The reason for this is the way in which the different indicators capture different types of household. Part B of the Annex to this Chapter gives the compositional breakdown for the new indicator for 2009. Further analysis, presented in Figure 2.5 shows that different types of household have moved in and out of fuel poverty since 1996.

Figure 2.5: *Individuals in fuel poverty (under the final report LIHC indicator) by household type, 1996-2009, England (millions)*



Source: Fuel Poverty Review

Figure 2.6: *Proposed LIHC indicator – Aggregate fuel poverty gap, 1996 and 2003-2009, England (2009 prices)*



Source: Fuel poverty data, 1996 and 2003-2009

57. This figure suggests that increasing fuel poverty within families with children offset declining fuel poverty since 1996 within pensioner couples and single person households.

58. Since it is a crucial part of our indicator, it is important to understand the impact of the new approach to equivalisation on our fuel poverty gap. The results of our modelling are shown in Figure 2.6.

59. It can be seen that although the aggregate fuel poverty gap was slightly lower under the new version of the indicator than under the original version in 1996, the total gap shown for 2009 is now very similar (£1.1 billion). This is because the average fuel poverty gaps of the larger households that have become more prevalent over time are greater than those of the smaller households that they have replaced.

The revised version of our indicator gives the same overall account of fuel poverty since 1996, albeit with changes to the composition of fuel poor households. It suggests that in 2009 some 2.7 million households had both low incomes and faced higher-than-median costs, down only slightly from the 2.8 million households in the same position in 1996. The average level of fuel poverty over the period remains as shown in the current official indicator, but without the dramatic fall between 1996 and 2003.

However, changes in the way we are adjusting for household size and composition means that more individuals – some 7.8 million – were fuel poor in 2009 than in 1996. This is higher than the number of people considered to be living in fuel poverty by the current official definition of fuel poverty.

At the same time, the aggregate fuel poverty gap in 2009 is shown to be £1.1 billion. This value is broadly unchanged from the level identified in our interim report, despite the changes made to the details of the calculation. This – in some ways the best indicator of the scale of the problem we face – is greater in real terms than it was in 1996 and has increased by three-quarters compared to what it was in 2003, when fuel prices were at their lowest.

2.4: Target setting under the LIHC approach

60. The terms of reference for the review asked us to develop "possible formulations for a future definition and any associated form of target" in the light of our findings of the nature of the issues at the core of the problem of fuel poverty. It is not for the review to say what that the level of such targets should be for any particular date: that is for government and Parliament.

61. What does follow from our analysis, however, is that the *form* of any target should be based on the LIHC framework as first described in our interim report and subsequently developed in this Chapter. If, as we contend, this is the best way of capturing the essence of the problem, it follows that this is the best way of monitoring progress, of judging the effectiveness of policy interventions and of setting targets for those policies.

62. The form of target should therefore be based on looking at both the extent of the problem as measured by the number of households and individuals with low incomes and high costs (against the thresholds described in Section 2.2) and its depth as measured by the associated fuel poverty gap. Progress is being made if the numbers with low incomes and high costs *and* the value of the aggregate fuel poverty gap are being reduced.

63. As Section 2.3 showed, there has only been very limited progress since 1996 in these terms. The number of households with LIHC was only slightly lower in 2009 than it had been in 1996 and the number of individuals was slightly higher. The fuel poverty gap did fall up to 2003, but its 2009 value of £1.1 billion was just over 75 per cent higher than in 2003.

64. There is, however, one factor of major concern to many of those with the greatest interest in this area. That is that the 2000 Warm Homes and Energy Conservation Act commits governments to ensure that "as far as reasonably practicable persons in England and Wales do not live in fuel poverty" and to do so, by dint of the publication of the UK Fuel Poverty Strategy in 2001, by 2016.

65. In Chapter 6 we look at projections for how far we might be towards that objective by 2016 given our current starting point and the current policy mix.

66. During the review, several stakeholders raised the concern that, with a threshold for 'reasonable costs' based on the median energy requirements of contemporary housing, literal eradication of fuel poverty would be impossible or at least very difficult. This is because the relative approach creates a moving target under which it would be very hard to squeeze all the property lived in by low-income households below the threshold. This is true. However, as we saw in Section 2.2, a range of other approaches put to us for dealing with this also have problems. In our view, they are less satisfactory as a way of measuring the problem described by the WHECA.

67. In approaching this, there is an analogy with debates around poverty in general. Under the 2010 Child Poverty Act four different indicators are used to monitor whether child poverty is being eliminated, as required by the Act:

- The proportion of children living in households with low income where the standard is measured *in relative terms*, changing over time as median incomes change (the target level is less than 10 per cent);
- The proportion of children living in households with low income where the standard is *fixed in real terms* (the target level is less than 5 per cent);
- The proportion of children living in households with *both* low income measured in relative terms and material deprivation defined by reference to a fixed list of particular items (the target is less than 5 per cent);[34]

34 Material deprivation is a measure of a given household's ability to afford a list of particular items, compiled to reflect items linked to deprivation measured in the past.

- The proportion of children living in households that are persistently poor, defined as living in relative poverty for at least three of the last four years.[35]

68. In principle, there is no reason why the proportion of households identified by the second and third indicators could not be reduced to zero, or at least very close to it, as overall living standards rise. Few people in Britain today have incomes that would be below a fixed poverty line that would have been seen as appropriate in, say, the 1950s and few households lack the kind of amenities (such as hot and cold running water) that were the focus of policy then.

69. But exactly for that reason, this kind of indicator will become out of date. Only a few people would argue that there is no longer poverty in Britain today because people are not poor compared to the standards of the 1950s, or that no-one is deprived because virtually all houses have indoor WCs. That is why most attention has been paid in Britain and elsewhere in Europe to the first, relative, indicator.

70. However, even the most egalitarian Scandinavian countries have not reduced relative poverty to zero. Accordingly, the targets set for the first measure have been formulated as being sufficient, in effect, to reduce child poverty levels to what at one point were formulated as the 'best in Europe' (taken in the Child Poverty Act as reduction to single figures).

71. In interpreting what might be taken as eradication within the field of fuel poverty, one could adopt a similar approach, by:

- Looking at the number of households that *both* have low incomes *and* live in energy-inefficient homes (as measured by a *fixed* standard).
- Looking at the number of people who have low incomes and high costs as measured by our framework and the associated fuel poverty gap, but using a threshold for costs which is *fixed* according to today's energy efficiency standards, rather than changing over time.
- Looking at the number of people who have low incomes and high costs as measured by our framework and the associated fuel poverty gap, using our preferred relative threshold for costs, but accepting that 'elimination' would mean reducing them – particularly the fuel poverty gap – to very low levels, rather than literally to zero.

72. We look at the first two of these indicators in some detail in Part D of Annex 2. The first – Option A there – was considered within our interim report: a low income low fixed SAP measure.[36] As can be seen in Figure A2.7 in Part D of Annex 2, if the fixed SAP threshold were taken at the median level for the housing stock in 2009, with the income threshold set at 70 per cent of median income, the number of households affected fell from 4.7 million in 1996 to 4.0 million in 2003 and to 2.8 million in 2009 itself. That fixed standard would be just below 55, virtually the same as the boundary between energy performance certificate ratings of D and E and, as it happens, the level currently used for Warm Front eligibility.

73. Such an approach has the virtue of being simple and straight-forward, including the fact that there is no reason in principle why it should not be reduced to zero. It does, however, have two drawbacks. The first is the problem with absolute measures in general already referred to above, that over time they become irrelevant. If, as a country, we really are to meet the carbon reduction targets we have set ourselves, we shall have to do better in the medium term than a SAP level of 55 for the whole housing stock. Second, as we argued in the interim report, energy efficiency by itself only measures part of the problem.[37] As such, an ideal indicator should

35 The target for the persistence indicator is to be defined in secondary legislation at a future point. The persistence of fuel poverty, for its part, is hard to measure. Longitudinal surveys allowing this to be done would be welcome, but expensive.

36 See Section 6.5 of the interim report.

37 This was a conclusion supported by most respondents to our consultation.

also capture whether low-income households pay higher prices for energy than others. It should also allow for variations in occupancy patterns and other needs between different households. This is exactly what the complex energy costs assessment underlying both the current official indicator and our proposed LIHC measure does.

74. The second approach we look at (Option B in Part D of the Annex to this Chapter) is therefore to look at a variant of the LIHC indicator with a fixed costs threshold. This could be based on energy efficiency and hence median required costs in 2009, with no changes made thereafter as general energy efficiency standards rise. As can be seen in the Annex, following this approach suggests that the number of households with low incomes and high costs fell from 3.2 million in 2006 to 2.7 million in 2009. For technical reasons resulting from changes in methodology, there is a discontinuity in the numbers that can be produced for earlier years, but there would also have been a fall of 0.9 million between 1996 and 2004.[38]

75. Again, there is no reason in principle why such an indicator should not be reduced to zero. Doing so would be far from easy, as highlighted by our projections in Chapter 6. This approach would also be consistent with our preferred indicator in terms of what it measures, capturing all the elements that low SAP by itself does not. A data series compiled in this way could be used to supplement the headcount and fuel poverty gap indicators provided by our preferred relative indicator. However, as before, it has the problem that it would over time become less relevant to contemporary standards. Further, its derivation is not straightforward. Unlike the relative LIHC measure, it is rather sensitive to technical changes in the methodology by which energy requirements are assessed – which is why there is a discontinuity in the historic series we can produce for this report.

38 This discontinuity could be addressed by re-working the historical series to reflect changes to the methodology.

76. The final option is rather different. This is to use the relative LIHC numbers and fuel poverty gap not just as the most appropriate indicators of the problem of fuel poverty at any one time, but also for any target involving elimination. However, as with the relative child poverty target, we would have to recognise that elimination is unlikely to mean literally reducing the problem to zero. We do not have equivalent data for other countries that would allow us to say what might constitute 'being the best in Europe' in the case of fuel poverty. However, a target could be set for the aggregate fuel poverty gap in particular that would mean that although there might be some low-income households whose energy requirements were above the contemporary median – as that is very hard to avoid – they could not be very far above the contemporary median.

77. On balance, it is this third option that is most consistent with our overall analysis. It puts most weight on monitoring the depth of the problem and so focuses attention on tackling the problems of those most severely affected. It would not lose its relevance over time and would maintain pressure to avoid low-income households being left behind as the rest of the housing stock is made more efficient. By the same token, although some might see today's median as too unambitious a reference point, the threshold would become tighter over time. In this way, improving homes that are not the top priority today (because their costs are just below the threshold) would have to become a focus for policy in future.

78. If this approach were followed, defining what would constitute a sufficient degree of elimination would be an intensely political decision. In making it, those responsible might want to note that the fuel poverty gap measured as we proposed was around £800 million in 2000 when the Act was passed and hit its lowest point to date in 2003, when it was around £630 million. Any target would by implication have to be a fraction of those numbers and therefore a massive improvement on the 2009 fuel poverty gap of £1.1 billion.

79. There are two important factors that might be taken into account when considering the appropriateness of this approach. The first is set out in Chapter 3 below: *any* regime for targeting resources on the problem of fuel poverty is bound to be approximate. With any practical approach to tackling fuel poverty there will be some households who are assisted that do not come into a strict definition of what fuel poverty means. In reality, policies have to have a broad spread and cannot be designed to adhere narrowly to precisely drawn boundaries. So, while it is true that this approach would allow some low-income households to remain fuel poor whose requirements were close to, but just above, the contemporary median, other beneficiaries from policy interventions would include some low-income households whose requirements were below the threshold. Put simply, the policy instruments at any government's disposal are not so fine-tuned as to allow design without a margin of error in either direction.

80. Second, being driven by a desire to adopt an approach to fuel poverty measurement that is compatible with literal eradication of the problem seems to us to risk encouraging the adoption of perhaps the least satisfactory of all targets: one set at a low, unambitious level measured against an absolute threshold that ceases to bear any relevance to contemporary conditions. Many would feel – and we would agree – that an attachment to delivering real and significant progress against a target that reflects a measurement approach that best describes the nature of the fuel poverty problem is a much more appropriate way forward.

This Section attempts to deal with one of the most contentious and difficult aspects of the current fuel poverty problem: how to set targets given that the legislation says that 'no-one' should be affected.

In some respects, this is an issue that is outside the terms of reference of the review, which focused on the form of target to be applied, rather than the scale of ambition. This is appropriate because only Parliament and directly accountable Ministers can take such decisions.

But we recognise that our preferred indicator of the extent of fuel poverty would make literal eradication of fuel poverty very challenging. There are ways of overcoming this difficulty and the child poverty targets offer some insight into possible options. We have examined two ways of setting an alternative – absolute – threshold, but neither approach is entirely satisfactory.

After detailed analysis, we believe the right approach remains that targets should be formulated against the two core elements of the LIHC approach: a count of the number of households and individuals affected and the fuel poverty gap, which identifies the depth of the problem. Where a target is to involve 'elimination', a target could be set for the aggregate fuel poverty gap in particular that would mean that although there might be some low-income households whose energy requirements were above the contemporary median – as that is very hard to avoid – they could not be very far above the contemporary median.

Chapter Summary

We have given considerable thought to a range of issues relating to the Low Income High Costs indicator before deciding on its final form. This has included reconsidering our approach to equivalisation and ultimately adopting new factors for this element of the calculation. We have also considered, as set out in the Annex to this Chapter, a variant proposed by stakeholders based on unit costs.

We have also re-examined the way the level of the threshold for reasonable costs is set but continue to believe that the contemporary median modelled bill is the most appropriate level. Other options require more arbitrary judgements to be made. However wherever the threshold is set, the same households with the largest fuel poverty gaps would remain the priorities for action.

We have also considered the way in which the threshold develops over time. Although the relative nature of our preferred indicator makes the literal eradication of fuel poverty extremely challenging (though not theoretically impossible) we believe there are advantages to this approach, not least in terms of ensuring a focus on improvements in lower-income households as well as richer ones.

We have considered whether two options for setting some form of absolute threshold would be appropriate, but we find these approaches less satisfactory than our preferred relative approach.

Our remit was to suggest a form for any target, not to prescribe the level of such a target. We believe that the two elements of our framework, the number of households with low incomes and high costs and the associated fuel poverty gap, are the appropriate measures. Where a target is to involve 'elimination' – as required by WHECA – a realistic approach would be to set a target for the aggregate fuel poverty gap to be reduced to very low levels, so that although there might be some low-income households whose energy requirements were above the contemporary median, they could not be very far above it.

Recommendations:

1. The Government should set the reasonable costs threshold at the level of the contemporary median energy requirements for the population as a whole. The modelled bills for individual households should be adjusted for household size and composition – using a specific set of adjustment factors – when comparing them to this threshold.

2. The Government should use the LIHC indicator and fuel poverty gap as the basis for operational target setting. The fuel poverty gap in particular gives the best focus on the scale of the problem and progress in tackling it.

CHAPTER 3

Finding the fuel poor

1. We argued in our interim report that a good indicator of the fuel poverty problem should help identify fuel poor households and target policies in their direction. Having set out the final version of our indicator in Chapter 2, we turn now to the question of finding the fuel poor.

2. This Chapter first considers principles for finding and targeting the fuel poor, including administrative factors, the pros and cons of constructing a tightly-focused approach and the role of the fuel poverty gap. It then moves on to consider the specific targeting implications of the Low Income High Costs (LIHC) indicator. It does this by examining the detailed composition of fuel poor households in 2009 in relation to a range of dwelling, household and similar characteristics. Having identified such characteristics in principle, we consider whether they can be used in practice, through the use of proxies, to help target fuel poverty policy and, if so, how effectively. We also touch briefly on the tools that can be used for targeting fuel poor households, in Box 3.2.

3. We then consider how the LIHC approach can provide a framework for identifying the households that are a priority for action. Thereafter we consider additional factors relating to the most vulnerable households – those containing people aged over 75, children under 5 and long-term disabled people – and how to identify these groups.

3.1 Principles for targeting

4. Before considering precisely who is fuel poor and how they can be found and assisted, it is helpful to discuss a number of general principles involved in targeting.

5. First, it must be remembered that all targeting will involve a degree of administrative burden, particularly in terms of collecting the data needed. In principle, a detailed household and building sample survey followed by sophisticated modelling work is required to establish how many and which types of households have low incomes and high costs at a national level. It would be prohibitively expensive – and intrusive – to carry this out for all households. Instead, those working to tackle fuel poverty – government agencies, local government, energy suppliers and voluntary organisations – use simpler proxy indicators to try to find the households in need of assistance. Some people identified through rough and ready proxies fall outside the strict boundaries of the definition we have proposed. It would be naive to suggest we can tackle the full scale of fuel poverty – 2.7 million households under our LIHC indicator in 2009 – by treating only 2.7 million homes. In practical terms, a wider group will inevitably be targeted. This means that tackling the core problem will cost more than it would if we had perfect information on incomes and energy requirements at all times.

6. However the area of energy costs and energy efficiency is one where straying over a strict boundary of eligibility should not necessarily be seen as a problem. For example, helping a low-income household that has costs that are just below the threshold may not immediately address fuel poverty but will make an important difference to the lives of those who find high energy costs difficult to deal with. Similarly, if a high-costs household is helped that is not low-income, but is just above the income threshold, this intervention will still make a difference in terms of national energy efficiency and reduction of carbon emissions.

7. Being relatively relaxed about the fact that some people on the wrong side of a given threshold may receive assistance makes even more sense when one considers the reality that people's situations change frequently over time, for example as they move in or out of employment, as they have children or as they move home.[39] Perfect targeting of those at risk of fuel poverty this year would still leave others in fuel poverty next year. Therefore any policies which address a wider group of homes than are occupied by fuel poor households at one particular time is very likely still to help to tackle the problem in the long term.

8. Experience from other policy areas also suggests caution in attempting to draw precisely targeted systems. This is discussed in Box 3.1.

9. The implied lesson is that it is best to avoid sharp 'cliff edges', such as entitlement to assistance which depends on receipt of a narrow range of income-tested benefits. From this perspective too, a degree of imprecision in targeting may be desirable rather than undesirable.

10. Aside from these considerations, there are two additional principles worth stressing which flow from our choice of indicator. First, the fact that the indicator is relatively stable over time means that policy-makers could establish ways of identifying and targeting that would hold from year to year. This contrasts to a degree with the current indicator of fuel poverty whose sensitivity to prices means that new and different kinds of household are pulled into or pushed out of fuel poverty with every price change.

11. Second, a reliable fuel poverty gap measure would give a clear indicator of the types of household that are priorities for assistance. This brings an entirely new perspective to targeting, opening up avenues for assisting priority cases as well as measuring the impact on them. In this way, finding the most straight-forward ways of targeting groups with the highest average fuel poverty gaps and which account for the largest proportions of the aggregate gap could lead to considerable progress.

12. Later in Section 3.4 we discuss further the implications for targeting of the LIHC approach.

39 See, for example: Sefton, T. (2004). *Aiming High – An evaluation of the potential contribution of Warm Front towards meeting the Government's fuel poverty target in England*. CASE report 28. CASE: London. Also Hills, J. McKnight, A. and Smithies, R. (2006). *Tracking Income: How Working Families' Incomes Vary Through the Year*. CASE report 32. CASE: London. Also Jenkins, S. (2011). *Changing Fortunes: Income Mobility and Poverty Dynamics in Britain*. Oxford University Press: Oxford

Box 3.1: Welfare reforms and means-testing

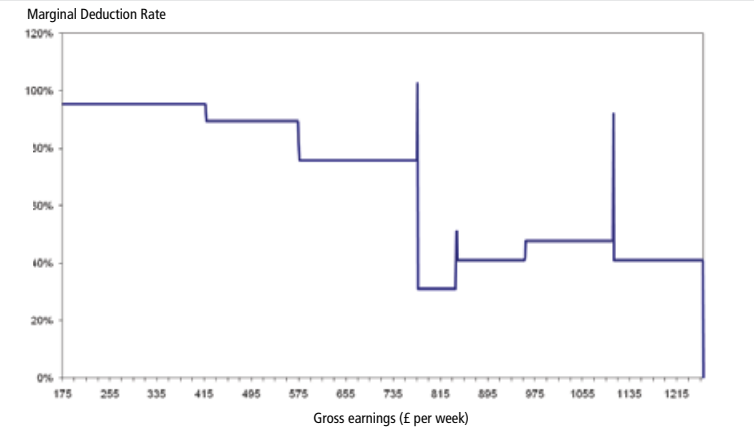
The pension reforms of the last few years have been designed, with all-party support, to reduce the extent to which people are affected by means-testing in old age, which creates disincentives for people to save towards their own retirement. The Universal Credit reforms being introduced by the current government are also designed to smooth out some of the worst of the 'poverty trap' and disincentives to work for those of working age and on low incomes. Measures that involve tight means-testing for other kinds of assistance work to undermine these reforms, despite their immediate attraction in reducing costs.

As an example, an intervention that reduced someone's energy bills by £400 per year – a typical fuel poverty gap in 2009 – would be worth £8 per week to them. If they already faced an effective marginal tax rate of 72 per cent (which many on the margins of poverty will as a result of income tax, national insurance contributions and tax credit withdrawal), they would need an increase in gross income of nearly four times this – £29 per week – to offset this benefit if an income increase meant loss of entitlement to this help. In turn, this would require an increase in earnings of more than one quarter for a lone parent working for 16 hours at the minimum wage. Many tenants have even higher effective marginal tax rates, as can be seen in Figure 3.1.

If the intervention were seen as equivalent to a capital grant worth thousands of pounds, and its value compared with the income change across a single year, the effective marginal tax rate could work out at much more than 100 per cent.

As always, it is not that people are necessarily in a position to make such calculations or would even actually respond directly to the disincentives involved if they could, but putting people in a position where they are no better off – or even worse off – if they 'do the right thing' by increasing earnings has more general corrosive effects.

Figure 3.1: *Marginal deduction rate for a hypothetical tenant couple with two children and no childcare costs where the head of the family works 30 hours a week, (2009-10)*



Source: DWP Tax Benefit Model, April 2010
(see: http://research.dwp.gov.uk/asd/index.php?page=tbmt)

Note: The marginal deduction rate is the effective marginal tax rate faced by a person on their earnings, given effects of direct taxation and the withdrawal of mean-tested benefits. Rent is assumed to be £209 per week and Council Tax £27 in this example.

Attempts to target fuel poor households for policy interventions involve trade-offs. Precise targeting would require administratively burdensome screening, while the use of proxy indicators means that households who are not strictly identified as fuel poor would be eligible for policies. However the latter outcome is not necessarily undesirable since eligibility criteria which include households on the margins of fuel poverty are still likely to help address the problem of fuel poverty in the long term, either by helping those households whose energy costs are just below the threshold and who may become fuel poor over time, or by helping those who are just above the income threshold but who are still facing high costs. The experience gained from means-testing in other policy areas also suggests a need to avoid devising eligibility criteria which result in sharp cliff edges, such as entitlement to assistance which depends on receipt of a narrow range of income-tested benefits. Finally, the use of the LIHC indicator would have two further strengths when considering targeting. The relative stability of the headcount indicator should allow ways of targeting that are consistent from year to year, while the fuel poverty gap helps identify households that are a priority for assistance.

3.2 Characteristics for targeting

13. One of the attractions of the LIHC approach is the way in which it provides a bridge between the aggregate numbers and trends shown by the fuel poverty statistics and the ways in which practical policies can be directed on the ground to those most at risk. Our approach to measuring fuel poverty offers this advantage in part because it provides an understanding of the characteristics shown by households in different parts of the income and costs matrix. In effect, our approach to measurement opens up an understanding of the distribution of different types of households by income and required energy costs that in turn can lead to the development of a successful approach to targeting those households in the fuel poverty quadrant.

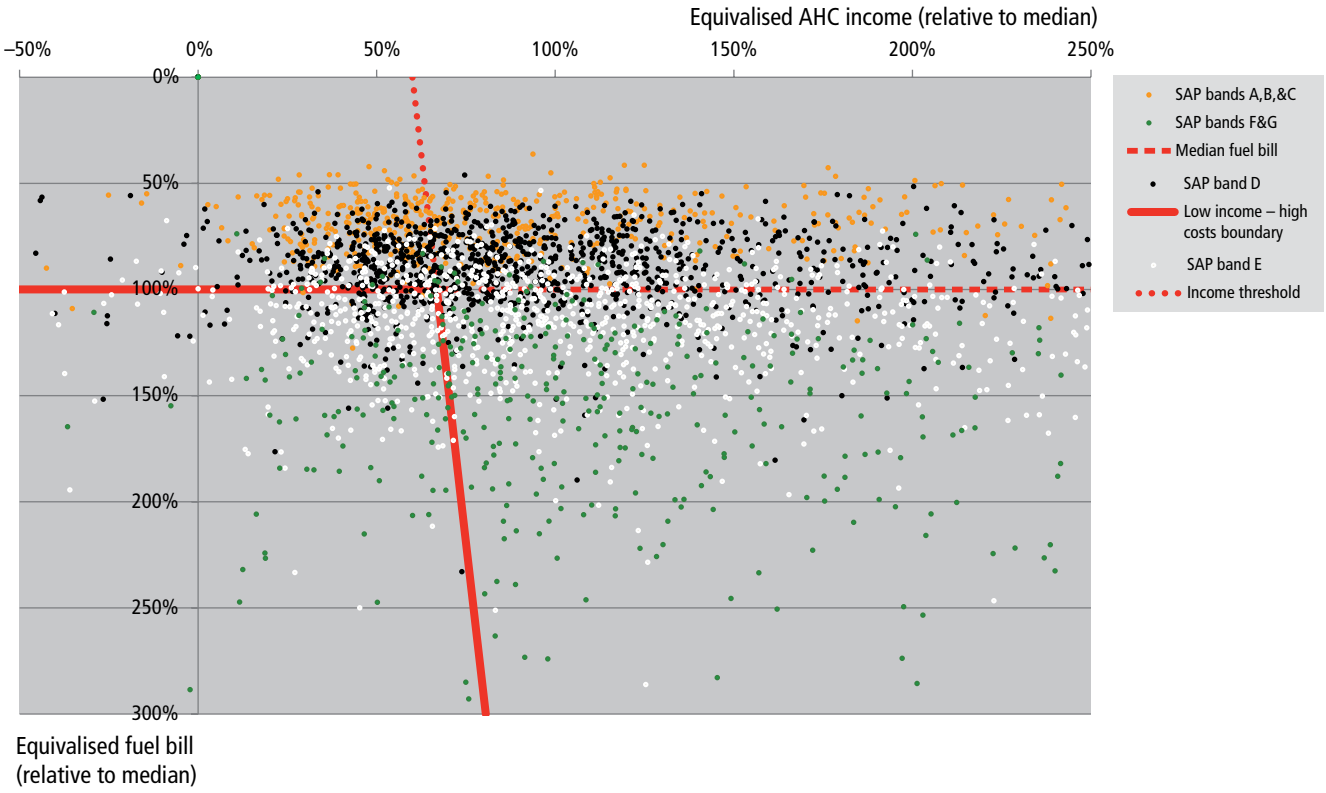
14. This section examines in detail a range of relevant characteristics – which may relate to households, dwellings or other factors – starting with energy efficiency characteristics. Box 3.2, at the end of the next section discusses some practical approaches to targeting on the ground, although we have not been able to consider these in great detail.

SAP/Energy Performance Certificate rating

15. Figure 3.2 below shows the breakdown of households within the income/costs matrix by SAP, or, more specifically, Energy Performance Certificate (EPC) rating. The distribution shows how the energy efficiency rating of a property is a clear factor in driving high costs. As might be expected, almost no properties with an energy performance rating of A, B or C have costs above the median energy costs threshold. The few that do have this level of efficiency and have costs above the threshold are to be found close to the threshold as it is currently set, and so have very low fuel poverty gaps (although this could change over time as the energy efficiency of the housing stock improves).

16. We can also see that a very large proportion of dwellings with ratings of E, F or G are fuel poor. The analysis in Table 3.1 confirms that properties with an F or G rating in particular have very high costs, with an average fuel poverty gap of £767 per property. Between them, F and G rated properties account for more than half of the total fuel poverty gap. Taken together with E rated properties, the most energy inefficient homes in England account for 90 per cent of the aggregate fuel poverty gap and for three-quarters of fuel poor households.

Figure 3.2: *Distribution of households by EPC rating, 2009, England*



Source: DECC Fuel Poverty Data 2009.

17. Table 3.1 provides more of the detail underpinning Figure 3.2, including the proportion of LIHC households that have a given EPC rating. The table also shows the proportion of all low-income households (both high and low costs) with a given rating. The table also shows the fuel poverty gap relating to each rating.[40]

Table 3.1: *Distribution of fuel poor households by EPC rating, with fuel poverty gaps, 2009, England*

	ABC	D	E	FG	Total
Proportion of all households that are found in this group (%)	14	38	34	14	**100**
Proportion of households in this group that have LIHC (%)	1	8	18	24	**13**
Proportion of individuals in this group that have LIHC (%)	3	11	21	27	**15**
Proportion of LIHC households that have this EPC rating (%)	2	23	48	28	**100**
Proportion of low-income households that have this EPC rating (%)	17	39	30	14	**100**
Fuel poverty gap – aggregate (£ million)	6	119	416	575	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	1	11	37	52	**100**
Average fuel poverty gap – per LIHC household (£)	140	194	323	767	**414**

Source: Fuel Poverty Data 2009 (DECC)

40 We adopt a similar presentational approach for other characteristics in Tables 3.2 to 3.8 below. Additional information is available in our on-line Annex, which can be found at: www.decc.gov.uk/hillsfuelpovertyreview

18. It can therefore be seen that any low income household living in an E, F or G rated property has a high probability of being in fuel poverty. Households in band D properties account for nearly all of the rest of the fuel poverty gap. However, on average, low-income households occupying band D properties have fuel costs below the current median level. We discuss below in Section 3.3 the characteristics of the households with a Band D rating that are also fuel poor.

Other characteristics

Rurality

19. Rural households make up 20 per cent of LIHC households, which is similar to the proportion of rural households nationally. However the depth of fuel poverty in rural households is much greater: rural LIHC households have an average fuel poverty gap of £622 compared to a gap of £362 for urban properties (Table 3.2).

On and off gas grid

20. Linked to this, as can be seen in Table 3.3, being off the gas grid also drives high costs, with an average fuel poverty gap for such dwellings of £705. Those properties that are both off the gas grid and in rural areas face some of the highest fuel poverty gaps of all, at nearly £800.

Payment method

21. The distribution of fuel poor households by payment method (Table 3.4) shows that fuel poor households are reasonably evenly split, with 28 per cent using prepayment meters, 33 per cent paying by standard credit and 38 per cent by direct debit. One quarter of all households using prepayment meters are fuel poor, compared to less than one in ten of those paying by direct debit and one in six of those paying by standard credit. The fuel poverty gaps for those using pre-payment meters are smaller, however, than for those using other methods.

Wall type

22. The wall type of the property is a significant factor in whether a household is fuel poor (Table 3.5). Non-cavity wall properties (which are predominately solid wall) make up 45 per cent of the fuel poor and more than half of the aggregate fuel poverty gap despite only representing around 30 per cent of properties in general.

Property type

23. More than two thirds of fuel poor households live in either terraced or semi-detached properties (Table 3.6). Along with detached properties these make up 86 per cent of the fuel poverty gap. Detached properties, perhaps unsurprisingly, have the largest fuel poverty gap (£788).

Age of property

24. The age of the property is also a very significant factor in driving high energy costs, with older properties having greater fuel poverty gaps, linked again to features such as solid walls (Table 3.7). Houses built before 1945 make up two thirds of the aggregate fuel poverty gap. These properties also account for over half of the fuel poor, despite accounting for just over a third of properties nationally.

Heating system

25. The heating system within the property also has a clear impact on the depth of fuel poverty. This is expected given the link between heating systems and EPC ratings and our previous EPC-related findings. Homes with fixed room heating or portable heating have very high fuel poverty gaps. Although such households do not make up a large proportion of households that are fuel poor, they account for a disproportionate share of the aggregate fuel poverty gap. Table 3.8 also shows that a relatively large proportion of households with either fixed room heating or portable heating are fuel poor.

Tenure, region and area deprivation

26. Across tenures, although a high proportion of households in social housing have low income (52 per cent), less than a third of these also have low cost (16 per cent). This is probably explained by the greater average energy efficiency of social housing (in 2009 the average SAP rating of the social housing stock was 61 compared to an overall average for all housing of 53). Nevertheless, there are 585,000 social tenants (or about one in six social tenant households) in fuel poverty in 2009 under our indicator. In terms of regional distribution, the LIHC indicator finds that London households account for a greater proportion of fuel poor households than the official indicator. Table 3.9 shows that London households are only slightly less likely to be fuel poor than others, although they do appear to be less deeply in fuel poverty on average, with a considerably lower average fuel poverty gap than other regions. There is a relatively even split between the broad regions in terms of the fuel poverty gap, so that region by itself would not be an effective targeting tool.

27. Table 3.10 shows how the composition of the fuel poor under the LIHC indicator breaks down using the Index of Multiple Deprivation scale. As might be expected the most deprived areas account for a higher proportion of fuel poor households, with the 40 per cent most deprived areas accounting for more than half of LIHC households, but only 43 per cent of the fuel poverty gap. However, the table also shows that LIHC households are found across the whole deprivation scale, with a third of the fuel poverty gap found in the least deprived 40 per cent of areas, making the Index a very approximate tool for targeting purposes.

Table 3.2: *Distribution of fuel poor households by rurality, with fuel poverty gaps, 2009, England*

	Rural	Urban	TOTAL
Proportion of all households that are found in this group (%)	20	80	**100**
Proportion of households in this group that have LIHC (%)	13	12	**13**
Proportion of individuals in this group that have LIHC (%)	14	16	**15**
Proportion of LIHC households that have this rurality (%)	20	80	**100**
Proportion of low-income households that have this rurality (%)	15	85	**100**
Fuel poverty gap – aggregate (£ million)	338	778	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	30	70	**100**
Average fuel poverty gap – per LIHC household (£)	622	362	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.3: *Distribution of fuel poor households by rurality and gas grid connection, with fuel poverty gaps, 2009, England*

	on grid urban	on grid rural	off grid urban	off grid rural	TOTAL
Proportion of all households that are found in this group (%)	74	13	6	7	**100**
Proportion of households in this group that have LIHC (%)	13	10	10	18	**13**
Proportion of individuals in this group that have LIHC (%)	16	11	12	19	**15**
Proportion of LIHC households with a given rurality and connection to the gas grid (%)	75	10	5	10	**100**
Proportion of low-income households with a given rurality and connection to the gas grid (%)	77	10	7	6	**100**
Fuel poverty gap – aggregate (£ million)	713	127	65	211	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	64	11	6	19	**100**
Average fuel poverty gap – per LIHC household (£)	352	457	519	795	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.4: *Distribution of fuel poor households by electricity payment method, with fuel poverty gaps, 2009, England*

	direct debit	pre payment	standard credit	Total
Proportion of all households that are found in this group (%)	60	14	26	**100**
Proportion of households in this group that have LIHC (%)	8	25	16	**13**
Proportion of individuals in this group that have LIHC (%)	10	30	20	**15**
Proportion of LIHC households that have this payment method (%)	38	28	33	**100**
Proportion of low-income households that have this payment method (%)	40	29	31	**100**
Fuel poverty gap – aggregate (£ million)	457	253	406	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	41	23	36	**100**
Average fuel poverty gap – per LIHC household (£)	443	330	453	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.5: *Distribution of fuel poor households by wall type, with fuel poverty gaps, 2009, England*

	Other (mostly solid walls)	Cavity wall	Total
Proportion of all households that are found in this group (%)	30	70	**100**
Proportion of households in this group that have LIHC (%)	19	10	**13**
Proportion of individuals in this group that have LIHC (%)	22	12	**15**
Proportion of LIHC households that have this wall type (%)	45	55	**100**
Proportion of low-income households that have this wall type (%)	33	67	**100**
Fuel poverty gap – aggregate (£ million)	581	535	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	52	48	**100**
Average fuel poverty gap – per LIHC household (£)	479	361	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.6: *Distribution of fuel poor households by property type, with fuel poverty gaps, 2009, England*

	Bungalow	converted flat	purpose built flat	Detached	terraced	semi-detached	Total
Proportion of all households that are found in this group (%)	9	4	15	17	29	26	**100**
Proportion of households in this group that have LIHC (%)	11	15	4	10	16	15	**13**
Proportion of individuals in this group that have LIHC (%)	13	17	5	12	19	18	**15**
Proportion of LIHC households that have this property type (%)	8	5	5	14	36	32	**100**
Proportion of low-income households that have this property type (%)	8	5	2	9	35	24	**100**
Fuel poverty gap – aggregate (£ million)	87	41	28	301	343	316	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	8	4	2	27	31	28	**100**
Average fuel poverty gap – per LIHC household (£)	386	338	217	788	352	366	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.7: *Distribution of fuel poor households by age of property, with fuel poverty gaps, 2009 England*

	pre 1919	1919 – 1944	1945 – 1964	post 1964	Total
Proportion of all households that are found in this group (%)	21	17	20	42	**100**
Proportion of households in this group that have LIHC (%)	19	18	14	6	**13**
Proportion of individuals in this group that have LIHC (%)	22	23	16	8	**15**
Proportion of LIHC households with this property age (%)	31	25	23	21	**100**
Proportion of low-income households with this property age (%)	22	17	22	39	**100**
Fuel poverty gap – aggregate (£ million)	473	278	180	185	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	42	25	16	17	**100**
Average fuel poverty gap – per LIHC household (£)	557	417	297	323	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.8: *Distribution of fuel poor households by heating system, with fuel poverty gaps, 2009, England*

	Central heating	Fixed room heating	Portable heating	Storage heater	Total
Proportion of all households that are found in this group (%)	90	3	0.1	7	**100**
Proportion of households in this group that have LIHC (%)	12	27	43	12	**13**
Proportion of individuals in this group that have LIHC (%)	15	29	32	15	**15**
Proportion of LIHC households that have this heating system (%)	15	29	32	15	**15**
Proportion of low-income households that have this heating system (%)	87	6	0.3	7	**100**
Fuel poverty gap – aggregate (£ million)	89	4	0.1	6	**100**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	891	136	8	81	**1,116**
Average fuel poverty gap – per LIHC household (£)	80	12	0.7	7	**100**
Fuel poverty gap – per LIHC household (£)	380	871	978	432	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.9: *Distribution of fuel poor households by Government Office region, with fuel poverty gaps, 2009, England*

	SW	SE	LON	WM	EM	EE	YH	NW	NE	Total
Proportion of all households that are found in this group (%)	10	16	14	10	9	11	10	14	5	**100**
Proportion of households in this group that have LIHC (%)	11	8	12	16	16	11	12	14	15	**13**
Proportion of individuals in this group that have LIHC (%)	12	10	17	21	19	13	16	16	19	**15**
Proportion of LIHC households that are in this region (%)	9	10	14	14	11	10	10	16	6	**100**
Proportion of low-income households that are in this region (%)	9	12	17	12	9	9	10	14	6	**100**
Fuel poverty gap – aggregate (£ million)	120	128	125	144	130	127	105	162	74	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	11	11	11	13	12	11	9	14	7	**54**
Average fuel poverty gap – per LIHC household (£)	479	459	332	390	446	491	385	383	430	**414**

Source: Fuel Poverty Data 2009 (DECC)

Table 3.10: *Distribution of fuel poor households by Index of Multiple Deprivation, 2009, England*

	Index of multiple deprivation scale (1 = most deprived)					
	1-2	3-4	5-6	7-8	9-10	Total
Proportion of all households that are found in this group (%)	20	20	20	21	20	**100**
Proportion of households in this group that have LIHC (%)	18	14	12	10	8	**13**
Proportion of individuals in this group that have LIHC (%)	24	18	14	11	9	**15**
Proportion of LIHC households that are in this IMD group (%)	29	23	20	16	12	**100**
Proportion of low-income households that are in this IMD group (%)	33	24	18	15	10	**100**
Fuel poverty gap – aggregate (£ million)	246	235	262	223	151	**1,116**
Proportion of aggregate fuel poverty gap accounted for by this group (%)	22	21	23	20	14	**100**
Average fuel poverty gap – per LIHC household (£)	317	383	487	504	462	**414**

Source: Fuel Poverty Data 2009 (DECC)

One of the clearest characteristics of fuel poor households highlighted by the compositional breakdown of the LIHC indicator is their low energy efficiency ratings. Properties with an E, F or G EPC rating are lived in by 75 per cent of LIHC households, accounting for 90 per cent of the fuel poverty gap. Other key characteristics include:

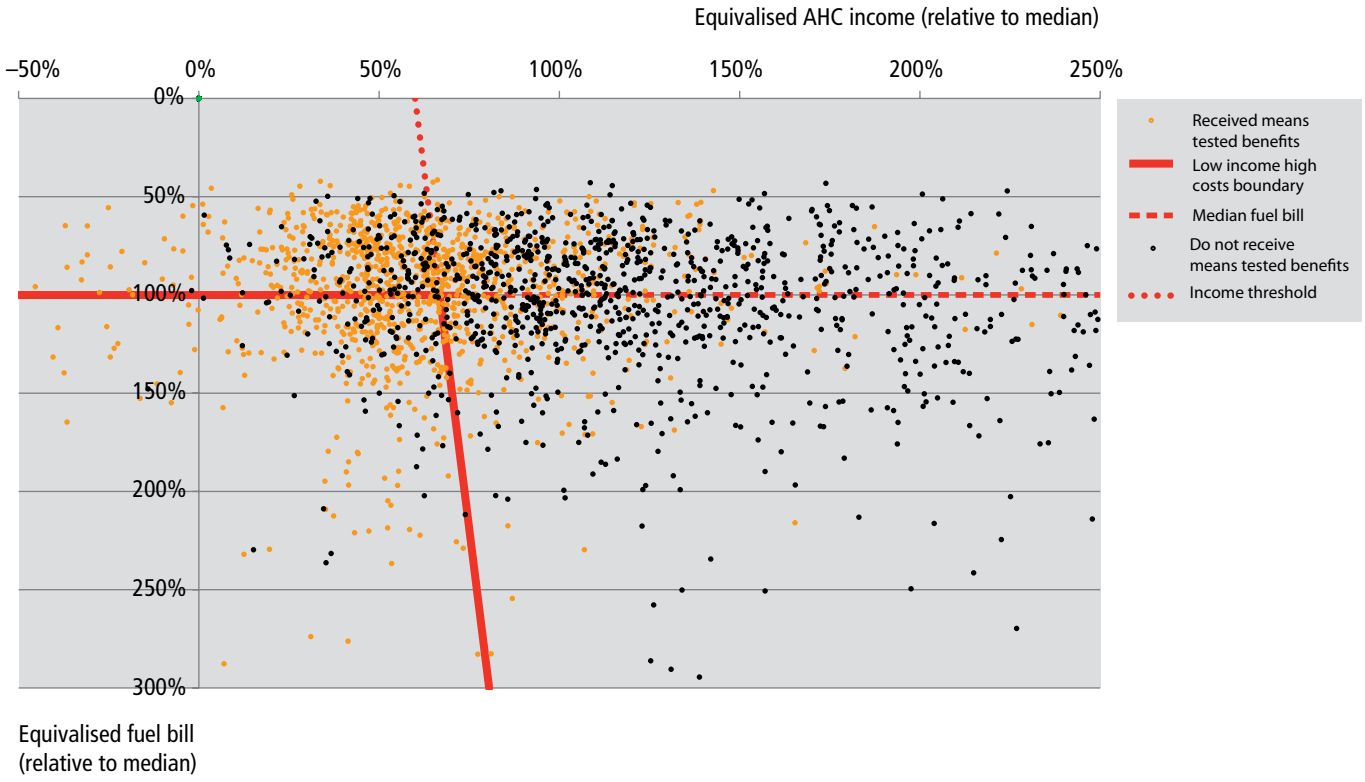
- Rurality: rural households are deeper in fuel poverty with an average fuel poverty gap of £622, compared to £362 for urban properties.
- Connection to the gas grid is also important, with off-grid properties having higher costs. Households that are both off the gas grid and located in rural areas have the highest fuel poverty gaps of all, at nearly £800.
- Although fuel poor households are generally evenly distributed between the different payment methods, one in four households using a prepayment meter are fuel poor compared to fewer than one in ten households on direct debit.
- The characteristics of the property are also useful guides to the likelihood of a households being fuel poor. Non-cavity wall properties (the majority of which are solid wall) make up 45 per cent of the fuel poor households, compared with just over 30 per cent of households nationally.
- Terraced, semi-detached and detached properties together make up 86 per cent of the aggregate fuel poverty gap, with detached properties having the highest average fuel poverty gap at £788.
- The 38 per cent of properties built before 1945 make up two-thirds of the aggregate fuel poverty gap.
- On the LIHC basis, fuel poverty is spread fairly evenly between regions, including London, while it is only weakly concentrated in areas of general deprivation.

However no one characteristic by itself can be used to identify fuel poor households. The next section goes on to look at how these characteristics can be used in combination. An online Annex details additional information about the distribution of households by different characteristics. This is available at: www.decc.gov.uk/hillsfuelpovertyreview

3.3 Proxies for targeting

28. Understanding the characteristics of fuel poor households is a first step to identifying them on the ground. However, we need to use this information to examine which specific proxies can be used to screen households most effectively. This is because, on their own, the characteristics identified in the previous section are only part of the picture. For example, we have seen how under the LIHC framework it is very likely that a low income household living in an E, F or G rated home will be fuel poor. This is a helpful insight – but it does not in itself tell us how to identify such households in practice. How could prospective installers of energy-efficiency measures know where the low energy efficiency homes are and which ones are lived in by households below the income threshold?

Figure 3.3: *Distribution of households by whether or not they are receiving means-tested benefits, 2009, England*



Source: DECC Fuel Poverty Data 2009.

Low income proxies

29. One obvious starting point is to consider proxies for low income. The most commonly used proxy is receipt of means-tested benefits. This is not without its pitfalls. Our analysis shows that in 2009 only 62 per cent of LIHC households were on means-tested benefits.[41] These households also accounted for 62 per cent of the aggregate fuel gap. Figure 3.3 shows all households receiving benefits (the orange dots) and households not receiving benefits (the black dots). The 62 per cent of LIHC households on means-tested benefits – 'true positives' (i.e. the households we want to target, and are identified through using this proxy) – are represented by the orange dots within the LIHC quadrant. 38 per cent of LIHC households were not on means-tested benefits – these 'false negatives' (i.e. the households we are trying to target, but who are not identified by using this proxy) are represented by the black dots within the LIHC quadrant in the figure. At the same time, 72 per cent of those on these benefits did not have low incomes and high costs. These 'false positives' are shown in Figure 3.3 by orange dots outside the LIHC quadrant. Black dots outside the LIHC quadrant represent 'true negatives', some of whom, of course, have low incomes and some of whom have high costs (but not both).

41 Our analysis has been based on the list of means-tested benefits for which information is available to DECC within the results of the English Housing Survey.

Combining low income and energy efficiency proxies

The benefits group

30. Proxies for energy efficiency have hitherto not been easily found – instead, agents on the ground tend to conduct some kind of property assessment. For example, eligibility for Warm Front, given the new SAP-related criterion, is confirmed through a physical property survey.

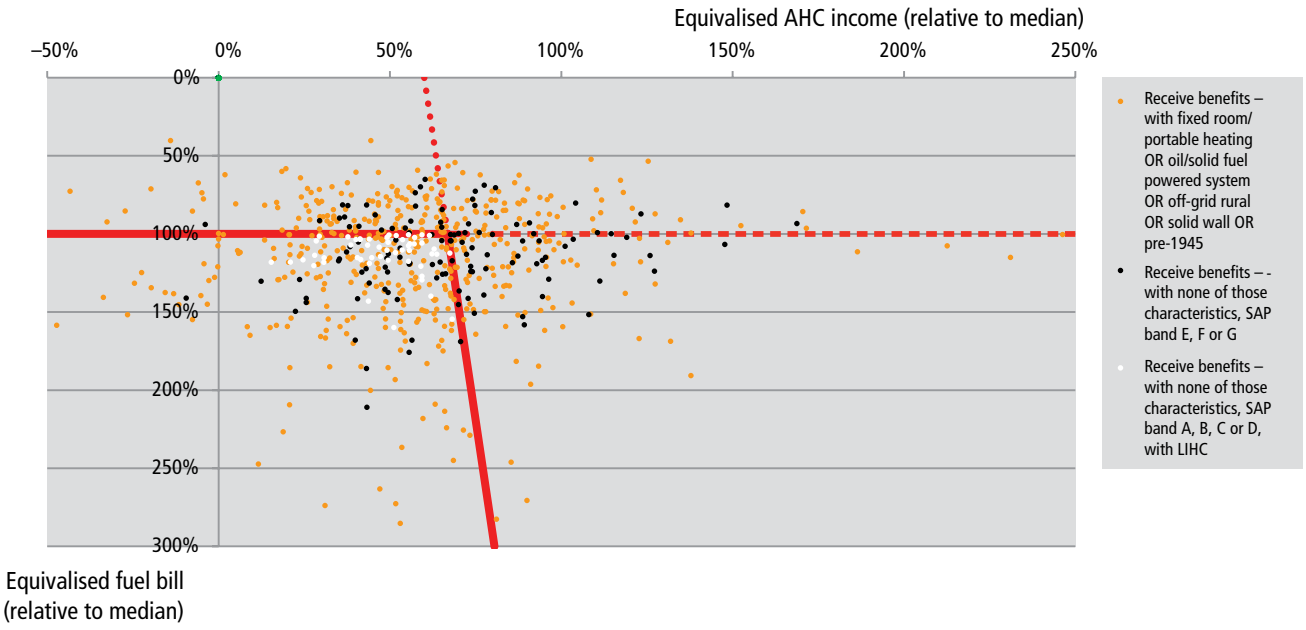
31. The framework explored above gives a way of analysing the extent to which the use of different characteristics as proxies for low-income households and high costs can lead to identification of the target groups, perhaps as the first stage in a screening process. For instance, the first five lines of Table 3.11 show a simple set of proxies for energy

Table 3.11: *Cumulative targeting rates for households receiving means-tested benefits, by property characteristics, 2009, England*

	No of households	No of LIHC households	Proportion of fuel poverty gap (%)	LIHC households in this group as proportion of all such households (%)	Proportion of LIHC households accounted for by these households (%)	Rate of false positives (%)
Oil/solid fuel fired system	186	109	9	59	4	41
OR fixed room/portable heating	372	208	17	56	8	44
OR rural off grid	536	272	20	51	10	49
OR solid wall	2,108	923	42	44	34	56
OR pre-1945	2,765	1,171	51	42	43	58
With all other EFG properties	3,454	1,441	59	42	53	58

Source: Fuel Poverty Data 2009 (DECC)

Figure 3.4: *Distribution of households identified using the proxies in Table 3.11, 2009, England*



efficiency which, when combined with benefit receipt, would identify households accounting for approximately half of the total fuel poverty gap, while keeping the rate of identifying 'false positives' as low as possible.

32. The approach used here has been to layer certain dwelling characteristics on top of eligibility for means-tested benefits. The characteristics in question – type of fuel, rurality, connection to the gas grid, wall type and age of property – are all easy to identify by simple inquiries without a complex physical survey of the property in question.

33. The rate of false positives – households that are identified by this process but do not, in fact, have low incomes and high costs – is a minimum of 41 per cent. This applies in the case of households receiving means-tested benefits with an oil or solid fuel fired heating system. Such households account for only 9 per cent of the total fuel poverty gap and 4 per cent of fuel poor households. If the characteristics are widened to include the first five of the characteristics shown in Table 3.11, 1.2 million fuel poor households could be covered, accounting for 51 per cent of the fuel poverty gap. However, in total 2.8 million households would be identified by this limited, possibly initial, screening.

34. The orange dots in Figure 3.4 illustrates the households captured by this targeting approach. Comparing this with the distribution of all households shown in Figure 3.3 indicates how well these households are concentrated on the core of the problem.

35. One immediate conclusion is that it would be unreasonable to expect using any simple proxies of this kind to have a high 'hit rate' in terms of finding LIHC households without also accepting that this can only be achieved while also identifying a larger number of homes which are not strictly within the LIHC definition.

36. A second conclusion is, however, that given that only 62 per cent of LIHC households receive the means-tested benefits used here, accounting for the same proportion of the fuel poverty gap, finding more than half of the fuel poverty gap through this fairly simple screening is potentially quite helpful.

In addition, Figure 3.4 suggests that a proportion of the 'false positives' are actually quite close to the cost and income thresholds, so there would still be benefits from assisting them, if they were not ruled out by a second stage of screening.

37. Since the proportion of the fuel poverty gap accounted for by households receiving means-tested benefits is 62 per cent, using this set of characteristics allows us to find five-sixths of the aggregate fuel poverty gap accounted for by households on means-tested benefits without additional information.

38. Finding 51 per cent of the fuel poverty gap and 43 per cent of LIHC households in the way set out above still leaves 49 per cent of the gap and 57 per cent of households unidentified. Some of the remaining fuel poverty gap is accounted for by LIHC households eligible for means-tested benefits, but not displaying any of the other above characteristics**.** The final line of Table 3.11 therefore shows what could be added if some kind of mechanism (such as an address-specific energy-efficiency database) allowed us to identify precisely all remaining households receiving means-tested benefits and living in E, F, or G rated properties. These are shown by the black dots in Figure 3.4. Our analysis shows that this would capture 59 per cent of the fuel poverty gap and 53 per cent of all LIHC households. The false positive rate would not change. This kind of information could be useful when weighing up the pros and cons of the screening that would be needed to collect such specific information.

Low-income households not receiving benefits

39. We need to look beyond the benefits group to uncover the remaining 38 per cent of the fuel poverty gap – and, indeed, of LIHC households. If there were a way of identifying low-income households who are not on means-tested benefits that had low income – which would require more detailed income screening – a similar approach could be taken to the one used above. Table 3.12 shows how much of the remaining total of LIHC households and the fuel poverty gap would be accounted for by low-income households who are not receiving means-tested benefits sharing the same range of property characteristics as those used above.

Table 3.12: *Targeting rates for low-income households not receiving means-tested benefits, by property characteristics, 2009, England*

	No of households (thousands)	No of LIHC households (thousands)	Proportion of fuel poverty gap (%)	LIHC households in this group as proportion of all households (%)	Proportion of LIHC households accounted for by these households (%)	Rate of false positives (%)
Oil/solid fuel fired system	92	89	6	97	3	3
Or rural off grid	146	130	9	89	5	11
OR Fixed room/portable heating (no central heating)	215	180	12	83	7	17
OR solid wall	862	539	24	63	20	37
OR pre 1945	1,105	686	30	62	25	38
OR SAP EFG	1,443	902	36	63	33	37

Source: Fuel Poverty Data 2009 (DECC)

Table 3.13: *Cumulative targeting rates for LIHC households in SAP Band D, by household characteristics, 2009, England*

Cumulative effects	Number of households (thousands)	Number of LIHC households (thousands)	% of fuel poverty gap accounted for	LIHC households in this group as proportion of all households (%)	Proportion of LIHC households accounted for by these household (%)	Rate of false positive (%)
Lone parents	739	190	3	26	7	74
OR electricity pre-payment	1,745	322	5	18	12	82
OR means-tested benefits	3,052	473	8	16	18	84

Source: Fuel Poverty Data 2009 (DECC)

40. Our analysis shows that with such detailed income information, and by using the same five energy efficiency proxies as before, we could reach a further 30 per cent of the aggregate fuel poverty gap for all households with a false positive rate of less than 40 per cent.

41. Our analysis also shows that targeting LIHC households that do not receive benefits is extremely difficult without additional information on incomes. Using the five property characteristics alone with no further income information, 7.5 million households would have to be screened order to find 686,000 additional households in fuel poverty.

Less energy inefficient homes

42. A quarter of LIHC households and a tenth of the fuel poverty gap are accounted for by households in properties with ratings better than E, the majority of these being D-rated properties (although only 27 per cent of low-income households in D rated homes are LIHC).

43. Table 3.13 shows some characteristics for these households that would be the most promising as a way of identifying them. These are the type of household (lone parents), electricity payment method (pre-payment meter) and, as with E, F and G households, whether they are receiving benefits. The first two characteristics could identify a further 5 per cent of the fuel poverty gap, most – allowing for some overlap – of those missing from the bottom lines of Tables 3.11 and 3.12.

44. However the rate of false positives is far higher within this group of households. For instance, 26 per cent of lone parent households in homes with a SAP rating of D are LIHC, but this is only some 190,000 households in total. If we add SAP D households that pay for their electricity by pre-payment meter, and all SAP D households on benefits, this allows us to reach 473,000 households, equivalent to nearly a fifth of all fuel poor households and 8 per cent of the fuel poverty gap. Indeed, by looking at these three simple proxies, we are able to capture nearly three quarters of the fuel poverty gap that is accounted for by SAP D households.

45. On this first attempt we have, however, not been able to identify simple characteristics that would allow us to identify a large number of Band D fuel poor, without also capturing a large number of other households, without more detailed information or wider screening.

Box 3.2: Practical tools for targeting

For on the ground delivery of interventions, practical techniques are needed to identify households at risk. While we did not have the scope to examine these in detail, evidence submitted to the review touched on important issues about how this can be done. Issues raised included:

- Data-matching: one feature of some interventions is that they rely on households taking the initiative in order to receive help. For reasons including a sense of social stigma this means that uptake can be limited. Data-matching schemes can help to get round these low take-up rates, by identifying households to receive a benefit automatically. This is the approach used by DECC and DWP to find households eligible for the Warm Home Discount. While this approach has been very effective at identifying eligible households for this particular policy, extending it to other means-tested benefits would not necessarily be straightforward, requiring for instance, legislation and raising issues of privacy and data protection.

- Area-based approaches are also commonly used by energy companies and other delivery bodies to target assistance. Specific geographic areas are identified, based on certain characteristics e.g. the concentration of households receiving means-tested benefits. While this approach – as with CESP – has been felt to be effective, it is not completely successful (for example concerns have been raised about whether this approach is appropriate for rural areas). The analysis in Table 3.10 above suggests that standard measures of area deprivation are not very effective in identifying areas of concentrated fuel poverty. It might be possible to use other characteristics, such as the energy efficiency proxies discussed in Section 3.3, to identify areas with a high concentration of properties 'at risk' of fuel poverty. Any area-based approach means making trade-offs, for example between the cost-effectiveness advantages of tackling a whole street but including many households who may not be fuel poor (but who could make a contribution to the costs).

- Technological innovation also offers opportunities that may assist with targeting. Thermal imaging can be used to target energy inefficient homes, identifying heat loss from particular areas (which may indicate high costs). A recent project carried out by East Hertfordshire District Council used thermal imaging to identify households that would benefit from either free or subsidised insulation. Identification rates were of the same order as door to door canvassing. Smart meters are another innovation that might prove useful, either through the information the meters provide (though subject to the limitations set out above for data-matching) or through the opportunities provided by installation of the meters, which could be used to give energy efficiency advice to customers, or assess the energy efficiency of the property.

- We discuss in Chapter 5 the role of Energy Performance Certificates – and in particular the value of easy public access to such data on property energy efficiency.

- Finally, there are ways in which fuel poor households can be found which draw on other interactions between them and, for instance, the health system. Health-based referral schemes have been shown to be effective, including because of the relationship of trust between patient and GP. Pilot schemes are underway in several locations and their usefulness in being able to identify those vulnerable to the impacts of fuel poverty should be considered and best practice shared.

Understanding the core characteristics of LIHC households is a first step to identifying them on the ground. However we need to use this information to examine which proxies can be used to screen households more effectively. One limitation is that the traditional proxy for low income of means-tested benefits receipt accounts for only 62 per cent of LIHC households and 62 per cent of the fuel poverty gap. However we show that within this group a small set of physical characteristics, which can be ascertained without an in-depth physical survey, could account for households with more than half the total fuel poverty gap. These are those having oil, solid fuel or portable heating, living in a rural property off the gas grid, having solid walls, or being built before 1945. However, even this most effective set of simple proxies would still identify more than twice as many households as were actually LIHC, without further screening.

Identifying the remaining half of the fuel poverty gap is much harder. Finding all households on benefits living in other E, F and G rated properties would take the total of the fuel poverty gap accounted for to 59 per cent, leaving 3 per cent of LIHC households who receive means-tested benefits unidentified (i.e. with homes that are neither E, F or G rated, or without any of the physical characteristics screened for).

Beyond this, 38 per cent of the fuel poverty gap is accounted for by low-income households who do not receive benefits. Finding them would require more detailed screening of incomes. If this could be done, the same range of five property characteristics could identify LIHC households accounting for a further 30 per cent of the fuel poverty gap, and other E, F and G properties for a further 6 per cent (which, along with the proportion of the fuel poverty gap that could be identified through a combination of means-tested benefits and energy efficiency proxies, would account for over 90 per cent of the fuel poverty gap in total). The majority of the rest of the fuel poverty gap is accounted for by the D-rated properties, but we could not find a simple way of identifying which of them were most at risk.

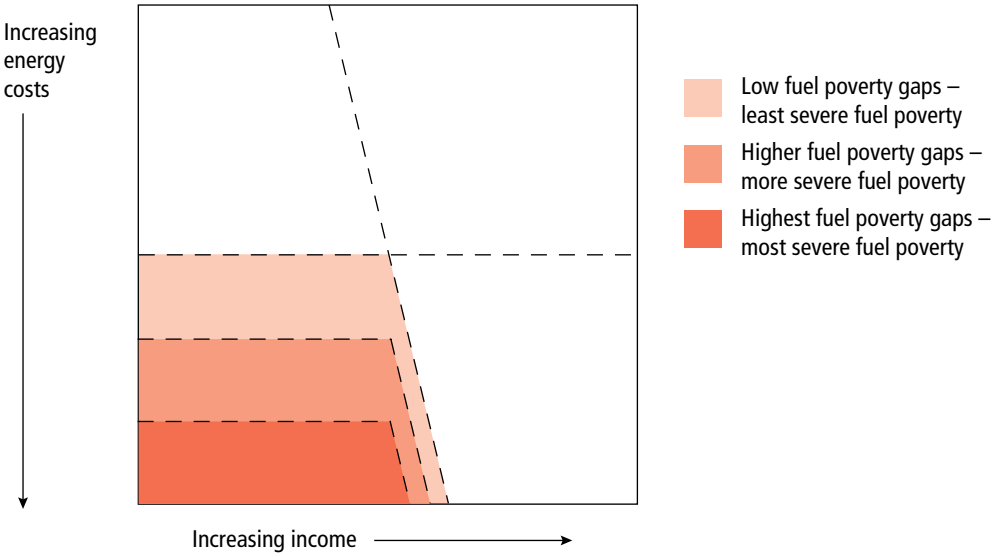
3.4 Prioritising assistance

46. A further advantage of the LIHC approach is that it provides a clear insight into which households should be prioritised for assistance. Leaving aside issues of vulnerability to the next section, the people facing the deepest problems are those with the biggest fuel poverty gaps. As set out in Figure 3.5, it is possible conceptually to add layers within the fuel poverty quadrant of the costs/income matrix, which would help a tiered approach to targeting. Especially given the reasonably strong correlation between a household's position on the costs line and its SAP, this approach corresponds broadly to the banded approach adopted for EPCs.

47. Conceiving of the problem of fuel poverty in this way has a number of benefits. First, it should help drive assistance to those households who face the worst trade-offs between energy and other spending that can lead to the adverse health and social impacts which we considered in detail in our interim report.

48. Second, it creates an incentive for Government and those delivering policy to ensure that sustainable improvements are made to the homes of those households in the deepest fuel poverty, because this will have the biggest impact on the aggregate fuel poverty gap. As prices rise and the fuel poverty gap increases, the cost of making sustainable improvements – as opposed to alleviating fuel

Figure 3.5: *Fuel poverty severity bands within the Low Income High Costs approach*



poverty through price policies or rebates on bills – remains the same. Take, for example, two households with similar income levels but different fuel poverty gaps – one representing very deep fuel poverty (a gap of, say, £800) and the other less deep fuel poverty (a gap of, say, £200). If both households received the same energy efficiency measure that lifted them out of fuel poverty at a cost of, for example, £3,000, the pay-off in fuel poverty gap terms would be £600 greater for the household with the higher gap. We consider cost-effectiveness of a range of policies in detail in Chapter 7, but already we can see that using the fuel poverty gap in this way could support cost-effective targeting of those most deeply in fuel poverty.

49. It should also be noted that this layered approach leads to similar results in terms of which households are the greatest priority wherever the fuel costs threshold is drawn. As we saw in Section 2.2, some of those responding to our consultation advocated setting, for the short term at least, a lower costs threshold than the median costs level we have used. But even if this were done, the same households would be identified as having the greatest fuel poverty gaps. Lower cost thresholds imply that a larger number of households are affected by fuel poverty, but imply that the same households are the worst-affected and should be priority targets for assistance.

50. Of course, any threshold will leave a group of households just the 'wrong' side of it, so this is a problem however one is set. But one group of households of particular concern to stakeholders is those on low incomes with costs only slightly lower than the median modelled bill. Such households are not considered to be fuel poor under our framework but may still have bills that, given their low incomes, are not easy to pay. We set out the rationale for not identifying these households as 'fuel poor' in our interim report (see pages 141-143 in particular). WHECA defines households that are fuel poor as those that are low income and cannot be kept warm at reasonable cost. We believe this definition reflects the core problem of fuel poverty.

51. Here it is important to remember the effects of the relative threshold which we concluded in Chapter 2 should be the basis for defining 'high costs'. Over time, we expect the energy efficiency of the stock overall to improve, and so the threshold will tend to fall, bringing in households which would currently be below the threshold. For us and, we believe for the vast majority of stakeholders, the priority households for immediate help are those deepest in fuel poverty – subject to considerations of vulnerability which we turn to in the next section. However, as overall standards improve and the worst problems are addressed we would need to turn to those that currently would be lower priority. The relative framework we suggest encourages this.

52. Secondly we showed in Section 3.1, that precision-targeting of the fuel poor is extremely difficult and that all policies are therefore likely to have positive impacts on some households who are currently below the threshold (see Figure 3.4). Viewed in this overall context, some low-income households with costs just below the threshold are likely to receive assistance in any case, and others would be in line for assistance from fuel poverty policies in future.

The use of a fuel poverty gap to supplement the headcount indicator can provide a way of identifying those who are deepest in fuel poverty and therefore a priority for action. In this way, assistance can be prioritised at those who face the worst trade-offs between paying energy bills and other spending that can lead to adverse health and social impacts. Doing so will also have the biggest impact on the aggregate fuel poverty gap. Under a tiered approach of this kind the same households would remain the focus for interventions however the reasonable costs threshold was drawn.

3.5 Fuel poverty and vulnerability

53. In our interim report we explored the impacts of living in cold homes and two broad types of vulnerability – that is, vulnerability to being fuel poor and vulnerability to the effects of exposure to cold temperatures.

54. Certain groups of people are more vulnerable to being fuel poor, because they have higher energy requirements. For example, the elderly and those suffering from long term illness or disability may be more likely to spend more time in the home, leading to higher than average energy costs. This is to some extent allowed for in the way costs are modelled. However, this does not necessarily capture those who are most vulnerable to the impacts of cold homes.

55. In our interim report we showed evidence that there are strong associations between certain illnesses, some of which prove fatal, and cold homes. Additionally, certain groups of people are more likely to suffer from bad health as a result of living in low temperatures. Of the thousands of excess winter deaths each year, the overwhelming majority of these occur amongst the elderly. The elderly are also at greater risk of suffering from non fatal adverse health consequences as a result of spending time in low temperatures as are, to a lesser extent, younger children and those suffering from long term illness or disability based on the research we detailed in our previous report.

56. We discuss three issues below: whether the temperature standards used in the fuel poverty calculations should be different for certain groups; what properties of those identified by the LIHC indicator fall within particular vulnerable groups; and whether 'extra costs benefits' such as Disability Living Allowance should be included in income assessments.

Temperature requirements

57. Our interim report found that there was less firm basis for the specific temperatures used in the BREDEM model for assessing household energy requirements than many suppose. We also found, more broadly, a lack of evidence about the impacts of specific temperatures on health. The limited evidence regarding the temperatures to which people, whose spending is not constrained, heat their homes suggests that these may be significantly lower than the 21°C temperature standard used for the main living room within the fuel poverty calculations. In general, the temperature standard may be set too high given contemporary behaviour. This suggests the need for more and better information about the temperature standards that those families who do not face particular energy spending constraints generally achieve.

58. Part of the strength of the proposed LIHC indicator and threshold related to median energy requirements is that it is much less sensitive to these assumptions than the current 10 per cent indicator. However, the size of the fuel poverty gap measured is affected by the assumptions.

59. As far as the general temperature standards are concerned it would be helpful to revisit these when more data on temperatures and actual spending patterns are available.[42] The general temperature standards could then be brought into line with contemporary behaviour (and average modelled bills would be brought more closely into line with actual spending patterns). However, once this was done, it would also be important to examine whether there is sound evidence of the health effects of cold temperatures that could be used to allow for the particular vulnerability of the elderly and of infants (and of some groups affected by disability and long-term illness) to the impact of cold temperatures to be reflected in higher standards for the temperatures used for those households.[43]

The distribution of vulnerable households in the costs/income matrix

60. Pending such developments, one would still argue that vulnerable households should remain priorities for action, even if they did not have the largest fuel poverty gaps. To indicate what this implies, Table 3.14 shows the distribution of particular types of

42 For instance, from the results of the Energy Follow-Up Survey and DECC's current pilot exercise to match actual spending data to modelled requirements for individual households.

43 This examination might also reflect on the impact of high summer temperatures on the health of vulnerable people and the way in which any identified need for cooling during that time should be picked up in the fuel poverty methodology.

Table 3.14: *Distribution of vulnerable households by type under the LIHC matrix, England, 2009*

	Contains a person with a long-term illness or disability	Contains a person over 75	Contains a person under 5
Number of households in this group	6,278	2,441	2,740
% of all households in this group	29	11	13
Number of LIHC households in this group (000s)	917	269	530
% of households in this group that are fuel poor under LIHC	15	11	19
% of LIHC households in this group	34	10	20

Source: Fuel Poverty Data 2009 (DECC)

vulnerable groups across the income/costs matrix. The vulnerable groups shown are:

- Households including someone over 75 years;
- Households including someone aged under 5 years; and
- Households including someone with a long-term illness or disability.

Of the 2.7 million households identified as LIHC in 2009, 54 per cent have one or other of these characteristics.

Long term sick or disabled people

61. Inclusion of Disability Living Allowance (DLA) in the calculation of household income under the fuel poverty methodology has been the subject of some debate. The rationale for entitlement to DLA is that those with long-term illnesses or disability require a higher income to achieve the same standards of living as others and it is therefore intended to cover the additional costs incurred as a result of disability or illness. However classifying DLA as general income for measuring fuel poverty implicitly assumes that its recipients are better off than those who do not receive it. Groups such as Macmillan Cancer Support therefore argue that this calculation does not accurately reflect the true disposable income of those suffering from long term illness or disability.[44]

62. Given the potential consequences of this calculation, Government (perhaps through the Fuel Poverty Methodology Group) should assess whether extra costs benefits such as DLA should be excluded from the assessment of household income used to measure fuel poverty. Our starting point is that removing DLA from the income calculation would be appropriate, reflecting more general arguments about the way in which its inclusion leads to understatement of the proportion of disabled people who have low incomes.[45] The effect of this would not necessarily be to change the overall number of households classed as fuel poor, but it would change their composition.

Older people and infants

63. Compared to the current official indicator, a smaller proportion of households including someone over 75 years are captured by the LIHC indicator (11 per cent compared with 34 per cent). This is because over 75s have comparatively higher incomes under the LIHC indicator. One reason for this is the decision to use AHC income: many older people will have lower housing costs compared to other households because they tend to own their houses. It is also the case that the use of equivalisation factors under this indicator results in fewer 'under-occupiers' being shown as fuel poor. We believe this is the correct approach for the reasons set out in Chapter 2 and Part B of its Annex and is consistent with responses to our consultation.

64. Nonetheless, 10 per cent of households with low incomes and high costs contain a member aged 75 and over (Table 3.14). Given their vulnerability to low temperatures they are an obvious priority for action that makes it easier for them to keep warm.

65. Equally, around two-fifths of households classed as fuel poor under the LIHC measure contain children (Table A2.8), and one-fifth children under 5. This is a higher proportion than suggested by the current fuel poverty indicator, which we believe has understated the problem of fuel poverty for many families with children, as also highlighted in a recent report by Save the Children.[46]

44 National statistics for the prevalence of fuel poverty at a particular date are of limited use in identifying households whose circumstances change rapidly due to illness, for example cancer patients. It is systems for providing support on the ground that need ways of rapidly channelling support and assistance to those who heating needs have changed suddenly for this kind of medical reason.

45 For further analysis, see 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: CASE. Box 7.3, p189-192.

46 Save The Children (2012). *Rising Energy Costs: The Impact on Low Income Families*. London: Save The Children. Available online at: http://www.savethechildren.org.uk/sites/default/files/docs/Rising%20energy%20costs%20briefing.pdf

Certain groups of people are more vulnerable to being fuel poor, because they have higher energy requirements. Some of the factors driving these higher costs (such as needing to spend more time in the home) are captured in the way energy costs are modelled and households including vulnerable people will be identified as fuel poor. However this does not necessarily capture those who are most vulnerable to the impacts of fuel poverty and of cold homes.

The three main groups of people likely to experience particularly negative health impacts of fuel poverty are the elderly, infants, disabled people and those living with long term sickness. 34 per cent of fuel poor households contain someone with a disability or long-term illness, 20 per cent have a child aged 5 or under, and 10 per cent a person aged 75 or over. Given their vulnerability to the impacts of fuel poverty, these groups are an obvious priority for interventions that make it easier to keep warm, even if they do not have the very greatest fuel poverty gaps.

A related issue is the temperature standards that are used within the current model to calculate energy requirements. When more data are available on the temperatures at which households that are not constrained in what they can spend are actually living, these standards should be revisited to see whether they can be brought into line with contemporary behaviour (helping to bring average modelled bills more closely in line with actual spending patterns). Once this was done, it should be examined whether there is sound evidence of the health effects of cold temperatures that implies the need for separate standards that allowed for the particular vulnerability of the elderly and of infants (and of some groups affected by disability and long-term illness).

Another issue of concern in the way the fuel poverty methodology is calculated is the classification of extra costs benefits (such as the Disability Living Allowance) as general income, implying that households entitled to them are better off than those who do not, when they in fact reflect the requirement for a higher income to achieve the same standard of living as others. Government should assess whether removing extra costs benefits from the income calculation would be appropriate.

Chapter Summary

Targeting fuel poverty interventions involves trade-offs, with precise targeting not possible and not necessarily desirable. Experience from other kinds of means-testing suggests the need to avoid very closely defined systems and 'cliff edges' such as entitlements that rest on a narrow range of benefits. It would be naïve to think a problem affecting 2.7 million households could be addressed by offering assistance only to that number.

We have used the LIHC framework to examine what kinds household and dwelling characteristics are associated with being at risk of fuel poverty. For example, any low-income household living in an E, F or G rated home is highly likely to be fuel poor, and such households account for 90 per cent of the fuel poverty gap. However, no single characteristic, or proxy, can be expected to pinpoint fuel poor households with total accuracy.

In looking at which characteristics are most helpful to focus on when screening for households at risk the fuel poverty gap provides a helpful tool. For example, using a combination of means-tested benefits receipt and certain dwelling characteristics – oil/solid fuel heating system, rural off gas grid properties, solid walls, pre-1945 construction – just over half of the 2009 fuel poverty gap could be found (although more than twice as many households as were actually fuel poor would be identified by this first round of screening). One major constraint is that only 62 per cent of fuel poor households and 62 per cent of the fuel poverty gap is accounted for by households receiving means-tested benefits. Finding the rest would require more detailed screening of income levels.

The fuel poverty gap can be used to identify the households that are deepest fuel poverty and so are a priority for assistance, but it is important to consider vulnerability to the impacts of cold indoor temperatures. The groups of most concern are the elderly, children under 5 and people with a long-term illness or disability.

Technical recommendations

1. Once data on contemporary temperatures in people's homes is available, the evidence of the health effects of cold temperatures should be re-examined to establish whether it implies a need for separate temperature standards to allow for the particular vulnerability of the elderly and infants, and of some groups affected by disability and long-term illness.

2. Government should assess whether removing extra costs benefits such as the Disability Living Allowance from the calculation of income in the fuel poverty measurement methodology would be appropriate.

CHAPTER 4

Principles for tackling fuel poverty

1. Having established our overall approach to the LIHC indicator, and considered who is fuel poor under this approach, we turn now to the issue of understanding how both our extent (numbers of people affected) and depth (fuel poverty gap) indicators would reflect the impact of different kinds of policies. An understanding of the theoretical impact provides preparation for an exploration of the potential impact of particular policies in later chapters.

2. The impact of a given policy depends on three key factors: its type; the kind of household targeted; and its source of funding. We first examine the impact of three broad types of policy – price-based, energy efficiency-related and income-based. These sections include stylised examples of policies with different kinds of targeting. In Section 4.4 we discuss how the source of funding – taxes or consumer bills – would affect the net results of any of these policies. The examples in Sections 4.1 to 4.3 take no account of the funding implications.

4.1 Price-based policies

3. The Government could introduce policies designed to reduce the price paid by households for their energy. Such policies could lead (depending on their scale) to changes in the median bill and therefore an interaction with the position of households relative to the income threshold. This would imply some kind of effect on fuel poverty as measured by the LIHC indicator. Those households seeing lower bills and therefore reduced costs under the LIHC approach would have lower fuel poverty gaps (or move further away from the costs threshold if they already had lower costs). Any fuel poor household that did not see lower bills as a result of such policies would instead face an increase in its fuel poverty gap (as it would be further away from the cost threshold). The overall effect would depend on the balance achieved between these two outcomes. Policies to reduce prices and/or bills for poorer households specifically would be expected to bring some of them out of fuel poverty, reducing both headcount and fuel poverty gap indicators.

4. Policies falling into this category could also include rebates on energy bills (such as the current Warm Home Discount). It is possible to consider a discount of this kind to be equivalent to an income transfer. As such, its effect under the LIHC framework would relate to a household's poverty status i.e. whether they are in poverty or not and, if so, how deeply. Taking a pure economics view, households receiving the rebate might 'rationally' consider it to be a boost to income that could actually be spent on any household expenditure. However, there is evidence to suggest that households receiving such payments do not always behave in this way, particularly where

a direct association with fuel has been made.[47] For the analysis in later chapters we treat rebates as reductions in bills.

Example 1

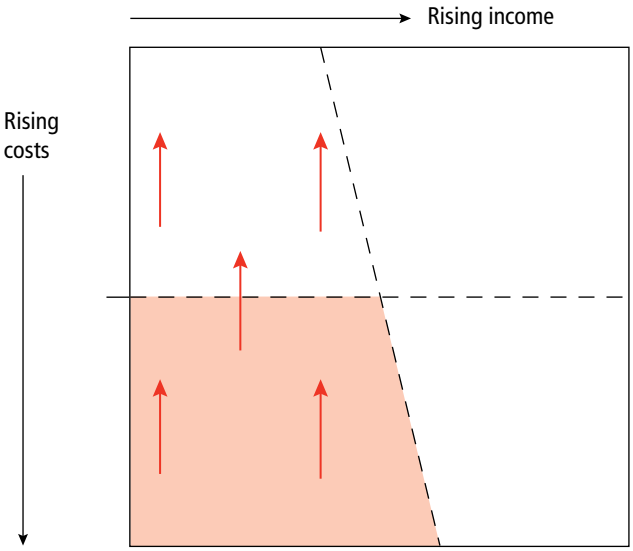
5. The first example reflects the type of policy represented by the Warm Home Discount. This policy is focused on low-income households through the use of benefit proxies. The effect of this type of policy – without allowing for the fact that this particular policy is funded by a levy on customer bills – can therefore be represented as shown in Figure 4.1.

6. This type of instrument would tend to reduce levels of fuel poverty (both extent and depth). Some assistance is given to people outside the fuel poverty quadrant. We discussed in Chapter 3 the fact that targeting the fuel poor is not straight-forward and that some policies will affect non-fuel poor households. In this particular case, there is, of course, some advantage in helping low-income households meet the cost of their fuel bills, even if they do not have higher than typical costs.

7. A transfer such as this would only have a one-off impact on fuel poverty unless repeated. This has implications for cost-effectiveness which are considered in Chapter 7.

47 As explained further in Chapter 5, in 2011 the Institute for Fiscal Studies found that, in general, an income increase of £100 would lead to an increased spend on energy services of £3. The same report found that every £100 paid in Winter Fuel Payments led to an increased spend on energy services of £41.

Figure 4.1: *Impact of bill rebate targeted at low-income households*



Effect on cost threshold
It would tend to fall a little.

Effect on income threshold
None, although it would intersect the cost threshold in a different place.

Effect on measure of extent of fuel poverty
The number of households would tend to fall

Effect on the fuel poverty gap
The aggregate gap would tend to fall.

4.2 Energy efficiency-based policies

8. A policy to improve energy efficiency standards would be expected to have an impact on the costs threshold (by improving median SAP and therefore lowering median modelled costs). The costs threshold would therefore intersect the income threshold at a different point.

9. The position of individual households would depend on whether or not they benefited from the measures deployed. Any households receiving assistance would move upwards within the framework of our indicator. Fuel poverty gaps for those fuel poor households assisted (measured in £s) would fall, reflecting the reduction in their energy requirements. A sufficiently large improvement in efficiency would obliterate the fuel poverty gap by taking the households out of fuel poverty, potentially on a sustainable basis.

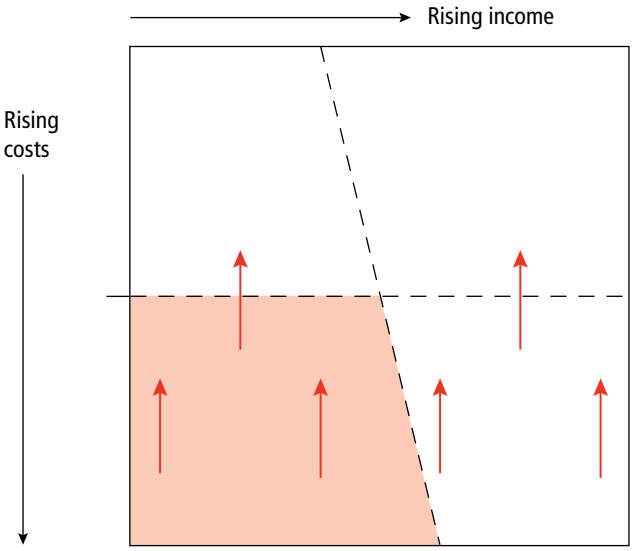
10. An energy efficiency programme focused on the worst housing in general would have the effect of both shifting the median and benefiting those households who receive assistance. By extension, the relative position of those households not receiving the benefit would however worsen. In this way, energy efficiency programmes that improve overall standards have ambiguous effects. A programme focused on low-income, energy-inefficient households would lead to reduced levels of fuel poverty, both in numbers and in the fuel poverty gap. By contrast, a programme that saw energy inefficiency tackled principally in richer homes would see fuel poverty increase, both in headcount and fuel poverty gap terms as the relative standard of low-income households deteriorated.

11. The implications of this were discussed briefly in Chapter 2 above. While some stakeholders see the last effect as a problem of the proposed indicator, we believe this feature should be seen as an advantage because it would show fuel poverty rising if energy efficiency improvements left low-income households falling behind.

Example 2

12. A policy such as the Carbon Emission Reduction Target (CERT) represents an energy efficiency improvement policy that is targeted on those households requiring efficiency improvements. The priority and super priority groups mechanisms exist to ensure that the policy is delivered across the income distribution. The effect of this policy (again, we have not allowed for the fact that this specific policy is funded by a levy on bills) can be represented as shown in Figure 4.2.

Figure 4.2: *Impact of an energy efficiency improvement policy targeted at energy inefficient households*



Effect on cost threshold
It would tend to fall.

Effect on income threshold
None, although it would intersect the cost threshold in a different place.

Effect on measure of extent of fuel poverty
Ambiguous, reflecting the overall income balance of households with high costs that receive assistance.

Effect on the fuel poverty gap
As for the measure of extent, with the largest fuel poverty gaps likely to be reduced.

13. As can be seen, this type of policy would tend to lower bills for high-cost households, in that way tending to reduce fuel poverty and lowering fuel poverty gaps. However, the outturn in practice would depend on the precise way in which different types of household with high costs (fuel poor and non-fuel poor) were assisted as there would also be some effects on the median bill and so the cost threshold.

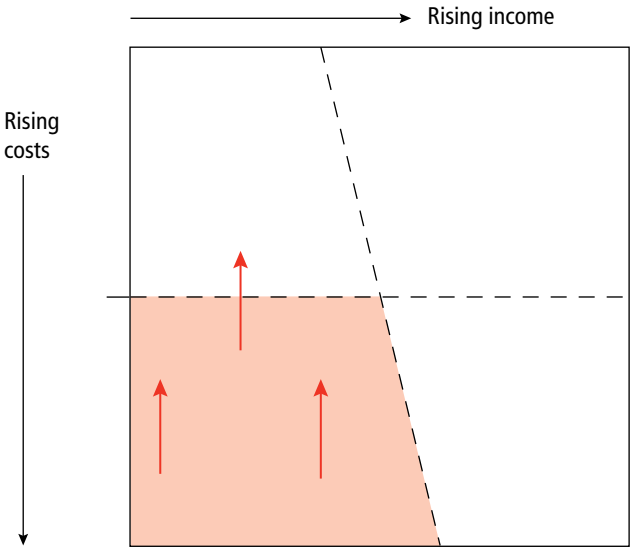
14. Energy efficiency improvements would represent a long-term change in household circumstances. This has implications for cost effectiveness which are considered in Chapter 7.

Example 3

15. A policy such as Warm Front represents an energy efficiency policy that is targeted on those low-income households with low energy efficiency. The effect of this policy – which is tax-payer funded, although we have not allowed for this here – can be represented as follows:

16. Because of its focus on households in the fuel poverty quadrant, this policy would lead to reductions in the fuel poverty extent and depth indicators (with only limited effects on median bills and the cost threshold).

Figure 4.3: *Impact of an energy efficiency policy targeted at low-income households with low energy efficiency*



Effect on cost threshold
It would tend to fall a little.

Effect on income threshold
None, although it would intersect the cost threshold in a different place.

Effect on measure of extent of fuel poverty
The number of households would fall.

Effect on the fuel poverty gap
The aggregate gap would fall.

4.3 Income-based policies

17. Policies increasing incomes would move households benefiting from them to the right of the diagram showing the LIHC framework. If all households received the same benefit, the median would change but the distribution around it would remain broadly the same. An income-based policy focused on poorer households would improve their position relative to the median (unless more than half of households benefited). Depending on their level of costs, this could move them out of fuel poverty. The aggregate fuel poverty gap would fall both because some households were removed from fuel poverty altogether but also because some would be moved to only just below the income threshold.

Example 4

18. The next example focuses on the incomes of low-income households, such as a general increase in benefit levels or increasing the take up rates of benefits to which people are already entitled. The effect of such a policy might expected to be as shown in Figure 4.4.

19. Under such a policy, there would be no change to the costs threshold, although the income threshold could be increased a little (if some middle-income households benefited). This policy could reduce fuel poverty by pushing households in the fuel poverty quadrant to the right-hand side of the income threshold. Where this happened, fuel poverty gaps would be eliminated. There would also be some reduction in the fuel poverty gap as a result of pushing some households towards the leading edge of the fuel poverty quadrant (since the fuel poverty gap is the shortest vertical distance to the 'edge' of the fuel poverty quadrant).

20. As with the Warm Home Discount, such payments would need to be continued, or their impact would only be one-off. See Chapter 7 for consideration of implications for cost-effectiveness.

Example 5

21. The final example, shown in Figure 4.5 reflects a policy – such as Winter Fuel Payments, if they are classed as an income supplement – which directs income support to a large number of

Figure 4.4: *Impact of an income improvement policy targeted at low-income households*

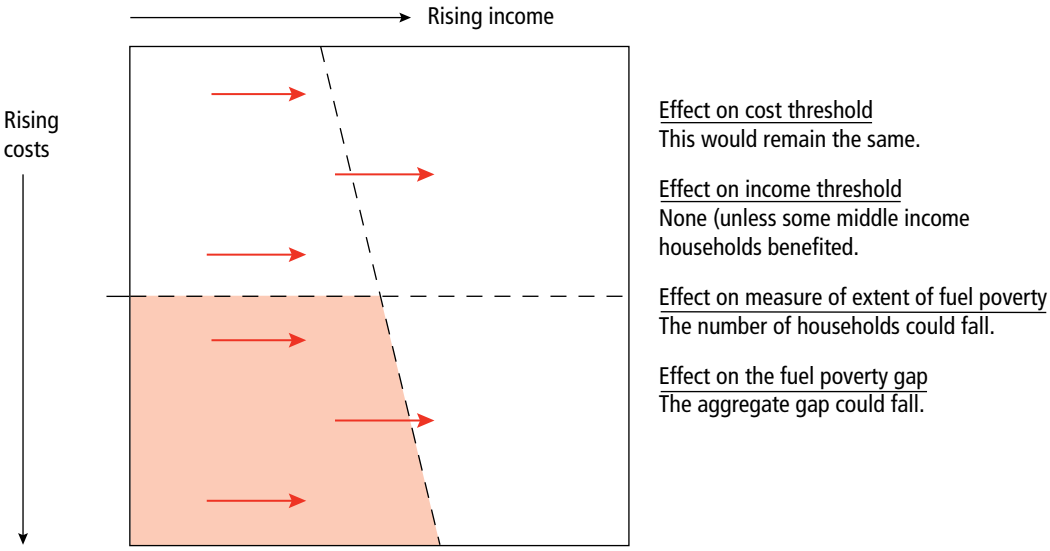
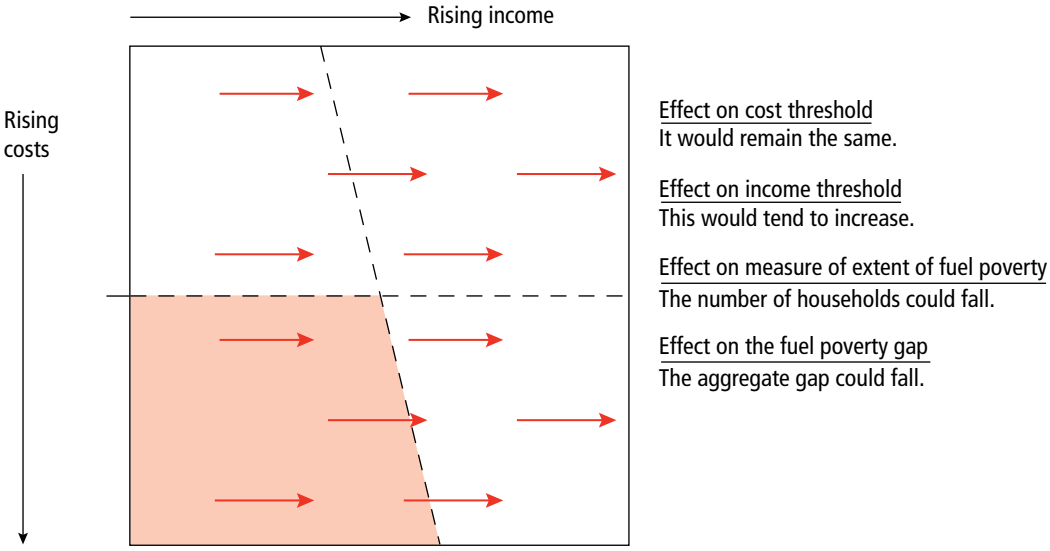


Figure 4.5: *Impact of a non-means tested income support measure*



eligible households regardless of income. In the case of those payments, there is, of course, an age qualification.

22. This policy would leave the cost threshold unaffected. The income threshold could see an increase, depending on the rate of changing incomes across the whole population. As with Example 4, the extent and depth of fuel poverty would fall through some households being pushed over the income threshold (or into the leading edge of the fuel poverty quadrant).

4.4: The effect of funding source on the impact of policies

23. These stylised examples have looked at the effects of different kinds of policy without specifically allowing for how they could be funded. However, the funding route could also affect fuel poverty measured under our proposed indicators. The overall impact of a given policy depends on the balance of these effects. In other words, the net effect reflects the type of policy in question, the type of households targeted and the type of funding used.[48] We allow for these effects in our investigation of the relative impacts of different types of policy in Chapter 7.

24. Beyond voluntary expenditure by individual households (including expenditure that is incentivised through policy) there are two main sources of funding: the Exchequer and levies on energy bills. We look at these here.

Tax-funded policies

25. Assuming that funding were provided through direct taxation (e.g. income tax) – and assuming that we are considering new policies which add to the tax burden rather than displacing other tax and spend – the impact of funding policies in this way would be as follows:

    - there would be no impact on the reasonable costs threshold;
    - median income would be affected and the income threshold for the low income high costs indicator would therefore change.

26. The effect could be slightly different for indirect taxation (e.g. VAT) depending on the goods and services which gave rise to it. In the case of taxation raised on goods and services other than domestic energy the impact would be the same as for direct taxation. On the other hand, increasing the level of taxation charged on domestic energy would have an impact on the reasonable costs threshold.

27. Data from the Office for National Statistics (ONS)[49] suggest that, measured against gross incomes, general tax increases would affect households approximately in proportion to their income, although they would be a slightly higher proportion for both the poorest and richest fifth.[50] Given this, the overall distribution of household income would be unlikely to change. Broadly speaking, a fuel poor household before the increase in taxation would be fuel poor afterwards; similarly a non-fuel poor household would probably remain outside fuel poverty. In other words, tax-funded measures have a roughly equi-proportional impact on net incomes and therefore this type of funding would not affect the extent indicator under the LIHC approach.[51]

Policies funded by energy consumers

28. This range of funding sources could include increased VAT on energy spend, a carbon tax, or the impact on bills of the wide range of policies currently funded through levies on energy suppliers whose costs are assumed to be passed through to consumers.

48 Another reason for excluding the effect of funding from our stylised examples above is the fact that the net effect of different policies changes over time. One reason for this is that certain policies have effects that last longer than the policies themselves. So, while the costs of levy-funded policies are assumed to be passed on only during the operation of the policies themselves – for example, five years in the case of CERT – the benefits accrue well beyond this period (the lifetime of insulation measures delivered under CERT is taken to be 20 years). This means that the net effect of a given policy in a given year could be different from the same policy in a different year.

49 ONS Statistical Bulletin, 19 May 2011, *The effects of taxes and benefits on household income*. London: ONS.

50 At the very bottom of the income scale, people pay little or no income tax. However, they contribute through indirect taxation on spending (typical spending patterns mean that such households would be expected to pay indirect tax equivalent to quite a high proportion of their income). At the very top of the income scale, people pay much higher levels of income tax, with rather less paid (as a proportion) through indirect taxation.

51 The reasoning in paragraph 27 above also implies that certain types of tax funding – for example the imposition of additional VAT on fuel or a carbon tax – might not have this impact because they would be levied in a way that reflected energy consumption. We briefly consider hypothecation of tax revenue for energy efficiency or other fuel poverty related policies in Chapter 5. Such hypothecation would alter the fuel poverty impact of tax-funded schemes.

29. These ways of raising funding would increase bills for consumers, but would also have an impact on both the reasonable costs threshold (as median bills would rise) and on the income threshold (as its level rises for those with greater bills). Taken in isolation from the impact of any measures funded, this would be expected to raise both the fuel poverty headcount and fuel poverty gaps. The precise impact would, however, depend on the way in which the costs were passed on and the degree of those costs.[52]

30. For example, a policy that was funded in a way linked to consumption (e.g. a carbon tax) would tend to increase fuel poverty gaps since fuel poor households have high modelled costs. Also some more households on the margins of poverty would be pulled into fuel poverty by their increased costs. This same effect would be expected where a policy were funded through a levy with costs recouped on a consumption basis. This effect is discussed further in Chapter 5 in relation to rising block tariffs.

52 Note that the measurement framework shows the effects on households if they consumed the amount shown by modelling to meet their needs. Where households actually prioritise other needs – and live at low temperatures – the effects on their actual spending will be less. What the framework shows is the increase in the costs that would be needed to reach the standard level of warmth.

31. Where a new policy were funded through a levy where costs were passed on to consumers on a 'poll' basis, each customer would face the same 'standing cost' for the policy. This approach would affect both the reasonable costs and income thresholds. It would shift more households into fuel poverty and aggregate fuel poverty gaps would rise because of the change at the margins (in relation to the income threshold).

32. Under any policies, it is also important to remember that the overall picture over time will also be affected – perhaps more affected – by other changes taking place elsewhere across the whole economy. Of primary importance are changes in income levels and energy prices – although the trend of improvement in the housing stock is also an important background factor. In Chapter 6 we look at what could happen to fuel poverty levels as measured under the LIHC indicator (including the fuel poverty gap) over the next few years, taking account of potential changes in these three background factors. Our analysis compares this to projections of fuel poverty under the official indicator. Chapter 6 includes details of specific assumptions we make about these factors, drawing on published projections by DECC and the Office of Budget Responsibility and our own analysis.

Chapter Summary

In this chapter we show in principle how different kinds of policy – price-based, energy efficiency-based or income-based – can affect the number of households with different combinations of high and low costs and incomes. We also discuss the different effects of interventions funded by taxes and those funded by energy consumers. While tax-funding does not generally change the impact of particular kinds of intervention, funding from energy consumers can increase the fuel poverty gap of those who do not benefit from them.

A major benefit of the measurement framework is that it facilitates a better understanding of the type of policies that would benefit particular kinds of household and the impact on them relative to all other households. It also supports an understanding of the lifetime effects of policies. This combination means that the LIHC framework can provide a helpful tool for policy-makers when considering the trade-offs they have to make when shaping policies.

Policies for tackling fuel poverty

1. We now examine the suite of more specific policy interventions that are in place, or could be put in place, to tackle fuel poverty. The first section in this Chapter looks at the Government's current policy package (including those policies – such as the Green Deal – that are under development). The second section examines other policy approaches that have been proposed as potentially important additions (or alternatives) to the existing policy framework. There is also a brief discussion of those policies which could help alleviate fuel poverty through changing behaviours. The Chapter is intended to set the discussion of interventions to tackle fuel poverty in a practical context. It is beyond the scope of the Review to comment on the many crucial issues that surround implementation of policies on the ground.

2. Chapter 6 looks at projections of the extent and depth of fuel poverty taking into account the current policy package. Chapter 7 looks at the potential impacts of variations to the current policy package of different kinds, indicating their cost-effectiveness within the framework we have developed.

5.1 The current fuel poverty policy package

3. Government policies affect each of the drivers of fuel poverty: improving the thermal efficiency of dwellings, improving incomes and reducing energy costs. We discuss each of these in turn.

Thermal efficiency

4. The main focus of fuel poverty policy to date has been to improve the thermal efficiency of dwellings for low income and vulnerable households. The **Warm Front Scheme** is perhaps the best known of the current suite of fuel poverty policies, although it is currently being wound down. In operation since 2000, the policy provides Exchequer-funded grants for heating and insulation improvements to households receiving particular income-related benefits and living in properties that are poorly insulated and/or do not have a working central heating system. To date, around £2.8 billion has been spent through the Scheme, which has resulted in around 2.3 million households receiving assistance, at an average of some £1,200 per household. According to the 2010/11 Warm Front Annual Report[53], assistance through the scheme resulted in an average SAP improvement of 27 points, from 32 to 59. In the 2010 Spending Review, the Government announced a reduction in the level of funding for Warm Front for two years, after which time the Scheme would close. Funding was £369 million in 2009/10, £345 million in 2010/11 and £110 million in 2011/12 (supplemented by £20 million from the Department of Health as announced in late 2011).

53 http://www.decc.gov.uk/assets/decc/11/funding-support/warm-front/2747-warm-front-annual-report-2010-2011.pdf

5. Several factors suggest that Warm Front has been an effective tool for tackling fuel poverty. First, the measures delivered by the scheme – predominantly low-cost insulation and gas heating systems – are among the most cost-effective in terms of increasing household SAP and reducing energy bills (as was shown by the analysis presented in Chapter 2 in the interim report). Second, the measures are targeted at those households we consider to represent the core of the fuel poverty problem – low-income households in low SAP dwellings.[54] Finally, the policy is funded by the Exchequer. As we discussed in Chapter 4 this funding approach is generally less regressive than policies that are funded through a levy on energy costs. We would expect, therefore, that Warm Front would have a positive impact on the Low Income High Costs (LIHC) indicator, both in terms of headcount and the fuel poverty gap. We compare the effectiveness of this broad kind of approach with others in Chapter 7.

6. In the past, Warm Front has been criticised for helping too many households who did not need assistance. For example, in their most recent examination of the Scheme, the National Audit Office (NAO) suggested that the use of benefit entitlement to determine who is eligible for Scheme grants had resulted in inefficient targeting of resources.[55]

7. As we have already seen in Chapter 3, targeting policy is not straight-forward and the use of proxy indicators (e.g. receipt of a means-tested benefit) will always result in some non-fuel poor households being eligible for support. However, in the case of the NAO criticism of the Warm Front Scheme, we believe that the use of a flawed indicator of fuel poverty is a significant factor. For example, when prices were low in the middle of the last decade, the 'hit rate' (i.e. the proportion of households that were eligible for support under the Scheme that were classed as fuel poor under the current indicator) for Warm Front was found to be very low (around 14 per cent in 2004). But this reflected the fact that, at a time of low prices, the indicator of fuel poverty reported only limited numbers of fuel poor households. Had the official indicator reflected more closely the number of households facing high costs, in relative terms, the targeting under Warm Front would have appeared to be much better – e.g. our calculations suggest that the Warm Front fuel poverty 'hit rate' in 2004 under the LIHC indicator would have been twice as high, around 28 per cent.

8. For its part, the **Decent Homes** programme has resulted in a significant improvement in the thermal efficiency of the stock of Local Authority housing. In 2000, the then Government set a target to ensure that all homes met a set standard of 'decency' by 2010 (where the criteria for the standard are based around: meeting the current statutory minimum standard for housing; being in a reasonable state of repair; having reasonably modern facilities and services and providing a reasonable degree of thermal comfort). Local Authorities were required to set out a timetable under which they would carry out improvement work to their housing stock in line with the conditions set out in the standard.

9. As a result, there has been very significant public investment in improving the quality of Local Authority housing over the course of the last decade. Since 2001, around £3.7 billion has been invested in improving the thermal efficiency of the social housing stock (this is not all as a result of Decent Homes) resulting in around 844,000 Local Authority dwellings receiving insulation and around 1.2 million receiving a new or replacement heating system.[56] This is reflected in the average SAP rating of Local Authority housing – which increased from 50 in 2001 to 60 in 2009[57].

54 For the majority of the time it has been in operation, Warm Front assistance has been available to households that were receiving of one of a number of means-tested and non means-tested benefits. Since 2011 new and tighter eligibility criteria have been applied, whereby a household needs to be in receipt of one of a number of means-tested benefits (non means-tested benefit recipients are no longer eligible) and in a household with a SAP rating lower then 55 (which is applied through a SAP assessment of the dwellings of applicant households).

55 http://www.nao.org.uk/publications/0809/the_warm_front_scheme.aspx

56 http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/2184-fuel-poverty-monitoring-indicators-2011.pdf

57 See the English Housing Survey headline report, 2011.

10. We would expect that a policy such as Decent Homes that uses Exchequer funding to make improvements to the thermal efficiency of low-income households will have had a positive impact on the Low Income High Costs indicator – both in terms of the headcount and the fuel poverty gap.

11. Improvements to the thermal efficiency of dwellings have also been driven through a series of statutory obligations that have been placed on energy suppliers. These obligations include the **Energy Efficiency Commitment (EEC), Carbon Emission Reduction Target (CERT) and Community Energy Saving Programme (CESP).** The primary objective of these measures is to reduce carbon emissions in the household sector. Energy companies have met their obligations largely by delivering energy efficiency measures to households, thereby helping to reduce their energy costs.

12. These policies have resulted in significant spending on energy efficiency measures in the household sector. The Government estimates that CERT – which started in April 2008 and is due to finish at the end of December 2012 – drives some £1 billion of annual expenditure across all households. In turn, CESP is expected to deliver £0.35 billion of expenditure in deprived areas over the 39 months of the policy, about £110 million per year (CESP runs from the beginning of September 2009 until the end of December 2012).

13. One of the arguments for delivering policies through this type of obligation is that Government expects energy companies will wish to minimise the cost of meeting targets, thereby leading to cost-effective delivery of objectives.[58] At the same time, it is assumed that energy suppliers recoup the cost of delivery through higher energy prices on all households. Since energy expenditure makes up a large proportion of overall spending for lower-income households, this increase in energy costs represents a relatively regressive means of funding a policy (by comparison to a policy that is funded through general taxation).

14. As was shown through the discussion of distributional impacts in Chapter 1, these policies create groups of 'winners' (who receive energy efficiency measures) and 'losers' (who pay for the policy through higher prices but would receive no measures). The key thing from a fuel poverty perspective is to ensure that an equitable share of measures is directed at low-income and vulnerable households. Achieving this would mean meeting the dual objectives of reducing carbon emissions while ensuring that the poor are not left behind. The key to this kind of success is policy design. The EEC, CERT and CESP all incorporate elements that help to ensure that lower-income households receive a share of the energy efficiency measures that are delivered through the scheme. For example, EEC and CERT have so-called 'priority groups' of low-income and vulnerable households in which energy suppliers are required to deliver a specified proportion of the overall effort whilst CESP is targeted at areas that score highly on the Index of Multiple Deprivation.

15. As explained in principle in Chapter 4, the impact of supplier obligations on fuel poverty (as defined by the Low Income High Costs framework) depends on:

    - the overall size of the obligation (which determines the level of costs passed through to energy bills);
    - the types of measures installed through the obligation; and
    - the targeting of measures (specifically the balance between measures delivered to high income and lower income households).

16. An obligation that targeted measures mainly at lower-income households would be likely to result in a reduction in fuel poverty (although this would depend on the net impact of the higher bills due to

58 Although without careful criteria-setting this can lead to 'game-playing' and relatively ineffective measures being deployed. A commonly cited example is delivery by suppliers of low-energy light-bulbs to their customers, a practice ruled out from April 2011.

cost pass-though and the impact of the measures that are delivered), while an obligation that focused support mainly on better-off households could result in a worsening of fuel poverty.

17. Improvements to the thermal efficiency of the household stock will also be driven by those policies that have been put in place (or will be introduced in the near future) to make progress towards the UK's renewable energy target. Small-scale **Feed-In Tariffs (FITs)** were introduced in 2010 and are available for households that install and use small scale renewable electricity generation technology. The sorts of measures supported through FITs policy – which include wind, solar photovoltaics, anaerobic digestion and domestic scale micro-Combined Heat and Power – do increase household SAP ratings and reduce household energy costs. However, the up-front cost of measures can be high and the impact of some measures can be relatively modest compared to some other heating and insulation measures (as was shown in Chapter 2 of the interim report). Under the FITs scheme, households that install micro-generation renewable electricity receive a payment from their energy supplier for each unit of electricity that they generate and use. Energy suppliers recoup the costs of the policy through higher energy prices.[59]

18. While any household can qualify for support under the policy it is not well-tailored to poor households and, in practice, take up is likely to be predominantly in high-income households. This is because they are more likely to be able to have access to capital to be able to cover the up-front costs of the measure.[60] That being the case, the policy is likely to have a small but negative impact on fuel poverty overall because lower-income households are left behind but contribute to its cost.

19. The Government is currently developing policy proposals to encourage the take up of renewable heat in the domestic sector. A **Renewable Heat Incentive (RHI)** for the non-domestic sector – which provides a continuing Exchequer-funded subsidy for the installation and running of renewable heat – was launched by DECC in 2011. The Government also launched the **Renewable Heat Premium Payment (RHPP)** in 2011. This was said to be short-term provision of support for domestic renewable heat put in place while Government worked up a more substantial proposal for the future. The operation of the RHPP is also designed to assist Government in the development of the evidence base on the performance of the technologies.

20. Like micro-generation technologies, the installation of a renewable heating system – such as a ground or air source heat pump – improves household SAP. In general, these technologies are less effective in reducing household energy costs than a conventional gas system (although the comparison can be much more favourable for those off the gas grid) and tend to be more costly to install. It is unlikely, therefore, that renewable heat technologies would be taken up in large numbers by low-income households unless there were generous subsidies to cover the up-front costs. That being the case, renewable heat measures are unlikely to make a significant contribution towards reducing fuel poverty in the immediate future.

21. The **Green Deal and Energy Company Obligation (ECO)** will be the Coalition Government's primary policy for improving energy efficiency, including in the domestic sector. At the time of writing, the Government is consulting on secondary legislation and hopes to launch the policy in Autumn 2012.

22. Several elements of Green Deal will have an impact on domestic energy efficiency. These include:

59 The future generosity of the scheme is currently unclear. The Government held a consultation in late 2011 on the level of FITs subsidy for solar PV that led to legal action whose final outcome is unknown at the time of writing.

60 However, some companies use a business model for solar PV sometimes known as 'rent-a-roof'. Under this model, a company puts up the capital required for a solar installation on a householder's roof. Typically the household would benefit from the electricity generated but the company would receive all of the income from the FIT. Such an approach may mean that some lower-income households benefit from these technologies but to a much lesser extent than those putting in the capital themselves.

a. minimum energy efficiency standards for the Private Rented Sector;

b. a new financial instrument ('**Green Deal Finance**') that allows householders to upgrade the thermal efficiency of their home at no up-front cost, with investment paid back through electricity bills (at the same time as the cost savings accrue); and

c. an **Energy Company Obligation** that places two obligations on energy suppliers:

   i. a **carbon obligation**: energy suppliers will be required to make a specified amount of carbon savings in the household sector. As is the case under existing supplier obligations such as CERT, energy suppliers will meet this obligation by delivering energy efficiency measures – predominantly solid wall insulation (SWI). It is envisaged that energy suppliers will meet their ECO carbon obligation by co-financing measures with Green Deal finance (i.e. the energy supplier will pay part of the up-front cost of the measure, with the household covering the remaining cost through Green Deal Finance). It is proposed that energy suppliers will be able to count the *full* carbon score (towards compliance with their obligation) of an energy efficiency measure even where a proportion of the costs is financed through Green Deal Finance.[61]

   ii. an '**Affordable Warmth**' **obligation**: this will be an obligation on energy suppliers to make a specified energy bill reduction in a set of low-income and vulnerable households (where the obligation is specified in terms of a SAP-based reduction in energy costs – in other words, a reduction in the costs of meeting a specified level of thermal comfort). It is envisaged that suppliers will meet this obligation by providing fully-subsidised heating and insulation measures (predominantly new and replacement gas central heating) to eligible households.

23. Under Green Deal Finance, providers will offer energy efficiency retrofits to householders. Where the retrofit can meet the Green Deal's 'Golden Rule' – which says that the expected financial savings from the measure must be at least equal to the cost attached to the energy bill (and is effectively a test for cost-effectiveness) – the investment will be made at no upfront cost to the customer. The provider will in effect make the finance available, to be paid back over up to 25 years by the electricity bill payer through a charge on his or her electricity bill. Based on current prices and expected savings, the charge should not exceed the value of the savings enjoyed by the householder, so that the householder pays less or at least no more in total for energy than he or she would have done without the measures being installed. If prices were to rise, savings would be greater because each unit of energy saved would have a higher value, but if prices fell, savings would be lower.

24. Where the Golden Rule cannot be met – which is likely to be the case for a large number of energy efficiency measures, including most solid wall insulation – then an energy supplier may be able to provide some ECO subsidy to help co-finance improvements (which would allow that supplier to count the full carbon saved towards its carbon obligation). ECO will therefore play a role in maximising the potential of the Green Deal finance mechanism.

25. Energy suppliers are expected to recoup the costs of the ECO through higher energy prices. The scale of the policy will therefore affect the level of costs passed through to consumers. The ECO will be specified in terms of outcomes (i.e. an aggregate

61 On the face of it, this would seem to introduce a bias towards households able to make a financial contribution to measures and towards properties that are close to meeting the Golden Rule. In turn, and to the extent that higher-income households (with higher energy consumption) are more likely to be able to meet the Golden Rule, this could reinforce the importance of some kind of distributional mechanism (to ensure an equitable share of the carbon objective is met within lower-income households) as well as of the Affordable Warmth element of ECO. At the time of writing, the Government is considering the responses to its consultation on the Green Deal and ECO which explicitly sought views on this issue.

reduction in carbon emissions and in household energy costs) rather than in terms of an amount of expenditure. However, the Government has estimated that the ECO at the current proposed scale will cost energy suppliers around £1.3 billion per annum,[62] contributing to the impact we see on bills in 2020 set out in Figure 1.6. The level of cost associated to ECO is similar to the cost of the current range of supplier obligations; DECC therefore suggests that the Green Deal and ECO are unlikely to result in an increase in prices compared to the current situation.

62 The Government has stated its intention that the ECO will operate for ten years, however funding arrangements have only been confirmed for the current Spending Review period (i.e. up 2014/15). For more details see: http://www.decc.gov.uk/assets/decc/11/consultation/green-deal/3603-green-deal-eco-ia.pdf

26. The DECC Green Deal consultation document and Impact Assessment[63] proposed that that some 25 per cent of the ECO (which would equate to around £325 million per year) should be for the delivery of the Affordable Warmth objectives. As mentioned, Government expects energy suppliers to meet these objectives primarily through the installation of insulation and new and replacement gas central heating systems to households that are receiving particular means-tested benefits. These measures would increase the thermal efficiency of dwellings (and reduce energy costs) and would also drive a net reduction in carbon emissions (further detail of the expected impact of the Affordable Warmth obligation on carbon emissions measured in different ways is set out in Box 5.1).

63 http://www.decc.gov.uk/en/content/cms/consultations/green_deal/green_deal.aspx

Box 5.1: Carbon impact of installing heating systems through the Affordable Warmth obligation

As set out in the DECC consultation on the Green Deal and ECO, it is currently assumed that the Affordable Warmth obligation will be met predominantly through the installation of new and replacement gas central heating systems. Installing a new gas system in a home that previously had no heating system means that the household switches from using a 'secondary' heating source – most likely to be relatively inefficient plug-in electric heaters – to using gas. From the household's perspective, the move results in a net reduction in household carbon emissions. For instance, heat is now being produced in the house by directly using gas in an efficient boiler, rather than the gas being used in a distant power station, generating electricity that is subject to substantial transmission losses.

The national picture is, however, complicated by the carbon accounting framework. A move away from electric heating reduces emissions from electricity generation. This is a sector that is included in the EU Emissions Trading System and these 'traded sector' emissions are capped at an EU level. As such, a reduction in emissions in UK power generation – while good for the UK in that it reduces the number of EU allowances that need to be purchased by UK generators – does not reduce carbon emissions overall. This is because a reduction in emissions from UK generation means, all things being equal, that another installation in the EU can increase its emissions by the same amount – the so-called 'waterbed effect'.

On the other hand, the emissions from domestic gas use are not included in the EU Emissions Trading System – they are not capped in the same way as emissions from electricity generation. An increase in gas usage resulting from a move to gas central-heating represents an increase in emissions in this 'non-traded sector.' In turn this makes it more difficult for the UK to meet its carbon budgets.

On one level, it may appear that there is a conflict between Affordable Warmth and carbon objectives. However, seen from an 'end-user' perspective, the shift from electricity to gas drives a net reduction in carbon emissions. This creates the ability for emissions caps to be further reduced. Moving away from the 'static' analysis of traded and non-traded emissions means that the there need be no ultimate conflict between Affordable Warmth and carbon objectives.

27. The remaining ECO subsidy, some £950 million per annum, is intended to work alongside the Green Deal Finance mechanism for delivery of solid wall insulation.[64] The Government is consulting on the need for some form of a distributional safeguard to ensure that the delivery of SWI measures is spread across households in an equitable way. At the time of writing, the Government has not concluded its assessment of the need for such a safeguard. An assessment of the distributional impacts of the current proposal for Green Deal and ECO is set out in Box 5.2.

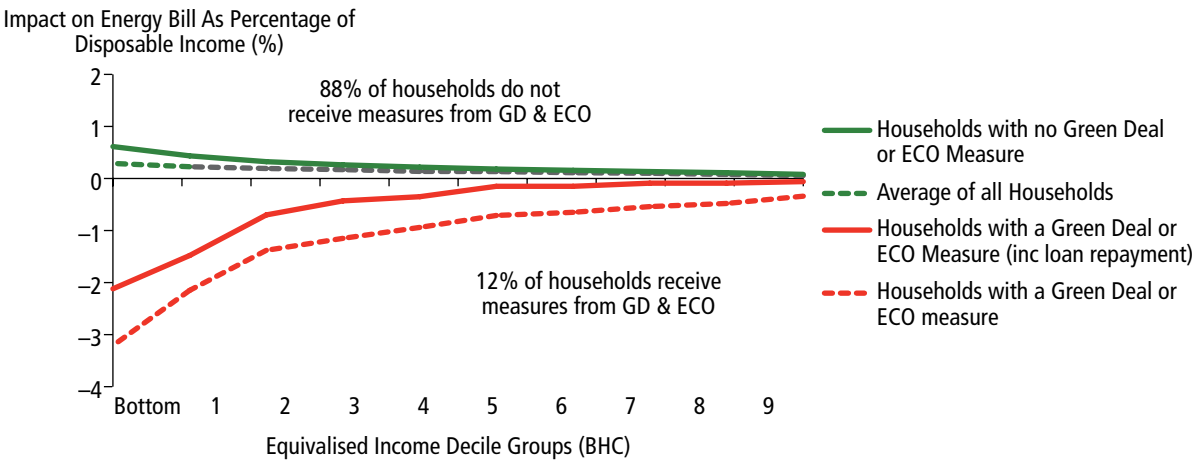
28. Flowing from the discussion in Box 5.2, it is clear that the key questions from the fuel poverty perspective in relation to the Green Deal and ECO are: how many households with low incomes and high costs stand to benefit from the Green Deal and what are the implications of households with high incomes and high costs being the main focus of policy.

64 In a recent letter to DECC, the Committee on Climate Change criticised the narrow focus of the Green Deal ECO. They argued that low levels of uptake of loft and cavity wall insulation would create a problem for meeting carbon budgets and mitigating bill impacts and said that 'the Government should consider including full potential for loft and cavity wall insulation in the ECO'. See: http://www.theccc.org.uk/news/latest-news/1134-ccc-expresses-concern-about-green-deal-proposals-20-december-2011

Box 5.2: The distributional impact of Green Deal and ECO

Figure 5.1 shows how the proposed Green Deal and ECO – based on a 25 per cent share of the funding for Affordable Warmth and 75 per cent for carbon objectives – is expected to affect the energy costs across households in 2020. There is a group of households that receives measures (and that therefore sees a reduction in energy bills – particularly where households receive fully subsidised measures through the Affordable Warmth obligation) and a significantly larger group of households that does not receive measures but pays the costs of the policy through higher energy prices (thereby facing higher energy bills).

Figure 5.1: *Distributional impacts of Green Deal and ECO in 2020*



Source: Distributional Impacts Model for Policy and Strategic Analysis

Box 5.2: The distributional impact of Green Deal and ECO *(continued)*

As can be seen, it is expected that households at the bottom end of the income range will, on average, see an increase in their energy bill as a percentage of disposable income whereas richer households see little change.

For the poorest tenth the average net loss is equivalent to 0.3 per cent of disposable income. This is both regressive and has a limiting effect on the contribution the package can make to reducing fuel poverty. The distributional outcomes of Green Deal and ECO would change were a greater amount of the overall support focused at low-income households. A more equitable distribution of the costs and benefits of ECO would mean those in the lowest three income decile groups breaking even on average – as is already broadly the case for the highest income decile groups. Although it is very difficult to model how this scenario could be brought about, our best estimate is that to remove the regressive effect more than half of the spending under ECO would need to be targeted towards the fuel poor, rather than a quarter.[65]

However, encouraging low-income households to take up measures under the carbon obligation would be likely to require greater (or even full) subsidy. This follows from the fact that lower-income households tend to use small amounts of energy relative to need and a presumption that they will take greater levels of comfort. Therefore the improvement in distributional outcomes is not costless. It also means that, for a given level of overall expenditure, the policy would deliver fewer measures and abate fewer GHG emissions.

A focus on low income households would also be expected to reduce the extent and depth of fuel poverty. We return to this issue in Chapter 6 when we look at the expected impact of the current policy package on fuel poverty outcomes. In Chapter 7 we look at the scale of impacts on fuel poverty of interventions that are either narrowly focused (such as Affordable Warmth) or broadly focused (such as the Carbon Obligation).

29. On the face of it, the Green Deal mechanism is not tailored to meet the needs of the fuel poor. It was shown in Chapter 2 of our interim report (and also in a recent study undertaken by Loughborough University and the Centre for Sustainable Energy[66]) that, while fuel poor households have high modelled energy requirements, the reality is that budgetary constraints are likely to mean they have relatively low actual consumption. Their actual energy bill is the starting point for the Green Deal. Where a household is significantly under-consuming energy relative to need, is likely to take greater comfort as the thermal efficiency of the home is improved. This means that, for many low-income households, there is less potential to make savings to repay a Green Deal charge. Making Green Deal finance work for these households (i.e. ensuring that the Golden Rule is met) would require energy suppliers to subsidise a greater proportion of the up-front costs. This would be likely to make fuel poor households less attractive to energy suppliers

65 For simplicity in the absence of more complex modelling, we have assumed an equal level of subsidy per household under ECO, and have calculated this broadly as around £2,600. We have then estimated the impact of a different approach to targeting by redistributing a number of households receiving measures in higher income decile groups to lower income decile groups. We have done this until the average impact for households in the three lowest income decile groups is at or close to zero. We have then multiplied the number of households redistributed from higher income groups receiving measures to the lowest three income decile groups receiving measures (around 150,000 per year from 2013 to 2020) by the value of £2,600. This gives a total of £390 million per year in addition to the current level of the ECO envelope targeted at lower income groups. Accounting for the existing 25 per cent for Affordable Warmth, this would broadly translate into at least 56 per cent of the current ECO envelope being targeted at low-income groups.

66 http://www.consumerfocus.org.uk/files/2011/10/Understanding-fuel-expenditure.pdf

compared to higher-income households and could result in their being excluded from the Green Deal.

30. The Government expects some fuel poor households to be assisted through the installation of solid wall insulation under ECO. Where this happens, this would have the effect of reducing fuel poverty. The biggest doubt here is about the scale of expenditure within the ECO on this set of households. The Government's decision on distributional questions is pivotal.

31. On balance, a successful Green Deal programme, accompanied by an ECO that spends a relatively small amount of its total available funding on the fuel poor, would be expected to increase fuel poverty under our proposed measurement framework. This is because it would lower the median bill by reducing the costs of a number of high income high costs households, many of whom would move across the high costs threshold. This would make the plight of those people in homes that have been untreated relatively worse. Chapter 6 shows the projected impact of the ECO in 2016. Chapter 7 adds further significant analysis relating to this question, based on modelling the effects of different kinds of approaches to fuel poverty.

32. The interaction set out in the preceding paragraph has been criticised for putting fuel poverty and carbon mitigation policies into tension. In fact, a tension between fuel poverty and carbon mitigation has always existed. Lower-income households will tend to 'take-back' a larger proportion of the potential saving from efficiency measures in higher temperatures – which is desirable as many currently under-heat relative to need, suffering health and other consequences – which will reduce the potential to finance costs through energy bill savings. There is also a risk that, as efficiency standards improve as a whole, poorer households get left behind. As we argued in Chapter 4 of the interim report, the existence of a cohort of marginalised households – the fuel poor – is actually a barrier to the deployment of carbon mitigation policies. At some point, the argument could be made that their isolation is too high a price to pay for reducing emissions.

33. We believe that the solution is to tailor policies effectively so that the poor will more than keep pace with the general improving trend rather than falling behind. A Green Deal policy that leads to the worst remaining homes being lived in by poor people could not be considered a success. It is a major positive feature of the indicator we propose that it would provide an incentive to develop policy in a way that takes account of the impact on fuel poor households. It is also important to stress the importance of also looking at the fuel poverty gap here. This may show a reduction in the aggregate depth of fuel poverty even if the headcount measure shows that the pace of improvement in fuel poor households is not fast enough to improve the position of all lower-income households relative to richer ones.

Improving incomes

34. There is a range of means-tested and non means-tested benefits that are aimed at increasing household incomes – receiving any of these benefits increases household income and reduces the likelihood of a household being fuel poor. The level of benefits, and whether those who are entitled to them receive them, are obviously key influences on whether people have low incomes to start with, as is whether people are in, or can move out of, situations where they need them. However, the two key benefits that are fully or partially aimed specifically at supporting households with high energy costs are the Winter Fuel Payment and Cold Weather Payments.

35. The **Winter Fuel Payment** (WFP) is a non means-tested benefit paid directly into the bank account of all households with a member aged 60 or over. It is labelled as a payment to help the elderly to meet their fuel bills. Payments are made in winter, when fuel bills are at their highest. In 2011/12, eligible households received a payment of £200 per year (with households with a member over 80 years of age receiving £300 per year) and the policy is expected to cost around £2.1 billion making it significantly larger than the proposed scale of the ECO initiative.

36. In spite of its name, the WFP is paid as an open cash transfer and there is no requirement to spend any part of it on energy. That being the case, one might expect households to treat the Winter Fuel Payment as an increase to household income and therefore to increase their spending across all components of consumption. However, a recent study by the Institute for Fiscal Studies (IFS) [67] suggested that the labelling of the benefits as a payment to help with energy costs has a remarkable impact on the way in which the money is spent. Their estimates suggest that the observed group spent around 41 per cent of Winter Fuel Payment on energy (which compares with an expected 3 per cent if the household were to treat the WFP strictly as an increase in income). This finding suggests that even loosely earmarked transfer payments can potentially play an important part in reducing the extent of under-heating (and avoiding some of the health impacts associated with cold houses) among low-income households.

37. To the extent that this benefit moves some households across the income threshold, we would expect the WFP to reduce the extent of fuel poverty under the LIHC indicator. However, the overriding concern with the WFP relates to poor targeting and limited value for money from a fuel poverty perspective. It is striking – although perhaps not surprising given the lack of any targeting other than age – that only 26 per cent of WFP recipients are fuel poor on the basis of the current indicator and 10 per cent are fuel poor on the basis of the LIHC definition. This suggests that the policy is an inefficient means of making progress against this particular objective. However, the WFP may be seen by many as serving other objectives as well (e.g. in providing a pension top-up). As we discussed in Chapter 3, there are adverse side-effects of tight targeting and means-testing that also need to be taken into account in policy design.

38. The **Cold Weather Payment** (CWP) is a benefit paid directly by the exchequer to qualifying individuals, when the temperature is predicted to fall below 0°C for a period of seven days or more. The payment is £25 per week of cold weather. It is designed to act as an emergency measure for those in the eligible group so that they are able to heat their homes during extreme cold. The cost to the Exchequer on a yearly basis is unpredictable as it is based on weather and can vary heavily from year to year – for example, only around £4 million of CWPs were paid in 2007/08 whilst around £431 million were paid during the cold winter of 2009/10.[68]

39. CWPs are made to individuals who receive one of a number of means-tested benefits – including Pension Credit, Income Support, income-based Job Seeker's Allowance and income related Employment and Support Allowance who meet other eligibility criteria (such as those who have a child under 5). The policy is, therefore, relatively well targeted at low-income households. At the same time it takes no account of required energy costs (and is paid to 'high cost' and 'low cost' households alike). Overall it is likely to be better targeted as a measure to alleviate fuel poverty than the Winter Fuel Payment.[69]

67 Beatty, T, Blow, L, Crossley, T, O'Dea, C, (2011). *Cash by Any Other Name? Evidence on Labelling from the UK Winter Fuel Payment*. London: Institute for Fiscal Studies.

68 An increase in the weekly payment from £7.50 to the current level of £25 also accounted for some of this increase.

69 Although it is important to note that neither the Cold Weather Payments nor the impact on heating costs of the cold weather that trigger the payments are reflected very accurately in the fuel poverty statistics – either under the current or the proposed LIHC indicator. This is because modelled need for heating is based on a standard climate, rather than the actual temperatures experienced in any particular year, while CWPs are unlikely to be collected in the income section of the EHS.

Reducing energy costs

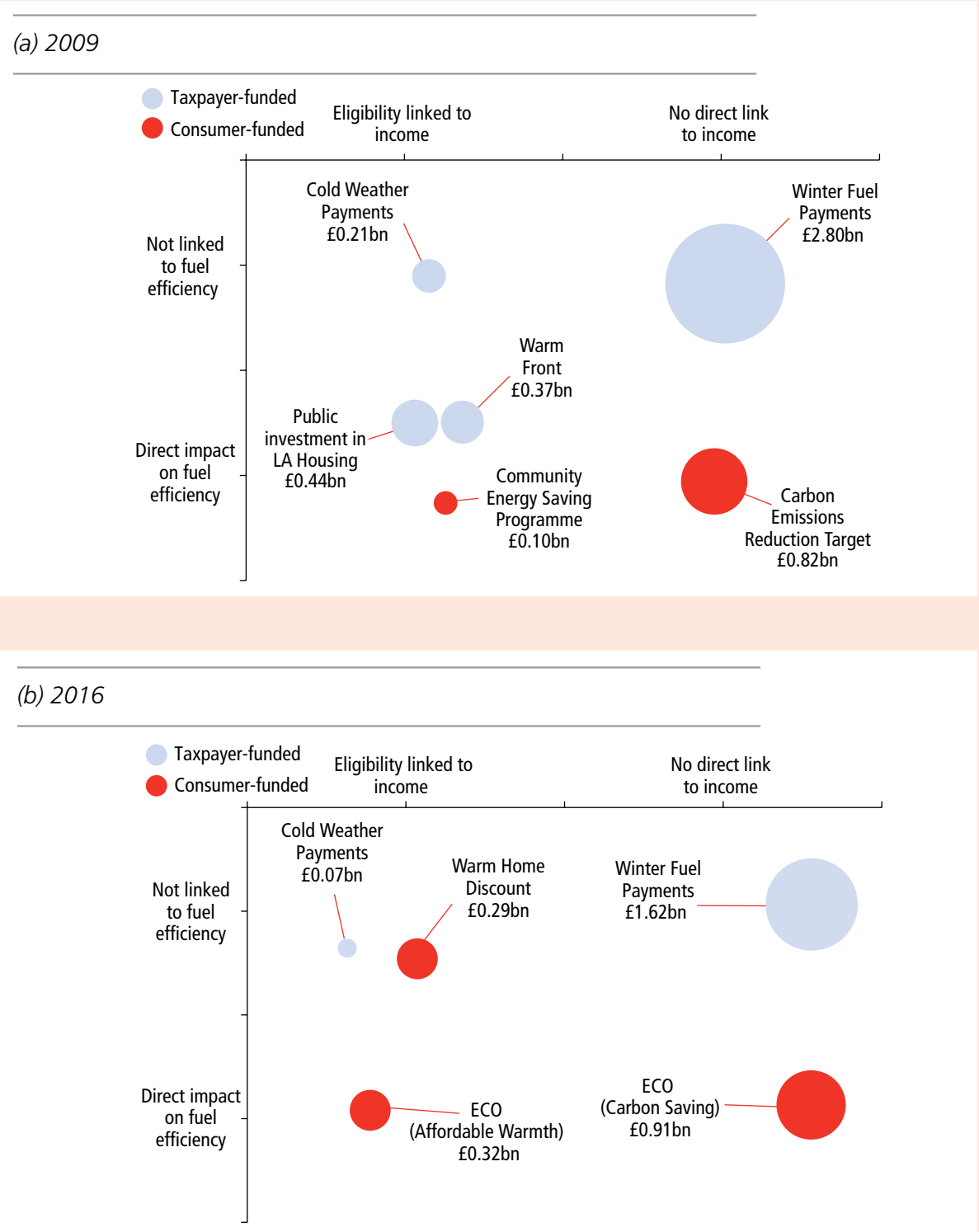
40. The Government launched the **Warm Home Discount** (WHD) in 2011 to provide direct energy bill support to a set of low-income households. Broadly speaking, this policy requires energy suppliers to provide energy bill rebates (of £120 in the first year) to a 'core group' of low-income pensioners (identified through a data-matching mechanism) and a 'broader group' of low-income households. Eligibility criteria for this second group are determined by energy suppliers, subject to guidelines set out in law. The policy is currently due to run from April 2011 until the end of March 2015 and requires energy suppliers to give discounts totalling £1.1 billion over the lifetime of the policy, averaging £275 million per year.

41. The Warm Home Discount is relatively well targeted at fuel poor households. For example, in the first year of the policy, around 70 per cent of core group households are fuel poor based on the current indicator (but only around 25 per cent based on the LIHC indicator). The relatively lower proportion of fuel poor households receiving the WHD under the LIHC indicator is partly a result of incorporating housing costs and equivalisation into the way incomes are measured. However, it also reflects the fact that the scheme eligibility criteria do not take account of the thermal efficiency of dwellings. As such, some low-income people in quite thermally-efficient dwellings will receive support under the policy.

42. The rebates for the WHD are paid for by energy suppliers, who are expected to recoup costs through higher energy prices. The impact of the policy on energy bills is different for households receiving a rebate (and whose bills are therefore reduced) from the impacts on those who do not. In Chapter 7 we examine the balance between these effects for this kind of intervention. The fact that WHD payments are targeted entirely at low-income households means that it is less regressive than the energy efficiency obligations (i.e. EEC, CERT, CESP) where only a proportion of the benefits accrue to low-income households. As such, we expect the Warm Home Discount to reduce both the extent and depth of fuel poverty in the years in which it operates, but, unlike capital investment, its effects are temporary. We discuss the issue of the duration of benefits from different types of interventions in more detail in Chapter 7.

This section has looked at the range of policy interventions that are either in place or are being put in place. Figure 5.2 summarises this, reflecting the policy position in 2009 and the current expected scenario for 2016. Each circle in the figure represents a particular policy, with its size determined by the scale of expenditure on the policy. The placing of each circle reflects the extent to which different policies are targeted at low-income households as well as their link to household energy efficiency. It can be seen that there is a mixture of targeting towards the fuel poor with policies such as CESP, Cold Weather Payments and Warm Home Discount (and Warm Front to a lesser extent) being more focused on low-income households and CERT, ECO and Winter Fuel Payments being more widely spread over the population. In Chapter 6 we show the projected impact of individual policies over the next few years against different indicators of fuel poverty.

Figure 5.2: *Levels spending on fuel poverty related policies in 2009 and 2016 (2009 prices)*[68]



70 The size of each bubble is internally consistent for 2009 and 2016 respectively. All funding flows are expressed in real 2009 prices. This means that policies that are fixed in cash terms (such as the Winter Fuel Payment) will have a lower value in 2016 than in 2009 due to the effects of inflation.

5.2: Other policy approaches

43. We turn now to consider other policies that could potentially help to tackle fuel poverty, many of which were raised through the call for evidence or consultation on the interim report. As before, the policies are arranged across the three drivers: improving the thermal efficiency of dwellings, improving incomes and reducing energy costs.

Thermal efficiency standards and information

44. The preceding discussion showed that existing thermal efficiency policies rely on one of two forms of funding – the Exchequer or consumer bills. Other potential policy approaches tap into additional sources of finance within the realm of discretionary expenditure by households.

45. An important suggestion put forward in evidence sent to the review is the establishment of **minimum standards for domestic energy efficiency**. The main objective sought is to drive up standards across all types of housing by legislating for minimum standards. Such legislation would add to costs for home owners, landlords and tenants.

46. There is a Government commitment that, from 2016, all new homes will meet zero carbon standards (the date is 2019 for new non-domestic buildings). A consultation was launched in February 2012 relating to proposed changes to Part L of the Building Regulations intended to facilitate the transition to zero carbon standards from 2016.[71] However homes yet to be built could make up only one third of the housing stock by 2050, so it remains necessary to focus on the standards of existing houses.[72] In terms of Building Regulations, the same February 2012 consultation seeks views on amendments relating to existing dwellings, particularly in terms of so-called consequential improvements. This relates to whole house energy efficiency improvements that could be required when building works take place, for example when an extension is added. The consultation links this idea with the Green Deal policy which is one mechanism for obtaining the finance required for such improvements.[73]

47. Beyond Building Regulations, other legislation relating to minimum standards exists in the form of the Energy Act 2011. This introduces minimum standards within the existing stock in the private rented sector. For more information, see Box 5.3. The Government is currently consulting ahead of passing secondary legislation in 2012 to give full effect to the provisions in the Act.

48. Extending beyond the private rented sector, it is possible to envisage the development of policies to require the fulfilment of minimum standards in homes under all kinds of tenure. For example, in the owner occupier sector, a requirement could be introduced that, at the time of sale/purchase, home owners would need to improve energy efficiency to a given EPC level, or to do so before the next time the property was sold.[74]

71 The Government's definition of zero carbon includes an allowance for off-site carbon abatement.

72 See DECC. (2012). *Energy Efficiency Deployment Office Evidence Brief*. London: DECC.

73 The details of this approach are naturally beyond the scope of the review. The consultation is available at: http://www.communities.gov.uk/documents/planningandbuilding/pdf/2077834.pdf

74 Various commentators have published proposals along these lines. See, for example, Boardman, B. *Achieving Zero: delivering future-friendly buildings*. January 2012. Environmental Change Institute, University of Oxford. Available at: http://www.eci.ox.ac.uk/research/energy/achievingzero/achieving-zero.pdf

Box 5.3: Minimum standards in the private rented sector (PRS)

Energy efficiency standards in the PRS tend to be lower than other sectors – it has the highest proportion of F and G rated homes of all sectors. In 2009, some 18 per cent of households in this sector were SAP F or G, compared to 6 per cent in the social housing sector and 16 per cent in the owner-occupied sector. Under the LIHC approach 32 per cent of fuel-poor PRS households have a SAP rating of F or G compared to 30 per cent of fuel-poor owner occupiers.

One of the main reason for lower standards is the existence of a range of barriers to making efficiency improvements in this sector, primarily the fact that the cost of improvements fall to landlords while the benefits accrue to tenants. This rationale led to the inclusion in the Energy Act 2011 of provisions stating that landlords cannot refuse consent for reasonable requests for energy efficiency improvements from tenants that can be financed through the Green Deal and that properties let to domestic tenants from 2018 must meet a minimum energy efficiency standard (currently an E rating) or to have received all reasonable energy efficiency improvements that can be financed through the Green Deal or ECO (even if the property remains below an E rating).

We looked at EPC ratings – and specifically the likelihood of households with low EPC ratings being fuel poor – in Chapter 3. The evidence presented within that Chapter suggested that, while eliminating F and G rated dwellings in the PRS would make a significant contribution, a threshold set at the level of an EPC E rating would still leave many households in the PRS in fuel poverty. In addition, the 'golden rule' requirement for Green Deal finance could still leave many properties *below* an E rating, unless it were supplemented by what are effectively grants from ECO.

49. Some see minimum standards as a vital – if not the most important – way of bringing about the scale of improvement needed across the housing sector. There is a case for this, although we cannot examine it in much detail here. Broadly speaking, regulating in this way for improvements in the housing stock has the clear advantage of being enforceable. However, there are costs that need to be taken into account. In the owner-occupied sector, costs would be added for the purchaser. This might in turn be reflected in the purchase price offered, with the seller effectively picking up the costs of structural energy inefficiency. This could be seen as correcting a market failure in which house prices are insufficiently related to long-term running costs. From a carbon reduction perspective, there is considerable advantage in the most energy-efficient housing stock fetching a premium on the property market – and encouraging the retention of value for energy efficiency investments by reducing the future costs of compliance. Of course, the overall low efficiency of the current stock would mean that a considerable proportion of sales could be affected by a standard that reached a high level of efficiency, and so regulation would affect many buyers and sellers.

50. A more modest step in this direction would be for there to be much more routine availability and prominence to EPC ratings within both owner-occupied and rental housing markets. Already, land registry data on the sales price history of residential property is available on-line. There is no obvious reason why the classification of EPC that accompanies each sale should not be available alongside this. Similarly, from 2008 landlords are obliged to provide an EPC for new tenants, as well as for prospective tenants on request.[75] Again, as

75 See: http://www.communities.gov.uk/documents/planningandbuilding/pdf/866773.pdf

with other property information, it would be very helpful if such information could be accessed freely, including on-line.

51. From a fuel poverty perspective, the important questions in relation to this kind of policy are: what happens to fuel poor households under such policies and what is the general effect across the whole housing stock? The answer to the first question is complicated by the fact that a fuel poor household might move out of a home and be replaced by a household that is not fuel poor. Similarly, a family may move into fuel poverty, at least transitionally, by occupying an energy-inefficient home for the first time.[76] However, it is reasonable to assume that in general a minimum standards policy would help lift some fuel poor households out of fuel poverty, given sufficient SAP improvements. Fuel poverty gaps would also fall. Chapter 3 showed how closely fuel poverty within our LIHC framework relates to low energy-efficiency standards and how this relates to housing tenure.

76 This is one reason why the National Housing Federation urged, in its response to our consultation, a continuing focus on improving social housing: such properties are likely only to pass between low-income households, meaning that the properties can more easily be 'fuel poverty proofed'.

Equity release

52. A further option for tapping finance is equity release, whereby people who own all, or a large proportion, of their property, use the value of their home to raise income or capital which can then be spent on improving the energy efficiency of the property. There are two broad models for equity release, as explained in Box 5.4.

53. In relation to energy efficiency improvements, the suggestion is that property owners might release

Box 5.4: Common forms of equity release

Lifetime mortgages

In this case a lender provides a regular income or lump sum payment that is repaid with interest at a future date, normally the death of the property owner. The owner retains full title to the property. Interest accumulates quickly because it is compound, that is, it is paid on both the amount borrowed and on the interest. The fact that the interest on the amount released will compound over what can be a long period of time means that the amount that needs to be paid back can be significantly higher than the amount borrowed. However, such mortgages often come with a negative equity guarantee meaning that the amount owed to the lender cannot exceed the value realised for the property when sold.

Home reversion agreement

Under such schemes a property owner agrees to sell a share in his or her home to a reversion company. The owner is allowed to stay in the property long-term, sometimes for a nominal rent. When the property is sold, usually on death, the reversion company obtains its share. The remaining value in the property remains part of the estate. This type of product can suffer from an 'adverse selection' problem. If the reversion company obtains its share of the property soon after the agreement is made, because of the owner's death, the financial arrangement offered poor value for money for the householder. This may mean such agreements are most attractive to individuals that are in good health with a long life expectancy. However, such clients are likely to be the least attractive to the home reversion company because of a potentially prolonged period of zero return on its investment. As a result the terms may be set in a way that is unfavourable for those with more typical health and life expectancy. In addition, uncertainty about future house prices at the time of reversion make this a risky investment for the company, adding to the costs it is likely to charge to take the risk on.

equity from their homes in order to provide the capital required for investments such as solid wall insulation or new heating systems. The question that arises in the context of the review is whether equity release offers a realistic option for funding measures that would reduce fuel poverty.

54. There were, in 2009, more than 600,000 owner occupiers in fuel poverty (based on the LIHC indicator) who owned their property outright. In addition, there were almost 800,000 more owner occupiers with an outstanding mortgage, some of whom could have paid-off enough of their mortgage – and fulfil the other eligibility criteria – to be able to make use of an equity release product.

55. Equity release schemes already exist on the market but are considered by many to be an expensive way of providing an income boost or lump sum payment compared to other types of borrowing. The overall size of the market suggests there is a number of demand and supply-side factors limiting the widespread use of this kind of financial product. In a document published in 2009, Safe Homes Income Plans set out many of these obstacles.[77] These include (on the demand side) a lack of understanding and concern about the costs of the products as well as the potential impact that releasing equity could have on household benefit entitlement. The document also explained the most common uses of equity release which, at that time, did not include funding for energy efficiency improvements.[78] The striking results of a pilot scheme that investigated the potential for use of equity release amongst low-income asset-rich households are set out in Box 5.5.

56. Given our remit, we have not considered any of the obstacles to the use of equity release in detail. There could in principle be a role for equity release for energy efficiency improvements. An advantage of equity release over other forms of borrowing is that there is no requirement for the borrower to make any kind of repayment during the period of the loan. Under both forms of equity release, the loan is only repaid at the end, in a single payment, normally as part of winding up an estate. This

77 SHIP – Safe Home Income Plans – is the primary trade body for equity release. Its 2009 report is available at: http://www.ship-ltd.org/uploads/shipdocfinal3.pdf

78 Evidence suggests that equity release is used as a source of income for low income households and a source of capital for lifestyle improvements (SHIP report 2009).

Box 5.5 Piloting equity release for low-income households

The Joseph Rowntree Foundation (JRF) wanted to investigate whether older, income-poor but asset-rich homeowners would use some of the value of their home to improve their quality of life (e.g. to fund additional help at home or works to the property).[79] They were interested in whether it was possible to overcome some of the key barriers to uptake (i.e. value for money, minimum required draw-down and impact on benefit entitlement) could be overcome through the combination of a bespoke product and partnership with a trusted intermediary.

Three London Local Authorities agreed that they would signpost low-income, older homeowners to the new product. Each authority involved a wide range of external parties in the project – including voluntary organisations, housing services and health services – in all, some 250 people received training.

After 18 months, there were only twenty enquiries about the new product. The Local Authorities involved reported that (among other things) the deeply embedded negative perception of equity release products amongst the potential client group was acting as a powerful constraint on uptake.

79 http://www.jrf.org.uk/sites/files/jrf/equity-release-schemes-full.pdf

contrasts with, for example, the Green Deal finance mechanism which requires an ongoing repayment. On the face of it, therefore, this approach might be more attractive to low-income households who, in return for an agreement to a bill a long way down the line, could see living costs reduced in the short-term and on a lasting basis.

57. However, as well as public suspicion about these products, a further concern with the use of equity release for fuel poverty relates to social equity. Existing supplier obligations (and, in future, the Energy Company Obligation) could fund or part-fund energy efficiency measures within the homes of non-fuel poor households. Funding for this partial or full subsidy comes in part from the fuel poor via their energy bill. It could be seen as unfair for income-rich asset-rich householders to benefit from subsidy while income-poor asset-rich householders were expected to fund their own improvements.

58. While there is theoretical scope for equity release to be used by fuel poor households to reduce their costs, the market for equity release is currently small and complex and without major intervention it is unlikely to provide a particularly fruitful avenue for a substantial reduction in fuel poverty. Only about 18 per cent of those who are fuel poor according to our LIHC indicator – or about 500,000 households – are owner-occupiers aged 60 or more, and even for them, in many cases the terms of equity release products currently on offer may not provide the best value for money. Only some 170,000 LIHC households are outright owners aged over 75 for whom terms may be somewhat more favourable.

Occupancy patterns

59. Looking beyond investment in the thermal efficiency of dwellings, one major cause of high energy costs is **under-occupancy**. The fuel poverty methodology assumes a 'half-house' heating regime for under-occupiers. There are some arguments concerning the appropriateness of this approach, given the possible repercussions of keeping half of a home cold during the winter and given the practicability for people to only heat half their home. The adjustment is not made in Scotland when assessing its level of fuel poverty, for instance. Whatever conclusion one draws on these points, it is clear that whether or not dwellings are appropriately sized for the requirements of their occupants is an important factor in determining household energy costs.

60. Under-occupancy is a growing trend in England, particularly for pensioner households. The most recent official fuel poverty statistics suggest that there were 6.9 million 'under-occupying' households in England in 2009 and Figure 5.3 shows that the proportion of under-occupied households has risen very rapidly from around 23 per cent in 2003 to around 32 per cent in 2009.[80] In this context a household is considered to be 'under-occupied' if there are one or more extra bedrooms than required for homes without dependent children (under 18 years) or there are two or more extra bedrooms than required for homes with dependent children. Additionally, to be considered under-occupied, a property must also have surplus floor area.[81]

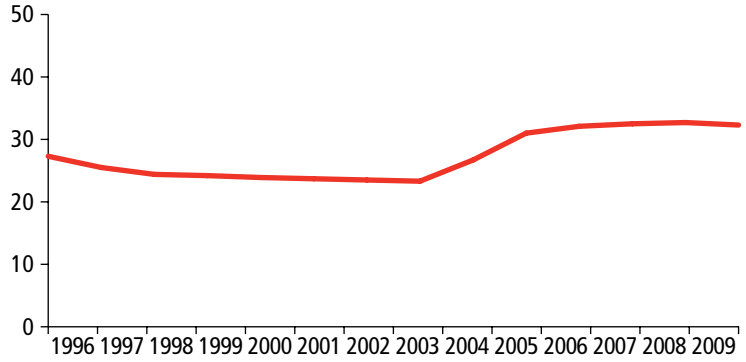
61. Such a definition is, of course, a matter of opinion. Some households will greatly value spare bedrooms for visiting children and grandchildren, for instance. Nonetheless, the increasing phenomenon is a concern from a fuel poverty perspective not least because a lack of space efficiency can compound the effect of energy inefficiency.

62. Under the current official indicator of fuel poverty, 46 per cent of households in fuel poverty in 2009 were under-occupiers. This compares to 28 per cent under the LIHC headcount indicator.

80 DECC. (2011). *Fuel Poverty Monitoring Indicators 2011: Annex to the Annual Report on Fuel poverty Statistics 2011*. DECC: London. Available at: http://www.decc.gov.uk/assets/decc/statistics/fuelpoverty/2184-fuel-poverty-monitoring-indicators-2011.pdf

81 For a full explanation of the methodology for calculating under occupancy, see: DECC. (2010). *Fuel Poverty Methodology Handbook*. DECC: London. Available at: http://www.decc.gov.uk/assets/decc/statistics/fuelpoverty/614-fuel-poverty-methodology-handbook.pdf

Figure 5.3: *Percentage of all households that are under-occupied, 1996-2009, England (%)*



Source: Fuel poverty indicators, 2009 (DECC)

Note: A household is under-occupied if there are one or more extra bedrooms than required for homes without dependent children (under 18) or there are two or more extra bedrooms than required for homes with dependent children. A property must also have a surplus floor area.

63. Downsizing may be a viable option for some people. Moving to a more appropriately sized property could make it easier for people currently under-occupying properties to keep warm by reducing the amount of energy required to heat the home adequately. Downsizing can also increase disposable income because other living costs are reduced (e.g. council tax, utilities bills etc). It could therefore have a major effect on fuel poverty status. Equivalently, some households may have space within their home that could be used by lodgers of some kind, offering an alternative route to reducing costs by sharing them.

64. However, the costs of down-sizing can be significant. The cost of moving house tends to amount to several thousand pounds, and involves significant disruption, which is why many avoid it, even though there would be financial gains. Equally, taking in lodgers may be an unattractive option for some.

Improving incomes

65. The most important influences on the incomes of the currently fuel poor are levels of employment and income from work for those of working age, and levels of benefits and their take-up by those entitled to them more generally. The first two are, of course, major national issues, but in this context the rate of under-claiming of benefits is also significant – the Department of Work and Pensions estimates that some £6.9 billion to £12.7 billion worth of benefits went unclaimed compared to a total of £38.1 billion claimed in 2008-09.[82] This represents take-up by expenditure in the range of 75 to 85 per cent. Our analysis of which households report the lowest incomes and have high costs within the English Housing Survey suggests that many could be entitled to benefits they are not receiving (assuming they are not under-reporting income).

82 DWP (2010), *Income Related Benefits: Estimates of Take-Up in 2008-2009*, London: DWP. Available at: http://research.dwp.gov.uk/asd/income_analysis/jun_2010/0809_Publication.pdf

66. This suggests that **benefit entitlement checks** may have a part to play in tackling fuel poverty. Benefit entitlement checks have been used by several schemes and organisations, such as Warm Front and energy companies, to help customers increase their incomes. A benefit entitlement check essentially comprises a survey to establish whether or not a household is claiming all the benefits to which it is entitled. As well as increasing the income of a household, benefit entitlement checks may also result in the household becoming eligible for energy efficiency schemes which use receipt of a means tested benefit as eligibility criteria.

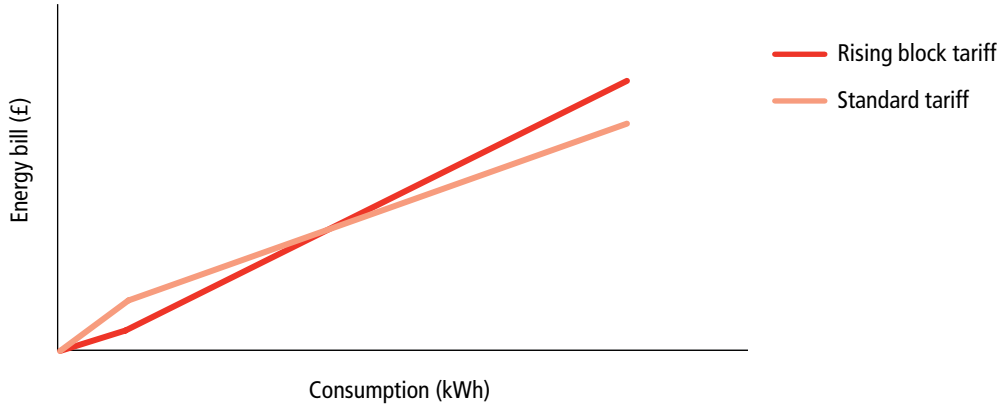
67. Benefit entitlement checks have in some cases proved to be an extremely effective way of increasing the income of those in low income households. For example, in 2010/11, the Warm Front scheme identified over 6,000 unclaimed benefits amongst around 32,000 benefit entitlement checks carried out that year. Figures show there was an average increase in benefits of almost £1,900, an aggregate increase in annual income for their target group of £11 million.[83] These figures suggest that ensuring that households are claiming all of the benefits to which they are entitled could be an important component of any fuel poverty strategy. We will return to the issue of benefits, and the contribution that they could make in tackling fuel poverty, in Chapter 7.

Reducing energy costs

68. A policy that is often raised in the context of fuel poverty is **rising block tariffs** (RBTs). The majority of current energy tariffs charge a lower unit price for consumption up to a given threshold, after which the unit prices increases to a higher level. The effect is that low-use consumers pay a higher average cost per unit of energy than high-use

83 http://www.decc.gov.uk/assets/decc/11/funding-support/warm-front/2747-warm-front-annual-report-2010-2011.pdf

Figure 5.4: *Conceptual representation of rising block and standard tariffs*



Source: Fuel Poverty Review

consumers, for whom the higher initial unit price is spread over a large amount of consumption. At least some energy suppliers would argue that the higher initial rate is an efficient way for them to cover their fixed costs.

69. RBTs reverse this structure so that the initial block of consumption is charged at a lower unit price than the subsequent block – that is, the price of energy rises with consumption. In essence, the idea is to provide a disincentive for energy waste at the same time as reducing costs for low consumption households.

70. Figure 5.4 provides a graphical representation of the differences between rising block tariffs and the current tariffs on the market. It shows how standard tariffs are more expensive than RBTs at low levels of consumption with RBTs becoming more expensive for those with higher consumption levels.

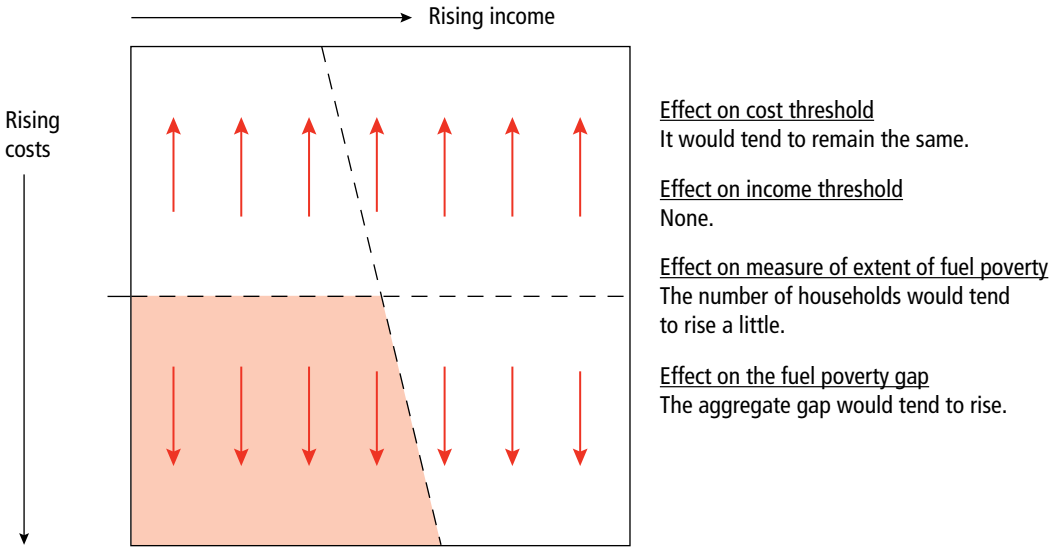
71. Some of those giving evidence to our review suggested that RBTs would be a more equitable way for energy companies to recover costs because there is on average a correlation between low income and low consumption.

72. We know that many of the households in the bottom left quadrant under the LIHC indicator will have quite low levels of actual energy usage (because they are under-heating relative to need). This means that, on average, low-income households are likely to see a reduction in *actual* energy bills from a rising block tariff. However, we saw in Chapter 2 of the interim report that there is a significant number of low-income households that do use large amounts of energy – because they prioritise energy expenditure over other consumption. As a result, these households would see an increase in actual energy costs from a move to a system rising block tariffs.

73. Seen from the perspective of our indicator, we would not expect the median bill to alter very much under a system of RBTs. Households with low energy requirements would be likely to see their required costs reduced under such a measure and would therefore have a lower bill as a proportion of the median bill. Households with high energy

requirements would be likely to see their costs increased, which would increase their fuel poverty gap. At the margins, some higher-income households with higher costs would be drawn into fuel poverty by the higher tariff. This is shown in Figure 5.5.

Figure 5.5: *Conceptual representation of the impact of RBTs under the low income high costs indicator*



74. In 2009, the Committee on Climate Change (CCC) commissioned BRE to look into the impact of RBTs. The resulting report found that as the fuel poor (under the official definition) tended to have higher than average energy costs, the introduction of such a tariff would result in higher average bills for fuel poor households with little impact on the number of households in fuel poverty overall.[84] They concluded that fuel poverty would need to be addressed through energy efficiency and other policies before this type of policy could be introduced. Whilst this study was based on the official definition, it is clear that the same conclusion would hold for the LIHC indicator.

75. A move to RBTs would represent a major intervention in the competitive energy market. The effects of such an intervention, both on the market itself and particularly on low-income households would need to be well understood before it were undertaken. For example, the impact on the general level of energy prices is not clear – for example, a move away from the current structure could increase the risk of energy companies being unable to cover the fixed costs of supply, which would be expected to increase prices.

76. The idea of a lower rate on the first units of consumption is intuitively appealing. However, it is clear that moving to a system of rising block tariffs, while beneficial for some, would cause significant 'collateral damage' to households with high energy usage and/or high energy requirements. As such, we agree with the conclusions of the CCC that fuel poverty should be addressed through more targeted energy efficiency measures before any move to rising block tariffs could be made. Once this is done, RBTs would emerge as a more clearly progressive strategy.

77. Other considerations of tariffs are relevant to this review. In our interim report we highlighted that

84 http://downloads.theccc.org.uk/Rising%20block%20tariffs%20and%20fuel%20poverty_051009FINAL.pdf

households pay (significantly) different prices for the energy they consume depending on the tariff they are on. For instance, if the households with the lowest three-tenths of incomes had paid the lowest tariffs (the fifth percentile within each payment type and region) then fuel poverty under the current indicator would have been 15 per cent lower in 2009.[85] Conversely, if these households had paid the highest tariffs (the ninety-fifth percentile for each group) then fuel poverty would have been 7 per cent higher than officially calculated.

78. Recent years have seen a proliferation in the tariffs offered by companies. This provides a significant barrier to consumers wishing to find the best deal and, as a result, many households either do not engage with the market or do not achieve a better deal when they do. Ofgem has found that profit margins for so-called 'sticky' customers are higher than for 'mobile' customers.[86] The risk of ending up on a worse tariff following a switch is highest for pre-payment meter customers.

79. As a response to this situation, there have been many calls for **tariff simplification**. Most recently Ofgem published a proposal to simplify the tariff structure (and, therefore, to facilitate greater customer switching) as a result of their ongoing investigation into the retail market. Their proposals consist primarily of splitting the market into 'standard' and 'non-standard' tariffs. For each of the standard tariffs, Ofgem propose to set the standing charge with the supplier then setting a single unit price. Furthermore, energy suppliers would be limited to one standard tariff per payment method. The market for non-standard tariffs would more closely resemble the current market, although there would be some additional restrictions placed on suppliers in order to encourage customers to engage with the market – for example, there would be rules about the duration of contracts.

80. In principle, a more transparent and simpler market has the potential to bring benefits to low-income and fuel poor households for reasons we discussed in section 2.3 of our interim report. Moves to simplify the supply market are, therefore, to be welcomed.

81. Finally, it is possible for Government to influence energy prices through taxation – the most obvious lever being to change the rate of **VAT on domestic energy use**. VAT is currently levied on domestic energy at a rate of 5 per cent[87] (which compares with a rate of 20 per cent for most other goods and services). The lower rate of VAT on domestic energy use is generally a progressive policy because low-income households tend to have lower energy usage. Compared to a scenario where VAT is charged at 20 percent, this means that that the current VAT treatment of energy results in fewer fuel poor households and lower fuel poverty gaps. However, it is clear that the low rate of VAT on energy use also benefits higher-income households. As such, it could be argued that the low rate of VAT on domestic energy use is an expensive (and inefficient) policy in terms of supporting low-income and fuel poor households.

82. This speaks again of the potential tension – irrespective of the approach to fuel poverty measurement that is adopted – between, on the one hand, the Government's objectives to reduce greenhouse gas emissions and, on the other, to tackle fuel poverty. An efficient strategy for reducing GHG emissions would be for households to pay the full carbon cost associated with the energy that they consume. For domestic gas and other off-gas heating fuels (i.e. coal, LPG, oil but excluding electricity), which currently do not face a carbon price that is commensurate with their carbon intensity, this would suggest that an increase in the level of VAT (or equivalently a 'green tax') would be a sensible strategy. However, this would hit the fuel poor and low-income households hardest.

85 Based on a comparison with the figures generated where average tariffs are used.

86 http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR_FINAL.pdf

87 5 per cent is the EU minimum level for fuel duty. Member States are free to increase rates above that minimum rate.

83. In theory, it might be possible to vary the level of VAT for different levels of consumption (i.e. a lower rate up to a specified consumption threshold) or for different types of household (i.e. the low rate is only applied to lower income households). However, there are some obvious limitations to both approaches – e.g. varying VAT based on consumption would replicate the impact of a rising block tariff while charging the lower rate only for low-income households would be administratively complex (i.e. it would require energy companies to charge different rates for different households depending on their circumstances or it would require some form of VAT rebate for low-income households – both of which would be very cumbersome)

84. An alternative approach to protecting low-income households from higher VAT on energy could be to hypothecate[88] the additional tax revenue into programmes designed to alleviate some of the negative distributional impacts of the tax increase. As a general rule, hypothecation is not a feature of the UK Government's approach to tax and spend.[89] Advocates of the hypothecation of the revenue from higher VAT on energy (or carbon taxes) for energy efficiency measures argue that this could increase the public acceptability of such taxes while also delivering major benefits to the economy and the effort to reduce carbon emissions. From a fuel poverty perspective, the impact of hypothecation could be positive, depending on the tax that has been levied and on the way in which the funds are used. However, revenue raised from consumption of energy (e.g. carbon taxes and increased VAT) could be more regressive than measures funded from income-based taxation.

The impact of behavioural change

85. As we have discussed in both our interim report and within this report, fuel poverty is defined on the basis of modelled energy costs. That is, the amount that a household would need to spend in order to maintain a satisfactory heating regime and cover energy required for water heating, lighting and appliances. We argued in Chapter 5 of the interim report that the fact that *actual* energy expenditure can be affected by constrained resources or profligacy means that a focus on modelled energy costs is appropriate when thinking about fuel poverty.

86. The fact that fuel poverty is based on a modelled energy requirement means that the energy use behaviour of the householder does not impact on modelled energy requirements and, therefore, will not affect whether a household is fuel poor or not.[90] This is true for both the current indicator and the proposed LIHC indicator (as both use the same modelled assessment of household energy costs).

87. However, in terms of people's actual welfare, people's behaviour, and whether they *actually* make the most appropriate use of their energy can be very important indeed. One of the issues for those concerned with public health is whether people keep themselves warm enough, particularly older people in the winter[91]. Avoiding activities that waste heat and energy can make a large difference to people's bills, as well as their impact on carbon emissions. Health advice and energy advice and assistance are therefore very important parts of the services offered by those concerned with fuel poverty . How this is done most effectively, and the potential impact of interventions on both health and energy consumption were beyond the scope of this review, however.

88 Hypothecation means reserving a revenue stream for a particular type of expenditure (in this case, energy efficiency).

89 See, for example, a recent House of Commons Library Standard Note available at: www.parliament.uk/briefing-papers/SN01480

90 Although, of course, average behaviours are captured to some extent in terms of modelled non-heating costs.

91 It is also important to keep cool enough in the summer.

Chapter Summary

There is a broad range of policies currently in place – or that could potentially be implemented – to help tackle fuel poverty. These policies span the three drivers of fuel poverty: thermal efficiency (e.g. Warm Front, Green Deal); incomes (e.g. Winter Fuel Payments) and energy prices (e.g. Warm Home Discount). Current policies are mainly funded from either the Exchequer or through energy suppliers (both of which spread the costs of policies over all households) although it may be possible to unlock other sources of funding by getting households to pay directly for energy efficiency improvements.

Policies vary in terms of the types of households they target for support. Policies such as CESP, Cold Weather Payments and Warm Home Discount are focused on low-income households. Eligible households are therefore likely to fall below the income threshold under the LIHC indicator and may also have high costs. CERT, ECO and Winter Fuel Payments are more widely spread over the population. Those receiving assistance under CERT and ECO may well have high costs. Winter Fuel Payments go to households with older members irrespective of income or energy efficiency.

This chapter has looked at the potential distributional effects of the proposed balance between 'Affordable Warmth' and the Carbon Obligation within ECO. With only 25 per cent going to Affordable Warmth, the package would be regressive overall. We cannot calculate precisely what the balance would need to be to avoid this, but it appears that over half of ECO would need to go to Affordable Warmth to do this. We look more at the implications of this balance in terms of the projected impact on fuel poverty in Chapter 6 and potential impact of alternatives in Chapter 7.

While we cannot cover implementation issues in any detail this Chapter has also covered a number of points related to current debates:

- We have seen that minimum standards policies (as recently introduced for the private rented sector) can be used to unlock additional funding and overcome delivery barriers. But it is clear the target EPC rating of E, even if it were achieved, would leave many private tenant households still in fuel poverty.

- Public provision of information on the energy efficiency rating of housing, such as on-line provision of EPC ratings alongside sales price data, could help drive up standards.

- Equity release for energy efficiency might also tap into a new source of funding. However it would seem to be appropriate for only a small number of fuel poor households, as well as raising questions of social equity by comparison with assistance under ECO.

- In terms of energy prices, simplified retail energy markets could increase customer participation and bring benefits to the fuel poor.

- Rising block tariffs (RBTs) have been proposed as a more radical change to the structure of energy tariffs. RBTs would be broadly progressive, but they would marginalise a large number of low-income and high-use households and could well worsen fuel poverty unless offset in other ways. We agree with the Climate Change Committee that fuel poverty should be better addressed before any move to RBTs is made.

Chapter Summary *(Continued)*

- Policies that aim to help households make best use of energy through behavioural change can be very important for both health and welfare. However, how this is done most effectively, and the potential impact of such interventions were beyond the scope of this review.

We examine the net impact of current policy choices in the near future in Chapter 6. And in Chapter 7 we examine the cost-effectiveness of different policy approaches.

Projections of trends in fuel poverty

1. We now turn to the outlook for fuel poverty over the medium term. This Chapter sets out a series of projections of how we expect the extent and depth of fuel poverty, measured in different ways, to change between 2009 and 2016. The projections reflect both underlying changes in the key drivers of energy prices and incomes and the impact of Government policies.

2. We first discuss the assumptions underpinning our projections and then set out projected levels of fuel poverty as measured by the Low Income High Costs (LIHC) indicator, showing the contributions of particular factors to these changes, and making a comparison with other indicators. Such projections are inevitably subject to considerable uncertainties and methodological limitations (including an inability to capture additions to the housing stock, DIY efficiency improvements such as loft insulation carried out and funded by the householder, changes to unemployment after 2009 and changes to the structure of the tax and benefit system). We therefore also explore some sensitivities in the analysis, in particular to the evolution of incomes and energy prices.

3. It should be noted that due to the complexity of the analysis we show projections only for 2016, not for intermediate years after 2009. Some of the main factors driving the changes – such as part of the increases in fuel prices – have already occurred and their impacts will affect levels of fuel poverty earlier than a linear trend would suggest.[92]

6.1 Modelling assumptions

4. The projections are based on the 2009 English Housing Survey (EHS) dataset, with the projected level of fuel poverty in future years estimated based on assumptions and current official expectations about future changes in household incomes, energy prices and the thermal efficiency of the housing stock. We describe below the key assumptions we have made for each of these factors. A list of all our assumptions as well as a technical description of the modelling methodology are set out in the Annex to this Chapter.

Growth in household incomes

5. For the growth in household incomes, the projections use assumptions consistent with those used in the Office of Budget Responsibility (OBR) Outlook Report published in November 2011.[93] The OBR suggests there will be real terms falls in disposable income and earnings in the immediate future and only modest growth thereafter. Applying these assumptions to the 2009 EHS dataset suggests that median household incomes will be

92 Note also that the fuel poverty measurement methodology uses data for two years, so the '2009' baseline figures are, in fact, based on 2008 and 2009 data.

93 See: http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-november-2011/

3.3 per cent higher in 2016 in real terms than in 2009, after housing costs.

6. Our projections imply that in 2016 there will be an increase of 8 per cent in the number of households with incomes below our income threshold, but nearly all of this is accounted for by rising fuel costs. Apart from this effect the projections involve little change in relative poverty. This is somewhat out of line with other (and more sophisticated) income forecasts, many of which suggest there will be a significant increase in relative poverty over this period. For example, recent work by the Institute of Fiscal Studies[94] (IFS) suggests that relative child poverty is expected to rise from 19.7 per cent in 2009 to 22.2 percent in 2015. Working age relative poverty amongst adults without children is forecast to increase from 17.1 per cent in 2009 to 18.5 per cent in 2015. We explore the reasons for this divergence in the Annex to this Chapter.

7. It is worth noting here that there is no robust way in which a change in unemployment can be reflected in the EHS dataset.[95] Furthermore, detailed modelling of changes to the tax and benefits system is complex (and beyond the scope of this report as well as the data available in the EHS). Both of these factors suggest that the income assumptions that are used in our fuel poverty projections will, if anything, overstate the likely growth in incomes that will be experienced by poor households. As a result, our baseline projections are likely to be over-optimistic in terms of the future trends in fuel poverty rates as they may understate the size of the 'at risk' group.

Growth in energy prices

8. For energy prices, the projections use assumptions for electricity and gas prices that are consistent with the DECC central price projections published alongside the 2011 Annual Energy Statement.[96] These predict continued strong growth in energy prices in the medium term – driven by a combination of fossil fuel prices, by the costs of transmission and distribution and by pass-through costs for suppliers associated with Government policies. The estimates suggest that between 2011 and 2016 domestic electricity prices will increase in real terms by 18 per cent and domestic gas prices will increase in real terms by 28 per cent. This comes on top of a real increase of 23 per cent for electricity prices and 28 per cent for gas prices between 2009 and 2011.[97] The price of other fuels (i.e. coal, heating oil & LPG) is assumed to track fossil fuel prices. The projections for these are based on DECC assumptions.[98] In Section 6.2, we show the sensitivity of the projections to a range of fossil fuel price assumptions.

The impact of Government policies on energy bills

9. The impact of rising energy prices should be alleviated somewhat for those households receiving support from the Government through its policy package. Chapter 5 set out in detail the current policy package and also described the key policies that are under development. We expect certain elements of the current package to remain in place over the course of the Spending Review period (including Winter Fuel Payments, Cold Weather Payments and Warm Home Discount). However, the Government's policy approach to delivering improvements to the thermal efficiency of the housing stock is in a period of transition. Within the next few years, CERT, CESP and Warm Front will come to an end and will be replaced

94 For more details see: http://www.ifs.org.uk/comms/comm121.pdf

95 The problem is that there is no information available about the energy efficiency standards of households that we know have been affected by rising unemployment since 2009. We cannot therefore judge the extent to which their standards correspond to either the energy efficiency characteristics of unemployed households in 2009 or a random cross-section of employed households in that year.

96 See: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf

97 Based on a combination of the Quarterly Energy Prices (see: http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx) and 'The estimated impact of energy and climate change policies on energy prices and bills: November 2011' (see: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf)

98 See: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx

by the Green Deal and the accompanying Energy Company Obligation.

Limitations to the modelling

10. The fact that the projections are based on the 2009 EHS means that the housing stock is effectively frozen at this point in time. In reality there will be some churn in the housing stock as some new (usually more energy-efficient) dwellings are constructed and some existing properties demolished. This churn in the housing stock could have an impact on the level of fuel poverty, depending on the types of dwelling constructed and the types of people who live in them (e.g. if new energy-efficient homes are predominantly for higher-income people and low-income households do not benefit from better stock filtering down, this could worsen fuel poverty under the LIHC indicator)[99]. However, this kind of impact is not captured under the projections in this Chapter.

To project the level of fuel poverty to 2016 we need to make a large number of assumptions and apply them to the 2009 EHS. This is not a straightforward process and our baseline projections are, if anything, likely to be over-optimistic (i.e. they may under-estimate the number of fuel poor households) because of specific difficulties in making detailed assumptions about employment and income changes. In any case, there are considerable uncertainties and methodological limitations to the projections which can be made. They should therefore be understood as indications of the broad direction of change rather than as precise forecasts.

6.2 Projections of the LIHC and fuel poverty gap indicators

11. Figure 6.1 shows the baseline projections for fuel poverty to 2016 based on the LIHC indicator. It should be remembered that we do not project figures for intermediate years between 2009 and 2016, and the price rises already experienced by 2011 mean that the numbers will not, in fact, follow a linear trend. The upper panel shows the headcount indicator of households and individuals affected. The lower panel shows the associated fuel poverty gap. The 'without policies' projections show the expected baseline in the absence of the climate and energy policies. The figures suggest that the number of households that are in fuel poverty will increase from 2.7 million in 2009 to 3.0 million by 2016 (an increase of more than 10 per cent). This change is mainly driven by rising energy prices, which draw some additional households into fuel poverty.[100]

12. The 'with policies' projection shows the aggregate impact of the climate and energy policy package.[101] This suggests a projected increase from 2.7 million in 2009 to 2.9 million in 2016. The effect of the policy package in total is a small reduction in the fuel poverty headcount from what it would otherwise be – reducing the number of fuel poor households by around 150,000 households in 2016. The number of individuals affected will rise from 7.8 million in 2009 to 8.5 million in 2016, taking account of the impact of policies. Analysis of how different policies account for this overall effect is set out in Section 6.3.

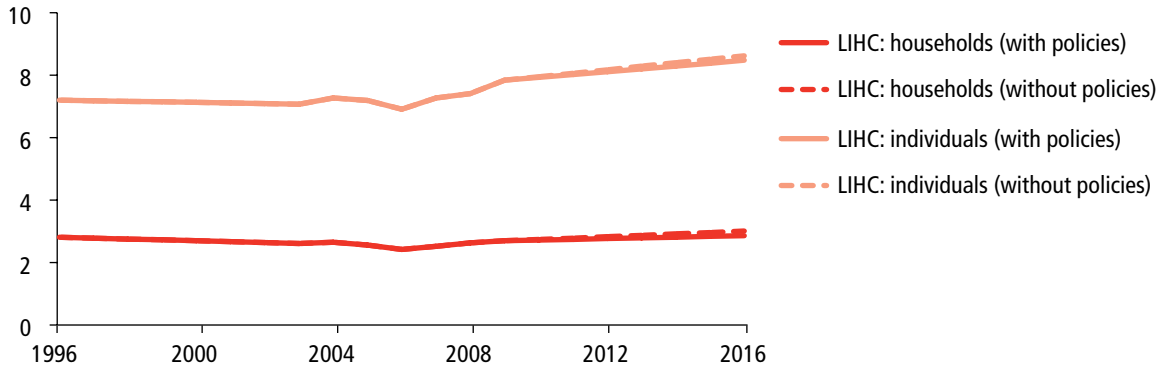
99 This is another example of the benefits of a relative approach to fuel poverty measurement which should be effective in tracking whether general improvements across the housing stock pass low income households by.

100 See Section 6.4 for a comparison of this result with the expected result under the current official indicator.

101 This includes only policies that are in place or those that have been planned to a sufficient degree of detail. The policy package therefore includes the following: better billing, CCS demonstration, CERT, CERT extension, CRC, CCA, CCL, CESP, EMR, EU ETS (inc. CPF), FITs, Green Deal and ECO, products policy, RHI, RO, smart metering and WHD.

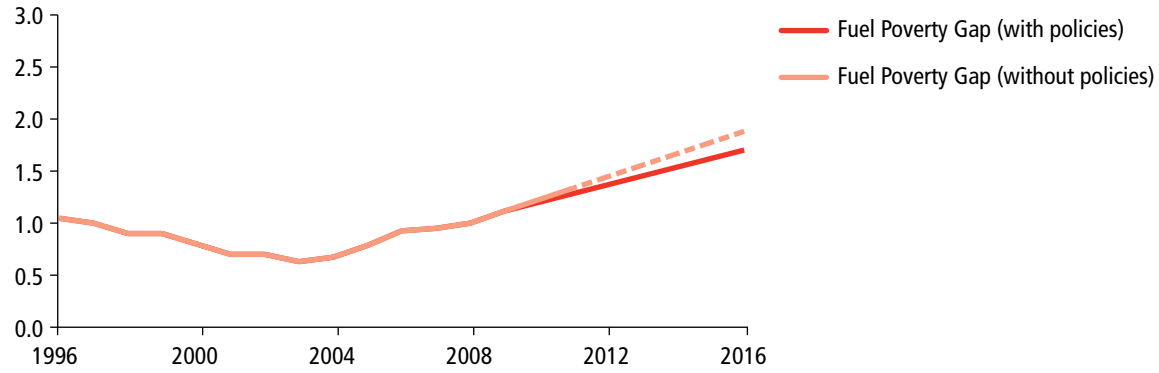
13. The lower panel of Figure 6.1 shows the baseline projections for the fuel poverty gap. The 'without policies' projection suggests that the aggregate gap will increase substantially from £1.1 billion in 2009 to around £1.9 billion in 2016 (an increase of nearly 75 per cent). This is driven primarily by rising energy prices, resulting in more fuel poor households (as set out above) and large increases in modelled energy costs for those households above the costs threshold. The 'with policies' projection suggests that the climate and energy policy package will result in a reduction in the fuel poverty gap of around one tenth from this, or £0.18 billion in 2016. Measures directed at fuel poor households (e.g. Warm Front, Warm Home Discount and the ECO Affordable Warmth Obligation) are expected to offset the impact of higher energy prices. Nonetheless, the fuel poverty gap will, on this central projection, reach £1.7 billion in 2016, compared to £1.1 billion in 2009, £0.7 billion in 2004 and £1.0 billion in 1996 (at 2009 prices).

Figure 6.1a: *Baseline projections of the number of households in fuel poverty under the LIHC indicator with and without the effects of policies included, 1996-2016, England, (millions)*



Source: Fuel Poverty Review. See Annex 6 for the full list of sources for the calculations for this and all subsequent charts in this chapter unless otherwise stated.

Figure 6.1b: *Baseline projections of the aggregate fuel poverty gap under the LIHC indicator with and without the effect of policies included, 1996-2016, England (£bn, 2009 Prices)*



Source: Fuel Poverty Review

14. These future projections are inherently uncertain. As such, for both the headcount and fuel poverty gap indicators we estimate a series of projections with different income and price assumptions. This helps us understand how sensitive our 'central' projections are to changes in the underlying assumptions.

15. The extreme points of these 'sensitivity' projections are scenarios that are based on:

    a. Low growth in income and high growth in energy prices: low income growth and high growth in energy prices will both put upward pressure on fuel poverty. This scenario gives a sense of the upper-bound for the headcount and fuel poverty gap projections.

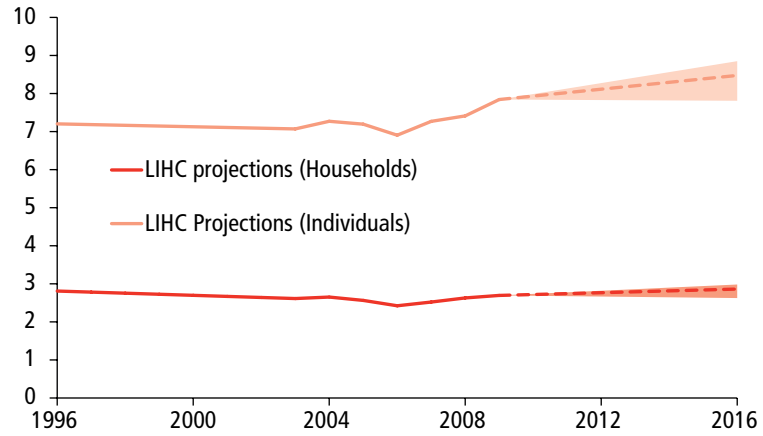
    b. High growth in income and low growth in energy prices: high income growth and low growth in energy prices will both put downward pressure on fuel poverty. This scenario gives a sense of the lower-bound for the headcount and fuel poverty gap projections.

16. The high and low energy prices projections are taken from DECC high and low price scenarios – these assume an oil price of $114.9 per barrel in 2016 (2011 prices) in the central scenario versus $99.5 per barrel in the low scenario and $124 per barrel in the high scenario.[102] For incomes, the projections are based on the high and low assumptions that were published by the Office for Budget Responsibility in their November 2011 Outlook report. The impact of Government policies, in terms of what is delivered, does not vary between scenarios. More details of the assumptions that have been used in the high and low projections are set out in the Annex to this Chapter.

17. Figure 6.2 shows the sensitivity projections against the LIHC headcount and fuel poverty gap indicators. As can be seen in the upper panel, in the least optimistic scenario the number of households affected will rise a little further (still around 3.0 million). In the most optimistic scenario, the numbers will fall slightly from their 2009 level, to around 2.6 million. The observed movement in the number of fuel poor households is mainly driven by changes in energy prices.

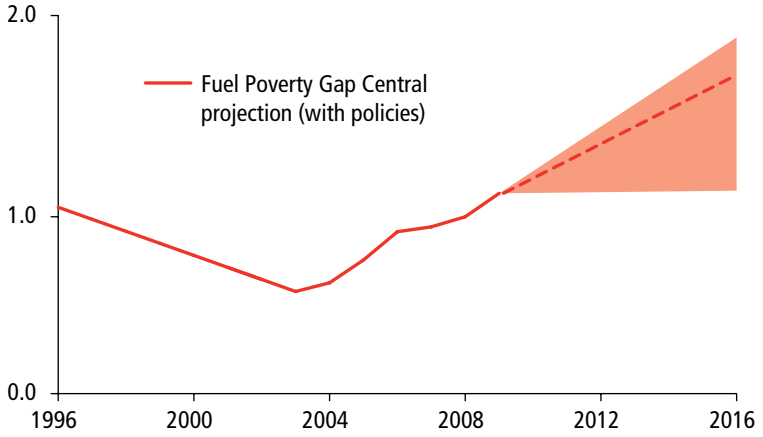
102 For more details see: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/2933-fossil-fuel-price-projections-summary.pdf

Figure 6.2a: *Sensitivity projections for the number of households and individuals fuel poverty under the LIHC indicator, 1996-2016, England (millions)*



Source: Fuel Poverty Review

Figure 6.2b: *Sensitivity projections for the aggregate fuel poverty gap under the LIHC indicator, 1996-2016, England (£ billions, 2009 prices)*



Source: Fuel Poverty Review

18. The lower panel of Figure 6.2 shows the sensitivity projections for the fuel poverty gap. As we would expect the fuel poverty gap is very sensitive to movements in energy prices and (to a lesser extent) to changes in incomes. This is reflected in the projections, which suggest that the fuel poverty gap could range between £1.1 billion and £1.9 billion in 2016.[103]

19. It is important to reiterate that this sensitivity to prices within the fuel poverty gap is desirable. It shows how much deeper fuel poverty can become for affected households as prices change. It also points towards the priorities for action – those with the largest fuel poverty gaps – with a bigger prize for successfully delivering assistance to them at no extra cost (at least in the case of thermal efficiency measures).

These projections will be profoundly disappointing to all those concerned with fuel poverty and aware of the serious problems it causes. Far from being eliminated in 2016 it will still affect between 2.6 million and 3.0 million households (containing between 7.8 and 8.9 million individuals) when measured using our preferred indicator. Our central projection is that the key indicator of its scale, the fuel poverty gap, will rise to £1.7 billion, compared to £1.1 billion in 2009. The overall impact of policy is that this number will be a tenth – but only a tenth – lower than it would otherwise be. Even in the most optimistic scenario for prices and incomes the fuel poverty gap would remain roughly the same in 2016 as in 2009.

6.3 The impact of policies under the LIHC and fuel poverty gap indicators

20. We saw in the previous section that the 'with policies' projections suggest that the climate and energy policy package is expected to reduce the number of fuel poor households by 150,000 households – and the fuel poverty gap by £0.18 billion – in 2016. The upper panel of Figure 6.3 shows how this aggregate impact breaks down across different policies. There are a number of points that are worth noting:

    a. the impact of measures installed under Warm Front and CESP reduces the level of fuel poverty in 2016. While these policies are due to finish by the end of 2012/13, measures installed through CESP and Warm Front will continue to have an impact on household energy bills into the future (e.g. a new heating system is assumed to have a lifetime of 12 years).

    b. CERT results in a small increase in the number of fuel poor households under the LIHC indicator. This is because CERT is targeted at households across the income distribution. As such, the policy does not improve the *relative* position of fuel poor households, because their costs have not been reduced as much as those of households who are not fuel poor. We discuss below the fuel poverty gap, which will help to reflect the impact of policies like CERT on energy costs of fuel poor households.

    c. The figures suggest that the ECO Affordable Warmth Obligation will reduce the number of fuel poor households in 2016. While the obligation is funded through energy suppliers (which means an increase in the reasonable cost threshold) the measures delivered through this element of the scheme will be targeted at low-income households in energy-inefficient

103 The aggregate gap always changes somewhat more quickly – up and down – than prices because it is the product of either higher prices applied to more fuel poor households or lower prices applied to fewer fuel poor households.

dwellings.[104] The aggregate impact of the policy will, therefore, be to reduce the number of households in fuel poverty.

d. Conversely, the ECO carbon obligation and Green Deal Finance will result in an increase in the level of fuel poverty, although taken as a whole the effect of the ECO is to reduce fuel poverty. The policy will deliver energy efficiency improvements which reduce the reasonable cost threshold. However, because the measures are targeted at households across the income distribution, the relative position of fuel poor households will not improve. Adding to that, the impact of higher energy prices caused by the policy increase the number of fuel poor households. As discussed in Chapter 5, the fuel poverty and distributional impacts of the Green Deal would improve if a larger proportion than is currently proposed of the measures delivered by the policy were targeted at LIHC households. We will examine this kind of impact further in Chapter 7 where we compare narrowly targeted (i.e. focused on LIHC households) and broadly targeted (i.e. focused on *all* high-cost households) energy efficiency policies.

e. The Warm Home Discount will draw some households into fuel poverty through the increase in the reasonable costs threshold. However, the rebates are targeted predominantly at low-income households, which means that the policy will shift a greater number of households above the reasonable costs threshold and resulting in a net reduction in fuel poverty.

f. Households receiving the Winter Fuel Payment see an increase in their income. For a few households, this is sufficient to move them across the income threshold and out of fuel poverty. However, the impact of the WFP is relatively modest compared to the resources devoted to the policy (only 20,000 households will be removed from fuel poverty as defined by the LIHC indicator as a result of approximately £2 billion of expenditure each year).

g. The impact of 'other' policies will mainly be to increase energy prices across all households (although CWPs do provide some support to low-income households). As such, the impact of this broad group of policies will be to increase the reasonable costs threshold and draw more households into fuel poverty.

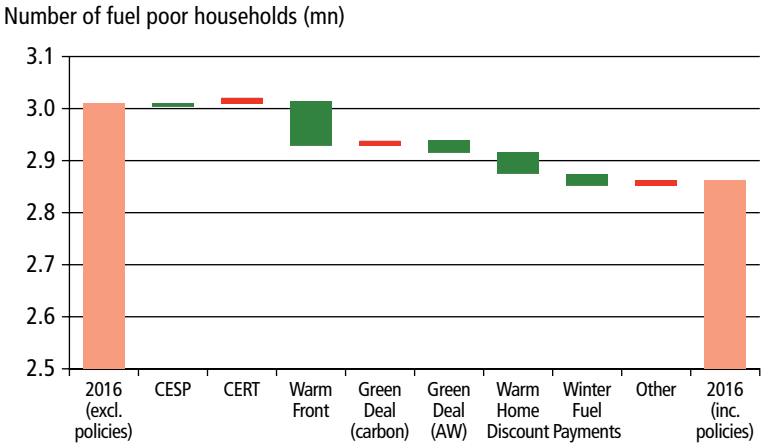
21. The baseline projections presented in Section 6.2 suggest that the policy package will reduce the aggregate fuel poverty gap by £0.18 billion in 2016. The lower panel in Figure 6.3 shows how the estimated change in the fuel poverty gap in 2016 breaks down across different policies. The results suggest that:

    a. CESP, CERT and Warm Front will reduce the fuel poverty gap. This is driven by the fact that all of these policies improve the thermal efficiency of fuel poor households (and therefore reduce modelled energy costs) and in 2016 will also no longer be exerting any impact on energy prices as a result of energy suppliers recouping the cost of the policies. It is notable that CERT will reduce the fuel poverty gap significantly, even though it will slightly raise the number of fuel poor households. This indicates that CERT leads to the installation of many cost effective measures across a broad range of households.

    b. The Affordable Warmth Obligation will result in an increase in energy prices for all households as energy suppliers recoup the cost of the policy (which increases the fuel poverty gap). However, the policy will concentrate support on households that are fuel poor (which will reduce the fuel poverty gap). The results suggest that the latter effect will dominate, driving a reduction in the fuel poverty gap.

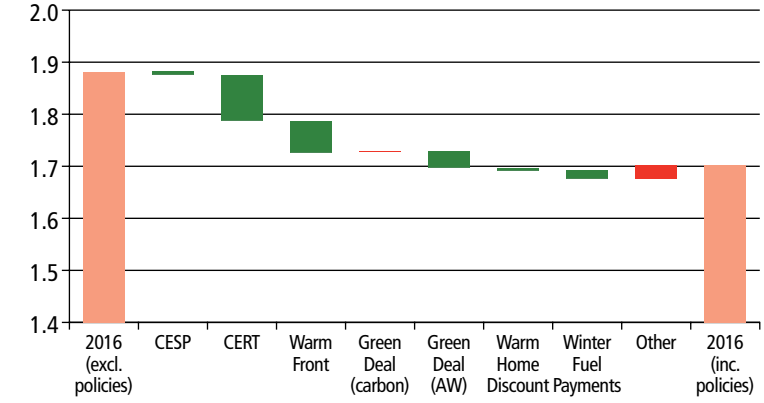
104 We need to exercise some caution when comparing the impacts of policies such as CERT and CESP (where we are measuring the energy saving benefits of measures that were installed in the past, but do not take account of the costs of these measures) and policies such as the Green Deal (where we are taking account of *both* the costs and benefits of the policy). The issue of the comparability of the 'gross' and 'net' impacts of policies is discussed further in the Annex to this Chapter.

Figure 6.3a: *Breakdown of the impacts of the climate and energy policy package on fuel poverty based on the LIHC indicator in 2016 (headcount of households)*



Source: Fuel Poverty Review

Figure 6.3b: *Breakdown of the impacts of the climate and energy policy package on fuel poverty based on the LIHC indicator in 2016 (fuel poverty gap)*



Source: Fuel Poverty Review

c. The Green Deal Carbon Obligation will also increase energy costs and will deliver some measures to fuel poor households. However, unlike the Affordable Warmth obligation, the measures delivered will be spread across all households. As such, the prices effect is expected to dominate, are leading to a small increase in the fuel poverty gap at this time (although see Chapter 7 for a calculation of the lifetime effect of this kind of policy). As with the headcount indicator, the net effect of ECO taken as a whole is to reduce the fuel poverty gap.

d. The rebates paid through the Warm Home Discount are mainly targeted at low-income households – many of whom are fuel poor. As such, the policy is expected to result in a small reduction in the fuel poverty gap.

e. The Winter Fuel Payment will also result in a modest reduction in the aggregate fuel poverty gap. This is driven by households being removed from fuel poverty (or moving into the 'leading edge' of the fuel poverty segment) as a result of receiving the benefit.

f. The policies included as 'other' will result in higher energy prices and, as a result, drive a significant increase in the fuel poverty gap.

The climate change and energy policy package is expected to have a small but downward net impact on the aggregate level of fuel poverty measured by the LIHC indicator and on the fuel poverty gap. Policies that focus support on LIHC households (such as Warm Front , the Affordable Warmth part of ECO and, to a lesser extent, Warm Home Discount) are expected to improve the relative position of the fuel poor and reduce the extent and depth of fuel poverty. Conversely, those policies that do not focus support on LIHC households (such as FITs and the Green Deal carbon obligation) are not expected to improve the relative position of the fuel poor and are expected to increase both the number and depth of fuel poverty.

6.4 Comparison with other indicators

22. In this section we examine what the projections imply for the number of households classed as being in fuel poverty using other indicators (the current official indicator, an absolute variant of the LIHC indicator and a low income low fixed SAP indicator) by comparison with the projections for the LIHC indicator.

10 per cent indicator

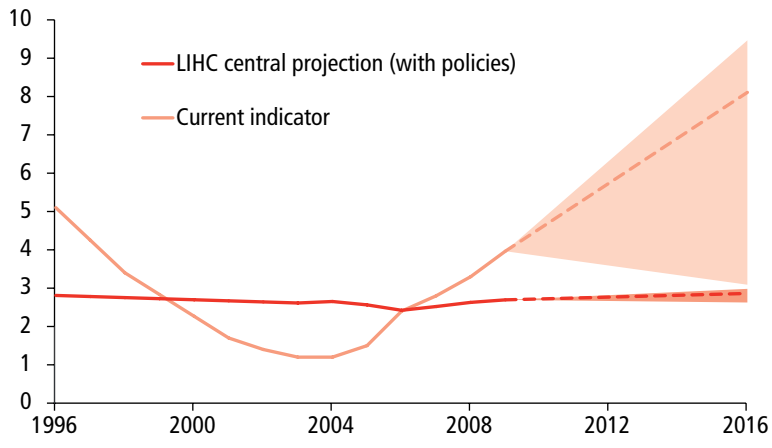
23. Figure 6.4 compares the range of the projected number of households in fuel poverty under our preferred LIHC indicator with the range that would be shown by the current official indicator. It shows the very great sensitivity of the current indicator to energy prices and incomes. With the most pessimistic assumptions, by 2016 it will class 9.2 million households – 43 per cent of all households – as being in fuel poverty. On the most optimistic scenario for prices and incomes, only a third as many, 3.1 million households, will be in fuel poverty, a reduction of one quarter from 2009. On the central projection, 8.1 million households will be fuel poor. This is 230,000 households fewer (or 3 per cent lower) than if the impact of policies were not taken into account. As we argued in the interim report and in Chapter 1, the sensitivity of this indicator to prices and the way it includes higher-income households when prices are high do not seem to be helpful characteristics. At the same time, policy impacts are masked. In this case the reduction – albeit a very modest 10 per cent – in the fuel poverty gap shown in Figure 6.1 seems a more realistic measure of the impact of policy.

Low income low fixed SAP indicator

24. We discussed in Chapter 2 (and explored in more detail in the Annex to that Chapter) options suggested by some of the points made to us in the consultation on our interim report that an absolute standard should be used for measuring energy efficiency. While we have argued that our preferred indicator has more helpful features, Figure 6.5 compares what the level of fuel poverty under various low income low fixed SAP indicators suggest for the period between 1996 to 2009 and projected to 2016.[105] There are three lines shown:

105 SAP levels for 2016 have been projected as part of the overall projections methodology. As the projections do not allow for new build dwellings, increases in annual average SAP levels are likely to be faster in reality.

Figure 6.4: *Baseline projections of the number of households in fuel poverty under the LIHC and current indicators 1996 to 2016 (millions)*



Source: Fuel Poverty Review

Figure 6.5: *Baseline projections of the number of households in fuel poverty under various low-income low SAP indicators 1996-2016, England (millions)*

Source: Fuel Poverty Review

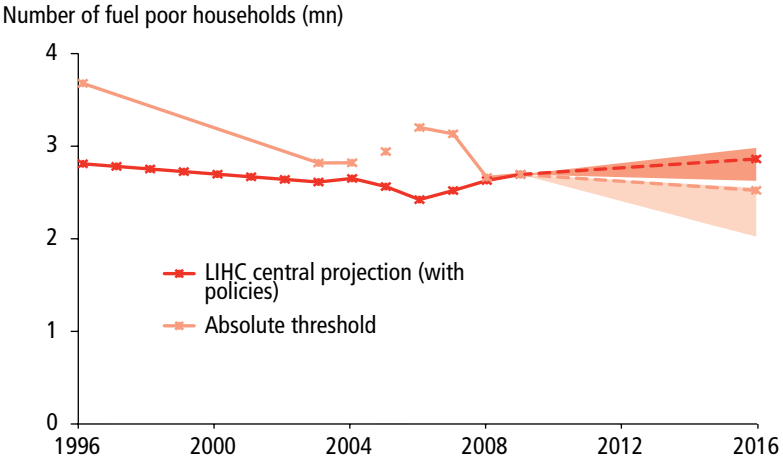
- a low income low SAP measure based on median SAP as it was in 2009 (around 55).
- a low income low SAP measure based on median SAP as we have estimated it to have been in 2000 (around 46).
- a low income low SAP measure based on the boundary between EPC levels C and D as suggested by some stakeholders (this is 68.5).

25. As we would expect, these measures do show continuing improvement over time against their fixed standards. However, on none of them would the number of households with low incomes and low SAP be reduced to zero by 2016 on our central projection. Taking median standards as they were in 2009 there will still be 2.2 million low-income households living in homes with a SAP level below the standard. Half of those households, 1.1 million, will still be below the standard reached by the median household more than a decade ago. On the higher standard, the number will be 4.7 million households. It is particularly disappointing that even against these standards, which are affected by energy efficiency improvements and income changes but not by energy prices, the projections suggest slower progress between 2009 and 2016 than between 2003 and 2009.

Absolute variant of the LIHC indicator

26. Finally, Figure 6.6 compares the number of households with low incomes and high costs against an absolute standard (which is unaffected by improvements in the energy efficiency of all homes including those on higher incomes). For the reasons we discussed in Chapter 2 and its Annex it was not possible to construct a consistent series on this basis back to 1996, so there is a break in the series between 2003 and 2006. It is also rather complex to derive. Looking forward the central projection is for a small fall in fuel poverty between 2009 and 2016, but only from 2.7 million to 2.5 million households. Only on the most optimistic assumptions will there be a fall by 2016 approaching the rates seen between 1996 and 2003 or between 2006 and 2009.[106]

Figure 6.6: *Projections of fuel poverty under an absolute variant of the LIHC indicator, 1996-2016, England*



Source: Fuel Poverty Review/EHS

This section has looked at what the projections of fuel poverty by 2016 would imply using other indicators. On the current 10 per cent indicator the range given by the sensitivity analysis suggesting levels of between 3.1 million households in 2016, a fall compared to 2009, and 9.2 million households (43 per cent of all households) with a central projection of 8.1 million, double 2009 levels. This illustrates the sensitivity of the current indicator to energy prices, but also shows that even in the most optimistic case the numbers in fuel poverty would only fall by a quarter by 2016.

We have also shown what trends would be using indicators based on the number of low-income households with homes below a range of fixed SAP standards. Even in the least demanding case more than 1 million households would remain in very energy-inefficient homes in 2016 and in all cases progress is projected to be much slower after 2009 than before. Against an absolute variant of the LIHC indicator, the central projections show a very small fall by 2016.

106 The reduction in the absolute threshold measures would be greater between 2009 and 2016 if new build dwellings were included in our projections.

Chapter Summary

To aid an understanding of the position we are in, this Chapter has presented projections for 2016 of what could happen to fuel poverty within our preferred framework. Such projections are inherently uncertain, so we show the effects of a range of assumptions for energy prices and income growth. Because of limitations to the modelling possible using the source data, these projections are, if anything, likely to be over-optimistic about the scale of the problem.

Using our preferred indicator, between 2.6 million and 3.0 million households would still have low incomes and high costs in 2016. Our central projection is that the fuel poverty gap would have risen by half to £1.7 billion from £1.1 billion in 2009. Only on the most optimistic price assumptions would this key indicator remain constant.

Without the policy measures we have allowed for the fuel poverty gap would, however, have been nearly a tenth greater. The most significant contributors to this positive impact are CERT, Warm Front and the Affordable Warmth component of the Green Deal.

Using the same range of assumptions the level of fuel poverty measured by the current official indicator would be between 3.1 million and 9.2 million households, with a central projection of 8.1 million.

Alternative indicators based on absolute standards show reductions in the number of low-income households with energy efficiency or costs below fixed standards. However, in each case progress is projected to be slower after 2009 than before it.

These results are profoundly disappointing for all those concerned with the problems we have explored in this report and our interim report. They suggest that there is no plausible definition of fuel poverty under which it would be eliminated by 2016 given current official projections for incomes, prices and the impacts of the current policy package. On our preferred key measure, the fuel poverty gap, low-income households would face costs of £1.7 billion each year to keep their homes warm and cover other energy needs above the costs faced by typical families, compared to £1.1 billion in 2009.

CHAPTER 7

Making further progress

1. In Chapter 5 we examined the current fuel poverty framework in detail before turning, in Chapter 6, to consider its impact on fuel poverty by 2016 (alongside the impacts of changing fuel prices and incomes). Those projections set out how – unless energy prices develop in the most favourable way – fuel poverty is likely to be higher in 2016 than it was in 2009. This Chapter therefore now provides further analysis under our framework of how additional policy effort could contribute to tackling fuel poverty.

2. Our intention is to give a guide to the potential effects of interventions based on lessons from existing policies. Setting out a detailed strategy for tackling the fuel poverty problem is beyond our remit. Instead we provide evidence on the scale of what might be achieved through different types of intervention. Different readers inside and outside Government will have different priorities for action. Our aim is to provide all involved in future decision-making and discussion with analytical insight into the trade-offs that might be involved.

3. Drawing our inspiration from the current policy package – which contains interventions aimed at addressing each of the three main drivers of fuel poverty – we consider broad policy 'archetypes'. Although these can be considered analogous in some respects to existing policies, no direct comparison can be made. The archetypes are:

   a. *Energy prices:* two policies that deliver direct energy bill support to particular low-income households;

   b. *Thermal efficiency:* four policies that deliver subsidised insulation and heating systems to certain households in energy-inefficient dwellings; and

   c. *Incomes:* two policies that deliver direct income support to particular kinds of households.

4. The next three sections discuss each of these in turn. For each of the archetypes, we consider the impact that a given level of expenditure (set at £500 million per year to allow for comparison) would have in terms of fuel poverty and greenhouse gas (GHG) emissions.[107] Using the 2009 Fuel Poverty and English Housing Survey (EHS) database projected forward to 2016, we measure the impact of our archetypes on fuel poverty in relation to both the headcount shown by the low income high costs (LIHC) indicator and the fuel poverty gap. Through cost-benefit analysis, we also make quantitative assessments of the range of societal impacts of

107 It is important to note that most of the results presented in this chapter are not scalable – i.e. an intervention that spent £1 billion per year would not necessarily result in an impact that was twice as large as an intervention that spent £500 million per year. This issue of 'scalability' is discussed further in Section 7.4.

each of the policies.[108] Broadly speaking, the impacts we show quantify the stylized effects we described in Chapter 4.

7.1 Energy price archetypes

5. The energy price archetypes consist of the provision of direct energy bill support for low-income households. The modelling that follows assumes that:

   a. All households that receive a means-tested benefit[109] would be eligible for support under the policy. Based on the data within the 2009 EHS there are around 5.7 million households in this group in England.

   b. Each eligible household would receive a rebate on its electricity bill of around £90 per year. The policy has a total subsidy cost of £500 million per year.

   c. Energy suppliers would be able to locate all eligible households in order to pay the rebate. Chapter 3 discussed the difficulties in targeting support. In practice, it would be extremely challenging for energy suppliers to be able successfully to reach all eligible households. Extending data-matching powers might help with this although – as can be seen through the experience of the Warm Home Discount and the preceding Energy Rebate Scheme – this is an imperfect targeting mechanism. In addition, there are practical considerations around the reform of the benefits system that are likely to constrain a significant expansion of data-matching powers in the short term.

6. We consider two different sources of funding. First, a supplier-funded scheme (in this way, this archetype broadly resembles the current Warm Home Discount policy) where energy suppliers are assumed to recoup the costs of the funding through higher energy prices (for gas and electricity). In reality, there is no way of knowing exactly how these costs would be passed on to energy bills. However, the modelling assumes that the costs of the policy would be recouped entirely from domestic customers and through an increase in energy prices for all customers. Second, an Exchequer-funded scheme where costs would be met directly from public expenditure (requiring an increase in the level of direct and indirect taxation).[110]

7. Basing eligibility for support on receiving a means-tested benefit means that the policy would be targeted at households likely to be poor rather than fuel poor (i.e. there would be some households in very efficient dwellings that would receive support). While this can be viewed in a positive light from a poverty perspective (as the majority of households receiving a benefit would be low income), it would reduce the cost-effectiveness of the policy from a fuel poverty perspective.

8. More precise targeting of the fuel poor could be achieved through the addition of an energy efficiency threshold to the eligibility criteria (e.g. households would be eligible for a payment if they were in receipt of a means-tested benefit *and* lived in a low-SAP dwelling). However, we saw in Chapter 3 that there would be difficulties in targeting these households in practice. It is also the case that making receipt of a rebate conditional on living in an inefficient home could have the perverse effect of making it unappealing for a household to incur the effort and expense of upgrading the energy efficiency of their home, even when it would be cost-effective to do so (although it could be argued that this could act as a spur to action by

108 As discussed in Chapter 1, in the absence of a robust methodology for doing so, we have not attempted to account for possible savings to the NHS in this analysis. Ideally for assessing different archetypes it would be helpful to have a full analysis of their short and long run distributional implications. We were not able to do this on a consistent basis for the different approaches in the time available.

109 Households where one or more occupants are claiming the main or any sub-component of Pension Credit, Income Support, Income-based Job Seekers Allowance, Working Tax Credit, Child Tax Credit & Housing Benefit.

110 The Annex to this Chapter sets out information about the assumptions we have made in terms of the way policy costs are shared between households. We discussed in Chapter 4 the different effects of the two funding approaches in principle.

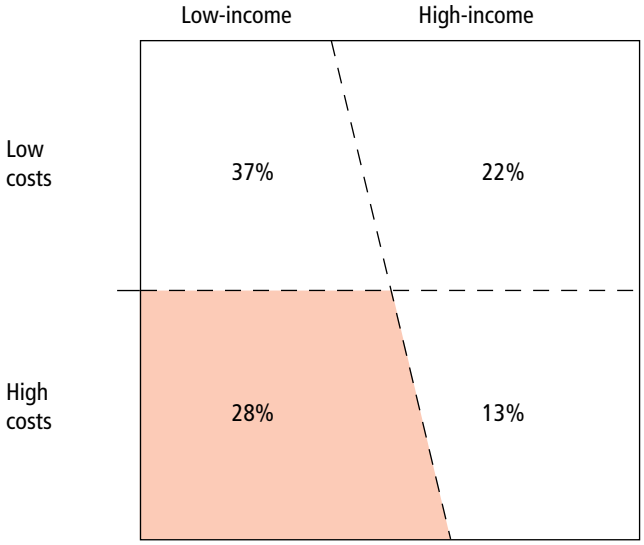
authorities to reduce the need for such transfers). We do not model this possibility.

9. We show impacts relative to the 2016 'with policies' baseline projection (as set out in Chapter 6) and assume that the archetype is implemented in 2016 for a single year. This is a somewhat unrealistic scenario, as in reality a rebate would be likely to be paid on continuing basis, but serves to illustrate in a straightforward way the relative strengths and limitations of each policy approach.

Fuel poverty impacts

10. Figure 7.1 shows the proportion of households receiving support under the prices archetypes that would be LIHC as well as the proportions that would be in other quadrants of our matrix. The assumed targeting of support is the same across both archetypes – i.e. all households receiving a means-tested benefit would receive an energy bill rebate – so the single set of figures describes the distribution of beneficiaries across both policies.

Figure 7.1: *Distribution of households that would receive support under the energy prices archetype, 2016, England*



Source: Fuel Poverty Review. Please see Annex 7 for the full list of sources for this and all subsequent figures and tables in this chapter, unless otherwise noted.

Table 7.1: *Short-term fuel poverty impacts of the energy prices archetype, 2016, England*

	Effect of policy on the number of Households in fuel poverty (000s households)	**Effect of policy on aggregate Fuel poverty gap (£ million)**
2016 central projection (inc. climate and energy policies)	2,860	1,700
Supplier-funded rebate policy	-110	-40
Exchequer-funded rebate policy	-110	-70

Source: Fuel Poverty Review

As we would expect (given that the policies would be targeted at households receiving means-tested benefits), the majority (two-thirds) of households supported through the policy would have low incomes, but the policies would target both 'high cost' and 'low cost' households. Indeed the majority of beneficiaries would have below-median costs.

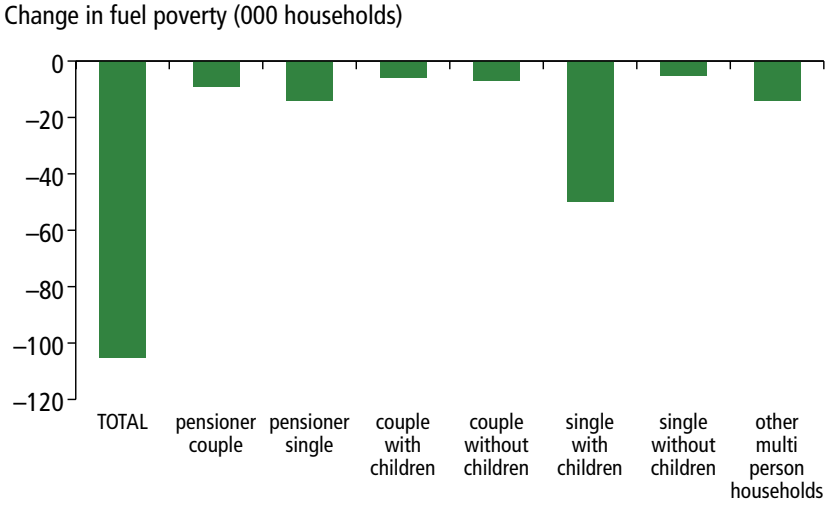
11. Table 7.1 shows the impact that the different price archetypes would have on fuel poverty indicators in 2016. As was shown in Chapter 4, a policy that directly reduces energy bills would have a number of impacts on the LIHC indicator. First, households that received a rebate would see a reduction in their energy costs. To the extent that recipient households were captured by the LIHC indicator, this would reduce both the number of households in fuel poverty and the fuel poverty gap. Second, depending on its funding source, the policy could have an effect on the reasonable costs and income thresholds, bringing some additional households into fuel poverty. At this level of spending, the policy could reduce the number of households in fuel poverty by around 100,000 and reduce the fuel poverty gap by £40 million-70 million.

12. The modelling results show that both the supplier and Exchequer-funded policies would be expected to reduce the number of fuel poor households and the fuel poverty gap in 2016. However, the Exchequer-funded policy would appear to be more effective in terms of reducing the fuel poverty gap. This is because the Exchequer-funded policy would offer a less regressive funding option, with a smaller proportion of the overall costs coming from low-income households (who typically pay less tax in absolute terms than wealthier households).

13. The results suggest that the supplier-funded policy would have a smaller impact on the fuel poverty gap – the policy is shown to reduce the fuel poverty headcount by around 4 per cent but to reduce the fuel poverty gap by just 2 per cent. This is because of the way in which the costs of the policy would be borne by households. Energy suppliers would be expected to increase the price of energy in order to recoup the £500 million cost of the policy. This increase in the unit price of energy would mean that a larger absolute share of the costs of the policy would be borne by high-cost households compared to a policy that is funded through taxation (which would result in a larger absolute share of the costs of the policy being borne by high-income households).

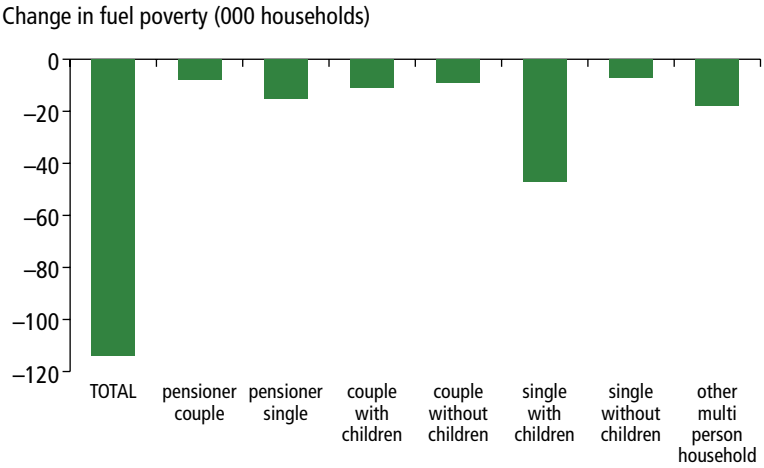
14. It is important to understand that these fuel poverty impacts would not be persistent. Households would only be removed from fuel

Figure 7.2: *Short-term fuel poverty impact of the supplier-funded archetype by household type, 2016, England*



Source: Fuel Poverty Review

Figure 7.3: *Short-term fuel poverty impact of the Exchequer-funded archetype by household type, 2016, England*



Source: Fuel Poverty Review

poverty in the year in which the rebates were paid. A persistent impact would require rebates to be paid every year, implying an ongoing expense (in this case, £500 million per year).

15. Figures 7.2 and 7.3 show how the fuel poverty impacts of these archetypes would be spread between household types. The reductions in fuel poverty would be greatest amongst lone parent families, although we would see a net reduction across all household types.

Cost-effectiveness

16. To compare what would be delivered by different policy approaches for a given level of expenditure, we have developed a range of cost-effectiveness indicators. These are: (a) lifetime reduction in fuel poverty numbers per £500 million of subsidy (household-years); and (b) lifetime reduction in fuel poverty gap per £500 million of subsidy. See Box 7.1 for further description of the cost-effectiveness indicators.

17. In this case, the term 'subsidy' refers to either Exchequer or energy supplier funding. In the case of a publicly-funded policy, the total subsidy refers to the amount that would need to be raised through taxation in order to fund the policy objectives. In the case of a supplier-led scheme, the total subsidy is the amount that energy suppliers would be expected to recoup through energy bills.

18. For comparison with the results of other kinds of intervention, Table 7.2 sets out how the prices archetypes would score against the cost-effectiveness indicators. The results suggest that the Exchequer-funded archetype would be more cost-effective against both – removing more households from fuel poverty for a given cost. As was seen in the previous section, this reflects the fact that funding policies through taxation results in LIHC households paying less of the costs than if funds were raised through obligations on energy suppliers. Note that because of the broad spread of benefits and their one-off nature, each £500 million spent would only reduce fuel poverty gaps over the long-term by between £40 million and £70 million, that is, by the first year impact only.

Box 7.1: Cost-effectiveness indicators

Cost-effectiveness indicators provide a means of comparing the costs of the different ways of delivering a specific outcome (and, specifically, of identifying the lowest cost way of doing so). There are undoubtedly many considerations when assessing a policy's desirability, including key barriers such as issues of practicality and legality (and policies may also have other aims beyond those considered here). However, cost-effectiveness indicators are a helpful tool because they provide a common basis on which to compare policies which are otherwise difficult to contrast.

In terms of interventions targeted at alleviating fuel poverty, the output of interest is the 'lifetime change in fuel poverty' (or 'lifetime change in the fuel poverty gap'). It is important to consider the lifetime change because some interventions (e.g. energy efficiency and heating measures) would have persistent impacts on the households. Note that in doing this we do not discount the value of future fuel poverty gap reductions. In the full cost-benefit analysis we also present values of total effects discounted in the normal way.

For example, consider the illustrative case of £500 million spent on rebates versus £500 million spent on heating systems. This could allow the delivery of:

- 5 million energy bill rebates of £100 per household; or
- 200,000 new heating systems (assuming a cost of £2,500 per system) which could reduce modelled household energy costs by £600 per year for the lifetime of the systems.

Assuming that a new heating system lasts for 12 years, the gross lifetime reduction in the fuel poverty gap per £500 million spend on each policy would:

- Rebates: £500 million
- Heating systems: £1.4 billion (200,000 systems x 12 years x £600 reduction per year, undiscounted)

This assumes that both policies could be perfectly targeted at LIHC households. With such assumptions, heating systems would be a significantly more cost-effective option for reducing fuel poverty than a policy of continuing subsidies.

Table 7.2: *Cost-effectiveness of the energy price archetypes, England*

	Lifetime change in fuel poverty (000s household-years)	**Lifetime change in the fuel poverty gap (million)**
Supplier-funded rebate policy	–110	–40
Exchequer-funded rebate policy	–110	–70

Source: Fuel Poverty Review

Greenhouse gas impacts

19. Table 7.3 shows the estimated impact of these policy archetypes on greenhouse gas (GHG) emissions. It is difficult to assess accurately how different types of households would react if they received an energy bill rebate. The elasticities used in the analysis (i.e. the values used to reflect the responsiveness of household energy demand to changes in income or energy costs) are based on empirical estimates adjusted to reflect our view that demand is likely to be more responsive in households receiving a benefit (which would be a highly visible addition to their energy bill) than in households not receiving a benefit (who would experience a small increase in their energy or tax burden that would be more difficult to identify). Further discussion of the elasticities used in the analysis and what these elasticities mean for the results is set out in the Annex to this chapter.

20. We have made the estimates in Table 7.3 consistent with DECC Appraisal Guidance on the measurement and valuation of energy and GHG impacts.[111] The results suggest that both policies would increase carbon emissions in 2016 – the supplier-funded archetype would increase emissions by 0.35 million tonnes of CO_2 ($MtCO_2$) while the Exchequer-funded archetype would increase emissions by 0.58 $MtCO_2$. These increases would take place in the traded sector (i.e. the parts of the economy covered by the EU Emissions Trading System) and in the non-traded sector. The GHG impacts would only occur in the year in which the rebates were paid – both energy consumption and GHG emissions would revert to previous levels once the policy finished.

Cost-benefit analysis

21. The final analytical tool that we apply to our archetypal policies is an overall assessment of costs and benefits. Cost-benefit analysis (CBA) draws together economic, social and environmental aspects in order to determine the net impact of a policy on society. CBA estimates and monetises the aggregate costs and benefits of a policy and expresses them as a Net Present Value (NPV). A positive NPV implies that the benefits of a policy exceed the costs while a negative NPV implies that costs exceed benefits. The cost-benefit analysis that follows has been carried out using HM Treasury Green Book Guidance[112] and DECC Appraisal Guidance.

22. When undertaking conventional cost-benefit analysis, it can be difficult to reflect certain factors, including social and distributional considerations. This is clearly an important issue when considering the costs and benefits of policies in the field of fuel poverty. For example, charging a tax on low-income households in order to fund tax cuts for high-income households would be viewed neutrally by conventional cost-benefit methodology because this is a transfer of resources and does not in itself give rise to economic costs or benefits. However, most people would view this as a highly regressive

111 http://www.decc.gov.uk/assets/decc/statistics/analysis_group/122-valuationenergyuseggemissions.pdf

112 http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

Table 7.3: *Lifetime impact of the energy prices archetypes on greenhouse gas emissions, England*

	Impact on greenhouse gas emissions ($MtCO_2$)		
	Traded sector	**Non-traded sector**	**Total**
Supplier-funded rebate policy	0.09	0.26	0.35
Exchequer-funded rebate policy	0.16	0.42	0.58

Source: Fuel Poverty Review

transfer and, as such, one that is welfare-reducing. The impact in distributional equity terms associated with transfers can be captured in cost-benefit analysis through the use of 'equity weightings'. This technique applies weights to the transfers paid and received by different households where the weight varies according to household income – with higher weights used for lower income households. The basic rationale is that an extra pound gives more benefit to a household that is poor compared to a household that is relatively well-off. The application of equity weighting to the cost-benefit analysis helps to give a better sense of the distributional impacts of the prices archetypes. A fuller discussion of the CBA methodology can be found in the Annex to this Chapter.

23. Table 7.4 sets out the estimated NPVs of the prices archetypes. The results suggest that, for both policy archetypes, the aggregate benefits would exceed the costs. For example, the NPV results without equity-weighting for the supplier-funded policy suggest a net benefit of £100 million. The NPV should be seen as additional to the initial expenditure. That is, an expenditure of £500 million results in £600 million in gross benefits. The equity-weighted NPVs are significantly higher than the conventional NPV estimates, reflecting the fact that these policies would make payments to low-income households. As expected, the less regressive Exchequer-funded policy shows a higher equity-weighted NPV.

We have modelled Exchequer and supplier-funded prices archetypes, both of which would target energy bill rebates to a group of low-income households. About 28 per cent of beneficiaries would be fuel poor on an LIHC basis. Our estimates suggest that both policies could result in a reduction in the extent and depth of fuel poverty. £500 million spent on energy bill rebates could result in a reduction of up to 110,000 in the number of fuel poor households and a £40 million – £70 million reduction in the fuel poverty gap that year. These impacts would not be sustained unless the policy were sustained. However, policies that directly subsidise energy costs increase carbon emissions and, therefore, potentially conflict with GHG mitigation objectives. An overall cost-benefit analysis suggests that – on an equity-weighted basis – benefits would exceed cost by £500 million – 600 million (or by £50 million – 100 million on an unweighted basis).

7.2 Thermal efficiency

24. The thermal efficiency archetypes consist of policies supporting households to improve the thermal efficiency of their homes through the delivery of insulation and heating measures. Evidence presented in Chapter 2 of the interim report suggested that low-cost insulation and heating measures were the most cost-effective ways of improving household SAP ratings. The analysis examines four basic variations:

a. An Exchequer-funded, narrowly-targeted scheme that would deliver fully subsidised

Table 7.4: *Net Present Values of the energy prices archetypes, England (2011 prices)*

	Net present value (£ million, discounted)	Equity-weighted net present value (£ million, discounted)
Supplier-funded rebate policy	100	490
Exchequer-funded rebate policy	50	600

Source: Fuel Poverty Review

insulation and heating measures to households receiving means-tested benefits living in dwellings with a SAP of 55 or less;

b. An Exchequer-funded, broadly-targeted scheme that would deliver fully subsidised insulation and heating measures to households living in dwellings with a SAP of 55 or less.

c. A supplier-funded narrowly-targeted scheme that would deliver fully subsidised insulation and heating measures to households receiving means-tested benefits living in dwellings with a SAP of 55 or less.

d. A supplier-funded broadly-targeted scheme that would deliver fully subsidised insulation and heating measures to households living in dwellings with a SAP of 55 or less.

25. Comparing archetype (a) with archetype (b) and archetype (c) with archetype (d) will help show the sensitivity of the LIHC indicator to narrow targeting (i.e. support for at low-income households in poor quality dwellings) and broad targeting (i.e. support targeted at poor quality dwellings irrespective of household income).

26. The way in which the policies are funded clearly affects the distribution of costs across households. However, our modelling also assumes that the funding source could affect the mix of measures delivered. Where the policy is supplier-funded, we assume that the Government would set an obligation on energy suppliers to deliver a certain level of heating cost reduction in eligible households but would leave energy suppliers free to determine how to meet the obligation. In this way, this is analogous to the proposed Affordable Warmth Obligation under the ECO. It is assumed that competitive pressure to minimise the amount of cost passed through to energy bills would result in energy suppliers delivering the most cost-effective set of measures. That is, they would exhaust opportunities to install the most cost-effective insulation measures before moving on to the next best technology. See the Annex to this Chapter for further discussion on how the supplier-funded archetype has been modelled.

27. For Exchequer-funded options we assume that the policy would operate through the provision of grants for heating and insulation work for households coming forward for support (in this way, this resembles the Warm Front Scheme). The modelling additionally assumes that all heating and basic insulation measures would be carried out within the homes of those households that came forward for support. This would result in a 'whole house' approach, meaning that an Exchequer-funded archetype would not deliver the same mix of measures as a supplier-funded policy. What is more, because the mix of measures delivered would depend on the types of households coming forward for support, it would not necessarily be the case that all of the most cost-effective measures would be carried out. Instead, the Exchequer-funded policy would deliver a mix of heating systems and a range of insulation measures (low-cost loft and cavity-wall insulation and some more expensive solid-wall insulation).

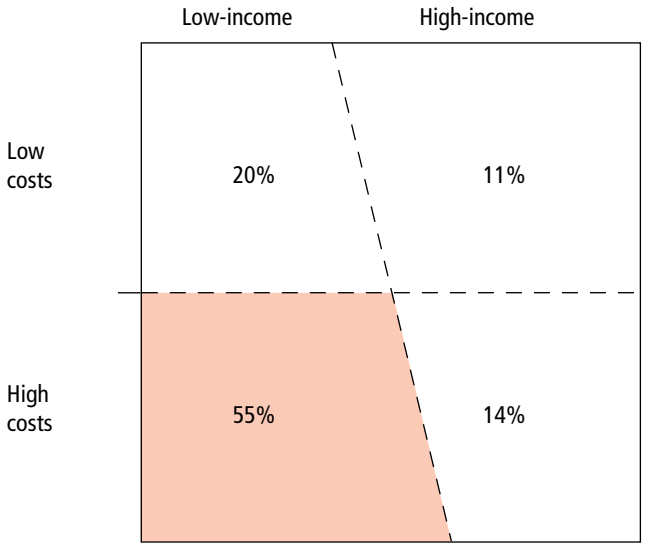
28. As before, to allow comparison, the modelling assumes that the policies have a budget of £500 million. For the supplier-funded variant, this would equate to the total amount of cost passed through to energy bills. As was the case with the prices archetypes, the modelling of the thermal efficiency archetypes assumes that the policy is implemented in 2016 for a single year.

Fuel poverty impacts

29. Figures 7.4 and 7.5 show the proportion of households receiving support under the thermal efficiency archetypes that are LIHC and the proportions that are in other quadrants. Targeting measures at low SAP dwellings means that the support would be predominantly delivered to high-cost households across all of the archetypes. As we would expect, both the archetypes targeted at

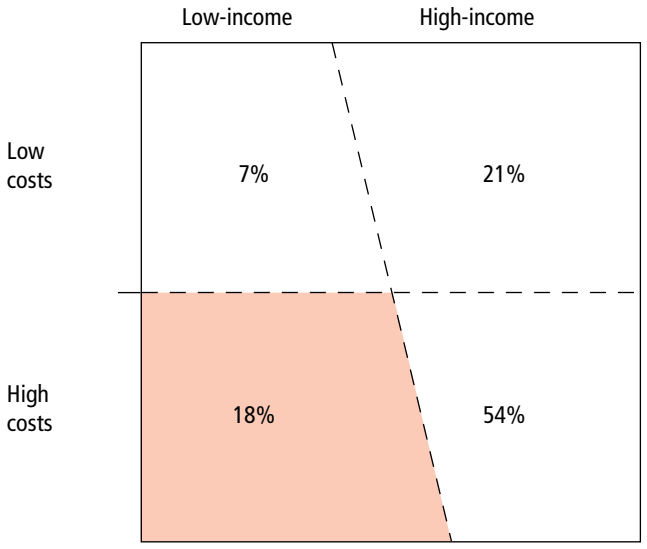
means-tested benefit recipients would result in the majority of benefits being targeted at low-income households. In the broadly targeted interventions less than a fifth of the beneficiaries would have low incomes and high costs.

Figure 7.4a: *Distribution of households that would receive support under the exchequer-funded thermal efficiency archetypes (narrowly targeted), 2016, England*



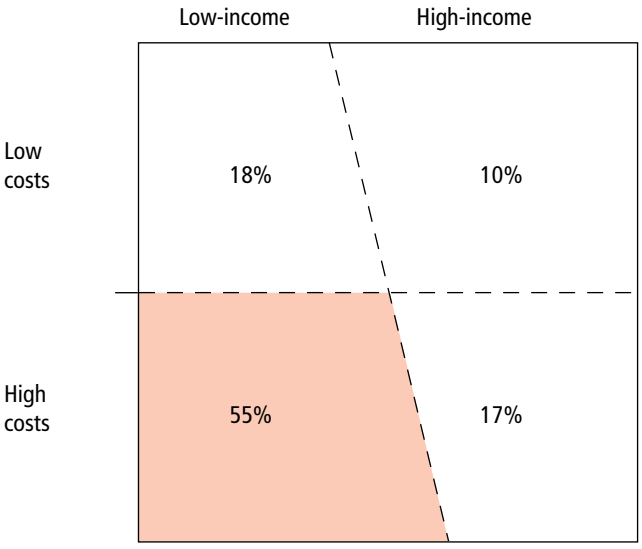
Source: Fuel Poverty Review

Figure 7.4b: *Distribution of households that would receive support under the exchequer-funded thermal efficiency archetypes (broadly targeted), 2016, England*



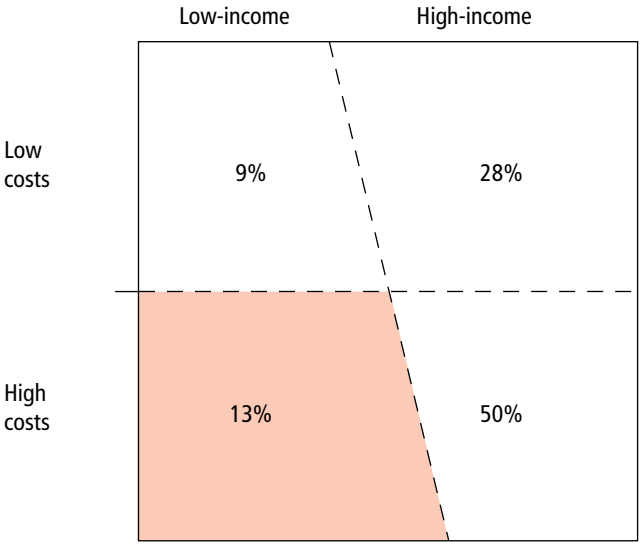
Source: Fuel Poverty Review

Figure 7.5a: *Distribution of households that would receive support under the supplier-funded thermal efficiency archetypes (narrowly targeted), 2016, England*



Source: Fuel Poverty Review

Figure 7.5b: *Distribution of households that would receive support under the supplier-funded thermal efficiency archetypes (broadly targeted), 2016, England*



Source: Fuel Poverty Review

30. Unlike energy bill support, upgrading the thermal efficiency of dwellings would have persistent impacts: providing a dwelling with a new heating system would reduce household energy costs for the period that the system is operational.[113] This means that the impact of policies could change over time. Specifically, a thermal efficiency policy funded through energy suppliers could increase the

113 Our analysis assumes 12 years.

level of fuel poverty during the period of the policy's operation (as some households would receive heating and insulation measures but all households would see higher energy prices as energy suppliers looked to recoup the costs) but could result in a reduction in fuel poverty once the policy had finished (as households that received support would continue to benefit but energy suppliers would no longer have costs to recoup).

31. For the purpose of the modelling we assume that, where a household has been removed from fuel poverty due to an improvement in the thermal efficiency of the dwelling, that household remains out of fuel poverty (with a consequent reduction in the headcount and fuel poverty gap) for as long as the measure lasts. Clearly this is a simplification because the fuel poverty status of a household depends on factors other than the thermal efficiency of the dwelling.[114] However, making this assumption allows us to compare the relative cost-effectiveness of the different archetypes.

32. Table 7.5 shows the impact that the different thermal efficiency archetypes could be expected to have on fuel poverty indicators in 2016.

33. The results suggest, unsurprisingly, that policies targeted at low-income households would result in better fuel poverty outcomes – as these are the options that most improve the relative position of fuel poor households. Both of the broadly-targeted policies would perform significantly worse than their narrowly-targeted equivalent and both would result in a small increase in the number of fuel poor households. Furthermore, a broadly targeted supplier-funded policy would *increase* the aggregate fuel poverty gap.

34. Although the archetypes are not directly comparable to any existing policy approach, these results can be seen to have a read-across to the policy development that is underway on the Green Deal. As discussed in Chapter 5, the Green Deal and ECO consultation document and Impact Assessment set out the proposed split of the Green Deal and ECO between affordable warmth (which delivers heating and insulation measures to low-income households) and carbon objectives (which delivers mainly solid wall insulation across all households). The Government's proposal is for around 25 per cent of ECO funding to be for Affordable Warmth. The results presented in this section – as well as the policy impacts presented in Chapter 6 – highlight the significance of the share of support that is delivered to low income households from a fuel poverty perspective. While these results should not be seen as a definitive answer to the question of the appropriate balance within ECO, they nevertheless point to the fact that a failure to ensure that the share is at least equitable would be liable to constrain the Government's ability to make progress towards fuel poverty goals.

114 In reality, whether a household remains out of fuel poverty depends on future movements in the cost and income thresholds. For example, a household could potentially be moved out just of fuel poverty after receiving energy efficiency measures but could subsequently fall back into fuel poverty if the energy cost threshold fell. As such, the long-run impact on fuel poverty could be smaller.

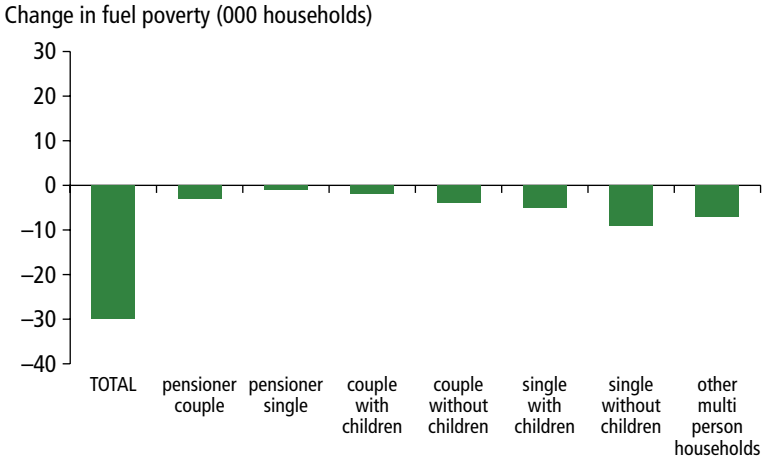
Table 7.5: *Short-term fuel poverty impacts of the thermal efficiency archetypes, 2016, England*

	Effect of policy on the number of households in fuel poverty (000s households)	**Effect of policy on the aggregate fuel poverty gap (£ million)**
2016 central projection (inc. climate and energy policies)	2,860	1,700
Exchequer-funded, narrowly-targeted	-30	-70
Exchequer-funded, broadly-targeted	+6	-20
Supplier-funded, narrowly-targeted	-10	-50
Supplier-funded, broadly targeted	+20	+20

Source: Fuel Poverty Review

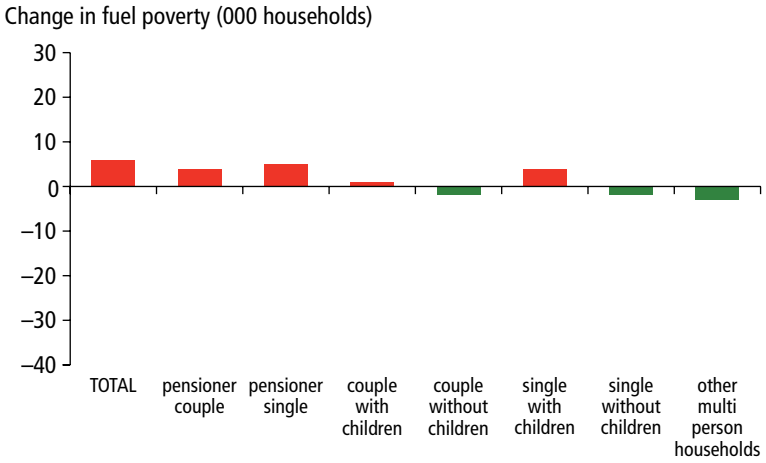
35. Figures 7.6 and 7.7 show how the fuel poverty impacts of these policies would be spread across household types. The distribution reflects a combination of the targeting of the policy and the type of households where opportunities exist to upgrade a property (e.g. an unfilled wall cavity or the lack of a heating system). The results suggest that the supplier-driven policy could have the greatest impact on reducing the numbers of fuel poor pensioner households. However, the broadly targeted supplier-driven policy would increase the number of families with children in fuel poverty.

Figure 7.6a: *Short-term fuel poverty impact of the Exchequer-funded energy efficiency archetype by household type (narrowly targeted), 2016, England*



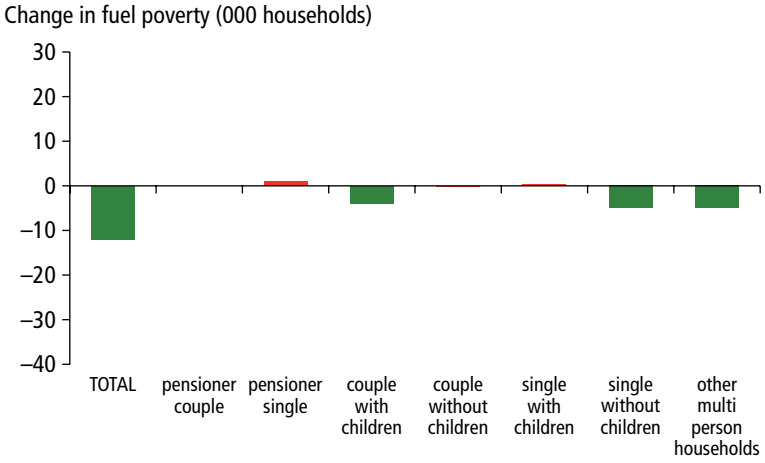
Source: Fuel Poverty Review

Figure 7.6b: *Short-term fuel poverty impact of the Exchequer-funded energy efficiency archetype by household type (broadly targeted), 2016, England*



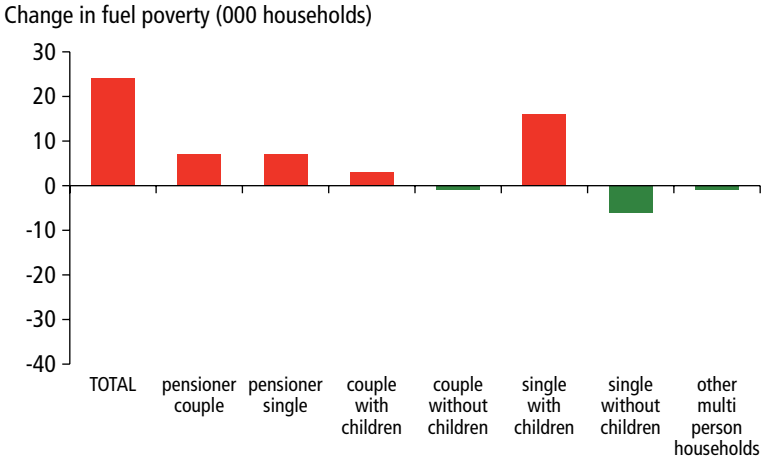
Source: Fuel Poverty Review

Figure 7.7a: *Short-term fuel poverty impact of the supplier-funded energy efficiency archetype by household type (narrowly targeted), 2016, England*



Source: Fuel Poverty Review

Figure 7.7b: *Short-term fuel poverty impact of the supplier-funded energy efficiency archetype by household type (broadly targeted), 2016, England*



Source: Fuel Poverty Review

Cost-effectiveness

36. Energy efficiency interventions – unlike rebates or income measures – have long-term benefits. Table 7.6 sets out how the thermal efficiency archetypes score against the cost-effectiveness indicators. The results suggest that – with the exception of the broadly targeted policy variants which would increase fuel poverty headcounts – the thermal efficiency archetypes would be significantly more cost-effective in the long run than the prices archetypes presented in Section 7.1. This is driven by the fact that the policies would deliver a significant number of low-cost measures (e.g. cavity wall insulation) and, more importantly, that the effects of these measures would be long-lasting (e.g. insulation would continue to provide benefits for over 40 years). Notably, investments of £500 million in narrowly targeted energy efficiency measures (however funded) would result in lifetime fuel poverty gap reduction of over £2.5 billion.

Table 7.6: *Cost-effectiveness of the thermal efficiency archetypes, England*[115]

	Lifetime change in fuel poverty (000 household-years)	**Lifetime change in the fuel of subsidy (£m)**
Exchequer-funded, narrowly-targeted	-1,070	-2,630
Exchequer-funded broadly targeted	+140	-680
Supplier-funded, narrowly-targeted	-1,230	-2,930
Supplier-funded, broadly targeted	+310	-390

Source: Fuel Poverty Review

Note: Negative numbers imply an decrease in fuel poverty.

115 The cost-effectiveness of the thermal efficiency archetypes is driven by the assumption that the impacts of measures are persistent. The results should therefore be interpreted as the aggregate impact of the policy over time (i.e. over the working lifetime of the measures that are installed) rather than representing the annual impact of the policies.

Greenhouse gas impacts

37. Table 7.7 shows the estimated impact of the policies on GHG emissions. Discussion of the elasticities used in the analysis is set out in the Annex to this Chapter. As discussed in Box 5.1 in Chapter 5, a policy delivering new and replacement heating systems makes hitting current carbon targets more difficult (as, from the perspective of carbon budgets, it results in a transfer of emissions from the traded sector to the non-traded sector). However, such a policy does reduce emissions overall. Further, insulation measures certainly reduce carbon emissions.

38. The results suggest that all of the archetypes would drive reductions in carbon emissions which we would expect to persist. The supplier-funded archetypes would be the best from a carbon perspective – this results from the fact that the supplier-funded policies are assumed to deliver significantly higher amounts of the lowest cost insulation measures compared to the Exchequer-funded policy. The broadly targeted supplier-funded intervention has a greater impact than the narrowly targeted one.

Cost-benefit analysis

39. Table 7.8 sets out the NPVs of the thermal efficiency archetypes. The results suggest that, for all of the archetypes, the aggregate benefits considerably exceed the costs even without equity-weighting – resulting in highly positive NPVs. The NPVs for the thermal efficiency policies are significantly higher than for the prices archetypes. This is because each of the policies would deliver a number of cost-effective measures with persistent impacts (on energy costs, GHG emissions, thermal comfort, etc.) for a one-off cost.

40. As we would expect, the supplier-funded policies would have the highest NPVs (because they would deliver the most cost-effective package of measures) and the broadly-targeted policy shows the lowest equity-weighted NPV (which reflects the fact that households across the income distribution would benefit through the policy). With equity-weighting each of the archetypes would have gross benefits that are more than twice their costs – in the case of a supplier-funded narrowly targeted intervention benefits exceed costs by four to five times.

Table 7.7: *Impact of the thermal efficiency archetypes on greenhouse gas emissions, 2016, England*

	Impact on GHG emissions ($MtCO_2$)		
	Traded sector	**Non-traded sector**	**Total**
Exchequer-funded, narrowly-targeted	-2.26	-1.14	-3.40
Exchequer-funded, broadly-targeted	-1.94	-1.82	-3.76
Supplier-funded, narrowly-targeted	-0.88	-4.03	-4.92
Supplier-funded, broadly targeted	-0.70	-6.06	-6.76

Source: Fuel Poverty Review calculations based on DECC IAG Guidance

Table 7.8: *Net Present Values of the thermal efficiency archetypes, England (2011 prices)*

	Net present value (£ million, discounted)	Equity-weighted net present value (£ million, discounted)
Exchequer-funded, narrowly-targeted	310	1,730
Exchequer-funded, broadly-targeted	360	860
Supplier-funded, narrowly-targeted	590	1,900
Supplier-funded, broadly targeted	990	1,360

Source: Fuel Poverty Review

We have modelled four thermal efficiency archetypes that vary both according to the funding stream (i.e. we look at an Exchequer-funded scheme that resembles Warm Front and a supplier-funded scheme that resembles current supplier obligations) and in terms of targeting (i.e. we look at narrowly and broadly targeted policies).

Naturally, the narrowly targeted policies focusing support on LIHC households would have the greater impact in terms of reducing fuel poverty. More than half of beneficiaries of narrowly-targeted policies would have low incomes and high costs, but fewer than a fifth of those who benefit from broadly targeted policies would be fuel poor. Our modelling also suggests that a supplier-funded option would result in a slightly better outcome in terms of lifetime fuel poverty headcount. The narrowly targeted supplier funded policy worth £500 million is estimated to reduce fuel poverty – by around 1.2 million household-years compared with around 1.1 million household-years for the narrowly targeted, Exchequer-funded policy. This difference is driven by the assumption that a supplier-led scheme would deliver a more cost-effective mix of measures.

Based on the assumption that they would deliver low-cost insulation and heating measures the thermal efficiency archetypes would be highly cost-effective policies for reducing fuel poverty gaps. Notably, investments of £500 million in narrowly targeted energy efficiency measures (however funded) would result in a lifetime reduction worth over £2,500 million in fuel poverty gaps. This is because improving the thermal efficiency of a dwelling can result in a large and sustained reduction in household energy costs.

Policies to improve the thermal efficiency of the housing stock also reduce net carbon emissions. As such, they offer a win-win against fuel poverty and carbon objectives. Overall cost-benefit analysis suggests that the aggregate benefits would considerably exceed the costs. On an equity-weighted basis a supplier-driven narrowly targeted intervention would have benefits of nearly five times the costs.

7.3 Income archetypes

41. We model two income archetypes, both of which consist of an increase in the level of existing benefit payments. The two different archetypes are: (a) a means-tested benefits (MTB) archetype – an increase in the rate of existing means-tested benefits; and (b) a Winter Fuel Payment (WFP) archetype – an increase in the rate of Winter Fuel Payment.

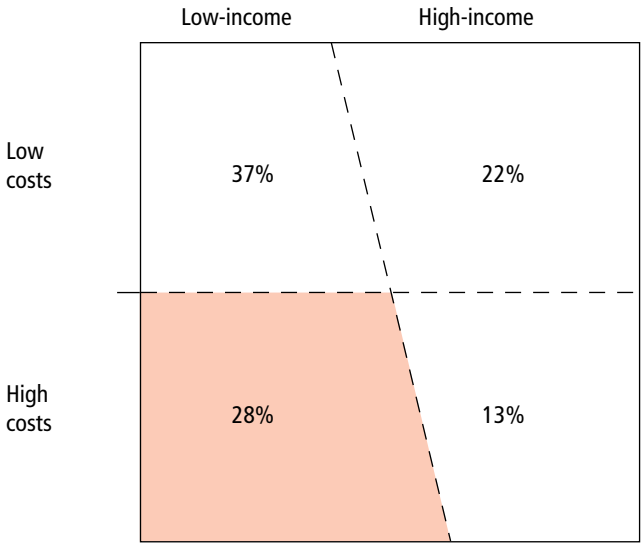
42. The WFP archetype assumes that the rate of WFP is increased by around 30 per cent. This would mean households containing someone aged between 60 and 79 receiving an additional annual payment of £59 and households with someone 80 or above receiving an additional annual payment of £89. This would have a cost of £500 million per year.

43. It is assumed that both of these policies would be financed through the Exchequer, requiring an increase in both direct and indirect taxation. See the Annex to this Chapter for more information on how the burden of additional taxation would fall across households. As was the case for the prices and thermal efficiency archetypes, the modelling that follows assumes that the policy is implemented in 2016 for a single year.

Fuel poverty impacts

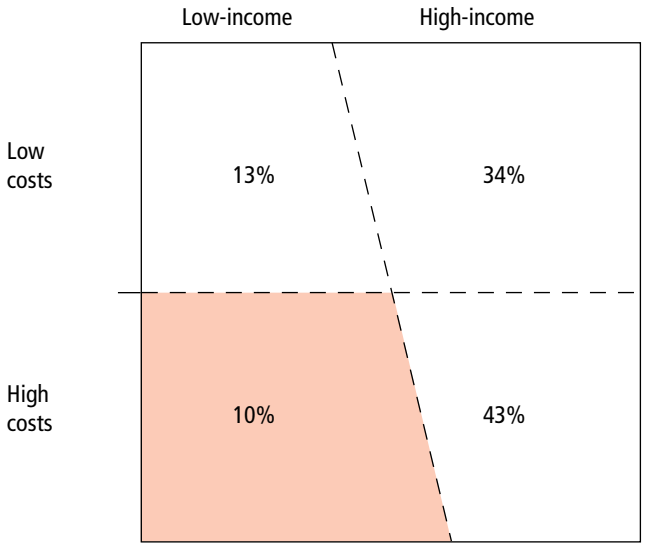
44. Figures 7.8 and 7.9 show the proportion of households receiving support under both archetypes that are LIHC and the proportions that are in other quadrants. As we might expect, more of the benefits under the MTB archetype would be targeted at low-income households. In this case 28 per cent of the beneficiaries would be LIHC, compared to only 10 per cent for the Winter Fuel Payment-type intervention.

Figure 7.8: *Distribution of households that would receive support under the Means Tested Benefits archetype, 2016, England*



Source: Fuel Poverty Review

Figure 7.9: *Distribution of households that would receive support under the Winter Fuel Payment archetype, 2016, England*



Source: Fuel Poverty Review

45. Table 7.9 shows the impact of the different income archetypes on fuel poverty and the fuel poverty gap in 2016. As was shown in Chapter 4, a policy that increases household income can move households out of fuel poverty (and reduce the aggregate fuel poverty gap) where receipt of the benefit moves the household across the income threshold.

46. The modelling results show that the MTB archetype would reduce the number of fuel poor households in 2016, while the WFP archetype would result in a very small increase. This increase is the result of the increase in taxation required to fund an uplift to the Winter Fuel Payment, which pushes some non-pensioner households below the income threshold.

47. It is striking – but not unexpected – that the income archetypes would have only a very small impact on the numbers of fuel poor households. This is because many households have an income that falls significantly below the income threshold. For these households, a relatively large increase in income would be required to move them across the income threshold.[116]

116 Note that the findings for Winter Fuel Payments result from their treatment as an addition to income. If they were instead seen as – at least partially – equivalent to a contribution to bill reductions, their impact on fuel poverty would be somewhat greater.

Table 7.9: *Short-term fuel poverty impacts of the incomes archetypes, 2016, England*

	Effect of policy on the number of households in fuel poverty (000 households)	**Effect of policy on the aggregate fuel poverty gap (£ million)**
2016 central projection (inc. climate and energy policies)	2,860	1,700
Increase in means-tested benefits	-6	-3
Increase in Winter Fuel Payments	<+1	<-1

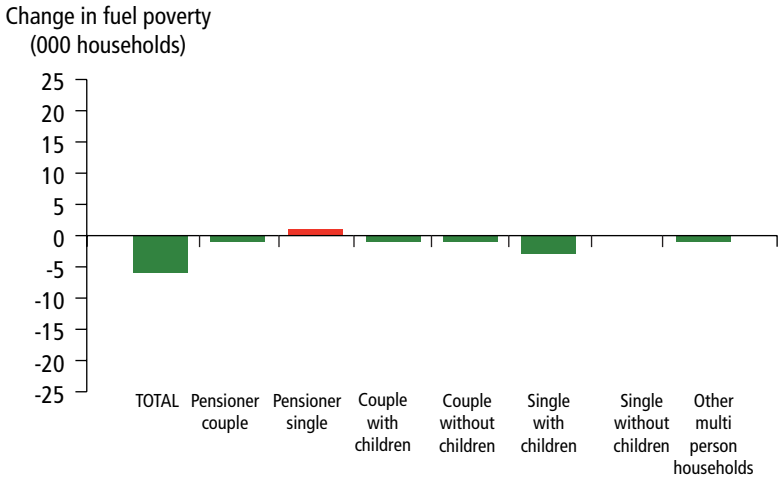
Source: Fuel Poverty Review

48. Both archetypes would also have a negligible impact on the fuel poverty gap. While additional benefit payments would move some households across the low income threshold (and out of fuel poverty), thereby reducing the fuel poverty gap, this would appear to be almost entirely offset by the impact of the increase in taxation that is required to pay for the policy. As we saw above, this would move households to the left in the matrix and would increase the fuel poverty gap for those households that are close to the income threshold.

49. As was the case with the prices archetypes (and unlike the energy efficiency archetypes) the fuel poverty impacts of the income archetypes would not be persistent. Households would only be removed from fuel poverty in the year in which the rebates were paid. The level of fuel poverty would revert to its previous level once the policy had stopped.

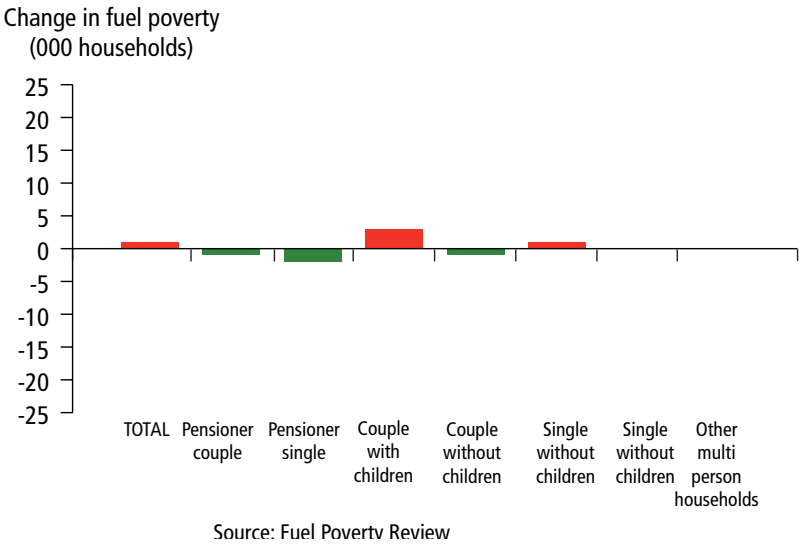
50. Figures 7.10 and 7.11 show how the fuel poverty impacts would be felt across different household types. As can be seen, reductions in fuel poverty would be concentrated among pensioners and families (i.e. the main recipients of mean-tested benefits) for the MTB archetype and among pensioners for the WFP archetype. Both archetypes show that some households would be pulled into fuel poverty through the policy – this would result from the increase in taxation pulling households below the income threshold.

Figure 7.10: *Short-term fuel poverty impact of the means-tested benefit archetype by household type, 2016, England*



Source: Fuel Poverty Review

Figure 7.11: *Fuel poverty impact of the Winter Fuel Payment archetype by household type, 2016, England*



Cost-effectiveness

51. Table 7.10 sets out how the income archetypes score against the cost effectiveness indicators. The results suggest that the MTB archetype is more cost-effective than the WFP archetype – removing more households for fuel poverty for a given cost – although both policies are significantly less cost-effective than most of the prices and efficiency archetypes.

Table 7.10: *Cost-effectiveness of the income archetypes, England*

	Lifetime change in fuel poverty per £500 million of subsidy (000s household-years)	**Lifetime change in the fuel poverty gap per £500 million of subsidy (£ million)**
Increase in means-tested benefits	-6	-3
Increase in Winter Fuel Payments	<+1	<-1

Source: Fuel poverty statistics (DECC), English Housing Survey

Greenhouse gas impacts

52. Table 7.11 sets out the estimated GHG impact of the income archetypes. The results suggest that the increase in the Winter Fuel Payment would have the larger impact on increasing energy consumption and GHG emissions. In fact, the results suggest that the MTB archetype would have a negligible impact on GHG emissions. This reflects the assumptions made about how receiving an 'energy-linked benefit' would affect responsiveness of demand. See the Annex to this Chapter for further discussion on how this has been modelled. It is likely that these increases would be shared across the traded and non-traded sectors. The GHG impacts would only occur in the year in which the additional benefits were paid – both energy consumption and GHG emissions would revert to previous levels once the policy had finished.

Cost-benefit analysis

53. Table 7.12 provides NPVs of the incomes archetypes. The results suggest that, for both policy archetypes, the aggregate benefits would exceed the costs even without equity-weighting. On the basis of the conventional cost-benefit analysis, the WFP archetype is preferable. This is because it is assumed to have a stronger impact on the behaviour of recipient households (which results in welfare gains as households turn up their heating). Conversely, the MTB archetype (which is better targeted at low-income households) has a better equity-weighted NPV. On an equity-weighted basis the two interventions have benefits that are about double their costs. This is similar to the results for the interventions based on discounts examined in Section 7.1, but much less favourable than the energy-efficiency archetypes examined in Section 7.2.

Table 7.11: *Impact of the income policy archetypes on greenhouse gas emissions, 2016, England*

	Impact on greenhouse gas emissions ($MtCO_2$)		
	Traded sector	**Non-traded sector**	**Total**
Increase in means-tested benefits	<+0.01	<+0.01	<+0.01
Increase in Winter Fuel Payments	0.15	0.43	0.58

Source: Fuel Poverty Review

Table 7.12: *Net Present Values of the income archetypes, England (2011 prices)*

	Net present value (£ million, discounted)	Equity-weighted net present value (£ million, discounted)
Increase in means-tested benefits	<10	550
Increase in Winter Fuel Payments	60	420

Source: Fuel Poverty Review

We have modelled two income archetypes: an increase in the level of means-tested benefits and an increase in the rate of Winter Fuel Payments. Our estimates suggest that both policies would have a very small impact on the extent and depth of fuel poverty. Only 28 per cent of means-tested beneficiaries would be LIHC – this figure is only 10 per cent for the Winter Fuel Payment interventions. The MTB archetype would result in a fall of around 6,000 households whereas the WFP archetype results in a small increase. Both would have small – and temporary – effects on the fuel poverty gap. Income-based measures appear to be significantly less cost-effective in terms of alleviating fuel poverty than either price or energy efficiency policies

As is the case with the prices archetypes, providing additional benefits increases energy usage and carbon emissions. As such, these policies would potentially be in conflict with GHG objectives. An overall cost-benefit analysis suggests that benefits would narrowly outweigh costs without equity-weighting, but would do so considerably on an equity-weighted basis. This net benefit would be much less than the energy-efficiency based interventions however.

7.4 What can we learn from the policy archetypes?

54. In this section, we consider some of the key results from the analysis in order to draw some conclusions about how Government can make further progress against its fuel poverty objectives.

55. The results give an illustration of the impacts of spending £500 million across the different archetypes of policy interventions. It should be noted that whilst some of the results are scalable – for example, twice the amount spent on rebates or benefits would result in an approximate doubling of the NPV and GHG impacts – this is unlikely to be the case in terms of the fuel poverty impacts. The impact of a policy on fuel poverty would be driven (among other things) by the distribution of incomes and costs within the population of fuel poor households. For example, a policy could have a significant impact on the numbers in fuel poverty if there were a large number of households near to the reasonable costs boundary. For these households, it would only take a small amount of support to take them out of fuel poverty (this would also be reflected by a modest reduction in the fuel poverty gap). However, further reductions in fuel poverty numbers would become increasingly expensive to achieve as policies would have to address households that were further away from the reasonable costs threshold. As such, it is unlikely that there would be a linear relationship between the costs of a policy and the impact on numbers in fuel poverty. This is one reason for paying most attention to relative impacts on the fuel poverty gap (although we would not expect the relationship with costs to be linear for that either).

56. Non-scalability is especially true in the case of policies that aim to increase the thermal efficiency of dwellings, where a larger programme could result in more expensive measures being delivered only when the opportunities to install cheaper measures had been exhausted. This is particularly true of the results we show for supplier-driven energy efficiency programmes, where the modelling assumes that the most cost-effective interventions are made first. For Exchequer-funded interventions, where we assume a different mix of measures, this problem would be somewhat smaller.

57. Table 7.13 compares the archetypes in terms of the proportion (and number) of households that would receive support and how these households would be spread across different quadrants within the costs/income matrix. In terms of immediate targeting efficiency, the policies based on narrowly targeted energy efficiency perform best, with more than half of the beneficiaries having low incomes and high costs. Winter Fuel Payments and broadly targeted supplier-driven efficiency programmes perform least well, with fewer than 15 per cent of beneficiaries in the target group.

58. Table 7.14 compares the archetypes in terms of their impact on fuel poverty and the fuel poverty gap. It also shows the fuel poverty cost-effectiveness indicators. These give a sense of which policies would be likely to make the largest contribution to reducing the scale of the fuel poverty problem. Here the key indicator is the lifetime reduction in the fuel poverty gap. Again, the narrowly targeted energy efficiency programmes would be most effective, with lifetime reductions in the fuel poverty gap of over £2,500 million for each £500 million invested. The income transfers would have little effect.

Table 7.13: *Distribution of households that receive support across policy archetypes, 2016, England*

Archetype	Proportion (%) of recipients that are:			
	LIHC	LILC	HIHC	HILC
Exchequer-funded, narrowly-targeted energy efficiency policy	55	20	14	11
Supplier-funded, narrowly-targeted energy efficiency policy	55	18	17	10
Supplier-funded rebate policy	28	37	13	22
Exchequer-funded rebate policy	28	37	13	22
Increase in means-tested benefits	28	37	13	22
Exchequer-funded, broadly-targeted energy efficiency policy	18	7	54	21
Supplier-funded, broadly targeted energy efficiency policy	13	9	50	28
Increase in Winter Fuel Payments	10	13	43	34

Source: Fuel Poverty Review

Table 7.14: *Fuel poverty impacts of policy archetypes, England*

Archetype	Short-term change in fuel poverty (thousands of households)	Short-term change in fuel poverty gap (£ million)	Life-time change in fuel poverty (thousands of household-years)	Life-time change in fuel poverty gap (£ million)
Supplier-funded, narrowly-targeted energy efficiency policy	-10	-50	-1,230	-2,930
Exchequer-funded, narrowly-targeted energy efficiency policy	-30	-70	-1,070	-2,630
Exchequer-funded, broadly-targeted energy efficiency policy	+6	-20	+140	-680
Supplier-funded, broadly targeted energy efficiency policy	+20	+20	+310	-390
Exchequer-funded rebate policy	-110	-70	-110	-70
Supplier-funded rebate policy	-110	-40	-110	-40
Increase in means-tested benefits	-6	-3	-6	-3
Increase in Winter Fuel Payments	<+1	<-1	<+1	<-1

Source: Fuel Poverty Review

59. Table 7.15 compares the GHG and NPV results. While these factors are not the primary concern of this review, they are potentially limiting factors and would involve trade-offs for decision-makers. For example, it would be problematic to implement a fuel poverty policy that made it difficult for the UK to live within its statutory carbon budgets.

60. Here rebate-based policies and Winter Fuel Payments would lead to increases in GHG emissions – as low income households would be able to keep warmer. The biggest reductions would come from supplier-driven efficiency programmes.

61. In terms of overall social welfare, it should be noted that the cost-benefit analysis suggests that all of the interventions would have positive net present values, even without giving extra weight to benefits for lower-income households. For the supplier driven energy efficiency policies the £500 million investments would yield gross benefits of between £1.1 billion and £1.5 billion without equity-weighting. Allowing for the greater value of benefits for low-income households all the interventions emerge as socially valuable, the narrowly-targeted efficiency programmes particularly so, whether Exchequer-funded or supplier-driven.

62. The results point to some important conclusions. First, funding policies through general taxation rather than through a levy on energy supply means that higher-income households would tend to bear a greater share of the cost of policies, resulting in some desirable characteristics – for example, greater reductions in the fuel poverty gap and a better distributional outcome. However, our modelling suggests that, in the case of thermal-efficiency policies, the incentive to ensure cost-effective delivery of targets could mean that supplier-funded policies would result in a better lifetime outcome in terms of reducing the number of households in fuel poverty.

63. Second, policies that deliver low-cost insulation and heating systems would be the most cost-effective means of making sustained reductions in fuel poverty. This is partly because the measures

Table 7.15: *Greenhouse gas emissions and Net Present Value impacts of policy archetypes, England*

Archetype	**Change in greenhouse gas emissions ($MtCO_2$):**		**NPV (£ million):**	
	Traded sector	**Non-traded sector**	**Non-equity-weighted**	**Equity-weighted**
Supplier-funded, narrowly-targeted energy efficiency policy	-0.88	-4.03	590	1,900
Exchequer-funded, narrowly-targeted energy efficiency policy	-2.26	-1.14	310	1,730
Supplier-funded, broadly targeted energy efficiency policy	-0.70	-6.06	990	1,360
Exchequer-funded, broadly-targeted energy efficiency policy	-1.94	-1.82	360	860
Exchequer-funded rebate policy	+0.16	+0.42	50	600
Increase in means-tested benefits	+<0.01	+<0.01	<10	550
Supplier-funded rebate policy	+0.09	+0.26	100	490
Increase in Winter Fuel Payments	+0.15	+0.43	60	420

Source: Fuel Poverty Review

would provide on-going reductions in energy costs (compared to the one-off impact that is provided by a bill or income subsidy) but also because such policies would tend to be delivered to those living in poor quality dwellings (i.e. less of the support under these policies would be directed at low-income low-cost households who would typically receive support under bills and incomes policies). This suggests that low-cost insulation and heating systems should be the central component of efforts to tackle fuel poverty. However, there are two important qualifications to this result:

a. Thermal efficiency measures typically require significant up-front costs, which means that relatively few households can be supported for a given budget. For example, our £500 million thermal efficiency, Exchequer-funded archetype assists around 0.5 million households per year compared to 5.7 million households assisted under the rebates policy. Unless there were a very significant increase in the level of resource devoted to the problem, upgrading of the housing stock would be a gradual process. As such, there would be a case for income and bill support to offer more immediate help in the short to medium term, perhaps especially for the vulnerable; and

b. While low-cost insulation and heating measures appear to be the most cost-effective options, this conclusion is unlikely to hold for all types of measures that improve the thermal efficiency of dwellings. The evidence presented in Chapter 2 of the interim report showed that the costs of improving household SAP rating begin to increase rapidly once a property has basic insulation and a central heating system. More expensive insulation, renewable heat and micro-generation technologies are likely, at least in the short to medium term, to be significantly less cost-effective options.

64. Our analysis also shows the importance of ensuring that policies delivering thermal efficiency measures are geared towards the needs of the fuel poor if fuel poverty is to be reduced. Policies that did not focus support on the group of households that face both low incomes and unreasonable energy costs would be less effective in terms of improving the relative position of the fuel poor and would be of only limited help to address the problem as we understand it. It is vital, therefore, for low-income high-cost households to be a central focus of energy efficiency policies in the household sector. As we have argued elsewhere in this report, this is a key question for the Government in developing the Green Deal and ECO.

The analysis of the archetypes allows us to draw some conclusions about the relative effectiveness and cost-effectiveness of different policy approaches. This suggests that policies to improve the thermal efficiency of the housing stock would tend to be the most cost-effective. They would have persistent benefits in reducing fuel poverty, would reduce greenhouse gases, and would have very substantial net societal benefits. Narrowly targeted supplier-driven policies would have the largest effects on fuel poverty, on the assumption that suppliers reacted to their incentive to maximise cost-effectiveness. However, broadly targeted supplier-based interventions – while being the most effective in reducing greenhouse gas emissions – could worsen fuel poverty numbers because of the impact of higher prices on low-income households, although they would have positive effects on fuel poverty gaps in the long run (albeit more modest than the narrowly targeted variants).

By analogy increasing the share of Affordable Warmth within ECO could therefore be expected to have positive effects on fuel poverty, favourable effects on greenhouse gas emissions and significant net societal benefits on an equity weighted basis.

However, upgrading the thermal efficiency of the housing stock will be a gradual process. Other short-term interventions such as price subsidies may therefore need to continue to be part of the policy mix. In terms of making the fastest progress towards fuel poverty objectives, the analysis shows that policies should be focused on LIHC households.

Chapter Summary

In this Chapter we have built on the analysis of the current policy package presented in Chapters 5 and 6 to determine how it might be possible to make further progress in tackling fuel poverty. We have analysed three broad types of interventions: policies that tackle energy prices, through delivering bill rebates; policies that aim to improve thermal efficiency through delivering subsidised insulation and heating systems to certain households; and policies that act on incomes by delivering direct income support. We have tested these against a number of key criteria: their immediate impact on fuel poverty; their long term cost-effectiveness; their impact on carbon emissions; and their net associated benefits as measured by official cost-benefit analysis approaches. We have distinguished between policies that are Exchequer-funded (similar to Warm Front) and those that are supplier-funded through additions to bills (similar to Warm Home Discount or ECO). We have also compared those that are narrowly targeted on low-income households with high costs (analogous to Affordable Warmth) or are more broadly targeted on all high costs households (similar to the Carbon Obligation in ECO).

For each of these – which between them cover all of the drivers of fuel poverty – we look at the short- and long-term impacts in 2016 of interventions with standard costs of £500 million. This allows us to compare and contrast the impact of the range of policies on both the LIHC headcount and fuel poverty gap indicators, and so their cost-effectiveness.

This analysis is, of course, abstract. However it allows us to draw some conclusions about the relative impact and cost-effectiveness of alternative policy approaches. It suggests that policies that improve the thermal efficiency of the housing stock would be the most cost-effective. They would have persistent benefits in reducing fuel poverty, they would reduce greenhouse gases, and they would have very substantial net societal benefits. Narrowly targeted supplier-driven policies would have the largest effects on fuel poverty, on the assumption that suppliers reacted to their incentive to maximise cost-effectiveness. However, broadly-targeted supplier-based interventions – while being the most effective in reducing greenhouse gas emissions – would have much more limited effects on fuel poverty, and would worsen it for some, because of the impact of higher prices on low-income households.

By analogy increasing the share of Affordable Warmth within ECO could therefore be expected to have more positive effects on fuel poverty while still having favourable effects on greenhouse gas emissions and significant net societal benefits on an equity weighted basis.

CHAPTER 8

Conclusions

1. Our interim report, published in October 2011, focused primarily on establishing the causes and impacts of fuel poverty, assessing the ways in which fuel poverty is a distinct problem and considering the implications of this for measurement. We concluded that fuel poverty was a serious national problem which is of concern from at least three perspectives – those of health and well-being, poverty, and carbon emissions reduction. We argued that measuring the problem accurately was important to underpin progress in tackling fuel poverty, to identify priority households and to assess the effectiveness of different policy options.

2. We made an assessment of the current official indicator of fuel poverty which is based on the number of households with required energy spending exceeding a threshold of 10 per cent of income. We argued that, while it has some strengths, this indicator also has serious weaknesses, including its undue sensitivity to energy prices and to technical considerations within the calculation, such as precise temperature standards and accuracy of income reporting. The trends it reports do not well reflect changes in the underlying problems, and its definition can encompass households that clearly are not poor. Part of the difficulty is that although a single indicator, it attempts to reflect both the extent and the depth of the problem.

3. Our analysis suggested that the definition of fuel poverty as set out in the Warm Homes and Energy Conservation Act 2000 correctly identified the core of the problem: we should be concerned about individuals in households "living on a lower income in a home that cannot be kept warm at reasonable cost." With this in mind we put forward a new framework for measuring fuel poverty, based on twin indicators to capture both the extent and depth of the problem. For the former, we described a headcount indicator capturing the number of households and individuals failing two thresholds relating, respectively, to required energy costs – set at the contemporary median – and incomes – set at the after housing costs poverty line plus the household's modelled bill. For the latter, we developed the idea of a fuel poverty gap – the difference between a given household's required costs and the median level for a typical household.

4. We held a consultation on our interim report. Responses were broadly very positive about the essential framework of our proposed Low Income High Costs (LIHC) measure. They were also supportive of the way in which we proposed that an income threshold for defining 'low income' should be set. However, there were concerns expressed about the way in which the cost threshold in particular had been set, including how required energy bills were adjusted for household size and composition in order to compare them

to the threshold. Based on our own analysis and the responses to the consultation, in this report we have proposed an adjusted way of allowing for family size and composition in this element of the calculation. We discuss the reasons for this choice and its effects in Chapter 2.

5. We also re-examined the way in which the level of the threshold for reasonable costs could be set, examining a number of alternative options and proposals. However, we found that each of these had shortcomings when compared with our original proposal. While no way of setting the threshold will be without some problems, we have retained our view that the median contemporary modelled energy requirement is the most robust level at which to set the boundary between 'reasonable' and 'unreasonable' costs.

6. These decisions lead to the following recommended measurement framework:

   The Government should adopt a new indicator of the extent of fuel poverty under which households are considered fuel poor if:

   - *They have required fuel costs that are above the median level; and*
   - *Were they to spend that amount they would be left with a residual income below the official poverty line.*

   The Government should also count the number of households in this position as well as the number of individuals living within those households.

   The Government should also adopt a new indicator of the depth of fuel poverty as represented by the average and aggregate 'fuel poverty gap', defined as the amount by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs.

7. This relative approach creates a 'moving target', as energy efficiency standards improve for the stock as a whole. For some stakeholders some of the effects of this are controversial. In particular we recognise that the relative nature of our preferred indicator makes the literal eradication of fuel poverty extremely challenging. Some might argue that this is a problem that could contribute to policy inertia: if the problem cannot literally be eliminated, why bother trying? However, we believe that our approach offers a more sophisticated interpretation of the way in which ambition can be set. While the relative approach could mean that there are always some low-income households with costs above the threshold, we suggest that the key indicator should be the scale of the aggregate fuel poverty gap. If this is reduced to a low level then no low-income households can be left very far above the threshold.

8. Our approach also has other advantages, not least in terms of ensuring a focus on improvements in lower-income households. There is a very large degree of consensus that those households with the largest fuel poverty gaps are the priorities for action. Regardless of where and how the threshold is drawn, our approach provides an incentive to focus resources in that direction.

9. Good measurement is only one step on the way to addressing the problem of fuel poverty. There needs to be consistency between measurement and the impacts of action on the ground. This is currently absent: one of the problems identified with the current indicator of fuel poverty is that it does not easily lend itself to being used for targeting the fuel poor. This is always a complex exercise and no system will allow for great precision. Very narrowly defined criteria can in some ways be undesirable. In practical terms offering assistance to households outside the strict interpretation of fuel poverty can still have important benefits.

10. One major advantage of the LIHC indicator we recommend is that it provides a bridge to targeting the fuel poor based on an understanding of dwelling and household characteristics. For example, we show in Chapter 3, that any low-income household living in an E, F or G Energy Performance Certificate rated home is highly

likely to be fuel poor and is certainly an obvious candidate for assistance. We also showed how a very simple set of proxies could allow for the identification of households accounting for about half of the overall problem, as measured by the fuel poverty gap. However, getting at the remaining half of the fuel poverty gap is much harder. For instance 38 per cent of LIHC households have lower incomes but do not receive means-tested benefits and are therefore relatively difficult to identify without more detailed screening.

11. In terms of priorities for action those facing the deepest fuel poverty gaps are clearly of high priority, but so are those in fuel poverty who are likely to be most vulnerable to its effects on health, particularly the most elderly, infants, and those with particular long-term illnesses or forms of disability.

12. The approach we propose also provides a framework within which policy-makers and those involved in this debate can identify the trade-offs between different kinds of policy. This could colour imminent decisions in the field of domestic energy efficiency policy in terms of the Green Deal and ECO. In Chapter 4 we showed how this kind of framework could apply in principle, while in Chapter 5 we examined the main elements of the current policy package offered by Government in this light, spanning the three drivers of fuel poverty: thermal efficiency (e.g. Warm Front, Green Deal); incomes (e.g. Winter Fuel Payments) and energy bills (e.g. Warm Home Discount). These have a variety of impacts on both the extent and depth of fuel poverty, depending on the source of funding and targeting.

13. This policy package could be supplemented by a range of additional policies. We discuss the potential roles of policies such as those related to minimum standards of energy efficiency (including the public provision of key related information), or for equity release schemes (but only in limited circumstances). We examine the impact of rising block tariffs but conclude that they would help only once the core problem of fuel poverty has been tackled, as such a policy could otherwise have an adverse impact on precisely the households we most wish to help.

14. We looked at the potential distributional effects of the ECO as currently proposed. With only one quarter of the policy going to Affordable Warmth, the package would be regressive overall. We cannot calculate precisely what the balance would need to be to avoid this, but it appears that over half of ECO would need to go to Affordable Warmth to avoid this.

15. We have also looked at what will happen to fuel poverty levels in the future. These inevitably contain large uncertainties and are subject to methodological limitations. Nonetheless it is clear that even allowing for these uncertainties, fuel poverty will not have been eradicated by 2016, however it is defined. Under our preferred indicator, our projections of fuel poverty in 2016 suggest that between 2.6 million and 3.0 million households will be fuel poor, and the fuel poverty gap will rise on our central projection from £1.1 billion in 2009 to £1.7 billion in 2016. This depth of fuel poverty is, as one would expect, greatly affected by the level of fuel prices. Only at the most optimistic end of the range will the fuel poverty gap remain close to its 2009 level. The report also looks at what the situation would be if there were no Government policies in place, showing that the policy package is expected to help keep fuel poverty levels lower than they would be, albeit only by about a tenth (looking at the fuel poverty gap). This is profoundly disappointing. While the current policy package will have some beneficial effects, its scale is clearly not enough to even to ensure that fuel poverty, as we think it should be measured, will be lower in 2016 than it was in 2009, let alone be eliminated.

16. For comparative purposes, we also set out projections for the current indicator, which showed a range extending from 3.1 million to 9.2 million households (43 per cent of the total in England) in fuel poverty by 2016, highlighting the great sensitivity of the indicator to changes in fuel prices.

We also show that the number of low-income households with energy efficiency or costs below absolute standards would fall more slowly over the years after 2009 than before then.

17. Against this perturbing background we then went on, in Chapter 7, to look at how additional policy effort could contribute to tackling fuel poverty. We analysed three broad types of interventions: policies that tackle energy prices, through delivering bill rebates; policies that aim to improve thermal efficiency through delivering subsidised insulation and heating systems to certain households; and policies that act on incomes by delivering direct income support. We then tested these against a number of key criteria: their immediate impact on fuel poverty; their long term cost-effectiveness; their distributional impact; their impact on carbon emissions; and their net associated benefits as measured by official cost-benefit analysis approaches.

18. The analysis suggests that policies to improve the thermal efficiency of the housing stock that are targeted on those with low incomes and have energy-inefficient homes would be the most effective at reducing the level of fuel poverty. Policies analogous in some ways to Warm Front or the Affordable Warmth component of ECO would have the greatest focus on fuel poor households and would be the most cost-effective in achieving long-term reductions in the fuel poverty gap. They would also lead (along with the Carbon Reduction part of ECO) to the greatest reductions in carbon emissions. They would have very substantial net societal benefits in relation to cost, particularly when their distributional impact is allowed for.

19. It is clear that the problem of fuel poverty is both serious and widespread. Our preferred indicator shows that it affects more than seven million people living in nearly three million homes. Our projections suggest that far from being eliminated by 2016 as the 2000 Act requires, it is likely to be substantially worse than it was in 2009. Current policies are expected to have a positive impact on the level of fuel poverty, as measured by our indicator, so that it is less bad than it might otherwise be, but this impact is a limited one.

20. Effective future action requires a reinvigorated fuel poverty strategy. We believe that the case for this is very strong. First, the framework for measurement underlying the 2001 strategy is inappropriate and does not effectively support policy-making and delivery. Second, on current trends and policies, fuel poverty will not be eradicated by 2016, however it is measured. Third, the context has changed since 2001, with combating climate change a still more urgent national priority, while the economic and fiscal crisis leaves more households vulnerable to the effects of energy prices that have risen, rather than fallen as was assumed in 2001.

21. The scale of the challenge is daunting. Within Government, although DECC has the clearest interest in fuel poverty, tackling it cannot be the task of a single Department. The problem is one affecting health, poverty, communities, and climate change. Tackling it successfully will require many parts of Government to be involved.

22. Our analysis shows that interventions, targeted on the core of the problem, can make a substantial difference. We hope that the framework we have developed provides some of the tools that will allow this to be done most effectively.

Recommendation: The Government – not just DECC but also other Departments – should set out a renewed and ambitious strategy for tackling fuel poverty, reflecting the challenges we lay out in this report and the framework we have set out for understanding them.

Annex to Chapter 1

Respondents to the consultation on the interim report

Association for the Conservation of Energy

Action with Communities in Rural England (ACRE)

Act on Energy

Age UK

Beat the Cold

Blackburn with Darwen Borough Council

Dr Brenda Boardman

Bolton NHS

Bromford Group

Carillion

Dr Noel Cass

Chartered Institute of Environmental Health

Cheshire West and Chester Council

Citizens Advice

Consumer Focus

Contec Heat Controls

Cornwall Council

County Durham Fuel Poverty Partnership

Centre for Sustainable Energy

Cumbria Affordable Warmth

Department for Social Development in Northern Ireland

EDF Energy

End Fuel Poverty Coalition

Energy Action Scotland

E.ON

Energy Saving Trust, Manchester

Fuel Poverty and Energy Efficiency Group

Fuel Poverty Advisory Group

Health, Housing and Fuel Poverty forum

Herefordshire Council

Donald Hirsch

Greater London Authority

Independent Age

Islington Council

Keeping Warm in Later Life Team

Leeds City Council

Macmillan Cancer Support

Maidstone Borough Council

Marmot Review team

Peter Matejic

Beryl Metcalf

Milton Keynes Council

National Housing Federation

National Pensioners Convention

National Energy Action

NW Tenants and Residents Assembly

Dr Fin O'Flaherty, Sheffield Hallam University

Prof David Ormandy

Dr Noel Olsen

Philip Parry

Portsmouth City Council

Professor Sullivan

Rights to Warmth

Andrew Robertson

Peter Rowberry

Sefton Council

South Kesteven

Prof Gordon Walker – INCLUESEV

West Yorkshire Fire and Rescue Service

Allan Whitehead MP

Zaccheus 2000

Annex to Chapter 2

1. This Annex contains technical analysis relating to a range of issues that are relevant to Chapter 2. The structure is as follows:

   - Part A: Applying an income threshold to the current official indicator of fuel poverty;
   - Part B: Understanding equivalisation of modelled bills under the Low Income High Costs (LIHC) approach;
   - Part C: Setting out the unit costs approach put forward by stakeholders and comparing this to our approach based on equivalisation;
   - Part D: Looking at potential absolute indicators for fuel poverty measurement.

Part A: Applying an income threshold under the 10 per cent indicator

2. As explained in the summary of responses to the consultation on the interim report (see Chapter 1), one suggestion made was to add an income threshold to the current indicator of fuel poverty (the 10 per cent indicator). Higher-income households would not be counted as fuel poor even if their ratio were above 10 per cent.

3. This suggestion amounts to a proposal to capture the overlap of low income and high costs without making any major modification to the current indicator. Those households with relatively high income would be automatically ruled out from being identified as fuel poor. This would be an advantage. Applying a low income threshold to the 2009 data, whereby a household could only be fuel poor if, as well as having a modelled energy requirement representing more than 10 per cent of its income, it had an income in the lowest 30 per cent of incomes (bottom three income decile groups), would reduce fuel poverty from 4.0 million to 3.4 million households.

4. However, this kind of approach has a number of disadvantages. These centre around the fact that merely adding an income threshold to the indicator addresses only one of its fundamental weaknesses as summarised in Chapter 1 and described in more detail in Chapter 5 of the interim report. The indicator would remain a ratio indicator at heart, prone to an oversensitivity to price changes, to technical decisions taken within the methodology (such as temperature standards) and to the misreporting of low incomes. An income threshold would not address the way in which the arbitrarily chosen 10 per cent threshold cuts off the tail of the distribution of fuel poverty ratios. It would not mean the indicator told us more than before about the depth of fuel poverty – and we believe it would not be meaningful to use a fuel poverty gap indicator alongside the 10 per cent fuel poverty ratio measure since this would compound the

sensitivity to fuel prices. It would help in targeting the fuel poor to some extent, if higher income households can be identified, but that would still require some form of screening.[117]

Part B: Equivalisation of modelled bills under LIHC

How household bills are adjusted in the calculation

5. As set out in Chapter 1, we use equivalisation factors for both income measurement and modelled bills in our Low Income High Costs indicator, as proposed in the interim report.

6. The original equivalisation factors we used in the interim report are set out in Table A2.1

7. As a reminder, this is how the calculations are made. The reference household – to which others are standardised – is a couple without children (equivalisation factor of 1.00). As an example, the equivalisation factor used by DWP (for after housing cost income calculations) for a single-person household is 0.58. That is, a single person with an after housing costs income of £11,600 is taken to have the same standard of living as a couple with £20,000.

8. Under the LIHC indicator, the costs threshold is calculated by equivalising all bills and then finding the median bill. Let's assume this is shown to be £1,200, which therefore becomes the costs threshold to which individual households can be compared.

9. To work out the fuel poverty status of an individual household, the equivalised bill is added to the official poverty line to give a specific household threshold. For a couple without children with a modelled bill that is identical to the median, this would mean adding £1,200 to the income threshold. For a single person with a modelled bill of £1,200, equivalisation using the factors used in our interim report gives a modelled bill of £2,069 (=£1,200/0.58) which should be added to the equivalised poverty line for that household.

10. Whether an individual household's modelled costs are above or below the costs threshold can be judged in two ways. Either:

    - by comparing the modelled bill, without adjusting it for household size and type, to an adjusted threshold; or

    - by comparing the modelled bill, after adjusting it for household size and type, to an unadjusted threshold.

11. Therefore, if the equivalised median modelled bill is £1,200 and a single household has an unadjusted bill of £1,100, one can either compare (again using the factors from our interim report):

117 The full background to these criticisms of the current indicator is not set out here. For some detail, please see Chapter 1. For the full picture, we refer readers to Chapter 5 of our interim report.

Table A2.1: *Fuel cost equivalisation factors used in the low income high costs indicator in the interim report*

Household types	1 adult	1 adult 1 child	1 adult 2 chldn	2 adult	2 adult 1 child	2 adult 2 chldn	3 adult	3 adult 1 child	4 adult
DWP adjusted equivalence factor	0.58	0.78	0.98	1	1.2	1.4	1.42	1.62	1.84

Source: Hills Fuel Poverty Review interim report

- £1,100 to an adjusted threshold of £696 (=£1,200*0.58; the difference of £404 is the fuel poverty gap if the household falls below the income threshold); or

- £1,897 (=£1,100/0.58) to an unadjusted threshold of £1,200 (the difference of £697, once unequivalised to £404, is the fuel poverty gap).

Developing alternative factors

12. As we discussed in Chapter 2, respondents to the consultation suggested that the use of these equivalisation factors – based on those used by DWP for adjusting after housing costs income – for adjusting the fuel costs in relation to the threshold was incorrect. They do not reflect the role that energy plays in the household basket of goods, whose economies of scale are less than for other goods (apart from housing). The question is then, how could one develop appropriate alternative equivalisation factors? This section sets out the approach we have now taken.

13. Our starting point was the modelled spending patterns discernible in the 2009 English Housing Survey data. From this one can identify the average requirements of different household types. The data used are presented below (see Table A2.7 below) in relation to the alternative proposal made to us by Dr Richard Moore to use a unit costs approach. For instance, couples with two children have average modelled fuel cost requirements that are 18 per cent higher than those of couples without children (see table A2.7).

14. The difficulty with using an approach based on average modelled costs is that spending patterns may be distorted by different groups having unequal standards of living. For example, modelled spend data for lone parents with two children would suggest that they have very different needs from two adult households with two children. This is most likely to reflect the fact that lone parents are on average much poorer, and live in more energy-efficient and smaller social housing.

15. To overcome this problem, we have examined the average modelled expenditure of those households of all types whose (equivalised) income is within 20 per cent either side of the national median. In this way, we can base our equivalisation scale only on households with fairly typical incomes, and avoid any skew that including particularly high or low income households might introduce. This generates the values given in Table A2.2.

16. Our equivalisation factors relate to a more limited range of household types than presented in Table A2.7. This is because it is difficult to distinguish between the numbers of children in households in a robust way (because of small sample sizes). Therefore deriving equivalisation factors based on the number of children in households would not only add complexity, but would also potentially jeopardise the accuracy of our equivalisation scale. We also drop the differentiation between pensioner and non-pensioner households. The prime reason for this decision is that we are not convinced that it is 'reasonable' for a single pensioner to spend more

Table A2.2: *Index of average fuel costs by household size and composition, based on households with AHC equivalised income within 20 per cent of the median AHC equivalised income, 2009*

couple with dependent child(ren)	couple, no dependent child(ren)	lone parent with dependent child(ren)	one person	other multi-person households
1.13	1.00	0.93	0.82	1.08

Source: Fuel Poverty data, 2009 (DECC)

Table A2.3: *Index comparing average modelled fuel costs by household composition, based on households with AHC equivalised income within 20 per cent of median AHC equivalised income, 2007 and 2008*

	couple with dependent child(ren)	couple, no dependent child(ren)	lone parent with dependent child(ren)	one person	other multi-person households
2008	1.13	1.00	0.93	0.82	1.08
2007	1.16	1.00	0.97	0.82	1.06

Source: Fuel Poverty data, 2007 and 2008 (DECC)

on fuel than a single non-pensioner. A distinction between pensioner and non-pensioner households is not made by DWP (or internationally) in adjusting income to measure relative living standards. Such a distinction would also add complexity to our equivalisation scale.

17. In order to ensure the robustness of the factors, we have also calculated them based on the 2007 and 2008 English Housing Surveys, to see whether they fluctuate markedly over time. The results are given in Table A2.3.

18. As can be seen, there are minor discrepancies between the three years of data. We believe that these differences should be taken into account, and we therefore propose taking the average of these three years as the final equivalisation factors, as set out in Table A2.4.

19. One way of testing these factors is to compare them with one's expectations. We believe that, on balance, these factors are sensible and appropriate: they suggest that a single person typically needs to spend 82 per cent of the spending of a couple without children and that having children in a household adds some 12-15 per cent to requirements.[118]

Effects on composition

20. The major impact of adjusting the equivalisation factors is in terms of the breakdown of households classified as fuel poor. The data are given in Table A2.5 and represented graphically in Figure A2.1, with a comparison made between the current indicator and the Low Income High Costs indicator from our interim report.

118 It can also be noted that these give the same ratio between single people and couples as that for total modelled energy costs across the whole EHS sample shown in Table A2.7 below. The adjustment factors for couples with children and lone parents are also consistent given the biases we expect in the raw data. The adjustment factor for multi-adult households is perhaps lower than one might expect, however. If the approach we recommend were adopted for official fuel poverty measurement this is an area which could be investigated further.

Table A2.4: *Index comparing average fuel costs by household composition, based on households with AHC equivalised income within 20 per cent of median AHC equivalised income, 2007-2009 (average)*

	couple with dependent child(ren)	couple, no dependent child(ren)	lone parent with dependent child(ren)	one person	other multi-person households
Average of 2007, 2008, 2009	1.15	1	0.94	0.82	1.07

Source: Fuel Poverty data, 2007-2009 (DECC)

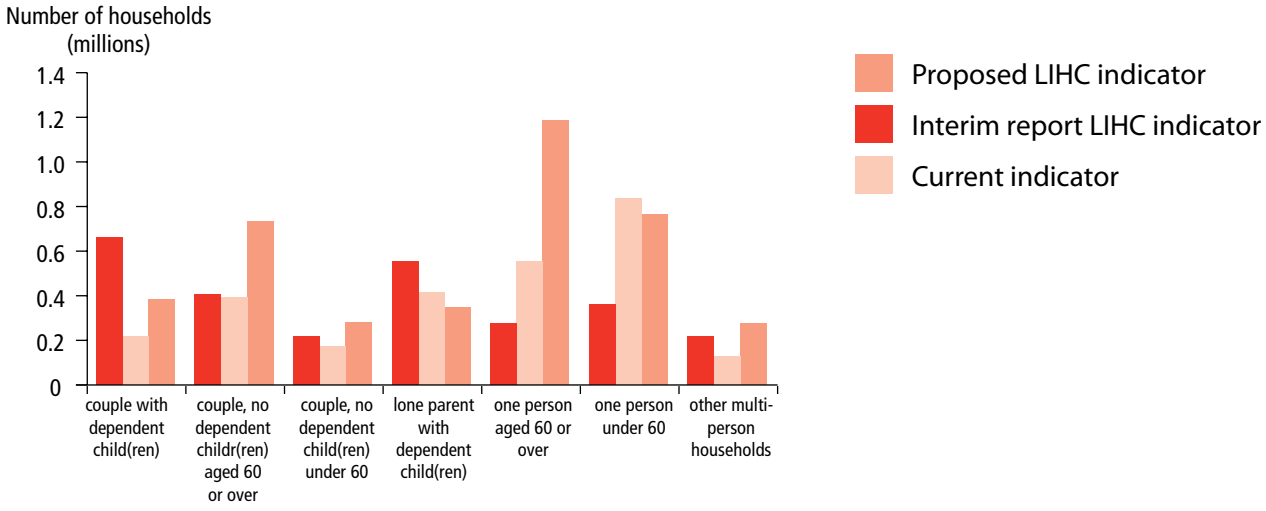
Table A2.5: *Composition of fuel poor households, and numbers of individuals, under three different indicators, 2009*

	Total households	Couple with dependent children	Couple, no dependent child(ren), aged 60 or over	Couple, no dependent child(ren) under 60	Lone parent with dependent child(ren)	One person aged 60 or over	One person under 60	Other multi-person households	Total individuals
New proposed LIHC	2,695	661 (25%)	406 (15%)	219 (8%)	555 (21%)	277 (10%)	361 (13%)	215 (8%)	7,842
Original LIHC	2,716	216 (8%)	394 (15%)	172 (6%)	415 (15%)	555 (20%)	836 (31%)	128 (5%)	4,763
Current indicator	3,964	381 (10%)	733 (18%)	281 (7%)	347 (9%)	1,184 (30%)	763 (19%)	275 (7%)	7,374

Source: Fuel Poverty data, 2009 (DECC)

21. As can be seen, the two versions of the low income high costs indicator give very different results in terms of overall household composition, but not total household numbers. The big difference is that, of the fuel poor identified under the new version of the indicator, far more of them are accounted for by couples with dependent children and far fewer by single people (both over and under 60). There are also differences between the current indicator and the new version of the low income high costs indicator, although they find very similar numbers of individuals to be fuel poor. The biggest differences are in the proportion of fuel poor households accounted for by couples with children (higher under the new version of our indicator), lone parents (higher under the new version of our indicator) and single pensioners (higher under the current indicator). The reduction in the proportion of older households within the total is common to other approaches, such as the unit cost approach discussed in Part C of this Annex.

Figure A2.1: *Composition of fuel poor households, under three different indicators, 2009*



Source: Fuel poverty statistics 2009 (DECC)

Part C: Alternatives to equivalisation

Measuring unit costs (£/m²)

22. A specific alternative approach put forward by stakeholders during the consultation on our interim report was, within the overall LIHC framework, to measure required spending in terms of unit costs, measured in £ per m², rather than total costs adjusted for household size.

23. The case for this approach centres around the observation that analysis of the 2009 English Housing Survey data shows that modelled unit energy costs do not vary substantially by household size. In his detailed analysis provided to the review, Dr Richard Moore shows that unit fuel costs are relatively unaffected by the size and composition of the household, varying from the average for households comprising two adults by typically only 3-5 per cent and by no more than 10 per cent. This can be seen in Table A2.6.

Table A2.6: *Index comparing modelled fuel cost requirements by household size and composition*

Household types	**1 adult**	**1 adult 1 child**	**1 adult 2 chldn**	**2 adult**	**2 adult 1 child**	**2 adult 2 chldn**	**3 adult**	**3 adult 1 child**	**4 adult**
Space heating	0.88	0.80	0.78	1	0.90	1.03	1.03	1.10	1.11
Water heating	0.71	0.94	1.13	1	1.13	1.30	1.20	1.36	1.40
Lights and appliances	0.71	0.90	1.12	1	1.15	1.42	1.23	1.47	1.48
Cooking	0.90	1.04	1.15	1	1.13	1.25	1.12	1.26	1.26
Total fuel costs	0.82	0.85	0.93	1	1.00	1.18	1.11	1.24	1.25
Average floor area	0.77	0.73	0.82	1	0.92	1.11	1.06	1.20	1.19
Unit costs (Fuel cost per m$^{2)}$	1.06	1.10	1.08	1	1.05	1.05	1.03	1.05	1.03
Average SAP rating	53.3	57.3	58.9	52.2	55.7	53.9	52.2	53.2	52.4

Source: Research commissioned by Consumer Focus and carried out by Dr Richard Moore.

24. Under this needs-based approach, reflecting current accommodation patterns, couples have total energy needs represented by the factor 1.00 in the fifth line of the table. Couples with one child have the same total needs. This reflects lower space heating requirements as their accommodation is smaller on average, but higher requirements for water heating, lights and cooking. Single adult households have a factor of 0.82; lone parents with one child a factor of 0.85. Note that for these different household types variations in dwelling sizes and the SAP ratings of the homes occupied affect the average spending needs as well as the number of people.

25. From the table, it can be seen that average modelled costs per m^2 are relatively similar between household types, just six per cent more for single adults than couples, for instance, or ten per cent more for lone parents with one child. A common threshold across all household types expressed in £/m^2 would therefore have roughly consistent results on average between household types, without any need for equivalisation.

26. One concern of some stakeholders is that the assessment of fuel poverty should not be unduly driven by under-occupancy, which can lead to high modelled costs per person. Dr Moore argued that the current fuel poverty model allows for this (by giving a half-heating regime where there is under-occupancy, the results of which are also allowed for above) so the cost of space heating is made dependent on the size and composition of the household as well as on the energy efficiency and size of the home. Under this approach this reduced need for fuel is then compared with the single national threshold. In commentary on the unit costs approach, Dr Brenda Boardman argued that with a single unit costs threshold there should be no adjustment to half-heating regimes when calculating the energy needs of under-occupying households.

Threshold setting and composition

27. If the unit costs approach were taken a decision would be needed in relation to the threshold representing the boundary between 'reasonable' and 'unreasonable' costs. There are various options and the documentation relating to this proposal sent to the review set many of these out. Some of them emulated approaches we discussed in Chapter 2 above, for example the idea of setting a threshold at 60 per cent of median unit costs. Of course, it would also be possible to apply our preferred threshold – the contemporary median – under the unit costs approach.

28. The decision on the threshold would affect the scale of the problem identified by the indicator and therefore the composition of households in fuel poverty. The option we use to understand what the unit costs approach would show in practice is to draw the threshold at the level of the median unit costs of all households, as this allows us to compare the approach with our own (where we used median total costs of all households). However, some stakeholders suggested that we should use a cost threshold based on the median costs of homes at the boundary between an C rating on the EPC scale and a D rating. Conceptually, this would mean comparing everyone's costs to those faced by households living in the best seventh of homes – only 14 per cent of households in England have an A, B or C rating.

29. We have set out in Chapter 2 the compositional breakdown of fuel poor households under our preferred LIHC indicator. This is compared below, in Table A2.8 and Figure A2.2, to the breakdown that results from the current official indicator, the original LIHC indicator (from the interim report) and the unit costs approach.

Table A2.7: *Breakdown of fuel poor under households by type under various indicators, 2009, England*

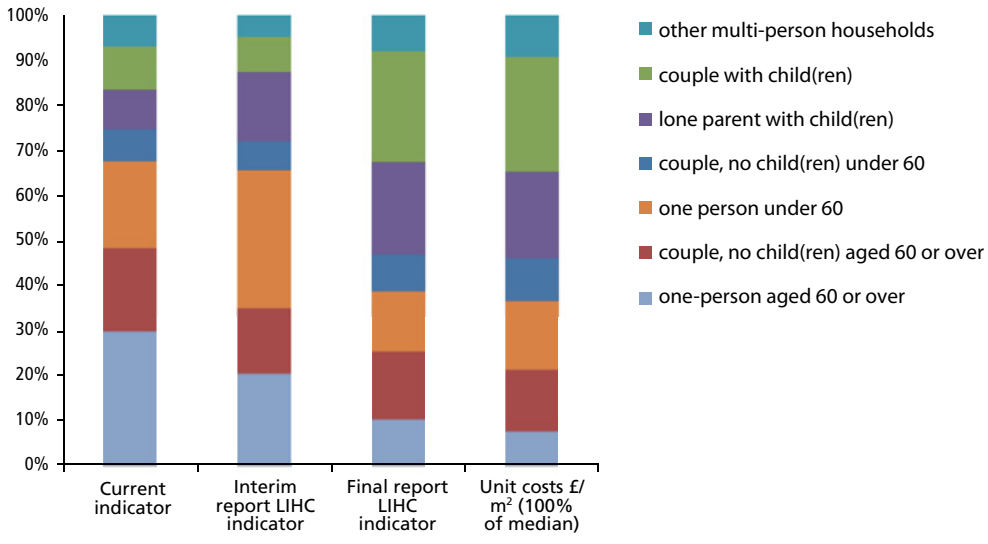
	couple with child(ren) (%)	couple, no child(ren) aged 60 or over (%)	couple, no child(ren) under 60 (%)	lone parent with child(ren) (%)	one person aged 60 or over (%)	one person under 60 (%)	other multi-person households (%)	TOTAL (000s)
Current indicator (full income)	9.6	18.5	7.1	8.8	29.9	19.2	6.9	3,964
Interim report LIHC	8.0	14.5	6.3	15.3	20.4	30.8	4.7	2,716
Proposed LIHC	24.5	15.1	8.1	20.6	10.3	13.4	8.0	2,695
Unit costs £/m^2	27	13	9.0	19	8.0	15	9.0	3,496

Source: Fuel Poverty data, 2009 (DECC)

30. Figure A2.2 shows the proportion of households under each indicator.

31. Basing the fuel threshold on unit costs rather than total costs has a large effect on the number of fuel poor households, with nearly 3.5 million households in fuel poverty under a unit cost approach. This is considerably more than under the total costs approach (2.7 million), despite setting the threshold at the median level of unit costs. However, compared to the official indicator, both the revised LIHC indicator and the unit costs indicator find smaller proportions of fuel poor households to be pensioners that the current definition.

Figure A2.2: *Breakdown of households under various indicators, by household type, 2009, England*



Source: Fuel Poverty data, 2009 (DECC)

Comparing the equivalisation approach with the unit costs approach

32. We have considered this alternative very carefully, in particular comparing its results with our LIHC indicator based on total household needs, adjusted using the equivalisation factors derived as set out in Part B of this Annex. Our conclusion is, however, that the equivalisation approach described in the previous section is more effective at reflecting relative needs than the £/m^2 approach.

33. One key feature of the proposed £/m^2 approach is that the threshold used is independent of the number of people living in a household. However, the required energy costs will be larger for a bigger household, reflecting the additional water heating and lights and appliance consumption that they will require, and benefit rates and gross incomes are generally larger for bigger households reflecting these needs. This means that for a particular property, a larger household will be more likely to be assessed as having needs that exceed the threshold. It is not obvious that this is always appropriate.

34. As an example, consider a pensioner couple living in a particular home. The husband dies and his widow continues to live in the same home. Under either approach, whether she ends up above or below the income threshold will be approximately reflected in the equivalisation of incomes before and after she became a widow. Her actual income is likely to be lower, but whether this pushes her into poverty will depend on whether the drop is greater than the reduction in her needs. We believe her changed circumstances should also be reflected in our understanding of what constitutes a reasonable bill.

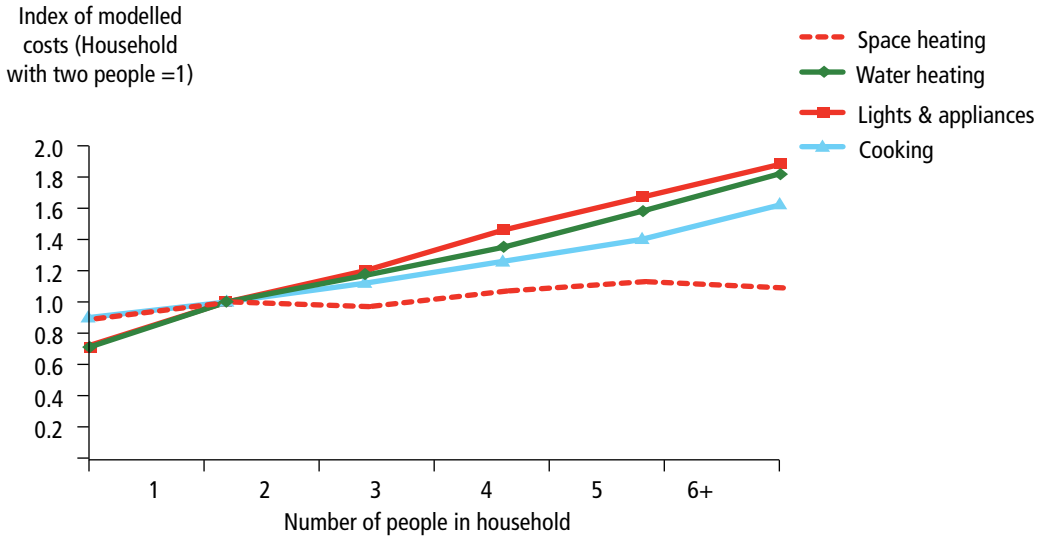
35. Her energy costs as a single person living in the same dwelling would be expected to fall somewhat and this will be reflected in her calculated energy requirement. But under the unit costs approach this lower energy requirement is compared with the *same* costs threshold as before. It could be that the couple were previously considered to have high costs under this approach – and so were in fuel poverty – but that her reduced costs as a widow now put her below the threshold – and so no longer in fuel poverty as a result of her husband's death. This would be even more likely if the modelling incorporated a 'half house' standard in her new circumstances. By contrast, under the approach outlined in the previous section, the key issue would be whether her required energy costs fell by more or less than the 18 per cent implied by our revised equivalisation factors. This seems more appropriate.

36. In effect the unit costs approach implies that those in this situation will move to smaller accommodation (and so keep their required costs constant per m^2). This may be true on average comparing all single people and all couples, but it clearly does not always happen and it is not necessarily appropriate to assume it should.

37. Given the imperfections of any assessment of this kind it is, of course, always possible to find counter-intuitive illustrations. But the general point is that, in essence, the unit costs approach would seem to require homes perfectly suited to needs and to penalise householders who are not in such a situation.

38. In a nutshell while we agree that the equivalisation approach set out in the interim report made much too great an adjustment to the effective costs threshold, it seems wrong to make *no* adjustment at all, which is what is implied by the £/m^2 alternative. Our initial proposal did make it too likely that under-occupying households would be counted as having high costs. But part of the root of the fuel poverty problem is that people – particularly those on low incomes – do have difficulty in moving to new accommodation, and therefore may face genuine difficulties through the energy needs of a property they continue to live in. Our revised approach makes some allowance for this and the results appear reasonable. At the same

Figure A2.3: *Modelled expenditure on space heating, water heating, lights & appliances, and cooking by number of people in household, 2009, England*



Source: Fuel poverty data, 2009 (DECC)

time the 'half house' regime within the underlying methodology already reduces the weight given to the needs of 'under-occupying' households.

39. The way in which different kinds of energy needs vary by household size is shown in Figure A2.3. This sets out average 2009 modelled energy bills for each of the four main components of a bill, expressed relative to the average bill of a two person household.

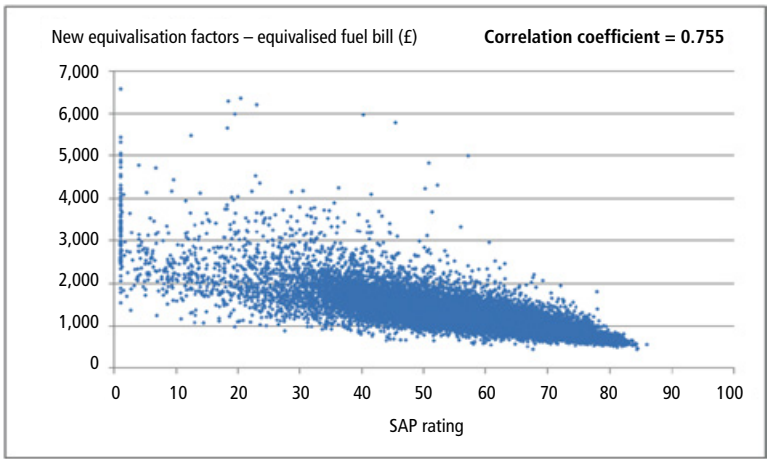
40. This figure shows that the relationship between three of these factors (water heating, lights and appliances and cooking) is strongly correlated with the number of people in the dwelling. These three components account for more than 40 per cent of average modelled bills. This means that modelled bills will – unsurprisingly – relate quite strongly to the number of people in the household. One effect of this is that costs measured in £/m^2 vary significantly between properties with equal energy efficiency ratings.

41. Figure A2.4 shows the relationship between SAP and equivalised modelled bill, using our new equivalisation factors. Figure A2.5 shows the relationship between SAP and unit fuel costs. Although the relationship is not by any means linear, there is a much better correlation under the equivalisation approach (Figure A2.4) than under the unit costs approach (Figure A2.5).[119] In effect, whether a household has reasonable costs is more strongly associated with energy efficiency under our approach than under the unit costs approach (where the number of people in the household will be a much more important factor). The former seems more appropriate. It also suggests that a SAP proxy will be a better guide to fuel poverty status, when combined with income information, under our LIHC proposal than in the unit costs approach.

42. Given this discussion, we conclude that an approach using equivalisation has more merits than a unit costs approach. An approach using equivalisation gives a flavour of the impact of bills on individual households compared to all other households, reflecting needs as far as possible. In order for

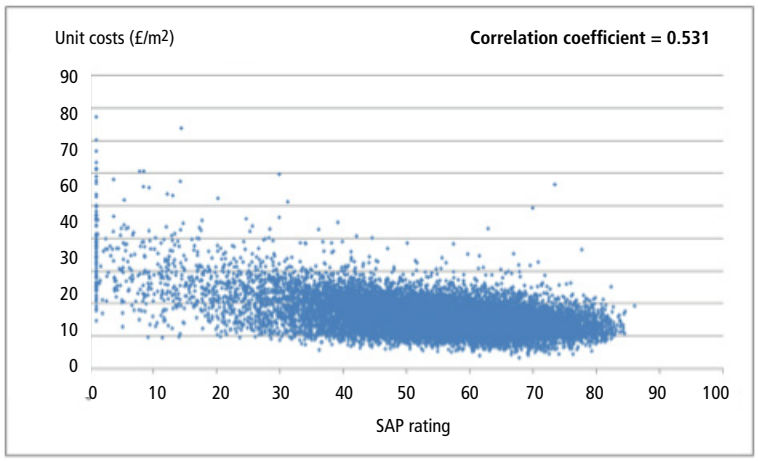
119 A correlation coefficient of -1 would represent a perfect (negative) correlation between increasing SAP and decreasing bills/costs. A correlation coefficient of -0.755 is therefore very strong.

Figure A2.4: *Relationship between SAP rating and AHC equivalised fuel bill under the proposed LIHC indicator, 2009, England*



Source: Fuel poverty data, 2009 (DECC)

Figure A2.5: *Relationship between SAP rating and unit fuel costs under the unit fuel costs indicator, 2009, England*



Source: Fuel poverty data, 2009 (DECC)

this preference to be reflected in practice, the key question is whether factors can be derived which allow this approach to be taken forward. The analysis in Part B of this Annex suggests that they can be, although further refinements would certainly be possible.

43. Ultimately both the approach we have adopted (as set out in Chapter 2) and the unit costs approach are aimed at establishing the same thing: which low-income households have high relative energy needs. To do this, households of different sizes need to be compared in some way. The unit costs approach assumes this will happen through differences in the floor area occupied. Our approach makes an explicit adjustment for household size. Neither approach is perfect, but we believe that our proposal gives a better focus on the underlying problem.

Part D: Options for thresholds using fixed energy standards

44. We recognised in Chapter 2 that our preferred approach to setting the threshold for reasonable costs – based on median contemporary requirements – represents a challenge in terms of literal eradication of fuel poverty. One way around this fact – which is seen as a problem by some stakeholders who believe it is vital to measure fuel poverty in a way that lends itself to eradication given the wording of WHECA – would be to use an absolute threshold.

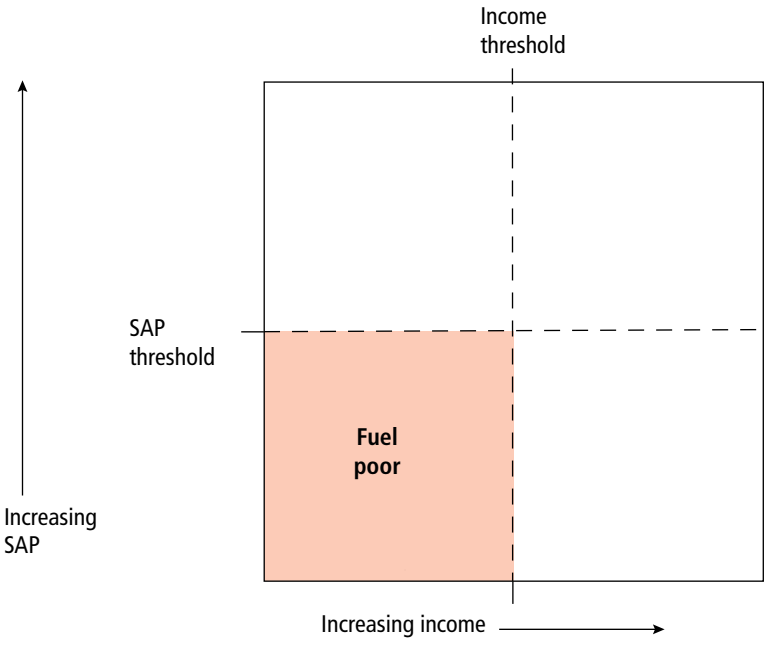
45. We have considered two possible ways of setting an absolute threshold to supplement our preferred indicator. First, the use of the low income low fixed SAP indicator examined (and rejected in favour of the LIHC approach) in our interim report. Second, a version of the LIHC with a fixed energy standard based on 2009 norms.

Option A: a low income low fixed SAP approach

46. One option we have reconsidered is the low income low SAP indicator we examined in our interim report (see Section 6.5 of that document).

47. To recap this approach, a low income threshold would need to be calculated. The most straight-forward way of doing this would be to choose a particular proportion of median income. By parallel with the DWP measure of child deprivation, we have modelled this approach using an income threshold of 70 per cent of median income. We would also need a SAP threshold – effectively an (imperfect) proxy for reasonable costs. A fixed threshold could be taken as median SAP for a given year. The choice of year would be to some extent arbitrary. We have modelled this approach using a SAP threshold of median SAP for 2009. A fuel poor household is one that falls below the income and SAP thresholds. This is shown conceptually in Figure A2.6.

Figure A2.6: *Fuel Poverty defined as the overlap between low income and low SAP*



48. We argued in our interim report that this approach has limitations as a basis for fuel poverty measurement since it ignores two key aspects of fuel poverty problem as seen from first principles:

    a. SAP does not reflect prices faced by particular households (e.g. if they are on pre-payment meters) or price changes, meaning that this indicator would be essentially impervious in headcount terms to changes in relative bill levels;[120]

    b. SAP does not reflect household needs. A single person going out to work each day from a low SAP home has much lower energy needs than a house-bound pensioner couple in the same type of home, yet both would be treated the same under this approach.

49. At the same time, there is a simplicity to this measure that is attractive. Furthermore, it correlates well with the practical approach to targeting that is currently used by Government for policy delivery. For example, the current rules for eligibility for Warm Front are linked to having a SAP lower than 55 and being receiving certain means-tested benefits. (Incidentally, median SAP for 2009, at 54.96, is virtually identical to this Warm Front criterion.)

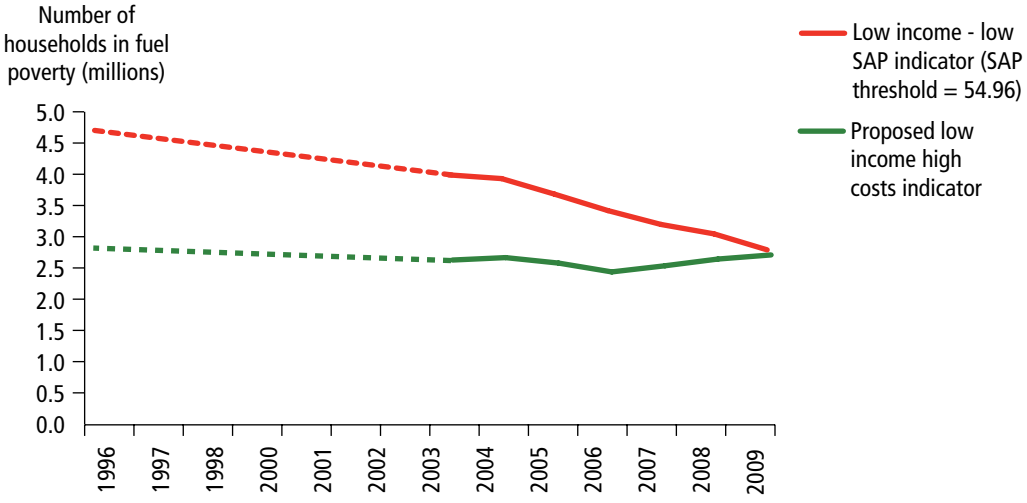
50. Figure A2.7 therefore shows the results of modelling of this indicator.

51. As can be seen, the number of households counted by this measure would have fallen between 1996 and 2009 by 41 per cent, reflecting the improvement in some of our most energy-inefficient homes lived in by some of our poorest families.[121] We previously identified this trend in Figure 1.2 in Chapter 1: between 1996 and 2009, there was a considerable reduction in the proportion of households in the bottom three income decile groups living in E, F or G rated homes (from 76 per cent in 1996 to 46 per cent in 2009).

120 As and when SAP is updated, changes in relative energy prices are reflected. A consultation on an update to SAP was launched by DECC in January 2012, closing on 28 March 2012. The next SAP update is not expected until 2015.

121 We do not have data allowing us to model a reliable data point for 2000. Assuming a straight-line reduction between 1996 and 2003, fuel poverty fell by about 35 per cent under this measure between 2000 and 2009 (from 4.3 million households to 2.8 million households).

Figure A2.7: *Trend in the number of fuel poor households under the proposed low income high costs measure, compared with low income low SAP measure with a fixed threshold of the median 2009 SAP, 1996 and 2003-2009, England*



Source: Fuel poverty data, 1996 and 2003-2009 (DECC)
Note: Income threshold set at 70 per cent of median income.

52. This shows the main attraction of this measure: it would establish a clear reference framework against which to judge progress towards eradicating fuel poverty. Under this kind of measure, eliminating fuel poverty would be a direct matter of ensuring that no low-income people live in homes with a worse SAP than the threshold.

53. Aside from the failure to reflect prices or need another key objection is the need to identify a SAP threshold to use. Our modelling is based on the 2009 median SAP because that is the latest year for which we have data. Conveniently, the value of 54.96 is virtually identical to the boundary between an EPC rating of D and one of E. SAP 55 is also a qualifying criterion for Warm Front assistance.[122] However, it would, of course, be possible to set a different threshold. We show both past trends and future projections against alternative thresholds in Figure 6.5 in Chapter 6.

A variant of the LIHC indicator with a fixed energy costs threshold

54. The relative costs threshold within our preferred framework changes as the consumption patterns of all households change over time, including as a result of general improvements in energy efficiency. The framework could be used to incorporate a threshold that is instead *fixed* on the basis of the stock composition in a particular year. In effect, the threshold moves each year in line with changes in fuel prices. This gives an alternative kind of absolute threshold to the low income low fixed SAP indicator, but one that takes account of the wider range of factors that affect energy costs.

55. There are a number of ways in which an absolute fuel costs measure of this kind can be produced. The measure we have developed involves calculating how energy prices change over time and then applying these changes to the 2009 median equivalised energy bill (i.e. the 2009 fuel costs threshold), to give a threshold for each year that reflects only price changes between that year and 2009 (and not any changes in energy consumption).

56. In fact, if this sort of approach were used, a choice would have to be made in terms of reference year for the median equivalised bill. The choice would dictate numbers, but not trends. There is an argument that, for the purpose of assessing progress under WHECA, the reference year should be 2000 – the year of the Act's adoption. However, we do not have data for this year. Choosing the nearest year for which we have good data – 2003 – has no clear basis. We therefore suggest that, if an approach of this kind were taken forward for progress measurement and target setting, the reference year should be 2009, the latest year for which we have official data.

57. Taking 2009 as our base year for these reasons, we have compared average energy prices across all fuels (weighted by modelled expenditure from the fuel poverty data and payment method) in each year to the 2009 level, to give the proportional change in energy prices over time.

58. In Table A2.8, the median equivalised modelled fuel bills reflect changes in prices and consumption, whereas the relative energy prices column shows changes in prices **only**. For example, the table shows that fuel prices in 2006 were 66 per cent of the 2009 level. If one applies this to the median equivalised fuel bill for 2009 (£1,270), this gives a fuel costs threshold of £843 for 2006, accounting only for changes in prices over time. As can be seen, the median equivalised bill is always higher than the bill that is adjusted only for price changes.

59. Under this absolute threshold, which gives this lower value for 2006, more households would have low incomes and high costs than when using the relative threshold. This is because the relative threshold takes into account general

122 It would, of course, be possible to set a different threshold, such as SAP 81 – the value that has been identified by some as the level required to effectively 'fuel poverty proof' a domestic property.

Table A2.8: *The trend in fuel prices and the median equivalised fuel bill, 1996 and 2003-2009*

Year	Median equivalised modelled fuel bill (£)	Energy prices relative to 2009	Adjusted median equivalised fuel bill – taking into account price changes prior to 2009 only (£)
1996	784	0.54	686
2003	656	0.50	640
2004	674	0.52	661
2005	761	0.57	721
2006	953	0.66	843
2007	1,066	0.77	980
2008	1,135	0.89	1,130
2009	1,270	1.00	1,270

Source: Fuel Poverty datasets 1996, 2003-2009 and Quarterly Energy Prices, 1996-2011 (both DECC)

energy consumption changes due to efficiency improvements from 2006-2009, whereas the absolute threshold does not. One would therefore expect a faster fall in the number of households with low incomes and high costs with the absolute threshold than the relative one, as can indeed be seen by Figure A2.8.

60. There are two key differences in the trend shown by these indicators. First, the absolute threshold gives a much sharper drop in fuel poverty numbers from 1996 to 2003. This is because general consumption needs decreased during this period. However, these affect only the relative threshold, not the absolute one. Where households are living in properties that have become more energy-efficient their costs are more likely to fall below the absolute threshold.

61. The second key feature is that the number of low income households below the absolute threshold was higher in 2006 than in 2004. This is largely a result of methodology changes that were introduced into the modelling of fuel bills at that time, which assume a substantial increase in consumption for all households. The impact is spread across both 2005 and 2006, because of the way fuel poverty data is constructed by merging two consecutive years of data together. The figures for the years before 2004 are not therefore fully comparable with those for the years since 2006, which is why we show a break in the series.

62. These changes do not affect the relative approach in the same way, because the methodology change is applied to both the threshold and the bills of individual households. For the absolute approach they affect the bills of individual households but not the threshold (which is only sensitive to price changes).

63. Figure A2.8 shows that it would be possible to construct a version of the LIHC indicator incorporating a threshold that was in some senses absolute, and did not become more stringent over time as national energy standards improved. Using this approach would still include a wider range of factors affecting household needs than the low income low fixed SAP indicator set out as Option A above. It is, however, more complex and, as we have seen, is sensitive to methodological changes in a way that makes producing a consistent time series harder.

Figure A2.8: *Trend in the number of households in fuel poverty under a relative and absolute fuel threshold approach where only prices vary, 1996 and 2003-2009, England*

Source: Fuel poverty data, 1996 and 2003-2009, with adjustments made using Quarterly Energy Prices, 1996-2011 (both DECC)

Annex to Chapter 6

Projections methodology

1. This Annex sets out in more detail the approach, data and assumptions used to estimate levels of fuel poverty over the medium term, both with and without the current Government policy package. This comprises the combination of three sets of projections: a) changes in household income; b) changes in energy prices; and c) the impact of the Government's policies on household energy bills.

2. Each of these projections is based on the 2009 English Housing Survey (EHS) dataset, drawing from a range of official and published data to inform the main assumptions for each key factor. We describe these in turn below, and list all of our assumptions in Table A6.1. We also list upper and lower bounds for testing the sensitivity of our results to changes in each key factor in Tables A6.2 and A6.3. All assumptions relating to the impact of Government policies are drawn from published impact assessments.

3. It also discusses in a short final section the gross impact of policies that will have costs associated with them in 2016.

Part A: Projecting changes in household income

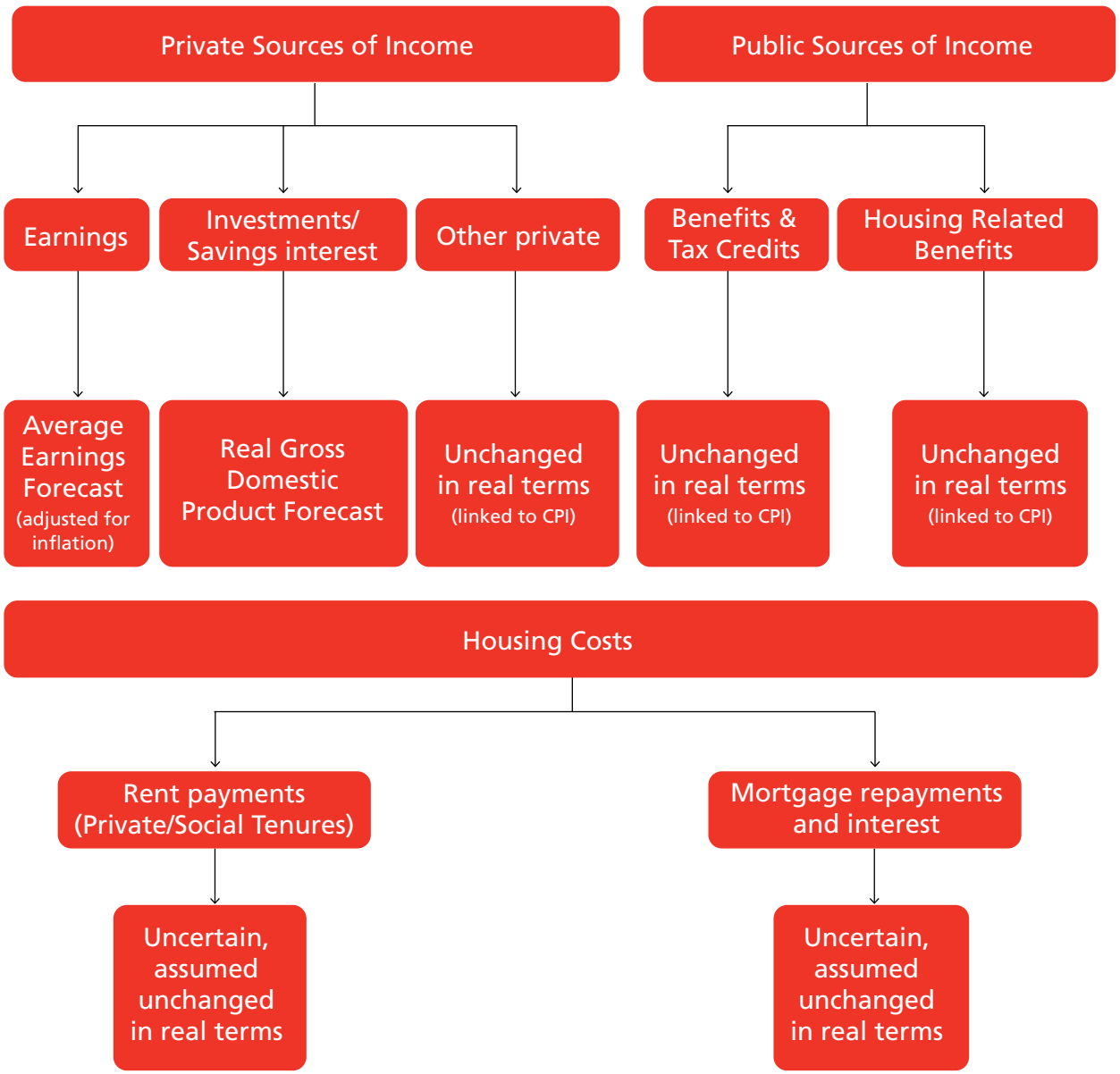
4. Changes in disposable household income, as used under the LIHC indicator, will be dependent on two main factors overall: household income and housing costs.[123] Data on both of these factors are drawn exclusively from the 2009 EHS and translated into net disposable income in ways consistent with the official DECC Fuel Poverty Methodology.[124] Housing costs are deducted as described in Section 6.1 of our interim report. The process of estimating disposable household income involves combining information on a number of alternative income sources, including earnings, interest from savings and investments and benefit receipt. Amounts of income from each of these sources are expected to change at different rates in the period to 2016. Earned income, for example, depends on activities in the labour market, whereas interest from savings depends more on interest rates set by banks.

5. Each component is adjusted in real terms (net of inflation) in line with the projections published in the Office for Budget Responsibility's (OBR) Economic and Fiscal Outlook report published in

123 As we noted in our interim report, housing costs in the EHS are restricted to mortgage repayments and rent. We do not include water rates, community or council water charges, structural insurance premiums or ground rent and service charges.

124 DECC (2011). Fuel Poverty Methodology Handbook, Figure 1. Available at: http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/614-fuel-poverty-methodology-handbook.pdf

Figure A6.1 *– Summary of the adjustments applied to income sources and housing costs*



Source: Fuel Poverty Review.

November 2011.[125] Our income projections are made in real terms, as this allows us to estimate changes in a household's ability to use that income to purchase items or services. A summary of the different OBR figures applied to each income source, before the deduction of taxes and national insurance, is shown in Figure A6.1. Profiles of the annual figures applied to 2016 are listed in Table A6.1.

6. Private sources of income comprise:

    a. *Earnings*: we increase earned income reported for each household in the EHS by the percentage increases in average earnings published by the OBR (2011). The OBR figures for average earnings are in nominal terms (i.e. include the effect of inflation), therefore to estimate real changes in earned income we deflate the OBR figures using the

125 Office for Budget Responsibility. (2011). Outlook Report. Available at: http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-november-2011/

Gross Domestic Product (GDP) deflator series published by HM Treasury.[126]

b. *Investments/savings interest*: financial returns on investments depend on the nature of specific investment and the performance of the sector invested in. Given that there is a diverse range in the types of investments made by English households we use the OBR's real GDP forecasts as a broad proxy for how these returns could change in the medium term. This is based on the premise that returns on investments are likely on average to reflect the overall performance of the economy. Interest from savings depends on the rates set by the financial institutions in which they are invested, which are ultimately determined by the Bank of England base rate. In the absence of official projections of the base rate, we also use the OBR GDP forecasts for increases in income from savings interest.

c. *Other private*: private income from other sources includes a wide range of relatively small income sources, for example income from other family members (i.e. children), and cash gifts from other family members. The nature of these income payments means that they are unlikely to vary significantly over time, therefore we assume that they do not change in real terms.

7. Public sources of income comprise:

   a. *Benefits and tax credits*: as the levels of benefit receipts and tax credits are indexed to the Consumer Prices Index (CPI), a measure of inflation, we assume that they do not change in real terms to 2016. We therefore do not apply any change to benefit or tax credit income reported in the EHS.

   b. *Housing related benefits*: payments related to housing costs, such as housing benefit and council tax benefit, are treated the same as wider state benefits and tax credits whereby no change is applied to these forms of income reported in the EHS.

8. Housing costs, which we deduct from household income to arrive at net disposable income under the LIHC indicator, consist of:

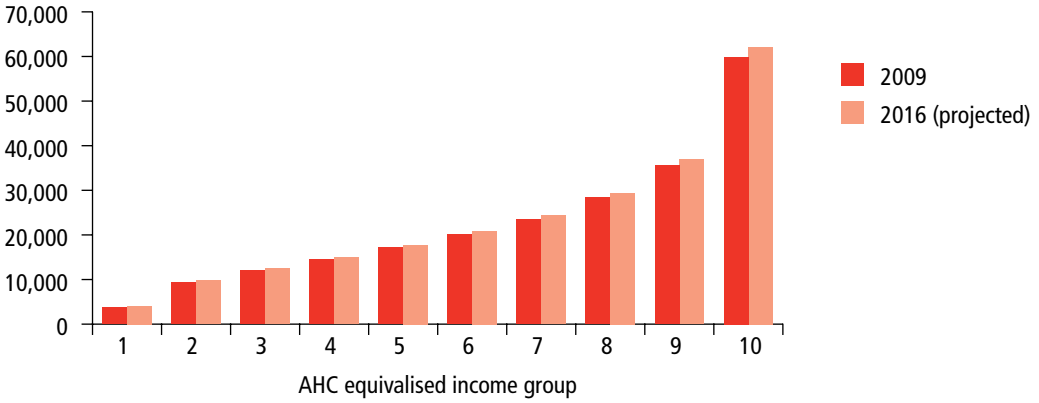
   a. *Mortgage repayments and interest (for owner-occupiers)*: housing costs for those householders who own their homes will be predominantly made up of mortgage repayments and interest. How these repayments vary over time depends on the terms of the mortgage (for example some households have fixed-rate mortgages whereas others have variable-rate mortgages), as well as factors in the mortgage market. The combined uncertainty of these factors makes it difficult to estimate how repayments might change over time. As a result, we assume that there are no real terms changes in mortgage repayments to 2016.

   b. *Rent payments (for those in the private-rented or social housing sectors)*: for those living in private or social rented accommodation, housing costs relate primarily to their rent payments. Changes in these payments over time depend on developments in the private rental market and the decisions of social landlords. How rent levels could change over time is therefore highly uncertain. As such we assume no real terms increase in rent payments to 2016.

9. Applying the different rates of change to individual components of both household income and housing costs results in a modified income distribution in 2016 compared to 2009 (see Figure A6.2). We project a small increase in median income, which results in a reduction in relative poverty in the period to 2016 – the estimates suggest that the proportion of households with an income that is less than the low income threshold we use within the Low Income High Costs indicator falls from 22 per cent to 21 per cent.

126 HM Treasury. (2012). Gross Domestic Product Deflators: a user's guide. Available at: http://www.hm-treasury.gov.uk/data_gdp_index.htm

Figure A6.2: *Average AHC equivalised income by AHC equivalised income decile group, 2009 vs 2016, England*



Source: English Housing Survey

10. We noted in Chapter 6 that our projections of changes in incomes across all households vary from more sophisticated income forecasts, many of which suggest an *increase* in relative poverty between now and 2016. For example, recent work by the Institute of Fiscal Studies[127] (IFS) suggests that relative child poverty is expected to rise from 19.7 per cent in 2009 to 22.2 percent in 2015. Working age relative poverty amongst adults without children is forecast to increase from 17.1 per cent in 2009 to 18.5 per cent in 2015.

11. The key factors that appear to drive this divergence are:

    a. *assumptions about unemployment:* the approach we take in projecting fuel poverty with the 2009 EHS database implicitly assumes that the level of participation in the labour market and unemployment is fixed at 2009 levels. However, we know that unemployment has already risen since 2009. Official estimates show that the ILO unemployment rate[128] had risen from 7.1 percent in the first quarter of 2009 to 7.7 percent in the first quarter of 2011. OBR expect that the rate will rise to above 8 percent for much of the forecast period. Allowing for this within the fuel poverty projections would require some form of reweighting of the EHS dataset between employed and unemployed households; and

    b. *assumptions about benefits:* the fuel poverty projections also effectively freeze the tax and benefit system as it was in 2009 and up-rate the level of benefits income by the CPI. This approach ignores the changes that are expected to take place over the forecast period such as the move to Universal Credit and changes to other personal taxes and benefits (e.g. Housing Benefit) – the IFS and others expect these to have negative impacts on lower income households on average.

127 For more details see: http://www.ifs.org.uk/comms/comm121.pdf. IFS estimates are based on BHC equivalised income.

128 Defined as people without a job who have been recently seeking work and are available to start work if a job is offered.

12. There is no robust way in which a change in unemployment can be reflected in the EHS dataset.[129] Furthermore, detailed modelling of changes to the tax and benefits system is complex (and beyond the scope of this report as well as the data available in the EHS). Both of these factors suggest that the income assumptions that are used in our fuel poverty projections could, if anything, overstate the likely growth in incomes that would be experienced by poor households. As a result, our baseline projections are likely to be over-optimistic in terms of the future trends in fuel poverty rates as they may understate the size of the 'at risk' group. If we could allow for these factors, the position would be likely to be worse than we show in this report.

13. We list the upper and lower bounds used to estimate the sensitivity of our projections to both higher and lower income growth scenarios in Table A6.2.

Part B: Projecting changes in energy prices

14. The energy price changes applied to the EHS dataset are a combination of observed changes between 2009 and the end of 2011 and DECC's most recent projected changes in gas, electricity and non-metered fuel prices, published alongside the 2011 Annual Energy Statement.[130] The proportional increase in each fuel from 2011 to 2016 are outlined in Table A6.1.

15. The central prices scenario projects continued strong growth in energy prices in the medium term – driven by a combination of fossil fuel prices, the costs of transmission and distribution and pass-through costs for suppliers associated with Government policies. The estimates suggest that between 2011 and 2016 domestic electricity prices will increase in real terms by 18 per cent and domestic gas prices will increase in real terms by 28 per cent. This comes on top of a real increase of 23 per cent for electricity prices and 28 per cent for gas prices between 2009 and 2011. The price of other fuels (i.e. coal, heating oil & LPG) is assumed to track fossil fuel prices. The projections for these are based on DECC assumptions.[131]

16. The application of observed price increases from 2009 to 2011 is consistent with the official DECC Fuel Poverty Methodology, which recognises differences in regional and payment type costs. When projecting from 2011 to 2016, year-on-year percentage increases in the price of each fuel are only available at national average level. We therefore implicitly assume that while prices increase overall, regional differences in prices and the relative costs of each payment method (e.g. direct debit, standard credit or pre-payment meter) remain fixed as in 2009.

Part C: Projecting the impact of the Government's policies on energy bills

17. The Government's policy package affects household bills in two ways. First through increased gas and electricity prices as a result of the costs of obligations on energy suppliers, captured as part of the projected prices increases above. Second through a reduction in energy bills for those households that receive support through these policies. The majority of these policies are expected to reduce bills through improving energy efficiency, for example through installing insulation, while others can reduce bills through the generation of renewable energy (and the receipt of any associated subsidies) or through a direct energy bill reduction.

129 The problem is that there is no information available about the energy efficiency standards of households that we know have been affected by rising unemployment since 2009. We cannot therefore judge the extent to which their standards correspond to either the energy efficiency characteristics of unemployed households in 2009 or a random cross-section of employed households in that year.

130 See: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf

131 See: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx

18. The projected reductions in bills from policies delivering energy efficiency measures[132] are undertaken in four stages:

    a. *Estimating the number of measures to be installed*. For policies that have delivered measures to date, such as CERT, we have collected observed delivery statistics for the major energy efficiency installations.[133] For policies which will deliver measures in the future, we have collected projected installation numbers for each of the major measures from the relevant impact assessments (see Table A6.1 for references to these sources).

    b. *Assigning estimated measures installations to households*. In order to estimate which households receive these measures, each household in the EHS is assigned to either an 'eligible group' or 'ineligible group' for each policy that is modelled. For example, when modelling which households receive measures under Warm Front, households which report receipt of a benefit which meets the Warm Front eligibility criteria are assigned to the 'eligible group' and all other households to the 'ineligible group'. Households in the 'eligible group' are then randomly selected and if there is the technical potential to install a measure (e.g. a dwelling has an unfilled cavity wall which could be insulated) then that dwelling is assigned that measure under that particular policy. This process is repeated until all measures are assigned to households in the 'eligible group'. The process of assigning measures is repeated around 1,000 times for each policy, with the most representative (modal) allocation taken forward for analysis.

    c. *Estimating bill savings from measures installed*. The reduction in modelled energy needs from the installation of a measure(s) under a policy varies according to the dwelling characteristics and heating fuels used by each household. In order to fully capture the range of interactions between the measure installed and the individual dwelling/household characteristics we would need use the BREDEM model to re-estimate the required energy use for every dwelling to which a measure(s) was assigned. This goes beyond the scope of this review. Instead, we assign percentage reductions to the bills of households to which a measure or package of measures are assigned. These percentage reductions are based on averages of detailed estimates of the savings from a measure(s) for a range of representative dwelling types, and are consistent with DECC's analysis of energy efficiency measures. While these averages do not account fully for all differences between dwellings, a different percentage reduction is applied depending on a dwelling's wall type, level of existing loft insulation, heating fuel and whether it is a house or a flat.[134]

    d. *Estimating improvements in SAP ratings from measures installed*. Simulating the impact of installing measures on an individual dwelling's SAP rating depends on the characteristics of the dwelling. As with bill modelling this effect for each household saving estimates is beyond the scope of this review. Instead, we apply average SAP improvements for a dwelling depending on some of its key characteristics, such as fuel type, whether or not it already has wall and/or loft insulation and whether it is a house or a flat. Again, these averages are consistent with DECC analysis of energy efficiency measures on SAP scores.

132 The policies modelled here that deliver energy efficiency measures are: CERT (2009-2011) and the CERT Extension (2011-12), Warm Front (2009 – 2013), CESP (2009-2011), and the Green Deal and Energy Company Obligation (2013 – 2016).

133 We collect delivery statistics for: cavity wall insulation, loft insulation, solid wall insulation, and new and replacement central heating systems.

134 For example, a house with an insulated loft and gas central heating would experience a different percentage reduction in their bill from installing cavity wall insulation than a flat with no loft insulation and electric storage heaters.

Table A6.1 below outlines the central assumptions used in the projections we outlined in Chapter 6. Tables A6.2 and A6.3 set out the high and low sensitivity assumptions for the key factors. Policy assumptions in terms of what is delivered (i.e. the number of households that receive support and the mix of measures) in the high and low scenarios retain the same assumptions as the central scenario. However, the impact of measures that alter the thermal efficiency of dwellings varies between scenarios (since a measure that results in a household using less energy has a larger absolute impact on energy costs in a scenario where energy prices are higher).

Modelling assumptions

Table A6.1: *modelling assumptions for the baseline scenario*
Source: see footnotes

£bn, 2011 prices	Comment	Source	2009-2016
Incomes:			
Gross Domestic Product (real terms)	Percentage increase from 2009 to 2016	Office of Budget Responsibility[1]	12%
Average earnings (nominal terms)	Percentage increase from 2009 to 2016	Office of Budget Responsibility[1]	23%
Prices:			
Gas (excl. policies)	Growth in domestic gas prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	60%
Gas (incl. policies)	Growth in domestic gas prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	63%
Electricity (excl. policies)	Growth in domestic electricity prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	35%
Electricity (incl. policies)	Growth in domestic electricity prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	46%
Coal/solid fuels	Percentage increase from 2009 to 2016	DECC[4]	61%
Heating oil	Percentage increase from 2009 to 2016	DECC[4]	77%

Table A6.1: *modelling assumptions for the baseline scenario (continued)*
Source: see footnotes

£bn, 2011 prices	Comment	Source	2010	2011	2012	2013	2014	2015	2016
Policies:									
Warm Front	Delivers a range of thermal efficiency measures. The modelling focus is on new and replacement gas central heating and heating systems for off gas-grid households. Measures are targeted at a group of low income and vulnerable households (households that are eligible to receive Cold Weather Payments[5]) with a household SAP rating below 55.	DECC[6]	£0.36bn	£0.11bn	£0.10bn	–	–	–	–
CERT *(Super Priority Group)*	Delivers a range of carbon saving measures, predominantly insulation. The modelling focus is on main measures – cavity wall insulation, loft insulation and solid wall insulation. Targeting of a 'Super Priority Group' based on benefit receipt: Cold Weather Payment Group5 + Child Tax Credit <£16k.	Fuel Poverty Review calculations and DECC[7]	£0.86bn	£0.83bn *(£0.19bn)*	£1.1bn *(£0.26bn)*	–	–	–	–

£bn, 2011 prices	Comment	Source	2010	2011	2012	2013	2014	2015	2016
CESP	Community-based approach in partnership with local authorities to deliver insulation and some heating measures (whole house approach incentivised). Area-based targeting using Lower Super Output Areas with high Index of Multiple Deprivation (income component) scores. Modelling focus on main measures – cavity wall insulation, loft insulation and solid wall insulation.	Fuel Poverty Review calculations and DECC[8]	£0.11bn	£0.11bn	£0.11bn	–	–	–	–
Green Deal/ECO *(Affordable Warmth Group)*	Subsidises more expensive carbon saving measures under the Green Deal (e.g. solid wall insulation). Affordable Warmth subsidises heating and basic insulation (cavity wall insulation/loft insulation) for low income/vulnerable households where the target group is same as CERT SPG but restricted to private tenure.	Fuel Poverty Review calculations and DECC[9]	–	–	–	£1.12bn *(£0.34bn)*	£1.23bn *(£0.34bn)*	£1.25bn *(£0.34bn)*	£1.34bn *(£0.34bn)*
Feed-in Tariffs (FITs)	Tariffs provided to subsidise PV and micro-wind measures (cumulative 300k measures by 2016). No particular group is targeted for support – measures distributed across all income groups.	Fuel Poverty Review calculations	£0.02bn	£0.10bn	0.20bn	0.30bn	0.30bn	0.35bn	0.35bn

£bn, 2011 prices	Comment	Source	2010	2011	2012	2013	2014	2015	2016
Warm Home Discount	Supplier-funded rebates to low-income households (increasing from £120 in 2011 to £140 in 2014). The majority of support is targeted at pensioner households. Some support is targeted at other low income and vulnerable groups.	DECC[10]	–	£0.25bn	£0.27bn	£0.29bn	£0.29bn	£0.29bn	£0.29bn
Renewable Heat Incentive	Government is currently developing proposals for a policy to deliver renewable heat to the domestic sector. These projections do not, therefore, model any form of RHI.	–	–	–	–	–	–	–	–
Winter Fuel Payment	Households with a member 60 or over receive a payment of £200 and households with a member 80 or over receive a payment of £300.	DWP[11] (figure for 2016 is assumption based on continuation of existing policy).	£2.8bn	£2.1bn	£2.1bn	£2.0bn	£1.9bn	£1.9bn	£1.9bn

1 http://cdn.hm-treasury.gov.uk/2011budget_complete.pdf
2 DECC price and bills modelling includes only policies that are in place or those that have been planned to a sufficient degree of detail. The policy package therefore includes the following: better billing, CERT, CERT extension, CESP, EMR, EU ETS (inc. CPF), FITs, Green Deal and ECO, products policy, RO, smart metering and WHD.
3 Based on a combination of the Quarterly Energy Prices (see: http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx) and 'The estimated impact of energy and climate change policies on energy prices and bills: November 2011' (see: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf)
4 http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx
5 CWP eligibility is if a household is in receipt of: 1) Pension Credit; 2) Income-based Employment and Support Allowance (including work or support component); or one of a) Income Support, b) Income-based Jobseeker's Allowance, c) Income-based Employment and Support Allowance in the assessment phase, and either i) a pensioner premium, ii) a disability premium, iii) child tax credit with a disabled child element, or iv) a child under 5 years old.
http://www.decc.gov.uk/assets/decc/Consultations/warm-front-eligibility/1442-ia-warm-front-eligibility.pdf
7 Supplier spend only. Baseline (Option 1) from IA for proposal to remove electronic goods from CERT extension: http://www.decc.gov.uk/assets/decc/Consultations/appliances-cert/899-ia-cert-role-appliances-consumer-electroni.pdf
8 ~£70m of this is assumed to be passed on to household bills, with the remaining ~£30m being passed on to non-domestic accounts. IA: http://www.decc.gov.uk/assets/decc/consultations/cesp/1_20090710121840_e_@@_cespia.pdf
9 http://www.decc.gov.uk/assets/decc/11/consultation/green-deal/3603-green-deal-eco-ia.pdf
10 http://www.decc.gov.uk/assets/decc/Consultations/warm-home-discount/1308-warm-home-disc-impact-assessment.pdf
11 http://research.dwp.gov.uk/asd/asd4/index.php?page=medium_term

Modelling assumptions for the high and low sensitivities

19. The assumptions underpinning the high and low scenario are constructed to give a sense of possible best and worst case scenarios for fuel poverty. The 'high' scenario combines assumptions about higher energy prices with low income growth assumptions, which would combine to worsen the outlook against both the headcount and fuel poverty gap indicators. The following tables set out the range of assumptions on: (1) incomes; (2) energy prices; and (3) policies.

Incomes

20. The high and low assumptions for growth in GDP are based on the range presented by the OBR in its November Outlook 2011. Trends in other variables are Fuel Poverty Review assumptions based on two hypothetical states of the economy:

    a. High growth: strong growth in demand, productivity, earnings and commodity prices. Limited spare capacity in labour market. Inflation persistently above target.

    b. Low growth: weak growth in demand, productivity, earnings and commodity prices. Significant slack in labour market. Low inflation throughout period.

Table A6.2: *High and low sensitivity assumptions for income projections*
Source: see footnotes

	Comment	Source	2009- 2016
Central scenario			
Gross Domestic Product (real terms)	Percentage increase from 2009 to 2016	Office of Budget Responsibility[1]	12%
Average earnings (nominal terms)	Percentage increase from 2009 to 2016	Office of Budget Responsibility[1]	23%
High scenario			
Gross Domestic Product (real terms)	Percentage increase from 2009 to 2016	Fuel Poverty Review assumptions	28%
Average earnings (nominal terms)	Percentage increase from 2009 to 2016	Fuel Poverty Review assumptions	40%
Low scenario			
Gross Domestic Product (real terms)	Percentage increase from 2009 to 2016	Fuel Poverty Review assumptions	-4%
Average earnings (nominal terms)	Percentage increase from 2009 to 2016	Fuel Poverty Review assumptions	1%

1 http://cdn.hm-treasury.gov.uk/2011budget_complete.pdf

Table A6.3: *high and low sensitivity assumptions for price projections*
Source: see footnotes

	Comment	Source	2009-2016
Central scenario			
Gas (excl. policies)	Growth in domestic gas prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	60%
Gas (incl. policies)	Growth in domestic gas prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	63%
Electricity (excl. policies)	Growth in domestic electricity prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	35%
Electricity (incl. policies)	Growth in domestic electricity prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	46%
Coal	Percentage increase from 2009 to 2016	DECC[4]	61%
Heating oil	Percentage increase from 2009 to 2016	DECC[4]	77%
High scenario			
Gas (excl. policies)	Growth in domestic gas prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	70%
Gas (incl. policies)	Growth in domestic gas prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	73%
Electricity (excl. policies)	Growth in domestic electricity prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	39%
Electricity (incl. policies)	Growth in domestic electricity prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	50%

	Comment	Source	2009-2016
Coal/solid fuel	Percentage increase from 2009 to 2016	DECC[4]	96%
Heating oil	Percentage increase from 2009 to 2016	DECC[4]	90%
	Growth in domestic gas prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]		
Low scenario			
Gas (excl. policies)	Growth in domestic gas prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	-17%
Gas (incl. policies)	Growth in domestic gas prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	-10%
Electricity (excl. policies)	Growth in domestic electricity prices from 2009 to 2016 excluding the price impact of climate and energy policies[2]	DECC[3]	-7%
Electricity (incl. policies)	Growth in domestic electricity prices from 2009 to 2016 including the price impact of climate and energy policies[2]	DECC[3]	11%
Coal/solid fuel	Percentage increase from 2009 to 2016	DECC[4]	35%
Heating oil	Percentage increase from 2009 to 2016	DECC[4]	53%

1 http://cdn.hm-treasury.gov.uk/2011budget_complete.pdf
2 DECC price and bills modelling includes only policies that are in place or those that have been planned to a sufficient degree of detail. The policy package therefore includes the following: better billing, CERT, CERT extension, CESP, EMR, EU ETS (inc. CPF), FITs, Green Deal and ECO, products policy, RO, smart metering and WHD.
3 Based on a combination of the Quarterly Energy Prices (see: http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx) and 'The estimated impact of energy and climate change policies on energy prices and bills: November 2011' (see: http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf)
4 http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx

The 'gross' impact of policies

21. In Section 6.3 we showed how the fuel poverty impact of the climate change and energy policy package in 2016 is broken down between different policies. We argued that there are a number of impacts and interactions that were affecting the estimates and, as such, some care needed to be taken in comparing the results across different policies.

22. In particular, we noted it is difficult to compare the relative impacts of different policies:

    a. Policies with no costs in 2016 such as CERT and CESP. These policies are due to finish by the end of 2012/13, so that the costs associated with them will no longer be feeding through to consumer bills by the year projected (i.e. 2016) However, the measures delivered under these policies will continue to provide benefits to households. The estimated policy impacts for this group of policies are therefore effectively a 'gross' impact, capturing the benefits of the policies without the costs.

    b. Policies with no costs in 2016 such as the Green Deal ECO and the Affordable Warmth Obligation. For these policies the costs and benefits are relevant because both arise in the projected year (i.e. 2016). The estimated policy impacts for this group of policies are therefore effectively a 'net' impact, capturing the benefits of the policies offset by their costs.

23. Table A6.4 shows how the results change when we estimate the impacts of the group of policies under (b) on a 'gross' basis. This can be done by stripping out the costs of the policy and simply looking at the impact of the measures that are delivered (that is, the benefits). While this takes us away from the real impacts of these policies this approach gives us a set of figures that can be more readily compared with the estimated impacts of policies listed under (a) above.

24. As we would expect, the removal of the price impacts improves the fuel poverty impacts of all of the policies. In the case of the ECO carbon obligation, the impact becomes positive overall. The reason for this is primarily the fact that removing the price impacts of these policies from the equation translates into lower costs across the board. This has the same effect as a fall in fuel prices – that is, the removal of some households from fuel poverty. Unsurprisingly, stripping out energy prices also has a significant impact on the fuel poverty gap.

Table A6.4: *gross and net fuel poverty impacts of the Green Deal and Warm Home Discount policies LIHC indicator, 2016*

	Green Deal: carbon	Green Deal: AW	WHD
Net impact of policies in 2016 (as presented in section 6.3)			
Change in LIHC households (thousand)	9	-23	-40
Change in Fuel Poverty Gap (£ million)	2	-31	-5
'Gross' impact of policies in 2016 (excluding price impacts)			
Change in LIHC households (thousand)	-25	-35	-61
Change in Fuel Poverty Gap (£ million)	-72	-53	-30

Source: Fuel Poverty Review

25. One of the most striking results is the 'gross' estimate for the Green Deal carbon obligation. Our estimate suggests that the measures installed through this policy would reduce fuel poverty by 25,000 households in 2016 under the LIHC indicator before allowing for its costs (compared to increasing it by 9,000 after allowing for them). It is interesting to compare this with the 'gross' estimate of CERT that was presented in Section 6.3 – there we showed that CERT increased the level of fuel poverty by around 11,000 households. This divergence is at first sight surprising since both ECO Carbon Obligation and CERT deliver insulation measures to households across the income distribution. However, the results show that CERT is more effective at reducing the fuel poverty gap than the ECO carbon obligation, although CERT increases the headcount measure by slightly more. While both policies result in a reduction in the reasonable costs threshold (bringing some households into fuel poverty), the reduction is 50 per cent larger for CERT. CERT delivers more measures to a wider range of households and reduces bills for many households in each quadrant. As well as reducing the costs threshold, it moves some households that receive measures below it. However, since it reduces the threshold by more than the ECO carbon obligation, it also has the tendency to bring more households that do not receive measures into the LIHC quadrant. These results show the importance of considering the fuel poverty gap alongside the headcount measure.

Annex to Chapter 7

1. This section sets out in more detail the methodologies and assumptions behind the results presented in Chapter 7. The following sections cover:

   - Part A: fuel poverty modelling;
   - Part B: estimating energy and GHG impacts; and
   - Part C: cost-benefit analysis.

Part A: Fuel poverty modelling

Energy prices

2. The prices archetypes assume that each eligible household – encompassing all households receiving a means-tested benefit – receives an energy bill rebate of £88. There are some additional costs associated with the policy including the costs to Government of running a data-matching and sweep-up mechanism and the administrative costs to energy suppliers of complying with the scheme. These costs are based on estimates in the Warm Home Discount Impact Assessment.[135] The cost to energy suppliers (which equals £500 million) is assumed to be recouped through higher energy prices for the supplier-funded archetype. The cost to Government (which equals £6 million) results in a small increase in the tax take, which reduces household incomes by a very small amount. This would have a negligible impact on the LIHC indicator, and we therefore do not model it.

3. Table A7.1 shows the average impact (excluding the impact of rebates paid) on household energy costs and incomes from each of the archetypes. The costs of the supplier-funded policy increases energy costs. The Exchequer-funded option affects household incomes.

Thermal efficiency

4. The thermal efficiency archetypes assume that insulation and heating measures are delivered to households (see the Annex to Chapter 6 for a more detailed explanation of how energy efficiency measures are modelled). The costs of the policies (along with the administrative cost for energy suppliers) are recouped through higher energy prices or through higher taxation. Table A7.1 how the costs fall across households.

5. The modelling assumes that the measures are delivered randomly to households within the target group, which is either:

   a. For the narrowly targeted archetype: households receiving a means-tested benefit and in a dwelling with a SAP rating of 55 or below; or

135 http://www.decc.gov.uk/assets/decc/Consultations/warm-home-discount/1308-warm-home-disc-impact-assessment.pdf

Table A7.1: *Average annual effects on the energy prices policy archetypes on the income and fuel bills of all households by AHC equivalised income group*

	AHC equivalised income group									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Supplier-funded energy rebate policy:										
Average increase in modelled energy bills	£30	£30	£29	£31	£30	£30	£31	£32	£31	£33
Average reduction in household income	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Exchequer-funded energy rebate policy:										
Average increase in modelled energy bills	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Average reduction in household income	£4	£10	£12	£15	£18	£21	£24	£29	£37	£62

Source: Fuel Poverty Review

b. For the broadly targeted archetype: households in a dwelling with a SAP rating of 55 or below.

6. Measures are delivered only to those households where opportunities for improvement exist. In the case of insulation, this means that the household has an unfilled loft or cavity wall, or a solid wall that has not been insulated. In the case of heating systems, this means either a household that has no central heating system or is a household where the heating system has reached the end of its working life.[136] The estimates of the number of opportunities to deliver measures in each of the eligible groups are based on the English Housing Survey.

7. The modelled mix of measures delivered under supplier-funded and tax-funded thermal efficiency archetypes varies significantly. This is primarily down to the delivery mechanism modelled. A supplier-funded archetypes assumes that suppliers will focus primarily on delivering the most cost-effective energy efficiency measures for which there are opportunities. The modelling suggests that this would mean a focus on the most cost-effective insulation measures such as cavity wall insulation. The tax-funded archetypes are assumed to adopt a different delivery mechanism, whereby any household that comes forward for assistance is provided with measures. Assuming that a random selection of target group come forward this means that a cross-section of the group have measures installed, regardless of the cost-effectiveness.

8. The amount of reduction in a households energy bill from installing energy efficiency measures will depend on the characteristics of the dwelling and the household that occupies the dwelling (see the Annex to Chapter 6 for a more detailed explanation). Dwelling and household characteristics vary between income decile groups and therefore different levels of bill reduction will be achieved in each group. Further, the length of time over which the bill is reduced depends on the package of measures installed. For example, cavity wall insulation is expected to last for around 40 years on average whereas a new central heating system is expected to last for around 12 years on average.

9. Table A7.2 sets out the total number of opportunities to deliver energy efficiency and heating measures alongside the measures that are delivered through the thermal efficiency archetypes. The opportunities represent the potential to install measures after the impact of the current DECC policy package. As would be expected, due to the assumed focus on minimising the costs of meeting

136 Boilers are assumed to have a working lifetime of 12 years – so, in any given year, it is implied that one-twelfth of boilers in the eligible group will reach the end of their life. We apply a more conservative assumption that one-fourteenth of boilers in the eligible group reach the end of their life each year.

Table A7.2: *Opportunities to install measures and measures installed through the thermal efficiency archetypes, 2016*

	Exchequer-funded measures policy targeted at low-income/ high cost households	Supplier-funded measures policy targeted at low-income/ high cost households	Exchequer-funded measures policy targeted at high cost households	Supplier-funded measures policy targeted at high cost households
Opportunities:				
Loft insulation	680,000	680,000	3,920,000	3,920,000
Cavity wall insulation	215,000	215,000	1,220,000	1,220,000
New/replacement heating system	280,000	280,000	1,125,000	1,125,000
Delivery:				
Loft insulation	270,000	515,000	345,000	13,000
Cavity wall insulation	85,000	120,000	96,000	415,000
New/replacement heating system	111,000	33,000	89,000	13,000

Source: Fuel Poverty Review

Table A7.3: *Proportion of household benefit income derived from means-tested benefits, England*

	Equivalised income decile groups (BHC)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Non-retired with children	61%	74%	69%	59%	40%	32%	27%	20%	2%	1%
Non-retired without children	54%	51%	30%	24%	19%	15%	13%	5%	4%	0%
Retired	7%	8%	15%	17%	20%	15%	15%	11%	14%	4%

Source: ONS (see footnote 137)

the obligation, the supplier-led policy results in a larger number of low-cost insulation measures being delivered than the Exchequer-funded policy.

Incomes

10. The impact of changes to the benefit system on recipient households is estimated using a combination of EHS and ONS data. The EHS does not hold robust data on the level of income from means-tested benefits. However, it does contain data on income derived from all benefits. In constructing the means-tested benefit archetype, we have used ONS data[137] to estimate the share of benefit income that is means-tested for different household types (set out in Table A7.3) and applied an increase to just the derived means-tested element. The level of the increase is set at the level required for the total standardised funding envelope to equal £500 million.

11. The modelling assumes that, because the archetypes simply increase the rate of existing benefit payments, there are no additional administrative costs. Table A7.4 shows how the

137 The effect of taxes and benefits on household income 2009/10, ONS

Table A7.4: *Average annual impact of the cost of income archetypes on all households (excluding the impact of the additional benefit payments) on incomes (2011 prices)*

	Equivalised income decile groups (BHC)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Increase in mean-tested benefits										
Average reduction in household income	£4	£10	£12	£15	£18	£21	£24	£29	£37	£62
Increase in Winter Fuel Payment										
Average reduction in household income	£4	£10	£12	£15	£18	£21	£24	£29	£37	£62

Source: Fuel Poverty Review

costs fall across different households – which are identical for the means-tested and winter fuel payment archetypes.

The impact of the funding decision

12. Whether a policy is funded by the Exchequer or through a levy (or obligation) on energy supplier has implications in terms of how the costs fall across different households.

13. Where a policy is funded through a levy or obligation on energy suppliers, we would expect suppliers to recover those costs through higher prices. In a competitive market, we would expect costs to be passed on in the same way that they are levied. For example, if the share of an obligation that is allocated to a particular supplier is determined by the number of customers that each supplier serves, then the costs should be passed on as a flat rate per customer account (i.e. the same charge would be added to each account). Conversely, where an obligation is allocated on the basis of units of energy sold, we would expect costs to be passed on through an increase in the price of each unit of energy sold. In this case, a greater share of the overall costs would be borne by high-use households. This is how the archetypes discussed later are modelled.

14. For each of the archetypes delivered through an obligation or levy on energy suppliers, the modelling assumes that the costs are passed on through an increase in the unit cost of energy. This means that a greater share of the costs will be borne by high-use households. Average energy use increases as household income rises, which means that higher-income households typically face a greater share of the total costs compared to a lower-income households. However, there are a significant number of low-income, high energy use households (e.g. households where electricity is the main heating fuel, pensioners/young families that are in the home for long periods) that would also face a large proportion of the overall costs.

15. Where a policy is funded through the Exchequer, the modelling assumes that: (a) this requires an increase in the overall tax burden; and (b) this results in an increase in both direct (e.g. income tax) and indirect (e.g. VAT) taxes.

16. Precise modelling of how an increase in taxation would affect on different types of households is complex (and beyond the scope of this review). However, data from the Office of National Statistics show the average impact of taxation for households across income groups – see Table A7.5. As we might expect, lower-income households pay a smaller share of their income in direct taxes and a larger share in indirect taxes. The figures suggest that the lowest and highest-income households pay a larger share of their income as taxation compared to households in the middle of the income distribution.

17. The modelling of policy archetypes funded by the Exchequer assumes that the increase in

Table A7.5: *Summary of the effect of taxes and benefits by quintile group 2009/10*

	BHC equivalised quintile groups for all households				
Income, tax and benefits (£pa)	**Bottom**	**2nd**	**3rd**	**4th**	**Top**
Original income	£4,847	£10,853	£23,088	£37,937	£77,896
Plus cash benefit	£6,863	£8,280	£6,139	£3,949	£1,992
Gross income	£11,730	£19,133	£29,227	£41,886	£79,889
Less direct tax and NIC	£1,195	£2,200	£4,850	£8,403	£19,500
Disposable income	£10,535	£16,933	£24,377	£33,483	£60,389
Less indirect taxes	£2,965	£3,466	£4,459	£5,386	£7,441
Post tax income	£7,570	£13,467	£19,918	£28,097	£52,948
Taxes as a share of gross income	35.5%	29.6%	31.9%	32.9%	33.7%

Source: ONS (see footnote 137)

taxation results in an equi-proportional reduction in disposable income across all households (i.e. a reduction of 0.1 per cent is applied to all households income in order to raise the required revenue for the policy under consideration). Clearly, this is a simplification as it ignores the true impact of taxation at the extremes of the income distribution. However, it does provide a reasonable approximation of the impact of tax-based revenues on household incomes.

Part B: Estimating the net energy and GHG impact of measures

18. We would generally expect a household that experiences a reduction in energy costs or an increase in income to increase the amount of energy it consumes. On the other hand, a household that experiences an increase in energy costs or a fall in income would be expected to reduce energy usage.[138]

19. The responsiveness of energy demand to a change in energy costs or income depends on household characteristics and the way in which costs fall on households. Modelling the impact of policies on energy use and greenhouse gas (GHG) emissions is based on a set of income and price elasticities.

20. As set out in Chapter 7, households that receive an energy bill rebate or an increase in the level of Winter Fuel Payment are assumed to spend a significant proportion of the additional income on energy. There is some evidence to suggest that households increase energy consumption significantly as a result of receiving benefits that are labelled as support for household energy costs.[139] The elasticities applied to households in receipt of a labelled income transfer in the analysis are therefore based on the recent findings of the Institute for Fiscal Studies on the way in which households use the Winter Fuel Payments. These elasticities describe the relationship between an increase in household income that is intended (and labelled) for fuel use and energy expenditure. For example, the elasticity of demand for fuel for a household in receipt of a Winter Fuel Payment or energy bill rebate results

138 We have not modelled energy demand responses in the baseline for increases in prices between 2011 and 2016. The elasticities applied for the analysis of policy archetypes are *marginal* elasticities that are unlikely to be appropriate to estimate the cumulative impact of changes in energy prices over multiple years. For this reason and for simplicity, we therefore do not adjust baseline energy consumption for changes in prices.

139 Beatty, T., Blow, L., Crossley, T. & O'Dea, C. (2011). *Cash by any other name? Evidence on labelling from the UK Winter Fuel Payment*. Available at: http://www.ifs.org.uk/publications/5603

in 41% of the payment being spent on fuel. As a result, we model a net increase in energy demand and in GHG emissions from an increase in Winter Fuel Payments.

21. Existing means-tested benefits are designed to support incomes and have no direct link to energy usage. As such, we would not expect households to treat these payments in the same way as a Winter Fuel Payment – in other words, it is unlikely that households would spend such a large proportion of the additional income on energy. However, we might still expect a tax-funded increase in means-tested benefits to increase aggregate energy consumption. The elasticities we apply to a general (un-labelled) change in household income are those published in Jamasb and Meier (2010)[140], mapped on to individual income decile groups and detailed in Table A7.6. They translate as a percentage change in expenditure on energy as the result of a 1 percent change in income. For example, average expenditure on electricity in the bottom income decile group would change by 0.033 per cent for every 1 per cent increase in income, compared to a 0.087 per cent increase in expenditure for a household in the top income decile group. Overall, the analysis assumes, therefore, that energy demand in lower and higher income households is relatively unresponsive to changes in income. This means that an increase in means-tested benefits would tend to result in an a relatively small increase in energy demand and resulting GHG emissions.

22. The elasticities also suggest that lower income households are less responsive to changes in income than in higher income households. This may reflect the fact that a greater proportion of an increase in income for low-income households would support spending on other necessities, whereas it is more likely that an increase in income for a wealthier household would lead to more energy consumption.

23. We discussed above evidence that as the WFP is labelled it has a significant impact on the amount of the income transfer that is spent on energy – it is suggested that around 41 percent of the WFP is spent on energy. We might expect, therefore, households in receipt of an energy bill rebate to make a similarly large increase in their energy consumption. That being the case, we would expect a rebate policy to result in an aggregate increase in energy consumption (and, therefore, in GHG emissions).

24. Energy expenditure is assumed to be less responsive to changes in the general tax burden (i.e. where archetypes are assumed to be funded through the Exchequer) or changes in benefits that are not related to energy use (i.e. changes to means-tested benefits). The elasticities used in the analysis to assess the impact on energy demand as a result of increasing tax revenues to fund a thermal efficiency archetype are detailed in Table A7.6 above and are the same as those used for modelling demand changes as a result of increasing the level of means-tested benefits.

25. Where a policy affects the unit price of energy (which occurs where a policy is funded through energy suppliers), the modelling uses a price elasticity which shows the relationship between the price and demand for a particular product in order to assess the impact on energy consumption. Once again, the elasticities used are taken from work by Jamasb and Meier (2010) for different income brackets and are mapped onto income decile groups. The values used are shown in Table A7.7, and can be interpreted as the percentage change in expenditure on gas and electricity in relation to a 1 percent increase in the price of each fuel. For example, a 1 percent increase in the price of gas would on average lead to a 0.748 percent increase in gas expenditure in income decile group 1. This implies that expenditure does not increase as fast as prices and therefore consumption of gas reduces. In contrast, on average in the top income decile group consumption of gas stays virtually constant

140 Jamasb, T. and Meier, H. (2010). *Household Energy Expenditure and Income Groups: Evidence from Great Britain*; Working paper CWPE 1011 & EPRG 1003.

Table A7.6: Income elasticities for changes in energy expenditure from an un-labelled cash transfer or increase in tax

BHC Income Decile Group	Electricity	Gas	Heating Oil/Solid Fuel (based on 'all energy' expenditure)
1	0.033	0.046	0.053
2	0.051	0.05	0.05
3	0.051	0.05	0.05
4	0.051	0.05	0.05
5	0.051	0.05	0.05
6	0.096	0.076	0.061
7	0.096	0.076	0.061
8	0.167	0.151	0.141
9	0.167	0.151	0.141
10	0.087	0.098	0.08

Source: Fuel Poverty Review, based on Jamasb & Meier (2010)

after a price increase, hence expenditure increases by nearly 1 percent for a 1 percent increase in the price of gas.

Part C: Cost-benefit analysis

26. As was set out in Chapter 7, all of the cost-benefit analysis for the policy archetypes was carried out on the basis of HM Treasury Green Book methodology.[141] The following sections set out some of the details of the methodology and assumptions used in the analysis.

Prices and Income Archetypes

27. For the prices and income archetypes we use a common approach to modelling a number of key outputs for the cost-benefit analysis, such as changes in GHG emissions and valuing changes in energy consumption. This approach differs, however, in relation to how the benefits are delivered to recipients under each policy and the knock-on effect on other key factors. We summarise these key differences for each archetype first, before providing an overview of the elements common to both polices. We show a high level summary of the two approaches in Figure A7.1.

Prices archetype

28. The prices archetype models the impact of providing direct reductions in energy bills for eligible households, thus reducing the cost of achieving a set level of energy use for beneficiaries in that group. We define the eligible group as those claiming a means-tested benefit (MTB). The policy is modelled both as funded through general taxation and through a levy on the suppliers, to illustrate the impact of the differences arising from funding mechanism. Where the approach differs for each funding mechanism this is highlighted in each of the following sections.

141 http://www.hm-treasury.gov.uk/data_greenbook_index.htm

Table A7.7: *Price elasticities for expenditure on electricity and gas*

BHC Income Decile Group	Electricity	Gas
1	0.536	0.748
2	0.684	0.768
3	0.684	0.768
4	0.684	0.768
5	0.684	0.768
6	0.709	0.939
7	0.709	0.939
8	0.772	0.972
9	0.772	0.972
10	0.742	0.965

Source: Fuel Poverty Review, based on Jamasb & Meier (2010).

Funding

29. When a policy is delivered through energy suppliers it is assumed that the suppliers recoup the cost from the consumer. As a result the policy increases the price per kWh of metered fuels (electricity and gas) paid by all households with gas and/or electricity accounts. As demonstrated in Part B above, a price increase reduces consumption via the gas and expenditure elasticities outlined in Table A7.7. The costs of the policy are recouped by only those consumers on metered fuels and those on oil and coal face no direct increases in energy costs.

30. When a policy is tax funded we assume that there is an increase in the overall tax burden to meet the costs of the policy. All households fund the policy, regardless of whether they are eligible or not to receive an energy bill rebate. This reduces disposable income available to spend on all goods. A proportion of this decrease in spending is attributable to energy consumption. This change in energy consumption is calculated using the income elasticities of energy expenditure described above in Table A7.6.

Transfer Impact

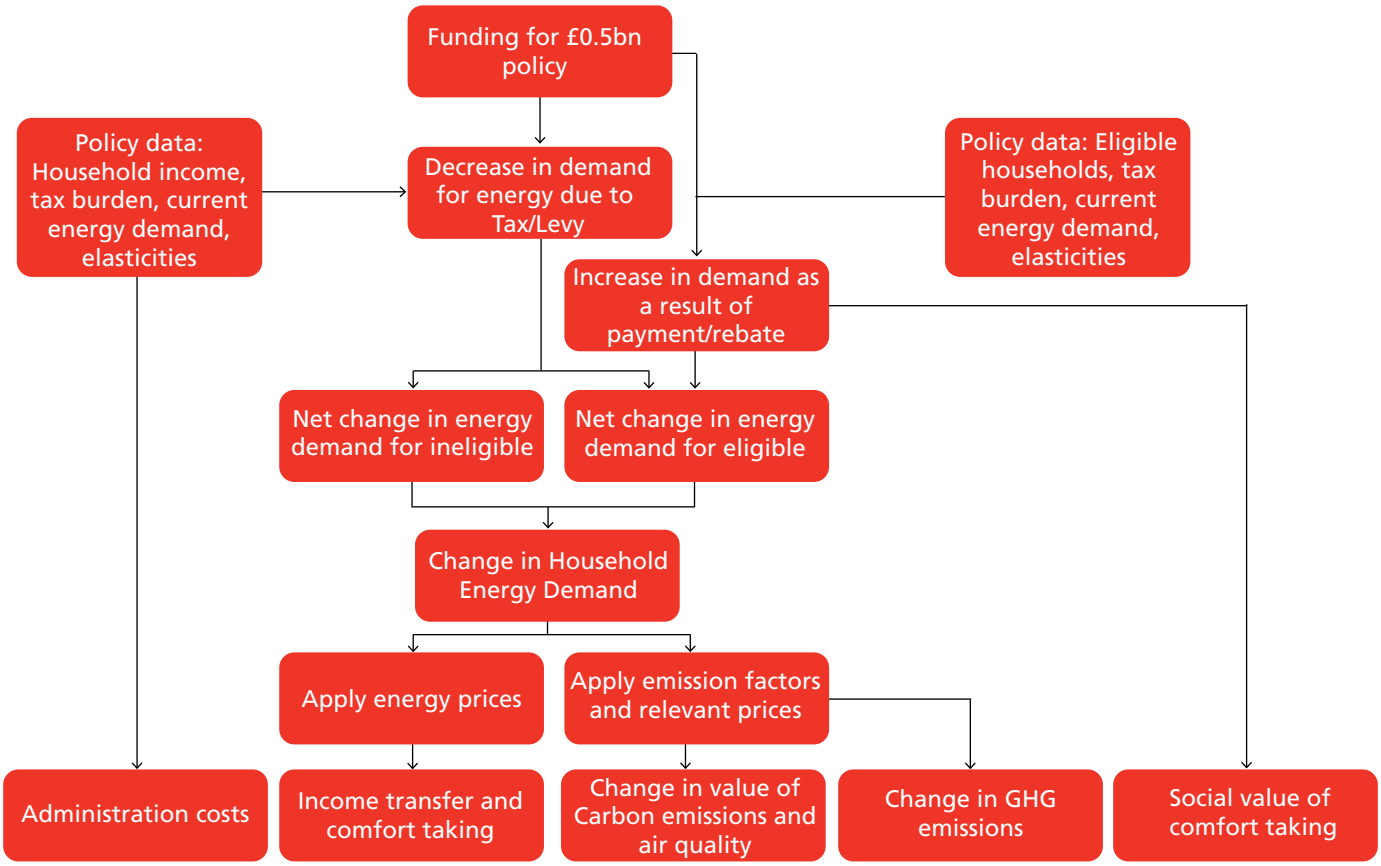
31. Under the rebate archetype a reduction in energy bill occurs only for those eligible individuals who are both eligible and can be identified. The policy is assumed to deploy a data-matching exercise to combine information on households claiming a means-tested benefit and their energy account.

32. Following the discussion above regarding evidence labelled transfers in relation to the Winter Fuel Payment, we assume that 41 percent of a labelled fuel related payment is spent on fuel whilst 59 percent is spent on other goods. We apply these elasticities uniformly across all households in receipt of the energy bill reduction regardless of their income. In this case consumers can be expected to increase their energy use but also increase their spending on other goods as demands on their income change.

Net impact on energy consumption

33. The effect of the payment and of the funding mechanism are combined to obtain the net impact on energy consumption for each income group. The

Figure A7.1: *Summary of approach to valuing costs and benefits of prices and income archetypes*



net impact of funding and payments is modelled to be a reduction in energy consumption for the ineligible group, as a result of contributing towards the funding of the archetype but without receiving a reduction in their bills. For the eligible group consumption increases in response to 41 percent of their bill reduction used for additional fuel. The remaining 59 percent is counted as additional income and does not affect domestic energy consumption.

Income archetype

34. The income archetype models increases in both mean-tested benefits (unlabelled income transfer) and in the Winter Fuel Payment (labelled income transfer). While the impact of each of these is similar in many respects, they key difference is whether the transfer is labelled or not as this has significant implications for changes in energy consumption and the costs and benefits that arise.

Funding

35. The income archetype is assumed to be funded through a small increase in the tax rate across all households in England and as a result there is no change in energy prices. Disposable incomes will decrease by a small amount across all households as a result of increasing tax revenues. The decrease in income will reduce expenditure on all goods, including energy (via the income elasticities of energy expenditure in Table A7.6).

Payment Impact

36. Eligible households are modelled as the Winter Fuel Payment group under one variation of the archetype, and households claiming a means-tested benefit under the other. Under both

variations households receive a cash transfer, which will increase expenditure (and as a result increase consumption) on energy across all fuel types. The effect, however, is different between making a labelled payment (WFP) and increasing a unlabelled payment (MTB). A labelled payment will have a greater impact on increasing fuel use than an unlabelled payment, due to the significant differences in elasticities assumed.

Net impact on energy consumption

37. The combined effect of reduced consumption from an increase in tax and increased consumption as a result of the payments under both archetypes would lead to a change in the overall consumption pattern of energy in the domestic sector. We would expect the net effect of an increase in means-tested benefits to be relatively neutral, as unlabelled income transfers tend to result in small increases in energy consumption, which would to some extent be cancelled out by the small reduction in consumption resulting from the tax increase. We would expect an increase in Winter Fuel Payments to lead to a larger overall increase in energy consumption as a result of a greater proportion of the income transfer being used on additional fuel.

Common approaches to prices and income archetype modelling

38. The income and prices archetypes share a number of common features, particularly in relation to the costs and benefits that they generate. Each key cost and benefit and its underlying assumptions is described in turn.

Costs

Administration Costs

39. Administration costs for the prices archetype relate primarily to the setup and running costs of a supplier obligation, and the costs to Government of implementing a mechanism of data matching. We estimate these costs consistently with DECC estimates for the Warm Home Discount scheme. The income archetypes assume no additional administration costs as they are effectively increases in funding for existing policies, for which much of the administrative costs will be 'sunk' and are assumed to not increase significantly as a result of increasing the level of payments made.

Policy Costs

40. The cost of the policy is consistent across all scenarios at £500 million. In standard cost-benefit analysis this cost is simply a transfer from all households, either through their energy bills or through taxation, to fund a policy for a smaller group of eligible households. When equity-weights (see below) are applied, however, we place a different value on these transfers depending on where these costs fall in terms of the income distribution.

Energy Use Cost

41. The different changes in energy consumption for each archetype described above would have an impact on society, by either using up resources that could be employed in alternative ways (if energy use increases) or freeing up resources to be used elsewhere (if energy use decreases). The cost of changes in energy consumption and the benefits of reduced use are valued at the variable domestic price for the relevant fuel in 2016, as published in the DECC Interdepartmental Analysts Group guidance on valuing energy use and greenhouse gas emissions.[142]

Air Quality and GHG Emission Valuation

42. Changes in energy consumption as a result of the archetypes would lead to changes in emission levels, which have a detrimental impact on society. Changes in the level of emissions would have social impacts which are valued by using a combination of market and 'shadow' prices. Emissions have two valuation-relevant elements; air quality and GHG cost of those emissions (traded and non-traded).

142 DECC (2011). *Valuation of energy use and greenhouse gas emissions for appraisal and evaluation*. Available at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx

The changes in air quality are valued following IAG guidance on prices per kWh of consumption (e.g. 0.04p/kWh for gas). The cost of the emissions are valued using the 'traded' price for emissions resulting from electricity use (based on the price set by the EU Emissions Trading System listed in the DECC IAG guidance) and non-traded emissions price for all fuels other than electricity.

Benefits

Income Transfer

43. Payments/bill reductions made under both the income and prices archetypes involve a component that is assumed to be used for increased energy consumption (which implies a degree of 'comfort taking') and the remainder that is taken as a simple increase in income. The impact of comfort taking is discussed below. The part of the transfer taken as income is a simple transfer, which does not attract a value in standard cost-benefit analysis. However, if we choose to value the effects of re-distributing resources from some income groups to others, through the use of equity-weights, we value the societal benefit of increasing the incomes of relatively poorer households positively (see below for more detail on equity-weighting).

Comfort Taking – Private Benefit

44. The part of a bill reduction or income payment that is used for increased energy consumption will relate in the main to increased internal temperatures – or 'comfort taking'. The amount spent on additional fuel will vary depending on the income distribution of the eligible group. It is calculated by applying the appropriate expenditure elasticity value to the payment/bill reduction made. Comfort taking values are lower with an unlabelled payment than a labelled payment. The private benefit plus the pure income transfer value will net off in non-equity weighted models to the policy cost (here £500 million).

Comfort Taking – Social Benefit

45. Increased thermal comfort resulting from an income transfer or energy bill reduction is primarily a private benefit. However, as support under the prices and income archetypes is targeted at relatively low-income households, a social value is derived from those in the eligible group increasing their energy consumption, primarily through increased levels of warmth. The increase in energy consumption of these group is valued using the retail price for the relevant fuel consumed, in line with the IAG guidance.

Equity weighting

46. Following the methodology set out in the *Green Book*[143], we apply equity-weights to our cost-benefit analysis in order to try and value the distributional impacts of each archetype. Equity weighting accounts for the difference in value that a household in a lower income group places on £1 compared to a household in a higher income group. Equity weighting places a greater value on £1 given to (or taken away from) the lower income group and a lower value of £1 given to (or taken away from) a higher income group.

47. Equity-weighted models calculate the appropriate weight for each income group by dividing the additional value of adding £1 to income of each group by the additional value of adding £1 of income to the average income. In economic terms, the marginal utility of consumption of the income group is divided by the average marginal utility of consumption of the population. Marginal utility of consumption is calculated as one divided by income. For example, Table A7.8 below, based on the EHS, shows an average income of the English population of £27,851 and the average income of Income Decile Group 1 of £7,257.

143 HM Treasury (2003). *The Green Book: Appraisal and Evaluation in Central Government*. Available at: http://www.hm-treasury.gov.uk/data_greenbook_index.htm

48. The calculated equity weighting for income decile group 1 means that if £100 is added to the spending power of a household in that group, it is worth the equivalent of providing a household with average income with £384. Further information for all groups is contained in Table A7.8 below.

49. Equity weights are applied to the pure income transfer and social benefit of comfort taking benefit but not the private benefit of comfort taking.

50. As a result of applying equity weights a progressive policy which gives a proportional or greater share of the benefits to the lower income groups will return a higher NPV than if it was not equity weighted.

Thermal efficiency archetypes

51. In the thermal efficiency archetypes we model the installation of heating and insulation measures in two target groups and estimate the differences in impact when each of these is funded through taxation or through an obligation on energy suppliers. As outlined above, the two target groups are i) all households in receipt of a means-tested benefits below a SAP threshold of 55; and ii) all households below a SAP threshold of 55.

Funding

52. We outlined above the differences assumed for the delivery mechanism for tax-funded thermal efficiency archetypes versus obligations on energy suppliers, and the effect this has on the profile of measures delivered. The funding method also affects the nature of the costs generated by the policy. Supplier obligations, for example, create a market for the installation of measures to meet the obligation target, which generates economic rent (see Box A7.1). We assume that a tax-funded thermal efficiency archetype would not create such a market but would adopt an approach of delivering grants to cover the cost of measures for households that come forward for assistance.

Changes in energy demand

53. The archetypes alter household energy demand in three ways. The first relates to the costs of funding the policy. In the same way as the prices and income archetypes, any reduction in income as a result of raises tax revenues or increase in the price of gas and electricity from a supplier obligation will result in a reduction in energy demand via the income and price elasticities shown in Tables A7.6 and A7.7 respectively. This will be smaller under the tax-funded archetypes than the obligation-based archetypes given the relatively small responses to changes in income versus the relatively larger responses to changes in energy prices across income groups.

54. The second relates to energy changes generated from the installation of measures. Installing insulation will reduce the amount of energy required to heat a home to the same level as pre-installation. This will typically be a reduction in consumption of the household's existing heating fuel (if a household uses gas for heating then typically installing insulation will reduce their consumption of gas). Installing a central heating system where there was no previously will typically move a household from using secondary heating (e.g. plug-in electric heaters) to central heating (e.g. from mains gas boiler). In such cases, installing heating will reduce consumption of the fuel previously used for secondary heating (e.g. electricity) and increase consumption for the new central heating fuel (e.g. gas). In most cases this will result in an increase in end user energy use (typically fewer kWh of electricity are required to meet a set temperature than of gas), but a reduction in energy bills (as gas prices are typically lower per kWh than electricity).

Table A7.8: *Equity weights used for the archetype modelling, 2009*

BHC Income Decile Group	Average Unequivalised Income (2009)	Marginal Utility of Consumption	Equity Weight
1	£7,257	0.00014	3.84
2	£11,112	0.00009	2.51
3	£13,992	0.00007	1.99
4	£17,089	0.00006	1.63
5	£20,718	0.00005	1.34
6	£24,827	0.00004	1.12
7	£29,619	0.00003	0.94
8	£35,679	0.00003	0.78
9	£44,438	0.00002	0.63
10	£73,770	0.00001	0.38
Average Income:	£27,851		
Average Marginal Utility of Income:	4.00E-05		

Source: Fuel Poverty Review

55. The third change relates to any decision by the household to increase temperatures at home as a result of having had a measure installed. For example, installing insulation will reduce the cost of achieving a set temperature, but the household may also choose to offset some part of that energy saving by increasing internal temperatures to more comfortable levels – 'comfort taking'. Comfort taking reduces the savings achieved from installing measures, but also generates a benefit to the household in terms of improved thermal comfort levels, which generates a benefit to society valued at the retail price for the relevant fuel, in line with IAG guidance.

56. We summarise the high level approach to modelling the thermal efficiency archetypes in Figure A7.2.

Costs of the thermal efficiency archetypes

Administration costs

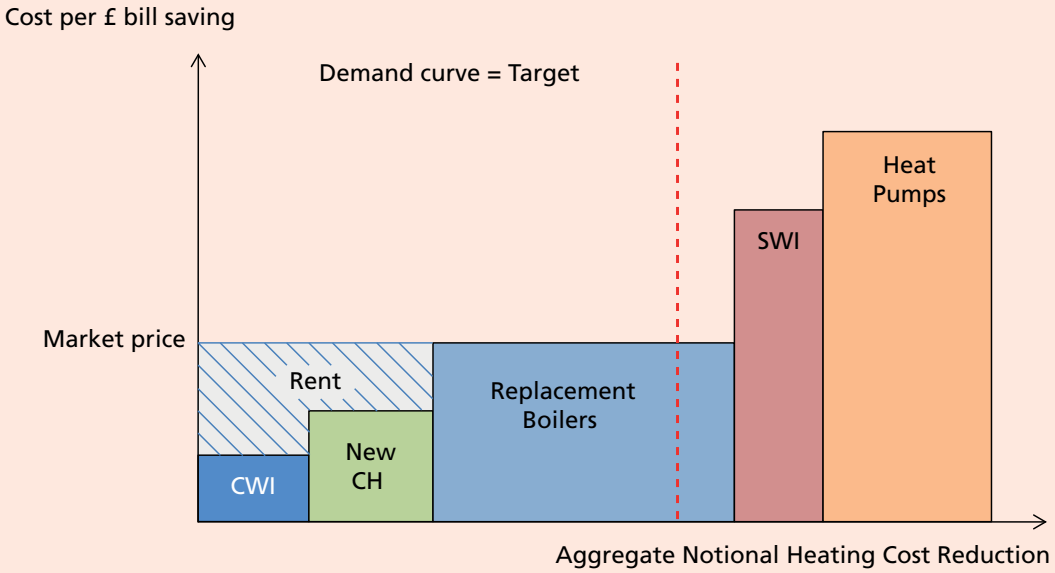
57. Administration costs are restricted in our analysis to the time cost of running the policy and any associated costs of processing enquiries and household referrals. Estimates for the supplier-obligation archetypes adopt an approach where an assumed level of personnel resource is required to administer the scheme for each obligated supplier, to which estimated full-time equivalent costs are applied. Costs of processing enquiries and referrals are estimated using DECC estimates based on previous schemes of a similar nature.

58. For the tax-funded archetypes, a fixed administration and management cost is estimated, based on estimates of previous schemes.

Box A7.1 – the costs of energy company obligations

Under a supplier obligation, energy companies are set a target to be delivered in the household sector – in the case of the thermal efficiency archetype, this is a specified reduction in notional heating costs. This creates an additional cost associated with the supply of energy. In a competitive market, energy suppliers would be expected to seek to meet the obligation at the lowest possible cost.

This effectively establishes a market for units of compliance (i.e. for £s of reduction in notional heating costs), where installers indicate how much they would charge to deliver heating cost reductions through certain measures. This establishes a supply curve (see illustration below).



The level of the obligation sets the total heating cost reduction that needs to be provided (shown above by the vertical broken line). The interaction of supply and demand generates a market price for units of compliance. In a competitive supply market, all energy suppliers pass through the cost of the obligation into energy prices on the basis of this market price.

Some measures can be installed at a lower cost that the market price – as is shown by both cavity-wall insulation and new central heating in the illustration above – thus generating some 'rent' (shown by the hatched area in the above diagram). This is defined as the payment beyond the amount needed to bring about supply of a good. This rent could be captured by installers (e.g. an installer could deliver some cheap insulation measures and sell the compliance to the energy supplier at the market price), the supplier or the household (or could be shared between the three). The existence of rents within a suppler obligation model serves to reduce the total amount of measures that can be delivered for a given level of overall cost.

Capital costs of measures and economic rents

59. The £500 million raised to fund the thermal efficiency archetypes is allocated differently under the tax-funded and supplier obligation approaches. Under the former, we assume that the full £500m is available for expenditure on measures. Under the latter, and as discussed in Box A7.1, part of the £500 million will consist of economic rent. We would expect, therefore, less than £500 million to be spent directly on measures. The component that is rent is a simple transfer from bill payers to either installers, suppliers, households, or all three. As a result of being a transfer, we count rent as both a cost and a benefit, which cancel each other out in our non-equity weighted cost-benefit analysis.

60. When valuing the distributional costs and benefits of these archetypes we apply equity-weights to account for the social value of placing costs on households in certain income groups and delivering benefits to other income groups. Under the tax-funded thermal efficiency archetypes each household pays the same proportional amount of additional tax, therefore no additional social costs or benefits are generated. Under the supplier-obligation approach, costs are assumed to be recouped from households based on how much energy they use. While households in lower income groups also tend to be relatively lower consumers of energy,[144] on average households in lower income groups are estimated to pay a greater proportion of their income towards funding the archetype than under a tax-funded approach. This means that when equity-weights are applied, a greater value is attached to costs paid by lower income groups, increasing the social cost of the policy overall.

Hidden installation costs

61. Installing thermal efficiency measures is expected to incur hidden costs in relation to activities such as time spent supervising the installation and re-decorating afterwards. We apply different costs depending the type of measure installed based on a published report by ECOFYS.[145] We also apply equity-weights where appropriate.

Benefits of the thermal efficiency archetypes

Reductions in energy use

62. Energy savings resulting from the installation of measures (net of comfort taking) free up energy resources to be used elsewhere. These are valued at the variable price per kWh for each relevant fuel, in line with IAG guidance.

Changes in GHGs and air quality

63. The changes in energy demand resulting from measures being installed have knock-on implications for the levels of GHG emissions from the domestic sector and air quality. We apply the emissions factors for each fuel published in the IAG guidance to estimate the changes in GHGs, before applying the non-traded carbon value to changes in gas, heating oil, solid fuel and LPG and the traded price to changes in emissions arising from electricity consumption. Air quality damage factors are applied to each kWh of energy demand change, for each relevant fuel.

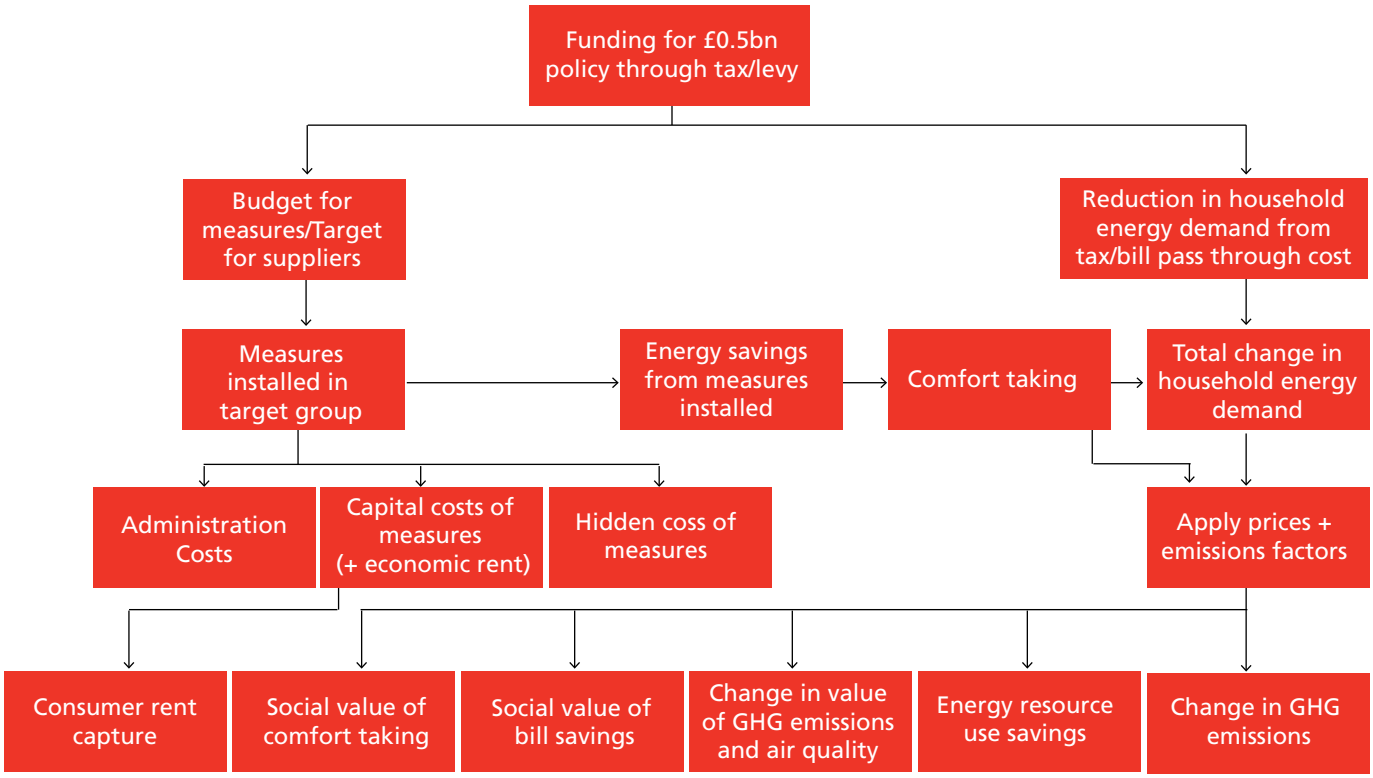
Comfort taking

64. Comfort taking is estimated separately for heating and insulation measures. For insulation, an average 15 percent of full energy savings from a measure is assumed to be taken in comfort. Comfort taking in relation to heating is based on evidence from the *Warm Front Study Group* findings that before receiving heating and/or insulation, on average lower income households tend to heat their living room and bedrooms to 17.9°C and 15.9°C

144 For example see White, I., Roberts, S. & Preston, I. (2010). *Understanding 'High Use, Low Income' Energy Consumers*. Available at: http://www.cse.org.uk/downloads/file/understanding_high_use_low_income_energy_consumers.pdf

145 ECOFYS (2009). *The hidden costs and benefits domestic energy efficiency and carbon saving measures*. Available at: http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/saving_energy/analysis/1_20100111103046_e_@@_ecofyshiddencostandbenefitsdefrafinaldec2009.pdf

Figure A7.2: *Summary of approach to valuing costs and benefits of the thermal efficiency archetypes*



Source: Fuel Poverty Review.

respectively, whereas after receiving measures they on average heated these same rooms to 19.6°C and 18.3°C.[146] We broadly apply these changes in our estimates of comfort taking from installing heating systems as the difference between heating a home to around 18°C before measures and around 19°C afterwards. The difference in kWh is then valued using the retail prices of the fuels involved.

Societal benefits from bill savings

65. Reducing household energy demand through installing measures will also reduce energy bills. Energy bill savings are a private benefit experienced by the household, and the benefit to society of reduced energy use is valued as a freeing up of energy resources for other uses. We therefore do not value private bill savings in our non-equity weighted cost-benefit analysis. However, as the bill savings generated under a number of the thermal efficiency archetypes are targeted at lower income groups, we value the benefit that society gains from assisting poorer households with their energy costs. This is estimated as the difference between equity-weighted bill savings and non-equity weighted bill savings (i.e. we only value the equity-weighted uplift of the bill savings, but not the savings themselves).

Rent capture

66. We outlined above that any supplier-funded thermal efficiency archetype would generate economic rent. Some of this rent may be captured by households receiving measures. For example, given the hidden costs associated with installing loft insulation (such as clearing out the loft), a household may require an additional incentive (other than an implied reduction in energy bills) to agree to have a measure installed. This could be in a number of different forms. We assume, consistently with recent published analysis, that

146 Green, G., Gilbertson, J. & The Warm Front Study Group (2008). *Warm Front Better Health*. Available at: http://www.apho.org.uk/resource/view.aspx?RID=53281

50 per cent of rent is captured by households. The remaining 50 per cent is assumed to be captured by installers and suppliers. This would be a simple transfer of rent and therefore is cancelled out by the cost of raising the rent to make the transfer in our non-equity weighted cost-benefit analysis. However, when applying equity-weights we value the social benefit of the economic rent captured by low-income households by taking the difference between equity-weighted and un-weighted rent captured by households.

Detailed Archetype Results

67. Discounting the costs and benefits of each archetype has been undertaken in line with *Green Book* methodology. The detailed results breakdowns are shown below.

Prices archetypes

68. There are several costs and benefits associated with the price archetypes. The main costs associated with such a scheme are: (a) the additional GHG and air quality impacts associated with greater energy consumption; (b) the cost of supplying additional energy supply due to increased consumption; and (c) the administrative costs to Government and energy suppliers of running the policy. From a cost-benefit perspective, the key benefit of a prices archetype is the household welfare gain associated with comfort-taking (i.e. the benefit enjoyed by the household from higher internal temperatures as a result of receiving the rebate).

69. The elasticities associated with energy use discussed early in this Annex mean that the exchequer funded version of this archetype shows higher emission levels than the levy funded archetype.

Income archetypes

70. The income archetype has the same cost and benefit components associated as with the tax-funded prices archetype. However the comfort taking impact seen in the prices archetype is not mirrored in the means tested benefits archetype. The discounted results from the income archetype show that increasing winter fuel payment by £0.5bn is more effective than increasing means-tested benefits by the same amount. The returns however for both policies are very low when not equity weighted. Equity weighting the results show that the means tested benefits increase provides a more equitable redistribution on income.

Table A7.9: *Discounted outputs from the prices archetype by levy and tax funded (millions)*

£2011 prices	Funded by Levy	Funded by Tax
Benefits		
Income Transfer Value	421	421
Comfort Taking	173	173
Total Benefits	**594**	**594**
Costs		
Tax/Levy cost	421	421
Increase in energy use	54	90
Increase value of greenhouse gas emissions (non-traded)	13	21
Increase value of EU Allowances required	1.5	3
Reduction in air quality	1	2
Administration costs	5	5
Total Costs	**496**	**541**
Net Present Value	**98**	**52**
Equity Weighted NPV	**485**	**595**
GHG Emission Changes ($MTCO_2e$)		
Traded	0.09	0.160
Non-Traded	0.263	0.421
Net Change in GHG Emissions	**0.353**	**0.581**

Source: Fuel Poverty Review

Note: The £421 million cost in line 4 is the 2011 value of £500 million spent in 2016 after discounting.

Thermal efficiency archetypes

71. The thermal efficiency archetypes targeted at households in receipt of a means-tested benefit living in a dwelling with a SAP rating of 55 or below both generate much larger benefits than costs. The supplier-funded archetype generates the largest benefits primarily because of the nature of its assumed delivery mechanism – where suppliers seek to install the most cost-effective measures only. This leads to a higher Net Present Value and equity-weighted NPV for the supplier-funded archetype.

72. Owing to the different mixes of measure delivered under each, we observe different patterns of changes in energy consumption and comfort taking (although when discounted over time the value of comfort taking is broadly the same across both). We observe a greater reduction in non-traded GHGs under the supplier archetype, as there is a greater proportion of insulation (which reduces

Table A7.10: *Discounted outputs from the income archetype, funded by tax (£ millions)*

£2011 prices	**Increase in Winter Fuel Payment**	**Increase in Means Tested Benefits**
Benefits		
Income Transfer Value	421	421
Comfort Taking	173	2
Total Benefits	**594**	**423**
Costs		
Tax/Levy cost (discounted)	421	421
Increase in energy use	91	0*
Increase value of greenhouse gas emissions (non-traded)	22	0*
Increase value of EUAs required	3	0*
Reduction in air quality	2	0*
Administration costs	0*	0*
Total Costs	**538**	**421**
Net Present Value	**55**	2
Equity Weighted NPV	**416**	547
GHG Emission Changes ($MTCO_2e$)		
Traded	0.153	0*
Non-Traded	0.433	0.001
Net Change in GHG Emissions	**0.586**	**0.001**

*rounded to the nearest million

Source: Fuel Poverty Review

consumption of the main heating fuel) in the measure mix, whereas the tax-funded archetype involves a greater level of switching households from electric secondary heating to (predominantly gas) central heating. Hidden costs are higher for the tax-funded archetype as a greater proportion of measures installed is new central heating, which incurs higher hidden costs than basic insulation, which is more prominent in the measure mix under the supplier-funded archetype.

73. The thermal efficiency archetypes targeted at any household with a SAP rating of 55 or below show similar relative patterns to those targeted at households claiming a means-tested benefit. The greater focus on the most cost-effective measures under the supplier obligation leads to a greater value of benefits generated. Further, targeting a broader group of households than just those in receipt of a means-tested benefit widens the scope for installing more of the most cost-effective measures (such as cavity wall insulation), therefore the net present value for the supplier-funded

Table A7.11 *Discounted costs and benefits of the thermal efficiency archetypes, targeted at households receiving means-tested benefits in dwellings with SAP 55 or below (£ millions)*

£2011 prices	Tax Funded	Supplier Obligation
Benefits		
Reduction in energy use	479	513
Reduction in value of GHG emissions	143	249
Improvement in air quality	27	40
Comfort taking	157	157
Societal benefit from bill savings for low-income households	-	-
Consumer rent capture	-	51
Installer/supplier rent capture	-	51
Total Benefits	**806**	**1,060**
Costs		
Capital cost of measures (and rent generated)	421	421
Hidden costs of installation	60	45
Administration costs	19	1
Total Costs	**499**	**467**
Net Present Value	**307**	**593**
Equity Weighted NPV	**1,731**	**1,902**
GHG Emission Changes ($MTCO_2e$)		
Traded	-2.257	-0.888
Non-Traded	-1.143	-4.034
Net Change in GHG Emissions	-3.400	-4.293

Source: Fuel Poverty Review

archetype targeted at all households is greater than when measures are targeted only at households on means-tested benefits. However, the equity-weighted NPVs show that targeting measures at lower income groups generates a greater level of net social benefit than installing measures across all income groups.

Table A7.12: *Discounted costs and benefits of the thermal efficiency archetypes, targeted at all households in dwellings with SAP 55 or below (£ millions)*

£2011 prices	**Tax Funded**	**Supplier Obligation**
Benefits		
Reduction in energy use	489	636
Reduction in value of GHG emissions	168	350
Improvement in air quality	31	62
Comfort taking	160	200
Societal benefit from bill savings for low-income households	-	-
Consumer rent capture	-	85
Installer/supplier rent capture	-	85
Total Benefits	848	1,419
Costs		
Capital cost of measures (and rent generated)	421	421
Hidden costs of installation	52	11
Administration costs	19	1
Total Costs	**491**	**433**
Net Present Value	**356**	**986**
Equity Weighted NPV	**855**	**1,362**
GHG Emission Changes ($MTCO_2e$)		
Traded	-1.944	-0.703
Non-Traded	-1.823	-6.055
Net Change in GHG Emissions	**-3.766**	**-6.758**

Source: Fuel Poverty Review

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