

**Aiming High – An evaluation of the potential
contribution of Warm Front towards meeting
the Government’s fuel poverty target in
England**

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EXECUTIVE SUMMARY

Introduction

Following the implementation of the government's fuel poverty strategy in 2001, Warm Front is expected to make a substantial contribution to reducing the number of fuel poor households – those unable to afford to heat their homes adequately¹. This report focuses on the targeting of the scheme in England and how this might be modified to help achieve the government's target of eliminating fuel poverty among vulnerable households by 2010, based largely on the recommendations in a recent National Audit Office report on Warm Front, which highlighted the relatively small overlap between eligibility for the scheme and fuel poverty.

This is a forward-looking piece of research and, as such, is not intended to be critical of the way the scheme has operated to date. Warm Front, like its predecessor the Home Energy Efficiency Scheme, was not originally designed to alleviate fuel poverty but to improve the energy efficiency of homes occupied by vulnerable households – those containing pensioners, children, and/or someone with a long-standing illness or disability. By this yardstick, the scheme has been a success - up to February 2004, approximately 770,000 vulnerable households had received a Warm Front grant, worth an average of £445 (in 2002) and saving each of these households up to £150 a year on their fuel bills. Whilst it would be unfair to evaluate the past performance of this scheme against an objective that it was not set up to achieve, it is reasonable to ask how far the current scheme is likely to contribute towards meeting a new or modified objective in future (i.e. the reduction of fuel poverty) and what changes could be made to increase this impact.

The report examines the characteristics of Warm Front recipients; estimates the impact of the current scheme on fuel poverty, as officially defined; models the likely effectiveness of various options for redesigning Warm Front in terms of their impact on fuel poverty; and explores the extent of and implications of 'churn'.

Targeting of Warm Front

For the scheme to be well-targeted on fuel poverty, the characteristics of grant recipients should closely match those of fuel poor households. So, for example, if over 40% of fuel poor households are single pensioner households then, other things being equal, over 40% of grants should be going to single pensioners. Although grant recipients are more similar to fuel poor households than private sector households in general, those groups who are most likely to be fuel poor are still substantially under-represented among Warm Front recipients, including single pensioners, occupants of less energy efficient dwellings, and low income households. Furthermore, the proportion of grants allocated to all three groups has been declining over the period covered by this analysis – from April 2000 to the end of 2003 (see Table 3.1).

Single pensioners are more likely to meet the eligibility criteria than other types of household, but are less likely to apply than other eligible households. Single pensioners comprise around a third of all eligible households, but less than a quarter of Warm Front grant recipients (see Figure 3.2), although they do receive larger grants, on average. This suggests that other factors are reducing the number of applications from this 'high risk' group. The reasons for this are not well understood,

¹ A household is defined as being in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use.

but it could be that single pensioners are less likely to hear about the scheme, less likely to value its potential benefits, and/ or more likely to be concerned about possible disruption. Additional efforts should be made to understand and address these and other possible barriers to potential applicants.

Households living in the least energy efficient homes are more likely to apply for a grant than other qualifying households, perhaps because they stand to benefit most from the scheme. But this 'self-selection' effect is not sufficiently strong for targeting purposes: dwellings with a very low energy efficiency rating – a SAP rating of less than 30 - constitute 14% of all eligible households and 21% of Warm Front recipients, but 40% of all fuel poor households (see Figure 3.3). The proportion of grants allocated to less energy efficient homes is unlikely to increase dramatically unless specific mechanisms are put in place to prioritise these dwellings.

Grants are skewed towards low income households, but again much less skewed than the distribution of fuel poor households (see Figure 3.4). This is partly because means-tested benefits are an imperfect proxy for low income, but also because not all the qualifying benefits are means-tested. A large and growing share of grants – up to 38% in 2003 - went to households that qualify on account of a non means-tested disability-related benefit and a further 21% of grants in that year went to households in receipt of the Working Families Tax Credit, few of whom are in fuel poverty, according to the official definition. The Disability Living Allowance was not on the original list of 'passport' benefits and its subsequent inclusion may explain why the share of grants to disabled households appears to have risen over the period covered by this analysis. The way benefit receipt is recorded in the Eaga database may also over-state the share of grants to this particular sub-group, although this is less likely to explain the rising share over time.

There also appears to be a substantial and growing regional imbalance in the distribution of grants, which raises concerns about equity. Within the areas covered by Eaga Ltd, the North East and North West comprise around a third of all eligible households and about the same proportion of those in fuel poverty, yet they receive over half of all grants (see Figure 3.5). One reason is that the regional targets set for Warm Front were apparently based on a misrepresentation of the geographical distribution of fuel poverty. In addition, the methods used to market the scheme, including informal 'word-of-mouth', may have been more effective in some regions than others.

It is estimated that just less than one in five Warm Front recipients are fuel poor prior to receiving a grant (see Table 3.2). Grant recipients are around three times as likely to be fuel poor as other private sector households, so the scheme is already being targeted with some success at fuel poor households. However, most recipients – around four in five - are probably not fuel poor and this proportion appears to have been rising over time, because of changes in the composition of grant recipients (see above). This estimate differs significantly from figures quoted in other studies of Warm Front, which report a much higher incidence of fuel poverty among assisted households. The estimate produced by the Energy Audit Company – between 30 and 44% of grant recipients in fuel poverty - is based on the same data set, but uses a different measure of income than used here and in the government's official definition of fuel poverty (see Section 3.4 and Table B2) which would account for most of the discrepancy between our respective estimates. It is more difficult to reconcile our estimates with other studies, because they are less well documented, although the quality of the income data used in some of these studies is rather weak.

Impact of Warm Front

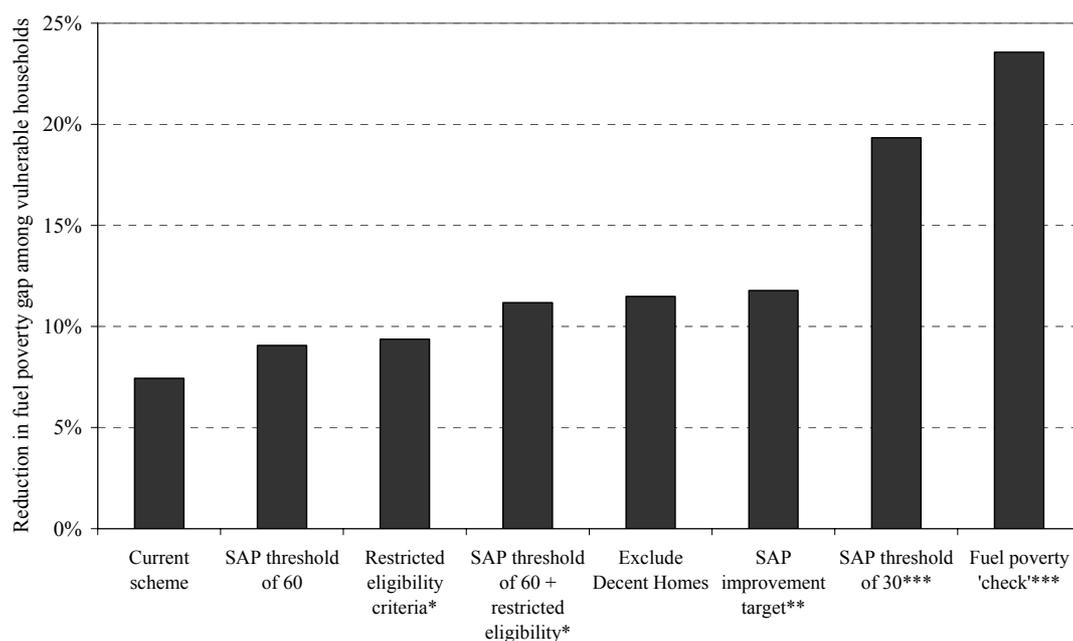
According to the results of the simulation model, the first four years of the Warm Front programme - with a budget of approximately £600 million over the period 2000 to 2004 - should contribute to a small, but significant, reduction in the fuel poverty gap among private sector vulnerable households in the order of 7% (or a reduction of around 60,000 in the number of vulnerable fuel poor households). If the programme continued at the same level of funding for a further four years, this would reduce the fuel poverty gap by an estimated 15% - around 2 percentage points higher if the funding increases announced in July 2004 are factored in.

The reason the scheme's impact is not larger is that many grant recipients are not fuel poor and because not enough grants are going to people living in the least energy efficient homes, where investment in energy efficiency improvements is generally most cost-effective. However, this also reflects the scale of the problem to be addressed and the need also to tackle the other causes of fuel poverty, in particular low household incomes. There are inevitably limits to what can be achieved through energy efficiency measures alone. Even if every vulnerable fuel poor household were to receive all the measures currently available under Warm Front, there would still be substantial levels of 'residual' fuel poverty; according to the model, the maximum achievable reduction in the fuel poverty gap would be around 40%. And even if more expensive measures were made available – for example, a special package for 'hard-to-heat' homes - it would not be possible to eliminate fuel poverty among very low income households.

Nevertheless, there is substantial scope for increasing the impact on fuel poverty through improved targeting of grants. The Figure below shows the potential impact of various options for redesigning Warm Front on the size of the fuel poverty gap among private sector vulnerable households (based on an overall programme budget of £600 million). Only a small increase in the impact of the scheme would be achieved by excluding households not in receipt of a means-tested benefit *or* by excluding those living in homes that are already energy efficient (with a SAP rating of 60 or more). Combining these two measures would have a more substantial effect. Of the other less radical options considered in this report, the most promising would be to install significant measures only in those dwellings that fail the thermal comfort criterion of the Decent Homes standard (as a crude proxy for low energy efficiency) or to introduce an average SAP improvement target, giving scheme managers an incentive to target less energy efficient dwellings. These options would all have broadly the same impact on the fuel poverty gap - a reduction of between 11-12% - though in different ways.

To make a more substantial difference, more radical changes are needed, such as the introduction of a much lower SAP threshold (at around 30) or a fuel poverty 'check' to ensure that grants are only offered to households identified as being fuel poor. In both cases, the initial eligibility criteria would need to be extended in order to generate a large enough pool of potential applicants. (Without this, the scheme would soon run out of potential clients that met the more restrictive eligibility criteria.) The assumption made in this analysis is that all pensioner households would be made eligible, as is already the case in Scotland. These proposals would increase the scheme's impact on fuel poverty by a factor of three or so, although they would also increase the administrative complexity of the scheme. In particular, these options would involve higher survey costs and/or other potentially expensive methods of screening out those unlikely to be at risk of fuel poverty.

Impact of options for redesigning Warm Front



* Only covering those who are in receipt of a means-tested benefit.

** Set at about twice the average improvement in SAP ratings under the current scheme to date.

*** All over 60s included in Warm Front Plus.

Note: the fuel poverty gap is a measure of fuel poverty that takes into account both the numbers in fuel poverty and the depth or severity of their fuel poverty (see Figure 4.2 and accompanying explanation).

There is almost inevitably a trade-off between improved targeting and higher operating costs. This study helps to quantify the potential benefits of a more targeted scheme, which can then be weighed against the additional costs of administering such a scheme, which are not quantified in this report.

Implications of churn

There is considerable movement into and out of fuel poverty (or 'churn') over time, largely driven by changes in households' financial circumstances. This could have important policy implications if, as seems appropriate, the greatest concern is for households who are in persistent fuel poverty. Over a 'typical' five year period in the early 1990s (with rising incomes, but relatively stable fuel prices), over 40% of dwellings that were initially occupied by a fuel poor household were no longer occupied by a fuel poor household at the end of the period. At the same time, around 12% of dwellings that did *not* contain a fuel poor household at the start of the period did contain one five years later.

According to a separate large-scale household survey, there is also substantial *year-on-year* movement into and out of fuel poverty. Around 18% of households experienced 'expenditure fuel poverty' at some point over a four year period (1997/98-2000/01), but only just over 4% of households were 'persistently' fuel poor in at least three out of the four years. Thus, for the majority of people who experience fuel poverty, it appears to be a transitory phenomenon. However, cases of persistent fuel poverty account for a much higher proportion of those households observed to be fuel poor at any given point in time - of these, nearly half (44%) were experiencing persistent fuel poverty (see Table 5.2).

Evidence from both surveys suggests that single pensioners stand out as being much more likely than other types of household to experience persistent fuel poverty. Low income households and occupants of less energy efficient homes are also more likely than average to experience persistent fuel poverty, whilst couples with children have very low rates of persistent fuel poverty (see Figures 5.1 and 5.2). This strengthens the case for targeting certain types of household, in particular single pensioners.

‘Churn’ makes little difference to the long-term effectiveness of Warm Front, as currently designed. On the one hand, some of those grant recipients who were fuel poor would have moved out of fuel poverty even in the absence of the scheme; on the other hand, some grants that appeared to be ‘wasted’ on non fuel poor households will have prevented some of these households from falling into fuel poverty in future years. These two effects cancel each other out.

There is some reduction in the effectiveness of more targeted schemes due to ‘churn’, but this effect is relatively small over a five year period, compared with the initial impact of these proposals. Taking ‘churn’ into account dilutes to a small extent, but does not negate, the potential benefits of better targeting (see Table 5.3 and accompanying text). It follows that targeting remains an important priority for Warm Front even after allowing for the ‘churn’ of fuel poor households.

Conclusions

There are broadly two sets of options for redesigning the Warm Front scheme to more closely reflect the government’s fuel poverty objectives. The first would produce a modest increase in the scheme’s impact on fuel poverty by tightening the eligibility criteria to exclude those groups least likely to be in fuel poverty, including those who are not in receipt of a means-tested benefit, *and* by excluding those in homes that are already energy efficient; neither change would have much impact on its own. A more flexible alternative, and potentially as effective, would be to set an average SAP improvement target to encourage scheme managers to skew grants towards those living in the least energy efficient homes, although this leaves open the mechanism(s) they would use to meet their target and whether this could be done without significantly altering the operating ‘norms’ of the current scheme. Excluding all dwellings that already meet the Decent Homes standard would have a similar impact on fuel poverty and would tie the scheme in neatly with the government’s broader housing agenda.

The second set of options would require more radical changes to the nature of the scheme, but with a much larger potential impact on fuel poverty. These options would be designed to target grants much more narrowly than at present on households at greatest risk of being fuel poor, either by restricting grants to those living in the least energy efficient homes (with a SAP rating of 30 or less) or by carrying out a prior assessment of each applicant’s dwelling and income and only allocating grants to those identified as being fuel poor. In both cases, the initial eligibility criteria would need to be extended, for example to cover all pensioner households, in order to generate a large enough pool of potential applicants. The benefits, which are potentially very large, need to be weighed against the additional administrative costs, as well as other ‘political’ or pragmatic considerations.

Aside from the eligibility criteria, more should be done to try to increase the share of grants going to single pensioners and, in particular, to understand and overcome any barriers that seem to be inhibiting applications from this ‘high risk’ group.

In evaluating the scheme, it is important that the effects of the scheme are monitored on a more consistent basis than in the past, based on a more standardised approach to defining and measuring incomes (in terms of identifying whether recipients are fuel poor) and to estimating potential fuel savings (in terms of identifying whether recipients are lifted out of fuel poverty).

CHAPTER 1:

INTRODUCTION

1.1 Context for research

The government recently published its second annual report on progress towards meeting the objectives set out in its Fuel Poverty Strategy (Defra, 2004). The target for England is to seek an end to fuel poverty for vulnerable households² as far as reasonably practicable by 2010 and to eliminate fuel poverty among all households as far as reasonably practicable by 2016. According to the principal definition used by the Government, a household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income, including Housing Benefit or ISMI³ on all household fuel use. The report shows a further fall in the number of fuel poor households on this measure - from 1.7 million households in 2001 to 1.4 million households in 2002. In 1996, there were over 4 million fuel poor households in England.

Much of the fall in the number of fuel poor households over recent years can be attributed to energy price reductions and rising incomes. The trend decline in fuel prices is not expected to continue - indeed gas and electricity prices have both risen sharply in recent months. The contribution of energy efficiency schemes is therefore intended to grow over the next few years. Warm Front, which is the Government's largest of these energy efficiency schemes, was launched in June 2000 with an annual budget of around £150 million for its first four years. This was increased in the latest spending round announced in July 2004, which awarded an additional £45 million in the second year of the new settlement and £95 million in the third year (on top of the £150 million per annum already allocated by Defra).

Last year, the National Audit Office (NAO) completed a review of Warm Front, focusing in particular on its effectiveness in tackling fuel poverty. Although it was acknowledged that Warm Front has made a difference to a large number of households in England, the NAO identified three important ways in which the scheme could be improved (NAO, 2003):

- problems with the match between the eligibility of the scheme and fuel poverty: many of the fuel poor may be ineligible and the majority of eligible households may not be fuel poor;
- the heating and insulation measures available under the scheme may be insufficient to move households out of fuel poverty; and
- only a relatively small proportion of grants are reaching the least energy efficient homes.

² A vulnerable household is defined here, as in the Fuel Poverty Strategy, as being any household with a member aged 60 or over, a child under the age of 16 or a member who is disabled or has a long term illness.

³ Income Support for Mortgage Interest.

As a result, the NAO conclude that the scheme may make less of a contribution to the fuel poverty strategy's aim of eliminating fuel poverty than it could, although the report also recognises that, in part, these areas for improvement have their origins in the scheme's history (see below).

More recently, the Fuel Poverty Advisory Group, a non-departmental public body that advises government on progress in delivering its fuel poverty strategy, has argued that the criticisms of targeting have been "seriously overdone" and that "there are limits to the extent to which the fuel poor can and should be 'pinpointed' by the schemes" (FPAG, 2004). They claim that the focus of the scheme could be improved by excluding dwellings that are already energy efficient but, that beyond a certain point, the following should be borne in mind:

- households who are on low incomes, but not currently fuel poor, may become fuel poor in a few years' time, because of changes in household circumstances. Improving their home now may prevent them falling into fuel poverty in future;
- more precise targeting will increase the complexity of the scheme and there is a danger that some households who need help will be put off by this;
- all those helped by the current scheme are on low incomes or disabled (even if they are not fuel poor) and that better targeting may risk "robbing Peter to pay Paul".

Defra is considering both reports and developing a Fuel Poverty Implementation Plan for England, which is expected to include proposals for revising the design of Warm Front.

This report is a forward-looking piece of research which is not intended to be critical of the way the scheme has operated to date. Warm Front, like its predecessor the Home Energy Efficiency Scheme, was not initially designed to alleviate fuel poverty but to achieve general improvements in domestic energy efficiency (and even the new scheme was in place well before the Fuel Poverty Strategy was launched in February 2001). By this yardstick, the scheme has performed well. Up to February 2004, approximately 770,000 vulnerable households have received assistance under the scheme. The average grant in 2002 was worth £445, which should save each of these households up to £150 a year through reductions in their fuel bills.

Whilst it would be unfair to evaluate the past performance of this scheme against an objective that it was not originally designed to achieve, it is reasonable to ask how far the current scheme is likely to contribute to meeting a new or modified objective (i.e. the reduction of fuel poverty) and what changes could be made to increase its impact.

1.2 Aims of research

This report addresses many of the issues raised in the NAO report, focusing on how the targeting of the scheme might be improved in order to have a greater impact on fuel poverty within the constraints on resources. It also addresses some of the

concerns about targeting identified in the FPAG report, including the need to take into account movements into and out of fuel poverty over time. This builds on earlier work by the author of this report, which highlighted poor targeting as a problem of the current scheme (Sefton, 2002). The main purpose of the report is to model the impact of various proposals for re-designing the Warm Front scheme, based on the following recommendations from the NAO report:

- reviewing the effectiveness of the scheme’s eligibility provisions to identify the extent to which they may exclude the vulnerable fuel poor and the extent to which they may direct funds to those who are not fuel poor;
- giving consideration to how resources can be concentrated on homes with the lowest energy efficiency;
- carrying out research into whether Warm Front has moved assisted households out of fuel poverty;
- setting targets that are framed around the average improvement in energy efficiency of households assisted, as a proxy for the impact on underlying fuel poverty⁴.

1.3. Outline of report

The next chapter examines the characteristics of households assisted under the Warm Front scheme to date, using a large database of grant recipients provided by Eaga Ltd, who are responsible for managing Warm Front for a large part of England. This allows a detailed assessment of how the current scheme is being targeted and is used to provide a more accurate estimate of the proportion of grants going to fuel poor households.

Chapter 3 starts by estimating the impact of the current Warm Front scheme on fuel poverty, as recommended in the NAO report. It then goes on to model the likely effectiveness of various options for improving the targeting of the scheme, including, for example, the introduction of a SAP threshold (above which dwellings would not be eligible for a grant). The same model can also be used to estimate the impact of increasing the Warm Front budget, since one of the recommendations in the FPAG report is that expenditure on this programme should be increased by at least 50% if the Government is to meet its fuel poverty objectives.

Chapter 4 examines the impact of movements into and out of fuel poverty over time - sometimes referred to as ‘churn’. As recognised in my previous research and in the NAO report, the fuel poor are a dynamic group with new households becoming fuel poor each year, which makes the task of eliminating fuel poverty more challenging. This chapter estimates the impact of ‘churn’ on the effectiveness of Warm Front and the implications, if any, for how the scheme should be targeted.

⁴ Current performance targets are based on the number of households assisted and not those removed from fuel poverty. This does not provide an incentive for scheme managers to reach the worst homes or those most in need.

CHAPTER 2:

TARGETING ISSUES

2.1 Introduction

A well-targeted scheme is one that benefits a high proportion of the targeted group (in this case fuel poor households), whilst minimising the number of beneficiaries who do not fall into the target group. In the case of Warm Front, efficient targeting would ensure the scheme had a greater impact on fuel poverty, without ‘wasting’ resources on households that were not fuel poor. Grants to households that are not fuel poor still benefit these households in terms of lower heating bills or warmer homes, but do not contribute to the government’s objective of eliminating fuel poverty. For the moment, we leave aside the complication that some households that are not currently fuel poor may become fuel poor in future years and vice-versa.

Figure 2.1 re-produces a diagram from the NAO report, but with estimates of numbers attached to each group, using data from the (latest) 2001 English House Condition Survey. This demonstrates the degree of mismatch between the measures available under the current scheme and the needs of fuel poor households, which appears to be even greater than suggested in the NAO report.

2.2 Fuel poor and eligible households

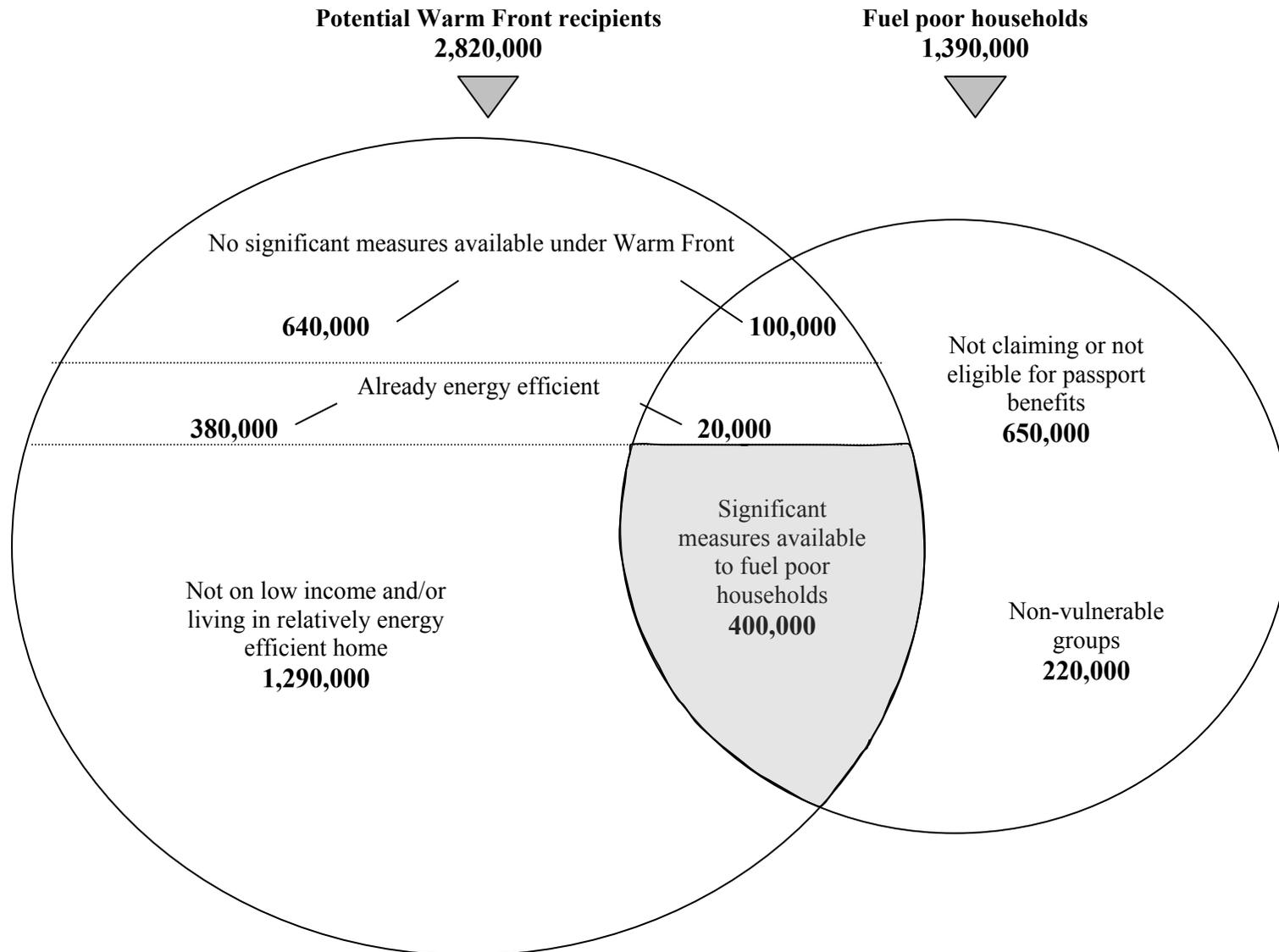
According to these estimates, only around 400,000 households are both fuel poor and eligible for significant measures⁵ under the current Warm Front scheme – or less than a third of all fuel poor households in the owner-occupied or private rented sectors. This may be a slight under-estimate, because it is based on a more restricted set of measures than is available under Warm Front - the installation of fixed heaters, for example, is not included in this analysis, because of modelling constraints (see section 4.1). On the other hand, Warm Front applicants sometimes refuse measures that are potentially available to them, so not all of these households would receive these measures in practice. Furthermore, even some of those households that receive ‘significant’ measures, as defined here, would experience only a relatively small improvement in the energy efficiency of their homes, in particular those whose loft insulation is topped up and no more.

2.3 Fuel poor and ineligible households

More than two thirds of those in fuel poverty in the private sector - about one million households - stand to benefit little if at all from Warm Front, as currently designed. This is twice as high as the figure quoted in the summary of the NAO report. These households fall into one of four categories:

⁵ One or more of the following: new central heating, cavity wall insulation or loft insulation.

Figure 2.1: Mismatch between eligibility for Warm Front and fuel poverty in England



Source: own analysis using 2001 English House Condition Survey

N.B. Owner-occupied and private rented sector households only. Figures are rounded to the nearest ten thousand and may not add up due to rounding.

- a relatively small number of them (around 20,000) are living in homes that are already energy efficient (defined here as having a SAP rating of 60 or more). They are fuel poor because their incomes are very low and/or they are under-occupying their home. Their fuel poverty needs to be addressed by other means than energy efficiency improvements;
- a further 100,000 households meet the qualifying criteria for the scheme, but would not receive any significant measures under the scheme, even though most of these homes have a below average energy efficiency rating. This includes hard to heat homes that have solid walls and/or are off the gas network;
- 220,000 households are fuel poor, but do not fit into one of the vulnerable categories. These are considered to be a lower priority by the government, which has decided to concentrate resources on households with children, older people, and disabled persons. But, they would need to be brought into the scheme in future years if the objective of eliminating all fuel poverty by 2016 is to be achieved. Just over a third of this group are receiving one or other of the passport benefits and could be incorporated into the scheme relatively easily by relaxing the eligibility criteria that currently restricts the scheme to households on income-related benefits that contain an older person or child;
- the remaining 650,000 households are vulnerable and fuel poor, but do not meet the current eligibility criteria. Just under 100,000 of these households contain a younger adult with a long-standing limiting illness or disability, but who is not receiving one of the disability-related benefits that would qualify them for Warm Front. Most of the remaining households contain someone aged 60 or over. Of these, a small number (around 20,000) do not qualify because they are not householders - for example older parents living with a younger relative. Around 500,000 households are headed by an older person and are fuel poor, but do not qualify for the scheme. The majority of these (around 60%) are single pensioners and most of them have low incomes - three quarters of them are in the bottom fifth of the income distribution and their median income is around £135 per week. Some of these households may not be claiming means-tested benefits to which they are entitled, but many of them will be (just) above the benefit thresholds. The Minimum Income Guarantee for a single pensioner in April 2001 was just over £92 per week, so someone on this level of income would be fuel poor if their running costs exceeded £480 per year. Most of these homes have relatively low energy efficiency ratings, although some of those on very low incomes would still be fuel poor even if their home had an above average energy efficiency rating. Under-occupancy may also contribute to their fuel poverty: 66 per cent of these homes were under-occupied according to the government's own definition⁶ (as compared to 24 per cent of all homes and 37 per cent of all older person households).

⁶ A home is considered to be under-occupied if the floor area is over twice the minimum set down in the Parker-Morris Standard and the number of bedrooms is in excess of the Bedroom Standard.

2.4 Non fuel poor and eligible households

From the point of view of resource efficiency, the other problem is the more than two million households who qualify for the scheme, but are not fuel poor - around four fifths of eligible households, again substantially higher than the figure quoted in the NAO report (up to two thirds). These households fall into three distinct groups:

- 640,000 households are eligible for the scheme, but could only receive minor measures, such as draught-proofing or energy efficient light bulbs that have little impact on energy efficiency ratings, in most cases because they already have adequate central heating and insulation. Nevertheless, the NAO estimated that around 9 per cent of total grant expenditure in 2001-02 was spent on minor measures such as these, many of which will have gone to this group of non fuel poor households;
- A further 380,000 non fuel poor households live in homes that are already energy efficient (with SAP rating of 60 or more), but would still qualify for one or more significant measure under this scheme;
- The remaining 1.3 million households are living in homes that have some scope for improvement, but they are not fuel poor because their incomes are not very low and/or their home is not very energy inefficient. One in four of these households could be classed as 'near' fuel poor - defined as needing to spend between 7.5 and 10% of their incomes on fuel to heat their home adequately and meet their other fuel needs. But, most of these households are some way from being fuel poor, though of course their circumstances could change over time. This group contains a disproportionate number of households with children and those who qualify because they are in receipt of one of the (non means-tested) disability benefits.

2.5 Other targeting issues

There are a number of additional factors that have implications for the cost-effectiveness of the scheme beyond the basic targeting issue highlighted in Figure 2.1 and that are also addressed in this report.

Firstly, the success of a scheme like Warm Front is dependent on the 'right' people applying for the scheme, as well as getting the eligibility criteria right. In practice, scheme managers use various marketing strategies to actively promote the scheme to households that are more likely to be in fuel poverty, including targeted mail shots in areas that are expected to have a high concentration of fuel poor households and 'networking' with health workers and organisations such as Age Concern, who have close contact with the target group. In addition, there may be an element of 'self-selection': for whatever reason, certain types of household may be more or less likely to apply for a grant than others. We might, for example, expect that households living in the 'worst' homes would be more likely to apply, because they have most to gain from the scheme. Other factors may also influence the pattern of applications. Private sector tenants, who have a relatively high incidence of fuel poverty, may be prevented or deterred from applying by the need to obtain their landlord's consent. Word of

mouth can be a very effective way of generating applications, but seems to be more prevalent in the North than the South (at least for the regions covered by Eaga Ltd). For all these kinds of reasons, the effectiveness of Warm Front may differ systematically from what would be predicted on the basis of a straight comparison between the eligible population and the target population. One of the advantages of having administrative data on grant recipients is that we can examine whether certain types of eligible household are under or over-represented among grant recipients.

Secondly, the cost-effectiveness of this scheme depends not only on reaching the right households, but also on installing the appropriate measures. The cost and impact of the measures available under Warm Front will vary substantially from one dwelling to the next, depending on a whole range of factors, including the initial energy efficiency rating of the home. The simulation model developed in this project (and in previous work by the same author) uses estimated heating costs based on the BREDEM-12 model, which were kindly provided by the Building Research Establishment. This allows us to identify where the most cost-effective improvements can be made, taking into account the individual characteristics of each dwelling in our data set, although it was only possible to consider a restricted set of measures (see Box 4.2 in Chapter 4).

Thirdly, the long-term effectiveness of the scheme may also be affected by movements into and out of fuel poverty over time, as already discussed. Some grant recipients who are fuel poor when the work is carried out to their home would not necessarily remain in fuel poverty (even in the absence of the scheme). They may move home and be replaced by a household that is not fuel poor or their own circumstances may change; for example, they may experience a rise in income that lifts them out of fuel poverty. On the other hand, some households that are not fuel poor when they apply for a grant would have become fuel poor as a result of an adverse change in their financial circumstances and so the scheme may prevent them from experiencing fuel poverty in future years. This issue is examined more fully in the final section of this report.

CHAPTER 3:

CHARACTERISTICS OF WARM FRONT RECIPIENTS

3.1 Introduction

This section examines the characteristics of Warm Front recipients, using Eaga Partnership Ltd's administrative database, which collects information on all grant applicants in the areas of England they cover (North East, North West, West Midlands, London, South East and the South West⁷). The analysis in this report is based on data on almost 400,000 households who applied for a grant between April 2000 and December 2003, including those who received minor measures, such as draught-proofing or energy efficient light-bulbs. It excludes social sector tenants, because they are no longer eligible and this project is primarily concerned with the future targeting of the scheme. It also excludes applicants who did not meet the qualifying criteria or who dropped out of the scheme before receiving any measures, as well as a small number of repeat observations⁸.

In order to assess how well the current scheme is targeted, data on Warm Front applicants is compared with data on a representative sample of all private sector households, using the 2001 English House Condition Survey (EHCS). The better a scheme is targeted (in terms of its fuel poverty objective), the more closely the characteristics of grant recipients should match those of fuel poor households. So, for example, grants should be skewed in favour of single pensioners, who constitute a disproportionate share of fuel poor households.

It is also possible to carry out a more detailed analysis of targeting using these two data sets. Using the EHCS, we can identify all those households that meet the qualifying criteria for Warm Front (i.e. all *potential* Warm Front applicants), not all of whom are equally likely to apply for a grant. This allows two sorts of comparisons to be made. First, comparing the characteristics of this group to all private sector households shows the impact of the eligibility criteria in restricting access to certain types of households. Second, comparing this group of eligible households with actual grant recipients (from the Eaga database) shows the impact of other influences on applicants, such as the way the scheme is marketed and possible self-selection effects (see Figure 3.1 and the earlier discussion in Section 2.5).

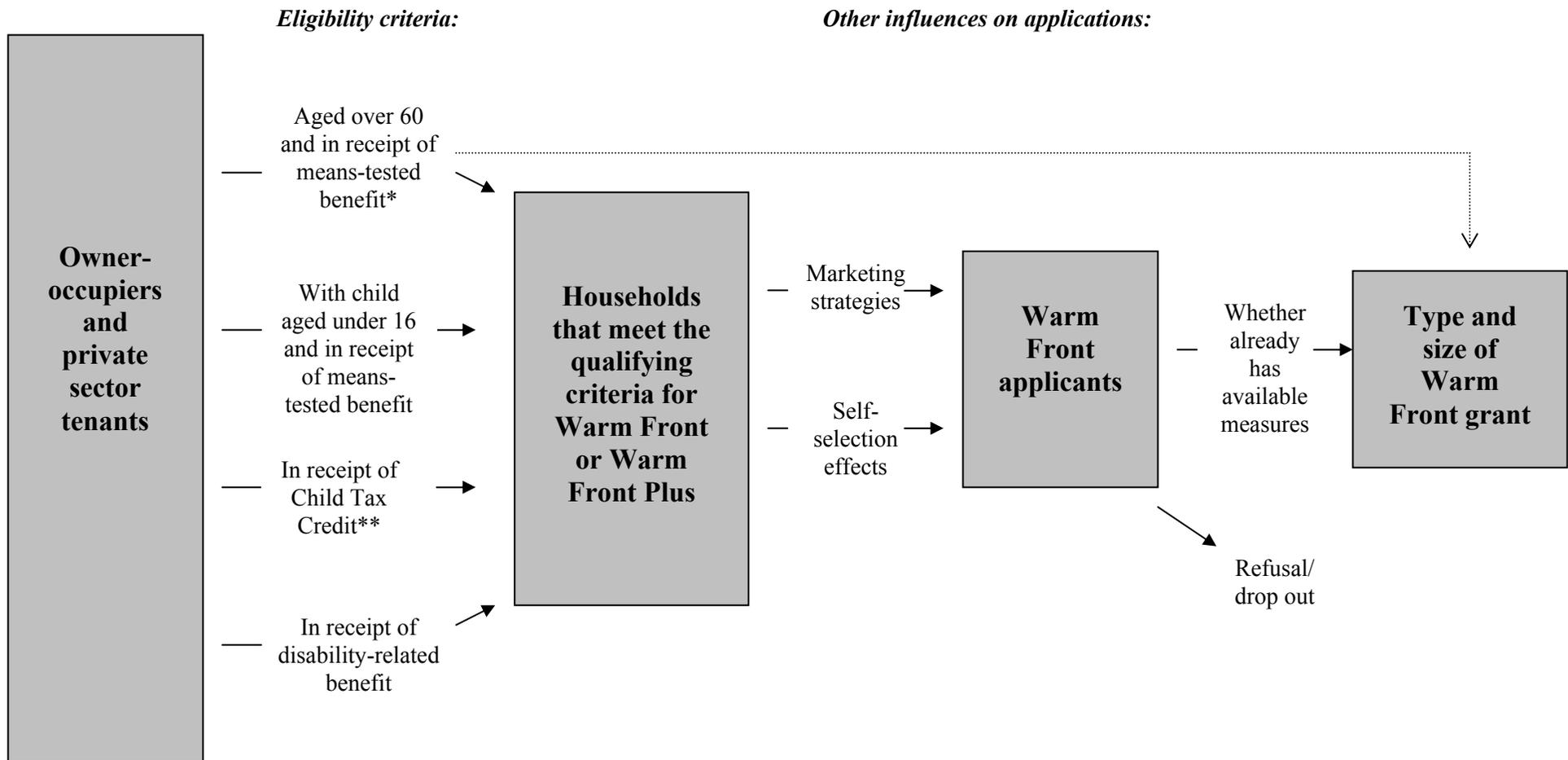
3.2 Characteristics of grant recipients

The results of this analysis are provided in full in Table A.1 in Annex A and summarised below, focusing on the main characteristics that determine how well the scheme is targeted.

⁷ The other regions (Eastern, East Midlands, and Yorkshire and Humberside) are covered by Powergen Ltd.

⁸ Some households appear more than once in the original data base if two (or more) measures were installed at different points in time.

Figure 3.1: Flow of applications to Warm Front scheme



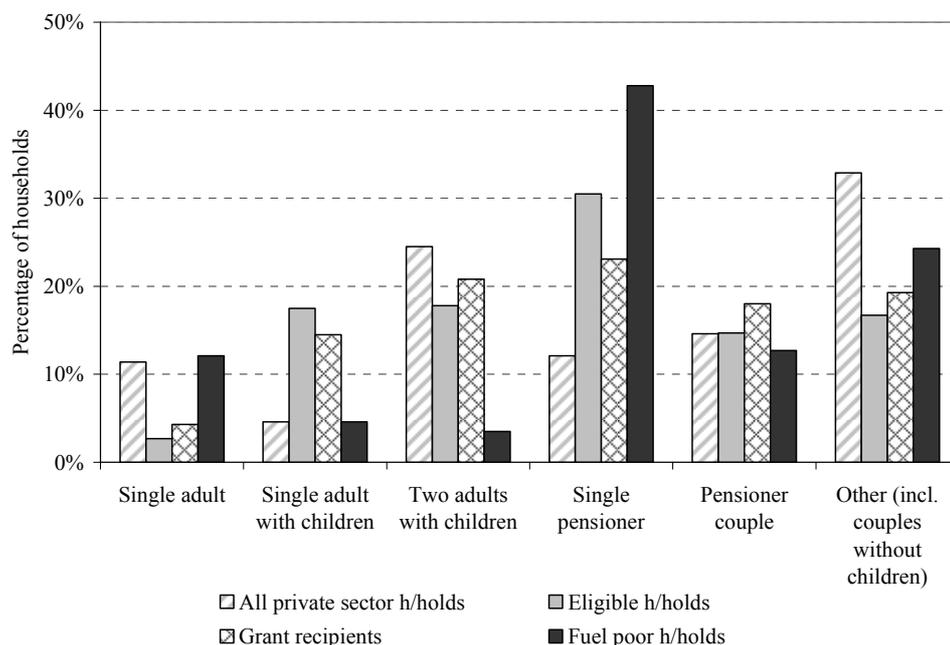
* These households are eligible for larger grants under Warm Front Plus, including new central heating systems.

** Formerly the Working Families Tax Credit. An upper income threshold of £14,600 has also been introduced.

By household type

Figure 3.2 provides a breakdown of grant recipients by household type and compares this with the composition of all private sector households, all Warm Front eligible households, and all fuel poor households. Single pensioners stand out as the single group most likely to be in fuel poverty; they constitute around one in seven private sector households, but over two fifths of all fuel poor households. Although single pensioners are more likely to receive a Warm Front grant than other types of household, they are still substantially under-represented among fuel poor grant recipients in that they receive a smaller share of grants than would be expected on the basis of the distribution of fuel poor households.

Figure 3.2: Breakdown by Household Type^{1,2}



Source: own analysis using Eaga Partnership Ltd database and 2001 English House Condition Survey.

1. This Figure shows the composition of each of the four groups (all private sector households, Warm Front eligible households, Warm Front grant recipients, and fuel poor households) broken down by household type.
2. Breakdown for grant recipients is based on Eaga database. Other breakdowns are based on the 2001 EHCS (see notes to Table A.1 in Annex A for more information on these data sources).
3. Based on the household categories in Eaga's database, which are slightly different from the EHCS categories. These are: single adult (aged under 60); single adult with (dependent) children; two adults with (dependent) children; single pensioner (aged 60 or over); two pensioners (two adults, one of whom is aged 60 or over); none of these (all other household types, including couples without children). See notes to Table A.1 in Annex A for some of the problems of classifying households into one of these categories.

The qualifying criteria are relatively effective in targeting single pensioners. They are by definition “vulnerable” and a relatively high proportion of them are also in receipt of one of the qualifying benefits. However, single pensioners that meet the qualifying criteria are less likely to apply for a grant than other eligible households; single pensioners comprise around a third of all eligible households, but less than a quarter of all grant recipients. This suggests that other factors are inhibiting this group from

applying (and/or that more single pensioners are pulling out at a later stage in the application process). The reasons for this are not well understood, but it could be that single pensioners are less likely to hear about the scheme, less likely to value its potential benefits, and/ or more likely to be concerned about possible disruption. Additional efforts should be made to understand and address these and other possible barriers to potential applicants, especially single pensioners.

Single working age adults are also under-represented among grant recipients, though for different reasons. Unless they are disabled (and in receipt of a disability-related benefit), they are not considered to be vulnerable and do not qualify for a grant, even if they are fuel poor. Hence, this group accounts for 12% of fuel poor households, but only 4% of Warm Front grants. It has been argued that single working age adults are less likely to experience persistent fuel poverty and this was given as a reason for excluding this group (DETR, 2001), but the evidence presented in Chapter 5 of this report does not support this contention.

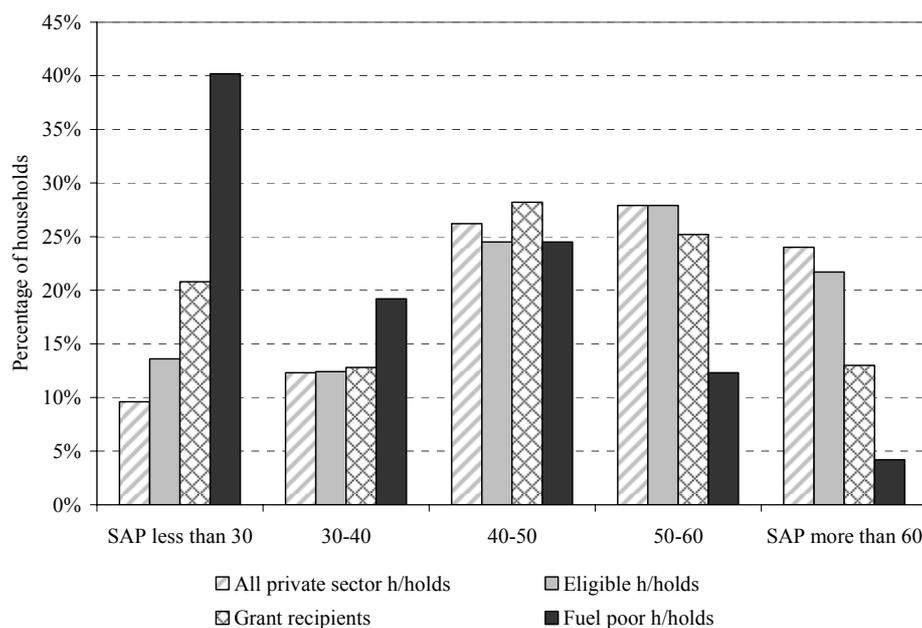
By contrast, households with children, including single parent households, are substantially over-represented among grant recipients: they receive 36% of all grants, but comprise less than 10% of fuel poor households. This is largely because the current eligibility criteria discriminate in favour of households with children. Not only are they one of the “vulnerable” categories, but the inclusion of child-related tax credits as one of the qualifying benefits also extends eligibility to families higher up the income scale (though an income ceiling of £14,600 has been introduced to exclude those towards the top end of this income range).

By energy efficiency rating

Occupants of the least energy efficient homes (with a SAP rating of less than 30) comprise around a fifth of Warm Front grant recipients, but two fifths of households in fuel poverty. Perhaps not surprisingly, eligible households are only slightly more likely to be found in low-SAP homes, because the qualifying criteria do not take into account the characteristics of the dwelling (though it is perhaps surprising that a group containing a high proportion of lower income households is not more heavily concentrated in the least energy efficient homes).

Earlier in this report, it was suggested that households living in the least energy efficient homes might be more likely to apply for a grant, because they stand to benefit most from the measures available under the scheme. Figure 3.3 provides some evidence for the existence of such an effect; occupants of homes with a SAP rating of less than 30 make up a higher proportion of grant recipients (21%) than of eligible households (14%) and vice-versa for occupants of high-SAP dwellings. This self-selection effect seems to be particularly strong for households without central heating (see Table A1). However, there is still a substantial mismatch between the distribution of grant recipients and that of fuel poor households, who are more heavily concentrated in the least energy efficient homes. This is unlikely to improve unless specific mechanisms are put in place to prioritise grants to low-SAP dwellings. Some of the options are explored in the next Chapter.

Figure 3.3: Breakdown by Initial Energy Efficiency Rating



By income group

As we would expect, the qualifying criteria help to skew grants towards low income households, since many of the qualifying benefits are means-tested. Hence, 16% of private sector households are in the bottom fifth of the income distribution⁹, but 36% of eligible households are in the lowest income group. However, Figure 3.4 shows that the distribution of fuel poor households is even more skewed towards low income households – nearly 70% of fuel poor households are in the bottom fifth.

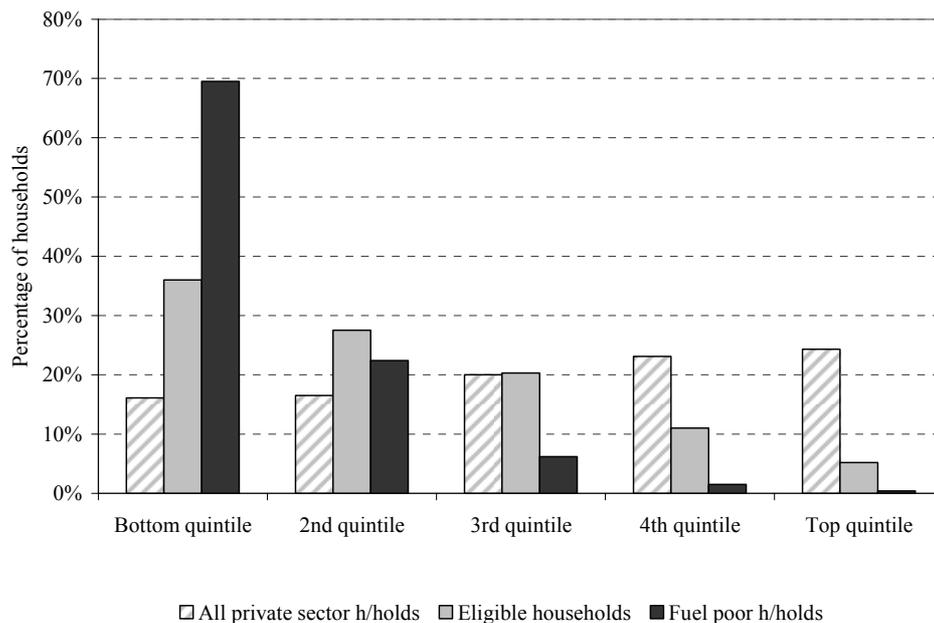
There are several reasons for this. First, not all the qualifying benefits are means-tested; around a third of grant recipients qualify because they are in receipt of tax credits or a non-means-tested disability-related benefit and may be relatively well-off¹⁰. Second, some low income households are receiving one of the means-tested benefits, but do not qualify for Warm Front because they are not in one of the ‘vulnerable’ categories, including working age adults without dependent children. Third, the receipt of a means-tested benefit is an imperfect proxy for low household income. Some low income households are entitled to a means-tested benefit, but are not claiming it, whilst other low income households may be (just) above the income thresholds or may fail the assets test¹¹. Alternatively, their household income may be boosted by income from other benefit units within the same household - for example an older child living at home.

Figure 3.4: Breakdown by Income Group^{1,2}

⁹ Income groups are defined across all households, including those in the social rented sector. Private sector households have higher incomes, on average, than social sector tenants, hence less than a fifth of these households are in the bottom fifth of the income distribution.

¹⁰ Around 40% of these households are in the top half of the income distribution. Some have a relatively high income to start with, though in some cases their incomes are inflated by disability-related benefits; arguably, these should not be counted as income, because they are designed to compensate the recipients for the additional costs of being disabled.

¹¹ Savings over £8,000 will usually mean that you cannot receive Income Support. If you or your partner is aged 60 or over, savings over £12,000 will usually mean you cannot receive the Minimum Income Guarantee (replaced by the Pension Credit from October 2003).



Source: own analysis using Eaga Partnership Ltd database and 2001 English House Condition Survey.

1. Breakdown for grant recipients is based on Eaga database. Other breakdowns are based on the 2001 EHCS (see notes to Table A.1 in Annex A for more information on these data sources).
2. A breakdown by income group is not available for Warm Front recipients as income data is not collected in the Eaga Partnership Ltd database.

By region

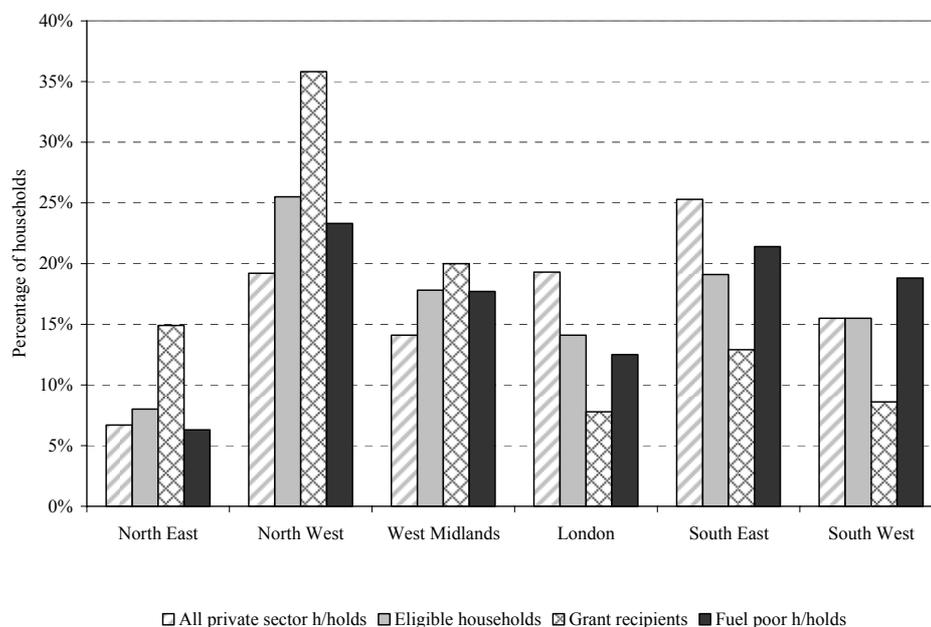
Households living in the North of England are substantially over-represented among grant recipients, whilst households in the South are substantially under-represented. Fewer households in the South East and London are in receipt of means-tested benefits and so they are less likely to qualify for the scheme. But, even among those who do qualify for the scheme, households living in the South are less likely to be receiving a grant. Within the areas covered by Eaga Ltd, the North East and North West comprise around a third of all eligible households and around a third of fuel poor households, but receive over half of all grants (see Figure 3.5).

The NAO report also highlighted this apparent regional imbalance and noted that the number of grants to London and the South East had fallen significantly short of their area targets (NAO, 2003, p18). This is not so much of a concern in terms of the government's fuel poverty objective. Among households who are eligible for Warm Front grants, there is little variation in the rate of fuel poverty between regions (i.e. the targeting of the scheme would not be significantly better or worse if grants were distributed more evenly between regions). But, it does raise concerns about equity in that fuel poor households in the South of England are less likely to benefit from the scheme than fuel poor households in the North.

Eaga Ltd have put forward various explanations for these regional differences, including differences in the composition of the housing stock - the preponderance of flats in London may make many of these properties less amenable to energy efficiency improvements. Cultural differences may also be a factor: more than a quarter of Warm Front recipients say they heard about the scheme from a friend,

family, or neighbour and this kind of ‘word of mouth’ publicity may be more effective in the North. Another reason is that the regional targets originally set for Warm Front were apparently based on a misrepresentation of the geographical distribution of fuel poverty.

Figure 3.5: Breakdown by Region¹



Source: own analysis using Eaga Partnership Ltd database and 2001 English House Condition Survey.

1. Breakdown for grant recipients is based on Eaga database. Other breakdowns are based on the 2001 EHCS (see notes to Table A.1 in Annex A for more information on these data sources).

Overall targeting of scheme

As already noted, if the scheme is well-targeted, we would expect the characteristics of grant recipients and fuel poor households to be closely matched. Although grant recipients are more similar to fuel poor households than other private sector households, those groups who are most likely to be fuel poor are substantially under-represented among Warm Front recipients, including single pensioners, households on low incomes, and occupants of low-SAP dwellings. There also appears to be a regional imbalance in the distribution of grants, which raises concerns about equity.

This may, however, give a slightly misleading impression, because it does not allow for the variation in the size of grants between different types of household. Pensioner households are entitled to larger grants than other households (including new central heating systems), whilst grants to low-SAP dwellings are higher than average, because it is less likely that they will already have the various measures available under Warm Front. Table A2 (also in Annex A) shows the distribution of non-minor grants and of total grant expenditure. This shows, for example, that 31% of total grant expenditure went on single pensioners (compared with 23% of all grants).

3.3 Changes in characteristics of Warm Front recipients

Table 3.1 shows how the characteristics of grant recipients have been changing over time for some of the key categories. There are several worrying trends over this period. Those groups that are most likely to be fuel poor - single pensioners, households living in low-SAP dwellings, those in receipt of means-tested benefits, and those without central heating - are all receiving a lower proportion of grants at the end of the period than at the beginning. At the same time, a large and growing share of grants – up to 38% in 2003 – were received by households that qualify on account of a non means-tested disability-related benefit and a further 21% of grants in that year went to households in receipt of the Working Families Tax Credit, few of whom will be fuel poor, according to the official definition.

Table 3.1: Changes in Characteristics of Warm Front Grant Recipients

% in each sub-category	Referral date:			
	2000	2001	2002	2003
<i>Household type:</i>				
Single adult	4%	4%	5%	4%
Single adult with children	12%	15%	16%	14%
Two adults with children	16%	22%	22%	22%
Single pensioner	29%	23%	21%	20%
Two pensioners	20%	18%	17%	18%
Other	18%	19%	19%	21%
<i>Qualifying criteria¹:</i>				
60+, means-tested benefit	49%	36%	30%	30%
Child, means-tested benefit	9%	11%	12%	11%
Working Families Tax Credit	17%	23%	24%	21%
Disability-related benefit	25%	30%	34%	38%
<i>Region:</i>				
North East	13%	14%	15%	18%
North West	33%	35%	38%	36%
West Midlands	21%	19%	20%	20%
London	8%	7%	8%	8%
South East	14%	14%	12%	11%
South West	11%	10%	7%	7%
<i>SAP rating²:</i>				
Under 30	26%	24%	16%	*
30-50	41%	41%	41%	*
50 and over	33%	35%	43%	*
<i>Thermal comfort:</i>				
No central heating	34%	30%	23%	22%
Non decent home	51%	53%	46%	44%

Source: Own analysis using Eaga database of Warm Front grant recipients (see notes to Table A.1).

1. See notes to Table A1 for definition of categories.
2. SAP data is not available for a large number of more recent grant recipients, so figures for 2003 are unreliable.

The Disability Living Allowance was not on the original list of ‘passport’ benefits and its subsequent inclusion may explain why the share of grants to disabled households appears to have risen over the period covered by this analysis. The way benefit receipt is recorded in the Eaga database may also over-state the share of grants to this particular sub-group¹², although this is less likely to explain the rising share over time. Thus, it appears that the scheme is becoming less well targeted over time. The regional imbalance noted earlier also seems to be growing over this period.

3.4 Fuel poverty among grant recipients

Methodology

The Eaga database does not collect information on household income, which is needed to identify whether grant recipients are fuel poor. However, it is possible to impute the income of each household in the Eaga database, using income data from a separate dataset, the Family Resources Survey (which is the basis for the Government’s official income statistics). Regression imputation is used to estimate the household income of each grant recipient as a function of various household characteristics that are closely correlated with income, including the type of qualifying benefit they are in receipt of, household composition, tenure, size of property, and region. The income measure is the same as that used in the official definition of fuel poverty - net household income (including housing benefit), before housing costs, and unadjusted for differences in household size. Details of the imputation process are given in Annex B.

Alongside estimates of required fuel spending¹³, imputed incomes can be used to estimate the proportion of grant recipients who were fuel poor prior to receiving a grant. A household is fuel poor if it would need to spend more than 10% of household income to heat its home satisfactorily and meet other fuel needs (for lights and appliances). In line with the Government’s methodology, estimated running costs allow for the fact that some households are more likely to be at home all day and so require heating to be on for longer each day. But, unlike the official methodology, they do not assume partial heating in under-occupied properties. This may bias the estimates of fuel poverty upwards (compared with official measures of fuel poverty), particularly for single pensioners and other single person households who are most likely to be under-occupying their home.

¹² Applicants are asked which benefit(s) they are receiving that makes them eligible for Warm Front. Surveyors may record more than one qualifying benefit, where applicable, but there is no requirement to do so. Where applicants say they are in receipt of one of the qualifying means-tested benefits, they are classified into one of the first two categories in Table 3.1 if they also contain an older person or dependent child (even if they also report being in receipt of a disability-related benefit). However, Eaga Ltd believes that their clients may be less likely to report a means-tested benefit, where they are also receiving another qualifying benefit, perhaps because of the possible stigma attached to means-testing. If so, this may bias the breakdown of grant recipients by qualifying criteria (although there is no firm evidence on this and it is also possible that some clients would not wish to report being in receipt of a disability-related benefit for similar reasons).

¹³ These were kindly provided by the Energy Audit Company who produced them on behalf of Eaga Partnership Ltd.

Results

Overall, our analysis suggests that around 18% of Warm Front recipients to date were fuel poor prior to receiving a grant, compared with 8% of all households living in England. Thus, grant recipients were more than twice as likely to be fuel poor than average. But, most grant recipients - around four in five - were probably not fuel poor.

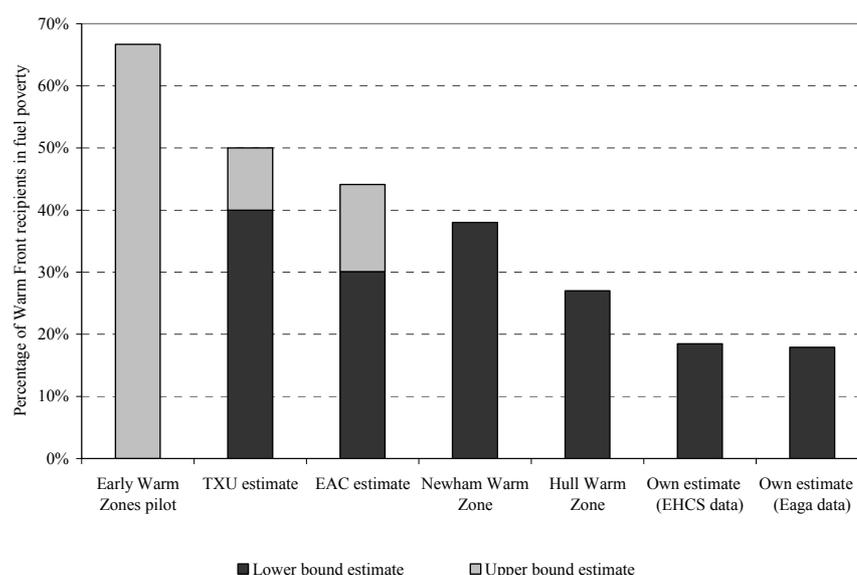
It is also possible to calculate the incidence of fuel poverty among the sub-sample of households in the 2001 English House Condition Survey (EHCS) who meet the qualifying criteria for Warm Front. This produces an identical estimate (18%) to the one based on Eaga data, which is what we might expect, given what we know about the characteristics of grant recipients as compared with all eligible households. On the one hand, Warm Front recipients include a more than proportionate number of lower-SAP dwellings (which would increase the risk of being fuel poor); on the other hand, they include a less than proportionate number of single pensioners (which would reduce the risk of being fuel poor). Overall, these two effects appear to cancel each other out.

Both these estimates are considerably lower than estimates from other sources (see Figure 3.6). Estimates by TXU Warm Front Ltd (now Powergen Warm Front Ltd), who are responsible for administering Warm Front in the Eastern, East Midlands, and Yorkshire and Humberside regions, suggested that 40-50% or more of their grant applicants were fuel poor, early evidence from the evaluation of Warm Zone pilot project suggested that a third or more of those eligible for Warm Front may *not* be fuel poor (though more recent estimates from individual Warm Zones are much lower), and a recent report by the Energy Audit Company (EAC) estimated that between 30-44% of grant recipients are fuel poor, excluding single adults and “other” households (Wilkinson, Hart, and Hart, 2003).

The EAC figure is also based on the Eaga database, but uses a different method of imputing incomes. This discrepancy can largely be accounted for by differences in the way incomes are measured. EAC do not include housing benefit or disability benefits, so household incomes are lower and, consequently, more households are defined as fuel poor. Using a similar income measure to theirs, we get a figure of 29%, excluding single adult and “other” households (See Table B2 in Annex B), which is only just below the range quoted in their report. There are good arguments for disregarding certain sources of income - the Disability Living Allowance, for example, is designed to compensate for the additional costs of being disabled and does not make the recipient better off than someone who is not disabled and not receiving DLA. For the purpose of this report, however, it is important to be consistent with the official definition of fuel poverty, which does include these benefits. This analysis shows just how sensitive these estimates are to the income measure used.

It is more difficult to reconcile our estimates with others (e.g. in Warm Zones areas), because these results are less well documented, although the quality of the income data used in some of these studies is rather weak. In evaluating Warm Front and other similar schemes, it is important that the effects of the scheme are monitored on a more consistent basis than in the past, including a more standardised approach to defining and measuring incomes.

Figure 3.6: Estimates of fuel poverty among Warm Front recipients



Source of other estimates:

Early Warm Zones Pilot estimate: quoted in NAO report (NAO, 2003, p 14).

TXU estimate: quoted in a presentation by the General Manager of TXU Warm Front Ltd (now Powergen Warm Front Ltd) to the Parliamentary Warm Homes Group on 11th December 2002.

EAC estimate: based on Table on pg 11 of their report (Wilkinson, Hart, and Hart, 2003).

Hull and Newham Warm Zones estimates: quoted on pgs 8-9 of a report published by the Warm Zones Central Team in July 2003, “Warm Zones data analysis: summary and conclusions”.

Table 3.2 provides a more detailed breakdown of our results using both the Eaga database and the sub-sample of households in the 2001 EHCS that meet the eligibility criteria for Warm Front. This shows, for example, that grant recipients who are not fuel poor are more likely to be ‘nearly fuel poor’ than other non fuel poor households, although many of them are not. It also shows that the incidence of fuel poverty among Warm Front recipients appears to be falling over time. In 2002, it is estimated that only 13% of these households were fuel poor, compared with 24% in 2000. These figures are adjusted for general rises in incomes over time, so the fall is largely explained by the changes in the composition of grant recipients shown in Table 3.1.

The rest of Table 3.2 shows the proportion of households who are fuel poor, broken down by various household (or dwelling) characteristics. The breakdown based on the Eaga database is very similar to that based on eligible households in the 2001 EHCS, which helps to validate these results. Within each sub-group, Warm Front recipients are more likely to be fuel poor than other private sector households (the first column). This is not surprising given that the scheme is primarily targeted at lower income households. So, for example, around 30% of all single pensioners are fuel poor, but over 40% of single pensioners who receive a grant are estimated to be in fuel poverty. For certain sub-groups of households, the incidence of fuel poverty among grant recipients is below the national average (i.e. 8%). This includes households with two adults and children, occupants of above-average SAP dwellings, and those who qualified because they were in receipt of the Working Families Tax Credit or a disability-related benefit. As shown in Table 3.2, these groups receive a very substantial and growing share of all Warm Front grants; the latter two categories alone account for over half of all grants from 2001 onwards.

Table 3.2: Incidence of Fuel Poverty

<i>Percentage of households in fuel poverty</i>	All private households ¹ (EHCS data)	Eligible households ¹ (EHCS data)	Warm Front recipients ² (Eaga data)
All	8%	18%	18%
<i>Degree of fuel poverty:</i>			
Up to 5%	69%	43%	43%
5-10%	22%	38%	40%
10-15%	6%	12%	11%
Over 15%	3%	6%	6%
<i>Year:</i>			
2000	- ³	- ³	24%
2001	8%	18%	20%
2002	- ³	- ³	13%
<i>Tenure:</i>			
Owner-occupier	8%	18%	18%
Private rented	13%	19%	15%
<i>Household type:</i>			
Single adult	9%	- ⁴	19%
Single adult with children	8%	10%	11%
Two adults with children	1%	5%	5%
Single pensioner	30-31%	34-35%	43%
Two pensioners	7-8%	13%	17%
Other	4-6%	7-16%	5%
<i>Qualifying criteria²:</i>			
Not eligible	6%	-	-
60+, means-tested benefit ⁷	-	33%	36%
Child, means-tested benefit ⁷	-	11%	15%
Working Families Tax Credit	-	2%	4%
Disability-related benefit ⁸	-	9%	7%
<i>SAP rating:</i>			
Under 30	35%	55%	50%
30-50	10%	22%	14%
50 and over	3%	6%	5%
<i>Heating system:</i>			
Central heating present	32%	44%	36%
No central heating	7%	15%	12%
<i>Thermal comfort:</i>			
Decent home	5%	13%	10%
Non decent home	17%	30%	27%
<i>Local deprivation:</i>			
Worst 20% of wards	10%	17%	- ⁵
Best 20% of wards	6%	17%	- ⁵

1. Own analysis using 2001 English House Condition Survey.
2. Own estimates using Eaga database and imputed incomes (based on data from the 2000/01 and 2001/02 Family Resources Survey).
3. No EHCS data is available for 2000 and 2002 figures have not yet been published.
4. Too few single (working age) adults are eligible to produce a reliable estimate.
5. Index of Multiple Deprivation is not available (and cannot easily be derived) within the Warm Front data base.

It is also notable that eligible households in the poorest 20% of wards (based on the Index of Multiple Deprivation) are no more likely to be fuel poor than eligible households from the 20% richest wards. Eaga Partnership Ltd carries out targeted mail-shots in areas that score highly on local indicators of deprivation. As a result, grants are quite heavily skewed towards households living in the poorest wards. This might be justified on targeting grounds if eligible households in the poorest areas were more likely to be fuel poor than eligible households in other areas, but this does not appear to be the case. Area-based marketing may be a cost-effective method of generating grant applications, but it does not appear to be an effective instrument for targeting fuel poverty.

CHAPTER 4:

IMPACT OF WARM FRONT ON FUEL POVERTY

4.1 Approach

Within the context of the fuel poverty strategy, the primary objective of Warm Front is to reduce fuel poverty among vulnerable households in the private housing sector. The Government's annual progress report states that energy efficiency schemes, such as Warm Front, are expected to have a greater role in achieving further reductions in fuel poverty. An important element of this research project is to estimate the impact of the current programme to see if these expectations are likely to be met and to provide a benchmark for considering the potential benefits of re-designing the scheme.

The estimates in this report are based on a micro-simulation model, using household-level data from the 2001 English House Condition Survey (EHCS). This section describes how this model operates and the assumptions underlying it. For those mainly interested in the results (see next section), the key features of the model are summarised in Box 4.1.

The EHCS is a large-scale survey of around 17,000 representative households with weights that can be used to gross up figures to a national level. The survey contains detailed information on each dwelling and its occupants. This can be used to estimate how much each household would need to spend to heat their home satisfactorily and, using the income data, whether that household is fuel poor and the extent of their fuel poverty. This is the same data that is used to generate the government's published estimates of fuel poverty (BRE, 2003). The analysis in this report is based on the sub-sample of 9,857 dwellings in the owner-occupied and private rented sectors, on the basis that Warm Front is no longer available to social sector tenants.

In order to simulate the impact of Warm Front, the Building Research Establishment (BRE) provided estimates of required fuel expenditure before and after the installation of specified energy efficiency measures for each dwelling in the 2001 EHCS (using their BREDEM model). Whilst it was not feasible to replicate the precise set of measures available under Warm Front, the BRE were able to model two packages of measures that approximate those available under Warm Front and Warm Front Plus. The main differences are that the basic package does not include the installation of fixed heaters (only insulation measures) and neither package includes minor measures, such as draught-proofing or energy efficient light-bulbs (see Box 4.2). On the other hand, the BRE estimates may over-estimate the potential savings of new central heating systems under Warm Front, because they do not allow for scheme restrictions on the number of radiators. A significant minority of homes already have all the available measures, so for these households the potential savings (and costs) are zero.

Box 4.1: Key features of the micro-simulation model

What is the purpose of the model?

To simulate the impact on fuel poverty of the Warm Front scheme and various proposals for redesigning it.

What data is it based on?

The 2001 English House Condition Survey, which contains a representative sub-sample of 10,000 households in the owner-occupied and private rented sectors. It includes detailed information on the characteristics of each dwelling and its occupants.

How is the impact on fuel poverty measured?

In two ways:

- (1) the reduction in the number of households in fuel poverty
- (2) the percentage reduction in the fuel poverty gap (which is the difference between what fuel poor households can afford to spend and what they would need to spend to heat their homes satisfactorily and meet other fuel use requirements).

Both are measured for private sector vulnerable households only.

What energy efficiency measures are modelled?

Two packages that approximate as far as possible those available under Warm Front and Warm Front Plus (see Box 4.2 for details).

How are the potential fuel savings estimated?

The Building Research Establishment provided estimates of potential fuel savings for the two Warm Front packages for each dwelling in the EHCS, using their BREDEM model.

How are costs estimated?

The BRE provided dwelling-specific estimates of installation costs. Administrative costs are assumed to be £1 for every £5 spent on energy efficiency measures (e.g. £100m out of a total programme budget of £600m).

How are grants allocated in the model?

Grants are distributed randomly between households that meet the qualifying criteria under the current scheme until the budget is used up. Alternatives to the current scheme are modelled by modifying the eligibility criteria and, in some cases, by imposing additional constraints on grant recipients (e.g. a maximum SAP rating).

What are the main limitations of the model?

- (1) The model is static (i.e. the scheme is modelled ‘as if’ all grants were allocated all at once). The implications of ‘churn’ are examined in the next Chapter.
- (2) The present model cannot be used to model ‘special’ or differentiated packages of energy efficiency measures, only different ways of allocating the two set packages.
- (3) Administrative costs are assumed to be the same for all options, whereas, in practice, more targeted options would be more expensive to operate. Hence, the potential benefits of these options would need to be weighed against these additional costs.

Box 4.2: Modelled packages

Two improvement packages that are designed to approximate the measures available under Warm Front and Warm Front Plus, respectively:

- Package 1: Basic insulation package including roof insulation, cavity wall insulation and cylinder/tank insulation.
- Package 2: Basic insulation package + standard central heating system.

Description of each measure:

Roof Insulation (P1-P2): If a property has 100mm or less then apply layers of 50mm insulation onto original insulation until a layer that is at least 250mm thick is attained.

Cavity Wall Insulation (P1-P2): Any unfilled cavity walls are filled with insulation.

Cylinder Insulation (P1-P2): If there is a hot water tank without a jacket, then a jacket is fitted.

Central Heating (P2): Apply standard gas central heating only to replace individual room heater systems of any type. If there is no sign of gas supply in the property storage radiators will be applied.

Water with central heating: Water will be heated by the central boiler if there is central heating.

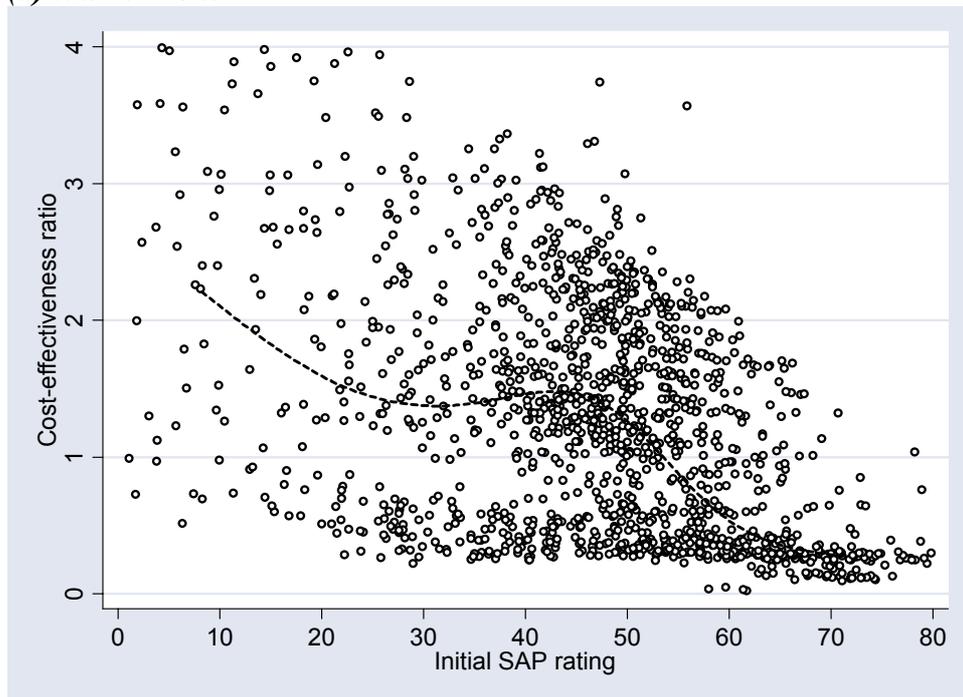
A comparison of these estimates with similar estimates produced by the Energy Audit Company shows that the potential fuel savings predicted by BRE are substantially lower for equivalent measures - by a factor of two or so. These discrepancies need to be investigated further, because they clearly lead to widely different conclusions about the likely impact of Warm Front on fuel poverty. However, there are two reasons for being less concerned about this in the context of this research. First, the figures we use are internally consistent; the BREDEM-12 model on which the estimates in this report are based is also used to generate the estimates of standardised heating costs that feed into the official measure of fuel poverty. Second, even if the BRE figures were under-estimates, this should not affect conclusions about the *relative* effectiveness of the different options modelled in this report, which is the main purpose of this exercise.

BRE also supplied estimates of the installation costs of the two packages for each dwelling in the 2001 EHCS, taking into account which measures were already present and the size of the dwelling (e.g. wall area in the case of cavity wall insulation). Actual installation costs from the Eaga data base appear to be somewhat lower (though less so for packages involving new central heating), perhaps because of economies of scale. We make a crude adjustment for this by assuming lower administrative costs (see below).

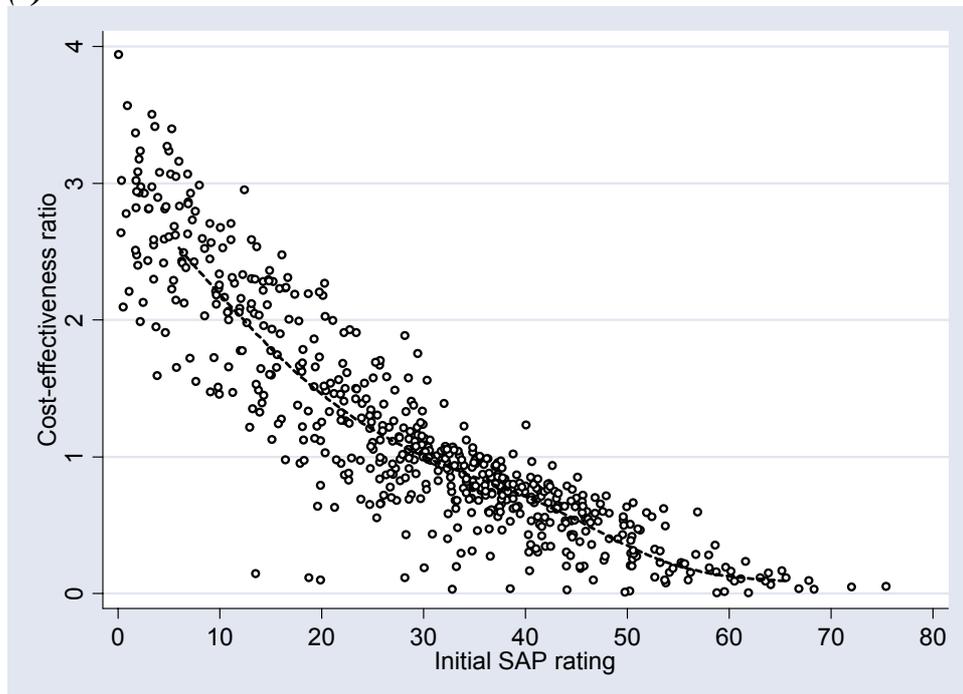
In general, the less energy efficient a dwelling is to start with, the more cost-effective it is to improve the energy efficiency of that home, although there is substantial variation in cost-effectiveness between individual dwellings (see Figure 4.1).

Figure 4.1: Cost-effectiveness of Energy Efficiency Improvements

(a) Warm Front



(b) Warm Front Plus



Source:

Own analysis using data from the 2001 EHCS and the Building Research Establishment's BREDEM model. Cost-effectiveness ratios are calculated by dividing estimated fuel savings per annum by the annualised installation cost of each package of measures. So, a higher ratio indicates a more cost-effective investment. (Costs are annualised over 15 years, using an 8 per cent real discount rate.) Fitted lines are produced using Stata's cubic spline option with six bands.

The simulation model works as follows. Households are identified as potential grant recipients if they meet the scheme's eligibility criteria. In modelling the current scheme, for example, households are eligible if they are receiving one of a specified list of disability-related benefits, or if they are receiving one of a list means-tested benefits or tax credits *and* one of the householders is aged 60 or over or has a dependent child under 16¹⁴. Most of the alternative schemes that are modelled in the next section involve restricting eligibility to certain types of households or dwellings. Grants are then distributed between eligible households until the budget is used up. Under the current scheme, the distribution of grants is done using random assignment, which is equivalent to handing out grants on a 'first-come-first-served' (assuming that every eligible household has an equal probability of applying). Under some of the alternative options, various additional constraints are imposed on 'grant recipients' (e.g. to ensure a given average increase in SAP ratings under the "SAP improvement target" option). Reductions in heating costs are then imputed for all grant recipients using the estimates provided by BRE (see above) and the extent of fuel poverty is recalculated and compared with its baseline (or 'pre-scheme') level.

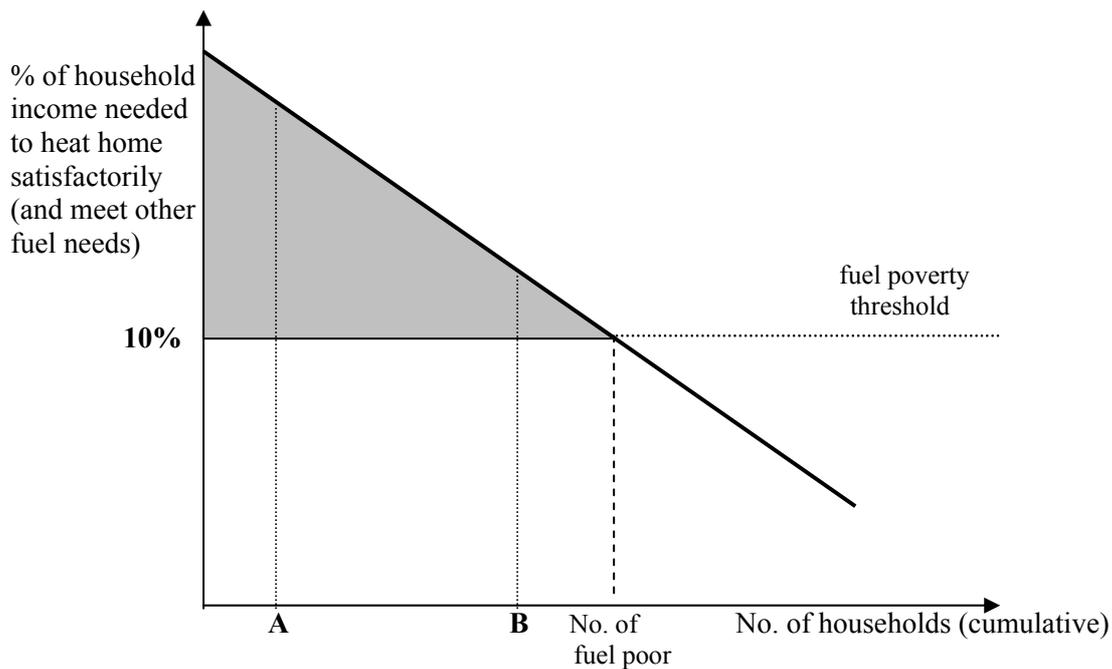
The extent of fuel poverty can be measured in two ways. One approach is to count the numbers of households in fuel poverty, which is the most common measure of fuel poverty - and the one used by government. Another approach - and the one we focus on in this report - is to look at the fuel poverty gap, which also takes into account the depth or severity of fuel poverty. The fuel poverty gap is the difference between what households can afford to spend - 10 per cent of their annual income, according to the official standard - and what they would need to spend each year to heat their home satisfactorily, aggregated over all fuel poor households (see Figure 4.2). This measure places greater value on assisting a household that is in severe fuel poverty to escape fuel poverty (such as household A in Figure 4.2) than on assisting a household that is only just below the fuel poverty threshold (such as household B). It also captures improvements in the situation of fuel poor households (i.e. reductions in the severity of fuel poverty), even if they remain in fuel poverty following improvements in the energy efficiency of their home.

Based on the 2001 EHCS, the overall size of the fuel poverty gap among vulnerable owner-occupiers and private rented sector households was just over £330m per year. This is equivalent to an average shortfall of about £300 per year for each of the 1.2 million or so vulnerable fuel poor households in the private housing sector. On average, these households would need to spend almost £1,000 per year to heat their home satisfactorily and meet their other fuel needs, but have an income of £7,000 (i.e. it is assumed they could only afford to spend £700 per year on fuel).

The analysis that follows focuses on the percentage reduction in the fuel poverty gap as a result of the Warm Front programme. We start by estimating the impact of the current scheme and use this as a baseline against which to assess the relative effectiveness of various options for redesigning the scheme.

¹⁴ The model does not take into account the change made to the eligibility criteria in 2003 whereby households in receipt of tax credits are no longer eligible for a grant if their income is above a certain threshold – currently £14,200 per year. Nor does it allow for the impact of benefit health-checks on offer to applicants who do not initially qualify for a grant (i.e. the fact that some households who are eligible for, but are not claiming, one of the passport benefits may become eligible for Warm Front following a benefit health-check).

Figure 4.2: Measuring the Fuel Poverty Gap (stylised picture)



4.2 Impact of current scheme

To start with, we simulate the impact of Warm Front under the current rules. The overall budget is assumed to be £500m, which was the amount allocated to the scheme for the four years 2000-2004, less £100m for administration costs i.e. around 17 per cent of the total. (As noted earlier, this is lower than the actual proportion spent on administration - 23 per cent in 2001-02¹⁵ - which is a crude adjustment for the fact that our estimates of installation costs may be slightly on the high side.) According to this model, the current scheme would reduce the numbers of fuel poor households by around 60,000 or reduce by 7% the size of the fuel poverty gap among private sector vulnerable households (see Table 4.1). Whilst this would represent a significant reduction, it is a long way from meeting the government's target to eliminate fuel poverty among vulnerable households by 2010.

There are several reasons why the estimated impact of Warm Front is not greater, which have also been identified as problems in the NAO report and in my own previous research (Sefton, 2002). Firstly, as discussed in the previous section, only around a fifth of grant recipients are likely to be fuel poor, so four out of every five grants make no contribution to reducing fuel poverty, at least in the short term (although there are still benefits to these households in terms of potential fuel savings). At the same time, two thirds of vulnerable fuel poor households are not eligible to receive any significant measures under Warm Front, either because they do not meet the eligibility criteria or because they already have all the measures available under the current scheme. This severely limits the potential impact of the current scheme, even if it were expanded or extended over a longer period.

¹⁵ Figure quoted on p 7 of the National Audit Office's report on Warm Front (NAO, 2003).

Table 4.1: Impact of current scheme

	<i>Baseline: current scheme</i>
% reduction in fuel poverty gap (vulnerable h/holds)	7%
Reduction in no. of fuel poor h/holds ('000s)	58
Number of eligible households ('000s)	2,010
Number of HEES grants ('000s)	842
% of vulnerable fuel poor households that are eligible	33%
% of grant recipients who are fuel poor	19%
% of grant recipients in low SAP homes (<30)	14%
Average grant (£)	590
Average annual fuel saving (£)	90
Cost-effectiveness ratio	1.3

Source: own estimates using EHCS-based micro-simulation model

Secondly, the potential fuel savings from the measures available under Warm Front are relatively small for many households. On average, grant recipients stand to save up to £90 per year. These savings are higher for fuel poor grant recipients – nearly £200 per year, on average, according to the estimates provided by the BRE. But these benefits are concentrated on a relatively small proportion of fuel poor households. Half these households stand to benefit by less than £100 per year and a quarter of them stand to benefit by less than £50 per year. This compares with an average fuel poverty gap of £300 per year, which explains why in this model the majority of fuel poor households that receive a grant are still in fuel poverty after the installation of Warm Front measures. An estimated 104,000 out of 166,000 (over 60%) would not be lifted out of fuel poverty, although the severity of their fuel poverty would be reduced. Independent analysis of the Stockton Warm Zone found that a very similar proportion of fuel poor households - between 50 and 60 per cent - would not be removed from fuel poverty following Warm Front-type interventions¹⁶.

4.3 Options for redesigning Warm Front

Many recommendations have been made for improving the effectiveness of Warm Front. The options considered in this report are drawn from the NAO report and from the proceedings of a discussion forum organised in November 2003 by Defra and the Energy Efficiency Partnership for Homes to consider the future of Warm Front. A list of these options is provided in Table 4.2. Not all these options are modelled in this report, either because they were not considered to be 'serious' options (e.g. co-funding of grants) or because of the constraints of this model (e.g. the more differentiated packages of measures). Other options can only be modelled imperfectly: for example, targeted marketing strategies can only be modelled by increasing the proportion of grants to the targeted groups on the assumption that the policy is successful.

¹⁶ Figure quoted in e-mail correspondence with Nick Merleau-Ponty at the NEA.

Table 4.2: Options for Re-designing Warm Front

	Modelled?
<u>Eligible groups:</u>	
• Include all pensioners, not just those in receipt of one of the qualifying benefits;	✓
• Exclude those who only qualify because they are receiving a (non means-tested) disability-related benefit;	✓
• Add health criteria (i.e. prioritising those with health problems that make them vulnerable to the effects of living in poorly heated homes);	✗
• Quotas for grants to different types of household or property (e.g. at least X% of grants to pensioners)	✓
<u>Prioritising less energy efficient homes:</u>	
• High SAP threshold (say 50 or 60) to exclude those in relatively energy efficient homes;	✓
• Low SAP threshold (say 20 or 30) to target those in the very worst homes;	✓
• Target for average improvement in SAP rating to give scheme managers a greater incentive to target those in low SAP homes (where large SAP improvements are generally easier to achieve);	✓
• Exclude dwellings that already meet the thermal comfort criterion of the Decent Homes standard.	✓
<u>Differentiated scheme:</u>	
• Special package of measures for hard-to-heat homes (e.g. oil-based central heating for those without cavity walls and off the gas network);	✗
• Restricting more expensive measures to less energy efficient homes with fewer measures for more energy efficient homes;	✗
• Co-funding: partial grants depending on client's circumstances – from, say 25%, for higher income households in relatively energy efficient homes, up to 100% for low income households in the least energy efficient homes;	✗
<u>More generous package of measures:</u>	
• 'Gold-star' service: installing all appropriate and cost-effective measures for those households that qualify;	✗
• Central heating for all those without central heating;	✓
• Removing grant maxima;	✗
<u>Marketing strategy:</u>	
• Targeted marketing strategies to increase applications from specific groups (e.g. those living in rural areas) and/or offering financial incentives to encourage referrals (e.g. from GPs);	(✓)
• Taking steps to reduce drop-out rate among applicants (e.g. better training of surveyors on how to handle clients' concerns);	✗
<u>Increased resources:</u>	
• Increase the scheme's budget.	✓

One of the limitations of this model is that the administrative costs are assumed to be the same for all these options, whereas in practice those options that involve a more complex system of allocating grants would be more expensive to administer. In general, there is a trade-off between improved targeting and higher administrative costs. What the analysis in this report helps to do is to quantify the potential benefits of better targeting, which can then be weighed against the additional administrative costs of a revised scheme, as well as other ‘political’ or pragmatic considerations. These options are discussed in turn and the key results are then summarised towards the end of this Chapter.

Eligible groups

Changing the qualifying criteria is the most obvious way to improve the match between eligibility and fuel poverty. Expanding the eligibility criteria would help to cover the many fuel poor households that are not eligible for Warm Front under the current rules. As discussed earlier, most of this group are pensioners, so one option would be to include all households with someone aged over 60 (not just those in receipt of certain passport benefits), as is already the case in Scotland.

Conversely, restricting the eligibility criteria would help to reduce the number of non fuel poor households that are eligible for the scheme. These are mostly households who qualify because they are receiving child-related tax credits or non-means-tested disability benefits. We, therefore, examine the impact of concentrating eligibility only on those groups on low incomes as shown by receipt of means tested benefits, as proposed in the NAO report.

Table 4.3 shows that changing the eligibility criteria on its own would have relatively little impact on the overall effectiveness of Warm Front. Including all over 60s in the scheme on its own would marginally reduce the cost-effectiveness of the scheme, because it would open the scheme to many higher income pensioners who are not fuel poor, though it would dramatically improve the coverage of the scheme - around two thirds of vulnerable fuel poor households would be eligible for the scheme (up from one third under the current scheme). Restricting eligibility only to those in receipt of a means-tested benefit would marginally improve the cost-effectiveness of the scheme, by excluding many non fuel poor households with only a small reduction in coverage.

SAP threshold

As the costs and benefits of Warm Front measures vary significantly between dwellings, there is scope to increase the efficiency of the programme by directing grants at homes where the improvements would be most cost-effective (i.e. with the greatest potential fuel savings per pound spent). As already noted, improvements are generally more cost-effective for less energy efficient homes, so one way to achieve this would be to focus resources on low SAP homes. The occupants of low SAP homes are also more likely to be in fuel poverty, so targeting would be improved, too.

The options considered here involve the introduction of a SAP threshold. Applicants would have an initial assessment of their home and those with a SAP rating above a certain level would be excluded from the scheme (or would only be eligible for very low cost measures, such as energy efficient light bulbs).

Table 4.3: Impact of Changing Eligibility Criteria

	<i>Baseline: current scheme</i>	<i>(1) plus all over 60s</i>	<i>(1) plus exclude disabled and WFTC claimants</i>
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>
% reduction in fuel poverty gap (vulnerable h/holds)	7%	6%	9%
Reduction in number of fuel poor h/holds ('000s)	58	54	72
Number of eligible households ('000s)	2,010	4,630	1,300
Number of HEES grants ('000s)	840	760	740
% of vulnerable fuel poor households that are eligible	33%	67%	30%
% of grant recipients who are fuel poor	19%	18%	27%
% of grant recipients in low SAP homes (<30)	14%	14%	17%
Average cost of improvements (£)	590	660	680
Average annual fuel savings (£)	90	100	100
Cost-effectiveness ratio	1.3	1.3	1.3

Source: own estimates using EHCS-based micro-simulation model

Table 4.4: Impact of SAP threshold

	<i>Baseline: current scheme</i>	<i>Current eligibility criteria, plus SAP threshold of:</i>		<i>Restricted eligibility criteria*, plus SAP threshold of:</i>		<i>Expanded eligibility criteria, plus SAP threshold of</i>
		<i>60</i>	<i>50</i>	<i>60</i>	<i>50</i>	<i>30**</i>
% reduction in fuel poverty gap (vulnerable h/holds)	7%	9%	11%	11%	14%	19%
Reduction in number of fuel poor h/holds ('000s)	58	69	82	88	99	100
No. of eligible households ('000s)	2,010	1,620	1,090	1,040	725	650
Number of HEES grants ('000s)	840	780	710	700	617	450
% of vulnerable fuel poor households that are eligible	33%	33%	29%	29%	26%	29%
% of grant recipients who are fuel poor	19%	24%	30%	32%	42%	53%
% of grant recipients in low SAP homes (<30)	14%	18%	26%	20%	29%	100%
Average cost of improvements (£)	590	640	700	710	810	1,100
Average annual fuel savings (£)	90	110	130	120	150	290
Cost-effectiveness ratio	1.3	1.5	1.6	1.4	1.6	2.3

* Excluding those who qualify because they are in receipt of disability-related benefits or tax credits.

** All over 60s included in Warm Front Plus.

If the current eligibility criteria are unchanged and the SAP threshold is set too low, then the scheme would soon run out of potential grant recipients. So, a very low SAP threshold only works if the existing eligibility criteria are extended, so that a large enough pool of potential applicants is available from which to select those who are living in the least energy efficient homes. For the purposes of this analysis, it is assumed that all over 60s are made eligible for Warm Front alongside the introduction of the very low SAP threshold of 30 or less. However, when the SAP threshold is set at a much higher level (at 50 or 60), it would be possible to combine this with more restricted eligibility criteria along the lines of the final option considered in Table 4.3.

Table 4.4 shows the estimated impact of introducing a SAP threshold at different levels. If the current eligibility criteria are unchanged, setting the threshold at a high level to reduce spending on dwellings that are already energy efficient has a small positive effect on the scheme's effectiveness, by excluding a group of potential applicants who are unlikely to be fuel poor. If, in addition, the eligibility criteria were tightened to include only those in receipt of a means-tested benefit, then the combined impact is greater still - a reduction of between 11-14% in the fuel poverty gap.

The potential benefits of a much lower threshold are even more substantial. With a SAP threshold of 30, the fuel poverty gap could be reduced by close to 20%, compared with 7% under the current scheme. Although the average size of grants would be substantially larger (because these homes are in greater need of improvement), the potential fuel savings more than justify the additional cost. On average, each £1 of investment (annualised over time) generates more than £2 per annum in potential fuel savings. Furthermore, over half these households would be fuel poor, compared to around a fifth of current Warm Front applicants. The main limitation of some of these proposals, other than the extra administrative costs, is that they would require quite a high response rate from households in lower SAP homes; for example, in the case of a SAP threshold of 30, around 70% of eligible households would need to apply with this size of programme, which is towards the limits of what is feasible however intensively the scheme is marketed. (Warm Zones have achieved around 80% coverage within their boundaries.)

Other proposals

Table 4.5 shows the estimated impact of various other options for redesigning Warm Front, compared with the current scheme. The first of these proposals involves extending Warm Front Plus to all eligible households, whereas at present new central heating systems are only available to older person households. There is no additional impact on fuel poverty, indeed a very slight fall. The main difference is that fewer larger grants are handed out. There are some clear 'winners': households without central heating who were previously only eligible for the more restricted package of measures. But, overall, the cost-effectiveness of these measures is slightly worse and recipients are only slightly more likely to be fuel poor.

The second proposal is an existing policy to increase the proportion of grants going to older person households (containing someone aged over 60 or over). For 2001/02, a target was set at 61%, which is around 10 percentage points higher than under the baseline scheme. If this target were achieved over the length of the programme, this option would lead to a very slight improvement in cost-effectiveness, because the targeted group is more likely to be in fuel poverty.

Table 4.5: Impact of other proposals

	<i>Baseline: current scheme</i>	<i>Warm Front plus for all</i>	<i>Grant quota/ target for over 60s</i>	<i>Average SAP target of 15</i>	<i>Non- decent homes only</i>	<i>Fuel poverty 'check'*</i>
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
% reduction in fuel poverty gap (vulnerable h/holds)	7%	7%	8%	12%	11%	24%
Reduction in number of fuel poor h/holds ('000s)	58	53	67	78	67	209
Number of eligible households ('000s)	2,010	2,070	2,010	2,010	830	780
Number of HEES grants ('000s)	840	670	820	590	630	520
% of vulnerable fuel poor households that are eligible	33%	35%	33%	33%	21%	67%
% of grant recipients who are fuel poor	19%	20%	21%	27%	30%	100%
% of grant recipients in low SAP homes (<30)	14%	15%	14%	23%	32%	44%
Average cost of improvements (£)	590	750	620	860	790	970
Average annual fuel cost saving (£)	90	110	90	160	140	200
Cost-effectiveness ratio	1.3	1.3	1.3	1.6	1.5	1.8

Source: own estimates using EHCS-based micro-simulation model

* Plus expanded eligibility (all over 60s included).

The third option is to set an average SAP improvement target. Scheme managers would need to show that, on average, the measures installed had increased energy efficiency by at least a certain number of SAP points - in this example, 15, which is around double the average achieved under the current scheme¹⁷. Large SAP improvements are easier to achieve for low SAP dwellings, so this option would encourage scheme managers to target the least energy efficient homes without the need to impose an absolute SAP threshold. It would also focus investment on the most cost-effective improvements. The results are reasonably encouraging: assuming the target was achieved, it would reduce the fuel poverty gap by 12%, compared with 7% under the baseline scheme. A greater share of grant expenditure would be on very low SAP dwellings, so the cost-effectiveness of these measures would be greater and the occupants would be more likely to be in fuel poverty. However, this leaves open the mechanism(s) that would be used to achieve this target and whether the target could be sufficiently ambitious without significantly altering the operating 'norms' of the current scheme.

The fourth option would restrict grants to those living in dwellings that fail the Decent Homes standard on the thermal comfort criteria (as a crude proxy for less energy efficient homes). This would link the scheme with the Government's housing agenda,

¹⁷ According to estimates based on BRE data, the average improvement in SAP ratings following Warm Front was about 7.5 (only counting significant measures). According to Eaga Ltd (and using a different model), the average SAP improvement is around 13. The appropriate level at which to set a SAP improvement target would clearly depend on how SAP improvements were estimated (e.g. it would need to be higher than 15 if Eaga's current methodology were employed), but the basic principle would be the same.

as well as helping to direct grants towards the least energy efficient homes. Again, the predicted impact is a non-trivial increase in the scheme's effectiveness - an 11% cut in the fuel poverty gap - which would need to be weighed against the extra administrative complexity of such a scheme.

The final option considered here would involve an initial assessment of whether the applicant was fuel poor, based on their household income as well as the characteristics of their home. Only households identified as being fuel poor would receive a grant. Leaving aside the difficulties of implementing this proposal, the potential benefits are considerable – a reduction in the fuel poverty gap of up to 24% (though less in practice, because the assessment would not be completely accurate).

Expanded scheme

All the options modelled so far have assumed a fixed budget of £500 million, which is approximately the amount allocated to Warm Front up to and including 2004/05. Clearly, one way to increase the impact of the programme is to increase its budget or extend it over a longer period¹⁸. In their most recent report, the Government's Fuel Poverty Advisory Group (FPAG) recommended a 50% increase in the Warm Front budget to help meet the government's targets. The government's own analysis estimated that between £1.5-1.9 billion would need to be spent on private housing to remove all vulnerable households from fuel poverty, although it recognised that more money would be needed in practice to allow for imperfect targeting and to help those households who would not be removed from fuel poverty by the measures proposed (FPAG, 2003).

Table 4.6 examines the potential impact of expanding the budget both under the current rules and with a SAP threshold. In the latter case, the SAP threshold is higher, the larger the programme is, in order to ensure a large enough pool of potential applicants. If the existing scheme were doubled in size (or extended at current levels of funding for a further four years), the fuel poverty gap would be cut by an estimated 15% (i.e. around double the impact of the current programme). At this point, most of those currently eligible for the scheme would have received a grant in our static model, so the scheme would have reached a natural limit (though, in practice, the pool of potential applicants is added to each year, as people turn 60 and/or start receiving one of the qualifying benefits).

With a SAP threshold, the impact of an expanded programme is greater for the reasons already discussed: grants are targeted at less energy efficient dwellings where improvements are generally more cost-effective and the occupants are more likely to be fuel poor. As the programme expands, though, the additional benefit of any further investment begins to fall. This is a classic case of diminishing marginal returns: as the number of fuel poor households is cut, so the additional (or marginal) cost of lifting the remaining households out of fuel poverty will tend to rise. A smaller programme can be more narrowly targeted at the very lowest SAP homes, where the benefits are greatest. With a larger programme (and a higher SAP threshold), more grants end up going to households that are not fuel poor, though coverage is improved.

¹⁸ This is a static model, so the predicted impact of, say, doubling the budget will be the same as the impact of extending the current programme over another four years.

Table 4.6: Impact of expanded programme

	<i>Current scheme</i>		<i>Expanded programme*</i> <i>(with variable SAP threshold)</i>		
	<i>500</i>	<i>1,000</i>	<i>1,000</i> <i>(SAP<40)</i>	<i>1,500</i> <i>(SAP<45)</i>	<i>2,000</i> <i>(SAP<50)</i>
Total installation costs (£m)	500	1,000	1,000	1,500	2,000
% reduction in fuel poverty gap (vulnerable h/holds)	7%	15%	25%	32%	35%
Reduction in number of fuel poor h/holds ('000s)	58	119	170	237	282
Number of eligible households ('000s)	2,010	2,010	1,270	1,830	2,590
Number of HEES grants ('000s)	840	1,660	1,060	1,760	2,590
% of vulnerable fuel poor households that are eligible	33%	33%	42%	51%	59%
% of grant recipients who are fuel poor	19%	19%	39%	33%	26%
% of grant recipients in low SAP homes (<30)	14%	15%	50%	35%	25%
Average cost of improvements (£)	590	600	940	850	770
Average annual fuel cost saving (£)	90	90	200	170	150
Cost-effectiveness ratio	1.3	1.3	1.8	1.7	1.6

Source: own estimates using EHCS-based micro-simulation model

* Expanded eligibility (all over 60s included).

However large the programme, there is a limit to what can be achieved through the energy efficiency measures available under the current scheme. Even if every vulnerable fuel poor household in the private sector were to receive all the measures available under Warm Front (including new central heating systems for those currently without central heating), there would still be substantial levels of 'residual' fuel poverty. According to our model, the maximum achievable reduction in the fuel poverty gap would be around 40%¹⁹ (or nearly a one third reduction in the numbers of vulnerable households in fuel poverty). To reduce fuel poverty beyond this point (at 2001 income levels), additional measures would be needed to assist those fuel poor households for whom current Warm Front measures are insufficient - and even then it would not be possible to completely eliminate fuel poverty among very low income households. However, some of these measures are not generally very cost-effective – for example, internal insulation in homes that have solid walls - which is why they are not currently on offer.

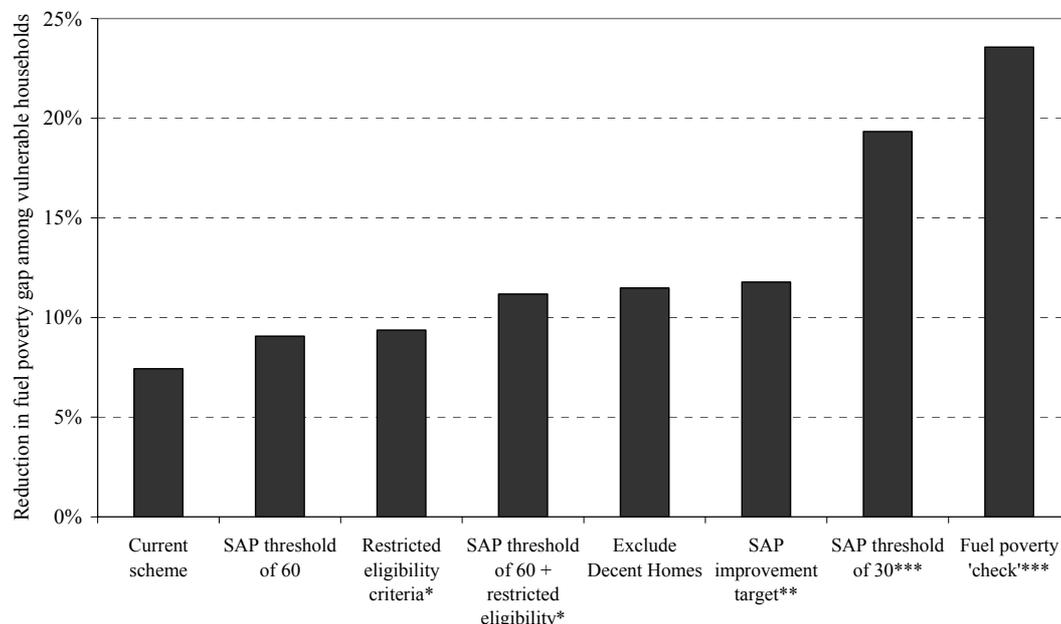
4.3 Summary

This chapter uses a micro-simulation model to quantify the impact of Warm Front on fuel poverty. The results suggest that the current programme covering the period from 2000 to 2004 should contribute to a small, but significant, reduction in the fuel poverty gap (of around 7%) and in the numbers of vulnerable fuel poor households (of around 60,000). To help put this into context, this is equivalent to the effect of a general rise in incomes of 3.5% or a fall in energy prices of 2.5% (both in real terms).

¹⁹ If all vulnerable fuel poor households were to receive all the measures available under Warm Front, including new gas central heating systems for those without central heating.

The effectiveness of various options for redesigning the scheme are summarised in Figure 4.3 in terms of their impact on the fuel poverty gap.

Figure 4.3: Impact of various options for redesigning Warm Front



Source: own estimates using EHCS-based micro-simulation model

* Only covering those who are in receipt of a means-tested benefit.

** Set at about twice the average improvement in SAP ratings under the current scheme to date.

*** All over 60s included in Warm Front Plus.

Only small improvements in the scheme’s effectiveness would be achieved by tightening the eligibility criteria (by excluding households not in receipt of a means-tested benefit) OR by excluding those living in homes that are already energy efficient. Combining these two measures would have a more substantive effect. Of the other less radical options considered in this report, the most promising would be to exclude dwellings that meet the Decent Homes standard or to introduce an average SAP improvement target, giving scheme managers an incentive to target lower SAP dwellings. These would have broadly the same impact on fuel poverty - a reduction of between 11-12% - though in different ways.

But, to make a more substantial difference, more radical changes are needed, such as the introduction of a much lower SAP threshold (in the order of 30) or a fuel poverty ‘check’ to ensure that grants are only allocated to households that are identified as being fuel poor. Both these proposals would increase the scheme’s effectiveness by a factor of three or so, though they would also add to its administrative complexity and cost.

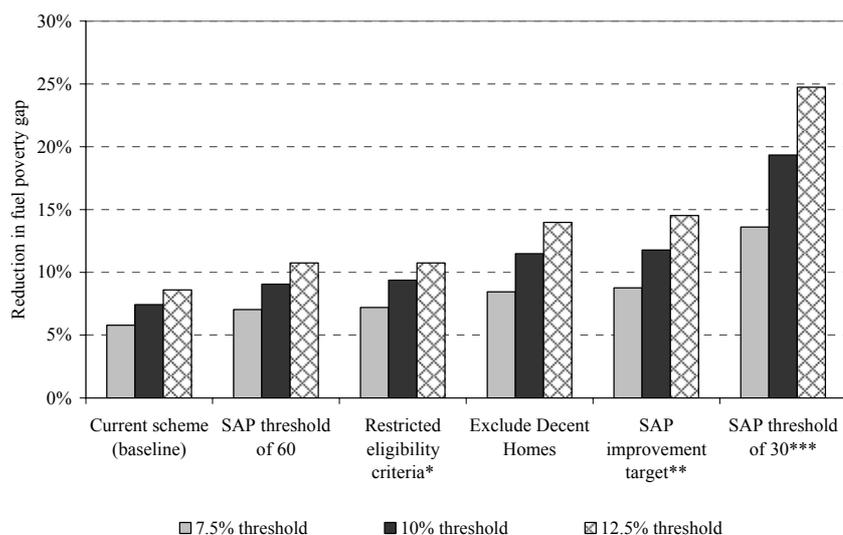
Expanding the budget would also increase the scheme’s impact on fuel poverty, but there are limits to what can be achieved through the energy efficiency measures alone. More than half the fuel poverty gap would remain even if every vulnerable fuel poor household in the private sector were to receive all the measures currently available under Warm Front.

4.4 Sensitivity analysis

The preceding analysis assumes there is no benefit in assisting households that are not fuel poor, even if they are only just above the official fuel poverty threshold. Although this is a reasonable, if strict, interpretation of the government’s fuel poverty objectives, the precise definition of fuel poverty is somewhat arbitrary. There is no good reason why, for example, we should be concerned about households who would need to spend 10.5% of their income to heat their homes satisfactorily and meet other fuel needs, but have no concern for those who would need to spend 9.5%. It would perhaps be more reasonable for our level of concern to be graduated; so, we might give some weight to assisting those who are close to being fuel poor, though more to those who are fuel poor, particularly those who are severely fuel poor.

For the purposes of this report, this only matters if it affects the relative effectiveness of the different options. One way of testing this is to see how sensitive the results are to changing the fuel poverty line. The simulation model is re-run under two alternative definitions of fuel poverty: a 7.5% threshold, which recognises the value of assisting those who are “near fuel poor” and a 12.5% threshold, which focuses on assisting those in more severe fuel poverty. The results of this sensitivity analysis do not substantively alter our earlier findings (see Figure 4.4). With a fuel poverty threshold of 7.5%, the fuel poverty gap is larger, hence the scheme’s impact is smaller in percentage terms (and vice-versa for a higher fuel poverty threshold). But, the ranking of different options is the same wherever the fuel poverty line is set. The only difference is that the more targeted options, such as the SAP threshold of 30, are marginally more attractive (relative to the current scheme) with a higher fuel poverty line and marginally less attractive with a lower fuel poverty line. This is not surprising: a more targeted scheme will be most advantageous if the focus is on helping the severely fuel poor.

Figure 4.4: Sensitivity of results to changes in the fuel poverty threshold



Source: own estimates using EHCS-based micro-simulation model

* Only covering those who are in receipt of a means-tested benefit.

** Set at about twice the average improvement in SAP ratings under the current scheme.

*** All over 60s included in Warm Front Plus.

CHAPTER 5:

DYNAMICS OF FUEL POVERTY

5.1 Introduction

Until fairly recently, policy documents on fuel poverty have largely ignored the dynamics of fuel poverty, even though previous research suggests that there is considerable movement of households into and out of fuel poverty (Sefton, 2002). This has important policy implications, because there is a strong case for targeting those households who are likely to be in persistent fuel poverty. Firstly, fuel poverty is arguably less of a concern for households that are only temporarily fuel poor; any health risks, for example, might be expected to accumulate over time. Secondly, the long-term cost-effectiveness of the programme will be greater if expenditure is concentrated on households, who are not only fuel poor now, but are likely to remain fuel poor for longer (in the absence of energy efficiency improvements). This report provides a more detailed analysis of fuel poverty dynamics using data from two separate surveys: the English House Condition Survey (EHCS) and the British Household Panel Survey (BHPS).

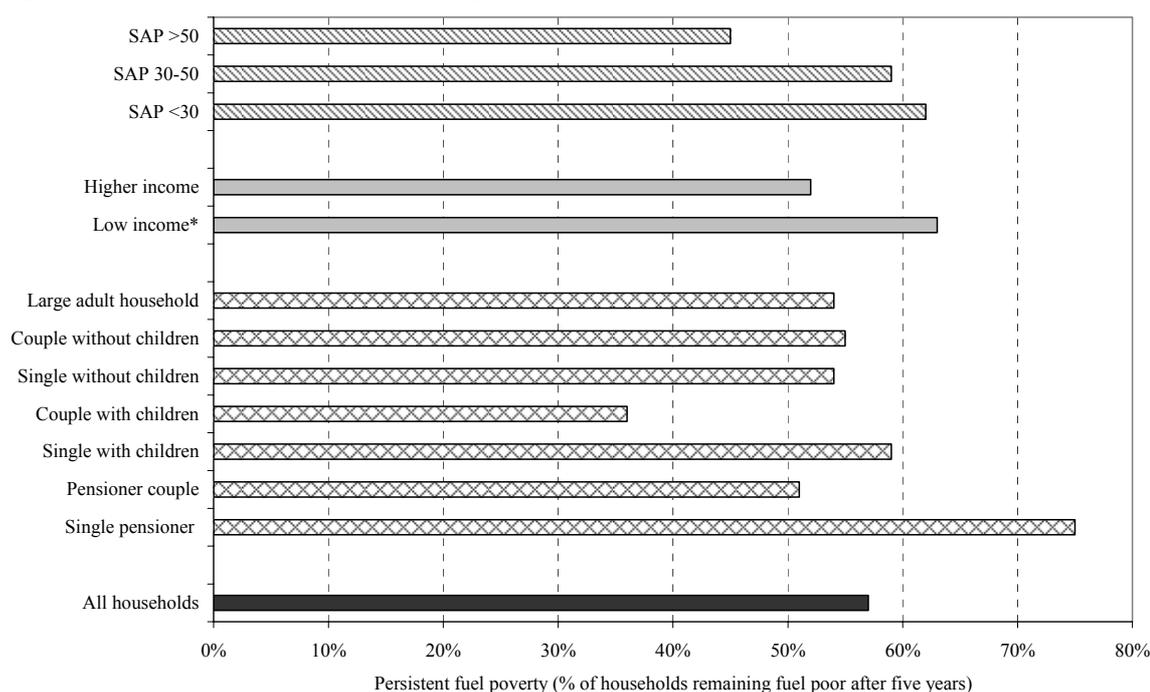
5.2 Analysis using the EHCS

Movements into and out of fuel poverty are first analysed using the longitudinal sample of the 1991 and 1996 English House Condition Surveys. We did not have a consistent measure of standardised fuel expenditure for the more recent longitudinal sample (i.e. 1996 and 2001), so it was not possible to update this part of the analysis. However, the broad conclusions are still likely to hold; indeed, the period 1991-96 is probably more representative than the more recent period, when energy prices have fallen sharply. We have data on around 2,600 dwellings that were surveyed in 1991 and re-surveyed in 1996, as well as information on their occupants at both points in time. The analysis in this section covers all tenures, including the social rented sector.

Around 28% of households were fuel poor in 1991, falling to 26% in 1996. Of those dwellings that were occupied by a fuel poor household in 1991, 57% were still occupied by a fuel poor household five years later. At the same time, around 12% of dwellings that did not contain a fuel poor household in 1991 were occupied by one five years later. Fuel poverty is, therefore, a moving target. Furthermore, these flows into and out of fuel poverty are not driven by small upward or downward movements across the 10% threshold. Many households who escape fuel poverty move well below the threshold and vice-versa (see Table A.3 in Annex A).

Figure 5.1 shows that the amount of movement out of fuel poverty varies significantly between different types of household. Not only are couples with children less likely to be fuel poor but, if they are fuel poor, the occupants are less likely than other types of household to remain in fuel poverty over a five year period - in just over a third of cases between 1991-96. Single pensioners are the most likely to experience persistent fuel poverty: three quarters of single pensioners who were fuel poor in 1991 were still in fuel poverty after five years. Persistent fuel poverty is also higher than average among low income households and occupants of low-SAP dwellings.

Figure 5.1: Rates of persistent fuel poverty by type of household



Source: own analysis using longitudinal sample of the 1996 and 2001 English House Condition Survey

* Low income is defined as being in the bottom fifth of net household incomes.

Table A.4 (in Annex A) also shows entry rates into fuel poverty (i.e. the proportion of dwellings occupied by a fuel poor household in 1996 that were *not* occupied by one five years previously). Entry rates are highest among pensioner households, single parent households, low income households, and low-SAP dwellings. These are broadly the same groups that are most likely to experience persistent fuel poverty. If they are already fuel poor, they are more likely to remain fuel poor and if they are not fuel poor, they are more vulnerable to falling into fuel poverty.

The occupants of a dwelling can move out of or into fuel poverty either because of a change in their income or a change in their required fuel expenditure, or some combination of the two. A change in the income of the occupants may come about either because of a change in the financial circumstances of the occupants or because the original occupants move home and are replaced by a different household. Table 5.1 shows that changes in income accounted for the majority - around two thirds - of all movements into and out of fuel poverty between 1991 and 1996. There was a fall in real fuel prices over this period, which is why changes in required fuel expenditure account for a greater proportion of exits from fuel poverty than entries into fuel poverty.

Table 5.1: Reasons for movements into and out of fuel poverty

	Exits from fuel poverty	Entries into fuel poverty	All movements into and out of fuel poverty
Rise or fall in income ¹	59%	71%	64%
Fall or rise in required fuel spend ²	17%	8%	13%
Both of the above ³	11%	7%	9%
Combination of the above ⁴	13%	15%	13%

Source: Own analysis using longitudinal sample of 1991 and 1996 English House Condition Survey.

1. Where the change in income is sufficient to move a household out of fuel poverty, but the change in required fuel spend is not.
2. Where the change in required fuel spend is sufficient to move a household out of fuel poverty, but the change in income is not.
3. Where both the change in income and required fuel spend would be sufficient on their own to move a household into or out of fuel poverty.
4. Where neither the change in income or required spend would be sufficient to move a household into or out of fuel poverty, but the two effects combined are sufficient.

5.3 Analysis using the BHPS

The British Household Panel Survey is unique in being a longitudinal survey, where the same individuals are re-interviewed each year – ten years (or waves) of data were available at the time of writing with complete data in all waves for around 5,000 individuals. Our analysis of BHPS data focuses on households who are spending a high proportion of their income on fuel – the “expenditure fuel poor”. This is different to the official definition of fuel poverty, which is based on an estimate of required (as opposed to actual) fuel expenditure. There is substantial overlap between these two definitions of fuel poverty, although some groups, notably single pensioners, make up a smaller proportion of the ‘expenditure fuel poor’ than of the official fuel poor, whilst single parent households, in particular, are over-represented among the expenditure fuel poor (See Annex C).

The advantages of using the BHPS is that it has a larger longitudinal sample and it is carried out every year (rather than every five years as was the case for the EHCS²⁰), enabling the analysis of year-on-year movements into and out of fuel poverty. It is also more up-to-date than the EHCS analysis presented in this report. The other difference between the two surveys is that for the EHCS the focus is on the dwelling, whereas for the BHPS the focus is on individuals. If an EHCS household moves home, the new occupants of the dwelling are interviewed in the follow-up survey, whereas if BHPS respondents move home, they are re-surveyed in their new home. Consistent data on fuel expenditure is only available since wave 7, so our analysis is restricted to waves 7-10, covering the period from 1997/98 to 2000/01.

Using a 10% fuel poverty threshold, around 10% of households and 8% of individuals were expenditure fuel poor in 1997/98 - falling to 8% and 5% in 2000/01. (Smaller households, in particular single pensioners, are much more likely to be fuel poor, hence the difference between the proportion of individuals and households in fuel poverty.) But, these are not the same people in each of the four waves. A greater proportion of people - 18% of households and 15% of individuals - experienced fuel

²⁰ From 2002 onwards, the English House Condition Survey is carried out on an annual basis.

poverty at some point over the four waves (see Table 5.2). At least half these households or individuals - 9.0% of households and 8.7% of individuals - experienced fuel poverty in only one wave out of the four, whilst 4.3% of households and 2.5% of individuals were fuel poor in at least three out of four waves. Thus, for the majority of people who experience fuel poverty, it appears to be a transitory phenomenon. However, cases of persistent fuel poverty account for a much higher proportion of those observed to be fuel poor at any given point in time²¹ - 44% of fuel poor households and 36% of fuel poor individuals.

Table 5.2: Persistence of Fuel Poverty in Expenditure Terms¹

Fuel poverty indicator	Households:		Individuals:	
	% of cases	% of fuel poverty observations	% of cases	% of fuel poverty observations
Proportion fuel poor in wave 7 ²	10.3	-	7.8	-
Number of time fuel poor over 4 waves ³ :				
0	82.1	-	85.5	-
1	9.0	28.9	8.7	36.9
2	4.6	27.2	3.3	26.9
3	2.8	25.7	1.7	22.6
4	1.5	18.1	0.8	13.6
At least once	17.9	100.0	14.5	100.0
3 or 4 (persistent)	4.3	43.9	2.5	36.2

Source: Waves 7-10 of the British Household Panel Survey.

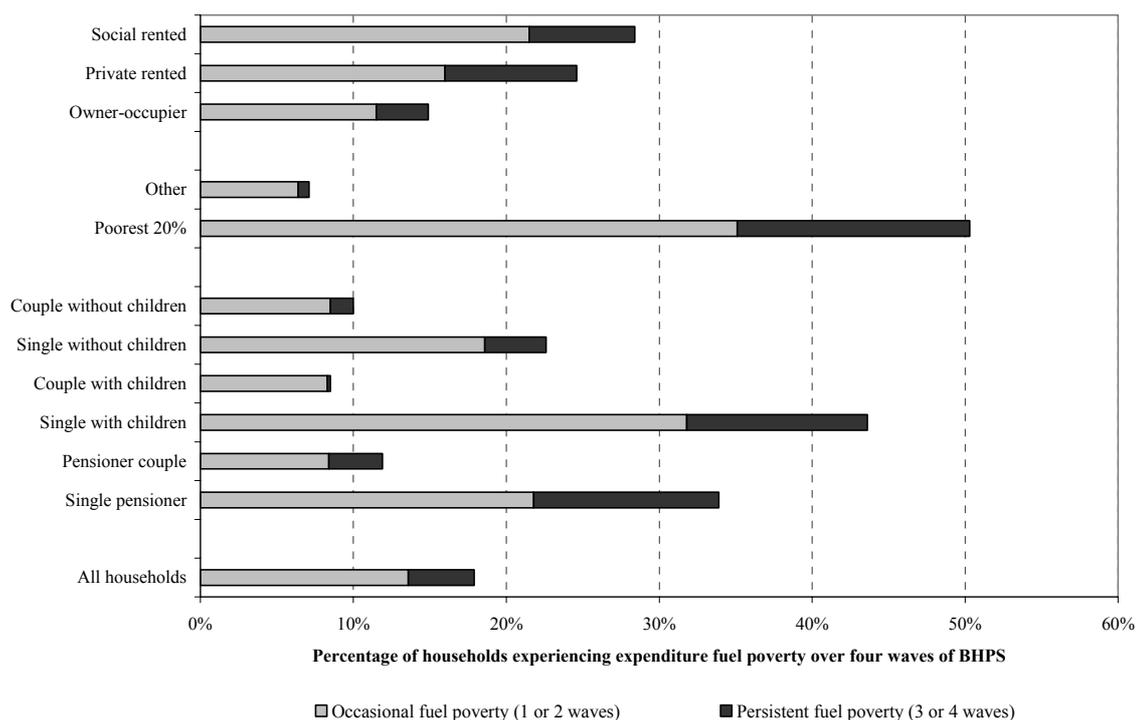
Based on a sample of 6,242 individuals and 2,571 household heads with complete data on household income and fuel expenditure in waves, 7-10.

1. Households (or individuals within these households) are defined as fuel poor if they are spending more than 10% of net household income on fuel.
2. Wave 7 corresponds to 1997/98.
3. The four waves included in this analysis are 1997/98 to 2000/01 (inclusive).

Figure 5.2 shows that certain types of individual are much more likely to experience expenditure fuel poverty. For all these sub-groups, occasional fuel poverty - one or two waves out of four - is more prevalent than persistent fuel poverty. However, single pensioners and individuals in low income households, in particular, experience a relatively high share of persistent fuel poverty compared with other sub-groups. Couples with children, on the other hand, are less likely to experience fuel poverty and, if they do, it is less likely to be a persistent spell of fuel poverty.

²¹ A common analogy is that of a hospital ward: most of those who have spell in hospital are short-stay patients, but most of the patients in hospital at any given point in time are long-stay patients.

Figure 5.2: Experience of expenditure fuel poverty by individual characteristics



Source: own analysis using waves 7-10 of the British Household Panel Survey.

These results are shown in full in Table A.5 (in Annex A). The final column of this Table shows the proportion of fuel poverty observations that are part of a persistent experience of fuel poverty i.e. the probability that if a household belonging to one of these sub-groups is observed to be expenditure fuel poor at a given point in time that this household is experiencing persistent fuel poverty (defined as being in fuel poverty for at least three out of the four waves). The majority of single pensioners who are observed to be fuel poor at any point in time (56%) are experiencing persistent fuel poverty, compared with 44% of all households that are fuel poor, and only 8% of couples with children.

Overall, these results are consistent with the results based on the EHCS (see above). Together, this evidence strengthens the case for targeting certain types of household, in particular single pensioners.

5.4 Impact on long-term effectiveness of Warm Front

This final section of this report attempts to incorporate the effects of ‘churn’ into the micro-simulation model that we used to predict the impact of Warm Front. So far, this modelling has been carried out in static framework, assuming that everything else is held constant except for the Warm Front programme; changes in the circumstances of the occupants (and changes in the occupants) are effectively ignored. Yet, the evidence just presented shows that these changes generate considerable movement into and out of fuel poverty over time. Given that the fuel poverty targets are long-run ones (e.g. to eliminate fuel poverty among vulnerable households *by 2010*), it is important to consider the implications of ‘churn’.

On the one hand, part of the money invested in Warm Front will only have a short-term impact on fuel poverty, because some of the assisted households would have moved out of fuel poverty in any case. On the other hand, some grants may at first appear to be ‘wasted’ on non fuel poor households, but may prevent (or reduce) fuel poverty at some point in the future due to changes in the occupants’ financial circumstances (or changes in the dwelling’s occupants). The net effect is difficult to quantify without further modelling (see below).

The model developed here is an adapted version of the one described at the beginning of Chapter 4, but using the longitudinal sub-sample of the 2001 EHCS. This consists of around 2,000 owner-occupied and private rented dwellings that were surveyed in 1996 and then re-surveyed in 2001. For these dwellings, we not only have information on the current occupants, but also on the occupants five years previously, including household type and income. This allows us to examine the impact of changes in households’ circumstances over a five year period, assuming that this period is reasonably representative of income dynamics over the next five years.

The model operates in the same way as the static model with the following differences. Firstly, eligibility for Warm Front (or the proposed variants of the scheme) is based on the circumstances of the occupants at the beginning of the five year period in 1996²², rather than in 2001. Secondly, the initial impact on the fuel poverty gap is computed using the income data for occupants in the 1996 survey. Thirdly, the impact on the fuel poverty gap is re-computed using the income data for the occupants in the 2001 survey.

The key results are presented in Table 5.3. The initial impact (in columns 1 and 2) is equivalent to the static model and the results are similar. (We would not expect identical results, because the base year is different.) The figures in the first column are based on actual incomes in 1996, whilst the figures in the second column are based on 1996 incomes adjusted upwards in line with the average growth in household incomes between 1996 and 2001. This enables us to distinguish the effects of a *general* rise in incomes over time²³ from the ‘pure’ effect of churn (i.e. upward and downward movements in relative incomes). The third column shows how much lower the fuel poverty gap is predicted to be in five years’ time as a result of the measures installed at the beginning of the period. In the case of the current scheme, the long-run impact is no different from the initial impact, once the effect of general rises in income are stripped out. The two effects discussed above - from some households moving out of and some households moving into fuel poverty - appear to cancel each other out.

There is some reduction in the effectiveness of the proposed alternatives to the current scheme. Schemes that are better targeted in the first place continue to be more effective in the longer-term, but some of the benefits of a better targeted scheme are diluted over time by the effects of churn. The ‘pure’ effect of churn is relatively small, however, both by comparison with the initial impact of these schemes and by

²² The eligibility criteria have had to be simplified to fit the data available in both surveys. Unlike in 2001, the 1996 EHCS did not ask respondents if they were in receipt of council tax benefit, so households who qualify on these grounds alone, including many single pensioners, are not identifiable as potential grant recipients.

²³ Some fuel poor households who are assisted by Warm Front would have been lifted out of fuel poverty in due course as a result of the general rise in incomes over time.

comparison with the effect of the general rise in incomes over time (i.e. the difference between columns 1 and 2).

In summary, churn appears to make little difference to the longer-term cost-effectiveness of Warm Front, as currently designed. And, although it dilutes the potential benefits of a better targeted scheme, this effect is relatively small over a five year period and could be reduced further by targeting grants at those households most likely to be in persistent fuel poverty.

Table 5.3: Long run effectiveness of Warm Front

<i>Reduction in fuel poverty gap (£m)</i>	Initial impact, unadjusted incomes ¹	Initial impact, adjusted incomes ²	Long-run impact after five years ³	Pure 'churn' effect
	(1)	(2)	(3)	(3)-(2)
Current scheme	18	13	13	0
Revised scheme I: (SAP threshold of 50*)	36	29	28	-1
Revised scheme II: (SAP threshold of 40*)	55	44	41	-3
Revised scheme III: (SAP threshold of 30*)	83	70	64	-6

Source: Own estimates based on micro-simulation model using the longitudinal sample of the 1996 and 2001 English House Condition Survey.

* Expanded eligibility (all over 60s included).

1. Impact on fuel poverty gap among occupants in 1996.
2. As in column (1), but with all 1996 incomes raised in line with the average growth in household incomes over the period 1996-2001.
3. Impact on fuel poverty among occupants in 2001, where grants are allocated on the basis of the characteristics of the occupants of each dwelling in 1996 (i.e. five years previously).

CHAPTER 6:

CONCLUSIONS

This report examines the targeting of grants under Warm Front and how this could be modified in order to have a greater impact on fuel poverty. It focuses in particular on the issues raised in the National Audit Office report and on the recommendations of that report and other proposals that have arisen during the Government's review of the scheme.

There are broadly two sets of options for increasing the scheme's contribution to the government's fuel poverty target. The first would produce a modest improvement in the scheme's impact by tightening the eligibility criteria to exclude those groups least likely to be in fuel poverty, including those who are not in receipt of a means-tested benefit, *and* by excluding those in homes that are already energy efficient – neither change would have much impact on its own. A more flexible alternative (and potentially as effective) would be to set an average SAP improvement target to encourage scheme managers to skew grants towards those living in the least energy efficient homes, although this leaves open the mechanism(s) they would use to meet their target and whether this could be done without significantly altering the operating 'norms' of the current scheme. Excluding all homes that already meet the Decent Homes standard would have a similar impact on fuel poverty and would tie the scheme in neatly with the government's broader housing agenda.

The second set of options would require more radical changes to the nature of the scheme, but with a much larger potential impact on fuel poverty. These options are designed to target grants much more narrowly than at present on households at greatest risk of being fuel poor, either by restricting grants to only those living in the least energy efficient homes (with a SAP rating of 30 or less) or by carrying out a prior assessment of each applicant's dwelling and income (and only allocating grants to those identified as being fuel poor). In both cases, the initial eligibility criteria would need to be extended, for example to cover all pensioner households, in order to generate a large enough pool of potential applicants. The benefits, which are potentially very large, would need to be weighed against the additional administrative costs, as well as other 'political' or pragmatic considerations.

Aside from the eligibility criteria, more still needs to be done to increase the share of grants going to single pensioners and, in particular, to understand and overcome any barriers that seem to be inhibiting applications from this 'high risk' group.

In evaluating the scheme, it is important that the effects of the scheme are monitored on a more consistent basis than in the past, based on a more standardised approach to defining and measuring incomes (in terms of identifying whether recipients are fuel poor) and to estimating potential fuel savings (in terms of identifying whether recipients are lifted out of fuel poverty).

REFERENCES

- Baker, W. and Gordon, D. (2003), *Predicting Fuel Poverty at the Local Level*, Final report on the development of the Fuel Poverty Indicator, Available on-line from the Centre for Sustainable Energy (www.cse.org.uk).
- Building Research Establishment (BRE) (2003), *Detailed Breakdown of Fuel Poverty in England, 2001*, Summary report produced on behalf of the DTI and Defra and available on-line on the DTI website.
- Department of Environment, Transport, and the Regions (DETR) (2001), *The UK Fuel Poverty Strategy: Consultation Paper*, London: The Stationary Office.
- Department for Environment, Food, and Rural Affairs (Defra) (2004), *The UK Fuel Poverty Strategy, 2nd Annual Progress Report: 2004*.
- Fuel Poverty Advisory Group (FPAG) (2003), *Estimating the Costs of Tackling Fuel Poverty in England*, report prepared by the Secretariat at the request of the Fuel Poverty Advisory Group.
- Fuel Poverty Advisory Group (FPAG) (2004), *Fuel Poverty Advisory Group (for England) Second Annual Report 2003/04*.
- National Audit Office (2003), *Warm Front: Helping to Combat Fuel Poverty*, London: The Stationery Office.
- Sefton, T. (2002), 'Targeting Fuel Poverty in England: Is the Government Getting Warm?', *Fiscal Studies*, Vol.23, Issue 3, pp. 369-399, London: Institute of Fiscal Studies.
- Wilkinson, B., Hart, M. and Hart, A. (2003), *Warming Up Vulnerable Households: An Evaluation of the Eaga Warm Front Programme and its Effect on Fuel Poverty*, produced by the Energy Audit Company on behalf of Eaga Partnership Ltd.

ANNEX A:

Additional Tables

Table A1: Characteristics of Warm Front Grant Recipients

	Private housing sector only:			Percentage of fuel poor households ¹ (4)
	Percentage of all h/holds ¹ (1)	Percentage of eligible h/holds ¹ (2)	Percentage of Warm Front grants ² (3)	
<i>Tenure:</i>				
Owner-occupier	88%	82%	90%	81%
Private rented	12%	18%	10%	19%
<i>Household type:</i>				
Single adult	11%	3%	4%	12%
Single adult with children	5%	18%	14%	5%
Two adults with children	24%	18%	21%	4%
Single pensioner ⁴	12-14%	31-34%	23%	43-49%
Two pensioners ⁴	15-17%	15-17%	18%	13-16%
Other	29-33%	10-17%	19%	15-24%
<i>Qualifying criteria:</i>				
Not eligible	83%	-	-	63%
60+, means-tested benefit ^{5,6}	7%	40%	35%	27%
Child, means-tested benefit ^{5,6}	4%	24%	11%	5%
Working Families Tax Credit ⁵	2%	10%	22%	<0.5%
Disability-related benefit ^{5,7}	4%	26%	32%	5%
<i>Income group:</i>				
Bottom 20%	15%	35%	27%*	79%
2 nd quintile	16%	28%	30%*	16%
3 rd quintile	21%	21%	27%*	4%
4 th quintile	23%	11%	13%*	1%
Top 20%	24%	5%	3%*	0%
<i>Region:</i>				
North East	7%	8%	15%	6%
North West	19%	25%	36%	23%
West Midlands	14%	18%	20%	18%
London	19%	14%	8%	12%
South East	25%	19%	13%	21%
South West	15%	16%	9%	19%
<i>Local deprivation⁸:</i>				
Worst 20% of wards	24%	35%	-	28%
20-40%	22%	25%	-	24%
40-60%	19%	18%	-	19%
60-80%	17%	12%	-	16%
Best 20% of wards	18%	10%	-	13%

Table A.1 (contd.): Characteristics of Warm Front Grant Recipients

	Private housing sector only:			
	Percentage of all h/holds ^{1,2} (1)	Percentage of eligible h/holds ^{1,2,3} (2)	Percentage of Warm Front grants (3)	Percentage of fuel poor households (4)
<i>Size of dwelling:</i>				
1 or 2 bedrooms	31%	39%	33%	37%
3 bedrooms	48%	50%	59%	44%
4+ bedrooms	21%	11%	8%	19%
<i>Age of dwelling:</i>				
Pre 1900	14%	16%	10%	27%
1900-1945	29%	30%	52%	35%
1946-1965	19%	21%	20%	21%
1966-1980	20%	19%	15%	12%
Post 1980	18%	13%	4%	5%
<i>Thermal comfort:</i>				
No central heating	6%	12%	27%	24%
Non decent home	25%	33%	48%	52%
<i>SAP rating:</i>				
Less than 30	10%	14%	21%	40%
30-50	39%	37%	41%	44%
50 or more	52%	49%	38%	16%

Source: Eaga Partnership Ltd database, 2001 English House Condition Survey.

- Columns 1, 2, and 4 are based on data from the 2001 EHCS. Sample sizes are 9,857 for column 1, 1,826 for column 2, and 895 for column 4. These figures are for the whole of England, whereas the figures in column 3 are only for regions covered by Eaga Partnership Ltd. The results are very similar if the EHCS analysis is repeated for Eaga regions only.
- Column 3 is based on data from Eaga's database of all Warm Front recipients in the areas they cover. SAP ratings were provided by the Energy Audit Company. Includes information on 389,228 households in the private housing sector, who applied to Warm Front between April 2000 and Dec. 2003. Results are based on non-missing values for each variable. The number of missing values is relatively small, except in the case of the SAP variable where ratings have not yet been estimated for many more recent grant applicants (29% of all cases)
- Based on the household categories in Eaga's database, which are slightly different from the EHCS categories.
- The classification of pensioner households in the Eaga database is unclear, so assumptions are made in replicating the categories within the EHCS. The lower bound figures only include those households containing one person aged 60 or over ("single pensioner") or couples one of whom is aged 60 or over ("pensioner couple"). The higher bound figures also include older people living as part of a larger household, for example an older person living with a relative, who would otherwise appear in the "other" category.
- Some households would fit into more than one of these categories (e.g. a pensioner in receipt of Income Support and Attendance Allowance would fit into both the first and fourth categories). In these cases, households are classified in the top-most category (in the order listed in the Table).
- One of the following benefits: Income Support, Housing Benefit, Council Tax Benefit, or Income-based Jobseekers's Allowance.
- One of the following benefits: Attendance Allowance, Disability Living Allowance, or Disabled Person's Tax Credit.
- Using Index of Multiple Deprivation (IMD) 2000. This variable is not available for the Eaga database.

Table A2: Characteristics of Warm Front Grant Recipients

	Private housing only		
	Share of all Warm Front grants (1)	Share of non-minor grants (2)	Share of grant expenditure (3)
<i>Tenure:</i>			
Owner-occupier	90%	93%	93%
Private rented	10%	7%	7%
<i>Household type:</i>			
Single adult	4%	4%	3%
Single adult with children	14%	13%	10%
Two adults with children	21%	20%	15%
Single pensioner	23%	23%	31%
Two pensioners	18%	19%	20%
Other	19%	20%	20%
<i>Qualifying criteria¹:</i>			
Not eligible	-	-	-
60+ and in receipt of means-tested benefit ²	35%	37%	53%
Families in receipt of means-tested benefit ²	11%	9%	7%
In receipt of Working Families Tax Credit	22%	22%	16%
In receipt of disability-related benefit ³	32%	32%	23%
<i>Income group:</i>			
Bottom 20%	27%	27%	34%
2 nd quintile	30%	30%	30%
3 rd quintile	27%	27%	23%
4 th quintile	13%	14%	11%
Top 20%	3%	3%	2%
<i>Region:</i>			
North East	15%	16%	11%
North West	36%	35%	37%
West Midlands	20%	20%	23%
London	8%	7%	7%
South East	13%	13%	12%
South West	9%	9%	9%
<i>Fuel poverty indicator⁴:</i>			
Worst 20% of wards	55%	52%	55%
20-40%	23%	24%	22%
40-60%	10%	11%	11%
60-80%	7%	8%	8%
Best 20% of wards	5%	5%	5%

Table A.2 (contd.): Characteristics of Warm Front Grant Recipients

	Private housing only		
	Share of all Warm Front grants	Share of non-minor grants	Share of grant expenditure
	(1)	(2)	(3)
<i>Size of dwelling:</i>			
1 bedroom	3%	2%	2%
2 bedrooms	30%	29%	29%
3 bedrooms	59%	62%	61%
4+ bedrooms	8%	8%	8%
<i>Age of dwelling:</i>			
Pre 1900	10%	8%	10%
1900-1945	52%	51%	53%
1946-1965	20%	22%	20%
1966-1980	15%	16%	13%
Post 1980	4%	3%	3%
<i>Thermal comfort:</i>			
No central heating	27%	30%	56%
Non decent home	48%	51%	69%
<i>SAP rating:</i>			
Less than 30	21%	24%	38%
30-50	41%	42%	39%
50 or more	38%	34%	24%

Source: Eaga Partnership Ltd database.

Based on data from Eaga's database of all Warm Front recipients in the areas they cover. SAP ratings were kindly provided by the Energy Audit Company. Includes information on 389,228 households in the private housing sector, who applied to Warm Front between April 2000 and December 2003. Results are based on non-missing values for each variable. The number of missing values is relatively small, except in the case of SAP variable where ratings have not yet been estimated for many of the more recent grant applicants (missing in 29% of cases).

Table A.3: Dynamics of fuel poverty, 1991-96

Required fuel spend as % of income: 1991	Required fuel spend as % of income: 1996						
	0-5%	5-7.5%	7.5-10%	10-12.5%	12.5-15%	>15%	
0-5%	67%	20%	8%	2%	1%	2%	
5-7.5%	39%	31%	14%	9%	3%	5%	
7.5-10%	15%	28%	26%	15%	6%	10%	
10-12.5%	12%	15%	27%	22%	10%	13%	
12.5-15%	9%	20%	22%	16%	13%	21%	
>15%	14%	10%	12%	17%	12%	35%	

Source: Own analysis using longitudinal element of 1991 and 1996 EHCS.

Lightly shaded box shows movements out of fuel poverty. Darkly shaded box shows movements into fuel poverty.

Interpretation of Table A.3:

Flows into and out of fuel poverty are not driven by small upward or downward movements across the 10% threshold. Many of those households who escape fuel poverty move well below the threshold and many of those households who fall into fuel poverty move well above the threshold. For example, just over half of the households who were marginally fuel poor in 1991 (in the 10-12.5% category) were no longer fuel poor in 1996. Of those that 'escaped' fuel poverty, half had moved up at least two categories (i.e. to 0-5% or 5-7.5%). Similarly, around 30% of those who were just below the fuel poverty threshold in 1991 (i.e. in the 7.5-10% category) had become fuel poor in 1996 and half of these had moved down at least two categories (i.e. into more severe fuel poverty).

Table A.4: Dynamics of Fuel Poverty: 1991-96

	<u>Incidence:</u> Percentage in fuel poverty in 1991	<u>Persistence:</u> % still fuel poor in 1996 if fuel poor in 1991	<u>Entry rate:</u> % fuel poor in 1996 if <i>not</i> fuel poor in 1991
All households	28%	57%	12%
<i>By household type:</i>			
Single pensioner	63%	75%	30%
Pensioner couple	33%	51%	22%
Single with children	68%	59%*	24%*
Couple with children	12%	36%	6%
Single without children	33%	54%*	11%
Couple without children	16%	55%*	8%
Large adult household	27%	54%*	14%
<i>By tenure:</i>			
Private	21%	56%	10%
Social	51%	60%	26%
<i>By income:</i>			
Low income (bottom 20%)	91%	63%	28%*
Other	17%	52%	12%
<i>By SAP rating:</i>			
Under 30	56%	62%	20%
30-50	27%	59%	12%
50 and over	15%	45%	10%

Source: Own analysis using longitudinal sample of 1991 and 1996 EHCS.

Based on a sample of 2,598 dwellings with complete data on household incomes and required heating costs in 1991 and 1996. To ensure consistent comparisons over time, the income measure used to identify fuel poor households does not include housing benefit (since data on HB is not available for 1991). Estimates of required heating costs for both years are based on the methodology used in the 1996 EHCS Energy Report.

Asterixes indicate small cell size (<100).

Table A.5: Experience of expenditure fuel poverty by household characteristics

Initial household characteristics (in wave 7)	Experience of fuel poverty over 4 waves:		Persistent fuel poor as % of all fuel poor observations
	Occasional fuel poverty (1-2 waves)	Persistent fuel poverty (3-4 waves)	
All households	13.6%	4.3%	44%
<i>By family type:</i>			
Single pensioner	21.8%	12.1%	56%
Pensioner couple	8.4%	3.5%	52%
Single with children	31.8%	11.8%	39%
Couple with children	8.3%	<0.5%	8%
Single without children	18.6%	4.0%	38%
Couple without children	8.5%	1.5%	28%
<i>By tenure:</i>			
Owner-occupier	11.5%	3.4%	44%
Private rented	16.0%	8.6%	50%
Social rented	21.5%	6.9%	42%
<i>By income group:</i>			
Bottom 20%	35.1%	15.2%	45%
Other	6.4%	0.7%	32%
<i>By eligibility for Warm Front:</i>			
Eligible	23.0%	9.5%	47%
Not eligible	11.3%	3.1%	41%

Source: Own analysis using waves 7-10 of the British Household Panel Survey.

Based on a sub-sample of 2,582 households with complete data on incomes and fuel expenditure in waves 7-10.

ANNEX B:

Imputation of Household Income for Warm Front Applicants

Regression imputation is the most appropriate technique in this context, because it makes the most efficient use of the information available on grant recipients in order to estimate their household income. The analysis was also carried out using hot-deck imputation, which is an alternative (and popular) method of imputation, and the results were very similar.

Household income is estimated as a function of various household and dwelling characteristics, using data from the Family Resources Survey (FRS), which includes an accurate measure of household income. These regression equations are then used to impute the incomes of grant recipients in the Eaga database with similar characteristics to those in the FRS. Fortunately, Eaga's database contains quite a range of variables that are common to the FRS and that are closely correlated with household income, including receipt of certain means-tested or disability benefits (the 'qualifying benefit'), household composition, size of property, tenure, and region. (The closer the correlation between these variables and household income, the more accurate this imputation process.) Care was taken to ensure these variables were defined in a consistent way across both datasets.

Data for the households in the 2000/01 and 2001/02 FRS are pooled in order to increase sample size. This generates a total sample of over 40,000 households in England. Incomes are imputed using the sub-sample of 10,000 households who meet the eligibility criteria for Warm Front (see below).

Four separate regressions are run for each of the main categories of scheme applicants. Some households fit into more than one of these categories and so are included in more than one of these regressions.

- (1) Householder(s) aged 60 and over and in receipt of either income support, housing benefit, council tax benefit, or income-based job-seeker's allowance;
- (2) Householders with at least one child under 16 and in receipt of one of the means-tested benefits listed above;
- (3) As above, but in receipt of the Working Families Tax Credit;
- (4) Households in receipt of one of the disability-related benefits, including Attendance Allowance and the Disability Living Allowance.

In each case, the independent variable in these regressions is logged household income. (Income is logged to generate a better 'fit' and because it generates a more normal distribution of residuals). The dependent variables vary slightly between the four regressions, but include household composition (i.e. number of adults and children), tenure, age of the householder, number of bedrooms, and two dummy variables for those living in the South East or London. The explanatory power (as measured by the R^2) is 30% or more for each of the four equations.

The resulting equations are used to predict the household incomes of grant recipients in the Eaga database. Where households fit into more than one of the four categories, they are classified in the order listed above – for example, the income of a single pensioner in receipt of both a means-tested benefit and a disability-related benefit will be imputed using the first regression, rather than the fourth one. This is designed to produce more conservative (i.e. lower) estimates of income. To ensure that the distribution of imputed incomes matches the distribution of incomes in the FRS, a random error term is added to the predicted values in order to match the variance observed in the incomes of FRS households. This is important because using predicted values without any error term would under-estimate the number of households on very low (and very high) incomes and would, therefore, under-estimate the number of households in fuel poverty.

The income measure used is net household income before housing costs, unadjusted for differences in household size. This includes housing benefit and disability benefits, in line with the definition of income used in the Government’s official estimates of fuel poverty for England.

As we would expect, the imputed incomes of grant recipients are skewed towards the lower end of the income distribution (see Table below). For example, 27% of grant recipients have imputed incomes that are in the bottom quintile of incomes for the whole of England and only 3% of grant recipients are in the top quintile. Reassuringly, the distribution of imputed incomes for grant recipients is similar to the income distribution for all eligible households in the FRS. (We would not expect them to be identical, because grant recipients are not a random sample of eligible households; for example, they contain a higher proportion of owner-occupiers.)

	Distribution of incomes (and imputed incomes)			
	% of households in each income group			
	All h/holds (FRS)	All eligible h/holds	Warm grant recipients (imputed)	Front recipients
Bottom quintile	20%	30%	27%	
2 nd quintile	20%	35%	32%	
3 rd quintile	20%	22%	26%	
4 th quintile	20%	10%	13%	
Top quintile	20%	3%	3%	

Source: own imputations and analysis using Family Resources Survey

We repeated this analysis using various alternative definitions of income. The Table below shows that the results (for the proportion of grant recipients in fuel poverty) are very sensitive to the income measure used. Column (4) uses an income measure that is similar to the one used in a recent report by the Energy Audit Company (Wilkinson et al, 2003), who estimated that between 30-44% of grant recipients were fuel poor prior to receiving a grant, excluding single adults and “other” households.

Sensitivity of Results to Different Income Measures

<i>Proportion of grant recipients in fuel poverty (est.)</i>	HBAI ¹ unequiv- alised incomes BHC (1)	As (1) less housing benefit (2)	As (1) less all housing costs (3)	As (1) less housing benefit and disability benefits ² (4)	As (1) less all housing costs and disability benefits ² (5)
All households	18%	20%	27%	26%	34%
All h/holds, excluding single adults and "other" h/holds	21%	24%	31%	29%	38%
<i>By household type:</i>					
Single adult	19%	25%	33%	46%	53%
Single adult with children	11%	17%	30%	18%	32%
Two adults with children	5%	6%	13%	7%	15%
Single pensioner	43%	48%	55%	56%	63%
Two pensioners	17%	17%	23%	26%	34%
Other	5%	6%	8%	10%	14%

1. HBAI stands for Households Below Average Income, which is the Government's official income measure (see the Department for Work and Pensions website for more details).
2. Excluding benefits that are designed to compensate for the additional costs of being disabled, including Disability Living Allowance and Attendance Allowance.

ANNEX C:

Measuring Fuel Poverty in Expenditure Terms

This Annex examines whether fuel poverty measured in expenditure terms is a reasonable indicator of fuel poverty, as officially defined (which is based on required expenditure, rather than actual spending). A household is expenditure fuel poor if they are spending more than 10% of their income on fuel. This may differ from the official measure of fuel poverty for three reasons:

- some people who are fuel poor may under-spend on their heating and live in a cold home or only heat part of their home adequately (e.g. because they can't afford to heat their home adequately, they prefer to spend money on other items, or their heating system is unable to heat their home satisfactorily however much they spend);
- some households spend more than 10% of their income on fuel even though they are not fuel poor (e.g. because they are over-heating their home or they have special needs that are not taken into account in estimates of required heating costs);
- errors in measuring required heating costs or actual fuel expenditure.

There are two possible types of error (Type I and Type II):

- 'wrongly excluded': those who are not classified as fuel poor (in expenditure terms), but *are* fuel poor according to the official measure;
- 'wrongly included': those that are classified as fuel poor (in expenditure terms), but are *not* fuel poor according to the official measure.

The size of both these types of error can be analysed using a sub-sample of the English House Condition Survey, for which there is information both on required heating costs and actual fuel expenditure. This comparison shows that, if a 10% expenditure threshold is used, 72% of those who are fuel poor in expenditure terms are also fuel poor on the official definition, whilst 52% of those who are fuel poor on the official definition are also fuel poor in expenditure terms. So, there appears to be a significant amount of overlap between the two measures of fuel poverty (i.e. a relatively low proportion of 'wrongful inclusions'), although there is a relatively high proportion of 'wrongful exclusions'. (Using a 9% expenditure threshold reduces the proportion of 'wrongful exclusions' to around a third, but increases the proportion of 'wrongful inclusions' to around a third, as well.)

The Table below compares the characteristics of those who are fuel poor under the two different definitions of fuel poor (using a 10% threshold in both cases). The proportion of 'wrongful exclusions' (i.e. those who are fuel poor, but are not picked up as being fuel poor using the expenditure measure) is greatest for single pensioners, those living in low-SAP properties, those without central heating, and those who are very dissatisfied with their heating system. Hence, these households will be under-represented among the expenditure fuel poor.

The proportion of ‘wrongful inclusions’ (i.e. those who are identified as being fuel poor in expenditure terms, but are not fuel poor on the official definition) is greatest for single parent households and those living in high-SAP properties who spend a relatively high proportion of their income on fuel. These groups are, therefore, over-represented among the expenditure fuel poor.

Composition of fuel poor households, 1996

	Official measure of fuel poverty	Expenditure-based measure of fuel poverty (10% threshold)
All households	20%	14%
<i>By household type:</i>		
Single adult	13%	16%
Single with children	5%	9%
Two adults with children	5%	5%
Single pensioner	36%	30%
Two pensioners	17%	18%
Other	24%	23%
<i>By tenure:</i>		
Owner-occupier	57%	57%
Private rented	19%	12%
Local authority	21%	26%
Housing association	4%	6%
<i>By income:</i>		
Bottom quintile	62%	59%
2 nd quintile	31%	35%
3 rd quintile	6%	4%
4 th quintile	1%	2%
Top quintile	0%	1%
<i>By SAP rating:</i>		
Under 30	30%	20%
30-50	55%	57%
50 and over	15%	24%
<i>By heating system:</i>		
No central heating	25%	16%
Has central heating	75%	84%

Source: Own analysis using the sub-sample of 2,081 households in 1996 English House Condition Survey with fuel expenditure data. Of these, 475 households were fuel poor according to the official definition of fuel poverty and 356 households were fuel poor in expenditure terms.

GLOSSARY

This glossary provides a brief explanation of some key terms as they are used in this report.

Churn:

A term sometimes used to describe movements into and out of fuel poverty over time. The occupants of a dwelling can move in or out of fuel poverty either because of changes in their financial circumstances or because they move to a more or less energy efficient home.

Cost-effective(ness):

The cost-effectiveness of energy efficiency improvements is a measure of the potential fuel savings per pound spent. A particular measure is more cost-effective than another if it generates larger potential fuel savings for the same amount of expenditure. The cost-effectiveness ratio (as reported in Tables 4.1 and 4.3 to 4.6) is equal to the average potential annual fuel savings divided by the average *annualised* cost of improvements (see also the notes to Figure 4.1).

Coverage:

This is the proportion of the target group that are eligible for a scheme. In this case, the target group is all vulnerable and fuel poor private sector households.

Fuel poor:

According to the principal definition used by the Government for target setting, a household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income, including Housing Benefit or Income Support for Mortgage Interest (ISMI) on all household fuel use for heating and non-heating purposes.

Fuel poverty gap:

This is the difference between what households can afford to spend – conventionally assumed to be 10 per cent of their household income – and what they would need to spend to heat their home satisfactorily and meet other fuel use requirements (for lighting and appliances), aggregated over all fuel poor households. This measure takes into account the depth or severity of fuel poverty, as well as the numbers in fuel poverty.

Micro-simulation model:

Micro-simulation models are computer models that operate at the level of the individual or, as in this case, the household. Such models can be used to simulate the impact of policy changes (in this case a large scale programme of energy efficiency improvements) on a large representative sample of households in order to draw conclusions that apply to higher levels of aggregation (in this case the whole population of England).

Minor measures:

This includes draught-proofing, hot water tank jackets, and/or energy efficiency light bulbs.

SAP:

Standard Assessment Procedure (SAP) for the energy rating of dwellings is a calculation of a building's energy efficiency. SAP ratings are scored on a scale from 1 to 120 where 1 is the worst and 120 the best.

Self-selection effect:

In this context, this refers to the possibility that certain types of household may be more likely to apply for a grant than other households that also meet the eligibility criteria. For example, we might expect those who are living in the least energy efficient homes and who, therefore, stand to benefit most from the scheme, to be more likely to apply for a grant (i.e. to self-select themselves into the scheme).

Significant measures:

These cover new central heating systems, cavity wall insulation, and/or loft insulation.

Vulnerable households:

In the context of the UK Fuel Poverty Strategy, a household is vulnerable if it contains a member aged 60 or over, a child under the age of 16 or someone who is disabled or has a long term illness.

Warm Front Plus:

Householders that are aged 60 or over and are in receipt of a means-tested benefit are eligible for Warm Front Plus, which has a higher grant ceiling of £2,500 (as opposed to £1,500 for other Warm Front recipients) and offers a package of measures including new central heating systems (for those without central heating), in addition to the measures available under Warm Front (i.e. cavity wall insulation, loft insulation, draught-proofing, and other improvements to the heating system).