FUEL POVERTY IN SCOTLAND:

Analysis of the Scottish House Condition Survey 1996

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ANALYSIS OF THE SCOTTISH HOUSE CONDITION SURVEY 1996

by
Cecilia Macintyre, Dave Cormack, Tony O'Sullivan and Chris Martin

CHAPTER ONE INTRODUCTION

1.1 This report sets out an analysis of fuel poverty in Scotland, based on the 1996 Scottish House Condition Survey. (Scottish Homes, 1997). The survey is a large nationally representative study in Scotland in which both comprehensive information on the household and dwelling is collected. For the first time in Scotland, the 1996 SHCS survey collected information on the thermal quality of dwellings and so this allowed a comprehensive assessment of fuel poverty, a situation which requires such linked information.

1.2 The report discusses the issues of identifying households in fuel poverty from survey data, and goes on to describe the extent of fuel poverty in the Scottish stock. The impact of dwelling improvements on the problem of fuel poverty is assessed by modelling the effect of a range of improvements to insulation, heating and double glazing. The impact of these improvements is quantified in terms of number of households affected, the reduction in number of fuel poor households, the potential reduction in fuel costs for heating and the potential increase in energy rating.

1.3 Fuel poverty does not have one simple or unambiguous cause, and can occur because of one, or a number of factors in combination, which relate to household or dwelling specific characteristics. Specifically, there are four factors which contribute to fuel poverty and which can be the basis of policies to tackle the problem.

- The energy efficiency of a dwelling, which determines how much energy is needed to warm a property to an acceptable level
- The income of a household, which determines its ability to afford an acceptable level of warmth
- The size of the household in relation to the dwelling it occupies, as under occupation can lead to unnecessary expenditure on energy to heat the dwelling
- The price of a unit of energy

1.4 The measurement of fuel poverty is made difficult by a number of things. In the first place, no agreed definition of the term exists. It has developed through studies and debate over time, and can mean different things to different people. Secondly, whatever definition is used, it is not possible to measure fuel poverty directly. Fuel poor households may either spend very little on fuel (as a proportion of their income) or a great deal. The underlying issue is how much of their income they would have to spend to achieve an acceptable living environment, given the home they currently live in. To determine this, it is necessary to specify what an acceptable living environment means, in terms of room temperatures, and periods through the day when such temperatures are achieved. The cost of achieving this is then modelled by using information on the heating system being used, the insulation characteristics of the house and fuel costs. By comparing this modelled cost for a household, with their actual income, it is possible to determine whether or not that household is fuel poor.

1.5 In the next chapter, the definitional issues are considered and the measures used in the report are set out. Chapter 3 considers the issues involved in modelling household fuel costs in more detail. As much of the problem of fuel poverty derives from the underlying energy efficiency of the housing stock, Chapter 4 is an energy efficiency profile of Scottish housing, to give a context for the rest of the report. Chapter 5 provides the picture of fuel poverty in Scotland that emerges from the Scottish House Condition Survey, and describes the types of people and dwellings which are affected. In Chapter 6, a number of different improvements to Scotland's housing are simulated to assess the effect they have in reducing fuel poverty. The last chapter draws some conclusions, and outlines the current initiatives which contribute to the alleviation of fuel poverty.

CHAPTER 2: DEFINITIONS OF FUEL POVERTY

2.1 Fuel poverty refers to a situation where a household has to spend an unreasonable proportion of income on fuel for various domestic purposes if it is to maintain a reasonable home environment. The current definition which is most commonly used is based on work by (Boardman, (1991) where she analysed the expenditure on fuel of the households in the lowest 30% of the income distribution. This study identified that that these households spent around 10% of their annual expenditure on fuel and this was then taken as an indication of the amount they could afford to spend on fuel.

2.2 The definition of fuel poverty is then based on a proportion established by dividing modelled fuel costs by actual household income. The modelled fuel costs are an estimate of the cost of heating the dwelling to an acceptable standard with an allowance for other fuel costs including lighting, cooking and use of appliances. A household which needs to spend more than 10% of its income on fuel is said to be fuel poor. A household that needs to spend more than 20% or more of its income on fuel should be considered to be in extreme fuel poverty.

2.3 The Department of Environment, Transport and the Regions (DETR) consultation paper on a new Home Energy Efficiency Scheme (HEES) (DETR, 1999) uses this definition of fuel poverty.

2.4 There have been a number of criticisms of this concept including those in a review by (MacKay and Gibb,1999) where they highlight the arbitrariness of some assumptions including

- use of total fuel costs rather than fuel for heating since the main policy interest is the area of warmth

- the conceptual leap from the finding that low income households spend 10% of expenditure to an assumption that this is an indicator of affordability

2.5 In the light of this ongoing work we have chosen to present estimates on fuel poverty based on the original Boardman definition and also to present estimates which consider only that fuel which is used for space and water heating, in both cases using the cut off of 10% of net household income. Although we recognise that this is not strictly correct in the latter case when only considering the space and water heating component of fuel use, we present these as minimum estimates. However the measure is a more appropriate one when considering affordable warmth rather than a broader policy interest of poverty.

2.6 We have used household income defined as total after tax income of the head of household (plus that of partner where relevant) from wages and salaries, plus benefit payments and income from other sources such as non-state pensions, alimony and maintenance payments.

CHAPTER 3: DETERMINING REQUIRED FUEL COSTS

3.1 The fuel costs relevant to measuring fuel poverty are those which must be met to provide an acceptable living environment for a household. Fuel is used for a variety of household purposes, such as space and water heating, lighting, cooking and appliances.

In this report a computer modelling package is used to determine the required fuel costs under each of these headings for each household surveyed in the SHCS, using information on the thermal characteristics of the dwelling, the available heating system and fuel type, and size of house. The models have been developed and refined over many years. Further details of the models are given in Annex 2.

In addition to the information provided from the survey, a number of other parameters required to be determined . These are outlined below and followed by details of the approach which has been taken in this report.

Firstly in order to determine the fuel costs required for space and water heating specification of a heating regime must be given, i.e. what temperature different parts of a home should be heated to, for how long, and on which days of the week these heating conditions should apply. This may vary because of the type of household involved. For example households with vulnerable members, such as the elderly, may require warmer conditions for longer periods than households where everyone goes out to work.

A further consideration is the size of a household relative to the size of the dwelling inhabited. For example a single pensioner living alone in a four-bedroom house would not need to heat the whole house to the same degree to achieve a comfortable living environment. In modelling fuel costs this should be allowed for.

A third consideration is whether indeed all fuel uses associated with a property should be allowed for in modelling fuel costs, or whether attention should be restricted to uses which relate to warmth, such as space and water heating. If the latter approach is taken a further question becomes how one allows for fixed costs such as standing charges and maintenance costs.

HEATING REGIME

3.7 Evidence now exists which links cold indoor environment with increased instances of ill health. In particular, respiratory illness, heart attacks and strokes are associated with such conditions, and the elderly, chronically sick and disabled and children are particularly susceptible. (Wilkinson, 1991) General opinion appears to favour a temperature range of 18-21 degrees Celsius as conducive to a healthy living environment. The standard heating regime used in this report to model fuel poverty is to assume a house is heated for nine hours a day through the week (between 7-9 a.m. and 4-11 p.m.), and for 16 hours continuously (between 7 a.m. and 11 p.m.) at the weekend. Over these periods a living room is maintained at 21 degrees Celsius and the rest of the house at 18 degrees Celsius.

3.8 These assumptions have been applied for the dwellings occupied by most household types. However, we have made somewhat more generous assumptions for a number of more vulnerable households.

3.9 For households including a person of pensionable age (but where no-one is over 75 years old), for those where there is someone who is long term sick, and for those with one or more children under 5 years of age, it is assumed that the house will be continuously heated for sixteen hours every day.

3.10 For households where one or more people is 75 years old or more, it is also assumed that the house will be heated continuously for 16 hours every day. Additionally, a temperature of 23 degrees Celsius is maintained in the living room.

SIZE OF HOUSEHOLD RELATIVE TO SIZE OF DWELLING

3.11 The 1996 Scottish House Condition Survey found 58% under occupancy using the 'Bedroom Standard'. The details of this standard are provided in Annex 1. Thirty seven percent of households in Scotland lived in a house with one room more than required by the standard. A further 16% and 5% lived in a house with, respectively, 2 or 3 or more rooms more than required by the standard. To allow for the fact that in situations where small households (in terms of number of members) occupy large houses (in terms of number of rooms) not all the house need be heated to achieve satisfactory living conditions the following adjustment has been applied. For houses occupied up to the level of the bedroom standard, plus one additional room, the heating circumstances detailed above were applied. For households with 2 or more rooms above the standard, the extra rooms were assumed to be unheated.

RELEVANT FUEL COSTS

3.12 As mentioned above, households use fuel within the home for a wide range of purposes. These include heating rooms and water, cooking, lighting and power for a wide range of leisure and other activities. Households also incur standing charges for the right to use fuel in the home, and maintenance charges to ensure that it is provided using safe equipment. Very roughly, space and water heating represent around 65% of total fuel costs, cooking and appliances use 20% and charges the remaining 15%[1]. Most if not all of the discussion of fuel poverty has centred on difficulties households face securing adequate warmth. Measurement of fuel poverty has evolved over time a range of methodologies, but total fuel costs have usually been employed even in the context of definitions based on the cost of warmth.

3.13 In this report both total fuel costs and fuel costs associated specifically with space and water heating have been calculated. In the latter case, the proportion of all non-fixed costs

[1] Analysis of the Scottish House Condition Survey 1996 shows that this varies with size of household given the greater allowance for other uses such as appliances and ranges from 85% for one-person households to 68% for 4 person households. It also varies with the energy efficiency of the dwelling given the greater amount of fuel required to heat an inefficient dwelling; this ranges from 83% of fuel costs in poor energy rated dwellings to 70% in good energy efficient dwellings. These variations result in slight differences in patterns of fuel poverty depending on whether heating fuel costs or total fuel costs are considered.

that these heating costs represent has been calculated, and this has then been applied to the standing charge. This proportion of standing charge has then been added to heating costs along with the maintenance costs, to generate fuel costs specifically associated with space and water heating.

CHAPTER 4: THE ENERGY EFFICIENCY OF SCOTTISH HOUSING

4.1 Much of the problem of fuel poverty arises from quality deficiencies in the housing stock. In particular, one aspect of housing quality is how much energy is required to heat a dwelling to a set temperature for a set period of time. This measure, standardised to take into account floor area, indicates how **energy efficient** a dwelling is.

4.2 There are a number of ways to measure the energy efficiency of a dwelling. One generally accepted way, which was used in the 1996 Scottish House Condition Survey, (Scottish Homes, 1997) is to give a dwelling a National Home Energy Rating (NHER). The NHER of a dwelling is based on the total fuel costs per square metre to heat it to a pre-set heating regime (temperatures/times of the day). In order to make comparison between dwellings valid, the calculation is done on the assumption that dwellings are occupied at a standard level of 'density', i.e. given the size of a dwelling (measured by floor space) a standard number of people are assumed to occupy it.

4.3 The NHER of a dwelling is assessed on a scale of 0 to 10. A dwelling with an NHER of 0 is extremely energy inefficient and correspondingly much more costly to heat. Conversely a dwelling of NHER 10, as well as being much more efficient, and environmentally sound, is much cheaper to keep warm. New dwellings constructed under the current building regulations should achieve an NHER of around 7. Typically, dwellings with an NHER of 0-2 are said to be 'poor' in terms of energy efficiency; those with NHER 3-6 to be 'moderate', and those with NHER 7-10 to be 'good'. The NHER rating is reliant on many factors including the extent and type of space and water heating systems, standard of insulation, type of windows as well as construction type and number of external walls. It is also location dependant being affected by wind speed, height and typical temperatures.

4.4 The 1996 Scottish House Condition Survey calculated the average NHER for housing in Scotland to be 4.2 [2] and 350,000 dwellings had a poor NHER rating. This represents almost one fifth of the stock (17%).

4.5 As indicated below there is considerable scope for improving the energy efficiency of the dwellings. Approximately 144,000 dwellings have no loft insulation, and 500,000 dwellings have inadequate loft insulation. Just over 270,000 dwellings have no form of central heating, and 750,000 have single glazed windows.

4.6 The following uses the 1996 Scottish House Condition Survey, to give a more detailed insight into the nature of energy inefficient housing in Scotland, and which households live in it.

THE CHARACTERISTICS OF ENERGY INEFFICIENT HOUSING IN SCOTLAND

4.7 Table 4.1 shows that, in terms of numbers, the biggest problem of poor NHER dwellings is found in tenements, terraced housing and detached houses. Though relatively small in absolute numbers, in percentage terms, tower blocks and 'slab constructed' flats

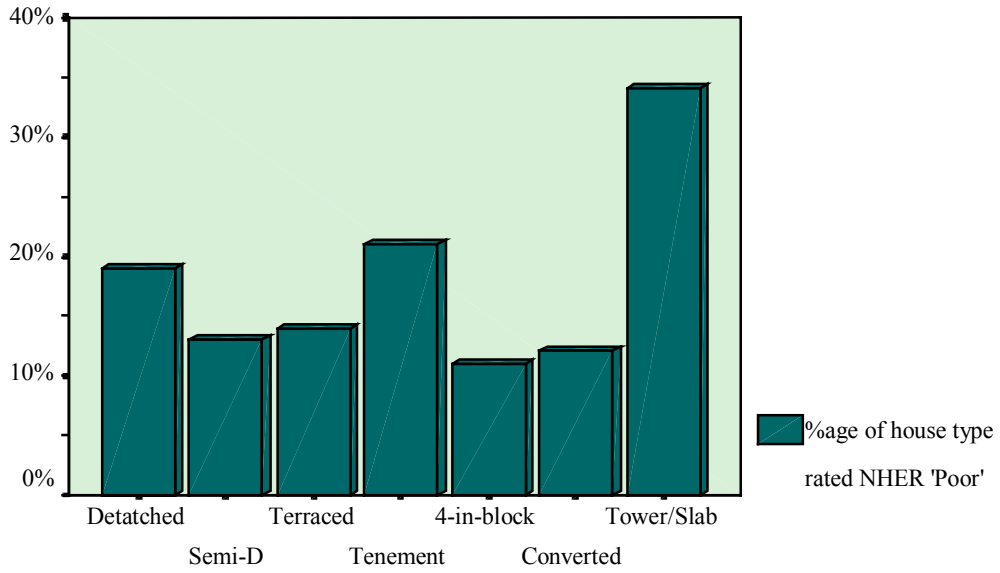
[2] The NHER reported here is based on the current SHCS96 dataset which deals with incomplete information on loft insulation in a different way from that used in the main report. This results in a very slight increase in the reported NHER, as the default used in the original analysis was conservative.

(such as 'deck access') show a particularly poor profile, as 34% of such housing has an NHER rating that is poor (Figure 4.1).

Table 4.1. NHER Rating by Type of Dwelling

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)
Detached house	68	287	11
Semi-detached house	61	375	14
Terraced house	71	385	41
Tenement	102	314	65
Four in a block	25	166	31
Flat in converted building	5	29	5
Tower/Slab	19	32	3

Figure 4.1 Percentage of Dwelling Type rated NHER 'Poor'

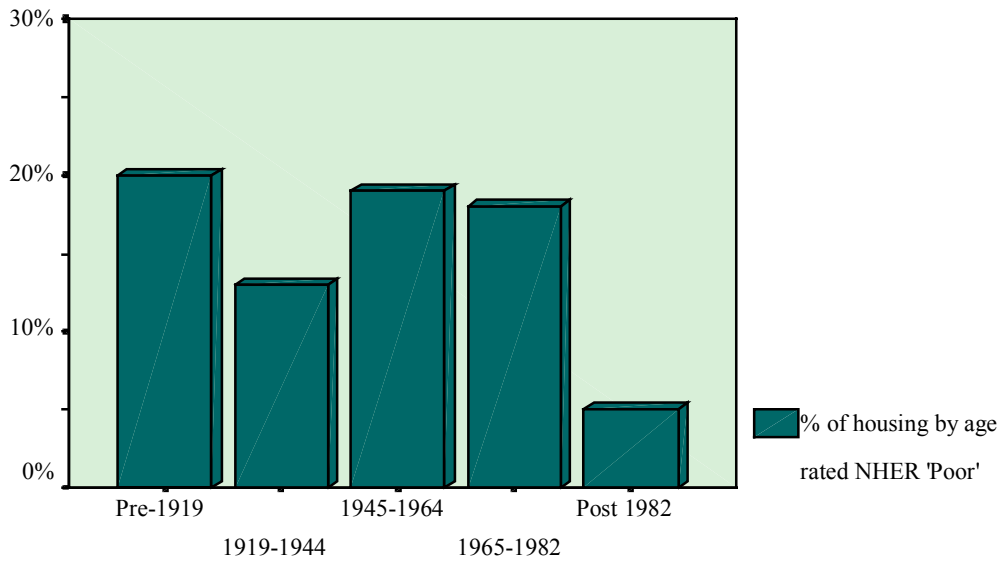


4.7 The energy efficiency of housing built since 1982 is markedly better than that built earlier. Only 5% of post 1982 dwellings (around 13,000) are rated as poor. Housing built before then is up to four times more likely to be rated poor, with the biggest problems found in pre 1919 and only slightly less of a problem in dwellings built between 1945-1982 (Table 4.2 and Figure 4.2).

Table 4.2 NHER Rating by Age of Dwelling

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)
Pre- 1919	92	320	40
1919-1944	41	257	19
1945-1964	113	437	36
1965-1982	91	398	21
Post 1982	13	177	54

Figure 4.2 Percentage of Dwelling in Age group rated NHER



4.9 Finally, a greater percentage of homes in rural areas (26%) have a poor NHER rating than those in urban areas (14%). In numerical terms, the bulk of the problem is still urban however, with 254,000 homes rated poor, (96,000 in rural areas). In part, the reason for a greater percentage of rural homes being rated poor is that a greater proportion of rural homes are detached houses as opposed to flats, which maximises the area from which heat loss may occur.

4.10 Annex 3 provides details on the average NHER rating achieved in Scottish housing, broken down by type, age and location of dwelling.

WHO LIVES IN ENERGY INEFFICIENT HOUSING IN SCOTLAND?

4.11 Turning to the question of who lives in poor rated NHER properties, the 1996 Scottish House Condition Survey demonstrates marked differences across different household types. Annex 3 provides a detailed breakdown using a household type framework developed for the 1996 Scottish House Condition Survey. This shows that people who live on their own, particularly pensioners, live in the least energy efficient housing in disproportionate numbers.

70,000 single pensioners, nearly one in four, live in a property rated NHER poor. 52,000 single adults, over one in five, are similarly housed. Nearly one in five single parents (21,000) is also housed in poor rated homes.

4.12 Other types of families and households comprised of more than one adult (with the exception of pensioner households) live in relatively good energy efficient housing. Just over one in ten (69,000) family households live in poor rated homes.

4.13 The household type framework used in the 1996 Scottish House Condition Survey did not prove entirely suitable for reporting fuel poverty. The structure of that framework is very detailed, but not always immediately intuitive. As an alternative, households have been separated into one of four groups, which are used as the basis for reporting results in the following chapters.

4.14 The chosen classification consists of four groups which are defined on the basis of the following factors

- Households who are eligible to qualify for a full grant to improve the energy efficiency of their home through the government's Warm Deal scheme[3]
- Single pensioner or pensioner couple households (elderly households)

4.15 Pensioner households were identified separately as they are a group of interest in the area of fuel poverty due to their increased risk of ill health. Also they can be identified through administrative systems which may be relevant to the development of approaches to dealing with the problem in these households.

4.16 The categories which are used in the report are

Non elderly, non Claimant	Non pensioner households who are **not** receiving any of the benefits which make then eligible for the Warm Deal
Non elderly, claimant	Non pensioner households in receipt of any of the benefits which make them eligible for the Warm Deal
Elderly, non claimant	Single pensioner or pensioner couples who are **not** receiving any of the benefits which make then eligible for the Warm Deal
Elderly, claimant	Single pensioner or pensioner couples in receipt of any of the benefits which make them eligible for the Warm Deal

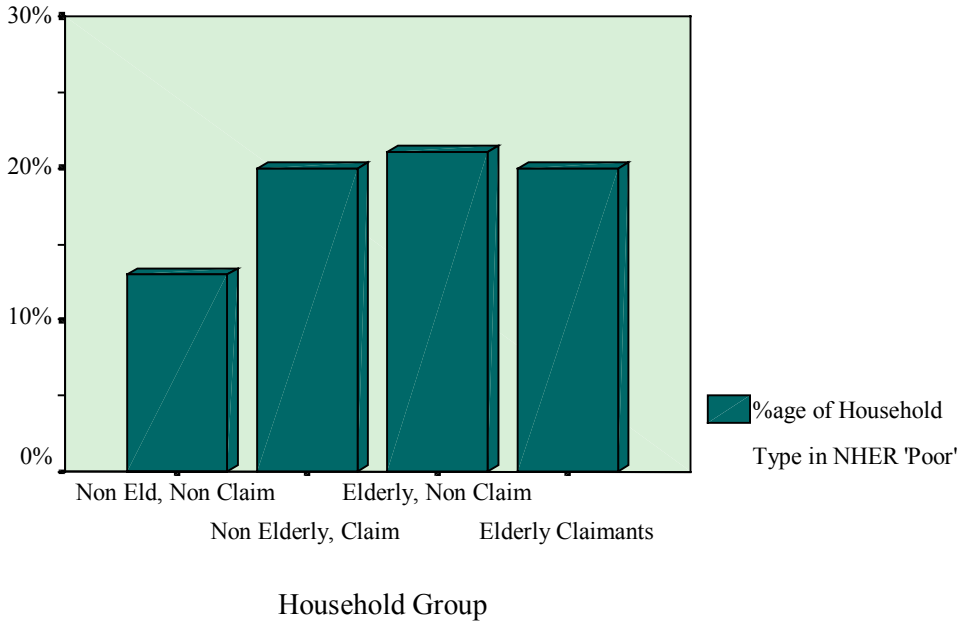
4.17 These four groups cover all households in Scotland. In absolute terms, the largest group of households who live in poor rated housing are the non-elderly who are not eligible for the Warm Deal (149,000) (Table 4.3) . In proportionate terms however the other three groups (at around 20%) are far more likely to be living in a poor rated property. (Figure 3).

[3] Warm Deal is a government scheme operating in Scotland which provides grants towards the cost of energy efficiency measures in the homes of people on qualifying benefits, the disabled and the over 60s. Households in receipt of the following benefits are eligible for a Warm Deal grant: attendance allowance, disability living allowance (care component all bands), disability living allowance (mobility components all bands), family credit, housing benefit, unemployment benefit, income support, industrial injury/disability benefit, war disablement pension. The English equivalent is the Home Energy Efficiency Scheme (HEES)

Table 4.3 NHER Rating by Household groups

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)
Non elderly, non Claimant	149	881	90
Non elderly, claimant	85	295	41
Elderly, non claimant	67	236	18
Elderly, claimant	49	176	20

Figure 4.3 Percentage of Household Groups in dwellings rated NHER 'Poor'



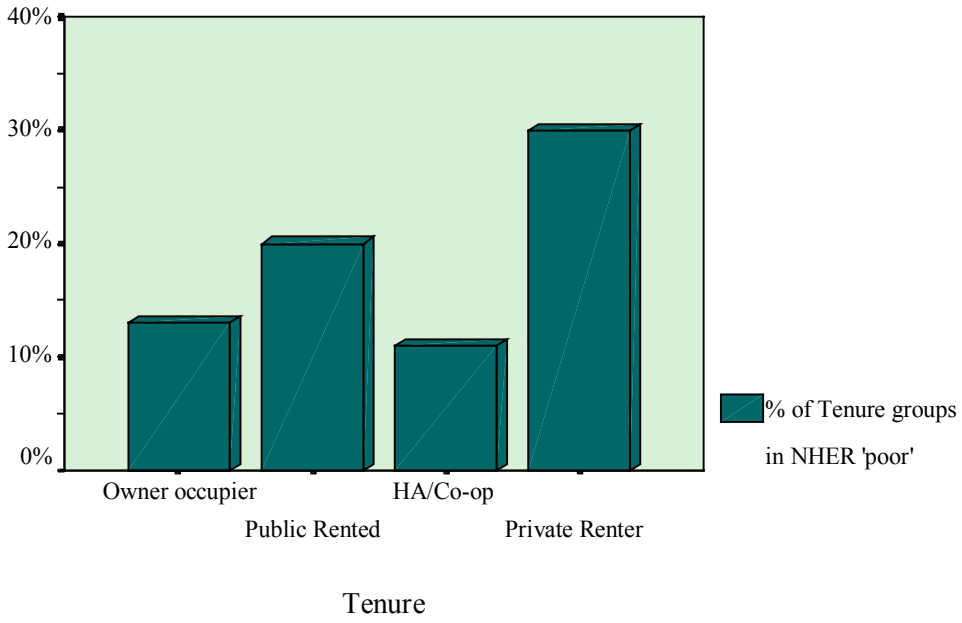
4.18 In terms of tenure, Table 4.4 shows the largest numbers of poor rated housing to be in the owner-occupier sector.

Table 4.4 NHER Rating by Tenure

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)
Owner-Occupier	158	951	85
Public Rented	133	482	53
Housing Association /Co-Operative	10	56	19
Private Rented	48	99	12

4.19 However, Figure 4.4 shows that the 48,000 poor rated homes in the private rented sector represent almost a third of the total private renting stock in Scotland. Comparing Table 4.4 and Figure 4.4 shows that the public rented sector has a significant concentration of poor rated stock in both percentage (20%) and absolute (133,000) terms.

Figure 4.4 Percentage of Tenure groups in dwellings rated NHER 'Poor'



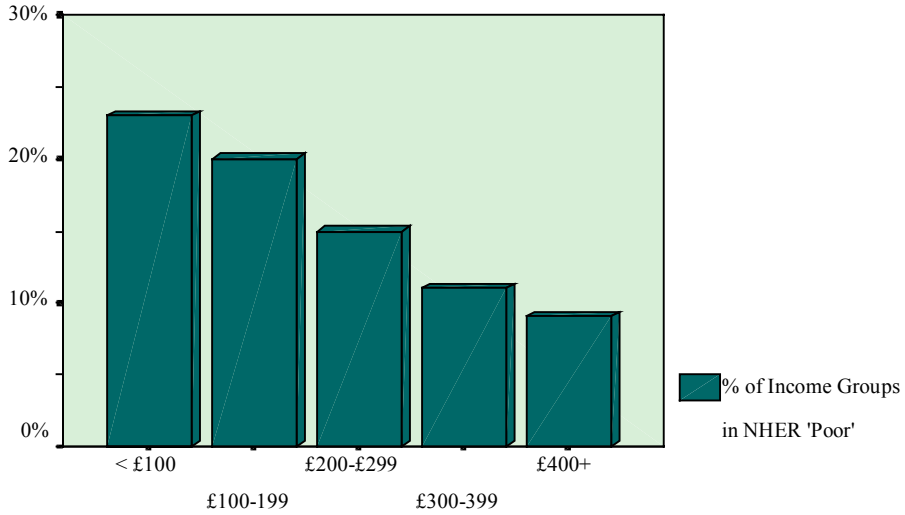
4.20 A final dimension to consider is the income situation of those living in energy inefficient housing. Table 4.5 shows that the bulk of households living in poor rated housing at the time of the 1996 Scottish House Condition Survey had an income of less than £200 per week.

Table 4.5 NHER Rating by Household Income

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)
Less than £100	81	243	29
£100-£199	143	503	58
£200-£299	63	313	31
£300-£399	31	228	26
£400+	30	291	26

4.21 In percentage terms, roughly a quarter of those with a weekly income of less than £100 live in a house rated poor. This drops in a fairly steady way as income increases to a tenth for those with a weekly income of £400 or more (Figure 4.5).

Figure 4.5 Percentage of Income Groups in dwellings rated NHER 'Poor'



4.22 Annex 3 provides details on the average NHER rating achieved in Scottish housing, broken down by both household tenure and income, whether or not their main income source is benefit income.

CHAPTER 5: FUEL POVERTY IN SCOTLAND

5.1 In this chapter, two sets of figures are given for fuel poverty. The first set use fuel costs associated specifically with heating a property. In brackets we have also reported the figures that result from including the fuel costs of all other activities within the home.

WHO ARE THE FUEL POOR IN SCOTLAND?

5.2 In Scotland, 506,000 households, out of a total 2,123,000 (24%) require to spend over 10% of their income to heat their homes to a standard regime. Of these, a total of 123,000 (6%) require to spend over 20%. (Using total fuel costs the figures become 738,000 (35%) and 178,000 (8%) respectively). Table 6 shows the numbers of households in fuel poverty, by household type, with the proportions within each category given in Figure 5.1.

Table 5.1 Fuel Poor households by household type

	Households requiring to spend 10%-20% income on fuel 000's	**Households requiring to spend >20% income on fuel 000's**	**Total Fuel Poor Households 000's**
Non elderly, non Claimant	77 (129)	24 (38)	101 (167)
Non elderly, claimant	113 (189)	30 (50)	143 (239)
Elderly, non claimant	100 (123)	48 (60)	148 (183)
Elderly, claimant	93 (120)	21 (30)	114 (149)

(Figures in brackets calculated using total fuel costs)

5.3 It can be seen from the table that large numbers of total fuel poor households are to be found amongst the non elderly who are in receipt of the Warm Deal eligible benefits and also elderly households who are not in receipt of the Warm Deal eligible benefits. In proportionate terms there are high rates of fuel poverty found across three of the four household groups (Figure 5.1), with markedly higher rates of extreme fuel poverty in elderly households not currently in receipt of a Warm Deal eligible benefit.

5.4 Table 5.1 shows this is also the group with the largest absolute number of households in extreme fuel poverty. It is not possible to identify accurately from the SHCS 1996 which non-claimant households may be eligible but are not claiming a benefit however there is a body of evidence to indicate that in elderly households in particular, the non claiming of some benefits is considerable.

5.5 The other factor to emerge from Table 5.1 and Figure 5.2 is that the impact of using total fuel rather than heating fuel costs to measure fuel poverty is not consistent across household types. Using total fuel costs the differential in fuel poverty between elderly and non-elderly households is reduced slightly. This is explained by the fact that non-elderly households tend to be larger than elderly households, and consequently have a greater allowance of fuel for non heating uses.

Figure 5.1 Fuel Poor Households (heating costs) by Household Groups: (%)

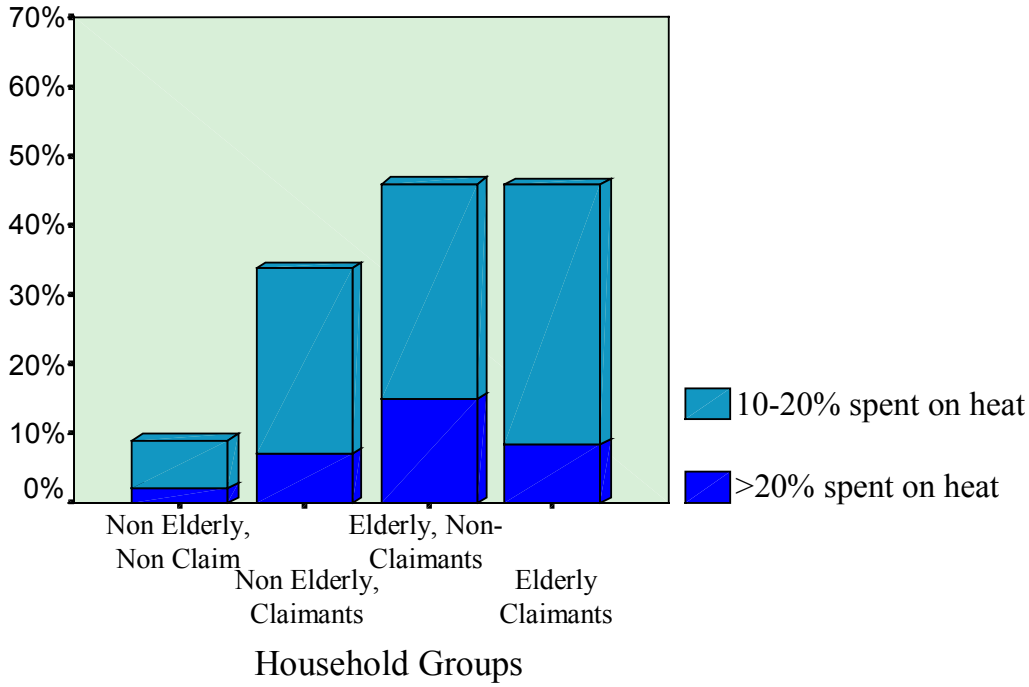
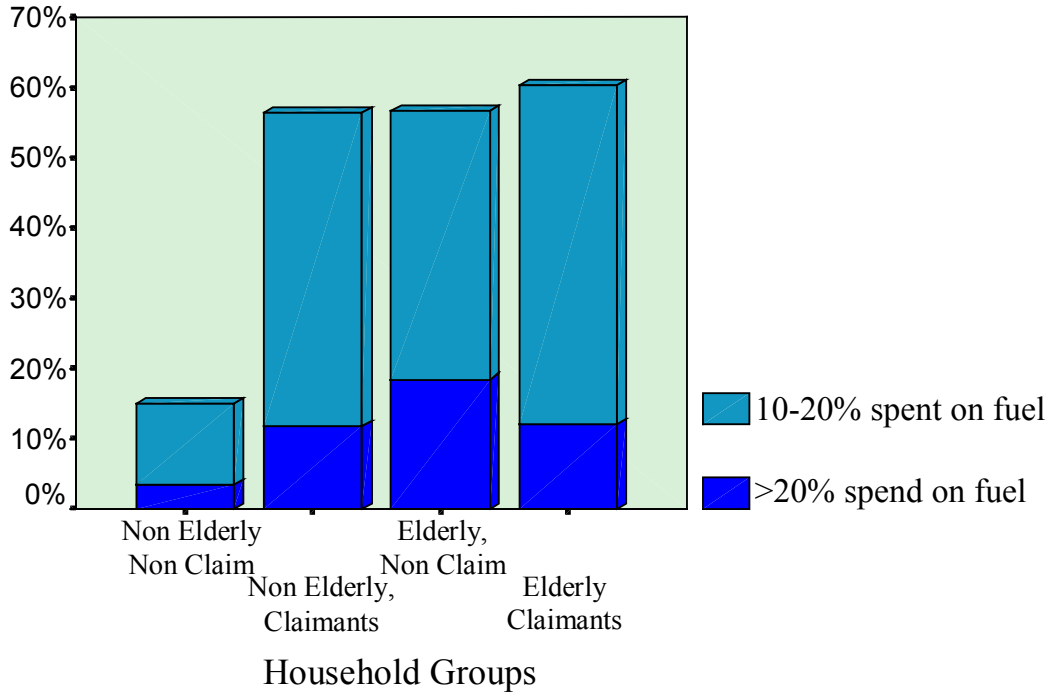


Figure 5.2 Fuel Poor Households (total fuel costs) by Household Groups: (%)



FUEL POVERTY AND TENURE

5.6 Table 5.2 shows the tenure distribution of the fuel poor households.

Table 5.2 Fuel Poor households by tenure

	Households requiring to Spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on Fuel (000's)	Total Fuel Poor Households (000's)
Owner-Occupier	141 (200)	66 (88)	206 (288)
Public Rented	184 (279)	36 (60)	220 (339)
Housing Association / Co-operative	17 (30)	4 (6)	21 (36)
Private Rented	41 (52)	17 (24)	58 (76)

(Figures in brackets calculated using total fuel costs)

5.7 The majority of the total fuel poor are to be found in the public sector, despite the fact that at the time of the 1996 Scottish House Condition Survey only 32% of the housing in Scotland was owned by public landlords. The picture changes somewhat when considering the extreme fuel poor; the owner-occupier sector houses a similar number of such households as the other sectors combined.

5.8 Proportionately, the biggest concentration of total fuel poor households is to be found in the public sector, closely followed by the private rented . In terms of extreme fuel poverty the proportion of households in the private rented sector in such circumstances is more than double that of any other tenure. (Figure 5.3)

5.9 Finally, it can be seen from Table 5.2 that using total rather than heating fuel costs has a greater impact in the public rented sector and housing association sectors.

Figure 5.3. Fuel Poor Households (heating costs) by Tenure: (%)

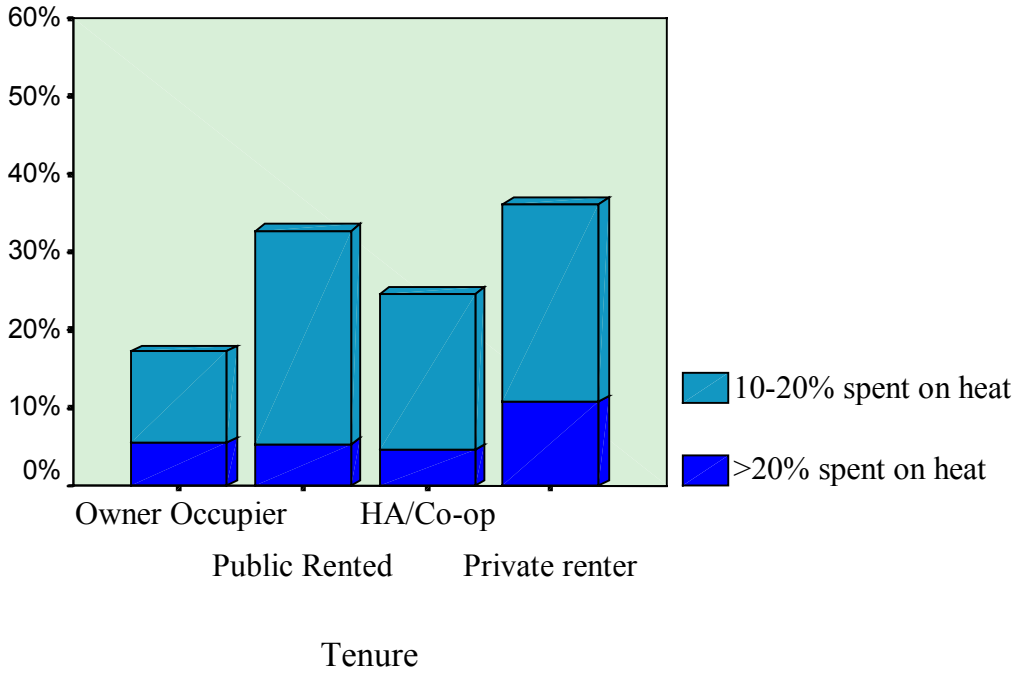
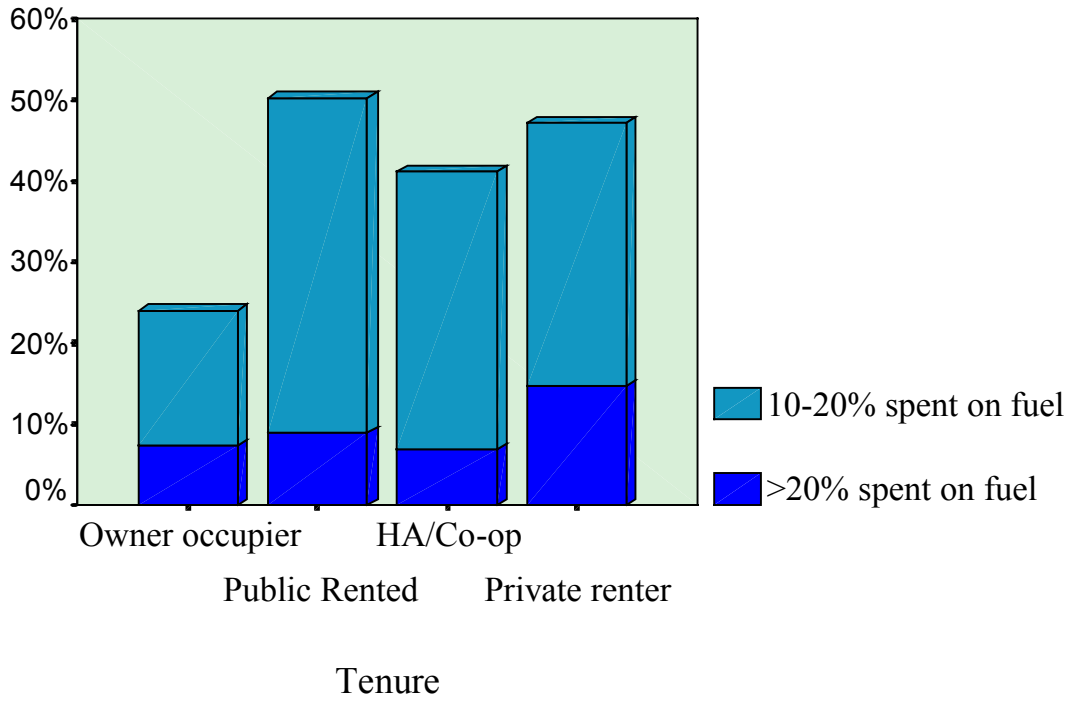


Figure 5.4 Fuel Poor Households (total fuel costs) by Tenure: (%)



HOUSEHOLD INCOMES AND FUEL POVERTY

5.10 Fuel poverty is strongly related to household income, as one would expect. Table 5.3 and Figure 5.5 demonstrate how dramatic this link actually is.

Table 5.3 Fuel Poor households by weekly income

	Households requiring to Spend 10% - 20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**	**Total Fuel Poor Households (000's)**
Less than £100	180 (177)	95 (135)	275 (312)
£100-£199	187 (341)	27 (41)	214 (382)
£200-£299	14 (37)	0 (2)	14 (39)
£300-£399	3 (5)	0 (0)	3 (5)
£400+	0 (0)	0 (0)	0 (0)

(Figures in brackets calculated using total fuel costs)

5.11 Almost four fifths of households with weekly income of less than £100 were found to be in fuel poverty, and a quarter found to be in extreme fuel poverty. For households with a weekly income of greater than £200 the incidence of fuel poverty is very low. If one uses total fuel cost, almost 90% of households with weekly income of less than £100 are in fuel poverty.

Figure 5.5 Fuel Poor Households (heating costs) by Weekly Income: (%)

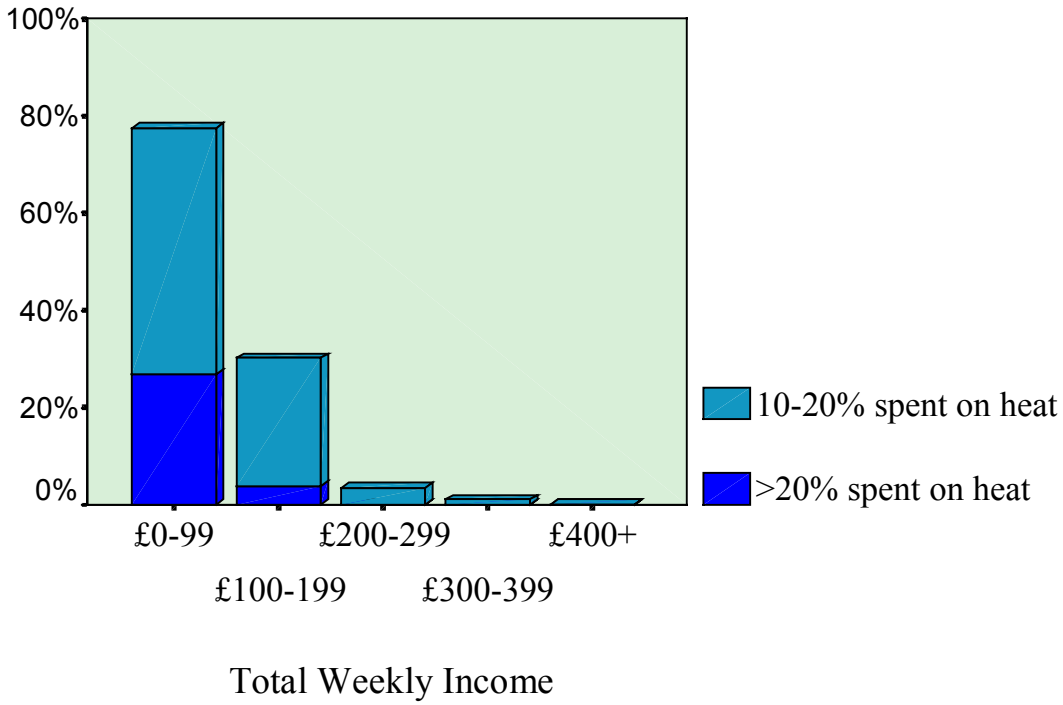
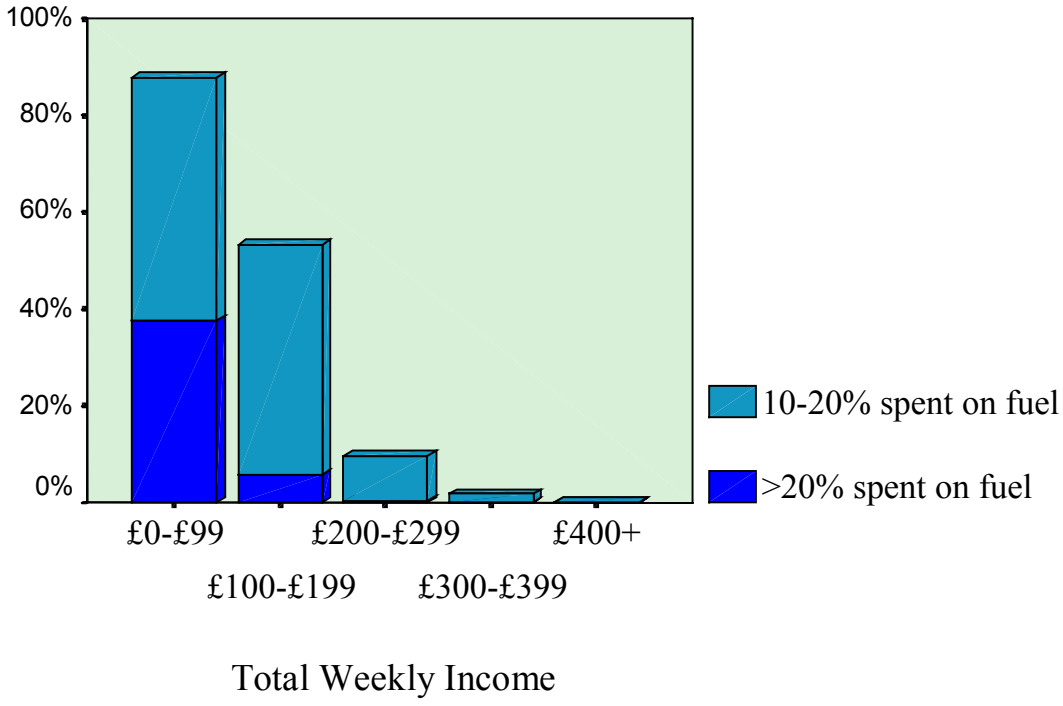


Figure 5.6 Fuel Poor Households (total fuel costs) by Weekly Income: (%)



WHAT SORT OF HOUSING DO THE FUEL POOR LIVE IN?

5.12 We turn now to the question of what type of properties the fuel poor occupy. One important aspect of this is how energy efficient the housing they occupy is. If it were highly energy efficient, the only way to reduce poverty would be to raise incomes. The following tables show there is considerable scope for addressing fuel poverty through improvements in the energy efficiency of the stock.

Table 5.4 Fuel Poor households by energy efficiency of home

	Households requiring to spend 10% - 20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**	**Total Fuel Poor Households (000's)**
NHER 'Poor' (0-2)	118 (137)	73 (93)	191 (230)
NHER 'Moderate' (3-6)	254 (399)	49 (82)	303 (481)
NHER 'Good' (7-10)	11 (24)	1 (3)	12 (27)

(Figures in brackets calculated using total fuel costs)

5.13 Table 5.4 shows that very few of the fuel poor live in housing with good energy efficiency profiles. The largest number of fuel poor households lives in housing with a 'moderate' rating, reflecting the fact that most of the housing in Scotland has such a rating. More significant is the concentration of extreme fuel poor households in the least energy efficient properties. Figure 5.7 shows this more starkly.

5.14 Over half of households (55%) living in poor rated housing are fuel poor to some degree and 21% experience extreme fuel poverty. In contrast only 7% of those households living in property rated as good are fuel poor to any degree, and no household in such housing has been assessed as in extreme fuel poverty.

Figure 5.7 Fuel Poor Households (heating costs) by Energy Efficiency of Home: (%)

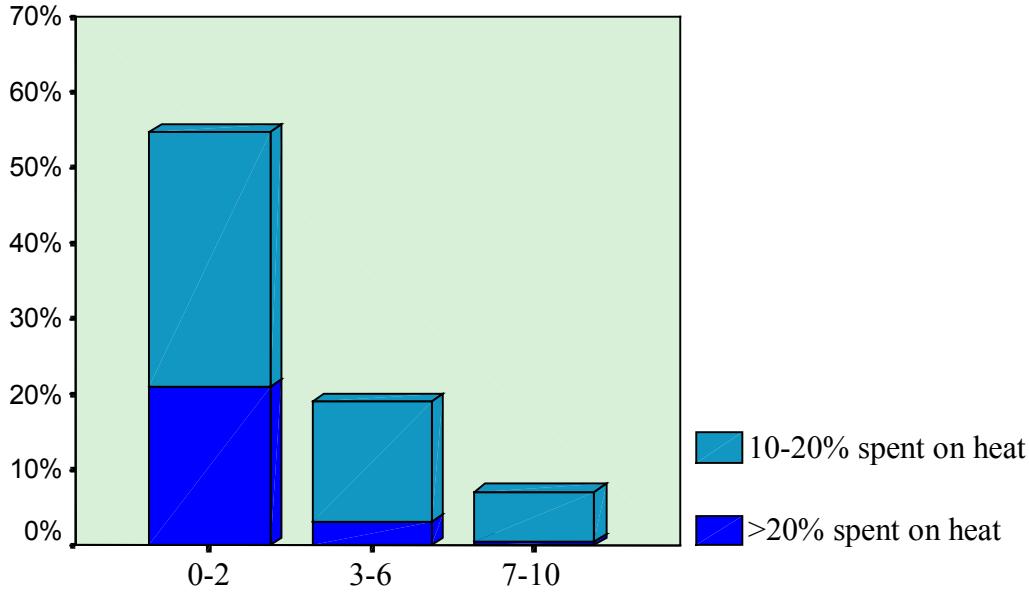
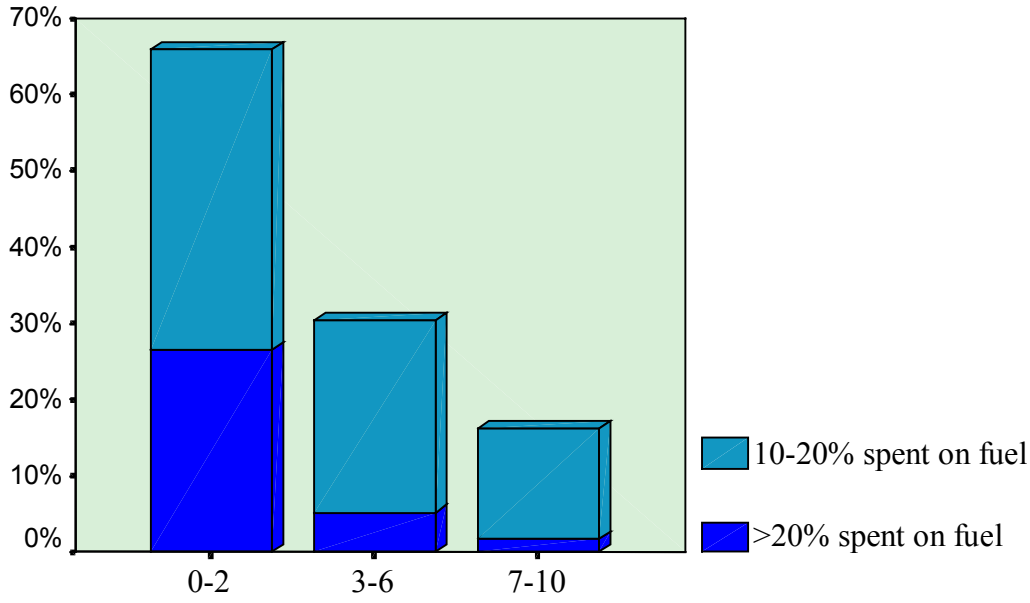


Figure 5.8 Fuel Poor Households (total fuel costs) by Energy Efficiency of Home: (%)



5.15 When total fuel costs are used, the effect is to moderate the differences between the three dwelling types. This is because the definition includes other fuel costs which not associated with thermal efficiency of the dwelling but are related to household size.

Table 5.5 shows that the biggest numbers of both total fuel poor and extreme fuel poor live in tenement housing. Figure 5.9 confirms that tenements also house the biggest proportions of fuel poor and extreme fuel poor households, with the exception only of flats in converted buildings and tower block/slab constructed properties (which are numerically very small)

Table 5.5 Fuel Poor households by property type

	Households requiring to spend 10% - 20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**	**Total Fuel Poor Households (000's)**
Detached house	49 (64)	28 (36)	78 (100)
Semi-detached house	76 (106)	21 (33)	97 (139)
Terraced house	88 (137)	22 (34)	109 (171)
Tenement	106 (153)	33 (46)	140 (199)
Four in a block	42 (67)	9 (14)	51 (81)
Flat in converted building	7 (10)	5 (7)	(16)
Tower/Slab	15 (23)	4 (7)	20 (31)

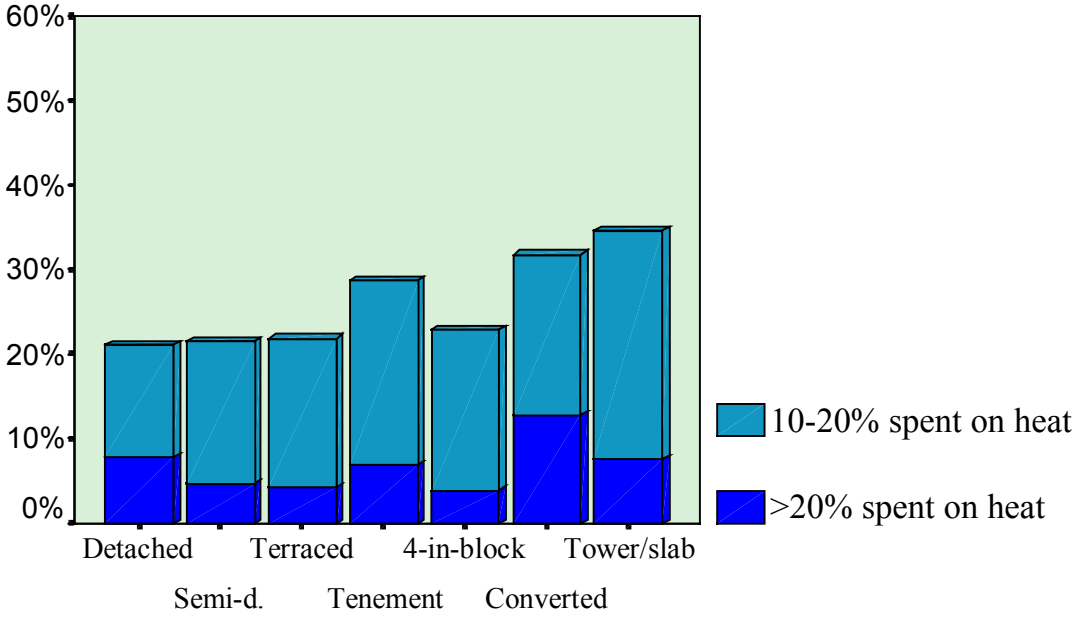
(Figures in brackets calculated using total fuel costs)

5.16 More than one in four (29%) of those who live in tenements are fuel poor to some degree; with 7% of households in extreme fuel poverty.

5.17 Annex 4 contains further details on the household and housing characteristics of the fuel poor, using the household classification scheme of the Scottish House Condition Survey 1996, and giving details on the age of properties and their location in terms of urban or rural.

Figure 5.9. Fuel Poor Households (Heating costs)

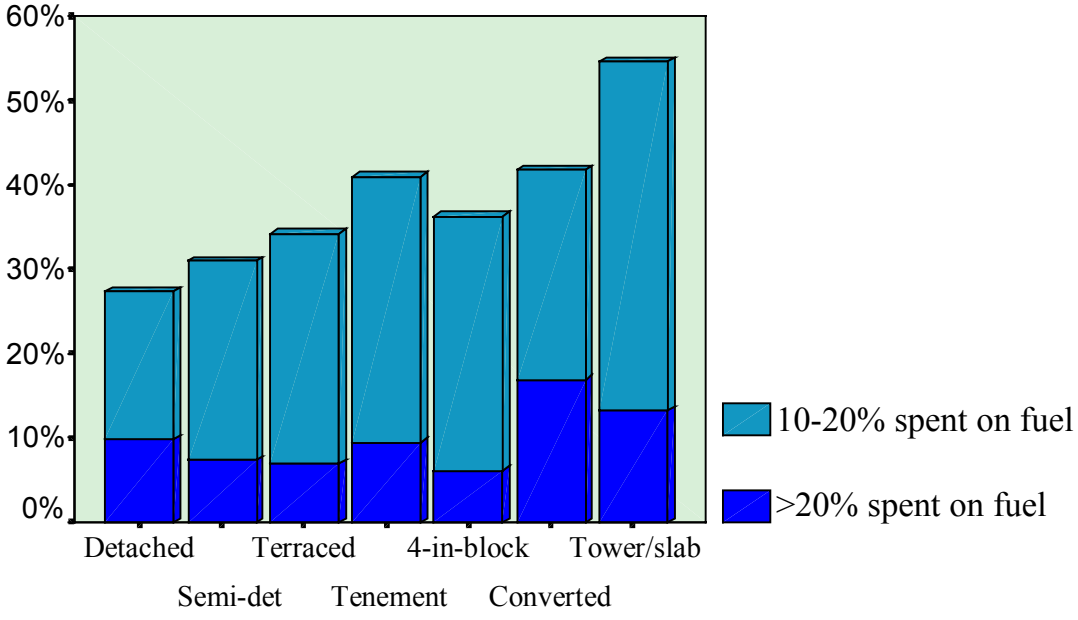
by Property Type: (%)



Type of Dwelling

Figure 5.10 Fuel Poor Households (total fuel costs)

by Property Type: (%)



Type of Dwelling

CHAPTER 6: DWELLING IMPROVEMENTS

6.1 Tackling fuel poverty through dwelling improvements has the attraction of improving the dwelling stock at the same time as enabling households to better afford to heat their homes. Given the information in Chapter 4 on the energy efficiency of Scottish housing, there is clearly scope for potential improvements to take place. These could address the problems of poor insulation, lack of central heating and single glazing that exists within Scottish housing. This chapter calculates the impact various property improvements would have on the number of fuel poor households.

6.2 Improvements to insulation, heating and windows were evaluated by using the same models as previously used to estimated required fuel costs, this time amending the models to simulate carrying out improvements to the stock. The models generate an upgraded NHER rating, resulting annual fuel costs and a capital cost of carrying out the improvement. The cost of each improvement is given in Annex 5.

6.3 The improvements considered are listed in Table 6.1. These are modelled in terms of a number of potential combinations of individual improvements, or 'scenarios' and the combinations we have used are summarised in Table 6.22. Some of these scenarios are more practical than others, either in total, or as applied to particular chapters of the total stock.

Table 6.1: Possible improvements to the thermal quality of Scottish Housing

Improvement	**Number of Properties in Scotland that could benefit (000's)**
INSULATION	
Installation of loft insulation to a thickness of 200mm	731
Insulation of hot water storage	104
Insulation of tanks and water pipes in loft	281
Installation of cavity wall insulation (houses)	653
Installation of cavity wall insulation (flats)	341
Internal lining of solid wall dwellings	567
HEATING	
Installation of gas central heating in dwellings with none	92
Installation of electric central heating in dwellings currently using electric room heaters	117
WINDOWS	
Installation of timber double glazing in dwellings with single glazing	795

Table 6.2: Combinations of property improvements applied to Scottish housing

	Number of properties improved (000's)	Number of properties housing fuel poor improved (000's)
SCENARIO A All improvements above to insulation, heating and windows	1,808	473 (671)
SCENARIO B All improvements to insulation	1,719	453 (640)
SCENARIO C Installation of central heating	209	116 (136)
SCENARIO D Installation of double glazing	795	251 (346)
SCENARIO E Insulation but excluding cavity wall insulation in flats and internal lining to solid wall dwellings	1,156	299 (419)

(Figures in brackets calculated using total fuel costs)

6.4 The first scenario (A) applies all improvements listed in Table 6.1. The next three scenarios (B-D) respectively apply improvements to the insulation of properties, heating systems, and windows separately. Finally scenario E illustrates the impact of a 'practical' set of improvements to property insulation. In scenario E improvements to cavity wall insulation in flats and internal lining to solid wall dwellings were excluded on the grounds of impracticality.[4]

6.5 Table 6.2 indicates how many properties the modelled scenarios would affect, and how many of the fuel poor would be affected to some degree.

6.6 The impact of improvements to the Scottish housing stock

6.7 Here the impact of each scenario on the energy efficiency of Scottish housing is summarised. Firstly, the scenarios are applied to all housing that would benefit from them. Subsequently they are applied to the properties occupied by the fuel poor.

6.8 Table 6.3 summarises the effects of applying the five scenarios to the total housing stock. A total of 1,808,000 dwellings in Scotland (85% of all dwellings) would benefit from at least one of the improvements listed in Table 6.1 (scenario A). Carrying out all improvements to all the housing stock in Scotland has the effect of raising the NHER of the improved stock by an average of 2.2 points (from 4.0 to 6.2), and the overall national NHER rating to 6.1. The average savings in annual fuel costs to households in improved properties are around £240 per annum, and the average cost of these improvements would be £1740, giving a total bill of £3.2bn. For half of these improved properties the capital investment would be recouped in less than 5 years.

[4] There are considerable difficulties in carrying out cavity wall insulation in flats as it requires the co-operation of all owners and tenants in a block and this can often prove extremely difficult to achieve. Internal wall lining is often unpopular with occupants as it reduces living space and disrupts internal decoration. These are clearly not insurmountable problems but omitting these improvements creates a scenario that in some senses reflects a more practically achievable outcome in terms of insulation.

Table 6.3: Impact of scenarios on Scottish housing: all housing

	%age of Stock improved	Average NHER (original)	Average NHER (revised)	Average annual fuel cost savings	Average Improvement costs	%age of improved dwellings with payback within 5 years
A	85%	4.0	6.2	£242	£1736	51%
B	81%	4.0	5.4	£192	£535	89%
C	10%	2.5	4.2	£417	£1650	55%
D	37%	3.9	4.3	£63	£2429	0%
E	54%	3.9	5.0	£135	£332	79%

6.9 The costs incorporated into Scenario D are for a full installation cost and take no account of cost differentials where single glazing is replaced by double glazing at the end of its useful life, as often happens during life cycle maintenance projects.

6.10 When the three components of the full improvements are considered separately (Scenarios B-D) it can be seen that the majority of dwellings in Scotland would benefit from improvements to their insulation, a tenth would benefit from installation of central heating, and over a third from having double glazing installed. For each of these improvements there are considerable differences in the impact on savings in fuel costs. Average savings resulting from the installation of central heating (scenario C) are around £420, insulation improvements (scenario B) result in average savings of approximately £190 and double-glazing (scenario D) has considerably less impact on fuel costs at an average saving of around £60. As expected the costs of these improvements also vary considerably; £535 for insulation, £1650 for central heating and £2430 for installation of double-glazing. For each of these improvements a payback period has been calculated, i.e. the number of years in which the costs of the improvements could be recouped in fuel cost savings. For the installation of insulation the payback is within 5 years for almost 90% of properties. For the installation of central heating it is within 5 years for just over half of properties and the payback period for double-glazing is over 5 years in all cases.

6.11 Turning to the impacts of improvements modelled in Scenario E, limited improvement to the insulation affects over half of the stock, and gives average annual household fuel cost savings of £135. The cost of these improvements is considerably lower than the full insulation at £330, with a payback within 5 years for almost 80% of the stock.

6.12 Given that the emphasis in this report is on the impact of dwelling improvements on fuel poverty, the above scenarios were also considered only for the dwellings occupied by those who are fuel poor to some degree, and all subsequent analysis only considers these properties.

Table 6.4: Impact of Scenarios on Scottish Housing: housing occupied by fuel poor and extreme fuel poor

	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (revised)	Average annual fuel cost savings	Average improvement costs	%age of improved dwellings with payback within 5 years
A	94% (91%)	3.0 (3.3)	5.6 (5.7)	£379 (£329)	£2135 (£2015)	52% (50%)
B	89% (87%)	3.0 (3.3)	4.6 (4.8)	£268 (£240)	£576 (£548)	94% (93%)
C	23%(18%)	2.0 (2.1)	3.7 (3.9)	£527 (£492)	£1574 (£1601)	70% (66%)
D	50%(47%)	2.9 (3.2)	3.3 (3.6)	£78 (£74)	£2352 (£2355)	0% (0%)
E	59% (57%)	2.9 (3.2)	4.0 (4.3)	£179 (£164)	£328 (£324)	85% (84%)

(Figures in brackets calculated using total fuel costs)

6.13 The general patterns that emerge are similar (Table 6.4). However there are a number of points which should be highlighted. In general housing occupied by fuel poor households is of lower energy efficient quality than the rest of Scottish housing as indicated by the low average NHER rating before applying improvements, and consequently a greater proportion of this stock is improved under each scenario. For example, under scenario A (all possible improvements) and measuring fuel poverty using heating fuel costs, almost 95% of properties housing fuel poor households would be improved to some degree. The limited insulation improvements (scenario E) will impact on nearly 60% of the fuel poor. A second general point under all scenarios is that the improvements result in higher average savings, and slightly improved pay back periods. These points apart, the general patterns across Tables 6.3 and 6.4 are very similar.

6.14 The general conclusions that can be drawn from Table 6.4 are as follows. Scenarios C and D alone (central heating and double-glazing) appear to be inferior approaches to alleviating fuel poverty through property improvements. The installation of central heating will only affect around a quarter of the fuel poor, and the installation of double glazing has a relatively high improvement cost, with modest fuel savings achieved. In general terms, insulation based improvements offer at least as good impacts on energy efficiency rating of the improved stock as other options, at lower average cost, and with significant consequent reductions in average fuel costs. As a consequence the investments can be seen to pay themselves back much more quickly. These conclusions are strengthened when we take into account the effects of the different scenarios in reducing the extent, and degree of severity of fuel poverty.

IMPACT OF IMPROVEMENTS ON FUEL POVERTY

6.15 The impact of each scenario of improvements on the number of fuel poor and the extent of their fuel poverty is summarised in Table 6.5

Table 6.5: Impacts of housing improvements on fuel poverty

	Households requiring to spend 10%-20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**		**Total fuel poor Households (000's)**	**Total Cost of Improvement (£m)**
Baseline	**384 (561)**	**123 (178)**		**506 (738)**	
	Household moving out of fuel poverty	*Households moving out of fuel poverty*	*Households moving into 10-20% band*	*Households moving out of fuel poverty*	
Reductions from					
Scenario A	-242 (-263)	-24 (-11)	-76 (-108)	-266 (-274)	1011 (1353)
Scenario B	-179 (-188)	-1 (-0)	-72 (-83)	-180 (-188)	260 (352)
Scenario C	-46 (-41)	-4 (-1)	-32 (-36)	-50 (-42)	183 (218)
Scenario D	-37 (-36)	-0 (-0)	-13 (-13)	-37 (-36)	590 (814)
Scenario E	-81 (-82)	-0 (-0)	-35 (-34)	-81 (-82)	98 (136)

(Figures in brackets calculated using total fuel costs)

6.16 Applying the full range of improvements to the heat poor stock results in a reduction of 266,000 in the number of fuel poor – a reduction of just over 50%. This would be achieved at a cost of just over £1 billion. There is a reduction of about a third (180,000) from insulation improvements alone (scenario B). The reductions resulting from the other three scenarios are considerably less with for example 50,000 of households (10%) being removed from fuel poverty when only central heating improvements are made. When 'practical' insulation improvements are applied some 81,000 households are removed from fuel poverty, considerably more than that achieved under scenario C, but at around half the cost of that scenario. In terms of numbers reached scenario B looks the most attractive option, but as already noted this includes improvements that for logistic or household preference reasons make them impractical to achieve. The next best option is scenario E in terms of numbers removed from fuel poverty for a given cost. Although the addition of central heating has much less impact on the numbers of fuel poor as can be seen from Table 6.3 the savings realised by those dwellings given central heating are substantial. It may be that an approach which involved the addition of heating and insulation in the poorest dwellings could be cost effective, although this has not been modelled specifically.

6.17 The impact of the different scenarios on the fuel poor defined on the basis of total fuel costs, (in terms of the numbers which are removed from fuel poverty), is remarkably similar to that achieved heating related fuel costs are used. The dwelling improvements modelled only have an impact on the space and water heating fuel costs of a property. This shows therefore that the two definitions differ in the extent to which they include households in fuel poverty as a result of low income (relative to fuel costs) rather than because they live in housing with different energy efficiency profiles.

6.18 A final point to make from Table 6.5 is that even if a considerable range of improvements to the stock occupied by the fuel poor were to be made (scenario A), there

would still be approximately 250,000 households who would remain in fuel poverty. Clearly dwelling improvements alone are not sufficient to eradicate fuel poverty. A large number of these households are fuel poor as a result of low income rather the poor energy efficiency of their dwelling. The most significant factors that would alleviate the fuel poverty remaining after scenario A were effected would be enhancements to income, and movements in the price of fuel – either generally, or in terms of the differential costs associated with different methods of payments.

6.19 Although there is scope for some additional dwelling improvements other than those modelled here , for example the upgrading of old central heating systems, this would only affect a small proportion of the remaining fuel poor.

IMPACT OF IMPROVEMENTS ON PARTICULAR HOUSEHOLDS AND PROPERTIES

6.20 The impact of different scenarios of improvement vary not just in their overall effects, but in the ways they impact on specific groups of households and dwellings. Annex 6 provides a detailed breakdown of each scenario in terms of its energy efficiency impacts across tenure, initial energy efficiency of the properties improved and household type. The following chapter considers the impact on numbers of fuel poor households within these categories, for scenarios A and E. The tenure breakdown is given since different issues relate to the design and implementation of policies in the private and public sectors. The breakdown by NHER rating illustrates the likely effect of any policy that targets the poorest stock. The household groups we have specified could be used for policy targeting, given both the elevated rates of fuel poverty evident in some of them and the fact that these groups can be identified in the population at large.

FUEL POVERTY AND HOUSE TENURE

6.21 Table 6.6 shows the impacts of the two scenarios on the numbers of fuel poor in different tenures in Scotland. The reduction in total fuel poor that results from full dwelling improvements is split almost evenly between the private (127,000) and public (139,000) sectors. However when attention is focussed on the extreme fuel poor, the picture changes. Two thirds of the possible reduction in extreme fuel poverty through scenario A (64,000) occurs in the private sector. This suggests that in terms of tackling extreme fuel poverty through dwelling improvements, effectively targeting the fuel poor within the private sector will give the greatest return. Figure 6.1 demonstrates ‘how much’ of the fuel poor problem is addressed in each tenure by scenario A. In some 80% of households would be removed from extreme fuel poverty, 99,000 out of a total of 123,000. This achievement would be roughly the same for the public and private sectors.

Table 6.6: Fuel poverty by tenure: reductions from housing improvements

	Households requiring to spend 10%-20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**		**Total fuel poor Households (000's)**	**Total Cost of Improvement (£m)**
Baseline	**384 (561)**	**123 (178)**		**506 (738)**	
	Household moving out of fuel poverty	*Households moving out of fuel poverty*	*Households moving into 10-20% band*	*Households moving out of fuel poverty*	
SCENARIO A					
Owner occupied/ Private rented	-116 (-129)	-11 (-6)	-53 (-64)	-127 (-135)	556 (716)
Social Rented	-126 (-134)	-12 (-6)	-23 (-44)	-139 (-139)	455 (636)
Total	-242 (-263)	-24 (-11)	-76 (-108)	-266 (-274)	1011 (1353)
SCENARIO E					
Owner occupied/ Private rented	-44 (-49)	-0 (-0)	-25 (-22)	-44 (-49)	63 (84)
Social Rented	-38 (-33)	-0 (-0)	-10 (-12)	-38 (-33)	35 (50)
Total	-81 (-82)	-0 (-0)	-35 (-34)	-81 (-82)	98 (136)

(Figures in brackets calculated using total fuel costs)

6.22 Turning to scenario E, practical insulation improvements, the same general patterns emerge. Table 6.6 and Figure 6.2 indicate, as one would expect, that a lower proportion of the problem overall is addressed through this scenario. This is partly due to the smaller proportion of the stock effected (roughly 1/3rd of the fuel poor households do not require any of these practical insulation improvements) and the more limited nature of the improvements. (Annex 6). As the figure shows, the effectiveness of the scenario at removing extreme fuel poverty is similar in the private and public sectors. In absolute numbers also, scenario E again has a much greater impact on extreme fuel poverty in the private sector (reducing it by 25,000) than in the public sector (where the reduction is 10,000).

Figure 6.1: Impact of scenario A on Fuel Poor by tenure: (percentage reduction in Fuel Poor)

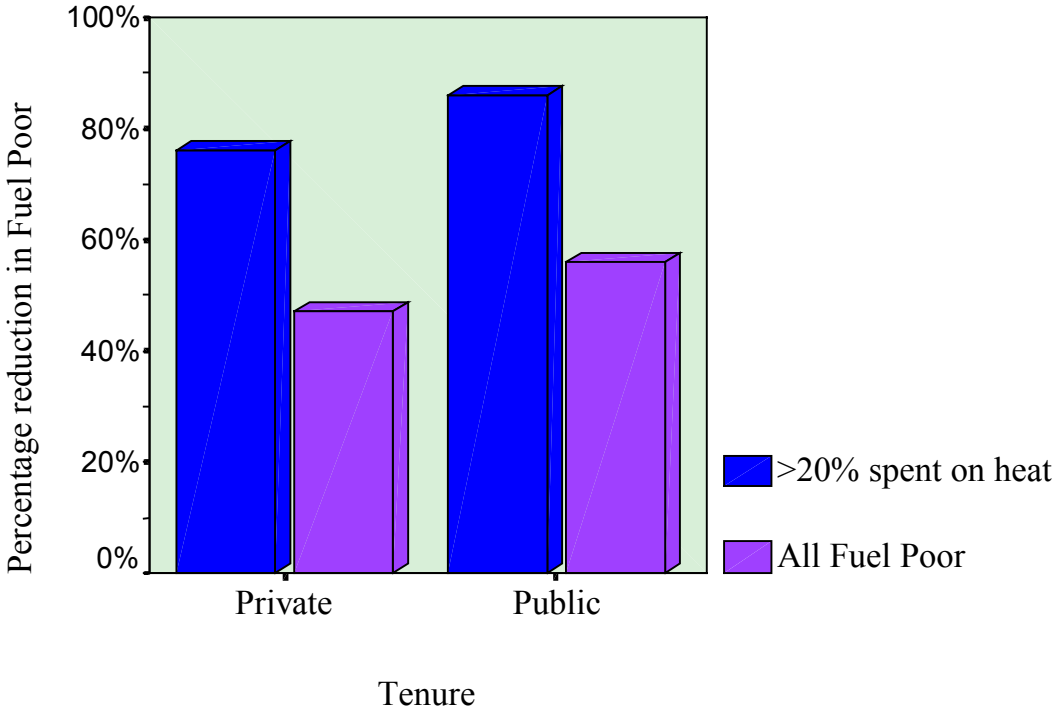
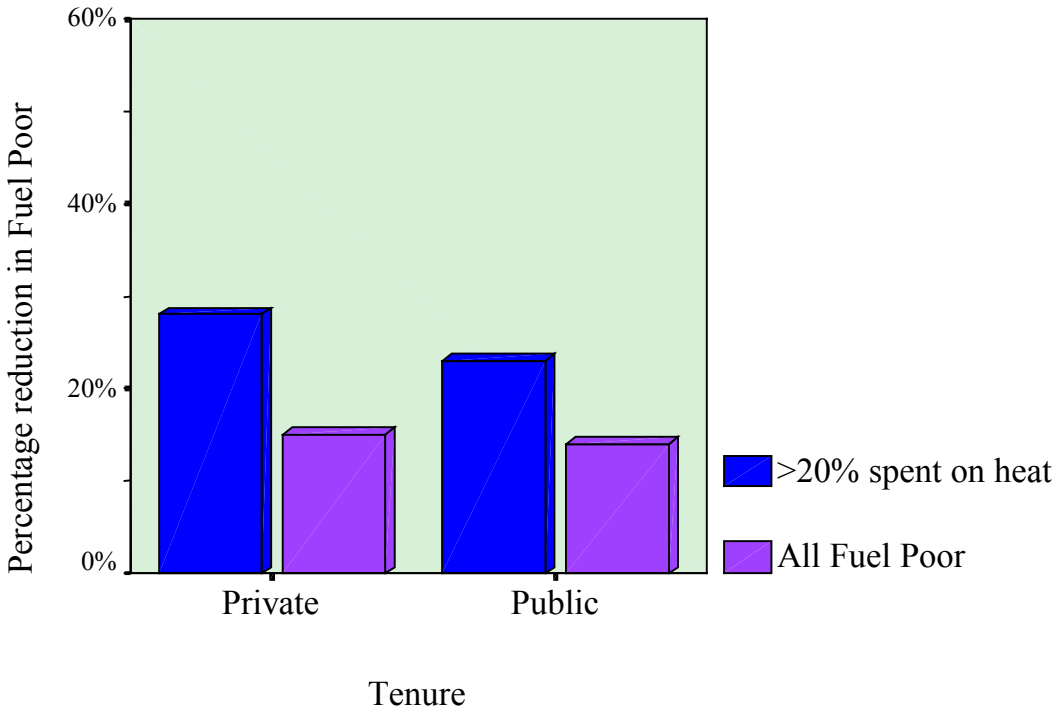


Figure 6.2: Impact of scenario E on Fuel Poor by Tenure: (percentage reduction in Fuel Poor)



FUEL POVERTY AND THE ENERGY EFFICIENCY OF PROPERTY

6.23 In table 6.7 the impact of improvements in scenarios A and E are illustrated for the stock categorised according to the energy efficiency of the properties inhabited by the fuel poor.

Table 6.7: fuel poverty by energy efficiency of property: reductions from housing improvements

	Households requiring to spend 10%-20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**		**Total fuel poor Households (000's)**	**Total Cost of Improvement (£m)**
Baseline	384 (561)	123 (178)		506 (738)	
	Household moving out of fuel poverty	*Households moving out of fuel poverty*	*Households moving into 10-20% band*	*Households moving out of fuel poverty*	
SCENARIO A					
NHER '0-2'	-87 (-78)	-21 (-11)	-41 (-59)	-108 (-89)	456 (526)
NHER '3-6'	-152 (-180)	-3 (-0)	-35 (-47)	-154 (-180)	546 (807)
NHER '7-10	-3 (-5)	-0 (-0)	-0 (-1)	-3 (-5)	9 (20)
Total	-242 (-263)	-24 (-11)	-76 (-108)	-266 (-274)	1011 (1353)
SCENARIO E					
NHER '0-2'	-26 (-19)	-0 (-0)	-17 (-16)	-26 (-19)	39 (46)
NHER '3-6'	-55 (-63)	-0 (-0)	-18 (-18)	-55 (-63)	58 (89)
NHER '7-10	-0 (-1)	-0 (-0)	-0 (-0)	-0 (-1)	0.2 (0.6)
Total	-81 (-82)	-0 (-0)	-35 (-34)	-81 (-82)	98 (136)

(Figures in brackets calculated using total fuel costs)

6.24 Looking at the impact of improvements within groups of dwellings of different energy efficiency qualities, nearly two thirds of the reduction in total fuel poverty from carrying out full dwelling improvements (Scenario A) comes in dwellings with a moderate energy efficiency rating (NHER 3-6). However, the picture is different with regard to extreme fuel poverty, where almost two thirds of the reduction resulting from full dwelling improvements arises within properties rated poor (NHER 0-2).

6.25 Figure 6.3 shows that the effect of scenario A in reducing the numbers of fuel poor in poor rated properties is only slightly higher than its effect in reducing such households in moderate rated properties. For example, over 80% of the extreme fuel poor occupying stock rated NHER '0-2' can be moved from fuel poverty through dwelling improvements, whereas three quarters of those extreme fuel poor households in stock rated '3-6' can be tackled in this way.

6.26 The impact of the more limited improvements (scenario E) in contrast is not concentrated in the poorest stock. These improvements have substantially less impact on the problem of extreme fuel poverty (Fig 6.4) in poor rated stock than they do in the moderately rated stock. In absolute number terms roughly equal numbers of extreme fuel poor households are reached in poor and moderate rated properties. Taking the effect of scenario E on all fuel poor, the cost of the improvements applied to moderate rated property appears to generate higher value than if applied to poor rated property. For £58 million, 55,000

households in are removed from fuel poverty in moderate rated stock. For poor stock the relevant figures become £39 million and only 26,000.

6.27 These results perhaps more than the other breakdowns show the importance of the 'impractical' insulation improvements to the resolution of fuel poverty through energy efficiency measures. Much of the poorest stock, and many of the most extreme fuel poor households would need internal wall lining of solid walls or cavity wall insulation in flats to make major inroads into the energy inefficient stock, or the problem of extreme fuel poverty. This is not to say that a great deal can't be done to address fuel poverty through the practical insulation measures used in scenario E. But these need to be augmented by other measures possibly involving a more extensive set of improvements, stock demolition/conversion and new build on the one hand and income enhancement on the other.

Figure 6.3: Impact of scenario A on Fuel Poor by NHER: (percentage reduction in Fuel Poor)

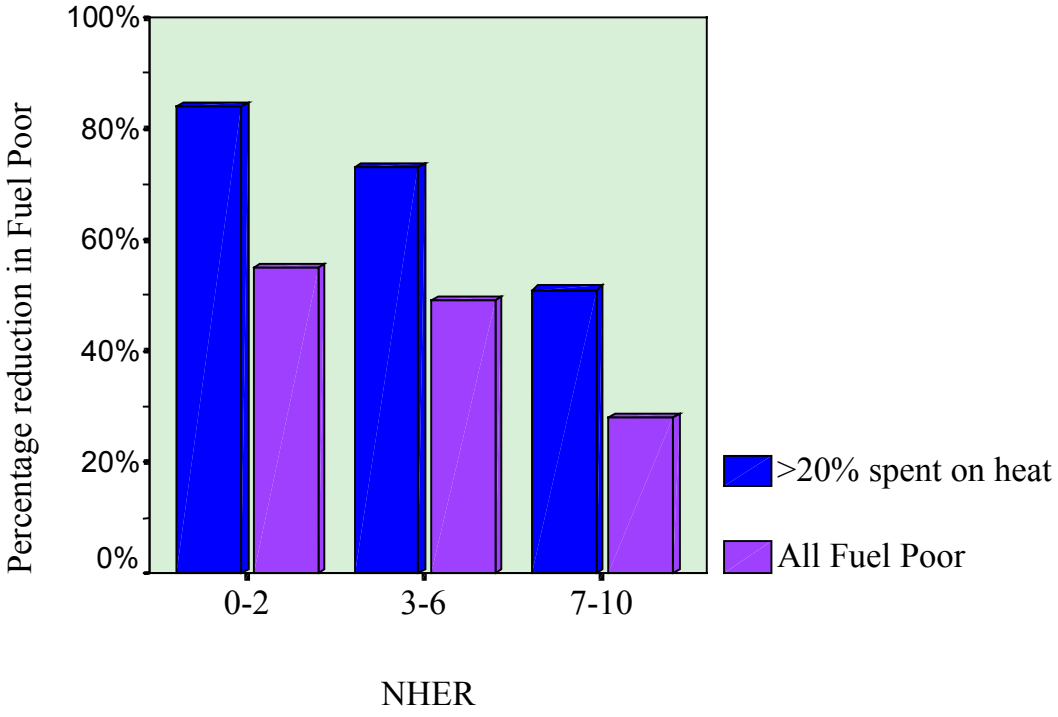
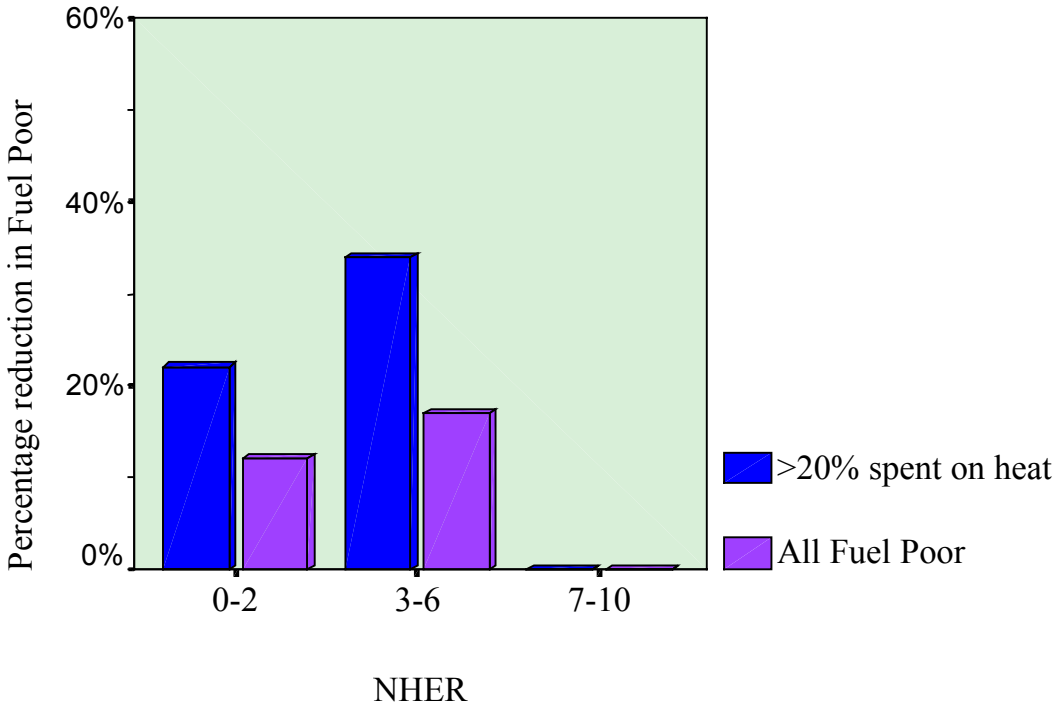


Figure 6.4: Impact of scenario E on Fuel Poor by NHER: (percentage reduction in Fuel Poor)



FUEL POVERTY AND HOUSEHOLD TYPE

6.28 Impact on fuel poverty is summarised by household group in Table 6.8. The greatest reduction in total fuel poor under scenario A is found in the non-elderly households which claim the 'passport' benefits entitling them to current Warm Deal scheme ('non-elderly claimants'). Targeting such households alone would alleviate fuel poverty for some 87,000 affected households at a cost of around £303 million.

Table 6.8: Fuel poverty by household type: reductions from housing improvements

	Households requiring to spend 10%-20% income on fuel (000's)	**Households requiring to spend >20% income on fuel (000's)**		**Total fuel poor Households (000's)**	**Total Cost of Improvement (£m)**
Baseline	**384 (561)**	**123 (178)**		**506 (738)**	
	Household moving out of fuel poverty	*Households moving out of fuel poverty*	*Households moving into 10-20% band*	*Households moving out of fuel poverty*	
SCENARIO A					
Non elderly, non claimants	58 (-77)	3 (-2)	15 (-19)	-61 (-79)	226 (338)
Non elderly, claimants	-76 (-86)	-11 (-4)	-16 (-32)	-87 (-90)	303 (455)
Elderly, non claimants	-54 (-50)	-5 (-2)	-32 (-36)	-59 (-52)	279 (314)
Elderly claimants	-53 (-50)	-5 (-3)	-13 (-21)	-59 (-53)	203 (244)
Total	-242 (-263)	-24 (-11)	-76 (-108)	-266 (-274)	1011 (1353)
SCENARIO E					
Non elderly, non claimants	-23 (-30)	-0 (-0)	-8 (-6)	-23 (-30)	24 (39)
Non elderly, claimants	-21 (-21)	-0 (-0)	-8 (-10)	-21 (-21)	22 (35)
Elderly, non claimants	-22 (-19)	-0 (-0)	-14 (-12)	-22 (-19)	34 (40)
Elderly claimants	-15 (-12)	-0 (-0)	-5 (-6)	-15 (-12)	18 (22)
Total	-81 (-82)	-0 (-0)	-35 (-34)	-81 (-82)	98 (136)

(Figures in brackets calculated using total fuel costs)

6.29 In terms of extreme poverty, the biggest absolute group of beneficiaries from Scenario A would be the elderly who currently don't claim such benefits (37,000).

6.30 In terms of Scenario E the biggest impact in reducing extreme fuel poverty occurs amongst the elderly non-claimants (Table 6.8). In terms of all fuel poor households similar numbers of fuel poor are affected by the improvement apart from elderly claimant households where substantially fewer households are removed from fuel poverty.

6.31 Figures 6.5 and 6.6 show how these reductions affect the overall levels of fuel poverty within household groups in proportionate terms. There are no clear patterns which emerge when considering the relative effectiveness of the different approaches to dwelling improvement .

Figure 6.5: Impact of scenario A on Fuel Poor by Household Groups: (percentage reduction)

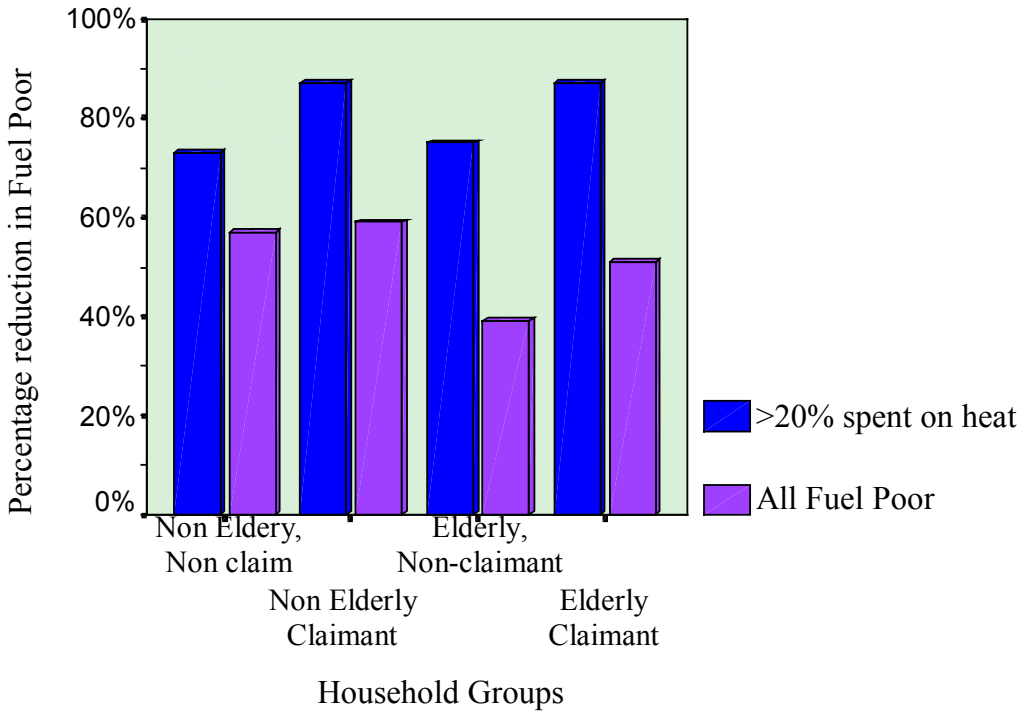
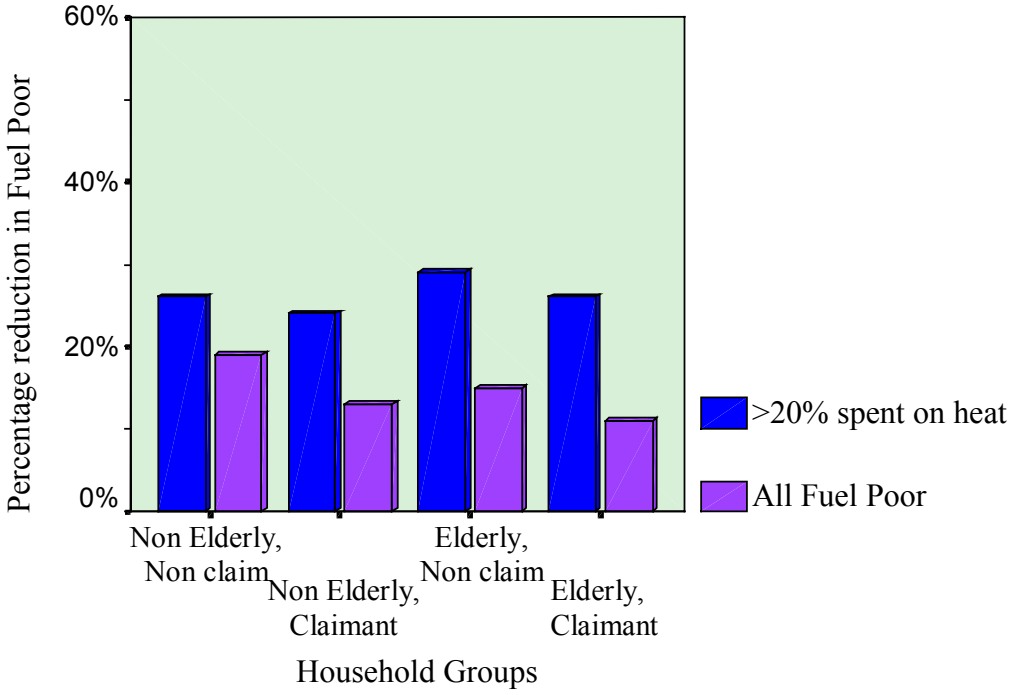


Figure 6.6: Impact of Scenario E on Fuel Poor By Household Groups: (percentage reduction)



ANNEX 1 : THE BEDROOM STANDARD

A1.1 The Scottish House Condition Survey 1996 Bedroom Standard calculated the minimum number of bedrooms required by the people resident in a dwelling, taking into account their ages and the nature of their relationships as far as possible. It then compared this number with the number of bedrooms available in the dwelling. The difference between these two measures formed the basis of a five-category classification:

- 3 or more above standard
- 2 above standard
- 1 above standard
- Equal to standard
- Below standard

A1.2 The minimum number of bedrooms required by a household was calculated as follows: a separate bedroom was allocated to each co-habiting couple, any other person aged 21 or over, each pair of young persons aged 10-20 of the same sex, and each pair of children under 10 (regardless of sex). Unpaired young persons aged 10-20 were paired with a child under 10 of the same sex if possible or allocated a separate bedroom. Any remaining unpaired children under 10 were also allocated a separate bedroom.

A1.3 In dwellings with multiple households where relationships were unknown, additional households were assigned the minimum number of bedrooms they required by allocating people to rooms in pairs. The number of bedrooms available in the dwelling was calculated as follows: bedrooms were all rooms described as such by surveyors. Where dwellings had more than six rooms the extra were not explicitly described; these were assumed to be bedrooms for the calculation of the SHCS 1996 Bedroom Standard.

ANNEX 2: MODELLING FUEL COSTS

A2.1 The model used to calculate fuel costs using the assumptions outlined in Chapter 2 of the report is based on a software programme developed by the Building Research Establishment (BRE) to calculate energy consumption in dwellings. The latter programme, known as BREDEM (the Building Research Establishment Domestic Energy Model), has been developed over a period of decades. The current version is BREDEM-12.

A2.2 BREDEM-12 uses a mixture of analytical and empirical techniques to assess the energy requirements needed in a dwelling to achieve a specified heating regime. This, together with similar energy calculations techniques for water heating, cooking, lighting and other domestic appliances, models the full energy requirements of a dwelling. A full technical description of the model is covered in the BRE Laboratory Report (Anderson et al, 1996). A very broad description of the model is provided here.

A2.3 BREDEM-12 models a dwelling as a number of 'zones'. Zone one is the main living area of a dwelling; Zone two the remainder, or that proportion of the remainder explicitly designated if the property is underoccupied. The model takes as raw data the heating regime required for each zone, occupancy levels, and the dwellings' heating system.

A2.4 In calculating the energy requirements of a dwelling, BREDEM-12 uses what has been discovered about the thermal qualities of housing over successive English House Condition Surveys, and allows for:

- Dwelling 'U' values - that is the capacity of the fabric of a dwelling to allow heat loss from within, to the external environment.
- 'Infiltration rates' - that is the patterns of air movement within a dwelling.
- 'Thermal capacity' – or the intrinsic ability of different materials (e.g. stone, or wood) to hold heat.
- 'Internal Heat Transfers – from zone one to zone two, and from zone two to the unheated part of a house (if relevant).
- 'Metabolic gains' – essentially heat from bodies.
- Characteristics of the heating system within a house, like efficiency, responsiveness to change, and control systems.
- External weather conditions, including temperature, wind, and solar effects.

A2.5 The modelling assumptions behind the estimates of non-heating fuel uses are based on research carried out in the 1970s and early 1980s. There is recognition that these may now need to be validated giving changes in appliance, lighting and cooking use in the last decade.

A2.6 To calculate annual dwelling fuel costs a complementary programme that works with BREDEM-12 was used. This programme, known as 'AutoEvaluator' was developed by the National Energy Foundation, (NEF) in conjunction with BRE. This program allows for Scottish criteria to be analysed as part of the program, especially with respect to wind speed, and dwelling construction variants. The main trigger for this is the postcode of the dwelling. A full technical description is available in the documentation developed by National Energy Services Ltd (National Energy Services Limited, 1997).AutoEvaluator uses information determined from the energy analysis and, together with data on the cost of different types of fuel calculates annual dwelling running costs, both in total and broken down by costs associated with:

- Space heating
- Water heating
- Lighting and electrical appliance use
- Cooking.

AutoEvaluator also generates three separate energy ratings for a dwelling:

- NHER (National Home Energy Rating), a rating system developed by NEF.
- SAP (Standard Assessment Procedure), a rating system developed by BRE.
- BEPI (Building Energy Performance Index), an alternative rating system developed by BRE.

ANNEX 3: NHER BY DWELLING AND HOUSEHOLD CHARACTERISTICS

Table A3.1 NHER Rating by Type of Dwelling

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Detached house	68	287	11	2	367
Semi-detached house	61	375	14	1	450
Terraced house	71	385	41	4	500
Tenement	102	314	65	6	487
Four in a block	25	166	31	1	223
Flat in converted building	5	29	5	0	39
Tower/Slab	19	32	3	1	56
Total	351	1588	167	16	2123

Table A3.2 NHER Rating by Type of Dwelling

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Detached house	19	78	3	1	3.9 (1.6)
Semi-detached house	13	83	3	0	4.2 (1.4)
Terraced house	14	77	8	1	4.4 (1.6)
Tenement	21	65	13	1	4.2 (1.9)
Four in a block	11	74	14	1	4.7 (1.6)
Flat in converted building	12	74	13	1	4.5 (1.7)
Tower/Slab	34	58	6	2	3.2 (1.8)
Total	17	75	8	1	4.2 (1.7)

Table A3.3 NHER Rating by Age of Dwelling

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Pre-1919	92	320	40	4	456
1919-1944	41	257	19	1	318
1945-1964	113	437	36	5	590
1965-1982	91	398	21	4	513
Post 1982	13	177	54	2	246
Total	350	1588	169	16	2123

Table A3.4 NHER Rating by Age of Dwelling

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Pre-1919	20	70	9	1	4.1 (1.8)
1919-1944	13	81	6	0	4.3 (1.5)
1945-1964	19	74	6	1	4.0 (1.7)
1965-1982	18	78	4	1	4.0 (1.6)
Post 1982	5	72	22	1	5.2 (1.6)
Total	17	75	8	1	4.2 (1.7)

Table A3.5 NHER Rating by Location

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Urban	254	1338	152	14	1758
Rural	96	250	18	2	364
Total	350	1588	169	16	2123

Table A3.6 NHER Rating by Location

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Urban	14	76	9	1	4.3 (1.7)
Rural	26	69	5	1	3.7 (1.7)
Total	17	75	8	1	4.2 (1.7)

Table A3.7 NHER Rating by Household type

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Single adult	52	165	21	3	241
Small adult	59	284	33	3	379
Single parent	21	84	11	0	117
Small family	48	285	31	2	366
Large family	21	151	14	1	187
Large adult	33	207	21	2	262
Older smaller	46	206	15	2	270
Single Pensioner	70	206	23	3	301
Total	349	1588	169	16	2123

Table A3.8 NHER Rating by Household type

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Single adult	22	69	9	1	4.0 (1.9)
Small adult	16	75	9	1	4.3 (1.7)
Single parent	18	72	10	0	4.2 (1.8)
Small family	13	78	8	1	4.4 (1.6)
Large family	11	81	8	0	4.5 (1.5)
Large adult	13	79	8	1	4.3 (1.6)
Older smaller	17	76	6	1	4.0 (1.6)
Single Pensioner	23	68	8	1	3.9 (1.8)
Total	16	75	8	1	4.2 (1.7)

Table A3.9 NHER Rating by Tenure

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Owner occupier	158	951	85	6	1200
Public Rented	133	482	53	7	675
HA/ Housing Co-op	10	56	19	2	87
Private Rented	48	99	12	2	162
Total	349	1588	169	16	2123

Table A3.10 NHER Rating by Tenure

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Owner occupier	13	79	7	1	4.3 (1.6)
Public Rented	20	71	8	1	4.1 (1.7)
Housing Association/ Co-operative	11	65	22	2	4.8 (1.9)
Private Rented	30	61	8	1	3.6 (1.9)
Total	16	75	8	1	4.2 (1.7)

Table A3.11 NHER Rating by Weekly Income band

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Less than £100	81	243	29	3	356
£100-£199	143	503	58	6	710
£200-299	63	313	1	3	410
£300-£399	31	228	26	1	286
£400+	30	291	26	2	349
Total	349	1588	169	16	2111*

* **Income data missing for some cases**

Table A3.12 NHER Rating by Weekly Income band

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Less than £100	23	68	8	2	3.9 (1.8)
£100-£199	20	71	8	1	4.0 (1.8)
£200-299	15	77	8	1	4.2 (1.6)
£300-£399	11	80	9	1	4.5 (1.6)
£400+	9	84	7	1	4.6 (1.4)
Total	16	75	8	1	4.2 (1.7)

Table A3.13 NHER Rating by Benefit dependency

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Independent	131	800	82	6	1019
Low dependency	41	191	17	2	251
Moderate dependency	66	239	26	2	333
High dependency	102	323	39	5	470
Total	349	1588	169	15	2074*

*** Information on Benefit dependency missing for some cases**

Table A3.14 NHER Rating by Benefit dependency

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Independent	13	79	8	1	4.4 (1.6)
Low dependency	16	76	7	1	4.1 (1.6)
Moderate dependency	20	72	8	1	4.1 (1.8)
High dependency	22	69	8	1	4.0 (1.8)
Total	16	75	8	1	4.2 (1.7)

Table A3.15 NHER Rating by Household groups

	NHER 'Poor' (000's)	NHER 'Moderate' (000's)	NHER 'Good' (000's)	NHER 'Missing' (000's)	Total (000's)
Non elderly, non claimants	149	881	90	7	1127
Non elderly, claimants	85	295	41	4	425
Elderly, non claimants	67	236	18	2	323
Elderly, claimants	49	176	20	3	248
Total	349	1588	169	16	2123

Table A3.16 NHER Rating by Household groups

	NHER 'Poor' (%)	NHER 'Moderate' (%)	NHER 'Good' (%)	NHER 'Missing' (%)	NHER Mean (SD)
Non-elderly, non Claimants	13	78	8	1	4.4 (1.6)
Non-elderly, claimants	20	69	10	1	3.9 (1.7)
Elderly, non claimants	21	73	6	1	4.1 (1.8)
Elderly, claimants	20	71	8	1	4.0 (1.7)
Total	16	75	8	1	4.2 (1.7)

ANNEX 4: FUEL POVERTY BY DWELLING AND HOUSEHOLD CHARACTERISTICS

Table A4.1. Fuel Poor by Type of Dwelling

	Not Fuel Poor (000's)	Households requiring to Spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on fuel (000's)	'Missing'	Total (000's)
Detached house	281 (258)	49 (64)	28 (36)	8 (8)	367
Semi-detached house	348 (305)	76 (106)	21 (33)	6 (6)	450
Terraced house	384 (322)	88 (137)	22 (34)	7 (7)	500
Tenement	329 (269)	106 (153)	33 (46)	18 (18)	487
Four in a block	168 (138)	42 (67)	9 (14)	5 (5)	223
Flat in converted building	25 (21)	7 (10)	5 (7)	2 (2)	39
Tower/Slab	35 (24)	15 (23)	4 (7)	2 (2)	56
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A4.2 . Fuel Poor by Type of Dwelling: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on Fuel (%)	'Missing' (%)
Detached house	77 (70)	13 (18)	8 (10)	2 (2)
Semi-detached house	77 (68)	17 (24)	5 (7)	1 (1)
Terraced house	77 (64)	18 (27)	4 (7)	2 (2)
Tenement	68 (55)	22 (31)	7 (10)	4 (4)
Four in a block	75 (62)	19 (30)	4 (6)	2 (2)
Flat in converted building	63 (53)	19 (25)	13 (17)	5 (5)
Tower/Slab	62 (42)	27 (41)	8 (13)	3 (3)
Total	74 (63)	18 (26)	6 (8)	2 (2)

Table A4.3. Fuel poor by age of dwelling

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on fuel (000's)	Missing (000's)	Total (000's)
Pre-1919	304 (266)	86 (109)	48 (63)	18 (18)	456
1919-1944	229 (187)	65 (100)	19 (27)	5 (5)	318
1945-1964	414 (336)	129 (189)	37 (55)	10 (10)	590
1965-1982	406 (353)	83 (125)	16 (27)	8 (8)	513
Post 1982	214 (194)	20 (38)	3 (6)	8 (8)	246
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A4.4 . Fuel Poor by Age of Dwelling: Percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on fuel (%)	'Missing' (%)
Pre-1919	67 (58)	19 (24)	11 (14)	4 (4)
1919-1944	72 (59)	21 (31)	6 (9)	1 (1)
1945-1964	70 (57)	22 (32)	6 (9)	2 (2)
1965-1982	79 (69)	16 (24)	3 (5)	2 (2)
Post 1982	87 (79)	8 (15)	1 (2)	3 (3)
Total	74 (63)	18 (26)	6 (8)	2 (2)

Table A4.5. Fuel Poor by Location

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on fuel (000's)	Missing (000's)	Total (000's)
Urban	1312 (1122)	311 (459)	93 (136)	42 (42)	1758
Rural	256 (214)	73 (102)	29 (42)	6 (6)	364
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A4.6. Fuel Poor by Location: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on Fuel (%)	'Missing' (%)
Urban	75 (64)	18 (26)	5 (8)	2 (2)
Rural	70 (59)	20 (28)	8 (12)	2 (2)
Total	74 (63)	18 (26)	6 (8)	2 (2)

Table A 4.7 . Fuel Poor by Household type

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on fuel (000's)	Missing (000's)	Total (000's)
Single adult	148 (124)	58 (74)	23 (31)	11 (11)	241
Small adult	319 (292)	35 (55)	13 (20)	12 (12)	379
Single parent	80 (50)	30 (56)	4 (9)	2 (2)	117
Small family	336 (306)	23 (48)	4 (8)	4 (4)	366
Large family	173 (149)	12 (33)	1 (4)	1 (1)	187
Large adult	214 (186)	32 (52)	9 (17)	7 (7)	262
Older smaller	178 (143)	68 (94)	20 (29)	4 (4)	270
Single Pensioner	120 (85)	125 (148)	49 (61)	7 (7)	301
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A 4.8. Fuel Poor by Household type: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on Fuel (%)	'Missing' (%)
Single adult	62 (52)	24 (31)	10 (13)	43 (4)
Small adult	84 (77)	9 (15)	3 (5)	3 (3)
Single parent	69 (43)	36 (48)	4 (8)	1 (1)
Small family	92 (84)	6 (13)	1 (2)	1 (1)
Large family	92 (80)	6 (18)	1 (2)	1 (1)
Large adult	82 (71)	12 (20)	3 (7)	2 (2)
Older smaller	66 (53)	25 (35)	7 (11)	2 (2)
Single Pensioner	40 (28)	42 (49)	16 (20)	2 (2)
Total	74 (63)	18 (26)	5 (8)	2 (2)

Table A4.9. Fuel Poor by Tenure

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on fuel (000's)	Missing (000's)	Total (000's)
Owner occupier	972 (890)	141 (200)	66 (88)	22 (22)	1200
Public Rented	443 (325)	184 (279)	36 (60)	11 (11)	675
HA/ Housing Co-op	62 (48)	17 (30)	4 (6)	3 (3)	87
Private Rented	91 (74)	41 (52)	17 (24)	12 (12)	162
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A4.10. Fuel Poor by Tenure: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on Fuel (%)	'Missing' (%)
Owner occupier	81 (74)	12 (17)	6 (7)	2 (2)
Public Rented	66 (48)	27 (41)	5 (9)	2 (2)
HA/Housing Co-op	72 (55)	20 (34)	5 (7)	4 (4)
Private Rented	56 (46)	25 (32)	11 (15)	7 (7)
Total	74 (63)	18 (26)	5 (8)	2 (2)

Table A4.11. Fuel Poor by Weekly Income band

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel 000's	Households requiring to spend >20% income on Fuel 000's	Missing (000s)	Total (000's)
Less than £100	58 (21)	180 (177)	95 (135)	23 (23)	356
£100-£199	489 (321)	187 (341)	27 (41)	8 (8)	710
£200-299	393 (368)	14 (37)	0 (2)	3 (3)	410
£300-£399	282 (280)	3 (5)	0 (0)	1 (1)	286
£400+	347 (346)	0 (0)	0 (0)	2 (2)	349
Total	1568 (1336)	384 (561)	123 (178)	32 (32)	2111*

*** Some cases missing income data**

Table A4.12. Fuel Poor by Weekly Income band: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on Fuel (%)	'Missing' (%)
Less than £100	16 (6)	51 (50)	27 (38)	6 (6)
£100-£199	69 (45)	26 (48)	4 (6)	1 (1)
£200-299	96 (90)	3 (9)	1 (0)	1 (1)
£300-£399	99 (98)	1 (2)	0 (0)	0 (0)
£400+	99 (99)	0 (0)	0 (0)	1 (1)
Total	74 (63)	18 (26)	5 (8)	2 (2)

Table A4.13. Fuel Poor by Benefit dependency

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% income on Fuel (000's)	Missing (000's)	Total (000's)
Independent	927 (874)	58 (100)	18 (29)	17 (17)	1019
Low dependency	216 (191)	28 (51)	5 (6)	3 (3)	251
Moderate dependency	201 (127)	105 (165)	22 (37)	4 (4)	333
High dependency	198 (122)	184 (234)	77 (103)	11 (11)	470
Total	1568 (1336)	384 (561)	123 (178)	35 (35)	2074*

***Some cases missing benefit dependency information**

Table A4.14. Fuel Poor by Benefit dependency: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to spend >20% income on fuel (%)	'Missing' (%)
Independent	91 (86)	6 (10)	2 (3)	2 (2)
Low dependency	86 (76)	11 (20)	2 (3)	1 (1)
Moderate dependency	60 (38)	32 (49)	7 (11)	1 (1)
High dependency	42 (26)	39 (50)	16 (22)	2 (2)
Total	74 (63)	18 (26)	5 (8)	2 (2)

Table A4.15. Fuel Poor by Household groups

	Not Fuel Poor (000's)	Households requiring to spend 10%-20% income on fuel (000's)	Households requiring to spend >20% Income on fuel (000's)	Missing (000's)	Total (000'S)
Non-elderly, non Claimants	999 (933)	77 (129)	24 (38)	27 (27)	1127
Non-elderly, claimants	271 (175)	113 (189)	30 (50)	10 (10)	425
Elderly, non claimants	168 (133)	100 (123)	48 (60)	7 (7)	323
Elderly, claimants	130 (94)	93 (120)	21 (30)	4 (4)	248
Total	1568 (1336)	384 (561)	123 (178)	48 (48)	2123

Table A4.16. Fuel Poor by Household groups: percentages

	Not Fuel Poor (%)	Households requiring to spend 10%-20% income on fuel (%)	Households requiring to Spend >20% Income on Fuel (%)	'Missing' (%)
Non-elderly, non Claimants	89 (83)	7 (11)	2 (3)	2 (2)
Non-elderly, claimants	64 (41)	27 (44)	7 (12)	2 (2)
Elderly, non claimants	52 (41)	31 (38)	15 (18)	2 (2)
Elderly, claimants	53 (38)	38 (48)	8 (12)	1 (1)
Total	74 (63)	18 (26)	5 (8)	2 (2)

ANNEX 5: IMPROVEMENT COSTS

Materials	**Fixed**	**Cost/sq m**
Cavity Fill	£100	£3
Dry Lining	£50	£10
Loft Insulation (avg)	£25	£2.50
Double Glazing per Window	£100	£80
Hot Water Tank Jacket	£8	
Insulation to Tanks & Pipes	£20	

Central Heating Costs	**Fixed**	**Cost/K**	**Cost/Room**
Add Gas Central Heating	£650	£50	£150
Add Electric Storage Heating	£300	£30	£75

All prices are exclusive of VAT

ANNEX 6: IMPACT OF HOUSING IMPROVEMENTS ON ENERGY EFFICIENCY AND FUEL COSTS

Table A6.1 Impact on full-range of improvements (Scenario A) on different groups

Groups	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (Revised)	Average annual fuel cost savings	Average improvement costs	Total cost of improvements £ millions	%age of improved dwellings with payback within 5 years
Tenure							
Private	94% (92%)	3.0 (3.2)	5.7 (5.8)	£445 (£400)	£2232 (£2133)	£556.0 (£716.3)	58% (58%)
Public	93% (90%)	3.1 (3.4)	5.5 (5.6)	£305 (£259)	£2027 (£1896)	£454.7 (£636.6)	44% (43%)
NHER cats							
0-2	98% (98%)	1.3 (1.4)	4.3 (4.2)	£616 (£572)	£2430 (£2339)	£455.8 (£525.8)	64% (63%)
3-6	92% (90%)	4.1 (4.2)	6.4 (6.4)	£226 (£211)	£19557 (£1865)	£546.3 (£806.8)	43% (44%)
7-10	55% (51%)	7.0 (7.0)	8.5 (8.4)	£114 (£106)	£1295 (£1448)	£8.6 (£20.2)	46% (40%)
HOUSEHOLD GROUPS							
Non elderly, Non-claimants	97% (94%)	2.8 (3.1)	5.5 (5.7)	£479 (£408)	£2313 (£2151)	£225.8 (£338.5)	58% (58%)
Non elderly, Claimants	96% (91%)	3.0 (3.4)	5.6 (5.8)	£380 (£298)	£2261 (£2094)	£310.4 (£455.4)	45% (43%)
Elderly, Non- claimants,	90% (89%)	3.1 (3.3)	5.6 (5.7)	£366 (£348)	£2032 (£1935)	£271.9 (£314.5)	57% (57%)
Elderly, Claimants	92% (90%)	3.2 (3.4)	5.6 (5.7)	£301 (£265)	£1936 (£1822)	£202.6 (£244.5)	48% (46%)
ALL	94% (91%)	3.0 (3.3)	5.6 (5.7)	£379 (£330)	£2135 (£2015)	£1010.7 (£1352.8)	52% (50%)

(Figures in brackets calculated using total fuel cost)

Table A6.2. Impact of all improvements to insulation (Scenario B) on different groups

Groups	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (Revised)	Average annual fuel cost savings	Average improvement costs	Total cost of improvements £ millions	%age of improved dwellings with payback within 5 years
Tenure							
Private	93% (91%)	3.0 (3.3)	4.8 (5.0)	£335 (£306)	£721 (£697)	£177 (£230.6)	95% (94%)
Public	86% (83%)	3.0 (3.4)	4.3 (4.6)	£189 (£169)	£404 (£388)	£83.8 (£120.1)	94% (92%)
NHER cats							
0-2	94% (94%)	1.3 (1.4)	2.9 (3.0)	£399 (£378)	£629 (£613)	£113.5 (£132.0)	98% (98%)
3-6	88% (86%)	4.1 (4.2)	5.6 (5.6)	£184 (£172)	£544 (£519)	£144.4 (£213.7)	92% (91%)
7-10	57% (49%)	7.1 (7.1)	8.1 (8.0)	£111 (£105)	£411 (£391)	£2.8 (£5.2)	81% (81%)
Household groups							
Non elderly, Non-claimants	93% (91%)	2.7 (3.1)	4.6 (4.8)	£362 (£313)	£758 (£704)	£70.8 (£106.8)	94% (94%)
Non elderly, Claimants	91% (86%)	3.0 (3.4)	4.4 (4.7)	£227 (£196)	£470 (£450)	£61.2 (£92.1)	95% (93%)
Elderly, Non- claimants	89% (87%)	3.2 (3.3)	4.8 (4.9)	£290 (£268)	£647 (£621)	£85.0 (£99.2)	95% (94%)
Elderly, Claimants	86% (83%)	3.2 (3.4)	4.6 (4.7)	£205 (£187)	£448 (£426)	£46.8 (£53.0)	93% (92%)
ALL	89% (87%)	3.0 (3.3)	4.6 (4.8)	£268 (£240)	£576 (£548)	£260.8 (£351.0)	94% (93%)

Figures in brackets calculated using total fuel cost)

Table A6.3 Impact of installation of central heating (Scenario C) on different groups.

Groups	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (Revised)	Average annual fuel cost savings	Average improvement costs	Total cost of improvements £ millions	%age of improved dwellings with payback within 5 years
Tenure							
Private	20% (17%)	1.9 (2.0)	3.7 (3.8)	£619 (£580)	£1597 (£1614)	£84.7 (£100.1)	75% (71%)
Public	26% (20%)	2.0 (2.2)	3.7 (3.9)	£449 (£419)	£1555 (£1590)	£98.1 (£118.3)	66% (61%)
NHER cats							
0-2	40% (36%)	1.1 (1.2)	2.9 (2.9)	£712 (£697)	£1371 (£1362)	£104.3 (£113.4)	96% (97%)
3-6	13% (11%)	3.5 (3.6)	5.3 (5.4)	£176 (£172)	£1957 (£1974)	£136.8 (£104.6)	20% (18%)
7-10[1]	2% (1%)	7.0 (7.0)	8.0 (8.0)	£60 (£60)	£2173 (£2173)	£0.4 (£0.4)	0% (0%)
Household groups							
Non elderly, Non-claimants	22% (18%)	1.6 (1.8)	3.4 (3.6)	£659 (£599)	£1516 (£1555)	£33.5 (£46.7)	87% (81%)
Non elderly, claimants	32% (23%)	2.0 (2.2)	3.6 (3.9)	£487 (£445)	£1518 (£1570)	£69.4 (£84.9)	69% (62%)
Elderly, Non- claimants	17% (15%)	2.0 (2.1)	3.8 (3.9)	£552 (£530)	£1653 (£1663)	£40.9 (£44.4)	65% (63%)
Elderly, Claimants	21% (17%)	2.2 (2.3)	4.1 (4.1)	£455 (£427)	£1651 (£1655)	£39.0 (£42.5)	63% (59%)
ALL	23% (18%)	2.0 (2.1)	3.7 (3.9)	£527 (£492)	£1574 (£1601)	£182.8 (£218.5)	70% (66%)

(Figures in brackets calculated using total fuel costs)
[1]. These figures are based on less than fifty cases.

Table A6.4 Impact of installation of double glazing (Scenario D) on different groups. Heat poor (fuel poor in brackets)

Groups	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (Revised)	Average annual fuel cost savings	Average improvement costs	Total cost of improvements £ millions	%age of improved dwellings with payback within 5 years
Tenure							
Private	45% (43%)	2.8 (3.1)	3.2 (3.4)	£80 (£77)	£2585 (£2600)	£310.6 (£406.1)	0% (0%)
Public	54% (51%)	3..0 (3.3)	3.5 (3.8)	£77 (£72)	£2138 (£2153)	£279.0 (£408.0)	0% (0%)
NHER cats							
0-2	56% (55%)	1.3 (1.3)	1.7 (1.8)	£106 (£104)	£2307 (£2302)	£246.1 (£289.2)	0% (0%)
3-6	47% (44%)	4.0 (4.2)	4.5 (4.6)	£58 (£57)	£2385 (£2382)	£337.2 (£508.0)	0% (0%)
7-10[2]	22% (25%)	7.1 (7.1)	7.4 (7.3)	£43 (£49)	£2413 (£2456)	£6.3 (£16.7)	0% (0%)
Household groups							
Non elderly, Non-claimants	47% (43%)	2.6 (2.9)	2.9 (3.3)	£83 (£78)	£2602 (£2608)	£124.2 (£189.5)	0% (0%)
Non elderly, Claimants	57% (53%)	2.8 (3.3)	3.3 (3.7)	£81 (£74)	£2245 (£2255)	£184.6 (£287.2)	0% (0%)
Elderly, Non- claimants,	42% (40%)	3.1 (3.2)	3.5 (3.6)	£75 (£73)	£2510 (£2507)	£157.2 (£183.5)	0% (0%)
Elderly, Claimants	51% (48%)	3.1 (3.3)	3.6 (3.8)	£75 (£71)	£2128 (£2121)	£123.5 (£153.7)	0% (0%)
ALL	49% (47%)	2.9 (3.2)	3.3 (3.6)	£78 (£74)	£2352 (£2355)	£589.6 (£814.1)	0% (0%)

(Figures in brackets calculated using total fuel cost)

2. These figures are based on less than fifty cases.

Table A6.5 Impact of limited improvements to insulation (Scenario E) on different groups

Groups	%age of Fuel Poor Stock Improved	Average NHER (original)	Average NHER (Revised)	Average annual fuel cost savings	Average improvement costs	Total cost of improvements £ millions	%age of improved dwellings with payback within 5 years
Tenure							
Private	67% (65%)	2.9(3.1)	4.0(4.2)	£205 (£192)	£358 (£357)	£63.2 (£84.9)	86% (85%)
Public	51% (48%)	3.0(3.3)	4.0(4.3)	£140 (£128)	£284 (£280)	£34.9 (£50.7)	84% (82%)
NHER cats							
0-2	63% (62%)	1.3(1.3)	2.4(2.4)	£255 (£246)	£325 (£323)	£39.2 (£46.1)	90% (90%)
3-6	58% (57%)	4.0(4.1)	5.1(5.2)	£128 (£123)	£331 (£326)	£58.6 (£88.9)	83% (82%)
7-10[3]	12% (13%)	7.1(7.1)	7.9(7.7)	£30 (£33)	£159 (£173)	£0.2 (£0.6)	15% (29%)
Household groups							
Non elderly, Non-claimants	67% (67%)	2.6(3.0)	3.8(4.1)	£216 (£194)	£355 (£351)	£24.1 (£39.0)	86% (86%)
Non elderly, Claimants	55% (51%)	3.0(3.3)	3.9(4.3)	£154 (£137)	£284 (£285)	£22.3 (£34.5)	81% (80%)
Elderly, Non- claimants,	64% (62%)	3.0(3.1)	4.2(4.3)	£191 (£182)	£359 (£359)	£34.0 (£40.4)	87% (87%)
Elderly, Claimants	51% (50%)	3.1(3.3)	4.2(4.3)	£149 (£137)	£303 (£292)	£17.7 (£21.6)	87% (84%)
ALL	59% (57%)	2.9(3.2)	4.0(4.3)	£179 (£164)	328 (324)	£98.2 (£135.7)	85% (84%)

(Figures in brackets calculated using total fuel cost)

3. These figures are all based on less than fifty cases.

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