Energy Use in Homes

A series of reports on domestic energy use in England

Energy Efficiency

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This is one of a series of five reports on the energy characteristics of the stock as observed by the 2001 English House Condition Survey.

The reports in this series are:

1. Energy Summary Report
2. Space and Water Heating
3. Thermal Insulation
4. Fuel Consumption
5. Energy Efficiency

The English House Condition Survey is funded and provided courtesy of the Office of the Deputy Prime Minister. More information about this survey can be found at www.odpm.gov.uk/ehcs

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Energy Efficiency

Executive Summary

The average SAP rating of dwellings in England is 50.6 – an increase of around five SAP points on the 1996 average. The number of dwellings with very poor energy efficiency (SAP less than 30) has decreased by around 1,000,000 dwellings since 1996 - however, there remain around 2 million dwellings (9% of the stock) below this level. A similar proportion (around 9%) have a SAP score of 70 or greater in 2001 – this is an increase from 5% in 1996.

Raised levels of loft and cavity wall insulation are reflected in a higher average SAP score. Houses with no loft insulation whatsoever have a mean SAP score of 37, whereas those with 150mm of insulation have a mean SAP score of 56. Dwellings without cavity wall insulation have a mean SAP score of 51, but those with insulation present have a mean SAP score of 60.

A clear pattern can be seen between SAP ratings and the type of primary heating system. Centrally heated dwellings have the highest average SAP rating of 53, dwellings with a programmable system (almost exclusively electric storage radiator systems) have an average SAP of 40, those employing fixed heater have an average SAP of 30 and the average SAP score of those with non-fixed heaters is less than 10.

Dwellings built with cavity walls have the best mean SAP scores in the housing stock (mean of 54). Dwellings built with solid walls have lower SAP scores, reflecting the greater level of heat loss through walls of this type.

Unsurprisingly, older dwellings tend to have lower SAP scores than more recent stock. The lowest SAP ratings are seen in the pre-1919 stock (mean SAP score of 41) and the highest SAP scores in the post-1980 stock (mean of 63). Since 1996 mean SAP scores have increased in dwellings of all ages – although the increase is seen to be larger in the more recent stock.

Similarly, all tenures show an increase in mean SAP scores since 1996. The private rented and RSL tenures show a six point rise, and the local authority tenure a seven point rise. A smaller rise of four SAP points is seen in the owner occupied stock. The RSL tenure has the highest mean SAP rating (SAP = 60) and the private rented sector the lowest (SAP = 45).

Purpose built flats have the highest mean SAP ratings in the housing stock (SAP = 61, with almost 30% of this dwelling type have a SAP > 70) and converted flats the lowest (mean SAP = 42). Regionally SAP scores vary according to the prevalence of each dwelling type, age, tenure and type of heating system in each region. The lowest SAP scores are seen in the South West where 15% of dwellings have a SAP rating below 30.

A high proportion of the one person over 60 group live in dwellings with a SAP below 30 (13%) although a high proportion also live in dwellings with a SAP above 70 (also 13%). The lone parent group shows the highest mean SAP in the stock (SAP = 54) and a high proportion with a SAP above 70 (14%) – this group has also seen the largest improvement in mean SAP rating since 1996 (seven points). Households with an older HRP tend to live in dwellings with a lower SAP ratings. The mean SAP of households with an HRP aged over 85 is only 45, compared to a mean SAP score of 53 for a household with an HRP aged between 26 and 35.

Households with higher incomes are less likely to live in dwellings with a SAP less than 30, and also less likely to live in dwellings with a SAP above 70 (i.e. they are more likely to live in dwellings with a mid-range SAP). The lowest income quintile has seen the biggest rise in mean SAP since 1996 (seven points), although 13% of the least well off households continue to live in dwellings with a SAP below 30, compared to 6% in the highest income quintile.

Energy Efficiency

INTRODUCTION

This report examines the energy efficiency of dwellings in England from information collected in the 2001 English House Condition Survey (EHCS). We assess the housing stock using the Government's Standard Assessment Procedure (SAP). This report considers variation in SAP ratings by both dwelling and household characteristics, drawing comparisons with the 1996 English House Condition Survey where appropriate.

The EHCS is a five yearly survey undertaken in order to assess the condition of the housing stock in England. The results presented here are from the sections of the survey that provide information on both the dwelling characteristics and the occupants. The survey results are based upon a sample of approximately 17,500 dwellings.

Standard Assessment Procedure

1.1 The Government's recommended system for home energy rating is the Standard Assessment Procedure (SAP). This procedure produces an energy cost rating (known as the SAP rating or SAP score) for any particular dwelling which is a function of the energy costs per unit area for space and water heating within that dwelling, and represents a measure of its energy efficiency. SAP ratings run from 1 to 120 – the higher the value the better the standard[i].

1.2 The SAP methodology is continuously reviewed and is updated every five years, and it is important when analysing any data to use the latest version of SAP. The original analysis of the 1996 English House Condition Survey[ii] used the SAP 1996 method. Since then, the SAP methodology has been updated to the SAP 2001 method. Analysis of the differences between the 1996 and 2001 methods has shown that SAP scores are generally slightly higher (between one and two points) when using the 2001 method, as opposed to the 1996 method. As a result it is not possible to simply compare the figures presented here with those published previously (for example those presented in the original 1996 EHCS Analysis). Therefore, the 1996 figures presented here are the result of re-analysis of the 1996 data using the SAP 2001 method.

Distribution of SAP ratings in the stock

2.1 The mean SAP rating of the 21 million dwellings in England in 2001 is approximately 50.6. This represents an increase of around five points on the 1996 average of 45.4 (as calculated using the 2001 methodology outlined above in paragraph 1.2).

2.2 The distribution of SAP scores around the average for both 1996 and 2001 is shown below in figure 2.1. The graph shows a clear move towards the right, and towards better SAP ratings throughout the stock. Of interest is the considerable 'tail' of low SAP scores (on the left of the graph) which can be seen for both the 1996 and 2001 data. This tail represents the stock with the worst energy rating. It is clear that the area underneath this tail (representing the number of dwellings with low SAP scores) has diminished somewhat between 1996 and 2001. A breakdown of the 2001 figures can be found in table 2.1.

2.3 In 2001 around 9% of dwellings have very low energy efficiency, revealed by a SAP rating of less than 30. Whilst this represents a considerable number of dwellings (around 2 million), this figure has reduced by around a third since 1996 when 15% (around 3 million dwellings)

had a SAP rating less than 30. However, it is clear that there remains considerable room for improving the energy efficiency of the poorest stock.

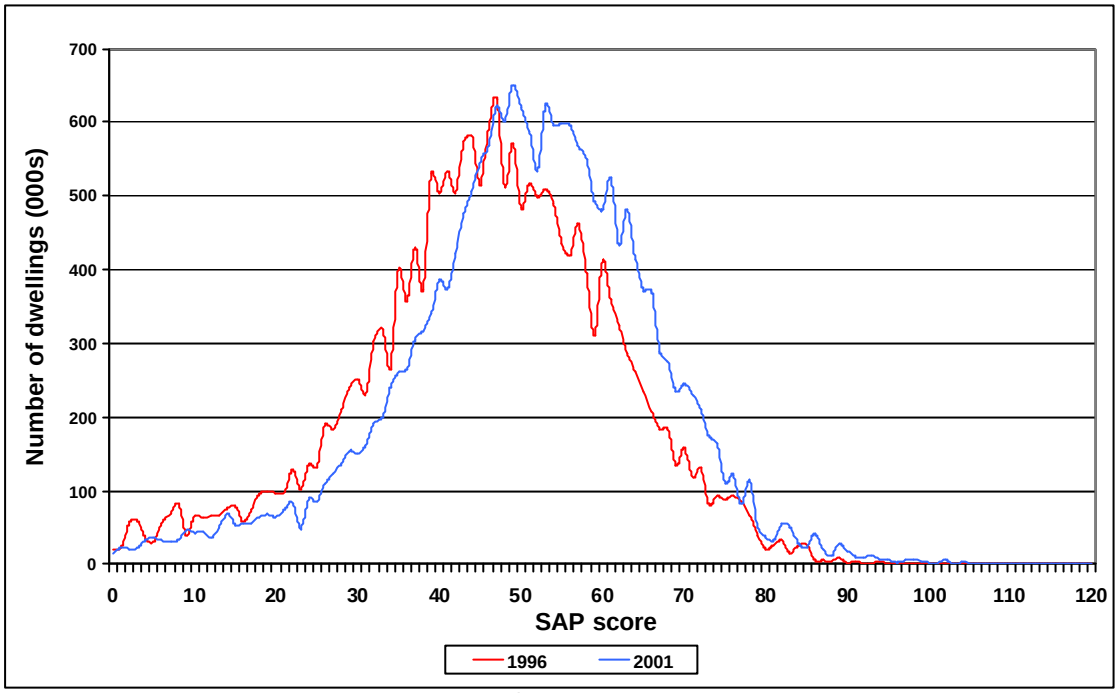

Figure 2.1 – Distribution of 1996 and 2001 SAP ratings within the English housing stock (all dwellings).

2.4 At the other end of the scale there has been an increase in the number of dwellings with high SAP scores (SAP > 70). 9% of all dwellings in 2001 are in this SAP band (2 million dwellings) – an increase from 5% (1.1 million dwellings) in 1996. It is likely that many of these dwellings will be new-builds completed since 1996.

Loft insulation, cavity wall insulation and primary heating system

Loft Insulation

The analysis in this section is limited to houses and bungalows with pitched roofs which have not been converted into loft rooms.

3.1 SAP scores are directly related to the levels of insulation within a dwelling, and it is no surprise that the two show a clear correlation. As levels of loft insulation rise, the mean SAP also rises. For houses with no insulation whatsoever, the mean SAP score is around 37, this rises to 56 for dwellings with 150mm of insulation. 27% of those with no loft insulation fall into the lowest SAP band (SAP < 30) with less than 1% achieving a SAP score greater than 70. For houses with 150mm of insulation the situation is reversed– only 6% of houses have SAP ratings less than 30, while 20% have SAP scores above 70 (i.e. those dwellings with thicker insulation have a higher SAP score). It is not surprising that there is this clear correlation between high levels of loft insulation and high SAP ratings. This is partly a result of the improved performance provided by the loft insulation, but also reflects the other energy efficiency measures which are more likely to be found in dwellings with higher levels of loft insulation (for example raised levels of cavity wall insulation and more efficient heating

systems). The mean SAP ratings of dwellings by loft insulation thickness are shown below in figure 3.1, and in table 3.1.

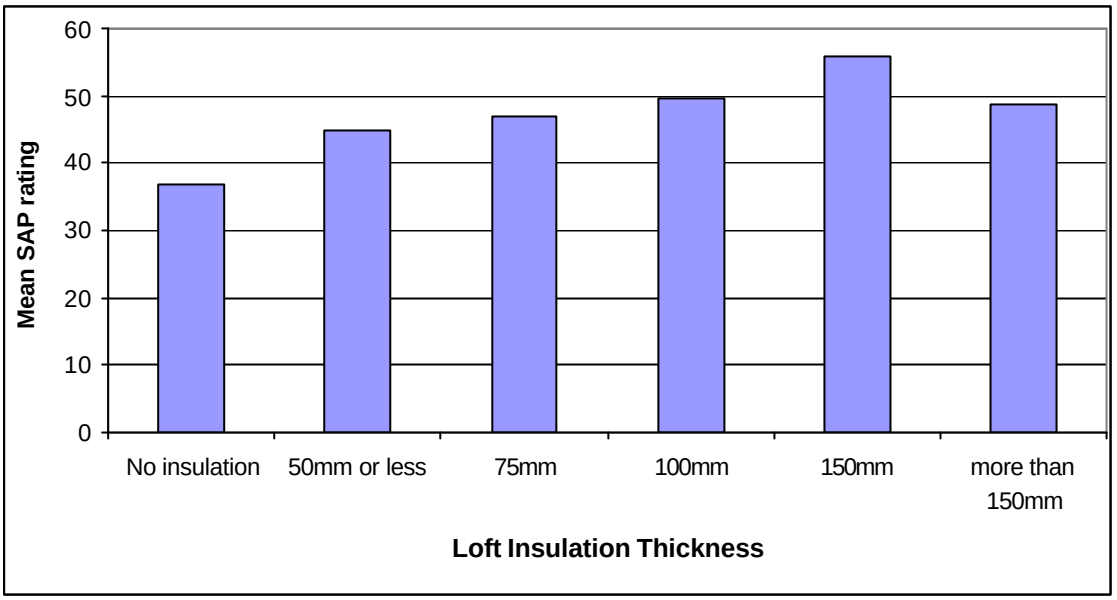

Figure 3.1 – Mean SAP rating by loft insulation thickness (all houses and bungalows with an unconverted loft).

3.2 Interestingly, while dwellings with 150mm of insulation have an average SAP score of 56, dwellings with *more* than 150mm of insulation have a *lower* average SAP (around 49). A similar anomalous picture is shown by the banded SAP scores. This may be because the very thickest loft insulation is primarily fitted retrospectively – and this tends to be in the older housing stock. Although the thick loft insulation raises the SAP ratings of this older stock – the stock has other energy losses associated with deficient insulation in other areas, wall construction and heating systems which counteract the improvement provided by the loft insulation. These other factors become more important as the loft insulation becomes thicker and the incremental savings in energy (and cost) diminish.

Cavity Wall Insulation

The analysis in this section considers just the 70% (14.7 million dwellings) with predominantly cavity walls.

3.3 We would expect to see higher SAP ratings in dwellings with insulated cavity walls, compared to dwellings with non-insulated cavity walls. The 2001 EHCS shows this very well. The mean SAP rating for a non-insulated cavity walled dwelling is approximately 51, this rises to around 60 for dwellings with insulation added. 8% of dwellings with non-insulated cavity walls have a SAP rating less than 30, and 9% have a SAP greater than 70. In comparison, only 4% of dwellings with cavity wall insulation have SAP scores below 30, while 19% achieve a score above 70. SAP ratings by the presence of cavity wall insulation are shown in figure 3.2 below, and in table 3.2.

3.4 This substantial difference in SAP scores reflects the importance of cavity wall insulation in energy efficiency terms - installation of cavity wall insulation can reduce heat loss through the walls by up to 40%[iii]. However, one cannot attribute this ten point difference in SAP scores to the presence or absence of cavity wall insulation alone. The EHCS shows that those dwellings with cavity wall insulation have other attributes (such as thicker loft insulation than those without cavity wall insulation) which will act to raise SAP scores in general. However,

the presence of cavity wall insulation increases the SAP ratings of these dwellings even further.

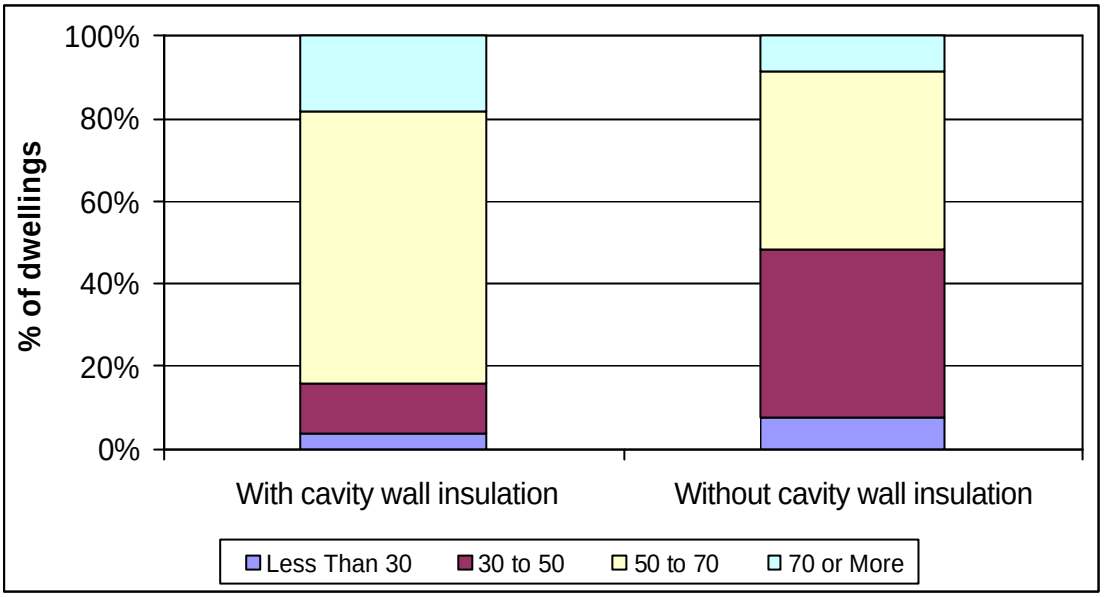

Figure 3.2 – Banded SAP ratings by presence of cavity wall insulation (all dwellings with predominantly cavity walls)

Primary Heating System

3.5 SAP ratings are heavily dependent on the running costs of a dwelling's primary heating system[1]. The EHCS shows that dwellings with central heating as their primary heating system achieve the best SAP scores, next best are dwellings with programmable systems (almost exclusively electric storage radiators), then fixed heaters and finally non-fixed heaters (which have the worst SAP ratings in the stock). The mean SAP score for dwellings with central heating is around 53, this drops considerably to around 40 for dwellings with a programmable system, 30 for fixed heaters and less than 10 for dwellings with non-fixed heaters as their primary provision. A similar pattern can be seen when considering the banded SAP ratings. Only 5% of dwellings with central heating have a SAP rating less than 30. This rises to 30% of dwellings with a programmable system, 45% of those with fixed heaters and almost all of those with non-fixed heaters (96%). As SAP scores increase this pattern continues - 10% of dwellings with central heating fall into the highest SAP band (SAP > 70), this compares to only 4% of dwellings with programmable systems and 2% of dwellings with fixed heaters. There are no dwellings at all with a SAP score above 50 which employ non-fixed heaters as their primary heating provision. Banded SAP ratings by primary heating provision are shown below in figure 3.3, and in table 3.3.

3.6 SAP is a cost based rating, and the pattern shown by primary heating provision is dependent upon the efficiency of the system, the fuel type and associated fuel prices. Although not true in all cases, central heating systems are usually more economical to run than programmable systems, with fixed and non-fixed heaters becoming increasingly more expensive ways of heating one's home. High heating system running costs result in a low SAP score. Other factors (such as typically raised insulation levels in centrally heated dwellings) are also likely to amplify the effect of more efficient space heating systems.

[1] See the Space and Water Heating report for definition of primary heating system.

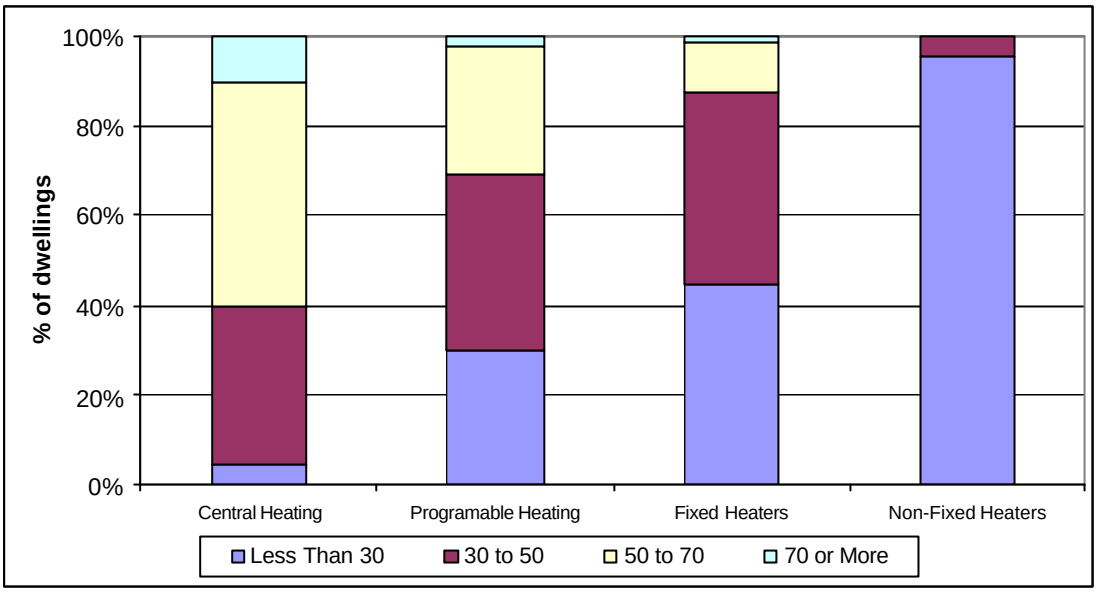

Figure 3.3 – Banded SAP ratings by primary heating provision (all dwellings).

Wall construction, dwelling age, tenure, dwelling type and geographical location.

Wall construction.

The analysis in this section only considers external walls.

4.1 The amount of heat lost through the walls of a dwelling, and the associated SAP ratings, are heavily dependent upon the materials and method used in the construction of the dwelling. This is shown in table 4.1. Dwellings with predominantly masonry cavity walls have the best SAP ratings of the stock – the average SAP rating of this group is 54, only 6% of these dwellings have a SAP rating of less than 30 while almost 12% of this group have SAP ratings above 70. These generally good SAP scores are unsurprising as walls of cavity construction let less heat pass through them than walls built using the other major methods of construction. In addition, it is possible to further improve the performance of dwellings with cavity walls by putting insulation inside the cavity – and this is relatively common (see paragraph 3.3). It should be noted that the better SAP scores exhibited by the stock with predominantly cavity walls also reflect other attributes of these dwellings – this method of construction is much more prevalent in the more recent stock which tends to have better levels of insulation throughout, and more efficient heating systems which will act to further increase the SAP scores of dwellings of this wall type.

4.2 Solid wall construction techniques fare worse than cavity masonry walls – the average SAP in this group is only 43 with around 17% of dwellings with solid walls having SAP ratings below 30, and only 2% of this group scoring above 70. Solid walls show higher levels of heat loss than cavity walls – and this is reflected in the lower SAP scores seen in dwellings built with this method of construction. In addition, the majority of solid walled dwellings are old, generally have lower levels of insulation and are less likely to have central heating installed which will exacerbate this effect.

Dwelling Age

4.3 Older dwellings are less energy efficient than the more recent stock. As we consider dwellings of increasing age we see SAP ratings decrease, more dwellings with a SAP below 30 and fewer dwellings with a SAP above 70. This is shown in figure 4.1 below, and in table 4.2. The difference between the oldest and most modern dwellings is significant – 45% of all pre-1919 dwellings have a SAP score less than 30, and less than 1% have a SAP score above 70 – the average SAP score is around 41. As dwellings become more modern SAP scores become progressively higher - only 3% of post-1980 dwellings have a SAP score of less than 30 and almost a third have a SAP greater than 70 – the average SAP score for post-1980 dwellings is around 63 - over twenty points higher than that seen in pre-1919 dwellings.

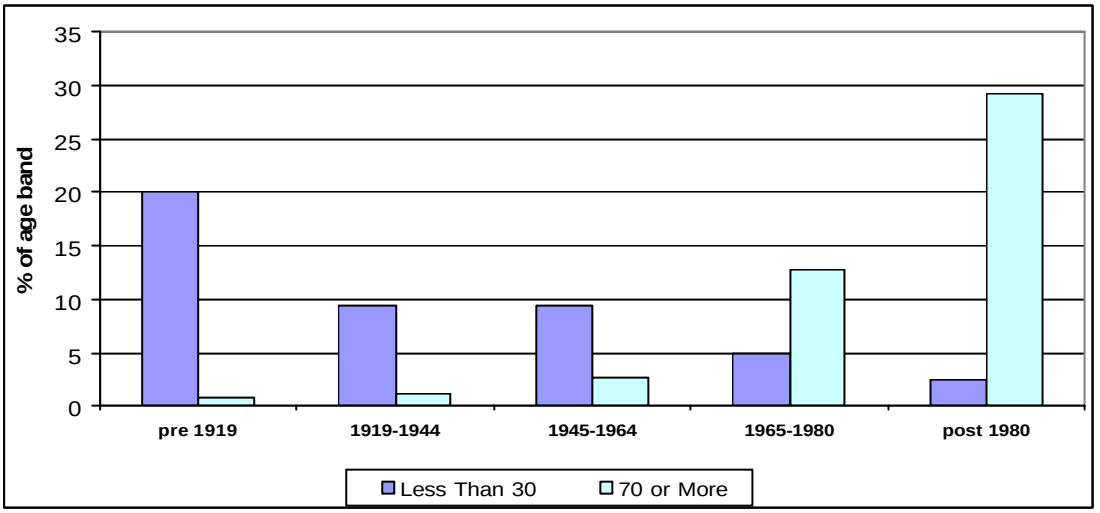

Figure 4.1 – SAP ratings below 30 and above 70 by age of dwelling (all dwellings).

4.4 Three key factors in determining SAP scores are a dwelling's external wall type, the level of insulation and type of space and water heating systems. Older dwellings tend to have less efficient varieties of all three. Older dwellings are primarily of less thermally efficient solid masonry construction which results in greater heat loss than cavity masonry construction – in addition solid walls cannot benefit from the installation of cavity wall insulation. Loft insulation is also less prevalent, and generally thinner, within the older stock, and older houses are more likely to have antiquated and inefficient space and water heating systems.

CHANGES SINCE 1996:

4.5 Dwellings of all ages have shown an improved level of energy efficiency since 1996 (as shown in figure 4.2 below) – although this is more apparent for dwellings of middle age groups rather than the newest or oldest dwellings Pre-1919 dwellings show an increase of around two SAP points, and post 1980 dwellings just under three points – dwellings built between 1965 and 1980 however have shown an increase of seven SAP points (the proportion of dwellings with SAP ratings above 70 has doubled in this group). We can associate this phenomenon with the installation of retrospective measures (e.g. cavity wall insulation and loft insulation) into this stock.

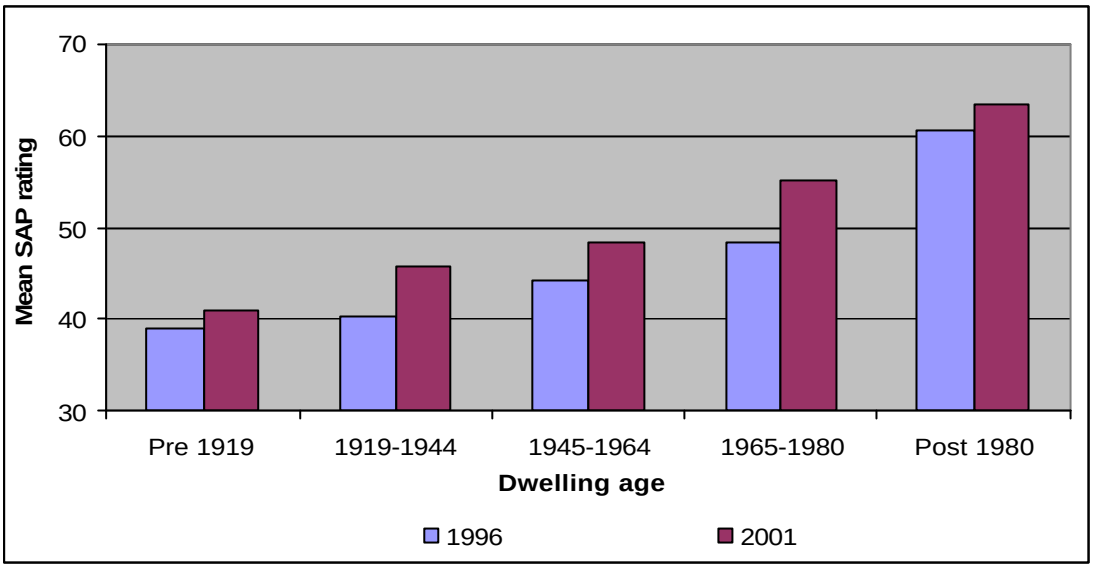

Figure 4.2 – Change in mean SAP between 1996 and 2001 by dwelling age (all dwellings).

Dwelling Tenure.

4.6 SAP scores for the different tenures show a distinct social/private tenure split. Average SAP ratings in the social sectors (local authority and RSL dwellings) are generally higher – particularly in the RSL sector which has a mean SAP rating of around 60. The owner occupied sector has an average SAP rating of approximately 50, with the private rented sector exhibiting the lowest mean score of 45. This pattern is reflected in the proportion of each tenure within each SAP band – 31% of RSL dwellings have a SAP greater than 70 (the largest proportion of all tenures) while less than 6% of RSL dwellings have a SAP rating of less than 30. Private rented dwellings have the highest proportion of dwellings with poor SAP ratings - 19% of this tenure has a SAP less than 30. The distribution of SAP ratings by tenure is shown in figure 4.3 below, and in table 4.3.

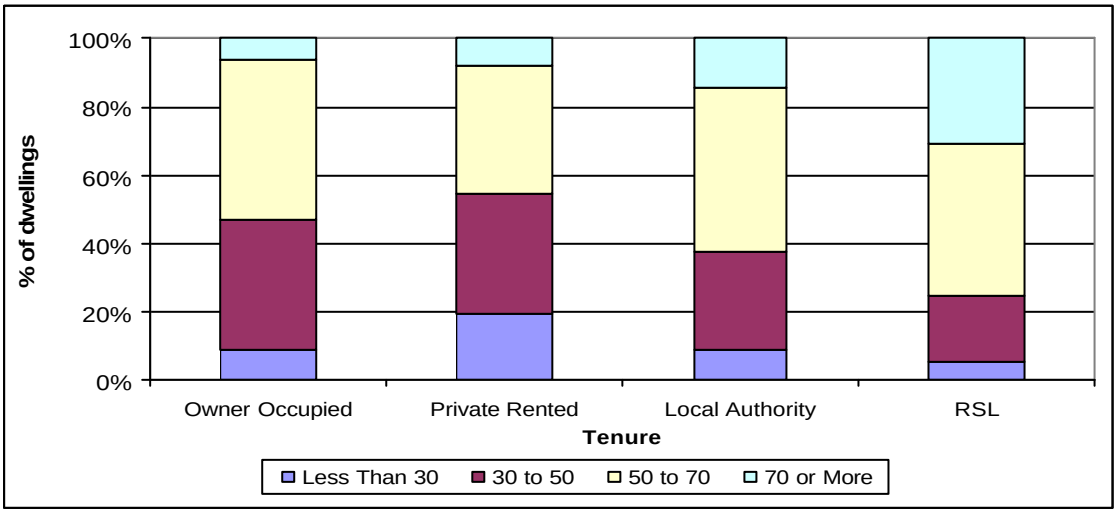

Figure 4.3 – Banded SAP ratings by tenure (all dwellings).

4.7 The typical age of the stock in each tenure can help to explain the difference in SAP ratings. Private rented dwellings tend to be within the older stock, and to have lower levels of insulation than the other tenures. In addition, they are the least likely of all tenures to have a central heating system installed. RSL dwellings on the other hand tend to be the newest and

best insulated of all the stock. Although central heating within this tenure is not as common as within the owner occupied or local authority stock, better energy efficiency in other areas counteracts this to increase overall efficiency and increase the SAP scores of the RSL stock.

CHANGES SINCE 1996:

4.8 Since 1996 all tenures have shown rises in mean SAP ratings. The owner occupied sector shows a four point rise, whereas the RSL tenure and private rented sectors have risen by slightly over six points. The local authority tenure shows the most improvement in mean SAP score with a rise of over seven SAP points.

Dwelling Type.

4.9 Different dwelling types exhibit different typical SAP ratings, as shown in table 4.4. Purpose built flats are generally more energy efficient than houses, with low-rise purpose built flats having the best SAP ratings of the entire stock – the mean SAP of this group is 61 with almost 30% of dwellings of this type having SAP scores of over 70. The average SAP rating of a high rise flat is slightly above average at 52 – although there are also a considerable number of high-rise purpose built flats with poor SAP scores of less than 30 (13% of this dwelling type). It is not surprising that purpose built flats in general score better than houses. There are likely to be several reasons for this. Firstly, they typically have fewer external surfaces (e.g. a 2nd floor flat may only have one wall exposed to the air - being surrounded by flats or sheltered space on all of the other five sides). This configuration reduces heat loss, increasing energy efficiency and increasing the SAP score for that dwelling. In addition, a high proportion of low-rise flats are modern (31% of all of this dwelling type have been built since 1980) and are more likely to have more efficient space and water heating systems and insulation measures. The lower scores for high-rise flats can be explained by the high proportion of these dwellings built with less efficient concrete walls, and the high percentage of high rise flats that rely on electric storage heaters and an electric immersion heater for their space and water heating provision.

4.10 The least energy efficient stock is the converted flats group. 18% of this group have SAP scores below 30, and the mean SAP rating of this stock is only 42 (compared to 50 across the stock as a whole). Converted flats tend to have the lowest levels of insulation, and the highest percentage of dwellings relying on fixed heaters for their space heating – which can help to explain their poor SAP scores.

4.11 Bungalows also have poor SAP ratings (averaging only 46) with all other house types having average SAP scores of around 50. This is likely to be related to the large external envelope of these dwellings which acts to increase heat-loss.

CHANGES SINCE 1996:

4.12 All dwelling types show an increase in SAP rating of between four and eight points, with the exception of converted flats, which actually show a small one point drop in average SAP rating since 1996. This anomaly may partially reflect a combination of demolitions, and conversions to and from converted flats in the period since 1996. In addition, experience tells us that surveyors may misidentify converted flats as a house in multiple occupation (HMO) and HMOs vice-versa, which may also contribute to this discrepancy.

Geographical Location.

4.13 When comparing the *mean* SAP scores between regions any differences are not always clear – however, when the *banded* SAP ratings are considered the distribution of energy efficient stock across England becomes more apparent as shown in table 4.5.

4.14 The highest mean SAP score (53) is found in the North East government region. However, this region does not, as might be expected, contain significantly more dwellings with the highest SAP scores (>70) than average. Indeed it contains slightly less. The higher *average* SAP can be explained by the considerable proportion of dwellings in the middle/high band of SAP scores between 50 and 70. The good SAP scores seen in the North East are likely to reflect both the raised levels of insulation in this stock and the more efficient space and water heating systems found in this region. Dwellings in the North East are the most likely to have insulated cavity walls, and the most likely to have the thickest loft insulation. In addition, the dwellings in this region are more likely to have a central heating system installed than the other regions.

4.15 The highest proportion of dwellings with SAP scores over 70 is found in London, where around 12% of all dwellings have this high rating. The high proportion of SAP scores over 70 reflects the number of purpose-built flats in the region (which is the most energy efficient dwelling type).

4.16 The lowest SAP scores are found in the South West – 15% of dwellings in this region have a SAP score of less than 30. Interestingly this region also contains a significant number of dwellings with SAP scores greater than 70 (10%). This pattern can be explained by the unusual nature of the stock in this region. Only 80% of dwellings in the South West employ a central heating system for their space heating, compared to the national average of 86% - this will act to reduce SAP ratings within this region and can explain the high number of dwellings with low SAP ratings. However, where a central heating system is present, high levels of insulation (for example double glazing and cavity wall insulation) within a substantial proportion of the stock in the South West acts to increase the percentage of dwellings in the South West with high SAP ratings.

CHANGES SINCE 1996:

4.17 The improvement in energy efficiency has not been uniform across the country. The North East government region has seen the biggest improvement (eight SAP points), and the South East the smallest (under three points). This may be related to the high proportion of dwellings in the social tenures in the North East, and the low proportion found in the South East.

Household characteristics.

5.1 SAP ratings vary by the characteristics of the occupying household. Examining who lives in dwellings with particular SAP ratings can help to build a better picture of the energy efficiency of the stock.

Household Type.

5.2 SAP ratings for each household type are shown in figure 5.1 below and in table 5.1. The group with the lowest average SAP score (SAP = 48) are couples over the age of 60 with no dependent children. This group is also the least likely to live in dwellings with a SAP rating above 70 (5%). This is the most likely group to live in energy inefficient bungalows (we can presume for reasons of mobility) which will contribute to a low average SAP score.

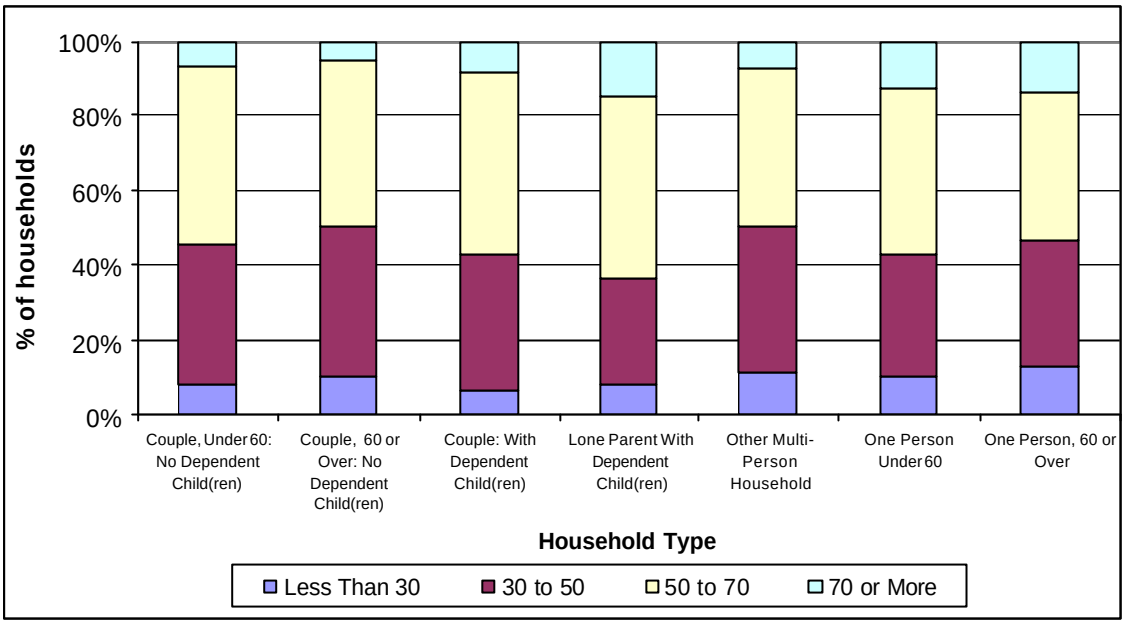

Figure 5.1 – Banded SAP ratings by household type (all households).

5.3 The one person aged 60 or over group tend to live in dwellings with both very low and very high SAP scores: 13% of this group (400,000 households) live in dwellings with a SAP score less than 30, however a high proportion of this group (13%) live in dwellings with high energy efficiency and a SAP greater than 70. This is the second most likely group to live in bungalows, and the second least likely of all household types to have central heating as the primary heating system - both of these factors can help to explain the high proportion of this group with low SAP ratings. However, also within this group are high numbers of households living in low-rise purpose built flats – which tend to be the most energy efficient of all dwelling types. This increases the proportion of this group with high SAP ratings.

5.4 The group with the highest average SAP rating (54) are lone parents with dependent children, 15% of households in this group live in dwellings with SAP greater than 70 – the highest of all household types. A high percentage of this group live in modern, low-rise purpose built flats, and live in the better insulated social tenures (50% of this household type are found in the social tenures) which is reflected in the increased SAP scores.

5.5 A high proportion (11%) of the multi-person households group live in dwellings with a poor SAP rating less than 30. This group includes a high proportion of households living in older dwellings (29% of this household type live in pre-1919 dwellings) which is reflected in the low SAP scores.

5.6 Similarly to the one person over 60 group, the one person *under* 60 group live in dwellings with both high and low SAP scores. A high proportion live in dwellings with poor energy efficiency (11%), but there is also a high percentage of this group living in dwellings with a SAP rating above 70 (12%). A large number of this group live in purpose built low-rise flats (which tend to have high SAP ratings) – but a high proportion also live in converted flats and lack central heating (contributing to the number with low SAP ratings).

CHANGES SINCE 1996:

5.7 All types of household are living in dwellings with improved energy efficiency in 2001 compared to 1996. The group which has seen the biggest improvement is the 'lone parent' household type – which has seen a seven point increase in SAP ratings and resulted in this

group having highest mean SAP of all household types. This reflects the high proportion of this group within the social tenures.

Age of household reference person.

5.8 The household reference person (HRP) is defined as the principal earner in a household. In general, households with an older HRP are more likely to live in dwellings with poor energy efficiency (SAP < 30). Only 6% of those households with an HRP between 26 and 35 live in dwellings with poor energy efficiency (SAP < 30), however, this rises gradually as we observe older HRPs. Within the group with the oldest HRPs (aged over 85) 25% of all households live in dwellings with a SAP below 30. The pattern is slightly different for very energy efficient dwellings with a SAP rating above 70. We observe a higher proportion of households with a young or old HRP within these very energy efficient dwellings than we do households with a middle-aged HRP. In terms of mean SAP scores, there is a clear pattern of lower SAP scores among households with older HRPs (mean SAP falls from 53 in the 26-35 age band to 45 in the over 85 age band). Households with a very young HRP (less than 25 years old) are slightly anomalous to these patterns – more tend to live in dwellings with SAP less than 30 than we might expect, and fewer in dwellings with SAP above 70. The distribution of SAP ratings by age of HRP is shown in figure 5.2 below, and in table 5.2.

5.9 Older HRP households are more likely to live in less energy efficient bungalows and to employ non-central heating systems (e.g. programmable heating or fixed heaters) which can help to explain the relatively large proportion of this group with low SAP scores. However, this group is more likely to belong to the social tenures (which tend to have higher levels of insulation, and better energy performance than the private tenures), and a large proportion also live in purpose built low rise flats (the most energy efficient of the stock) – which can also explain the large number of these households with high SAP scores.

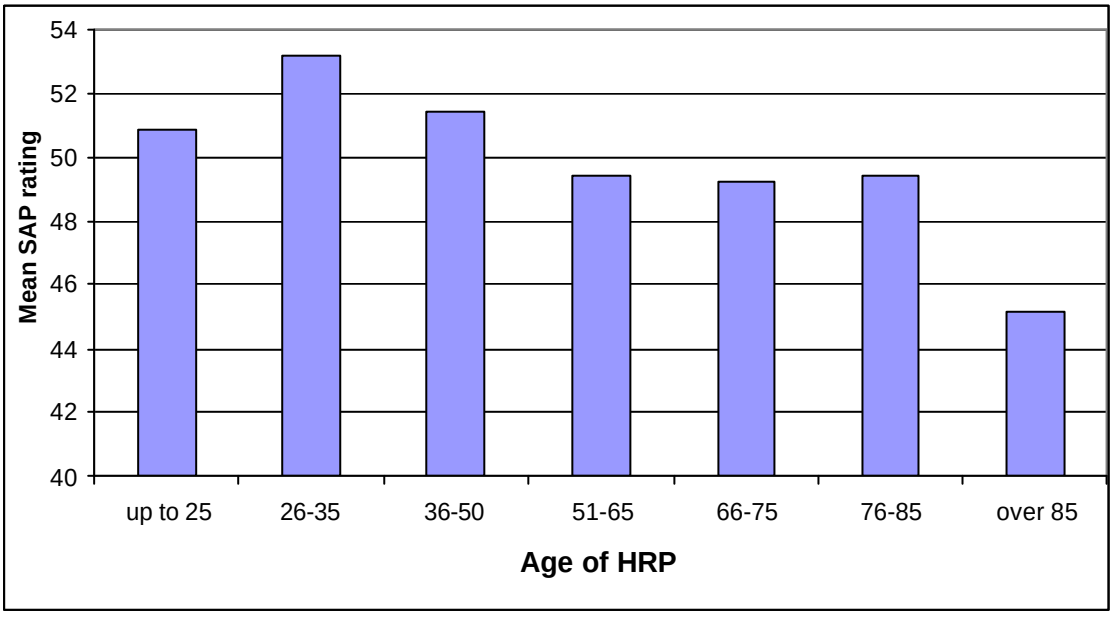

Figure 5.2 – Mean SAP by age of HRP.

CHANGES SINCE 1996:

5.10 All age groups show an increase in SAP ratings since 1996. The rises are all of comparable levels (between 4 and 6%) and show little obvious pattern – although there is some evidence that the changes are more dramatic among younger HRPs both in terms of mean and banded SAP scores.

Income.

5.11 SAP ratings show considerable variation by the income of the household reference person and their partner. In terms of average SAP ratings we see very little difference between groups, although interesting differences are visible when we consider the banded SAP ratings in each quintile. The banded SAP scores show that lower income households are more likely to live in dwellings with very low SAP ratings (13% have SAP < 30), in addition to being more likely to live in dwellings with very high SAP ratings (13% have SAP > 70). Those on higher incomes are more likely to live in dwellings with a mid-range SAP score between 30 and 70. The pattern of high and low SAP scores shown among the different income quintiles is shown in figure 5.3 below, and in table 5.3.

5.12 Those in the lowest income quintiles (many of which are elderly) are more likely to live in bungalows and to lack any central heating – these factors contribute to the high proportion of those on low income with poor energy efficiency. However, low income groups are also more likely to belong to the social tenures (those in the lowest income quintile make up almost 50% of the social tenures), and to live in purpose built flats – these factors can help to explain the high proportion of those on low incomes with high SAP scores.

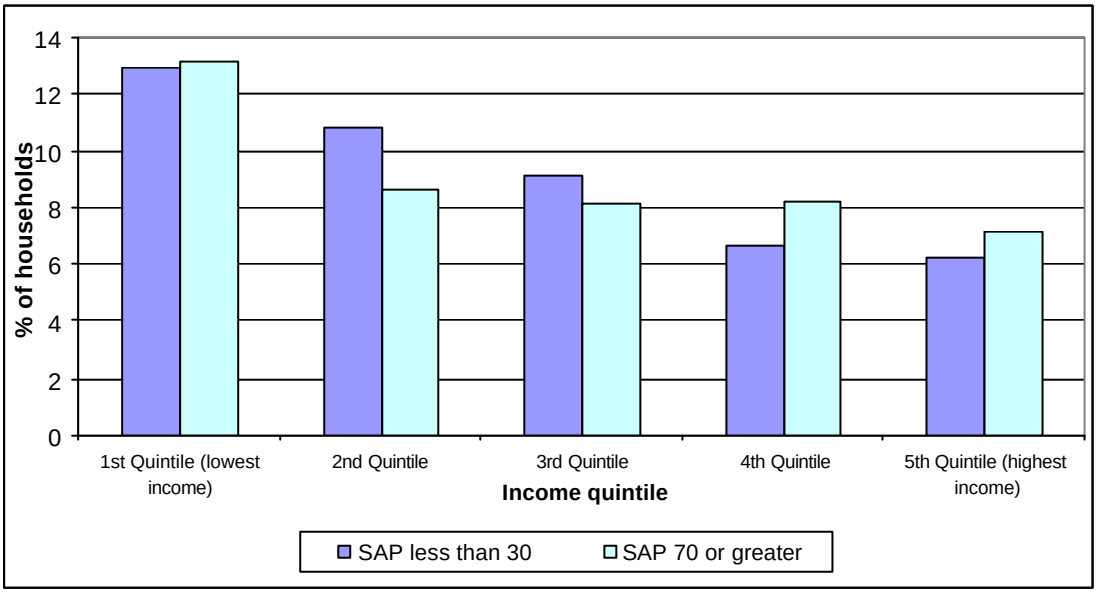

Figure 5.3 – SAP ratings below 30 and above 70 by income quintile (all households).

CHANGES SINCE 1996:

5.13 SAP scores have increased across all of the income quintiles. The largest rises in SAP scores can be seen within the lowest income quintile. This group has seen a seven point rise in the mean SAP rating since 1996 and the proportion of households within the group living in dwellings with a SAP rating above 70 has increased from 7% to 13%.

References:

i) "The Government's Standard Assessment Procedure for Energy Rating of Dwellings (2001 Edition)" DEFRA 2001

ii) "English House Condition Survey 1996 Energy Report" DETR 2000

iii) "Energy Efficiency Best Practice In Housing: Cavity Wall Insulation In Existing Housing – CE16"EST 2003

Index - All worksheets in this order:

Table 2.1 Distribution of SAP ratings in the stock

count(000s), (row%), (column%)

2001 SAP - 4 bands	Total
Less Than 30	1,983
	(100.0)
	(9.4)
30 to 50	7,584
	(100.0)
	(35.9)
50 to 70	9,643
	(100.0)
	(45.6)
70 or More	1,929
	(100.0)
	(9.1)
Total	21,140
	(100.0)
	(100.0)
Mean SAP	***50.6***

base: all dwellings
(grossed by dwellings)

Table 3.1 SAP rating by loft insulation thickness

	Loft Insulation Thickness						count(000s), (row%), (column%)
2001 SAP - 4 bands	**No insulation**	**50mm or less**	**75mm**	**100mm**	**150mm**	**More than 150mm**	**Total**
Less Than 30	221	225	219	621	177	110	1,573
	(14.1)	(14.3)	(13.9)	(39.5)	(11.2)	(7.0)	(100.0)
	(27.1)	(11.3)	(10.7)	(8.1)	(5.8)	(8.7)	(9.3)
30 to 50	438	1,039	911	2,860	847	500	6,595
	(6.6)	(15.7)	(13.8)	(43.4)	(12.8)	(7.6)	(100.0)
	(53.7)	(52.2)	(44.6)	(37.3)	(27.8)	(39.5)	(39.2)
50 to 70	154	709	868	3,914	1,404	624	7,672
	(2.0)	(9.2)	(11.3)	(51.0)	(18.3)	(8.1)	(100.0)
	(18.9)	(35.7)	(42.5)	(51.0)	(46.0)	(49.2)	(45.6)
70 or More	2	16	45	273	622	33	991
	(0.2)	(1.6)	(4.5)	(27.5)	(62.8)	(3.3)	(100.0)
	(0.3)	(0.8)	(2.2)	(3.6)	(20.4)	(2.6)	(5.9)
Total	816	1,989	2,042	7,667	3,050	1,267	16,831
	(4.8)	(11.8)	(12.1)	(45.5)	(18.1)	(7.5)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***36.7***	***44.9***	***46.9***	***49.7***	***56.1***	***48.9***	***49.3***

base: houses and bungalows with unconverted lofts
(grossed by dwellings)

Table 3.2 SAP rating by presence of cavity wall insulation

	Cavity Wall Insulation		count(000s), (row%), (column%)
	Cavity & Wall Insulation		
2001 SAP - 4 bands	**Present**	**Cavity Only Present**	**Total**
Less Than 30	197	717	914
	(21.5)	(78.5)	(100.0)
	(3.8)	(7.5)	(6.2)
30 to 50	604	3,873	4,477
	(13.5)	(86.5)	(100.0)
	(11.6)	(40.6)	(30.4)
50 to 70	3,435	4,135	7,570
	(45.4)	(54.6)	(100.0)
	(66.0)	(43.4)	(51.4)
70 or More	966	812	1,778
	(54.3)	(45.7)	(100.0)
	(18.6)	(8.5)	(12.1)
Total	5,202	9,538	14,740
	(35.3)	(64.7)	(100.0)
	(100.0)	(100.0)	(100.0)
Mean SAP	***60.0***	***50.5***	***53.8***

base: all dwellings with predominantly cavity walls
(grossed by dwellings)

Table 3.3 SAP rating by primary heating system

Main heating provision					count(000s), (row%), (column%)
2001 SAP - 4 bands	**Central Heating**	**Programable Heating**	**Fixed Heaters**	**Non-Fixed Heaters**	**Total**
Less Than 30	864	479	584	56	1,983
	(43.6)	(24.2)	(29.5)	(2.8)	(100.0)
	(4.8)	(29.9)	(44.8)	(95.6)	(9.4)
30 to 50	6,400	628	554	3	7,584
	(84.4)	(8.3)	(7.3)	(0.0)	(100.0)
	(35.2)	(39.2)	(42.5)	(4.4)	(35.9)
50 to 70	9,039	459	145	-	9,643
	(93.7)	(4.8)	(1.5)	(0.0)	(100.0)
	(49.7)	(28.7)	(11.1)	(0.0)	(45.6)
70 or More	1,873	34	22	-	1,929
	(97.1)	(1.8)	(1.1)	(0.0)	(100.0)
	(10.3)	(2.1)	(1.7)	(0.0)	(9.1)
Total	18,177	1,600	1,305	58	21,140
	(86.0)	(7.6)	(6.2)	(0.3)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***53.1***	***39.5***	***30.4***	***9.8***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 4.1 SAP rating by predominant wall type

	Predominant wall type of dwelling			count(000s), (row%), (column%)
2001 SAP - 4 bands	**cavity**	**solid**	**other**	**Total**
<30	914	1,032	37	1,983
	(46.1)	(52.0)	(1.9)	(100.0)
	(6.2)	(16.7)	(17.6)	(9.4)
>=30 - <50	4,477	3,061	47	7,584
	(59.0)	(40.4)	(0.6)	(100.0)
	(30.4)	(49.5)	(22.1)	(35.9)
>=50 - <70	7,570	1,973	100	9,643
	(78.5)	(20.5)	(1.0)	(100.0)
	(51.4)	(31.9)	(47.2)	(45.6)
>=70	1,778	123	28	1,929
	(92.2)	(6.4)	(1.5)	(100.0)
	(12.1)	(2.0)	(13.2)	(9.1)
Total	14,740	6,188	212	21,140
	(69.7)	(29.3)	(1.0)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***53.8***	***42.8***	***50.7***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 4.2 SAP rating by dwelling age

	Dwelling Age					count(000s), (row%), (column%)
2001 SAP - 4 bands	**pre 1919**	**1919-1944**	**1945-1964**	**1965-1980**	**post 1980**	**Total**
Less Than 30	886	353	423	229	92	1,983
	(44.7)	(17.8)	(21.3)	(11.6)	(4.6)	(100.0)
	(20.1)	(9.4)	(9.5)	(5.0)	(2.3)	(9.4)
30 to 50	2,118	2,000	1,848	1,247	372	7,584
	(27.9)	(26.4)	(24.4)	(16.4)	(4.9)	(100.0)
	(48.1)	(53.5)	(41.3)	(27.1)	(9.5)	(35.9)
50 to 70	1,364	1,342	2,088	2,541	2,308	9,643
	(14.1)	(13.9)	(21.6)	(26.3)	(23.9)	(100.0)
	(31.0)	(35.9)	(46.6)	(55.2)	(59.0)	(45.6)
70 or More	38	44	117	587	1,143	1,929
	(2.0)	(2.3)	(6.1)	(30.4)	(59.3)	(100.0)
	(0.9)	(1.2)	(2.6)	(12.7)	(29.2)	(9.1)
Total	4,406	3,739	4,476	4,604	3,915	21,140
	(20.8)	(17.7)	(21.2)	(21.8)	(18.5)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***41.0***	***45.8***	***48.3***	***55.1***	***63.3***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 4.3 SAP rating by tenure

Tenure					count(000s), (row%), (column%)
2001 SAP - 4 bands	**Owner Occupied**	**Private Rented**	**Local Authority**	**RSL**	**Total**
Less Than 30	1,239	424	245	76	1,983
	(62.4)	(21.4)	(12.4)	(3.8)	(100.0)
	(8.4)	(19.3)	(8.8)	(5.5)	(9.4)
30 to 50	5,751	773	797	264	7,584
	(75.8)	(10.2)	(10.5)	(3.5)	(100.0)
	(38.9)	(35.3)	(28.6)	(19.0)	(35.9)
50 to 70	6,863	818	1,343	619	9,643
	(71.2)	(8.5)	(13.9)	(6.4)	(100.0)
	(46.5)	(37.3)	(48.1)	(44.6)	(45.6)
70 or More	919	177	405	429	1,929
	(47.6)	(9.2)	(21.0)	(22.2)	(100.0)
	(6.2)	(8.1)	(14.5)	(30.9)	(9.1)
Total	14,771	2,191	2,790	1,388	21,140
	(69.9)	(10.4)	(13.2)	(6.6)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***49.9***	***45.3***	***53.6***	***60.3***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 4.4 SAP rating by dwelling type

	Dwelling Type								count(000s), (row%), (column%)
2001 SAP - 4 bands	Small Terraced House	Medium/Large Terraced House	Semi-Detached House	Detached House	Bungalow	Converted Flat	Purpose Built Flat, Low Rise	Purpose Built Flat, High Rise	Total
Less Than 30	287	298	515	319	232	128	160	45	1,983
	(14.5)	(15.0)	(25.9)	(16.1)	(11.7)	(6.4)	(8.1)	(2.3)	(100.0)
	(10.8)	(8.9)	(8.8)	(9.8)	(11.3)	(18.5)	(5.5)	(13.3)	(9.4)
30 to 50	838	1,165	2,654	1,204	885	303	450	86	7,584
	(11.0)	(15.4)	(35.0)	(15.9)	(11.7)	(4.0)	(5.9)	(1.1)	(100.0)
	(31.5)	(34.8)	(45.4)	(36.8)	(43.0)	(43.9)	(15.4)	(25.6)	(35.9)
50 to 70	1,275	1,647	2,435	1,535	906	245	1,448	152	9,643
	(13.2)	(17.1)	(25.3)	(15.9)	(9.4)	(2.5)	(15.0)	(1.6)	(100.0)
	(47.9)	(49.3)	(41.6)	(46.9)	(44.1)	(35.5)	(49.4)	(45.4)	(45.6)
70 or More	261	234	248	216	33	15	871	53	1,929
	(13.5)	(12.1)	(12.9)	(11.2)	(1.7)	(0.8)	(45.1)	(2.7)	(100.0)
	(9.8)	(7.0)	(4.2)	(6.6)	(1.6)	(2.1)	(29.7)	(15.7)	(9.1)
Total	2,660	3,344	5,853	3,273	2,055	691	2,929	335	21,140
	(12.6)	(15.8)	(27.7)	(15.5)	(9.7)	(3.3)	(13.9)	(1.6)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***50.9***	***50.4***	***48.3***	***49.3***	***46.4***	***42.7***	***60.9***	***52.3***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 4.5 SAP rating by Government Office Region

	Government Office Region									count(000s), (row%), (column%)
2001 SAP - 4 bands	North East	Yorkshire & Humberside	North West	East Midlands	West Midlands	South West	Eastern	South East	London	Total
Less Than 30	65	208	230	214	249	307	211	316	184	1,983
	(3.3)	(10.5)	(11.6)	(10.8)	(12.6)	(15.5)	(10.6)	(15.9)	(9.3)	(100.0)
	(6.0)	(9.4)	(7.9)	(11.6)	(11.6)	(14.5)	(9.1)	(9.2)	(6.0)	(9.4)
30 to 50	312	839	1,041	685	810	723	818	1,242	1,115	7,584
	(4.1)	(11.1)	(13.7)	(9.0)	(10.7)	(9.5)	(10.8)	(16.4)	(14.7)	(100.0)
	(29.0)	(38.0)	(35.7)	(37.2)	(37.7)	(34.1)	(35.1)	(36.2)	(36.2)	(35.9)
50 to 70	618	991	1,401	799	952	866	1,077	1,550	1,389	9,643
	(6.4)	(10.3)	(14.5)	(8.3)	(9.9)	(9.0)	(11.2)	(16.1)	(14.4)	(100.0)
	(57.5)	(44.9)	(48.0)	(43.4)	(44.2)	(40.9)	(46.3)	(45.2)	(45.1)	(45.6)
70 or More	80	169	246	142	140	222	221	321	389	1,929
	(4.1)	(8.8)	(12.8)	(7.4)	(7.3)	(11.5)	(11.5)	(16.6)	(20.2)	(100.0)
	(7.4)	(7.7)	(8.4)	(7.7)	(6.5)	(10.5)	(9.5)	(9.4)	(12.6)	(9.1)
Total	1,074	2,207	2,919	1,841	2,151	2,119	2,327	3,428	3,076	21,140
	(5.1)	(10.4)	(13.8)	(8.7)	(10.2)	(10.0)	(11.0)	(16.2)	(14.5)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***53.2***	***49.9***	***51.4***	***48.8***	***48.8***	***48.7***	***50.8***	***50.5***	***52.8***	***50.6***

base: all dwellings
(grossed by dwellings)

Table 5.1 SAP rating by household type

Household Type								count(000s), (row%), (column%)
2001 SAP - 4 bands	Couple, Under 60: No Dependent Child(ren)	Couple, 60 or Over: No Dependent Child(ren)	Couple: With Dependent Child(ren)	Lone Parent With Dependent Child(ren)	Other Multi-Person Household	One Person Under 60	One Person, 60 or Over	Total
Less Than 30	333	291	315	128	163	248	401	1,879
	(17.7)	(15.5)	(16.8)	(6.8)	(8.7)	(13.2)	(21.4)	(100.0)
	(8.2)	(9.9)	(6.3)	(8.0)	(11.3)	(10.3)	(13.0)	(9.2)
30 to 50	1,518	1,185	1,840	449	565	780	1,038	7,376
	(20.6)	(16.1)	(24.9)	(6.1)	(7.7)	(10.6)	(14.1)	(100.0)
	(37.2)	(40.5)	(36.9)	(28.1)	(39.2)	(32.6)	(33.7)	(36.0)
50 to 70	1,955	1,314	2,430	785	613	1,072	1,228	9,398
	(20.8)	(14.0)	(25.9)	(8.4)	(6.5)	(11.4)	(13.1)	(100.0)
	(47.9)	(44.9)	(48.7)	(49.2)	(42.5)	(44.7)	(39.9)	(45.8)
70 or More	279	134	401	235	103	297	409	1,858
	(15.0)	(7.2)	(21.6)	(12.6)	(5.5)	(16.0)	(22.0)	(100.0)
	(6.8)	(4.6)	(8.0)	(14.7)	(7.1)	(12.4)	(13.3)	(9.1)
Total	4,085	2,925	4,986	1,597	1,443	2,397	3,077	20,510
	(19.9)	(14.3)	(24.3)	(7.8)	(7.0)	(11.7)	(15.0)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***50.5***	***48.4***	***51.5***	***53.8***	***48.7***	***51.4***	***50.3***	***50.7***

base: all households
(grossed by households)

Table 5.2 SAP rating by age of household reference person

	Age of Household Reference Person								count(000s), (row%), (column%)
2001 SAP - 4 bands	**Up to 25**	**26-35**	**36-50**	**51-65**	**66-75**	**76-85**	**Over 85**	**unknown**	**Total**
Less Than 30	113	237	450	480	285	221	93	-	1,879
	(6.0)	(12.6)	(23.9)	(25.6)	(15.2)	(11.8)	(5.0)	(0.0)	(100.0)
	(10.6)	(6.4)	(7.5)	(9.7)	(11.0)	(12.4)	(24.9)	(0.0)	(9.2)
30 to 50	347	1,220	2,159	1,917	967	633	132	-	7,376
	(4.7)	(16.5)	(29.3)	(26.0)	(13.1)	(8.6)	(1.8)	(0.0)	(100.0)
	(32.7)	(32.8)	(35.8)	(38.8)	(37.3)	(35.6)	(35.2)	(0.0)	(36.0)
50 to 70	500	1,805	2,893	2,248	1,130	719	102	-	9,398
	(5.3)	(19.2)	(30.8)	(23.9)	(12.0)	(7.6)	(1.1)	(0.0)	(100.0)
	(47.1)	(48.5)	(47.9)	(45.5)	(43.6)	(40.3)	(27.4)	(0.0)	(45.8)
70 or More	102	457	536	298	209	208	47	< 1	1,858
	(5.5)	(24.6)	(28.9)	(16.0)	(11.3)	(11.2)	(2.5)	(0.0)	(100.0)
	(9.6)	(12.3)	(8.9)	(6.0)	(8.1)	(11.7)	(12.6)	(0.0)	(9.1)
Total	1,062	3,720	6,038	4,943	2,591	1,781	375	-	20,510
	(5.2)	(18.1)	(29.4)	(24.1)	(12.6)	(8.7)	(1.8)	(0.0)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***50.8***	***53.2***	***51.4***	***49.5***	***49.2***	***49.5***	***45.2***	***76.4***	***50.7***

base: all households
(grossed by households)

Table 5.3 SAP rating by income quintile

Income broken into quintiles					count(000s), (row%), (column%)
2001 SAP - 4 bands	1st Quintile (lowest income)	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile (highest income)	Total
Less Than 30	531	444	374	275	256	1,879
	(28.3)	(23.6)	(19.9)	(14.6)	(13.6)	(100.0)
	(12.9)	(10.8)	(9.1)	(6.7)	(6.2)	(9.2)
30 to 50	1,319	1,459	1,542	1,459	1,597	7,376
	(17.9)	(19.8)	(20.9)	(19.8)	(21.6)	(100.0)
	(32.2)	(35.6)	(37.6)	(35.6)	(38.9)	(36.0)
50 to 70	1,713	1,845	1,851	2,032	1,957	9,398
	(18.2)	(19.6)	(19.7)	(21.6)	(20.8)	(100.0)
	(41.8)	(45.0)	(45.1)	(49.5)	(47.7)	(45.8)
70 or More	539	355	335	337	292	1,858
	(29.0)	(19.1)	(18.0)	(18.1)	(15.7)	(100.0)
	(13.1)	(8.7)	(8.2)	(8.2)	(7.1)	(9.1)
Total	4,102	4,103	4,102	4,102	4,101	20,510
	(20.0)	(20.0)	(20.0)	(20.0)	(20.0)	(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Mean SAP	***50.5***	***49.8***	***50.2***	***51.8***	***51.0***	***50.7***

base: all households
(grossed by households)