

Energy Use in Homes 2006

**A series of reports on domestic energy use in
England**

Thermal Insulation

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This is one of a series of three reports on the energy characteristics of the stock as observed by the 2006 English House Condition Survey.

The reports in this series are:

1. Space and Water Heating
2. Thermal Insulation
3. Energy Efficiency

The English House Condition Survey is funded and provided courtesy of Communities and Local Government. More information about this survey can be found at www.communities.gov.uk/ehcs

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Energy Use in Homes 2006: Thermal Insulation

Executive Summary

Sixty-nine per cent of the housing stock (15.1 million dwellings) have predominantly cavity walls in 2006. There are 6.6 million dwellings with cavity wall insulation; this represents 44% of cavity walled stock.

Of all dwellings with a loft space, 26% have loft insulation of depths less than 100 mm, 18% have 200 mm or more and 4% have no loft insulation.

Approximately 87% (19 million dwellings) of dwellings have at least one double glazed window, 63% of the stock have the entire dwelling double glazed, whilst 13% have no double glazing.

The extent of thermal insulation measures in a property depends greatly on the type and age of the dwelling. Generally, the older the dwelling, the poorer the thermal insulation measures. Levels of cavity wall insulation, double glazing and the thickest loft insulation all increase as building age decreases. Converted flats generally have the lowest levels of thermal insulation when looking at building type, whilst detached dwellings have the highest levels, which may be attributed to the generally older age of converted flat stock compared to younger detached dwellings.

Private rented properties have the poorest thermal insulation measures when looking at all tenures. They have the lowest levels of full double glazing (45%), the lowest levels of loft insulation (only 11% having 200mm or more insulation), and the lowest levels of cavity wall insulation (29% of those dwellings with cavity walls).

Thermal insulation measures in dwellings have increased dramatically from 1991 to 2006. Entire household double glazing has increased from 30% in 1996 to 63% in 2006. Loft insulation of 150mm or more for the entire stock has increased from 25% in 2003 to 33% in 2006. Cavity wall insulation (in predominantly cavity walled dwellings) has increased from 11% in 1991 to 44% in 2006.

2006 Thermal Insulation Update Report

Summary

- Thermal insulation measures in English dwellings have continued to increase into 2006, particularly ownership of cavity wall insulation and double glazing.
- Private rented dwellings still show the worst thermal insulation characteristics on average, with Registered Social Landlords (RSL) the best. There is considerable remaining potential for thermal insulation improvement among converted flats and terraced houses.
- A key determinant of thermal insulation performance is the age of a dwelling, with tighter Building Regulations driving improvements in more recently built stock.

Introduction

This update report provides details of thermal insulation measures as monitored by the 2006 English House Condition Survey (EHCS). The report is split into sections analysing the incidence and quality of domestic insulation measures against both dwelling and household characteristics. Each section will also examine how these proportions have changed over time.

Since 2002 the EHCS has been in a continuous format, providing annual data which is then analysed in two-year datasets. This report presents temporal analysis based on the continuous survey and will also look at data from previous surveys conducted in 1991, 1996 and 2001¹.

Wall Type and Insulation

The report begins by examining the external wall construction of the English housing stock and in particular the frequency of insulation found in dwellings which are predominantly cavity walled². Cavity wall insulation (CWI) refers to the presence of an insulating layer in the internal cavity of an external wall, built with two or more leaves. This has become standard in new build homes since 1980, often as a moulded insulation board. When fitted retrospectively it describes the process of injecting an insulating material (usually fibres, beads or foam) in between the inner and outer leaves of masonry that make

up an external cavity wall. Some methods of construction replace the inner masonry layer with a timber or metal frame; however these are not included as cavity walls in this analysis since, in general, they cannot be fitted with conventional CWI.

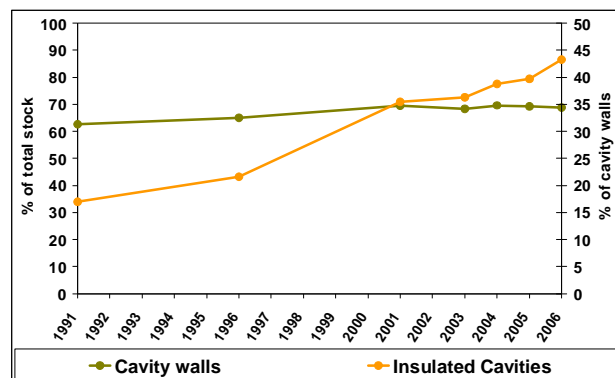


Figure 1: Timeline of the proportion of cavity walled stock, and the proportion of these which contain insulation

In 2006 around 15.1 million dwellings have predominantly cavity walls, which represent 69% of the 21.8 million dwellings in England. This has increased from 12.3 million (63%) in 1991, and from 65% in 1996, as shown in Figure 1. Of the cavity walled stock, 6.6 million are also insulated, representing 44% of these dwellings³, shown on the right hand axis of Figure 1. This frequency has risen from 2.1 million in 1991 (20% of all cavities at that time), including around 1.3 million more filled cavities, including new homes, since 2003.

Dwelling Age

EHCS analysis shows that cavity walls are more predominant in newer dwellings with 98% of post-1990 stock being cavity walled compared with only 15% of pre-1919 homes (Figure 2). Similarly, of those cavity walled dwellings built post-1990, 59% are also insulated whilst only 16% of pre-1919 homes have CWI. The relatively high proportion of 46% containing insulation in 1945 – 1964 dwellings suggests that a large amount of retrospective installation has been applied to this stock; something that can't occur in the predominantly solid-walled pre-1919 stock.

There is a slight decrease, to 41%, of cavity walls being insulated in homes built from 1965 to 1980. This comes as a result of the number of flats, particularly in high-rise modules, which were built in this period. A closer look at this issue is featured in the fact box below. In general, a

¹ The way in which EHCS data collection has evolved means that timeline analysis cannot always begin in 1991.

² Predominant wall type is defined as the wall type which makes up greater than or equal to 50% of the external wall area.

³ Subsequent charts will present CWI as a proportion of all homes, whilst quoted figures will specify whether they relate to cavity walled dwellings only.

strong correlation between dwelling age and external wall characteristics will inform the patterns seen when other dwelling and household characteristics are explored.

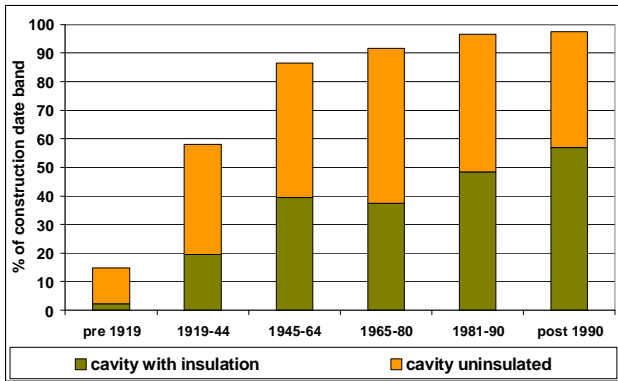


Figure 2: Comparison of cavity wall and CWI, as a proportion of total stock, by construction date

Dwelling Type

The dwelling types most likely to be constructed of predominantly cavity walls are bungalows and detached houses, with 87% and 81% respectively. These categories are also those most likely to date from 1965 or later, when cavity wall construction was considered to be standard in new homes. Purpose built flats and semi-detached houses are also above average with around three quarters of each dwelling type being cavity walled, as shown in Figure 3. Older terraced housing is less likely to contain cavity walls whilst only 18% of converted flats have cavity walls.

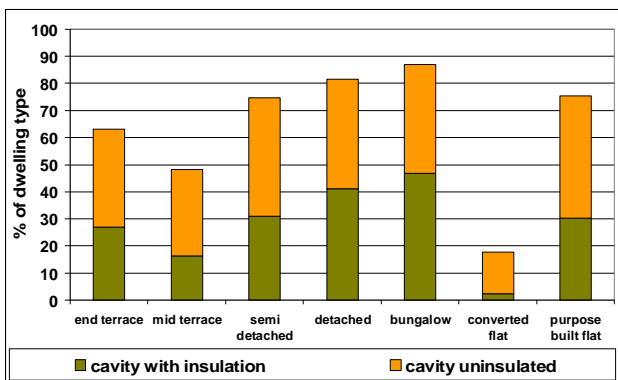


Figure 3: Comparison of cavity wall and CWI, as a proportion of total stock, by dwelling type

A similar pattern, also shown in Figure 3, is seen when comparing the incidence of CWI between dwelling types, with bungalows and detached houses having CWI proportions of 54% and 51% of their cavity walled stock. We also find that end-terraces are more likely to be both cavity walled and contain CWI than mid-terraces. Around 44% of cavity walled end-terraces are insulated, compared with a below average 36% of mid-terraced houses. This is a consequence of longer rows of terraced

houses (and therefore a greater number of mid-terraces) being found amongst older stock, with a corresponding high proportion of solid walls. The categories with the lowest incidence of cavity walls are the converted and non-residential⁴ flats, with a combined proportion of 13%. With some 84% of these being built pre-1919, converted flats are by far the oldest dwelling category, hence the high proportion of solid walled stock. A closer look at wall type in flats is shown in the fact box below.

Fact Box: Wall Construction in Flats

The basic structure of blocks of flats has an impact on the types of wall construction that can be used and, hence, an influence on the thermal performance of their external walls. The module height of many blocks precludes both cavity construction and the opportunity to retrospectively insulate any existing cavities. Figure 4 compares purpose built and converted flats, splitting each where the module is above 4 storeys, making the injection of CWI a lot less feasible.

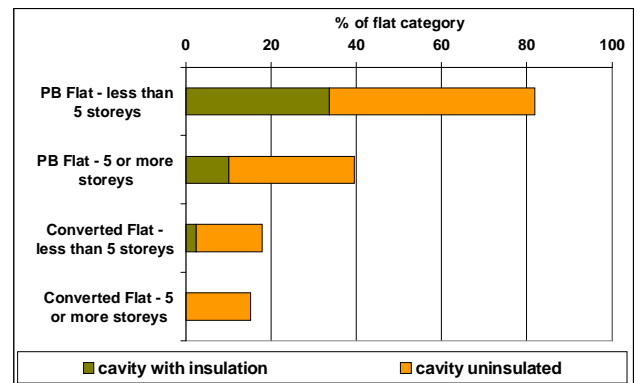


Figure 4: Cavity walls and CWI by height of flat module

Purpose built flats with up to 4 storeys, more likely to have been built since 1980, approximate the pattern of wall construction seen in most house types (82% with cavities, of which 41% have CWI), but above this height the proportion of cavity walled stock falls to 40%, with only a quarter of these being insulated. Much of the remainder of the latter category is of concrete panel construction, leaving external cladding or insulated dry-lining as the only options for improved thermal performance in these walls.

The very low levels of cavities and CWI seen in converted flats are generally determined by the dwelling age, as previously identified, and there are very few such dwellings above 4 storeys.

The analysis shows relatively little correlation between dwelling size and wall construction. We have already seen high proportions of cavities and CWI in low-rise

⁴ A building converted into flat plus commercial premises.

purpose built flats and bungalows – at the smaller end of the floor area scale, and in detached (and semi-detached to an extent) – at the larger end, giving a constant picture across the range of dwelling sizes.

Dwelling Location

By far the lowest proportion of cavity-walled stock is found in London, with 39% of all dwellings as shown in Figure 5. This compares with a range of values in the other government office regions (GOR's) from 65% (West Midlands) to 82% (North East). Over 60% of the dwellings in the capital were built pre-1944, compared with a national proportion of 40%. Although flats are most commonly found in London, a sizeable proportion of these are older converted flats, whilst the predominantly cavity-walled bungalows and detached houses comprise the rarest housing types here.

Outside London, the Midlands have lower than average incidence of cavity walls, but the East Midlands has the highest percentage of CWI with 54% of all cavity-walled dwellings whilst the North East and Eastern regions each have proportions of 50%. This is consistent with the 13% of dwellings of post-1990 construction in each region: more than any other region. The second lowest CWI proportion is in the South West, where 40% of cavity walled stock is filled; this is again age-related, with around a quarter of this regions' stock being pre-1919.

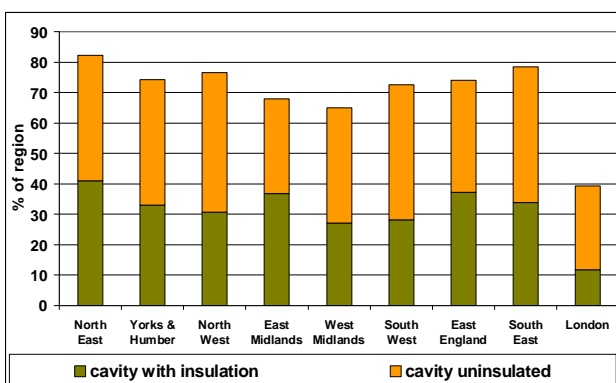


Figure 5: Comparison of cavity wall and CWI, as a proportion of total stock, by region

Using data from the EHCS market value survey, we find that cavity walled dwellings have an average market value around £33k lower than those with non-cavity walls. This has significantly more to do with city centre housing prices than any thermal properties of the dwelling itself. There is also little difference in value between homes with insulated and uninsulated cavities.

The largest discrepancies are seen in local authority stock, where dwellings with CWI is around 10% less valuable than those with empty cavities and 25% below the value of non-cavity homes. This is related to the

above average proportion of local authority homes in London, with typically solid walls, and the high mean value of dwellings in this region.

Fact Box: Wall Types in Urban and Rural Areas

Examining the predominant type of area surrounding a dwelling, we see a significant pattern of wall construction, but a slightly contradictory picture of CWI installations.

The solid-walled bias already indicated in London applies to urban dwellings in general, with city centre properties having the lowest proportions of cavity walls, (38%), shown in Figure 6. In these areas we find the largest quantities of high rise and converted flats, along with many older terraced houses.

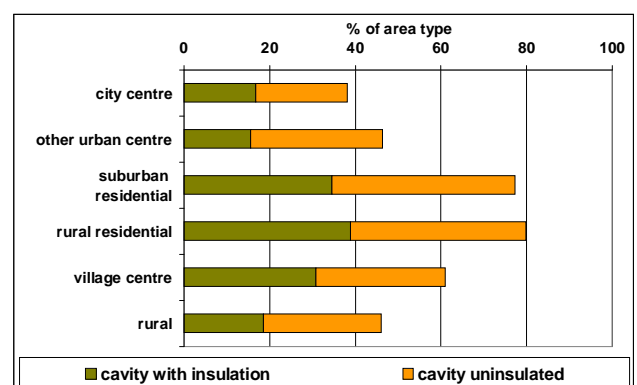


Figure 6: Cavity walls and CWI by detailed area category

At the other end of the scale, residential housing in suburban and rural locations each contain just below 80% cavity walled stock. Here, newer housing predominates, with larger bungalows and detached, the most likely to have cavity walls, being more frequent. The proportion drops to 61% in villages and 46% in other rural areas, where the oldest dwellings are often found, but where many of the resulting solid walls are of a thicker construction.

As a proportion of cavity walled stock, CWI is most predominant in villages (50%), followed by rural residential dwellings (49%). This is a stronger indicator of the ownership and occupancy of the home, and who is more likely to install CWI, rather than the physical dwelling details alone. Rural locations are more likely to be householder owned, rather than privately rented, with the increased likelihood of CWI being present (Figure 7). Social housing is most predominant away from rural areas, again giving above average proportions of CWI.

Tenure

The social sector shows higher proportions of stock with both cavity walls and CWI, as shown in Figure 7. Of the four tenures it is the private rented stock which has a noticeably lower proportion of CWI in cavity walled dwellings. The percentage is only 29% in this tenure, compared with 43% in owner occupied homes, 51% in the RSL sector and 54% in local authority stock. This is a consequence of the 43% of private rented homes built pre-1919. The 30% of RSL housing built since 1980, along with a high percentage of low-rise purpose built flats, puts this tenure ahead of private dwellings in its proportion of cavity walled homes. Private rented dwellings are also more likely to be converted flats than other tenures, whilst detached houses and bungalows, with the most energy efficient wall construction, are found less frequently in this sector.

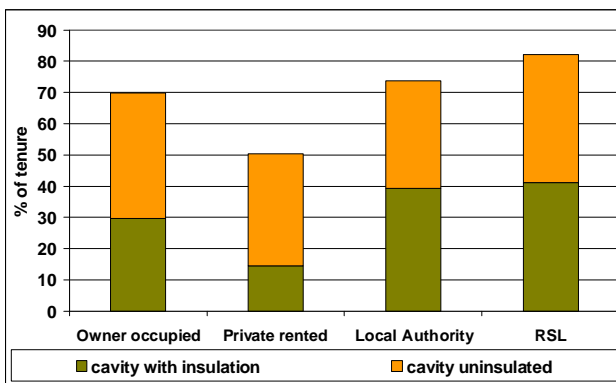


Figure 7: Comparison of cavity wall and CWI, as a proportion of total stock, by tenure

Household Type

The households most likely to be found in cavity walled dwellings are those comprising the elderly, with 76% of couples aged over 60 and 73% of single elderly people living in such homes (Figure 8). This corresponds with the fact that 68% of households living in bungalows are found in these two categories.

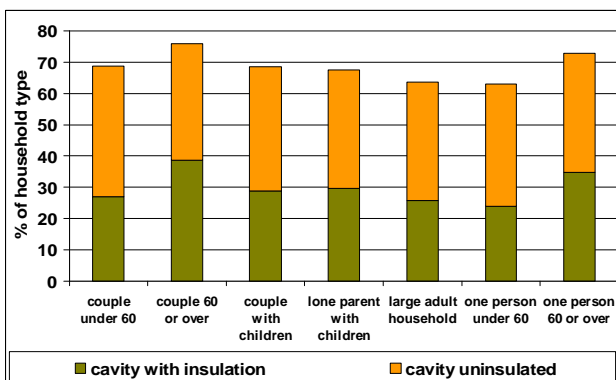


Figure 8: Comparison of cavity wall and CWI, as a proportion of total stock, by household composition

Only 63% of younger single people live in cavity walled stock and of these just 39% contain CWI. This group is by far the most likely to live in high rise and converted flats, both of which have already been identified as having low proportions of cavity walls and insulation.

The pattern is reinforced by examining the dwelling structure for a given age of the household reference person⁵ (HRP). Households containing an HRP aged over 65 have cavity wall proportions of 74% and CWI proportions of 51% of cavity walls (Figure 9); the only HRP group which shows figures that are significantly above average. Further analysis shows that this group is the least likely to occupy pre-1919 homes, but also the least likely to live in post-1990 dwellings. These households are most often found in dwellings built between 1945 and 1980, which still have a high cavity wall percentage of 89%.

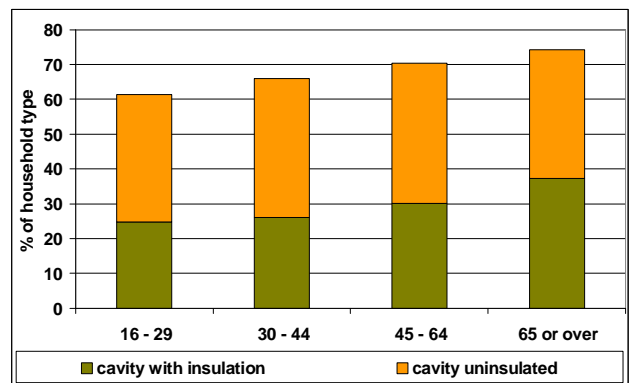


Figure 9: Comparison of cavity wall and CWI, as a proportion of total stock, by age of household reference person

Households with an HRP of less than 30 years old have the lowest proportion of cavity walls, partly explained by over 30% of this group living in pre-1919 dwellings. The fact that they are also the most likely to live in post-1990 homes (14% compared to 10% of all households) provides some explanation for the 41% of households in this category with CWI – slightly higher than those households whose HRP is between 30 and 65.

The tendency for a household to occupy a cavity-walled dwelling is at its lowest if its income is amongst the highest fifth of incomes, whilst higher incomes also correlate with low incidence of CWI. We find that those in the highest income quintile are the most likely to live in pre-1919 houses, whilst the lowest income households, being unlikely to live in detached houses, also occupy a

⁵ The HRP is the person in whose name the dwelling is owned or rented. Where there are joint householders the person with the highest income and then highest age is the HRP.

below average proportion of cavity walled stock. However, they do have the highest incidence of CWI, partly due to their occupation of social sector housing.

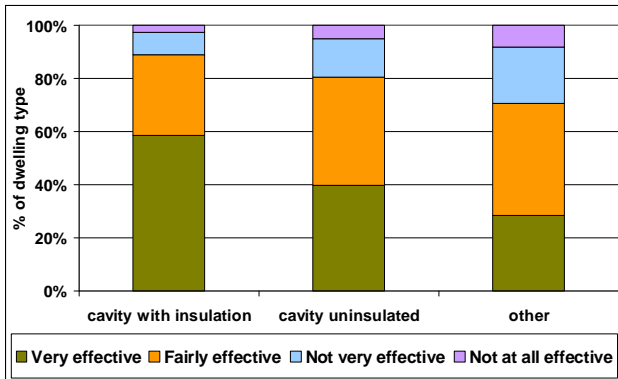


Figure 10: Comparison of wall structure by household satisfaction rating for insulation

Using data from the EHCS interview survey, a householders' perception of the effectiveness of their insulation can also be measured. We find a strong correlation in which 48% of householders in cavity walled dwellings said their insulation was "very effective", whilst only 28% of non-cavity wall occupiers gave the same response (Figure 10). The outcome is similar when comparing responses from those with CWI and those with unfilled cavities, with 58% of those with CWI rating their insulation as "very effective", compared to 39% of households with unfilled cavities.

Loft Insulation

In 2006, around 2.4 million homes (11% of the stock) are lower or mid-floor flats with dwellings above them, and therefore these have no need for ceiling or roof insulation. The analysis of loft insulation incidence and depth in this section will only apply to the remaining stock, which will include dwellings with flat roofs and inaccessible loft spaces for which the insulation information has been modelled.

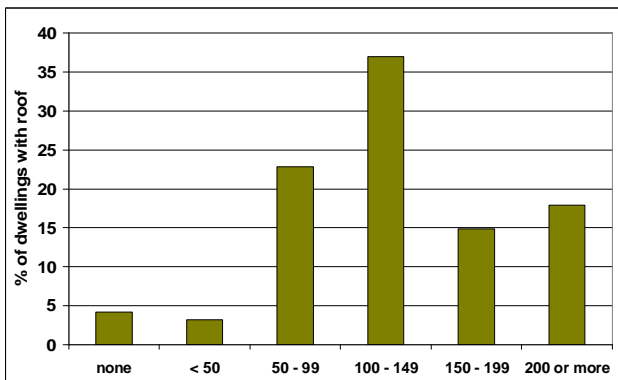


Figure 11: Proportions of loft insulation thicknesses

The proportions of insulation thicknesses in this section will be based on the remaining 89% of dwellings. Of these, 0.8 million (4%) have no insulation present, (Figure 11), whilst a further 26% have less than 100 mm. 37% have between 100 mm and 150 mm, 15% between 150 mm and 200 mm, with the remaining 18% having 200 mm or greater. Current building regulations require in excess of 150 mm for existing dwellings and over 200 mm for new build housing, suggesting that at least 67% of dwellings require some form of insulation top-up. A depth of 270 mm is now widely recommended to minimise heat losses, suggesting that the insulation in the vast majority of dwellings is currently insufficient.

Due to the way in which loft data has been collected by the EHCS, a comparable timeline of loft insulation depth is not possible for all surveys used elsewhere in these reports. However, we can see that the proportion of lofts with no insulation is unchanged since 2003, whilst the amount that is 150 mm or more has risen from 25% in 2003, to 27% in 2004, 30% in 2005 and 33% in 2006, as shown in Figure 12.

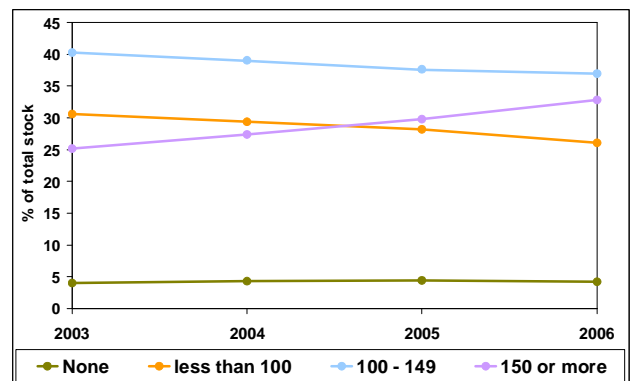


Figure 12: Timeline of loft insulation bands since 2003

Dwelling Type

As with wall structure, the age of a dwelling is often indicative of the existence and level of loft insulation, shown in Figure 14. We find that 10% of pre-1919 homes have uninsulated lofts and 14% have 200 mm or more. This compares with a tiny minority of post-1990 dwellings being uninsulated and 35% having at least 200 mm. This is a consequence of the tightening of building regulations since 1990. The second highest proportion of the thickest insulation category is in 1945 to 1964 homes, due to retrospective improvements made to social flats and bungalows and owner occupied semi-detached houses originally built in this period.

Fact Box: Alternative Loft Insulation Materials

Although most insulation is of the familiar mineral wool or fibre glass matting, a number of other materials can be found in a minority of homes. The EHCS measures standard varieties of these, although materials such as sheep's wool, cotton and hemp also exist in very small numbers.

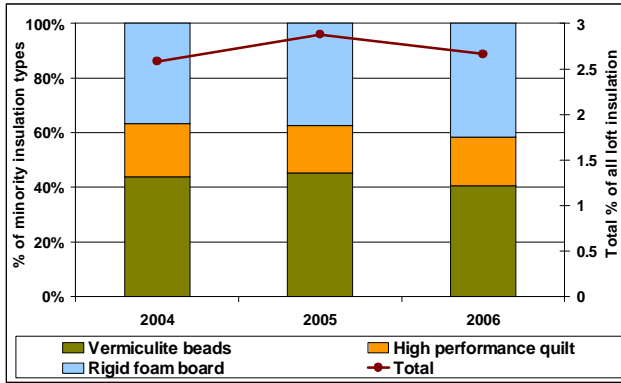


Figure 13: Minority loft insulation proportions over time

Figure 13 gives the proportions of vermiculite beads, rigid foam board, (more regularly used as under floor insulation), and high performance quilting since 2004, (this data was not collected until the 2003 survey). Each of these can achieve variable energy efficiency performances when compared to a standard depth of mineral wool, as indicated in Table 1. Here, the depths give a broad indication of the amount of each material that would give an equivalent U-value to 270 mm of mineral wool.

| Material | Equivalent depth | % share of insulation |
|------------------------|------------------|-----------------------|
| Rigid foam board | 168 mm | 1.1 |
| High performance quilt | 178 mm | 0.5 |
| Vermiculite beads | 425 mm | 1.1 |
| Mineral wool | 270 mm | 97.3 |

Table 1: Comparison of minority loft insulation materials

Currently, the timeline does not extend far enough to indicate a shift in the use of these insulating materials, but we may expect to see a move away from less efficient loose vermiculite beads to higher standard polyurethane boards and foil coated insulating quilt, although it is likely that mineral wool and fibre glass quilt will continue to predominate.

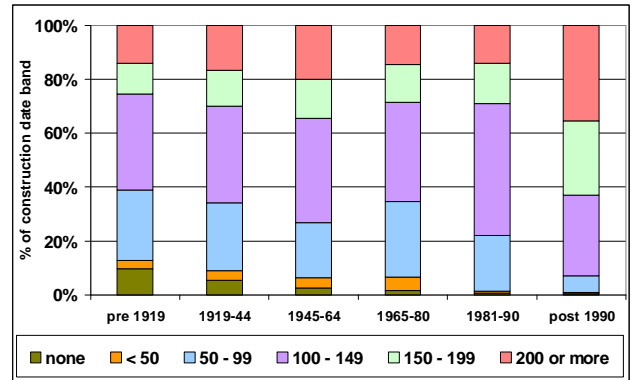


Figure 14: Comparison of loft insulation bands by construction date

The dwelling types most likely to have the deepest loft insulation are bungalows with almost a quarter of those with lofts having 200 mm or more. These are followed by detached and semi-detached houses each having 18%. Of the house categories these also have the lowest proportions of uninsulated lofts, (Figure 15). As indicated earlier, these dwelling types include a high proportion of newer stock. Older terraced houses and converted flats are the most likely to be uninsulated, whilst top floor purpose built flats have the highest percentage of insulation between 100 mm and 150 mm.

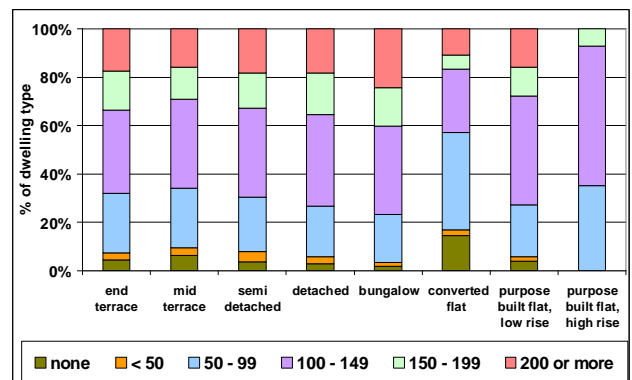


Figure 15: Comparison of loft insulation bands by dwelling type

Dwelling Location

The thickest average loft insulation is found in the North East, with 30% being at least 200 mm deep, as shown in Figure 16. Other northern regions and the Midlands have around 21% at this level, whilst London has only 10%. The age of the London stock along with the high proportion of private rented homes, account for both this low percentage and the above average 7% of this region that has no insulation. This difference in statistics from the North East and South East can be partly attributed to the typical temperatures in these regions and the greater need for good thermal performance in the north.

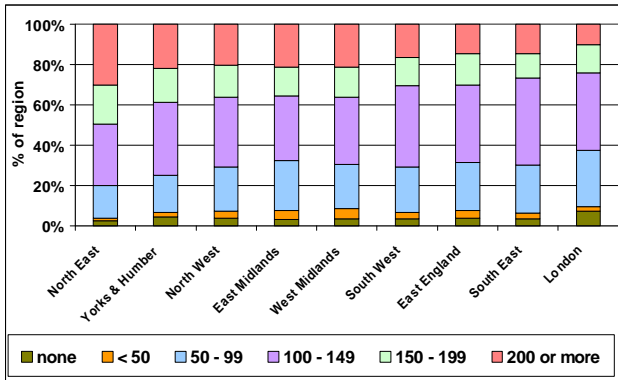


Figure 16: Comparison of loft insulation bands by region

The older city centre and urban stock is twice as likely to be without loft insulation as suburban areas and has the smallest proportion of 200 mm or more (15%), whilst the levels in suburban and rural locations are roughly equal, (Figure 17). As with cavity wall insulation, the highest valued properties, being typically found in city centres, are those with little or no loft insulation.

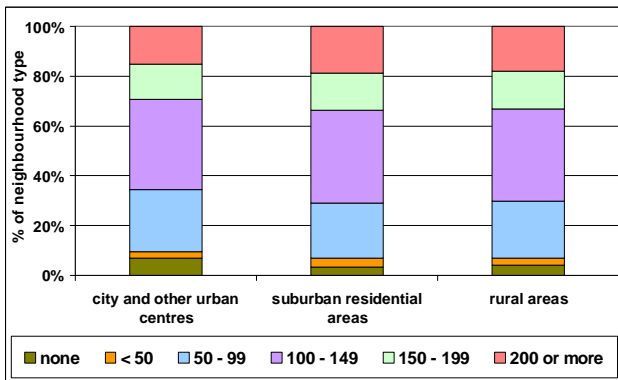


Figure 17: Comparison of loft insulation bands by neighbourhood type

Tenure

The analysis shows that only 11% of private rented homes have at least 200 mm, compared with 17% in owner occupied dwellings and 29% and 30% in the local authority and RSL tenures respectively (Figure 18). That the owner occupied tenure shows higher levels of loft insulation suggests that insulation is more likely to be ‘topped up’ by a home owner than by a private landlord.

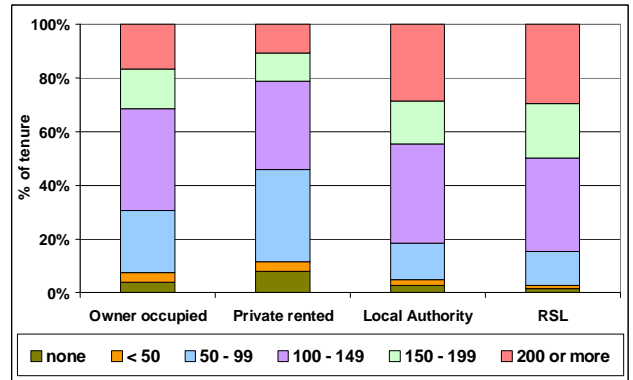


Figure 18: Comparison of loft insulation bands by tenure

The social sector has loft insulation levels far in excess of the private sector, with only 2% having no insulation and 29% having 200 mm or more. The quantity of newer housing in these social tenures is a powerful factor, along with the stronger requirements to meet certain levels of thermal comfort, that do not apply to private rented dwellings in particular.

Household Type

The largest proportion of households without loft insulation is found in the group of single people aged under 60, (Figure 19). This is the household category that is most likely to live in the oldest dwellings. The inverse is true for older single people and lone parent families, who have the highest proportion of thicker loft insulation and are the most likely to live in social sector housing.

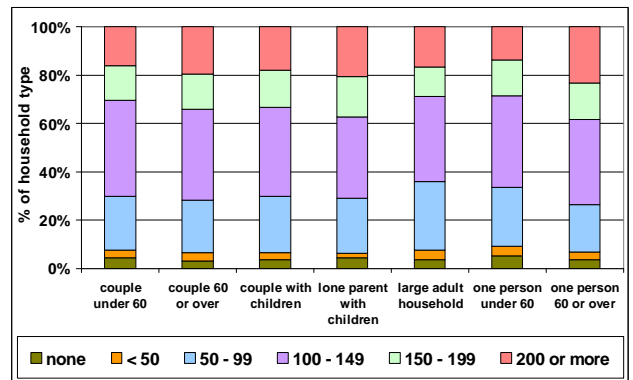


Figure 19: Comparison of loft insulation bands by household group

Households with lower incomes are slightly more likely to have thicker insulation, with their predominance in the social tenures a contributory factor. However, these households also have more uninsulated lofts, due to the greater dwelling ages of private sector, low income households. The proportion of householders giving their insulation measures ‘very effective’ ratings increases with each band of greater loft insulation depth, from 17% of

those with none, 34% of those with 50 mm to 100 mm and 58% for those with 200 mm or more, (Figure 20).

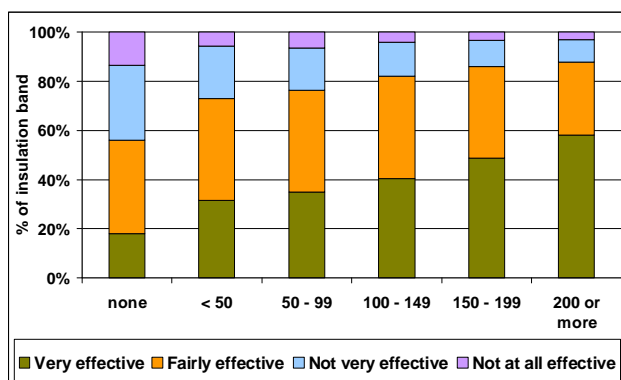


Figure 20: Comparison of loft insulation bands by household satisfaction rating for insulation

Double Glazing

One of the more popular home improvement methods for several decades, and an apparent early example of householders being pro-active in looking after the energy efficiency of their dwelling, was the installation of double glazed windows. However, the popularity was inconsistent with the true cost effectiveness of the measure relating to thermal performance, with sound insulation more of a consideration.

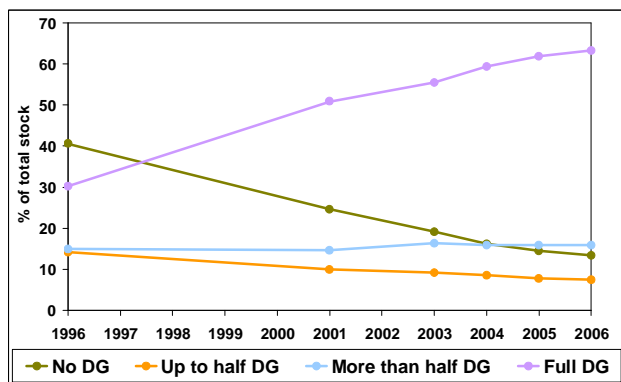


Figure 21: Timeline of double glazing proportions

Due to the method of data collection in 1991 there is no direct comparison with later years, but in 1996 we find that 41% of dwellings had no double glazing, with 14% having up to half double glazed, as seen above in Figure 21. A further 15% had the majority of windows double glazed and 30% had full double glazing. In 2006 these proportions have changed significantly, with 13% fully single glazed, 7% up to half double glazed and 63% fully double glazed.

Fact Box: Glazing Developments.

Further developments such as triple glazing are now being seen in new housing, and refinements including low emissivity coatings, (reducing heat loss through the glass), and argon filled gaps between the glass layers, (reducing convection within the cavity) are becoming standard. One effect of the double glazing boom has been the phasing out of draught stripping on windows and doors – rendered unnecessary by modern glazing and frame seals.

| Glazing and frame type | Typical U-value | % share of stock |
|------------------------|-----------------|------------------|
| Double: UPVC | 1.8 | 63.3 |
| Single: wood casement | 4.3 | 11.8 |
| Double: wood | 2.5 | 9.2 |
| Single: wood sash | 4.3 | 4.5 |
| Double: metal | 3.5 | 4.3 |
| Mixed types | - | 3.5 |
| Single: metal | 5.6 | 2.4 |
| Single: UPVC | 3.7 | 1.0 |

Table 2: Comparison of energy efficiency of window types

Table 2 categorises the predominant types of window glazing and frame per dwelling for the 2006 EHCS data, and gives their proportions and typical U-values, where a lower figure indicates a more energy efficient unit.

The most efficient UPVC double glazed windows form the majority of glazing in almost two-thirds of dwellings, followed by a variety of wooden framed windows. Of these, the single glazed units are more frequently found in older terraced houses and converted flats, whilst double glazing with wooden frames are increasingly used in modern detached and semi-detached developments. The worst thermal performing single glazed metal windows are most often found in older purpose built flats.

There is a strong correlation between dwelling age and glazing type, as demonstrated in Figure 22, with identifiable time periods corresponding to certain building practices. The pre-1919 category contains 46% of all fully single glazed dwellings and it is here that we find many homes in which it is not practical to upgrade to double glazing, due to circumstances such as planning regulations in conservation areas or dwellings with listed status. Only 37% of dwellings in this age category have full double glazing.

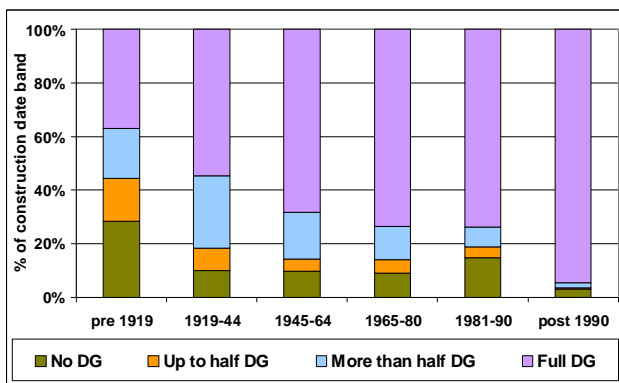


Figure 22: Comparison of double glazing proportions by construction date

For dwellings built between 1919 and 1990 the proportion with no double glazing is around 10%, and we see the proportion of full double glazing rise to around 74% in age bands between 1965 and 1990. Double glazed units were becoming standard towards the end of this period, accompanied by a large amount of retro-fitting for both heat and sound insulation. It is perhaps surprising that the newest stock, built since 1990, has 3% with no double glazing, but it also has 95% with full double glazing.

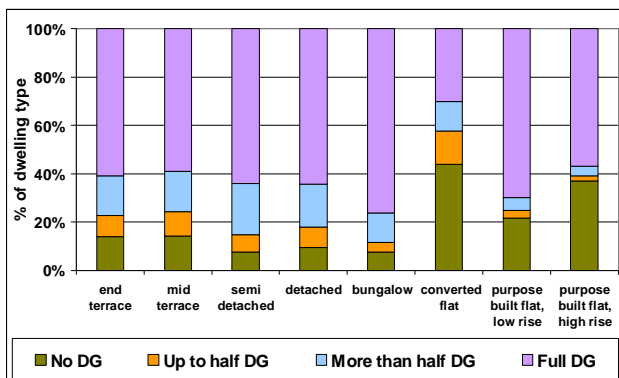


Figure 23: Comparison of double glazing proportions by dwelling type

Flats are typically less likely to contain double glazing than houses, with 44% of converted flats, 23% of purpose built flats and 10% of houses having none, with terraces having slightly lower standards than other house types, (Figure 23). Just 30% of converted flats have full double glazing, compared with 76% of bungalows, which have the most post-1945 dwellings. Although purpose built flats tend to fall into a similar construction period, the extent of double glazing is not as great, partly due to the proportion of this stock in the private rented and local authority tenures, which will be shown to have less double glazing than owner occupiers.

Dwelling Location

The region most likely to contain single glazed homes is London, in which 25% have no double glazing and 50%

have full double glazing, as shown in Figure 24. The age of this regions' stock is a clear contributor to this as previously noted. Perhaps surprisingly, the North East, with 17% fully single glazed comes next, despite having a high proportion of many other energy efficiency measures. Although the stock here is not as old as in London, it does not have a high proportion of the newer dwellings in which double glazing is standard. All other regions have between 9% and 12% with no double glazing and 63% to 68% with full double glazing.

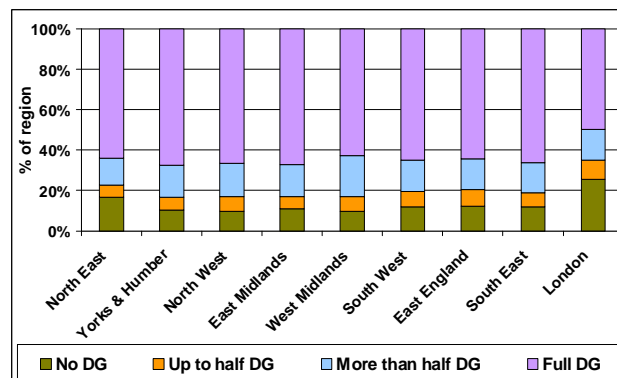


Figure 24: Comparison of double glazing proportions by region (isolating London and the North East)

The greater age of city centre and urban dwellings, along with the proportion of flats found here, gives these locations a high percentage with no double glazing (22%) and lower than average amounts with full double glazing (53%), shown in Figure 25. In newer suburban areas the respective proportions are 10% and 67%. Rural neighbourhoods are not far behind in numbers of fully double glazed stock (63%), with higher proportions of detached houses and bungalows here a contributory factor. Once again dwellings with higher market values are found more frequently among those with low amounts of double glazing – those most likely to be older, city centre properties.

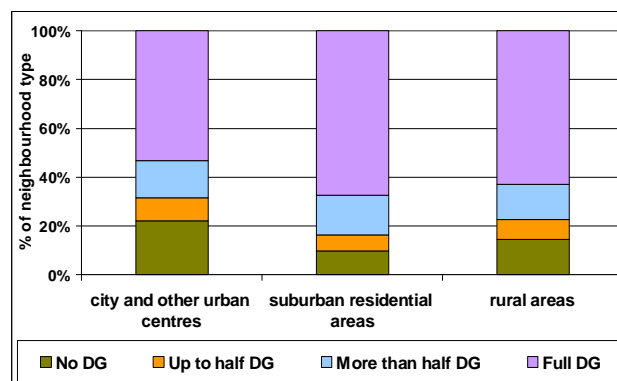


Figure 25: Comparison of double glazing proportions by neighbourhood type

Tenure

It is in the private rented sector where the lowest levels of double glazing are found, (Figure 27), although the figures have improved since 2005. Twenty-eight percent of dwellings in this group have no double glazing and 49% are fully double glazed. An earlier construction period reduces the chance of the dwelling originally having double glazing and the nature of the tenure precludes its subsequent installation. This is a rare situation in which owner occupiers are ahead of the social sector, particularly local authority stock, in terms of energy efficiency. We see 10% of private owners having no double glazing compared with 19% of social rented homes, although over three-quarters of RSL homes have full double glazing, well ahead of other tenures. The high proportion of flats in the social sector is one factor for the above average proportion of full single glazing, whilst the level of retrospectively fitted energy efficient windows among home owners is also key.

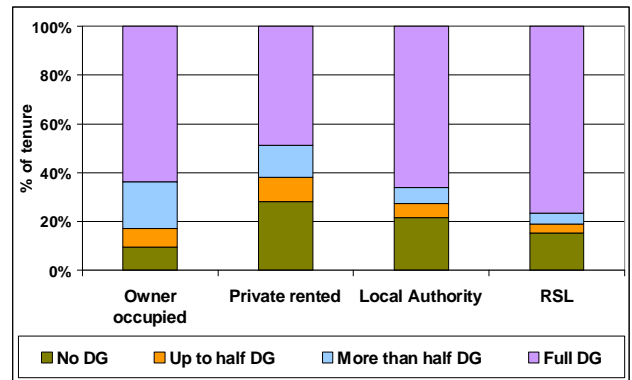


Figure 27: Comparison of double glazing proportions by tenure

Household Type

The highest levels of double glazing ownership are among couples with and without dependent children, as shown in Figure 28. These are more likely to be owner occupiers in detached or semi-detached houses than other household categories. Single people under 60 years old have the highest level without any double glazing, whilst only 55% of other large adult households have full double glazing. These groups are the most likely to live in pre-1919 homes, often converted flats and also private rented purpose built flats, all typical of high heat loss windows.

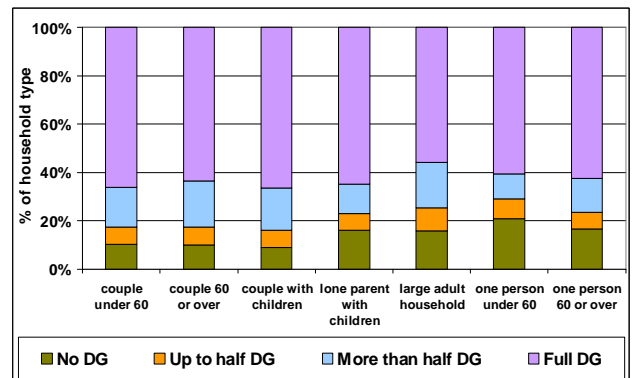


Figure 28: Comparison of double glazing proportions by household group

Fact Box: Double Glazing Growth in Private Homes

In the private housing sector, the number of dwellings with no double glazing has more than halved since 1996, whilst the number with full double glazing has more than doubled. Figure 26 shows how these improvements have progressed over time in the owner occupied (OO) and private rented (PR) tenures.

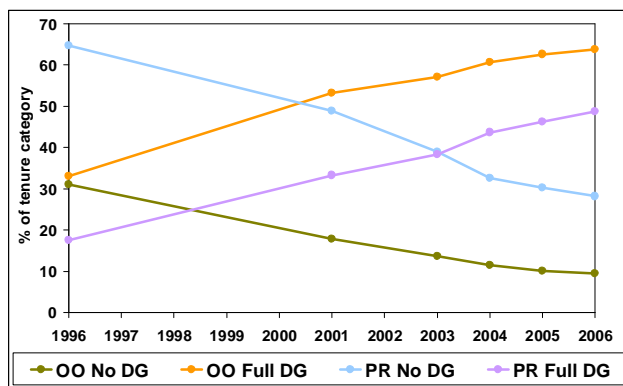


Figure 26: Timeline of double glazing proportions

In owner occupied stock the proportion with no double glazing has declined from 31% to 10%, leaving a minority that may be difficult to improve due to the age of the stock, including dwellings with listed or conservation area status. The private rented sector, on the other hand, still has less than half with full double glazing and around a quarter with none, despite a similar rate of improvement as owner occupiers. This is symptomatic of a generally slow uptake of energy efficiency measures by private landlords – a fact only partially offset by the age and condition of their stock.

The ability to afford to install double glazed windows appears to have an impact on proportions within household income bands, with lower income households more likely to have no double glazing than those with higher incomes. When comparing incomes in five equal groups it is actually the fourth highest group that has the highest levels of double glazing, (Figure 29). This may be because the highest income group is more likely to live in older, more valuable properties in which upgrading from single glazing may not always be feasible.

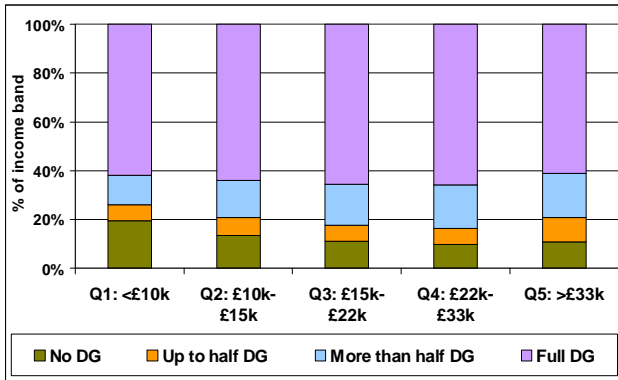


Figure 29: Comparison of double glazing proportions by household income

Fact Box: Combined Insulation Measures

Having examined the key insulation features individually, we can create a notional idea of 'good' or 'poor' insulation throughout a dwelling, as shown in Figure 30. Here, 'good' insulation includes dwellings with full double glazing, at least 200 mm of loft insulation and cavity wall insulation where a cavity is present, whilst 'poor' indicates those with no double glazing, less than 50 mm loft insulation and either a solid or empty cavity wall.

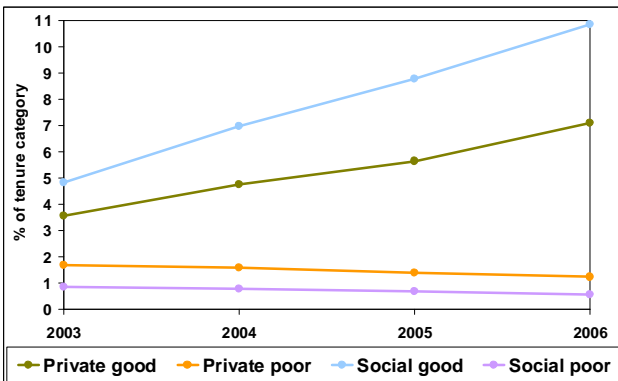


Figure 30: Good and poor insulation over time

The figure has been split between the private and social sectors to show the different rates at which recent improvements have been made. It can be seen that the proportion of homes with poor insulation is at a very low level across the stock, but still with a gradual year by year decrease. Around 60% of these were built pre-1919 and the largest proportion is mid-terraces.

The increase in dwellings with 'good' insulation is greater in social sector housing, with these landlords under stronger obligation to raise the level of thermal comfort in their dwellings to a higher level than private owners. However, with 11% of social stock and 7% of private stock a 'good' level, there is clearly still plenty of room for improvement.

Comparing the perceived effectiveness of a dwellings insulation measures with the glazing type gives the strongest correlation of all the thermal insulation measures under examination. This is shown in Figure 31 with the proportion of "very effective" rating given to fully double glazed dwellings far higher than for those with none. However, the small percentage of "Not at all effective" ratings within the highest double glazing category suggests deficiencies in other areas of thermal insulation.

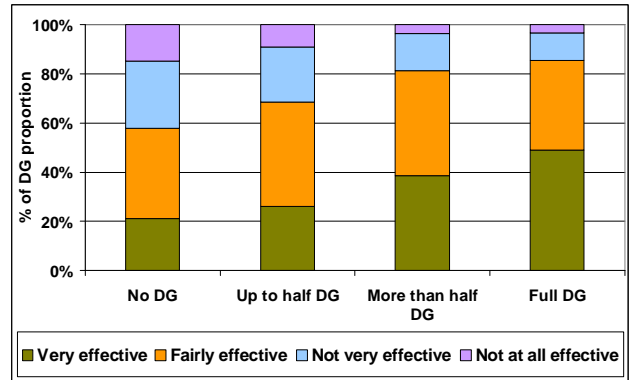


Figure 31: Comparison of double glazing proportions by household satisfaction rating for insulation

Hot Water Tank Insulation

Domestic water heating and storage is discussed in more detail in the Space and Water Heating Report; here we consider the measures taken to prevent heat losses from the hot water storage tank. It should be noted however that higher a higher heat loss from this system results in a slight gain in terms of space heating, this effect is taken into account by the energy efficiency rating for the whole dwelling. This section focuses on the 14 million (63%) of dwellings with operational hot water tanks, which excludes those with combination boilers, or instantaneous water heating and supply systems. This overall quantity has fallen by around 1.2 million since 2003 due to the uptake of combination, particularly condensing-combination, boilers.

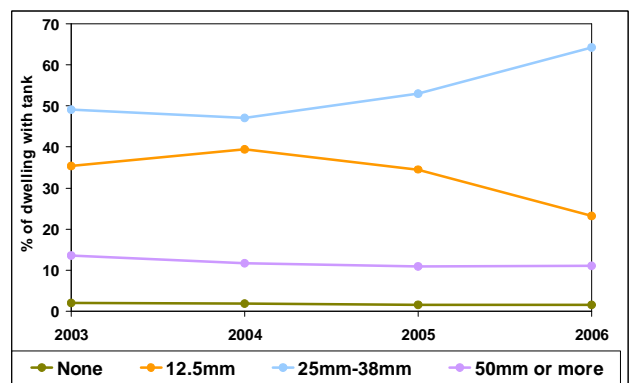


Figure 32: Timeline of hot water tank insulation bands

In 2006, around 1.5% of these tanks were uninsulated, a small reduction from 2% in 2003, (Figure 32). The efficiency of these systems would benefit greatly from any form of added insulation. Of those tanks with insulation, 67% are made from factory bonded foam insulation and 33% are loose insulated jackets, (Figure 33). The proportion of tanks with the thinnest insulation of 12.5 mm has fallen from 35% in 2003 to 23% in 2006, whilst the percentage with 25 mm or 38 mm has increased from 49% in 2003 to 64% in 2006. The proportion of cylinders with 50 mm or more has fallen from 13% to 11%.

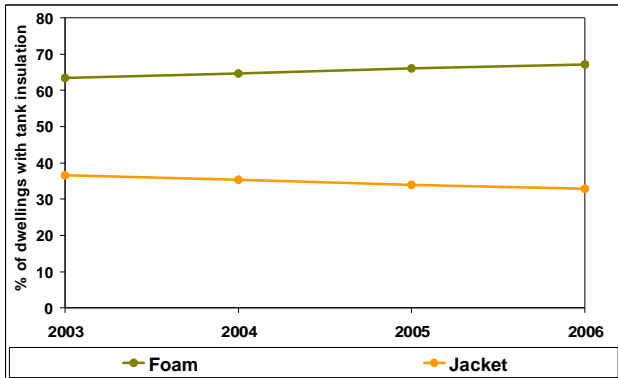


Figure 33: Timeline of hot water tank insulating materials

These figures suggest a move towards a standard thickness of factory moulded insulation of 25 mm or 38 mm, replacing poorly insulated cylinders or tanks covered by thicker, but less well insulating, loose jackets, which had previously been added to uninsulated tanks. Indeed, comparing thickness against material we find that around half of the 50 mm or more examples are jackets compared with only 26% of 25 mm – 38 mm insulation, as shown in Figure 34. This trend may become clearer as the timeline is extended in the future, when we would also expect thicker factory made foam insulation to become more prevalent on replacement cylinders. The option to reduce the tank heat loss by adding a jacket to an existing thinner layer of foam insulation is also open to householders and landlords.

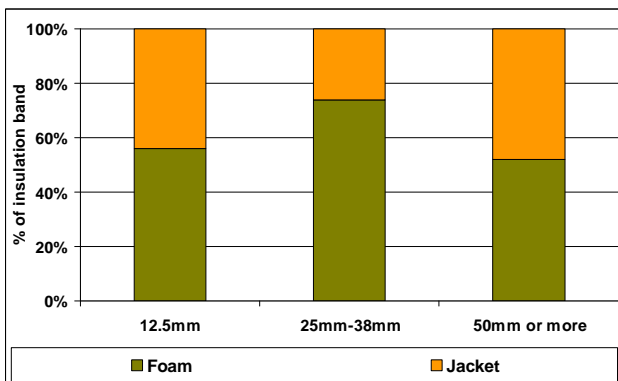


Figure 34: Comparison of hot water tank insulating material by thickness of insulation

Dwelling Type

There is some correlation between cylinder insulation and dwelling age, (Figure 35). There are very few uninsulated cylinders in post-1980's housing, and a below average proportion of 12.5 mm. These dwellings also have higher percentages of 25 mm – 38 mm insulation, of which the majority are made from factory moulded foam (88%). Pre-1919 dwellings have the highest proportion of uninsulated tanks; 41% of all uninsulated tanks are in this age band. Those with insulation use lower quantities of foam coating (62%) and more loose jackets (38%) than more recently built dwellings.

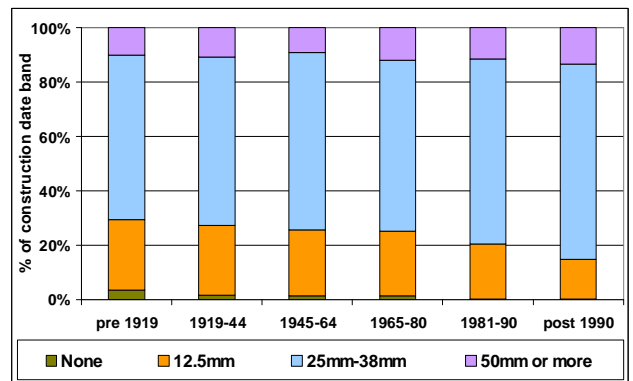


Figure 35: Comparison of hot water tank insulation thickness by construction date

Correspondingly, The older dwelling types such as converted flats and terraced housing are the most likely to contain uninsulated tanks, with purpose built flats having the highest proportion of thicker insulation and, along with detached homes, the highest percentage of foam coating where insulation exists.

Dwelling Location

There is a general pattern of Southern and Eastern regions having lower numbers of uninsulated cylinders, around 1% of hot water tanks, compared with 2% in the North and Midlands. There is also a tendency for more factory foam insulation in the south eastern regions (comprising the London and SE GOR's), with 74% using foam compared with 58% in northern regions (NE, NW and Yorkshire), as shown in Figure 36. The higher amount of new housing in the South East is a contributory factor to these figures, along with the above average quantity of purpose built flats.

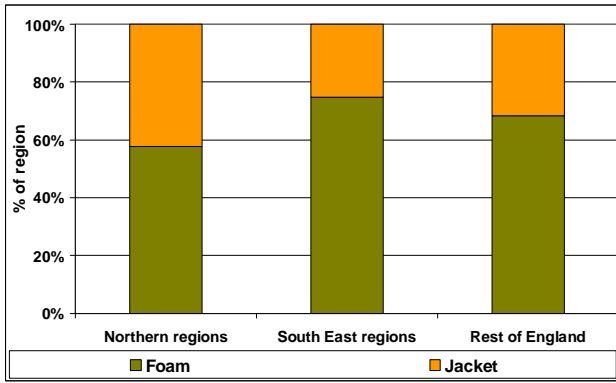


Figure 36: Comparison of hot water tank insulating material by region

Household Type

Household categories who are more likely to have hot water tanks with no insulation or poor insulating material include single people, (who often live in older homes), and those with low incomes. Households using uninsulated hot water cylinders also have more of a tendency to rate their overall satisfaction with their thermal insulation as ineffective, although clearly other measures have a more immediate impact on their attitudes.

Conclusions and Future Issues

We have seen continued increases in the uptake of thermal insulation measures such as cavity wall insulation, double glazing and greater depths of loft insulation. As more data becomes available from the continuous survey a consistent time series for these measures along with hot water cylinder insulation can be produced.

We are reaching the point at which improvements, although driven by Building Regulations in new build stock will be harder to achieve through refurbishments to particular ages and types dwelling, such as Hard to Treat stock. However, there is still considerable potential in the number of unfilled cavity walls and lofts insulated well below the recommended levels, and it is this potential which future update reports will focus on.

Fact Box: Hot Water Tanks by Tenure

Taking a slightly alternative view of hot water cylinder insulation a measure has been found in which private rented dwellings show a more positive energy efficient pattern than owner occupied stock.. Figure 37 groups the cylinder insulation by type and approximate thickness and then displays the spread of these categories across the tenures, so, for example, a similar proportion of each tenure contain cylinders with 12.5 mm of foam.

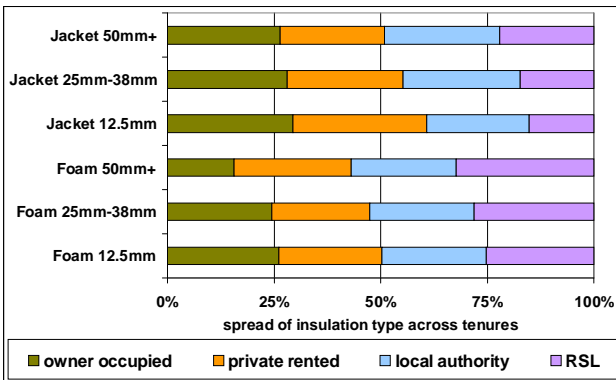


Figure 37: Comparison of combined tank insulation details by tenure

However, it can be seen that a greater proportion of private rented homes have the most efficient foam insulation, of at least 50 mm, than owner occupied stock. Using this measure the better private rented cylinders are more often found in purpose built flats, whilst the 12.5 mm jackets are more likely to be in older rented terraces. In general, the social tenures are more predominant in thicker insulation bands, with foam coating found particularly in registered social landlord stock.

Thermal Insulation Update Tables 2006

These tables give detailed breakdowns of the three main housing insulation groups (cavity wall insulation, loft insulation and double glazing) against key variables, as an appendix to the Thermal Insulation Update Report 2006.

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Table 3.8 Double glazing - Proportion of dwelling double glazed by household income

Table 1.1 Cavity wall insulation - Proportion of cavity wall dwellings with cavity wall insulation

| | count(000s), (column%) |
|---------------------------------|------------------------|
| Cavity wall insulation present? | Dwellings |
| Cavity with insulation | 6,644 (43.9) |
| Cavity uninsulated | 8,497 (56.1) |
| Total | 15,141 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.2 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by dwelling type

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|-------------------------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| end terrace | 591 (43.5) | 767 (56.5) | 1,357 (100.0) |
| mid terrace | 727 (35.5) | 1,319 (64.5) | 2,046 (100.0) |
| semi detached | 1,899 (42.1) | 2,613 (57.9) | 4,512 (100.0) |
| detached | 1,544 (50.8) | 1,495 (49.2) | 3,038 (100.0) |
| bungalow | 937 (54.2) | 791 (45.8) | 1,728 (100.0) |
| converted flat | 18 (13.4) | 115 (86.6) | 132 (100.0) |
| purpose built flat, low rise | 895 (41.0) | 1,289 (59.0) | 2,184 (100.0) |
| purpose built flat, high rise | 35 (24.5) | 108 (75.5) | 143 (100.0) |
| Total | 6,644 (43.9) | 8,497 (56.1) | 15,141 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.3 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by dwelling age

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|-------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| pre 1919 | 111 (15.7) | 594 (84.3) | 705 (100.0) |
| 1919 - 1944 | 810 (34.8) | 1,519 (65.2) | 2,329 (100.0) |
| 1945 - 1964 | 1,752 (46.4) | 2,027 (53.6) | 3,778 (100.0) |
| 1965 - 1980 | 1,827 (41.2) | 2,611 (58.8) | 4,438 (100.0) |
| 1981 - 1990 | 901 (50.9) | 870 (49.1) | 1,771 (100.0) |
| post 1990 | 1,244 (58.7) | 876 (41.3) | 2,120 (100.0) |
| Total | 6,644 (43.9) | 8,497 (56.1) | 15,141 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.4 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by floor area

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|--|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| Quintile 1: < 63m ² | 1,340 (43.2) | 1,759 (56.8) | 3,099 (100.0) |
| Quintile 2: 63m ² - 78m ² | 1,231 (41.8) | 1,717 (58.2) | 2,948 (100.0) |
| Quintile 3: 78m ² - 91m ² | 1,342 (43.5) | 1,745 (56.5) | 3,087 (100.0) |
| Quintile 4: 91m ² - 118m ² | 1,368 (44.3) | 1,718 (55.7) | 3,086 (100.0) |
| Quintile 5: > 118m ² | 1,363 (46.7) | 1,558 (53.3) | 2,921 (100.0) |
| Total | 6,644 (43.9) | 8,497 (56.1) | 15,141 (100.0) |
| | (100.0) | (100.0) | (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.5 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by tenure

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|-----------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| Owner occupied | 4,650 (43.2) | 6,118 (56.8) | 10,769 (100.0) |
| Private rented | 381 (28.9) | 936 (71.1) | 1,317 (100.0) |
| Local Authority | 834 (54.2) | 703 (45.8) | 1,537 (100.0) |
| RSL | 779 (51.3) | 739 (48.7) | 1,518 (100.0) |
| Total | 6,644 (43.9) | 8,497 (56.1) | 15,141 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.6 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by household composition

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|---------------------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| couple under 60 | 1,080 (39.5) | 1,653 (60.5) | 2,733 (100.0) |
| couple 60 or over | 1,378 (51.6) | 1,294 (48.4) | 2,671 (100.0) |
| couple with children | 1,488 (42.5) | 2,017 (57.5) | 3,505 (100.0) |
| lone parent with children | 458 (44.6) | 569 (55.4) | 1,026 (100.0) |
| large adult household | 377 (41.0) | 543 (59.0) | 920 (100.0) |
| one person under 60 | 614 (38.8) | 966 (61.2) | 1,580 (100.0) |
| one person 60 or over | 1,054 (48.7) | 1,108 (51.3) | 2,162 (100.0) |
| Total | 6,448 (44.2) | 8,149 (55.8) | 14,597 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.7 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by age of HRP

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| 16 - 29 | 433 (40.5) | 635 (59.5) | 1,068 (100.0) |
| 30 - 44 | 1,666 (40.0) | 2,493 (60.0) | 4,159 (100.0) |
| 45 - 64 | 2,339 (43.1) | 3,086 (56.9) | 5,425 (100.0) |
| 65 or over | 2,011 (51.0) | 1,935 (49.0) | 3,946 (100.0) |
| Total | 6,448 (44.2) | 8,149 (55.8) | 14,597 (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 1.8 Cavity wall insulation - Proportion of dwellings with cavity wall insulation by household income

| | Cavity wall insulation? | | count(000s), (row%), (column%) |
|-------------------------|-------------------------|------------------|--------------------------------|
| | Yes | No | Total |
| Quintile 1: < £10k | 1,397 (48.2) | 1,498 (51.8) | 2,895 (100.0) |
| Quintile 2: £10k - £15k | 1,329 (45.6) | 1,583 (54.4) | 2,912 (100.0) |
| Quintile 3: £15k - £22k | 1,311 (44.1) | 1,660 (55.9) | 2,971 (100.0) |
| Quintile 4: £22k - £33k | 1,228 (41.2) | 1,750 (58.8) | 2,978 (100.0) |
| Quintile 5: > £33k | 1,183 (41.6) | 1,658 (58.4) | 2,841 (100.0) |
| Total | 6,448 (44.2) | 8,149 (55.8) | 14,597 (100.0) |
| | (100.0) | (100.0) | (100.0) |

(of dwellings with predominantly cavity wall construction)

Table 2.1 Loft insulation - Thickness of loft insulation

| Loft insulation thickness | count(000s), (column%) Dwellings |
|---------------------------|-------------------------------------|
| None | 819 (4.2) |
| less than 50mm | 633 (3.2) |
| 50 up to 99mm | 4,412 (22.5) |
| 100 up to 149mm | 7,322 (37.3) |
| 150 up to 199mm | 2,916 (14.9) |
| 200mm or more | 3,520 (17.9) |
| Total | 19,621 (100.0) |

(of all dwellings with loft space)

Table 2.2 Loft insulation - Thickness of loft insulation by dwelling type

| | count(000s), (row%), (column%) | | | | | | |
|-------------------------------|--------------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
| end terrace | 99 (4.6) (12.1) | 58 (2.7) (9.2) | 533 (24.8) (12.1) | 739 (34.4) (10.1) | 345 (16.1) (11.8) | 374 (17.4) (10.6) | 2,149 (100.0) (11.0) |
| mid terrace | 267 (6.3) (32.6) | 143 (3.4) (22.6) | 1,014 (23.8) (23.0) | 1,586 (37.3) (21.7) | 573 (13.5) (19.6) | 670 (15.7) (19.0) | 4,253 (100.0) (21.7) |
| semi detached | 225 (3.7) (27.4) | 254 (4.2) (40.1) | 1,351 (22.4) (30.6) | 2,226 (36.9) (30.4) | 883 (14.6) (30.3) | 1,100 (18.2) (31.3) | 6,039 (100.0) (30.8) |
| detached | 104 (2.8) (12.7) | 119 (3.2) (18.8) | 765 (20.5) (17.3) | 1,420 (38.0) (19.4) | 643 (17.2) (22.1) | 683 (18.3) (19.4) | 3,734 (100.0) (19.0) |
| bungalow | 36 (1.8) (4.4) | 33 (1.7) (5.3) | 392 (19.7) (8.9) | 726 (36.5) (9.9) | 316 (15.9) (10.8) | 483 (24.3) (13.7) | 1,987 (100.0) (10.1) |
| converted flat | 43 (14.7) (5.3) | 7 (2.3) (1.1) | 108 (36.7) (2.5) | 88 (29.8) (1.2) | 17 (5.8) (0.6) | 32 (10.7) (0.9) | 294 (100.0) (1.5) |
| purpose built flat, low rise | 45 (4.0) (5.4) | 19 (1.7) (3.0) | 235 (21.0) (5.3) | 507 (45.3) (6.9) | 135 (12.0) (4.6) | 179 (16.0) (5.1) | 1,119 (100.0) (5.7) |
| purpose built flat, high rise | - (0.0) (0.0) | - (0.0) (0.0) | 15 (31.0) (0.3) | 29 (61.8) (0.4) | 3 (7.2) (0.1) | - (0.0) (0.0) | 48 (100.0) (0.2) |
| Total | 819 (4.2) (100.0) | 633 (3.2) (100.0) | 4,412 (22.5) (100.0) | 7,322 (37.3) (100.0) | 2,916 (14.9) (100.0) | 3,520 (17.9) (100.0) | 19,621 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.3 Loft insulation - Thickness of loft insulation by dwelling age

| | count(000s), (row%), (column%) | | | | | | |
|-------------|--------------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
| pre 1919 | 417 (9.8) (51.0) | 126 (3.0) (19.9) | 1,038 (24.4) (23.5) | 1,584 (37.3) (21.6) | 489 (11.5) (16.8) | 594 (14.0) (16.9) | 4,248 (100.0) (21.7) |
| 1919 - 1944 | 209 (5.5) (25.5) | 134 (3.5) (21.1) | 916 (24.1) (20.8) | 1,403 (37.0) (19.2) | 506 (13.3) (17.4) | 629 (16.6) (17.9) | 3,796 (100.0) (19.3) |
| 1945 - 1964 | 105 (2.7) (12.8) | 145 (3.7) (22.9) | 842 (21.3) (19.1) | 1,491 (37.8) (20.4) | 572 (14.5) (19.6) | 794 (20.1) (22.6) | 3,948 (100.0) (20.1) |
| 1965 - 1980 | 67 (1.6) (8.1) | 209 (5.0) (33.0) | 1,172 (28.3) (26.6) | 1,508 (36.4) (20.6) | 588 (14.2) (20.2) | 600 (14.5) (17.0) | 4,143 (100.0) (21.1) |
| 1981 - 1990 | 11 (0.7) (1.3) | 12 (0.8) (1.9) | 323 (20.7) (7.3) | 763 (48.9) (10.4) | 231 (14.8) (7.9) | 222 (14.2) (6.3) | 1,562 (100.0) (8.0) |
| post 1990 | 11 (0.5) (1.3) | 7 (0.4) (1.1) | 122 (6.3) (2.8) | 574 (29.8) (7.8) | 530 (27.5) (18.2) | 681 (35.4) (19.4) | 1,924 (100.0) (9.8) |
| Total | 819 (4.2) (100.0) | 633 (3.2) (100.0) | 4,412 (22.5) (100.0) | 7,322 (37.3) (100.0) | 2,916 (14.9) (100.0) | 3,520 (17.9) (100.0) | 19,621 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.4 Loft insulation - Thickness of loft insulation by floor area

| | count(000s), (row%), (column%) | | | | | | |
|--|--------------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
| Quintile 1: < 63m ² | 129 (4.4) (15.7) | 55 (1.9) (8.7) | 656 (22.4) (14.9) | 1,146 (39.2) (15.7) | 441 (15.1) (15.1) | 498 (17.0) (14.2) | 2,925 (100.0) (14.9) |
| Quintile 2: 63m ² - 78m ² | 161 (4.2) (19.7) | 135 (3.5) (21.4) | 896 (23.1) (20.3) | 1,393 (36.0) (19.0) | 559 (14.4) (19.2) | 729 (18.8) (20.7) | 3,874 (100.0) (19.7) |
| Quintile 3: 78m ² - 91m ² | 171 (4.1) (20.9) | 159 (3.8) (25.1) | 998 (23.7) (22.6) | 1,481 (35.1) (20.2) | 609 (14.5) (20.9) | 796 (18.9) (22.6) | 4,214 (100.0) (21.5) |
| Quintile 4: 91m ² - 118m ² | 172 (4.0) (21.0) | 152 (3.6) (24.0) | 977 (22.8) (22.1) | 1,638 (38.3) (22.4) | 621 (14.5) (21.3) | 721 (16.8) (20.5) | 4,281 (100.0) (21.8) |
| Quintile 5: > 118m ² | 186 (4.3) (22.7) | 132 (3.0) (20.8) | 885 (20.5) (20.1) | 1,664 (38.5) (22.7) | 686 (15.8) (23.5) | 775 (17.9) (22.0) | 4,327 (100.0) (22.1) |
| Total | 819 (4.2) (100.0) | 633 (3.2) (100.0) | 4,412 (22.5) (100.0) | 7,322 (37.3) (100.0) | 2,916 (14.9) (100.0) | 3,520 (17.9) (100.0) | 19,621 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.5 Loft insulation - Thickness of loft insulation by dwelling tenure

| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
|-----------------|---------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| Owner occupied | 594 (4.0) (72.6) | 514 (3.5) (81.2) | 3,351 (22.8) (76.0) | 5,609 (38.1) (76.6) | 2,178 (14.8) (74.7) | 2,461 (16.7) (69.9) | 14,707 (100.0) (75.0) |
| Private rented | 161 (7.9) (19.7) | 71 (3.5) (11.3) | 697 (34.4) (15.8) | 667 (32.9) (9.1) | 211 (10.4) (7.2) | 221 (10.9) (6.3) | 2,029 (100.0) (10.3) |
| Local Authority | 41 (2.8) (5.0) | 31 (2.1) (4.8) | 195 (13.2) (4.4) | 551 (37.2) (7.5) | 240 (16.2) (8.2) | 422 (28.5) (12.0) | 1,479 (100.0) (7.5) |
| RSL | 22 (1.6) (2.7) | 17 (1.2) (2.7) | 168 (12.0) (3.8) | 495 (35.2) (6.8) | 287 (20.4) (9.8) | 417 (29.6) (11.8) | 1,406 (100.0) (7.2) |
| Total | 819 (4.2) (100.0) | 633 (3.2) (100.0) | 4,412 (22.5) (100.0) | 7,322 (37.3) (100.0) | 2,916 (14.9) (100.0) | 3,520 (17.9) (100.0) | 19,621 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.6 Loft insulation - Thickness of loft insulation by household composition

| | count(000s), (row%), (column%) | | | | | | |
|---------------------------|--------------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
| couple under 60 | 167 (4.5) (21.9) | 115 (3.1) (18.9) | 801 (21.8) (19.0) | 1,468 (40.0) (20.8) | 532 (14.5) (18.9) | 588 (16.0) (17.1) | 3,671 (100.0) (19.4) |
| couple 60 or over | 104 (3.1) (13.6) | 121 (3.6) (19.9) | 714 (21.3) (16.9) | 1,266 (37.8) (17.9) | 491 (14.7) (17.4) | 652 (19.5) (19.0) | 3,348 (100.0) (17.7) |
| couple with children | 186 (3.8) (24.5) | 146 (3.0) (23.9) | 1,116 (22.7) (26.4) | 1,830 (37.2) (25.9) | 765 (15.5) (27.2) | 877 (17.8) (25.5) | 4,919 (100.0) (26.0) |
| lone parent with children | 59 (4.4) (7.8) | 25 (1.9) (4.1) | 298 (22.4) (7.1) | 453 (34.0) (6.4) | 223 (16.7) (7.9) | 274 (20.6) (8.0) | 1,331 (100.0) (7.0) |
| large adult household | 50 (3.8) (6.6) | 51 (3.9) (8.3) | 361 (27.7) (8.6) | 469 (35.9) (6.6) | 158 (12.1) (5.6) | 217 (16.6) (6.3) | 1,305 (100.0) (6.9) |
| one person under 60 | 100 (5.3) (13.2) | 74 (3.9) (12.2) | 452 (23.9) (10.7) | 725 (38.3) (10.3) | 280 (14.8) (10.0) | 259 (13.7) (7.5) | 1,890 (100.0) (10.0) |
| one person 60 or over | 94 (3.8) (12.4) | 77 (3.2) (12.7) | 476 (19.5) (11.3) | 860 (35.2) (12.2) | 364 (14.9) (13.0) | 570 (23.3) (16.6) | 2,441 (100.0) (12.9) |
| Total | 760 (4.0) (100.0) | 609 (3.2) (100.0) | 4,218 (22.3) (100.0) | 7,071 (37.4) (100.0) | 2,812 (14.9) (100.0) | 3,436 (18.2) (100.0) | 18,905 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.7 Loft insulation - Thickness of loft insulation by age of HRP

| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
|------------|---------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| 16 - 29 | 56 (4.1) (7.4) | 57 (4.1) (9.3) | 373 (27.0) (8.8) | 508 (36.8) (7.2) | 181 (13.1) (6.4) | 205 (14.9) (6.0) | 1,380 (100.0) (7.3) |
| 30 - 44 | 263 (4.6) (34.6) | 150 (2.6) (24.6) | 1,289 (22.6) (30.5) | 2,117 (37.1) (29.9) | 889 (15.6) (31.6) | 998 (17.5) (29.1) | 5,705 (100.0) (30.2) |
| 45 - 64 | 262 (3.7) (34.5) | 244 (3.4) (40.1) | 1,619 (22.8) (38.4) | 2,705 (38.0) (38.3) | 1,072 (15.1) (38.1) | 1,212 (17.0) (35.3) | 7,113 (100.0) (37.6) |
| 65 or over | 179 (3.8) (23.5) | 158 (3.4) (26.0) | 938 (19.9) (22.2) | 1,741 (37.0) (24.6) | 671 (14.3) (23.9) | 1,020 (21.7) (29.7) | 4,707 (100.0) (24.9) |
| Total | 760 (4.0) (100.0) | 609 (3.2) (100.0) | 4,218 (22.3) (100.0) | 7,071 (37.4) (100.0) | 2,812 (14.9) (100.0) | 3,436 (18.2) (100.0) | 18,905 (100.0) (100.0) |

(of all dwellings with loft space)

Table 2.8 Loft insulation - Thickness of loft insulation by household income

| | count(000s), (row%), (column%) | | | | | | |
|-------------------------|--------------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| | None | < 50 | 50 - 99 | 100 - 149 | 150 - 199 | 200 + | Total |
| Quintile 1: < £10k | 158 (4.7) (20.7) | 93 (2.8) (15.2) | 679 (20.2) (16.1) | 1,200 (35.7) (17.0) | 490 (14.6) (17.4) | 747 (22.2) (21.7) | 3,366 (100.0) (17.8) |
| Quintile 2: £10k - £15k | 162 (4.4) (21.3) | 123 (3.3) (20.2) | 764 (20.6) (18.1) | 1,335 (36.1) (18.9) | 580 (15.7) (20.6) | 735 (19.9) (21.4) | 3,699 (100.0) (19.6) |
| Quintile 3: £15k - £22k | 148 (3.8) (19.4) | 150 (3.9) (24.6) | 929 (24.0) (22.0) | 1,428 (36.8) (20.2) | 575 (14.8) (20.4) | 648 (16.7) (18.9) | 3,878 (100.0) (20.5) |
| Quintile 4: £22k - £33k | 132 (3.3) (17.3) | 129 (3.3) (21.2) | 981 (24.8) (23.2) | 1,519 (38.4) (21.5) | 581 (14.7) (20.7) | 612 (15.5) (17.8) | 3,953 (100.0) (20.9) |
| Quintile 5: > £33k | 161 (4.0) (21.2) | 114 (2.9) (18.8) | 866 (21.6) (20.5) | 1,588 (39.6) (22.5) | 586 (14.6) (20.8) | 693 (17.3) (20.2) | 4,009 (100.0) (21.2) |
| Total | 760 (4.0) (100.0) | 609 (3.2) (100.0) | 4,218 (22.3) (100.0) | 7,071 (37.4) (100.0) | 2,812 (14.9) (100.0) | 3,436 (18.2) (100.0) | 18,905 (100.0) (100.0) |

(of all dwellings with loft space)

Table 3.1 Double glazing - Proportion of dwelling double glazed

| | count (000s), (column%) |
|--------------------------------|-------------------------|
| Double glazing present? | Dwellings |
| No double glazing | 2,938 (13.4) |
| Less than half | 1,634 (7.4) |
| More than half | 3,492 (15.9) |
| Entire house | 13,924 (63.3) |
| Total | 21,989 (100.0) |

Table 3.2 Double glazing - Proportion of dwelling double glazed by dwelling type

| | count(000s), (row%), (column%) | | | | |
|-------------------------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| end terrace | 302 (14.0) (10.3) | 189 (8.8) (11.6) | 350 (16.3) (10.0) | 1,308 (60.9) (9.4) | 2,149 (100.0) (9.8) |
| mid terrace | 610 (14.3) (20.8) | 424 (10.0) (26.0) | 716 (16.8) (20.5) | 2,502 (58.8) (18.0) | 4,253 (100.0) (19.3) |
| semi detached | 473 (7.8) (16.1) | 427 (7.1) (26.1) | 1,283 (21.2) (36.7) | 3,856 (63.9) (27.7) | 6,039 (100.0) (27.5) |
| detached | 358 (9.6) (12.2) | 318 (8.5) (19.5) | 653 (17.5) (18.7) | 2,405 (64.4) (17.3) | 3,734 (100.0) (17.0) |
| bungalow | 152 (7.7) (5.2) | 77 (3.9) (4.7) | 245 (12.3) (7.0) | 1,513 (76.1) (10.9) | 1,987 (100.0) (9.0) |
| converted flat | 326 (43.8) (11.1) | 104 (13.9) (6.3) | 90 (12.0) (2.6) | 225 (30.2) (1.6) | 744 (100.0) (3.4) |
| purpose built flat, low rise | 598 (21.7) (20.4) | 88 (3.2) (5.4) | 143 (5.2) (4.1) | 1,933 (70.0) (13.9) | 2,762 (100.0) (12.6) |
| purpose built flat, high rise | 119 (37.0) (4.1) | 7 (2.2) (0.4) | 13 (4.0) (0.4) | 183 (56.8) (1.3) | 322 (100.0) (1.5) |
| Total | 2,938 (13.4) (100.0) | 1,634 (7.4) (100.0) | 3,493 (15.9) (100.0) | 13,924 (63.3) (100.0) | 21,989 (100.0) (100.0) |

Table 3.3 Double glazing - Proportion of dwelling double glazed by dwelling age

| | count(000s), (row%), (column%) | | | | |
|-------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| pre 1919 | 1,356 (28.4) (46.1) | 762 (15.9) (46.6) | 892 (18.7) (25.5) | 1,766 (37.0) (12.7) | 4,776 (100.0) (21.7) |
| 1919 - 1944 | 396 (9.9) (13.5) | 341 (8.5) (20.8) | 1,074 (26.8) (30.8) | 2,191 (54.8) (15.7) | 4,002 (100.0) (18.2) |
| 1945 - 1964 | 417 (9.6) (14.2) | 200 (4.6) (12.2) | 759 (17.4) (21.7) | 2,987 (68.5) (21.4) | 4,363 (100.0) (19.8) |
| 1965 - 1980 | 434 (9.0) (14.8) | 246 (5.1) (15.1) | 593 (12.3) (17.0) | 3,565 (73.7) (25.6) | 4,839 (100.0) (22.0) |
| 1981 - 1990 | 268 (14.6) (9.1) | 77 (4.2) (4.7) | 134 (7.3) (3.8) | 1,357 (73.9) (9.7) | 1,836 (100.0) (8.3) |
| post 1990 | 68 (3.1) (2.3) | 9 (0.4) (0.6) | 40 (1.8) (1.1) | 2,058 (94.6) (14.8) | 2,175 (100.0) (9.9) |
| Total | 2,938 (13.4) (100.0) | 1,634 (7.4) (100.0) | 3,493 (15.9) (100.0) | 13,924 (63.3) (100.0) | 21,989 (100.0) (100.0) |

Table 3.4 Double glazing - Proportion of dwelling double glazed by floor area

| | count(000s), (row%), (column%) | | | | |
|--|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| Quintile 1: < 63m ² | 909 (20.7) (30.9) | 230 (5.2) (14.1) | 326 (7.4) (9.3) | 2,931 (66.7) (21.1) | 4,397 (100.0) (20.0) |
| Quintile 2: 63m ² - 78m ² | 568 (12.9) (19.3) | 277 (6.3) (16.9) | 634 (14.4) (18.2) | 2,919 (66.4) (21.0) | 4,398 (100.0) (20.0) |
| Quintile 3: 78m ² - 91m ² | 502 (11.4) (17.1) | 261 (5.9) (16.0) | 757 (17.2) (21.7) | 2,878 (65.4) (20.7) | 4,398 (100.0) (20.0) |
| Quintile 4: 91m ² - 118m ² | 416 (9.5) (14.1) | 346 (7.9) (21.2) | 924 (21.0) (26.5) | 2,712 (61.7) (19.5) | 4,398 (100.0) (20.0) |
| Quintile 5: > 118m ² | 543 (12.4) (18.5) | 521 (11.8) (31.9) | 851 (19.3) (24.4) | 2,484 (56.5) (17.8) | 4,398 (100.0) (20.0) |
| Total | 2,938 (13.4) (100.0) | 1,634 (7.4) (100.0) | 3,493 (15.9) (100.0) | 13,924 (63.3) (100.0) | 21,989 (100.0) (100.0) |

Table 3.5 Double glazing - Proportion of dwelling double glazed by dwelling tenure

| | count(000s), (row%), (column%) | | | | |
|-----------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| Owner occupied | 1,466 (9.5) (49.9) | 1,189 (7.7) (72.7) | 2,931 (19.0) (83.9) | 9,856 (63.8) (70.8) | 15,442 (100.0) (70.2) |
| Private rented | 737 (28.2) (25.1) | 260 (10.0) (15.9) | 340 (13.0) (9.7) | 1,274 (48.8) (9.1) | 2,611 (100.0) (11.9) |
| Local Authority | 450 (21.6) (15.3) | 121 (5.8) (7.4) | 138 (6.6) (3.9) | 1,378 (66.0) (9.9) | 2,086 (100.0) (9.5) |
| RSL | 286 (15.4) (9.7) | 64 (3.5) (3.9) | 84 (4.5) (2.4) | 1,417 (76.6) (10.2) | 1,850 (100.0) (8.4) |
| Total | 2,938 (13.4) (100.0) | 1,634 (7.4) (100.0) | 3,493 (15.9) (100.0) | 13,924 (63.3) (100.0) | 21,989 (100.0) (100.0) |

Table 3.6 Double glazing - Proportion of dwelling double glazed by household composition

| | count(000s), (row%), (column%) | | | | |
|---------------------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| couple under 60 | 408 (10.2) (15.0) | 286 (7.2) (18.3) | 658 (16.5) (19.6) | 2,628 (66.0) (19.6) | 3,979 (100.0) (18.9) |
| couple 60 or over | 357 (10.1) (13.1) | 262 (7.4) (16.8) | 669 (19.0) (19.9) | 2,237 (63.5) (16.7) | 3,525 (100.0) (16.7) |
| couple with children | 454 (8.9) (16.7) | 368 (7.2) (23.6) | 901 (17.6) (26.8) | 3,392 (66.3) (25.3) | 5,114 (100.0) (24.3) |
| lone parent with children | 245 (16.2) (9.0) | 104 (6.8) (6.6) | 185 (12.2) (5.5) | 983 (64.8) (7.3) | 1,516 (100.0) (7.2) |
| large adult household | 229 (15.9) (8.4) | 139 (9.6) (8.9) | 270 (18.7) (8.0) | 806 (55.8) (6.0) | 1,444 (100.0) (6.9) |
| one person under 60 | 523 (20.9) (19.3) | 203 (8.1) (13.0) | 261 (10.4) (7.8) | 1,520 (60.6) (11.3) | 2,507 (100.0) (11.9) |
| one person 60 or over | 499 (16.8) (18.4) | 198 (6.7) (12.7) | 418 (14.1) (12.4) | 1,855 (62.5) (13.8) | 2,970 (100.0) (14.1) |
| Total | 2,714 (12.9) (100.0) | 1,560 (7.4) (100.0) | 3,361 (16.0) (100.0) | 13,419 (63.7) (100.0) | 21,055 (100.0) (100.0) |

Table 3.7 Double glazing - Proportion of dwelling double glazed by age of HRP

| | count(000s), (row%), (column%) | | | | |
|------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| 16 - 29 | 288 (16.6) (10.6) | 105 (6.1) (6.7) | 207 (11.9) (6.2) | 1,136 (65.4) (8.5) | 1,736 (100.0) (8.2) |
| 30 - 44 | 790 (12.5) (29.1) | 459 (7.3) (29.4) | 949 (15.1) (28.2) | 4,098 (65.1) (30.5) | 6,296 (100.0) (29.9) |
| 45 - 64 | 940 (12.2) (34.6) | 610 (7.9) (39.1) | 1,301 (16.9) (38.7) | 4,858 (63.0) (36.2) | 7,709 (100.0) (36.6) |
| 65 or over | 698 (13.1) (25.7) | 385 (7.2) (24.7) | 904 (17.0) (26.9) | 3,327 (62.6) (24.8) | 5,314 (100.0) (25.2) |
| Total | 2,714 (12.9) (100.0) | 1,560 (7.4) (100.0) | 3,361 (16.0) (100.0) | 13,419 (63.7) (100.0) | 21,055 (100.0) (100.0) |

Table 3.8 Double glazing - Proportion of dwelling double glazed by household income

| | count(000s), (row%), (column%) | | | | |
|-------------------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|
| | No double glazing | Less than half | More than half | Entire house | Total |
| Quintile 1: < £10k | 813 (19.4) (30.0) | 271 (6.5) (17.4) | 513 (12.2) (15.3) | 2,601 (61.9) (19.4) | 4,199 (100.0) (19.9) |
| Quintile 2: £10k - £15k | 566 (13.5) (20.9) | 309 (7.3) (19.8) | 636 (15.1) (18.9) | 2,695 (64.1) (20.1) | 4,206 (100.0) (20.0) |
| Quintile 3: £15k - £22k | 462 (11.0) (17.0) | 284 (6.7) (18.2) | 707 (16.8) (21.0) | 2,759 (65.5) (20.6) | 4,211 (100.0) (20.0) |
| Quintile 4: £22k - £33k | 412 (9.8) (15.2) | 278 (6.6) (17.8) | 746 (17.7) (22.2) | 2,780 (66.0) (20.7) | 4,216 (100.0) (20.0) |
| Quintile 5: > £33k | 462 (10.9) (17.0) | 418 (9.9) (26.8) | 758 (18.0) (22.6) | 2,585 (61.2) (19.3) | 4,223 (100.0) (20.1) |
| Total | 2,714 (12.9) (100.0) | 1,560 (7.4) (100.0) | 3,361 (16.0) (100.0) | 13,419 (63.7) (100.0) | 21,055 (100.0) (100.0) |