



Department for
Communities and
Local Government



English Housing Survey

Potential stock improvements, 2015



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Introduction and main findings

1. The English Housing Survey (EHS) is a national survey of people's housing circumstances and the condition and energy efficiency of housing in England. In its current form, it was first run in 2008-09. Prior to then, the survey was run as two standalone surveys: the English House Condition Survey and the Survey of English Housing. It is one of the longest standing surveys in government, with 2017 marking the 50th anniversary since the first survey in 1967.
2. This report investigates the current condition of England's housing stock and the potential for improving it in various ways. It is split into three chapters.
3. The first chapter looks at housing quality in four different ways: the Housing Health and Safety Rating System (HHSRS), repair costs, damp and Decent Homes. It also looks at how many dwellings have multiple indicators of poor housing quality.
4. The second chapter looks at the potential for energy efficiency measures, as well as the barriers for the installation of certain types of insulation measures. The chapter also considers overheating and parking facilities, the latter to assess the potential for electric vehicle charging points.
5. The third chapter explores the potential of the dwelling stock to meet the current and future needs of households in relation to accessibility, as well as specific features that would make housing more useable for people with disabilities and illnesses.

Main findings

In terms of the housing health and safety rating system, standardised repair costs, damp and Decent Homes, dwellings in England steadily improved up to 2013.

- The prevalence of Category 1 health and safety hazards in dwellings reduced from 23% in 2008 to 12% in 2013. Since 2013, the proportion of dwellings with Category 1 hazards remained very similar at 12%.
- The average cost of basic repair among English dwellings fell from £27/m² to £16/m² over the 2001 to 2015 period. The average level of basic repair costs has remained fairly constant for the whole stock since 2013.
- In 2015, about a million homes (4%) had problems with damp, compared with 2.6 million (13%) homes in 1996. Aside from an increase in rising damp within the stock between 2014 and 2015, the prevalence of damp has remained fairly constant since 2013.
- Between 2006 and 2015, the proportion of non-decent homes in the whole stock reduced steadily from 35% to 19%. There has been no year on year improvement on the prevalence of non-decent homes for the whole housing stock since 2013.

Around one quarter of all dwellings had at least one of the indicators of poor housing mentioned above. Such indicators were most common in private rented sector dwellings and least common in housing association dwellings.

- Around one quarter (27%) of all dwellings had at least one of the indicators of poor housing. Some 11% had just one indicator, another 11% had two and the remaining 5% had three or four indicators.
- The private rented sector had the highest proportion of homes with at least one indicator of poor housing (40%), while this proportion was lowest among housing association homes (19%), likely reflecting that this sector had a higher proportion of newer homes within its stock.

Exposed dwellings at risk of driving rain may be more problematic to insulate. Looking at the exposure of the site of the dwelling, around one in twenty dwellings in the survey were in an exposed location.

- Around 1.5 million dwellings (6%) in the English housing stock were in an exposed location.

Nine in ten houses have a garden or plot large enough (over 36m²) to have potential for a ground source heat pump, whereas only three in ten ground floor flats did.

- While 91% of houses (17.2 million) had a private plot available that exceeded 36m², only 29% of ground floor flats (487,000) did.

Garages and car ports have the most potential for installing an electric vehicle charging point. Half of owner occupied dwellings had a garage or car port on the plot, while less than one in five private rented and less than one in twenty social rented dwellings did.

- Half (50%) of owner occupiers had a garage or car port on the dwelling plot. Private rented homes were more likely to have a garage or car port on the dwelling plot (17%) compared with local authority and housing association homes (4%).

Over half the housing stock has potential for the installation of solar photovoltaic panels.

- The survey considers whether PV panels could be installed in the 18.8 million houses and bungalows without a thatched roof in England (e.g. not flats). Of these, 69% (12.9 million) could potentially benefit from the installation of PV panels. This equates to 55% of all the total housing stock.

A third of households had at least one person with a long-term limiting illness or disability. One in fifty households had a dependent child with a limiting long-term illness or disability.

- Around 7.1 million households (31%) had at least one person with a long-term limiting illness or disability.

-
- Around 554,000 households (2%) had a dependent child¹ with a long term limiting illness or disability.

One in five dwellings had level access to the main entrance doors, but in another three in five dwellings it would be feasible to install a ramp, creating level access.

- In 2015, 18% of all dwellings had level access to the main entrance door. It would also be feasible to create level access through the installation of a ramp in a further 58% of dwellings.

Many homes had an additional room that could be used by overnight carers or care equipment, but this was lower amongst households where somebody required overnight care by someone from outside the household.

- Overall, 71% of all dwellings had an additional room available that could be used by overnight carers or care equipment.
- Around 509,000 (2%) households required overnight care by someone who was not part of their household. Almost two thirds of these households (64%) had an additional bedroom available for their overnight carer.

Acknowledgements and further queries

6. Each year the English Housing Survey (EHS) relies on the contributions of a large number of people and organisations. The Department for Communities and Local Government (DCLG) would particularly like to thank the following people and organisations, without whom the 2015-16 survey and this report, would not have been possible: all the households who gave up their time to take part in the survey, NatCen Social Research, the Building Research Establishment (BRE) and CADS Housing Surveys.
7. This report was produced by Helen Garrett, Adele Beaumont, Justine Piddington and Maggie Davidson at BRE in collaboration with NatCen Social Research and DCLG.
8. If you have any queries about this report, would like any further information or have suggestions for analyses you would like to see included in future EHS reports, please contact ehs@communities.gsi.gov.uk.
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¹ All children under 16 years and other children under 18 years of age in full time education.

Potential Stock Improvements

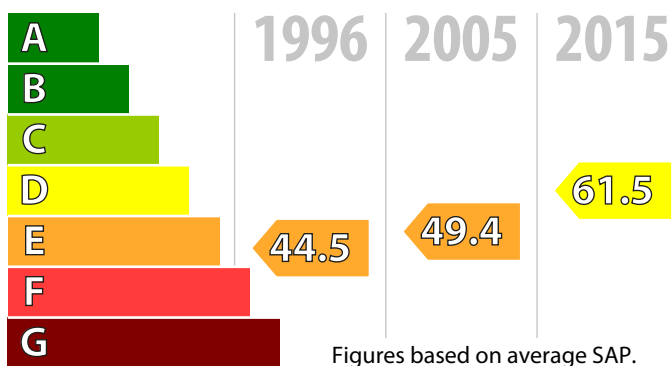
Housing quality

Since 2006, there's been a decline in the proportion of non-decent homes.



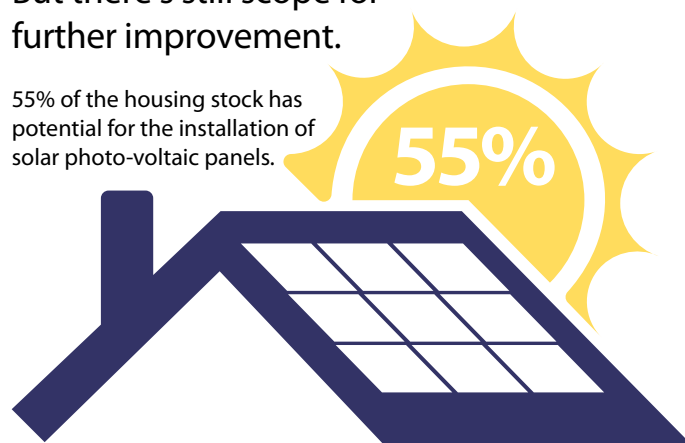
Energy efficiency

The energy efficiency of homes has improved over the last two decades.



But there's still scope for further improvement.

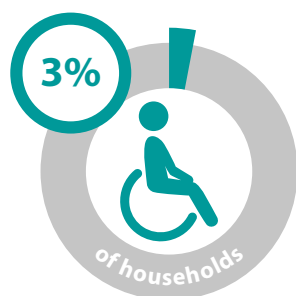
55% of the housing stock has potential for the installation of solar photo-voltaic panels.



Adaptations and accessibility



had at least one person with a long-term illness or disability.

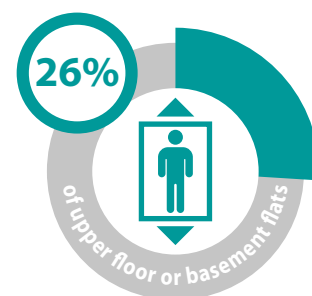


had at least one person using a wheelchair.



had level access to the main entrance door.

Ramp installation is feasible in a further 58% of dwellings.



had a lift.

Chapter 1

Housing quality

- 1.1 This chapter provides an overview of the condition of the housing stock and how this has changed over time. Using various indicators of housing quality, it identifies the types of dwellings that perform least well to demonstrate where the scope for improvement is highest within the stock.
- 1.2 To assess housing quality, four key indicators of dwelling condition are examined:
 - health and safety hazards assessed under the Housing Health and Safety Rating System (HHSRS)
 - repair costs
 - damp and mould
 - the Decent Homes Standard.
- 1.3 The final part of the chapter examines the extent to which dwellings have a combination of the indicators of poor housing.

Housing quality indicators

Housing Health and Safety Rating System (HHSRS)

- 1.4 The HHSRS is a risk-based assessment tool that identifies hazards in dwellings and evaluates their potential effects on the health and safety of occupants and their visitors, particularly of vulnerable people. It is used to assess whether a dwelling meets the statutory minimum standard for housing in England.
- 1.5 The EHS assesses 26 out of the 29 hazards covered by the HHSRS². The methodology to assess Category 1 excess cold was changed in 2010 and 2012 with a small number of dwellings failing excess cold under one methodology and not the other³. These changes in methodology mean that time series findings should be treated with a degree of caution.
- 1.6 The prevalence of Category 1 hazards in dwellings reduced from 23% in 2008 to 12% in 2013. Since 2013, however, this long-term trend of reduction

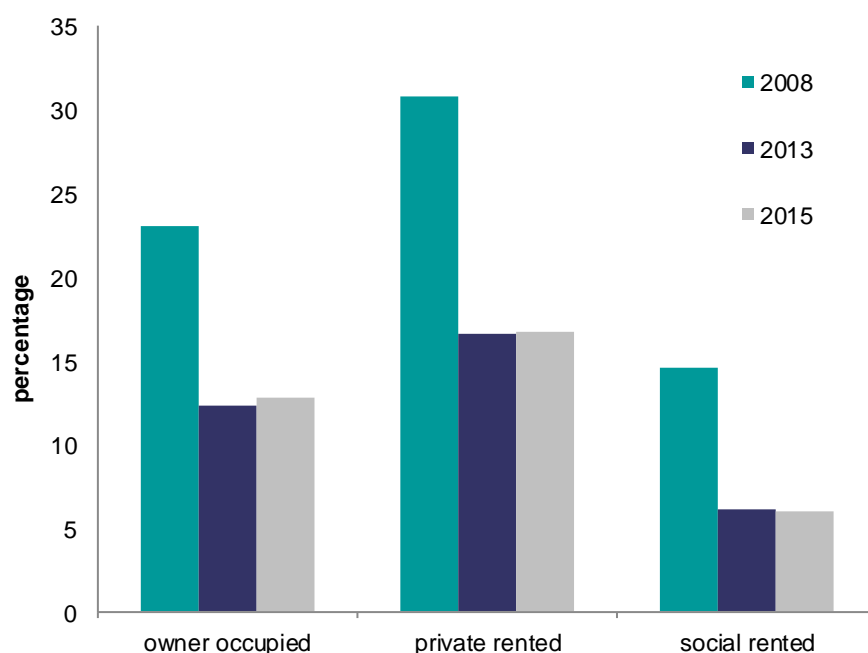
² The live web tables DA4101 to DA4103 provide data on the incidence of any Category 1 hazard and the most common types of hazards within the total housing stock since 2008.

³ See EHS Technical Report Chapter 5 Annex Table 5.5.7.

appears to have halted, with the proportion of dwellings with Category 1 hazards remaining very similar at 12%, Annex Table 1.1.

- 1.7 This applied to all tenures and most dwelling types. The reason for this cannot be established at present but the trend will be monitored, Figure 1.1.

Figure 1.1: Dwellings with any Category 1 hazard by tenure, 2008, 2013 and 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 1.1

Source: English Housing Survey, dwelling sample

- 1.8 As in 2013, the highest prevalence of Category 1 hazards in 2015 was found among the following types of dwellings: those built before 1919 (27%), converted flats (21%), rural homes (20%), vacant homes (20%), and private rented homes (17%).

Repair costs

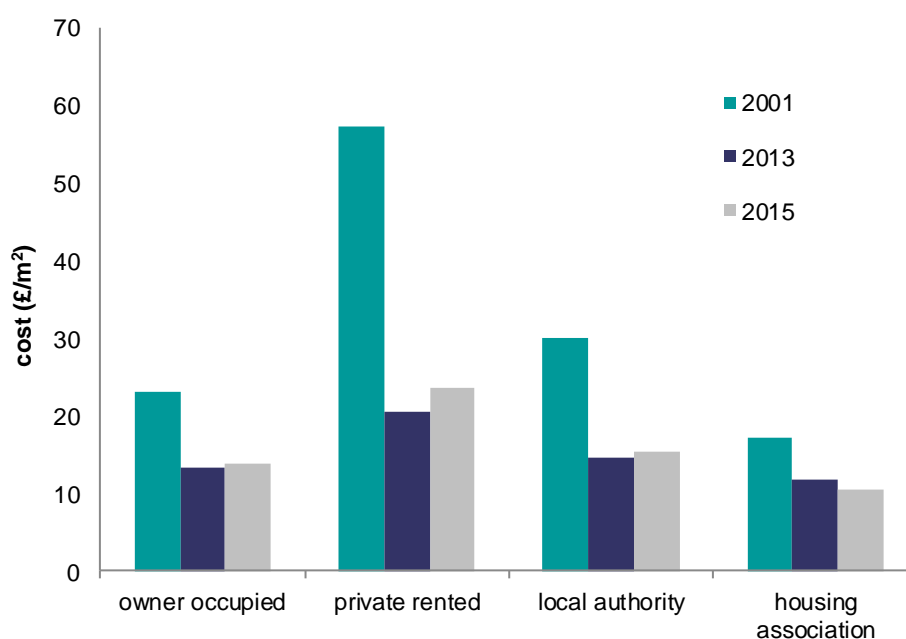
- 1.9 The following analysis uses standardised basic repair costs to show comparative levels of disrepair among different types of dwellings⁴. These basic repair costs include both urgent repairs such as leaking roofs and broken locks to external doors, and medium term repairs which require remedial action within five years, for example less urgent roof repairs.
- 1.10 To allow comparisons over time, costs (per square metre, £/m²) for years earlier than 2015 were set at 2015 prices using the Building Cost Information

⁴ See the Technical Notes for details of how the EHS categorises disrepair and calculates repair costs. The methodology used to create the different EHS repair costs variables is different to that used to calculate whether a dwelling meets the repair criterion of the Decent Homes Standard. See EHS Technical Report 2015-16 for details of the different modelling methodologies.

Service (BCIS) National Index⁵. This approach removes the impact of price inflation/deflation on the repair costs.

1.11 The average cost of basic repair among English dwellings fell from £27/m² to £16/m² over the 2001 to 2015 period. Reduction in the average level of basic disrepair was evident for all tenures, but particularly notable for private rented homes (£57/m² to £24/m²). Despite this improvement, in 2015 the average level of basic disrepair was still highest for private rented homes (£24/m²) compared with other tenures, particularly housing association homes (£10/m²), Figure 1.2.

Figure 1.2: Standardised basic repair costs by tenure, 2001, 2013 and 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 1.2

Sources:

2001: English House Condition Survey, dwelling sample

2013 onwards: English Housing Survey, dwelling sample

1.12 The average level of basic repair costs has remained fairly constant for the whole stock since 2013 and for most dwelling types. The exceptions were privately rented homes where the basic repair costs increased from £20/m² to £24/m², medium/large terraced houses (the basic repair costs increased from £17/m² to £20/m²) and bungalows (the basic repair costs decreased from £18/m² to £11/m²).

1.13 As with the HHSRS, the types of dwellings with high potential for improvement are vacant homes (£44/m²), converted flats (£30/m²), pre 1919 homes (£30/m²), private rented homes (£24/m²) and homes built 1919-44 (£23/m²). In

⁵ The average costs for this report will differ from those in the live web tables, due to differing cost bases: for this report it is 2015 only. The web tables for 2015 are for 2014+2015 average costs.

contrast to the HHSRS, on disrepair dwellings in urban areas (£20/m²) do less well than those in rural areas.

Damp

1.14 Aside from the increase in rising damp within the stock between 2014 and 2015, which was driven by the increase in the private rented sector (3% to 4%), the prevalence of damp has remained fairly constant since 2013⁶.

Decent homes

1.15 For a dwelling to be considered 'decent' it must:

- meet the statutory minimum standard for housing, which has been the HHSRS since April 2006. Homes with a Category 1 hazard under the HHSRS are considered non-decent
- be in a reasonable state of repair
- have reasonably modern facilities and services
- provide a reasonable degree of thermal comfort

1.16 Between 2006 and 2015, the proportion of non-decent homes in the whole stock reduced steadily from 35% to 19%⁷. There has been no improvement in the prevalence of non-decent homes for the whole housing stock since 2013 (the decrease in the proportion of these homes from 21% to 19% was not statistically significant).

1.17 Those homes with the greatest potential for improvement, due to the higher prevalence of non-decency, were those built before 1919 (37%), converted flats (36%), private rented dwellings (28%), vacant dwellings (27%), small terraced houses (26%) and rural homes (26%)⁸.

1.18 The private rented sector had the highest proportion of non-decent homes (28%), while 18% of owner occupied homes and 13% of social sector homes failed to meet the Standard⁹.

1.19 Breaking down the overall Decent Homes figure by the different criteria and tenure¹⁰, HHSRS is the most common criterion dwellings fail on, followed by thermal comfort. Overall, there is higher potential to improve each criterion among privately rented homes, Figure 1.3.

⁶ See English Housing Survey Headline Report, 2015-16, Figure 2.7 and Live Tables DA5101 to DA5103

⁷ See English Housing Survey Headline Report, 2015-16, Figure 2.6

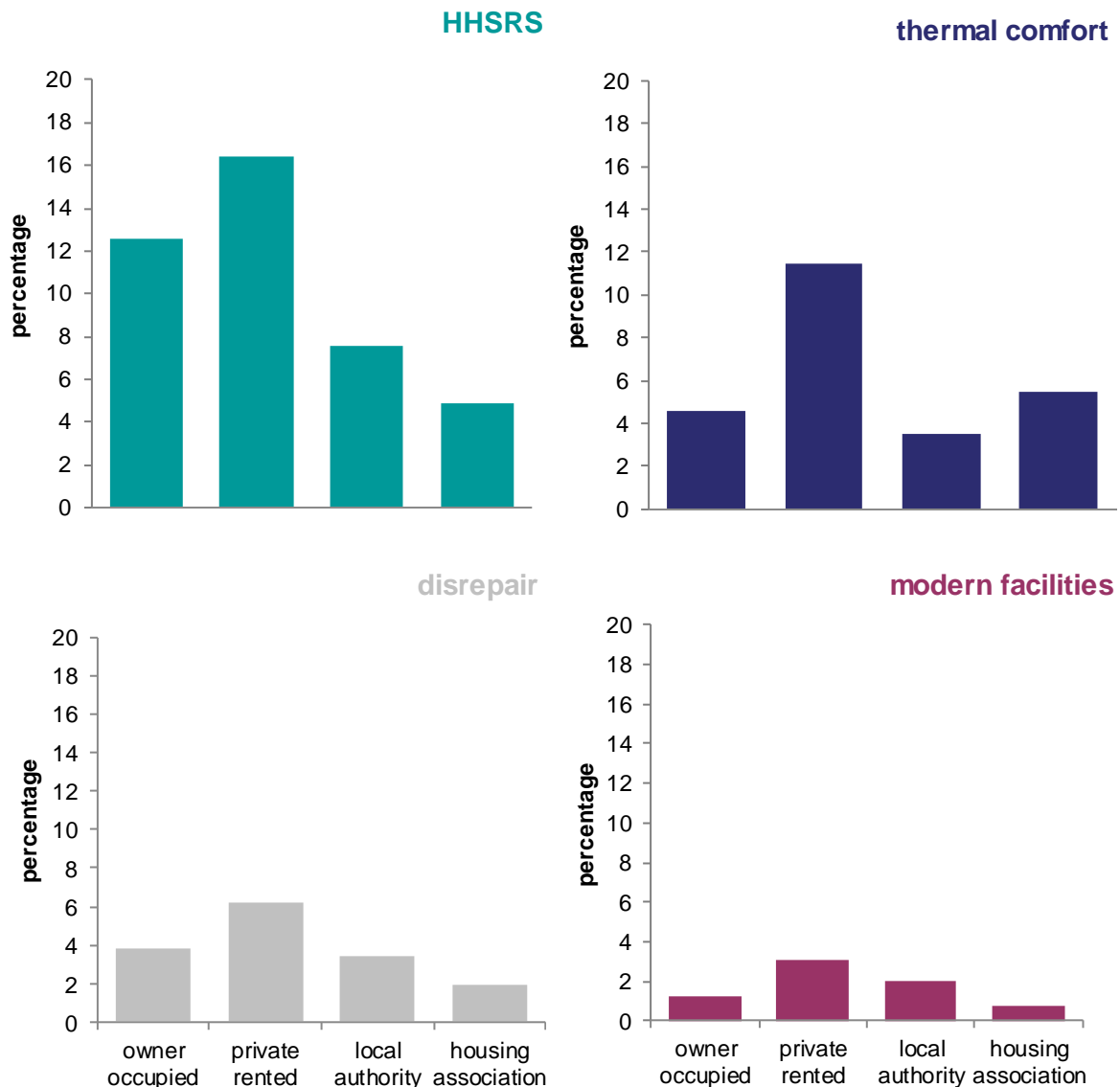
⁸ Further details on non-decent homes can be found in the live tables DA3201 to DA3203 and DT3101.

⁹ See English Housing Survey Headline Report, 2015-16, Annex Table 2.3

¹⁰ This analysis is not directly comparable to the analysis of homes failing each criterion in the EHS 2013 Stock Profile Report, which examined the prevalence of failure among non-decent homes only.

<https://www.gov.uk/government/statistics/english-housing-survey-2013-profile-of-english-housing-report>

Figure 1.3: Proportion of dwellings failing each criterion of Decent Homes by tenure, 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 1.3

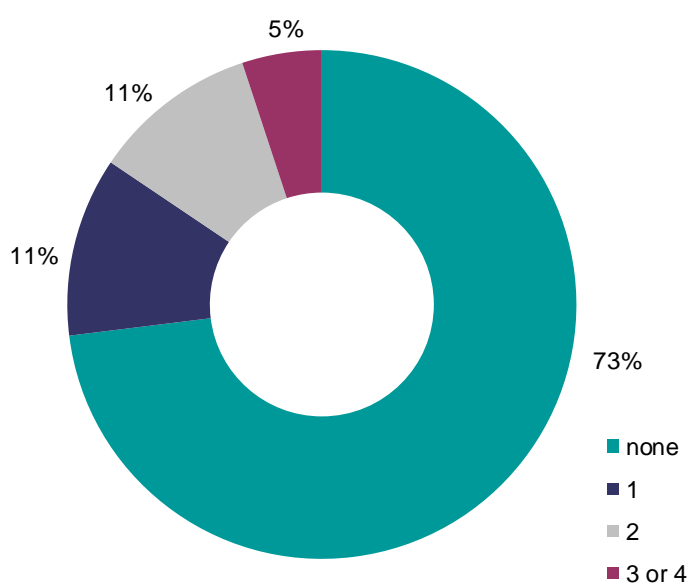
Source: English Housing Survey, dwelling sample

Summary of poor housing indicators

1.20 In terms of the housing quality indicators examined in this chapter, the same types of dwellings performed least well for each indicator. These were private rented homes, vacant homes, homes built before 1919 and converted flats. A summary overview of the housing quality indicators examined in this chapter is provided in Annex Table 1.4. For this analysis a dwelling with standardised basic repair costs of £35/m² or over is considered to have substantial disrepair.

- 1.21 This section investigates the prevalence of multiple poor housing indicators among different types of homes. Not surprisingly, the findings are closely linked with the types of homes that perform least well on the individual housing quality indicators.
- 1.22 Just over one quarter (27%) of all dwellings had at least one of the indicators of poor housing. Some 11% had just one indicator, another 11% had two and the remaining 5% had three or four indicators, Figure 1.4.

Figure 1.4: Number of poor housing measures, 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 1.5

Source: English Housing Survey, dwelling sample

- 1.23 Compared with other tenures, the private rented sector had the highest proportion of homes with at least one indicator of poor housing (40%), and dwellings in the private rented sector were more likely to have three or four indicators (10%), Annex Table 1.5.
- 1.24 Around a quarter of owner occupied and local authority homes had at least one of the indicators, but owner occupied homes were more likely to have two or more indicators (15%) than local authority homes (11%).
- 1.25 Poor housing indicators were least prevalent among housing association homes (19% with one or more), likely reflecting a higher proportion of newer homes within the housing association stock.
- 1.26 Just over half of converted flats (52%) had at least one poor housing indicator, higher than any other dwelling type, and 11% had three or four indicators. Terraced homes also had a relatively high proportion of one or more indicators of poor housing (32%).

-
- 1.27 Some 44% of vacant homes had at least one of the indicators and 11% had three or four indicators, demonstrating their large potential for improvement.
 - 1.28 The proportion of homes with at least one indicator was higher in older homes.

Chapter 2

Energy

2.1 This chapter explores the potential for energy efficiency improvements within the housing stock through measures such as wall and loft insulation, ground source heat pumps, solar photovoltaic (PV) panels and improvements that could be recommended by an Energy Performance Certificate (EPC). It then examines various barriers to the installation of some of these measures, particularly different types of insulation. The chapter also considers the potential for electric vehicle charging points and investigates the prevalence of overheating in dwellings, focusing on the occupants' subjective assessment of overheating.

Potential to install cavity and solid wall insulation

Exposure

2.2 Regular exposure to severe wind-driven rain may be a barrier to the effectiveness of wall insulation because there is a greater risk of moisture penetrating the exterior walls. Moisture penetration can reduce thermal performance and cause dampness which can potentially lead to the failure of the insulation itself. It may be possible to mitigate these problems by, for example, maintaining the wall structure and finish in good condition.

2.3 The EHS captures data regarding site exposure of the dwelling. This is different to exposure zones, which indicate the approximate amount of wind driven rain which the building may be subject to. In the EHS, four categories of site exposure are recorded:

- Not exposed. The dwelling is in a sheltered position, possibly surrounded by other buildings or trees or tucked away in a valley.
- Slightly exposed. The dwelling is quite sheltered but may be buffeted by winds from time to time.
- Exposed. The dwelling is open to the elements, possibly on all four sides with little shelter provided by other buildings or natural obstacles.
- Very exposed. The dwelling is permanently exposed to the worst that the English elements can offer. Cliff top houses and isolated hill farms might fall into this category.

-
- 2.4 As both the exposed and very exposed categories could create a possible barrier to wall insulation, these have been combined and referred to as 'exposed' in this report.
- 2.5 Around 1.5 million dwellings (6%) in the English housing stock were in an exposed location. According to the EHS definition, exposure was markedly more prevalent among purpose built high rise flats (35%, likely due to their height) than other building types, and amongst rural homes (13%). A higher proportion of dwellings with insulated solid walls were exposed (16%) than were dwellings with all other wall types, Annex Table 2.1.

Potential for cavity wall insulation

- 2.6 In 2015, 5.1 million dwellings¹¹ had uninsulated cavity walls and could possibly have cavity wall insulation installed (around 23% of the total housing stock), Annex Table 2.2. Due to a change in modelling assumptions this number is not directly comparable to earlier reports¹². This section examines the ease of installing cavity wall insulation using two different definitions of hard to treat cavity walls: the ECO definition and the extended EHS definition. Further details are provided in the Technical Notes of this report.

ECO definition

- 2.7 This definition provides a count of dwellings with harder to treat cavity walls consistent with the Energy Companies Obligation (ECO) definition¹³. The ECO definition categorises buildings with three or more storeys, narrow cavities (less than standard width), concrete, metal or timber frame construction, and those with tiles or cladding, as harder to treat. However, the EHS cannot fully replicate the ECO definition, because it is unable to identify those narrow cavities specifically less than 50 millimetres wide, or those cavities that are unsuitable to insulate with standard insulation materials or techniques. Both of these two features would mean that the uninsulated cavity wall would be harder to treat.

¹¹ The number of dwellings that could potentially benefit from cavity wall insulation will not match the number identified for the EPC improvements discussed later in this chapter. The EPC methodology involves more detailed energy modelling of the wall types and considers any amount of unfilled cavity wall in a dwelling as potential whereas the hard to treat methodology pertains to the 'predominant wall type'.

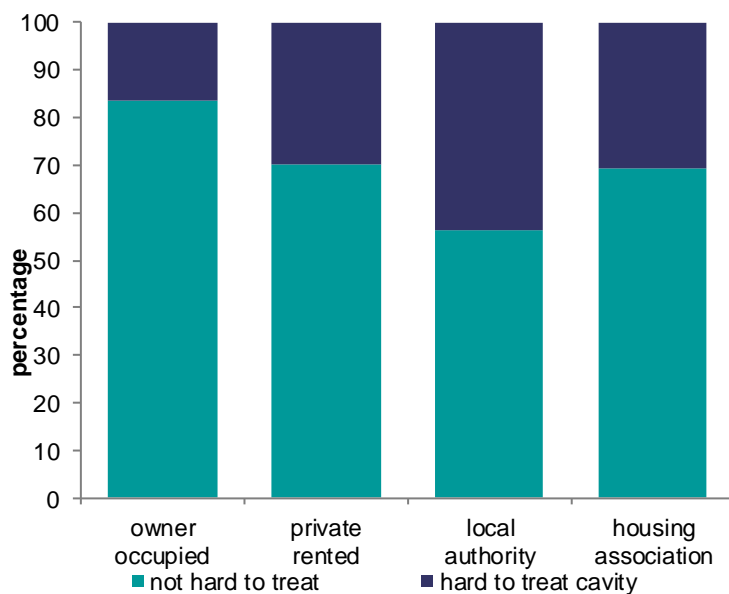
¹² This analysis excludes those cavity walled dwellings built in 1996 or after where there is no evidence of insulation (as it assumes homes of this age are likely to have had this installed when built). This assumption, new for the 2015 EHS, reflects that as built cavity wall insulation was the predominant method used to comply with Building Regulations after this time. In previous reports, cavity walled dwellings built in 1991 or after with no evidence of cavity wall insulation were combined with dwellings with known insulation and therefore excluded as potentially suitable for an upgrade. As a result the potential number of dwellings for cavity wall insulation is not directly comparable to earlier reports. See Headline Report for further details.

¹³ For the ECO definition see

https://www.ofgem.gov.uk/sites/default/files/docs/2014/05/eco_supplementary_guidance_on_hard-to-treat_cavity_wall_insulation_0.pdf

- 2.8 Using this definition, 77% of dwellings with uninsulated cavity walls were relatively easier to treat. Those homes that had the greatest potential, that is, the highest percentage of unfilled cavity walls that were easier to treat, were: all types of houses and bungalows ranging from 92% of detached homes to 84% of mid-terraced homes, rural homes (89%), owner occupied homes (83%) and homes outside London (81%), Annex Table 2.2.
- 2.9 Conversely, the types of homes with harder to treat cavity walls, were local authority dwellings (44% of which were harder to treat), urban dwellings (45%) and dwellings in London (54%). These types of homes had a higher proportion of purpose built flats, 58% of which were harder to treat.

Figure 2.1: Potential for cavity wall installation (ECO definition) by tenure, 2015



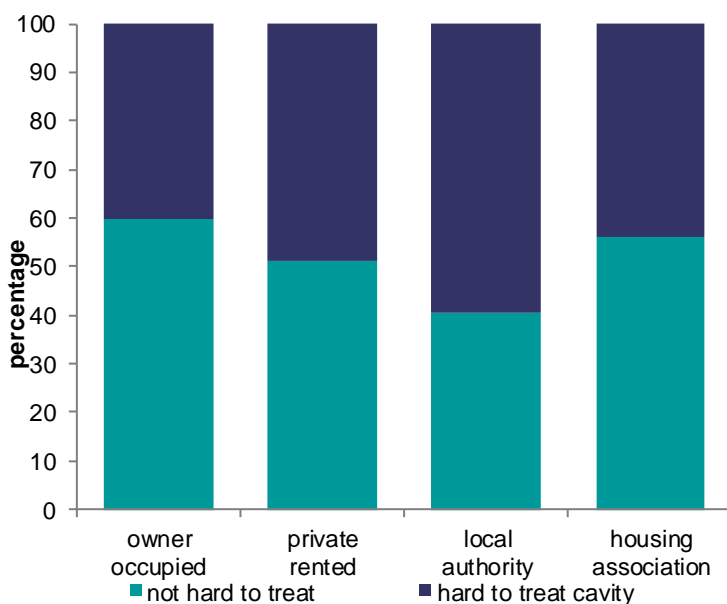
Base: all dwellings with uninsulated cavity walls
Note: underlying data are presented in Annex Table 2.2
Source: English Housing Survey, dwelling sample

Extended EHS definition

- 2.10 As the EHS now collects information on additional factors which impact on the potential for insulation, this new definition adds these to the ECO definition, providing further information about the potential for cavity wall insulation. The additional factors are: exposure, the presence of any stone walls and any disrepair to the external walls.
- 2.11 Disrepair to the external wall could create similar problems to those that can be caused by exposure, or exacerbate existing problems (see paragraph 2.2), as it can allow dampness to affect the insulation and other parts of the building. Stone walls are a possible barrier to insulation because, by their nature, they may have an uneven cavity making it more difficult to ensure the cavity is fully filled with insulation. The cavity is also less likely to be of a sufficient width for insulation.

- 2.12 Among those 5.1 million dwellings that could possibly have cavity wall insulation installed, 19% had some degree of disrepair to the external wall finish, 7% were in exposed locations and 4% had at least some stone walls, Annex Table 2.3.
- 2.13 Adding these factors to the ECO definition, 56% of dwellings with uninsulated cavity walls were relatively easier to treat, Annex Table 2.4.
- 2.14 Although the inclusion of these additional factors reduced the potential for all types of homes, this was less notable for relatively younger homes built after 1980. Under the ECO definition 79% of homes built from 1981-1990 and 82% of those built after 1990 were easier to treat. Under the extended EHS definition, the potential (the proportion modelled to be easier to treat) fell to 68% and 74% respectively.
- 2.15 The additional factors also had a notable impact on the potential for rural homes. Under the ECO definition the potential for cavity wall insulation was relatively high (89%) but this reduced to 58% using the extended EHS definition.

Figure 2.2: Potential for cavity wall installation (extended EHS definition) by tenure, 2015



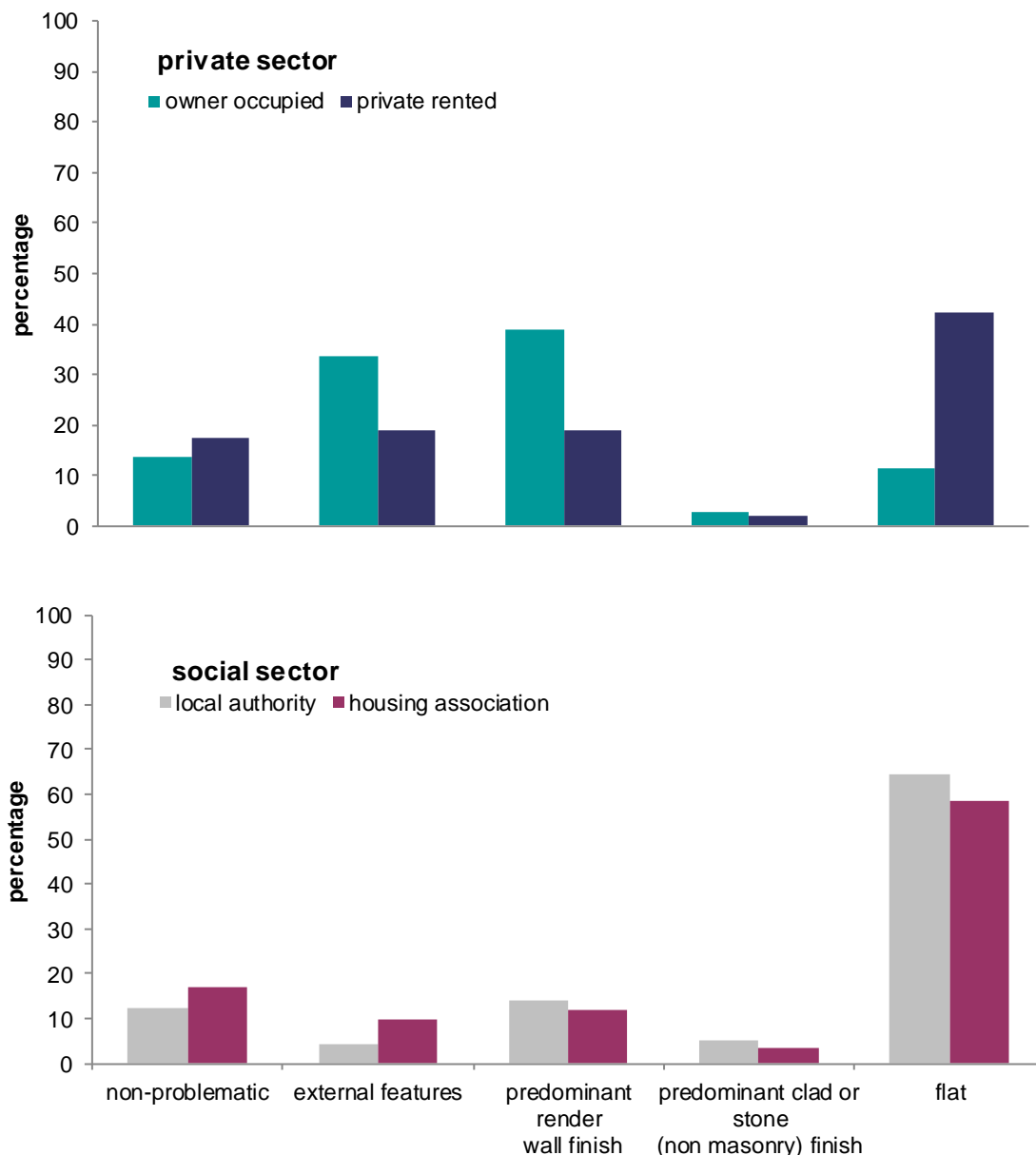
Base: all dwellings with uninsulated cavity walls
Note: underlying data are presented in Annex Table 2.4
Source: English Housing Survey, dwelling sample

Potential for solid wall insulation

- 2.16 In 2015, around 8 million homes¹⁴ (Annex Table 2.5) could possibly have some form of (external or internal) solid wall insulation installed. This not only included those with uninsulated solid walls, but other types of non-cavity walls such as system built and timber frame dwellings, and those dwellings classed as having a harder to treat cavity wall, for which the type of insulation applied to solid walls provides a potential alternative insulation option.
- 2.17 Only 15% (1.2 million) of these 8 million homes were easier to treat. Rather than a plain masonry wall finish 29% of these 8 million dwellings had walls with a predominantly rendered finish, 27% were flats, 26% had external features such as conservatories and porches and 3% had a non-masonry wall finish such as stone cladding, Annex Table 2.5. See the Technical Notes for further details regarding each type of potential barrier to solid wall insulation.
- 2.18 The private rented sector had a higher proportion of homes that were easier to treat (18%) compared with local authority homes (12%), Annex Table 2.5. The main barriers to insulation for owner occupied homes were rendered walls (39%) and the presence of external features (33%), while the most common barrier among rented dwellings was being a flat, Figure 2.3.

¹⁴ The number of dwellings that could potentially benefit from solid wall insulation will not match the number identified for the EPC improvements discussed later in this chapter. The EPC methodology involves more detailed energy modelling of the wall types and considers any amount of unfilled non-cavity wall in a dwelling as potential whereas the hard to treat methodology pertains to the 'predominant wall type'.

Figure 2.3: Potential for solid wall installation, by tenure, 2015



Base: all dwellings with theoretical potential to install solid wall insulation

Note: underlying data are presented in Annex Table 2.5

Source: English Housing Survey, dwelling sample

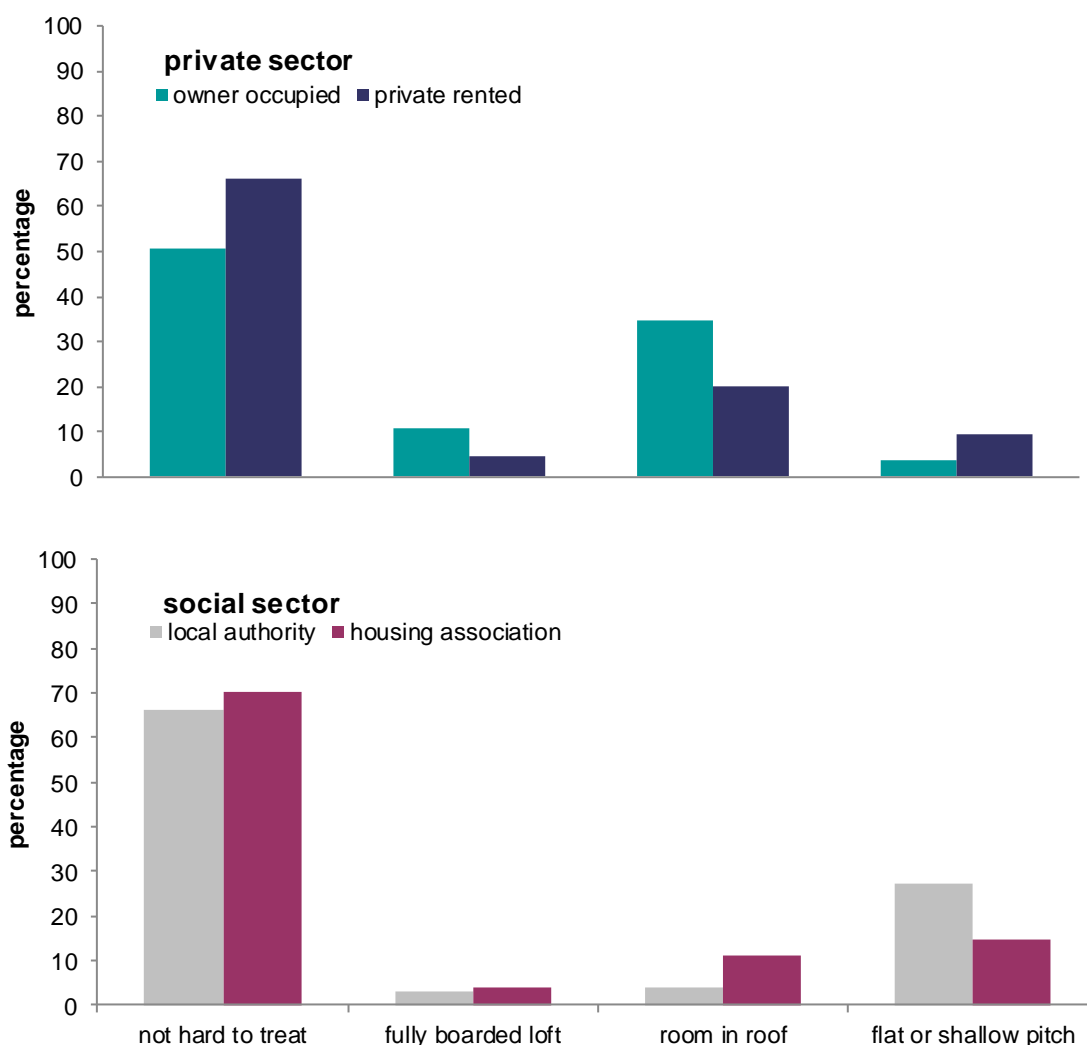
2.19 Of the 1.2 million dwellings that were easier to treat through installing solid wall insulation, 6% (around 74,000) were in an exposed location, Annex Table 2.6.

Potential for loft insulation

- 2.20 In 2015, 36% of dwellings (8.4 million)¹⁵ (Annex Table 2.7) could possibly have loft insulation installed or upgraded, as the existing level of insulation was 150mm or less. The installation or upgrading of loft insulation could, however, be problematic for dwellings that have the following features: a fully boarded loft across the joists, a habitable room in the roof area, or a shallow pitch or flat roof. See the Technical Notes for further information on how these potential barriers could affect the ease of installing or upgrading loft insulation in these homes.
- 2.21 The EHS estimates that installing or upgrading loft insulation was less problematic for 56% of these homes. In terms of potential barriers, 29% of homes had an existing room in the loft, 9% had a fully boarded loft and the remaining 7% had a shallow pitched or flat roof, Annex Table 2.7.
- 2.22 Rented homes had the highest potential for improvement, with 70% of housing association homes easier to treat with loft insulation, as were 66% of local authority and private rented homes.
- 2.23 The presence of a room in the roof was the most common barrier for owner occupied homes (35%) while a flat or shallow pitched roof was the most common barrier for local authority homes (27%), Figure 2.4.

¹⁵ The number of dwellings identified here that could potentially benefit from loft insulation will not match the number identified in the EPC improvements methodology discussed later in this chapter. The EPC improvements methodology involves more detailed modelling of three separate measures for loft insulation: homes with a pitched roof (slate or tiles) where insulation is currently equal to or less than 150mm, homes with flat roofs where insulation is currently less than 100mm, and homes with a room in the roof where the modelled effectiveness of insulation is considered unsatisfactory (including evaluations of U values).

Figure 2.4: Potential for loft installation by tenure, 2015



Base: dwellings with inadequate loft insulation, flat roofs or converted lofts

Note: underlying data are presented in Annex Table 2.7

Source: English Housing Survey, dwelling sample

2.24 Over three quarters (77%) of homes built from 1981 to 1990 were easier to treat with loft insulation, which is higher than homes built in all other time periods, including those built after 1990.

Ground source heat pumps

2.25 Ground source heat pumps circulate a mixture of water and antifreeze in a loop of pipe buried in the ground. Heat from the ground is absorbed into the fluid and then passed through a heat exchanger into the heat pump to be used to heat radiators, underfloor or warm air heating systems and hot water. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year.

- 2.26 In 2015, less than half a per cent (0.4%) of dwellings (approximately 94,000) had a heat pump (ground or air source) for either space or water heating, Annex Table 2.8.
- 2.27 The ground space required for the initial installation of a ground source heat pump with a borehole is around 10m². Each unit needs to be at least six metres apart from any other unit that may exist in a neighbouring garden, so if adjacent homes had a heat pump installed, 36m² of space would be needed in each garden. The following analysis examines the size of any private plot, front or back, using these 10m² and 36m² thresholds to provide an indication of where ground source heat pumps may be possible to install. The EHS is unable to provide information on any potential difficulties that may exist in accessing the plot.
- 2.28 The majority of dwellings (84% or 20 million homes) had a private plot and almost all houses (99%) had this feature. It may also be feasible to install a ground source heat pump in the garden of a ground floor flat, 39% of which had a private plot, Annex Table 2.9.
- 2.29 Around 17.7 million (75%) dwellings in the total housing stock had a private plot over 36m² and a further 1.6 million (7%) had a plot between 10 and 36m². It is, therefore, unlikely to be feasible to install a ground source heat pump for the remaining 4.3 million (18%) dwellings (including for all upper floor or basement flats), Annex Table 2.10.
- 2.30 The potential for ground source heat pumps varied markedly between houses and ground floor flats. While 91% of houses (17.2 million) had a private plot available that exceeded 36m², only 29% of ground floor flats (487,000) did.

Table 2.1: Potential for installation of ground source heat pumps by dwelling type, 2015

	less than 10m ² or non-ground floor flat	10m ² to 36m ²	over 36m ²
dwelling characteristics			
houses and bungalows	1.0	7.7	91.3
ground floor flat	62.1	9.0	28.9
upper floor or basement flat	100.0	n/a	n/a
all dwellings	18.1	6.8	75.1

Notes:

1) Percentages are within each group. For example, 62% of ground floor flats had a private plot under 10m²

2) Underlying data are presented in Annex Table 2.10

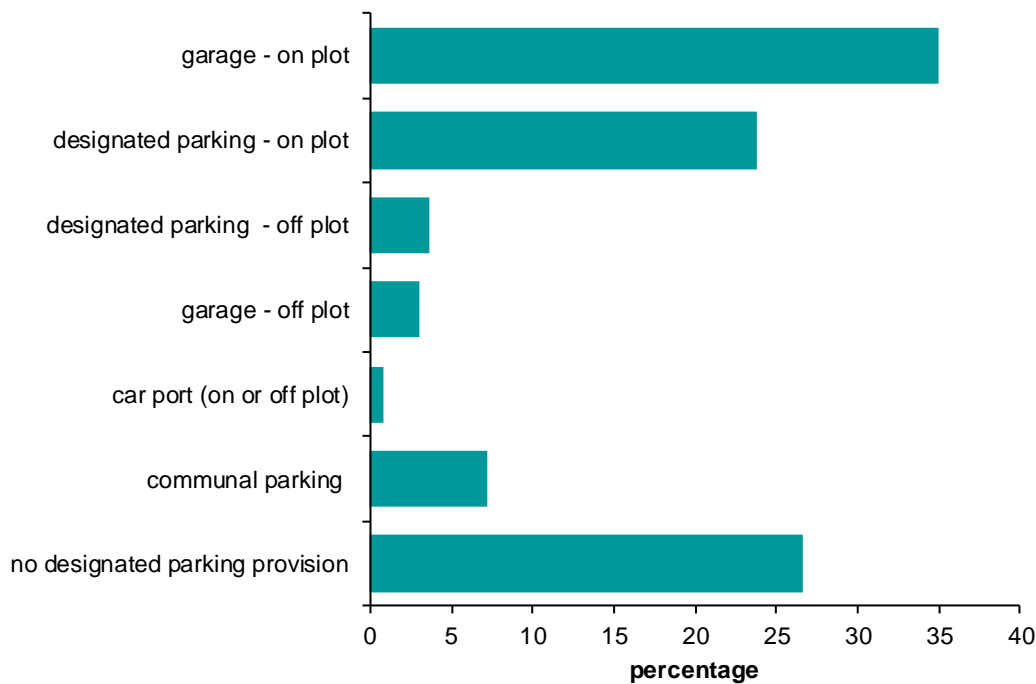
Source: English Housing Survey, dwelling sample

-
- 2.31 To be most efficient, heat pumps require dwellings to have well insulated walls. Around two fifths (39%) of dwellings (around 9.2 million) had insulated solid or cavity walls and a private plot over 36m², Annex Table 2.11.

Electric vehicle charging points

- 2.32 Electric or plug-in vehicles contain a variety of technologies which enable them to emit relatively low levels of pollution compared with other vehicles, but require access to special charging points.
- 2.33 This section looks at the types of parking available for dwellings to help determine the potential for installing residential vehicle charging points. Where more than one type of parking is available, the parking category reported on is the one with the better potential for the installation of a charging point. For example, a designated parking space is prioritised over any communal parking facilities. Apart from any available parking in communal areas, all other types of parking provision discussed here are for the exclusive use of the survey dwelling. There are also other factors limiting potential for charging points, such as the availability of the required electrical connection, but the EHS does not currently capture information on this.
- 2.34 Around 35% of dwellings (8.2 million) had a garage on the dwelling plot. A further 24% of dwellings had a parking space on the plot of their home. At the other end of the scale, some form of communal parking was available for 7% of homes but over one quarter of dwellings (27%) had no designated parking available, Figure 2.5.

Figure 2.5: Types of parking, 2015



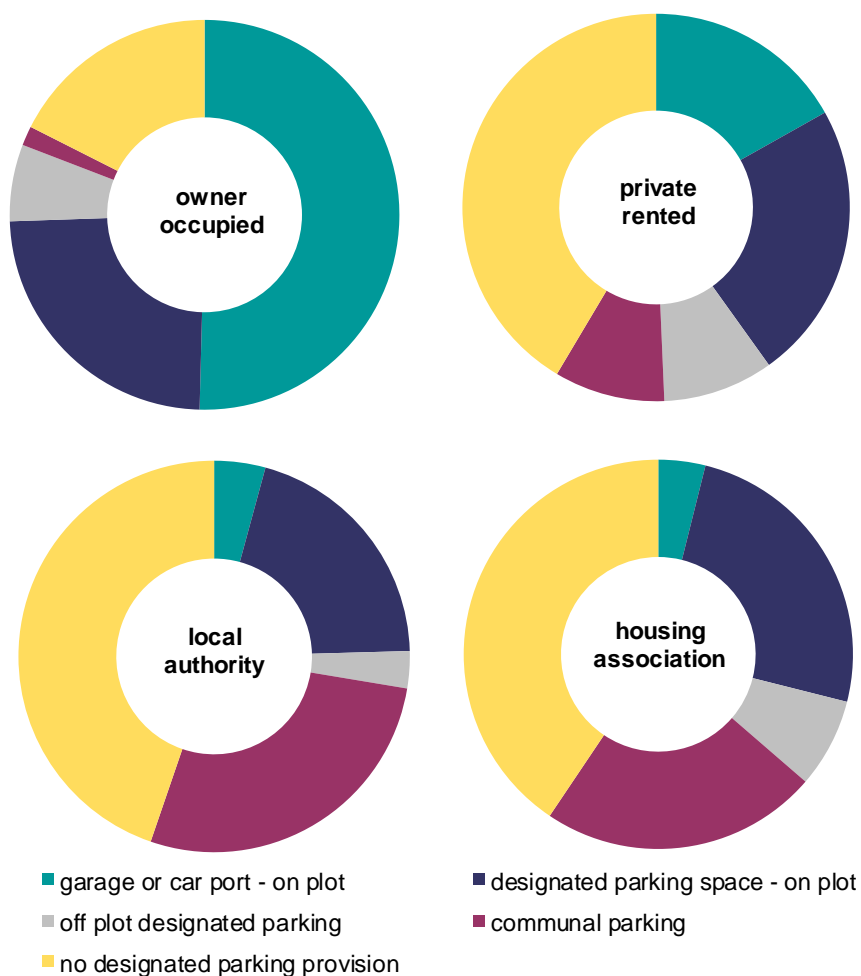
Base: all dwellings

Note: underlying data are presented in Annex Table 2.12

Source: English Housing Survey, dwelling sample

- 2.35 The potential for electric vehicle charging points varied by tenure. For this analysis, the prevalence of garages and car ports on the plot have been combined. Garages and car ports off the dwelling plot and other designated parking off the plot have also been combined into one category.
- 2.36 Potential was greatest among owner occupied homes, with half (50%) having a garage or car port on the dwelling plot. Rented homes were less likely to have this provision, though private rented homes were more likely to have a garage or car port on the dwelling plot (17%) than local authority and housing association homes (4%). Over 40% of all rented homes had no dedicated parking provision at all, Figure 2.6.

Figure 2.6: Parking provision by tenure, 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 2.12

Source: English Housing Survey, dwelling sample

Solar photovoltaic (PV) panels

2.37 Solar panel electricity systems, also known as solar photovoltaics (PV), capture the sun's energy using photovoltaic cells and convert this into electricity. These cells do not need direct sunlight to generate electricity but can still produce electricity on a cloudy day. The potential benefits of PV panels include:

- reduction in electricity bills
- payment for some of the electricity generated through Feed-in Tariffs
- reduced carbon emissions and pollution

2.38 In 2015, 4% of dwellings (842,000) had PV panels. Provision was higher among owner occupied homes (5%) compared with social sector (3%) and private rented (1%) homes, Annex Table 2.13.

-
- 2.39 The EHS is able to model the potential for PV installation using the EPC methodology which is examined in greater depth in the next section of this chapter. It incorporates factors influencing the quantity of energy that can be generated through PV panels, such as overshadowing, orientation of the roof and the pitch of the roof. It also takes the surveyor's assessment of the roof's suitability for PV panels into account. The modelling does not assess the relative ease of PV installation or the cost-effectiveness of it.
- 2.40 The potential to install PV panels is modelled for the 18.8 million houses and bungalows without a thatched roof. Of these, 69% (12.9 million) could potentially benefit from the installation of PV panels. This equates to 55% of the total housing stock (including flats), Annex Table 2.14.

Potential for Energy Performance Certificate measures

Background information

- 2.41 The energy efficiency improvement measures discussed in this section are recommendations considered by Energy Performance Certificate (EPC) assessments. EPCs make an assessment of the current energy performance of the property and make recommendations regarding a range of heating, insulation and other measures that would improve its energy performance. Although measures may be recommended, this does not imply that the dwelling or existing energy efficiency measures in the home are defective.
- 2.42 The applicability for each EPC measure refers to where this improvement might be possible, for example, cavity wall insulation would only be applicable to homes with uninsulated cavity walls¹⁶. The potential to benefit from the measure is where the EPC model would recommend its installation. The EPC methodology does not assess the relative ease of insulation (for example, whether it is harder to treat according to some of the definitions discussed earlier in this chapter) or the cost-effectiveness of installation. However, each measure is only recommended for installation if that measure alone would result in the SAP¹⁷ rating increasing by at least 0.95 points.
- 2.43 The methodology for modelling the potential EPC improvements to dwellings has been significantly updated for the 2015 EHS to better align it to the latest SAP methodology. As a brief summary, the new methodology includes many additional measures, a re-ordering of the sequence in which improvement measures are applied, some changes to criteria for individual improvement measures, the use of regional weather to calculate modelled EPC running

¹⁶ The potential number of dwellings eligible for wall and loft insulation in the earlier sections of this chapter will differ to those used for the EPC methodology due to different modelling assumptions.

¹⁷ The Government's Standard Assessment procedure (SAP) is used to monitor the energy efficiency of homes. See Glossary for further details.

costs and savings and a substantial revision to the methodology for calculating the costs of the improvement measures¹⁸.

Findings from the new EPC improvements model

- 2.44 In 2015, the new EPC improvements model recommends installation of at least one of the energy efficiency improvements in almost all dwellings (98%), Annex Table 2.14.
- 2.45 This was a marked increase from the 2013 position when 70% of the total housing stock was modelled to potentially benefit from at least one of the EPC measures then included in the model¹⁹. The increase is mainly due to the inclusion of many additional measures including the potential to install PV panels.
- 2.46 The measures for which the potential is large (in terms of the number of installations that the model recommends in the whole stock) are:
- a. Renewables - solar hot water and photovoltaics
 - b. Insulation measures - floor insulation, solid wall insulation, loft insulation and cavity wall insulation
 - c. Low energy lights and upgrading existing double glazing
 - d. Heating improvements - upgrading the heating controls for wet central heating systems and upgrading gas boilers
- 2.47 The average cost per dwelling of installing all the recommended energy efficiency measures is around £15,000. Solid wall insulation, floor insulation, solar water heating and photovoltaics are relatively high cost measures. Low energy lighting, although an easy improvement to install at a relatively low cost, will typically not provide as much of an energy saving as some of the other measures.
- 2.48 If it was possible to install *all* the recommended measures in *all* applicable dwellings, the mean SAP rating for the stock would rise from 62 to 81. These installations would also result in the following:
- a potential decrease in the average annual modelled fuel bill from £1,018 to £473 per dwelling (£545 fall or 54% reduction) at standard 2015 energy prices.
 - a potential fall in average modelled CO₂ emissions per dwelling of 2.5 tonnes per year (from 4.6 to 2.1 tonnes per year), Annex Table 2.15.
- 2.49 Applying *all* the EPC measures recommended by the model has a marked impact on the energy efficiency ratings for dwellings in different tenures.

¹⁸ Please see the forthcoming Technical Report for further details of the new modelling methodology.

¹⁹ See EHS 2013, Energy efficiency of English housing report, chapter 2.

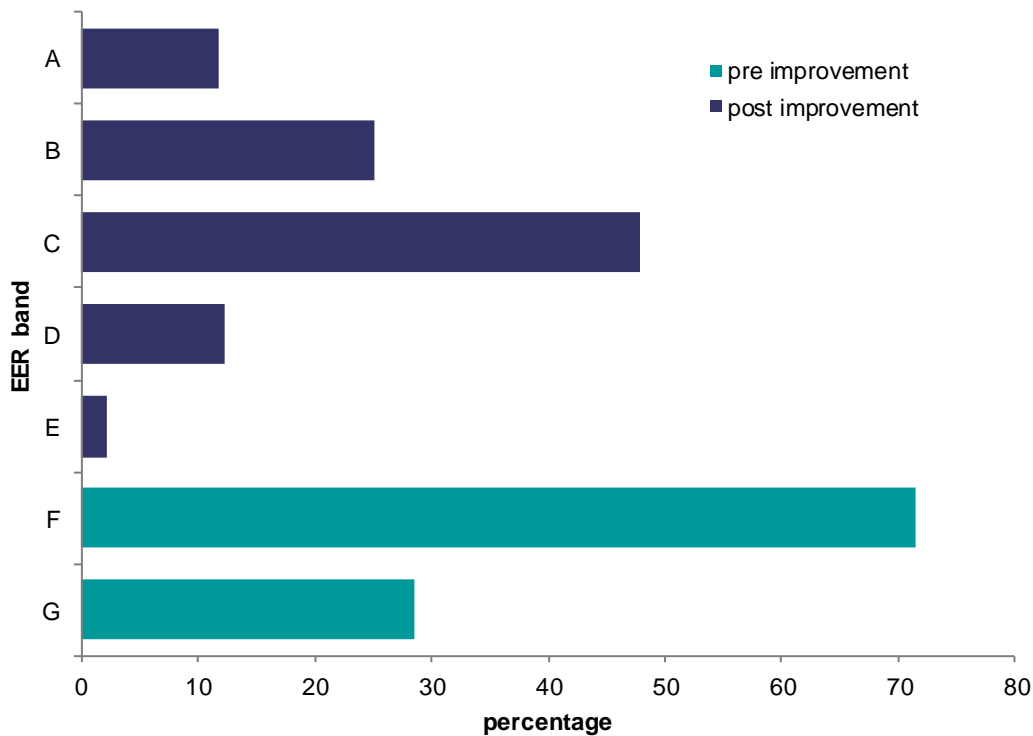
Virtually all homes would be taken out of lower energy efficiency rating (EER) bands (E to G). Over half of rented homes would be in B or C and over half of owner occupied stock in band B, Annex Table 2.16.

The potential to improve energy efficiency in the private rented sector

- 2.50 Measures to improve the energy efficiency of domestic private rented properties in England were introduced in 2015²⁰. From 1 April 2018, private sector landlords must ensure that their properties have an Energy Performance Certificate (EPC) rating of at least band E before granting a tenancy to new or existing tenants. By 1 April 2020, all private rented homes (including those with existing tenancies) must have a minimum EPC band E rating. The regulations include a number of exemptions to the minimum standard.
- 2.51 Of the 4.7 million dwellings in the private rented sector in 2015, 6% of dwellings (298,000) had an EER band of either F or G, Annex Table 2.16.
- 2.52 The following analysis explores how the energy efficiency of these homes would be improved if all the recommended EPC measures were applied. The analysis is exploratory in nature and is not intended to represent the level of improvements landlords would be required to undertake to comply with the new statutory obligations. This is partly because installing all the recommended EPC measures would not only likely improve the energy efficiency of the home well above the minimum energy efficiency rating required, but also potentially be more costly than meeting the minimum standard.
- 2.53 Not surprisingly, the types of measures for which the potential is large are broadly similar to those that could be applied to the whole of the dwelling stock (paragraph 2.46). However, a far higher proportion of private rented homes in F or G bands could benefit from solid wall insulation (78%), draught proofing measures (56%), new or replacement storage heaters (43%) and double glazing (42%), Annex Table 2.17.
- 2.54 If all the EPC recommended measures were applied to these dwellings virtually all of them would be taken out of the F and G bands and the majority of homes would be improved to EER band C or above, Figure 2.7.

²⁰ The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015.

Figure 2.7: Pre and post improvement energy efficiency ratings for private rented homes currently in F or G EER bands, 2015



Base: all private rented homes in EER bands F or G
Note: underlying data are presented in Annex Table 2.18
Source: English House Condition Survey, dwelling sample

2.55 The average cost to apply all the measures recommended by the model would be around £24,000 per dwelling. This would result in the following benefits:

- a potential decrease in the average annual modelled fuel bill from £2,018 to £485 per dwelling (£1,533 fall or 76% reduction) at standard 2015 energy prices.
- a potential average fall in modelled CO₂ emissions per dwelling of around 7.4 tonnes per year (from 10.1 to 2.7 tonnes per year).

Overheating

2.56 This section explores overheating in dwellings in two ways: households' subjective view of overheating in their homes²¹ and the surveyors' assessments of the risks of overheating undertaken as part of the HHSRS assessment. The causes of overheating are complex given that many building design factors influence the risk of this, including ventilation, glazing and the building's orientation, thermal insulation, dwelling location (for example, noisy

²¹ analysis excludes vacant homes

environments may mean occupants feel reluctant to open windows) and lack of overshadowing.

Subjective overheating

- 2.57 During the physical survey of the home, occupants were asked whether their home got uncomfortably hot even when their heating was turned off and the windows were open. Overall 7% of households stated that at least one part of their home got uncomfortably hot²², 3% stated that their bedroom got uncomfortably hot and 2% stated that their living room got uncomfortably hot, Annex Table 2.19.
- 2.58 Conservatories have large glazed areas which increase solar gain and therefore make a property potentially more susceptible to overheating, particularly where the glazing is south facing. Around 3.4 million dwellings had at least one conservatory and 14% of households that lived in such dwellings reported that their conservatory got uncomfortably hot.
- 2.59 Attic rooms created through loft conversions are more at risk of overheating where there is an absence of adequate roof insulation. Hot roofs radiate heat down into the dwelling. Around 2.3 million dwellings had an attic room and 7% of households that lived in such dwellings reported that their attic got uncomfortably hot.
- 2.60 Dwellings with uninsulated lofts (11%) or poorly insulated lofts with less than 100mm of insulation (10%) were more likely to get uncomfortably hot than dwellings with better insulated lofts (7%), whether or not they had an attic, Annex Table 2.20.
- 2.61 Subjective overheating was equally likely to be reported irrespective of the energy efficiency rating of the dwelling and irrespective of whether solid or cavity walls were uninsulated or insulated. Dwellings with other types of walls (for example, concrete, steel and timber framed) were, however, more likely to get uncomfortably hot (16%).

Surveyor assessment

- 2.62 The surveyors' assessments of overheating as part of the health and safety assessment (HHSRS) indicated that less than half a per cent (0.4%) of occupied homes had a significantly higher than average risk of overheating. Subjective overheating was reported by households in half (52%) of these dwellings. This demonstrates the difference between subjective overheating and the surveyor's assessment of the potential for the dwelling to suffer from excessively high indoor air temperatures which may pose a risk to health, Annex Table 2.21.

²² See EHS 2015-16 Headline Report for differences in prevalence of subjective overheating by dwelling age and dwelling type.

Chapter 3

Adaptations and accessibility

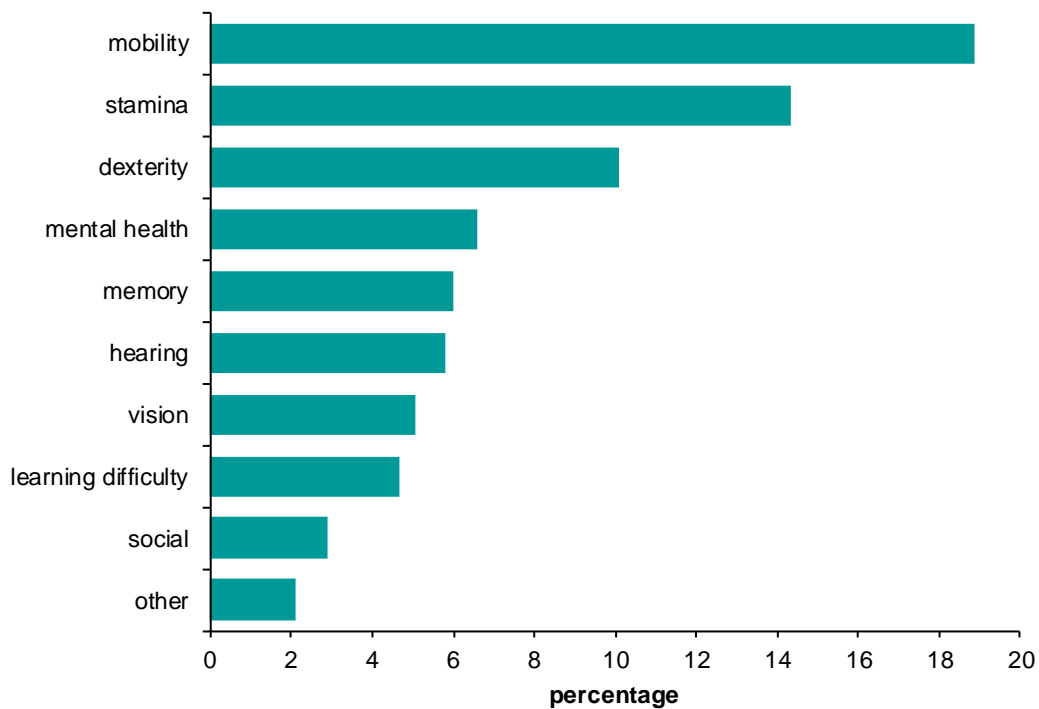
- 3.1 This chapter explores the potential of the dwelling stock to meet the current and future needs of households in relation to accessibility, as well as specific features that would make housing more useable for people with disabilities.
- 3.2 The first section looks at the prevalence of some key accessibility features that enable people with disabilities or health problems to access dwellings with more ease²³.
- 3.3 The chapter explores the prevalence of households with disabilities and long-term limiting illnesses, how such households are affected by the condition or illness in terms of impairments, whether they use a wheelchair and, if so, its ease of use around the home. It then examines existing adaptations in the housing stock, aspects of design facilitating adaptability, such as the availability of additional bedroom space for overnight carers, the availability of storage space for wheelchairs or other health-related equipment, kitchen-diners, and a WC on the same floor as a bedroom.

Households with a person with a long-term illness or disability

- 3.4 During the interview survey, respondents were asked if anyone in their household had a long-term limiting illness or disability (likely to last a year or more). Where they existed, respondents were asked if any impairment resulted from the illness or disability. It was possible to select more than one type of impairment where this applied.
- 3.5 Around 7.1 million households (31%) had at least one person with a long-term limiting illness or disability. The most commonly reported impairments were of mobility (19% or 4.3 million), stamina (14% or 3.3 million) and dexterity (10% or 2.3 million), Annex Table 3.1 and Figure 3.1.

²³ The EHS Adaptations and Accessibility Report 2014-15 contains more detailed information on key accessibility features and the relative ease of creating these where they do not already exist.

Figure 3.1: Types of impairments among all households, 2015-16



Base: all households

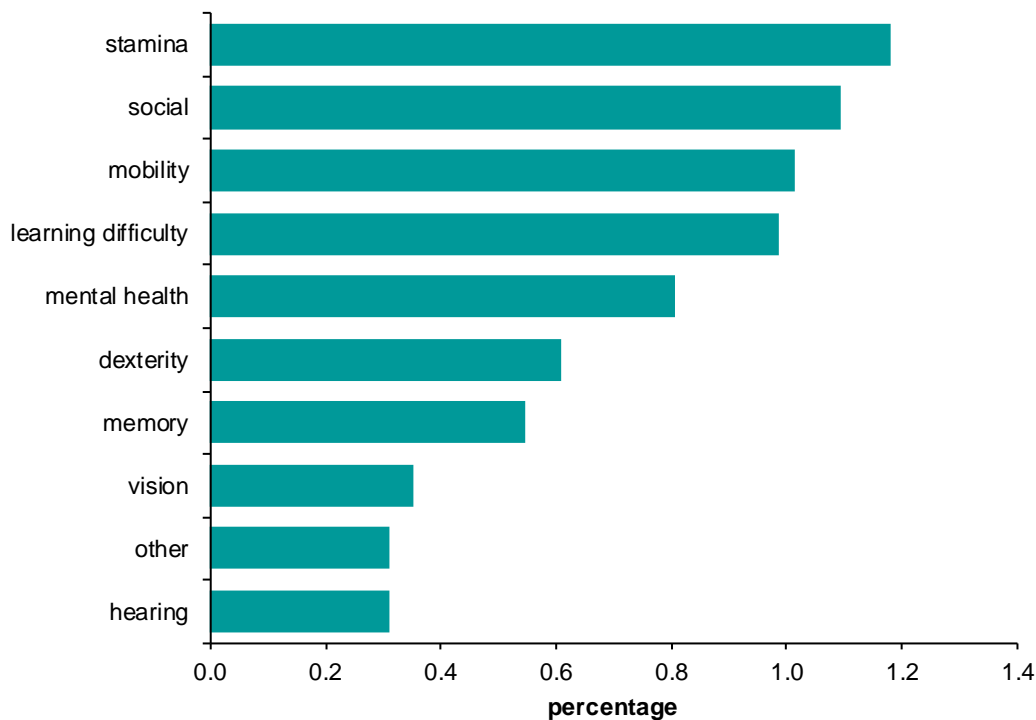
Note: underlying data are presented in Annex Table 3.1

Source: English Housing Survey, full household sample

3.6 Around 554,000 households (2%) had a dependent child²⁴ with a long-term limiting illness or disability, Annex Table 3.2. The most common impairments were stamina (1.2% of all households or 269,000), social difficulties (1.1% or 249,000), mobility (1% or 231,000) and learning difficulties (1% or 225,000), Figure 3.2.

²⁴ All children under 16 years and other children under 18 years of age in full time education.

Figure 3.2: Types of impairments among dependent children, 2015-16



Base: all households

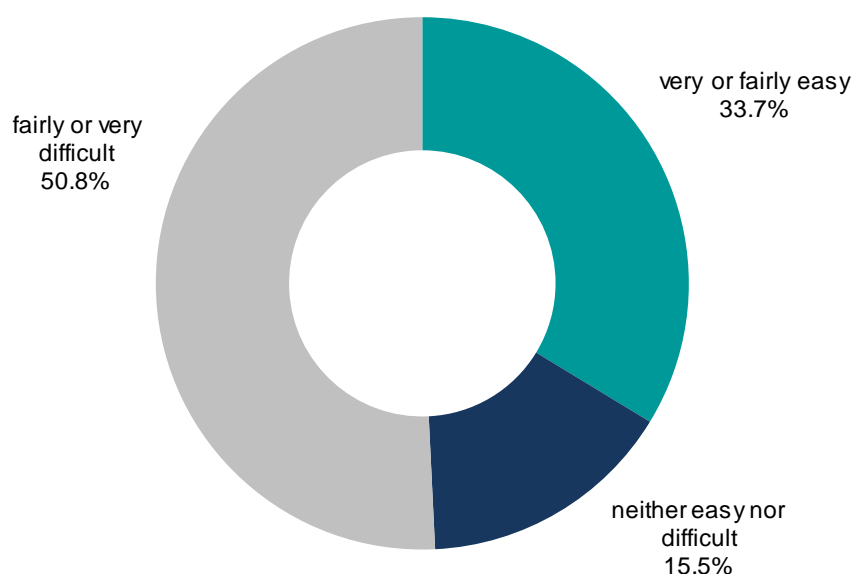
Note: underlying data are presented in Annex Table 3.2

Source: English Housing Survey, full household sample

Households with a wheelchair user

3.7 In 773,000 households (3%) at least one person used a wheelchair. Of these, in 232,000 households at least one person used a wheelchair inside the home. Of these, one half (51%) found it very or fairly difficult to manoeuvre their wheelchair around their home, Figure 3.3.

Figure 3.3: Degree of difficulty in manoeuvring wheelchair inside the home, 2015-16



Base: all households where at least one person used a wheelchair inside the home

Note: underlying data are presented in Annex Table 3.3

Source: English Housing Survey, full household sample

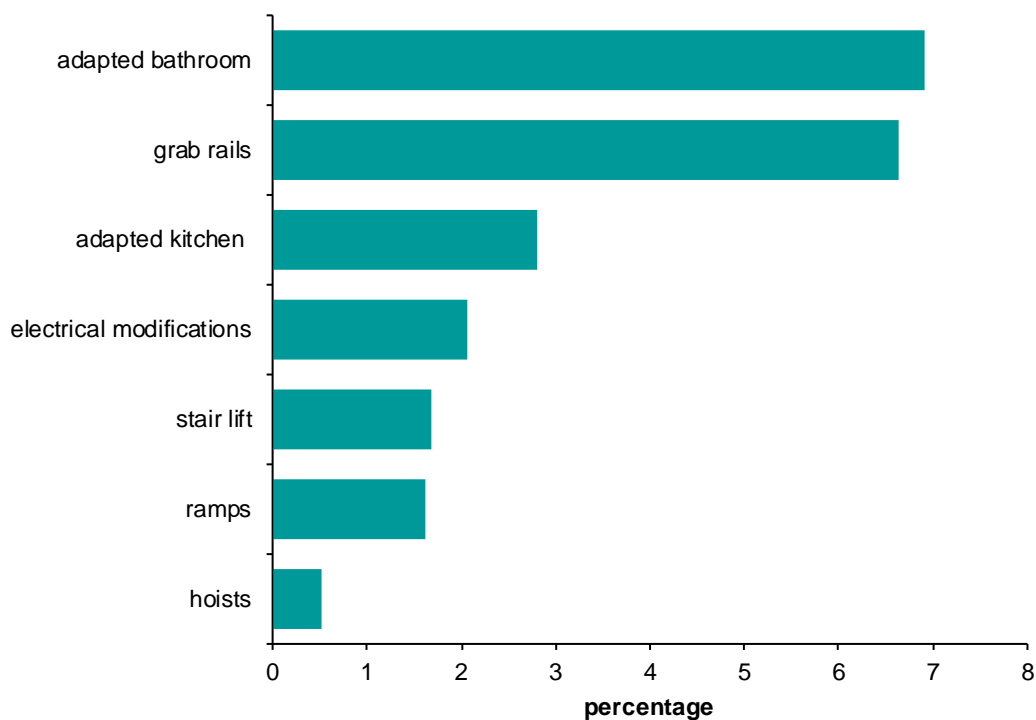
Key accessibility features and existing adaptations

- 3.8 In 2015, 18% of all dwellings had level access to the main entrance door. It would also be feasible to create level access through the installation of a ramp in a further 58% of dwellings. A quarter (25%) of dwellings had a flush threshold²⁵. Overall, 13% of dwellings had both level access and a flush threshold, Annex Table 3.4.
- 3.9 The EHS classifies the size of lifts available in communal areas into three categories: spacious, average and tight. Only a spacious lift would be able to comfortably accommodate a wheelchair user and another person, while an average sized lift may be able to accommodate a wheelchair, but with difficulty.
- 3.10 There were 3 million flats within the housing stock where the entrance level was not on the ground floor, but only 91,000 (3%) of these had a spacious sized lift. An average sized lift was available in 17% of these flats, while 6% had a tight lift and 74% no lift at all, Annex Table 3.5
- 3.11 The three most common types of adaptations present inside the dwelling were a bathroom adapted for disabled use (for example, hoists or door entry baths)

²⁵ See EHS Technical report 2015-16 Chapter 5 Annex 5.3 for more information on the definitions of level access and flush threshold.

and grab rails around the home (both 7% or 1.6 million), and kitchens adapted for disabled use (for example, special taps or low work surfaces) (3% or 660,000), Figure 3.4.

Figure 3.4: Existing adaptations among all dwellings, 2015



Base: all dwellings

Note: underlying data are presented in Annex Table 3.6

Source: English Housing Survey, dwelling sample

3.12 Some 44% of bathrooms adapted for disabled use were not wheelchair accessible, that is, they lacked sufficient space for a wheelchair user to access all the bathroom amenities, Annex Table 3.7.

Aspects of design facilitating adaptability

3.13 This section explores four aspects of design that facilitate adaptability for people with a long term illness or disability: availability of a storage room, bedroom space for an overnight carer or care equipment, a kitchen-diner with sufficient living space and a WC on the same level as a bedroom.

Availability of storage room

3.14 Wheelchairs could potentially be stored in various places around the home, such as ground floor bedrooms and utility rooms. Adequately sized and secure storage space may also help with wheelchair storage or other types of equipment for care needs. The EHS records whether the dwelling has a store

room of 3m² or over. This is large enough to have potential as wheelchair storage.

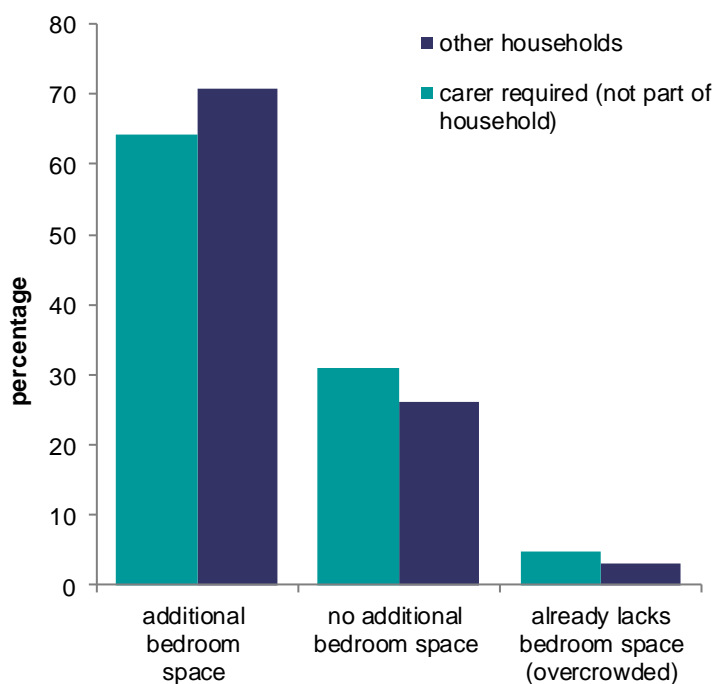
- 3.15 Around 662,000 dwellings (3%) had such a store room and of these, 428,000 (2% of the total stock) were located either on the ground floor of the home (houses or bungalows) or on the entrance level to the dwelling (flats), Annex Table 3.8.

Additional bedroom space

- 3.16 Using information on the number of bedrooms a household needs and the actual number of bedrooms they have²⁶, it is possible to examine the potential of the housing stock to provide additional bedroom space for an overnight carer, who is not a member of the household.
- 3.17 Overall, 71% of all households had an additional room available that could be used by overnight carers or for care equipment, Figure 3.5 and Annex Table 3.9.
- 3.18 Around 509,000 (2%) households required overnight care by someone who was not part of their household. Almost two thirds of these households (64%) had an additional bedroom available for their overnight carer. This is lower compared with those who did not currently require an overnight carer, 71% of whom had an additional room, Annex Table 3.9.
- 3.19 5% of households who currently required an overnight carer were already overcrowded (using the bedroom standard definition).

²⁶ The analysis is based on the bedroom standard; see Glossary for how this is calculated.

Figure 3.5: Potential bedroom space for overnight carer or equipment, 2015-16



Base: all households

Note: underlying data are presented in Annex Table 3.9

Source: English Housing Survey, full household sample

Kitchen-diners

3.20 Building Regulations recommend a minimum total ground floor living area to aid wheelchair users. The space recommended varies according to the number of bedrooms in the property. It also recommends that this living space should be step free and preferably open plan, combining kitchen and living space, to help wheelchair users move around in the space²⁷. This report focuses on analysing kitchen-diners, i.e. kitchens large enough to eat in, which may be combined with a living area but may also be separated from the living area.

3.21 In 2015, around 9.8 million dwellings (42% of the total stock) had a kitchen-diner at the entrance level to the dwelling. While the proportion of dwellings with this feature was stable between 2003 (35%) and 2008 (36%), it has increased since 2008, Annex Table 3.10 and Figure 3.6.

3.22 In 2015, 23% of all dwellings had a kitchen-diner at the entrance level that by itself complied with the recommended living space requirements²⁸. The proportion has increased steadily since 2003 (16%), with a slight increase between 2003 (16%) and 2008 (18%), Annex Table 3.11 and Figure 3.6.

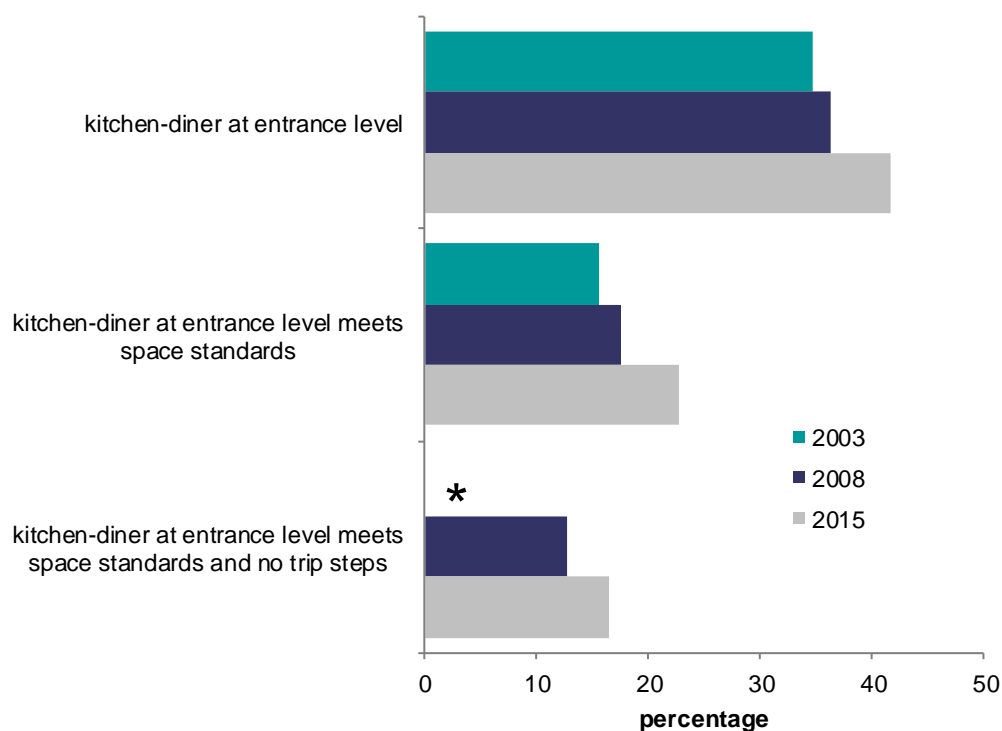
²⁷ Defined in The Building Regulations 2010 Access to and use of buildings, Vol. 1 Dwellings, Part M optional requirement M4(3) for Category 3: Wheelchair user dwellings

²⁸ See the Technical Notes for how the EHS has modelled this.

3.23 The EHS records whether there are any trip steps at the entrance level of the dwelling, but does not record how many trip steps exist or where any change of floor level occurs, for example, between the kitchen and living room or between two living room areas. Where a surveyor records a trip step, it is therefore possible that a kitchen-diner or open plan living area has a step or level change (but it may also be elsewhere on the entrance level).

3.24 In 2015, 16% of dwellings had kitchen-diners at the entrance level that by themselves complied with recommended space requirements and were located in homes where there was no trip step at the entrance level of the dwelling. This has increased since 2008 (13%)²⁹, Annex Table 3.12.

Figure 3.6: Kitchen-diners and related accessibility features, 2003, 2008 and 2015



Base: all dwellings

*data on presence of trip steps was not collected in the 2003 EHCS

Note: underlying data are presented in Annex Tables 3.10-3.12

Sources:

2003: English House Condition Survey, dwelling sample

2008 onwards English Housing Survey, dwelling sample

WC on same level as a bedroom

3.25 To help wheelchair users and other people with impairments for example, those associated with mobility, stamina and vision, it is also beneficial for a bedroom to be close to a bathroom on the same floor level in order to avoid the use of stairs. Overall some 94% of dwellings (22.1 million) had at least

²⁹ information on trip steps was not collected in 2003

one bedroom on the same floor as the main or a secondary WC, Annex Table 3.13.

Technical notes and glossary

Technical notes

1. Results for this report, which relate to the physical dwelling, are presented for '2015' and are based on fieldwork carried out between April 2014 and March 2016 (a mid-point of April 2015). The sample comprises 12,351 occupied or vacant dwellings where a physical inspection was carried out. Throughout the report, this is referred to as the 'dwelling sample'.
2. Where the numbers of cases in the sample are too small for any inference to be drawn about the national picture, the cell contents are replaced with a "u". This happens where the cell count is less than 5. When percentages are based on a row or column total with unweighted total sample size of less than 30, the figures are italicised. Figures in italics are therefore based on a small sample size and should be treated as indicative only.
3. **Where comparative statements have been made in the text, these have been significance tested to a 95% confidence level.** This means we are 95% confident that the statements we are making are true.
4. Additional annex tables, including the data underlying the figures and charts, are published on the website: <https://www.gov.uk/government/collections/english-housing-survey> alongside many supplementary tables, which are updated each year (in the summer) but are too numerous to include in our reports. Further information on the technical details of the survey, and information and past reports on the Survey of English Housing and the English House Condition Survey, can also be accessed via this link.

Weighting methodology

5. The Department for Communities and Local Government (DCLG) revised the weighting process on the English Housing Survey (EHS) going forward from 2015-16. The aim of the revision was to improve the stability of year-on-year estimates including household numbers. This new approach to weighting was approved by 'external' experts on the EHS Technical Advisory Group.
6. The improved weighting methodology was necessary because the initial weighted household counts increased considerably between 2014-15 and 2015-16 (by 361,583 additional households, 344,921 of which were in the private rented sector). The provisional 'grossed' dwelling and household estimates showed that, between 2014-15 and 2015-16, there were two additional households for every one additional dwelling (the number of dwellings increased by 180,814).

This appeared implausible when compared with an expected household growth of up to 200,000 per year as indicated by the Household Projections³⁰.

7. NatCen (the current EHS contractor) investigated and advised that some of the year-on-year variation in the initial weighted household counts was due to sampling variation in the data used in the weighting. The household weights are dependent on estimates of 'dwelling-to-household' ratios, which are subject to sampling variation. (This differs from the weighted dwelling counts that are controlled to 'external' DCLG estimates of dwellings by tenure and region.)
8. 'Dwelling-to-household' ratios vary by tenure and by year, Table T.1. In 2015-16, the average ratio increased from 1.0062 to 1.0129, resulting in a large increase in the grossed household counts between 2014-15 and 2015-16.

Table T.1: Dwelling-to-household ratio by tenure, 2013-14 to 2015-16

<i>all households</i>			
	2013-14	2014-15	2015-16 (before revision)
owner occupiers	1.0039	1.0013	1.0013
private rented	1.0600	1.0239	1.0670
local authority	1.0092	1.0103	1.0053
housing association	1.0091	1.0033	1.0079
total	1.0139	1.0062	1.0129

Source: English Housing Survey, full household sample

9. To reduce the year-on-year variation, the dwelling-to-household ratio was re-calculated by smoothing across two years of the EHS (2015-16 and 2014-15). The revised (smoothed) weights were used for producing the published EHS findings³¹. Smoothing across two years was preferred to smoothing across more years because the EHS sample uses a two year cycle whereby England is divided into 1,808 primary sampling units (PSUs) and interviewing takes places in the same 904 PSUs every other year.
10. When smoothed across two survey years, the average dwelling-to-household ratio reduced from 1.0129 to 1.0096, Table T.2. To assess the stability of the new methodology in producing less variable ratios across years, the 2014-15 ratio was also re-calculated using the same methodology (i.e. smoothing over 2 years: 2013-14 and 2014-15). As can be seen in the table below, the ratio appears quite stable (1.0100 in 2014-15 compared with 1.0096 in 2015-16).

³⁰ <https://www.gov.uk/government/collections/household-projections>

³¹ Both the household and the dwelling weights were revised because the dwelling-to-household ratio also has a minor role in the computation of the latter. The impact of the revision of the dwelling weights was very small.

Table T.2: Dwelling-to-household ratio by tenure, 2013-14 to 2015-16

<i>all households</i>	2014-15	2015-16
owner occupiers	1.0012	1.0022
private rented	1.0467	1.0425
local authority	1.0087	1.0102
housing association	1.0049	1.0059
total	1.0096	1.0100

Source: English Housing Survey, full household sample

11. This new approach to weighting was approved by external experts on the EHS Technical Advisory Group. It is considered to be the most robust and practical solution to the year-on-year inconsistencies observed in the household estimates. We expect to continue to smooth the weights in future waves of the EHS. The EHS team at DCLG, with NatCen and the EHS Technical Advisory Group, will review the further options to improve the weighting methodology. If you would like to share your views on the EHS weighting strategy, please contact: ehs@communities.gsi.gov.uk.

12. More detail on the EHS methodology can be found in the technical report³².

Modelling of kitchen-diners and recommended living space area

This section provides more information on the methodology for modelling the proportion of dwellings with kitchen-diners at entrance level and whether these met the recommended living space area.

The Building Regulations 2010 Access to and use of buildings, Vol. 1 Dwellings, Part M optional requirement M4(3) for Category 3: Wheelchair user dwellings, recommends minimum sizes that vary with the number of bedspaces for a dwelling to be considered wheelchair accessible, Table T.3.

³² <https://www.gov.uk/government/collections/english-housing-survey-technical-advice>

Table T.3: Minimum space standards for wheelchair users stipulated in Building Regulations 2010¹: the minimum combined floor area for living, dining, and kitchen space

Number of bedspaces	2	3	4	5	6	7	8
Minimum floor area m ²	25	27	29	31	33	35	37

¹The Building Regulations 2010 Access to and use of buildings, Vol.1 Dwellings, Part M optional requirement M4(3) for Category 3: Wheelchair user dwellings

To meet regulations, the relationship between the kitchen, dining and living areas should be convenient and step-free. Kitchen and eating areas should comply with all of the following.

- The kitchen and principal eating area are within the same room, or connected to each other and located within the entrance storey.
- There is a minimum clear access zone 1500mm wide in front of, and between, all kitchen units and appliances.

Where the dwelling is defined as wheelchair adaptable, additional requirements such as minimum worktop space, apply. Further information can be found on pages 36-37 of the Regulations³³.

The EHS is unable to replicate all of these requirements but is able to identify the prevalence of kitchens-diners at entrance level to the dwelling, whether the dwelling or the kitchen-diner itself (the latter is the focus of the analysis for this report) complies with the space standards provided in Table 3.2 of the Building Regulations 2010 Access to and use of buildings, Vol 1 Dwellings, Part M optional requirement M4(3) for Category 3: Wheelchair user dwellings. In addition, for the compliant kitchen-diners, whether there are any trip steps at the entrance level to the dwelling. The EHS does not record how many trip steps exist or where any change of floor level occurs.

Due to the complex nature of the analysis, various modelling assumptions and issues regarding the data should be noted:

- The room dimensions coded on the EHS form do not take account of alcoves and bays so are likely to underestimate rather than overestimate the size of rooms
- The dwelling is defined as having a kitchen-diner if the kitchen is large enough to dine in.

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540330/BR_PDF_AD_M1_2015_with_2016_amendments_V3.pdf

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- Where not a kitchen-diner, there is no information in the EHS on whether the rooms in question (living, kitchen, dining) are close to each other and whether doors and circulation between these particular rooms are wheelchair accessible.
 - For separate dining rooms (not coded as a kitchen-diner) with no available data on measurements, these rooms were modelled as 10m² in area, a conservative average estimate.
 - In cases where the area of the living room or kitchen could not be calculated because of missing data these have been modelled as 10m² each.
 - There is no data on the entry floor for houses – the modelling assumes it is at ground level.

Glossary

Accessibility features: see **visitability**

Area type: At the physical inspection, the surveyor makes an assessment of the area surrounding the dwelling and classifies it according to the following categories:

- city or other urban centre **which includes**
 - *city centre:* the area around the core of a large city.
 - *other urban centre:* the area around towns and small cities, and also older urban
- **suburban residential:** the outer area of a town or city; characterised by large planned housing estates.
- rural **which includes:**
 - *rural residential:* a suburban area of a village, often meeting the housing needs of people who work in nearby towns and cities.
 - *village centre:* the traditional village or the old heart of a village which has been suburbanised.
 - *rural:* an area which is predominantly rural e.g. mainly agricultural land with isolated dwellings or small hamlets.

Basic repair costs: Basic repairs include urgent work required in the short term to tackle problems presenting a risk to health, safety, security or further significant deterioration plus any additional work that will become necessary within the next five years. See Chapter 5, Annex 5 of the Technical Report for more information about how these are calculated and assumptions made.

Conversion: An alteration to the original construction which affects the total number of dwellings in the housing stock, for example, conversion of a house into two or more flats.

Damp and mould: There are three main categories of damp and mould covered in this report:

- **rising damp:** where the surveyor has noted the presence of rising damp in at least one of the rooms surveyed during the physical survey. Rising damp occurs when water from the ground rises up into the walls or floors because damp proof courses in walls or damp proof membranes in floors are either not present or faulty.
- **penetrating damp:** where the surveyor has noted the presence of penetrating damp in at least one of the rooms surveyed during the physical survey. Penetrating damp is caused by leaks from faulty components of the external

fabric e.g. roof covering, gutters etc. or leaks from internal plumbing, e.g. water pipes, radiators etc.

- **condensation or mould:** caused by water vapour generated by activities like cooking and bathing condensing on cold surfaces like windows and walls. Virtually all dwellings have some level of condensation. Only serious levels of condensation or mould are considered as a problem in this report, namely where there are extensive patches of mould growth on walls and ceilings and/or mildew on soft furnishings.

Decent home: A home that meets all of the following four criteria:

- it meets the current statutory minimum standard for housing as set out in the Housing Health and Safety Rating System (HHSRS – see below).
- it is in a reasonable state of repair (related to the age and condition of a range of building components including walls, roofs, windows, doors, chimneys, electrics and heating systems).
- it has reasonably modern facilities and services (related to the age, size and layout/location of the kitchen, bathroom and WC and any common areas for blocks of flats, and to noise insulation).
- it provides a reasonable degree of thermal comfort (related to insulation and heating efficiency).

The detailed definition for each of these criteria is included in *A Decent Home: Definition and guidance for implementation*, Department for Communities and Local Government, June 2006³⁴.

Double glazing: This covers factory made sealed window units only. It does not include windows with secondary glazing or external doors with double or secondary glazing (other than double glazed patio doors, which are surveyed as representing two windows).

Dwelling: A unit of accommodation which may comprise one or more household spaces (a household space is the accommodation used or available for use by an individual household). A dwelling may be classified as shared or unshared. A dwelling is shared if:

- the household spaces it contains are ‘part of a converted or shared house’, or
- not all of the rooms (including kitchen, bathroom and toilet, if any) are behind a door that only that household can use, and

³⁴ <https://www.gov.uk/government/publications/a-decent-home-definition-and-guidance>

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- there is at least one other such household space at the same address with which it can be combined to form the shared dwelling.

Dwellings that do not meet these conditions are unshared dwellings.

The EHS definition of dwelling is consistent with the Census 2011.

Dwelling age: The date of construction of the oldest part of the building.

Dwelling type: Dwellings are classified, on the basis of the surveyor's inspection, into the following categories:

- **small terraced house:** a house with a total floor area of less than 70m² forming part of a block where at least one house is attached to two or more other houses. The total floor area is measured using the original EHS definition of useable floor area, used in EHS reports up to and including the 2012 reports. That definition tends to yield a smaller floor area compared with the definition that is aligned with the Nationally Described Space Standard and used on the EHS since 2013. As a result of the difference between the two definitions, some small terraced houses are reported in the 2014 Housing Supply Report as having more than 70m².
- **medium/large terraced house:** a house with a total floor area of 70m² or more forming part of a block where at least one house is attached to two or more other houses. The total floor area is measured using the original EHS definition of useable floor area which tends to yield a small floor area compared with the definition used on the EHS since 2013.
- **end terraced house:** a house attached to one other house only in a block where at least one house is attached to two or more other houses.
- **mid terraced house:** a house attached to two other houses in a block.
- **semi-detached house:** a house that is attached to just one other in a block of two.
- **detached house:** a house where none of the habitable structure is joined to another building (other than garages, outhouses etc.).
- **bungalow:** a house with all of the habitable accommodation on one floor. This excludes chalet bungalows and bungalows with habitable loft conversions, which are treated as houses.
- **converted flat:** a flat resulting from the conversion of a house or former non-residential building. Includes buildings converted into a flat plus commercial premises (such as corner shops).

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- **purpose built flat, low rise:** a flat in a purpose built block less than six storeys high. Includes cases where there is only one flat with independent access in a building which is also used for non-domestic purposes.
 - **purpose built flat, high rise:** a flat in a purpose built block of at least six storeys high.

Energy efficiency rating: A dwelling's energy costs per m² of floor area for standard occupancy of a dwelling and a standard heating regime and is calculated from the survey using a simplified form of SAP. The energy costs take into account the costs of space and water heating, ventilation and lighting, less cost savings from energy generation technologies. They do not take into account variation in geographical location. The rating is expressed on a scale of 1-100 where a dwelling with a rating of 1 has poor energy efficiency (high costs) and a dwelling with a rating of 100 represents zero net energy cost per year. It is possible for a dwelling to have a SAP rating of over 100 where it produces more energy than it consumes, although such dwellings will be rare within the English housing stock.

The detailed methodology for calculating SAP to monitor the energy efficiency of dwellings was updated in 2012 to reflect developments in the energy efficiency technologies and knowledge of dwelling energy performance. These changes in the SAP methodology were relatively minor compared with previous SAP methodology updates in 2005 and 2009. It means, however that a SAP rating using the 2009 method is not directly comparable to one calculated under the 2012 methodology, and it would be incorrect to do so. All SAP statistics used in reporting from 2014 are based on the SAP 2012 methodology and this includes time series data from 1996 to the current reporting period (i.e. the SAP 2012 methodology has been retrospectively applied to 1996 and subsequent survey data to provide consistent results in the 2013 and following reports).

Energy efficiency rating (EER) bands: The 1-100 SAP energy efficiency rating is also presented in an A-G banding system for an Energy Performance Certificate, where Band A rating represents low energy costs (i.e. the most efficient band) and Band G rating represents high energy costs (the least efficient band). The break points in SAP (see below) used for the EER Bands are:

- Band A (92–100)
- Band B (81–91)
- Band C (69–80)
- Band D (55–68)
- Band E (39–54)
- Band F (21–38)
- Band G (1–20)

Energy Performance Certificate (EPC): Based on current energy performance the EPC provides a range of indicators, such as whether the property would benefit in

terms of improved performance from a range of heating, insulation and lighting upgrades and the likely performance arising from the application of those measures.

The EPC assessment is based on a simplified form of the energy efficiency SAP known as reduced data SAP (RdSAP). Following revisions to the way that RdSAP software implements improvements as part of the EPC production process, a new EPC methodology has been applied to the EHS 2015 data. Several additional improvement measures have been added to the methodology, and for some existing measures the criteria and/or improvement specification has changed (see the Technical Report for further information).

The EHS currently provides the following EPC based indicators, calculated using the survey's own approach to SAP (see the Technical Report for further information):

- current and post improvement performance:
 - *energy efficiency rating* (EER) and bands
 - *environmental impact rating* (EIR) and bands
 - *primary energy use* (kWh/m²/year)
 - *energy cost* (£/year) for space heating, water heating, lighting and renewables
 - CO₂ (carbon dioxide) emissions (tonnes/year)
- **improvement measures:** The Technical Report provides a list of improvements specified in the updated EHS methodology. These include loft insulation measures, wall and floor insulation measures, boiler upgrades, solar water heating, glazing and lighting measures. They are also listed in the relevant Annex Table.
- **the notional costs of installing the recommended measures:** The EHS also estimates the notional costs of installing each of the recommended measures and the total cost of applying all the recommended measures to the dwelling stock. The methodology for estimating these costs has also been revised (see the Technical Report for further information).

Excess cold (HHSRS Category 1 hazard): Households living in homes with a threat to health arising from sub-optimal indoor temperatures. The assessment is based on the most vulnerable group who, for this hazard, are those aged 65 years or more (the assessment does not require a person of this age to be an occupant). The EHS does not measure achieved temperatures in the home and therefore this hazard is based on dwellings with an energy efficiency rating of less than 35 based on the SAP 2001 methodology. Under the SAP 2009 methodology, used for the 2010- 2012 EHS reports, the comparable threshold was recalculated to be 35.79 and the latter was used in providing statistics for the HHSRS Category 1 hazard. Since 2013, the EHS Reports have used the SAP 2012 methodology and the comparable excess cold threshold has been recalculated to 33.52.

Exposure: The EHS captures data regarding site exposure of the dwelling. This is different to exposure zones, which indicate the approximate amount of wind driven rain which the building may be subject to. In the EHS, four categories of site exposure are recorded:

- Not exposed. The dwelling is in a sheltered position, possibly surrounded by other buildings or trees or tucked away in a valley.
- Slightly exposed. The dwelling is quite sheltered but may be buffeted by winds from time to time.
- Exposed. The dwelling is open to the elements, possibly on all four sides with little shelter provided by other buildings or natural obstacles.
- Very exposed. The dwelling is permanently exposed to the worst that the English elements can offer. Cliff top houses and isolated hill farms might fall into this category.

Habitable room: A room in the dwelling that offers 'living accommodation'. Includes bedrooms, kitchens if there is additional space to provide a dining area large enough to accommodate a table and chairs (typically an area of 2m² in addition to kitchen space). A fully converted room in the loft space is classified as a habitable room even if it can only be reached by a fixed ladder or unsafe staircase.

Hard to treat cavity walls: This approach aims to provide a count of dwellings with hard to treat cavity walls consistent with the Energy Companies Obligation (ECO) definition.

- **Standard fillable walls:** dwelling without hard to treat cavity walls. These typically occur in bungalows or 2 storey houses with standard masonry cavity walls and masonry pointing or rendered finishes.
- **Hard to treat cavity walls:** These are cavity walls that could in theory be filled, but which exhibit one or more of the following difficulties:
 - They are in a building with three or more storeys, where each storey has cavity walls. The limitation of some insulation systems and the need for scaffolding to install insulation in these higher buildings would contribute to the complication and cost of improving these homes.
 - The gap found in the cavity wall is found to be narrower than in standard walls. Although an attempt could be made to insulate these homes by injecting foam, the limited cavity space may lead to an uneven spread of the insulating material, resulting in substandard thermal properties.
 - The dwelling is of predominantly prefabricated concrete, metal or timber frame construction. Although more recent homes of these types will have had insulation applied during construction, the walls are generally unsuitable for retrospective treatment. In the case of timber frame

construction, the industry recommendation is not to inject insulation as this can hamper ventilation between the frame and the external wall that may lead to rot in the timber frame.

- The cavity wall has an outer leaf finished predominantly with tiles or cladding which can act as a barrier to the successful injection of insulating material.

Some dwellings with uninsulated cavity walls may have more than one barrier to insulation, but the analysis in this report seeks to provide an indication of the total number of homes with harder to treat cavity walls in the housing stock rather than estimate the degree to which multiple difficulties may exist.

Hard to treat solid walls:

- **Non-problematic walls:** non-cavity walls, or cavity walls identified as hard to treat, which do not include the barriers listed below.
- **Hard to treat wall:** by increasing level of difficulty.
 - Masonry wall with attached conservatories or other features: fixing the insulation round any projections like conservatories, porches or bays requires additional work and therefore additional expense.
 - Walls with a predominant rendered finish: this may add to the costs of the work as the render may need to be removed, repaired or treated before the insulation can be installed.
 - Walls with a predominantly non-masonry finish: improving dwellings with wall finishes such as stone cladding, tile, timber or metal panels would either add to the cost of the work or even preclude external solid wall insulation where the wall structure itself is stone or timber. Unlike brick walls, these types of wall finish may give an uneven surface on which to attach the insulated layer.
 - Flats: These can be problematic for two reasons. Firstly, there are likely to be issues related to dealing with multiple leaseholders (getting their agreement and financial contribution to the work). Also, the height of the module for high-rise flats would present significant complications in applying external solid wall insulation.

Where more than one difficulty exists, the highest level of difficulty takes precedence in the categorisation, for example, any flat with rendered walls falls into the 'flats' category and a house with rendered walls and a conservatory falls into the 'walls with a predominant rendered finish' category. For the purposes of the analysis, therefore, the first three categories refer to houses only. Flats are likely to have their own unique problems irrespective of, for example, the type of wall finish.

The report seeks to provide an indication of the total number of homes without compelling physical barriers to solid wall insulation in the housing stock rather than estimate the degree to which multiple difficulties may exist.

There are other barriers such as planning restrictions that apply in conservation areas or listed building status that will affect the real potential for installing solid wall insulation but EHS does not collect data on these.

Hard to treat loft insulation:

- **Non-problematic lofts:** installation would be straightforward with none of the barriers below.
- **Hard to treat by increasing level of difficulty/feasibility:**
 - More problematic: loft is fully boarded across the joists which would lead to extra work and expense.
 - Room in roof: insulation would need to be added between the rafters which would involve very extensive work and considerable expense.
 - Flat or shallow pitched roof: not feasible to install loft insulation as there is no access into the loft or no loft space.
- Unlike the hard to treat categories for cavity wall and solid wall insulation, where a dwelling may fall into more than one category, those for loft insulation are more distinct in nature. Although a room in the roof would also be fully boarded, improving energy efficiency would occur through insulating the roof slope rather than the ceiling.

Heating controls:

a) For central heating systems:

- **timers** which control when the heating goes on and off. They range from simple manual timeclocks to complex digital programmers and most include a manual override.
- **room thermostats** which measure air temperature in the home, and switch the space heating on and off. They can be used to set a single target temperature and there may be one or more of these in the dwelling.
- **thermostatic radiator valves (TRVs)** which enable the temperature of radiators in individual rooms to be modified manually.

b) For storage heating systems:

- **manual or automatic charge controls** adjust the amount of heat stored overnight. The more recently introduced automatic controls measure the temperature in the room (or more rarely, outside the house). If the temperature is milder these allow less heat to be stored, saving money.
- **select type controller** has electronic sensors throughout the dwelling linking to a central control device. It monitors the individual room sensors and optimises the charging of all storage heaters individually.

Heat pumps: Air source heat pumps absorb heat from the outside air into a fluid which passes through a compressor to increase its temperature. This higher temperature heat is then used to heat radiators, underfloor heating systems, warm air heaters or hot water in the home.

Ground source heat pumps absorb heat from the ground through a loop of pipe buried in the ground containing a mixture of water and antifreeze. The heat is absorbed into the fluid and then passed through a heat exchanger into the heat pump to be used to heat radiators, underfloor or warm air heating systems and hot water. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year. The length of the ground loop depends on the size of the dwelling and the amount of heat required. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead.

Heating system: There are three main types of heating covered in this report:

- **central heating system:** most commonly a system with a gas fired boiler and radiators which distribute heat throughout the dwelling (but also included in this definition are warm air systems, electric ceiling/underfloor and communal heating). It is generally considered to be a cost effective and relatively efficient method of heating a dwelling. Communal systems use heat generated in a centralized location for residential space and water heating. This could be from
 - a central boiler using any fuel which supplies a number of dwellings
 - waste heat from power stations distributed through community heating schemes
 - heat from a local CHP (combined heat and power) system
- **storage heaters:** predominately used in dwellings that have an off-peak electricity tariff. Storage heaters use off-peak electricity to store heat in clay bricks or a ceramic material, this heat is then released throughout the day. However, storage heating can prove expensive if too much on peak electricity is used during the day.
- **room heaters:** this category includes all other types of heaters such as fixed gas, fixed electric or portable electric heaters. This type of heating is generally considered to be the least cost effective of the main systems and produces more carbon dioxide emissions per kWh.

Housing Health and Safety Rating System (HHSRS): A risk assessment tool used to assess potential risks to the health and safety of occupants in residential properties in England and Wales. It replaced the Fitness Standard in April 2006.

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- The purpose of the HHSRS assessment³⁵ is not to set a standard but to generate objective information in order to determine and inform enforcement decisions. There are 29 categories of hazard, each of which is separately rated, based on the risk to the potential occupant who is most vulnerable to that hazard. The individual hazard scores are grouped into 10 bands where the highest bands (A-C representing scores of 1,000 or more) are considered to pose Category 1 hazards. Local authorities have a duty to act where Category 1 hazards are present, and may take into account the vulnerability of the actual occupant in determining the best course of action.
 - For the purposes of the decent homes standard, homes posing a Category 1 hazard are non-decent on its criterion that a home must meet the statutory minimum requirements.
 - The EHS is not able to replicate the HHSRS assessment in full as part of a large scale survey. Its assessment employs a mix of hazards that are directly assessed by surveyors in the field and others that are indirectly assessed from detailed related information collected. For 2006 and 2007, the survey (the then English House Condition Survey) produced estimates based on 15 of the 29 hazards. From 2008, the survey is able to provide a more comprehensive assessment based on 26 of the 29 hazards. See the EHS Technical Note on Housing and Neighbourhood Conditions³⁶ for a list of the hazards covered.

Insulation: There are two main types of insulation covered in this report:

- **wall insulation**
 - *cavity walls:* where a dwelling has external walls of predominantly cavity construction, it is defined as having cavity wall insulation if at least 50% of the cavity walls are filled with insulation. This could have been fitted during construction or retrospectively injected between the masonry leaves of the cavity wall.
 - *solid walls:* where a dwelling has external walls of predominantly masonry solid construction, it is defined as having solid wall insulation if at least 50% of the solid walls are fitted with insulation. This could be applied either externally (e.g. insulated board attached to the external face with a render finish) or internally (e.g. insulated plasterboard fitted to the external walls inside each room, with a plaster finish).
 - *other walls:* these are any dwellings with predominantly non-cavity or masonry solid walls (e.g. timber, metal or concrete frames). If at least 50% of the walls are fitted with insulation, the dwelling is defined as having other wall insulation.

³⁵ <https://www.gov.uk/government/organisations/department-for-communities-and-local-government/series/housing-health-and-safety-rating-system-hhsrs-guidance>

³⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211302/Housing_and_Neighbourhood_Conditions.pdf

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- **loft insulation:** the presence and depth of loft insulation is collected for all houses and top-floor flats. Insulation could be found between joists above the ceiling of the top floor of the dwelling or between the roof timbers where the loft has been converted to a habitable space. Where insulation could not be observed, information was taken from the householder or from imputed estimates based on the age and type of the dwelling.

Insulation – new cavity wall insulation variable: For the 2015 Headline Report, the English Housing Survey introduced a new measure of cavity wall insulation (variable wins95x). This new measure incorporates more up-to-date information regarding the insulation of buildings built since 1991 and aligns the English Housing Survey methodology to a common method for calculating energy efficiency of buildings.

In compliance with new Building Regulations, an increasing proportion of dwellings built in 1991 or after with cavity walls had insulation fitted at the time of construction (known as 'as built' cavity wall insulation), although compliance could also be achieved through other techniques. The non-intrusive survey undertaken in the EHS would not always be able to identify as built insulation, and the Survey has to assume that these properties have insulation. To align with current RdSAP methodology and to improve our methodology, the English Housing Survey has for 2015 data introduced a new variable, which assumes that properties built in 1995 or after has as built insulation. This is the assumption used in the RdSAP model, which in turn reflects that cavity wall insulation was not used as often as previously thought to comply with the new Building Regulations in the early 1990s.

In the earlier variable (wins90x), properties built in 1991 or after were assumed to be insulated, as it was thought builders used cavity wall insulation to comply with the new Building Regulations. Due to changes in data collection the new variable can only be taken back to 2008. Trends from earlier reports hold, though the exact numbers produced by the new variable are lower (as properties built in 1991 up to 1995 without evidence of retrofitted cavity wall insulation are no longer assumed to be insulated).

Long-term limiting illness: This is consistent with the core definition of disability under the Equality Act 2010. A person is considered to have a disability if they have a long-standing illness, disability or impairment which causes substantial difficulty with day-to-day activities.

Renewable energy: Data is collected on the presence of three types of renewable technology:

- **solar thermal panels:** these are usually roof mounted and use direct sunlight to heat water, providing an additional source of domestic hot water to the internal boiler or other water heater. The most common types are evacuated tube and glazed flat plate collectors.

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- **photovoltaic panels:** a photovoltaic cell is a device that converts light into electric current, contributing to the domestic electricity supply. A large photovoltaic system could provide a surplus of energy, allowing a household to export electricity to the national grid.
 - **wind turbines:** a domestic small-scale wind turbine harnesses the power of the wind and uses it to generate electricity. The sample size of dwellings with this feature is currently too small to provide robust estimates for reporting.

SAP: The energy cost rating as determined by Government's Standard Assessment Procedure (SAP) is used to monitor the energy efficiency of dwellings. It is an index based on calculated energy costs for a standard heating regime and is expressed on a scale of 1 (highly inefficient) to 100 (highly efficient with 100 representing zero energy cost). It is possible for a dwelling to have a SAP rating of over 100 where it produces more energy than it consumes although such dwellings will be rare within the English housing stock.

The method for calculating SAP was comprehensively updated in 2005 and in 2009 with an update of a more minor nature in 2012. This new SAP 2012 methodology is used in this report.

Size: The total usable internal floor area of the dwelling as measured by the surveyor, rounded to the nearest square metre. It includes integral garages and integral balconies but excludes stores accessed from the outside only, the area under partition walls and the stairwell area.

Substantial disrepair: Standardised basic repair costs of more than £35/m². Standardised repair costs measure repair costs expressed in pounds per square metre of floor area.

Thermal comfort: an assessment from the surveyor as to whether a dwelling has both efficient heating; and effective insulation. Efficient heating is defined as

- any gas or oil programmable central heating
- electric storage heaters; or warm air systems
- underfloor systems
- programmable LPG/solid fuel central heating
- similarly efficient heating systems which are developed in the future

The primary heating system must have a distribution system sufficient to provide heat to two or more rooms of the home. There may be storage heaters in two or more rooms, or other heaters that use the same fuel in two or more rooms.

Because of the differences in efficiency between gas/oil heating systems and the other heating systems listed, the level of insulation that is appropriate also differs:

- For dwellings with gas/oil programmable heating, cavity wall insulation (if there are cavity walls that can be insulated effectively) or at least 50mm loft insulation (if there is loft space) is an effective package of insulation.
- For dwellings heated by electric storage heaters/LPG/programmable solid fuel central heating a higher specification of insulation is required: at least 200mm of loft insulation (if there is a loft) and cavity wall insulation (if there are cavity walls that can be insulated effectively).

Tenure: In this report, households are typically grouped into three broad categories known as tenures: owner occupiers, social renters and private renters. The tenure defines the conditions under which the home is occupied, whether it is owned or rented, and if rented, who the landlord is and on what financial and legal terms the let is agreed.

- **owner occupiers:** households in accommodation which they either own outright, are buying with a mortgage or as part of a shared ownership scheme.
- **social renters:** this category includes households renting from Local Authorities (including Arms' Length Management Organisations (ALMOs) and Housing Action Trusts) and Housing Associations, Local Housing Companies, co-operatives and charitable trusts.

A significant number of Housing Association tenants wrongly report that they are Local Authority tenants. The most common reason for this is that their home used to be owned by the Local Authority, and although ownership was transferred to a Housing Association, the tenant still reports that their landlord is the Local Authority. There are also some Local Authority tenants who wrongly report that they are Housing Association tenants. Data from the EHS for 2008-09 onwards incorporate a correction for the great majority of such cases in order to provide a reasonably accurate split of the social rented category.

- **private renters:** this sector covers all other tenants including all whose accommodation is tied to their job. It also includes people living rent-free (for example, people living in a flat belonging to a relative).

Vacant dwellings: The assessment of whether or not a dwelling is vacant is made at the time of the interviewer's visit. Clarification of vacancy is sought from neighbours. Both properties in between lets and those that are vacant for a longer period are classified as vacant on the EHS. Surveyors are required to gain access to vacant dwellings and undertake full inspections.

Visitability: Visitability comprises four key features which are considered to be the most important for enabling people with mobility problems to either access their

home or visit someone else's home. These four features form the basis for the requirements in part M of the Building Regulations, although the EHS cannot exactly mirror the detailed requirements contained there.

- **Level access:** For all dwellings with a private or shared plot, there are no steps between the gate/pavement and the front door into the house or block of flats to negotiate. This includes level access to the entrance of the survey module (i.e. a group of flats containing the surveyed flat). Dwellings without a plot are excluded from the analysis as access is, in effect, the pavement/road adjacent to the dwelling.
- **Flush threshold:** a wheelchair can be wheeled directly into the dwelling from outside the entrance door with no steps to negotiate and no obstruction higher than 15mm.
- **Sufficiently wide doors and circulation space:** the doors and circulation space serving habitable rooms, kitchen, bathroom and WC comply with the requirements of part M of the Building Regulations.
- **WC at entrance level:** there is an inside WC located on the entrance floor to the dwelling.

Each dwelling is classified according to the highest degree of difficulty of the required work, for example, if work to provide a flush threshold is minor but providing a WC at ground floor involves building an extension, the dwelling is classed as requiring major works in order to make it fully visitable.

- **Minor work:** no structural alterations required. Costs likely to be under £1,000. Examples include replacing a door and frame to create a flush threshold or installing a ramp for level access.
- **Moderate work:** rearrangements of internal space required that will involve removing internal partitions and/or increasing size of doorways. Costs are likely to be in the region of £1,000-£15,000 depending on the size of dwelling and the precise nature of the work. Examples include:
 - internal structural alterations such as using an integral garage, storage cupboard or larder to create a WC at entrance level. This will likely involve partitioning off existing rooms together with associated works to water supplies, wastes and heating.
 - removing some wall partitions (where this does not contravene fire regulations) to create sufficient width for internal doorways or hallways.
- **Major work:** building extensions required. Works will be in excess of about £15,000 and the precise amount will depend on the size of the extension to be built, the scale of work to water and drainage services and ground conditions. A home, for example, may require an extension for a downstairs WC.

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- **Not feasible:** it is not physically possible to carry out the necessary work. For example, this could be due to the physical impossibility of building an extension or installing a ramp up to the front door.

Wall finishes: The outer layer or skin of the material of the wall structure or any coating applied to it. Wall finishes include:

- **Pointed brickwork:** The mortar is placed into a masonry joint after the masonry units (e.g. brick, concrete block or stone) have been laid. This creates a finish to the brickwork and adds resistance to weather
- **Rendered finish:** The application of, for example, premixed cement or pebbledash. The render may or may not be painted.
- **Mixed or other finish:** Other types of wall finish include protective and decorative timber, clay or concrete tiles fixed to the wall structure

Wall types: the method of the dwelling construction, including:

- **Cavity wall:** constructed of two brick or block walls separated by a cavity that is at least 50mm wide. They are generally found in houses dating from about 1930 onwards, although some older examples exist. Many dwellings (especially older private sector homes) have a mix of wall types because they have had one or more extensions added at different times. In the EHS dwellings are only classed as 'cavity wall' where at least 50% of the total external wall area is cavity brickwork.
- **Solid wall dwelling:** A dwelling whose structure comprises of solid brickwork i.e. no cavity inside the walls. Solid walls were mainly built until the 1930s in England.
- **Timber frame/concrete frame/other concrete/steel frame dwellings:** This category covers a wide range of building types, ranging from traditional timber frame buildings to non-traditional concrete or steel frame buildings using 'systems' of building focused on speed and economy of construction. They usually use pre-constructed frames of material, e.g. timber, concrete or steel, that are then erected on site. In some cases the frames may be constructed on site. The frames can be clad with other materials or filled to form panels.
- **Masonry walled dwellings:** Dwellings with walls constructed by laying individual masonry units (e.g. brick, concrete block or stone). The masonry units are normally laid with cement mortar, which binds them together to create a structure. They can be either cavity or solid wall.

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Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
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July 2017

ISBN: 978-1-4098-5083-0