



Ministry of Housing,  
Communities &  
Local Government



# English Housing Survey

Energy Report, 2017-18



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# Introduction and main findings

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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. It is one of the longest standing government surveys and was first run in 1967.
2. This report is split into three chapters. The first chapter analyses the awareness and influence of Energy Performance Certificates. It also looks at energy efficiency work done by owner occupiers and why some of them kept their radiators when replacing their boiler.
3. Chapter two concentrates on reported changes to gas and electricity tariffs. It also looks at the modelled cost of energy and of efficiency improvements.
4. Chapter three provides information on access to particular types of 'infrastructures', in particular internet, parking, mains gas and different types of space and water heating systems.

## Main findings

**Among households that had moved since 2008, almost two thirds remember seeing an Energy Performance Certificate (EPC) before moving. The EPC had influenced their decision to buy or rent that dwelling in a quarter of these households.**

- Of the 10.6 million households that had moved into their home in or after October 2008, around two thirds (63% or 6.7 million) remembered seeing an EPC before moving. Over a quarter (28%) said they had not seen one, while one in ten (9%) spontaneously said that they did not know if they had seen an EPC. There is likely to be some recall bias in these numbers, with those moving longer ago less likely to remember seeing an EPC, which means a higher proportion may have seen one at the time of moving.
- Those who remembered seeing an EPC were asked whether the information on the EPC influenced their choice to buy or rent that dwelling. Around a quarter (24%) said that the information on the EPC influenced their decision while 76% said they were not influenced by it.

**Among owner occupiers, three quarters had undertaken at least one energy efficiency measure in their dwelling in the last five years. The most common types of work were servicing or replacing the central heating boiler, and installing or increasing loft insulation.**

- Owner occupiers (14.8 million households) were asked if they had undertaken any energy efficiency improvements to their homes in the last five years. Of these, 75% had carried out at least one energy efficiency measure.

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- The three most common energy efficiency measures were servicing the central heating boiler (43%), replacing the central heating boiler (32%) and putting in or adding extra loft insulation (18%).

**One in four households said they had changed their electricity or gas tariff in the last year. Owner occupiers, those with a higher income and those paying by direct debit were more likely to report having changed their tariff.**

- Households were asked if they had changed their electricity or gas tariff over the previous 12 months. A quarter (25%) of households (around 5.8 million) said they had changed tariffs (either electricity or gas or both).
- Owner occupiers (30%) were more likely to have changed tariffs than private (19%), local authority (16%) and housing association (16%) renters.
- A third (34%) of those in the highest income quintile reported changing tariff compared to 18% of those in the lowest.
- Those who paid for their electricity or gas bill using direct debit were more likely to change tariffs (30%) than those paying through alternative methods (15% of those paying through pre-payment and 10% of those paying through standard credit).

**Most households had internet access in their homes. Owner occupiers and private renters were more likely to have internet access than social renters.**

- Almost nine in ten (88% or 20.3 million households) said they had access to the internet in their homes. More specifically, 87% had access to broadband internet while 1% had access to another type of internet.
- Owner occupiers (90%) and private renters (89%) were more likely to have access to broadband internet than households renting from housing associations (73%) and local authorities (71%).

**In order to meet the government's short and long-term ultra-low emission vehicle uptake ambitions, the UK needs a well-developed charging infrastructure for electric vehicles. Parking availability is a key factor in this. Six in ten dwellings had parking on the plot, while one in four had no designated parking provision at all. Smaller numbers of dwellings had either communal parking, or parking away from the plot.**

- Around 60% or 14.4 million homes had an on plot parking space, 7% had access to some form of communal parking (such as open-air parking bays), 6% had off-plot parking and over a quarter (26%) had no designated parking provision at all.

**The majority of homes have mains gas. Mains gas was less prevalent in the private rented sector, newer homes and purpose-built flats, and also in homes in rural areas, those with lower levels of loft insulation or double glazing.**

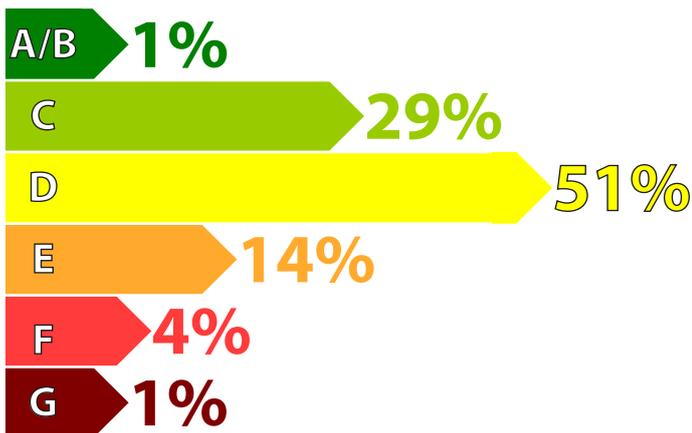
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- Around 86% or 20.5 million dwellings in England had access to mains gas supply in 2017 (as defined by the presence of a gas meter). The remaining 3.3 million (14%) had no gas meter present.
  - Dwellings with no access to gas were more prevalent in the private rented sector (20%), homes built post-2002 (23%), purpose-built flats (67%), dwellings in rural areas (76%), those with no loft insulation (17%) or with lower levels of double glazing (22%).

## Acknowledgements and further queries

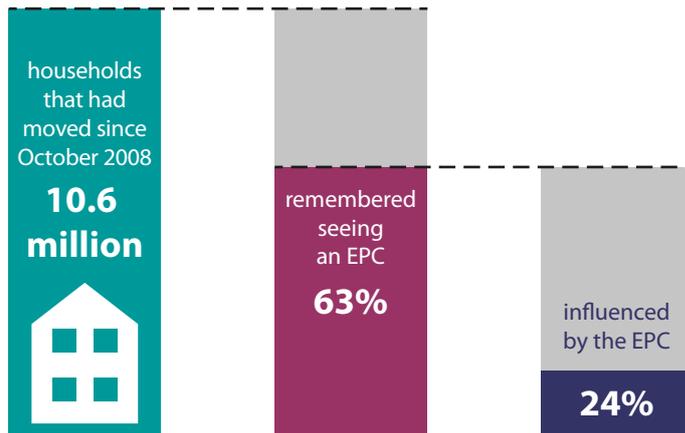
5. Each year the English Housing Survey relies on the contributions of a large number of people and organisations. The Ministry for Housing, Communities and Local Government (MHCLG) would particularly like to thank the following people and organisations, without whom the 2017-18 survey and this report, 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.
6. This report was produced by Ana Slater and Helen Garrett at BRE in collaboration with NatCen Social Research and MHCLG.
7. 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.gov.uk](mailto:ehs@communities.gov.uk).
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# Energy

Most English dwellings have an energy efficiency rating of D or C.

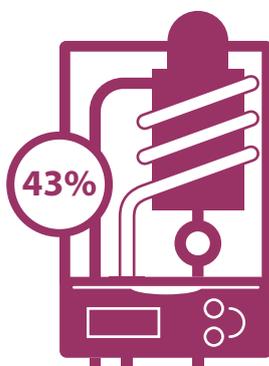
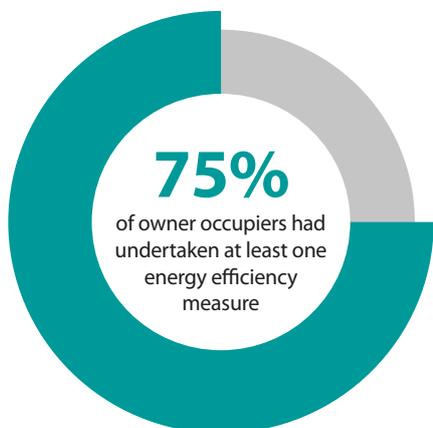


Energy Performance Certificates (EPCs) give suggestions for improving energy efficiency.



In the last five years, owner occupiers have carried out work on energy efficiency and their heating systems.

The three most common energy efficiency measures



servicing the central heating boiler

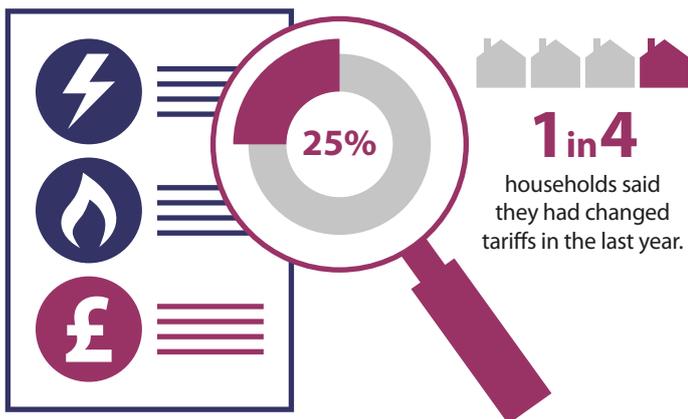


replacing the central heating boiler

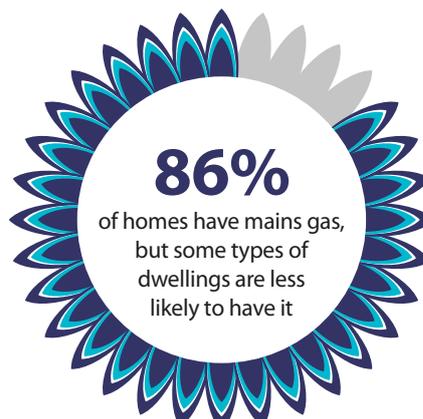


putting in or adding extra loft insulation

Another way of reducing energy costs is to switch tariffs.



Access to mains gas affects how energy is used and how much it costs.



- No access to gas:**
- 20%** Private rented sector
- 23%** Homes built post-2002
- 67%** Purpose-built flats
- 76%** Dwellings in rural areas

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# Chapter 1

## Energy Performance Certificates: awareness and work done

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- 1.1 A domestic Energy Performance Certificate (EPC) provides potential buyers and tenants with an indication of the energy efficiency of a dwelling. The certificate contains information about the dwelling's energy costs based on standardised assumptions about occupancy and energy use in dwellings of a similar size and type which may not reflect how energy is consumed by individual occupants. It also recommends ways to improve the energy efficiency of the dwelling. The requirement for dwellings to have an EPC when sold or rented was fully implemented by October 2008.
- 1.2 The first part of this chapter explores household awareness of EPCs, and the influence certificates had on a household's decision to buy or rent the home. The chapter will also examine whether there were any variations in the awareness and influence of EPCs by dwelling and household characteristics.
- 1.3 The second part of this chapter reports the types of energy efficiency improvement measures undertaken by owner occupiers.

### Awareness and influence of EPCs by dwelling, and household characteristics

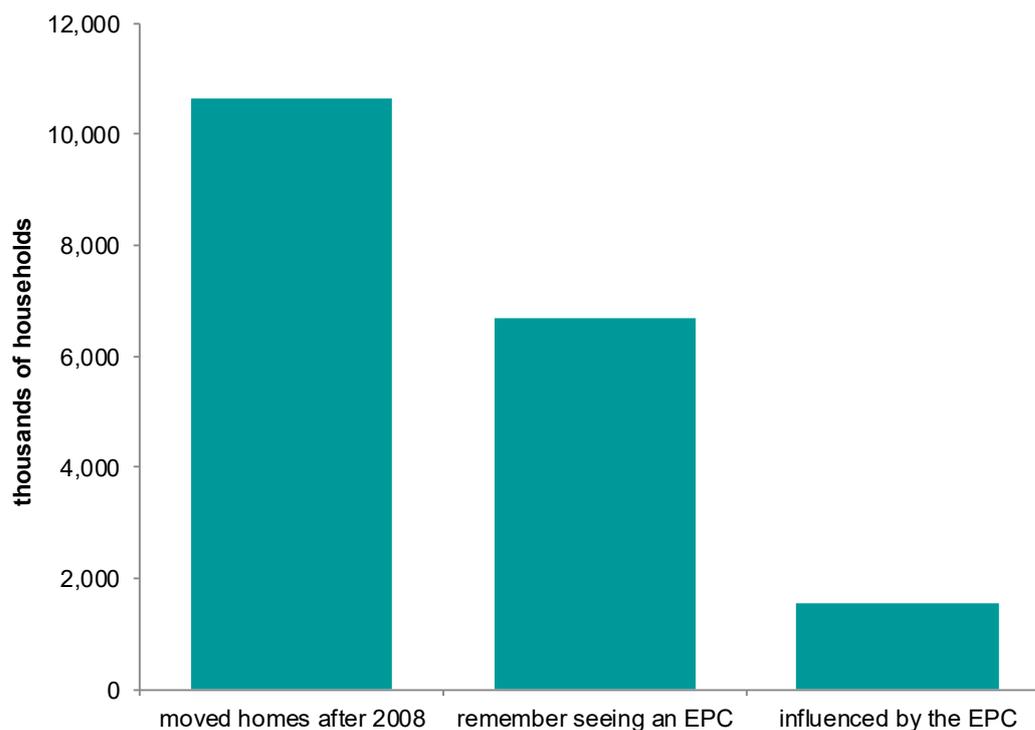
- 1.4 In the EHS interview survey for 2017-18, all households who had moved into their current home on or after October 2008 (10.6 million households or 47% of all households) were asked whether they remembered seeing an EPC relating to their new home. Respondents were given a show card illustrating what an EPC looks like, Annex Table 1.1.
- 1.5 Of the 10.6 million households who had moved, around two thirds (63% or 6.7 million) remembered seeing an EPC. Over a quarter (28%) said they had not seen one, while one in ten (9%) spontaneously said that they did not know if they had seen an EPC, Annex Table 1.2.
- 1.6 Households who remembered seeing an EPC were asked how far the information on the EPC influenced their choice to buy or rent that dwelling.

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Around a quarter (24%) said that the information on the EPC influenced their decision while 76% said they were not influenced at all<sup>1</sup>.

- 1.7 Where the household remembered seeing an EPC, almost half (46%) reported that the estate agent, solicitor, landlord or letting agent talked to them about the information provided in the certificate, Annex Table 1.6.

**Figure 1.1: Number of households who moved home after 2008, remember seeing an EPC and were influenced by the EPC, 2017-18**



**Base: all households**

**Note: underlying data are presented in Annex Tables 1.1, 1.2 and 1.7**

**Source: English Housing Survey, full household sample**

- 1.8 Households who had been living in their home for two years or less were more likely to remember seeing an EPC compared to other households (for example, 68% of those resident for 2 years remembered seeing one, while 61% of those resident for 3 years did), Annex Table 1.4. There was little difference between move in date and likelihood of being influenced by the EPC. This indicates there is a recall bias in the data. It is likely that a higher proportion of households actually saw an EPC than the overall proportion (63%) suggests, but some have forgotten they did.

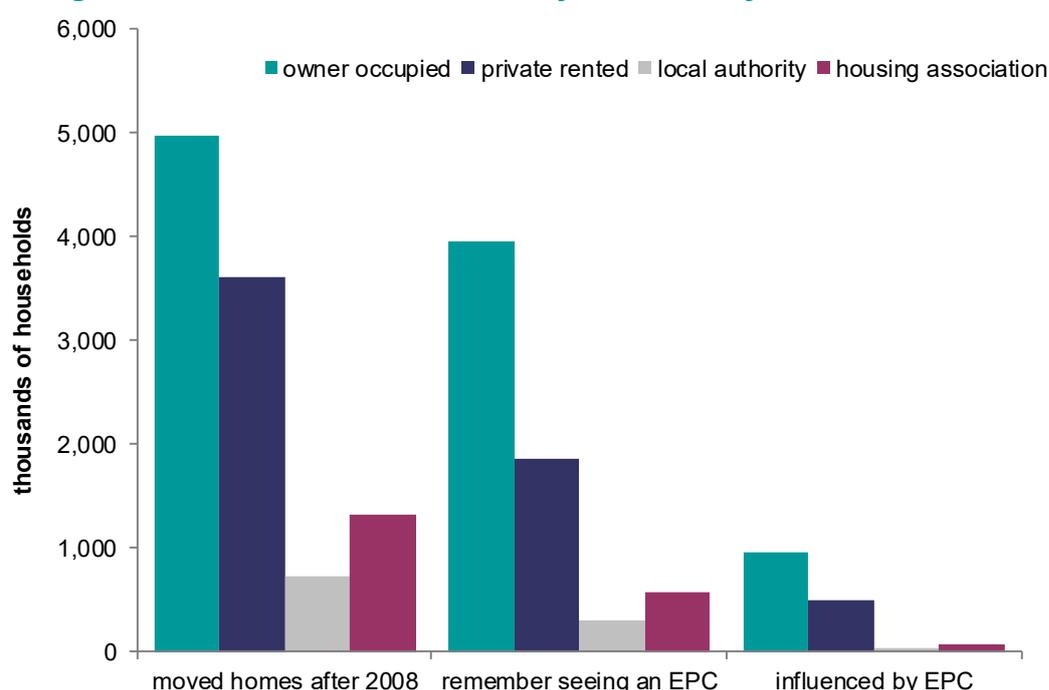
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<sup>1</sup> For ease of analysis, the answer categories have been grouped. The answers of being influenced 'a lot' (3%), 'quite a lot' (6%), and 'a little' (15%) have been combined into 'influenced' (24%). Analysis of the influence of EPCs excludes 'don't know' responses.

## Tenure

1.9 The likelihood of households remembering seeing and being influenced by the EPC varied by tenure. Owner occupiers (79%) were more likely to remember seeing an EPC than renters. Private renters (52%) were more likely remember seeing an EPC before moving in than housing association (43%) and local authority (42%) renters, Annex Table 1.2. Owner occupiers (25%), and private renters (27%) were roughly twice as likely to be influenced by the EPC than housing association (13%) and local authority renters (11%), Figure 1.2.

**Figure 1.2: Number of households who moved homes after 2008, remember seeing an EPC and were influenced by the EPC, by tenure, 2017-18**



Base: all households

Note: underlying data are presented in Annex Tables 1.1, 1.2 and 1.7

Source: English Housing Survey, full household sample

## Dwelling characteristics and location

1.10 Households living in houses (terraced 61%, semi-detached 67% and detached/bungalow 79%) were more likely to remember seeing an EPC than those who lived in flats (52%), Annex Table 1.2. This is likely due to the higher proportion of owner occupiers living in houses<sup>2</sup>. However, households living in flats (30%) were more likely to have been influenced by the EPC than those living in terraced (23%), semi-detached (21%) and detached/bungalow (21%) houses, Annex Table 1.7.

<sup>2</sup> English Housing Survey, 2017-18 Headline Report, Annex Table 2.1

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- 1.11 Households in homes built after 1990<sup>3</sup>, a relatively high proportion of which are flats<sup>4</sup>, were more likely to have seen an EPC (74%) and be influenced by the content (31%) compared with households living in homes of other ages, Annex Tables 1.2 and 1.7.
  - 1.12 Households in homes with high energy efficiency rating<sup>5</sup> (e.g. band A/B, 76%)<sup>6</sup> were more likely to recall seeing an EPC than households living in homes with lower energy efficiency ratings (e.g. Band C, 67%), Annex Table 1.3.
  - 1.13 Households living in villages (74%) or towns (71%) were more likely to remember seeing an EPC than households in urban areas (61%), Annex Table 1.2. The finding is likely to be a reflection of the mix of dwelling types and tenures in each area (for example, rural areas tend to have higher proportions of owner occupied dwellings). However, households living in urban areas (25%) were more likely to be influenced by the EPC when choosing which property to buy or rent than households living in villages (21%), towns (20%), and hamlets (14%), Annex Table 1.7.
  - 1.14 Households living in London (50%) were less likely to recall seeing an EPC compared with households in other regions but were more likely to be influenced by seeing it (34%), (Annex Tables 1.2 and 1.7).

### **Household characteristics**

- 1.15 Generally speaking, couples, households working full-time and those with the highest incomes were more likely to have seen and been influenced by an EPC. While households with a white HRP (65%) were most likely to recall seeing an EPC prior to moving than other households, households with an Asian HRP (45%) were the most likely to be influenced by the certificate, Annex Table 1.4 and 1.8.
- 1.16 The higher the income, the more likely the householder was to recall seeing an EPC before purchasing or renting the home, Annex Table 1.4. Households in the highest (29%) and the second highest income quintile (24%) were also more likely to be influenced by the EPC than households in the lowest income quintile (18%), Annex Table 1.8.

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<sup>3</sup> As the question on whether the EPC influenced their decision to buy/rent was only asked 2017-18, interview data could not be paired with physical survey data as two years' worth of interview data are required. Instead, this analysis uses the householder's information on when their home was built.

<sup>4</sup> English Housing Survey, 2017 Stock profile and condition Report, Annex Table 4.2.

<sup>5</sup> see glossary for more information on energy efficiency ratings

<sup>6</sup> This analysis uses the two-year dataset which combines physical survey data (used to model EER ratings) and interview survey data (on the awareness of EPCs) from 2016-17 and 2017-18.

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## Energy costs and financial help with energy efficiency work

- 1.17 Households who said they could keep their living room warm during the winter were more likely to remember seeing the EPC prior to moving in (64%) than those who said they could not keep it warm (51%), Annex Table 1.5. They were also more likely to have been influenced by the EPC before buying or renting (24%) than those who could not keep the living room warm (18%), Annex Table 1.9.
- 1.18 Households who found meeting heating costs ‘easy’ were both more likely to remember seeing (69%) and being influenced by the EPC (25%) than those who found it ‘difficult’ (43% remembered seeing one and 19% were influenced by it). These findings are likely linked to the findings above on the income of the household and the energy efficiency of the dwelling, Annex Tables 1.5 and 1.9.
- 1.19 Of the 10.6<sup>7</sup> million households who relocated after 2008, around 788,000 reported that they had received financial help from schemes such as the Renewable Heat Incentive, the Feed-in Tariff scheme, or through their energy supplier or landlord<sup>8</sup>. There was no significant difference in the likelihood of seeing the EPC and participating in a scheme aimed at improving domestic energy efficiency, Annex Table 1.10.

## Energy efficiency improvement work by owner occupiers

- 1.20 Owner occupiers (14.8 million households<sup>9</sup>) were asked if they had installed any energy efficiency measures in their homes in the last five years<sup>10</sup>. Three quarters of these (75%) had installed or undertaken at least one energy efficiency measure, Annex Table 1.11.
- 1.21 The three most common energy efficiency measures were servicing the central heating boiler (43%), replacing the central heating boiler (32%) and putting in or adding extra loft insulation (18%)<sup>11</sup>, Figure 1.3.
- 1.22 Of the 5.0 million homeowners who bought their property after 2008, around 79% recalled seeing an EPC prior to buying and 80% of these had undertaken at least one energy efficiency measure. The proportion

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<sup>7</sup> As ‘no answers’ have been excluded from AT 1.10, the figure for all households is 10.4 million in AT1.10.

<sup>8</sup> This total is likely to be an underestimation of the take-up of such schemes as households may not recall this information. See <https://www.gov.uk/government/collections/household-energy-efficiency-national-statistics#detailed-reports>.

<sup>9</sup> The base does not match the number for owner occupied households in Annex Table 1.1 as the analysis of work done includes interview responses where the respondent was not the HRP or the HRPs partner.

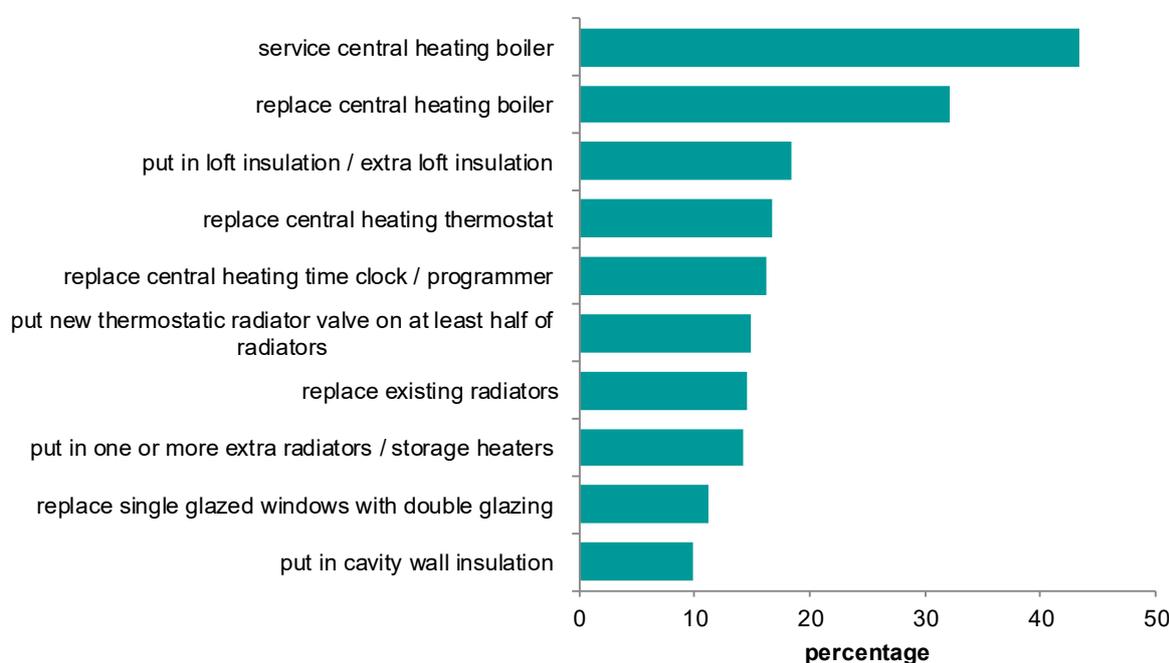
<sup>10</sup> The number of energy efficiency improvements installed reported by respondents differ from the findings of the physical survey, for example, for heat pump installation and solid/cavity wall insulation. These differences are likely to be due to interview respondents’ understanding of the type of ‘work done’.

<sup>11</sup> For information on the prevalence of energy efficiency measures within the owner occupied housing stock refer to chapter 2 of the 2017 Headline Report: <https://www.gov.uk/government/statistics/english-housing-survey-2017-to-2018-headline-report>.

remembering seeing an EPC did not vary significantly with the number of energy efficiency measures carried out, Annex Tables 1.12 and 1.13.

- 1.23 Amongst households that had moved after 2008, the two most common reasons for carrying out improvements were 'wanted to make the home more energy efficient' and 'wanted to make some general improvements to the home' (40% of households for both), Annex Table 1.14.
- 1.24 There was no relationship between the likelihood of seeing an EPC and the reasons owner occupiers provided for carrying out energy improvement measures, Annex Table 1.14.

**Figure 1.3: The top 10 most common energy efficiency improvements carried out over the past five years by owner occupiers, 2017-18**



**Base: all owner occupiers**

**Notes:**

1) percentages are within each group. For example, 43% of owner occupied households mentioned servicing their central heating boiler while the remaining 57% did not mention it.

2) analysis excludes 'no answer' responses

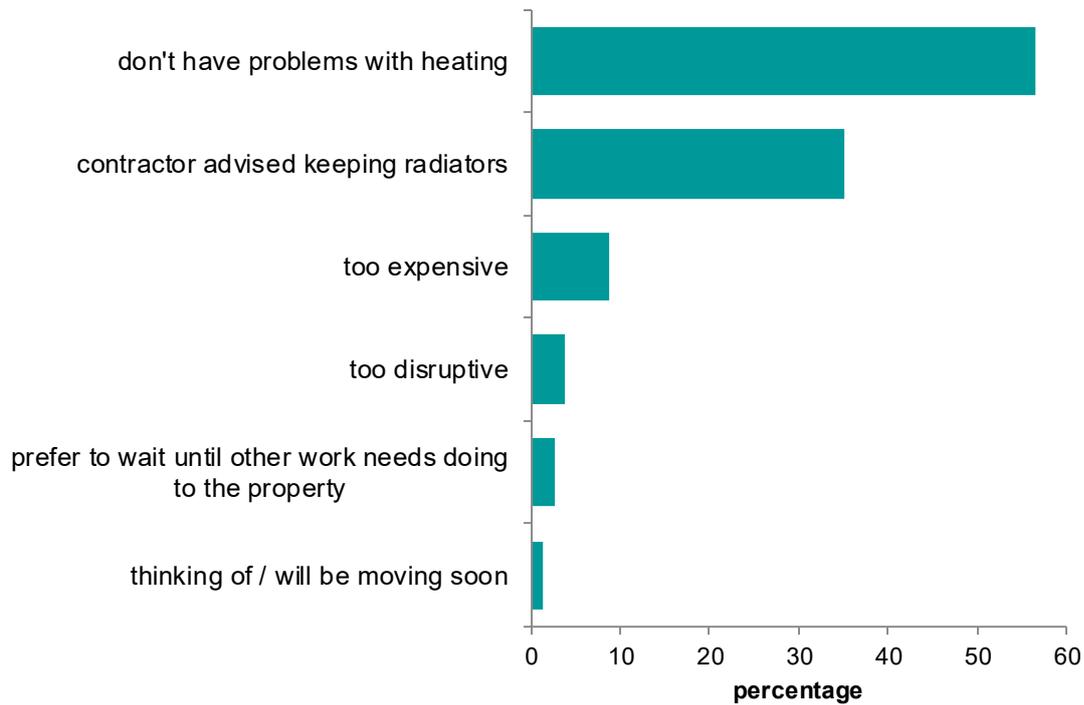
3) underlying data are presented in Annex Table 1.11

Source: English Housing Survey, full household sample

## Reasons for keeping the radiators when replacing boiler

- 1.25 Three quarters (72%, or 3.4 million) of the owner occupiers who said they had replaced their boiler (4.7 million) had kept the radiators, Annex Tables 1.11 and 1.16. The most common reasons cited for keeping the radiators when replacing the boiler were 'not having problems with the heating' (56%) and 'contractor advised keeping radiators' (35%), Figure 1.4.

**Figure 1.4: Reasons for keeping the old radiators, 2017-18**



**Base:** all households who replaced boilers, but not the radiators

**Notes:**

1) analysis excludes 'no answer' responses

2) underlying data are presented in Annex Table 1.16

**Source:** English Housing Survey, full household sample

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## Chapter 2

# Changes to fuel tariffs and energy costs

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- 2.1 The first part of this chapter explores how households change electricity and gas tariffs and how this differs across various dwelling and household characteristics. It also explores whether the method of paying for energy bills is linked to the likelihood of changing tariffs. The analysis uses information provided by households as part of the interview survey.
- 2.2 The second part of the chapter, which uses data from the physical survey, analyses modelled annual energy costs by the energy efficiency rating of dwellings and estimated costs for installing measures recommended by the Energy Performance Certificate (EPC) modelling methodology.

## Changes to gas and/or electricity tariffs by method of payment, dwelling, and household characteristics

- 2.3 Households were asked if they had changed their electricity or gas tariff over the previous 12 months. A quarter (25%) of households (around 5.8 million) said they had changed tariffs. Of those, 21% changed both their electricity and gas tariffs, 4% changed their electricity tariff only and less than 1% changed only their gas tariff<sup>12</sup>, Annex Table 2.1. For ease of analysis, households have been classified into two groups: ‘any change of tariff’ and ‘no change of tariff’.
- 2.4 The number of households changing tariffs may be under-reported as respondents may not have considered auto-switching (for example at the end of a fixed contract) as a change of tariffs. Furthermore, householders may have forgotten switching or be unaware of someone else within the household switching tariffs.

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<sup>12</sup> Figures differ from those published by the Department for Business, Energy (BEIS). The BEIS statistics are updated quarterly and are sourced from Ofgem. The BEIS figures refer to Great Britain (not England), and report on domestic customers who switch from one energy supplier to another, whereas the EHS figures also include switches between tariffs from the same supplier. For more information: <https://www.gov.uk/government/collections/quarterly-energy-prices> and <https://www.ofgem.gov.uk/publications-and-updates/state-energy-market-2018>. Overall switch rates are comparable to those found by Ofgem in their Consumer Engagement Survey, see chart 2 in <https://www.ofgem.gov.uk/publications-and-updates/consumer-engagement-survey-2018>. That indicated that 18% had switched supplier in the last 12 months and 15% had switched tariff, with 26% switching supplier and/or tariff.

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## Method of payment and tariff changes

- 2.5 There are three main ways households can pay their energy bills: direct debit, standard credit and prepayment meters. In 2017-18, 73% of all households said they paid for their electricity by direct debit, 13% by standard credit, 14% by prepayment and less than 1% said they paid through other means (for example through electricity being included in the rental payment)<sup>13</sup>, Annex Table 2.2.
- 2.6 Three quarters (74%) of households with gas said they paid for it by direct debit, 14% by prepayment methods, 12% by standard credit and less than 1% used other means, Annex Table 2.3.
- 2.7 Households who said they paid for their electricity or gas bill using direct debit (30%) were more likely to change tariffs than those paying through other methods, Annex Tables 2.4 and 2.5.

## Dwelling and household characteristics

- 2.8 Owner occupied households (30%) were more likely to have changed tariffs than households living in private rented (19%), local authority (16%) and housing association (16%) homes, Annex Table 2.6.
- 2.9 Generally speaking, the higher the income, the more likely a household was to change tariffs. Households in full-time work and those who found it easy to meet their heating costs were also more likely to change tariffs. Table 2.1 provides further examples of demographic groups *most and least* likely to change tariffs<sup>14</sup>.

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<sup>13</sup> These proportions vary from those published by BEIS in their Quarterly Energy Prices, section on payment methods in <https://www.gov.uk/government/statistics/quarterly-energy-prices-june-2018>. This is due to differences in methodology as the BEIS data are collected directly from energy companies. EHS respondents may not be aware of their exact payment type, for example thinking that standing order (classed as standard credit) is a type of direct debit.

<sup>14</sup> These findings are broadly comparable to those in the OFGEM Consumer Engagement Survey Report 2018, see Chapter 3 in <https://www.ofgem.gov.uk/publications-and-updates/consumer-engagement-survey-2018>.

**Table 2.1: Examples of the prevalence of changing tariffs by selected dwelling and household characteristics, 2017-18**

changes in tariffs are most prevalent/ likely in this group		changes in tariffs are least prevalent/ likely in this group	
		<i>percentages</i>	
<b>dwelling characteristics</b>			
<i>Tenure:</i> owner occupied	30	housing association	16
<i>Dwelling type:</i> detached house	34	flat	17
<i>Region:</i> Yorkshire and the Humber	29	London	19
<b>household characteristics</b>			
<i>Age of HRP:</i> 35 to 44 and 65 to 74 years	28	75 years or older	15
<i>Household type:</i> couples with dependent children	30	single person household	18
<i>Employment status:</i> full-time work	28	unemployed	16
<i>Income quintile:</i> 5th (highest)	34	1st income quintile (lowest)	18
<i>Ethnicity:</i> white	26	other	16
<i>Internet access:</i> broadband	27	no internet access	10
<i>Can keep living room:</i> warm	26	cannot keep living room warm	21
<i>Find meeting fuel costs:</i> easy	27	find meeting fuel costs difficult	19

Base: all households

Notes:

1) for the full set of characteristics, see Tables 2.6, 2.7, 2.8 and 2.9

2) percentages are within each group. For example, 30% of owner occupied households have changed tariffs while the remaining 70% did not mention switching tariffs.

3) underlying data are presented in Annex Tables 2.6, 2.7, 2.8 and 2.9

Source: English Housing Survey, dwelling sample and household sample

## Changes to tariffs

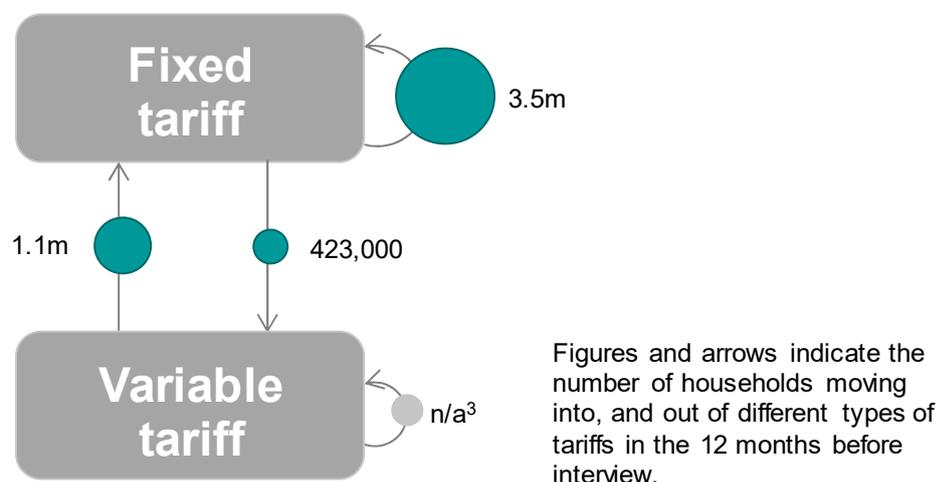
2.10 Households who reported changing tariffs in the 12 months before the interview survey were then asked how their tariff changed. There are two types of tariffs available:

- fixed tariffs where the unit price for gas or electricity remains constant for the duration of the plan, usually for one year although fixed tariffs of two or three years also exist, and
- variable tariffs where the unit price for gas or electricity may vary at the discretion of the supplier.

2.11 The most common type of reported tariff change was from one fixed tariff to another for both electricity and gas. For this to happen, the household must deliberately seek out a new fixed tariff before the current contract ends. If at the end of their contract the household has not switched to a new fixed plan, they are automatically moved to a default tariff. They may not recall or realise this has happened, so may not report such a change from a fixed to a variable tariff as a change of tariffs.

2.12 For electricity, around 1.1 million households (21%) reported moving from a variable tariff to a fixed tariff, 423,000 (8%) from a fixed tariff to a variable tariff and 3.5 million (65%) from one fixed tariff to another, Figure 2.1.<sup>15</sup>

**Figure 2.1: Changes in electricity tariffs, 2017-18**



**Base:** households who changed tariffs in the 12 months before the interview survey

**Notes:**

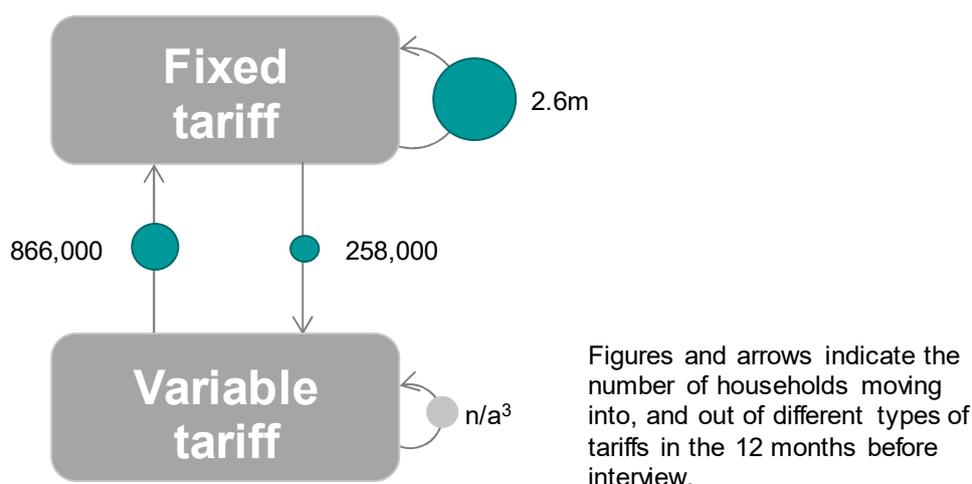
- 1) analysis excludes 'no answer' responses
- 2) underlying data are presented in Annex Table 2.10
- 3) The EHS interview survey did not collect information on the number of people who were originally on fixed or variable tariffs, nor the number of households switching from a variable tariff to another variable tariff.

**Source:** English Housing Survey, full household sample

2.13 For gas, around 866,000 households (16%) reported moving from a variable tariff to a fixed tariff, around 258,000 (5%) from a fixed tariff to a variable tariff and 2.6 million (48%) from a fixed tariff to another fixed tariff, Figure 2.2.

<sup>15</sup> The total number of households reporting a switch of tariffs do not add up to 100% as the percentages are within each group (i.e. 21% of households reported switching from a variable tariff to a fixed tariff while 79% did not mention such a switch of tariff). Householders could also report more than one type of switch for both electricity and gas.

**Figure 2.2: Changes in gas tariffs, 2017-18**



**Base:** households who changed tariffs in the 12 months before the interview survey

**Notes:**

- 1) analysis excludes 'no answer' responses
- 2) underlying data are presented in Annex Table 2.10
- 3) The EHS interview survey did not collect information on the number of people who were originally on fixed or variable tariffs, nor the number of households switching from a variable tariff to another variable tariff.

**Source:** English Housing Survey, full household sample

2.14 For both electricity and gas, owner occupiers were more likely to change from one fixed tariff to another fixed than renters, Annex Table 2.10.

## Energy Costs

### Modelled cost of energy by energy efficiency band

2.15 Increasing the energy efficiency of a dwelling could make a significant difference to the running cost of energy (modelled for space heating, water heating and lighting, but not for appliances). In 2017<sup>16</sup>, the difference between the modelled running costs of a typical EER Band A/B and a Band G home was around £2,740 per year. The average annual modelled running costs of a Band C rated home was £640 to pay for space heating, water heating and lighting. The modelled running cost is around £300 more in a Band D rated home and about £740 more in a Band E rated home, Figure 2.3<sup>17</sup>.

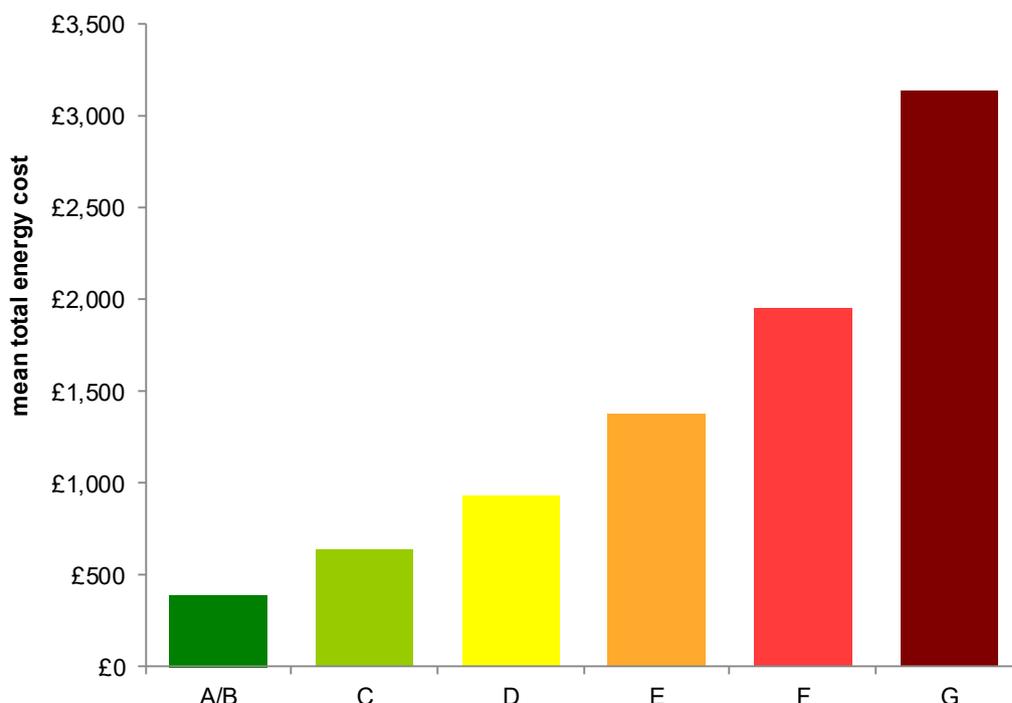
2.16 Actual spend may vary as the modelled costs are not based on actual energy consumption but on the consumption assumed under a standard occupancy

<sup>16</sup> For last years' figures refer to Annex Table 1.2 of the 2016 Energy Efficiency Report

<sup>17</sup> A similar chart was published on page 73 of The Clean Growth Strategy (October 2017, HM Government, <https://www.gov.uk/government/publications/clean-growth-strategy>), using estimated energy costs based on BREDEM, which takes into account factors such as actual occupancy levels and cooking and appliance use. Therefore, the mean costs, based on SAP, for each energy efficiency band are generally lower in Figure 1.2 than in the Clean Growth Strategy chart.

and standard heating pattern for each dwelling<sup>18</sup>. The modelled costs enable the performance of the housing stock to be assessed on a comparable basis between different types of dwellings as well as over time.

**Figure 2.3: Average modelled annual cost of energy in homes, by energy efficiency rating, 2017**



**Base: all dwellings**

**Note: underlying data are presented in Annex Table 2.11.**

**Source: English Housing Survey, dwelling sample**

## Modelled energy upgrade costs

- 2.17 This section examines what energy efficiency improvement measures could potentially be installed in English dwellings, how much this would improve the energy efficiency of the stock and how much this would cost in dwellings of different ages.
- 2.18 The identification of improvements does not imply that the dwelling or existing energy efficiency measures in the home are defective. The measures discussed here are selected from the recommendations considered by EPC assessments<sup>19</sup>. In the modelling energy efficiency measures are only

<sup>18</sup> The modelled running costs take into account space and water heating costs and lighting. It excludes any energy consumption from plug-in appliances, including those used for cooking. For more on modelled vs actual consumption analysis refer to: <https://www.gov.uk/government/publications/energy-trends-march-2019-special-feature-article-comparison-of-theoretical-energy-consumption-with-actual-usage>.

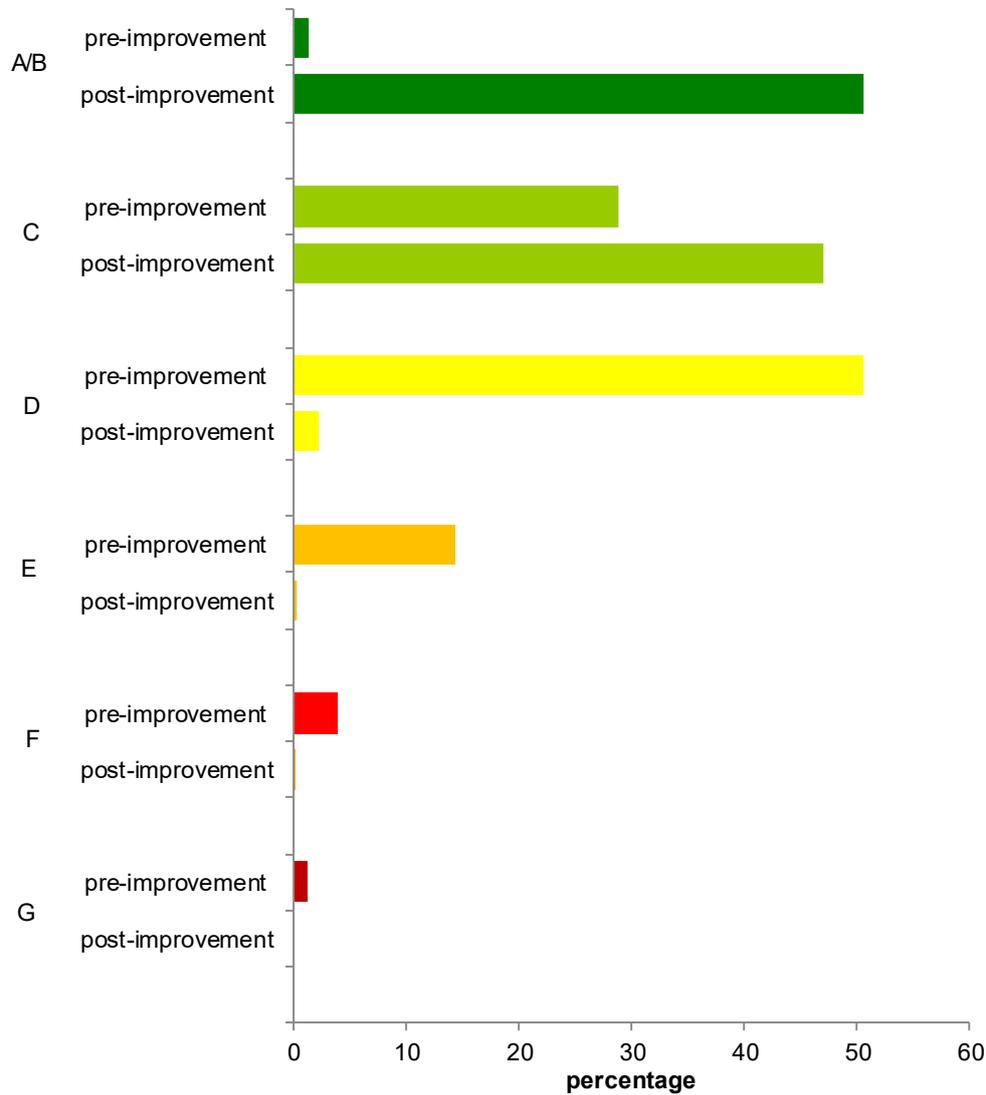
<sup>19</sup> Lower cost measures, which would typically cost less than £500, include installing low energy lighting and increasing loft insulation thickness. High cost measures are those reckoned to cost over £500. High cost measures would typically include upgrading heating systems.

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recommended for implementation if that measure alone would result in the SAP rating increasing by at least 0.95 points. This slightly reduces the potential number of installations for some measures that would provide only a minimal improvement in energy efficiency and that, therefore, may not be cost effective to install.

- 2.19 The model does not assess the relative ease, or the cost-effectiveness, of installation.
- 2.20 The modelling estimates how much would need to be spent on dwellings of different ages to implement all the EPC recommended energy improvement measures, i.e. to increase the energy efficiency as much as the EPC model deems possible. In the modelling, where the installation of all measures would not improve SAP rating, dwellings have been given 'zero' costs as no measures would be recommended for installation.
- 2.21 Over a quarter (26%) of newer dwellings (built post 1980) would need to spend £6,000 or less in order to implement all the EPC recommended energy improvement measures. In contrast around 63% of pre-1919 built dwellings would need more than £18,000 spent to install all the recommended measures. Only 10% of dwellings built after 1980 would require a similar amount of money, Annex Table 2.12.
- 2.22 If all the recommended EPC improvements were applied to all dwellings, it would markedly impact on the overall energy efficiency profile of the stock. The EHS modelling estimates that, across the whole stock, the application of all measures would increase the overall proportion of A/B rated dwellings by 50 percentage points, from 1% to 51%. The proportion of the least efficient homes (Bands E, F and G) would decrease from 19% to less than 1% of the stock, Figure 2.4.

**Figure 2.4: SAP rating pre- and post-improvement, if all potential energy improvement measures were applied, 2017**



**Base: all dwellings**

**Note: underlying data are presented in Annex Table 2.13.**

**Source: English Housing Survey, dwelling sample**

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## Chapter 3

# Access to infrastructure: internet, parking, gas grid and heating systems

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3.1 This chapter reports on access to the internet, differences in parking provision (as this is a key component in the potential for domestic electric vehicle charge points) and the characteristics of dwellings with no access to the mains gas supply. Finally, it reports on the types of space and water heating systems present in the housing stock, analysing this by tenure.

### Access to the internet

3.2 Households with access to the internet could potentially benefit from a range of technologies such as smart controls which can help to reduce energy consumption and improve thermal comfort. Additionally, access to price comparison and energy supplier websites facilitate changing tariffs and method of payment.

3.3 Almost nine in ten (88% or 20.3 million households) said they had access to the internet in their homes. More specifically, 87% had access to broadband internet while 1% had access to another type of internet, Annex Table 3.1.

3.4 Owner occupiers (90%) and private renters (89%) were more likely to have access to broadband internet than households renting from housing associations (73%) and local authorities (71%).

3.5 Households living in houses, whether detached (93%), terraced (88%) or semi-detached (87%), were more likely to have broadband access in their home compared with flats (78%). Those in detached houses were more likely to have broadband than those in other house types.

### Access to parking provisions: potential for electric vehicle charge points

3.6 In order to meet the government's short and long-term ultra-low emission vehicle uptake ambitions, the UK needs a well-developed charging infrastructure for electric vehicles. This section first looks at the types of parking available for English dwellings to help determine the potential for installing residential vehicle charge-points. It then analyses the availability of communal parking in blocks of flats, by the number of flats in the block.

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## Parking for all dwellings

- 3.7 For the analysis of parking for all dwellings, where more than one type of parking is available, the parking category reported on is the one deemed to have a higher potential for the installation of a charge-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. For analysis by tenure refer to 2015 Potential Stock Improvements Report<sup>20</sup>.
- 3.8 Around 60% or 14.5 million homes had a parking space on the plot, 7% had access to some form of communal parking (such as open-air parking bays), 6% had parking off the plot and over a quarter (26%) had no designated parking provision at all, Figure 3.1. As on plot<sup>21</sup> parking provisions are relatively better suited to the installation of electrical vehicle charge points, in the remainder of this section all types of parking on the plot are compared to all types of parking off the plot, Annex Table 3.2.
- 3.9 In 2017, there were 4.1 million detached houses, 6.1 million semi-detached, 2.2 million bungalows, 4.4 million mid terraces and 2.4 million end-terraces in the English housing stock<sup>22</sup>. Detached (96%), semi-detached (82%) and bungalows (77%) were more likely to have on plot parking than end-terraces (51%) and mid-terraces (32%). Mid-terraced houses (58%) were more likely to have no designated parking than other types of houses and bungalows, e.g. end-terraces (35%).
- 3.10 Around 20% (4.9 million) of all dwellings in 2017 were flats, with ‘purpose-built’ flats being the dominant flat type (16% of all dwellings). Purpose-built flats most commonly had access to communal parking facilities (39%) followed by on plot parking (26%) and off plot parking (8%). The remaining 27% of purpose-built flats had no access to designated parking.
- 3.11 Over half of converted flats had no designated parking provision (52%). Over a quarter had on plot parking (28%) followed by communal parking (15%) and off plot parking (4%).
- 3.12 Around 2 million dwellings (houses and flats) have been built since 2002. These properties were more likely to have access to on plot parking (63%), followed by off plot parking (20%) and communal parking (9%). The remainder had no parking facilities at all (8%).

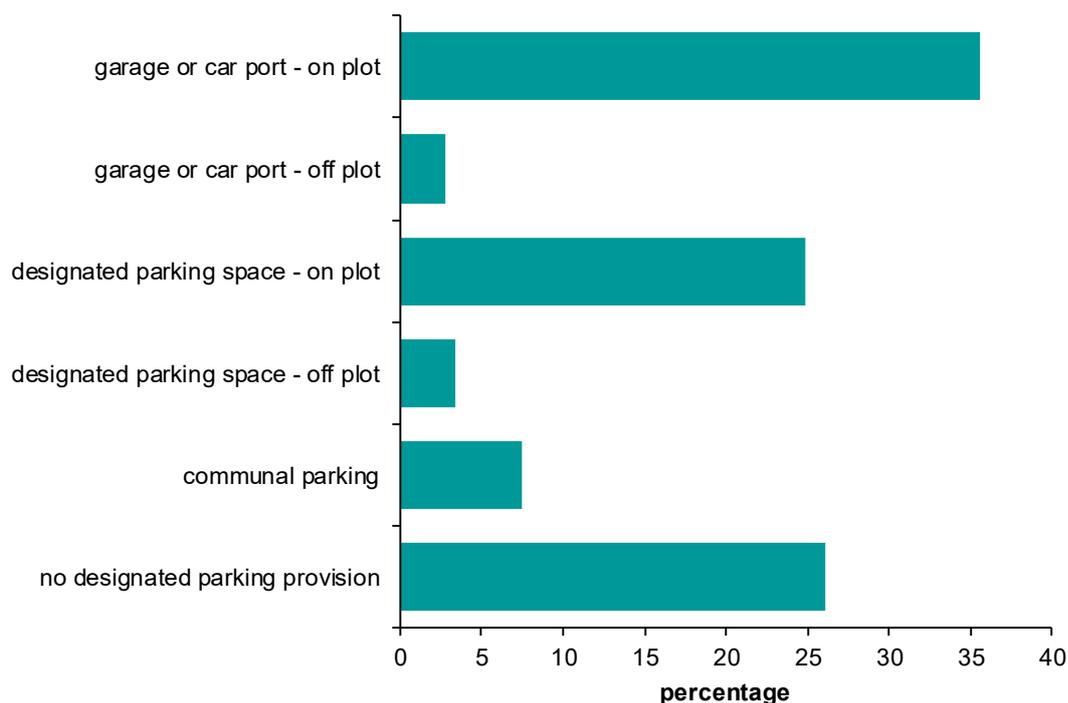
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<sup>20</sup> For information on parking by tenure, please refer to chapter 2 of the 2015 Potential Stock Report: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627688/Potential\\_stock\\_improvements\\_Report\\_2015-16.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627688/Potential_stock_improvements_Report_2015-16.pdf). There may also be 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.

<sup>21</sup> Please see the glossary for definition

<sup>22</sup> For information on the breakdown of dwelling types, please see Annex Table 2.1 of the 2017 Headline Report.

**Figure 3.1: Types of parking, 2017**



**Base: all dwellings**

**Note: underlying data are presented in Annex Table 3.2.**

**Source: English Housing Survey, dwelling sample**

### **Communal parking by number of flats in a block**

- 3.13 This section provides an overview of the types of communal parking available to households living in flats with shared parking facilities as well as the types of communal parking available to blocks of different sizes. Some flats may have non-communal parking, covered in the previous section.
- 3.14 Around 74% (3 million) of all flats had access to communal parking. Open air parking bays were the most common type of communal parking (66%), followed by garages (14%), underground parking (6%) and 'other' types of parking (4%), including multi-storey parking, roof parking and other covered parking provision. Around a quarter (26%) had no parking provision at all, Annex Table 3.3.
- 3.15 Open air parking bays was more common among blocks with 11 to 30 flats (74%) than those with 10 or fewer flats (64%) and 50 or more (55%).
- 3.16 Small blocks, with 10 or fewer flats (32%) were more likely to have no access to parking than larger blocks, while large blocks with more than 50 flats were more likely to have underground parking (22%).

## Access to mains gas

- 3.17 Low carbon heating and cooling systems are promoted by the Clean Growth Strategy<sup>23</sup> as a way to meet domestic fuel needs while reducing greenhouse gas emissions. This section explores the profile of dwellings and households with no access to mains gas to provide information on the feasibility of adopting such technologies in these dwellings.
- 3.18 Around 86% or 20.6 million dwellings in England had access to mains gas supply in 2017 (as defined by the presence of a gas meter<sup>24</sup>). The remaining 3.3 million (14%) had no gas meter present. For ease, dwellings without a gas meter present are referred to as 'off-gas', Annex Table 3.4.

**Table 3.1: Proportion of off-gas properties within selected categories: dwelling, energy efficiency and household characteristics, 2017-18**

off-gas dwellings are most prevalent/ likely in this group		off-gas dwellings are least prevalent/ likely in this group	
<i>percentages</i>			
<b>dwelling characteristics</b>			
<i>Tenure:</i> private rented	20	owner occupied	12
<i>Dwelling age:</i> post 2002	23	1919 to 1944	6
<i>Dwelling type:</i> purpose built flat, high rise	67	medium/large terraced house	5
<i>Location:</i> rural areas	76	suburban residential areas	7
<i>Region:</i> South West	25	North East	7
<b>energy efficiency characteristics</b>			
<i>Energy efficiency rating:</i> G	73	D	8
<i>Loft insulation:</i> no loft insulation	17	150mm of loft insulation or more	10
<i>Window glazing:</i> less than 80% double glazed	22	80% or more double glazed	13
<i>Wall insulation:</i> solid with insulation	32	cavity wall with insulation	12
<i>Heating system:</i> communal heating system	93	boiler system with radiators	6
<i>Heating fuel:</i> oil fired	97	gas fired (non mains gas)	1
<i>Age of heating system:</i> more than 12 years old	23	3-12 years old	11
<b>household characteristics</b>			
<i>Age of HRP:</i> 16 to 24 years	24	35 to 44 years	11
<i>Household type:</i> single person household	20	lone parent with independent children	7
<i>Income quintile:</i> 2nd (higher)	15	3rd (lower)	12

**Notes:**

- 1) for full set of characteristics and information on base, see Annex Tables 3.4, 3.5 for dwelling characteristics and 3.6 for household characteristics
- 2) percentages describe the proportion of off-gas dwellings within each group. For example, 20% of private rented dwellings are not connected to the mains gas while the remaining 80% are connected to mains gas
- 3) 'non mains gas' refers to bulk LPG and bottled gas
- 4) underlying data are presented in Annex Tables 3.4, 3.5 and 3.6

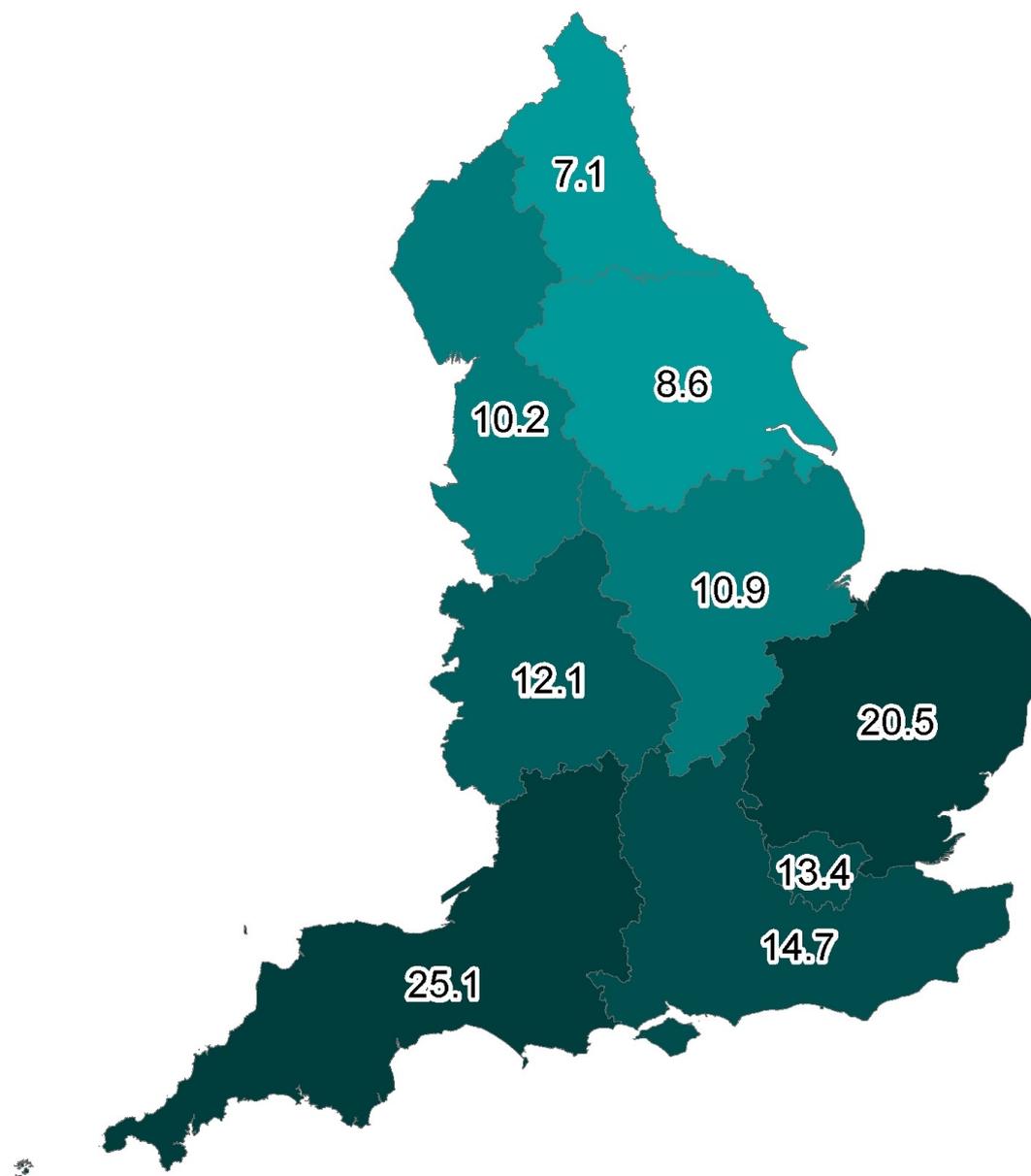
Source: English Housing Survey, dwelling sample and household sub sample

<sup>23</sup> <https://www.gov.uk/government/publications/clean-growth-strategy>

<sup>24</sup> Physical survey data has been used to establish access to mains gas network.

- 3.19 Dwellings with no access to gas were more prevalent among private renters, newer homes (built post-2002) and purpose-built flats. This finding is related to household type as younger and single person households (more likely to rent) were more likely to live in off-gas properties, Table 3.1 and Annex Table 3.4.
- 3.20 Off-gas dwellings were also more prominent in rural areas (Figure 3.2) as well as in dwellings with low levels of loft insulation and lower levels of double glazing.

**Figure 3.2: Proportion of off-gas dwellings, by region, 2017**



Base: all dwellings

Note: underlying data are presented in Annex Table 3.4.

Source: English Housing Survey, dwelling sample

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## Space heating and hot water systems

3.21 Space and water heating account for a large proportion of UK domestic energy use and are therefore of interest in relation to energy efficiency. This year's report focuses on the tenure distribution of different kinds of space and water heating systems.

### Space heating systems

3.22 Gas central heating was the most common heating system in 2017 (85%), followed by electric storage heaters (5%) and oil central heating (4%). The remaining dwellings had other heating systems, including electric room heaters and communal heating, Annex Table 3.7.

3.23 More owner occupied (87%) and local authority (87%) dwellings had gas central heating system than housing association (82%) and private rented dwellings (79%). Conversely, fewer owner occupied (4%) and local authority dwellings (4%) had electric storage heaters than private rented (9%) and housing association (8%) homes.

### Hot water systems

3.24 In 2017, over half of dwellings (55%) had a hot water heating system relying on the central heating system *without* having a separate hot water cylinder (i.e. a hot water storage tank). Over a third (36%) of water heating systems used the central heating but *with* a water cylinder for hot water storage. Many fewer dwellings (7%) had a hot water cylinder with an immersion heater, while the rest used other water heating technologies, Annex Table 3.7.

3.25 A higher proportion of local authority (66%) and housing association (63%) dwellings had a system that used the central heating *without* a separate hot water cylinder than homes in other tenures (58% of private rented and 52% of owner occupied homes).

3.26 Owner occupied (42%) homes were more likely to heat their water using the central heating system *with* a hot water cylinder present than housing association homes (26%). Private rented homes were the most likely tenure to use a hot water cylinder with an immersion heater to heat water (13%).

### Boiler type

3.27 Condensing boilers are generally the most efficient boiler types. Since the mid-2000s they have been effectively mandatory for most new and replacement boilers. Dwellings where the installation of a condensing boiler is

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particularly difficult can be assessed by a suitably qualified person and a different type of boiler installed<sup>25</sup>.

- 3.28 In 2017, 48% of dwellings had a condensing-combi boiler, 18% had a standard condensing boiler, 14% had a standard non-condensing boiler (floor or wall), 8% had a non-condensing combi boiler and 2% had a back boiler (to a fire or stove). The remaining 10% of dwellings had alternative heating systems that do not require a boiler (mainly storage heaters), Annex Table 3.7.
- 3.29 Owner occupied dwellings were more likely to have condensing (21%), standard (17%) and back (3%) boilers compared with rented dwellings. Conversely, condensing-combi boilers were less likely to be found in owner occupied dwellings (45%) compared with local authority (61%), housing association (58%) and private rented (50%) dwellings.
- 3.30 Private rented (18%) and housing association (17%) dwellings were more likely to have no boiler (i.e. using a non-boiler heating system such as storage heaters) than local authority (12%) and owner occupied dwellings (7%).

### **Boiler and heating system age**

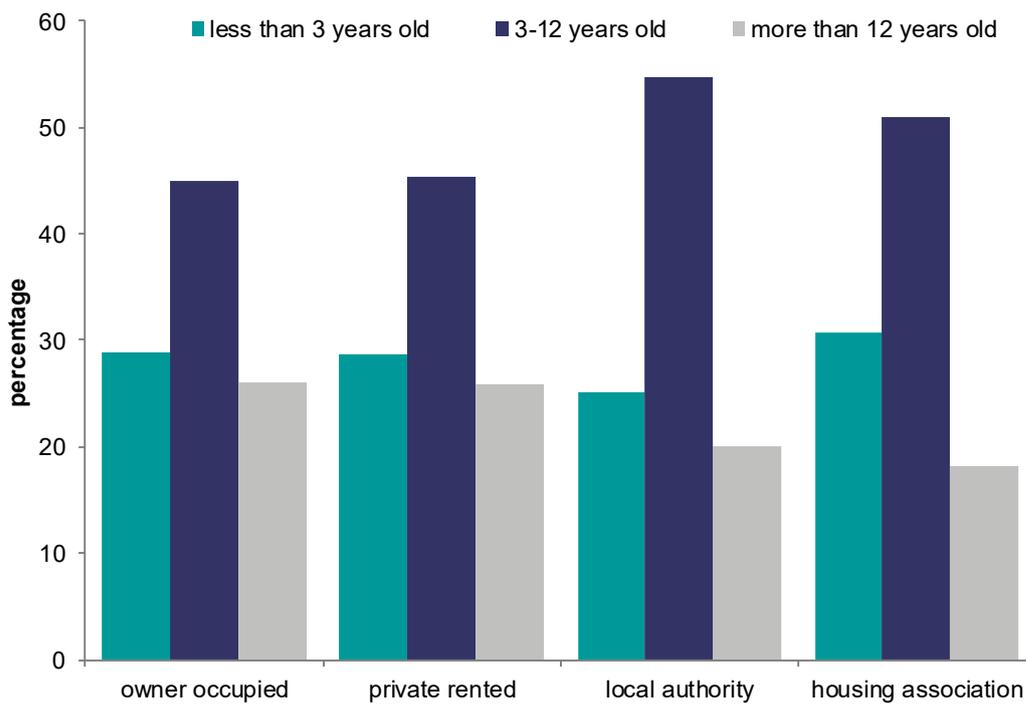
- 3.31 The age of the heating system<sup>26</sup> impacts on the energy efficiency and running costs of the system. Just under half (46%) of dwellings had a space heating system aged between three and 12 years, under a third (29%) had a system less than three years old and a quarter (25%) had a system more than 12 years old, Annex Table 3.7.
- 3.32 Housing association homes (31%) were more likely to have space heating systems aged three years or less. Local authority (55%) dwellings had the largest proportion of systems aged between three and 12 years. Owner occupied (26%) and private rented (26%) dwellings were more likely to have space heating systems aged 12 years or older than dwellings in other tenures, Figure 3.3.
- 3.33 Almost 90% of new (less than three years old) heating systems were condensing or condensing-combination boilers whereas only 14% of such heating systems were more than 12 years old. Older boilers (more than 12 years old) were more likely to be standard (40%) or combination (22%) boilers, Annex Table 3.8.

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<sup>25</sup> Domestic Building Services Compliance Guide, 2013 edition incorporating 2018 amendments (Table 2)

<sup>26</sup> 'Heating system age' refers to the age of the primary heating system. For central heating systems, this is the age of the boiler.

**Figure 3.3: Age of heating system, by tenure, 2017**



**Base: all dwellings**

**Notes:**

1) this figure refers to the age of the primary heating system. For central heating systems, this is the age of the boiler.

2) underlying data are presented in Annex Table 3.7

Source: English Housing Survey, dwelling sample

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# Technical notes and glossary

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## Technical notes

1. Some parts of this report use material from the interview questionnaire only. They are presented for '2017-18' and are based on fieldwork carried out between April 2017 and March 2018 on a sample of 13,395 households. Throughout the report, this is referred to as the 'full household sample'.
2. Other parts of this report, which relate to the physical dwelling, are presented for '2017' and are based on fieldwork carried out between April 2016 and March 2018 (a mid-point of April 2017). They use material from both the interview questionnaire and the physical survey. The sample comprises 12,320 occupied or vacant dwellings where a physical inspection was carried out. Throughout the report, this is referred to as the 'dwelling sample'.
3. The reliability of the results of sample surveys, including the English Housing Survey, is positively related to the unweighted sample size. Results based on small sample sizes should therefore be treated as indicative only because inference about the national picture cannot be drawn. To alert readers to those results, percentages based on a row or column total with unweighted total sample size of less than 30 are italicised. To safeguard against data disclosure, the cell contents of cells where the cell count is less than 5 are replaced with a "u".
4. 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.
5. Additional annex tables, including the data underlying the figures and charts in this report are published on the website: <https://www.gov.uk/government/collections/english-housing-survey> alongside many supplementary live 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.

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## Glossary

**Area type in the household sample:** All households are classified in the household sample according to the [2011 Rural-Urban Classification for Small Area Geographies](#):

- **urban:** includes a built up area with a population of more than 10,000 people
- **rural:** includes town and fringe, village, hamlets and isolated dwellings

**Area type in the dwelling sample:** 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.

**Boiler type:** The report covers a number of boiler types:

- **standard:** provides hot water or warm air for space heating with the former also providing hot water via a separate storage cylinder.
- **back:** located behind a room heater and feeds hot water to a separate storage cylinder. They are generally less efficient than other boiler types.
- **combination:** provides hot water or warm air for space heating and can provide hot water on demand negating the need for a storage cylinder, therefore requiring less space.
- **condensing:** standard and combination boilers can also be condensing. A condensing boiler uses a larger, or dual, heat exchanger to obtain more heat from burning fuel than an ordinary boiler, and is generally the most efficient boiler type.

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**Carbon dioxide (CO<sub>2</sub>) emissions:** The total carbon dioxide emissions from space heating, water heating, ventilation and lighting, less the emissions saved by energy generation as derived from the Standard Assessment Procedure (SAP; defined below) calculations and assumptions. These are measured in tonnes per year and are not adjusted for floor area, but represent emissions from the whole dwelling. The highest and lowest emitting performers have also been grouped with cut-off points set at three tonnes per year for the low emitters and 10 tonnes per year for the highest. CO<sub>2</sub> emissions for each dwelling are based on a standard occupancy and a standard heating regime.

**Dependent children:** Any person aged 0 to 15 in a household (whether or not in a family) or a person aged 16 to 18 in full-time education and living in a family with his or her parent(s) or grandparent(s). It does not include any people aged 16 to 18 who have a spouse, partner or child living in the household.

**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
- 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 70m<sup>2</sup> 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

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result of the difference between the two definitions, some small terraced houses are reported in the 2014 Housing Supply Report as having more than 70m<sup>2</sup>.

- **medium/large terraced house:** a house with a total floor area of 70m<sup>2</sup> 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).
- **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.

**Economic status:** Respondents self-report their situation and can give more than one answer.

- **working full-time/part-time:** full-time work is defined as 30 or more hours per week. Part-time work is fewer than 30 hours per week. Where more than one answer is given, 'working' takes priority over other categories (with the exception that all those over State Pension Age (SPA) who regard themselves as retired are classified as such, regardless of what other answers they give).
- **unemployed:** this category covers people who were registered unemployed or not registered unemployed but seeking work.

- 
- **retired:** this category includes all those over the state pension age who reported being retired as well as some other activity. For men the SPA is 65 and for women it is 60 if they were born before 6th April 1950. For women born on or after the 6th April 1950, the state pension age has increased incrementally since April 2010<sup>27</sup>.
  - **full-time education:** education undertaken in pursuit of a course, where an average of more than 12 hours per week is spent during term time.
  - **other inactive:** all others; they include people who were permanently sick or disabled, those looking after the family or home and any other activity.

On occasions, **full-time education** and **other inactive** are combined and described as **other economically inactive**.

**Energy cost:** The total energy cost from space heating, water heating, ventilation and lighting, less the costs saved by energy generation as derived from SAP calculations and assumptions. This is measured in £/year using constant prices based on average fuel prices for 2012 (which input into the 2012 SAP calculations) and do *not* reflect subsequent changes in fuel prices. Energy costs for each dwelling are based on a standard occupancy and a standard heating regime.

**Energy efficiency rating (EER, also known as SAP rating):** A dwelling's energy costs per m<sup>2</sup> 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 an EER/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 2013 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

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<sup>27</sup> For further information see: [www.gov.uk/browse/working/state-pension](http://www.gov.uk/browse/working/state-pension)

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applied to 1996 and subsequent survey data to provide consistent results in the 2013 and following reports).

**Energy efficiency rating (EER)/SAP bands:** The 1-100 EER/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 efficiency schemes:**

- **Green Deal Cashback:** This scheme rewarded those making energy efficiency improvements under the Green Deal Framework. It let households in England and Wales claim money from Government on energy-saving improvements such as insulation, draught-proofing and double-glazing.
- **Green Deal Finance:** The Green Deal Finance Company offered finance to those installing improvements approved for installation under the Green Deal Framework. It enabled paying for the installations of Green Deal improvements through the energy bills tied to the property.
- **Feed-In Tariffs:** Introduced in 2010, they provide small scale generators of electricity with tariff payments on both generation and export of renewable and low carbon electricity. Eligible schemes include those producing less than five megawatt from photo-voltaic panels, wind, hydro and anaerobic digestion or less than 2 kW from micro-CHP (combined heat and power plants).
- **Renewable Heat Premium Payment (RHPP):** The RHPP scheme was a government financial support scheme which provided one-off grants to help householders and landlords with the cost of installing eligible renewable heat technologies.
- **The Renewable Heat Incentive:** A government scheme which provides a fixed payment for seven years for the renewable heat a household generates through biomass boilers, solar water heating and certain heat pumps. It is similar to Feed-In Tariffs, but the scheme is funded by the Treasury, and there is no 'National Grid for Heat', so importing and exporting heat is irrelevant.

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## Energy Performance Certificates (EPCs):

An Energy Performance Certificate (EPC) indicates the energy efficiency of the dwelling. The assessments are banded from A to G, where A is the most efficient in terms of likely fuel costs and carbon dioxide emissions. An EPC is required whenever a dwelling is newly constructed, sold or let. The purpose of an EPC is to show prospective tenants or buyers the energy efficiency of the property. The requirement for EPCs was introduced in phases and fully implemented for domestic properties by autumn 2008. EPCs are valid for 10 years.

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. For further information on how the EHS models this, see the Technical Report for further information and also the EPC Improvements Modelling Review report:

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

## EPC modelling in the EHS:

The EHS 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 data since 2015. 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 and also the EPC Improvements Modelling Review report: <https://www.gov.uk/government/collections/english-housing-survey-technical-advice#methodology-reports>).

The EHS currently provides the following EPC based indicators, calculated using the survey's own approach to:

- **current and post improvement performance:**
  - *energy efficiency rating* (EER) and bands
  - *environmental impact rating* (EIR) and bands
  - *primary energy use* (kWh/m<sup>2</sup>/year)
  - *energy cost* (£/year) for space heating, water heating, lighting and renewables
  - CO<sub>2</sub> (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

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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).

**Energy tariffs:** There are two types of energy tariffs available.

- **fixed tariffs** where the unit price for gas or electricity remains constant for the duration of the plan, usually for one year although fixed tariffs of two or three years also exist
- **variable tariffs** where the unit price for gas or electricity may vary at the discretion of the supplier

**Ethnicity:** Classification according to respondents' own perceived ethnic group.

**Full-time education:** Full-time education is education undertaken in pursuit of a course, where an average of more than 12 hours per week is spent during term time.

**Gross income of the HRP and partner:** The gross annual income of the HRP and partner from wages, pensions, other private sources, savings and state benefits. This does not include any housing related benefits or allowances. This measure is divided by 52 to calculate weekly income. Income is presented in quintiles throughout this report (see income quintiles definition – below).

**Gross household income:** The gross annual income of all adults living in a household from wages, pensions, other private sources, savings and state benefits. This does not include any housing related benefits or allowances. This measure is divided by 52 to calculate weekly income. Income is presented in quintiles throughout this report (see income quintiles definition – below).

**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 2m<sup>2</sup> 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.

**Heating fuel:**

- **gas:** mains gas is relatively inexpensive and produces lower emissions per unit of energy than most other commonly used fuels. Liquefied Petroleum Gas and bottled gas are still associated with slightly higher costs and emissions.

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- **electricity:** standard rate electricity has the highest costs and CO<sub>2</sub> emissions associated with main fuels, but is used in dwellings without a viable alternative or as a back-up to mains gas. An off-peak tariff such as Economy 7 is cheaper than bottled gas but with the same emissions as standard electricity.
  - **oil:** in terms of both costs and emissions, oil lies between main gas and electricity.
  - **solid fuel:** most solid fuels have similar costs to oil, with the exception of processed wood which can be more expensive than off-peak electricity. Fuels included are coal and anthracite, with CO<sub>2</sub> emissions above those of gas and oil; wood, which has the lowest emissions of the main fuels; and smokeless fuel, whose emissions are close to those of electricity. By law, some areas (usually towns or cities) are designated as smoke control areas where the use of solid fuels emitting smoke is illegal.

**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.

**Household:** One person or a group of people (not necessarily related) who have the accommodation as their only or main residence, and (for a group) share cooking facilities and share a living room or sitting room or dining area.

The EHS definition of household is slightly different from the definition used in the 2011 Census. Unlike the EHS, the 2011 Census did not limit household membership

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to people who had the accommodation as their only or main residence. The EHS included that restriction because it asks respondents about their second homes, the unit of data collection on the EHS, therefore, needs to include only those people who have the accommodation as their only or main residence.

**Household in poverty:** a household with income below 60% of the equivalised median household income (calculated before any housing costs are deducted). Income equivalisation is the adjustment of income to take into account the varied cost of living according to the size and type of household (see the EHS Technical Report, Chapter 5, Annex 4 for further information).

**Household reference person (HRP):** The person in whose name the dwelling is owned or rented or who is otherwise responsible for the accommodation. In the case of joint owners and tenants, the person with the highest income is taken as the HRP. Where incomes are equal, the older is taken as the HRP. This procedure increases the likelihood that the HRP better characterises the household's social and economic position. The EHS definition of HRP is not consistent with the Census 2011, in which the HRP is chosen on basis of their economic activity. Where economic activity is the same, the older is taken as HRP, or if they are the same age, HRP is the first listed on the questionnaire.

**Household type:** The main classification of household type uses the following categories; some categories may be split or combined in different tables:

- couple no dependent child(ren)
- couple with dependent child(ren)
- couple with dependent and independent child(ren)
- couple with independent child(ren)
- lone parent with dependent child(ren)
- lone parent with dependent and independent child(ren)
- lone parent with independent child(ren)
- two or more families
- lone person sharing with other lone persons
- one male
- one female

**Income (equivalised):** Household incomes have been 'equivalised', that is adjusted (using the modified Organisation Economic Co-operation and Development scale) to reflect the number of people in a household. This allows the comparison of incomes for households with different sizes and compositions.

The EHS variables are modelled to produce a **Before Housing Costs (BHC)** income measure for the purpose of equivalisation. The BHC income variable includes:

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Household Reference Person and partner's income from benefits and private sources (including income from savings), income from other household members, housing benefit, winter fuel payment and the deduction of net council tax payment.

An **After Housing Costs (AHC)** income is derived by deducting rent and mortgage payments from the BHC measure.

**Income quintiles:** All households are divided into five equal groups based on their income (i.e. those in the bottom 20%, the next 20% and so on). These groups are known as quintiles. These can be used to compare income levels of particular groups to the overall population.

**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.

- **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.

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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).

**Method of payment for energy:** There are three main ways households can pay their energy bills: direct debit, standard credit and prepayment meters. The EHS gives respondents a number of options to choose from:

- (1) Direct debit (including online direct debit)
- (2) Payment on receipt of bill by post, telephone, online or at bank/post office
- (3) Standing order
- (4) Pre-payment (keycard, slot or token) meters
- (5) Included in rent
- (6) Frequent cash payment method (i.e. more frequent than once a month)
- (7) Fuel direct/direct from benefits
- (8) Fixed Annual Bill (however much gas/electricity is used) e.g. StayWarm

These options are then grouped into the three main types as follows:

- **Direct debit:** option 1, 5, 7 and 8
- **Standard credit:** option 2, 3 and 6
- **Prepayment meters:** option 4

There is also an 'other – specify' category in the EHS questionnaire, kept as 'other'.

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**Non-dependent children:** any person aged over 18 or those aged 16-18 who are not in full-time education living in a family with his or her parent(s) or grandparent(s).

**Parking provision:** This represents the 'best' parking available to the dwelling i.e. if the home has both a garage and off street parking, parking provision is coded as 'garage'. The parking provision does not have to be located on the plot of the dwelling – an off street parking space or garage may be in a block further down the street or round the corner.

All types of parking provision recorded are for the exclusive use of the survey dwelling apart from any available parking in communal areas. Communal parking relates to car parking provision for the module or block of which the survey dwelling is a part. Dwellings may have access to more than one type of communal parking facility. Other off street parking refers to either a designated parking space or a car port at the dwelling plot.

- Adequate parking - street parking generally being available outside or adjacent to the house or block of flats where the surveyed flat is located and the road is sufficiently wide to allow easy passage of traffic.
- Inadequate parking - it is difficult to park outside the house or block of flats where the surveyed flat is located. This might be due to the volume of cars competing for places, or due to legal restrictions on parking.
- None – it is not possible to park outside the house or block of flats where the surveyed flat is located at any time due to either the distance from the road or permanent parking restrictions.

**Plot:** The EHS records a number of details relating to the land immediately surrounding a dwelling, referred to as the dwelling's plot. The plot may be private (exclusive access) or shared (shared access, for example where a block of flats have a shared garden). The plot may consist of hard landscaping (e.g. concrete, tarmac, paving, gravel), soft landscaping (e.g. lawn, flower/vegetable beds), or a combination.

**Private accommodation:** The majority of homes in all three tenures, excluding hotels, bed and breakfast accommodation and institutional residences such as student halls, army barracks and care homes. The EHS only covers private accommodation.

**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 rating:** See the entries for the Standard Assessment Procedure and Energy Efficiency Rating

**Standard Assessment Procedure (SAP):** The Standard Assessment Procedure (SAP) is the methodology used by the Government to assess and compare the energy and environmental performance of dwellings. The SAP is used to calculate the energy efficiency rating (EER) of dwellings, also known as the SAP rating. The EER 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 rating of over 100 where it produces more energy than it consumes, although such dwellings will be rare within the English housing stock.

Reduced Data SAP (RdSAP) was introduced in 2005 as a lower cost method of assessing the energy performance of existing dwellings. RdSAP is used in the calculation of the energy ratings on the Energy Performance Certificate, a document which is required every time a home is put up for sale or rent. Since the 2015 survey, the EHS has provided a number of indicators on energy performance calculated using an approach which is in line with RdSAP 2012 version 9.92. To ensure that the findings in this report are as compatible as possible with energy performance assessments and certificates issued in England during 2017-18, the energy performance findings presented in this report were calculated using RdSAP version 9.92.

**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.

**Storeys:** The number of storeys *above* ground i.e. it does not include any basements.

**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

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- 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).

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**Usable floor area:** The total usable internal floor area of the dwelling as measured by the surveyor, rounded to the nearest square metre. A new modelling approach adopted since the 2013 report uses assumptions aligned with the Nationally Described Space Standard which was published as part of the Housing Standards Review. It excludes integral garages, balconies, stores accessed from the outside only and the area under external walls. The area remaining represents the total of all room areas, hallways and circulation space including cupboards and stairs. The area under internal partition walls is also included. Loft space is not included unless the loft is habitable, with a fixed stair in place to access it. Dwellings are also grouped into the following five categories:

- less than 50m<sup>2</sup>
- 50 to 69m<sup>2</sup>
- 70 to 89m<sup>2</sup>
- 90 to 109m<sup>2</sup>
- 110m<sup>2</sup> or more.

**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.

**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

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normally laid with cement mortar, which binds them together to create a structure. They can be either cavity or solid wall.

**Water heating systems:** The report covers several types of water heating systems.

- **from central heating with hot water cylinder:** the central heating provides hot water for space heating while also providing hot water via a separate storage cylinder.
- **from central heating (no hot water cylinder):** the central heating provides hot water for space heating and can provide hot water on demand negating the need for a storage cylinder, therefore requiring less space.
- **immersion heater:** an electric element heats water in a storage cylinder, used solely for hot water (not for central heating)
- **instantaneous:** hot water heated as needed by an appliance (not a boiler) fuelled by for example gas or electricity
- **dedicated boiler:** hot water supplied from a boiler only used for hot water (not central heating)

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In accordance with the Statistics and Registration Service Act 2007 the United Kingdom Statistics Authority has designated these statistics as National Statistics, signifying that they are fully compliant with the Code of Practice for Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
- are well explained and readily accessible;
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest.

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