Ministry of Housing, Communities & Local Government

English Housing Survey

Energy efficiency, 2018-19

50th Anniversary ENGLISH HOUSING SURVEY 1967 - 2017

Contents

Introduction and main findings

1. The English Housing Survey (EHS) is a national survey of people's housing circumstances and the condition and energy efficiency of housing in England. It is one of the longest standing government surveys and was first run in 1967. This report provides the findings from the 2018-19 survey.

2. This report is split into three chapters. The first chapter presents an overview of the energy efficiency of the housing stock between 2008 and 2018, and annual modelled energy costs. It also reports on how easy or hard householders find it to meet their heating costs and the prevalence of smart meters.

3. Chapter two explores trends, over the 2008 to 2018 period, in energy efficiency measures and how the energy efficiency measures present in the 2018 stock differ across tenures. It also explores the prevalence of damp and mould reported by households and ways in which householders keep cool during the summer months.

4. Chapter three reports on the types of work carried out by homeowners to improve the energy efficiency of their dwellings. It goes on to explore homes that had the worst energy efficiency (EER bands F or G) in 2018, and potential energy improvements.

5. Additional annex tables provide further detail to that covered in the main body of the report.

Main findings

The energy efficiency of the English housing stock has increased over the last decade.

- The average SAP rating is now 63, up from 53 in 2008 and 60 in 2013. A third (34%) of dwellings are now in the highest SAP energy efficiency (EER) bands A to C, up from 9% in 2008.
- Dwellings in the social rented sector were the most energy efficient with 56% rated A to C compared to 33% in the private rented sector and 29% of owner occupied dwellings.

Over the same period, and across all tenures, the proportion of dwellings in the lowest energy efficiency bands F or G has decreased.

- Between 2008 and 2018 the proportion of dwellings in the lowest F or G bands fell from 14% to 4%.

- The proportion of private rented homes in the F or G band fell from 19% in 2008 to 5% in 2018. The proportion of owner occupied fell from 15% to 5% while the proportion of socially rented homes fell from 5% to 1%.

Most households found it easy to meet their heating costs, especially those who pay by direct debit.

- In 2018, 73% of households found it easy to meet their heating costs, 15% neither easy nor difficult, and 12% found it difficult.
- Households using direct debit found it easier to meet their heating costs. Over three quarters (78%) of households who pay for their electricity using direct debit found it easy to meet their heating costs, compared with 64% on standard credit and 53% on pre-payment. Likewise, 79% of households who pay for their gas using direct debit found it easy to meet their heating costs, compared with those on standard credit or pre-payment (64% and 53%, respectively).

Local authority renters were most likely to report having a smart meter while private renters were the least likely.

- Overall 29% of all households said that they had a smart meter.
- Local authority renters reported the highest proportion of smart meters (35%) followed by housing association (32%), owner occupiers (30%), and private renters (21%).

The most common form of heating is gas central heating, the prevalence of which has remained stable since 2008. Further growth is restricted by the proportion of homes without a mains gas supply.

- The proportion of dwellings with gas central heating was 83% in 2008 and 85% in 2018.

Central heating systems using boilers and radiators tend to be fairly new, with about a quarter of the boilers in these systems less than three years old. In contrast, almost two thirds of warm air systems and storage radiators were over 12 years old.

- Central heating systems using boilers and radiators were the newest form of heating systems with 27% of boilers in these systems less than three years old and a further 48% between three and 12 years old. This primarily reflects that 77% of gas central heating systems were 12 years old or less.
- In contrast, the oldest heating systems were storage radiators with 65% over 12 years old, followed by warm air systems (61% of which were over 12 years old) and communal heating systems (36%).

Over a quarter of households reported having an issue with condensation, damp, or mould in their home.

- In 2018-19, 27% (6.2 million) of households reported having an issue with damp (including condensation and mould). This varied by tenure with private renters (38%), local authority renters (36%) and housing association renters (36%) more likely to report these problems than owner occupiers (21%).
- There was also a higher proportion of households with damp in dwellings built before 1919 (41%) compared with households living in newer dwellings. In fact, damp was least prevalent amongst households living in dwellings built after 1990 (14%).
- Households living in dwellings with less than 100mm of loft insulation (96%) or no loft insulation (95%) had a higher likelihood of having damp issues after moving in compared with those living in dwellings with 150mm or more of loft insulation. The same trend was seen for households living in dwellings with less than 80% of windows double glazed.
- Those living in dwellings with higher levels of loft insulation (150mm or more) were more likely to report having damp problems after the dwelling was insulated compared with those with lower levels of loft insulation (less than 100mm) or no loft insulation at all (3%). Similarly, households with the majority of windows double glazed (7%) were more likely to have damp problems after insulation was installed compared with other households (2%).

Almost half of households reported being able to open windows at night to stay cool. Older households and those with members with a long-term illness or disability were less likely to say they could do this.

- Around half (47%) of households reported always being able to cool down at night by opening a window, 24% said often, 20% said sometimes and just 8% said they could never keep cool by opening the windows at night.
- Households living in urban areas were less likely to be able to cool down by just opening windows (9%) than households living in hamlets (5%) and villages (5%).
- Households where the oldest occupant was 85 years or older were more likely to report never being able to keep cool by just opening a window (14%) than younger households.
- Households where at least one member of the family had a long-term illness or disability were more likely to not be able to keep cool by just opening the windows (11%) compared with other households (7%).

The most common type of energy improvements work undertaken by households in the last five years was maintenance or replacement of parts of the central heating system.

- The three most common improvements were servicing the central heating boiler (46%), replacing the central heating boiler (34%) and replacing the central heating thermostat (18%).

Acknowledgements and further queries

6. Each year the English Housing Survey relies on the contributions of a large number of people and organisations. The Ministry of Housing, Communities and Local Government (MHCLG) would particularly like to thank the following people and organisations, without whom the 2018-19 survey and this report, would not have been possible: all the households who gave up their time to take part in the survey, NatCen Social Research, the Building Research Establishment (BRE) and CADS Housing Surveys.

7. This report was produced by Ana Slater and Jon Whiteley at BRE in collaboration with NatCen Social Research and MHCLG.

8. If you have any queries about this report, would like any further information or have suggestions for analyses you would like to see included in future EHS reports, please contact ehs@communities.gov.uk.

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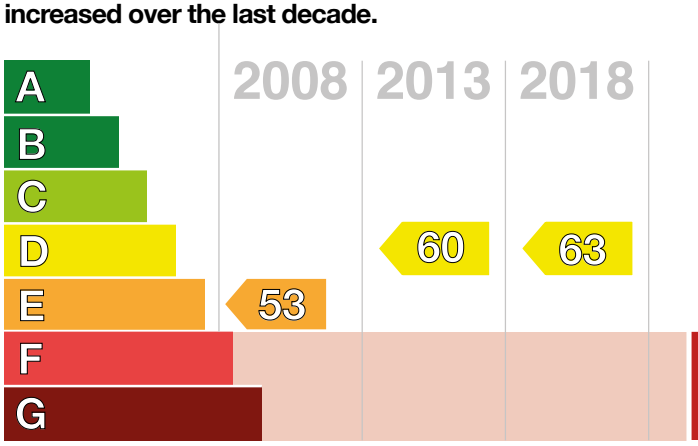
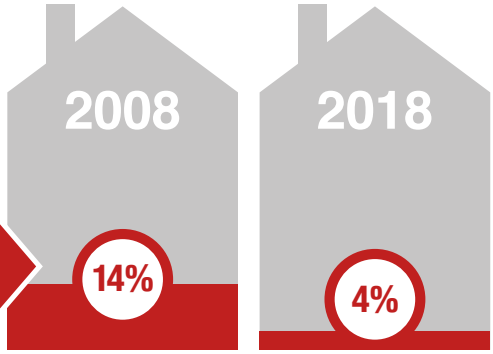
English Housing Survey 2018-19:
Energy efficiency

The energy efficiency of the English housing stock has increased over the last decade.

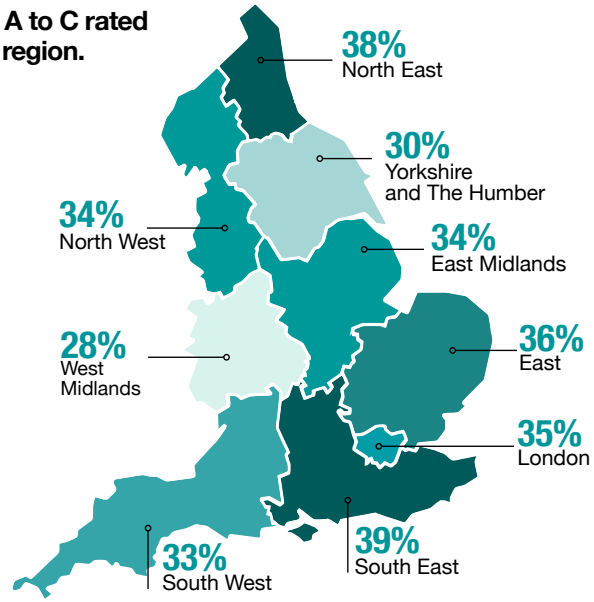


The figures show the average SAP rating.

Between 2008 and 2018 the proportion of dwellings in the lowest energy efficiency bands F or G has fallen.

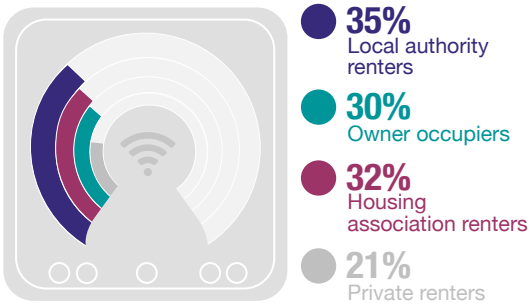


Proportion of A to C rated dwellings, by region.



29% of households reported having a smart meter for both gas and electricity.

Local authority renters were most likely to report having a smart meter while private renters were the least likely.



Most households found it easy to meet their heating costs, especially those who pay by direct debit.

73%
of households found it easy to meet their heating costs

15%
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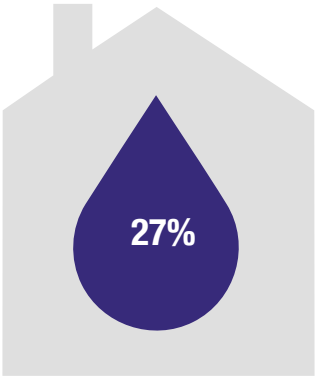
12%
of households found it difficult to meet their heating costs

Over a quarter of households reported having an issue with condensation, damp, or mould in their home.



See English Housing Survey
Energy Efficiency report, 2018-19
for more information.

Ministry of Housing, Communities & Local Government

50th Anniversary ENGLISH HOUSING SURVEY 1967 - 2017

NATIONAL STATISTICS

NatCen Social Research

bre

Chapter 1
Energy efficiency of the English housing stock

1.1 The first part of this chapter presents an overview of the energy efficiency of the English housing stock and how this changed between 2008 and 2018. The second part presents findings on annual modelled energy costs and reports on how easy or hard householders find it to meet their heating costs. Finally, this chapter reports on the prevalence of smart meters and In-Home Displays, and how households use this technology to monitor energy consumption in their homes.

Trends in energy efficiency

1.2 The English Housing Survey (EHS) uses the Government's Standard Assessment Procedure (SAP 2012) to monitor the energy efficiency of homes, through the calculation of a SAP energy efficiency rating (EER). A SAP rating is an index created by calculating annual lighting, space heating and water heating 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 costs).

1.3 The SAP energy efficiency rating is also converted into an A to G banding system for an Energy Performance Certificate, where Band A represents high energy efficiency and Band G represents low energy efficiency[1].

Energy efficiency trends of the housing stock

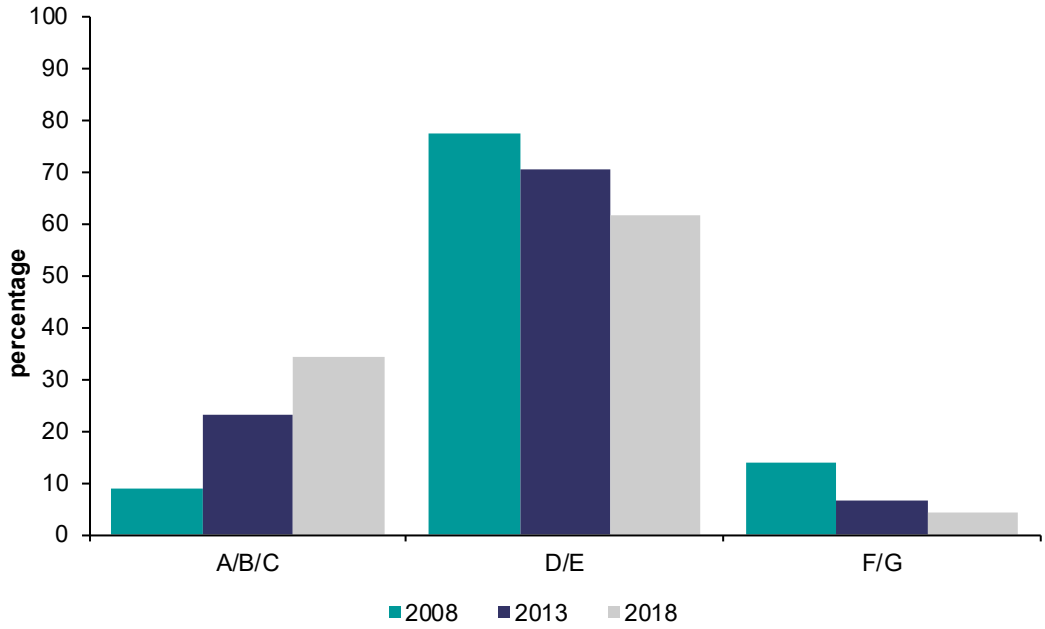
1.4 The mean SAP rating for all dwellings was 63 in 2018[2], rising from 53 in 2008 and 60 in 2013, Annex Table 1.1. This represents an improvement of one EER band, with the average dwelling improving from EER band E in 2008, to EER band D in 2018.

1.5 In 2018, 34% of dwellings were in the highest EER bands of A to C, an increase from 9% in 2008, Figure 1.1. This reflects the continuous improvement of energy efficiency across the housing stock over the 10 year period, which has moved some D to G rated dwellings into the higher EER

[1] See Glossary for further information on SAP and EER bands.
[2] In 2018 the RdSAP modelling methodology was updated to version 9.93 for half of the 2-year combined dataset. See EHS Technical Report, Chapter 5, for more details of the modelling.

bands. The introduction of more energy efficient new builds also increased the proportion of A to C rated dwellings in relation to the stock as a whole.

Figure 1.1: Energy efficiency rating bands, 2008, 2013 and 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 1.2
Source: English Housing Survey, dwelling sample

1.6 While energy efficiency ratings have consistently improved between 2008 and 2018, the increase in the mean SAP rating of dwellings between 2008 and 2013 was higher than the increase between 2013 and 2018 (7 and 3 SAP points, respectively), a trend which is generally consistent across all tenures and dwelling types, Annex Table 1.1.

1.7 The slowing in the rate of energy efficiency improvements in the stock can be partially attributed to a decrease in the number of improvement measure installations as part of the ECO and Green Deal framework schemes since 2014[3].

Dwelling characteristics

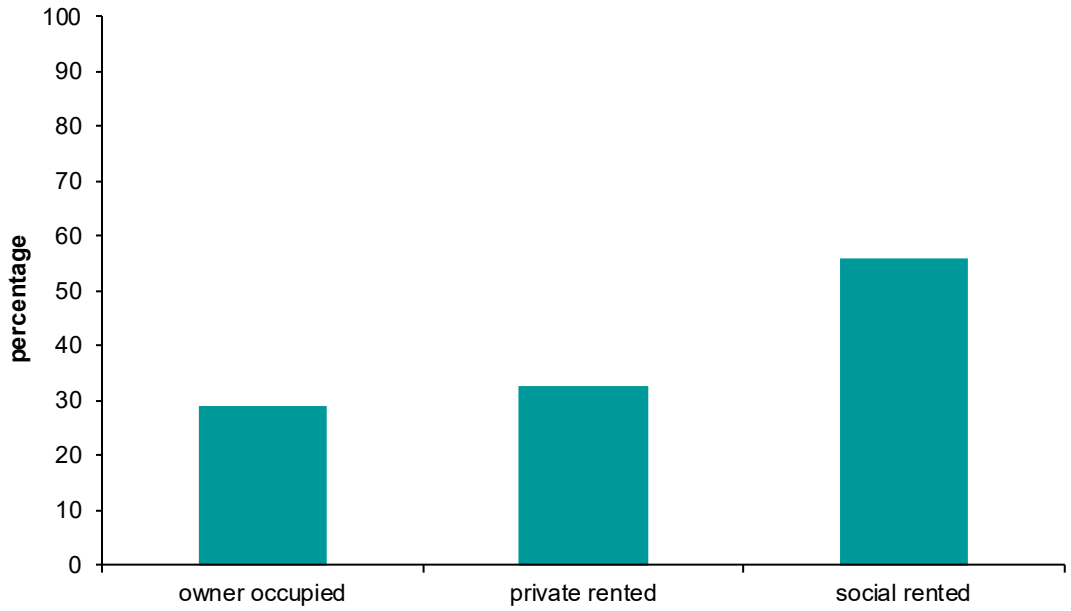
1.8 Dwellings in all tenures have seen increases in average energy efficiency ratings over the 10-year period. Between 2008 and 2018, the average EER of private rented dwellings increased by 12 SAP points, owner occupied by 11 points and dwellings in the social rented sector by nine points.

1.9 Dwellings in the social rented sector were generally the most energy efficient over this period. In 2018, over half of the dwellings in the social rented sector

[3] BEIS Household Energy Efficiency detailed release: Great Britain Data to December 2019 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873663/Detailed_Release_-_HEE_stats_19_March_2020.pdf.

(56%) were in the highest EER bands of A to C, Figure 1.2. This is comparable with 33% of private rented dwellings, and 29% of owner occupied dwellings. Within the social rented sector, a larger proportion of housing association dwellings (60%) had an EER band of A to C, than local authority dwellings (50%), Annex Table 1.3.

Figure 1.2: Proportion of dwellings in the highest energy efficiency rating bands (A to C), by tenure, 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 1.3
Source: English Housing Survey, dwelling sample

1.10 The private rented stock has seen the largest fall in the proportion of F and G rated dwellings compared with other tenures. In 2008, the private rented sector had the highest proportion of dwellings with an EER band of F or G (19%). In 2018, only 5% of private rented dwellings were in EER Bands F or G (a reduction of 14 percentage points from 2008), and a similar proportion to owner occupied dwellings, Figure 1.3. Regulations introduced in April 2018, which require any newly rented dwelling in the private rented sector to meet EPC band E, will likely have contributed to the energy efficiency improvement to private rented dwellings in recent years.

Figure 1.3: Proportion of dwellings in lowest energy efficiency rating bands (F and G), by tenure, 2008, 2013 and 2018

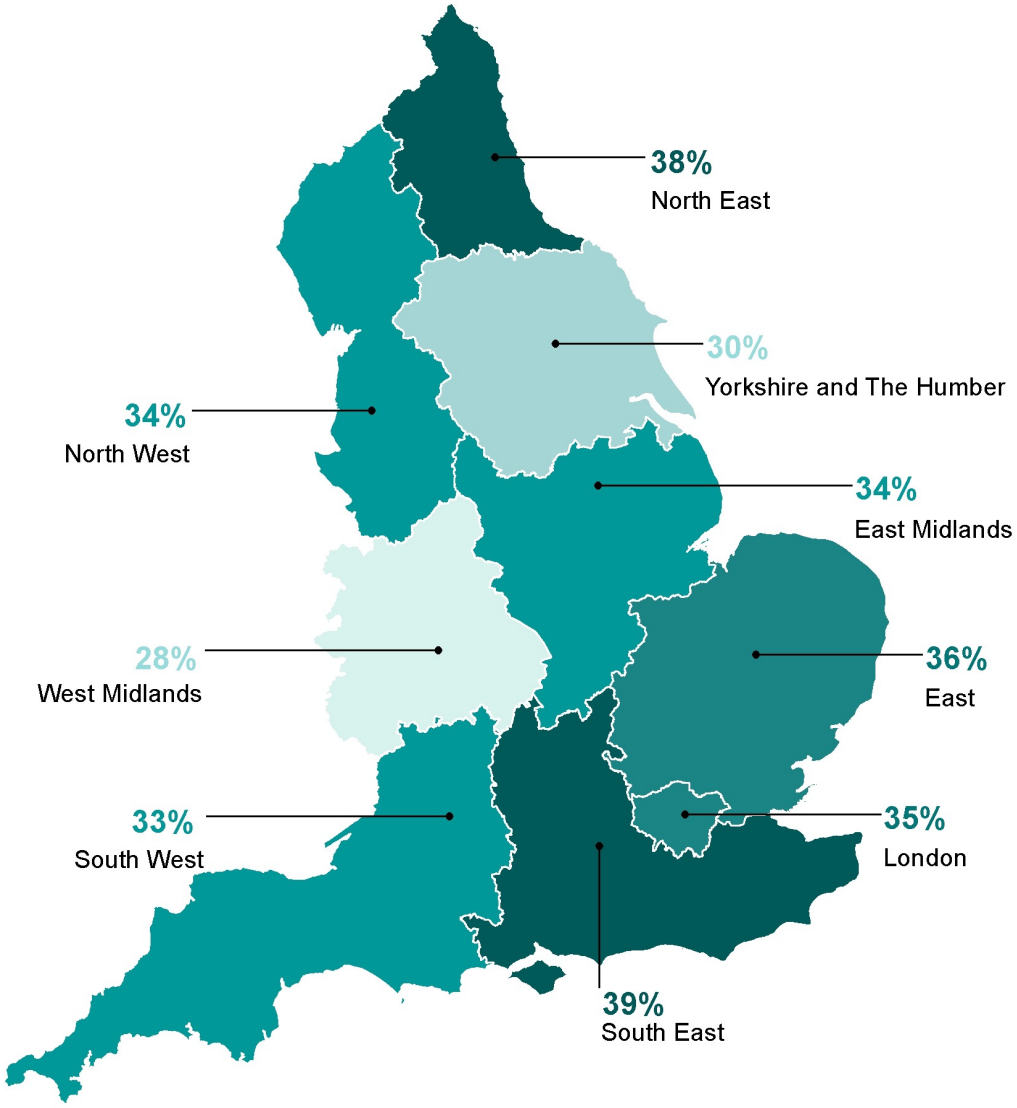
Base: all dwellings
Note: underlying data are presented in Annex Table 1.2
Source: English Housing Survey, dwelling sample

1.11 Purpose-built flats were the most energy efficient of all dwelling types and converted flats the least. In 2018, 65% of purpose built flats were in the highest EER bands of A to C. This contrasts with converted flats, where only 19% rated A to C, Annex Tables 1.1 and 1.3.

1.12 Excluding flats, mid-terraced dwellings tend to be the most energy efficient, with 34% rated A to C. One contributing factor to the higher energy efficiency of mid-terraces is that these houses generally have a smaller heat-loss wall area, due to being attached on multiple sides, and therefore a lower heating requirement.

1.13 In 2018, the South East had the highest proportion of A to C rated dwellings in England (39%) and the West Midlands had the lowest (28%), Figure 1.4. The mix of tenures, dwelling types, ages of dwellings and building characteristics within each region means that it is hard to quantify the effect of region alone as a driver of energy efficiency improvement.

Figure 1.4: Proportion of A to C rated dwellings, by region, 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 1.4
Source: English Housing Survey, dwelling sample

Average modelled energy costs

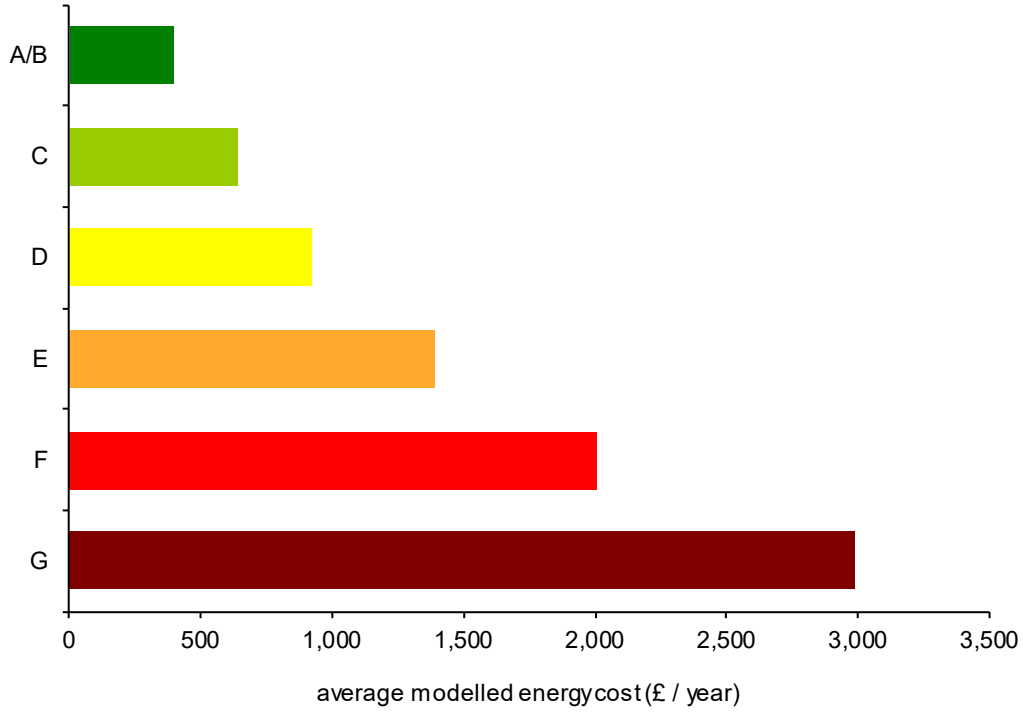
1.14 The average annual energy cost was modelled for each dwelling as part of the SAP methodology[4]. Actual household expenditure on energy use varies from modelled amounts and is often lower than modelled spend, as the model assumes people heat their homes to a set standard which may not be achieved in reality. In 2018, the average modelled energy cost of a dwelling

[4] Average modelled energy costs do not include costs associated with cooking and appliance use. Including cooking and appliance use would not be expected to impact the relative difference in energy costs between EPC bands or household / dwelling sub-groups.

was £935 per year. This has decreased by £78, from £1,013 in 2016[5], taking into account changes to fuel prices between years, Annex Table 1.5.

1.15 Increasing the energy efficiency of a dwelling could make a significant difference to the annual cost of energy. In 2018, the difference between average annual modelled energy costs of an EER band G dwelling and an EER band A/B dwelling was £2,592, Figure 1.5.

Figure 1.5: Average modelled annual cost of energy in homes, by energy efficiency band, 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 1.5
Source: English Housing Survey, dwelling sample

1.16 The difference in average annual modelled energy costs between EER bands decreases as energy efficiency improves. There was an average difference of £617 between EER band F and E rated dwellings, £469 between E and D rated dwellings, and £279 between D and C rated dwellings.

Dwelling characteristics

1.17 Dwellings in the social rented sector were generally the least expensive to run, with an average modelled energy cost of £637 per year. This was £207 less on average than private rented dwellings, and £405 less than owner occupied dwellings, Annex Table 1.5.

[5] EHS Energy efficiency report, 2016: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/724339/Energy_efficiency_2016.pdf

1.18 Purpose built flats were generally the least expensive types of dwellings to run, with an average modelled energy cost of £581 per year. In contrast, detached houses had the highest energy costs, with an average of £1,234 per year.

1.19 The average modelled energy cost decreased as the age of the dwelling decreased, reflecting that energy efficiency improves with newer dwellings. On average, the energy cost of dwellings built after 2002 was £656 less than dwellings built before 1919.

Household characteristics

1.20 Older households tend to have higher modelled energy costs. Households where the HRP[6] was 60 years or over had a modelled spend that was on average £119 higher than households with a HRP under 60 years, Annex Table 1.6.

1.21 High income households generally had higher average modelled energy costs than households in the lowest income quintiles. This is likely due to a higher proportion of low-income households being in the social rented sector, which tends to have lower heating requirements due to smaller average floor areas and higher energy efficiency standards.

Ease of meeting heating costs

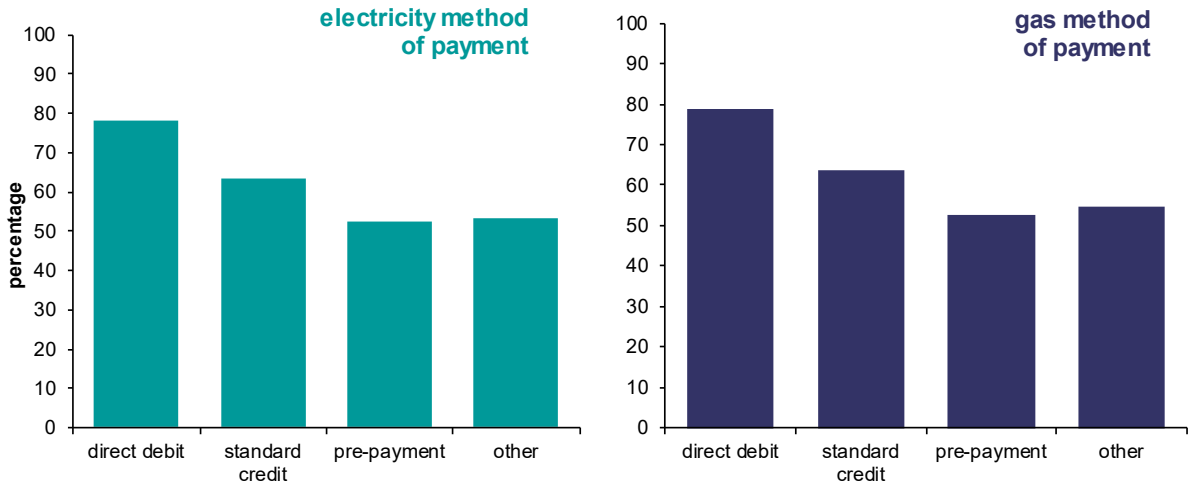
1.22 Households were asked how easy or difficult they found it to meet their heating costs. In 2018, 73% of households found it easy to meet their heating costs, 15% neither easy nor difficult, and 12% found it difficult, Annex Table 1.7.

Method of payment and change in tariff

1.23 Generally, households using direct debit as their main method of payment found it easier to meet their heating costs than those using all other methods of payment. Over three quarters (78%) of households who pay for their electricity using direct debit found it easy to meet their heating costs, compared with 64% on standard credit and 53% on pre-payment. Likewise, 79% of households who pay for their gas using direct debit found it easy to meet their heating costs, compared with those on standard credit or pre-payment (64% and 53%, respectively), Figure 1.6.

[6] The HRP (household reference person) is the “householder” in whose name the accommodation is owned or rented. See Glossary for further information.

Figure 1.6: Ease of meeting heating costs, by electricity and gas method of payment, 2018-19



Base: all households
Notes:
(1) analysis excludes 'no answer' and 'don't know' responses
(2) underlying data are presented in Annex Table 1.7
Source: English Housing Survey, full household sample

1.24 On average, those who had changed their gas or electricity tariff in the past 12 months found it easier to meet their heating costs than those who had not changed tariffs. Over three quarters (78%) of households who switched both their electricity and gas found it easy to meet their heating costs, compared with 75% of households who only switched for one fuel, and 72% of households who did not change their tariff at all.

1.25 More detailed information on the predominant method of payment and how households are changing their energy tariffs can be found in Chapter 2 of the EHS 2017-18 Energy report[7], including how this differs across various dwelling and household characteristics. The 2017-18 findings have remained largely consistent with findings in this report.

Household characteristics

1.26 In general, older households, white HRP households and higher income households found it easier to meet their household heating costs than other households, Annex Table 1.8.

1.27 Households comprising of a lone parent with dependent children found it most difficult to meet their heating costs, with 30% struggling to meet their heating costs, compared with 10% in all other households, despite having a lower average modelled energy cost of £160 per year, Annex Tables 1.6 and 1.8.

[7] EHS Energy Report, 2017-18: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817757/EHS_2017-18_Energy_Report.pdf.

Smart meters

1.28 The EHS collects information on the presence of gas and electricity smart meters. Smart meters are the next generation of gas and electricity meters and offer a range of intelligent functions, such as communicating directly with suppliers and allowing customers to access more accurate bills. They can also tell customers how much energy they are using in pounds and pence through an In-Home Display (IHD). Smart meters are a part of government plans for a smart energy system that will facilitate carbon emissions reductions. Without more flexible energy systems, modelling for the Committee on Climate Change estimates the costs of delivering net zero emissions by 2050 could be up to £16 billion higher each year[8].

1.29 In 2018, 90% of households had heard of smart meters, Annex Table 1.9. Overall 29% of all households said that they had a smart meter (6.8 million homes), 70% said they did not, and 1% didn't know whether or not they had a smart meter, Annex Table 1.10.

1.30 Around a quarter (23%) of households reported having both a gas and electricity smart meter, 6% electricity smart meters only and less than 1% gas only. In total, this equates to around 12 million smart meters operating in homes across England. These figures are similar to statistics published by BEIS[9], which indicate that there were 13.2 million smart meters operating across homes in Great Britain, up to March 2019.

1.31 Local authority renters were most likely to have a smart meter (35%), followed by housing association (32%) and owner occupiers (30%), while private renters were the least likely (21%), Annex Table 1.11. This matches data published by Smart Energy GB in March 2019, which showed that social housing tenants were the most likely to have a smart meter (36%)[10].

1.32 Households where the HRP was aged 65 to 74 years were more likely to have a smart meter (33%), with HRP households aged 16 to 24 years least likely (20%), Annex Table 1.12. A similar pattern by age is also seen in the data published by Smart Energy GB.

In-Home Displays

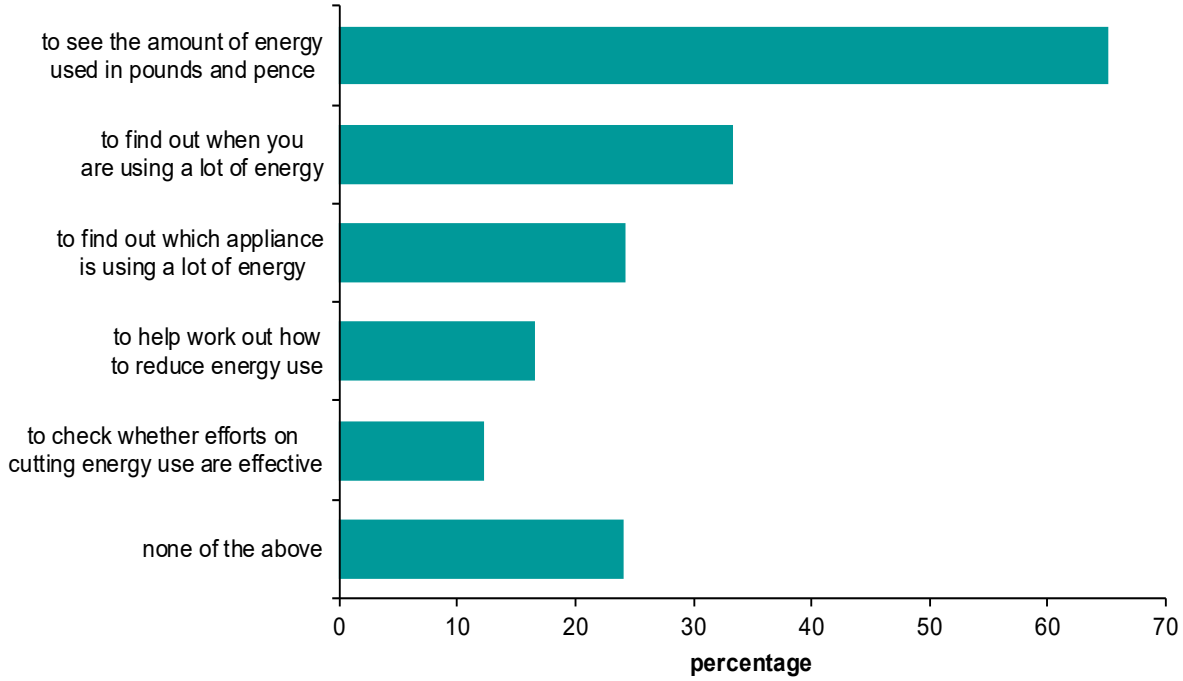
1.33 Households were also asked whether they had an In-Home Display (IHD) and if so, how they used their IHDs. Households which did not have or were

[8] Analysis of Alternative UK Heat Decarbonisation Pathways: https://www.theccc.org.uk/wp-content/uploads/2018/06/Imperial-College-2018-Analysis-of-Alternative-UK-Heat-Decarbonisation-Pathways.pdf.
[9] Smart Meter Statistics, Quarterly Report to end March 2019, BEIS: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/804767/2019_Q1_Smart_Meters_Report.pdf.
[10] Smart energy outlook, March 2019: https://www.smartenergygb.org/en/-/media/SmartEnergy/essential-documents/press-resources/Documents/Smart-energy-outlook-March-2019.ashx.

unsure whether they had a smart meter were excluded from this analysis. Of those who had a smart meter (6.8 million), 86% of households reported also having an IHD, 13% did not, and 1% did not know, Annex Table 1.13.

1.34 The most common reason for households interacting with their IHD was to see the amount of energy they were using, in pounds and pence (65%), a finding that was also seen in the data published by Smart Energy GB. Fewer households used their IHD was to work out how to reduce energy use (17%) and to check whether efforts on cutting energy use were effective (12%). Around a quarter (24%) of households reported that they didn't use their IHD for any of the reasons listed in the questionnaire, Figure 1.7.

Figure 1.7: How householders reported using their In-Home Displays, 2018-19



Base: all households
Notes:
(1) analysis excludes 'don't know' responses
(2) underlying data are presented in Annex Table 1.14
Source: English Housing Survey, full household sample

Chapter 2

Energy efficiency measures and seasonal temperature control in English homes

2.1 The first part of this chapter explores trends in energy efficiency measures, over the 2008 to 2018 period, which help households keep their homes warm during the winter months and potentially lower fuel costs. It also examines how the energy efficiency measures present in the 2018 stock differ across tenures.

2.2 The second part of the chapter reports on the prevalence of damp and mould reported by households. It explores how problems with damp, including when the problem began or worsened, may differ by characteristics such as tenure and levels of insulation.

2.3 The third and final part of the chapter reports on the ways in which householders keep cool during the summer months. It explores the methods used to control warm temperatures and analyses the dwelling and household characteristics of those who find it easy or who struggle to keep cool at night during the summer months.

Heating systems

2.4 There was little change in the proportions of each type of heating system between 2008 and 2018[11]. The proportion of dwellings with gas central heating, the most common form of space heating, increased by just two percentage points from 83% in 2008 to 85% in 2018, Annex Table 2.1. Further growth is restricted by the proportion of dwellings with access to a mains gas supply and legislation on decarbonising the housing sector.

2.5 Electric storage heaters were the second most common heating system, although the proportion of these decreased from 7% in 2008 to 5% in 2018.

Age of heating system

2.6 In 2018, boiler systems with radiators were generally newer, with 27% of boilers being less than three years old. On the other hand, storage radiators were the oldest heating systems; 65% were over 12 years old, as were 61%

[11] See EHS 2018-19 Headline Report for figures on heating systems from 1996 onwards. https://www.gov.uk/government/statistics/english-housing-survey-2018-to-2019-headline-report.

of warm air systems and 36% of communal heating systems, Annex Table 2.2.

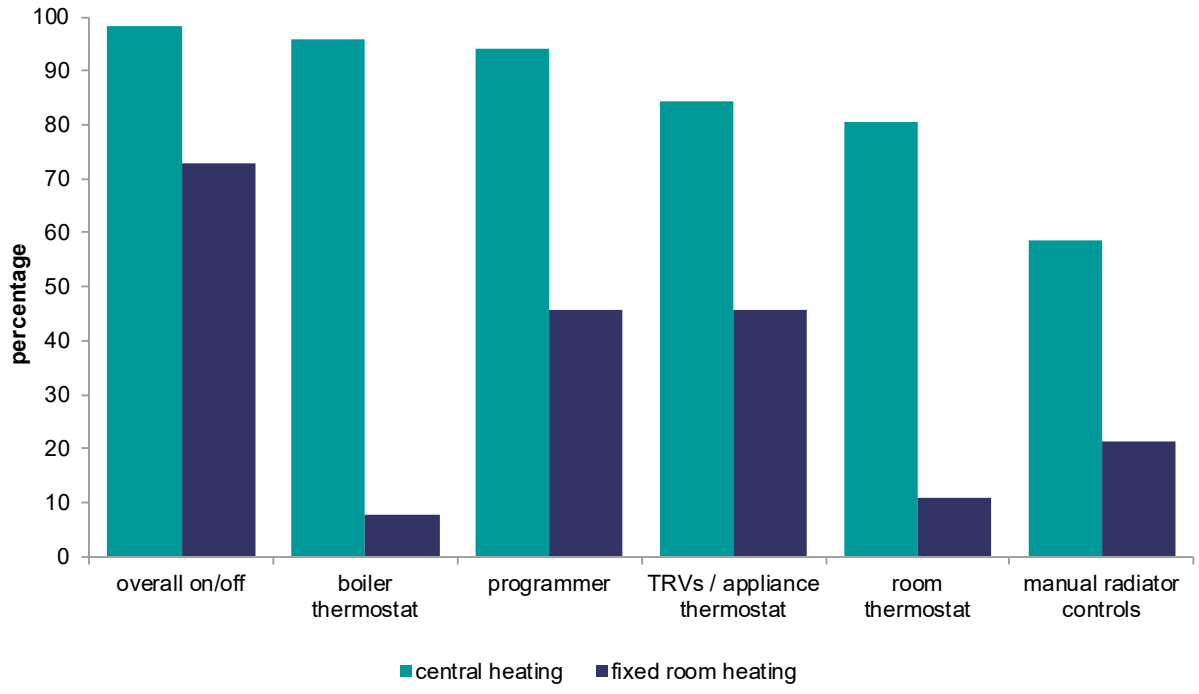
2.7 In terms of tenure, housing association (28%) dwellings were more likely to have newer heating systems, less than three years old, than private rented (24%) and local authority (24%) dwellings. Conversely, private rented (29%) and owner occupied dwellings (28%) had a higher proportion of older heating systems (more than 12 years old) compared with housing association (21%) and local authority (19%) dwellings, Annex Table 2.3.

Heating controls

2.8 This section reports on main heating systems and whether they had heating controls, which offer households flexibility and comfort around the internal temperatures of their homes as well as contributing to potential fuel cost savings.

2.9 In 2018, around 92% (or 22.3 million) of dwellings had a central heating system as the main heating system, 5% (or 1.3 million) had storage heaters and 3% (or 655,000 dwellings) had fixed room heaters, Annex Tables 2.1

Figure 2.1: Most common (non-storage) heating controls, by heating type, 2018



Base: all dwellings with central heating or fixed room heating
Notes:
(1) thermostatic radiator valves (TRVs) are used alongside central heating systems while appliance thermostats are used for room heaters
(2) underlying data are presented in Annex Table 2.4
Source: English Housing Survey, dwelling sample

2.10 Among dwellings with a central heating system, the most popular heating controls included on/off heating controls (98%), boiler thermostats (96%), programmers (94%), thermostatic radiator valves (TRVs) (84%) and room thermostats (80%), Figure 2.1.

2.11 For the 5% of dwellings with storage heaters as main heating system, 73% had manual charge heating controls, 28% had automatic charge heating controls and 1% had Celect type heating controls, Annex Table 2.5.

Heat pumps

2.12 Heat pumps make use of heat from a source (air, ground or water) and therefore have the potential to provide heating for homes using less energy than traditional systems. Being electrically powered, they also have the potential to be low carbon if the source of that electricity is itself low carbon. Fewer than 1% (125,000) of dwellings had a heat pump present in 2018, an increase from 76,000 in 2016[12]. The majority (80%) of those were air source heat pumps used for the central heating, Annex Table 2.6.

2.13 Despite being more common in the private sector, heat pump installations were overrepresented in the social rented stock. Social rented homes had over one third of heat pump installation (35%), although these homes comprised 17% of the total housing stock[13]. Houses and bungalows comprised 80% of the housing stock but contained 87% of heat pump installations, Annex Table 2.7.

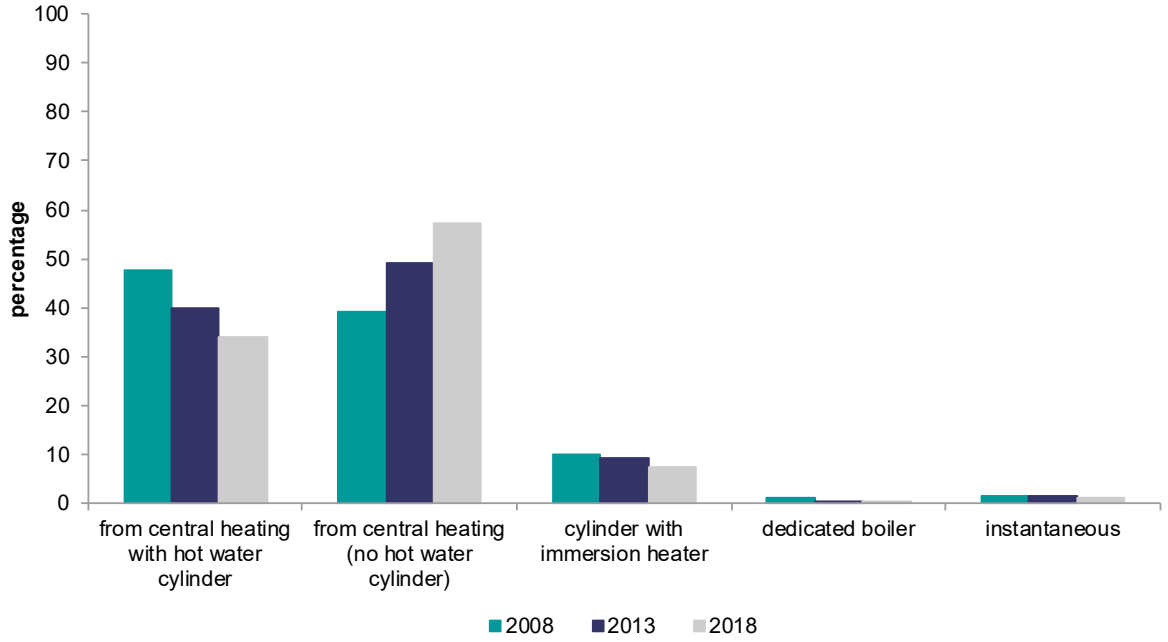
Hot water

2.14 Since the mid-2000s, condensing boilers, which are generally the most efficient boiler types, have been mandatory for most new and replacement boilers and as a result, the proportion of condensing boilers has markedly increased over the years[14]. At the same time, there has been an increase in the popularity of combination ("combi") boilers, which provide instantaneous hot water and therefore does not require a hot water cylinder. Since combi boilers provide hot water from the central heating *without* a separate cylinder, the proportion of dwellings with central heating *with* a separate hot water cylinder has decreased from almost half of the stock (48%) in 2008 to just over a third (34%) in 2018, Figure 2.2.

[12] See 2016 Energy Efficiency report: https://www.gov.uk/government/statistics/english-housing-survey-2016-energy-efficiency.
[13] See EHS 2018-19 Headline Report for tenure analysis: https://www.gov.uk/government/statistics/english-housing-survey-2018-to-2019-headline-report.
[14] See EHS 2018-19 Headline Report for time series analysis on boiler types: https://www.gov.uk/government/statistics/english-housing-survey-2018-to-2019-headline-report.

2.15 The proportion of dwellings with a hot water cylinder and immersion heater as the primary means of water heating has also decreased from 10% in 2008 to 7% in 2018.

Figure 2.2: Type of hot water systems, 2008, 2013 and 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 2.8
Source: English Housing Survey, dwelling sample

Dwelling construction and insulation

2.16 One of the most effective methods of increasing a dwelling's energy performance is increasing insulation. This section will explore the presence of wall insulation, loft insulation, ground floor insulation and double glazing across the stock and how levels of insulation may vary across tenures.

Wall construction

2.17 The most common construction type in 2018 was masonry[15] cavity walls with pointed brickwork (55%), followed by masonry solid walls with pointed brickwork (15%), Annex Table 2.9.

2.18 Non-masonry dwellings such as timber, concrete, and steel frame construction, accounted for 8% of the stock[16]. Both timber framed and 'non-traditional' construction methods, such as concrete and steel framed structures, make the installation of additional wall insulation more problematic.

[15] Masonry refers to brick, block, stone and flint.
[16] For figures dating back to 1996 refer to the 2016 Energy Efficiency report: https://www.gov.uk/government/statistics/english-housing-survey-2016-energy-efficiency.

For example, when insulating timber framed dwellings, it is necessary to ensure that damp and associated timber decay are not triggered.

2.19 Housing association (64%) and local authority (60%) dwellings were more likely to have masonry cavity walls with pointed brickwork than owner occupied (56%) and private rented (44%) dwellings. On the other hand, private rented (23%) and owner occupied (15%) dwellings were more likely have masonry solid walls with pointed brickwork than local authority (8%) and housing association (7%) dwellings.

Wall insulation

2.20 Around half (49%) of dwellings in the English stock had cavity or solid wall insulation; the majority had insulated cavity walls (46%) while relatively few (3%) had solid wall insulation. After insulated cavity walls, uninsulated solid walls were most prevalent (26%) followed by uninsulated cavity walls (22%), insulated solid walls (3%) and other wall types (2%), Annex Table 2.10.

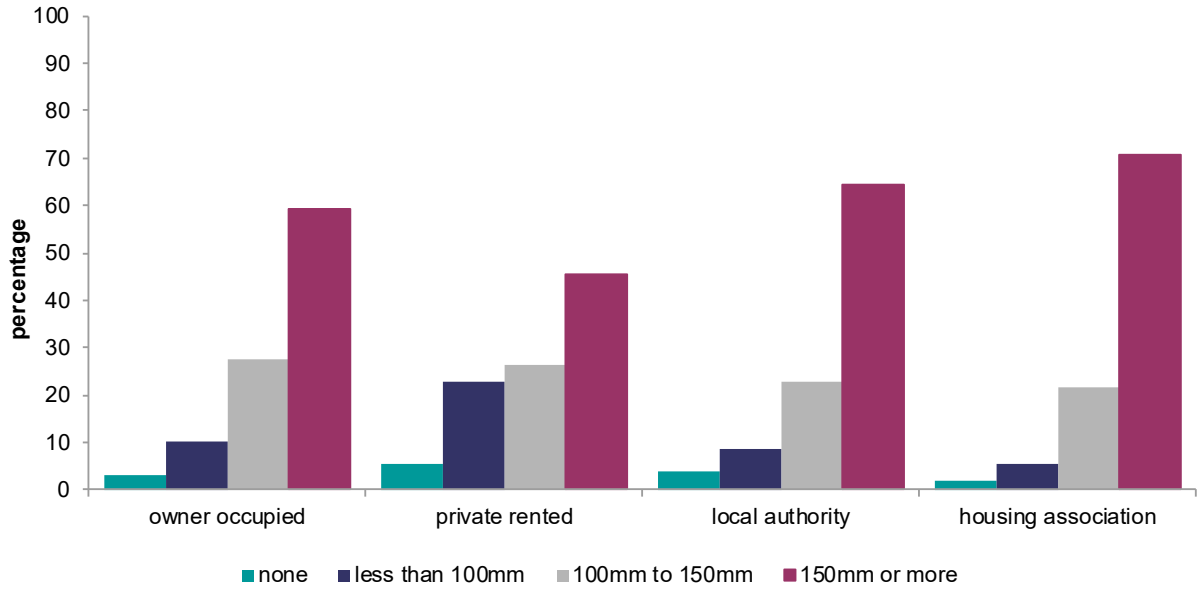
2.21 There was a higher proportion of insulated cavity walls within the social sector. Housing association (58%) and local authority (51%) dwellings had a higher proportion of insulated cavity walls compared with owner occupied (49%) dwellings. Private rented (31%) dwellings had the smallest proportion of dwellings with insulated cavity walls compared with all other tenures.

2.22 The private sector had the highest proportion of uninsulated solid walls as over a third (37%) of private rented and a quarter (26%) of owner occupied dwellings had uninsulated solid walls compared with 18% of local authority and 12% of housing association dwellings.

Loft insulation

2.23 In 2018, 21.1 million dwellings or 87% of the English housing stock had a loft. The social rented sector had the largest proportion of dwellings with higher levels of loft insulation as housing association (71%) and local authority (65%) dwellings were more likely to have 150mm or more of loft insulation compared with owner occupied (59%) and private rented (45%) dwellings. Conversely, private rented dwellings had the highest proportion of dwellings with no loft insulation (5%) compared with other tenures, Figure 2.3.

Figure 2.3: Loft insulation thickness, by tenure, 2018



Base: all dwellings with a loft
Notes:
(1) analysis excludes dwellings with no loft present
(2) underlying data are presented in Annex Table 2.11
Source: English Housing Survey, dwelling sample

2.24 The proportion of dwellings with 150mm or more of loft insulation markedly increased across all tenures from 2008 to 2018. Owner occupied homes had the largest increase (from 37% to 59%) although provision in 2018 still fell below that of housing association (71%) and local authority (65%) dwellings, Annex Table 2.11.

Ground floor insulation

2.25 Households who lived in dwellings with a habitable room in contact with the ground were asked if the dwelling was insulated with floor insulation and if so, how much of it was insulated. It is important to note that households, especially those in rented dwellings may not know if any floors in contact with the ground were insulated. Around 1.9 million occupied homes (or 8% of the stock) had floor insulation, Annex Table 2.12.

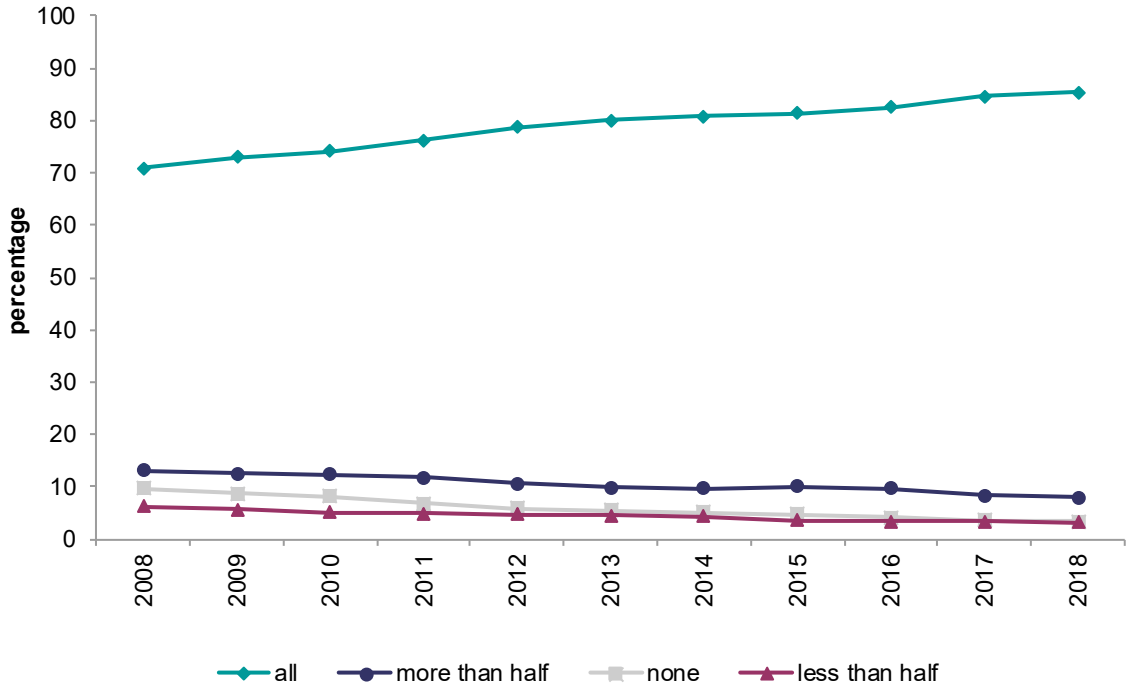
2.26 Owner occupied (14%) and housing association dwellings (10%) were more likely to have ground floor insulation than private rented (6%) and local authority (4%) dwellings.

Double glazing

2.27 Since 2006, building regulations have required that all windows in new dwellings and any that are replaced in older dwellings are double glazed[17]. As a result, the proportion of dwellings with full double glazing has increased steadily over the last 10 years, from 71% in 2008 to 85% in 2018. The rate of increase, however, has slowed somewhat, increasing by just five percentage points since 2013, Figure 2.4.

2.28 In 2018, around 85% of the stock had full double glazing and 8% had double glazing on more than half of the windows. The remaining 7% of dwellings had double glazing on less than half of the windows or none at all.

Figure 2.4: Extent of double glazing, 2008 to 2018



Base: all dwellings
Note: underlying data are presented in Annex Table 2.13
Source: English Housing Survey, dwelling sample

Ventilation

2.29 In 2018, almost half (45%) of dwellings in England had a trickle vent[18] present in at least one room. Newer dwellings built after 1990, and purpose-built flats were far more likely to have trickle vents in at least one room (75% and 65%, respectively) than other dwellings. It is possible that these findings are linked as purpose-built flats make up a large proportion of newly built dwellings.

[17] Planning permission may be required for listed dwellings or dwellings in conservation areas.
[18] A trickle vent is a small opening in a window frame that allows small amounts of natural ventilation into a room.

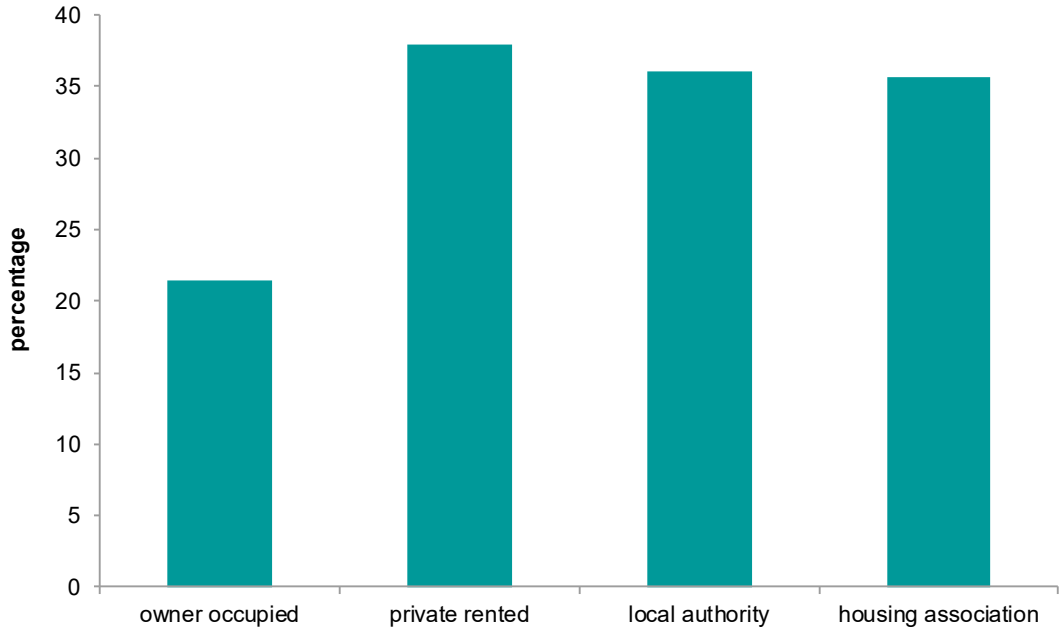
Conversely, dwellings built before 1919 and semi-detached houses had the lowest proportion of trickle vents present (29% and 37%, respectively), Annex Table 2.15.

2.30 Trickle vents were generally most common amongst dwellings with predominantly double-glazed windows, regardless of whether they were made of wood, UPVC or metal.

Damp, condensation and mould

2.31 Householders may worry about the unintended consequences increasing insulation may have in their home. This section reports on the prevalence of damp (including condensation and mould) in the stock as reported by households during the interview survey and explores whether higher levels of insulation could be linked to perceived problems with damp. It is important to recognise that the EHS cannot indicate the causes of any damp, only explore statistical relationships between dampness and energy efficiency measures and other building features.

Figure 2.5: Self-reported damp, by tenure, 2018-19



Base: all households
Notes:
(1) analysis excludes 'don't know' responses
(2) underlying data are presented in Annex Table 2.16
Source: English Housing Survey, household sub-sample

2.32 In 2018, over a quarter (27%) or 6.3 million households reported having an issue with condensation, damp, or mould in their home. Private renters (38%), local authority renters (36%) and housing association renters (36%), were

more likely to have problems with damp than owner occupiers (21%), Figure 2.5.

2.33 There was also a higher proportion of households with damp in dwellings built before 1919 (41%) compared with households living in newer dwellings. In fact, damp was least prevalent amongst households living in dwellings built after 1990 (14%). Among dwelling types, a higher proportion of households living in converted flats reported problems with damp (43%) compared with other households, likely reflecting that converted flats tend to be older, Annex Table 2.16.

2.34 Overall, households living in poorly insulated dwellings were more likely to report problems with damp. For instance, households living in homes with uninsulated solid walls, less than 100mm of loft insulation or no loft insulation and less than 80% of windows glazed were more likely to experience issues with damp compared with households with higher levels of insulation. These findings confirm that the causes of damp are complex and are often associated with other factors such household behaviour, ventilation and disrepair (e.g. gaps in brickwork, window frames).

Households with reported damp problems

2.35 This section focuses on the 6.2 million dwellings who reported having problems with damp and explores when the householders report the damp problems began/worsened. The vast majority of householders who reported having problems with damp said they had damp since they started living in their home (92%), 6% said the problems started after the property was insulated, and 4% said the problems got worse after the property was insulated, Annex Table 2.17.

2.36 Households were more likely to report that damp problems already existed when moving into their home if they were private renters. Conversely, private renters were generally less likely to report problems with damp after the property was insulated or to report damp as getting worse after it was insulated.

2.37 Generally speaking, households living in dwellings built before 1919 and after 1990 were more likely to report that the damp had occurred since moving in. They were, however, less likely to report having damp issues after insulation was installed. It is unlikely that households living in dwellings built after 1990 will need to retrofit insulation.

2.38 Households living in semi-detached houses (87%) were generally less likely to have issues with damp after moving in but were generally more likely to report having damp issues after the property was insulated or to report damp as getting worse after it was insulated.

2.39 Households living in dwellings with less than 100mm of loft insulation (96%) or no loft insulation (95%) had a higher likelihood of having damp issues after moving in compared with those living in dwellings with 150mm or more of loft insulation. The same trend was seen for households living in dwellings with less than 80% of windows double glazed, who were more likely to have damp issues after moving in than households in dwellings where the majority of windows were double glazed.

2.40 Those living in dwellings with higher levels of loft insulation (150mm or more) were more likely to report having damp problems after the dwelling was insulated (7%) than those with lower levels of loft insulation (less than 100mm) or no loft insulation at all. Similarly, households with the majority of windows double glazed (7%) were more likely to have damp problems after insulation was installed than other households (2%).

2.41 There was no relationship between reported damp and having trickle vents present in at least one room or the number of energy efficiency works carried out by owner occupiers.

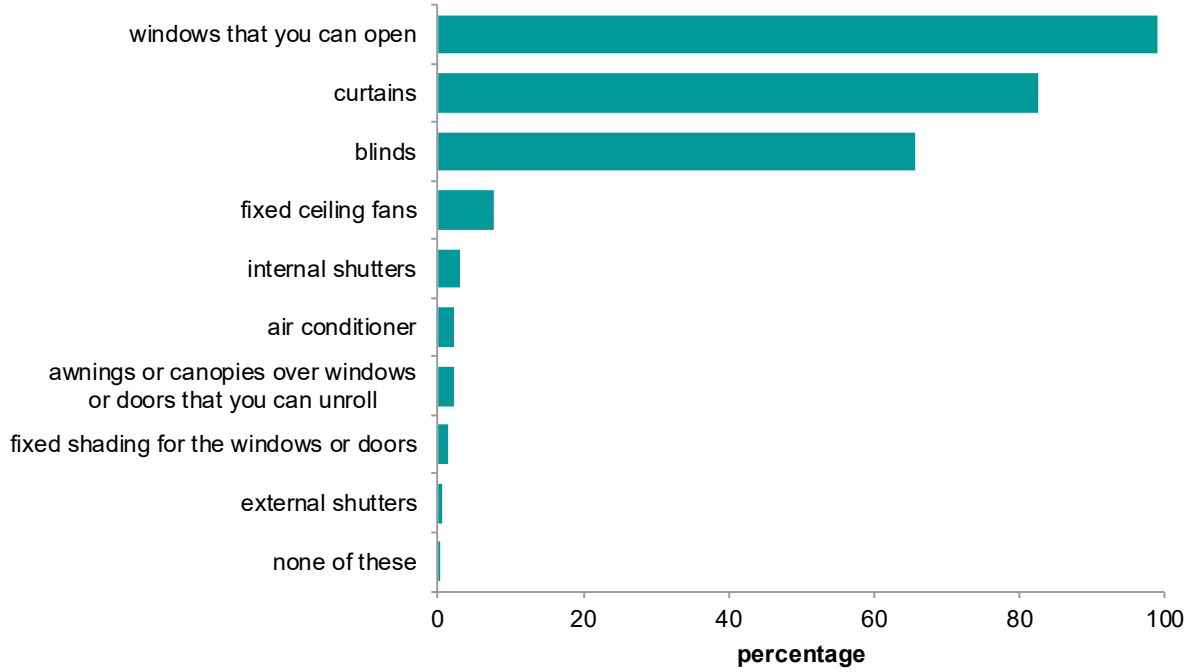
Keeping cool

2.42 Being able to cool down in the summer months is also important to households, particularly for those who are more at risk of ill-health due to excessive heat[19]. This section reports on the methods householders use to control warm temperatures in their home and explores the dwelling and household characteristics of those who can keep cool at night during the summer months by opening the windows.

2.43 Households were asked which cooling devices they had present in their homes. Almost all households had an openable window (99%). The next most common device was curtains (83%), followed by blinds (66%), fixed ceiling fans (8%), internal shutters (3%), air conditioners (2%), awnings or canopies that could be unrolled (2%) and fixed shading (1%). Less than 1% had external shutters, Figure 2.6.

[19] For more information on subjective overheating refer to the EHS Profile and condition of the English housing stock report 2018-19

Figure 2.6: Presence of household cooling devices, 2018-19



Base: all households
Notes:
(1) percentages are within each group. For example, 99% of households mentioned having openable windows while the remaining 1% did not mention it.
(2) analysis excludes 'no answer' responses
(3) underlying data are presented in Annex Table 2.19
Source: English Housing Survey, full household sample

2.44 Households who had means of keeping cool aside from just having fixed shading for the windows, were then asked what they do to keep their homes cool. The most common method of keeping cool was opening the windows (96%), followed by closing the curtains (47%), closing the blinds (42%), switching on an electric fan (32%), closing the shutters (4%), unrolling the canopy (2%) and switching on the air conditioner (2%), Annex Table 2.20.

2.45 There was no relationship between tenure and opening windows to keep the home cool. However, owner occupiers (2%) were more likely to use an air conditioner to keep their homes cool than both housing association (1%) and local authority (1%) renters.

Dwelling characteristics

2.46 Households living in dwellings built after 1990 were more likely to open their windows to keep their home cool (97%) than households living in dwellings built between 1945 and 1964 (96%) and before 1919 (95%). On the other hand, households living in dwellings built before 1919 were generally less likely to use an air conditioner (1%) to keep the home cool than households living in the newest dwellings (3%).

2.47 Households living in the West Midlands (97%) were more likely to open their windows to keep cool than those living in London (96%), East England (96%),

South East (96%), Yorkshire and the Humber (95%) and East Midlands (95%). Households living in the South East (3%) and London (3%), however, were more likely to use air conditioners than households living in the Yorkshire and the Humber (2%), East Midlands (2%) and North East (1%).

Household characteristics

2.48 Overall, older households were less likely to open their windows to keep cool. Households where the oldest occupant was aged 85 or over (92%) were generally less likely to open their windows in order to keep cool than other aged households. HRPs aged over 65 years were also less likely to open their windows than all younger households. HRPs aged 45-64 years (3%) were more likely to use an air conditioner to cool the home than HRPs aged 25-44 and 75 years or over (both 1%), Annex Table 2.21.

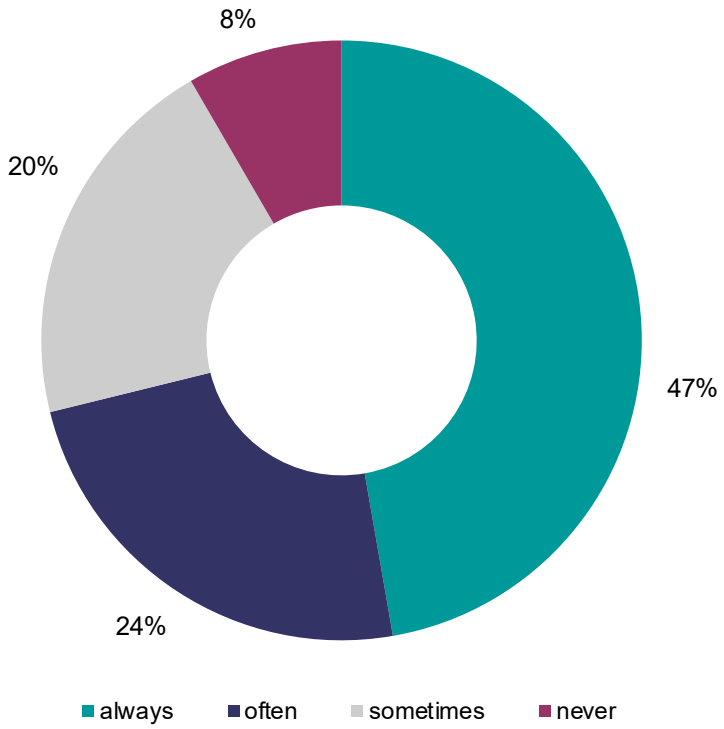
2.49 Households where at least one member had a long-term illness or disability were less likely to keep cool by opening the window (95%) than other households.

Households' ability to keep cool at night by opening windows during summer months

2.50 Households were asked if they could keep cool at night by opening the windows[20]. Around 47% of households reported always being able to cool down at night by opening a window, 24% said often, 20% said sometimes and just 8% said they could never keep cool by just opening the windows at night, Annex Table 2.22.

[20] The forthcoming 2017 Energy Follow Up Survey (EFUS) report on Thermal Comfort, Ventilation, Damp and Mould, due to be published in Winter 2020 by the Department for Business, Energy & Industrial Strategy, will investigate this in further detail.

Figure 2.7: Households' ability to keep cool at night by opening a window, 2018-19



Base: all households
Note: underlying data are presented in Annex Table 2.22
Source: English Housing Survey, full household sample

Dwelling characteristics

2.51 Owner occupiers (49%) were more likely to report always keeping cool at night in the summer months by just opening a window than both local authority (45%) and private renters (44%), Table 2.1.

2.52 Households living in the oldest dwellings (built before 1919) were more likely to always keep cool at night in the summer by opening a window (50%) than households living in the newest dwellings in the stock (45%).

2.53 Households living in urban areas were more likely to report never being able to cool down night by opening windows (9%) compared with households living in hamlets (5%) and villages (5%). Related to this, households living in London were considerably less likely to always cool down at night by opening a window (36%) than any other region in England.

Table 2.1: Ability to reduce overheating during the night by opening windows in summer months, by dwelling and household characteristics, 2018-19

	most likely to *never* be able to keep cool at night by opening windows		most likely to *always* be able to keep cool at night by opening windows	
				percentages
dwelling characteristics				
Tenure:	local authority	15	owner occupied	49
Dwelling age:	1981 to 1990	10	pre 1919	50
Area:	urban	9	hamlets	58
Region:	London	10	North West	54
household characteristics				
Age of HRP:	75 years or over	12	75 years or over	55
Age of oldest occupant:	85 years or over	14	75 to 84 years	54
Long term illness or disability:	yes	11	no	48

Base: all households
Notes:
(1) these are examples and may not be statistically significant
(2) underlying data are presented in Annex Tables 2.22 and 2.23
Source: English Housing Survey, full household sample

Household characteristics

2.54 Households where the oldest occupant was aged 60 years or over were more likely to always be able to keep cool at night by just opening a window than younger HRP households. However, households where the oldest occupant was 85 years or older were more likely to report never being able to keep cool at night by just opening a window (14%) than younger households, Annex Table 2.23.

2.55 Households where at least one member of the family had a long-term illness or disability were more likely to not be able to keep cool at night by opening the windows (11%) compared with other households (7%).

Chapter 3

Energy improvement works in English homes

3.1 The first part of this chapter reports on the types of work carried out by owner occupiers to improve the energy efficiency of their home. It goes on to explore the characteristics of owner occupiers who undertook energy improvements in their home.

3.2 The second part focuses on those homes that had the worst energy efficiency (EER F or G) in 2018, as modelled using the SAP 2012 methodology. It demonstrates the potential of F and G properties if all recommended measures considered during an Energy Performance Certificate assessment were applied.

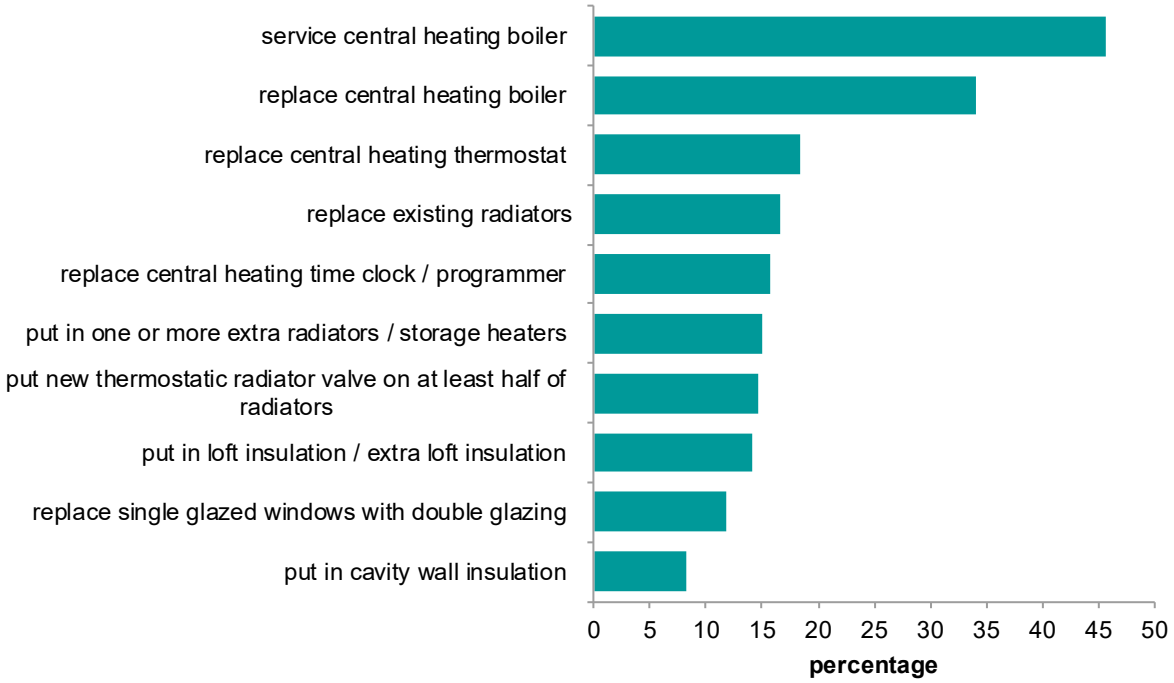
Energy efficiency improvement work by owner occupiers

3.3 Owner occupiers (15 million households) were asked if they had installed any energy efficiency measures in their homes over the last five years. Over three quarters of owner occupiers (77%) had installed or undertaken at least one energy efficiency measure[21]. This included 37% of owners who had installed three or more measures, Annex Tables 3.1 and 3.2.

3.4 The three most common energy efficiency improvement measures were servicing the central heating boiler (46%), replacing the central heating boiler (34%) and replacing the central heating thermostat (18%), Figure 3.1.

[21] Figures include households who had serviced the boiler.

Figure 3.1: The top 10 most common energy efficiency improvements carried out by owner occupiers over the past five years, 2018-19



Base: all owner occupiers
Notes:
(1) percentages are within each group. For example, 46% of owner occupied households mentioned servicing their central heating boiler while the remaining 54% did not mention it.
(2) analysis excludes 'no answer' responses
(3) underlying data are presented in Annex Table 3.1
Source: English Housing Survey, full household sample

Household characteristics

3.5 Owner occupiers aged between 45 and 74 years (around 81%) were generally more likely to have carried out at least one energy efficiency improvement to their home than other households. Younger owner occupiers (HRPs aged 16 to 24), on the other hand, were the least likely to have carried out any energy efficiency works (30%), Annex Table 3.3.

3.6 Couples with independent children (85%) were more likely to have carried out energy efficiency works than other household types while lone parents with dependent children (68%) were less likely to have had energy efficiency work done compared with couples with dependent children (79%) and couples with no children (80%).

3.7 Higher income households, in the third, fourth and fifth income quintiles, were more likely to have carried out energy efficiency works than lower income households (first and second income quintiles).

Potential for installing EPC measures in the least energy efficient homes

3.8 This section examines the potential to install a range of energy efficiency measures in the least energy efficient homes (EER bands F or G). The range of measures included by the model are those considered during an Energy Performance Certificate (EPC) assessment.

3.9 The potential installation of each energy efficiency improvement measure is modelled only where an EPC assessment would recommend its installation. The model does not assess the relative ease or the cost-effectiveness of installation. However, each measure is only recommended for installation if that measure alone would result in the SAP rating increasing by at least 0.95 points.

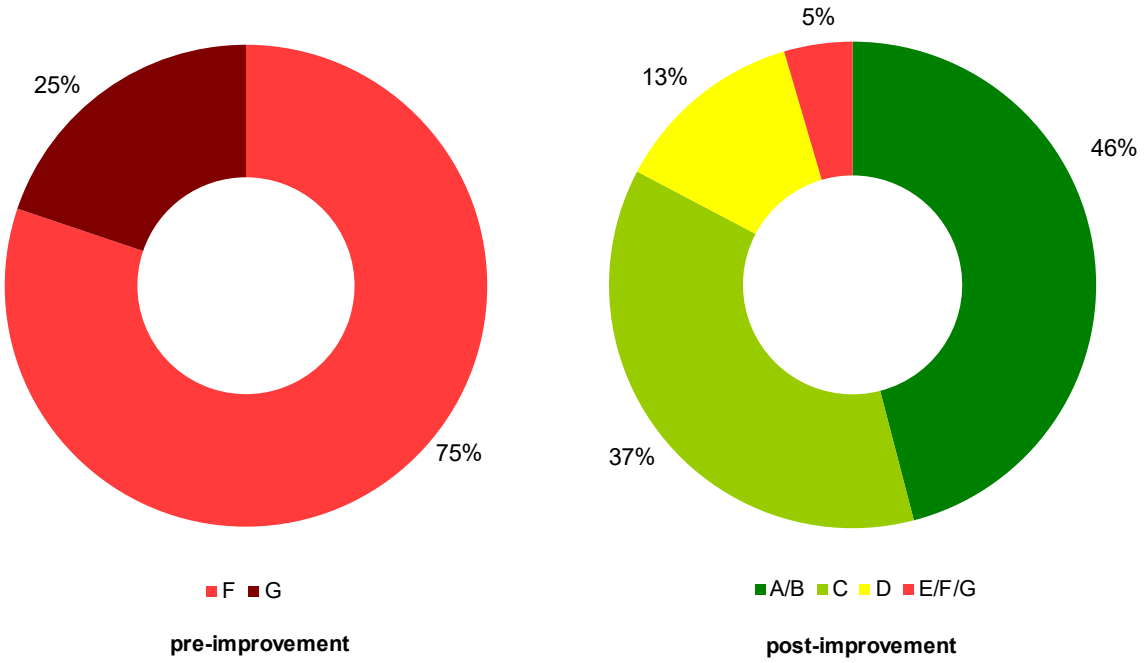
3.10 There were just over one million (4%) F or G rated dwellings in the 2018 stock. If all applicable energy improvement measures, as defined in the EPC methodology, were to be installed to those dwellings, 46% would be rated as A or B, 37% as C, 13% as D and just 5% would not be moved up above a band F[22]. The average SAP rating of these one million homes would rise from 27 to 79, Figure 3.2.

3.11 Installing all the recommended energy improvement measures in homes currently banded F or G would result in an average saving of around £1,690 per year in total modelled energy costs. The equivalent modelled saving for dwellings currently in bands A to E is much smaller, around £460. The average notional cost for installing all recommended energy efficiency measures in F or G band dwellings is also higher at £26,891, while the average for A to E band dwellings is lower, at £13,347, Annex Table 3.4.

3.12 On average, a dwelling in the English stock produced 4.4 tonnes of carbon dioxide (CO_2) per year (as modelled in line with the SAP methodology). If all applicable energy efficiency measures were installed, the average CO_2 emissions per dwelling would decrease by half to 2.2 tonnes per year. For F or G rated bands alone, CO_2 emissions per dwelling would decrease from 10.8 to 3.2 tonnes per year.

[22] The energy efficiency of these dwellings may be improved using other methods not recommended as standard by an EPC.

Figure 3.2: SAP rating pre- and post-improvement, if potential energy improvement measures were applied to F or G rated dwellings, 2018



Base: all energy inefficient dwellings where improvements might be possible irrespective of the ease of installation, e.g. for cavity wall insulation the base is the number of dwellings with cavity walls
Note: underlying data are presented in Annex Table 3.4
Sources: English housing Survey, dwelling sample

Technical notes and glossary

Technical notes

1. Some parts of this report use material from the interview questionnaire only. They are presented for '2018-19' and are based on fieldwork carried out between April 2018 and March 2019 on a sample of 13,431 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 '2018' and are based on fieldwork carried out between April 2017 and March 2019 (a mid-point of April 2018). The sample comprises 12,562 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.

Data quality

6. A full account of data quality procedures followed to collect and analyse English Housing Survey data can be found in the Quality Report, which is updated and published annually[23]. A summary of the quality assurance processes for data collection and reporting are provided in the English Housing Survey Headline Report[24]

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.

[23] https://www.gov.uk/government/publications/english-housing-survey-quality-report
[24] https://www.gov.uk/government/statistics/english-housing-survey-2018-to-2019-headline-report

- **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.

Carbon dioxide (CO_2) 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_2 emissions for each dwelling are based on a standard occupancy and a standard heating regime.

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

- **rising damp**: where the surveyor has noted the presence of rising damp in at least one of the rooms surveyed during the physical survey. Rising damp occurs when water from the ground rises up into the walls or floors because damp proof courses in walls or damp proof membranes in floors are either not present or faulty.
- **penetrating damp**: where the surveyor has noted the presence of penetrating damp in at least one of the rooms surveyed during the physical survey. Penetrating damp is caused by leaks from faulty components of the external fabric e.g. roof covering, gutters etc. or leaks from internal plumbing, e.g. water pipes, radiators etc.
- **condensation or mould**: caused by water vapour generated by activities like cooking and bathing condensing on cold surfaces like windows and walls. Virtually all dwellings have some level of condensation. Only serious levels of condensation or mould are considered as a problem in this report, namely where there are extensive patches of mould growth on walls and ceilings and/or mildew on soft furnishings.

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^2 forming part of a block where at least one house is attached to two or more other houses. The total floor area is measured using the original EHS definition of useable floor area, used in EHS reports up to and including the 2012 reports. That definition tends to yield a smaller floor area compared with the definition that is aligned with the Nationally Described Space Standard and used on the EHS since 2013. As a result of the difference between the two definitions, some small terraced houses are reported in the 2014 Housing Supply Report as having more than 70m².
- **medium/large terraced house:** a house with a total floor area of 70m^2 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[25].
- **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.

[25] For further information see: www.gov.uk/browse/working/state-pension

- **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 Company Obligation (ECO) and **Green Deal (GD)** are Government energy efficiency schemes which began operating in 2013. They replaced the previous schemes: Carbon Emissions Reduction Target, Community Energy Saving Programme and Warm Front. Their aim is to improve the efficiency of Great Britain's homes by encouraging the uptake of energy efficiency measures, leading to impacts such as reduced consumer bills and increased comfort in the home.

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^2 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 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 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^2/year)
- *energy cost* (£/year) for space heating, water heating, lighting and renewables
- CO_2 (carbon dioxide) emissions (tonnes/year)

- **improvement measures:** The Technical Report provides a list of improvements specified in the updated EHS methodology. These include loft insulation measures, wall and floor insulation measures, boiler upgrades, solar water heating, glazing and lighting measures. They are also listed in the relevant Annex Table.

- **the notional costs of installing the recommended measures:** The EHS also estimates the notional costs of installing each of the recommended measures and the total cost of applying all the recommended measures to the dwelling stock. The methodology for estimating these costs has also been revised (see the Technical Report for further information).

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 2m² in addition to kitchen space). A fully converted room in the loft space is classified as a habitable room even if it can only be reached by a fixed ladder or unsafe staircase.

Heating controls:

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

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

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.
- **electricity**: standard rate electricity has the highest costs and CO_2 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_2 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.

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

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

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 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:

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.

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.

In compliance with new Building Regulations, an increasing proportion of dwellings built in 1991 or after with cavity walls had insulation fitted at the time of construction (known as 'as built' cavity wall insulation), although compliance could also be

achieved through other techniques. The non-intrusive survey undertaken in the EHS would not always be able to identify as built insulation, and the Survey has to assume that these properties have insulation. To align with current RdSAP methodology and to improve our methodology, the English Housing Survey has for 2015 data introduced a new variable, which assumes that properties built in 1995 or after has as built insulation. This is the assumption used in the RdSAP model, which in turn reflects that cavity wall insulation was not used as often as previously thought to comply with the new Building Regulations in the early 1990s.

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

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

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’.

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).

Off-peak electricity: This supply is identified by the presence of a multi-rate meter (as opposed to single rate), and is able to provide discounted electricity tariffs during periods of reduced demand (such as at night). This can reduce the cost of heating, most commonly for those with, storage radiator systems. For cases where presence of off peak electricity was unknown we have assumed this to be not present if there is no off-peak heating or hot water system. Any remaining unknown cases were also assumed to not have off-peak electricity for ease of analysis.

Older households: Households where the oldest person in the household is aged 55 or over.

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.

Region: A nine region classification is used to present geographical findings, as follows:

- North East
- North West
- Yorkshire and the Humber
- East Midlands
- West Midlands
- East
- London
- South East
- South West

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. In 2018 the RdSAP modelling methodology was updated to version 9.93 for half of the 2-year combined dataset. See EHS Technical Report, Chapter 5, for more details of the modelling.

Serious condensation or mould: See 'damp, condensation and mould'

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.

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).

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 $50m^2$
- 50 to $69m^2$
- 70 to $89m^2$
- 90 to $109m^2$
- $110m^2$ 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 finishes: The outer layer or skin of the material of the wall structure or any coating applied to it. Wall finishes include:

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

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

- **Cavity wall**: constructed of two brick or block walls separated by a cavity that is at least 50mm wide. They are generally found in houses dating from about 1930 onwards, although some older examples exist. Many dwellings (especially older private sector homes) have a mix of wall types because they have had one or more extensions added at different times. In the EHS dwellings are only classed as 'cavity wall' where at least 50% of the total external wall area is cavity brickwork.

- **Solid wall dwelling**: A dwelling whose structure comprises of solid brickwork i.e. no cavity inside the walls. Solid walls were mainly built until the 1930s in England.
- **Timber frame/concrete frame/other concrete/steel frame dwellings**: This category covers a wide range of building types, ranging from traditional timber frame buildings to non-traditional concrete or steel frame buildings using 'systems' of building focused on speed and economy of construction. They

usually use pre-constructed frames of material, e.g. timber, concrete or steel, that are then erected on site. In some cases the frames may be constructed on site. The frames can be clad with other materials or filled to form panels.

- **Masonry walled dwellings:** Dwellings with walls constructed by laying individual masonry units (e.g. brick, concrete block or stone). The masonry units are normally laid with cement mortar, which binds them together to create a structure. They can be either cavity or solid wall.

Water heating controls:

- **Cylinder thermostat**: A thermostat is a device that automatically controls temperature. Thermostats are usually attached to the outsider of the hot water cylinder but can also comprise a diverter valve type arrangement with a thermocouple connected to the tank.
- **Time-clock:** A system whereby the water heating is controlled by the same device that controls the central heating or by an independent timer.

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)

Younger households: Households where the oldest person in the household is aged less than 55 years.

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.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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