Ministry of Housing, Communities & Local Government

English Housing Survey

Energy report, 2019-20

ENGLISH HOUSING SURVEY

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 2019-20 survey.

2. This report is split into four chapters. The first chapter presents an overview of the energy efficiency of the housing stock and how it has changed over the past 10 years. It then focusses on the household characteristics of owner occupiers in relation to the energy efficiency of the dwellings they live in. The final part of the chapter reports on the common energy efficiency improvement measures by tenure.

3. Chapter two explores the presence of different heating systems, by dwelling characteristics. The second part reports on whether householders had changed their fuel supplier as well as what tariffs they are on. Finally, the chapter reports on the prevalence of smart meters and how uptake may differ by household characteristics.

4. Chapter three reports on the financial support for installing energy improvement measures that householders may have received. The second part looks at the cost of improving all dwellings in the English housing stock if all the recommended measures considered during an Energy Performance Certificate (EPC) assessment were applied. Finally, the chapter explores the costs of improving dwellings with an energy efficiency rating (EER) band of D or below, to at least an EER band of C.

5. Chapter four reports on the prevalence of ventilation and condensation, damp or mould in homes, and the differences by tenures. It then examines the actions households undertook to mitigate any damp they had reported, and the measures households undertook to keep cool in their home.

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

Main findings

The energy efficiency of English homes has improved over the last decade.

- The proportion of dwellings in the highest EER bands of A to C, increased from 12% in 2009 to 40% in 2019, 47% were in band D (44% in 2009), 10% in band E (32% in 2009) and 3% in bands F or G (12% in 2009).

Social rented homes remain the most energy efficient, though there have been marked improvements across all tenures in the last decade.

- In 2019, social rented homes were generally the most energy efficient (61% in bands A to C, up from 23% in 2009). Meanwhile, 38% of homes in the private rented sector and 36% of owner occupied homes were in bands A to C in 2019 (up from 13% and 8% respectively in 2009).

Over two thirds of homes with lower energy efficiency, of D or below, could be brought up to band C for a cost of less than £10,000.

- It would cost less than £10,000 to improve over two thirds of dwellings (69%) to a band C, and about £15,000 or more to improve 11% of dwellings.

- The average cost to raise dwellings with an EER band D to G into an EER band C was estimated to be £8,110. The average cost was highest for owner occupied homes (£8,579), followed by the private rented sector (£7,646). The average costs for local authority and housing association dwellings were similar at £6,067 and £5,910, respectively.

Average fuel savings for dwellings that could be improved to a band C were almost £300 a year.

- For those dwellings that were able to be improved to an EER band C, the average fuel cost savings were £298 per year. Owner occupied dwellings had the highest average fuel cost saving at £324, followed by private rented dwellings, at £279. The average fuel cost savings for local authority and housing association dwellings were lower, at £162 and £167 respectively.

Owner occupiers were more likely to have a boiler system with radiators and gas central heating than renters. Half of dwellings with heat pumps were also owner occupied.

- Most (90%) English homes have a boiler system with radiators as their main heating system. Such systems were more prevalent in owner occupied dwellings (94%) than local authority (89%), private rented (83%) and housing association (83%) dwellings.

- Dwellings in the private rented sector were more likely to have room heaters as their main heating system compared with all other tenures whereas social rented dwellings were more likely to have communal heating than other tenures.

- Of the 103,000 dwellings that had a heat pump in 2019, half were owner occupied (50%), around a quarter were owned by housing associations (23%), and 16% were owned by local authorities. The remaining 11% were in the private rented sector.

Over three quarters of households had not changed their electricity or gas supplier or tariff in the last 12 months. Owner occupiers were more likely to report switching suppliers or tariffs than renters.

- In 2019, 23% households mentioned having changed suppliers, 19% had changed both electricity and gas, 3% had just switched their electricity supplier and fewer than 1% changed their gas supplier only

- Owner occupiers were more likely to have changed both their electricity and gas suppliers (21%) compared with private renters (15%), housing association renters (14%) and local authority renters (13%).

- Owner occupiers were also more likely to have changed both electricity and gas tariffs (15%) compared with private renters (7%), housing association renters (6%) and local authority renters (5%).

Vulnerable households were more likely to have problems with serious damp.

- In 2019, around 2% or 455,000 dwellings had a problem with damp.

- Overcrowded households were more likely to experience problems with damp (6%) compared with households living at the bedroom standard (3%) or under occupying (1%) their home.

- Serious damp issues were more prevalent among households where the HRP was unemployed (7%) compared with households where the HRP was inactive (3%), in part-time work (3%), full-time work (2%) and full-time education (1%).

- Lone parents with independent children (4%) and lone parents with dependent children (3%) were more likely to have serious damp issues in their home than couples with no children (1%). Couples with no children were also less likely to have issues with damp (1%) than couples with dependent children (3%).

Acknowledgements and further queries

7. Each year the English Housing Survey relies on the contributions of a large number of people and organisations. The Ministry for Housing, Communities and Local Government (MHCLG) would particularly like to thank the following people and organisations, without whom the 2019-20 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.

8. This report was produced by Ana Clara Slater, Emma Munkley and Emma Woods at BRE in collaboration with NatCen Social Research and MHCLG.

9. 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

Energy Efficiency

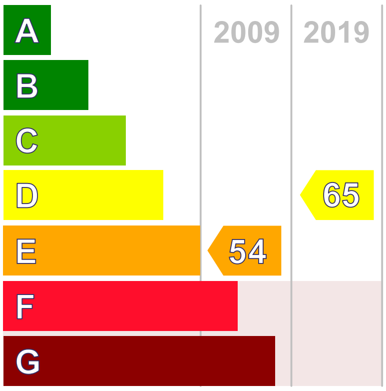
Ministry of Housing, Communities & Local Government

ENGLISH HOUSING SURVEY

NatCen Social Research

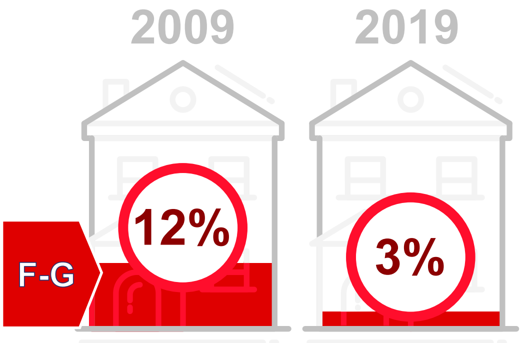
bre

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

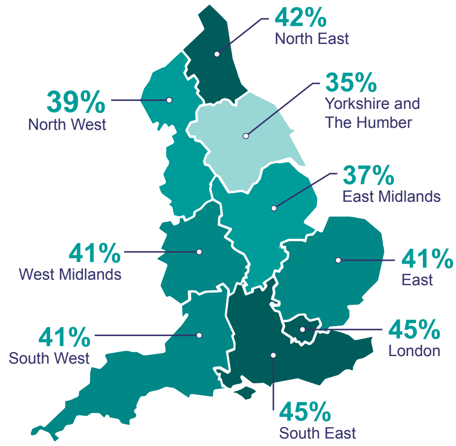


The figures show the average SAP rating.

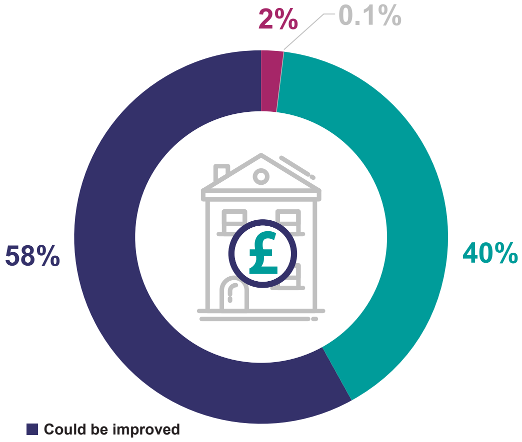
Only 3% of dwellings are now in bands F to G



The South East and London were more likely to have A to C rated homes



Over half of homes could be improved to band C



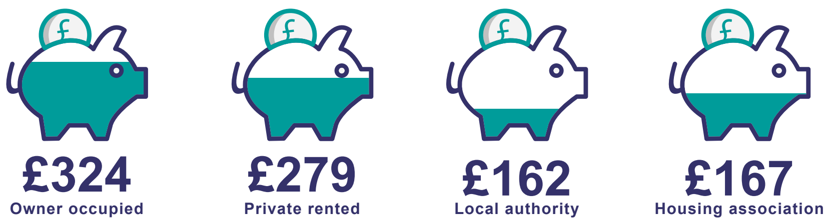
- Could be improved
- Already band C or above
- Unable to reach band C
- Not eligible

The cases unable to reach band C could technically be improved through measures not mentioned in an energy performance certificate (EPC).

A small proportion of dwellings were ineligible to receive any improvement measures and therefore have no estimated costs.

The average cost to improve dwellings to band C was £8,110

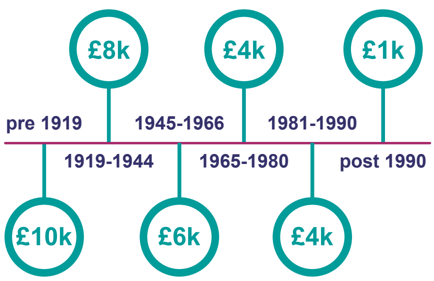
The average annual energy cost saving when improving dwellings to band C was £298



Annual energy costs after improvements have been made

High rise and low-rise purpose-built flats were more likely to cost less than £1,000 to improve to band C than other dwelling types

Older houses were more likely to cost more to improve to band C



See English Housing Survey *Energy Efficiency report, 2019-20* for more information.

Chapter 1
Energy efficiency profile

1.1 The first part of this chapter presents an overview of the energy efficiency of the English housing stock and how this has changed between 2009 and 2019. The second part focuses on the household characteristics of owner occupiers in relation to the dwelling's energy efficiency rating. The final part of the chapter reports on the prevalence of some of the most common energy efficiency improvement measures and how these may differ by tenure.

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).

1.3 The EER is also converted into an A to G banding system, where band A represents high energy efficiency and band G represents low energy efficiency[1]. The EER is the primary rating presented on an Energy Performance Certificate (EPC).

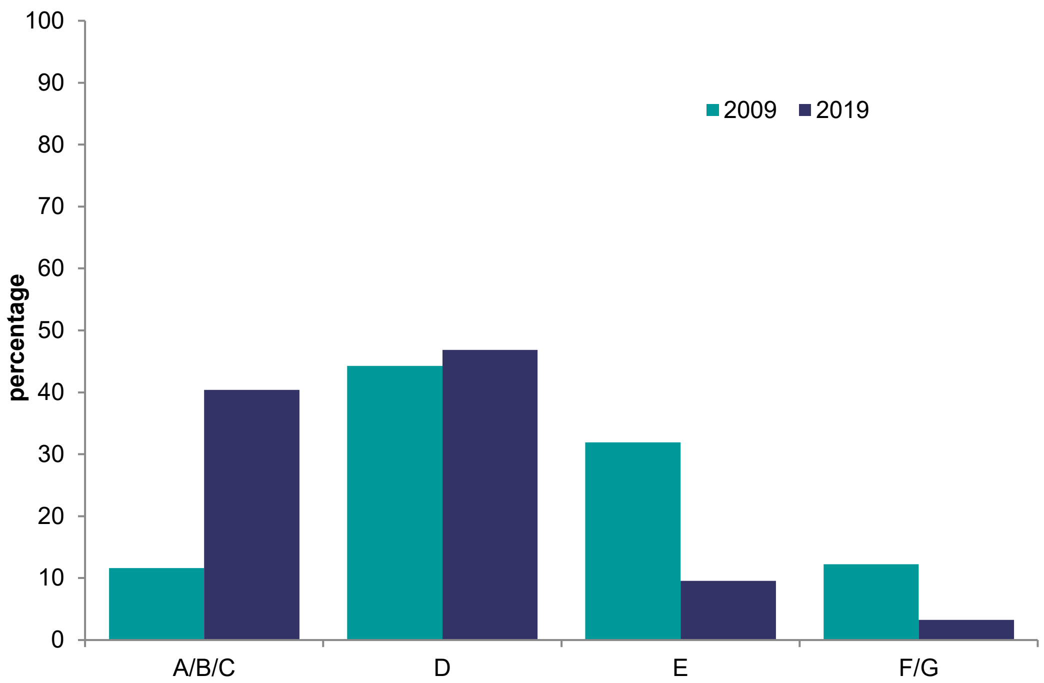
1.4 The mean SAP rating for all dwellings was 65 in 2019, up from 54 in 2009. This represents an improvement of around one EER band, with the average dwelling improving from EER band E in 2009 to EER band D in 2019. Dwellings in all tenures have seen increases in average energy efficiency ratings over this period. Between 2009 and 2019, 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 8 points, Annex Table 1.1.

1.5 In 2019, 40% of (or 9.9 million) dwellings were in EER band A to C, 47% were in band D, 10% in band E and just 3% were in bands F or G, Annex Table 1.4.

1.6 The proportion of dwellings in the highest EER bands of A to C, increased from 12% in 2009 to 40% in 2019. Over the same period there was also a fall in the proportion of dwellings in the lowest EER bands of F or G, by nine percentage points, from 12% to 3%, Figure 1.1.

[1] 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). See Glossary for further information on SAP and EER bands.

Figure 1.1: Energy efficiency rating bands, 2009 and 2019



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

Tenure and dwelling characteristics

1.7 Dwellings in the social rented sector are generally the most energy efficient. In 2019 social rented dwellings were more likely to be in the highest EER bands of A to C (61%) compared with private rented (38%) and owner occupied (36%) dwellings, Annex Table 1.4. A similar trend was observed in 2009; the social rented sector (23%) had the highest proportion of dwellings with an EER band of A to C compared with private rented (13%) and owner occupied (8%) homes, Annex Table 1.2

1.8 In 2019, the proportion of owner occupied dwellings in EER bands A to C were similar to those of private rented dwellings, but this was not the case in 2009 when owner occupied dwellings were least likely to be in EER bands A to C compared with all other tenures. This was mostly driven by a substantial improvement to the energy efficiency of owner occupied dwellings.

1.9 There has been a marked fall in the proportion of F or G rated dwellings. The proportion of dwellings in the private rented sector decreased from 17% in 2009 to 4% in 2019 while the proportion of F or G rated owner occupied dwellings fell from 13% in 2009 to 4% in 2019.

1.10 Over three quarters (77%) of dwellings built after 1990 had an EER band of A to C and were most likely to be the most energy efficient while dwellings built before 1919 were the least energy efficient; 8% had an EER band of F or G, Annex Table 1.4.

1.11 Purpose-built flats were the most energy efficient of all dwelling types. In 2019, 78% of purpose built, high rise flats and 69% of purpose built, low rise flats were in the highest EER bands of A to C. Conversely, converted flats (5%) had the highest proportion of F or G rated dwellings compared with other flats. Among other dwellings, bungalows (6%) and detached houses (5%) were the least energy efficient (EER bands F or G).

Region

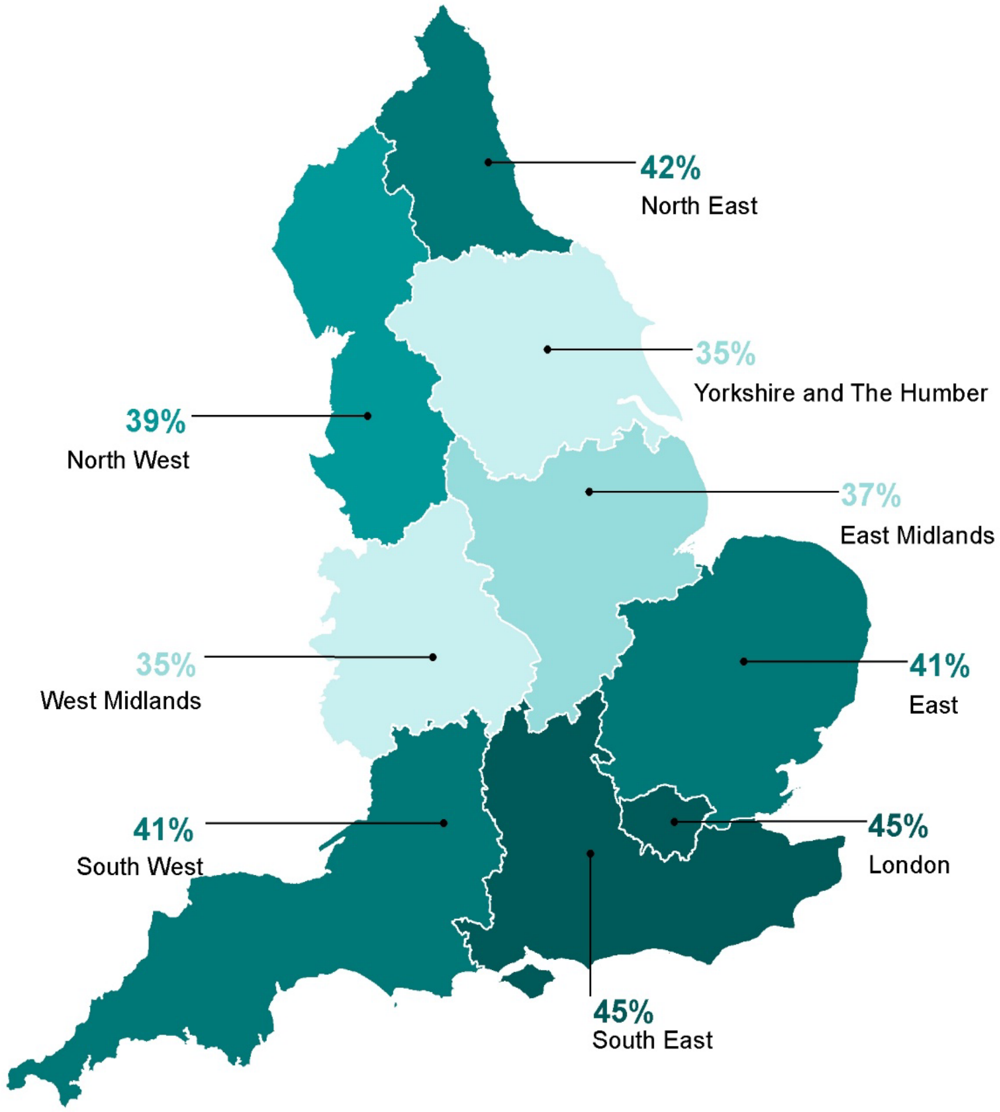
1.12 This section summarises how the energy efficiency of dwellings differs across regions. Assumptions on weather conditions, including external temperatures and wind speeds, are standardised for all dwellings when modelling the EER bands under the SAP methodology. Patterns of energy efficiency by region are therefore not affected by differences in regional weather and are instead driven by differences in the physical characteristics of dwellings[2].

1.13 There were some differences in the energy efficiency of the stock by region; for example, dwellings in the South East and London were more likely to have A to C rated homes (both 45%) than those in the West Midlands (35%) and Yorkshire and the Humber (35%), Figure 1.2.

1.14 The South West was generally more likely to have the least efficient (F or G rated) dwellings (6%) while London was generally less likely to have dwellings in bands F or G (1%), Annex Table 1.4.

[2] 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 and its improvement.

Figure 1.2: Proportion of A to C rated dwellings, by region, 2019



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

1.15 Between 2009 and 2019, the energy efficiency of homes improved in all regions. The South East had the largest percentage point increase (32) of A to C rated dwellings, from 13% in 2009 to 45% in 2019. Dwellings in the East Midlands had the largest fall (12 percentage points) in the proportion of F and G rated dwellings over the 10-year period (from 15% to 3%), Annex Table 1.3.

Energy efficiency ratings for owner occupiers

1.16 Among owner occupiers, there were distinct differences between outright owners and those buying with a mortgage in terms of the energy efficiency of their homes, Annex Tables 1.5 to 1.8. The reasons for these differences are complex and likely reflect the different types and ages of dwelling that the two groups live in (i.e. mortgagors are more likely to live in newer properties and flats whereas outright owners tend to live in older houses) and the fact that outright owners are, on average, older and have lived in their property for longer.

1.17 Over a third of all owner occupiers lived in an A to C rated dwelling (36%), half (50%) lived in an D rated dwelling, 11% in an E rated and just 3% lived in an F or G rated home, Annex Table 1.6.

1.18 Outright owners were less likely to live in the most energy efficient homes, EER bands A to C (31%) and more likely to live in the least efficient homes EER bands F and G (5%) than mortgagors (42% and 2%, respectively), Annex Tables 1.7 and 1.8.

1.19 The Home Ownership Report 2019-20 examines the most notable variations among homeowners; many differences were found to be associated with household age and, related to age, length of residence. Income did not change the likelihood of living in a more energy efficient home among mortgagors but was a factor for outright owners. Outright owners in the 1st (lowest) income quintile (26%) were less likely to live in EER band A to C homes than those in the 4th quintile (33%) and 5th (highest) quintile (34%).

1.20 Overall, there was no significant difference in the likelihood of a homeowner being in any one energy efficiency band, according to whether they had any savings. In addition, the distribution of homes in each energy efficiency band varied little by the amount of savings a household had.

Energy efficiency improvement measures

1.21 This section explores the prevalence of some of the most effective methods of increasing a dwelling's energy performance and examines variations by tenure.

Boiler systems

1.22 Condensing boilers are generally the most efficient boiler type and since the mid-2000s have been mandatory for new and replacement boilers. As expected, the proportion of dwellings with condensing (including condensing-combination) boilers has increased considerably. In 2001, just 2% of homes had these boilers types and by 2019 almost three quarters of the stock (74%) had condensing boilers[3].

1.23 Local authority dwellings had the highest proportion of condensing boilers (including condensing-combination) compared with other tenures (82%).

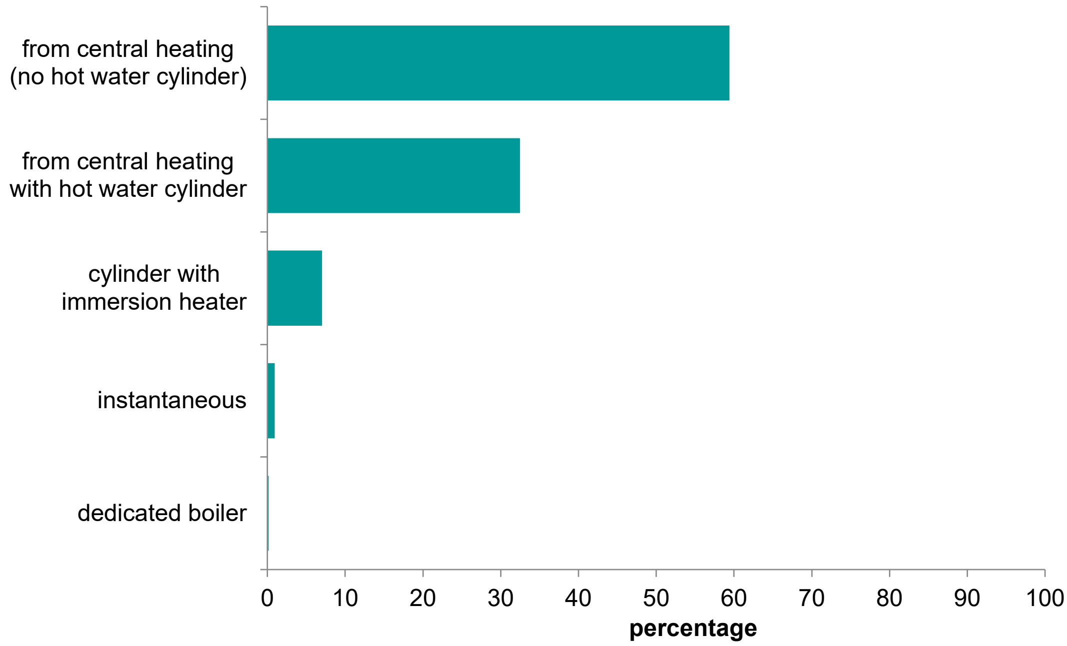
[3] See English Housing Survey Headline report 2019-20, Annex Table 2.11 https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report

Conversely, private rented dwellings had the lowest proportion of these boiler types (67%), Live Table DA6101.

Hot water cylinders and extent of insulation

1.24 Due to the increase in condensing-combination boilers, which provide instantaneous hot water without requiring a hot water cylinder, 59% of dwellings in 2019 used their central heating system to provide hot water *without* a separate cylinder. Around a third (32%) used their central heating system to provide hot water through a separate hot water cylinder, 7% had a hot water cylinder and immersion heater as the primary means of water heating and less than two percent had an instantaneous water heater or dedicated boiler (1% and 0.2%, respectively), Figure 1.3.

Figure 1.3: Hot water heating systems, 2019



Base: all dwellings

Sources: English Housing Survey, dwelling sample

1.25 Owner occupied dwellings had a higher proportion of central heating systems that provided hot water through a separate hot water cylinder (37%) compared with local authority (26%), housing association (24%) and private rented (23%) dwellings. Conversely, owner occupied dwellings were less likely to have a central heating system *without* a tank (57%) than other tenures. Private rented (12%) and housing association (11%) dwellings were more likely to have a hot water cylinder with an immersion heater than both local authority and owner occupied dwellings (both 5%).

1.26 Of the 8.9 million dwellings with a cylinder present and known levels of insulation, fewer than one percent of cylinders had no insulation[4]. Most cylinders (41%) had 25mm of insulation and under a quarter (21%) had 50mm or more[5]. Housing association (22%) and private rented (22%) dwellings were more likely to have 50mm of hot water cylinder insulation than owner occupied (18%) and local authority (16%) dwellings, Annex Table 1.10.

Solar photovoltaic panels and hot water heating[6]

1.27 Feed-in tariffs, introduced in 2010, provide small scale generators of electricity, such as those from small PV panels, with tariff payments on generation and potentially export of renewable and low carbon electricity. The level of Feed-in Tariff available has reduced over time. In 2019, there were an estimated 1.1 million dwellings (5%) with photovoltaic panels and 205,000 homes (1%) with solar panels for hot water, Annex Table 1.11.

Loft insulation

1.28 In 2019, almost half of all dwellings (49%) had at least 150mm of loft insulation[7]. Overall, owner occupied dwellings were most likely to have more than 150mm or more of insulation, Live Table DA6201.

Wall insulation

1.29 Around half (50%) of all dwellings had cavity or solid wall insulation[8]. Of homes with cavity walls (69% of total), 68% were insulated, and of homes with solid walls (29% of total), 11% were insulated. Other wall types made up the remaining 2% of dwellings, Annex Table 1.12.

1.30 Insulated cavity walls were more common in housing association dwellings (60%) compared with other tenures, especially private rented dwellings (31%). Overall, the private sector had the highest proportion of uninsulated solid walls. Over a third (38%) of private rented and around a quarter (26%) of owner occupied dwellings had uninsulated solid walls compared with 19% of local authority and 12% of housing association dwellings, Figure 1.4.

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[4] The thickness of the insulation has a smaller impact on performance than the type of insulation (i.e. a thinner layer of sprayed foam will perform better than a thicker quilt).

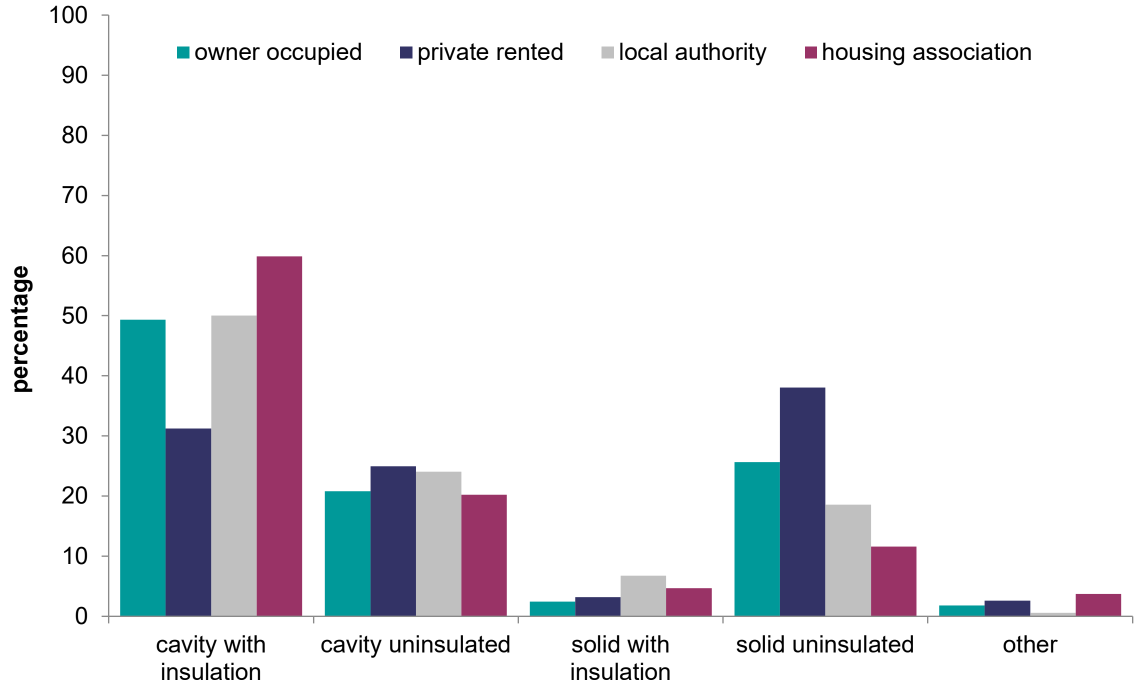
[5] These figures are percentages of dwellings where the insulation level was known. Around 10% of hot water cylinders had unknown insulation levels.

[6] Solar photovoltaics (PV) generate electricity, by which a photon (the basic unit of light) impacts a surface made of a special material which generates the release of an electron. Solar thermal panels, however, use sunlight to heat up water stored in a cylinder.

[7] Dwellings with no loft present have been included in this analysis.

[8] Solid wall insulation is either applied externally (e.g. insulated board attached to the external face with a render finish), changing the appearance of the dwelling, or internally (e.g. insulated plasterboard fitted to the exposed walls inside each room, with a plaster finish), reducing useable floor area. It can also be more expensive than cavity wall insulation.

Figure 1.4: Wall construction, by tenure, 2019



Base: all dwellings

Sources: English Housing Survey, dwelling sample

1.31 Taking dwellings with predominantly cavity or solid walls separately, 68% of dwellings with predominantly cavity walls had insulation installed compared with only 11% of dwellings with predominantly solid walls[9].

1.32 Among dwellings with solid walls, the social rented sector had a higher proportion with solid wall insulation (28%) than the private sector (8%). Among dwellings with cavity walls, the private rented sector had a lower proportion of dwellings with cavity insulation (56%) than the other tenures (for example, 70% of owner occupied dwellings and 72% of social rented sector dwellings).

Solid floors

1.33 Solid floors, unlike suspended floors, can be more problematic when installing floor insulation. The vast majority (80%) of dwellings in England had solid floors present in at least one of the surveyed rooms[10]. Dwellings with suspended floors were in the remaining 20% of the stock, Annex Table 1.13.

1.34 Local authority dwellings were more likely to have solid floors (88%) compared with housing association (85%), owner occupied (79%) and private

[9] English Housing Survey, 2019-20 Headline Report, Annex Table 2.14 https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report
[10] Surveyed rooms are living room, kitchen, main bedroom, bathroom, and circulation area.

rented (76%) dwellings. Private rented dwellings were least likely to have solid floors in at least one room than other tenures.

Double glazing

1.35 In 2019, 86% of homes in England had full double glazing, up from 73% of homes in 2009. Housing association (95%) and local authority (94%) dwellings had a higher proportion of fully double-glazed windows than owner occupied (84%) and private rented (83%) dwellings. Private rented dwellings were more likely to have no double-glazing at all (6%) compared with other tenures, Live Table DA6201.

Chapter 2
Heating and energy costs

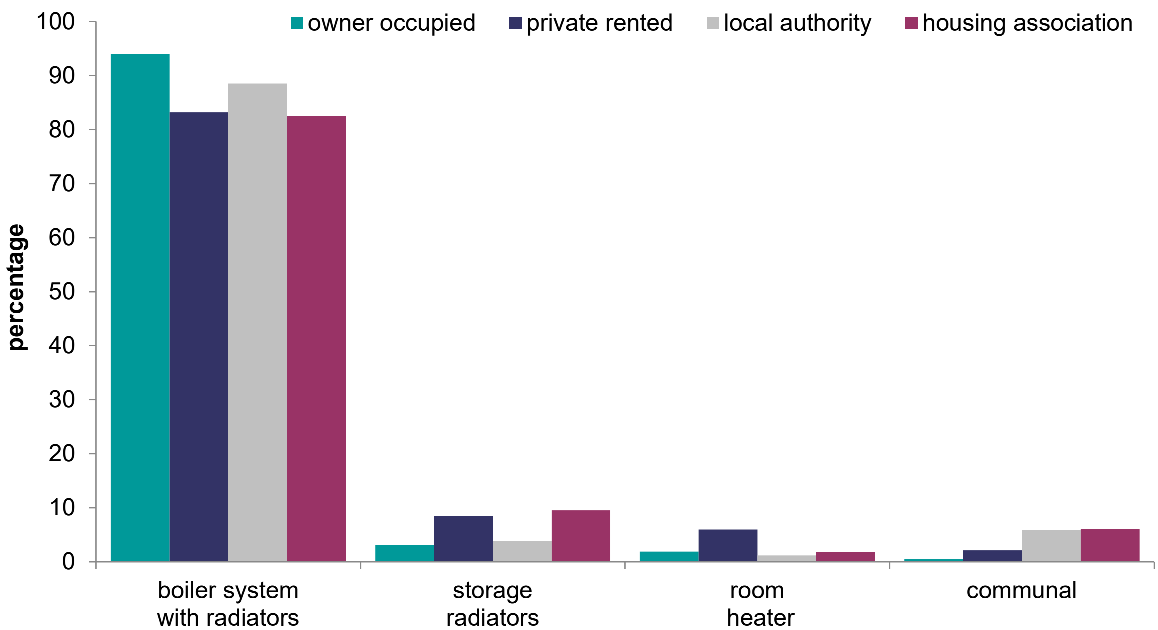
2.1 This chapter explores the presence of different heating systems, and how these varied by dwelling characteristics. It also reports on fuel tariffs and whether householders had changed their fuel supplier in the last 12 months. Finally, the chapter reports on the prevalence of smart meters and how uptake varies by household characteristics.

Heating systems

2.2 In 2019 boiler systems with radiators and/or underfloor heating were by far the most common main heating system, with 22.1 million of dwellings with this type of heating system (90%). The second most common main heating systems were storage radiators (5%) followed by room heaters (3%) and communal heating (2%), Annex Table 2.1.

2.3 Owner occupied dwellings were more likely to have a boiler system with radiators (94%) compared with local authority (89%), private rented (83%) and housing association (83%) dwellings, Figure 2.1.

Figure 2.1: Most common heating systems, by tenure, 2019



Base: all dwellings

Sources: English Housing Survey, dwelling sample

2.4 Dwellings in the private rented sector (6%) were more likely to have room heaters as their main heating system compared with all other tenures whereas social rented dwellings (6%) were generally more likely to have communal heating compared with private rented dwellings (2%), Annex Table 2.1.

2.5 Houses were more likely to have a boiler system with radiators than flats. Conversely, among the 5% (or 1.2 million) of dwellings that had storage radiators as their main heating system, over half (56%) were purpose-built low-rise flats. Flats were also more likely to have room heaters as their main heating system compared with houses.

Heating system with fuel type

2.6 In 2019, gas central heating was the most common heating system (86%) followed by electric storage heaters (5%) and oil central heating (3%), Annex Table 2.2.

2.7 There were variations by tenure and dwelling characteristics. Owner occupied dwellings were more likely to have gas central heating (89%) than local authority (87%), housing association (80%) and private rented (80%).

2.8 Dwellings built from 1919 to 1964 had a higher prevalence of gas central heating (93%) compared with those built before 1919 (84%) and after 1965 (81% to 84%). On the other hand, dwellings built after 1965 were more likely to have electric storage heaters compared with dwellings built before 1964. These findings are likely to be driven by trends in dwelling types.

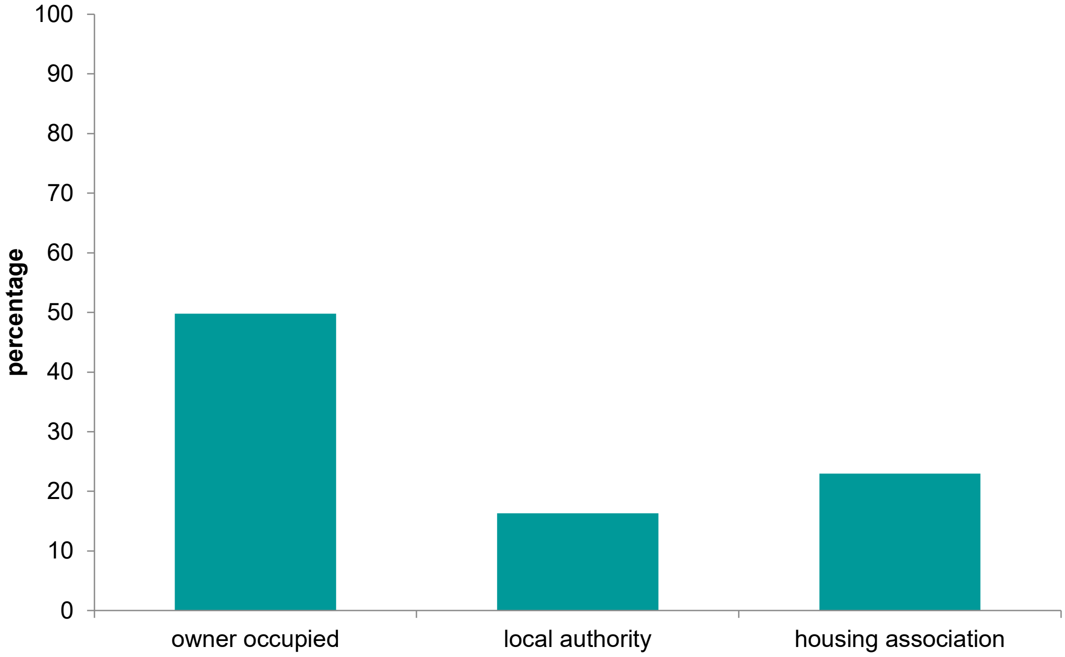
2.9 Medium to large terraced houses (95%), semi-detached houses (93%) small terraced houses (92%), detached houses (88%) and bungalows (83%) were more likely to have gas central heating compared with flats, particularly purpose-built high rises (39%). Around a quarter (26%) of purpose-built high-rise flats had communal heating as the main heating system.

Heat pumps

2.10 Heat pumps make use of heat from a source (air, ground or water) and have the potential to provide heating 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. Less than 1% of the stock or 103,000 dwellings had a heat pump for space and/or water heating, Annex Table 2.3.

2.11 Of the 103,000 dwellings that had a heat pump, half were owner occupied (50%), around a quarter were owned by housing associations (23%), and 16% were owned by local authorities, Figure 2.2. The proportion of homes with a heat pump in the private rented sector is too small to report.

Figure 2.2: Heat pumps, by tenure, 2019



Base: all dwellings with heat pumps

(1) sample size for private rented is too small for reliable estimate
(2) underlying data are presented in Annex Table 2.3
Sources: English Housing Survey, dwelling sample

Heating controls

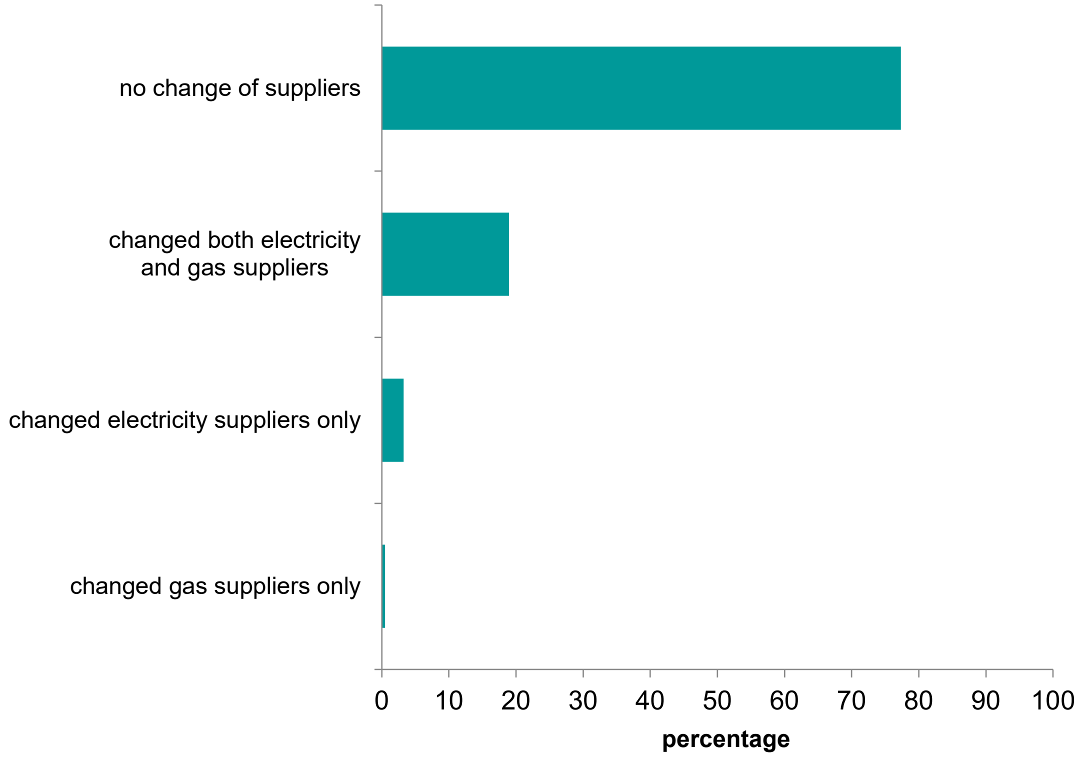
2.12 Virtually all homes (99%) had heating controls which may offer households flexibility and comfort around the internal temperatures of their homes as well as contribute to potential fuel cost savings. Purpose-built high-rise flats, however, were generally less likely to have had heating controls present (95%) compared with other dwelling types, Annex Table 2.4.

Fuel tariffs

Changing electricity and/or gas suppliers

2.13 Householders were asked whether they had changed their electricity and/or gas supplier in the last 12 months. Over three quarters of households (77%) mentioned that they had not changed their electricity or gas supplier. Of the 23% of households who mentioned having changed suppliers, 19% had changed both electricity and gas, 3% had just switched their electricity supplier and fewer than 1% changed their gas supplier only, Figure 2.3.

Figure 2.3: Reported changes to gas and/or electricity suppliers, 2019-20



Base: all households

(1) analysis excludes 'don't know' responses
(2) underlying data are presented in Annex Table 2.5
Source: English Housing Survey, full household sample

2.14 There were variations by tenure. Owner occupiers were more likely to have changed both their electricity and gas suppliers (21%) compared with private renters (15%), housing association renters (14%) and local authority renters (13%), Annex Table 2.5.

2.15 Around a fifth of households had changed both their electricity and gas suppliers in the previous 12 months. Households who lived in semi-detached (22%), detached/bungalow (22%), or terraced houses (19%) were more likely to have changed both their electricity and gas suppliers compared with those living in converted (14%) and purpose-built (11%) flats.

Changing electricity and/or gas tariffs

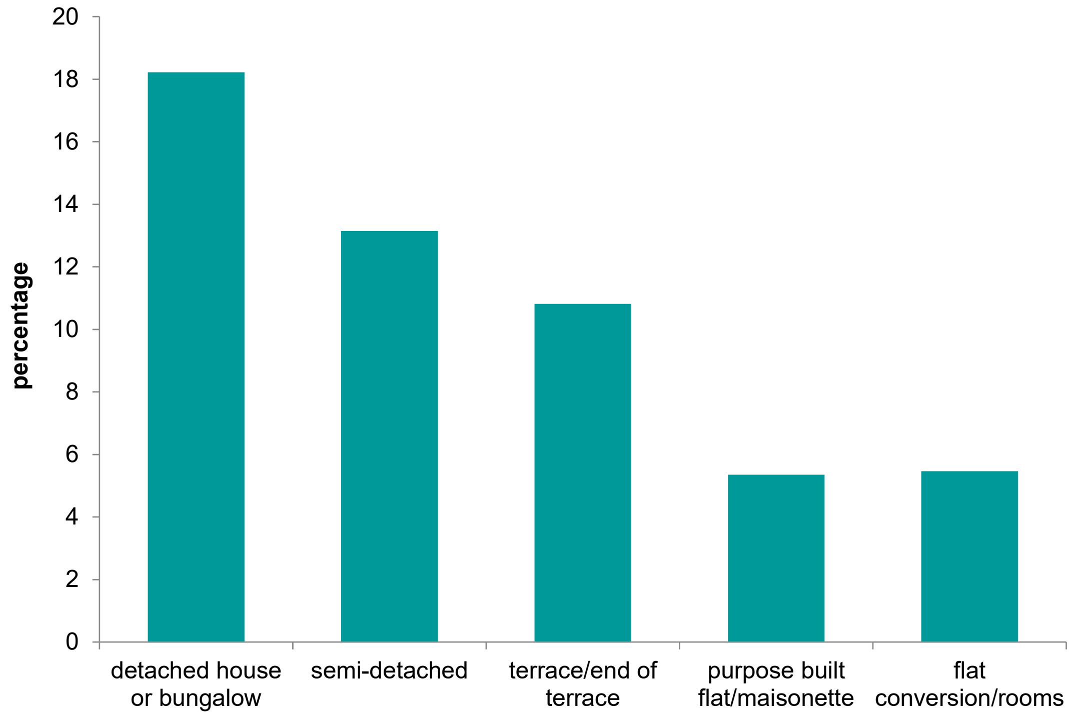
2.16 Households who had not changed their electricity and/or gas suppliers were asked whether they had changed their tariffs in the previous 12 months.

2.17 Most households (86%) had not changed their tariff for electricity or gas during this period. The 14% of households who mentioned switching tariffs comprised of: 12% who changed both their electricity and gas tariffs; 2% who changed just their electricity tariff; less than 1% who had changed their gas tariff only, Annex Table 2.6.

2.18 Mirroring the trends for changing suppliers, owner occupiers were more likely to have changed both electricity and gas tariffs (15%) compared with private renters (7%), housing association renters (6%) and local authority renters (5%).

2.19 Households in detached (18%), semi-detached (13%) and terraced (11%) houses were generally more likely to have changed both their electricity and gas tariffs compared with those in converted (5%) and purpose-built (5%) flats, Figure 2.4.

Figure 2.4: Reported changes to gas and electricity tariffs, by dwelling type, 2019-20



Base: all households who didn't change their electricity/gas supplier

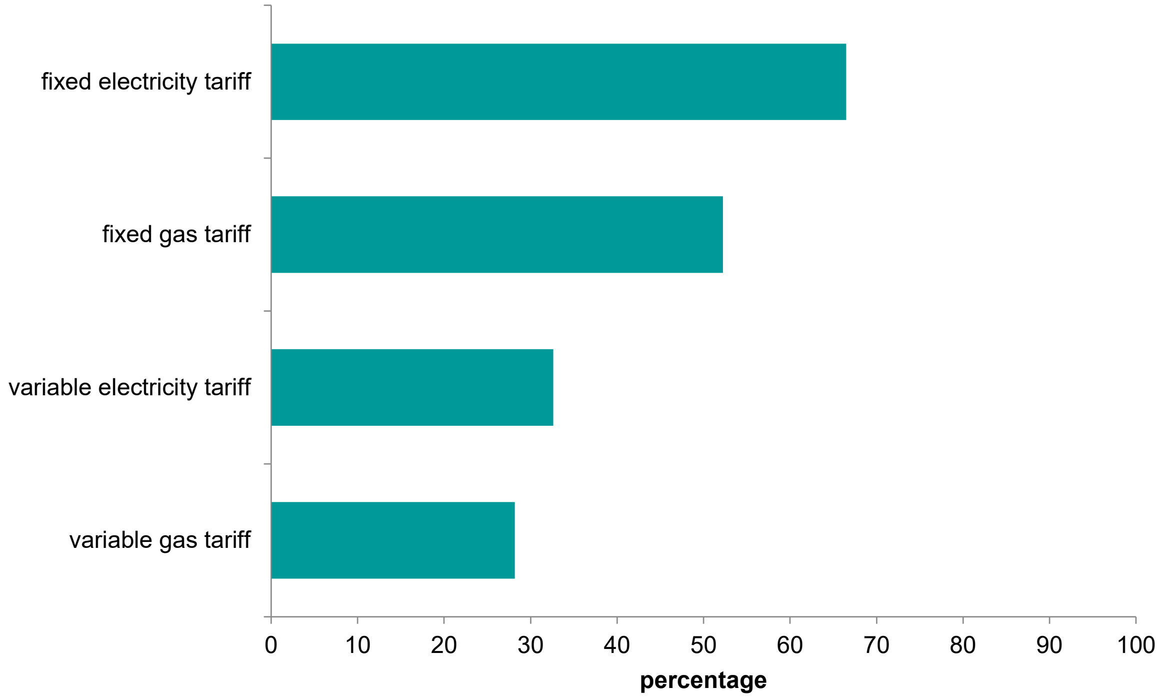
(1) analysis excludes 'don't know' responses
(2) underlying data are presented in Annex Table 2.6
Source: English Housing Survey, full household sample

Tariffs

2.20 Households who had not changed their electricity and/or gas suppliers or tariffs, were asked what tariffs they were on[11]. Two thirds (66%) of households mentioned having a fixed electricity tariff, over half (52%) mentioned having a fixed gas tariff, a third (33%) mentioned having a variable electricity tariff, and 28% mentioned having a variable gas tariff, Figure 2.5.

[11] Some households chose more than one tariff type (i.e. both a fixed electricity tariff and a variable electricity tariff).

Figure 2.5: Current electricity/gas tariff, 2019-20



Base: all households who didn't change their electricity tariffs

(1) percentages are within each group. For example, 66% of households mentioned having fixed electricity tariff while the remaining 34% did not mention it.
(2) analysis excludes 'don't know' responses
(3) please note that households may have chosen more than one tariff (i.e. both variable and fixed electricity tariffs)
(4) underlying data are presented in Annex Table 2.7
Source: English Housing Survey, full household sample

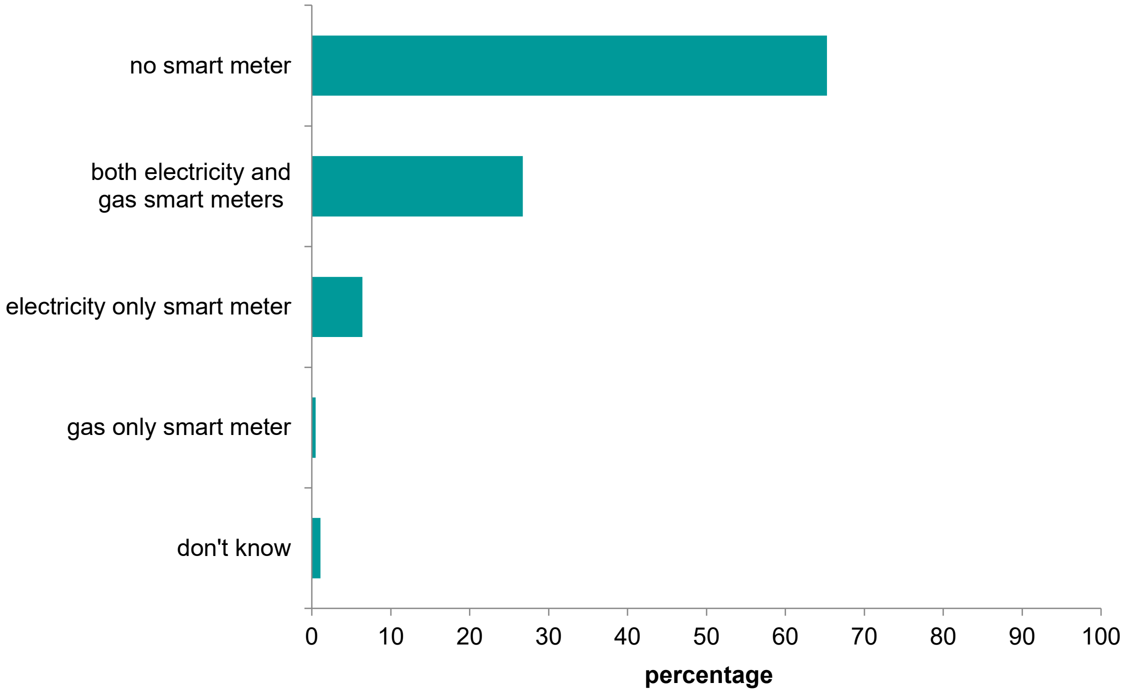
2.21 Those living in purpose-built flats (62%) were less likely to have a fixed electricity tariff than those in detached (69%) and semi-detached (69%) houses. Conversely, households who resided in semi-detached (59%), detached (53%) and terraced (53%) houses were more likely to have fixed gas tariffs compared with households in converted (43%) and purpose-built (39%) flats, Annex Table 2.7.

Smart meters

2.22 The rollout of smart meters is an essential national infrastructure upgrade that will make the country's energy system more efficient and flexible, helping to deliver net zero emissions by 2050. Smart meters are the next generation of gas and electricity meters and offer a range of new functions. For example, they can tell residents how much energy they are using in pounds and pence via an In-Home Display. Smart meters communicate directly with the energy supplier, which avoids manual meter reads and provides customers with accurate bills.

2.23 In 2019, around a third (34%) of households reported having a smart meter present in their home. Over a quarter (27%) of households had a smart meter for both electricity and gas, 6% of households with smart meters for electricity only and less than 1% of households had a smart meter for gas only. The remaining 66% comprised of households who did not have a smart meter (65%) or did not know whether they had a smart meter (1%), Figure 2.6[12].

Figure 2.6: Whether households had a smart meter, 2019-20



Base: all households

(1) analysis excludes vacant homes
(2) underlying data are presented in Annex Table 2.8
Source: English Housing Survey, household sub sample

Dwelling characteristics

2.24 Local authority (41%) and housing association (39%) renters were more likely to have smart meters compared with owner occupiers (35%) and private renters (25%), Annex Table 2.9.

2.25 Households living in older dwellings, built before 1919 (26%), were less likely to have smart meters than dwellings post 1919 (30% or more).

[12] The EHS results are broadly in line with smart meter statistics from the Department for Business, Energy, and Industrial Strategy (BEIS) for 2019. The latest BEIS data shows that 19.8 million smart meters (or 36% of all meters) were operated in smart mode at the end of March 2021. Differences between EHS and BEIS statistics are likely to reflect the different time periods for data collection and the definition of smart meters (EHS surveyors may not differentiate between the most modern 'SMETS-compliant' smart meters and 'smart-type meters' or between meters operating in smart and non-smart mode). See BEIS Smart Meters Quarterly Report to end March 2021 Great Britain for further information: https://www.gov.uk/government/statistics/smart-meters-in-great-britain-quarterly-update-march-2021

2.26 Households living in houses were more likely to have smart meters than households living in flats. Households living in small terraced houses (38%), semi-detached houses (37%), bungalows (37%), medium/large terraced houses (36%) and detached houses (33%) were more likely to have smart meters than households living in purpose built, low rise (25%), high rise (24%) and converted flats (16%).

Household characteristics

2.27 Households where the HRP was aged between 16 and 34 years were less likely to have a smart meter in their home compared with households where the HRP was aged between 35 and 74 years, Annex Table 2.10.

2.28 Lone parents with dependent children (38%), couples with dependent children (37%) and couples with independent children (36%) were more likely to have a smart meter than lone person sharing with other lone persons households (27%).

2.29 Households where the HRP was in full-time education were least likely to have smart meters (17%) than households with other types of employment status.

2.30 There was no clear relationship between having a smart meter and income but households in the highest (5th) income quintile (31%) were less likely to have a smart meter than those in the second (37%).

Chapter 3
Energy improvement potential

3.1 This chapter reports on the financial support for installing energy improvement measures that householders may have received. It also reports on the cost of improving dwellings if all the recommended measures considered during an Energy Performance Certificate (EPC) assessment were applied. Finally, the chapter explores the costs of improving dwellings with an energy efficiency rating (EER) band of D or below, to at least an EER band of C.

Financial support for energy saving improvements

3.2 All households were asked whether they had ever received any financial help from government schemes to improve the energy efficiency of their home[13]. Almost 4 million households (17% of households) reported having received financial assistance for energy improvements, Annex Table 3.1.

3.3 Owner occupiers, especially those who own their home outright, were more likely to report having received financial help from the government for energy improvement works than renters[14]. For example, 27% of outright owners reported having received financial help for energy improvement measures compared with 5% of private renters.

3.4 Those living in newer dwellings (built after 1990) (8%) were less likely to report having received financial help from government schemes than those living in older dwellings, which tend to have poorer energy efficiency. Households living in dwellings built between 1945 and 1980 were most likely to have benefited from those schemes (21 to 23%).

3.5 Households living in flats (4%) were less likely to report having received financial help from government schemes compared with households living in detached or bungalow (22%), semi-detached (22%) and terraced (15%) houses.

[13] The question did not stipulate whether this was the current or previous home nor was any timescale applied to when the help was received, for example, whether it was in the previous 5 years.

[14] Figures for renters may be lower than expected as the landlord may have received financial support from the government without the tenant knowing.

Financial support for energy saving improvements for owner occupiers

3.6 Older owner occupiers were markedly more likely to have taken up a scheme than younger owner occupiers. For example, owner occupiers aged 75 or over were more likely to have received financial support for energy saving improvements than owner occupiers aged 25 to 34 (32% and 5%, respectively). This was the case for both outright owners and those with a mortgage, Annex Tables 3.2, 3.3, and 3.4.

3.7 Similarly, retired owner occupiers were more likely to have taken up a scheme than those either in full-time or part-time work for all owners. This was the case for both outright owners and those with a mortgage.

3.8 Households in the lowest (1st) income quintile were more likely to have taken up a scheme than households in the highest (5th) income quintile among all owners (29% and 15%, respectively), outright owners (30% and 23%, respectively), and mortgagors (26% and 10%, respectively).

3.9 Given the findings relating to the age of the HRP, it is not surprising that length of residence was a good predictor of receipt of financial support. Owner occupiers who had resided in their property for 30 or more years (37%) were more likely to have received financial help compared with households that had lived in their property for less than 1 year (4%). A similar trend was observed for outright owners and among those with a mortgage.

3.10 Among all owner occupiers, those who had more than £50,000 in savings were more likely to have taken up a scheme (24%) compared with those with no savings (20%), less than £1,000 in savings (15%), and £1,000 to £4,999 in savings (18%).

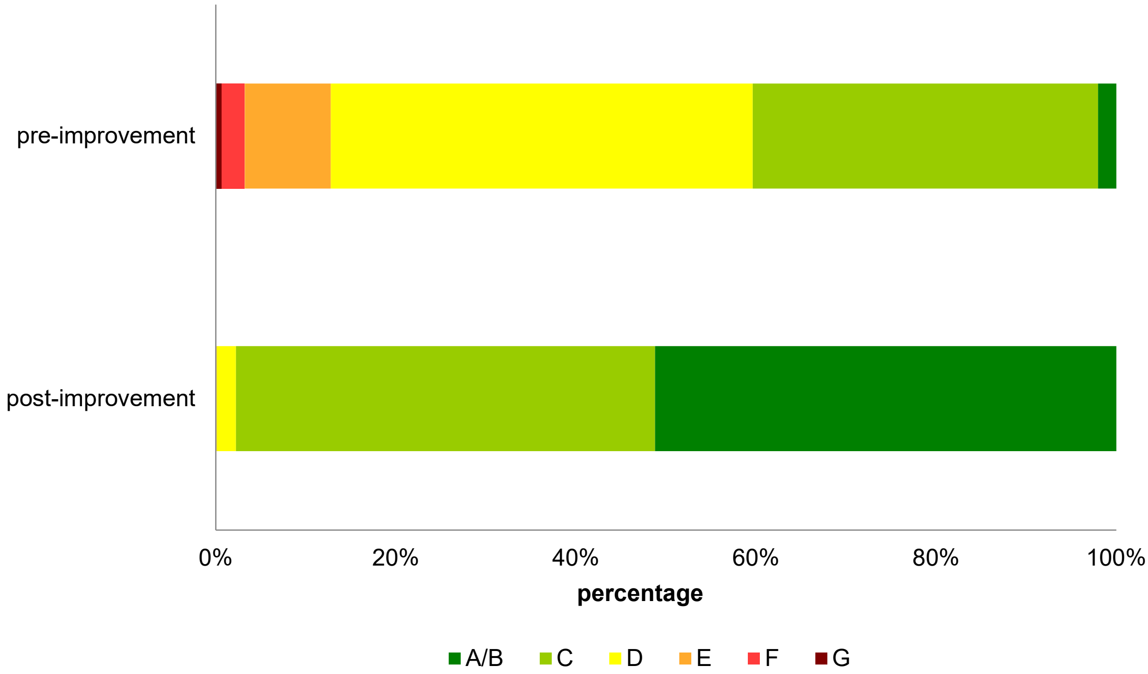
Cost of applying all energy improvement measures to all dwellings

3.11 This section examines the [total/full/maximum] potential to install energy efficiency improvement measures to all dwellings. The range of measures included in the model are those considered during an EPC assessment.

3.12 The potential installation of each energy efficiency improvement measure is modelled only where an EPC assessment would recommend its installation. The methodology 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.

3.13 In 2019, 40% of dwellings (9.9 million) were A to C rated; 47% (11.4 million) were D rated; 10% (2.3 million) were E rated and 3% (784,000) were F or G rated, Annex Table 1.2. If all eligible energy improvement measures, as defined in the EPC methodology, were to be installed in those dwellings, 98% of dwellings would fall into an EER band A to C , and just 2% of dwellings would have an EER band of D or lower, Figure 3.1.

Figure 3.1: SAP rating pre- and post-improvement, if all potential energy improvement measures were applied, 2019



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

Source: English Housing Survey, dwelling sample

3.14 Installing all the recommended energy improvement measures in homes currently banded F or G would result in an average saving of around £1,780 per year in energy costs. The equivalent saving for E rated dwellings would be around £920. For D rated dwellings this would be around £500, while savings for dwellings currently in bands A to C is much smaller, around £260, Table 3.1.

3.15 The average notional cost for installing all recommended energy efficiency measures in F or G band dwellings is also higher at around £25,800, while the average for E rated dwellings is slightly lower, at around £19,970. For D rated properties, it is around £14,560. The average notional cost for installing all recommended energy efficiency measures in A to C rated dwelling is around £8,500, Table 3.1.

Table 3.1: Installation cost, energy savings cost and payback period of energy efficiency measures, by EER band, 2019

	installation cost	energy cost saving (annual)	simple payback (years)
EER band			
A to C	£8,506	£264	33
D	£14,558	£504	29
E	£19,974	£922	22
F or G	£25,804	£1,780	14

Base: all applicable dwellings

1) improvement costs of low and high cost measures at 2019 prices
2) underlying data are presented in Annex Table 3.6
Source: English Housing Survey, dwelling sample

Cost of improving dwellings to a band C

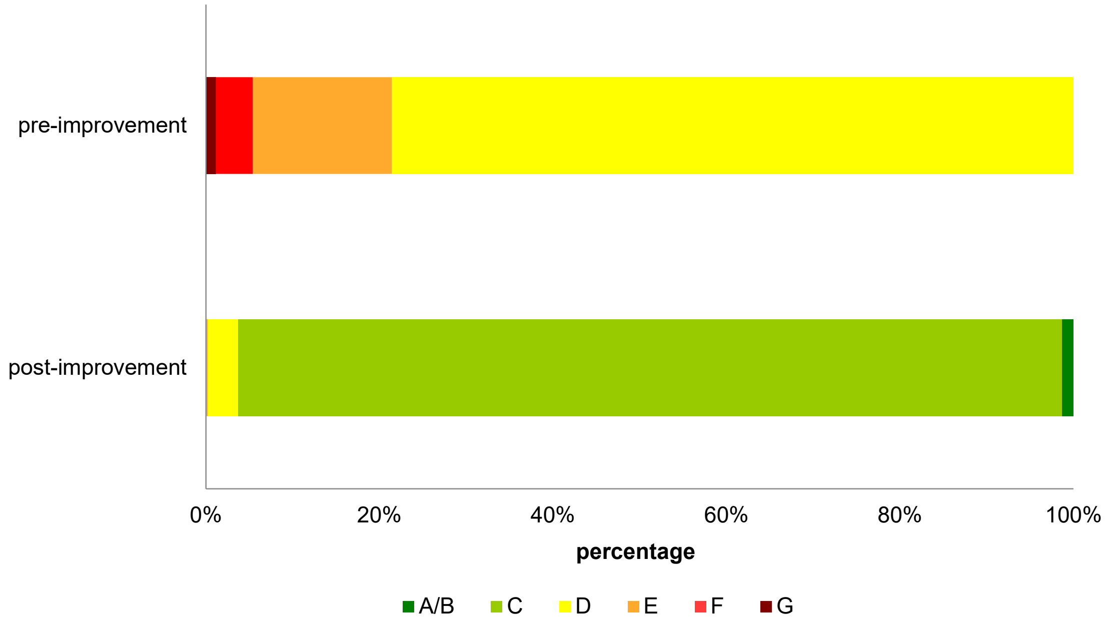
3.16 This section looks at the cost of improving dwellings with an energy efficiency rating (EER) band of D or lower to an EER band of at least C. The Government has set an aspiration for as many homes as possible to be EER Band C by 2035 where practical, cost-effective and affordable[15].

3.17 For each of the dwellings identified as having an EER band of D or lower, improvement measures were simulated cumulatively using SAP as the underlying methodology. After each improvement, the SAP rating was recalculated until the dwelling reached the threshold for EER band C (SAP rating of 68.5 or higher). The following analysis covers the 57% of dwellings that were able to reach an EER band C. The remaining dwellings in the stock were categorised as already having an EER band of C or higher (40%), receiving at least one improvement measure but were unable to reach EER band C (2%), or not eligible to receive any improvement measures (less than 1%)[16], Annex Table 3.7.

3.18 A dwelling's energy efficiency rating may also be improved beyond the target band in certain cases. This may occur where a dwelling's energy efficiency rating is already close to the band C threshold, and a measure with a high SAP improvement yield is installed, for example solid wall insulation, improving the dwelling beyond band C into the band B range.

[15] https://www.gov.uk/government/publications/clean-growth-strategy
[16] Some dwellings that were below an EER band C were eligible for certain improvement measures as part of the EPC framework, and therefore have estimated costs attached to them, but were unable to reach a band C using this methodology. However, a small proportion of dwellings were ineligible to receive any measures within the EPC framework, and therefore have no estimated costs.

Figure 3.2: EER band pre- and post-improvement, if potential energy improvement measures were applied to all dwellings rated below band C, 2019



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

Source: English Housing Survey, dwelling sample

3.19 If all energy improvement measures were applied to all dwellings rated below an EER band C, then 96% of dwellings would fall into an EER band of A to C and 4% of dwellings would have an EER band of D or lower, Figure 3.2.

3.20 Where it was possible for energy improvements to raise dwellings with an EER band D to G into an EER band C or higher, the average cost was estimated to be around £8,110. The average cost was highest for owner occupied homes at around £8,580 compared with both private and social rented dwellings. The next highest average cost arose in the private rented sector, around £7,650. The average costs for local authority and housing association dwellings were similar at around £6,070 and £5,910, respectively, Annex Table 3.8.

3.21 Installing all the recommended energy improvement measures in homes currently banded F or G would cost £18,858 and result in an average saving of around £1,339 per year in energy costs. The equivalent cost for E rated dwellings would be £13,285, resulting in savings of £594. For D rated dwellings this installation cost would be £6,472 and result in an energy cost saving of around £179, Table 3.2.

Table 3.2: Installation cost, energy savings cost and payback period of energy efficiency measures required to reach an EER band C, by EER band, 2019

	installation cost	energy cost saving (annual)	simple payback (years)
EER band			
D	£6,472	£179	36
E	£13,285	£594	22
F or G	£18,858	£1,339	14

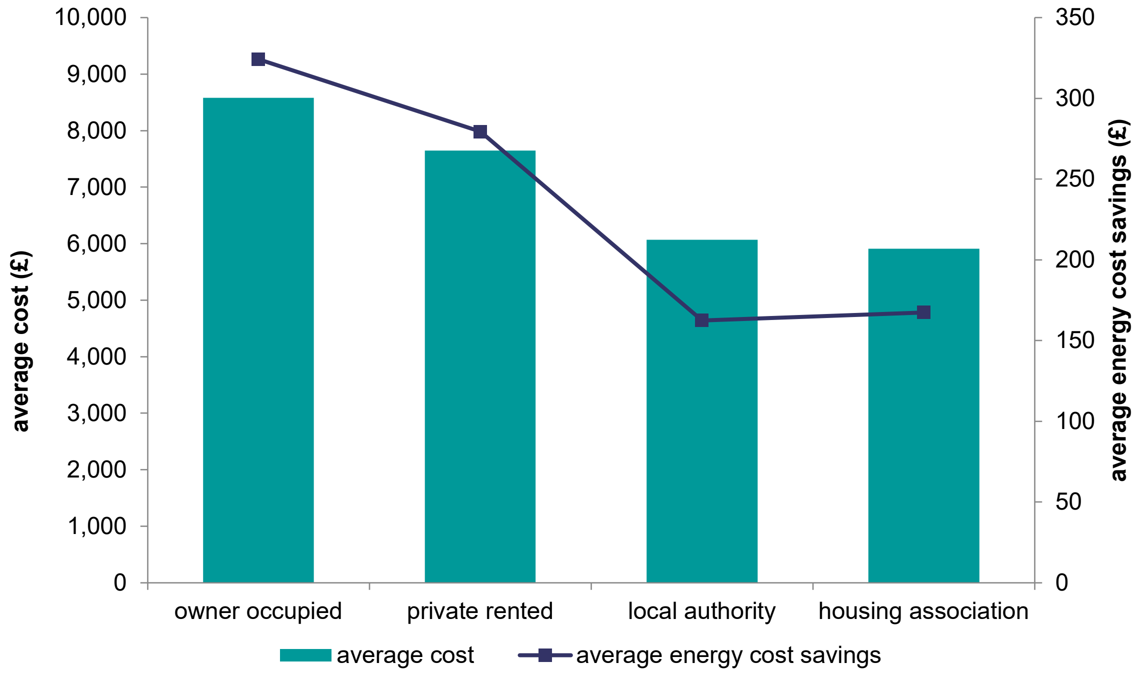
Base: all dwellings able to be improved to an EER band C

Source: English Housing Survey, dwelling sample

3.22 Overall, it would cost less than £10,000 to improve over two thirds of dwellings (69%) to a band C, and about £15,000 or more to improve 11% of dwellings, Annex Table 3.9.

3.23 For those dwellings that were able to be improved to an EER band C, the average fuel cost savings were £298 per year, Annex Table 3.10. Owner occupied dwellings had the highest average fuel cost saving at £324, followed by private rented dwellings, at £279. The average fuel cost savings for local authority and housing association dwellings were lower, at £162 and £167 respectively, Figure 3.3.

Figure 3.3: Average cost to improve to an energy efficiency rating band C with average energy cost savings, by tenure, 2019



Base: dwellings rated below an EER band C 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

Source: English Housing Survey, dwelling sample

Dwelling characteristics

3.24 Housing association dwellings (8%) were more likely to cost less than £1,000 to improve to an EER band C than local authority (4%) and owner occupied dwellings (4%). Conversely, owner occupied (12%) and private rented (8%) dwellings were more likely to cost £15,000 or more to improve to an EER band C compared with local authority (4%), and housing association (3%) dwellings, Annex Table 3.12.

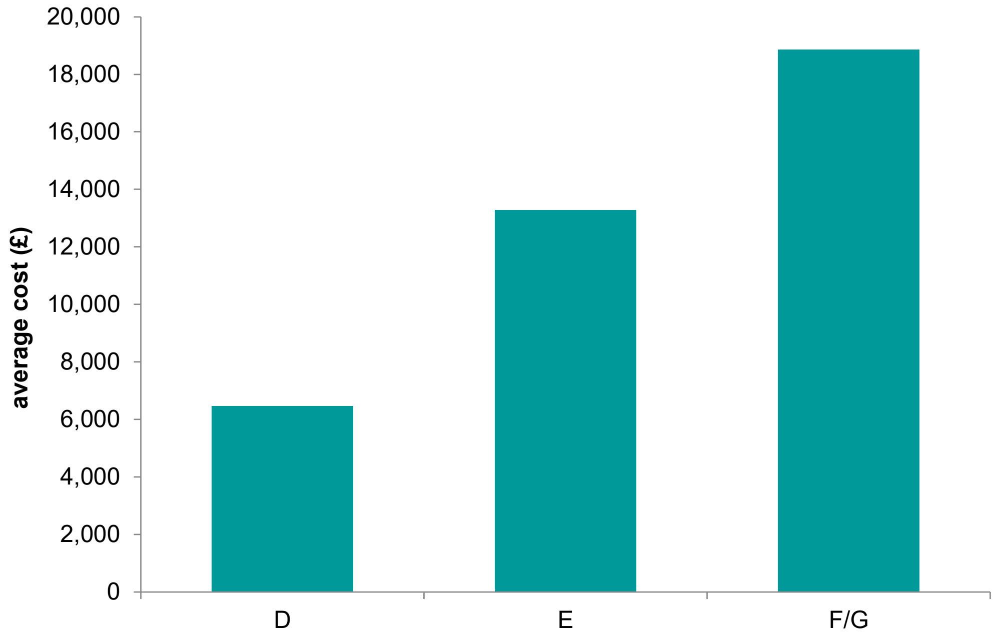
3.25 Looking at the private rented sector specifically, around three quarters (74%) of dwellings would require less than £10,000 worth of investment to improve to band C.

3.26 Newer dwellings, built after 1990 (16%), were more likely to require less than £1,000 to reach an EER band C compared with older dwellings. Conversely, older dwellings, those built pre 1919 (22%), were more likely to cost £15,000 or more than all other aged dwellings.

3.27 High rise and low-rise purpose-built flats (25% and 13%, respectively) were more likely to cost less than £1,000 to improve to an EER band C compared with all other dwelling types. On the other hand, detached dwellings (20%) were more likely to cost £15,000 or more to obtain an EER band C compared with medium/large terraced houses (12%), bungalows (11%), small terraced houses (9%) and semi-detached houses (9%).

3.28 In terms of EER bands, dwellings that currently fall into band D were more likely to cost between £1,000 to £5,000 in order to improve to an EER band C (26%) compared with dwellings in band E (10%) and F or G (5%). Conversely, dwellings that fall into bands F or G (64%) were more likely to cost £15,000 or more than those in bands D (3%) or E (34%).

Figure 3.4: Average cost to improve to an energy efficiency rating band C, by pre-improvement EER band, 2019



Base: dwellings rated below an EER band C 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

Source: English Housing Survey, dwelling sample

Household characteristics

3.29 The relative cost of improving homes to at least an EER band C varied by household characteristics. The differences described below relate to owner occupiers. Trends were generally similar for outright owners and mortgagors, so these have not been described separately, Annex Tables 3.13, 3.14, and 3.15.

3.30 Owner occupiers aged 65 to 74 years (17%) or 75 years or over (15%) were more likely to need to spend £15,000 or more to improve their home to an EER band C than owner occupiers aged between 25 to 44 years (5% to 6%). In contrast, owner occupiers aged between 35 and 44 years (7%) were more likely to need less than £1,000 to bring their dwelling up to an EER band C than owner occupiers aged 65 or over (2% to 3%).

3.31 Households where the HRP was economically inactive (15%), which includes retired households, were more likely to require £15,000 or more to bring their home to an EER band C than households where the HRP was working (9%).

3.32 Owner occupiers in the highest (5th) income quintile (15%) were more likely to require £15,000 or more than owner occupiers in the second income quintile (9%). This finding may likely reflect that higher earners tend to reside in larger homes which can be more expensive to improve, depending on the age and type of home.

3.33 Owner occupiers with savings (13%) were more likely to need to spend £15,000 or more than owner occupiers without savings (10%). More specifically, those with £50,000 or more in savings were more likely to need to spend at least £15,000 compared with households with less than £16,000 in savings, or with no savings. In households that had no savings, over three-quarters (77%) required £5,000 or more to improve their home to an EER band C.

3.34 As homes built before 1919 tended to be the least energy efficient, it is not surprising that owner occupiers who lived in such homes (27%) were markedly more likely to need to spend £15,000 or more to improve their home to an EER band C than owner occupiers living in newer dwellings. Conversely, owner occupiers living in homes built after 1990, were more likely to need less than £1,000 to improve their home to a band C level.

3.35 Owner occupiers who had resided in their homes for 30 years or over (16%) were generally more likely to need £15,000 or more to improve their homes to an EER band C than households who had only been in their homes for under 10 years. This trend was, however, not evident among outright owners.

Chapter 4
Ventilation, damp and keeping cool

4.1 This chapter reports on the prevalence of ventilation and condensation, damp or mould in homes, and how they differed across tenures. It then examines the actions households undertook to mitigate any damp they had reported, and the measures households undertook to keep cool in their home.

4.2 The first part of the analysis on condensation, damp or mould uses the surveyor assessment and explores how damp varied by dwelling and household characteristics. The second part uses the household assessment of damp to explore mitigating actions to prevent the build-up of condensation. The surveyor and household assessments of damp in the home are not directly comparable as the physical survey records the presence of damp on the day of the survey, while the interview survey asks respondents about their experiences of damp and mould in their home more generally.

Ventilation

4.3 Lack of air flow in the home can promote condensation and cause damp and mould. For most homes, the provision of ventilation such as extractor fans, air bricks and trickle vents in windows, can greatly reduce this problem.

4.4 In 2019, around 1% of dwellings (or 145,000 dwellings) did not have adequate room[17] or appliance ventilation[18]. There were insufficient cases to analyse by dwelling and household characteristics, Annex Table 4.2.

Trickle vents

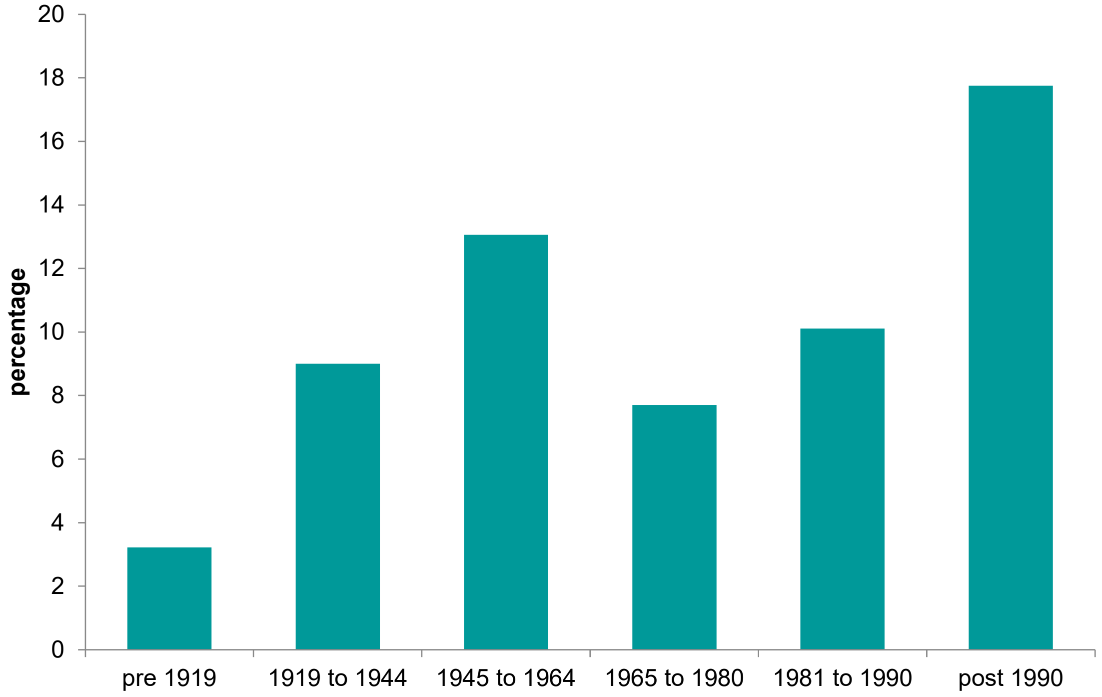
4.5 Overall, there were around 2.4 million or 10% of dwellings with trickle vents present in all surveyed rooms, Annex Table 4.1.

4.6 Dwellings built after 1990 were more likely to have trickle vents in all windows (18%) compared with other dwelling ages while dwellings built before 1919 were least likely (3%), Figure 4.1.

[17] For the EHS, inadequate room ventilation occurs when “windows are permanently fixed (painted, screwed, nailed) and there is no other adequate form of ventilation to the room”. Window openings may also be “too small or too poorly positioned to allow proper ventilation”.

[18] For the EHS, inadequate appliance ventilation occurs when there is no permanent ventilation provided to all gas, solid fuel and oil appliances such as air bricks or door vents.

Figure 4.1: Trickle ventilation in all rooms, by dwelling age, 2019



Notes:
(1) 'all rooms' refers to all surveyed rooms (living room, kitchen, main bedroom, bathroom and circulation space)
(2) dwellings with no windows in the circulation space are not included in the figures
(3) underlying data are presented in Annex Table 4.1
Source: English Housing Survey, dwelling sample

4.7 Trickle vents were more prevalent in detached houses (13%) than purpose-built high-rise flats (8%), bungalows (6%) and converted flats (4%). In terms of flats, purpose-built low-rise flats (9%) were more likely to have trickle vents than converted flats (4%), likely reflecting that converted flats tend to be older dwellings, Annex Table 4.1.

Damp, condensation, and mould

4.8 This section reports on the prevalence of damp (including condensation and mould) identified by the surveyor at the time of survey and how this varies by dwelling and household characteristics. The causes of condensation and dampness are complex and can be caused by household behaviour, density of occupation and dwelling factors such as poor ventilation, lack of insulation and disrepair to window openings; all these dwelling factors may vary in prevalence by the age and type of home.

4.9 In 2019, around 2% or 455,000 dwellings had serious damp problems.

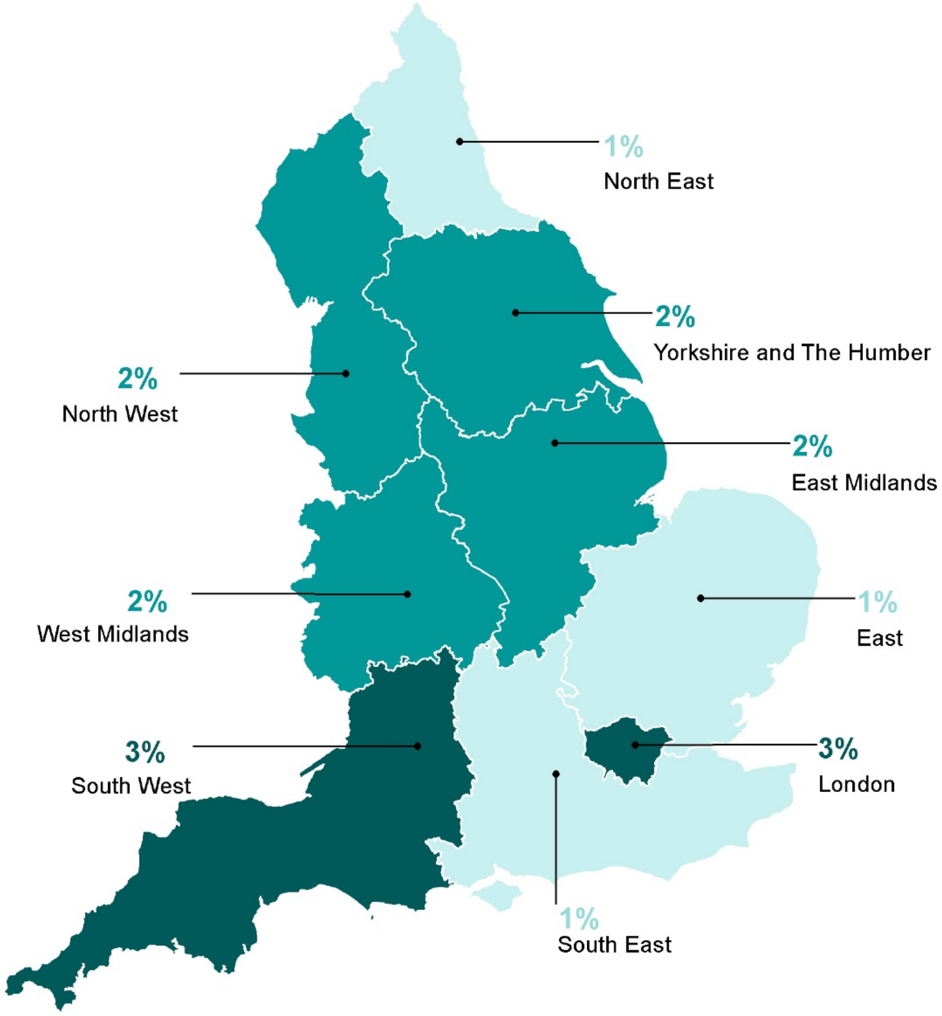
Dwelling and household characteristics

4.10 Overall, dwellings in the social sector (3%) and older homes, built before 1964 (2%), were more likely to have damp compared with the private sector and newer dwellings. There was little difference between dwelling types although damp issues were more common in converted flats (5%) than semi-detached (2%), small terraced (2%), bungalows (2%)and detached (1%); this finding may be unsurprising as converted flats tend to be older. Damp issues were also more common in semi-detached (2%) and small terraced (2%) than detached dwellings (1%), Annex Table 4.2.

4.11 Dwellings with inadequate room or appliance ventilation (14%) were markedly more likely to experience serious damp problems than those with adequate ventilation (2%).

4.12 The prevalence of damp was generally similar among regions (ranging from 1% to 3% of homes). There were some significant differences; dwellings in the South West (3%) were more likely to have serious damp issues compared with dwellings in the North East (1%), East (1%) and South East (1%) of England, Figure 4.2.

Figure 4.2: Presence of damp, by region, 2019



Note: underlying data are presented in Annex Tables 4.2
Source: English Housing Survey, dwelling sample

Household characteristics

4.13 Households where the HRP was aged between 35 to 64 (2% to 3%) were more likely have issues with damp than households with HRPs aged between 65 and 74 (1%). Similarly, younger households where the oldest occupant was aged between 25 and 59 (2% to 3%) were more likely to have damp compared with those where the oldest occupant was 60 years of age or more (1%), Annex Table 4.3.

4.14 Lone parents with independent children (4%) and lone parents with dependent children (3%) were more likely to have serious damp issues in their home compared with couples with no children (1%). Couples with no children were also less likely to have issues with damp (1%) than couples with dependent children (3%). Furthermore, lone parents with independent children (4%), lone parents with dependent children (3%) and couples with dependent children (3%) were more likely to have damp issues compared with single person households (1%).

4.15 Serious damp issues were more prevalent among households where the HRP was unemployed (7%) compared with households where the HRP was inactive[19] (3%), in part-time work (3%), full-time work (2%) and full-time education (1%). Also, households in the lowest (1st) income quintile were more likely to have damp issues (3%) compared with households in the third (2%), fourth (1%) and fifth (1%) income quintiles (highest).

4.16 Households where at least one member of the family had a long-term illness or disability were more likely to have serious damp problems (3%) than other households (2%).

4.17 Households who were overcrowded[20] were more likely to experience problems with damp (6%) compared with households living at the bedroom standard (3%) or under occupying (1%) their home.

Households’ response to damp

4.18 Households were asked whether they thought they had condensation, damp, or mould in their home[21]. Almost a quarter of all households (23% or 5.5 million) reported having issues with damp, Annex Table 4.4.

4.19 Those 5.5 million households were then asked how they dealt with their damp issues. Around 80% reported opening the windows to get rid of the damp, over a third (35%) mentioned using extractor fans and 15% used trickle vents, Annex Table 4.5.

Household characteristics

4.20 Younger households, who were more likely to experience damp, were generally more likely to use these methods to help with damp issues compared with older households. Households where the HRP was aged between 25 and 64 years (81% to 86%), were more likely to mention opening windows compared to those aged 75 or over[22]. Households where the HRP was aged between 25 and 44 years were also more likely to mention using extractor fans to help ease damp issues than households with HRPs aged 65 or over, Annex Table 4.5.

4.21 Lone parents with dependent children (88%), couples with independent children (86%) and couples with dependent children (85%) were more likely to mention opening their windows than other multi-person households (72%). Lone parents with dependent children (88%) were also more likely to use

[19] includes those with long-term illness and disabilities, and retired households.
[20] Refer to Glossary for definition of overcrowding.
[21] Uses full interview survey data (2019-20), ‘Households perception on damp issues’.
[22] These findings could reflect that older households may be less willing to open their windows for other reasons such as feelings of insecurity and concerns around maintaining sufficient internal temperatures.

windows to help with damp issues compared with couples with no children (77%) and single person households (76%).

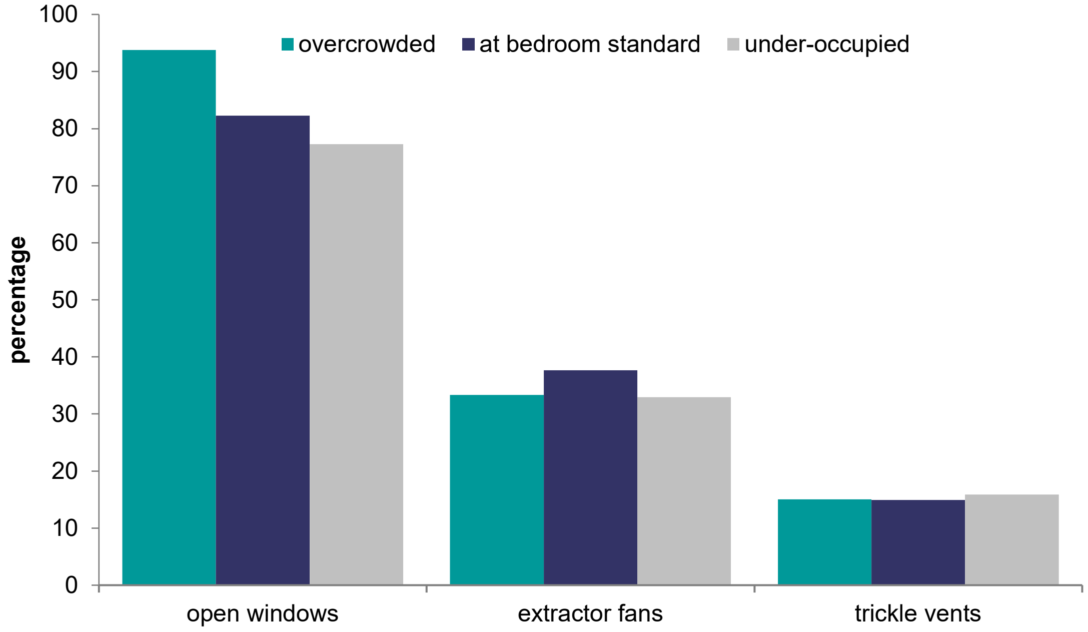
4.22 Lone parents with dependent children (28%) and lone parents with independent children (25%) were generally less likely to use extractor fans to mitigate damp compared with other households. Couples with independent children (40%) and couples with dependent children (38%) were both more likely to mention using an extractor fan to mitigate damp issues compared with single person households (31%).

4.23 Single person households (11%) were generally less likely to mention using trickle vents than lone parents with independent children (23%), couples with independent children (20%), couples with no children (19%) and couples with dependent children (16%).

4.24 Households where at least one member of the family had a long-term illness or disability were more likely to use trickle vents (17%) than other households (14%). There were no other significant relationships.

4.25 There is some evidence to suggest that overcrowded households, who were more likely to have problems with damp, were more pro-active in taking measures to mitigate this issue as they were more likely to report opening windows (94%) to mitigate damp problems than households under-occupying their home (77%).

Figure 4.3: Measures taken to deal with damp problems, by overcrowding, 2019-20



Base: all households who reported having a damp problem
Notes:
(1) analysis excludes ‘don’t know’ responses
(2) underlying data are presented in Annex Table 4.5
Source: English Housing Survey, full household sample

4.26 Households living in dwellings at the bedroom standard were more likely to mention using extractor fans (38%) than households in under-occupied dwellings (33%).

4.27 There were regional variations, but the reasons are likely to be complex and due to different distributions of dwelling types, ages and household compositions. Households living in the East Midlands (83%), West Midlands (83%) and South West (82%) were more likely to report opening their windows to curb damp problems compared with households living in Yorkshire and the Humber (75%).

4.28 Households in the East (44%) were more likely to report using extractor fans compared with households living in the East Midlands (34%), North West (32%), West Midlands (31%), North East (30%) and Yorkshire and the Humber (27%).

4.29 Households living in the East (27%) and South East (20%) were generally more likely to use trickle vents to get rid of damp issues compared with households living in other regions.

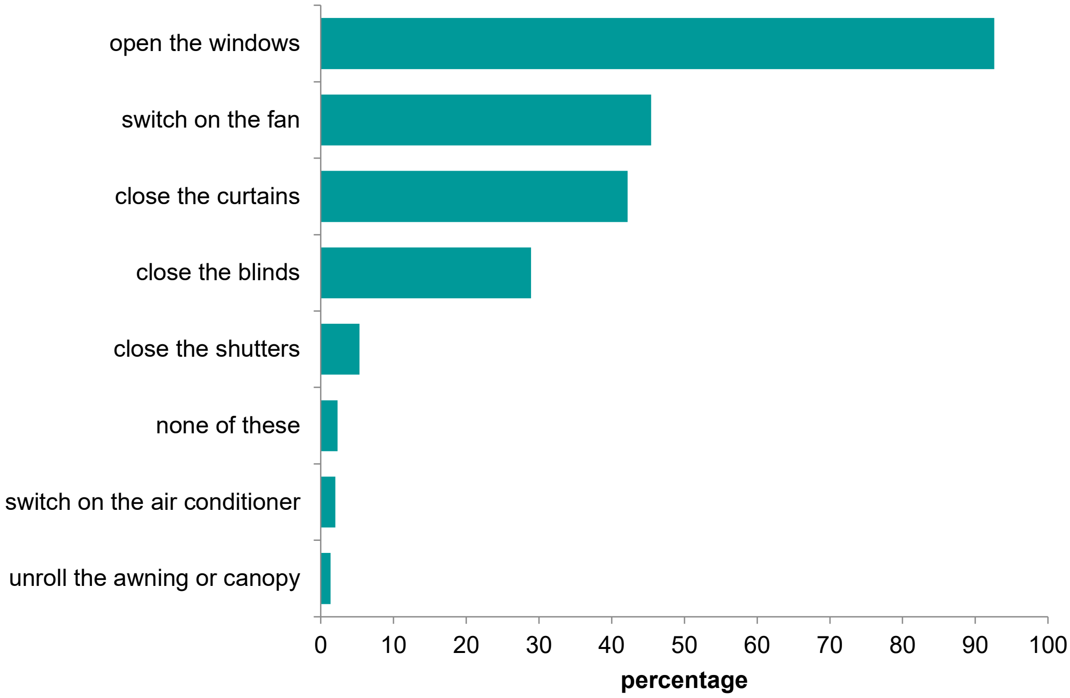
Keeping cool

4.30 Being able to cool down in the summer months is particularly important for older households who are more at risk of ill-health due to excessive heat[23]. This section reports on the methods householders used to control warm temperatures in their home during the summer months and explores the dwelling and household characteristics of those who reported keeping cool at night by opening the windows.

4.31 By far the most mentioned method to keep homes cool among households was to open the windows (93%). The next most common methods were switching on the fan (45%) and closing the curtains (42%). The least common methods mentioned were switching on air conditioners (2%) and unrolling the awing or canopy (1%), Figure 4.3.

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

Figure 4.4: Presence of household cooling devices, 2019-20



Base: all households
Notes:
(1) percentages are within each group. For example, 93% of households mentioned opening their windows while the remaining 7% did not mention it.
(2) analysis excludes 'no answer' responses
(3) underlying data are presented in Annex Table 4.6
Source: English Housing Survey, full household sample

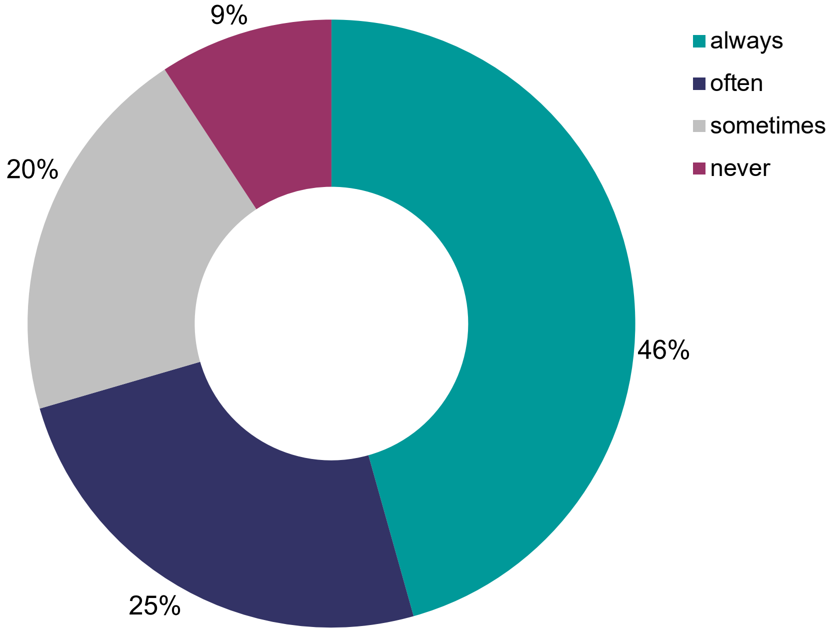
4.32 There were few regional differences although households in London (56%) were generally more likely to switch on the fan, Annex Table 4.6.

4.33 Households aged 65 and over (HRPs aged 65 to 74, 90% and those aged 75 or over, 89%) were less likely to open their windows to keep cool compared with all other households (94% for other HRP age bands), Annex Table 4.7.

Keeping cool by opening windows at night

4.34 In 2019, just under half of all households (46%) claimed they were always able to keep cool at night by opening windows, a quarter mentioned 'often', 20% mentioned 'sometimes' and 9% reported that they could never get cool at night by opening windows, Figure 4.4.

Figure 4.5: Households' ability to keep cool at night by opening a window, 2019-20



Base: all households who mentioned opening their window to keep cool during the summer months
Notes:
(1) analysis excludes 'don't know' responses
(2) underlying data are presented in Annex Table 4.8
Source: English Housing Survey, full household sample

4.35 There were some variations by tenure and by household characteristics. Social renters (14%) were more likely to report never being able to keep their homes cool by opening the window, compared with private renters (10%) and owner occupiers (8%), Annex Table 4.8.

4.36 Households with an oldest occupant aged 85 or over (17%) were more likely to respond to never being able to keep themselves cool at night by opening a window, compared with all other households (8 to 11%), Annex Table 4.9.

4.37 Those households where at least one member of the family had a long-term illness or disability (more commonly older households) were less likely to keep their homes cool by opening the window with 12% reporting ‘never’ taking this action compared with 8% of other households.

Technical notes and glossary

Technical notes

1. Some parts of this report use material from the interview questionnaire only. They are presented for '2019-20' and are based on fieldwork carried out between April 2019 and March 2020 on a sample of 13,332 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 '2019' and are based on fieldwork carried out between April 2018and March 2020 (a mid-point of April 2019). The sample comprises 12,300 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.

Glossary

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

Bedroom standard: The 'bedroom standard' is used by government as an indicator of occupation density. A standard number of bedrooms is calculated for each household in accordance with its age/sex/marital status composition and the relationship of the members to one another. A separate bedroom is allowed for each married or cohabiting couple, any other person aged 21 or over, each pair of adolescents aged 10-20 of the same sex, and each pair of children under 10. Any unpaired person aged 10-20 is notionally paired, if possible, with a child under 10 of the same sex, or, if that is not possible, he or she is counted as requiring a separate bedroom, as is any unpaired child under 10.

This notional standard number of bedrooms is then compared with the actual number of bedrooms (including bed-sitters) available for the sole use of the household, and differences are tabulated. Bedrooms converted to other uses are not counted as available unless they have been denoted as bedrooms by the respondents; bedrooms not actually in use are counted unless uninhabitable.

Households are said to be overcrowded if they have fewer bedrooms available than the notional number needed. Households are said to be under-occupying if they have two or more bedrooms more than the notional needed.

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

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

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 $70m^2$.
- **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[24].

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

- **other inactive**: all others; they include people who were permanently sick or disabled, those looking after the family or home and any other activity.

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

Energy 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)

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

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/EPC 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 $2m^2$ 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.

Overcrowding: Households are said to be overcrowded if they have fewer bedrooms available than the notional number needed according to the bedroom standard definition. See bedroom standard.

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

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

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

- **photovoltaic panels**: a photovoltaic cell is a device that converts light into electric current, contributing to the domestic electricity supply. A large photovoltaic system could provide a surplus of energy, allowing a household to export electricity to the national grid.

- **wind turbines**: a domestic small-scale wind turbine harnesses the power of the wind and uses it to generate electricity. The sample size of dwellings with this feature is currently too small to provide robust estimates for reporting.

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

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

Reduced Data SAP (RdSAP) was introduced in 2005 as a lower cost method of assessing the energy performance of existing dwellings. RdSAP is used in the calculation of the energy ratings on the Energy Performance Certificate, a document which is required every time a home is put up for sale or rent. 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).

Unable to be improved to a Band C: A small percentage of households (2%) were unable to be improved to a band C through installing measures recommended by the

EPC improvement methodology. It may be possible for these dwellings to reach the target EER band through methods not recommended by an EPC, however, this is not explored in the current modelling approach. The building characteristics of these dwellings may also mean that they are not eligible to receive improvement measures with a high energy efficiency improvement potential, which would be required for the dwelling to reach a band C. These limitations may be due to the wall type being unsuitable for insulation or a roof that is unable to support PV panels.

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.

Under-occupation: Households are said to be under-occupying their property if they have two or more bedrooms more than the notional number needed according to the bedroom standard definition. See bedroom standard.

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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