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Scottish House Condition Survey: 2017 Key Findings

A National Statistics publication for Scotland

PEOPLE, COMMUNITIES AND PLACES

Acknowledgements

The Scottish Government acknowledges and thanks the 3,002 households across Scotland who gave their time to take part in the Scottish House Condition Survey interview and physical dwelling inspection in 2017.

This report was produced by the Scottish House Condition Survey team at the Scottish Government with support from Adam Krawczyk and the Scottish Household Survey team (Emma McCallum, Pat Cairns, Conor Nangle and Claire Wood).

Finally, special thanks to:

- Ipsos MORI: Chris Martin, Murray Petrie, the social interviewers and the building survey team.
- BRE: Matthew Custard, Chris Beer, and Jonathon Whiteley for their energy modelling and work on the physical survey.
- Alembic Research: Bill Sheldrick for his role in surveyor training and the energy prices survey.

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December 2018

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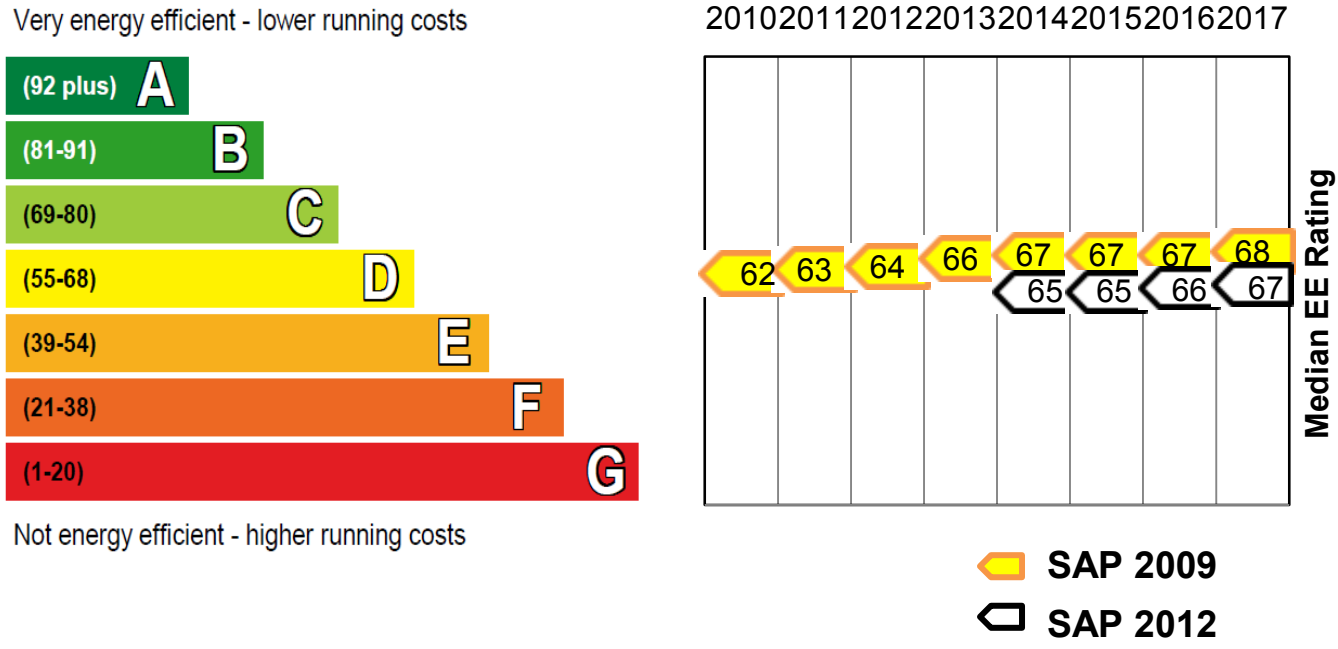
Key Findings Summary

Energy Efficiency and Carbon Emissions

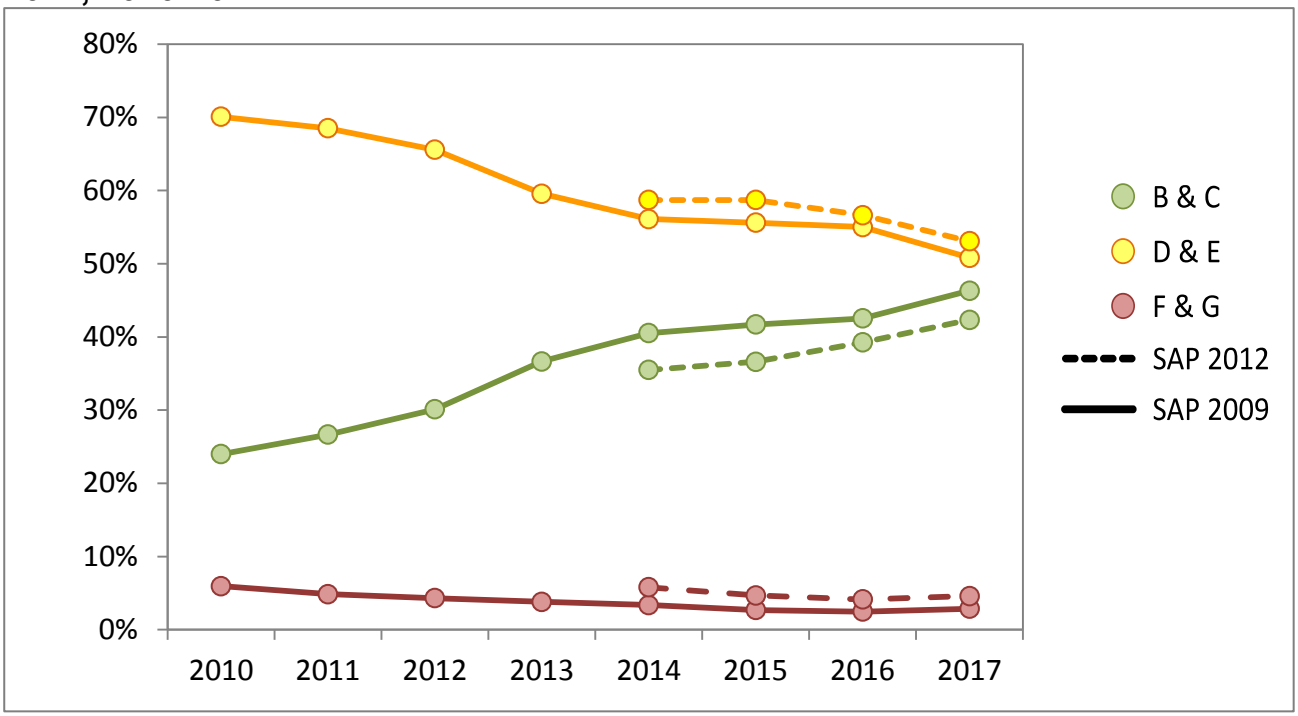
- In 2017, 42% of Scottish homes were rated as EPC band C or better and half had an **energy efficiency rating** of 67 or higher (**SAP 2012**). This is a significant increase from 39% in 2016 and continues the improving trend from 35% in 2014, the first year in which data based on SAP 2012 is available.
- In the last year, the share of properties built between 1945 to 1964 and post-1982, in band C or better, increased by 6 percentage points to 37% and by 5 percentage points to 74% respectively. In addition, the share of properties which are off the gas grid increased from 30% rated C or better to 36% while those using gas as their primary heating fuel increased from 44% to 47% and those in urban areas increased from 43% to 46%.

Median Energy Efficiency Rating Relative to EPC Band, SAP 2009 and SAP 2012, 2010 to 2017



- Using **SAP 2009** continues to show improvement in the energy efficiency profile of housing. The share of the most energy efficient dwellings (rated C or better) increased from 24% in 2010 to 46% in 2017. In the same period, the proportion of properties in the lowest EPC bands (E, F or G) more than halved, reducing from 27% to 13%.

Proportion of Scottish Homes by Grouped EPC Band, SAP 2009 and SAP 2012, 2010-2017



- The share of homes with **lofts** insulated to 100 mm or more remained at 94% in 2017. This represents an increase of 12 percentage points on 2010 levels. 30% of lofts were insulated to a high standard of insulation (300 mm or more), a similar level to 2015 and 2016, following significant increases from 5% in 2010.
- Wall insulation measures continue to be delivered under energy efficiency programmes such as the Energy Company Obligation (ECO)[1] and the SHCS data suggests that this is having an impact on the share of dwellings with wall insulation although sample size limitations mean that the difference since 2016 is not statistically significant. Levels of **wall insulation** remained similar in the last year, with 60% of walls having insulation in 2017. However, there is a longer term trend of improvement with 18% of solid wall dwellings and 75% of cavity wall dwellings being insulated in 2017, representing an increase from 11% and 66% respectively in 2012.
- In 2017, 57% of gas and oil **boilers** meet the minimum efficiencies specified by current Building Standards, an increase of 5 percentage points from 2016.
- 32% of dwellings had an **environmental impact rating** in band C or better in 2017 (SAP 2012) an increase from 29% in 2016. The mean rating was 60 and the median was 63, both of which lie in band D.

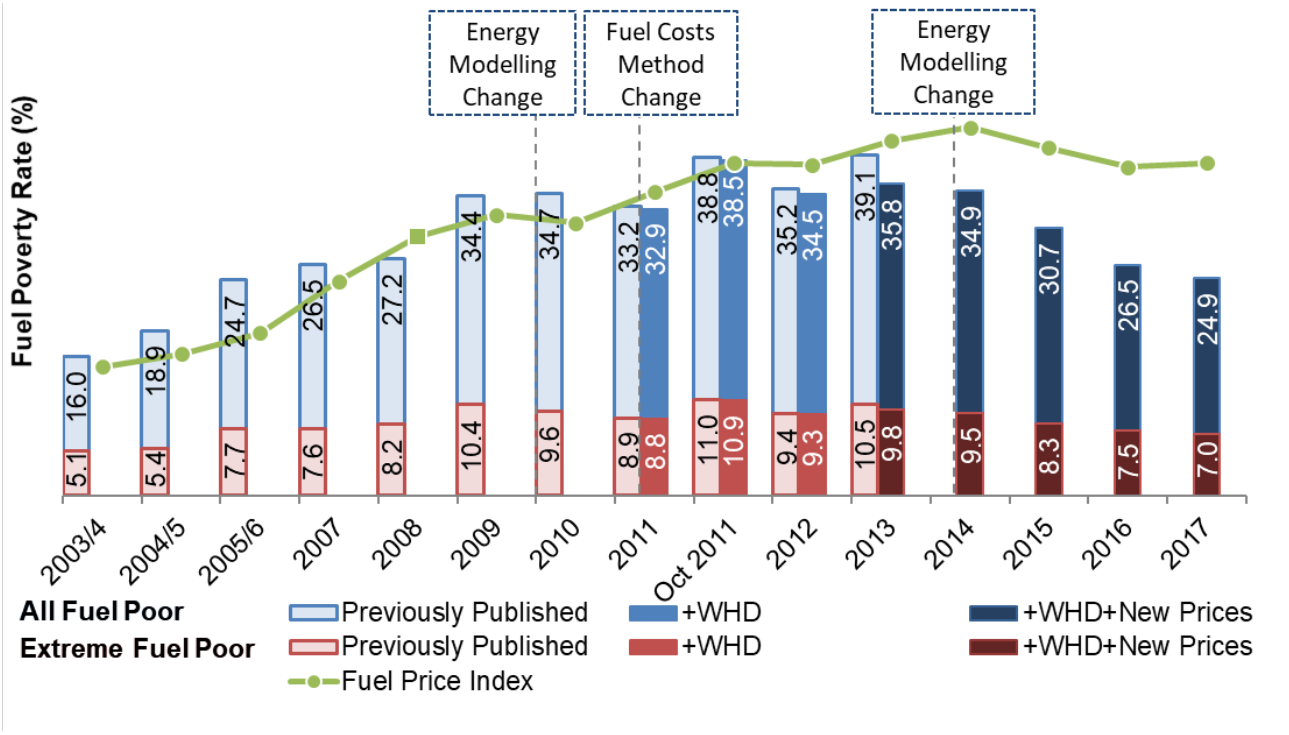
[1] https://www.gov.uk/energy-company-obligation

- Based on modelled energy use the average Scottish home is estimated to produce 7.0 tonnes of **CO2** per year. Average modelled carbon emissions for all properties have decreased in the last year from 76 kg/m^2 2016 to 74 kg/m^2 in 2017.

Fuel Poverty and Heating Satisfaction

- In 2017, 24.9% of households (613,000) were estimated to be in **fuel poverty**, a similar level to 2016 (26.5% or 649,000 households). 7.0% (or 174,000 households) were living in extreme fuel poverty in 2017. This follows a period of annual decreases between 2014 and 2016 and is the lowest rate recorded by the survey since 2005/06.

Proportion of Households in Fuel Poverty and Extreme Fuel Poverty, 2003/4-2017

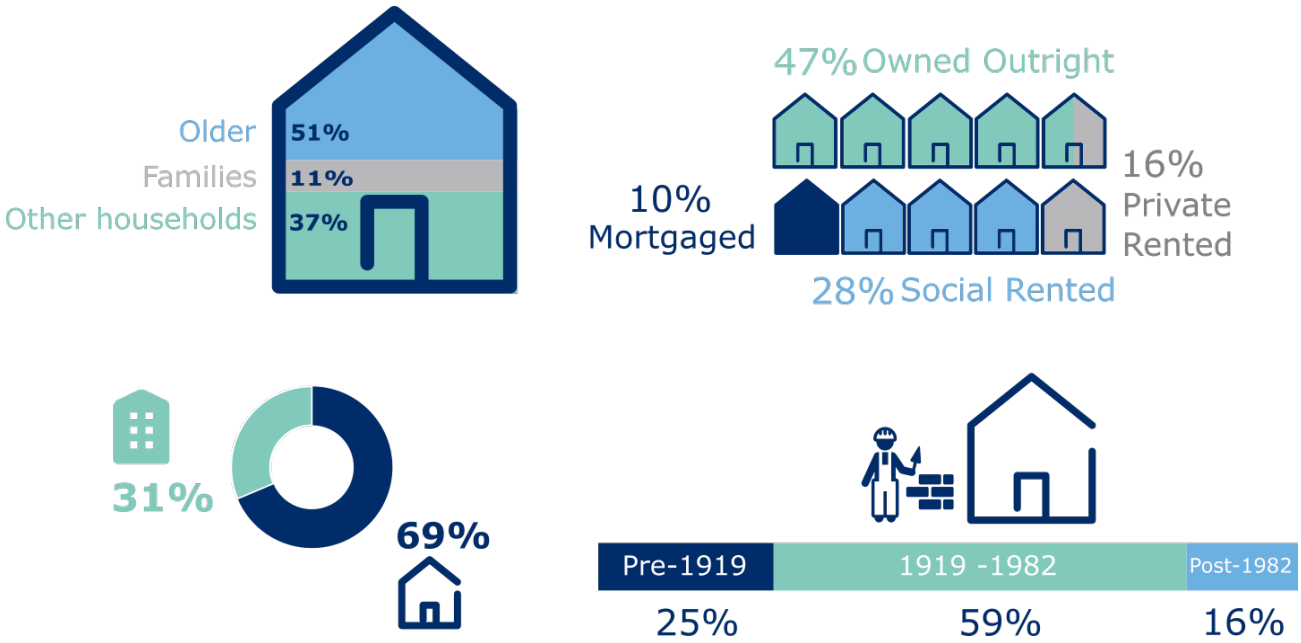


Note: Energy requirement underpinning fuel poverty estimate modelled on the following basis: 2003/4 – 2009: BREDEM – 12; 2010 – 2013: BREDEM 2012 v.1.0; from 2014 onwards: BREDEM 2012 v.1.1. + WHD indicates the inclusion of Warm Homes Discount, and + New Prices to the adjustment of fuel price sources; from 2016 a further improvement is included by assigning pre-payment metered fuel prices to the relevant households.

- There was no significant difference in the fuel poverty rate between 2016 and 2017. Increases in fuel prices in this period have been offset particularly by increases in household incomes as well as improvements in the energy efficiency of dwellings.

- Between 2016 and 2017 fuel poverty decreased in **urban areas** increasing the gap when compared to the **rural areas**. Households using gas as their primary heating fuel have continued to see improving fuel poverty rates in 2017. This is likely to be due, at least in part, to gas prices continuing to fall though not as steeply as in 2016. Consequently, fuel poverty rates fell in the last year for households living in urban areas, from 24% in 2016 to 21% in 2017.
- Those households using oil as their primary heating fuel saw the greatest increase in fuel poverty rates with 40% estimated to be in fuel poverty in 2017, up from 26% in 2016. This follows a 24% increase in liquid fuel prices between 2016 and 2017 although oil prices would have to increase by another 45% to reach their 2013 levels. Oil is more commonly used in rural areas than urban and therefore this has contributed to the fuel poverty rate in rural areas remaining at 43% in 2017 (not significantly different from the 37% recorded in 2016).
- On average the **social and private sector** have similar rates of fuel poverty at 24% and 27% respectively in 2017. This marks a change from 2016 where there was a significant difference between these sectors. Mortgaged households remain those with the lowest rates of fuel poverty (11%) while households who own their property outright have the highest rates (35%). Households in local authority housing saw an improvement in fuel poverty rates with 28% estimated to be in fuel poverty, compared to 36% in 2016.

Composition of Fuel Poor Households, 2017



- Over half of fuel poor households are older households while 11% are families with children and 37% are other households without children. The majority (57%) are owner occupiers (owned outright and mortgaged) and over two-thirds live in houses (69%).
- Over a third (37%) of fuel poor households have incomes above the poverty threshold, defined as £313 per week before housing costs for a couple without children. This is similar to 2016. Fuel poverty rates for households living above the income poverty threshold, were a similar level in 2016 (13%) and 2017 (12%). The rate for households below the income poverty threshold has also remained similar to 2016 levels at 70%.
- Fuel poor households are more likely to report difficulties staying warm in winter. 22% of them say that their heating keeps them warm in winter "only sometimes" (15%) or "never" (6%) compared to 18% of all other households. This pattern and overall rate is similar to 2016. 7% of fuel poor households report that they cannot afford to heat their home, higher than the 4% of non-fuel poor households.
- Overall, there has been no change in the past year in the share of all householders reporting that their heating only sometimes (14%) or never (4%) keeps them warm in winter.
- The extent to which home energy use is monitored by householders remains unchanged since last year with 54% stating they monitor their energy use "very" or "fairly closely". However there has been an increase of 8 percentage points, to 18%, in households reporting that they own an energy monitoring device. Fuel poor households are no more likely to monitor their energy use than other households but they are less likely to own a monitoring device (14% compared to 20% for non-fuel poor households).

Housing Quality

- The level of disrepair was unchanged from last year, with 68% of all dwellings having some degree of disrepair, however minor it may be in 2017. Disrepair to critical elements stood at 50%, while 28% of dwellings had some instance of urgent disrepair, and 5% had some extensive disrepair. While these figures are not statistically different from 2016, there is still a longer-term trend of improvement.
- Levels of damp and condensation improved slightly compared to 2016. 91% of properties were free from any damp or condensation, up from 89%
- Levels of compliance with the tolerable standard in 2017 remained similar to 2016: 1% (or 24,000) of all dwellings fell below the Tolerable Standard. Longer term this represents an improvement of 3 percentage points since 2012.
- Across the stock as a whole, Scottish Housing Quality Standard (SHQS) compliance improved on 2016 levels. In 2017, 40% of Scottish homes failed to meet the SHQS, down from 45% in 2016.

- The SHQS failure rate in the social sector was 37%, not allowing for abeyances and exemptions. This has fallen from 60% in 2010. 26% of properties did not meet the Energy Efficient criterion.
- SHCS surveyors may not always be able to identify the presence of cavity wall insulation. The overall SHQS failure rate in the social sector would be 25% if it is assumed that all social dwellings have insulated cavity walls where this is technically feasible.
- The majority of dwellings falling below the SHQS failed on a single criterion: this accounts for more than 9 out of 10 failures in the social sector. For 8 out of 10 social homes which failed the SHQS this was due to falling short on a single one of the standard's 55 elements.
- Overcrowding levels in Scotland remain unchanged: 3% of all households (66,000) were living in overcrowded accommodation in 2017.

1 Introduction

1. The statistics reported in this publication are based on a national survey of the housing stock, the only one of its kind in Scotland, which is part of the Scottish Household Survey (SHS). Until 2012 it was carried out as a stand-alone survey under the name Scottish House Condition Survey (SHCS). Following the review of the large-scale Scottish population surveys, the SHCS was incorporated within the SHS and became one of its modules. We continue to report the results from this module of the SHS under the name Scottish House Condition Survey.

2. The SHCS consists of an interview with householders and a physical inspection of the dwelling they occupy, which provides a picture of Scotland's occupied housing stock. It covers all types of households and dwellings across the country - whether owned or rented, flats or houses. The physical data about the dwelling is recorded by surveyors trained to collect detailed information on housing characteristics. This is combined with information about the household collected through a face to face interview with the householder. The interview covers a range of topics such as household characteristics, tenure, neighbourhood satisfaction, dwelling satisfaction, health status, income, etc. The result is a unique and powerful data set for examining the condition and characteristics of Scotland's housing stock alongside the views and experience of the people living in those dwellings.

3. This is the fourteenth 'Key Findings' report since the SHCS changed to a continuous format in 2003 and the sixth since it was integrated within the SHS. Details on the methodology and design of the survey are provided in the SHS Technical Report published on the Scottish Government website[2]. The incorporation of the SHCS within the SHS in 2012 introduced some discontinuities in the methodology of the survey and may contribute to some observed change over time.

4. In 2017 there were 3,002 surveyed properties. Statistics published in this report are based on fieldwork undertaken during 2017. A small proportion (5%) of the household interviews took place in the first quarter of 2018.

5. In 2009, the SHCS was designated as a National Statistics product by the UK Statistics Authority (UKSA). This demonstrates that the SHCS statistics are accurate, trustworthy and compliant with the high standards required of National Statistics.

[2] http://www.gov.scot/Topics/Statistics/16002/PublicationMethodology

6. In 2013 and 2014, there were changes made to the methodology used to analyse energy performance of the housing stock. This affects the comparability over time of statistics on energy efficiency, fuel poverty and carbon emissions from housing. Data presented in this report clearly highlights where methodology changes have occurred. Details of the impact of these methodology changes are published in the Key Findings reports and Methodology Notes for 2013[3] and 2014[4]. There have been no further changes to the energy modelling methodology and the current 2017 Key Findings report is based on the same methodology used in 2014, 2015 and 2016.

7. The 2014 Key Findings report also introduced some improvements to the method for determining the cost of the energy required to maintain an appropriate standard of heating and other energy use which underpins the fuel poverty estimates. Details on the nature of the changes and their impact are provided in the 2014 Methodology Notes[5] publication. In the 2016 survey, a further small improvement through the collection of information about pre-payment meters for energy supply was introduced. This has allowed us to improve the accuracy of fuel price information for these customers. The current report continues to use these improved methods for setting the cost of the domestic energy requirement.

8. There are no other significant methodological changes in this year's report in comparison to the previous publication. We always seek to improve and keep our methods and processes up to date and there may therefore be small changes to elements of data processing which do not impact significantly on the results. In such cases details are provided in the respective technical sections.

9. Differences between years or across characteristics are only highlighted in the commentary of this report if they are statistically significant. On occasion we also note where a difference is not statistically significant, particularly if it might appear large to the reader. Large differences which are not significant can occur if the statistic is based on a small sample size. Please see Chapter 7 for further details of confidence intervals, design effects and statistical significance.

[3] 2013 SHCS Key Findings: http://www.gov.scot/Publications/2014/12/6903 and Methodology Notes: http://www.gov.scot/Topics/Statistics/SHCS/Downloads/MethodologyNotes2013

[4] 2014 SHCS Key Findings: http://www.gov.scot/Publications/2015/12/8460 and Methodology Notes: www.gov.scot/Topics/Statistics/SHCS/Downloads/Methodology2014

[5] Methodology Notes 2014: www.gov.scot/Topics/Statistics/SHCS/Downloads/Methodology2014

10. The remainder of this report covers the following topics:

- Key Attributes of the Scottish Housing Stock: this chapter describes key characteristics of the housing stock such as dwelling type and age of construction, their location in relation to the gas grid, and the characteristics of the households that occupy them.
- Energy Efficiency: this chapter presents an analysis of the energy efficiency of the housing stock including presence and level of insulation.
- Fuel Poverty: this chapter presents an analysis of the number and characteristics of households in fuel poverty and extreme fuel poverty. It also examines the key drivers of fuel poverty and how they have changed over time.
- Perceptions and Experiences: this chapter examines householders' reports of their experience and satisfaction with heating and the extent to which they monitor their use of energy.
- Housing Conditions: this part of the report provides information on the number of dwellings in compliance with the tolerable standard and the Scottish Housing Quality Standard (SHQS). It also covers the presence of dampness, condensation and disrepair as well as some indicators of overcrowding and under-occupation.
- Technical Notes: the final chapter in the report provides information about the content of the survey and the definition of some of the key concepts used. Discussion on the statistical reliability of the estimates is also included.

2 Key Attributes of the Scottish Housing Stock

11. The Scottish House Condition Survey provides a snapshot of the Scottish housing stock in each survey year. This chapter sets out information on the basic attributes of occupied Scottish dwellings as captured in 2017. Subsequent chapters build on this and provide more details on energy efficiency, fuel poverty, housing quality and disrepair.

12. The following topics are included:

    - the construction age and general types of Scottish domestic buildings;
    - the dwellings' location in relation to the gas network and the type of fuel used to heat them;
    - the relationship between the dwellings' attributes and household tenure; and
    - the makeup of the households who live in them.

2.1 Dwelling Age and Type

13. The age of construction and the built form of a dwelling has consequences for energy performance, the improvement potential, affordability and living conditions. For example, dwellings built since 1982 comply with standards for minimum levels of energy efficiency and airtightness.

14. More information on the main dwelling types used in the SHCS is provided in section 7.9.1.

15. At the same time, types of dwellings can differ in terms of the size of exposed areas: fewer exposed areas of wall, or shielding by dwellings above and below, lead to lower levels of heat loss than in buildings with fewer sheltered sides.

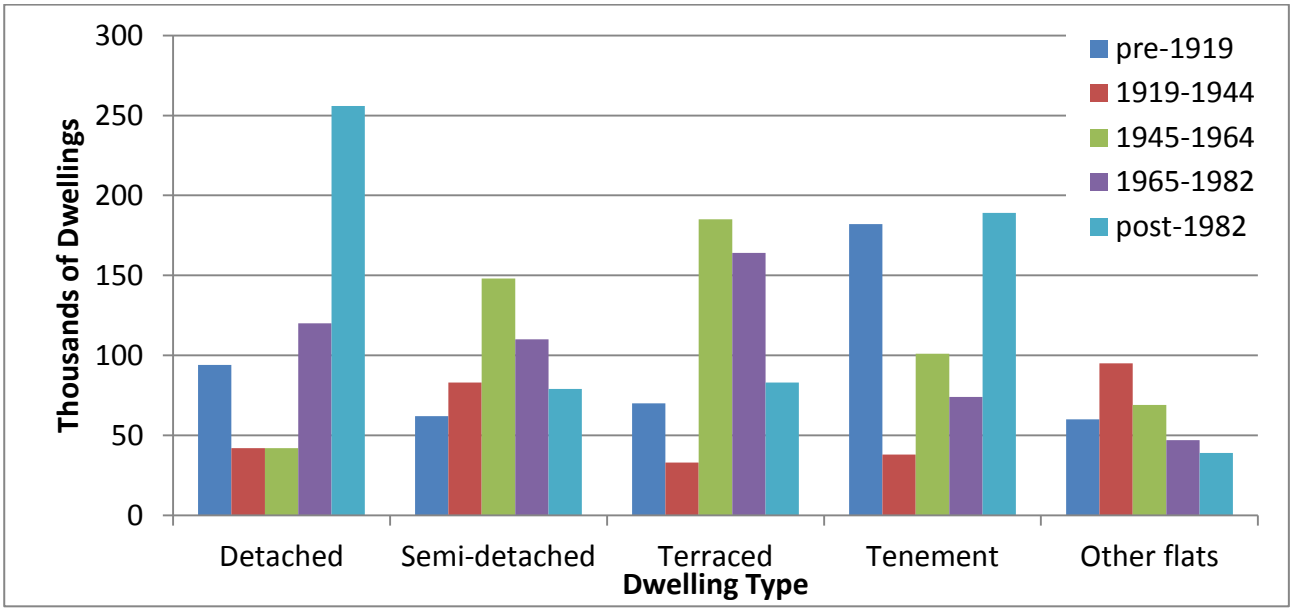
16. The Scottish housing stock is diverse and varies across the country and between rural and urban areas. However, some common types can be recognised in Figure 1:

    - Old (pre-1919) detached houses (around 94,000) and tenement flats (182,000)
    - More modern post-1982 detached houses (256,000) and tenements (189,000)
    - Post-war terraced houses (349,000 built between 1945 and 1982)

- Semi-detached houses, common across all age bands and accounting for around 20% of the stock alone.

17. These six broad categories account for 63% of the overall housing stock. However, there is also a good deal of variability within these groups; even among pre-1919 tenement flats of the type common in Edinburgh and Glasgow, there is a wide range of sizes, shapes and areas of exposure (for example in top floor flats the roof is exposed) which affects their energy efficiency and the living conditions they provide.

Figure 1: Number of Occupied Scottish Dwellings by Age Band and Type, 2017



18. The proportion of the stock in each dwelling age band and type is provided in Table 1. Numbers of dwellings of each age group and type are shown in Table 2.

Table 1: Proportion of Occupied Dwellings by Age Band and Type, 2017 (Percentage of Whole Stock)

Age of dwelling	Type of Dwelling					
	Detached	Semi-detached	Terraced	Tenement	Other flats	Total
pre-1919	4%	3%	3%	7%	2%	**19%**
1919-1944	2%	3%	1%	2%	4%	**12%**
1945-1964	2%	6%	8%	4%	3%	**22%**
1965-1982	5%	4%	7%	3%	2%	**21%**
post-1982	10%	3%	3%	8%	2%	**26%**
Total	**22%**	**20%**	**22%**	**24%**	**13%**	**100%**
Sample size						*3,002*

Table 2: Number of Occupied Dwellings by Age Band and Type, 2017 (Thousands)

Age of dwelling	Type of Dwelling					
	Detached	Semi-detached	Terraced	Tenement	Other flats	Total
pre-1919	94	62	70	182	60	**467**
1919-1944	42	83	33	38	95	**291**
1945-1964	42	148	185	101	69	**544**
1965-1982	120	110	164	74	47	**515**
post-1982	256	79	83	189	39	**646**
Total	**554**	**481**	**534**	**584**	**311**	**2,464**
Sample size						*3,002*

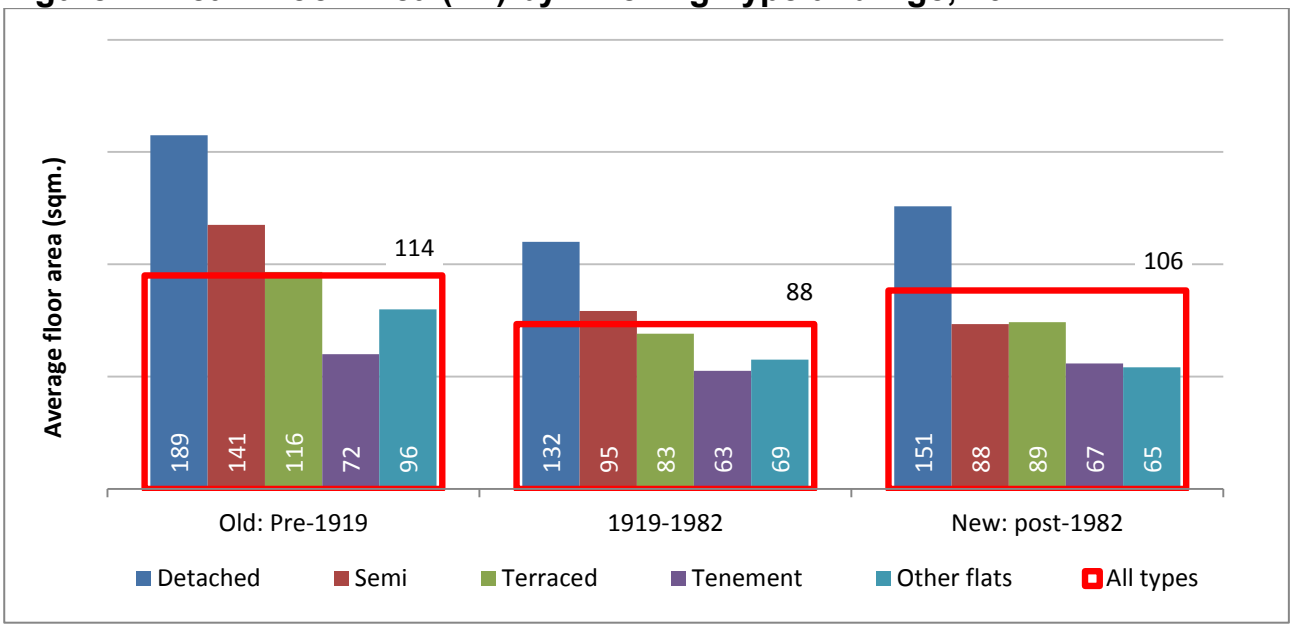
19. The category ‘other flats’ includes houses that have been converted to flats (40,000), towers / slabs (64,000) and so-called “4-in-a-block” flats (207,000).

- “4-in-a-block” flats were commonly built as social housing between 1919 and 1965 (69% of all flats of this type fall in that age category).
- 85% of towers / slabs were built in the 1945 to 1982 period, again often as social housing.
- Converted flats are almost exclusively pre-1919 structures (92%), where a house has been divided into multiple residences.

2.1.1 Dwelling Size (Floor Area)

20. The size of the internal floor area has implications for the heating requirements of a dwelling. Larger dwellings require greater heat inputs and therefore cost more to heat. This has a direct impact on fuel poverty (see Chapter 4).

Figure 2: Mean Floor Area (m^2) by Dwelling Type and Age, 2017



21. Pre-1919 dwellings tend to be larger than the other two age categories and this applies across all dwelling types with the exception of tenement flats which on average are comparable in size to more recently built ones (Figure 2). Detached and terraced houses built after 1919 are on average around three-quarters of the size of those built pre-1919. Semi-detached houses built after 1919 are on average around two thirds of those built pre-1919.

22. The overall average for post-1982 dwellings is somewhat higher compared to those built between 1919 and 1982. This is largely driven by differences in detached houses, which are both larger in size and more common in the post-1982 stock (see Table 2).

23. Rural dwellings are, on average, 44% larger than urban dwellings on average based on internal floor area, as shown in Table 3. The difference is smallest for dwellings built between 1919 and 1982 at 16%. Among older dwellings, rural properties are around 57% larger, while among the post-1982 stock the difference is 54%.

Table 3: Average Internal Floor Area (m^2) by Urban/Rural Location, 2017

Dwelling Age	Location			Rural % larger
	Urban	Rural	All	
Pre-1919	100	156	114	57%
1919-1982	86	100	88	16%
Post-1982	95	147	106	54%
All Age Bands	91	131	98	44%

2.2 Gas Grid Coverage and Rural/Urban Location

24. Approximately 17% of dwellings in Scotland are estimated to be outside the coverage of the gas grid[6]. As shown in Table 4, the majority (92%) of urban dwellings are within the coverage of the gas grid, whereas over half (65%) of those in rural areas are not.

Table 4: Gas Grid Coverage Overall and by Urban/Rural Location, 2017

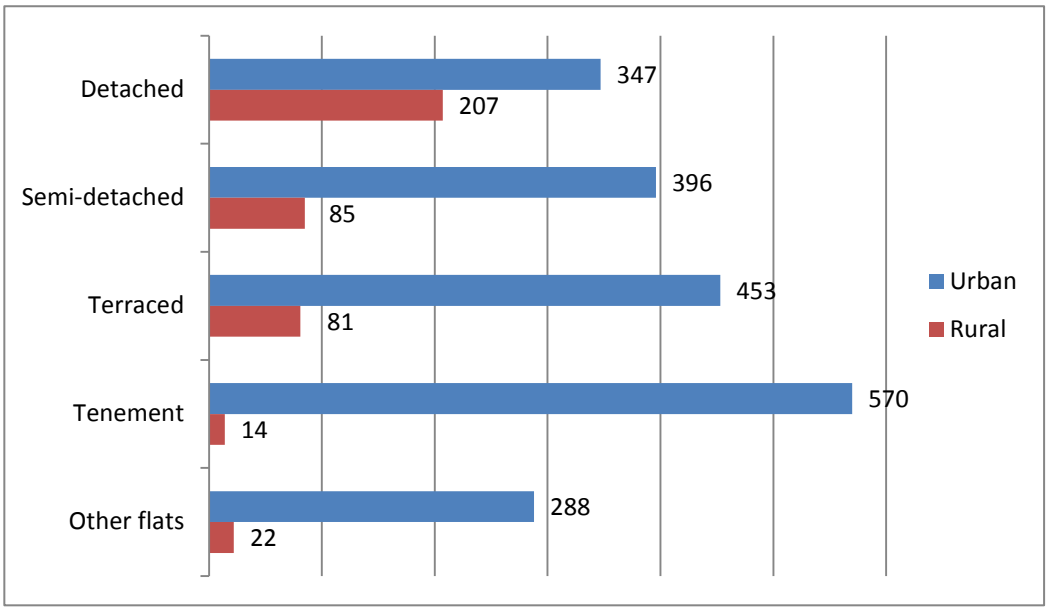
Gas Grid Coverage			Location			
			Urban		Rural	
	000s	%	000s	%	000s	%
On Gas Grid	2,038	83%	1,896	92%	148	35%
Off Gas Grid	425	17%	159	8%	260	65%
Total	2,464	100%	2,055	100%	409	100%
Sample size		*3,002*		*2,341*		*661*

25. Connection to the grid allows households to use gas for heating and hot water. Gas is currently the cheapest of the major commercial fuels, so gas grid access can have a strong effect on the cost of heating a home.

26. Figure 3 shows the number of dwellings in rural and urban areas by type.

[6] Gas grid coverage is determined on the basis of the distance of the dwelling from a low / medium / intermediate pressure gas distribution pipe. Based on the usual maximum distance for standard domestic connection (63 m), dwellings are classified as being "on" or "off" the grid. This does not reflect whether the dwelling is actually connected to the grid. Further details on the method for estimating distance to the gas grid are available in section 7.9.4 of this report and in SHCS Methodology Notes available at: http://www.gov.scot/Topics/Statistics/SHCS/Downloads

Figure 3: Dwelling Types in Rural and Urban Areas (000s), 2017



27. Just over half (207,000) of all rural dwellings are detached, and 21% (85,000) are semi-detached. Only 9% of rural dwellings are flats; 36,000 in total.

28. The most common dwelling type in urban areas is the tenement flat (570,000), accounting for around 28% of urban housing. Around 58% of urban stock is detached, semi-detached and terraced houses, in total accounting for almost 1.2 million of the 2 million urban dwellings.

2.3 Heating Fuel

29. The primary heating fuel affects the cost of heating and therefore the energy efficiency rating of the dwelling and the risk of the occupants experiencing fuel poverty.

30. The relationship between the type of fuel used, the energy efficiency rating and fuel poverty will be explored further in later chapters. This section examines the distribution of dwellings in terms of the primary heating fuel used and a range of other characteristics, such as age and type of dwelling.

31. Overwhelmingly the most common heating fuel is mains gas: 79% of Scottish households (around 1.9 million) use mains gas for heating, 12% use electricity and 6% use oil.

Table 5: Primary Heating Fuel, Households (000s) and %, for All Stock and by Sector, 2017

	All Stock		Private		Social	
Primary Heating Fuel	**000s**	**%**	**000s**	**%**	**000s**	**%**
Mains gas	1,937	79%	1,449	79%	488	78%
Electricity	292	12%	195	11%	97	15%
Oil	143	6%	143	8%	*	*
Communal Heating	32	1%	3	0%	29	5%
LPG bulk or bottled	30	1%	25	1%	5	1%
Solid mineral fuel	16	1%	10	1%	6	1%
Biomass	13	1%	13	1%	0	0%
Sample size		*3,002*		*2,274*		*728*

* denotes cases where attributes appear too rarely to provide an adequate basis for reporting. See section 7.1.6 for table conventions.

32. Gas and electricity are the main fuel types present in 93% of social housing. A further 5% (29,000 households) use some form of communal heating which is very uncommon in the private sector. Conversely, oil is rarely used to heat social housing but is the primary fuel of 8% of private dwellings.

33. 84% of dwellings built between 1919 and 1982 use gas as their primary heating fuel. In comparison, 73% of dwellings built after 1982 and 71% of dwellings built pre-1919 use gas. Older dwellings more commonly (17%) use other fuel types (than gas or electricity) while dwellings built post-1982 were most likely to use electricity (15%).

34. Primary heating fuel also varies by type of dwelling. As shown in Table 6, households living in detached houses are least likely to use mains gas for heating: 69% of them do, compared to almost 79% of households for Scotland as a whole and 85% of those households living in terraced houses. This is largely because less than a third (30%) of pre-1919 detached houses use gas as their primary heating fuel; 11% use electricity and 58% use some other fuel source. As shown in Figure 3 this is due to the higher proportion of detached dwellings in rural areas and Table 4 demonstrates that dwellings in rural areas are less likely to be within the coverage of the gas grid.

35. “Other” fuels (than gas or electricity) are most commonly used in detached houses across all age groups. Flats have the highest levels of electricity as primary heating fuel (18%), especially among post-1982 dwellings (27%).

Figure 4: Primary Heating Fuel by Age and Type of Dwelling, 2017 (per cent of dwellings in age/type category using fuel type)

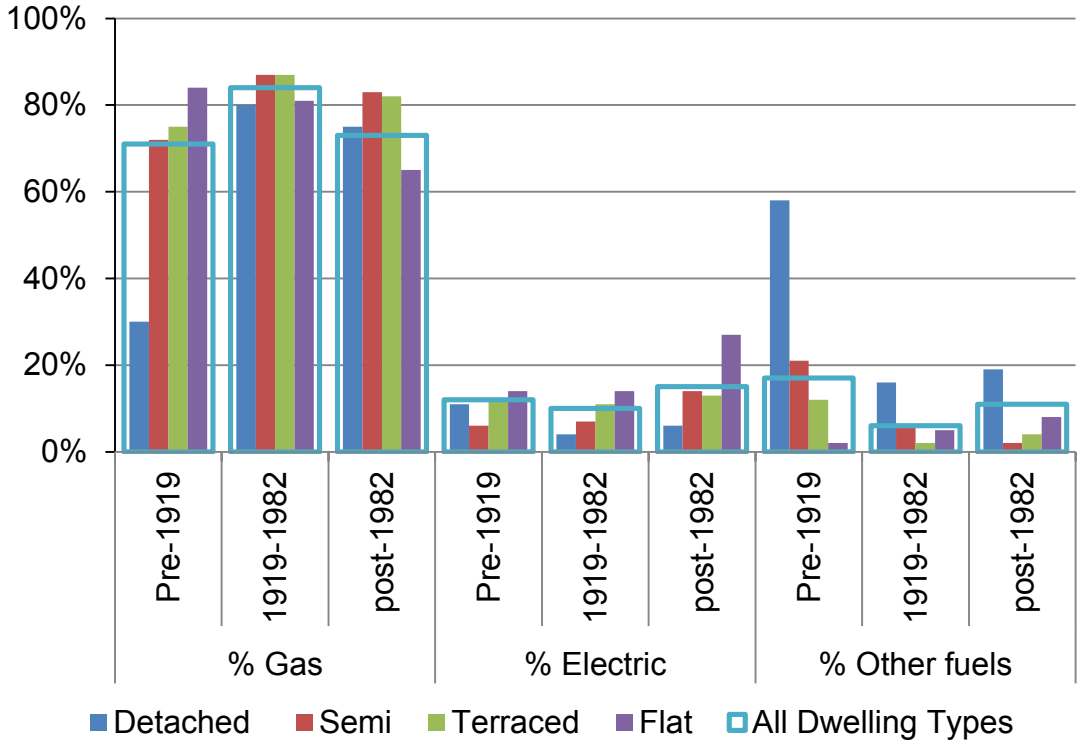


Table 6: Primary Heating Fuel by Age and Type of Dwelling, 2017

Dwelling Type	Dwelling Age	Primary Heating Fuel			*Sample size*
		Gas	Electric	Other	
All Dwelling types	**All age bands**	79%	12%	10%	*3,002*
	pre-1919	71%	12%	17%	*512*
	1919-1982	84%	10%	6%	*1700*
	post-1982	73%	15%	11%	*790*
Detached	**All age bands**	69%	6%	25%	*824*
	pre-1919	30%	11%	58%	*147*
	1919-1982	80%	4%	16%	*314*
	post-1982	75%	6%	19%	*363*
Semi	**All age bands**	84%	8%	7%	*661*
	pre-1919	72%	6%	21%	*74*
	1919-1982	87%	7%	6%	*475*
	post-1982	83%	14%	2%	*112*
Terraced	**All age bands**	85%	11%	4%	*619*
	pre-1919	75%	12%	12%	*72*
	1919-1982	87%	11%	2%	*454*
	post-1982	82%	13%	4%	*93*
Flat	**All age bands**	78%	18%	5%	*898*
	pre-1919	84%	14%	2%	*219*
	1919-1982	81%	14%	5%	*457*
	post-1982	65%	27%	8%	*222*

2.4 Household Type

36. In this report we describe households in terms of three main types which are derived from the more detailed classification used in the Scottish Household Survey[7]:

    - **Families.** These are households which contain at least one child aged under 16. The resident adults may be of any age.
    - **Older households.** One- or two-member households which include at least one resident aged 65 or older.
    - **Other households.** These are all other household types which are made up of adults only and have no resident children.

37. More details about the definitions are provided in section 7.9.2. This grouping was introduced in the 2015 Key Findings report and is different from the one used in previous reports, where the pensionable age for women was 60 and 65 for men. From 2015 onwards, 65 is adopted as the common age threshold for both men and women for older households reflecting the gradual increase in the state pension age for women.

38. There is a broad association between household types and the type of dwellings they occupy, as shown in Figure 5 and Table 7. While families and older households are more likely to live in houses (75% and 66% respectively), other households are more evenly split between houses and flats (56% and 44% respectively).

39. Families have the highest proportional occupancy of post-1982 houses: 26% of households with children live in post-1982 houses, compared with 13% of older households and 15% of other types of households. The highest occupancy of pre-1919 flats is observed among other types of households, 15%, compared to 6% for families and 6% for older households.

[7] Available at http://www.gov.scot/Publications/2017/09/9979/downloads

Figure 5: Proportion of Households in Each Dwelling Type and Age Band, 2017

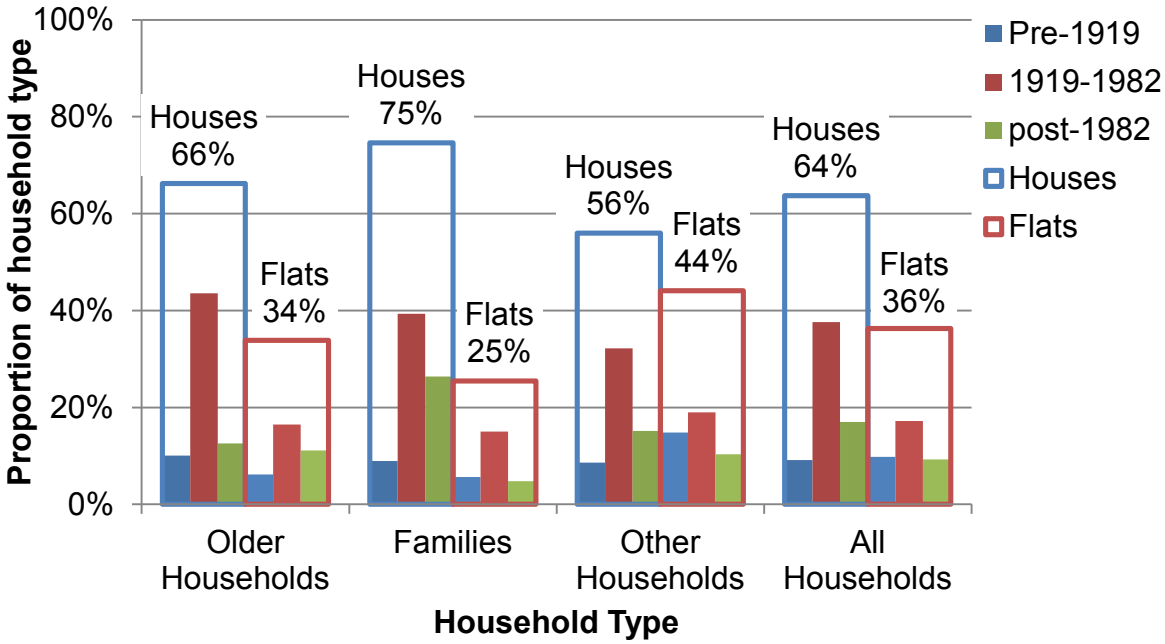


Table 7: Proportion of Households in Each Dwelling Type and Age Band, 2017

Dwelling Type and Age Band		Older Households	Families	Other Households	All Household Types
Houses	Pre-1919	10%	9%	9%	9%
	1919-1982	44%	39%	32%	38%
	Post-1982	13%	26%	15%	17%
	Subtotal	66%	75%	56%	64%
Flats	Pre-1919	6%	6%	15%	10%
	1919-1982	16%	15%	19%	17%
	Post-1982	11%	5%	10%	9%
	Subtotal	34%	25%	44%	36%
Total		100%	100%	100%	100%
Sample size		*1015*	*705*	*1,282*	*3,002*

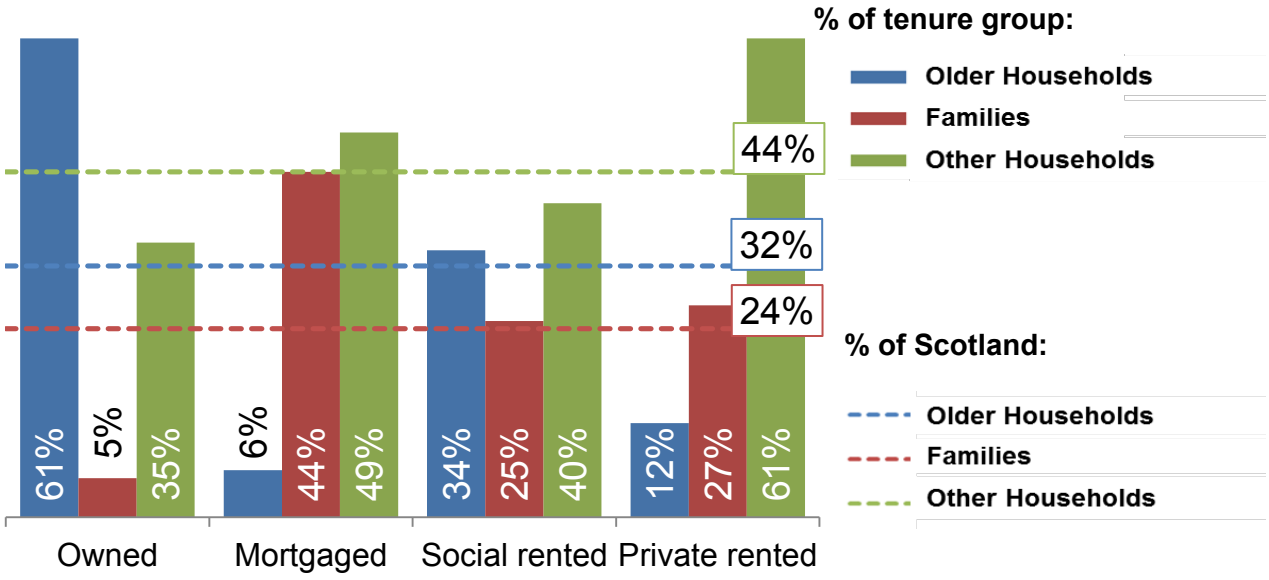
2.5 Tenure

40. Statistics on tenure in the SHCS are based on the achieved sample of dwellings in the physical survey and are not calibrated against figures produced as part of the Scottish Government Housing Statistics for Scotland[8] publication or the Scottish Household Survey publication (which is based on a larger sample and different weighting methodology). For estimates of the total number of dwellings by tenure, readers are referred to the Housing Statistics for Scotland publication which uses information from social landlords' returns which comprehensively cover the social housing sector and therefore provides more accurate estimates of the total stock.

41. In this section we explore data from the SHCS sample which provides more detailed information on the composition of each tenure type.

2.5.1 Household Type and Tenure

Figure 6: Proportion of Households in Each Tenure Group by Household Type, 2017



Note: Dashed lines represent the proportion of household type in Scotland as a whole.

42. There are some clear differences in household type across tenure, as shown in Figure 6.

[8] Housing Statistics for Scotland http://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/HSfS/KeyInfoTables

43. Owner occupiers with mortgages are predominantly families (44%) and other households (49%), while those who own their properties outright are dominated by older households (61%) and other types of households (35%).

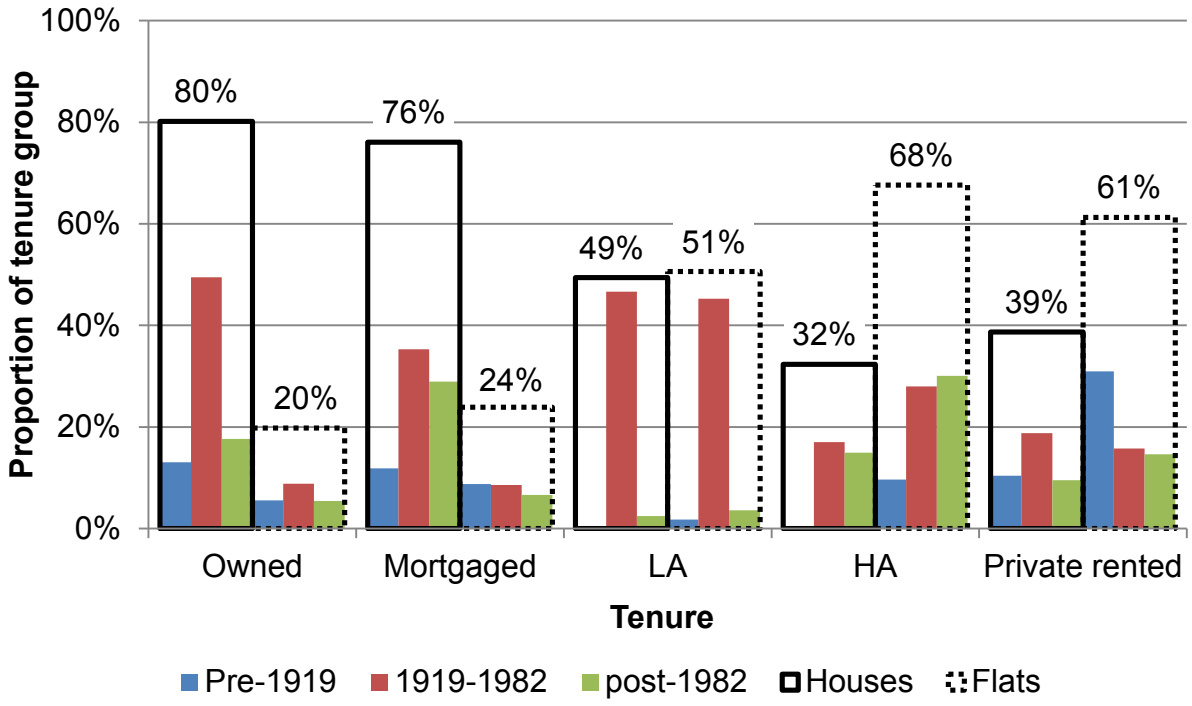
44. The majority of those who rent from private landlords (PRS) belong to other households (61%) and only 12% are older households. Around a quarter of renters in both the private (27%) and the social sector (25%) are households with children, which reflects their share in the national population.

2.5.2 Dwelling Type and Tenure

45. Figure 7 shows that rented properties in the Housing Association (HA) and the private rented sector are more likely to be flats. Flats account for 68% of Housing Association (HA) stock and 61% of dwellings rented from private sector landlords.

46. Owner-occupied dwellings are more likely to be houses: 80% of dwellings owned outright and 76% of those with a mortgage, compared to 49% of dwellings owned by Local Authorities, 32% of Housing Association stock and 39% of private rented properties are houses.

Figure 7: Proportion of Dwellings in Each Tenure Group by Age Band and Type of Dwelling, 2017



47. Almost all properties (92%) owned by Local Authorities were built between 1919 and 1982, while less than half (45%) of the Housing Associations stock was built in this period. 45% of Housing Association stock is more recent, built after 1982. By contrast, 41% of private rented sector dwellings were built before 1919 (Table 8).

Table 8: Proportion of Dwellings in Each Tenure Group, by Age Band and Type of Dwelling, 2017

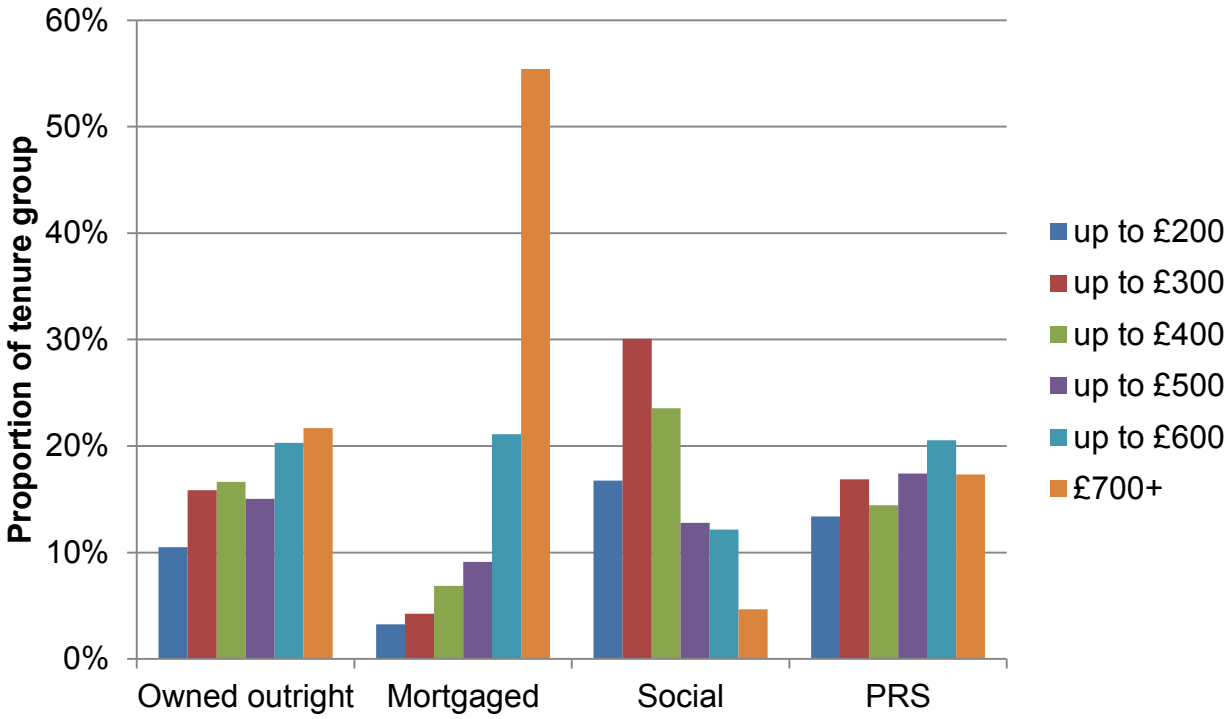
Dwelling Age and Type		Owned	Mort-gaged	LA	HA	Private rented
Houses	Pre-1919	13%	12%	*	*	10%
	1919-1982	49%	35%	47%	17%	19%
	Post-1982	18%	29%	2%	15%	10%
	Subtotal	80%	76%	49%	32%	39%
Flats	Pre-1919	6%	9%	2%	10%	31%
	1919-1982	9%	9%	45%	28%	16%
	Post-1982	5%	7%	4%	30%	15%
	Subtotal	20%	24%	51%	68%	61%
Total		100%	100%	100%	100%	100%
Sample size		*1104*	*797*	*439*	*289*	*373*

2.6 Household Income Band

48. As we might expect, income and tenure are closely correlated. For social sector residents the distribution is skewed towards lower income groups, as shown in Figure 8, while households with mortgages have the largest share of higher income groups.

49. The distribution of households by income in the private rented sector (PRS) is broadly similar to that for outright owner occupiers. It is generally wider than the social housing sector, including significant shares of both higher and lower income band households.

Figure 8: Proportion of Households in Each Tenure Group by Weekly Household Income Band, 2017



3 Energy Efficiency

50. The energy efficiency of a dwelling depends on its physical characteristics. Factors such as the age of construction, the dwelling type, the heating and hot water systems in use and the extent to which the building fabric is insulated, all affect energy efficiency.

51. Based on information about the characteristics of the dwelling collected in the SHCS physical survey, and using standard assumptions about the make-up and the behaviour of the occupying household, the energy consumption associated with the dwelling is modelled. This allows us to make comparisons of energy use, emissions and energy efficiency ratings between dwellings that are independent of occupant behaviour. Further details on the methodology underpinning these measures of energy efficiency are provided in the Methodology Notes[9].

52. In this chapter we report on analysis of:

- levels of insulation in Scottish dwellings (section 3.1);
- boiler efficiencies (section 3.2);
- Energy Efficiency Ratings (EER), also known as SAP ratings (section 3.3);
- modelled CO2 emissions from dwellings (section 3.5); and
- Environmental Impact Ratings (section 3.6).

3.1 Insulation Measures

53. Installing or upgrading insulation is one of the most effective ways to improve the energy efficiency of a building. The Energy Saving Trust estimates that an un-insulated dwelling loses a third of all its heat through the walls and a further quarter through the roof[10]. As a result, insulation can significantly reduce energy consumption and therefore lower heating bills, making it cheaper to enjoy satisfactory levels of thermal comfort[11].

54. Additional insulation is most commonly added to a property through the insulation of loft spaces and by adding insulating material to external walls.

[9] SHCS - Methodology Notes available at: http://www.gov.scot/Topics/Statistics/SHCS/Downloads
[10] EST: Roof and Loft Insulation http://www.energysavingtrust.org.uk/scotland/Insulation/ Roof-and-loft-insulation
EST: Wall Insulation http://www.energysavingtrust.org.uk/domestic/cavity-wall and http://www.energysavingtrust.org.uk/domestic/solid-wall
[11] See Chapter 4 on Fuel Poverty.

- The majority of loft spaces are insulated. In 2017, 94% of dwellings had been installed with **loft insulation** with a thickness of 100mm or more. This is no change on 2016 but an increase of 12 percentage points on 2010 levels.
- In 2017, 30% of lofts were insulated to a high standard of insulation (300 mm or more). This is similar to 2016 and 2015 following year on year increases from the 2010 figure of 5%.
- The proportion of **insulated cavity walls** recorded by the SHCS was 75% in 2017, similar to the previous year. In the longer term, the share of insulated cavity walls has been increasing, with a 9 percentage point improvement since 2012.
- The proportion of **solid wall** dwellings with insulation was 18% in 2017, which was similar to 2016, and an increase of 7 percentage points on the 2012 figure.
- Levels of insulation (both loft and wall) are higher in the social sector than in the private sector. 56% of homes in the private sector have wall insulation compared to 72% in the social sector. In the private sector, 60% of lofts are insulated to 200 mm or more compared to 75% in the social sector; both of these figures are similar to 2016.

3.1.1 Loft Insulation

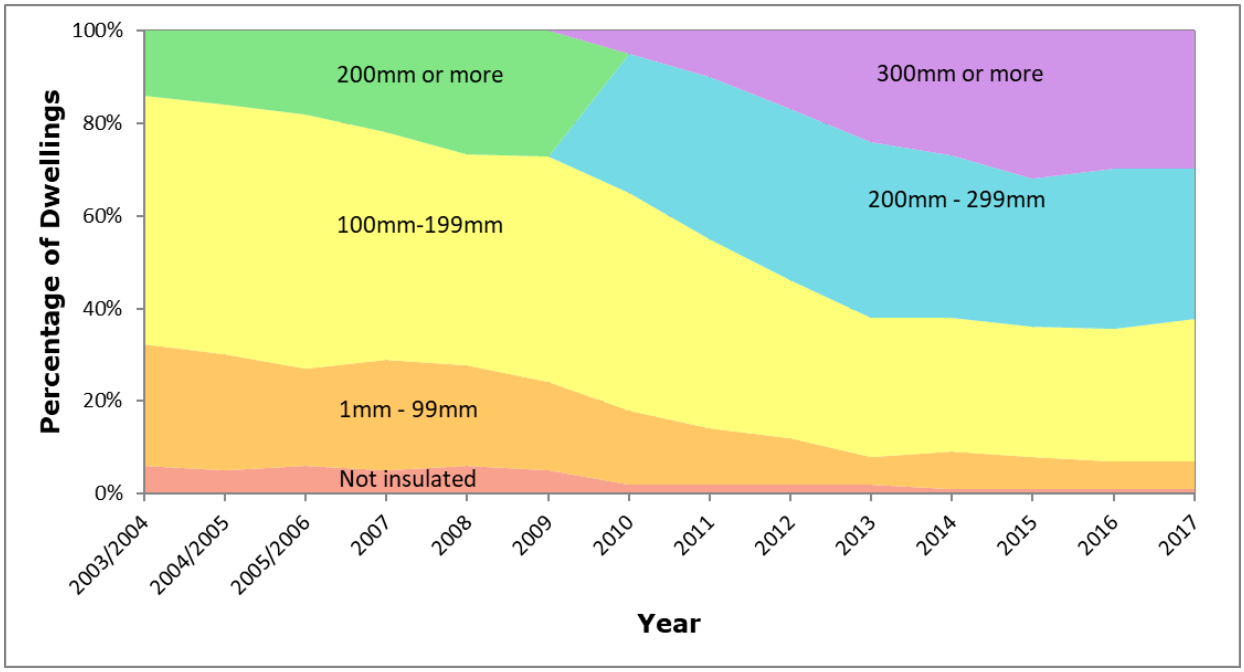
55. Since 2010, an overall improvement in loft insulation has occurred. The proportion of all housing with 100 mm or more of loft insulation has increased by 12 percentage points on 2010 levels with 94% of applicable dwellings insulated in 2017 (see Table 10), similar to the level in 2016. Most of this improvement occurred before 2013.

56. Figure 9 shows the level of loft insulation in all dwellings back to 2003/4. The share of dwellings with no loft insulation has fallen from 6% in 2003/4 to 1% in 2017. Most of this decline occurred before 2010. Since then improvement has slowed down, suggesting that there may be barriers preventing the installation of insulation in the relatively few remaining lofts.

57. Over the same period the thickness of loft insulation has increased significantly. In 2017, 63% of dwellings with lofts had insulation with a depth of 200 mm or more (excluding properties with no loft). Much of this increase has occurred between 2009 and 2013; when the percentage increased from 27% to 62%. This can largely be attributed to the installation of top-up insulation. In 2017, 37% of lofts had less than 200 mm of insulation, or no insulation, which equates to around 673,000 dwellings (Table 9). The increase in the estimated number of dwellings with loft insulation between 100-199 mm between 2016 and 2017, and the associated decrease with 200+ mm over the same time period, are both within the margin of error of the survey.

58. The percentage of lofts with a high standard of insulation (300 mm or more) has remained similar to 2015 and 2016, at 30%, following significant increases from 5% in 2010 (the first year the SHCS captured this information). In 2017, 28% of private sector dwellings had a high standard of loft insulation, compared to 37% of dwellings in the social sector; both of these figures are similar to 2016.

Figure 9: Depth of Loft Insulation (where applicable) 2003/04 – 2017



Note: A dwelling is classified as 'not applicable' for loft insulation if it has a flat roof or another dwelling above it (i.e. it is a mid- or ground-floor flat).

59. Between April 2008 and December 2012, the UK government Carbon Emissions Reduction Target (CERT) scheme delivered 410,937 loft insulation measures in Scotland[12].

60. Between January 2013 and December 2017 a further 59,359 loft insulation measures were delivered in Scotland by its successor scheme, the Energy Company Obligation (ECO)[13].

61. In total, around 470,000 loft insulation measures have been installed under these government programs since 2008.

Table 9: Depth of Loft Insulation (000s), 2010 and 2012 to 2017

Loft Insulation	2017	2016	2015	2014	2013	2012	2010
none	9	9	19	15	27	31	42
1mm-99mm	101	109	125	143	113	185	279
100mm-199mm	563	525	518	528	534	617	822
Subtotal: <200mm	673	643	663	686	675	834	1,143
200mm or more	1,152	1,197	1,161	1,123	1,118	975	621
Not applicable	638	612	610	611	606	577	592
All Dwellings	2,464	2,452	2,434	2,420	2,399	2,386	2,357
Sample Size	*3,002*	*2,850*	*2,754*	*2,682*	*2,723*	*2,787*	*3,114*
Cumulative recorded loft insulations under government schemes (since April 2008)							
CERT (000s)						411	157
ECO (000s)	59	53	39	30	10		

62. As shown in Table 10 thickness of loft insulation is greater in social sector dwellings than private sector dwellings. In 2017, 93% of private housing lofts were insulated to 100 mm or more and 60% to at least 200 mm. In the social sector, 97% of dwellings had lofts insulated to 100 mm or more, and 75% had at least 200 mm of loft insulation.

63. One of the reasons for this difference between private and social sector is that the Scottish Housing Quality Standard (SHQS), which was introduced in 2004, requires at least 100 mm of loft insulation (see section 6.2.2 for more information).

[12]CERT-Summary-Report-Q19-by-English-Regions-Scotland-Wales, HEED dB, Nov 2014. Access available through Energy Saving Trust.

[13] Scottish Government analysis of data provided by Ofgem of measures installed under ECO. Provisional figures.

64. The difference in the proportion of lofts with at least 100 mm insulation between the private and the social sector has been reducing gradually, from 17 percentage points in 2003/04 (81% in the social and 64% in the private sector) to 4 percentage points in 2017 (97% in the social sector and 93% in the private sector).

Table 10: Depth of Loft Insulation (000s and %) by Tenure, 2016 and 2017[14]

		Private Sector		Social Sector		All Tenures	
Year	**Loft Insulation**	000s	%	000s	%	000s	%
2017	none	9	1%	-	-	9	1%
	1mm - 99mm	92	6%	9	3%	101	6%
	100mm+	1354	93%	361	97%	1715	94%
	100mm - 199mm	480	33%	83	22%	563	31%
	200mm - 299mm	459	32%	142	38%	601	33%
	300mm or more	415	28%	136	37%	551	30%
	Total	1,455	100%	370	100%	1,825	100%
2016	none	9	1%	-	-	9	1%
	1mm - 99mm	96	7%	13	3%	109	6%
	100mm+	1349	93%	373	97%	1722	94%
	100mm - 199mm	451	31%	74	19%	525	29%
	200mm - 299mm	477	33%	166	43%	643	35%
	300mm or more	421	29%	133	35%	555	30%
	Total	1,455	100%	386	100%	1,840	100%
Samples	*2017*		*1,895*		*464*		*2,359*
	2016		*1,793*		*473*		*2,266*

3.1.2 Wall Insulation

65. The presence of **cavity wall insulation (CWI)** is becoming increasingly difficult for SHCS surveyors to identify as over time the injection holes age, fade or are covered up by later work. Contractors are also getting better at disguising their work. This may mean that the SHCS under-estimates the number of homes which have had CWI installed (see also section 6.2.2). Despite efforts to maintain the high quality of the SHCS physical survey fieldwork, some misclassifications may remain.

[14] Dwellings without loft spaces are excluded.

66. In Scotland around three quarters of dwellings have external cavity walls and the remaining one quarter have solid or other construction types of external wall. These “other” types include steel or timber-frame dwellings and dwellings made from pre-fabricated concrete. Because the improvement of solid and other wall types generally requires more expensive interventions than CWI, this diverse group is addressed together in this chapter.

67. Table 11 and Table 12 show the number and proportion of insulated dwellings by type of external wall. Higher insulation levels in new buildings have been required by building standards since 1982. These dwellings are therefore presumed insulated when built.

Table 11: Cavity Wall Insulation, 2012 and 2014 to 2017[15]

	2017		2016		2015		2014		2012	
	000s	%	000s	%	000s	%	000s	%	000s	%
Not insulated	457	25%	512	28%	525	29%	518	29%	606	34%
Insulated	1,363	75%	1,323	72%	1,286	71%	1,287	71%	1,157	66%
Total	1,821	100%	1,834	100%	1,811	100%	1,805	100%	1,763	100%
Sample		*2,284*		*2,154*		*2,099*		*2,017*		*2,076*
Cumulative reduction in SHCS uninsulated since 2007										
000s	359		304		291		298		210	
Cumulative recorded cavity wall insulations under government schemes since 2007										
CERT[1]									218	
ECO	91		82		72		54			

68. In 2017, 75% of cavity wall dwellings in Scotland were insulated (Table 11), similar to 2016. We know from administrative data that 9,103 cavity wall dwellings were insulated during 2017 (through ECO). However, although the percentage of insulated cavity wall dwellings identified through the SHCS appears to have increased, this is not a statistically significant difference and reflects that this is a sample of all dwellings.

69. The longer term trend, showing a decrease in the share of uninsulated cavity walls of 9 percentage points since 2012, is broadly consistent with administrative data on the number of cavity wall insulation measures installed under the CERT and ECO schemes.

[15] Dwellings built post 1982 are presumed insulated when built.

70. Between April 2008 and December 2012, the CERT scheme delivered around 218,000 cavity and 9,000 solid and other wall insulation measures in Scotland[16]. Between January 2013 and December 2017 a further 90,816 cavity and 50,420 solid wall insulation measures were delivered in Scotland by the successor ECO scheme[17]. This equates to around 368,000 wall insulation measures, including around 309,000 cavity wall insulation measures, installed under these programs by the end of 2017. This is clearly reflected in the cumulative reduction of 359,000 uninsulated cavity wall dwellings reported by the SHCS since 2007 (Table 11).

71. Table 12 shows the levels of insulation in dwellings with **solid or other** construction type walls recorded by the survey in 2017. The results show that 18% of dwellings in this category had insulated walls in 2017; the difference with the level recorded in the previous year (15%) is not statistically significant but is an increase of 7 percentage points from 2012. Only 718 dwellings with solid walls were surveyed in 2017 as part of the SHCS. This relatively small sample does not allow enough precision to capture the increase in solid wall insulation measures which we know from administrative data is taking place. Since the beginning of January 2013 at least 50,420 solid wall insulation measures were delivered in Scotland[18].

72. In the social sector, around three quarters (77%) of cavity wall dwellings and around two-fifths (44%) of dwellings with solid and other wall types were estimated to have insulation in 2017 (Table 13). Nearly three-quarters (72%) of social housing overall had insulated walls.

73. In the private sector, nearly three quarters (74%) of cavity wall dwellings and more than one tenth (13%) of solid and other wall dwellings, had insulation in 2017. Over half (56%) of all private sector dwellings had insulated walls.

[16] CERT-Summary-Report-Q19-by-English-Regions-Scotland-Wales, HEED dB, Nov 2014. Access available through Energy Saving Trust.

[17] Scottish Government analysis of data provided by Ofgem of measures installed under ECO. Provisional figures.

[18] This is the number of Solid Wall Insulation (SWI) measures delivered under ECO.

Table 12: Wall Insulation of Solid and Other Wall Types, 2012 and 2014 to 2017[19]

	2017		2016		2015		2014		2012	
	000s	%	000s	%	000s	%	000s	%	000s	%
Not insulated	529	82%	524	85%	552	89%	528	86%	557	89%
Insulated	115	18%	94	15%	71	11%	85	14%	66	11%
Total	643	100%	617	100%	623	100%	613	100%	623	100%
Sample		*718*		*696*		*655*		*663*		*711*
Cumulative recorded EWI installations under government schemes since 2007, thousands										
CERT									9	
ECO*	50		41		30		19			

74. The information in Table 13 is broken down by type of cavity wall into hard to treat cavities (HTTC) and standard cavity walls using the ECO definition as far as possible with the available data (further details are available in section 7.9.6). HTTCs have certain attributes which make CWI more expensive, complex or inadvisable. Standard cavity walls have no such barriers.

75. 38% of cavity wall dwellings in Scotland have had retrofit cavity wall insulation, which is generally the lowest cost improvement available; the remainder of insulated cavity walls were insulated as built or insulated in another way.

76. Levels of insulation are higher in the social sector at 72% (all wall types) compared with 56% in the private sector. Within wall type, this tenure divide is also apparent for the more expensive insulation measures: internal / external insulation of cavity walls (15% of cavity wall dwellings in the social sector; 3% of private dwellings) and retrofit solid wall insulation measures (44% of solid wall dwellings in the social sector; 11% in the private sector).

77. No statistically significant improvement in wall insulation levels were recorded in the survey in the last year for either the private or the social housing sector. Low sample numbers mean the apparent increase from 2016 in wall insulation amongst households in the social sector and the private sector are within the margin of error for the survey, however improvements have been seen since 2015, when 66% of social sector and 52% of private sector dwellings had insulated walls.

[19] Dwellings built post 1982 are presumed insulated when built.

Table 13: Insulation by Wall Type and Tenure, 2017 and Insulation of all Wall Types by Tenure, 2016 and 2017[20]

Wall and Insulation Type	Private Sector			Social Sector			Total		
	000s	%type	%all	000s	%type	%all	000s	%type	%all
2017									
Cavity									
Un-insulated	334	26%	18%	123	23%	20%	457	25%	19%
- HTTC	116	9%	6%	50	9%	8%	165	9%	7%
- Standard	218	17%	12%	74	14%	12%	292	16%	12%
Insulated	953	74%	52%	411	77%	66%	1,363	75%	55%
- CWI	465	36%	25%	219	41%	35%	684	38%	28%
- Int/External	40	3%	2%	80	15%	13%	120	7%	5%
- As built	447	35%	24%	113	21%	18%	559	31%	23%
Total	1,286	100%	70%	534	100%	85%	1,821	100%	74%
Sample Size		*1,648*			*636*			*2,284*	
Solid/Other									
Un-insulated	478	87%	26%	51	56%	8%	529	82%	21%
- Pre-1919	394	71%	21%	28	31%	5%	422	66%	17%
- Post-1919	84	15%	5%	23	25%	4%	106	17%	4%
Insulated	74	13%	4%	41	44%	6%	115	18%	5%
- Retrofit	60	11%	3%	40	44%	6%	101	16%	4%
- As built	14	2%	1%	*	*	*	14	2%	1%
Total	552	100%	30%	92	100%	15%	643	100%	26%
Sample Size		*626*			*92*			*718*	
All Wall Types									
Un-insulated	811		44%	174		28%	986		40%
Insulated	1,026		56%	451		72%	1,478		60%
Total	1,838		100%	626		100%	2,464		100%
Sample Size			*2,274*			*728*			*3,002*
2016: All Wall Types									
Un-insulated	856		47%	180		29%	1,035		42%
Insulated	974		53%	443		71%	1,417		58%
Total	1,829		100%	622		100%	2,452		100%
Sample Size			*2,134*			*716*			*2,850*

[20] Dwellings built post 1982 are presumed insulated when built

3.2 Boilers

In 2017, 57% of gas and oil **boilers** meet the minimum efficiencies specified by current Building Standards, an increase of 5 percentage points from 2016.

78. The heating system is a key factor in the thermal efficiency of a dwelling. Around 85% of households use a gas or oil-fuelled boiler. Trends in boiler efficiency are closely related to developments in energy efficiency and building standards regulations:

    - From 1998, minimum boiler efficiency standards were set by European Council Directive 92/42/EEC[21]
    - In 2007, Scottish Building Standards increased the efficiency requirements for all new and replacement boilers[22]

79. Building regulations in Scotland effectively require the installation of a condensing boiler[23] for gas and oil-fuelled heating in new builds or when boilers are replaced in any dwelling.

80. The SHCS has recorded the age of the household's heating system since 2010 and contains sufficient data to derive the Seasonal Efficiency (SEDBUK) ratings of surveyed boilers in the 2012-2017 data collections. For these years we can track the energy efficiency improvement of gas and oil boilers associated with the rising standards of the regulatory framework.

81. The methodology by which boiler efficiency ratings are calculated changed in 2016 and the time series was updated at that point to reflect this and to account for the minimum efficiency required of new oil combination condensing boilers. The data presented in Table 14 on the percentage of boilers compliant with standards is therefore comparable with the 2016 Key Findings report but will not match data published in previous reports. Further details on the methodology change can be found in section 7.7.

[21] EU "Boiler Efficiency Directive" http://www.icqc.co.uk/userfiles/File/Directive_92_42.pdf

[22] Domestic Building Services Compliance Guide for Scotland http://www.gov.scot/Resource/0046/00460094.pdf

[23] This design has higher running efficiencies; a portion of the heat that would be lost through vented water vapour is recovered through condensation in a heat exchanger.

82. The minimum requirements applied in the assessment of whether a boiler is compliant with standards are: a minimum efficiency of 88% for condensing standard gas, oil and LPG boilers; for condensing combination boilers, 86% for oil, and 88% gas and LPG; for ranges, back boiler and CPSUs, 75% when gas, and 80% when oil[24].

Table 14: Gas and Oil Boiler Improvements, 2007, 2010 & 2013-2017

	2017	2016	2015	2014	2013	2010	2007
Households using gas or oil boilers for heating							
%	85%	86%	85%	84%	84%	83%	82%
000s	2,104	2,097	2,075	2,041	2,022	1,945	1,896
… of which							
% "New" boilers (post-1998)	91%	91%	89%	85%	83%	70%	
% condensing boilers	67%	61%	56%	48%	43%	22%	7%
% standards compliant boilers	57%	52%	47%	41%	33%		
Sample size (gas/oil boilers)	*2,475*	*2,356*	*2,259*	*2,195*	*2,219*	*2,488*	*2,410*

83. In 2017 the survey found that 91% of the domestic gas and oil boilers in Scotland had been installed since 1998, when the European Boiler Efficiency Directive minimum standards came into effect. The proportion installed since then has increased by 21 percentage points since 2010.

84. In 2017, two-thirds (67%) of gas and oil boilers were condensing boilers. This represents a rapid increase of 45 percentage points since 2010.

85. In 2017, 57% of gas and oil boilers meet the minimum efficiencies specified by current Building Standards, an increase of 5 percentage points from 2016. As older boilers reach the end of their life and are replaced, we expect to see a continuation of this trend of improving efficiency.

3.3 Energy Performance Certificates

- In 2017, 42% of Scottish homes were rated as EPC band C or better under **SAP 2012**, up from 39% in 2016 and from 35% in 2014 (the first year in which data based on SAP 2012 is available).
- Under **SAP 2009**, which allows comparisons over a longer period, well over two fifths of dwellings (46%) were rated C or better**, up 22 percentage points since 2010.** In the same period, the proportion of properties in the lowest EPC bands (E, F or G) has more than halved, reducing from 27% in 2010 to 13% in 2017.

[24] For existing dwellings, there are occasions where it may not be practical to install a condensing boiler. The 'Condensing Boiler Installation Assessment Procedure Guide' offers further guidance in this area. Where a non-condensing boiler is installed this may results in a boiler with poorer efficiency than that of a newly installed condensing boiler of the same fuel type.

86. **Energy Performance Certificates (EPC)**[25] were introduced in January 2009 under the requirements of the EU Energy Performance Building Directive (EPBD). They provide energy efficiency and environmental impact ratings for buildings based on standardized usage. EPCs are required when a property is either sold or rented to a new tenant.

87. EPCs are generated through the use of a standard calculation methodology, known as Standard Assessment Procedure (SAP). SAP is the UK Government approved way of assessing the energy performance of a dwelling, taking into account the energy needed for space and water heating, ventilation and lighting and, where relevant, energy generated by renewables.

88. The Energy Efficiency Rating (EER) is expressed on a scale of 1-100 where a dwelling with a rating of 1 will have very poor energy efficiency and high fuel bills, while 100 represents very high energy efficiency and low fuel bills. Ratings can exceed 100 where the dwelling generates more energy than it uses.

89. Ratings are adjusted for floor area so that they are essentially independent of dwelling size for a given built form.

90. For Energy Performance Certificates EERs are presented over 7 bands, labelled A to G. Band A represents low energy cost and high energy efficiency, while band G denotes high energy cost (and low energy efficiency).

91. Energy Efficiency Ratings reported in this publication are calculated under two versions of SAP, the SAP 2009 methodology[26] and the most recent SAP 2012 methodology[27]. Using SAP 2009 enables us to examine the trend in the energy efficiency of the housing stock since 2010. SAP 2012 was first used in reporting data from the SHCS in the 2014 Key Findings report and therefore only four years of data are available.

3.3.1 Energy Efficiency Rating, SAP 2009

92. Table 15 shows the trend in mean EERs based on SAP 2009, which rose from 59.9 in 2010 to 65.6 in 2017. These ratings fall into band D. There was around a 1 point increase in the mean EER each year between 2010 and 2014. Improvement since then has been slower, and the increase between 2016 and 2017 was less than 1% which is not statistically significant.

[25] An example of the current EPC format can be seen at http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/enerperfor/epcguidance

[26] BRE: The Government's Standard Assessment Procedure for Energy Rating of Dwellings, http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf

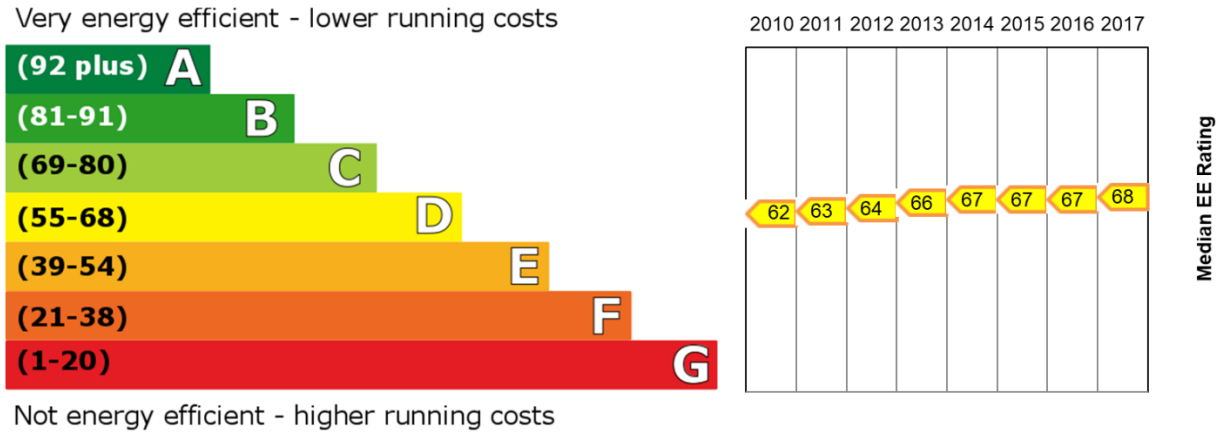
[27] http://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf

Table 15: Average EER for 2010 – 2017, SAP 2009

		2017	2016	2015	2014	2013	2012	2011	2010
EER	**Mean**	65.6	65.1	64.6	64.1	63.2	61.8	60.9	59.9
	Median	68	67	67	67	66	64	63	62
Sample		*3002*	*2850*	*2754*	*2682*	*2725*	*2787*	*3219*	*3115*

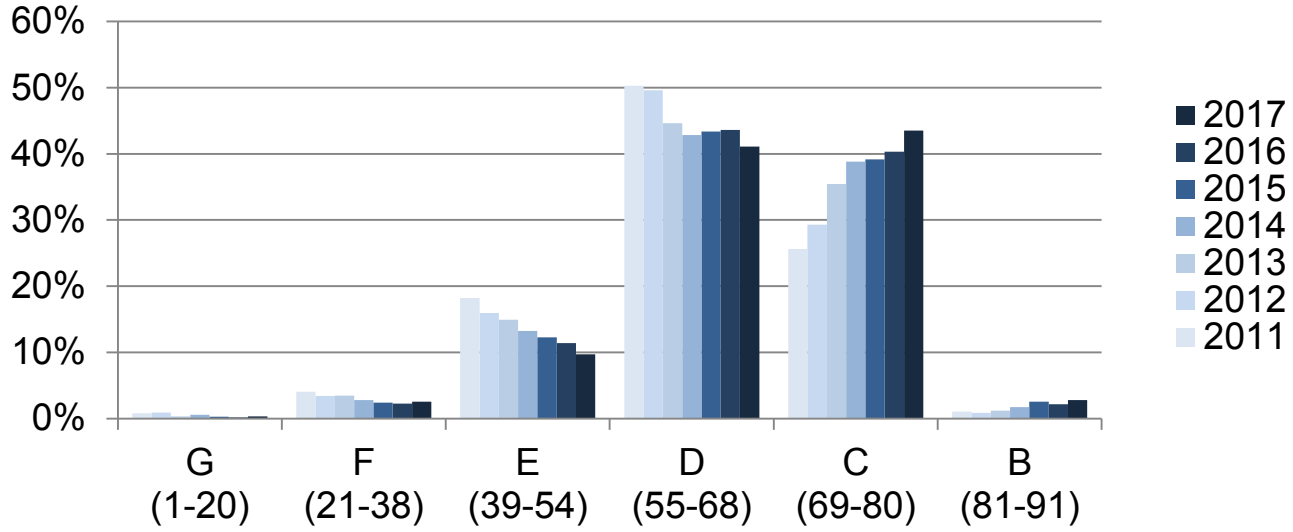
93. The median EE Rating has also improved over this period. In 2017 half of all Scottish dwellings were rated 68 or better, an increase from 62 in 2010.

Figure 10: Median EER relative to EPC bands, SAP 2009, 2010-2017



94. The average figures reflect that Scottish housing is gradually moving up through the EPC bands (where A is the most energy efficient), as shown in Figure 11 and Table 16.

Figure 11: Distribution of the Scottish Housing Stock by EPC Band, SAP 2009, 2011-2017



Note: Values for this figure are provided in Table 16.

95. Over two-fifths (46%) of the housing stock in 2017 had an EPC rating of C or better, up 22 points since 2010 (Table 16). Over the period 2010-2017, the proportion of properties in the lowest EPC bands, E, F and G, has dropped 14 percentage points: 27% of properties were rated E, F or G in 2010 compared with 13% in 2017.

Table 16: Distribution of the Scottish Housing Stock by EPC Band, SAP 2009, 2010 and 2013 to 2017

EPC band	2017		2016		2015		2014		2013		2010	
	000s	%	000s	%	000s	%	000s	%	000s	%	000s	%
A (92-100)	-	-	-	-	-	-	-	-	-	-	-	-
B (81-91)	69	3%	54	2%	62	3%	42	2%	29	1%	18	1%
C (69-80)	1072	44%	989	40%	953	39%	939	39%	851	35%	547	23%
D (55-68)	1,012	41%	1,070	44%	1,055	43%	1,037	43%	1,072	45%	1,157	49%
E (39-54)	240	10%	279	11%	298	12%	321	13%	359	15%	495	21%
F (21-38)	63	3%	56	2%	59	2%	68	3%	84	3%	127	5%
G (1-20)	8	0%	5	0%	7	0%	14	1%	8	0%	13	1%
Total	2,464	100%	2,452	100%	2,434	100%	2,420	100%	2,402	100%	2,368	100%
Sample		*3,002*		*2,850*		*2,754*		*2,682*		*2,725*		*3115*

No A-rated properties were sampled between 2010 and 2017.

3.3.2 Energy Efficiency Rating, SAP 2012

96. This section examines the energy efficiency profile of the Scottish housing stock in 2017 under the most recent SAP 2012[28] methodology.

97. SAP is periodically reviewed by the UK government to ensure it remains fit for purpose and to address application across an increasing range of carbon and energy reduction policy areas. SAP is used for assessment of new buildings whilst a 'reduced data' version of the methodology, RdSAP, is applied to assessment of existing buildings.

98. SHCS energy modelling for SAP 2012 is currently based on RdSAP (version 9.92) which was released on 7 December 2014. This introduced some technical updates and broadening of scope (for example, enabling assessment of 'park homes' as a dwelling type) as well as updating UK carbon factors and fuel costs based upon recent research undertaken by BEIS. The latest version of RdSAP (version 9.93) was released on 19 November 2017. It has not been applied in this publication since it was not applicable to the majority of the 2017 SHCS sample.

99. Dwellings with main heating fuels other than mains gas (for example oil or coal) have systematically lower SAP ratings in SAP 2012 than in SAP 2009 and this is particularly true at the lower end of the SAP range. The main reason for this is that between SAP versions 2009 and 2012, fuel prices for these fuels increased more than for mains gas. As a result, average energy efficiency ratings tend to be slightly lower under SAP 2012 compared to SAP 2009.

100. Tables 17 and 18 show the energy efficiency profile of the Scottish housing stock between 2014 and 2017 under SAP 2012. Figure 12 shows this alongside the longer term change as measured by SAP 2009.

Table 17: Average EER for 2014-2017, SAP 2012

		2017	2016	2015	2014
EER	Mean	64.3	63.7	62.8	62.2
	Median	67	66	65	65
Sample		*3,002*	*2,850*	*2,754*	*2,682*

[28] www.bre.co.uk/sap2012

101. In 2017, the mean energy efficiency rating of the Scottish housing stock under SAP 2012 was 64.3 and the median was 67 points, indicating that half of the housing stock has an energy efficiency rating of 67 or better. The difference in mean rating between 2016 and 2017 was not significant. However, there has been an overall improvement since 2014.

102. More than two-fifths (42%) of all properties in 2017 were rated C or better, an increase from 39% in 2016 and 35% in 2014. Less than a fifth (16%) were in bands E, F or G – a drop of 5 percentage points over the 4-year period from 2014 to 2017.

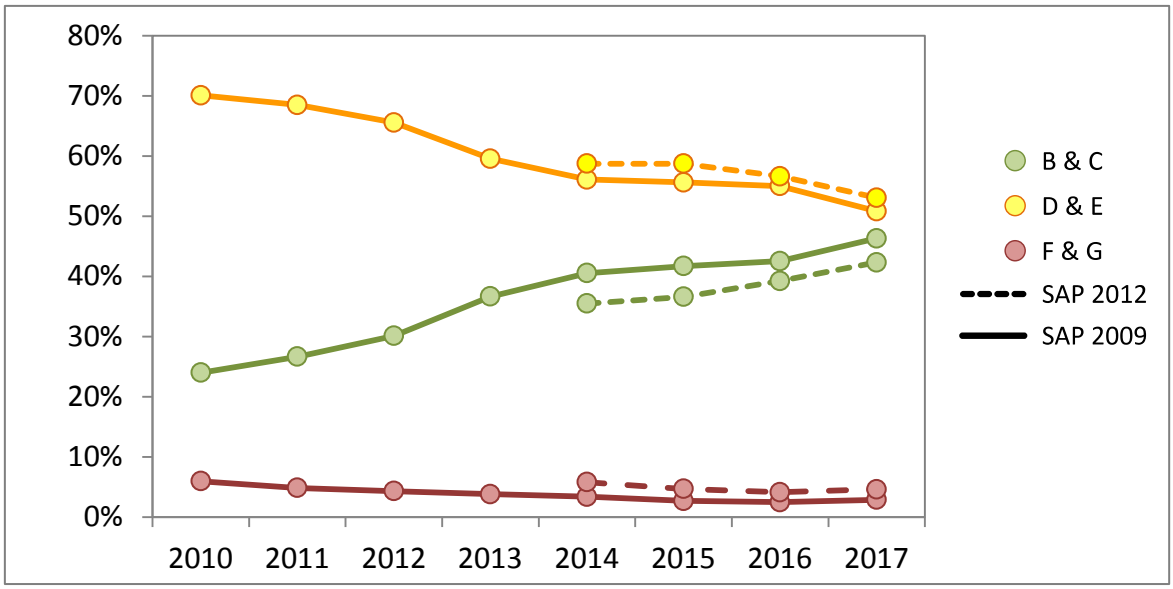
Table 18: Distribution of the Scottish Housing Stock by EPC Band, 2014 – 2016, SAP 2012

EPC Band	2017		2016		2015		2014	
	000s	%	000s	%	000s	%	000s	%
A (92-100)	-	-	-	-	-	-	-	-
B (81-91)	65	3%	53	2%	53	2%	29	1%
C (69-80)	978	40%	910	37%	837	34%	830	34%
D (55-68)	1,028	42%	1,068	44%	1,061	44%	1,052	43%
E (39-54)	280	11%	321	13%	368	15%	369	15%
F (21-38)	95	4%	88	4%	94	4%	115	5%
G (1-20)	18	1%	13	1%	20	1%	25	1%
Total	2,464	100%	2,452	100%	2,434	100%	2,420	100%
Sample		*3,002*		*2,850*		*2,754*		*2,682*

No A-rated properties were sampled for 2014-2017

103. Figure 12 shows EPC bandings for SAP 2009 and SAP 2012. The chart shows a strong trend of improvement in the energy efficiency profile of the housing stock since 2010. The proportion of dwellings rated C or better increased from 24% in 2010 to 46% in 2017 (as measured under SAP 2009), and 35% in 2014 to 42% in 2017 (as measured under SAP 2012).

Figure 12: Grouped EPC Bands under SAP 2009 and SAP 2012, 2010-2017



104. Table 19 shows the energy efficiency profile by broad tenure groups in 2017 using SAP 2012. Figure 13 provides more details on the distribution of the least energy efficient properties by household characteristics.

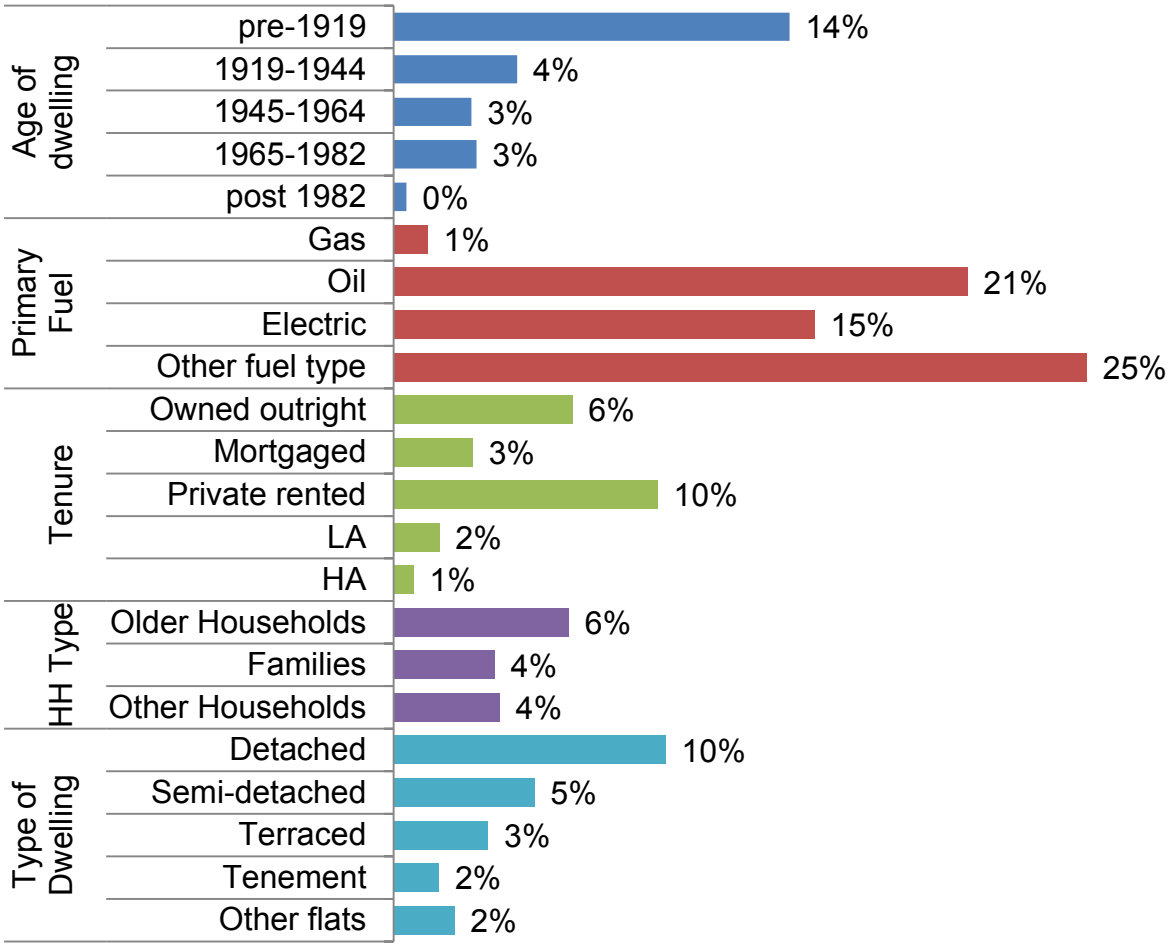
Table 19: EPC Band by Broad Tenure in 2017, SAP 2012

EPC Band	Owner occupied		Private rented		Social sector		All Tenures	
	000s	%	000s	%	000s	%	000s	%
A (92-100)	-	-	-	-	-	-	-	-
B (81-91)	36	2%	10	3%	18	3%	65	3%
C (69-80)	525	35%	124	36%	328	52%	978	40%
D (55-68)	664	45%	128	37%	236	38%	1,028	42%
E (39-54)	194	13%	50	15%	36	6%	280	11%
F (21-38)	60	4%	28	8%	7	1%	95	4%
G (1-20)	13	1%	5	1%	*	*	18	1%
Total	1,491	100%	346	100%	626	100%	2,464	100%
Sample		1,901		373		728		3,002

105. Over half (55%) of social housing is in band C or better under SAP 2012, compared to just under two-fifths (39%) in the private rented sector and 38% of owner-occupied households. Seven per cent of dwellings in the social sector are within EPC bands E, F or G, while 18% of owner occupied dwellings and 24% of the private rented sector are within these EPC bands. Housing in the social sector tends to be more energy efficient than the owner occupied or private rented sector. This could be driven by the Scottish Housing Quality Standard and the Energy Efficiency Standard for Social Housing which introduced minimum energy efficiency levels for that sector.

106. Figure 13 shows that the share of dwellings in the lowest energy efficiency bands (F and G) is particularly high for pre-1919 dwellings (14%), non-gas heated properties (between 15% and 25%), detached properties (10%) and in the private rented stock (10%). Across Scotland as a whole in 2017, 5% of properties were in bands F or G.

Figure 13: Proportion of Homes in Band F or G by Dwelling Age, Primary Heating Fuel, Tenure and Household and Dwelling Type in 2017 (SAP 2012)



Base figures and more detailed breakdowns are provided in Table 20 and Table 21.

107. More detailed breakdowns are shown in Table 20 by household characteristics. Mean SAP 2012 ratings range from 61.6 in the private rented sector to 69.7 in housing association dwellings, and this is a statistically significant difference. Social housing as a whole is more energy efficient than the private sector, with a mean EER of 67.8 compared to 63.0 for private dwellings.

Table 20: Mean EER and Broad EPC Band, by Household Characteristics in 2017, SAP 2012

	EE Rating		Band			*Sample*
	Mean	Differences from 2016[1]	BC	DE	FG	
Tenure						
Owned outright	61.8		33%	61%	6%	*1,104*
Mortgaged	65.3		44%	53%	3%	*797*
LA/Other public	66.6		49%	50%	2%	*439*
HA/co-op	69.7		65%	34%	1%	*289*
PRS	61.6		39%	52%	10%	*373*
Private	63.0		38%	56%	6%	*2,274*
Social	67.8		55%	43%	1%	*728*
Household Composition						
Older Households	62.7		37%	57%	6%	*1,015*
Families	65.5		47%	49%	4%	*705*
Other households	64.7	+1.1	44%	53%	4%	*1,282*
Weekly Household Income						
< £200	64.5		46%	49%	6%	*316*
£200-300	63.7		41%	54%	5%	*479*
£300-400	64.0		44%	50%	6%	*446*
£400-500	64.0		44%	50%	6%	*375*
£500-700	64.8	+1.6	42%	54%	4%	*543*
£700+	64.3		40%	56%	3%	*789*
Council Tax Band						
Band A	65.2		47%	49%	4%	*601*
Band B	63.9		40%	57%	3%	*670*
Band C	65.1		46%	48%	6%	*464*
Band D	64.9		44%	51%	4%	*385*
Band E	62.2		35%	58%	7%	*425*
Band F	64.1		39%	56%	5%	*268*
Band G & H	63.4		41%	53%	5%	*187*
Scotland	64.3		42%	53%	5%	*3,002*

1. Differences provided where statistically significant.

108. Table 21 shows that there is a strong association between dwelling characteristics and energy efficiency rating. Across **dwelling types**, detached properties have the lowest energy efficiency profile on average (mean EER 60.7) while flats have the highest rating (68.9 for tenements and 67.0 for other flats).

109. The **oldest, pre-1919**, properties are least energy efficient (mean EER of 55.6 and only 17% rated C or better) while those built after 1982 have the highest energy efficiency ratings (mean EER of 71.6, with 74% in band C or better). The other age categories are comparable in terms of their energy efficiency profile.

110. **Primary heating fuel** is a key determinant of the energy efficiency of the dwelling. Properties heated by mains gas have an average rating of 66.8 and 47% are in band C or better. Dwellings heated by other fuels (including electric and oil) have considerably lower ratings. The average energy efficiency rating for oil heated properties is 50.2 (making the average dwelling in this group E rated) and only 9% are in band C or better. Proximity to the gas grid has a similar effect on the energy efficiency rating (average SAP rating 65.7 for dwellings near the gas grid, higher than the 57.5 for other dwellings). As dwelling characteristics associated with lower energy efficiency are disproportionately represented in rural areas, the average energy efficiency profile of rural properties is lower than that for urban; table 21 shows that mean SAP 2012 rating is 66.1 for dwellings in urban areas, higher than the 54.9 for dwellings in rural areas .

111. Improvements since 2016 which pass the statistical significance test include a 1.3 points gain in the mean SAP score for 1945-1964 dwellings, a 0.9 gain for dwellings with gas a primary heating fuel, and a 0.6 gain for urban dwellings. These improvements are reflected by increases in the proportion of dwellings rated band B or C between 2016 and 2017, which were 6 points for 1945-1964 dwellings, 4 points for dwellings with gas as a primary fuel, and 3 points for urban dwellings[29]. Improvements in the mean SAP score between 2016 and 2017 were also seen for tenement flats, however the corresponding increase of B and C rated dwellings for these categories was within the margin of error. Improvements in the proportion rated C or better were also seen for post-1982 dwellings (increasing by 5 percentage points) and those off the gas grid (increasing by 6 percentage points) although the corresponding change in mean SAP score was not significant.

[29] Figures for the previous year are available in the 2016 version of this publication here: https://www.gov.scot/publications/scottish-house-condition-survey-2016-key-findings/pages/5/#t21

Table 21: SAP 2012: Mean EER, Differences from 2016 and Broad EPC Band, by Dwelling Characteristics, 2017

	EE Rating		Band			Sample
	Mean	Differences from 2016[1]	BC	DE	FG	
Dwelling Type						
Detached	60.7		35%	56%	10%	*824*
Semi	61.9		29%	66%	5%	*661*
Terraced	63.4		37%	60%	3%	*619*
Tenement	68.9	+1.2	60%	39%	2%	*520*
Other flats	67.0		54%	44%	2%	*378*
Age of dwelling						
pre-1919	55.6		17%	69%	14%	*512*
1919-1944	62.2		28%	68%	4%	*369*
1945-1964	64.3	+1.3	37%	60%	3%	*684*
1965-1982	64.0		39%	58%	3%	*647*
post-1982	71.6		74%	25%	0%	*790*
Primary Heating Fuel						
Gas	66.8	+0.9	47%	52%	1%	*2,240*
Oil	50.2		9%	70%	21%	*240*
Electric	56.1		26%	59%	15%	*430*
Other	55.5		42%	33%	25%	*92*
Location						
urban	66.1	+0.6	46%	51%	2%	*2,341*
rural	54.9		22%	62%	17%	*661*
Gas Grid						
On	65.7		44%	54%	2%	*2,309*
Off	57.5		36%	47%	17%	*693*
Scotland	64.3		42%	53%	5%	*3,002*

[1] Differences provided where statistically significant.

3.4 National Home Energy Ratings (NHER)

112. The National Home Energy Ratings (NHER) system was the main methodology used in the SHCS to report on the energy efficiency of the housing stock prior to 2013. With the publication of the 2013 SHCS Key Findings Report the energy modelling methodology was updated and it is no longer possible to reproduce exactly the original NHER method, as the full documentation of this method is not publicly available. However because of user interest and because NHER scores are taken into account under the energy efficiency criterion of the SHQS, we provide an approximate NHER score. Further details can be found in the Methodology Notes to the 2013 SHCS report[30].

113. Table 22 presents banded NHER scores and mean values for selected categories of dwellings and household types for 2017. Significant differences were seen by age of dwelling, with older dwellings having lower average values (6.4 for pre-1919) than properties that were built more recently (8.7 for post-1982). Private sector dwellings had significantly lower NHER scores (7.4) than social sector (8.1) with mean scores by detailed tenure ranging from 7.2 (owned outright and private rented) to 8.4 (housing associations). There were also differences by dwelling type ranging from detached properties at 7.0 to tenements at 8.4. Dwellings using oil as their main fuel had the lowest score at 5.9 while those fuelled by gas had the highest at 7.9.

114. Table 22 also shows the percentage of homes in each dwelling and household category that were rated as good, moderate, or poor. Significant differences in the percentage of dwellings that were rated as “good” were seen by type of dwelling (66% of detached properties, compared to 85% of tenement flats). A very strong relationship was seen between age of dwelling and the proportion of dwellings rated as good (50% of pre-1919 dwelling, lower than 92% of post-1982 dwellings). Primary heating fuel also had an impact on the proportion that were rated as good (83% of dwellings with gas as a primary fuel, compared to just 40% of dwellings with oil as a primary fuel). This profile is similar to SAP 2012.

[30] SHCS - Methodology Notes 2013 available at http://www.gov.scot/Topics/Statistics/SHCS/Downloads/MethodologyNotes2013

Table 22: NHER Scores and Banded Ratings by Selected Dwelling and Household Characteristics, 2017

		NHER band			
	Mean	Good	Moderate	Poor	***Sample***
Scotland	7.6	75%	23%	1%	*3,002*
Dwelling Type (grouped)					
Detached	7.0	66%	31%	3%	*824*
Semi-detached	7.1	70%	29%	1%	*661*
Terraced	7.3	74%	25%	2%	*619*
Tenement	8.4	85%	15%	0%	*520*
Other flats	8.0	84%	15%	1%	*378*
Age of dwelling					
pre-1919	6.4	50%	47%	3%	*512*
1919-1944	7.2	71%	28%	2%	*369*
1945-1964	7.5	77%	22%	1%	*684*
1965-1982	7.5	79%	20%	1%	*647*
post 1982	8.7	92%	8%	0%	*790*
Primary Heating Fuel					
Gas	7.9	83%	17%	0%	*2,240*
Oil	5.9	40%	58%	2%	*240*
Electric	6.1	44%	49%	7%	*430*
Other fuel type	6.9	58%	29%	13%	*92*
Tenure					
Owned outright	7.2	69%	29%	2%	*1,104*
Mortgaged	7.6	78%	22%	1%	*797*
LA	7.9	85%	15%	1%	*439*
HA	8.4	87%	13%	1%	*289*
Private rented	7.2	68%	29%	3%	*373*
Private Sector	7.4	72%	27%	2%	*2,274*
Social Sector	8.1	85%	14%	1%	*728*
Household Composition					
Older Households	7.4	72%	27%	2%	*1,015*
Families	7.6	77%	22%	1%	*705*
Other Households	7.6	77%	22%	1%	*1,282*

3.5 Carbon Emissions

- Based on modelled energy use, the average Scottish home is estimated to produce 7.0 tonnes of **CO_2** per year in 2017, which is almost double the average carbon emissions per household as reported by BEIS (3.8 tonnes per year) in 2016. This suggests that households are not heating their homes to the standard heating regimes.
- Average modelled carbon emissions for all properties have continued to decrease in the past year from 76 kg per square metre of floor area in 2016, to 74 kg per square metre in 2017.

115. **Carbon Emissions** are the amount of carbon dioxide gas vented to the atmosphere. Estimates of emissions from the residential sector which take into account actual energy consumption by households are reported by BEIS at Local Authority and Scotland level annually[31]. This methodology is consistent with the Greenhouse Gas Inventory (GHGI) which is the source for monitoring progress against the Scottish Government's climate change commitments.

116. In contrast, emissions reported from the SHCS are modelled on the assumption of a standard pattern of domestic energy consumption and do not reflect differences in consumption behaviour due to preferences or changes in weather conditions. As such, they are distinct from the carbon emissions figures published by BEIS and compiled in GHG inventories. Table 23 shows modelled emissions from the SHCS and provides a comparison with the estimates published by BEIS for the period 2010-2016.

117. Average carbon emissions per household decreased in 2011, accompanied by a decrease in the SHCS based average modelled emissions. In 2012, cooler temperatures led to an increase in domestic energy consumption and an increase in CO_2 emissions from the domestic sector overall. This was reflected in the estimates of emissions levels from the domestic sector reported by BEIS. At the same time, modelled SHCS emissions per household fell by 1.4%, reflecting the improved energy efficiency of the sector in this period and the greater potential to reduce CO2 emissions. The SHCS estimates are not designed to capture the increased demand for heating due to colder weather or reduced demand associated with warmer weather in any particular year.

[31] Local and Regional CO2 Emissions Estimates, BEIS: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2016

Table 23: Carbon Emissions and Modelled Emissions in Scottish Housing, 2011-2017

		2011	2012	2013	2014	2015	2016	2017
Carbon Emissions[1]: BEIS Domestic sector	Total (Mtonnes)	12.0	12.8	12.3	10.4	10.0	9.3	
	per HH (tonnes)[2]	5.1	5.3	5.1	4.3	4.1	3.8	
	% change per HH	-12.8%	5.8%	-4.0%	-16.4%	-4.2%	-7.2%	
Modelled emissions: SHCS	Total ("Mt")	18.2	18.1	17.4	17.9	17.7	17.2	17.3
	per HH ("t")	7.7	7.6	7.3	7.4	7.3	7.0	7.0
	% change per HH	-2.6%	-1.4%	-3.6%	1.1%	-1.8%	-3.0%	-0.2%

[1] Local and Regional CO2 Emissions Estimates, BEIS. Data reflects revisions made in the most recent publication. https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2016

[2] Number of households (HHs) sourced from National Records of Scotland, Estimates of Households and Dwellings, 2017: https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/households/household-estimates/2017

* Modelled emissions figures for 2014 to 2017 are not fully comparable to previous years

118. Estimates in the Second Report on Proposals and Policies (RPP2)[32] or in the Draft Climate Change Plan[33] are also not comparable to SHCS estimates. RPP2 figures for the residential sector relate to non-traded emissions only (i.e. exclude electricity which is covered by the EU Emissions Trading System) while SHCS estimates cover all fuel types.

119. This report is only concerned with the level and variations in modelled emissions from the Scottish housing stock. These estimates are produced through the use of BREDEM 2012-based models, in line with other statistics on energy efficiency and fuel poverty reported here[34].

120. To derive emissions estimates, modelled energy demand is combined with carbon intensity factors as adopted for the 2012 edition of the SAP (see section 7.3). These are CO_2 equivalent figures which include the global warming impact of CH_4 and N_2O as well as CO_2.

[32] RPP2 available at: http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/lowcarbon/meetingthetargets

[33] http://www.gov.scot/Resource/0051/00513102.pdf

[34] Information on the energy modelling is available in the methodology notes which are available on the SHCS website: https://www2.gov.scot/Topics/Statistics/SHCS/Downloads

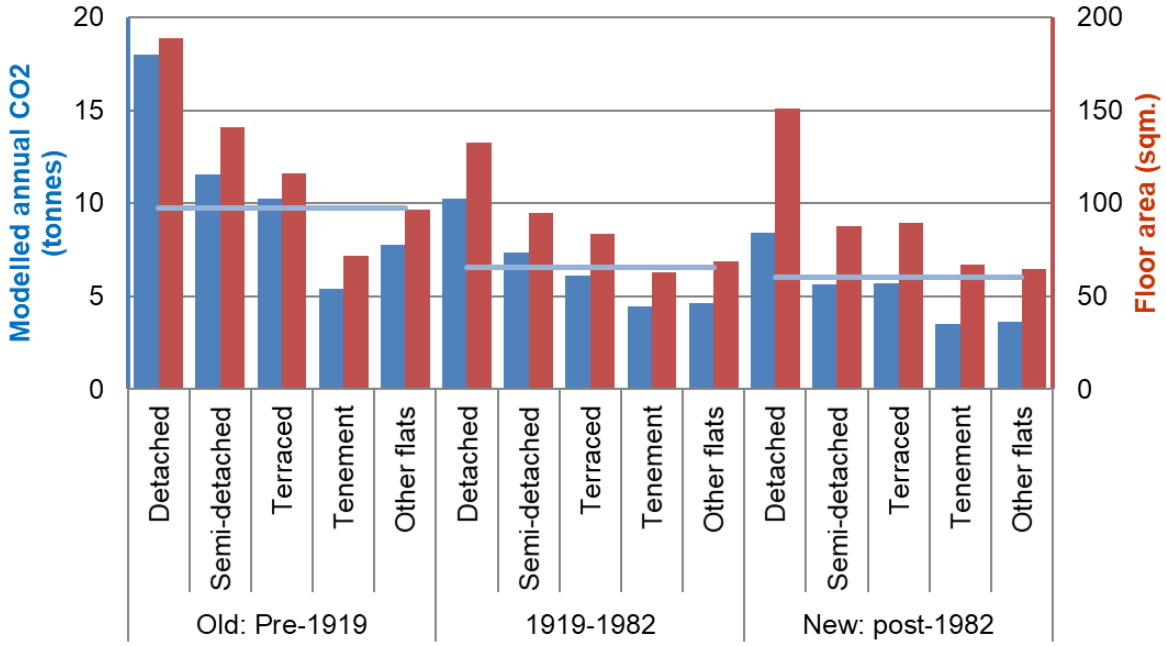
121. The change in the underlying BREDEM 2012 model, first implemented in the reporting of 2014 data, has meant that carbon emissions for 2014-2017 are not estimated on a consistent basis with those for 2010-2013. Further details on this change are given in the Methodology Notes to the 2014 Key Findings report[35].

3.5.1 Modelled Emissions by Dwelling Type and Age of Construction

122. The annual modelled emissions from a property reflect the energy use for the whole dwelling heated according to the standard heating regime. Figure 14 shows that dwellings with larger floor area generally have higher carbon emissions.

123. Newer dwellings have lower modelled emissions than older ones on average as a result of their better thermal performance and higher energy efficiency (as shown in section 3.3). Post-1982 flats have the lowest modelled emissions on average; less than 4 tonnes per year (Table 24) which is around half the average across all dwellings.

Figure 14: Average Floor Area and Average Modelled Annual Emissions by Age and Type of Dwelling, 2017



Note: Floor areas for these subgroups are provided in section 2.1.1. Modelled carbon emissions figures are provided in Table 24.
The pale blue line indicates the average modelled emissions from the dwelling age group.

[35] SHCS Methodology Notes 2014 available at www.gov.scot/Topics/Statistics/SHCS/Downloads/Methodology2014

Table 24: Average Modelled Annual Carbon Emissions (tonnes per year) by Dwelling Age and Type, 2017

	Dwelling Age			
Dwelling Type	Pre-1919	1919-1982	Post-1982	All
Detached	18.0	10.2	8.4	10.7
Semi-detached	11.6	7.4	5.6	7.6
Terraced	10.3	6.1	5.7	6.6
Tenement	5.4	4.5	3.5	4.4
Other flats	7.8	4.6	3.6	5.1
All dwelling types	9.8	6.6	6.0	7.0

124. Across all age bands, detached houses have the highest modelled emissions due to a larger share of exposed surfaces. As shown in section 2.3, they are also the most likely to use high carbon-intensity fuels such as oil and coal in place of mains gas.

125. By dividing modelled emissions by total internal floor area we derive emissions per square meter (kg/m^2). Controlling for floor area in this way shows that pre-1919 detached houses have the highest modelled emissions per sq. m (108 kg/m^2), as shown in Table 25. Post-1982 detached dwellings (58 kg/m^2), tenements (56 kg/m^2) and other flats (59 kg/m^2) have the lowest emissions.

Table 25: Average Modelled Emissions per Square Meter of Floor Area (kg/m^2) by Age and Type of Dwelling, 2017

Dwelling Age		**Pre-1919**	**1919-1982**	**Post-1982**	**All Ages**
Type	Detached	108	80	58	75
	Semi	89	80	67	79
	Terraced	94	75	66	76
	Tenement	78	72	56	69
	Other flats	86	68	59	71
All types		89	76	60	74

3.5.2 Modelled Emissions by Tenure

126. Although data for 2014-2017 is not directly comparable to prior years, the data suggests that there is a longer term trend of declining emissions. Average modelled carbon emissions reduced from 92 kg/m^2 in 2010 to 80 kg/m^2 in 2013. Based on the updated carbon emissions methodology, there was then a further decrease from 80 kg/m^2 in 2014 to 74 kg/m^2 in 2017.

127. Figure 15 and Table 26 show how emissions differ across tenure for the period 2010-2017. The highest rates of emissions observed for private rented dwellings (83 kg/m^2) and lowest for housing association dwellings (68 kg/m^2), with emissions from the other tenures falling in between those values. The values were similar to the previous year across all tenures, however the longer time series shows a decreasing trend over the 2010-2017 period for all tenures.

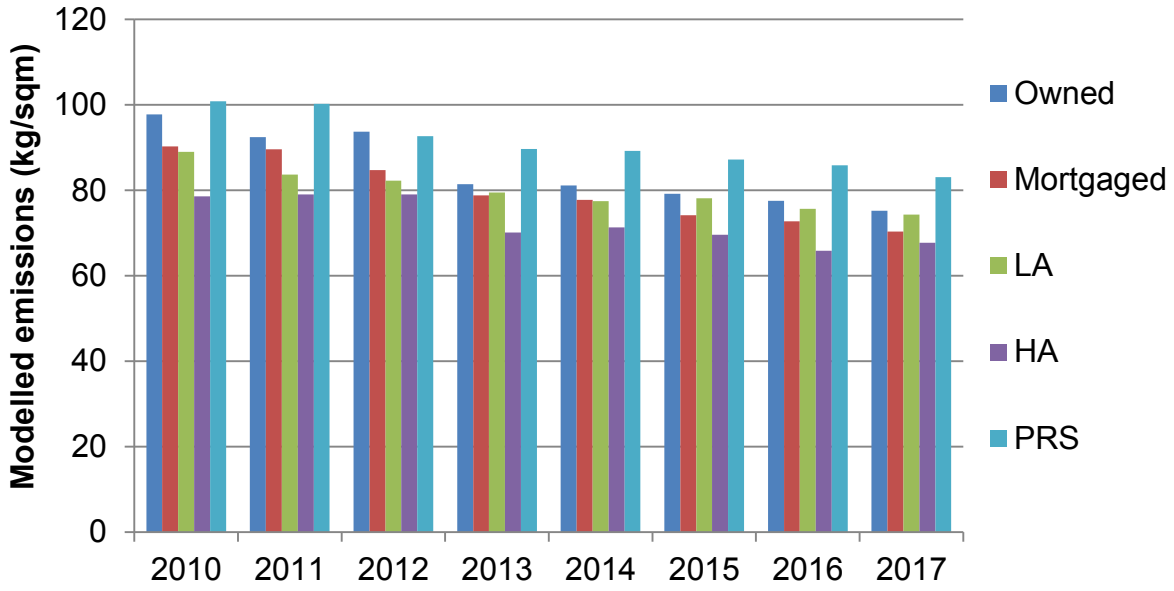
128. Changes to the tenure definitions and the revised carbon emissions methodology mean that figures for 2014-2017 by tenure are not fully comparable to earlier years. Differences that were statistically significant were seen in the mortgaged sector (reducing from 78 kg/m^2 in 2014 to 70 kg/m^2 in 2017) and households that are owned outright (reducing from 81 kg/m^2 to 75 kg/m^2 between 2014 and 2017).

Table 26: Average Modelled Emissions per Square Meter by Tenure, 2010-2017*

	2017*	2016*	2015*	2014*	2013	2012	2010
Owned outright	75	78	79	81	81	94	98
Mortgaged	70	73	74	78	79	85	90
LA/Other public	74	76	78	77	79	82	89
HA/co-op	68	66	70	71	70	79	79
PRS	83	86	87	89	90	93	101
All Tenures	74	76	78	80	80	88	92

* Data for 2010 to 2013 does not include households living rent free. Figures for 2014-2017 are therefore not fully comparable to the previous years.

Figure 15: Modelled Emission per square meter (kg/m2) by Tenure, 2010-2017*



* Data for 2010 to 2013 does not include households living rent free. Figures for 2014-2017 are therefore not fully comparable to previous years.

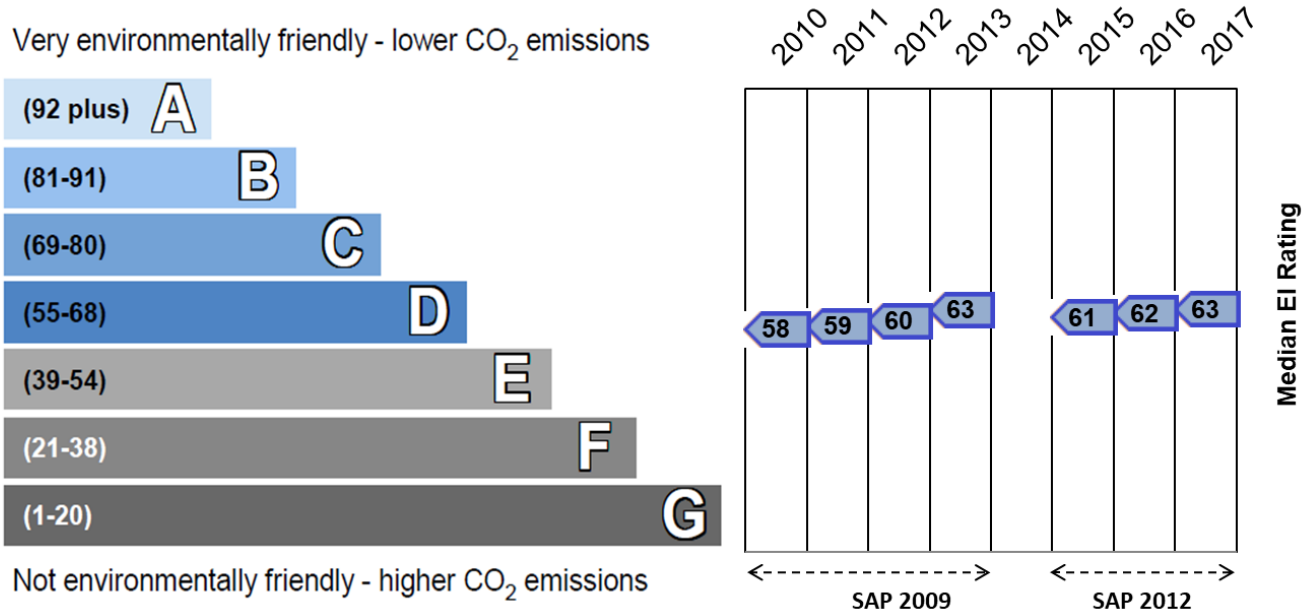
3.6 Environmental Impact Rating

129. The Environmental Impact Rating (EIR) represents the environmental impact of a dwelling in terms of carbon emissions associated with fuels used for heating, hot water, lighting and ventilation. Ratings are adjusted for floor area so they are independent of dwelling size for a given built form. Emissions for this measure are calculated using SAP methodology.

130. EI ratings for 2015, 2016 and 2017, produced on the basis of SAP 2012, are not fully comparable to those for the period 2010-2013, which were produced on the basis of SAP 2009.

131. Figure 16 illustrates the increasing trend in the median EIR between 2010 and 2017. This indicates that the environmental impact of Scottish housing is gradually falling over time.

Figure 16: Median EIR relative to Band, 2010-2013 (SAP 2009) and 2015-2017 (SAP 2012)



132. As shown in Table 27, 32% of dwellings had EI ratings in band C or better, an improvement on the 2016 figure of 29%. The mean rating was 60 and the median was 63, both of which fall in band D.

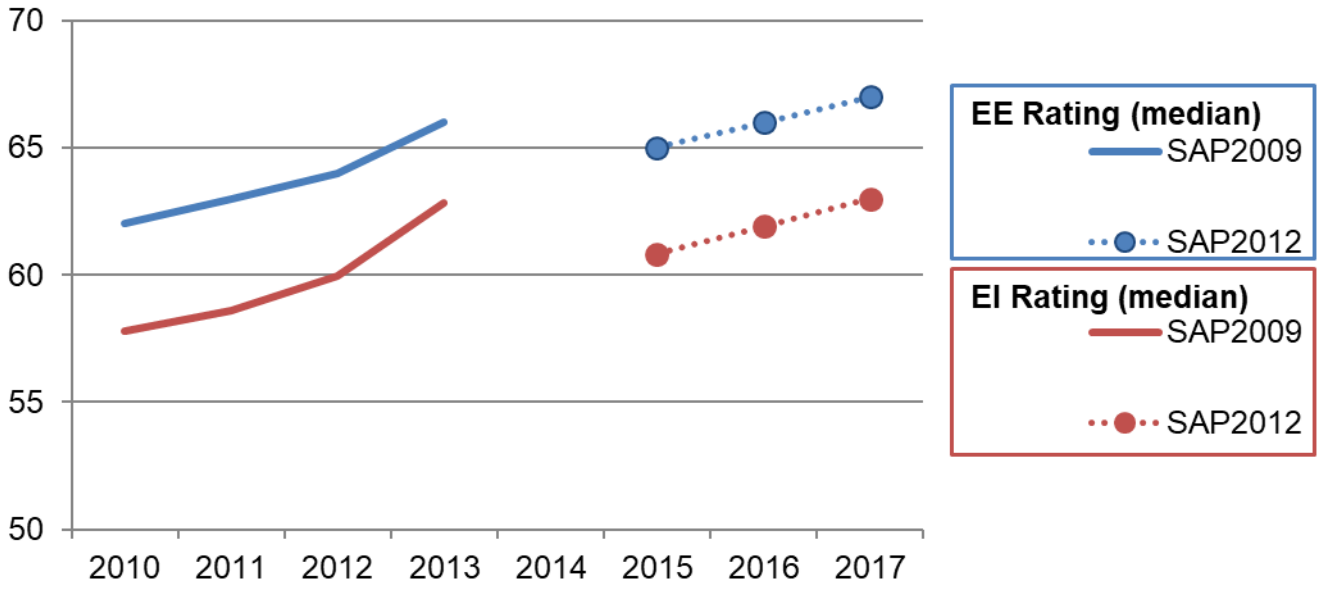
133. In 2017, 9% of dwellings were rated F or G in terms of their environmental impact.

Table 27: EIR Bands in the Scottish Housing Stock, 2011-2013 and 2015-2017

EPC Band	2017		2016		2015		2013		2012		2011	
	000s	%	000s	%	000s	%	000s	%	000s	%	000s	%
A - B (81+)	120	5%	96	4%	102	4%	71	3%	52	2%	55	2%
C (69-80)	671	27%	613	25%	554	23%	524	22%	468	20%	424	18%
D (55-68)	929	38%	947	39%	926	38%	888	37%	873	37%	857	37%
E (39-54)	512	21%	558	23%	576	24%	587	25%	623	27%	615	26%
F (21-38)	191	8%	200	8%	221	9%	248	10%	270	12%	297	13%
G (1-20)	41	2%	39	2%	55	2%	64	3%	64	3%	81	4%
Total	2,464	100%	2,452	100%	2,434	100%	2,402	100%	2,383	100%	2,349	2,402
Mean		60		59		58		60		57		56
Median		63		62		61		63		60		59
Sample		*3,002*		*2,850*		*2,754*		2,725		2,783		*3,191*

134. Figure 17 illustrates that the energy efficiency and the environmental impact rating for the median Scottish dwelling have changed in parallel since 2010.

Figure 17: Trend in Median EE and EI Ratings, 2010-2013 and 2015-2017



135. Table 28 shows how EI ratings vary across different type of dwellings. As expected dwellings built since 1982 have better environmental impact ratings than other dwellings, with 60% rated C or better and only 2% in the bottom two bands (F and G). Flats have a lower environmental impact than houses, as do gas heated properties compared to those using oil or electricity.

136. Oil heating systems and houses are more common in rural areas, leading to lower overall environmental impact ratings for rural dwellings.

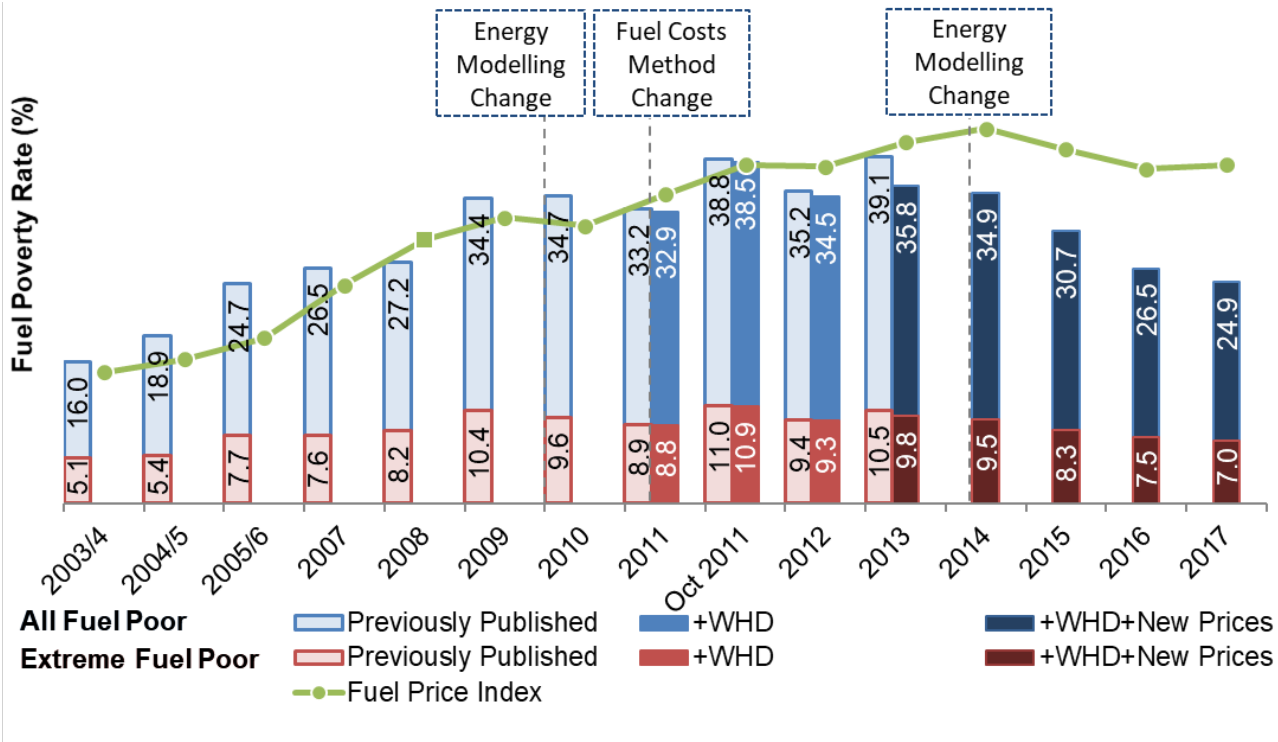
Table 28: Mean EIR and Broad EIR Band, by Dwelling Characteristics, 2017

	Environmental Impact Rating	EI Band			*Sample*
	Mean	ABC	DE	FG	
Dwelling Type					
Detached	55.2	22%	62%	16%	*824*
Semi-detached	56.2	18%	69%	12%	*661*
Terraced	59.0	25%	66%	9%	*619*
Tenement	67.0	53%	44%	3%	*520*
Other flats	64.3	46%	49%	5%	*378*
Age of Dwelling					
pre-1919	50.0	12%	64%	24%	*512*
1919-1944	57.7	22%	70%	8%	*369*
1945-1964	60.1	28%	65%	7%	*684*
1965-1982	59.7	26%	66%	8%	*647*
post-1982	69.0	60%	37%	2%	*790*
Primary Heating Fuel					
Gas	63.6	36%	61%	3%	*2,240*
Oil	41.6	3%	57%	41%	*240*
Electric	46.9	13%	53%	34%	*430*
Other fuel type	57.8	52%	21%	27%	*92*
Urban-Rural Indicator					
Urban	62.4	35%	60%	5%	*2,341*
Rural	49.1	18%	52%	30%	*661*
Gas Grid					
On	61.7	32%	63%	6%	*2,309*
Off	52.8	33%	39%	28%	*693*
Scotland	60.2	32%	58%	9%	*3,002*

4 Fuel Poverty

- In 2017, 24.9% of households (613,000) were estimated to be in **fuel poverty**, a similar level to 2016 (26.5% or 649,000 households). 7.0% or 174,000 households were living in extreme fuel poverty in 2017. This follows a period of annual decreases between 2014 and 2016 and is the lowest rate recorded by the survey since 2005/06.
- Between 2016 and 2017 rates of fuel poverty decreased in urban areas (from 24% to 21%), widening the gap when compared to rural areas (43%). This is likely to be driven by gas prices continuing to fall in 2017, while oil prices increased by 24% between 2016 and 2017.
- On average the social (24%) and private sector (27%) have similar rates of fuel poverty in 2017. Households in local authority housing saw an improvement in fuel poverty rates with 28% estimated to be in fuel poverty compared to 36% in 2016.

Figure 18: Fuel Poverty and Extreme Fuel Poverty since 2003/4



Note: Energy requirement underpinning fuel poverty estimate modelled on the following basis: 2003/4 – 2009: BREDEM – 12; 2010 – 2013: BREDEM 2012 v.1.0; from 2014 onwards: BREDEM 2012 v.1.1. + WHD indicates the inclusion of Warm Homes Discount, and + New Prices to the adjustment of fuel price sources; from 2016 a further improvement is included by assigning pre-payment metered fuel prices to the relevant households.

4.1 Definition and Measurement of Fuel Poverty

137. As set out in the Scottish Fuel Poverty Statement, a household is in **fuel poverty** if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use[36].

138. Under the 2001 Housing (Scotland) Act (section 88), the Scottish Government was committed to eradicating fuel poverty as far as practicably possible by November 2016[37]. In June 2016, the Minister for Local Government and Housing informed Parliament that, based on the advice received from experts, it was unlikely that the statutory fuel poverty target would be met. This has now been confirmed by 2016 and 2017 fuel poverty rates of 26.5% and 24.9% respectively.

139. The Fuel Poverty (Target, Definition and Strategy)(Scotland) Bill[38] was introduced to the Scottish Parliament on 26 June 2018. This includes a proposed new definition of fuel poverty based on advice from an independent panel of experts. The statistics presented in this report are based on the current definition and this will continue until the legislation receives Royal Assent and the new definition become the official measure.

140. **Extreme fuel poverty** indicates that a household would have to spend more than 20% of its income to maintain a satisfactory heating regime.

141. A **satisfactory heating regime** is defined as follows:

- For “vulnerable” households[39], 23°C in the living room (zone 1) and 18°C in other rooms (zone 2), for 16 hours in every 24.
- For other households, 21°C in the living room (zone 1) and 18°C in other rooms (zone 2) for 9 hours a day during the week and 16 hours a day during the weekend.

[36] Scottish Fuel Poverty Statement 2002, http://www.gov.scot/Resource/Doc/46951/0031675.pdf

[37] Scottish Government's Fuel Poverty Policy, http://www.gov.scot/Topics/Built-Environment/Housing/warmhomes/fuelpoverty

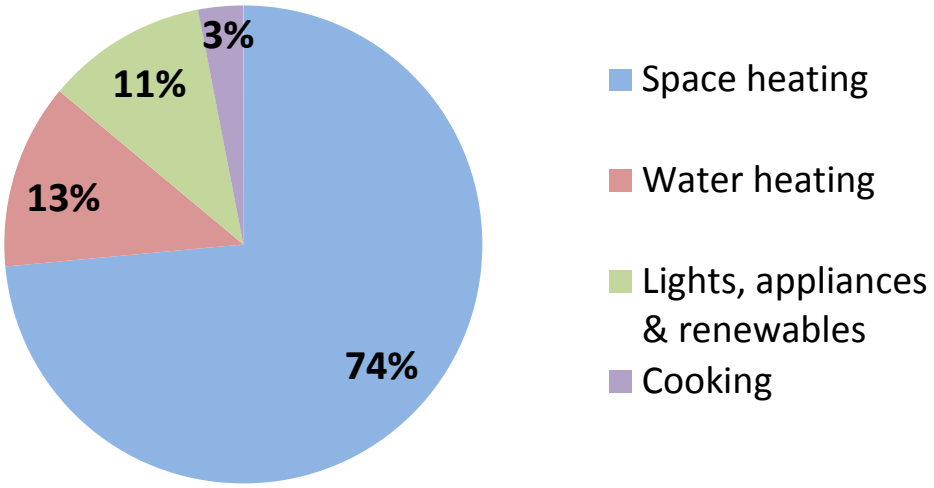
[38] http://www.parliament.scot/parliamentarybusiness/Bills/108916.aspx

[39] Vulnerable households are those where at least one resident is aged 60 or over, or suffers long term sickness or disability.

142. Although space heating is the largest component of the energy spend which underpins the fuel poverty estimate, there are other types of energy use that are also taken into account, such as water heating, lighting and appliance use, and cooking. All types of energy expenditure are estimated on the basis of a standard set of behavioural assumptions and do not reflect the actual energy use of the household, which may vary considerably depending on personal preference and priorities relative to other types of household expenditure.

143. Figure 19 shows that in 2017, on average, around 74% of the modelled household energy demand was from space heating, 13% from water heating, 11% from lighting and appliance usage, and 3% was accounted for by cooking. These proportions are the same as in 2016.

Figure 19: Mean Household Energy Consumption by End Use, 2017



Note: Figures do not add to 100% due to rounding

144. The **energy costs** of maintaining a satisfactory heating regime and other uses of energy are modelled using data from the physical inspection of dwellings and the household interview conducted as part of the SHCS, as well as information on consumer fuel prices. The methodology for modelling the cost of energy use was updated for the 2014 Key Findings report and details were provided in the accompanying Methodology Notes[40].

[40] SHCS - Methodology Notes 2014 available at www.gov.scot/Topics/Statistics/SHCS/Downloads/Methodology2014

145. The current report continues to use this improved method for setting the cost of the domestic energy requirement. A further small improvement introduced in the 2016 survey about **pre-payment meters** for energy supply is also continued, which has allowed us to improve the accuracy of fuel price information for pre-payment users, who are more common among lower income groups which are at higher risk of fuel poverty. In 2017, 21% of households in Scotland had a pre-payment meter (mains gas, electricity, or both).

146. The cost of the energy requirement includes an allowance for the bill rebate provided under the Warm Home Discount (WHD) scheme[41]. It no longer includes the £12 contribution of the Government Electricity Rebate (GER) as the scheme only ran for the previous two years (2014 and 2015)[42].

4.2 Fuel Poverty and Extreme Fuel Poverty

147. In 2017 an estimated 24.9% of all households were in fuel poverty, around 613,000 households. This is not statistically different to the 2016 fuel poverty rate of 26.5% (around 649,000 households).

148. The fuel poverty rate is at the lowest rate recorded by the survey since 2005/6.

149. Around 7.0% (174,000 households) were living in extreme fuel poverty in 2017 which is similar to the 7.5% (183,000 households) in the previous year.

[41] Eligible households receive a £140 discount on their electricity bills: https://www.gov.uk/the-warm-home-discount-scheme. Households qualify if they receive the guarantee credit element of pension credit (core group) or they are on a low income and meet their energy supplier's criteria (broader group).

[42] https://www.gov.uk/guidance/government-electricity-rebate

Table 29: Estimates of Fuel Poverty and Extreme Fuel Poverty since 2011

	Fuel Poverty		Extreme Fuel Poverty	
	000s	%	000s	%
2011	779	32.9%	209	8.8%
Oct 2011	911	38.5%	257	10.9%
2012	824	34.5%	222	9.3%
2013	860	35.8%	236	9.8%
2014	845	34.9%	229	9.5%
2015	748	30.7%	203	8.3%
2016	649	26.5%	183	7.5%
2017	613	24.9%	174	7.0%

Note: There are some discontinuities in the underlying methods as follows: figures for 2011 and 2012 allow for WHD adjustment only; 2013 include WHD and price source adjustment; figures from 2014 onwards include WHD and price source adjustment and an updated BREDEM model; from 2016 a further improvement is included by assigning pre-payment metered fuel prices to the relevant households.

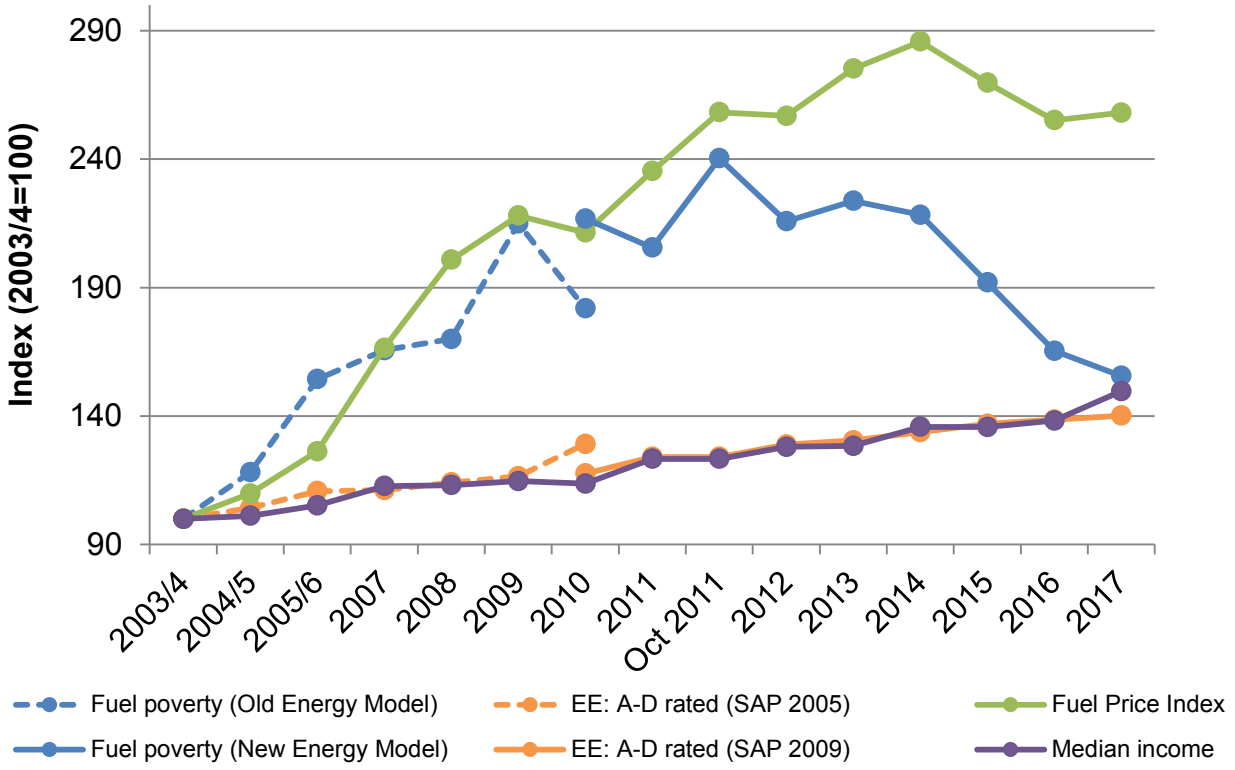
4.3 Drivers and Trends

150. Fuel poverty is affected by levels of household income, the price of fuel required for space and water heating, and the energy efficiency of housing. Fuel poverty under the current definition is distinct from poverty in that, while low income is an important driver, it is not a prerequisite. As shown in Table 35, fuel poor households are found in all income bands. Around 15% of all fuel poor households had weekly income above £400 before housing costs, which places nearly all of these households in the top half of the income distribution (Table 35).

151. In Table 30 and Figure 20 we have constructed indexes to compare trends in the three key drivers of fuel poverty since 2003. Measures of energy efficiency and household incomes are derived from SHCS data. The fuel price index is constructed from Department for Business, Energy and Industrial Strategy (BEIS) quarterly prices as described in section 4.3.1. Prices and incomes are presented in nominal (cash) terms.

152. Since 2003 the proportion of dwellings rated A-D has grown by 41%, while income has grown by 50%. Fuel prices have risen much faster, so that by 2017 they were around two and half times (158%) their level in 2003.

Figure 20: Trends in Fuel Price, Energy Efficiency and Median Income, 2003/4 to 2017



Note: All values indexed to 100 in 2003/4. Data for this chart are provided in Table 33. Fuel Price index constructed as described in section 4.3.1.
Fuel poverty energy requirement modelled on the following basis: 2003/4 – 2009: BREDEM – 12; 2010 – 2013: BREDEM 2012 v.1.0; 2014 and 2015 onwards: BREDEM 2012 v.1.1.
Fuel poverty costs as follows: 2011 and 2012 include WHD adjustment only; from 2013 onwards include WHD and price source adjustments; from 2016 a further improvement is included by assigning pre-payment metered fuel prices to the relevant households.

153. Until 2012 fuel price growth outweighed gains from improving energy efficiency and household income growth, such that the increase in fuel poverty broadly mirrored the growth in the fuel price index[43]. Between 2013 and 2014 the rate of fuel poverty did not increase in line with the rise in the average fuel price index, and there are a number of factors that may have contributed[44]. In 2015 and 2016, the decline in the price of fuel and improvements in energy efficiency was reflected in a reduction in the fuel poverty rate.

154. The 2017 rate (24.9%) is likely to be due to fuel price increases being offset by increases in median income and energy efficiency.

[43] Allowing for the impact of the new fuel price methodology which contributes to the slower rate of growth in the estimated level of fuel poverty between 2012 and 2013 shown in Figure 20.

[44] There are several discontinuities in the methodology for estimating fuel poverty reflected in Figure 20 which may affect this comparison: the underlying energy model changed in 2010 and 2014, and the method of sourcing price information changed from 2013.

Table 30: Fuel Price, Energy Efficiency and Income Indices

Key Drivers of Fuel Poverty: Indices 2003/4=100								
Survey year	Fuel poverty		Fuel Price Index		EE: A-D rated		Median income	
	%	Ix	Ix	Rebased	%	Ix	£	Ix
2003/4	16.0	100	47	100	62%	100	16,000	100
2004/5	18.9	118	52	110	65%	104	16,000	101
2005/6	24.7	154	60	126	69%	111	17,000	105
2007	26.5	166	79	167	69%	111	18,000	113
2008	27.2	170	95	201	71%	114	18,000	113
2009	34.4	215	103	218	72%	117	18,000	115
2010	34.7	217	100	211	73%	118	18,000	114
2011	32.9	206	111	235	77%	124	20,000	123
Oct 2011	38.5	240	122	258	77%	124	20,000	123
2012	34.5	216	122	257	80%	128	20,000	128
2013	35.8	224	130	275	81%	131	20,000	128
2014	34.9	218	135	286	83%	134	22,000	136
2015	30.7	192	128	270	85%	137	22,000	136
2016	26.5	165	121	255	86%	139	22,000	138
2017	24.9	156	122	258	87%	141	24,000	150

Sources: BEIS Quarterly Prices; SHCS.
Note: Fuel poverty rates shown on BREDEM-12 basis (old energy model) up to 2009 and on BREDEM 2012 basis (new energy model) from 2010.
EE ratings shown on SAP 2005 basis up to 2009 and on SAP 2009 basis from 2010.

4.3.1 Fuel Costs

155. Data published by the Department for Business, Energy and Industrial Strategy (BEIS) on the price of key fuels enables us to construct time series for the price of fuels for the average Scottish household over the longer term.

156. Using information from the SHCS about the fuels used for space and water heating we can weight the national quarterly fuel price indices published by BEIS[45] and produce an average index value for the price of the heating fuel requirement for Scotland. The results are shown in Figure 21.

157. Since the majority of Scottish households heat their properties with gas (79%), the national average index follows the gas index closely. Between 2003 and 2014 the price of the fuel mix required by the average Scottish household almost trebled. In 2015 and 2016 the average index fell by 5.6% and 5.4%, respectively, primarily due to the falling price of oil and gas. However, in 2017 the average index grew by 1.2%, mostly driven by electricity (up 6.7%) and liquid fuels (up 24%).

[45] BEIS Quarterly Energy Prices, Table 2.1.3, https://www.gov.uk/government/statistical-data-sets/monthly-domestic-energy-price-stastics

Figure 21: BEIS Fuel Price Indices and a Weighted Average for Scotland: 2003 to September 2018

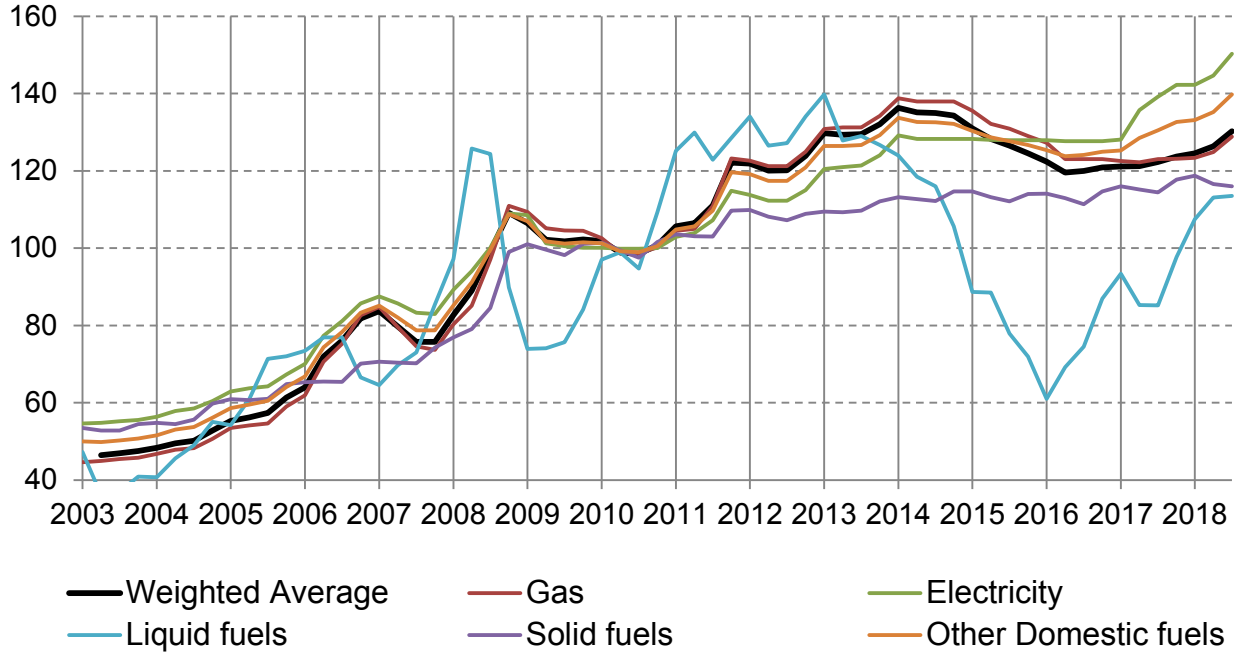


Table 31: BEIS Current Fuel Price Indices and a Weighted Average for Scotland: 2003/04 – September 2018

Year	Current fuel price indices					
	Gas	Electricity	Liquid fuels	Solid fuels	Other fuels	**Weighted Average**
2003/04	45.7	55.5	38.7	53.7	50.6	**47.3**
2004/05	50.1	60.0	51.0	57.7	55.4	**52.0**
2005/06	57.4	66.3	69.5	63.0	62.7	**59.7**
2007	78.1	84.9	73.2	71.4	81.2	**78.8**
2008	93.4	98.1	109.3	84.9	96.2	**95.0**
2009	105.9	102.6	77.0	100.0	102.9	**103.2**
2010	100.0	100.0	100.0	100.0	100.0	**100.0**
2011	110.9	107.3	126.6	104.8	110.0	**111.3**
Oct 2011	123.2	114.9	128.5	109.7	119.6	**122.2**
2012	122.5	113.4	130.5	108.6	118.7	**121.5**
2013	131.9	121.7	130.8	110.2	127.2	**130.2**
2014	138.2	128.5	116.0	113.2	132.8	**135.2**
2015	131.9	128.0	81.8	113.5	128.4	**127.6**
2016	124.1	127.7	72.9	113.3	124.6	**120.7**
2017	122.8	136.3	90.4	115.9	129.3	**122.1**
to Sep 2018	125.7	145.8	111.4	117.1	136.0	**127.1**

BEIS Quarterly Energy Prices, Table 2.1.3. Indices supplied with 2010 = 100
https://www.gov.uk/government/statistical-data-sets/monthly-domestic-energy-price-stastics
Weighted average based on SHCS heating fuel use proportions, 2003/4 to 2016. 2018 proportions assumed unchanged from 2017.

158. BEIS has published fuel price data up to September 2018. As fuel use changes slowly, we assume that the fuel mix in Scotland in 2018 was the same as captured by the 2017 SHCS in order to extend the weighted average for Scotland into 2018. Into the third quarter of 2018 the weighted average of heating fuels continues to rise, again driven by increases in prices for electricity (up 6.9%) and liquid fuels (up 23.2%). This amounts to an approximately 4.1% increase in the composite price on average 2017 levels to September 2018 (Table 31).

4.3.2 Household Income

159. The SHCS is not designed to capture income comprehensively. Total household income is not recorded, only that of the highest income householder and their partner. Income is reported in nominal terms and is not equivalised to take into account that households of different size and composition need different levels of income to sustain the same living standard. Figures in this section therefore may not align with official statistics on household income and inequality.

160. In 2017, 50% of households earned £23,800 or more after tax, up from £22,000 in 2016. This median income has increased by 32% (around £5,700) in cash terms since 2010.

161. Between 2016 and 2017 there was a 6% nominal increase in mean income of the surveyed households (Table 32). This was not uniform across the distribution, although increases across all deciles were detected. The increases ranged between 3% in the second from the top decile and 9% in the middle decile. Median income increased by 8%.

Table 32: Mean Annual Income in Each Decile Group, SHCS 2016 and 2017

Income Decile	Year 2016	2017	Percentage change
1	£6,800	£7,200	5%
2	£11,100	£11,900	7%
3	£13,800	£14,900	8%
4	£16,800	£18,200	8%
5	£19,900	£21,800	9%
6	£24,300	£25,700	6%
7	£29,200	£30,700	5%
8	£35,600	£37,300	5%
9	£44,700	£46,100	3%
10	£68,200	£73,400	8%
All	£27,000	£28,700	6%
Median	£22,000	£23,800	8%

162. The increase in income can potentially be attributed to a number of factors, including to some extent sampling variation. While median income from benefits has decreased, overall earnings recorded by the survey have increased, particularly among households with children. Furthermore, overall median income from sources other than earnings or benefits increased in 2017 for older households, particularly from non-state occupational pensions.

4.3.3 Housing Stock

163. As we have seen from the analysis in Chapter 3, on some measures, the energy efficiency of the housing stock increased between 2016 and 2017, although this varied according to dwelling characteristics. There were improvements in the energy efficiency profile of domestic gas and oil boilers, and the mean SAP ratings for properties built between 1945 and 1964, tenement dwellings, as well as urban dwellings and those using gas as a primary heating fuel. As shown in Table 33, the mean modelled energy required to meet the fuel poverty heating regime for 2017 was: 26,586 kWh, compared to 26,644 kWh for 2016, a reduction of 0.2% which is not significant.

164. At the same time mean running costs have increased by 3.7% from £1,577 in 2016 to £1,634 in 2017, which reflects the overall increase in domestic fuel prices in 2017.

Table 33: Modelled Annual Energy Consumption and Running Costs, 2010-2017

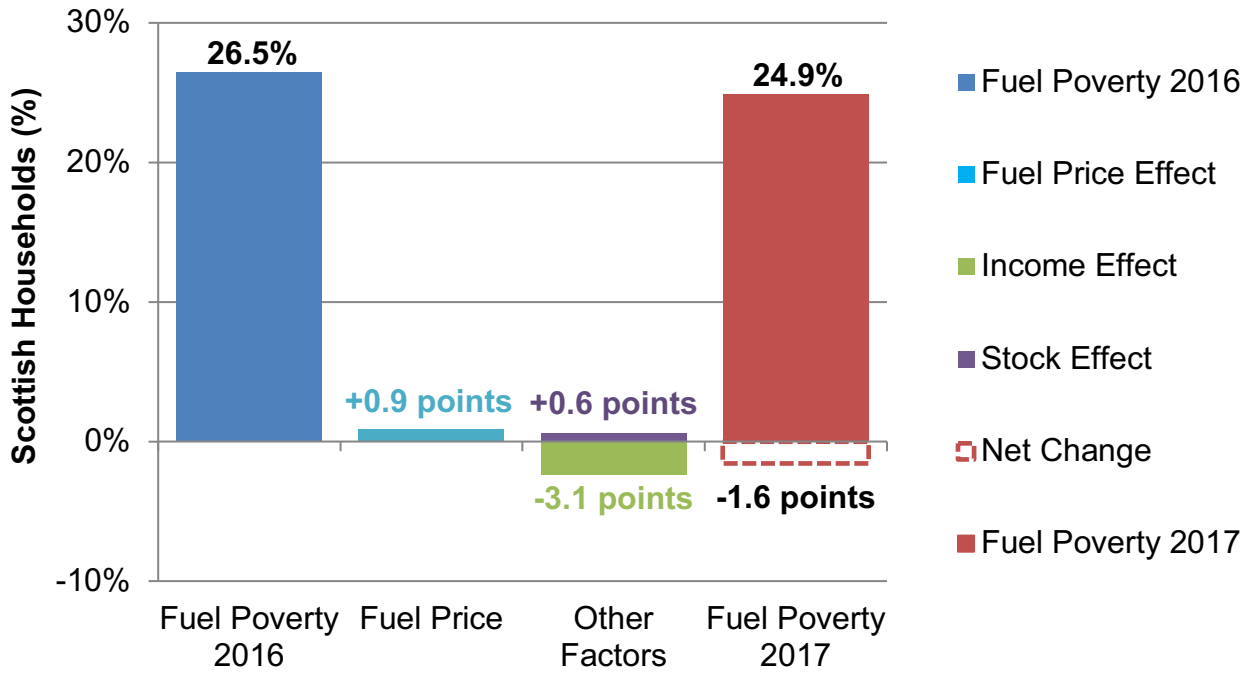
	Energy requirement		Running Costs	
Year	Mean (kWh)	Annual change	Mean (£)	Annual change
2010	29,752	-	1,531	-
2011	28,881	-2.9%	1,594	4.1%
2012	28,077	-2.8%	1,704	6.9%
2013	27,425	-2.3%	1,764	-
2014	27,609	-	1,826	-
2015	27,398	-0.8%	1,709	-6.4%
2016	26,644	-2.7%	1,577	-7.7%
2017	26,586	-0.2%	1,634	3.7%

Fuel poverty energy requirement modelled on the following basis: 2003/4 – 2009: BREDEM – 12; 2010 – 2013: BREDEM 2012 v.1.0; 2014 -2017: BREDEM 2012 v.1.1. Fuel poverty costs as follows: 2011 and 2012 include WHD adjustment only; from 2013 onwards include WHD and price source adjustments; from 2016 a further improvement is included by assigning pre-payment metered fuel prices to the relevant households.

4.3.4 Impact on Fuel Poverty

165. To understand how the changes in the price of domestic fuels and the incomes of the households included in the SHCS sample interact with the performance of the housing stock, we carried out a micro-simulation which sought to isolate the impact of each set of factors on the level of fuel poverty recorded in 2017. The results are illustrated in Figure 22 and Table 34.

Figure 22. Contributions to Change in Fuel Poverty Rate between 2016 and 2017



166. The analysis which underpins these findings uses SHCS data from 2016 and 2017 to model hypothetical rates of fuel poverty under different scenarios, adding one change at a time. This included the following steps as shown in Table 34.

- First, 2017 fuel prices were applied to the 2016 survey sample to determine the effect of price change alone under 2016 levels of energy demand and household income. The 2017 survey is the second year fuel prices are applied by the presence of a prepayment meter, allowing a more detailed allocation of fuel price data to 2016.
- Next, the income of households in this sample was updated by the mean change observed for their decile group between 2016 and 2017. This demonstrated the additional effect of income changes on fuel poverty between 2016 and 2017.

- We then compare the fuel poverty rate modelled at the previous step with the estimate for 2017. The difference is therefore estimated to be the effect of the energy performance of the housing stock and other sampled housing stock changes between 2016 and 2017.[46]

Table 34: Steps in Attributing Change in the Fuel Poverty Rate between 2016 and 2017

	Fuel Poverty Rate	Step Difference
Fuel Poverty 2016	26.5%	
- Step 1: Fuel price change	27.4%	+0.9 points
- Step 2: Income change	24.3%	-3.1 points
- Step 3: Attributed to energy efficiency and other sampled housing stock changes	24.9%	+0.6 points
Fuel Poverty 2017	24.9%	

167. The net change of 1.6 percentage points in the fuel poverty rate between 2016 and 2017 was not statistically significant. The results from the micro-simulation analysis indicate that increases in fuel prices and income combined would not have been sufficient to significantly change the fuel poverty rate. Applying fuel price changes increased the fuel poverty rate by 0.9 percentage points, and adding the income effect is estimated to have reduced the fuel poverty rate by 3.1 percentage points. Taking the income change alone would have resulted in a significant reduction in the fuel poverty rate, however.

168. The residual change is attributed to differences in the energy efficiency performance of the housing stock and other underlying changes to the sampled stock distribution, increasing the rate by 0.6 percentage points.

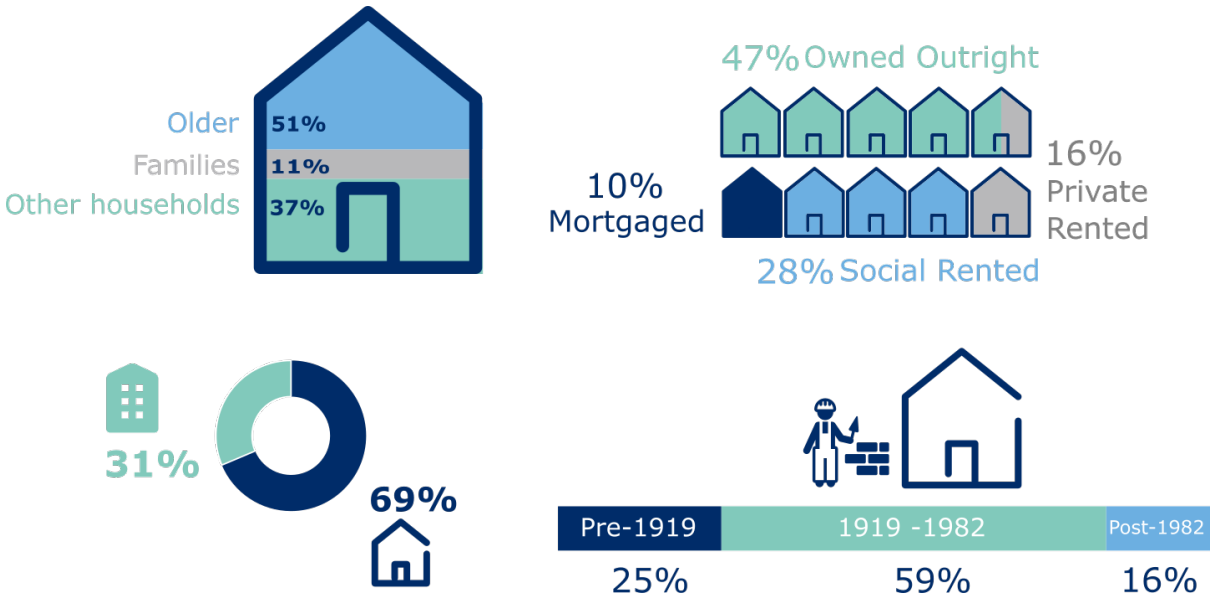
[46] The sequence of steps in this method affects the size of the estimated impact. Where factors operate in the same direction any potential joined effect will be attributed to those assessed first. For the 2017 analysis, the impact of fuel prices were assessed first because of the smaller uncertainty in assigning 2017 prices to 2016 data, compared to updating 2016 income.

169. Caution should be applied in interpreting the residual stock effect. Overall, the energy efficiency of Scotland's housing stock has improved: 42% of dwellings are rated EPC C or above in 2017 compared to 39% in 2016 (as measured by SAP 2012). Furthermore, modelled energy consumption has not changed between the two years, despite floor area increases in the sampled housing stock. However the 0.6 percentage point increase in the fuel poverty rate arising from energy efficiency and other changes in the sampled housing stock, suggests that improvements in energy efficiency of dwellings have been outweighed by other characteristics of the dwellings and households selected in the 2017 sample. This reflects more the annual variability in the sample survey design, where different dwelling and households are selected each year.

4.4 Characteristics of Fuel Poor Households

170. Figure 23 illustrates some of the key attributes of the fuel poor population in 2017. Approximately half (51%) of fuel poor households are older one- or two-person households. Around 11% of households living in fuel poverty are families with children, and 37% are other adult households without children.

Figure 23: Composition of Fuel Poor Households by Selected Household and Dwelling Characteristics, 2017



171. The large majority of fuel poor households are owner occupiers (57%), 28% are social housing residents and the remaining 16% rent in the private sector. 69% of fuel poor households live in houses – of which 26% are detached properties, 20% semi-detached, and 22% terraced – while the remaining 31% occupy flats.

172. One quarter (25%) of the dwellings of fuel poor households were built before 1919, and 16% were built since 1982. The remaining 59% were constructed in the intervening years.

4.4.1 Household Characteristics

173. Table 35 shows fuel poverty rates by a number of household characteristics for 2017 and in comparison to the previous year. The highest and lowest rates of fuel poverty by tenure are found in the **private sector**: 35% of outright owners but only 9% of those with a mortgage are assessed to be fuel poor. The 2017 fuel poverty rate for outright owners (35%) has remained similar to the 2016 rate (37%), reduced from 45% in 2015.

174. **Older households** make up a substantial part of those who own their property outright; they have generally lower income than working age households and their energy needs are assessed under an enhanced heating regime in accordance with the fuel poverty definition. The properties in which they live are often larger, requiring more energy to heat, and are more likely to be detached which leads to greater heat loss. Correspondingly, at 39%, older households have a higher fuel poverty rate than other household types.

175. On average the **social and private housing sectors** have similar rates of fuel poverty (27% and 24% respectively), in contrast to 2016 when the private sector had lower rates than the social sector following a noticeable decline in the fuel poverty rate for private sector households between 2015 and 2016. The similarity in 2017 rates is likely driven by a significant reduction in the fuel poverty rate in local authority housing (36% in 2016 to 28% in 2017).

176. As in previous years, fuel poverty has a strong association with income and households in the lower income bands have the highest rates of fuel poverty: 88% for the bottom income band and 51% for the 2nd bottom band. Fuel poverty rates across all income bands are similar to 2016 fuel poverty rates.

Table 35: Fuel Poverty Rates by Household Characteristics, 2017 and 2016

	2017			2016		
	000s	%	*Sample*	000s	%	*Sample*
Tenure						
Owned outright	289	35%	*1,075*	296	37%	*963*
Mortgaged	60	9%	*790*	78	11%	*794*
LA/ public	104	28%	*430*	127	36%	*411*
HA/co-op	66	26%	*283*	73	27%	*287*
PRS	95	28%	*361*	74	23%	*330*
Private	444	24%	*2,226*	449	25%	*2,087*
Social	170	27%	*713*	200	32%	*698*
Household type						
Older households	316	39%	*1,001*	311	41%	*899*
Families	70	12%	*699*	66	12%	*628*
Other households	228	21%	*1,239*	272	24%	*1,258*
Weekly Household Income						
< £200	221	88%	*307*	263	87%	*349*
£200-300	209	51%	*479*	229	49%	*506*
£300-400	93	24%	*446*	94	24%	*436*
£400-500	49	15%	*375*	27	10%	*311*
£500-700	29	6%	*543*	28	6%	*516*
£700+	12	2%	*789*	7	1%	*667*
Council Tax Band						
Band A	144	29%	*592*	172	33%	*581*
Band B	146	26%	*652*	172	29%	*662*
Band C	98	26%	*453*	92	27%	*415*
Band D	60	20%	*370*	59	18%	*364*
Band E	82	24%	*420*	90	27%	*384*
Band F	46	20%	*264*	36	18%	*214*
Band G – H	37	24%	*186*	28	20%	*162*
All Scotland	613	24.9%	*2,939*	649	26.5%	*2,785*

4.4.2 Dwelling Characteristics

177. Table 36 shows how the level of fuel poverty varies across dwelling characteristics.

178. The lowest rates of fuel poverty are associated with higher energy efficiency standards. Only 15% of households living in **post-1982** dwellings and 13% of households living in dwellings **rated C or better were fuel poor**. Both of these categories have similar rates to their respective 2016 levels. Reductions in the fuel poverty rate have taken place among those living in terraced dwellings (down from 31% in 2016 to 25% in 2017), and dwellings built in the period 1945-1964 (down from 33% to 25%).

179. Households using **gas** as **primary heating fuel** have continued to see improving fuel poverty levels in 2017: 19% of these households are fuel poor, down from 23% in 2016, a decrease of 3 percentage points. This is likely to be at least in part due to gas prices continuing to fall in 2017, although not as steeply as in 2016. Consequently, the rates of fuel poverty for households **within coverage of the gas network** and for **urban** households have both decreased in 2017 by 3 percentage points, to 22% and 21% respectively. The **large urban area** household fuel poverty rate declined by 5 percentage points, from 22% to 17% in 2017.

180. However, the fuel poverty rate for households using **oil** as **primary heating fuel** has increased from 26% in 2016 to 40% in 2017. This is similar to estimated rates in 2012 and 2014 when liquid fuel prices were even higher. This year on year change is against a backdrop of rising liquid fuel prices in 2017, increasing by 24% on 2016. However, liquid fuel prices would have to increase by a further 45% to reach 2013 levels.

181. Moreover, while fuel poverty rates in 2017 for households **outwith the gas network**, and **rural** households have remained similar to 2016 levels, the **remote rural** fuel poverty rate has increased to 59% in 2017, up from 48% in 2016, reflecting their greater likelihood to use oil as heating fuel.

182. Levels of fuel poverty among households using **electricity** as primary heating fuel have remained among the highest, at 52%.

Table 36: Fuel Poverty by Dwelling Characteristics, 2017 and 2016

	2017			2016		
	000s	%	*Sample*	000s	%	*Sample*
Dwelling Type						
Detached	161	29%	817	159	28%	753
Semi	124	26%	645	126	27%	589
Terraced	136	25%	608	168	31%	614
Tenement	112	20%	499	109	19%	491
Other flats	80	26%	370	87	27%	338
Age of dwelling						
pre-1919	154	33%	502	146	31%	513
1919-1944	83	29%	361	74	26%	321
1945-1964	136	25%	670	177	33%	629
1965-1982	142	28%	633	168	31%	614
post-1982	98	15%	773	84	14%	708
Primary Heating Fuel						
Gas	379	19%	*2,189*	442	23%	*2,051*
Oil	58	40%	*237*	41	26%	*260*
Electric	151	52%	*422*	143	51%	*389*
Other	26	41%	*91*	23	37%	*85*
EPC Band (SAP 2012)						
B - C	137	13%	*1,129*	137	14%	*1,006*
D	267	26%	*1,239*	313	29%	*1,207*
E	130	46%	*396*	133	42%	*417*
F - G	80	69%	*175*	66	66%	*155*
Location						
Urban overall	438	21%	*2,286*	495	24%	*2,135*
Large urban areas	148	17%	*801*	190	22%	*765*
Other urban areas	191	22%	*1,016*	189	22%	*910*
Accessible urban areas	62	28%	*297*	72	32%	*281*
Remote small towns	37	42%	*172*	44	48%	*179*
Rural overall	175	43%	*653*	154	37%	*650*
Accessible rural	89	34%	*330*	81	31%	*331*
Remote rural	87	59%	*323*	73	48%	*319*
SIMD: Most deprived 15%						
Yes	84	21%	*393*	122	31%	*373*
No	529	26%	*2,546*	527	26%	*2,412*
Gas Grid						
On	449	22%	*2,253*	510	25%	*2,128*
Off	164	38%	*686*	139	34%	*657*
All Scotland	613	24.9%	*2,939*	649	26.5%	*2,785*

Note: Fuel poverty rates for the 15% most deprived areas showed in this table use the most recent SIMD publication available for the time period of the SHCS sample; figures for 2016 and 2017 are based on SIMD 2016 and the 2011 definition of Data Zones. Fuel poverty rates for urban and rural geographies are based on the 2013/14 classification, 2011 definition of Data Zones. For more information please refer to the Methodology notes.

4.5 Fuel Poverty and Income Poverty

183. Although fuel poverty is correlated with low income, it is not equivalent to income poverty. This section updates previous analysis of how these two conditions relate in the household population under the current fuel poverty definition.

184. According to the official poverty definition, individuals are considered to be in relative (income) poverty if their equivalised net household income is below 60 per cent of the median income in the same year. Official poverty estimates are calculated using the Department for Work and Pensions' (DWP) Family Resources Survey (FRS). The latest estimates for Scotland were published on 22 March 2018 and relate to 2016/17[47].

185. It is possible to use the SHCS to determine how fuel poverty and income poverty relate, although there are some caveats to this approach. One of the main caveats is that the SHCS does not collect the full range of household income data used to derive the official measure of poverty. For example, income information is only collected for the Highest Income Householder and their spouse/partner. As a result, the SHCS would underestimate the income of households with more than two earners, and therefore over-estimate levels of income poverty. To correct to some extent for this we make a corresponding adjustment to the equivalisation method used for producing official poverty statistics. It is therefore important to note that the results presented here do not reproduce exactly the official measure of fuel poverty and are only approximate.

186. As in previous reports, the adjustment is applied to household income before housing costs (BHC). However for 2017, we make an additional adjustment before equivalising, by deducting council tax to match the definition of income used to derive fuel poverty estimates. This treatment of council tax is consistent with the DWP's Household Below Average Income (HBAI) statistics income definition[48]. The 2016 income poverty estimates in this report also reflect this approach, and will therefore not match last year's report.

[47] Poverty and Income Inequality in Scotland: 2014/17. Note, in this release the data were presented as a three year rolling average for the first time. However, single year data relating to 2016/17 were also provided.

[48] HBAI Quality and Methodology Information Report.

187. A further caveat is that the latest published income poverty estimates relate to 2016/17. In order to derive a poverty threshold figure for 2017 we use the relationship between the SHCS and the FRS estimates of the median equivalised household income for the previous year, 2016. We adjust the 2017 SHCS median by the ratio between the two estimates observed in 2016 to obtain a 2017 poverty threshold. We estimate this as £313 per week BHC for a couple without children. However, the actual FRS 2016/17 poverty threshold of £296 is used for 2016 data, which is also different to the threshold used for 2016 in the 2016 Key Findings Report - £291 in the 2016 report. As already noted above, the 2016 estimates presented here will therefore not match the previous report due to these methodological updates.

188. As Table 37a shows almost two-thirds of all fuel poor households would be considered poor in terms of their income (63% or 387,000) while the other third have incomes above the relative poverty threshold (37% or 227,000 households). This pattern is similar to 2016.

189. Table 37b shows the fuel poverty rate by income poverty status. 70% of income poor households were fuel poor in 2017, similar to 2016.

Table 37a: Estimated Number and Proportion of Households by Fuel Poverty and Income Poverty Status, SHCS 2016 and 2017

			Income Poor	Not Income Poor	All
2017	**Fuel Poor**	000s	387	227	613
		%	63%	37%	100%
	Not Fuel Poor	000s	169	1,681	1,850
		%	9%	91%	100%
	All	000s	556	1,908	2,464
2016*	**Fuel Poor**	000s	400	249	649
		%	62%	38%	100%
	Not Fuel Poor	000s	157	1,646	1,803
		%	9%	91%	100%
	All	000s	557	1,895	2,452

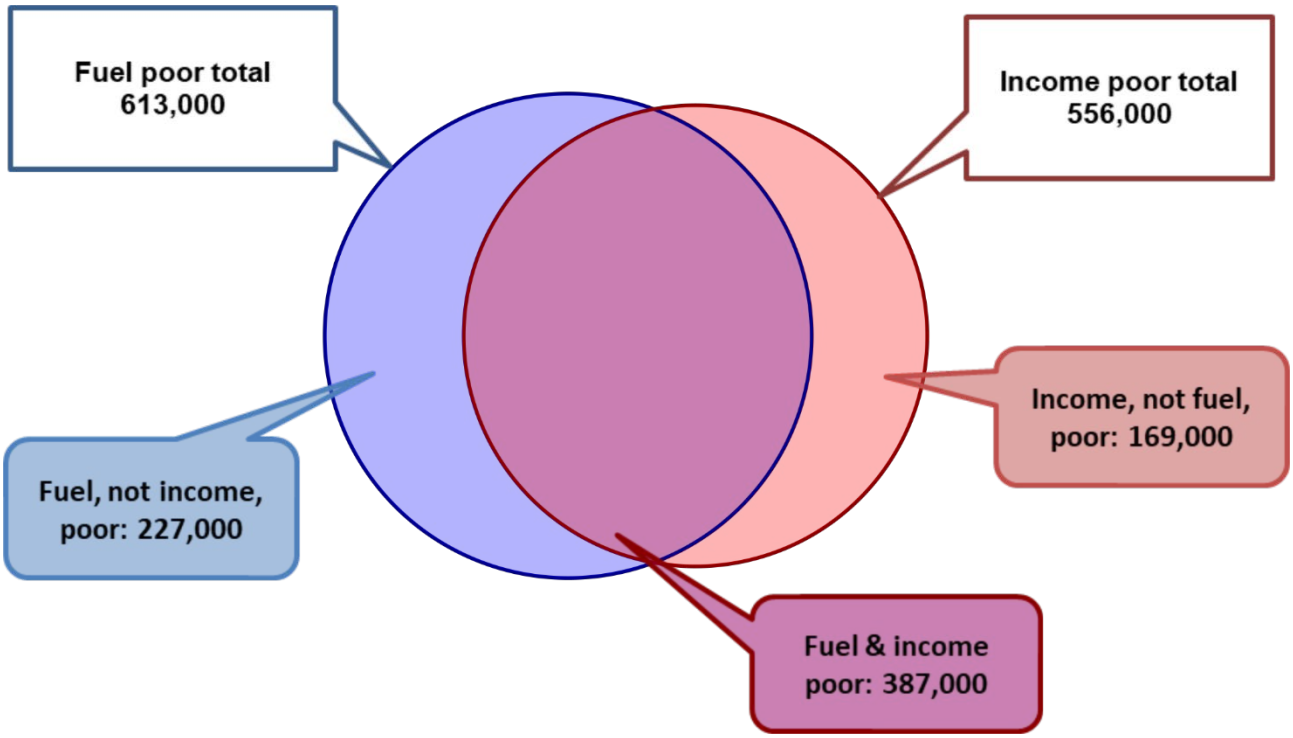
Table 37b: Fuel Poverty Rate (%) by Income Poverty, SHCS 2016 and 2017

	2016*	2017
Income Poor	71.7%	69.6%
Not Income Poor	13.1%	11.9%
All	26.5%	24.9%

*2016 data revised to reflect updated methodology described in section 4.5.

190. Figure 24 sets out this information graphically. This chart demonstrates, that while low income is associated with fuel poverty, it is not equivalent. Almost 4 in 10 fuel poor households would not be considered income poor. Similarly, there are some income poor households who are unlikely to be struggling with their fuel bills with around 3 in 10 income poor households not being fuel poor.

Figure 24: Fuel Poor and Income Poor Households, SHCS 2017



191. Table 38 provides further information about the characteristics of the households who fall into the different sub-groups. Households that are both income poor and fuel poor tend to live in more energy efficient dwellings than other fuel poor households, potentially because of high energy efficiency standards in the social rented sector. They are more likely to use gas for heating and live in urban locations. These characteristics point to low income as a key reason for their experience of fuel poverty.

192. On the other hand, those who are not poor but experience fuel poverty have high likelihood of living in low energy efficiency properties, more than other fuel poor households and well in excess of the average for Scotland. Among these households the share of electricity use for heating is higher and the use of mains gas is lower. Such households are more likely to live in rural locations and include a higher share of older households compared to other fuel poor households and the rest of Scotland.

Table 38: Household and Dwelling Characteristics by Poverty and Fuel Poverty, 2017

		Fuel, not Income Poor	Fuel & Income Poor	All Fuel Poor	Income, not Fuel Poor	All Scotland
EPC Band (SAP 2012)						
B-C	000s	17	120	137	117	1,041
	col %	7%	31%	22%	69%	42%
D	000s	90	177	267	46	1,027
	col %	40%	46%	43%	27%	42%
E-G	000s	120	90	210	6	395
	col %	53%	23%	34%	3%	16%
Household Type						
Older	000s	126	190	316	52	805
	col %	56%	49%	51%	31%	33%
Families	000s	23	47	70	63	593
	col %	10%	12%	11%	37%	24%
Other	000s	77	150	228	54	1,065
	col %	34%	39%	37%	32%	43%
Urban-Rural						
Urban	000s	133	305	438	155	2,052
	col %	59%	79%	71%	92%	83%
Rural	000s	93	82	175	14	412
	col %	41%	21%	29%	8%	17%
Primary Heating Fuel						
Gas	000s	107	272	379	154	1,966
	col %	47%	70%	62%	91%	80%
Oil	000s	29	28	58	*	144
	col %	13%	7%	9%	*	6%
Electric	000s	75	76	151	8	291
	col %	33%	20%	25%	4%	12%
Other fuels	000s	16	10	26	*	62
	col %	7%	3%	4%	*	3%
Gas Grid						
On grid	000s	136	313	449	155	2,033
	col %	60%	81%	73%	92%	83%
Off grid	000s	90	74	164	14	431
	col %	40%	19%	27%	8%	17%
Sample size		*329*	*484*	*813*	*180*	*2,939*

5 Energy Perceptions

- Nearly a fifth of households find that their heating keeps them warm in winter only sometimes (14%) or never (4%). This is similar to 2016 rates.
- 5% of all households report that their homes were difficult to heat because they cannot afford to heat them, which is similar to the level in 2016.
- Fuel poor households are more likely to have difficulties staying warm in winter and to report affordability problems; 22% of fuel poor say that their heating keeps them warm in winter “only sometimes” (15%) or “never” (6%), compared to 18% of all other households. This pattern and overall rate is similar to 2016. 7% of fuel poor households report that they cannot afford to heat their home, higher than the 4% of non-fuel poor households.
- The extent to which home energy use is monitored by householders remains unchanged since last year with 54% stating they monitor their energy use “very” or “fairly closely”.
- 18% of households report owning an energy monitoring device – an 8 percentage point increase on the previous year. Fuel poor households are no more likely to monitor their energy use than other households but they are less likely to own a monitoring device (14% compared to 20% for non-fuel poor households).

5.1 Heating Satisfaction

193. Respondents’ views on their ability to keep warm in the winter and why this may be difficult is a useful context for understanding statistics on fuel poverty and energy efficiency in the home.

194. In 2017, 79% of householders reported that they were always able to stay warm at home during the winter (Figure 25), 14% said that their heating keeps them warm only sometimes, and 4% report that their heating systems never keep them warm in winter. These are similar levels to 2016.

195. Of those reporting that their heating system keeps them warm in winter “only sometimes” or “never”, 22% report this to be “a serious problem”, 52% “a bit of a problem”, while 26% said it was “not very much” or “not a problem”. This distribution is similar to the results from the 2016 survey.

196. As shown in Figure 25 this means that, of all households, 4% reported their heating not keeping them warm in winter, and this to be “a serious problem”, while 10% said it was “a bit of a problem”, both which are at similar levels to 2016.

Figure 25: Staying Warm in Winter, 2017

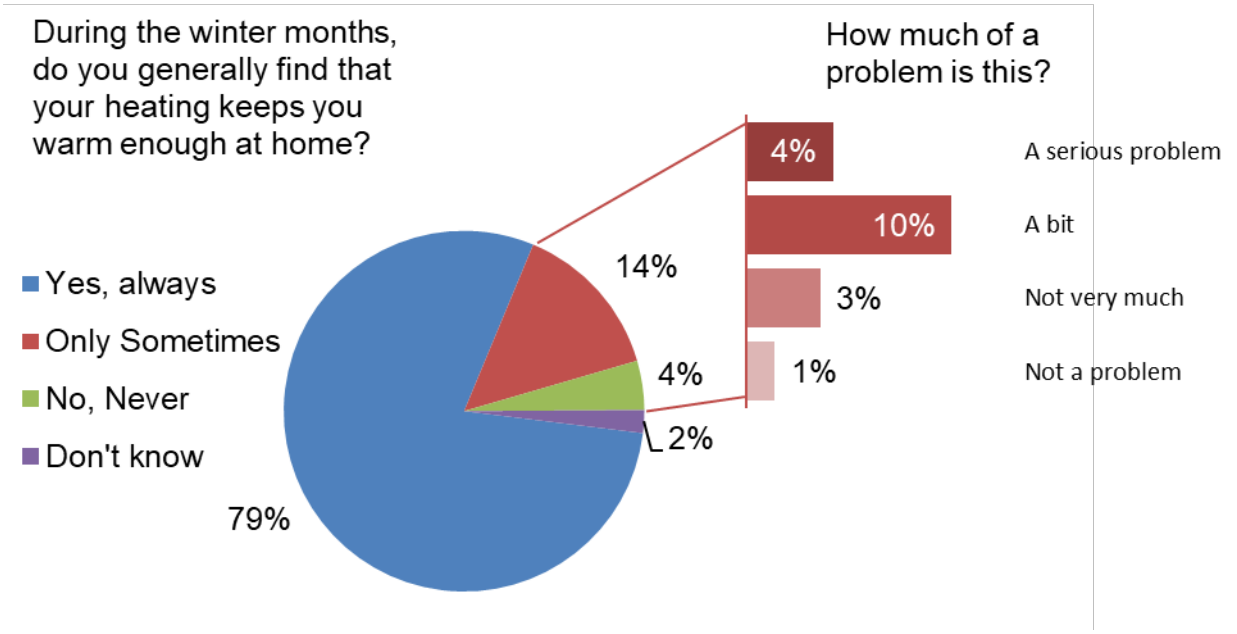
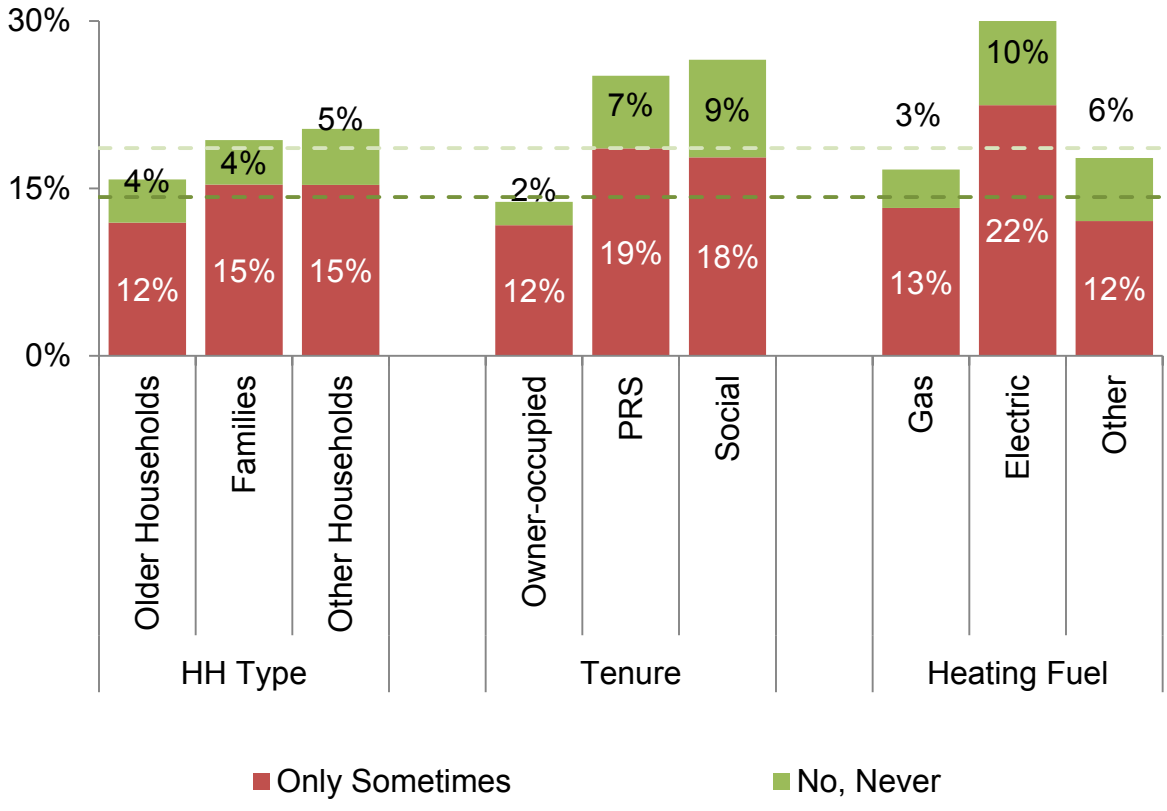


Figure 26: “Does Your Heating Keep You Warm Enough in the Winter?” by Household Type, Tenure and Primary Heating Fuel; SHCS 2017



Note: Dashed lines represent the Scotland levels shown in Figure 23.

197. Figure 26 shows respondents' views on how well their heating systems keep them warm in winter vary depending on household (HH) type, tenure and the primary heating fuel they use.

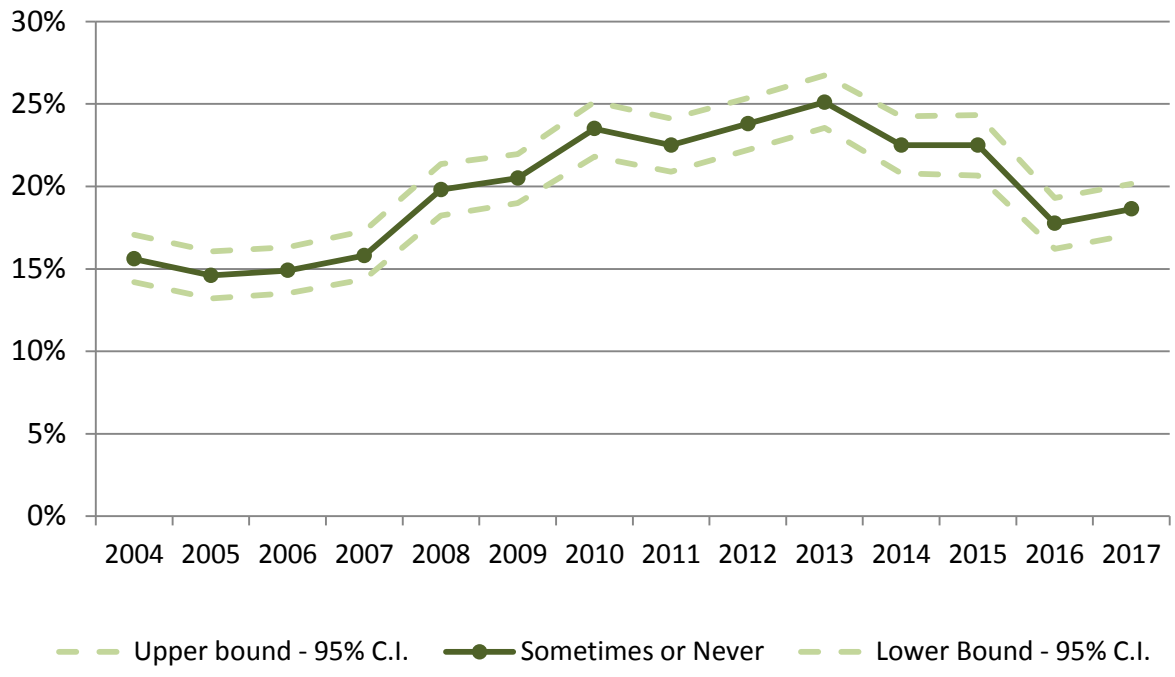
198. Older households are less likely than Other household types to report that their heating system doesn't always keep them warm in the winter; 16%, compared 20% of Other households.

199. Householders with electric heating have high propensity to report that their heating systems does not keep them warm in the winter (32%).

200. Social and private renters also have increased likelihood to report that their heating does not always keep them warm compared to owner occupiers. For social sector tenants this is in contrast to the relatively better energy efficiency of the dwellings they occupy compared to the housing stock overall (as shown in Table 19).

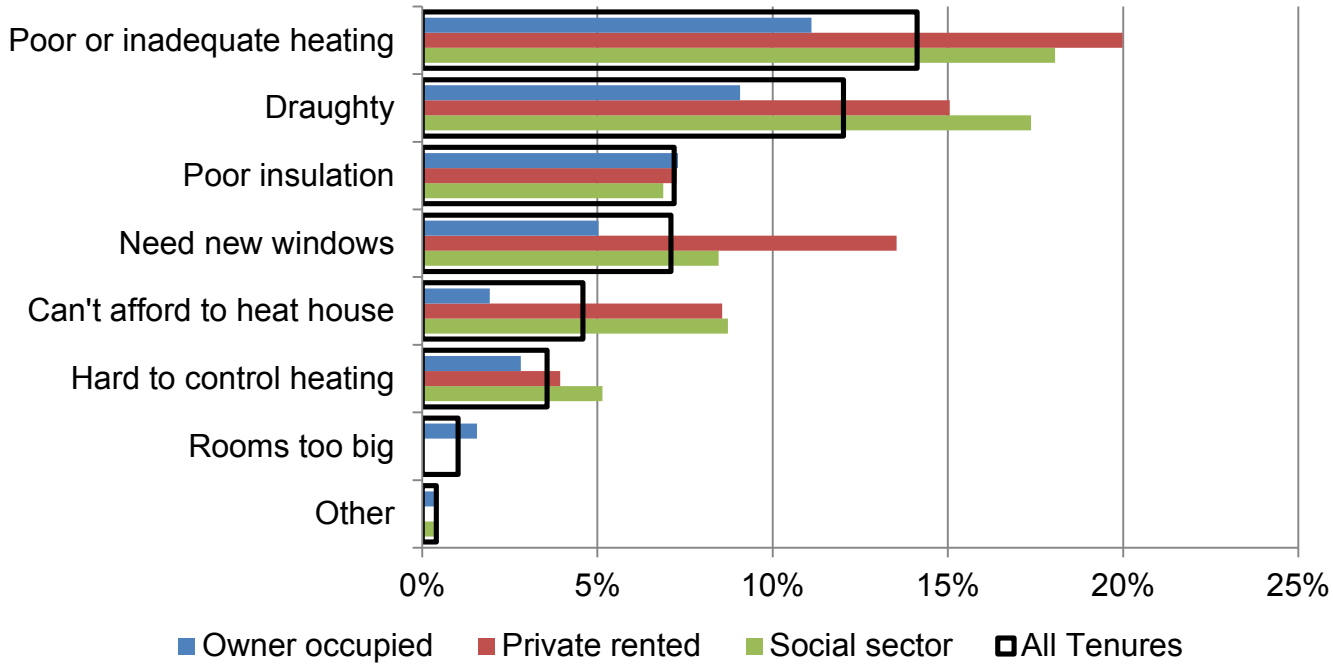
201. Figure 27 shows how the proportion of householders reporting that their heating does not always keep them warm has changed over time, allowing for the margin of error. However, following the significant decrease in 2016, there was not a significant change in the proportion in 2017.

Figure 27: "Does Your Heating Keep You Warm Enough in the Winter?", Proportion 'Sometimes' or 'Never Warm', 2004-2017



202. The reasons why people find their homes difficult to heat are shown in Figure 28 and Table 39. The most common reasons relate to poor energy performance of the dwellings: poor heating systems and draughts (14% and 12% respectively) followed by insulation and windows (7% each). About 5% of all surveyed householders consider it unaffordable to achieve the indoor temperatures they want. This is higher among private and social renters (9% each) compared to owner occupiers (2%). On the whole private rented and social sector tenants are more likely than owner occupiers to report difficulties. 68% of all interviewed households did not report any problems heating their homes.

Figure 28: Reasons Heating Home is Difficult by Tenure, 2017 (% of households)



Note: responses have been grouped by theme, as described in section 7.9.5. More than one answer allowed so that the sum of responses can exceed 100%.

Table 39: Reasons Heating Home is Difficult by Tenure, 2017 (% of households)

	Owner occupied	Private rented	Social sector	All Tenures
None reported	73%	59%	63%	68%
Poor or inadequate heating	11%	20%	18%	14%
Draughty	9%	15%	17%	12%
Poor insulation	7%	7%	7%	7%
Need new windows	5%	14%	8%	7%
Can't afford to heat house	2%	9%	9%	5%
Hard to control heating	3%	4%	5%	4%
Rooms too big	2%	*	*	1%
Other	0%	*	0%	0%
Sample size	*1,901*	*373*	*728*	*3,002*

Note: Respondents are permitted to select more than one response. For this reason the sum down a column can exceed 100%

203. Table 40 shows how fuel poor and non-fuel poor households compare in their views on winter heating and heating affordability. Fuel poor households are more likely to report that their heating keeps them warm in winter "only sometimes" or "never", 22% compared to 18% of non-fuel poor households. For 17% of fuel poor households this is "a serious" or "a bit of a problem", higher than 13% for households who are not fuel poor.

Table 40: Staying Warm and Fuel Poverty, 2017 (% of households)

	Not Fuel Poor	Fuel Poor
During the winter months, do you generally find that your heating keeps you warm enough at home, or not?		
Yes, always	80%	77%
Only some of the time	14%	15%
No, never	4%	6%
Don't know	2%	2%
How much of a problem is this, if at all, to you?		
A serious problem	4%	6%
A bit of a problem	9%	11%
Affordability		
Cannot afford to heat house	4%	7%
Sample size	*2,126*	*813*

204. Fuel poor households are also more likely to report affordability problems. When asked about the reasons why they find it difficult to keep their home warm, 7% of fuel poor households say "cannot afford to heat my home", which is similar to the 2016 level. The proportion of non-fuel poor households who give this answer is 4%.

5.2 Monitoring Energy Use

205. Since 2008 the SHCS has asked respondents to what extent they monitor their energy use and whether or not they have energy monitoring devices.

206. The proportion of households who do not monitor their energy use has fallen from 31% in 2008 to 22% in 2012 and remained around that level (20-22%) until 2017, which saw an increase to 24% (Table 41) from 20% in 2016.

207. However the proportion of those who report monitoring their energy use "fairly" or "very closely" followed a pattern of improvement. As shown in Table 41, the proportion increased from 44% in 2008 to 54% in 2012 and has remained around that level since (54-57%).

Table 41: Extent to which Energy Use is Monitored, 2008. 2010-2017 (% of households)

Extent Energy Use is Monitored…	Year								
	2017	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2008**
Very closely	17%	18%	16%	16%	17%	16%	14%	12%	11%
Fairly closely	37%	38%	41%	37%	38%	38%	33%	33%	33%
Subtotal: Very or fairly closely	54%	56%	57%	54%	56%	54%	47%	45%	44%
Not very closely	21%	23%	22%	24%	24%	24%	22%	23%	24%
Not at all	24%	20%	22%	22%	20%	22%	30%	32%	31%
Don't know	1%	1%	0%	1%	0%	0%	0%	0%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sample size	*2,529*	*2,441*	*2,492*	*2,682*	*3,442*	*3,428*	*3,949*	*3,853*	*3,762*

208. In 2016 18% of households had energy monitoring devices, as shown in Table 42. This is the second consecutive statistically significant year on year increase and represents an 85% increase in the proportion of households with an energy monitoring device compared to 2016.

Table 42: Households with Energy Use Monitoring Devices, 2008-2017

	% of households	*Sample Size*
2017	18%	2,529
2016	10%	2,441
2015	8%	2,492
2014	7%	2,682
2013	8%	3,442
2012	8%	3,428
2011	7%	3,949
2010	4%	3,853
2009	2%	4,153
2008	2%	*3,762*

209. Table 43 shows that fuel poor households are similar to others in the way they monitor their energy use: 54% report monitoring “very” or “fairly closely” compared to 56% of households who are not fuel poor. However they are less likely to have monitoring devices at home - 14% of fuel poor households compared to 20% of all other households – despite the overall increase in energy monitoring devices recorded by the survey.

Table 43: Monitoring Energy Use and Fuel Poverty, 2017 (% of households)

	Not Fuel Poor	Fuel Poor
To what extent do you monitor your use of energy in your property?		
Very closely	16%	18%
Fairly closely	37%	38%
Not very closely	23%	17%
Not at all	23%	26%
Don't know	*	*
Do you have an energy-use monitoring device in your home?		
Yes	20%	14%
Sample Size	*1,784*	*686*

6 Housing Conditions

6.1 Disrepair

- The level of disrepair was unchanged in 2017, with 68% of all dwellings having some degree of disrepair, however minor it may be.
- Disrepair to critical elements stood at 50%, 28% of dwellings had some instances of urgent disrepair, and in 5% of the housing stock some extensive disrepair was present. None of these represent a statistically significant difference from 2016 although there is a longer-term trend of improvement.
- Levels of damp and condensation improved slightly compared to 2016. 91% of properties were free from any damp or condensation, up from 89%.

210. The SHCS measures disrepair for a wide range of building elements. This is reported in four broad categories:

- **Any (or Basic) disrepair.** This is the minimum threshold of disrepair measured in the SHCS and relates to any damage where a building element requires some repair beyond routine maintenance. It is the most comprehensive category covering all types of disrepair, however minor, and encompasses all other types of disrepair (see Figure 29).
- **Extensive disrepair.** To be described as extensive, the damage must cover at least a fifth (20%) or more of the building element area. This category is different from the severity of damage as described by the next two categories, urgent and critical, and can be applied to any of the other 3 categories of disrepair.
- **Urgent disrepair.** This relates to cases requiring immediate repair to prevent further damage or health and safety risk to occupants. Urgency of disrepair is only assessed for external and common elements.
- **Critical element disrepair.** This refers to disrepair to building elements central to weather-tightness, structural stability and preventing deterioration of the property. These elements are listed in section 7.9.7.3. There is some overlap in the building elements assessed under this category and those assessed for urgent disrepair. Not all disrepair to critical elements is necessarily considered urgent by the surveyor.

211. More detailed description of the categories of disrepair is given in section 7.9.7. Rates for each category for the period 2013-2017 are shown in Table 44.

212. In 2017, 68% of Scottish dwellings had some disrepair, however minor it may be. This is similar to 2016 and follows reductions from 81% in 2012. Disrepair to critical elements stood at 50%, 28% of dwellings had some urgent disrepair, and in 5% of the housing stock some extensive disrepair was present. None of these represent a statistically significant difference from 2016 but, again, follow reductions from 61%, 39% and 9% respectively in 2012.

Table 44: Rates of Disrepair by Category, 2012-2017

Year	Any (Basic) Disrepair		Disrepair to Critical Elements	Urgent Disrepair	Extensive Disrepair
	No Disrepair[1]	Some Disrepair			
2017	32%	68%	50%	28%	5%
2016	32%	68%	48%	28%	6%
2015	27%	73%	52%	33%	8%
2014	27%	73%	53%	32%	7%
2013	22%	78%	57%	36%	7%
2012	19%	81%	61%	39%	9%

Notes

1. This category may contain very small number of cases where it was not possible to obtain the disrepair status of every element of the property.

213. It is fairly common for dwellings to display elements of disrepair in more than one category, as illustrated in Figure 27. For example, we imagine a house with several elements in disrepair of varying severity.

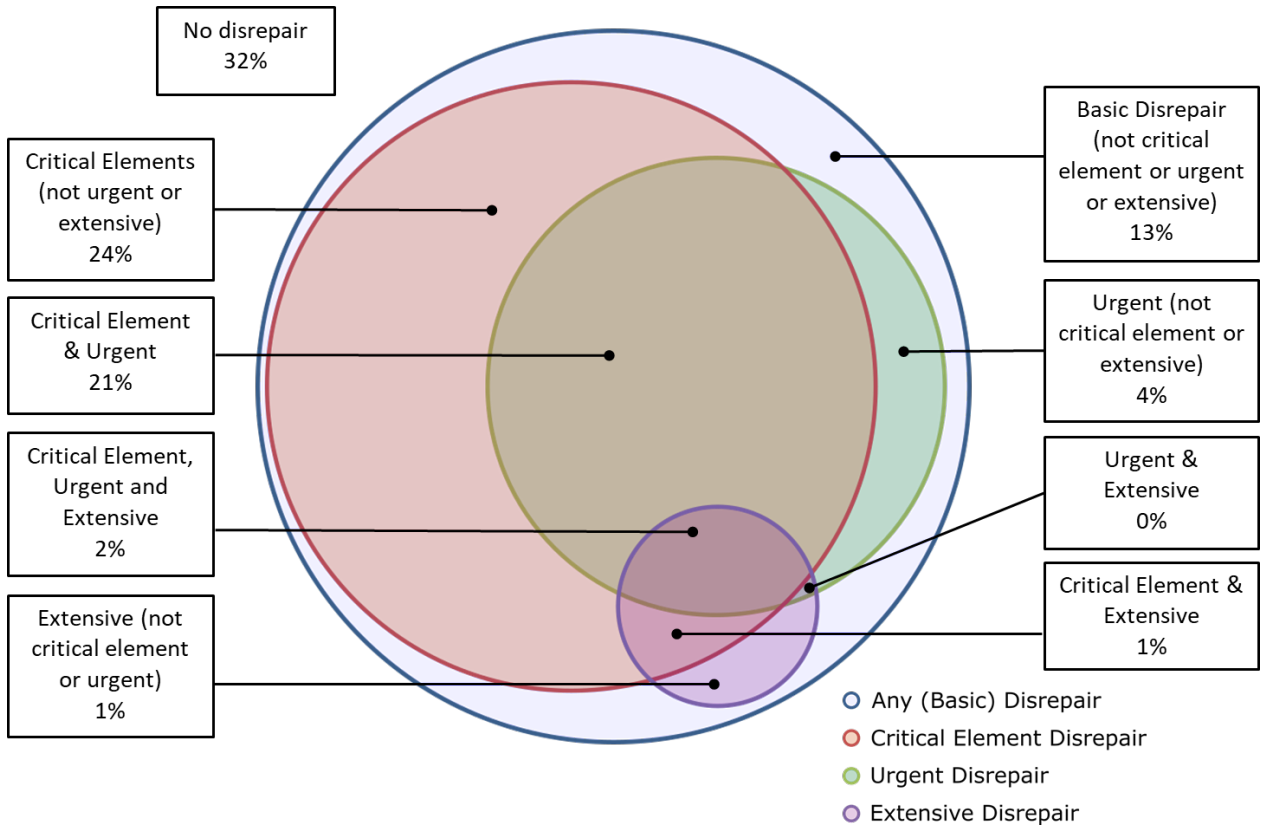
- There is a leaking tap in the bathroom.
- A large section of the render on an external wall has broken off.
- A small area of guttering is damaged, causing rain water to pour down an external wall surface.

214. Following the guidance in the SHCS surveyor handbook, the leaking tap is recorded in the survey as a minor repair. This alone is sufficient to place the house in the category **any (or basic) disrepair**.

215. The broken render on the external wall covers more than 20% of the wall area. The surveyor does not consider the repair urgent. However, the external wall finish is a critical element. This is therefore recorded as both an **extensive** disrepair and a disrepair to a **critical element**.

216. The surveyor has marked the guttering defect as requiring urgent repair, considering that the water pouring down the wall is likely to lead to further damage and compromise the weather-proofing of the building in the short term. Guttering is also one of the critical elements. As a result of this defect the dwelling has both **urgent** and **critical element** disrepair.

Figure 29: Disrepair Categories, Proportions of Scotland's Housing Stock, 2017



6.1.1 Disrepair to Critical Elements

217. This section examines in more detail disrepair to critical elements and its prevalence across tenure, dwelling age band and location.

218. As shown in Table 45, in 2017 the proportion of dwellings which had some disrepair to a critical element(s) was 50%, similar to the rate in 2016. In some of these dwellings, accounting for 24% of the stock overall, there was also some urgent disrepair. In 2% of the housing stock, in addition to critical and urgent disrepair, some disrepair was assessed as extensive. There is no significant difference in any of these rates compared to 2016.

6.1.1.1 Dwelling age and location

219. The prevalence of disrepair to critical elements is associated with age of construction, with dwellings built after 1964 less likely to fall within this category. Dwellings built in the period 1965 to 1982 have a critical disrepair rate of 48% while those built after 1982 have a rate half that level at 24%. This is also evident where instances of critical disrepair co-exist with urgent or urgent and extensive disrepair, a pattern which has remained unchanged in the last year.

220. Urban and rural dwellings show similar rates in all categories of disrepair shown in Table 45. There has been no significant change in the rates of disrepair in any of these categories for urban or rural areas between 2016 and 2017.

Table 45: Disrepair to Critical Elements, Urgent and Extensive Disrepair by Dwelling Age and Location, 2016 and 2017

	Age of dwelling					Location		
	pre-1919	1919-1944	1945-1964	1965-1982	post 1982	Urban	Rural	Scotland
Dwellings with any Critical Disrepair								
2017	68%	63%	58%	48%	24%	50%	47%	50%
2016	67%	58%	60%	48%	20%	48%	49%	48%
Dwellings with Critical and Urgent disrepair								
2017	36%	32%	31%	21%	8%	24%	23%	24%
2016	37%	27%	30%	22%	9%	24%	25%	24%
Dwellings with Critical, Urgent & Extensive disrepair								
2017	5%	1%	4%	3%	0%	2%	3%	2%
2016	5%	3%	5%	2%	1%	3%	2%	3%

6.1.1.2 Tenure

221. Levels of critical disrepair are similar for the private and the social housing sector considered as a whole. In 2017, around half of all dwellings (49% in the private and 53% in the social sector) have some disrepair to critical elements. Just under a quarter of dwellings have both critical and urgent disrepair (24% for the private sector and 23% for the social sector) and a very small proportion (2% in the private and 3% in social sector) also have instances of extensive disrepair in addition to critical and urgent.

222. However, the sectors are not homogenous. Housing associations dwellings have the lowest levels of disrepair in all of the categories covered by Table 46 in 2017. They are followed by owner occupied dwellings, while LA properties and private rented properties have the highest levels of disrepair in these categories.

223. Only the reduction in the percentage of housing association dwellings with instances of critical, urgent and extensive disrepair from 3% in 2016 to 0% in 2017 is statistically significant.

Table 46: Disrepair to Critical Elements, Urgent and Extensive Disrepair by Tenure Group, 2016 and 2017

	Tenure						
	Owner occupied	LA/Other Public	HA/Co-op	Private rented	Private Sector	Social Sector	Scotland
Dwellings with any Critical Disrepair							
2017	46%	61%	40%	59%	49%	53%	50%
2016	46%	57%	37%	60%	48%	49%	48%
Dwellings with Critical and Urgent disrepair							
2017	22%	30%	13%	33%	24%	23%	24%
2016	22%	30%	16%	31%	24%	24%	24%
Dwellings with Critical, Urgent & Extensive disrepair							
2017	2%	5%	0%	3%	2%	3%	2%
2016	2%	5%	3%	3%	3%	4%	3%

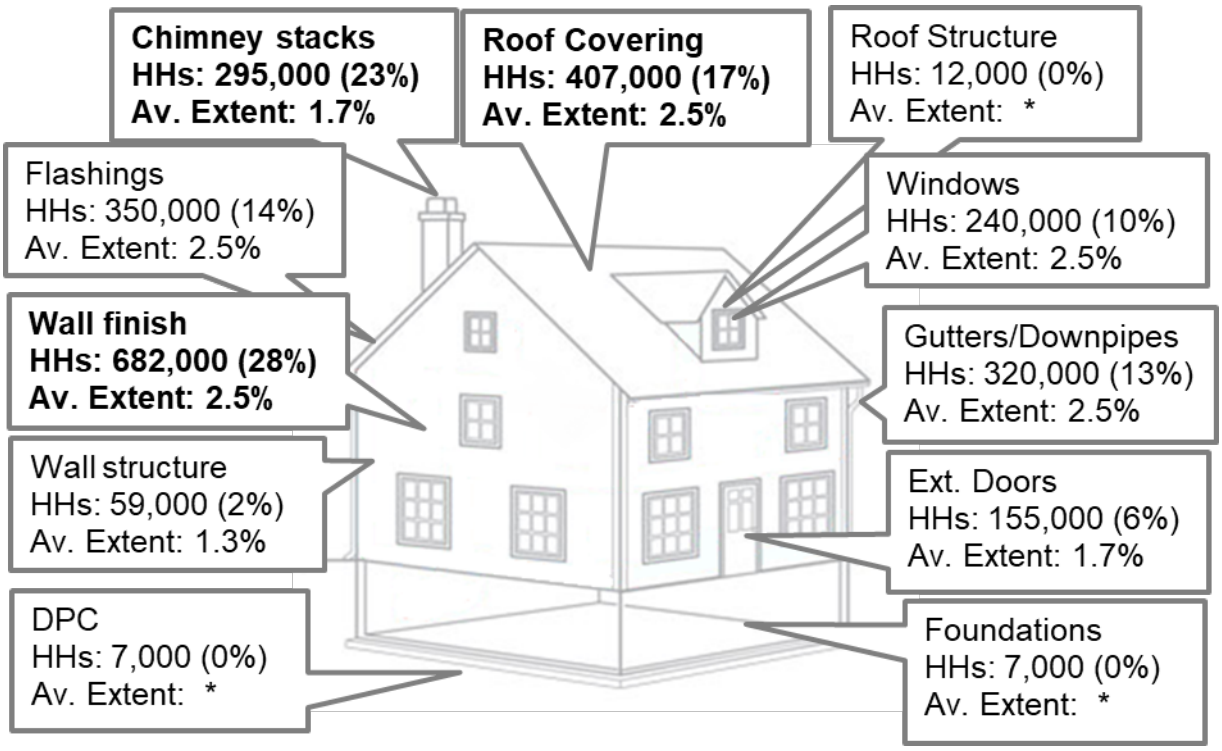
6.1.1.3 Type of Disrepair to Critical Elements

224. As shown in Figure 30, although some disrepair to critical elements is fairly common it tends to be at a relatively low level in each property, affecting on average no more than 2.5% of the relevant area. A full list of elements in this category is provided in section 7.8.7.3.

225. Wall finish and roof coverings are often affected. Around 28% of dwellings had some disrepair to wall finish and 17% had some disrepair to roof coverings; however, in both cases the disrepair covered no more than 2.5% of the area on average. Where stone pointing, render or harling on walls is damaged, moisture can seep into the structure of the walls and cause further damage. Similarly slipped roof tiles or slates can allow water to access the roof structure or the tops of internal walls.

226. Around 23% of dwellings with chimneys showed some signs of disrepair. Unchecked this can lead to water ingress and eventually falling masonry.

Figure 30: The Number of Households (HHs) Affected and Average (Median) Extent of Disrepair to External Critical Elements



** Av. Extent has been suppressed for some categories due to small sample sizes*

6.1.2 Damp and Condensation

227. The definitions of damp and condensation are provided in section 7.9.8.

228. Any condensation, rising or penetrating damp recorded in the SHCS can cover anything from a small damp patch or area of condensation on a single wall in one room (caused for example by ineffective ventilation whilst cooking) to prevalence throughout a dwelling, so does not indicate a serious housing quality issue in all cases.

229. The incidence of these defects in isolation and together is given in Table 47. Around 91% of all dwellings in 2017 were free from any form of condensation or damp. This is an increase on 2016 (89%) but similar to 2015 (90%) and represents an overall improvement from 86% in 2012.

230. In 2017 2.3% of the housing stock (around 58,000 dwellings) suffered from some degree of penetrating damp, a slight decrease on 2016 (3.7%) and returning to 2015 levels. The presence of penetrating damp has fluctuated between 2.3% and 3.7% across the past 6 years of the survey. There were a very small number of properties with rising damp in the survey sample, suggesting that their share in the housing stock is less than 1%.

231. Condensation was observed in 7.5% of the surveyed stock (equivalent to around 185,000 dwellings) which is similar to 2016 levels although represents a reduction from 11.3% in 2012.

232. In just under 1% of dwellings (19,000) both condensation and some form of damp were recorded. This level has not changed significantly in the previous six years.

Table 47: Presence of Damp and/or Condensation in 2012-2017

	2017		2016		2015		2012	
Defect	000s	%	000s	%	000s	%	000s	%
No Damp or Condensation	2,237	90.8%	2,171	88.6%	2,179	89.5%	2,056	86.2%
Condensation	185	7.5%	209	8.5%	214	8.8%	270	11.3%
Penetrating damp	58	2.3%	91	3.7%	58	2.4%	86	3.6%
Rising damp	6	0.2%	10	0.4%	3	0.1%	7	0.3%
Condensation and any damp	19	0.8%	26	1.0%	20	0.8%	29	1.2%
Total	2,464		2,452		2,434		2,386	
Sample		*3,002*		*2,850*		*2,754*		*2,787*

6.2 Housing Quality Standards

- Levels of compliance with the tolerable standard in 2017 remained similar to 2016: 1% (or 24,000) of all dwellings fell below the Tolerable Standard. Longer term this represents an improvement of 3 percentage points since 2012.

- The Scottish Housing Quality Standard (SHQS) failure rate in the social sector was 37%, not allowing for abeyances and exemptions, representing no change from 2016. This has fallen from 60% in 2010. 26% of social sector properties did not meet the Energy Efficient criterion.

- SHCS surveyors may not always be able to identify the presence of cavity wall insulation. The overall SHQS failure rate in the social sector would be 25% if it is assumed that all social dwellings have insulated cavity walls where this is technically feasible.

- The failure rate in the private sector dropped from 47% in 2016 to 41% in 2017, driven mainly by a reduction for properties which are owned outright. Whilst private owners and landlords are currently under no obligation to bring their properties up to this standard, the comparison demonstrates that improvement is being made in this sector and, in 2017, there was no statistically significant difference in the failure rate overall between the private and social sectors.

- The majority of dwellings falling below the SHQS failed on a single criterion; this accounted for more than 9 out of 10 failures in the social sector.

- For almost 8 out of 10 social homes failing the SHQS this was due to falling short on a single one of the 55 elements which make up the standard. Most frequently these were cavity wall insulation, pipe and tank insulation, presence of at least six electrical sockets in the kitchen, full and efficient central heating, safe kitchen working arrangements and the presence of a minimum of $1m^3$ food storage in the kitchen.

233. Two quality standards are set by the Scottish Government and monitored through the Scottish House Condition Survey.

234. The **Tolerable Standard** is a "condemnatory" standard. In other words, it is not reasonable to expect people to continue to live in a house that falls below it. For more information on the Tolerable Standard see section 7.9.10.

235. The **Scottish Housing Quality Standard (SHQS)** was introduced in February 2004[49]. It means social landlords must make sure their tenants' homes are in a good state of repair, energy efficient, healthy, safe and secure. A target was agreed that all social landlords must ensure that all their dwellings pass the SHQS by April 2015. Private owners and private landlords are currently under no obligation to bring their properties up to this standard. However SHCS collects the same data for all dwellings to allow comparison across the housing stock. Since 2012 this target has been incorporated in the Scottish Social Housing Charter and the performance of landlords has been monitored by the independent Scottish Housing Regulator (SHR).

236. For more information on the SHQS see section 7.9.11.

6.2.1 Tolerable Standard

237. The overall level of compliance with the tolerable standard remained similar to 2016. As shown in Table 48, 1% of all dwellings (or 24,000 dwellings) fell below the tolerable standard in 2017. However there is a longer term trend of improvement and 2016 levels represent a drop of 3 percentage points since 2012.

238. The share of dwellings below tolerable standard in the private sectors was 1%. This is similar to 2016 but around 3 points better than 2012 when 4% of all private dwellings fell below tolerable standard.

239. There was no change since 2016 in the social sector, where dwellings rarely fell below the tolerable standard.

240. The rate for the private rented sector in 2017 was 2% and has remained broadly at the same level for the last 6 years. However, while in the past, we have found that PRS dwellings were more likely to fall below tolerable standard than owner occupied dwellings or those in the social sector, this gap is no longer observed in the SHCS sample for 2016 or 2017.

241. The proportion of pre-1919 dwellings below tolerable standard has declined since 2012 by around 6 percentage points and stood at 3% in 2017. This however still exceeds the levels of BTS recorded for the most recently built dwellings (post 1965), at under 1%.

[49] For more information see letter and notes at: http://www.gov.scot/Publications/2004/02/18860/32772

Table 48: Dwellings Below Tolerable Standard (BTS) by Tenure and Age Band, 2017

		Below Tolerable Standard			
		%	000s	% of BTS Stock	*Sample*
Whole Stock		1%	24	100%	*3,002*
Tenure	Owner-occupied	1%	16	64%	*1,901*
	Private-rented	2%	6	24%	*373*
	Subtotal: Private	*1%*	*22*	*89%*	*2,274*
	Social	0%	3	11%	*728*
Age of Dwelling	Pre-1919	3%	13	55%	*512*
	1919-1944	1%	4	18%	*369*
	1945-1964	1%	4	15%	*684*
	Post-1965	0%	3	12%	*1,437*

242. The tolerable standard consists of 12 criteria (listed in section 7.9.10), failure on one of which leads to a failure overall. Dwellings which failed the tolerable standard in 2017 most commonly did so because they:

- were not free from rising/penetrating damp (7,000 or 31% of BTS dwellings);
- were not satisfactorily insulated (5,000 or 19% of BTS dwellings);
- did not have adequate piped wholesome water (3,000 or 14% of BTS dwellings);
- had unsatisfactory provision for lighting, ventilation or heating (3,000 or 12% of BTS dwellings).

6.2.2 Scottish Housing Quality Standard (SHQS)

243. In this section we present the results of analysis of the SHCS with regards to compliance with the Scottish Housing Quality Standard (SHQS). The SHQS provides a common standard for assessing the condition of Scottish housing. For this reason, although the requirement to comply with SHQS applies only to social sector housing, we assess all tenures for comparison.

244. The SHQS is made up of 55 different elements grouped into 5 higher-level criteria: Tolerable Standard (A), Serious Disrepair (B), Energy Efficiency (C), Modern Facilities and Services (D) and Healthy, Safe and Secure (E)[50]. In the SHCS 54 of the 55 individual elements is assessed by surveyors trained to collect detailed information on housing characteristics. Only one element is not assessed using SHCS data: no information is collected on external noise insulation. This data collected is subsequently aggregated by Scottish Government analysts into higher level measures for each of the 5 criteria and the standard overall.

245. Table 49 shows the overall results for the Scottish housing stock, covering the period 2010 to 2017. In 2017, 40% of all dwellings failed to meet the SHQS, down from 45% in 2016 and 61% in 2010. As in previous years, the highest failure rate was with respect to the Energy Efficient criterion (30%), followed by Healthy, Safe and Secure (10%) and Modern Facilities (7%). There were a very small number of dwellings which did not meet the BTS criterion (1%) or the Serious Disrepair criterion (0.1%). The reduction in the rate of dwellings failing the energy efficient and healthy, safe and secure criteria between 2016 and 2017 are statistically significant whilst the changes for other criteria are within the margin of error for this survey.

Table 49: Proportion of Dwellings Failing SHQS and Individual Criteria 2010-2017

	2017	2016	2015	2014	2013	2012	2011	2010
SHQS	40.3%	44.7%	45.4%	47.5%	49.1%	54.0%	58.2%	61.0%
BTS	1.0%	1.6%	1.7%	2.0%	3.0%	3.7%	3.0%	3.6%
Serious Disrepair	0.1%	*	0.1%	0.1%	0.2%	0.1%	0.5%	0.8%
Energy Efficient	29.7%	32.8%	33.7%	34.8%	36.3%	42.2%	46.0%	49.2%
Modern Facilities	7.4%	8.6%	8.8%	11.1%	11.4%	11.9%	13.7%	15.6%
Healthy, Safe and Secure	10.4%	12.4%	13.4%	13.8%	13.7%	16.1%	17.0%	16.6%

Notes: 1. Figures for 2014-2017 are not fully comparable to previous years. For details see Technical Notes and Definitions

[50] Full guidance available at http://www.gov.scot/Topics/Built-Environment/Housing/16342/shqs

6.2.2.1 Compliance by Tenure, Dwelling Age and Location

246. Table 50 shows the number and proportion of properties failing the SHQS by selected characteristics.

247. The lowest failure rates are in the newest dwellings (post-1982, 18% fail) and in Housing Associations stock (30% fail). As previously shown (section 2.5.2), Housing Association dwellings are often newer than Local Authority stock and are built to a higher energy efficiency standard. The newest purpose-build social housing in Scotland is also likely to be designed to comply with SHQS.

248. The overall SHQS failure rate for social sector housing in 2017 stood at 37%, similar to 2016. If it is assumed that all social dwellings have insulated cavity walls where this is technically feasible, the overall SHQS failure rate in the social sector would be 25% (see section 6.2.2.4). SHCS based measures do not make an allowance for abeyances and exemptions.

Table 50: Number and Proportion of Dwellings Failing SHQS, 2016 and 2017

	2017			2016		
	000s	% fail	*Sample*	000s	% fail	*Sample*
All Scotland	993	40%	*3,002*	1,097	45%	*2,850*
Tenure						
Owned outright	338	41%	*1,104*	406	51%	*988*
Mortgaged	255	38%	*797*	277	40%	*802*
LA	159	42%	*439*	159	45%	*419*
HA/co-op	75	30%	*289*	78	29%	*297*
PRS	166	48%	*373*	176	53%	*344*
Private	759	41%	*2,274*	859	47%	*2,134*
Social	234	37%	*728*	237	38%	*716*
Dwelling Age						
pre-1919	226	48%	*512*	238	49%	*529*
1919-1944	142	49%	*369*	165	57%	*330*
1945-1964	272	50%	*684*	279	53%	*640*
1965-1982	238	46%	*647*	293	55%	*627*
post-1982	115	18%	*790*	122	20%	*724*
Location						
Urban	806	39%	*2,341*	888	43%	*2,189*
Rural	187	46%	*661*	209	51%	*661*

249. The overall reduction in the SHQS failure rate in the past year is driven by improvements in the private sector, where the failure rate dropped from 47% to 41% and there was a particular reduction in the failure rate where properties were owned outright. The reduction in urban areas and properties aged 1919-1944 or 1965-1982 are also statistically significant.

6.2.2.2 Individual SHQS Criteria

250. Table 51 shows the failure rates for each criterion of the SHQS for private and social sector housing since 2010. It demonstrates that there has been a consistent trend of improvement in both the private and the social sector. The survey sample is not large enough to measure accurately year-on-year change in each instance. However, in 2017 we do see significant improvements, overall and in the private sector, from 2016 in the failure rates for the overall SHQS, the energy efficient criteria and the healthy, safe and secure criteria.

251. The SHCS estimates that 37% of social sector housing failed to meet the SHQS in 2017. This was predominantly due to the Energy Efficient criterion, 26% of properties failed on this measure. Seven per cent failed the Healthy, Safe and Secure criterion and 7% failed the Modern Facilities criterion. The share of those not meeting the BTS or the Disrepair criterion was negligible.

Table 51: SHQS Criteria Failure Rates by Tenure, 2010-2017

		2017	2016	2015	2014	2013	2012	2011	2010
All tenures	**SHQS Overall**	40%	45%	45%	47%	49%	54%	58%	61%
	Below Tolerable Standard	1%	2%	2%	2%	3%	4%	3%	4%
	Serious Disrepair	0%	*	0%	0%	0%	0%	1%	1%
	Not Energy Efficient	30%	33%	34%	35%	36%	42%	46%	49%
	Lacking Modern Facilities/Services	7%	9%	9%	11%	11%	12%	14%	16%
	Not Healthy, Safe or Secure	10%	12%	13%	14%	14%	16%	17%	17%
Private	**SHQS Overall**	41%	47%	47%	48%	51%	55%	60%	61%
	Below Tolerable Standard	1%	2%	2%	2%	3%	4%	4%	4%
	Serious Disrepair	0%	*	0%	0%	0%	*	1%	1%
	Not Energy Efficient	31%	35%	36%	37%	39%	43%	49%	51%
	Lacking Modern Facilities/Services	7%	9%	9%	11%	11%	11%	13%	13%
	Not Healthy, Safe or Secure	11%	14%	14%	14%	14%	17%	17%	17%
Social	**SHQS Overall**	37%	38%	39%	45%	43%	52%	52%	60%
	Below Tolerable Standard	0%	1%	1%	1%	3%	3%	1%	2%
	Serious Disrepair	-	-	-	*	*	*	*	*
	Not Energy Efficient	26%	26%	27%	30%	28%	39%	37%	44%
	Lacking Modern Facilities/Services	7%	8%	8%	12%	12%	15%	15%	22%
	Not Healthy, Safe or Secure	7%	9%	10%	14%	13%	13%	15%	16%

Notes: 1. Figures for 2014-2017 are not fully comparable to previous years.

6.2.2.3 Number of Criteria and Elements Failing

252. In the large majority of cases failure to meet the SHQS is due to a dwelling not passing one criterion or even a single element. As the standard incorporates 55 different elements, it is generally sufficient for a dwelling to fail on a single one of these in order to be considered not satisfying the higher level criterion requirement and the SHQS overall[51].

253. Table 52 and Table 53 present the distribution of dwellings for Scotland as a whole and social housing separately by number of criteria failed. The majority of failures in 2017 were due to a single criterion: 33% of dwellings in the whole stock and 35% of social sector dwellings failed the SHQS because of a single criterion. This constitutes respectively 83% (for all housing) and 92% (for social sector) of all dwellings falling below the SHQS. In 2010 the corresponding figure for the percentage of dwellings failing the SHQS which do so on just one criterion was 68% for both the social sector and the whole housing stock. Therefore over time, alongside the reduction in the overall failure rate, there has also been a reduction in the reasons why a dwelling does not meet the standard.

Table 52: Number and Proportion of Dwellings by Numbers of SHQS Criteria Failures, All Housing, 2010, 2014-2017

Number of Criteria Fail	2017		2016		2015		2014		2010	
	000s	Col %	000s	Col %	000s	Col %	000s	Col %	000s	Col %
None	1,470	60%	1,355	55%	1,328	55%	1,271	53%	920	39%
1	821	33%	867	35%	843	35%	865	36%	980	42%
2	143	6%	202	8%	226	9%	227	9%	352	15%
3+	29	1%	28	1%	37	2%	58	2%	106	4%
Total Dwellings	2,464	100%	2,452	100%	2,434	100%	2,420	100%	2,357	100%
Criteria Fails as % of All assessed	10%		11%		12%		12%		17%	
Sample size		*3,002*		*2,850*		*2,754*		*2,682*		*3,115*

[51] There is an exception to this principle with respect to 14 secondary building elements where failure on at least two is required for a building to be considered not meeting the standard overall. The full guidance is available at http://www.gov.scot/Topics/Built-Environment/Housing/16342/shqs

Table 53: Number and Proportion of Dwellings by Numbers of SHQS Criteria Failures, Social Dwellings, 2010, 2014-2017

Number of Criteria Failing	2017		2016		2015		2014		2010	
	000s	Col %	000s	Col %	000s	Col %	000s	Col %	000s	Col %
None	392	63%	385	62%	359	61%	347	55%	252	40%
1	217	35%	202	33%	191	32%	216	34%	257	41%
2	15	2%	35	6%	35	6%	54	9%	95	15%
3+	*	*	-	-	4	1%	10	2%	29	5%
Total Dwellings	626	100%	622	100%	589	100%	627	100%	633	100%
Criteria Fails as % of All Assessed	8%		9%		9%		11%		17%	
Sample size		*728*		*716*		*659*		*673*		*798*

Table 54: Number and Proportion of Social Sector Dwellings by Number of SHQS Element Failures, and Most Common Single-Element Failures, 2017

Number of Element Failures	000s	% of All Dwellings	% of Failing Dwellings
None	392	63%	
1 element	185	30%	79%
… *of which*			
Cavity wall insulation (C31)	*80*		
Pipe and tank insulation (C33)	*25*		
At least six kitchen sockets (D39)	*15*		
Full and efficient central heating (D34)*	*13*		
Safe kitchen working arrangements (D38)	*11*		
Adequate food storage space (D40)	*9*		
2 elements	34	5%	15%
3 or more elements	15	2%	6%
Subtotal: dwellings failing the SHQS	234		100%
All social sector dwellings	626	100%	
Sample size		*728*	

*Note that this element should have been included in the same table in the 2016 Key Findings report. 9,000 dwellings in 2016 had a single-element failure due to a lack of full or efficient central heating.

254. Table 54 shows the distribution of social sector dwellings by the number of elements failed. Over three quarters (79%) of dwellings failing the SHQS did so because of a single element. The elements most likely to cause failure (as there are no other reasons to fail the SHQS in these dwellings) are cavity wall insulation, pipe and tank insulation, presence of at least six electrical sockets in the kitchen, full and efficient central heating, safe kitchen working arrangements and the presence of a minimum of $1m^3$ food storage in the kitchen (Table 54).

6.2.2.4 SHQS Compliance and Cavity Wall Insulation

255. The SHQS target is incorporated into the Scottish Social Housing Charter and the independent Scottish Housing Regulator (SHR) is responsible for monitoring social landlords' progress towards the target. The latest SHQS progress update published by the SHR[52] reported that 94% of social homes met the SHQS in 2017/18.

256. There are some differences between the SHR and the SHCS survey in the way data for assessing the SHQS is collected and reported which make the headline compliance rates not immediately comparable. Abeyances and exemptions are not taken into account by the SHCS as it is not feasible to collect this kind of information in the survey.

257. One potential source of difference relates to the ability of the survey to detect the presence of cavity wall insulation (CWI) in all cases. According to feedback from social landlords, cavity wall insulation is installed as standard where there is a suitable cavity, and in most other cases external or internal insulation is considered (although this is not required for SHQS). This is because CWI is recognised throughout the sector as a relatively low cost measure with a high impact on energy efficiency.

[52] https://www.scottishhousingregulator.gov.uk/publications/national-report-scottish-social-housing-charter-headline-findings-20172018

258. However, the survey still records uninsulated cavity wall properties, and to allow for the possibility that SHCS surveyors may not always be able to identify the presence of CWI we provide an alternative estimate of SHQS compliance (Table 55). This estimate assumes that all social dwellings have insulated cavity walls where this is technically appropriate. Where it is not appropriate we assume an exemption. Therefore this alternative measure of compliance assumes that no dwelling fails the SHQS for lack of CWI. Although this is an unlikely scenario, it illustrates the maximum impact that undercounting CWI in the survey could potentially be making on the measurement of SHQS compliance in the social sector.

Table 55: Number and Proportion of Dwellings in the Social Sector Failing the Energy Efficient Criterion and SHQS Overall, With and Without the Cavity Wall Insulation (CWI) Element, 2016 and 2017

		Dwellings Failing the Energy Efficient Criterion		Dwellings Failing the SHQS Overall	
		000s	%	000s	%
2017	inc. CWI element	160	26%	234	37%
	exc. CWI element	70	11%	154	25%
	Difference	-90	-14 pts	-80	-13 pts
2016	inc. CWI element	159	26%	237	38%
	exc. CWI element	68	11%	160	26%
	Difference	-91	-15 pts	-77	-12 pts

259. In 2017, almost one fifth of social dwellings (16% or 101,000 dwellings) are recorded as failing the CWI element of the SHQS. Excluding this element from the compliance requirement leads to a 14 percentage point reduction in the energy efficiency element failure rate and a 13 percentage point reduction in overall SHQS failure. This amounts to around 80,000 fewer social sector dwellings failing the SHQS and an overall SHQS failure rate of 25%.

6.3 Overcrowding and Under-Occupancy

- In 2017 around 66,000 households lived in overcrowded accommodation (3%) under the bedroom standard.
- Around 880,000 (36%) households had one bedroom in excess of the minimum requirement under the bedroom standard. A further 766,000 (31%) households had two or more bedrooms in excess.
- Social sector tenants are more likely to live in accommodation which is at the level meeting the minimum requirements of the bedroom standard (55% compared to 22% in the private sector). Social sector tenants are also slightly more likely (4%) to live in accommodation which is overcrowded according to the bedroom standard than those households living in the private sector (2%).

260. This section examines some key measures of whether households are living in overcrowded or under-occupied conditions. This is determined on the basis of the bedroom standard as defined in the Housing (Overcrowding) Bill 2003[53] taking into account the number of bedrooms available in the dwelling and the type of household that occupies it.

261. Minimum requirements for bedrooms under the bedroom standard should not be confused with criteria for the removal of the spare room subsidy. More information on the bedroom standard and the differences between the two is included in section 7.9.9.

262. Figure 31 and Table 56 show how headline occupancy measures have changed over time. There was no significant change in these headline measures between 2016 and 2017. In 2017, the national rate of households with at least one bedroom above the minimum standard was 67%. The rate of overcrowding has stayed stable since 2009 (3%), and is significantly lower than the peak observed in 2004/5 (4%).

263. Subsequent sections examine in more detail differences across household and dwelling characteristics for 2017 and the preceding year.

[53] Housing (Overcrowding) Bill 2003, section 2: http://www.publications.parliament.uk/pa/cm200203/cmbills/046/2003046.pdf

Figure 31: Proportion of Dwellings which are Overcrowded, Meet the Minimum Standard, Exceed it by 1 Bedroom or Exceed by 2 or More Bedrooms, 2003/4-2017

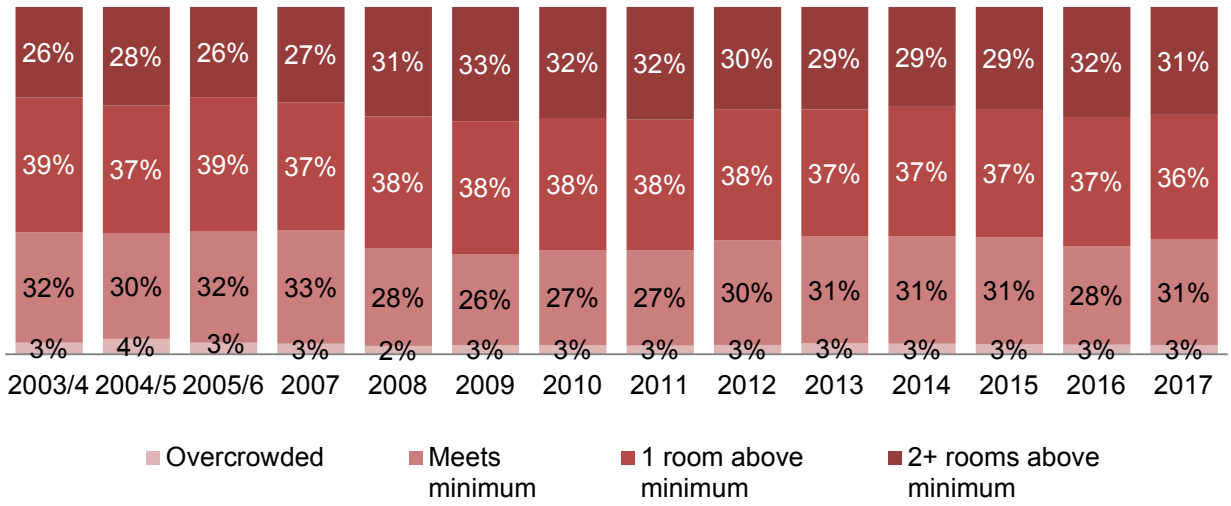


Table 56: Dwellings which are Below The Standard, Meet The Minimum Requirement, or Exceed it by 1, 2 or + Bedrooms, 2010, 2016, 2017

	2017		2016		2010	
Bedroom Standard	000s	%	000s	%	000s	%
Below Standard	66	3%	67	3%	61	3%
Compliance: minimum requirements	752	31%	695	28%	644	27%
Above Standard	1,646	67%	1,690	69%	1,653	70%
1 bedroom above minimum	880	36%	912	37%	898	38%
2+ bedrooms above minimum	766	31%	777	32%	754	32%
2 bedrooms above minimum	517	21%	560	23%	543	23%
3 or more bedrooms above minimum	249	10%	217	9%	211	9%
Total	2,464	100%	2,452	100%	2,357	100%
Sample Size		*3,002*		*2,850*		*3,115*

6.3.1 Overcrowding

264. A dwelling is considered overcrowded if there are insufficient bedrooms to meet the occupants' requirements under the bedroom standard definition (see section 7.9.9).

265. Around 3%, or 66,000 households, lived in overcrowded accommodation in 2017. Social sector dwellings (4%) were more likely to be overcrowded than private sector dwellings (2%). There was also a 4 percentage point increase in overcrowded households who rent from their local authority, compared to 2016 (from 1% to 5%), bringing the rate for the local authority sector back to 2015 levels (6%).

Table 57: Overcrowding by Tenure and Housing Type, Dwelling Age Band, Income Band and Location, 2016 and 2017

	Overcrowded under Bedroom Standard					
	2017			2016		
	000s	%	*Sample*	000s	%	*Sample*
Tenure						
Owned	5	1%	*1,104*	9	1%	*988*
Mortgaged	16	2%	*797*	15	2%	*802*
LA	20	5%	*439*	5	1%	*419*
HA	7	3%	*289*	15	6%	*297*
PRS	18	5%	*373*	23	7%	*344*
Private	39	2%	*2,274*	48	3%	*2,134*
Social	27	4%	*728*	20	3%	*716*
Age of dwelling						
pre-1919	17	4%	*512*	9	2%	*529*
1919-1944	9	3%	*369*	8	3%	*330*
1945-1964	13	2%	*684*	14	3%	*640*
1965-1982	18	4%	*647*	14	3%	*627*
post-1982	8	1%	*790*	22	4%	*724*
Dwelling Type						
Detached	6	1%	*824*	2	0%	*767*
Semi-detached	12	2%	*661*	9	2%	*606*
Terraced	12	2%	*619*	18	3%	*620*
Tenement	24	4%	*520*	24	4%	*506*
Other flats	13	4%	*378*	14	4%	*351*
Weekly Household Income						
< £200	2	1%	*316*	5	2%	*355*
£200-300	7	2%	*479*	10	2%	*506*
£300-400	7	2%	*446*	16	4%	*436*
£400-500	14	5%	*375*	4	2%	*312*
£500-700	18	4%	*543*	11	3%	*516*
£700+	15	2%	*789*	14	2%	*669*
Location						
urban	60	3%	*2,341*	58	3%	*2,189*
rural	6	1%	*661*	9	2%	*661*
Scotland	66	3%	3,002	67	3%	2,850

266. Households who own their properties outright and who live in rural areas had below the average national overcrowding rate. There were also lower rates than the national average for households living in post-1982 dwellings and for those in the lowest weekly income band. Only 1% of households earning less than £200 a week were living in overcrowded accommodation while 5% of those earning £400-£500 a week were overcrowded.

6.3.2 Under-Occupancy

267. In 2017 around 880,000 (36%) had one additional bedroom above the minimum under the bedroom standard. 766,000 (31%) households had two or more bedrooms in excess of the minimum standard.

268. In 2017, there were both differences and similarities between residents in private housing and the social housing sector for different measures of under-occupancy. Social sector tenants are more likely to live in accommodation which is at the level meeting the minimum requirements of the bedroom standard (55% compared to 22% in the private sector). In contrast, households in the social housing sector are less likely to have two or more bedrooms in excess of the minimum requirements: 5% have two or more additional rooms, compared to 40% of private sector households. However, rates of social and private sector households with just one bedroom in excess of minimum requirements (36% and 35% respectively) are similar.

269. There are also differences within the private sector. Those dwellings which are owned outright (54%) or are mortgaged (37%) are more likely to have at least 2 additional rooms than those renting in the private sector (12%).

270. Higher income households (£700+ per week) are more likely to live in dwellings with additional bedrooms: 46% have two or more additional bedrooms.

271. Under-occupied dwellings are least common amongst dwellings built between 1919 and 1964, where 24% have two or more bedrooms in excess of the standard compared to post-1982 where the rate is 37%. Similarly, detached houses have the highest rates of under-occupancy compared to other building types: 72% with two or more additional bedrooms.

272. Under-occupation is more common in rural areas. 49% of rural dwellings have two or more bedrooms in excess of the minimum requirements under the bedroom standard, compared to 28% for urban properties.

273. Changes from 2016 on the measures shown in Table 58 and Table 59 are mostly within the margin of error for this survey. A decrease of three percentage points in the proportion of social sector dwellings with two or more bedrooms above the minimum was recorded in 2017.

274. Longer term, the proportion of social dwellings with two or more additional bedrooms has dropped by 8 percentage points, from 13% in 2011 to 5% in 2017. In the same period the proportion of social sector households at the minimum bedroom standard has increased from 46% to 55% in 2017.

Table 58: Above Minimum Standard, by Tenure, Dwelling Age, Type and Location, 2016 and 2017

	2017					2016				
	2+ additional		1 additional		*Sample*	2+ additional		1 additional		*Sample*
	000s	%	000s	%		000s	%	000s	%	
Tenure										
Owned	445	54%	286	35%	*1,104*	416	52%	299	37%	*988*
Mortgaged	244	37%	243	37%	*797*	253	36%	275	39%	*802*
LA	27	7%	131	35%	*439*	37	11%	131	37%	*419*
HA/co-op	7	3%	89	35%	*289*	17	6%	93	34%	*297*
PRS	43	12%	131	38%	*373*	54	16%	115	35%	*344*
Private	732	40%	661	36%	*2,274*	723	40%	689	38%	*2,134*
Social	34	5%	219	35%	*728*	54	9%	224	36%	*716*
Age of dwelling										
pre-1919	153	33%	140	30%	*512*	179	37%	129	27%	*529*
1919-1944	70	24%	143	49%	*369*	84	29%	124	43%	*330*
1945-1964	129	24%	233	43%	*684*	136	26%	230	44%	*640*
1965-1982	178	35%	153	30%	*647*	150	28%	208	39%	*627*
post-1982	236	37%	211	33%	*790*	229	37%	222	36%	*724*
Dwelling Type										
Detached	397	72%	122	22%	*824*	365	65%	161	29%	*767*
Semi	183	38%	173	36%	*661*	183	39%	182	38%	*606*
Terraced	131	25%	221	41%	*619*	147	28%	213	40%	*620*
Tenement	25	4%	212	36%	*520*	46	8%	210	37%	*506*
Other flats	30	10%	151	49%	*378*	36	11%	146	46%	*351*
Weekly Household Income										
< £200	54	21%	94	37%	*316*	74	24%	113	37%	*355*
£200-300	83	21%	143	36%	*479*	87	19%	183	40%	*506*
£300-400	98	26%	139	37%	*446*	107	28%	149	39%	*436*
£400-500	77	24%	121	38%	*375*	85	32%	89	34%	*312*
£500-700	151	34%	168	38%	*543*	149	35%	164	38%	*516*
£700+	289	46%	202	32%	*789*	261	46%	201	35%	*669*
Urban-rural indicator										
urban	567	28%	750	37%	*2,341*	585	29%	773	38%	*2,189*
rural	199	49%	130	32%	*661*	192	47%	140	34%	*661*
Scotland	766	31%	880	36%	*3,002*	777	32%	912	37%	*2,850*

Table 59: Households Meeting the Minimum Bedroom Standard, by Tenure, Dwelling Age, Type and Location, 2016 and 2017

	2017			2016		
	000s	%	*Sample*	000s	%	*Sample*
Tenure						
Owned	92	11%	*1,104*	79	10%	*988*
Mortgaged	160	24%	*797*	154	22%	*802*
LA	197	53%	*439*	180	51%	*419*
HA	149	59%	*289*	145	54%	*297*
PRS	154	45%	*373*	137	42%	*344*
Private	406	22%	*2,274*	370	20%	*2,134*
Social	346	55%	*728*	325	52%	*716*
Age of dwelling						
pre-1919	156	33%	*512*	166	34%	*529*
1919-1944	70	24%	*369*	71	25%	*330*
1945-1964	169	31%	*684*	146	28%	*640*
1965-1982	166	32%	*347*	163	30%	*627*
post-1982	191	30%	*790*	149	24%	*724*
Dwelling Type						
Detached	29	5%	*824*	32	6%	*767*
Semi-detached	113	24%	*661*	99	21%	*606*
Terraced	170	32%	*619*	154	29%	*620*
Tenement	323	55%	*520*	286	50%	*506*
Other flats	117	38%	*378*	124	39%	*351*
Weekly Household Income						
< £200	104	41%	*316*	111	37%	*355*
£200-300	164	41%	*479*	172	38%	*506*
£300-400	129	34%	*446*	112	29%	*436*
£400-500	106	33%	*375*	86	33%	*312*
£500-700	109	24%	*543*	107	25%	*516*
£700+	121	19%	*789*	94	16%	*669*
Location						
urban	677	33%	*2,341*	625	31%	*2,189*
rural	74	18%	*661*	69	17%	*661*
Scotland	752	31%	*3,002*	695	28%	*2,850*

7 Technical Notes and Definitions

7.1 Survey Estimation

275. From 2012 onwards the SHCS is a module of the Scottish Household Survey (SHS)[54]. In general, around one third of respondents to the SHS are invited to participate in a follow-up inspection by SHCS building surveyors. For 2017, this was increased to almost half of respondents to ensure that the required number of households for the physical survey sample was achieved.

7.1.1 Sample Sizes and Gross Dwelling Numbers

276. In Table 60 we provide the sample sizes in the social interview and physical dwelling inspection follow-up for all years of the annual SHCS to 2017.

Table 60: Achieved Samples for SHCS Streams of the Scottish Household Survey and Base Number of Occupied Dwellings by Survey Year, 2003/4-2017

Survey Year	Social Interview	Physical Survey	Households (000s)
2003/4	3,870	3,090	2,269
2004/5	3,783	3,093	2,301
2005/6	3,679	3,147	2,315
2007	3,867	3,033	2,314
2008	3,763	3,015	2,331
2009	4,153	3,346	2,344
2010	3,853	3,115	2,357
2011	3,949	3,219	2,368
2012	3,813	2,787	2,386
2013	3,780	2,725	2,402
2014	3,787	2,682	2,420
2015	4,083	2,754	2,434
2016	4,220	2,850	2,452
2017	5,049	3,002	2,464

277. Table 60 also shows the total number of households in Scotland for each survey year which provides the basis for grossing up the estimates of households and dwellings in this report. These figures are produced annually by the National Records of Scotland[55] as part of their inter-censal household estimates publication.

[54] Scottish Household Survey Website: http://www.gov.scot/Topics/Statistics/16002

[55] NRS: Estimates of Households and Dwellings in Scotland, 2017, https://www.nrscotland.gov.uk/files//statistics/household-estimates/2017/house-est-17-publication.pdf

278. The SHCS is a sample survey. All survey figures are estimates of the true prevalence within the population and will contain some error associated with sampling variability. The likely size of such variability can be identified, by taking account of the size and design of the sample, as described in sections 7.1.2 to 7.1.5.

279. In addition to sampling variability, there are other sources of uncertainty, such as those arising from incomplete responses or failure to secure participation in the survey from each sampled household. Where non-response is not random, i.e. some types of household are less likely to participate than others, bias is introduced into the survey data. Such errors have not been quantified in this report.

280. In general, the smaller the sample size, the greater the likelihood the estimate could be misleading, so more care must be taken when using smaller subsets of the survey sample for analysis. In this report estimates representing 2 or fewer cases, or where the base sample is below 30 have been suppressed.

281. Different types of estimates are subject to different levels of uncertainty associated with sampling and design. For example estimates of change (i.e. figures relating to comparisons across survey years) are generally subject to greater sampling error than point-in-time estimates (i.e. figures relating to one survey year only) and such errors would be understated by figures in Table 61. There is more uncertainty associated with complex measures, such as the fuel poverty rate and this is not quantified in this report or reflected by stated confidence intervals in Table 61.

7.1.2 Confidence Intervals

282. By convention, a 95% confidence interval is used to quantify the variability of a sample estimate, under which there is a 1 in 20 chance that the true value will fall outside the given confidence interval.

283. Table 61 shows the 95% confidence limits for estimates of proportions based on sub-samples of various sizes before design effects are taken into account.

Table 61: Approximate 95% Confidence Limits for Estimates Based on SHCS Sub-Samples of Various Sizes (Excluding Design Effects)

Sub-sample size (corresponding to 100%)	Estimate (lookup to nearest multiple of 5%)											
	1% or 99%	2% or 98%	5% or 95%	10% or 90%	15% or 85%	20% or 80%	25% or 75%	30% or 70%	35% or 65%	40% or 60%	45% or 55%	50%
	percentage points (+ / -)											
100	2.0	2.7	4.3	5.9	7.0	7.8	8.5	9.0	9.3	9.6	9.8	9.8
150	1.6	2.2	3.5	4.8	5.7	6.4	6.9	7.3	7.6	7.8	8.0	8.0
200	1.4	1.9	3.0	4.2	4.9	5.5	6.0	6.4	6.6	6.8	6.9	6.9
250	1.2	1.7	2.7	3.7	4.4	5.0	5.4	5.7	5.9	6.1	6.2	6.2
300	1.1	1.6	2.5	3.4	4.0	4.5	4.9	5.2	5.4	5.5	5.6	5.7
350	1.0	1.5	2.3	3.1	3.7	4.2	4.5	4.8	5.0	5.1	5.2	5.2
400	1.0	1.4	2.1	2.9	3.5	3.9	4.2	4.5	4.7	4.8	4.9	4.9
450	0.9	1.3	2.0	2.8	3.3	3.7	4.0	4.2	4.4	4.5	4.6	4.6
500	0.9	1.2	1.9	2.6	3.1	3.5	3.8	4.0	4.2	4.3	4.4	4.4
600	0.8	1.1	1.7	2.4	2.9	3.2	3.5	3.7	3.8	3.9	4.0	4.0
700	0.7	1.0	1.6	2.2	2.6	3.0	3.2	3.4	3.5	3.6	3.7	3.7
800	0.7	1.0	1.5	2.1	2.5	2.8	3.0	3.2	3.3	3.4	3.4	3.5
900	0.7	0.9	1.4	2.0	2.3	2.6	2.8	3.0	3.1	3.2	3.3	3.3
1,000	0.6	0.9	1.4	1.9	2.2	2.5	2.7	2.8	3.0	3.0	3.1	3.1
1,100	0.6	0.8	1.3	1.8	2.1	2.4	2.6	2.7	2.8	2.9	2.9	3.0
1,200	0.6	0.8	1.2	1.7	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.8
1,300	0.5	0.8	1.2	1.6	1.9	2.2	2.4	2.5	2.6	2.7	2.7	2.7
1,400	0.5	0.7	1.1	1.6	1.9	2.1	2.3	2.4	2.5	2.6	2.6	2.6
1,500	0.5	0.7	1.1	1.5	1.8	2.0	2.2	2.3	2.4	2.5	2.5	2.5
1,600	0.5	0.7	1.1	1.5	1.7	2.0	2.1	2.2	2.3	2.4	2.4	2.5
1,700	0.5	0.7	1.0	1.4	1.7	1.9	2.1	2.2	2.3	2.3	2.4	2.4
1,800	0.5	0.6	1.0	1.4	1.6	1.8	2.0	2.1	2.2	2.3	2.3	2.3
1,900	0.4	0.6	1.0	1.3	1.6	1.8	1.9	2.1	2.1	2.2	2.2	2.2
2,000	0.4	0.6	1.0	1.3	1.6	1.8	1.9	2.0	2.1	2.1	2.2	2.2
2,200	0.4	0.6	0.9	1.3	1.5	1.7	1.8	1.9	2.0	2.0	2.1	2.1
2,400	0.4	0.6	0.9	1.2	1.4	1.6	1.7	1.8	1.9	2.0	2.0	2.0
2,600	0.4	0.5	0.8	1.2	1.4	1.5	1.7	1.8	1.8	1.9	1.9	1.9
2,800	0.4	0.5	0.8	1.1	1.3	1.5	1.6	1.7	1.8	1.8	1.8	1.9
3,000	0.4	0.5	0.8	1.1	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.8
3,200	0.3	0.5	0.8	1.0	1.2	1.4	1.5	1.6	1.7	1.7	1.7	1.7
3,400	0.3	0.5	0.7	1.0	1.2	1.3	1.5	1.5	1.6	1.6	1.7	1.7
3,600	0.3	0.5	0.7	1.0	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.6
3,800	0.3	0.4	0.7	1.0	1.1	1.3	1.4	1.5	1.5	1.6	1.6	1.6
4,000	0.3	0.4	0.7	0.9	1.1	1.2	1.3	1.4	1.5	1.5	1.5	1.5

7.1.3 Design Effects

284. The design effect is the ratio between the variance (average deviation of a set of data points from their mean value) of a variable under the sampling method used (actual) and the variance computed under the assumption of simple random sampling (standard). In short, a design effect of 2 would mean doubling the size of the sample used (actual) in order to obtain the same level of precision as with a simple random sample; a design effect of 0.5 implies the reverse. Design effect adjustments are necessary where standard errors are affected by the design and complexity of the survey.

285. Generally speaking, disproportionate stratification and sampling with non-equal probabilities tends to increase standard errors, giving a design effect greater than 1. However, this can be controlled by deliberately over-sampling in stratum where the item of interest is either very rare or variable. The impact of non-response weighting on standard errors tends to be, although with exceptions, comparatively limited. The sampling design of the SHCS meets the criteria above in that disproportionate stratification is applied across the 32 Local Authority areas with over-sampling of remote rural areas - for example in Shetland and Orkney. As a result, one would expect the design effect to be above 1 although only modestly so.

286. Table 62 shows the design effects for all the SHCS surveys since 2003/4. When using a mixture of the physical and social survey data, the physical survey design effect must be used. The design effects for the 2017 SHCS are 1.10 for the physical and 1.08 for the social surveys.

287. When producing estimates at Local Authority level, no design effect adjustment of standard errors is necessary because simple (actually equal interval) random sampling was carried out within each Local Authority.

Table 62: Design Effects for the Annual SHCS, 2003/4 to 2017

	Design Effect	
Survey Year	Physical Weight	Social Weight
2003/04	1.14	1.13
2004/05	1.18	1.17
2005/06	1.14	1.14
2007	1.13	1.11
2008	1.11	1.11
2009	1.09	1.08
2010	1.11	1.1
2011	1.12	1.11
2012	1.09	1.08
2013	1.09	1.08
2014	1.09	1.08
2015	1.10	1.08
2016	1.10	1.08
2017	1.10	1.08

7.1.4 Example: Accounting for Sampling Variation

288. Both confidence intervals and the design effect must be accounted for when quoting confidence levels on a statistic. For example we may wish to find the confidence interval for the proportion of pre-1919 detached houses in Table 1.

289. The stated proportion is 4%. The sub-sample size for the group (the sample size of 100% of the group) is also provided in the table, which in this case is the full survey sample: n=3,002. Reading from Table 60 in the row labelled 3,000 (the closest value to our n value) in the column for 5% we find the confidence interval for this estimate is 0.8 percentage points.

290. To account for the design effect, we must multiply this value by the physical design effect value from Table 61 since this statistic relates to the physical properties of the dwelling. So the true confidence interval is 0.8 x 1.10 = 0.88 ≈ 0.9 percentage points. We can therefore be 95% confident that the true proportion of pre-1919 detached houses is between 4.1% and 5.9%.

7.1.5 Statistical Significance

291. Because the survey's estimates may be affected by sampling errors, apparent differences may not reflect real differences in the population. A difference is significant if it is so large that a difference of that size is unlikely to have occurred purely by chance.

292. Comparisons in this publication are tested at the 5 per cent level as described in section 7.1.2. Testing significance involves comparing the difference between two statistics (for example, the per cent of households rated as EPC band C or better in 2017 compared to 2016 or for the social sector compared to the private sector) with the 95 per cent confidence limits for each of the two estimates taken into account.

293. Our approach to testing statistical significance follows that described in Annex 3 of the Scottish Household Survey annual report[56].

[56] http://www.gov.scot/Topics/Statistics/16002/PublicationAnnual

7.1.6 Table Conventions

294. The following conventions are used in tables:

    0 indicates value is rounded to 0.

    - indicates no sample cases in this category

    * indicates base sample too small to report (below 30 cases) or estimate representing 2 or fewer sampled households

295. Because of rounding, figures in tables and charts may not always add exactly.

7.2 Missing Tenure Information

296. Because of a routing error tenure information is not available for a small number of cases in the 2012 and 2013 surveys (46 in 2012, 42 in 2013). This was rectified for the 2014 fieldwork and the full sample has been used when reporting on tenure for subsequent years. This introduces some discontinuities in comparing statistics for the social (or the private) sector between 2014 and 2015, on the one hand, and previous years, on the other. For further details please refer to the respective earlier Key Findings reports.

7.3 Energy Models

297. Two different models are used to produce the energy efficiency outputs in this report. They are based on the same core methodology but have some different assumptions and calculations which affect the output values.

Table 63: Summary of Domestic Energy Models used on SHCS Data

Model	SAP	BREDEM 2012
Version	SAP 2009[57] SAP 2012[58] and RdSAP 9.92 for 2014 onwards	Version 1.0 for data up to 2013 Version 1.1 for data from 2014 onwards
Outputs	Energy Efficiency Rating Environmental Impact Rating	• Fuel poverty energy use • Carbon emissions • Fuel poverty running costs
Fuel Prices	SAP standard	Based on a range of sources[59]
Occupancy	Number of occupants derived based on total floor area of the dwelling	Actual number of occupants in the dwelling
Heating regime	21°C in the main living area and 18°C elsewhere; 9 hours per weekday and 16 hours at the weekend	As SAP, except for vulnerable households for fuel poverty related statistics, where: 23°C in the main living area and 18°C elsewhere; 16 hours per day
Climate	East Pennines	Based on geographical location
Energy end-use included	• space heating • water heating • fixed lighting • gains from renewable energy technologies.	As SAP but also energy used for: • cooking • running appliances

298. Energy presented in this report is based on RdSAP 9.92. Version 9.93 was released in November 2017. Since the majority of the 2017 SHCS falls in the period prior to the introduction of the latest version, we have continued to use version 9.92 in this report.

[57] BRE, "The Government's Standard Assessment Procedure for Energy Rating of Dwellings": http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf

[58] BRE, "The Government's Standard Assessment Procedure for Energy Rating of Dwellings, 2012 Edition", Table 12: http://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf

[59] For more details see SHCS Methodology Notes 2014 www.gov.scot/Topics/Statistics/SHCS/Downloads/Methodology2014

299. Carbon emissions are calculated on the basis of the standard heating regime, applying carbon intensity values to each type of fuel used. Emissions factors for the BREDEM 2012 model come from SAP 2012 and are provided in Table 64.

Table 64: Carbon Intensity of Common Heating Fuels, SAP 2012

Fuel	kg CO2 per kWh
Mains gas	0.216
LPG	0.241
Oil	0.298
Coal	0.394
Anthracite	0.394
Smokeless fuel	0.433
Wood	
- logs	0.019
- pellets	0.039
- chips	0.016
Electricity	0.519

300. In common with previous years, a number of small changes to the energy modelling methodology have been implemented to improve modelling accuracy. More details can be found in the methodology notes accompanying this publication. It is expected that the average SAP 2012 rating would improve by around 0.13 points as a result of these updates compared to a situation where no changes were added

7.4 Fuel prices for pre-payment meters

301. The 2016 SHCS collected information about the presence of pre-payment meters for energy supply. This allowed us to assign the appropriate fuel price which in 2016 was higher than the overall weighted average of all payment methods. In 2017 this approach has continued, although prepayment electricity and gas prices decreased, while non-prepayment electricity prices increased compared to 2016.

7.5 Fuel Poverty Income

302. For the 2017 SHCS, an updated set of questions collecting council tax information were incorporated and accounted for in fuel poverty analysis. Previously respondents were only asked to provide what they paid in council tax whether or not they received any deductions or reductions. The survey now distinguishes between reported council tax after any deductions or reductions, and full council tax. This reduces the risk of double counting Council Tax Reduction in household income in the former case.

303. As described in section 4.5, income for fuel poverty analysis is total household income (a sum of the highest income householder and their spouse/partner's income), net of council tax. For income poverty analysis, this income is equivalised, and compared against an adjusted FRS poverty threshold for a couple with no children, to account for the fact the latest published FRS data relate to 2016/17. Previous reports have equivalised income before the deduction of council tax.

304. Furthermore, 2016 income poverty results have been updated to use the published FRS poverty threshold, rather than the adjusted threshold. For the 2016 SHCS, the poverty threshold was estimated at £291 per week. The 2016/17 FRS threshold used for 2016 data in the 2017 report is £296. The adjusted FRS threshold, estimated using the 2016 SHCS median and FRS 2016/17 threshold, for 2017 data is £313 per week,

305. These two changes (income and threshold) mean 2016 income poverty results in the 2017 SHCS will not match those in the 2016 SHCS.

7.6 Extent of Disrepair Correction

306. The methodology for deriving two measures of disrepair were revised in the 2013 Key Findings report: extensive disrepair (see section 6.5 of SHCS 2013 Key Findings report) and "serious disrepair" under the Scottish Housing Quality Standard. These revisions affected statistics up to 2013. Further details are available in the Methodology Notes to the 2013 Key Findings report[60]. This report contains no further revisions.

7.7 Boilers

307. Testing compliance of boilers with current Scottish Building Standards for domestic properties is carried out by comparing the boiler efficiency to minimum requirements. Data on the efficiency of households' heating systems was first produced by BRE for the 2012 SHCS. However, there was a change to the methodology for the 2014 and 2015 SHCS which made an adjustment to the modelling to allow for the assumption that a poorly controlled system is in effect less efficient.

[60] SHCS - Methodology Notes 2013 available at http://www.gov.scot/Topics/Statistics/SHCS/Downloads/MethodologyNotes2013

308. In the 2016 SHCS report, the full boiler efficiency dataset was revised to ensure it was on a consistent basis across years and represents the efficiency of the heating system before any adjustments for lack of controls. Efficiencies are taken directly from the Product Characteristics Database whenever possible and from the SAP default efficiencies for that system otherwise. This is therefore more representative of the actual boiler efficiency.

309. Furthermore, the thresholds used to test compliance for oil condensing boilers were also updated in 2016 to reflect current minimum standards. The full time series presented in the 2017 report continues to reflect these changes.

7.8 Scottish Housing Quality Standard

310. 2015 data on compliance with the SHQS was revised in the 2016 publication. An error was identified in the method used to compile the data for the failure rate of the Energy Efficiency criterion in that year. This also affected the overall SHQS failure rate for 2015.

7.9 Definitions of Categories in the Key Findings Report

7.9.1 Dwelling Types

311. The SHCS uses the following definitions of dwelling types:

- **Detached house**: a house that is free standing with no party walls;
- **Semi-detached house**: a house that is only attached to one other dwelling, commercial premise etc. The two properties taken together should be detached from any other properties
- **Terraced house**: a house forming part of a row of three or more dwellings, commercial premises etc.
- **Tenement flat**: a dwelling within a common block of two or more floors (commonly up to five storeys but may be higher in certain circumstances) where some or all of the flats have a shared or common vertical access. The selected dwelling need not share the access, but may be situated within the block with shared/common access (own door flat)
- **4-in-a-block**: each flat in a block has its own independent access. Flats on the upper level have an internal or external stair
- **Tower/slab**: flats in a high rise (ten or more storeys) or flats where the common circulation is predominantly horizontal (maisonette, balcony or gallery access)
- **Flat from a conversion**: flats resulting from the conversion of a house only. A flat converted from a non-residential building (e.g. a warehouse) is classified according to the above flat types.

7.9.2 Household Types

312. This report uses the following classification of household types:

- **Families**: Households which contain at least one child aged under 16. Resident adults may be of any age.
- **Older households**: Small households made up of one or two residents, at least one of which is aged 65 or older.
- **Other households**. These are all other households with adult residents (of any age) and no children.

313. This classification is derived from the more detailed grouping used in the Scottish Household Survey[61] as set out in Table 64 below:

Table 65: Household Types Classification Used in the SHCS and the SHS Reports

SHCS	SHS
Families	A **single parent** household – contains one adult of any age and one or more children. A **small family** household – contains two adults of any age and one or two children. A **large family** household – contains two adults of any age and three or more children, or three or more adults of any age and one or more children.
Older households	A **single older** household - contains one adult of pensionable age and no children. An **older smaller** household – contains one adult of working age and one of pensionable age and no children, or two adults of pensionable age and no children.
Other households	A **single adult** household – contains one adult of working age and no children. A **small adult** household – contains two adults of working age and no children. A **large adult** household – contains three or more adults and no children

[61] https://www.gov.scot/publications/scotlands-people-annual-report-results-2017-scottish-household-survey/pages/15/

314. The pensionable age threshold used for the 2015, 2016 and 2017 SHCS Key Findings reports is 65 years for both men and women. Previous publications used 65 for men and 60 for women. Therefore the categories 'Older households' and 'Other households' used from 2015 are not fully comparable with previous years.

7.9.3 Urban Rural Classifications

315. The urban/rural classification in this report is the Scottish Government 2 fold Urban Rural Classification[62]. Dwellings in settlements with over 3,000 people are considered urban by this definition. The Scottish Government published the 2016 Urban Rural Classification in 2017. However, to remain consistent with the classification underpinning survey weight derivations, the 2013/14 Urban Rural Classification (2011 datazone edition) is used for reporting 2016 and 2017 data. Prior to 2016, 2001 datazones are used.

7.9.4 Gas Grid Coverage Derivation

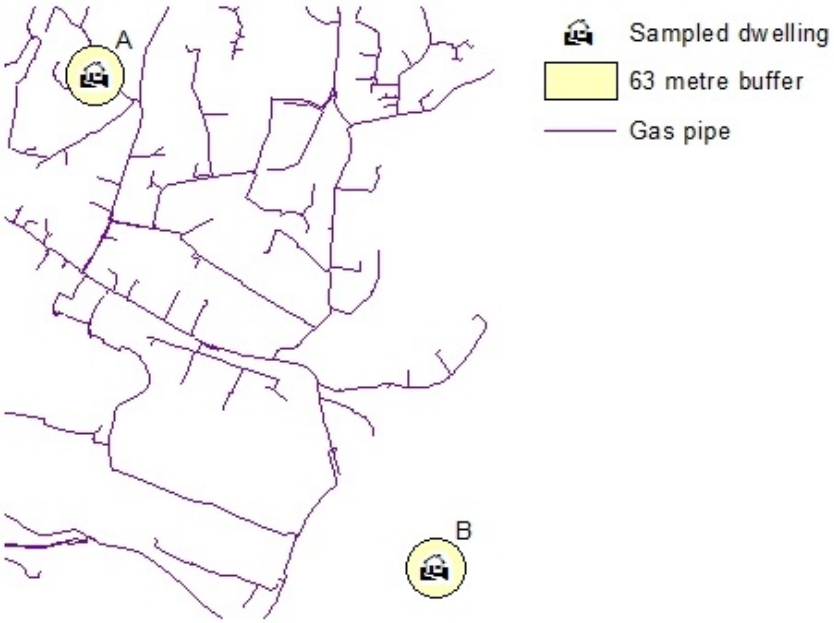
316. Determining whether a dwelling is within the coverage of the gas grid is based on its proximity to gas distribution pipes. The current methodology for deriving gas grid coverage was first used for the 2013 Key Findings Report. A dwelling is considered to be "on the gas grid" if it is within 63m of a low/ medium/ intermediate pressure pipe, the usual maximum distance for a standard domestic connection.

317. Figure 32 shows how this is derived using GIS mapping. From the dwelling location information of surveyed properties, a 63m buffer is drawn. Where this buffer intersects a gas distribution pipe, the dwelling is said to be on the gas network. In the example, dwelling A is on the network, while dwelling B is not.

318. The gas grid information used for this mapping is provided by SGN. It includes both the national gas network and the Scottish Independent Undertakings (SIUs), where gas is provided in areas remote from the national gas grid. It does not however include information on pipes owned and operated by Independent Gas Transporters (IGTs). Therefore, dwellings classified as off-grid by the survey may be within 63m of an IGT operated gas distribution pipe and potentially have a connection to the gas grid and the methodology may therefore slightly undercount dwellings within the range of the gas grid.

[62] More details can be found at:
http://www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification

Figure 32: Gas Grid Derivation with GIS



7.9.5 Reasons Why Home Heating is Difficult

319. The full text of this question is: “Which of these things, if any, make it difficult to heat your home”[63]. Response categories have been grouped for reporting, as described in Table 66. Respondents were able to choose any combination of reasons why heating their home was difficult.

[63] http://www.gov.scot/Topics/Statistics/16002/PublicationQuestionnaire , question ht14

Table 66: Potential Responses to Question ht14

Group	Response Number	Response
Poor or inadequate heating	ht14_01	No Central Heating
	ht14_02	Not enough heaters/radiators
	ht14_03	Position of heaters/radiators
	ht14_04	Poor/need new heating system
	ht14_05	Radiators not large enough
	ht14_06	Heating not working
	ht14_07	Dislike storage heaters
	ht14_08	Inadequate heating
	ht14_10	Heating in part of house
	ht14_17	Can't afford to replace system
Hard to control heating	ht14_09	Difficult to control
	ht14_11	Hard to control heat
Need new windows	ht14_12	Need new windows
Poor insulation	ht14_13	Poor insulation
Draughty	ht14_14	Draughty
Rooms too big	ht14_15	Rooms too big
Can't afford to heat house	ht14_16	Can't afford to heat house
Other	ht14_18	Other
No answer	ht14_19	No answer

7.9.6 Hard to Treat Cavity Walls

320. In this report we use the ECO definition of HTTCs[64] to provide a breakdown of the remaining insulation potential of cavity wall dwellings in the Scottish housing stock (see Table 13).

321. A cavity wall is considered hard to treat if:

- **The building has three or more storeys.** Dwelling spaces in lofts are not counted as storeys.
- **The building is severely exposed to wind-driven rain.** The SHCS is not able to collect this information, which will lead to an underestimation of hard to treat cavity walls.
- **Walls at risk of water penetration** i.e. walls requiring urgent repair to the wall finish and walls with penetrating damp[65].

[64] Change Works: Guide to insulating Hard to Treat Cavities (HTTC) http://www.changeworks.org.uk/sites/default/files/Guide_to_Insulating_Hard_to_Treat_Cavities_2014.pdf

[65] DECC: Review of number of cavity walls in Great Britain https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48433/5620-review-of-the-number-of-cavity-walls-in-great-brit.pdf ,

- **Non-traditional building types** e.g. timber frame, metal-frame, prefabricated concrete.
- **Partially filled, narrow or uneven cavities** as well as cavities with failed CWI**.** The SHCS is not able to capture this information. As a result hard to treat cavity walls may be underestimated.
- Note that the presence of a conservatory alone does not cause a dwelling to be considered hard to treat under ECO.

7.9.7 Disrepair

322. This report uses our categories of disrepair to describe the state of disrepair of a dwelling.

323. A range of elements - both internal and external - are assessed for the extent of disrepair, the urgency of disrepair (for external and common elements only), and in some cases the residual life of the element.

324. Extent of disrepair is usually measured on a 5- or 10-point scale relating to the area of the element which is in disrepair.

7.9.7.1 Any (Basic) Disrepair

325. Any (Basic) disrepair is recorded where any element of the dwelling is found to have any level of disrepair, no matter how small.

7.9.7.2 Extensive Disrepair

326. Extensive disrepair is recorded where:

- Any building element has an overall disrepair score exceeding 20% by area
- Any building element assessed has a score of 'medium' or 'renew' on the 5-point repair scale (equivalent to an area of around 25% or more of the element) or
- Dry/wet rot is recorded in two or more rooms

327. Extensive disrepair is calculated in order to identify those dwellings where any disrepair present is of a relatively greater severity.

7.9.7.3 Disrepair to Critical Elements

328. Disrepair to critical elements is recorded where there is any disrepair, no matter how small, to the critical elements of the dwelling.

329. The critical elements are those whose condition is central to a dwelling being wind and weather proof, structurally stable and safeguarded against further rapid deterioration. They are as follows:

- Roof covering;
- Roof structure;
- Chimney stacks;
- Flashings;
- Roof gutters and downpipes;
- External walls - finish;
- External walls - structure;
- Access decks and balustrades (common areas - flats only);
- Foundations;
- Damp-proof course;
- External doors and windows (dwelling only);
- Doors, screens, windows and roof lights (common areas - flats only);
- Internal walls/partitions[66];
- Floor structure;
- Floor finish;
- Dry rot/wet rot.

7.9.7.4 Urgent Disrepair

330. Urgent disrepair is recorded where the SHCS surveyor deems that a dwelling has any disrepair which, if not rectified, would cause the fabric of the building to deteriorate further and/or place the health and safety of the occupier at risk.

331. Urgency of disrepair is only assessed for external and common elements.

7.9.8 Damp and Condensation

- **Penetrating damp** is usually the result of a defect in the building fabric, such as damage to the walls or roof, water ingress due to damaged seals on doors or windows or damp as a result of leaking plumbing.
- **Rising damp** is the result of defective or missing damp proof coursing, leading to water leaching into the building fabric.
- **Condensation** is the build-up of moisture inside a dwelling, which may be the result of insufficient or ineffective ventilation.

7.9.9 Bedroom Standard

332. The Bedroom Standard is defined in the Housing (Overcrowding) Bill 2003 based on the number of bedrooms in a dwelling and the people in a household who can share a bedroom[67].

[66] This element has been incorrectly described in all previous SHCS reports as 'party walls'

333. Each of the following groups or individuals requires a separate bedroom:

- Any couple;
- a person aged 21 years or more;
- two people of the same sex aged between 10 and 20;
- two children (whether of the same sex or not) under 10 years;
- two people of the same sex where one person is aged between 10 years and 20 years and the other is aged less than 10 years;
- any further person who cannot be paired appropriately.

334. This definition is distinct from the rules introduced by the UK Government in April 2013 for the size of accommodation that Housing Benefit will cover for working age tenants renting in the social sector, known as the 'spare room subsidy'[68]. Applying the rules of the spare room subsidy requires information not collected in the SHCS. Statistics in this report relate to the Bedroom Standard only.

7.9.10 Tolerable Standard

335. The Tolerable Standard is a minimum standard for habitability introduced in the 1969 Housing (Scotland) Act, and updated by the 1987, 2001 and 2006 Acts[69].

336. Additional criteria for electrical installations and thermal insulation were added by the 2006 Act[70]. These requirements came into force in April 2009 and were first reported by the SHCS in 2010. The change in definition caused the fail rate for the standard to increase from 0.7% in 2009 to 3.9% in 2010 in the full time series tables[71].

337. A dwelling meets the tolerable standard if it:

- is structurally stable;
- is substantially free from rising or penetrating damp;

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[67] Housing (Overcrowding) Bill 2003, section 2: http://www.publications.parliament.uk/pa/cm200203/cmbills/046/2003046.pdf Retrieved: 19/11/15

[68] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229364/factsheet-hbsssc1.pdf Retrieved: 19/11/15

[69] A full definition and description of Local Authority duties as regards the Tolerable Standard can be found at: http://www.gov.scot/Publications/2009/03/25154751/3 Retrieved: 19/11/15

[70] These amendments are published at: http://www.legislation.gov.uk/asp/2006/1/section/11 Retrieved: 19/11/15

[71] Full time series are provided at http://www.gov.scot/Resource/0044/00445920.xlsx Retrieved: 19/11/15

- has satisfactory provision for lighting, ventilation and heating;
- has an adequate piped supply of wholesome water available within the house;
- has a sink provided with a satisfactory supply of both hot and cold water within the house;
- has a water closet or waterless closet available for the exclusive use of the occupants of the house and suitably located within the house;
- has a fixed bath or shower and a wash-hand basin, each provided with a satisfactory supply of both hot and cold water and suitably located within the house;
- has an effective system for the drainage and disposal of foul and surface water;
- has satisfactory facilities for the cooking of food within the house;
- has satisfactory access to all external doors and outbuildings;
- has electrical installations that are adequate and safe to use. The "electrical installation" is the electrical wiring and associated components and fittings, but excludes equipment and appliances;
- has satisfactory thermal insulation.

7.9.11 Scottish Housing Quality Standard

338. The Scottish Housing Quality Standard (SHQS) was announced by the Minister for Communities in February 2004[72]. A target was agreed that all social landlords must ensure that all their dwellings pass the SHQS by 2015. Private owners and private landlords are currently under no obligation to bring their properties up to a standard which meets the SHQS. However SHCS collects the same data for all dwellings to allow comparison across the housing stock.

339. The SHQS is an aggregation of the results from 55 different elements grouped into 5 higher-level criteria, which in turn provide a single pass/fail classification for all dwellings. The 5 higher-level criteria specify that the dwelling must be:

- above the statutory tolerable standard;
- free from serious disrepair;
- energy efficient;
- with modern facilities and services;
- healthy, safe and secure.

340. A full list of assessed elements is available on the Scottish Government website[73]. Only one element of the SHQS is not assessed using SHCS data: no information is collected on external noise insulation[74].

[72] For more information see letter and notes at: http://www.gov.scot/Publications/2004/02/18860/32772

[73] http://www.gov.scot /Topics/Built-Environment/Housing/16342/shqs

341. Figures on SHQS failure rates for 2014 and 2015 are not entirely comparable to previous years published in this report. Because of missing tenure information a small number of dwellings (see section 7.2 for more detail), are excluded from tenure breakdowns in figures relating to years prior to 2014.

342. In addition, small changes to data processing relating to failure thresholds for the energy efficiency criterion[75], as well as other minor data processing corrections were introduced in 2014. Although the effect of these corrections on the overall failure rates in the social sector was neutral, some discontinuities with previous years cannot be ruled out, especially when considering more detailed breakdowns.

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[74] A summary list of elements by higher level criteria is available here: http://www.gov.scot/Resource/Doc/1125/0114870.pdf Retrieved: 19/11/15

[75] This relates to the SAP and NHER thresholds for element 35 and the thickness of hot water tank insulation for element 33.

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The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-78781-427-1 (web only)

Published by The Scottish Government, December 2018

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS547966 (07/19)