



## Report 5: Secondary heating systems

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## Executive Summary

This report presents the findings on the extent and type of secondary heating and how it is used, using householder interview data from the 2011 Energy Follow-Up-Survey (EFUS), providing an overview of the usage of these systems in the English housing stock. The main objective of the EFUS 2011 is to collect new data on patterns of household and dwelling energy use, in order to update current modelling assumptions about how energy is used in the home. Analysis is based on the interview sample weighted to the national level, using a weighting factor specific to the interview sample. The results presented in this report are therefore representative of the English housing stock, with a population of 21.9 million households.

Secondary heating systems are those that provide space heating which is in addition to that provided by the main heating. This report considers two types of secondary heating:

- § **Alternative heating:** defined as heating that is used *instead* of the main heating in a room. This could either be where the main heating is turned off or does not exist, for example, a study with no central heating radiator, where a householder uses an electric heater to heat the room.
- § **Supplementary heating:** defined as heating that is used in *conjunction* with the main heating in a room, for example, a gas flame effect fire in a living room that is mainly heated by a central heating radiator.

The main findings of the analysis are:

### Alternative heating

- § Approximately 65% of all households (14.3 million households) have one or more rooms not heated by the main heating system. Of these, 26% (3.7 million households) use alternative heating to heat these rooms.
- § Alternative heating is typically used in one room per household, most commonly in either a kitchen, bathroom, conservatory or bedroom, and the predominant type of alternative heater used is electric (74% of households with alternative heating).
- § Households using storage radiators as their main heating are most likely to use an alternative heater. Only 21% of the centrally heated households use an alternative heating system compared to 56% and 51% of the households with storage heaters or room heaters as their main heating system respectively.
- § Although only a small percentage of households have living rooms not heated by the main heating system (4%), a large percentage of these are instead heated by an alternative heater (65%, 0.5 million households), reflecting the importance of keeping the living room warm.

### Supplementary heating

- § Close to half of all households (48%; 10.5 million households) indicate that they have supplementary heating in one or more rooms.
- § Approximately 79% of households using supplementary heating use it in only one room per dwelling, with a further 17% using it in two rooms per dwelling.
- § Supplementary heating is most commonly used in living rooms. Of households with supplementary heating, 83% use it in living rooms and 12% in bedrooms. Supplementary heating is rarely used in other room types.
- § Typically supplementary heaters are either electric (46%) or use mains gas (41%). Supplementary heaters are slightly more likely to be used in conjunction with central heating systems (49% of households with central heating) than with storage heaters (45% of households with storage heaters), and are least likely to be used in conjunction with room heaters (20%).
- § Bivariate analyses suggest that the dwelling characteristics of: dwelling type, age, floor area, regional location and presence of double glazing, and the household characteristics of: tenure, household size, whether a pensioner lives in the household, household income and under-occupancy status are likely to be underlying factors determining whether a household uses supplementary heating in one or more rooms.
- § Almost half (47%) of households using supplementary heating indicated that they use their heaters 'to provide extra heat when the heating system is on', about a quarter (26%) have stated that it is used 'to provide heat when the heating system is not on', 18% say that it is used for both the aforementioned reasons, while only 3% give more specific reasons (such as 'ambience/decorative purposes' and 'back-up system when the main heating system is not working').

### Heating patterns

- § The average length of heating season reported for both types of secondary heating is very similar. The average alternative heating season length is 4.6 months (mean) and supplementary heating season is 4.2 months (mean).
- § The timing of the heating season is also reported to very similar for both types of secondary heating. Usage of both alternative and supplementary heaters peaks in December (85% and 84% of households respectively). The majority of households start using their alternative and supplementary heating between October and December.
- § On average, households use alternative heating for 17.5 hours per week (median) during their heating season. Supplementary heating is typically used for a shorter period of 8 hours per week (median).

### Unheated rooms

- § No heating is provided from the main or alternative heating system (including main heating turned off) in one or more rooms in 48% (10.6 million) of all households. The majority of these households (60%; 6.4 million) reported less than a fifth of all rooms in the dwelling were unheated.
- § Typically, circulation spaces, WCs and 'other' rooms (which include rooms such as utilities etc.) are much more likely to be unheated than other types of rooms. Approximately 23% of households with at least one bedroom have one or more bedrooms that are not heated by the main or alternative heating system.
- § The most common responses from households to the question of why they do not heat specific rooms were that the room was warm enough already (41% of households), the room did not have a heater (36% of households) or that the room did not need a heater as the room was not used (33% of households). Only 5% of households reported that they did not heat a room due to expense.

This report gives a general overview and headline figures of the data collected in the secondary heating sections of the EFUS 2011 Interview Survey. The analysis has highlighted a number of areas when the SAP and BREDEM energy modelling assumptions differ from those reported by households. Future development of these methodologies should consider whether these assumptions should be revised in light of these findings. It is important to recognise, however, that many energy modelling applications are defined to aspirational, desirable or other standardised levels rather than attempting to model actual usage.

In particular, SAP and BREDEM assumptions should be considered in the following areas:

- The proportion of a dwelling that householders actually heat compared to that modelled in SAP and BREDEM algorithms, and the implications that this may have on potential energy and carbon savings and predictions.
- Information to feed into how householders heat their dwellings and their reasoning behind this.
- Consideration of the need for separating secondary heating into two separate types of heating, following distinct results shown by alternative and supplementary heating sections.

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# 1 Introduction

The main aim of the 2011 Energy Follow-Up Survey (EFUS) was to collect new data on domestic energy use, in order to update the current modelling assumptions about how energy is used in the home, and to inform energy efficiency policy. The 2011 EFUS consisted of a follow-up interview survey of a sub-set of households first visited as part of the 2010/2011 English Housing Survey (EHS). Additionally, sub-samples of these households were selected to have temperature loggers and electricity consumption monitors installed. A further stage of the EFUS was the compilation of gas and electricity consumption data from meter readings.

This report presents the findings on the extent and type of secondary heating and how it is used. This will be used to inform and update energy efficiency and related policies and models, including the assumptions in the BRE Domestic Energy Model (BREDEM) and Standard Assessment Procedure (SAP) methodologies. These methodologies are extensively used to predict the annual energy consumption in dwellings; BREDEM includes estimates for space and water heating, lighting, electrical appliances and cooking energy use; whereas SAP includes space and water heating and lighting energy use. CO<sub>2</sub> emissions can be deduced directly from energy use, and the prediction of housing-related CO<sub>2</sub> emissions through to 2050 will continue to rely heavily on the SAP and BREDEM methodologies. Space heating is still the largest end-use of energy, and therefore it is important to ensure that modelling of space heating uses appropriate assumptions that are supported by empirical evidence, so that estimates of future carbon emissions and potential carbon savings are robust.

In the SAP and BREDEM methodologies, secondary space heating is set as a proportion of the overall heat demand for space heating, depending on the type of main heating used. The use of secondary space heating is still poorly understood and there is a lack of data to substantiate the proportion of heat that it contributes to the overall space heating energy use. In the EHS, surveyors record the presence and type of secondary heating, but this does not inform us of how householders actually use the secondary heating systems (if at all). The extent to which householders actually heat their homes is also not well known, nor are the times that these systems are in use, and the results of this analysis of the EFUS 2011 data also aim to inform this area of modelling.

In the 2011 EFUS, data were collected for two types of secondary heating:

- Firstly, 'alternative heating', which is defined in the EFUS interview survey as heating that is used *instead* of the main heating in a room (including rooms where the main heating system is turned off); for example a study with no central heating radiator, where a householder uses an electric heater to heat the room.
- Secondly, 'supplementary heating', which is defined as heating that is used to *top up* heating in the rooms where the main heating is already used; for example a gas flame effect fire in a living room that is mainly heated by a central heating radiator.

As described above, one of the principal objectives of the 2011 EFUS is to inform the SAP and BREDEM methodologies. Specific questions that the SAP/BREDEM teams are looking to be addressed by the 2011 EFUS survey about secondary heating include:

- What are the common combinations of primary and secondary heating?
- What proportion of the dwelling is heated by secondary heaters?
- For how many hours per day is each type of secondary heating used on weekdays and at weekends?
- What proportion of rooms is unheated, or significantly less well heated than the rest of the house?

A key component of this analysis process has been the linkage of the EFUS data to key dwelling and household descriptor variables collected in the interview and physical survey components of the 2010 English Housing Survey (EHS). In this report, and the majority of the companion reports in this EFUS series, simple bivariate comparisons between the variable under consideration and individual descriptor variables have been performed in order to provide preliminary results and identify bivariate trends. It should be recognised, however, that subsequent investigations using more sophisticated statistical analysis may assist in the interpretation of results.



## 2 Methodology

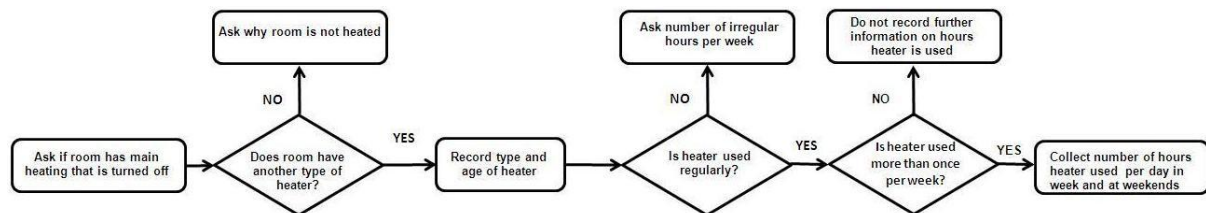
A summary of the methodology of particular relevance to this report is provided below. Additional details, including the full interview questionnaire, can be found in the Methodology report.

### 2.1 Data collection and processing

The results presented in this report have been produced using data collected from the 'Alternative Heating' and 'Supplementary Heating' sections of the EFUS interview survey<sup>1</sup>. Flowcharts for these sections of the interview survey are shown in Figure 1 and Figure 2 below.

In the 'Alternative Heating' section, the householder is first asked to indicate which rooms are not heated by the main heating system. If the response is 'none' then no further questions are asked for this section and the interview moves on to the 'supplementary heating' section. If the response is positive, then for each room the householder is asked whether it has main heating that is turned off and then whether another type of heater heats the room. If the response to the latter question is no, the section is bypassed and respondents are asked why the room is not heated. If a heater is indicated, the details of the heater (type and age) and the months and frequency of use are collected. If they responded that the heater is used more frequently than once a week, the householder is then asked whether the heater is used regularly or irregularly. If it is used regularly, the timings for both weekdays and weekends are collected. If it is used irregularly, the total number of hours per typical week is asked (Figure 1).

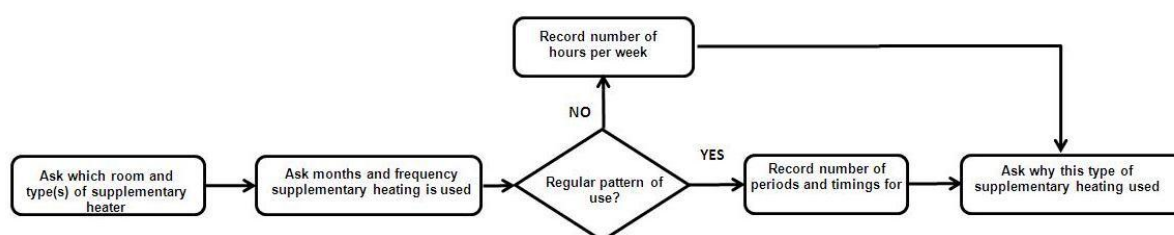
Figure 1: Questions asked for each room not heated by main heating system



In the 'Supplementary Heating' section, the householder is asked whether any other types of heater are used in the rooms that are heated by the main heating system. If the response is yes, the respondent identifies which rooms and what type(s) of heater is used. The months used and frequency and regularity of use are then asked. If irregular patterns are indicated, the numbers of hours per week are recorded. If regular hours are indicated, the number of periods and timings are recorded for each day of the week. A final question is asked to determine why this heating is used (Figure 2).

<sup>1</sup> See the EFUS 2011 Methodology Report. The results in this report relate to responses given to questions q33 through to q62.

Figure 2: Questions asked for each room heated by main heating system and by supplementary heater(s)



Overall, 1,689 of the sampled households responded (of 2,616 in total) that they had one or more rooms that were not heated by the main heating. Of these, 416 of the sampled households had alternative heating of some kind in one or more rooms, with 101 of these reporting regular heating patterns for one or more heaters and 194 reporting irregular heating patterns for one or more heaters. In the ‘supplementary heating’ section, 1,241 of the sampled households were recorded as having supplementary heating in one or more rooms. Of these, 284 of the sampled households use supplementary heating at regular times for one or more heaters and 617 use it at irregular times for one or more heaters. As these sample totals illustrate, the sample sizes for particular groups of interest rapidly become quite small for these heating system types. These small sample sizes restrict the level of detail that can be presented in many areas.

All statistics in this report are written as ‘per household’ (for example ‘One or more alternative heaters per household’). This helps to define secondary heating characteristics at a household level, rather than on a ‘heater by heater’ or ‘room by room’ level. Also, room types have been grouped for analysis, as shown in Table 1. Kitchens and kitchen diners have been grouped as ‘kitchen’ and bathrooms with and without a WC have been grouped as ‘bathroom’. All multiple occurrences of a room type in a household have been grouped together as described above, to deal with information on a ‘house by house’ basis (e.g. ‘one or more bathrooms with no heating’).

Table 1: Grouping of room type for analysis

Raw data	Grouping for analysis
Kitchen (1-3)	Kitchen
Kitchen/diner (1-3)	
Living room (1-3)	Living room
Dining room (1-3)	Dining room
Combined living and bedroom (1-5)	Combined living and bedroom
Bedrooms (1-10)	Bedroom
Bathrooms with a WC (1-5)	Bathroom
Bathrooms without a WC (1-5)	
Separate WC (1-5)	Separate WC
Conservatories (1-3)	Conservatory
Hallways or landings (1-5)	Hallway or landing
Study (1-3)	Study
Other (1-5)	Study

Recoding of the responses from the heater type questions was undertaken for alternative heaters, and recoded into the general categories of ‘gas and solid’ and ‘electrical’ and ‘other’ as shown in Table 2. ‘Gas’ and ‘solid’ had to be combined due to small sample sizes for alternative heaters, but are treated as separate categories for supplementary heating.

Table 2: Grouping of heater type for analysis

Raw data	Grouping for analysis of alternative heaters	Grouping for analysis of supplementary heaters
Gas fire (mains gas)	Gas/solid combined	Gas
Gas fire (bottled gas)		
Electric heater (including electric towel rails and oil filled radiators)	Electric	Electric
Open fire burning coal/wood/smokeless	Gas/solid combined	Solid fuel
Enclosed fire or stove burning coal/wood/smokeless fuel		
Aga or Rayburn stove (any fuel)	Other	Other
Radiator connected to hot water system (not the central heating system)		
Other (specify)		

In conducting this analysis, derived variables have been produced for the analysis of secondary heating from the interview survey. The reported on and off times in each heating period for the supplementary or alternative heating system have been used to calculate the numbers of hours the system is on for each weekday and the weekend (i.e. subtracting the on-time from the off-time for each period provides the number of hours in each period). This has been done for households who use their alternative or supplementary heating in a regular manner (i.e. on regular times on regular days of the week), and for all supplementary and alternative heating systems in the home (in all rooms). Data at the room level were then aggregated together to give data at the dwelling level for reporting. In some analysis the data for regular heaters has been combined with the weekly estimate of irregular heaters (where this has been done it is specified in the text, table or figure). Heating season lengths have been calculated from the householders' responses to questions q38 (alternative heating) and q53 (supplementary heating) dealing with which months the household uses these heating systems on a daily basis.

## ***2.2 Data quality***

The raw outputs from the interview survey were generally complete and considered good quality. Occasional problems resulted from confusion with the 24-hour clock or random input errors. For these cases, the approach has been to 'correct' the data as it was usually obvious what the response should have been. This was carried out for <0.5% of raw survey cases.

It should also be remembered that the analysis presented in this report is based on householders' responses to questions rather than on data of actual appliance use. There is therefore an inherent problem in 'validating' the quality of this data. The fact that the data is reported, rather than directly monitored, should be considered when interpreting the results presented below.

## ***2.3 Weighting factors***

The EFUS data have been scaled up to represent the national population (and to correct for non-response) using weighting factors. The results presented in this report are therefore representative of the English housing stock, with a population of 21.9 million households. See section the EFUS 2011 Methodology report for further details of the weighting process.

### 3 Findings

The results of the analysis of the secondary heating data are presented in this chapter. Section 3.1 presents analysis of 'alternative heating'. Supplementary heating is then analysed in section 3.3. The findings presented in this report follow on from the findings on the extent of main heating use, presented in the EFUS 2011 Main Heating Systems report.

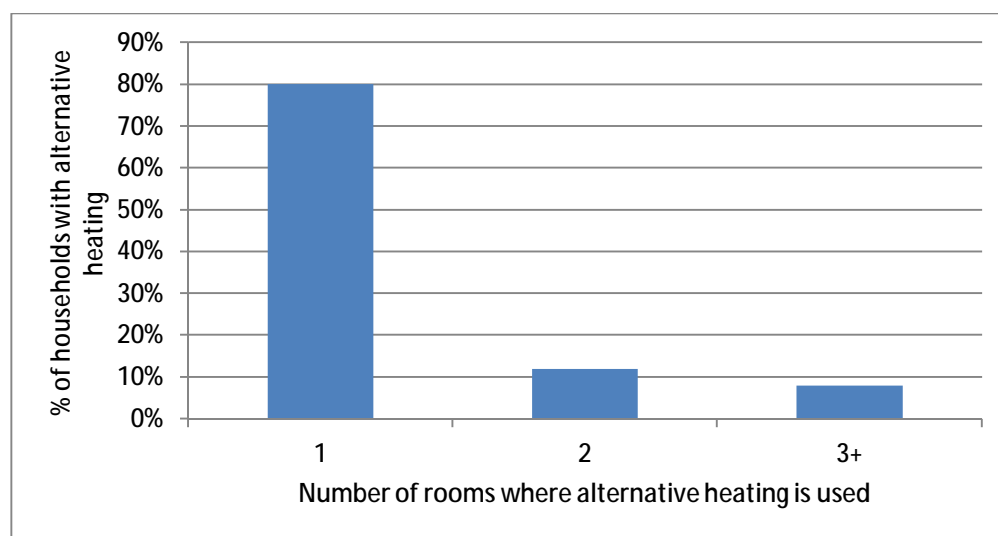
#### 3.1 Alternative heating

Alternative heating has been defined in the EFUS interview survey as heating that is used instead of the main heating in a room. This could be where the main heating is turned off or where the main heating does not extend into a particular room; e.g. a study room with no central heating radiators so the householder uses an electric heater to heat the room.

##### 3.1.1 Extent, location and type of alternative heating

Of the 65% of all households (equivalent to 14.3 million households) with one or more rooms not heated by the main heating, 26% (3.7 million households; approximately 17% of the total stock) use another form of heating, defined in this report as 'alternative heating', in one or more rooms. Typically, alternative heating is used in only one room per household (80% of households using alternative heating) (Figure 3).

Figure 3: Number of rooms in household heated by alternative heating



Base: All households in the EFUS Interview Survey using alternative heating in 1 or more rooms (n=416)

Table 3 shows the numbers and percentages of the various room types that are not heated by the main heating system and, of those not heated by the main heating system, the numbers and proportions using an alternative heating system. Although only a small percentage of households have living rooms not heated by the main heating system, a large percentage of these are instead heated by an alternative heater (65%, 0.5 million households), reflecting the importance of keeping the living room warm. Over half (57%) of conservatories not heated by the main system use an alternative heater; the nature of this heating is covered in the EFUS 2011 'Conservatories' report. Alternative heaters are also likely to be used in the bathroom (34% of that room type where main heating is not used) (Table 3).

Table 3: Number of households heated by alternative heating by room type

Households with one or more:	Households with at least one room of this type (000s)			Households with at least one room of this type not heated by main heating*			Households with alternative heating in at least one room of this type		
	Sample size	Number (000s)	(%)	Sample size	Number (000s)	(%)	Sample size	Number (000s)	% (of those not heated by main heating)
Kitchen	2589	21,694	99.1	566	4,822	22.2	89	773	16.0
Living Room	2573	21,512	98.3	98	837	3.9	66	543	64.8
Dining Room	953	8,403	38.4	68	592	7.0	20	*177	*29.8
Living/Bedroom	40	393	1.8	3	*28	7.2	3	*28	*100.0
Bedroom	2595	21,728	99.2	615	5,318	24.5	74	623	11.7
Bathroom	2602	21,775	99.5	311	2,631	12.1	104	887	33.7
Separate WC	1083	8,992	41.1	327	2,675	29.7	7	*53	*2.0
Conservatory	438 <sup>#</sup>	4,015 <sup>#</sup>	18.3 <sup>#</sup>	165	1,518	37.8	91	859	56.6
Hallway/Landing	2526	21,068	96.2	621	5,066	24.0	13	*101	*2.0
Study	365	3,300	15.1	44	414	12.5	17	*141	*34.1
'Other'	495	4,469	20.4	328	3,018	67.5	48	452	15.0

Base: All households in the EFUS Interview Survey (n=2616)

\*Including where main heating is reported to be turned off in that room

\*Sample responses are very small and subject to large sampling errors

# Conservatory presence uses response to q4 (presence of rooms).

The predominant type of alternative heater used is electric. Of households with an alternative heater, 74% use an electric alternative heater in one or more rooms, 16% use gas/solid fuel heaters and 16% use other types of heater. These categories are not mutually exclusive (i.e. each household could have more than one type of heater). The verbatim descriptions of 'other' heaters (12%) were mostly specified as descriptions that appear to represent electric heaters, but as some were unclear, the data remains marked as 'other' for further analysis. Households with more than one alternative heater are most likely to use more than one electric heater. A small number of households use a combination of different types of heaters, but the sample size is too small to comment on.

Table 4 shows the number and percentages of households with different main heating systems that have 1 or more rooms not heated using that main heating system (including rooms where a radiator or heater is turned off). 63% of households with central heating and approximately 90% of households with either storage heaters or room heaters have at least one room in which the main heating is turned off.

Table 4: Number of households, by main heating system type, having one or more rooms not heated using the main heating system.

Main Heating Type	Does the dwelling have one or more rooms not heated using the main heating system?	Sample size	Number of households (000s)	% of households
Central Heating system	No	896	7,341	37.3
	Yes	1460	12,350	62.7
	Total	2356	19,691	100.0
Storage radiators	No	25	*167	*11.5
	Yes	155	1,281	88.5
	Total	180	1,448	100.0
Room heaters	No	6	*72	*9.5
	Yes	74	683	90.5
	Total	80	754	100.0

Base: All households in the EFUS Interview Survey (n=2616). \*Sample responses are very small and subject to large sampling errors

Considering only the households with at least one room in which the main heating is turned off, Table 5 shows the numbers and percentages of those which use an alternative heating system in at least 1 or more rooms. Households using storage radiators as their main heating are most likely to use an alternative heater. Only 21% of the centrally heated households use an alternative heating system compared to 56% and 51% of the households with storage heaters or room heaters respectively.

Table 5: Number of households, by main heating system type, having one or more rooms not heated using the main heating system and which have one or more rooms heated by an alternative heating system.

Main Heating Type	Of those dwellings with one or more rooms not heated using the main heating system, does the dwelling use alternative heating in one or more rooms?	Sample size	Number of households (000s)	Percentage of households %
Central Heating system	No	1171	9,759	79.0
	Yes	289	2,591	21.0
	Total	1460	12,350	100.0
Storage radiators	No	66	560	43.7
	Yes	89	721	56.3
	Total	155	1,281	100.0
Room heaters	No	36	337	49.4
	Yes	38	346	50.6
	Total	74	683	100.0

Base: All households in the EFUS Interview Survey with 1 or more rooms not heated by the main heating system (n=1689).

The type of alternative heating used, for each main heating system type, is shown in Table 6. The predominant type of alternative heating, for all main heating types, is electric heaters. The final column of Table 6 shows the percentage of all households with each main heating system that use each type of alternative heater. Households using storage heaters as main heating and electric heaters as an alternative heater are the most likely combination of main and alternative heating systems (43% of households with storage heaters), following by households using room heaters as their main heating system and electric heaters as the alternative heating system.

Table 6: Main heating system type by alternative heater type<sup>+</sup>

Main Heating Type	Alternative Heating Type	Sample size	Households with one or more rooms not heated by main heating system and one or more rooms heated by alternative heating system		% of all households with this main heating type (n=2616)
			Number of hholds (000s)	%	
Central Heating system	One or more electric heaters	198	1,802	69.6	9.2
	One or more gas/solid heaters	54	450	17.4	2.3
	One or more 'other' heaters (inc Aga/Rayburn and radiator from hot water system)	51	454	17.5	2.3
Storage radiators	One or more electric heaters	76	626	86.7	43.2
	One or more gas/solid heaters	10	76	10.6	*5.3
	One or more 'other' heaters (inc Aga/Rayburn and radiator from hot water system)	10	70	9.7	*4.8
Room heaters	One or more electric heaters	34	285	82.5	37.8
	One or more gas/solid heaters	3	*52	*15.0	*6.9
	One or more 'other' heaters (inc Aga/Rayburn and radiator from hot water system)	6	*57	*16.5	*7.6
All main heating systems	One or more electric heaters	308	2,713	74.2	12.4
	One or more gas/solid heaters	67	578	15.8	2.6
	One or more 'other' heaters (inc Aga/Rayburn and radiator from hot water system)	67	581	581	2.7

Base: All households in the EFUS Interview Survey using alternative heating in 1 or more rooms (n=416).

\*Sample responses are very small and subject to large sampling errors

+ Percentages within each main heating system type may not add to 100% as households may appear in more than one alternative heating category for the same main heating type, as it is possible to have more than one type of alternative heater in the same household.

### 3.1.2 Heating season

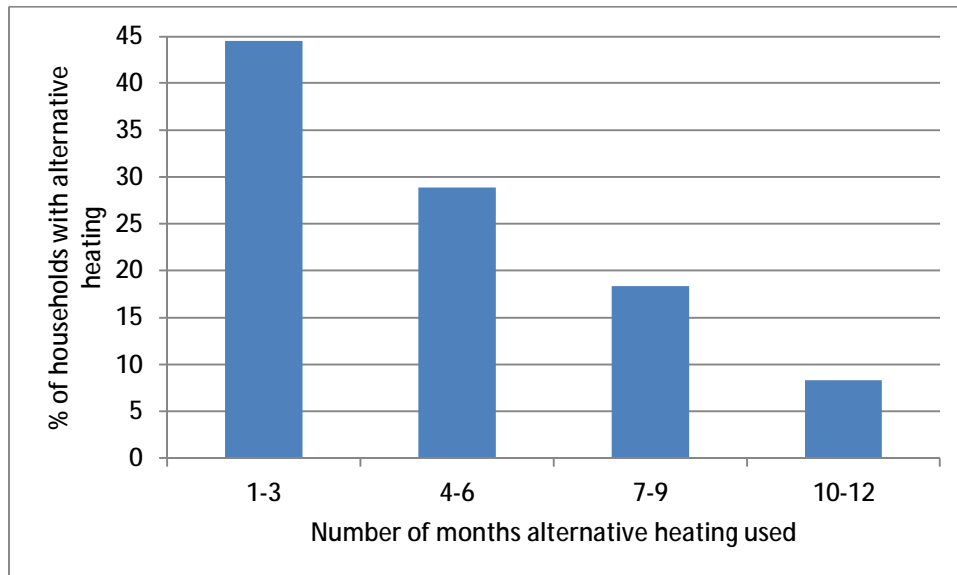
The mean length of heating season reported by householders for alternative heating is 4.6 months<sup>2</sup>, although as shown in Figure 4, a shorter heating season of 1-3 months is the most common (modal value = 1). Of the households that use an alternative heating system in 1 or more rooms, approximately 45% of them use an alternative heater in one or more rooms for 3 months or less

<sup>2</sup> The length of the heating season has been calculated as being from the middle of the reported start month to the middle of the reported end month e.g. if the householder reported that they turned it on in October and off in April then the heating season is 6 months. The uncertainty of this is +/- 1 month as the reality could be that the heating goes on at the beginning of October and off at the end of April, or vice versa.



during the year, 47% use an alternative heater in one or more rooms for 4-9 months of the year, and 9% use alternative heating for 10 or more months. Around 8% of households with alternative heating use it all year round, and in most cases this probably represents towel rails or fan heaters in bathrooms, although the sample sizes are too small to determine this with confidence.

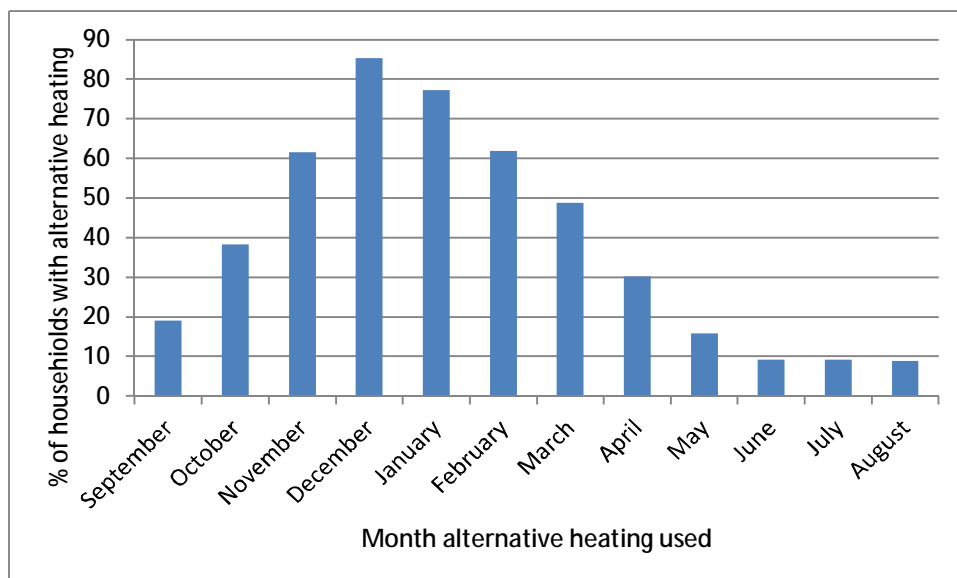
Figure 4: Length of alternative heater heating season (months)



Base: All households in the EFUS Interview Survey using alternative heating in one or more rooms (n=416).

Figure 5 shows the months for which occupants indicated that they used alternative heating. Usage of alternative heaters peaks in December with 85% of households with alternative heaters using them in this month, decreasing to fewer than 10% in the summer months, with the majority of these households being those that heat rooms in their home all year with alternative heaters.

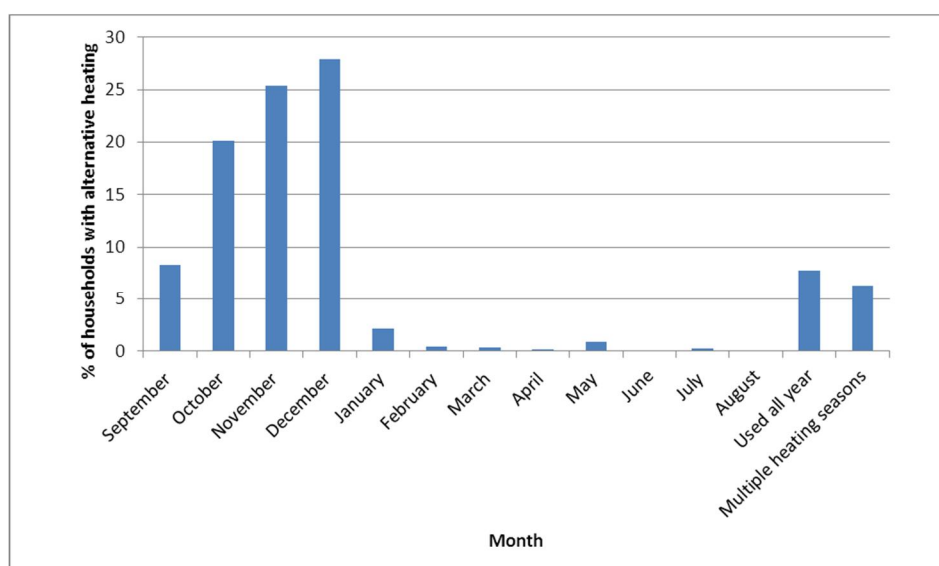
Figure 5: Months that alternative heating is used



Base: All households in the EFUS Interview Survey using alternative heating in one or more rooms (n=416).

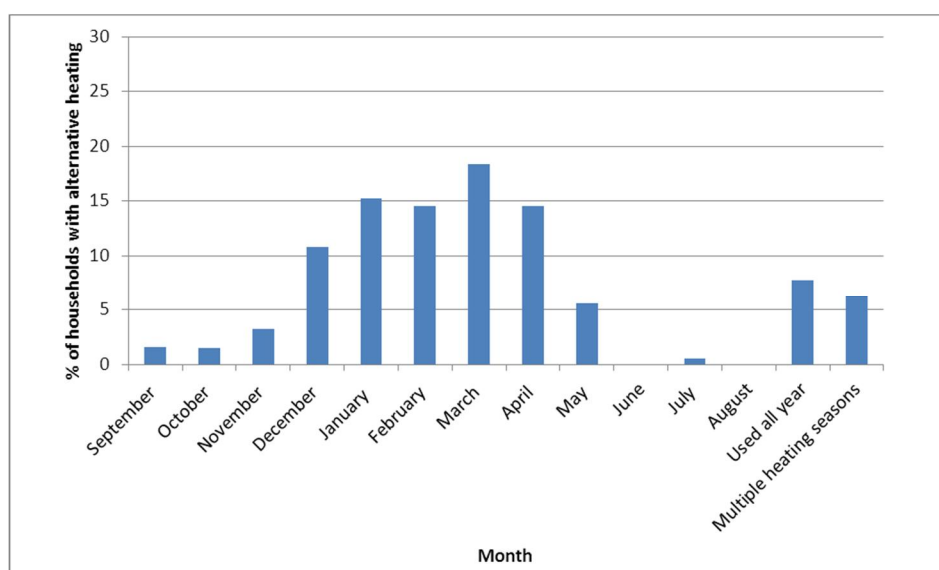
The majority of households start using their alternative heating between October and December (73%) (Figure 6). The end date for alternative heating is more variable, typically lying between December to April (Figure 7). Generally, the earlier the heating season starts, the greater number of months alternative heating is used. Approximately a quarter (27%) of households with alternative heaters start to use their heater in December, and heat for a short season (1-3 months). Around a third (24%) of households with alternative heaters start to use their heater earlier (October and November) and heat for an average length heating season (4-7 months).

Figure 6: Month alternative heating starts



Base: All households in the EFUS Interview Survey using alternative heating in one or more rooms (n=416). 'Multiple heating seasons' refers to households where alternative heating is used in non-consecutive months.

Figure 7: Month alternative heating ends



Base: All households in the EFUS Interview Survey using alternative heating in 1 or more rooms (n=416). 'Multiple heating seasons' refers to households where alternative heating is used in non-consecutive months.

The three most common periods to use alternative heating, each used by approximately 10% of households with these systems, are December only, November-March and December-January. Around 6% of households using an alternative heater use the alternative heating for more than one episode of heating per year (i.e. using their alternative heating in non-consecutive months). The sample size of this group is, however, too small to comment on in any greater detail.

### 3.1.3 Household heating patterns

Alternative heaters are used once a week or more often in 66% (2.4 million) of households with these heaters during their heating season. The remaining households (1.2 million) use alternative heaters less often.

The households that indicated that they use alternative heating 'every day' or 'more than once a week' were then asked about the frequency, timings and durations that they use the heater. Alternative heaters are used in a regular daily manner in one or more rooms in 29% (0.7 million) of these households; that is they turn their heaters on and off at set times of the day, although this pattern can change for different days of the week and at weekends. The majority of households which use alternative heaters once a week, or more often, do not heat using these systems in a regular daily manner: 65% (1.7 million) of these households do not heat in a regular daily manner in one or more rooms (referred to as 'irregular hours' below), and the remaining 5% (0.1 million) have a mixture of rooms heated both regularly and irregularly.

The following two sections look in more detail at those households that gave responses regarding heating hours which were collected for households heating more regularly than once per week. The first section looks at those reporting 'regular' heating hours in one or more rooms, and the second looks at those reporting 'irregular' heating hours in one or more rooms.

#### 3.1.3.1 Regular hours

Households that indicated using alternative heating for regular hours during their heating season were asked how many times their alternative heating comes on, on a typical Monday. The times that the heating was turned on and off, for each separate period, were recorded and from these responses the number of hours that the heating was on was calculated. A follow-up question asked if these timings changed on any other weekdays and at the weekends. Very few households (<1% of all households) with a regular heating pattern for these heater types reported that they changed the timings during the week (compared to a typical Monday). However, 23% of households with a regular pattern of alternative heating changed the timings at weekends. The analysis that follows therefore looks at the 'Weekday' heating pattern (based on the responses for a typical Monday), and a 'Weekend' heating pattern separately. Of these households that indicated regular hours, 10% responded 'Don't know' when asked what these hours were and are omitted from the following analysis.

It was not possible to create a 'timeframe' stereotype variable<sup>3</sup> to look at heating hours (as undertaken for the report on the main heating system), due to the sample size restrictions. However, the averages and distributions of heating hours have been analysed to inform questions

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<sup>3</sup> This is based on the duration and start times of each heating period. See the EFUS 2011 Main Heating report for further details.

relating to hours used. The start times for each period have been used to create a 'time on' stereotype following the criteria set out in Table 7.

Table 7: 'Time on' stereotype categories

'Time On'	
§	Wake up (0500-0800)
§	Daytime (0801-1459)
§	Home time (1500-1900)
§	Evening/Night (1901-0459)

### Weekday:

On a typical weekday, households with rooms heated at regular times and on regular days, use alternative heaters for six hours per heater per day on average (median). This indicates that, when it is used, alternative heating contributes considerably to the overall heating in specific rooms of the house. However, the length of time varies considerably, ranging from 0.25 to 24 hours per day, although the distribution is greatly skewed toward the lower end of this range.

Heating hours are most usually spread across one or two heating periods per day. Of the households (0.7 million) using alternative heating regularly, 53% use it for only one period per day per dwelling and 33% (0.25 million) households use alternative heating for two heating periods per day per dwelling. Those households using an alternative heater for a single period tend to use alternative heaters for slightly longer - a total of 6 hours per heater per day (median), compared to 5 hours per heater per day (median) for those using their heaters for two separate periods.

Approximately 47% of these households use their alternative heaters in the 'wake up' period (0500-0800), and 56% in the 'hometime' period (1500-1900). Very few use alternative heaters at other times of the day. Those households using their alternative heater for more than a single period tend to do so during both the 'wake up' and 'hometime' periods.

### Weekend:

The following analysis considers weekend timings. This section includes all weekend timings, including those that were reported to be the same as weekdays to allow the sample size to be sufficient to analyse.

During a typical weekend, households with rooms heated at regular times and on regular days use alternative heaters for 6 hours per heater per day on average (median); but the range of timings is large ranging from 0.25 to 24 hours per day, although the distribution is greatly skewed toward the lower end of this range.

Similarly to weekdays, alternative heating hours at the weekend are most usually in one or two heating periods per day. Households using an alternative heater for one period on average use alternative heaters for a total of 7 hours per heater per day (median), compared to 6 hours per heater per day (median) for those using their heaters for two separate periods. These heating lengths are slightly longer (around 1 hour) than the equivalents for usage of alternative heating at weekdays.

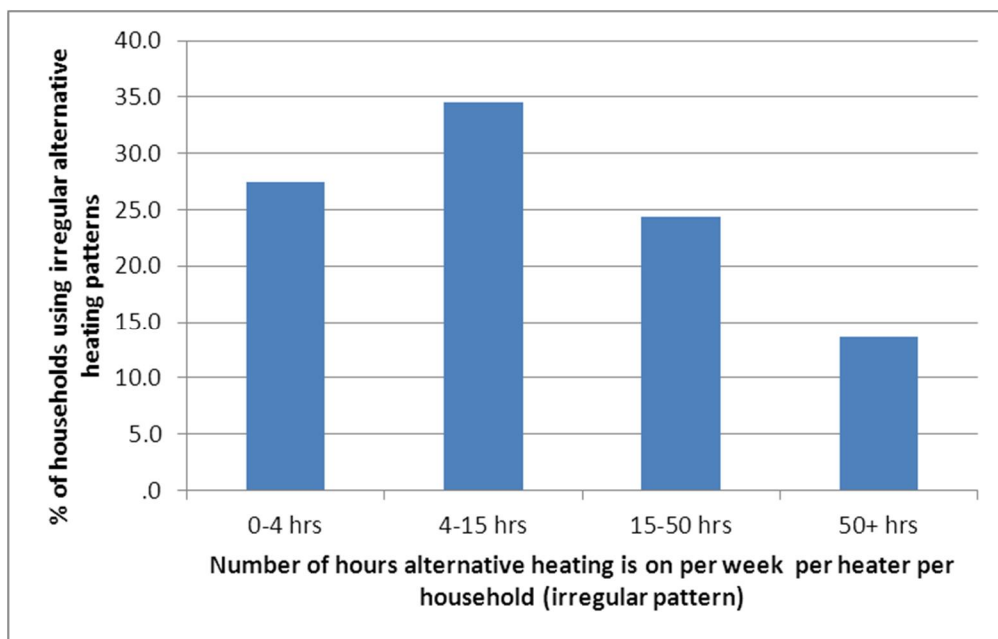
At the weekend, 34 % of households with a regular heating pattern for alternative heaters use these systems in the 'wake up' period (0500-0800), and 53 % in the 'hometime' period (1500-1900).

In summary, the conclusions that can be drawn from data on regular heating suggest that when a household uses alternative heaters with regular time periods, they are most likely to use them for around 6 hours per day (although variation in these hours is large), split across a 'wake up' time and a 'home time' period. Patterns do not change significantly between weekdays and weekends, although the heating period length is slightly (around 1 hour) longer at the weekend.

### 3.1.3.2 Irregular hours

65% of households (1.7 million) that report using alternative heaters in one or more rooms at least once per week indicate that they use this heating in an irregular daily manner. The sample of these households were then asked how many hours they use the heater in a typical week (as opposed to the daily patterns reported for those heating in a regular manner). The median total heating time per week reported for alternative heaters per dwelling use in an irregular fashion is 10 hours per heater, equivalent to 1.4 hours per day. Figure 8 shows the distribution of usage for heaters used 'irregularly' (average of all heaters in household). Irregular heating is reported for relatively short periods per week (62% indicate using for 15 hours or less per week).

Figure 8: Distribution of irregular alternative heating hours per week (average of all heaters in household)



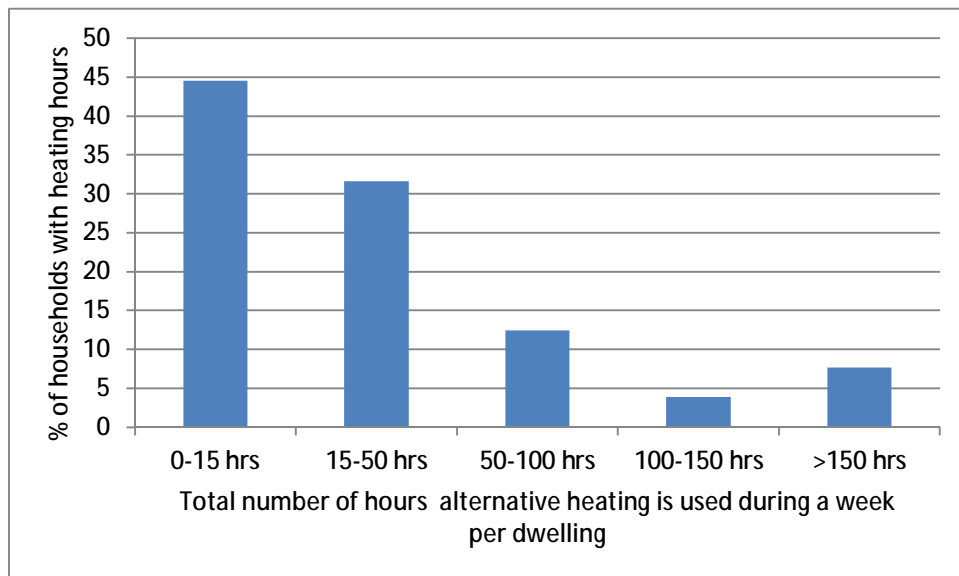
Base: All households in the EFUS Interview Survey using alternative heating 'irregularly' (n=180).

### 3.1.3.3 Summary of total hours alternative heating is used

Considering all households that use alternative heating at least once per week it is clear that those that heat with a regular pattern report considerably greater levels of use than those that heat in an irregular daily manner over the week. Figure 9 shows the total number of hours from alternative heating per week (including all regular and irregular hours reported). On average, households that use alternative heating tend to use it for 17.5 hours per week (median) per heater during their heating season. Slightly fewer than 50% of these households use alternative heating for less than 15

hours per week per heater. It should be noted that these results do not include those households that responded that they use their alternative heaters “less than once a week”.

Figure 9: Total weekly hours from alternative heating (of all using alternative heating at least once per week)

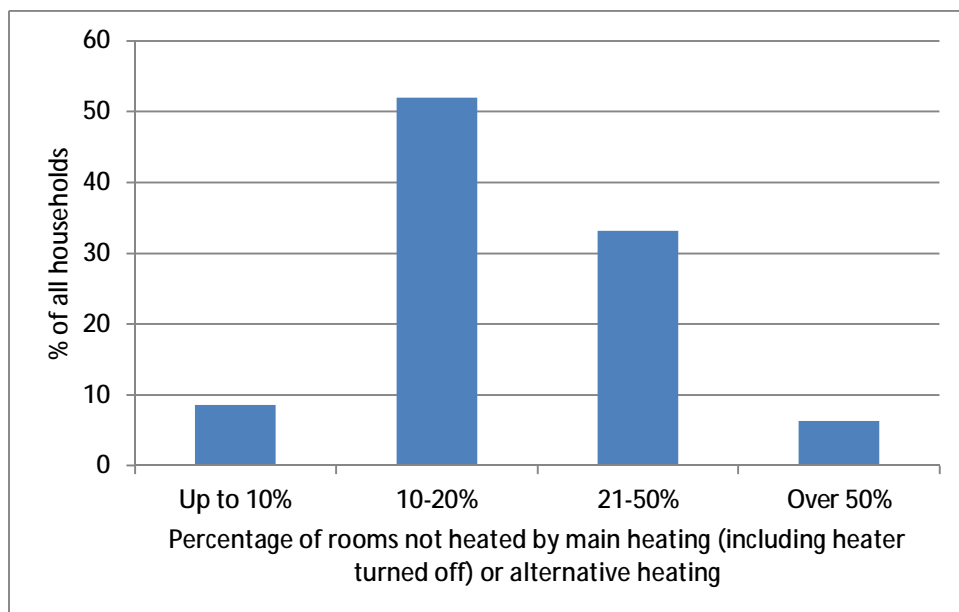


Base: All households in the EFUS Interview Survey using alternative heating in 1 or more rooms (n=416).

### 3.2 Unheated rooms

No heating is provided from the main or alternative heating system (including main heating turned off) in one or more rooms in 48% (equivalent to 10.6 million) of all households. Of these, 60% (6.4 million) households reported less than a fifth of all rooms in the dwelling were unheated (Figure 10).

Figure 10: Percentage of rooms that are not heated (including main heating turned off)



Base: All households in the EFUS Interview Survey with 1 or more rooms not heated by either the main or an alternative heating system (n=1273).

Table 8 shows the type of rooms that households reported not being heated by the main or alternative heating system. Rooms of secondary usage are more likely to be unheated. For example, circulation spaces, WCs and 'other' rooms (which include rooms such as utilities etc.) are much more likely to be unheated than other types of rooms. Approximately 23% of households with at least one bedroom have one or more bedrooms that are not heated by the main or alternative heating system. Only a very small percentage of households (1.4%) have a living room that is not heated, reflecting the importance of this room to households.

Table 8: Type of room reported by households as not being heated by the main or alternative heating systems

<i>Type of room reported by households as not being heated by the main or alternative heating systems</i>	<i>Sample size</i>	<i>Number of households (000s)</i>	<i>% (of type of room)</i>	
<i>One or more kitchens not heated?</i>	<i>Yes</i>	<i>477</i>	<i>4,049</i>	<i>18.7</i>
	<i>No</i>	<i>2112</i>	<i>17,644</i>	<i>81.3</i>
	<i>Total households with one or more kitchens</i>	<i>2589</i>	<i>21,694</i>	<i>100.0</i>
<i>One or more living rooms not heated</i>	<i>Yes</i>	<i>32</i>	<i>295</i>	<i>1.4</i>
	<i>No</i>	<i>2541</i>	<i>21,217</i>	<i>98.6</i>
	<i>Total households with one or more living rooms</i>	<i>2573</i>	<i>21,512</i>	<i>100.0</i>
<i>One or more dining rooms not heated</i>	<i>Yes</i>	<i>48</i>	<i>416</i>	<i>4.9</i>
	<i>No</i>	<i>905</i>	<i>7,987</i>	<i>95.1</i>
	<i>Total households with one or more dining rooms</i>	<i>953</i>	<i>8,403</i>	<i>100.0</i>
<i>One or more living/bedrooms not heated</i>	<i>Yes</i>	<i>0</i>	<i>**</i>	<i>**</i>
	<i>No</i>	<i>40</i>	<i>*393</i>	<i>*100.0</i>
	<i>Total households with one or more living/bedrooms</i>	<i>40</i>	<i>*393</i>	<i>*100.0</i>
<i>One or more bedrooms not heated</i>	<i>Yes</i>	<i>569</i>	<i>4,925</i>	<i>22.7</i>
	<i>No</i>	<i>2026</i>	<i>16,803</i>	<i>77.3</i>
	<i>Total households with one or more bedrooms</i>	<i>2595</i>	<i>21,728</i>	<i>100.0</i>
<i>One or more bathrooms not heated</i>	<i>Yes</i>	<i>208</i>	<i>1,751</i>	<i>8.0</i>
	<i>No</i>	<i>2394</i>	<i>20,024</i>	<i>92.0</i>
	<i>Total households with one or more bathrooms</i>	<i>2602</i>	<i>21,775</i>	<i>100.0</i>
<i>One or more WC's not heated</i>	<i>Yes</i>	<i>322</i>	<i>2,635</i>	<i>29.3</i>
	<i>No</i>	<i>761</i>	<i>6,357</i>	<i>70.7</i>
	<i>Total households with one or more WCs</i>	<i>1083</i>	<i>8,992</i>	<i>100.0</i>
<i>One or more conservatories not heated #</i>	<i>Yes</i>	<i>74</i>	<i>*660</i>	<i>*16.4</i>
	<i>No</i>	<i>364</i>	<i>3,356</i>	<i>83.6</i>
	<i>Total households with one or more conservatories</i>	<i>438</i>	<i>4,015</i>	<i>100.0</i>
<i>One or more hallway/landings not heated</i>	<i>Yes</i>	<i>614</i>	<i>5,015</i>	<i>23.8</i>
	<i>No</i>	<i>1912</i>	<i>16,054</i>	<i>76.2</i>
	<i>Total households with one or more hallways</i>	<i>2526</i>	<i>21,068</i>	<i>100.0</i>

<i>One or more studies not heated</i>	Yes	27	*272	*8.3
	No	338	3,027	91.7
	<i>Total households with one or more studies</i>	365	3,300	100.0
<i>One or more other' rooms not heated</i>	Yes	291	2,674	59.8
	No	204	1,795	40.2
	<i>Total households with one or more 'other' rooms</i>	495	4,469	100.0

Base: All households in the EFUS Interview Survey (n=2616).

\*Sample responses are very small and subject to large sampling errors

\*\* Within the sample there were no responses for this combination but this is not necessarily true for the population. The probability of this combination occurring in the population is likely to be <0.5%.

# Conservatory presence uses response to q4 (presence of rooms)

Table 9 shows the reasons why households reported that they do not heat specific rooms. The most common responses were that the room was warm enough already (41% of households), the room did not have a heater (36% of households) or that the room did not need a heater as the room was not used (33% of households). Only 5.2% of households reported that they did not heat a room due to expense.

Table 9: Reasons why households reported they do not heat specific rooms

<i>One or more rooms not heated because...</i>	<i>Number of households reporting one or more rooms not heated (000s)</i>	<i>% of households reporting one or more rooms not heated</i>
<i>Too expensive</i>	516	4.8
<i>Room stays warm enough already</i>	4,130	38.8
<i>Room not used/hardly ever used</i>	3,335	31.3
<i>No heating system in place</i>	3,772	35.4
<i>Heating system doesn't work</i>	306	2.9
<i>Room too small to require heating</i>	2,626	24.6
<i>Room too small to fit a heater inside</i>	680	6.4
<i>Other Specify</i>	1,420	13.3

Base: All households in the EFUS Interview Survey not heating 1 or more rooms with either the main heating system or an alternative heating system (n=1273).

Most of the 13% of households with unheated rooms who responded 'Other -Specify' gave verbatim answers that would fit into the categories given above in Table 9, but have been treated separately to give some extra insight into why households choose not to heat rooms. The most common reasons given here can be grouped into four main areas (most common first):

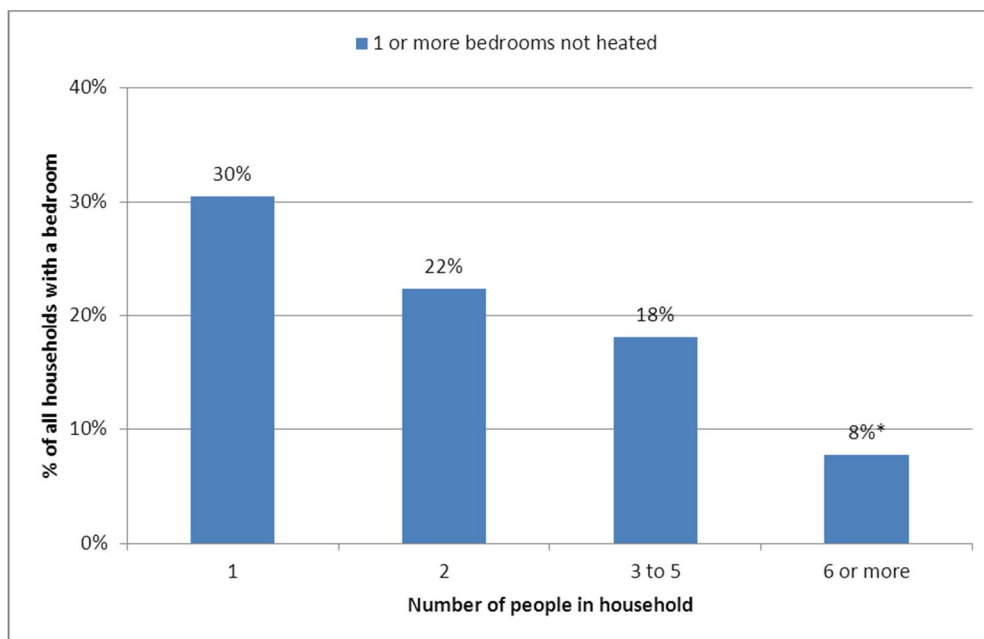
- § Personal Preference: A large proportion of responses in this category were personal preferences for a cooler room mostly relating to the bedroom, such as '*I don't like heated bedrooms*', '*I don't believe in warm bedrooms*' or '*don't heat due to medical reasons*'.
- § Other non-heater heat source: A large number of responses reported some other source of heat in a room which meant that heating was unnecessary, such as '*boiler and tank in this room*', '*gets heat from downstairs*' or '*heats when cooker is used*'.



- § Room not used: A number of respondents reported that heaters were not needed as the room was either not used or used for only very short periods. Typical responses were *'just spare room'*, *'don't use it in winter'*, and *'not in there long'*.
- § Practical reasons: A small proportion of responses were for practical reasons such as *'Because the fridge freezer is located right next to the radiator'*.

There is a clear correlation between household size and propensity to leave one or more bedrooms unheated. The data suggests that there may be 5 million households are not heating one or more bedrooms. Figure 11 shows that 30% of people that live alone do not heat one or more bedrooms, and this percentage decreases with increasing number of people in the household.

Figure 11: Whether a household heats the bedroom by size of household



Base: All households in the EFUS Interview Survey with 1 or more bedrooms in the dwelling (n=2595).

\*Sample responses are very small and subject to large sampling errors

Table 10 provides the reported reasons for not heating one or more bedroom. Over 50% of households in this group give the reason that the 'room is not used/hardly ever used' for not heating it. Fewer than 10% of households who were not heating one or more bedrooms reported that there was 'no heating system in place'.

Table 10 Reasons why households reported they do not heat bedrooms

1 or more bedrooms not heated because...	Sample size	Number (000s)	% (of those with no heat from main or alt)
Too expensive	50	410	8.3
Room stays warm enough already	257	2,156	43.8
Room not used/hardly ever used	324	2,893	58.7
No heating system in place	152	1,442	29.3
Heating system doesn't work	18	*210	*4.3
Room too small to require heating	90	833	16.9
Room too small to fit a heater inside	21	*184	*3.7
Other Specify	115	935	19.0

*Base: All households in the EFUS Interview Survey with 1 or more bedrooms unheated by main or alternative heating system (n=569).*

*\*Sample responses are very small and subject to large sampling errors*

### 3.3 Supplementary heating

Supplementary heating has been defined in the Energy Follow-Up Survey as a type of secondary heating that is used *in addition* to main heating in a room. For example an electric heater in a living room that is mainly heated by a central heating radiator.

#### 3.3.1 Extent, type and location of supplementary heating

Close to half of the population (48%; 10.5 million households) indicated that they have supplementary heating in one or more rooms. A very small proportion (1%) of these households reported that they did not actually use these supplementary heaters. Approximately 79% of households using supplementary heating use it in only one room per dwelling, with a further 17% using it in two rooms per dwelling. In terms of the proportion of the dwelling in which supplementary heating is used, the majority of households using supplementary heating (88%) report that it is used in less than 20% of all rooms in the dwelling ( Table 11).

Table 11: Percentage of rooms heated by supplementary heating per household

Percentage (%) of rooms heated by supplementary heating	Percentage (%) of households using supplementary heating
10%	32.0
10-20%	56.3
20-50%	11.5
50% +	0.2

Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241)

Supplementary heating is most commonly used in living rooms. Of households with supplementary heating, 83% use it in living rooms and 12% in bedrooms (use in any other type of room is rare).

Gas and electric supplementary heaters dominate the systems in use. 46% use an electric supplementary heater in one or more rooms, 41% use mains gas heater, 12% use open fires burning coal/wood/smokeless fuel and 4% use 'other'<sup>4</sup> heaters.

Supplementary heaters are more likely to be used in conjunction with central heating systems or storage heaters (49% and 45% of the respective main heating types), than in conjunction with room heaters (20%) (Table 12). The combinations of main heating system and supplementary heater types are shown in Table 13.

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<sup>4</sup> Upon further review of the households who indicated that they use 'other' heaters (4%), it was observed that a major proportion of these appear to be electric however as this is uncertain, they have been left as 'other' for the purpose of analysis.

Table 12: Households using a supplementary heater in one or more rooms by type of main heating system

Main Heating Type	Does the dwelling use supplementary heating in 1 or more rooms?	Sample size	Number of hholds (000s)	% of households with each main heating type
Central Heating system	No	1218	10,133	51.5
	Yes	1138	9,558	48.5
	Total	2356	19,691	100.0
Storage radiators	No	95	794	54.8
	Yes	85	654	45.2
	Total	180	1,448	100.0
Room heaters	No	62	605	80.2
	Yes	18	149	19.8
	Total	80	754	100.0

Base: All households in the EFUS Interview Survey (n=2616).

Table 13: Type of supplementary heater used by main heating system type

Main heating system	Supplementary heating system <sup>+</sup>	Sample size	Number of households (000s)	% of households within each main heating type that use supplementary heaters <sup>+</sup>
Central Heating system	One or more electric heaters	493	4,197	43.9
	One or more gas heaters	529	4,274	44.7
	One or more solid heaters	191	1,710	17.9
	One or more 'other' heaters	53	451	4.7
Storage radiators	One or more electric heaters	64	511	78.2
	One or more gas heaters	10	*65	*9.9
	One or more solid heaters	8	*67	*10.3
	One or more 'other' heaters	6	*38	*5.9
Room heaters	One or more electric heaters	13	*94	*62.8
	One or more gas heaters	3	*33	*22.2
	One or more solid heaters	1	*18	*11.8
	One or more 'other' heaters	2	*12	*8.4
All main heating systems	One or more electric heaters	570	4,803	21.9
	One or more gas heaters	542	4,372	20.0
	One or more solid heaters	200	1,795	8.2
	One or more 'other' heaters	61	502	2.3

Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

\*Sample responses are very small and subject to large sampling errors

+ note that households may appear in more than one supplementary heating type for the same main heating type, as it is possible to have more than one type of supplementary heater in the same household. Therefore percentages may sum to greater than 100%.

### 3.3.2 Characteristics of households using supplementary heating

The variation in the percentage of households using supplementary heating in one or more rooms within the categories of different dwelling and household groups is shown in Table 14 and Table 15. The 95% confidence intervals of the percentages show the significance of the differences across categories. Detailed descriptions of the variables used or derived from the EHS and EFUS data can be found in the Glossary.

Table 14: Percentage (and 95% confidence intervals) of households within various dwelling characteristic groups using supplementary heating

Dwelling characteristic	Characteristic category	Sample size	% of characteristic category using supplementary heating	95% CI
Dwelling type	End terrace	274	44	(37.1, 50)
	Mid terrace	478	45	(40, 49.8)
	Semi detached	715	51	(47.4, 55.4)
	Detached	419	63	(57.5, 67.7)
	Bungalow	244	60	(53.1, 66.6)
	Flat	486	27	(22.5, 31.1)
Dwelling type	House or bungalow	2130	52	(49.7, 54.4)
Dwelling type	Flat	486	27	(22.5, 31.1)
Dwelling Age	Pre 1919	488	54	(48.7, 58.4)
	1919-1944	423	50	(44.8, 55.3)
	1945-1964	600	50	(45.5, 54.3)
	1965-1974	404	43	(37.8, 48.4)
	1975-1980	185	39	(31, 46.4)
	1981-1990	219	49	(41.6, 56.1)
	Post 1990	297	36	(30.5, 42.5)
Useable floor area	< 50 m <sup>2</sup>	313	31	(25.1, 36.4)
	50 to 69 m <sup>2</sup>	654	38	(34.1, 42.3)
	70 to 89 m <sup>2</sup>	744	48	(44, 51.9)
	90 to 109 m <sup>2</sup>	344	51	(45.3, 57)
	110 to 139 m <sup>2</sup>	261	59	(52.7, 65.8)
	≤140 m <sup>2</sup>	300	64	(58.2, 70.1)
Region - EHS order	North East	168	49	(40.5, 57.1)
	North West	419	54	(48.3, 58.8)
	Yorkshire and the Humber	342	54	(47.7, 59.4)
	East Midlands	216	49	(41.2, 55.9)
	West Midlands	237	52	(45.5, 59.5)
	East	311	51	(44.7, 57)
	London	268	28	(22, 33.8)
	South East	375	43	(37.5, 48.5)
	South West	280	53	(46.2, 59.1)
Is dwelling in an urban or rural location?	Urban	2356	46	(43.5, 47.9)
	Rural	260	62	(55.7, 68.7)
Type of heating system	Central Heating	2356	49	(46.3, 50.8)
	Non-Central Heating	260	36	(30, 42.9)
Main fuel	Mains gas	2173	47	(45.1, 49.7)
	Electricity	247	41	(34.1, 47.5)
	Other (bottled/bulk gas, solid, oil, community scheme)	196	55	(47.6, 62.9)

Are the walls of the dwelling insulated?	Insulated	1122	48	(44.8, 51.2)
	Not insulated	1494	47	(44.1, 49.7)
Loft insulation	<50mm	177	46	(37.9, 54.1)
	50-149mm	1038	50	(46.8, 53.5)
	150+ mm	1083	51	(47.8, 54.4)
Is dwelling fully double glazed?	Yes	2005	44	(41.6, 46.4)
	No	611	57	(52.7, 61.3)
How many insulation measures does the dwelling have?	All 3 insulation measures	397	50	(44.9, 55.7)
	2 insulation measures	317	58	(51.6, 63.6)
	1 insulation measure	397	50	(44.9, 55.7)
	No insulation measures	751	48	(44.1, 52)
Energy efficiency (SAP09) rating	less than 30	833	49	(45.1, 52.6)
	30 to 50	317	58	(51.6, 63.6)
	51 to 70	83	48	(35.7, 59.3)
	more than 70	597	55	(50.5, 59.3)

Base: All households in the EFUS Interview Survey (n=2616).

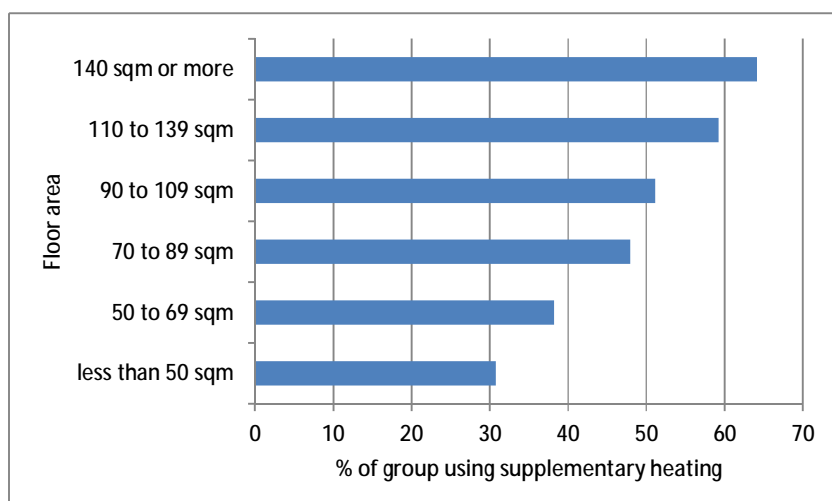
Households living in flats are less likely to use supplementary heating than households living in any other dwelling type; conversely households living in detached houses are more likely to use supplementary heating than households in all other types with the exception of bungalows.

In terms of dwelling age, households living in pre-1919 dwellings are more likely to use supplementary heating than households in dwellings built 1965-1980 and post-1990; households in the newest properties are less likely to use supplementary heating than those in homes built before 1965. This may be due to the differences in insulation levels and heating systems in newer dwellings. 36% of households living in dwellings built after 1990 use supplementary heating, much lower than the levels reported in pre 1919 dwellings (54%).

The likelihood of supplementary heating being used increases with increasing floor area (Figure 12). Households in the largest dwellings (>140m<sup>2</sup>) are significantly more likely to use supplementary heating than dwellings smaller than 109m<sup>2</sup>. Households living in dwellings in London are significantly less likely to use supplementary heating than those in any other region bar the South-East; as are households in rural areas compared to those in urban areas.

As already seen in Table 12, households using room heaters as their main heating system are significantly less likely to use supplementary heating than households with either central heating systems or storage heaters and households using oil as their main fuel are most likely to use supplementary heaters compared to other fuel types. In terms of the energy efficiency characteristics of the dwelling, households that are fully double glazed are less likely to use these types of systems than those that are not (44% and 57% respectively).

Figure 12: Use of supplementary heating by floor area



Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

Table 15: Percentage (and 95% confidence intervals) of households within various household characteristic groups using supplementary heating

		Sample size	% of characteristic category using supplementary heating	95% CI
Tenure	Owner Occupied	1486	53	(50.5, 56.1)
	Private rented	385	37	(31.8, 42.5)
	Local Authority	405	35	(30.2, 40.4)
	RSL	340	35	(29.2, 40.4)
Household size	1	734	46	(42, 49.9)
	2	907	51	(47.5, 54.7)
	3	424	47	(41.6, 52)
	4	365	45	(39.9, 51.1)
	5 or more	186	38	(30.3, 45.7)
Pensioner Present?	At least one person of pensionable age	942	53	(49.9, 56.9)
	No persons of pensionable age	1674	44	(41.6, 46.9)
Children Present?	At least one child	807	43	(39.2, 46.7)
	No children	1809	49	(46.7, 51.7)
Age of HRP	16 - 34	395	40	(34.4, 45)
	35 - 44	477	39	(33.8, 43.4)
	45 - 54	524	49	(44.5, 53.9)
	55 - 64	494	53	(48.5, 58.2)
	65 - 74	426	52	(46.7, 57.2)
	75 or more	300	53	(47.3, 59.7)
Employment status of HRP and partner combined	1 or more work full time	1267	46	(43.2, 49.2)
	1 or more work part time	229	48	(41.2, 55.4)
	none working, one or more retired	774	52	(47.9, 55.6)
	none working and none retired	346	41	(35.7, 47.1)

Annual gross income of the HRP and partner weighted quintiles	1st quintile (lowest)	611	44	(39.7, 48.3)
	2nd quintile	578	45	(40.8, 49.7)
	3rd quintile	499	46	(40.8, 50.5)
	4th quintile	471	46	(40.6, 50.5)
	5th quintile (highest)	457	56	(51.2, 61.2)
Is anyone in the household at home during the day on a weekday?	No	1012	46	(42.8, 49.6)
	Yes	1604	48	(45.5, 50.9)
Under-occupying?	Not under-occupying	1806	42	(39.1, 44.1)
	Under-occupying	810	59	(55.3, 62.8)
In Fuel Poverty? LHC definition	Not in fuel poverty	2351	47	(45, 49.4)
	In fuel poverty	265	48	(41.8, 55.1)

Base: All households in

the EFUS Interview Survey (n=2616).

In terms of the characteristics of the households living in the dwellings, several groups can be identified that are more likely to use supplementary heating than their counterpart groups.

In particular, owner occupiers are more likely to use supplementary heating compared to any other tenure; as are households with at least one pensioner present compared to those without; households in the highest income quintile compared to all lower quintiles and households classified as 'under-occupying' their home compared to those that are not.

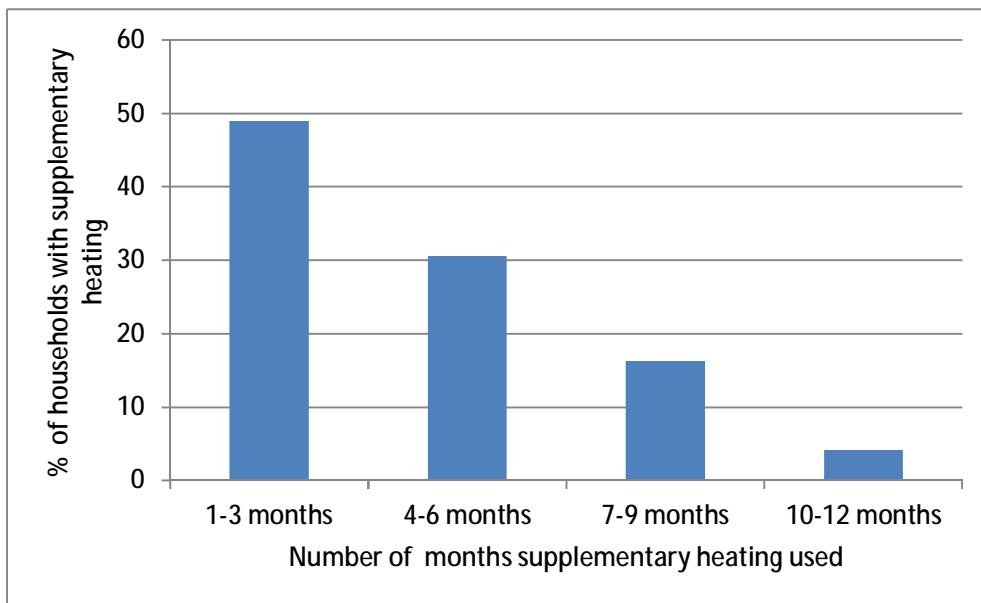
### 3.3.2 Heating season

The average length of heating season reported for supplementary heating per household is around 4.2 months (mean)<sup>5</sup>. Close to half of all households that use a supplementary heater do so in one or more rooms for 3 months or less during the year, 39% use a supplementary heater in one or more rooms for 4-7 months of the year, and 12% use supplementary heating for 8 or more months (Figure 13). Only 3% of households with supplementary heating use it all year round. Of the households who use supplementary heating all year round, 81% use it to heat their living rooms.

<sup>5</sup> The length of the heating season has been calculated as being from the middle of the reported start month to the middle of the reported end month e.g. if the householder reported that they turned it on in October and off in April then the heating season is 6 months. The uncertainty of this is +/- 1 month as the reality could be that the heating goes on at the beginning of October and off at the end of April, or vice versa.



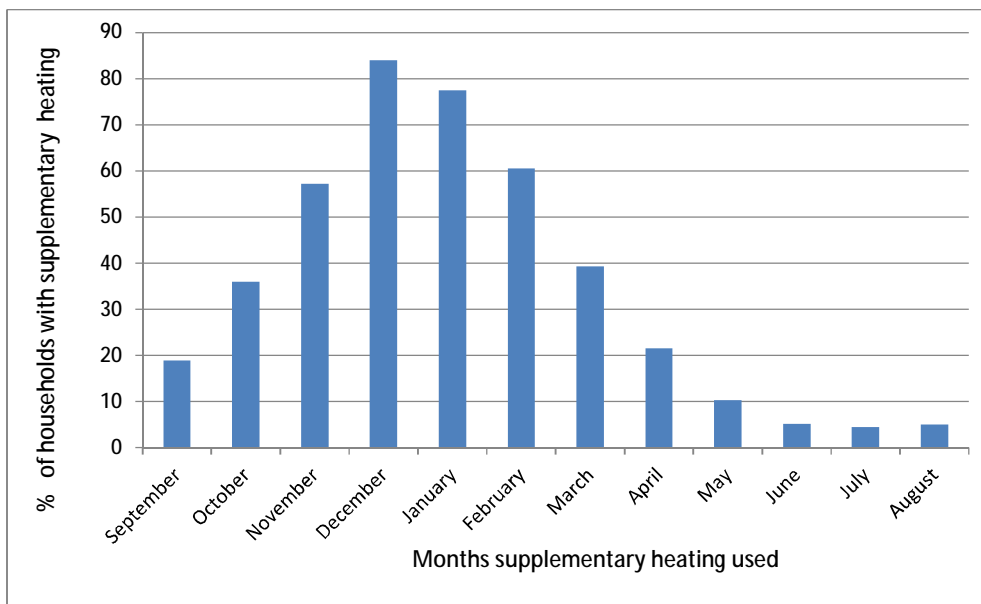
Figure 13: Length of supplementary heater heating season (months)



Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

The use of supplementary heating peaks in December with 84% of households that use supplementary heaters reporting using it in this month (Figure 14). This decreases to fewer than 10% in the summer months, with the majority of these households being those that heat rooms in their home all year with supplementary heaters.

Figure 14: Months that supplementary heating is used

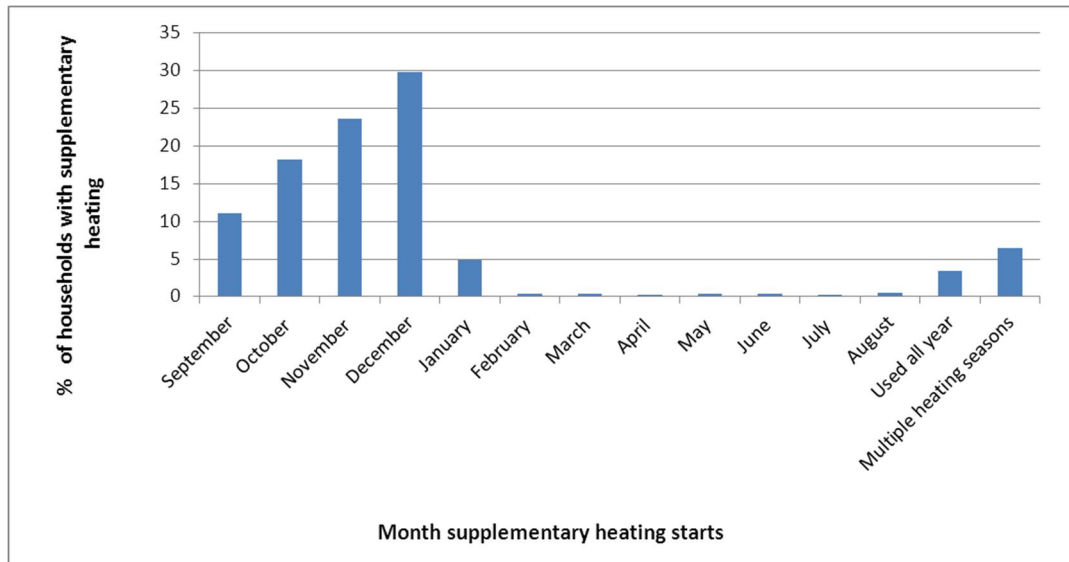


Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

The majority (72%) of households start using their supplementary heating between October and December (Figure 15). The end of the heating season for these systems is more variable, ranging

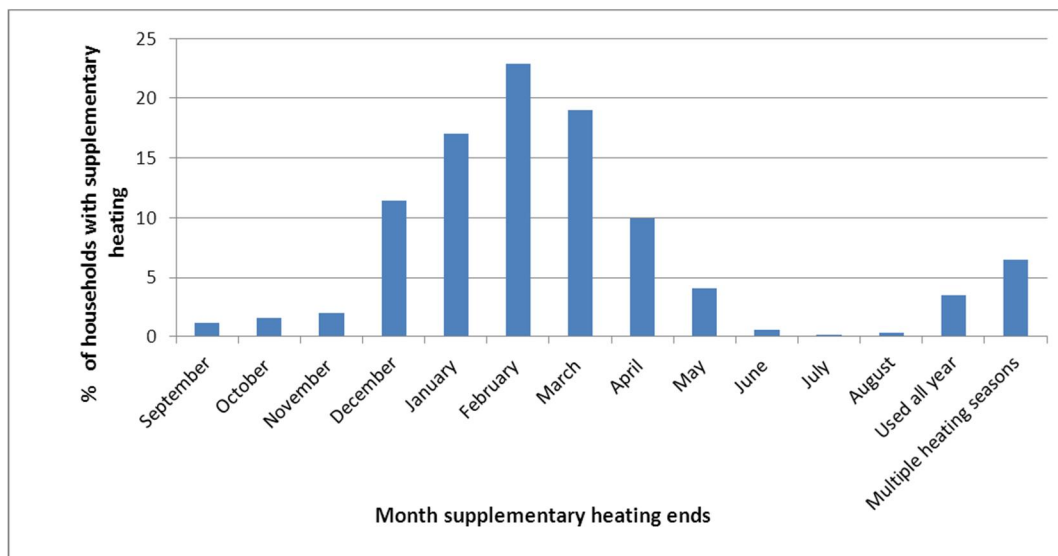
typically from December to April (Figure 16). The ‘start’ and ‘end’ yearly heating pattern found in supplementary heating (Figure 15 and Figure 16) is very similar to the pattern found in alternative heating (Figure 6 and Figure 7).

Figure 15: Month supplementary heating starts



Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241). ‘Multiple heating seasons’ refers to households where alternative heating is used in non-consecutive months.

Figure 16: Month supplementary heating ends



Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241). ‘Multiple heating seasons’ refers to households where alternative heating is used in non-consecutive months.

There are four common heating seasons which each account for about 8 -10% of households with supplementary heating. These are:

- December-January
- November-February

- December only
- December-February

Approximately 7% of households with supplementary heating use it for more than one heating period per year, i.e. they use their supplementary heating in non-consecutive months.

### 3.3.3 Household heating patterns

The majority of households that use supplementary heating do so relatively often. Some 69% (7.1 million) of households using supplementary heaters use them at least once a week during their heating season. Others with supplementary heating use it less often, and 22% use them 'only in unusual circumstances' (for example very cold weather).

The households who indicated that they use supplementary heating at least once a week were then asked about the frequency, timings and durations that they use the heater. Some 28% (1.9 million) of these households use supplementary heaters in a regular manner; that is they turn their heaters on and off at set times of the day, although this pattern can change for different days of the week and at weekends. However, the majority (65%, equivalent to 4.6 million) of these households do not have set daily patterns (referred to as 'irregular hours' below), and the remaining 7% (0.5 million) have a mixture of rooms heated both regularly and irregularly.

The following two sections look in more detail at those households that gave responses regarding heating hours. As in the consideration of alternative heating above, the first section looks at those reporting 'regular' heating hours, and the second looks at those reporting 'irregular' heating hours.

#### 3.3.3.1 Regular hours

Households that indicated that they used supplementary heating at regular hours during their heating season were asked for how many time periods their supplementary heating was used on a typical Monday, and at what times it was turned on and off. The number of hours that the heating was used was then calculated from the times that the heating was turned on and off for each separate period. These households were subsequently asked if these timings changed on any other weekdays and at the weekends. Only a few households (6%) reported that they change the times they use their supplementary heating during the week, while 30% of households changed the timings at weekends. The analysis that follows looks at the 'Weekday' heating pattern (based on the responses for a typical Monday), and a 'Weekend' heating pattern separately.

#### Weekday

Heating hours are most usually spread across one or two heating periods per day. The majority (63%) of households who use supplementary heating at regular times use it for only one period per day, while 15% of households use it for two heating periods per day in one or more rooms.

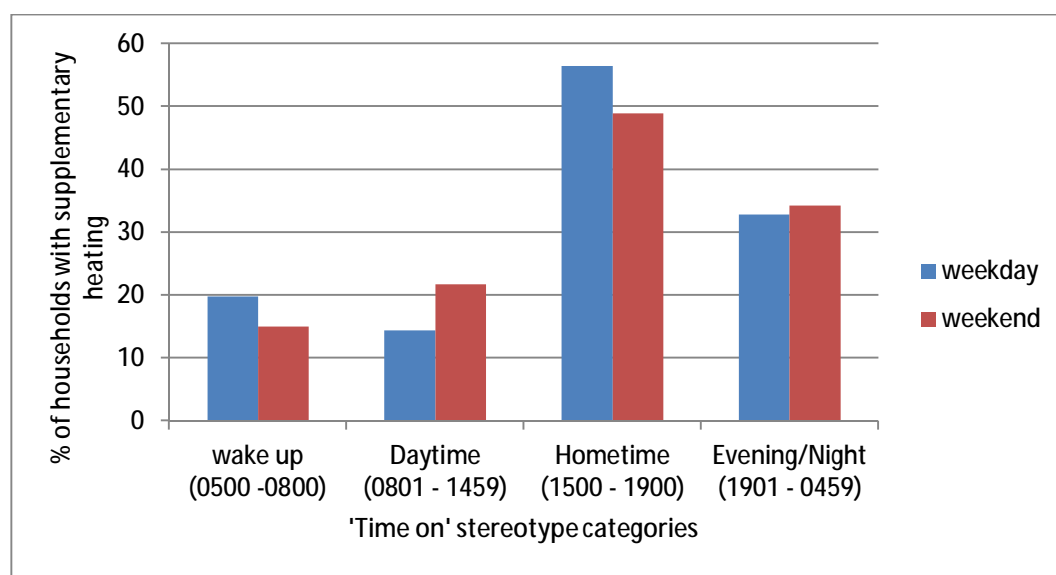
As in the analysis of alternative heating (and main heating in the EFUS 2011 Main Heating report which deals with these systems), the heating periods are placed into a 'time on' stereotype following the criteria set out in Table 16.

Table 16: 'Time on' stereotype categories

'Time On'
§ Wake up (0500-0800)
§ Daytime (0801-1459)
§ Hometime(1500-1900)
§ Evening/Night (1901- 0459)

Approximately 20% of households using supplementary heating at regular times on a weekday use it in the 'wake up' period (0500-0800), 14% in the 'daytime' period (0801-1459), 56% in the 'hometime' period (1500 -1900) and 33% in the 'evening/night' period (1901-0459) (Figure 17). On a typical weekday, households with regularly heated rooms use supplementary heaters on average for just under 3 hours per heater per household per day (median).

Figure 17: Distribution of 'time on' for weekday and weekend



Base: All households in the EFUS Interview Survey using supplementary heating in a regular manner.

### Weekend

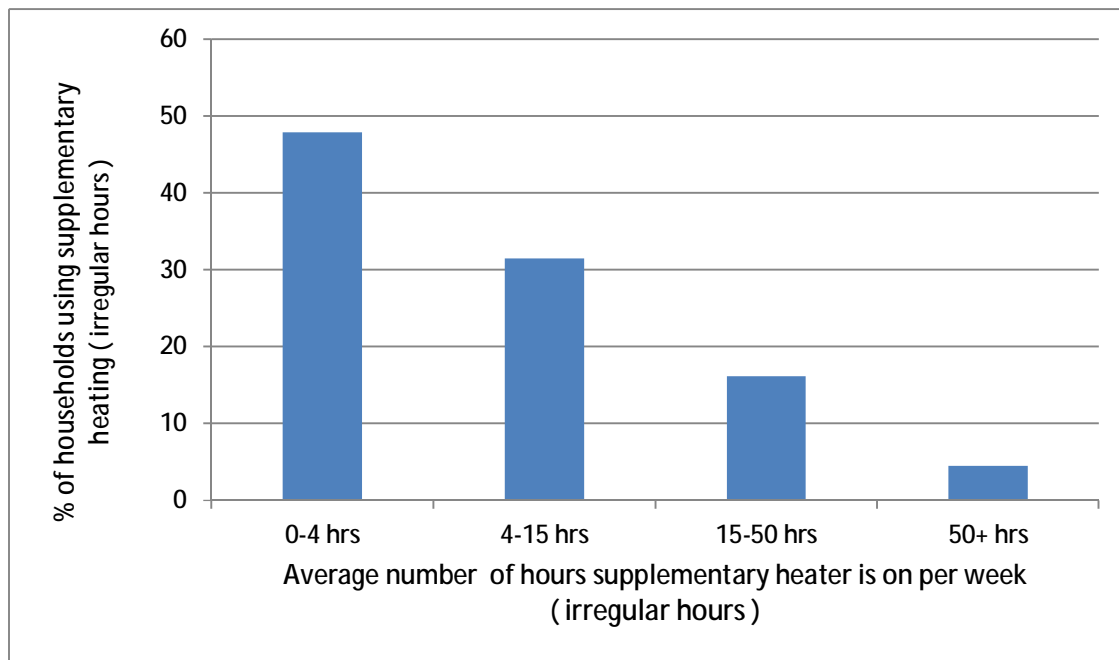
The analysis in this section includes all weekend usage, as well as households who indicated their usages on weekends are the same as on weekdays. At weekends, as on weekdays, heating hours are most usually spread across one or two heating periods per day. Of those that use supplementary heating at set times, 15% use their heaters in the 'wake up' period (0500-0800), 22% in the 'daytime' period (0801-1459), 49% in the 'home time' period (1500-1900) and 34% in the 'evening/night' period (1901-0459) (Figure 17). During a typical weekend, households with regularly heated rooms use supplementary heaters for 3 hours per heater per household per day on average.

In summary, households with supplementary heating appear to use it for an average of 3 hours per heater per household per day for one to two periods. As shown in Figure 17 the regular heating pattern timings on weekends and weekdays are not significantly different.

### 3.3.3.2 Irregular hours

Approximately 65% of households using supplementary heaters (equivalent to 4.6 million households) indicated that they use a supplementary heater in one or more rooms but not at set times. They were then asked for how many hours they used the heater in a typical week. The average usage per week per household for supplementary heaters used in an irregular fashion is 5 hours (median). This is equivalent to just under 1 hour per day (median). Figure 18 shows the distribution of supplementary heating hours for heaters not used at set times (average of all heaters in household).

Figure 18: Average number of hours supplementary heating is used – irregular hours



Base: All households in the EFUS Interview Survey using supplementary heating in an irregular manner.

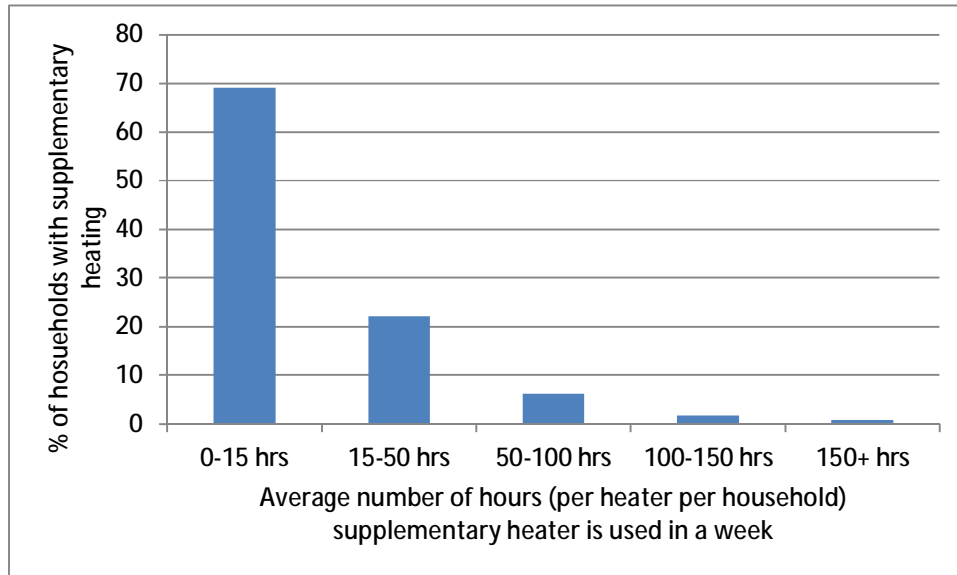
Approximately 79% of households who use supplementary heating in an irregular manner do so for fewer than 15 hours per heater per week. This may indicate that supplementary heating is being used to 'top-up' heating in the house. Living rooms and bedrooms dominate the room types where supplementary heating is used at irregular times. About half (51%) of the households who use supplementary heating at irregular times use an electric heater, while 42% use a gas heating system. Sample sizes for other systems are too small to analyse in detail.

### 3.3.3.3 Summary of total hours supplementary heating is used

The total number of hours that heating is on has been calculated for all households which use supplementary heating, including those which indicated that they heat at set times and those which do not. The total number of hours that heating is on was then averaged over the total number of

supplementary heaters per household. On average, households using supplementary heaters regularly use them for 8 hours per week (median) during their heating season. The majority of households are likely to use supplementary heating less than 15 hours per week (Figure 19).

Figure 19: Averaged total number of supplementary heating hours in a week (all households using supplementary heating)

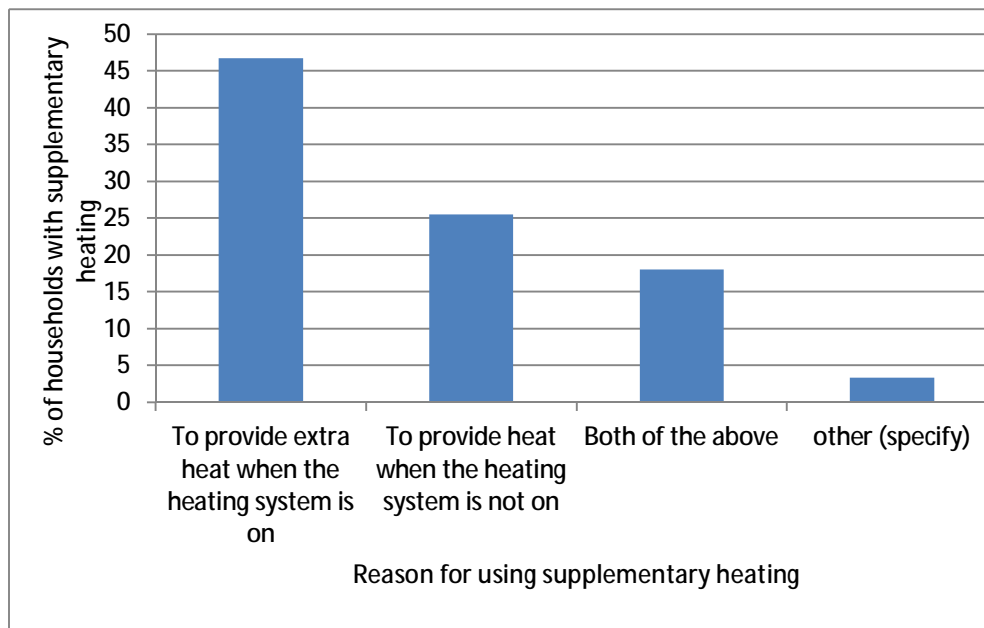


Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

### 3.3.4 Reasons for supplementing household heating

Almost half of households (47%) using supplementary heating indicated that they use their heaters 'to provide extra heat when the heating system is on', about a quarter (26%) have stated that it is used 'to provide heat when the heating system is not on', 18% say that it is used for both the aforementioned reasons, while only 3% give more specific reasons (Figure 20). The more specific reasons can be categorised into two groups (1) ambience/decorative purposes (2) back-up system when the main heating system is not working.

Figure 20: Reasons why households use supplementary heating



Base: All households in the EFUS Interview Survey using supplementary heating in 1 or more rooms (n=1241).

## 4 Conclusions

The EFUS 2011 interview data has provided detailed information on how households report using secondary heating systems. These systems have been considered in terms of alternative systems (those that act in place of the main system in a room) and supplementary systems (those that act together with the main system in a room).

The main findings of the analysis are:

### Alternative heating

- § Approximately 65% of all households (14.3 million households) have one or more rooms not heated by the main heating system. Of these, 26% (3.7 million households) use alternative heating to heat these rooms.
- § Although only a small percentage of households have living rooms not heated by the main heating system, a large percentage of these are instead heated by an alternative heater (65%, 0.5 million households), reflecting the importance of keeping the living room warm.
- § Alternative heating is typically used in one room per household, and the predominant type of alternative heater used is electric (74% of households with alternative heating).
- § Households using storage radiators as their main heating are most likely to use an alternative heater. Only 21% of the centrally heated households use an alternative heating system compared to 56% and 51% of the households with storage heaters or room heaters respectively.

### Supplementary heating

- § Close to half of all households (48%; 10.5 million households) indicate that they have supplementary heating in one or more rooms.
- § Approximately 79% of households using supplementary heating use it in only one room per dwelling, with a further 17% using it in two rooms per dwelling.
- § Supplementary heating is most commonly used in living rooms. Of households with supplementary heating, 83% use it in living rooms and 12% in bedrooms. Supplementary heating is rarely used in other room types.
- § In terms of the proportion of the dwelling in which supplementary heating is used, the majority of households using supplementary heating (88%) report that it is used in less than 20% of rooms.
- § Typically supplementary heaters are either electric (46%) or use mains gas (41%). Supplementary heaters are slightly more likely to be used in conjunction with central heating systems than with storage heaters (49% versus 45% of the respective main heating types), and are least likely to be used in conjunction with room heaters.
- § Bivariate analyses suggest that the dwelling characteristics of dwelling type, age, floor area, regional location and presence of double glazing and the household characteristics of



tenure, household size, whether a pensioner lives in the household, household income and under-occupancy status are likely to be underlying factors determining whether a household uses supplementary heating in one or more rooms.

- § Almost half (47%) of households using supplementary heating indicated that they use their heaters '*to provide extra heat when the heating system is on*', about a quarter (26%) have stated that it is used '*to provide heat when the heating system is not on*', 18% say that it is used for both the aforementioned reasons, while only 3% give more specific reasons (such as '*ambience/decorative purposes*' and '*back-up system when the main heating system is not working*').

### Heating patterns

- § The average length of heating season reported for both types of secondary heating is very similar. The average alternative heating season length is 4.6 months (mean) and supplementary heating season is 4.2 months (mean).
- § The timing of the heating season is also reported to very similar for both types of secondary heating. Usage of both alternative and supplementary heaters peaks in December (85% and 84% of households respectively). The majority of households start using their alternative and supplementary heating between October and December.
- § On average, households use alternative heating for 17.5 hours per week (median) during their heating season. Supplementary heating is typically used for a shorter period of 8 hours per week (median).

### Unheated rooms

- § No heating is provided from the main or alternative heating system (including main heating turned off) in one or more rooms in 48% (10.6 million) of all households. The majority of these households (60%; 6.4 million) reported less than a fifth of all rooms in the dwelling were unheated.
- § Typically, circulation spaces, WCs and 'other' rooms (which include rooms such as utilities etc.) are much more likely to be unheated than other types of rooms. Approximately 23% of households with at least one bedroom have one or more bedrooms that are not heated by the main or alternative heating system.
- § The most common responses from households to the question of why they do not heat specific rooms were that the room was warm enough already (41% of households), the room did not have a heater (36% of households) or that the room did not need a heater as the room was not used (33% of households). Only 5% of households reported that they did not heat a room due to expense.

This report has aimed to give a general overview and headline figures of the data collected in the secondary heating sections of the EFUS 2011 Interview Survey. Further analysis of main heating and secondary heating regimes would be beneficial to further expand information about the heating patterns of households.

## Glossary

Age of dwelling:	This is the date of construction of the oldest part of the dwelling. Recorded by surveyors in the EHS physical survey.
Age of HRP:	The Household Reference Person (HRP) is the person in whose name the dwelling is owned or rented or who is otherwise responsible for the accommodation. In the case of joint owners and tenants, the person with the highest income is taken as the HRP. Where incomes are equal, the older is taken as the HRP. This procedure increases the likelihood that the HRP better characterises the household's social and economic position. The age of the HRP is derived from householder responses to q167/168/169/170 in the EFUS 2011 Interview survey for new households and from variables obtained from the EHS Interview survey for households that had not changed since the earlier EHS interview.
Annual gross income of the HRP and partner weighted quintiles:	This is the annual income of the Household Reference Person and (any) partner. This includes income from private sources (regular employment, self-employment, government schemes, occupational pensions, private pensions and other private income), state benefits/allowances and tax credits, as collected on the EHS survey (this includes housing benefit/Local Housing Allowance but excludes council tax benefit and Support for Mortgage Interest) and interest from savings. It is a gross measure i.e. income before Income Tax or National Insurance deductions.
Children Present:	Anyone in the household who is 16 years old or younger. Derived from householder responses to q167/168/169/170 in the EFUS 2011 Interview survey for new households and from variables obtained from the EHS Interview survey for household that had not changed since the EHS interview.
Dwelling insulation:	The number of insulation measures where positive responses for 'Fully double glazed', 'Insulated walls' and having loft insulation greater than 200mm count as insulation measures.
Dwelling type:	Classification of dwelling on the basis of the surveyors' inspections during the EHS physical survey.
Employment status of HRP and Partner combined:	Information on employment status was not re-collected as part of the EFUS and is as reported in the EHS interview survey (and some households may have changed status in the period between the two interviews).
Fuel Poverty – LIHC definition:	<p>Under the Low Income High Cost definition a household is considered to be fuel poor where:</p> <ul style="list-style-type: none"><li>• They have required fuel costs that are above average (the national median level)</li><li>• Were they to spend that amount, they would be left with a residual income below the official poverty line.</li></ul> <p>Please refer to the following documents for more information. <a href="https://www.gov.uk/government/uploads/system/uploads/attachment">https://www.gov.uk/government/uploads/system/uploads/attachment</a></p>

[\\_data/file/66570/6406-fuel-poverty-changing-the-framework-for-measureme.pdf](#)  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/226988/fuel\\_poverty\\_stats\\_methodology\\_handbook\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226988/fuel_poverty_stats_methodology_handbook_2013.pdf)

Fully double glazed:	Derived from the 'dblglaz4' variable as measured by surveyors in the EHS physical survey. Fully double glazed is 'entire house double glazed'. Not fully double glazed is anything less than fully double glazed.
Household size:	Number of persons in the household, banded into 5 groups, derived from the 'hhsizex' variable from the EHS Interview survey.
In during the day:	See the EHS interview documentation for full details of occupancy questions asked as part of the EHS (question 'Hmwtht'). A household has been classified as being 'in during a weekday' if they indicate being generally in the house on weekdays during the winter, for any period between 9am and 5pm. It should be noted that this information was not re-collected as part of the EFUS, and some households occupancy patterns may have changed in the interval between the two interview surveys.
Insulated walls:	Derived from the 'wallinsx' variable as measured by surveyors in the EHS physical survey. 'Insulated' are 'cavity with insulation'; 'Not insulated' includes 'cavity without insulation' and 'other' wall types.
Loft insulation:	Banded variable of 'loftinsx', the level of loft insulation recorded by surveyors in the EHS physical survey.
Main fuel:	As determined by surveyors in the EHS physical survey. Grouped into 'mains gas', 'electricity' and 'other', which includes bottled gas, bulk gas, solid fuels, oil and community schemes.
Pensioner Present:	Anyone in the household who is 65 or over (male) or 60 or over (female). Derived from householder responses to q167/168/169/170 in the EFUS 2011 Interview survey for new households and from variables obtained from the EHS Interview survey for households that had not changed since the EHS interview.
Region:	Government Office Region that the dwelling is located in. Obtained from the EHS.
Rurality:	Is the dwelling in a rural (village or isolated hamlet) or urban (urban or town or fringe) location. Derived from the 'rumorph' variable in the EHS.
SAP rating:	The energy cost rating as determined by Government's Standard Assessment Procedure (SAP) and is used to monitor the energy efficiency of dwellings. It is an index based on calculated annual space and water heating costs for a standard heating regime and is expressed on a scale of 1 (highly inefficient) to 100 (highly efficient with 100

representing zero energy cost).

- Tenure: Derived from householder responses to q01 in the EFUS 2011 Interview survey.
- Type of heating: Central heating or non-central heating. Determined from householder responses to Q06 in EFUS 2011 interview survey. Non-central heating includes storage radiators, gas fires, electric heaters, coal/wood/smokeless fuel fires or stoves and other.
- Under-occupying: A household is considered to be under-occupying if the dwelling is more than large enough for the number (and type) of occupants living there. For the full definition of under occupancy, see the fuel poverty methodology handbook, which is available at: <http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/614-fuel-poverty-methodologyhandbook.pdf>
- Useable floor area: The total usable internal floor area of the dwelling as measured by the surveyor in the EHS physical survey, rounded to the nearest square metre. It excludes integral garages, balconies, stores accessed from the outside only and the area under partition walls. Grouped into 5 categories.