



## Report 6: Conservatories

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## Executive Summary

Conservatories are a popular addition to a home and previous data has suggested that they may be a major source of heat loss in dwellings where they are present. However, only limited information at the national level has been available to date. This report presents results from the Interview Survey component of the 2011 Energy Follow-Up-Survey (EFUS) which collected detailed information on how households in England use conservatories. 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. However, it should be noted that the proportion of households with a conservatory is based on a relatively small sample size and there are some instances, where the sample is further subdivided for analysis, that the results have an increased level of statistical uncertainty and should be considered as indicative only.

These data are valuable for a number of policy reasons, including updating the evidence base underpinning current household modelling assumptions, e.g. as used in the UK Standard Assessment Procedure (SAP) and the BRE Domestic Energy Model (BREDEM).

If heated, conservatories can result in a significant additional space heating requirement, particularly if they have poor thermal performance (e.g. if they are single glazed). In addition, leaving a door open between the house and conservatory in winter will result in additional heat loss from the house.

The results of the analysis indicate that:

- § Approximately 18% of households in England have conservatories.
- § Around 77% of conservatories have heating.
- § Just over half of those with heating (55%) are connected to the central heating system, and 42% have storage or direct electric heaters, including portable heaters.
- § In winter, 56% of conservatories with heating are heated every day. Only 20% are never heated.

These results demonstrate that a significant proportion of conservatories are heated, with potentially important implications for the assumptions used in energy modelling of housing.

Further analysis indicates that:

- § 45% of occupants report that they heat the conservatory to the same temperature, and 39% to a lower temperature, than the house.
- § In approximately 91% of dwellings with conservatories there is a separating door.
- § Most households with a conservatory with a separating door (83%) keep the door shut in winter:

- This is mainly to keep heat in the room, and also for security.
- Of the smaller proportion (17%) of households who reported the door was kept open, it is mainly for convenience.

§ In summer 81% of households report that they keep the door to the conservatory open for a period of time:

- This is mainly for convenience and to let heat into the adjoining room, and also to make the room feel more spacious.

The average (median) annualised gas consumption for homes containing a conservatory heated by gas is 18,200 kWh which is significantly higher than the median gas consumption of 13,400 kWh for homes without a conservatory. However, the presence of a conservatory is likely to co-vary with other dwelling and households characteristics. Analysis of the 'high gas consumer' group, as defined and reported on in the annex to the 'Metered Fuel Consumption' report in this EFUS series, shows that households living in dwellings with conservatories are statistically no more likely to be high (total) gas consumers, nor be high gas consumption per m<sup>2</sup> consumers, than those without conservatories. A multivariate analysis may help investigate the links between the increased gas consumption and the presence of a conservatory as seen in this sample.

These results have a number of potential implications for domestic energy modelling methodologies. Under the SAP methodology, a conservatory is currently ignored (i.e. no energy use is assigned) if it is 'thermally separated'. While 91% of conservatories studied by the EFUS have a separating door (and it is likely that most of these may be included in the definition of 'thermally separated'), the EFUS results indicate that the majority of these conservatories will actually be heated. The thermal separation may, therefore, be irrelevant in many cases. In light of these results consideration should be given to amending SAP to assign energy usage to conservatories whether or not thermal separation exists. Any changes to SAP should also note that most households report heating the conservatory to the same temperature, but a substantial number also report heating to a lower temperature, than the rest of the dwelling.

There are further potential implications for Building Regulations. Under current Building Regulations guidance, conservatories are exempt from energy efficiency requirements given certain conditions, one being that the heating system is not extended into the conservatory. This does not cover the case of conservatories in which portable heaters are used. Consideration should therefore be given to including conservatories under Building Regulations under other circumstances, perhaps where there are gas or electric points that portable heating may be connected to.

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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. 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.

Conservatories are popular additions to dwellings in England, but information we have about them is limited. At a national scale, recent data is limited to their physical characteristics. Data collected in 2004 from a sample of conservatory owners in four London boroughs, however, (Pathan, A et al, 2007) suggests that they may be heated regularly, and that they could constitute a significant source of heat loss in dwellings where they are present. The 2011 EFUS provides an opportunity to investigate the use of conservatories using a representative sample from across England.

The 2011 EFUS collected detailed information about conservatories, including information on their heating and usage patterns by householders. In addition to directly informing energy efficiency policies, one of the principal reasons for collecting these data are to provide valuable information to inform current modelling assumptions about energy use in the home.

The EFUS contained a number of questions on heating in conservatories and about the separation between the conservatory and the rest of the dwelling. If heated, conservatories can result in a significant additional space heating requirement, particularly if they are single glazed and have poor thermal performance. Even if not heated, leaving the door open between the house and the conservatory in winter will result in additional heat loss, again particularly if the conservatory has poor thermal performance.

Space heating is the largest end-use of energy in the existing housing stock and it is important to understand the effect of a conservatory on heating consumption. The data collected on conservatories will be used to inform and update assumptions in the methodologies used to model energy use in UK dwellings – particularly the BRE Domestic Energy Model (BREDEM) and the UK Standard Assessment Procedure (SAP). These methodologies are extensively used to predict annual energy consumption in dwellings. 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.

Key questions relating to conservatories that are of particular interest for the development of SAP and BREDEM and which can be informed by the 2011 EFUS are:

- § What proportion of homes have conservatories that are heated?

- § Of these, what heating systems are used to heat the conservatories, and how often is the heating used?
- § Is the door between conservatory and house left open for a significant time (thereby causing heat losses) and for what reason?

In addition, the results of this analysis may have potential implications for future revisions to Building Regulations Part L (Conservation of Fuel and Power). Under current Building Regulations guidance, conservatories are exempt from energy efficiency requirements given certain conditions, one being that the heating system is not extended into the conservatory.

## 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.

The results presented in this report use the data collected from the 'Conservatories' section of the EFUS interview survey<sup>1</sup>, supplemented by data from the meter reading sub-sample.

The EFUS 2011 interview survey was undertaken by interviewers from GfK NOP between December 2010 and April 2011. A total of 2,616 interviews were completed, drawn from a sample of addresses provided from the first three quarters of the 2010/11 English Housing Survey (EHS). When weighted, this resulted in a population of 21.9 million households. The EFUS 2011 interview survey was undertaken by interviewers from GfK NOP between December 2010 and April 2011.

The conservatories section of the interview survey begins with a question asking households if a conservatory is present<sup>2</sup>. Households that said one or more were present were then asked which room it opens into and whether it has a door into this room that could be closed. If there was such a door, they were asked the following questions for a typical day in winter (described as December to February), and then again for a typical day in summer (described as June to August):

- § How long the door is left open, selecting from a list of options
- § Why is the door left open or closed (depending on their response to the previous question), again selecting from a list of options.
- § How many days a week is the conservatory used ('use' meaning to stay for at least half an hour).
- § If the conservatory is used one day a week or more: what times of day the conservatory is typically used; morning (6am to 12pm), afternoon (12pm to 6pm), evening (6pm to 12am), overnight (12am to 6am).

The householder was then asked how the conservatory was heated, selecting from a list of options. If the conservatory was heated, the following questions were asked, for a typical day in winter (December to February), and then again for a typical day in summer (June to August):

- § How often is the conservatory heated, selecting from a list of options
- § What temperature, compared to the rest of the house, is the conservatory heated to, selecting from a list of options.

If two or more conservatories were reported by a householder, the conservatory questions were asked only of the main conservatory. In the 2011 EFUS, only one dwelling surveyed had more than one conservatory.

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<sup>1</sup> See EFUS 2011 Methodology Report. The results in this report relate to responses given to questions q135 to q152.

<sup>2</sup> The presence of a conservatory is identified in two locations in the interview, Q4 and Q135. Two cases responded that they had a conservatory in Q4, but contradicted these responses in Q135. This analysis uses those who responded that they had a conservatory in Q135.



Alongside the interview survey, electricity and gas meter readings were taken to allow estimates of consumption to be produced. These readings were collected for approximately half the sample and are compared with results from the interview survey component. Further details on the methodology for collecting and analysing consumption data can be found in the 'Metered Fuel Consumption' report.

## ***2.1 Data quality***

The raw outputs from the interview survey were generally complete and considered good quality. The main difficulty in analysis arises from the fact that only around 18% of the households interviewed had a conservatory, resulting in a relatively small sample size (n=436). This becomes significant in some instances where the sample is further subdivided for analysis. Such instances where the sample size is <30 are indicated under the charts below (using an \*), and these results should be considered as indicative only, and having an increased level of statistical uncertainty. The 95% confidence intervals around the statistics derived from the EFUS Interview Survey have been calculated using a design factor of 1.1, and, in this report, are presented in the text in superscript (see the Methodology report for further details).

The reader should also recall that the analysis of the EFUS interview data, which underlies most of the information presented in this report, is based on householders' responses to questions rather than on the observations of professional interviewers or surveyors. As such it is subject to additional uncertainty as the interviewee may be unable or unwilling to provide accurate responses.

## ***2.2 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 the EFUS 2011 Methodology report for further details of the weighting process.

## 3 Findings

### 3.1 Number of conservatories

Conservatories have become an increasingly popular addition to a house, providing additional space which gives the house a connection with the garden, whilst still being protected from the weather. Based on householder responses to the 2011 EFUS questions, approximately 18% of households in England (~4.0 million) have a conservatory (Table 1).

Table 1: Households with a conservatory

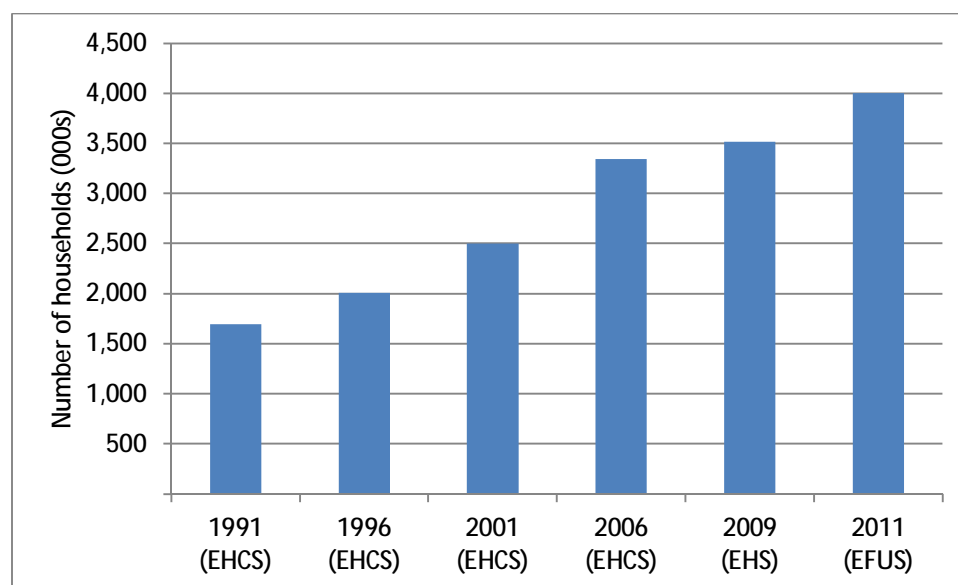
	Sample size	Number of households (000s)	Percentage of households (%)	95% C.I. (%)
Yes <sup>#</sup>	436	3,999	18.3	(16.6,19.9)
No	2180	17,895	81.7	(80.1,83.4)
Total	2616	21,894	100.0	(100,100)

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

<sup>#</sup> Results based on Q135 of the Interview. Two cases stated that a conservatory was present in response to Q4 of the EFUS interview, but stated that it was not in response to Q135. These cases are not included in the analysis presented in this report.

The increase in the number of conservatories between 1991 and 2011 can be seen in Figure 1, rising from approximately 1.7 million 1991 to around 4 million in 2011<sup>3</sup>.

Figure 1: Number of conservatories by year (000's) using EHS and EFUS data



Base: All households in the EFUS Interview Survey

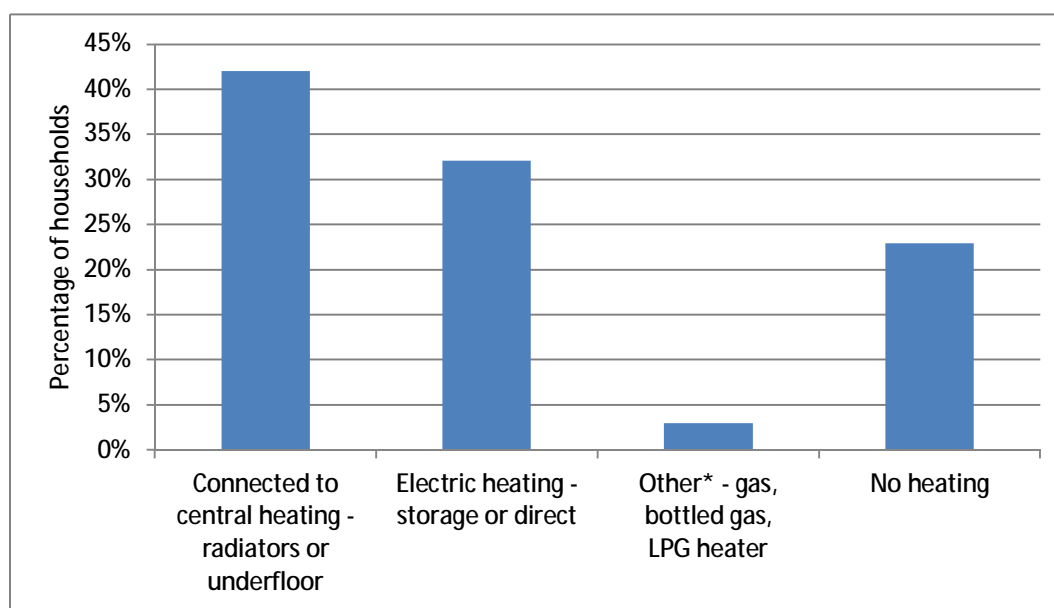
Sources: 2006 and earlier DCLG English House Condition Survey; 2009 DCLG English Housing Survey.

<sup>3</sup> Additional sources: English House Condition Survey data 1991; 1996; 2001; 2006 and English Housing Survey data 2009.

### 3.2 Heating of conservatories

The householder responses from the EFUS indicate that approximately 77%<sup>(73%-81% C.I.-95%)</sup> of conservatories have heating (Figure 2). Most of those with heating are either connected to the household central heating (55%;<sup>49%-60% C.I.-95%</sup> of heated conservatories) or have storage or direct electric heating (42%;<sup>36%-47% C.I.-95%</sup> of heated conservatories). It may be noted that another of the requirements for conservatories to be exempt from the Building Regulations energy efficiency requirements (besides being less than a specified floor area) is that in England and Wales the heating system of the dwelling is not extended into the conservatory.

Figure 2: Type of heating present in conservatories

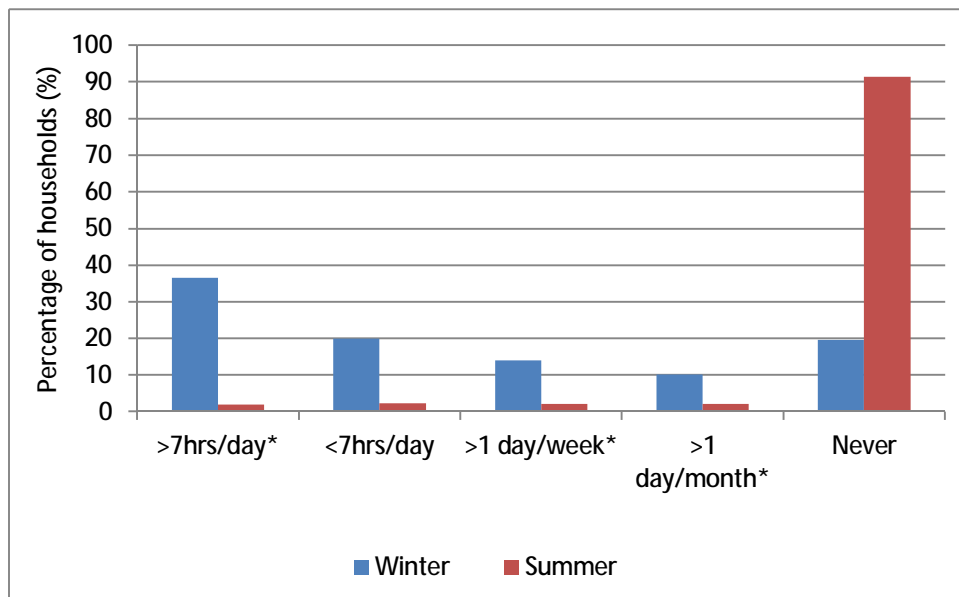


Base: All households with conservatories in the EFUS Interview Survey (n=436)

Clearly, the frequency and length of time of heating is important in assessing energy use in conservatories. Householders report that, in the winter period between December and February, 37%<sup>(31%-42% C.I.-95%)</sup> of conservatories with heating are heated every day for more than seven hours per day, while 20%<sup>(15%-25% C.I.-95%)</sup> are heated every day but for less than seven hours every day (Figure 3). This is a significant number of conservatories that are heated, whether it is to a greater or lesser degree. Of conservatories with heating, 20%<sup>(15%-24% C.I.-95%)</sup> are never heated in winter.

In summer, as one might expect, most conservatories with heating (91%;<sup>88%-95% C.I.-95%</sup>) are never heated (Figure 3). Around 9%<sup>(5%-12% C.I.-95%)</sup> of conservatories are reported by householders to be heated to some extent in summer between June and August (Figure 3).

Figure 3: How often conservatories with heating are heated (EFUS)

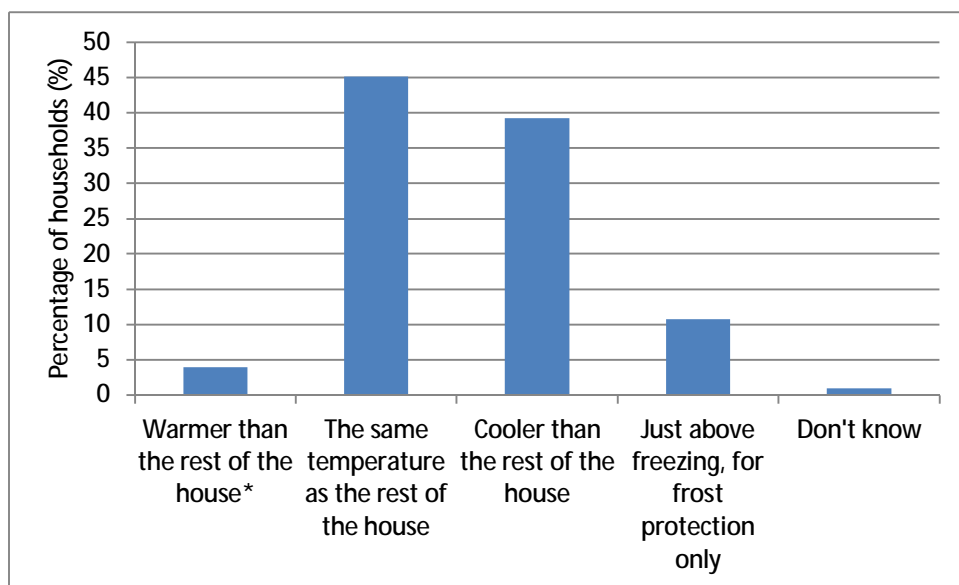


Base: All households with conservatories with heating in the EFUS Interview Survey (n=333)

\* Sample responses (for summer) are very small and subject to large sampling errors

The temperature to which the conservatory is heated is also important in assessing energy use. In general, householders reported that their conservatories are predominantly heated to a temperature which is the same (45%; 39%-52% C.I.-95%) or slightly lower (39%; 33%-46% C.I.-95%) than the rest of the house (Figure 4). Approximately 11% (7%-15% C.I.-95%) were heated to just above freezing, for frost protection only.

Figure 4: For heated conservatories, temperature relative to the rest of the house, in winter (EFUS)



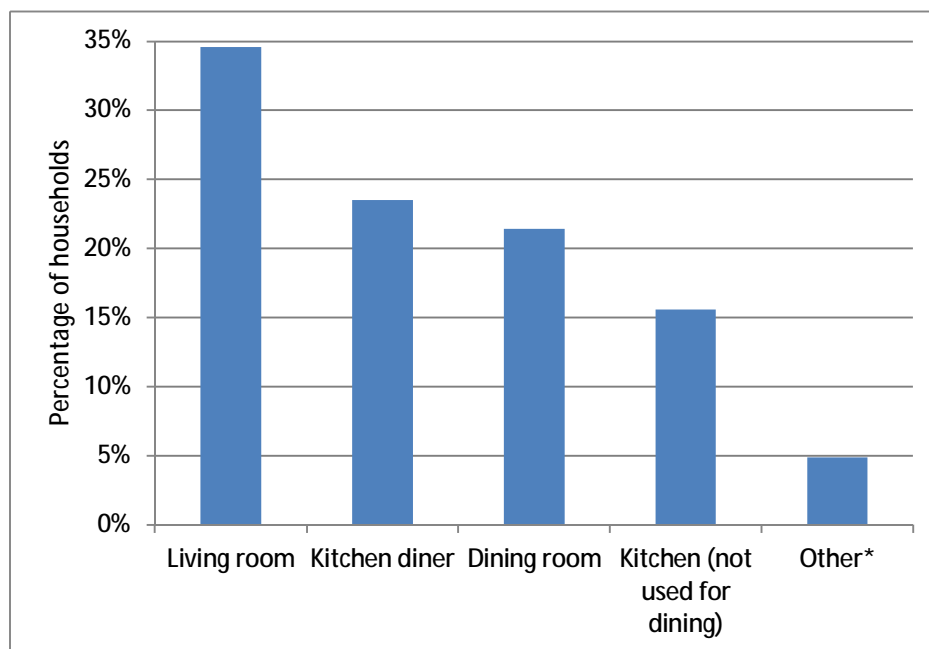
Base: All households with conservatories with heating used in winter in the EFUS Interview Survey (n=268)

\* Sample responses (for summer) are very small and subject to large sampling errors

### 3.3 Heat loss from adjacent rooms

It is also of interest to understand how conservatories are connected to the main part of the dwelling, and what rooms they are attached to. Householders reported that most conservatories (95%; <sup>93%-97% C.I.-95%</sup>) open into the living room, kitchen/diner, dining room or kitchen. Fewer than 5% (3%-7% C.I.-95%) open into other rooms (Figure 5). It can be seen that, typically, conservatories open onto rooms that are likely to be heated. This has implications for heat transfer between the house and the conservatory.

Figure 5: Room that conservatory opens into



Base: All households with conservatories in the EFUS Interview Survey (n=436)

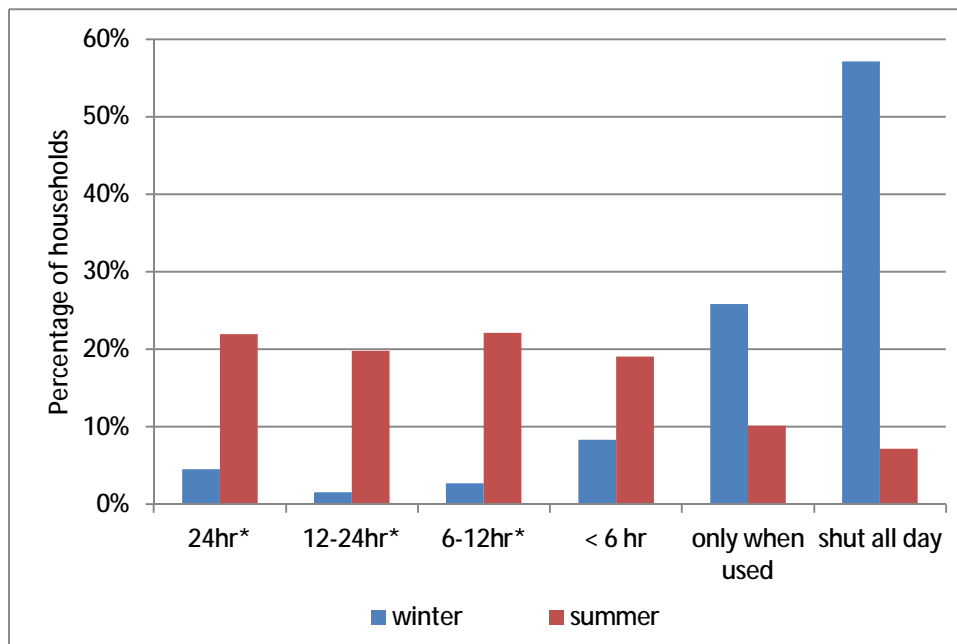
\* Sample responses (for summer) are very small and subject to large sampling errors

Conservatories without a closable door to the house will have increased heat loss in winter. The EFUS indicates that most conservatories have a door to the house that can be closed, and only around 9% (<sup>6%-12% C.I.-95%</sup>) do not.

Within the SAP methodology, a conservatory that is thermally separated (i.e. the walls, floors, windows and doors between dwelling and conservatory have U-values similar to the rest of the dwelling) is ignored by the energy calculation. The above data does not give us detailed information on thermal separation, but effectively gives a maximum value (i.e. no more than 91% (<sup>88%-94% C.I.-95%</sup>) are thermally separated).

Of those that do have a door, in winter the majority of households (83%; <sup>79%-87% C.I.-95%</sup>) keep it shut all day or only open it when they use the conservatory (sum of last two columns for winter shown in Figure 6). Conversely, in summer most people (81%; <sup>77%-86% C.I.-95%</sup>) keep the door open for some of, or all of the day (sum of first four columns for summer shown in Figure 6).

Figure 6: Number of hours that the door is open to the conservatory



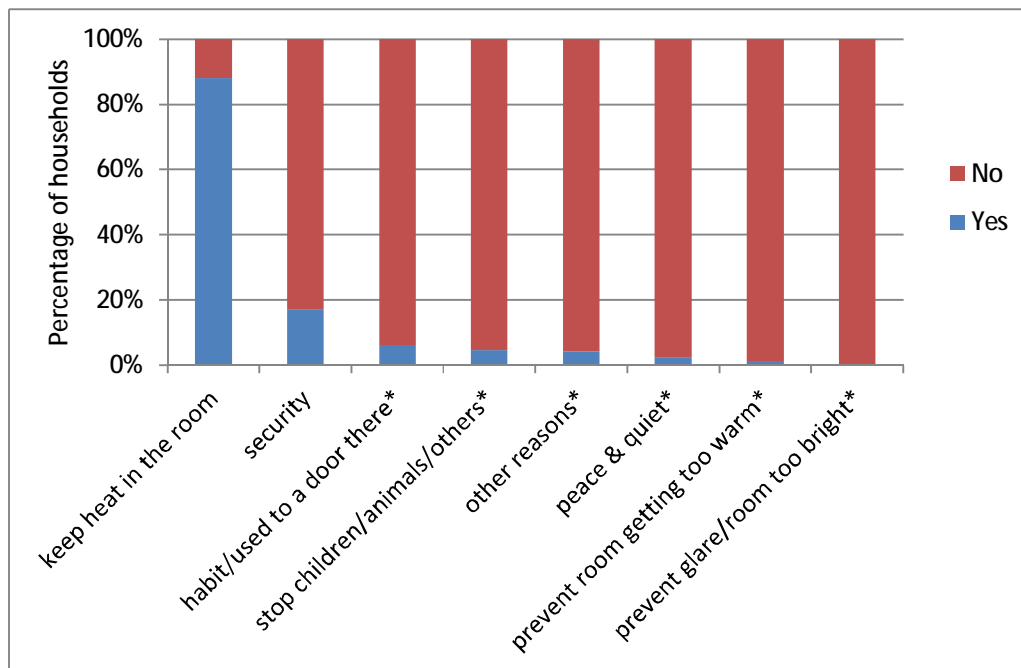
Base: All households with conservatories with a closeable door in the EFUS Interview Survey (n=399)

\* Sample responses (for winter) are very small and subject to large sampling errors

Householders who answered that the door to the conservatory is left open for any period of time were asked to identify why they have it open. Similarly, those who answered that the door is closed (i.e. only open when used, or shut all day), were asked to identify why they have it shut. (n.b. that each respondent could give more than one reason).

Of the 83% of households that report that they keep the door to the conservatory closed in winter, 88% (84%-92% C.I.-95%) do so in order to keep heat in the room adjacent to the conservatory, and 17% (13%-22% C.I.-95%) do so for security (Figure 7). Of the small proportion (17%; 13%-22% C.I.-95%) of households who report they leave the door open (sum of first four columns in Figure 6), the main reason, given by 52% (39%-66% C.I.-95%) of these households, is convenience.

Figure 7: Reasons why the door is left closed in winter

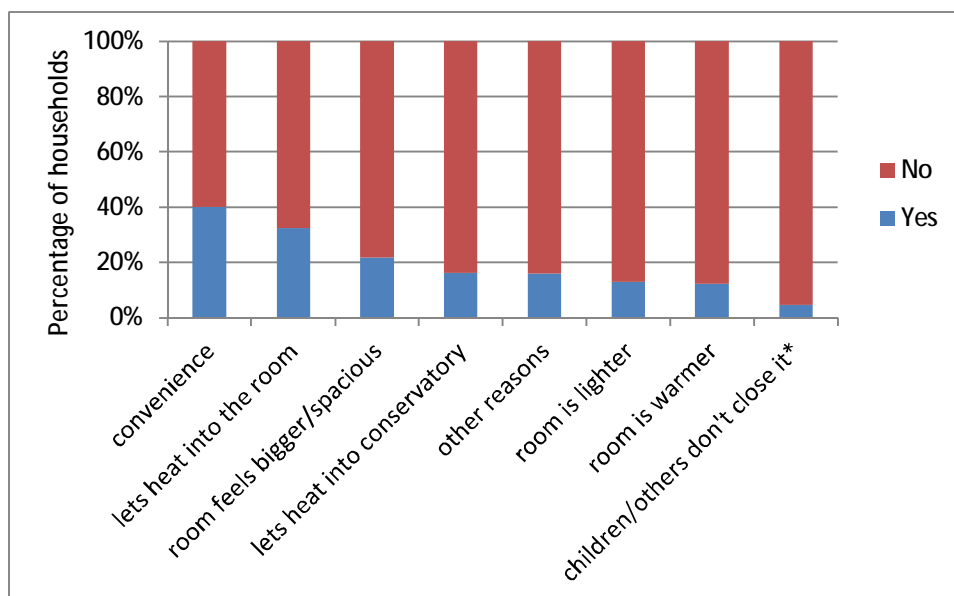


Base: All households with conservatories with a closeable door, kept shut in winter in the EFUS Interview Survey (n=331)

\* Sample responses (for 'yes' response) are very small and subject to large sampling errors

Of the 81% of households that report that they keep the door to the conservatory open for a period of time in summer, 40% (28%-52% C.I.-95%) do so for convenience, with other main reasons being to let heat into the room adjacent to the conservatory (33%; 21%-44% C.I.-95%), or to make the room feel more spacious (22%; 12%-32% C.I.-95%)(Figure 8).

Figure 8: Reasons why the door is left open in summer



Base: All households with conservatories with a closeable door, kept open in summer in the EFUS Interview Survey (n=319)

\* Sample responses (for 'yes' response) are very small and subject to large sampling errors

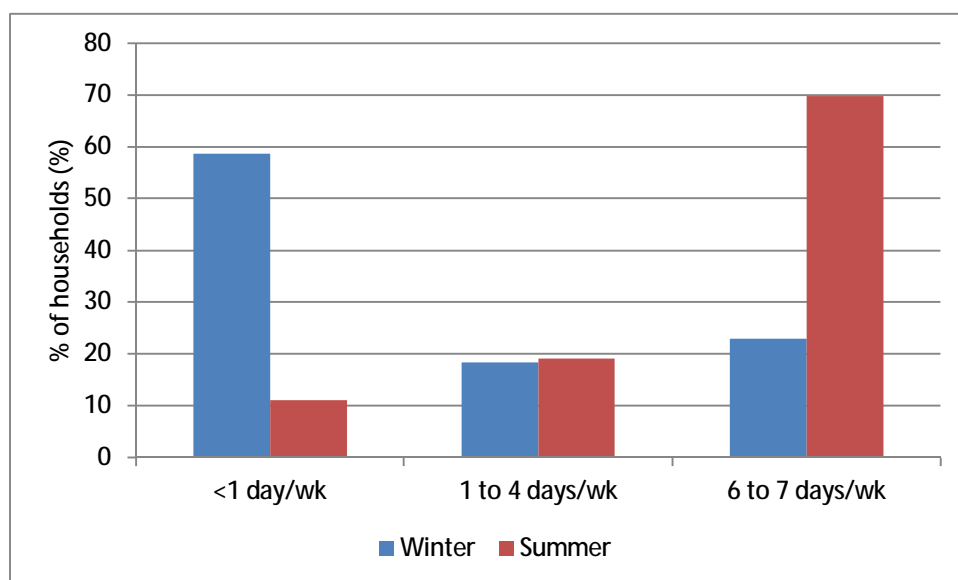
### 3.4 Use of conservatories

Conservatories are conventionally considered to be used primarily in the summer months, and this is supported by the results of the EFUS household survey.

In summer 70% (65%-75% C.I.-95%) of households with conservatories reported that the conservatories are used for 6 to 7 days per week, while 19% (15%-25% C.I.-95%) are used 1-4 days per week and 11% (8%-14% C.I.-95%) are used less than once per week.

In winter, this falls dramatically and most conservatories are used less than once a week (59%; 54%-64% C.I.-95%). However, 18% (14%-22% C.I.-95%) are used from one to four days per week and 23% (19%-27% C.I.-95%) are used for 6 to 7 days per week (Figure 9). It is likely that some householders become accustomed to or require the extra space and wish to use it in winter as well as summer.

Figure 9: How often the conservatory is used

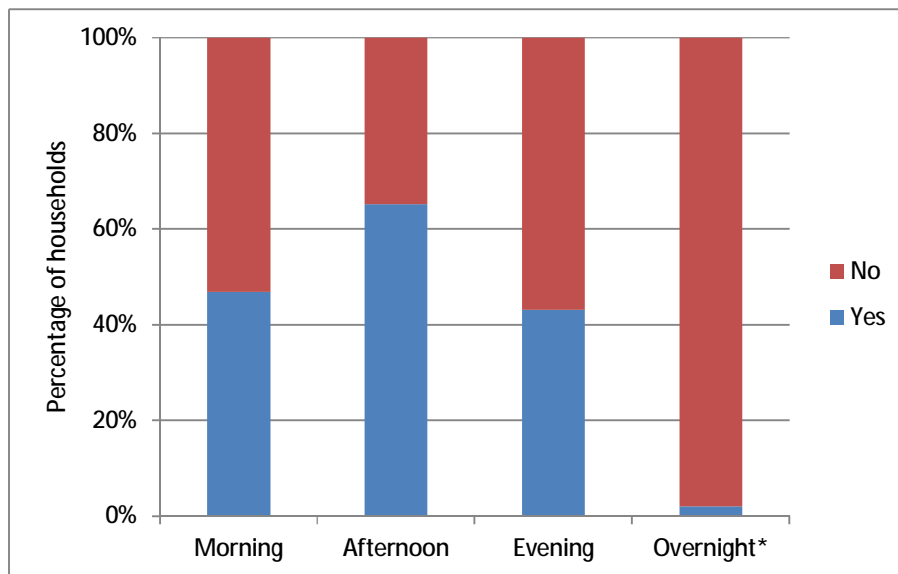


Base: All households with conservatories in the EFUS Interview Survey (n=436)

Conservatories that are used for one day per week or more in winter, are used mostly in the afternoon (65%; 58%-73% C.I.-95%), but also by many in the morning (47%; 35%-51% C.I.-95%) and evening (43%; 39%-51% C.I.-95%) (Figure 10).



Figure 10: Times when the conservatory is used in winter

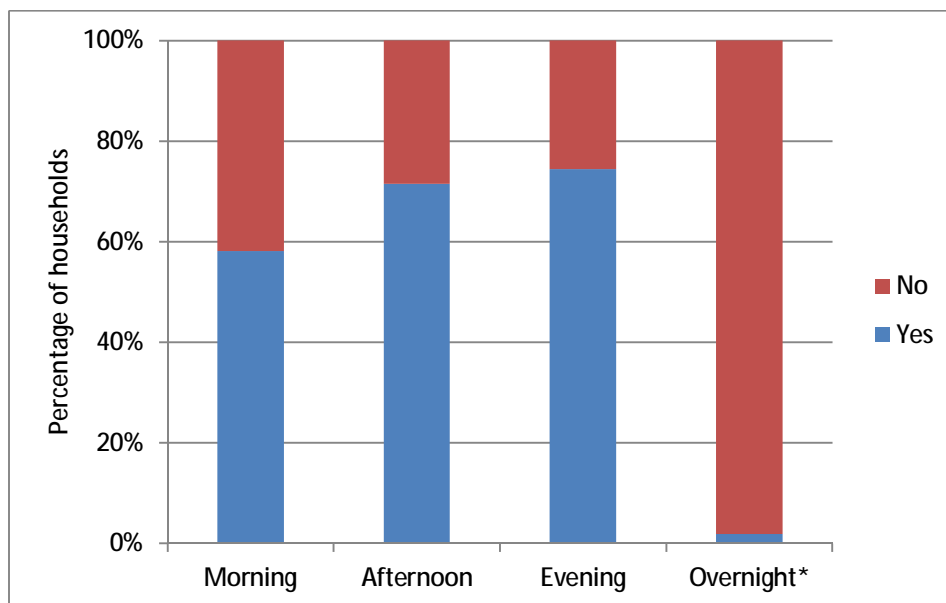


Base: All households with conservatories used  $\geq 1$  day a week in winter in the EFUS Interview Survey (n=182)

\* Sample responses (for 'yes' response) are very small and subject to large sampling errors

Compared to the winter, in summer a slightly greater proportion of conservatories are used in the afternoon (72% : 67%-77% C.I.-95%) and morning (58% : 53%-64% C.I.-95%), and a significantly greater number of conservatories are used in the evening (74% : 70%-79% C.I.-95%) (Figure 11).

Figure 11: Times when the conservatory is used in summer



Base: All households with conservatories  $\geq 1$  day a week in summer in the EFUS Interview Survey (n=386)

\* Sample responses (for 'overnight' response) are very small and subject to large sampling errors

### 3.5 Metered consumption

A total of 2,616 interviews were completed as part of the interview survey and just over half of these (1,345 cases) made up the subset of dwellings that had meter readings recorded during the EFUS<sup>4</sup>. However, the small size of the subsample with both conservatories and gas meter readings (n=201) means that the analysis of metered consumption with respect to conservatories is limited.

The average (median) annualised gas consumption for all households is 14,000 kWh. For homes containing a conservatory heated by gas this median figure is 18,200 kWh <sup>(16,400-20,000 kWh C.I.-95%)</sup> <sup>5</sup>, compared to 13,400 kWh <sup>(12,900-14,000 kWh C.I.-95%)</sup> for homes without a conservatory. However, the presence of a conservatory is likely to co-vary with other dwelling and households characteristics. For example, homes that have conservatories tend to be larger on average than homes without (median floor area of 94m<sup>2</sup> compared to 77 m<sup>2</sup>). Analysis of the 'high gas consumer' group, as defined and reported on in the annex to the EFUS 2011 Metered Fuel Consumption report<sup>6</sup>, shows that households living in dwellings with conservatories are statistically no more likely to be high (total) gas consumers, nor high gas consumption per m<sup>2</sup> consumers than those without conservatories (Table 2).

Table 2: Proportion of dwellings with and without conservatories within the top decile band (and bottom 90% band) of total gas consumption and gas consumption per m<sup>2</sup>

Dwelling characteristic category	Sample size	Proportion of category that is in the top 10% of gas consumers		Proportion of category that is in the bottom 90% of gas consumers		Proportion of category that is in the top 10% of gas consumption per m <sup>2</sup>		Proportion of category that is in the bottom 90% of gas consumption per m <sup>2</sup>	
		Row %	95% CI	Row %	95% CI	Row %	95% CI	Row %	95% CI
Conservatory present	235	15	(10, 20)	85	(80, 90)	11	(6, 15)	89	(85, 94)
Conservatory not present	962	9	(7, 11)	91	(89, 93)	10	(8, 12)	90	(88, 92)

Base: All households with gas in EFUS Metered consumption sub-sample (n=1197).

A full multivariate analysis would be required to investigate the links between the increased gas consumption and the presence of a conservatory as seen in this sample.

<sup>4</sup> See EFUS 2011 Metered fuel consumption report, and the EFUS 2011 Methodology report for more details on the methodology of the metered consumption data.

<sup>5</sup> 95% confidence intervals around a median value have been calculated following the method described by McGill et al, 1978 using a Design Factor of 1.1. See the EFUS 2011 Methodology Report for further details.

<sup>6</sup> High gas consumers have been defined as those households with metered gas consumptions in the top 10% of weighted values obtained during the survey.

## 4 Conclusions

Because conservatories are often considered as additions to the main dwelling, any associated energy consumption is sometimes neglected, particularly if it is thought that the conservatory is not heated. The EFUS has provided detailed information on how conservatories are used and how they are heated. This has provided evidence that regular heating of conservatories is commonplace.

The main findings can be summarised as:

- § Approximately 18% <sup>(17%-20% C.I.-95%)</sup> of households in England have conservatories.
- § Around 77% <sup>(73%-81% C.I.-95%)</sup> of conservatories have heating.
- § Just over half of those with heating (55%; <sup>51%-62% C.I.-95%</sup>) are connected to the central heating system, and 42% <sup>(36%-47% C.I.-95%)</sup> have storage or direct electric heaters.
- § In winter, 56% <sup>(51%-62% C.I.-95%)</sup> of conservatories with heating are heated every day in the winter. Only 20% <sup>(15%-24% C.I.-95%)</sup> are never heated.

These results demonstrate that a significant proportion of conservatories are heated, with potentially important implications for the assumptions used in energy modelling of housing.

The SAP methodology ignores a conservatory in the energy calculation if it is thermally separated (i.e. the walls, floors, windows and doors between dwelling and conservatory have U-values which are similar to the rest of the dwelling). The EFUS householder responses indicate that around 91% of conservatories have a closable door between conservatory and house. It is likely that the majority of these may be considered 'thermally separated'.

This thermal separation, however, may be irrelevant if the conservatory is heated – which this analysis suggests is very common. Consideration should therefore be given to amending SAP to include conservatories if the central heating system is extended into the conservatory, or perhaps if there are gas or electric points capable of providing heating.

The EFUS also indicates that few people heat the conservatory to a higher temperature than the house, most heat it to the same or a lower temperature. Use of a slightly lower demand temperature in SAP for the conservatory than for the rest of the house might therefore be considered in conjunction with any change along the lines of that suggested above.

In England and Wales, Building Regulations guidance exempts conservatories (or porches) from energy efficiency requirements if:

- it is at ground level
- the floor area is less than 30m<sup>2</sup>
- the separating walls, doors and windows meet the energy efficiency requirements
- the heating system is not extended into the conservatory.

Clearly this covers the conservatories where the dwelling heating system is extended into the conservatory. However, it does not capture those in which portable heaters are used. Consideration

should therefore be given to including additional conservatories within the building regulations, perhaps those where there are gas or electric points capable of providing heating.

EFUS householder responses indicate that most conservatories are connected to the living room, a smaller proportion open on to a kitchen diner, dining room or kitchen not used for dining. In dwellings where there is a separating door (91% of conservatories), in winter most households keep the door shut most of the time. The reason given for keeping the door shut was predominantly to keep heat in the room, but also for security. The main reason given for keeping the door open was for convenience.

In summer the householders responses about the amount of time the conservatory door is open are more evenly spread between the extremes of households keeping the door open all the time, to keeping the door shut most of the time. The main reasons given for keeping the door open were convenience, to let heat into the room and also to make the room feel more spacious.

Regarding the use of the conservatories, the EFUS householder responses indicate that in winter most conservatories are used for less than one day a week, although a reasonable number are still used more than this, some even for seven days a week. In summer this pattern reverses and most conservatories are used for seven days a week, with some used less than this, including some which are used less than once a week.

The average (median) annualised gas consumption for homes containing a conservatory heated by gas is 18,200 kWh which is significantly higher (at the 95% confidence level) than the median gas consumption of 13,400 kWh for homes without a conservatory. However, the presence of a conservatory is likely to co-vary with other dwelling and households characteristics. Analysis of the 'high gas consumer' group, as defined and reported on in the annex to the EFUS 2011 Metered Fuel Consumption report, shows that households living in dwellings with conservatories are statistically no more likely to be high (total) gas consumers, nor be high gas consumption per m<sup>2</sup> consumers, than those without conservatories. A multivariate analysis is required to investigate the links between the increased gas consumption and the presence of a conservatory as seen in this sample.

This analysis has provided some important new results relating to the use of conservatories, particularly on how they are being heated. Careful consideration is required on how conservatories should be included in energy modelling in the future. These results also have a number of potential implications for policy.

## 5 References

Pathan,A ,Summerfield,A.J., Lowe,R, Oreszczy, T & Young, A. (2007). Trends in Conservatory Use. A comparison between the 1991 Conservatory Association survey and the UCL 2004 survey. (EST/UCL/BRE).