Summary results of the domestic wood use survey

Introduction

This article provides the high level summary results of the Domestic Wood Survey carried out during 2015. They have been used to improve DECC's estimates of the contribution domestic wood fuel makes towards meeting the UK's share of the Renewable Energy Directive target. The survey focussed on consumption during 2014 and the results were incorporated in DUKES 2015. It showed that the UK had previously been underestimating its domestic wood fuel consumption by a factor of three.

Key points

- The results confirmed that the UK has consistently underestimated domestic wood fuel use; consumption in 2013 was revised up by a factor of three in DUKES 2015

- 31 per cent of wood fuel was sourced from the informal "grey" wood market, an area particularly difficult to estimate

- Over 90 per cent of domestic wood users used logs either solely or in conjunction with other fuels; use of other fuels (pellets, briquettes, waste wood, gathered, and wood chips) was relatively small.

- Wood fuel users represent 7.5 per cent of the UK population although only 2.3 per cent of respondents used wood fuel only

- The amount of users varied regionally with the highest number of users in the South East

- Northern Ireland had the highest proportion of wood users at 18 per cent reflecting lower gas grid connectivity

- Almost half of appliances were closed stoves (wood burners) and 40 per cent were open fires

- Approximately 10 per cent of open fires and 10 percent of closed stoves were second appliances

Background

In March 2007, the European Council agreed to a common strategy for energy security and tackling climate change. An element of this was establishing a target of 20 per cent of the EU's energy to come from renewable sources by 2020. During 2008, a Directive was negotiated on this basis and resulted in the agreement of country "shares" of this target being included in the final 2009 Renewable Energy Directive. For the UK, 15 per cent of final energy consumption calculated on a net calorific basis should be accounted for by energy from renewable sources.

Domestic wood consumption represents a sizeable contribution to renewable energy's share of overall energy use and in the 2014 edition of The Digest of UK Energy Statistics (DUKES 2014)[1]; its use in 2013 was 600 thousand tonnes of oil equivalent (ktoe), representing 35 per cent of renewable heat and 5.4 per cent of total renewable energy. Up until 2013, appliance sales data and data collected from the Renewable Heat Premium Payment scheme – a forerunner to the domestic Renewable Heat Incentive scheme (RHI), government initiatives to promote the use of renewable heat energy, were useful to assess increases in domestic wood fuel use. However the large but uncertain baseline of wood fuel use from older appliances remained a key weakness in the data.

In May 2012, Concerted Action-Renewable Energy Sources Directive (CA-RES) published a paper[2], "Quality standard for statistics on wood fuel consumption of households", considering the

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[1] www.gov.uk/government/statistics/digest-of-united-kingdom-energy-statistics-dukes-2014-printed-version
[2] Quality standards for statistics on wood fuel consumption of households. CARES 2012. www.ca-res.eu/fileadmin/cares/public/Reports/Quality_standard_for_statistics_-_CA-RES_I/Quality_Standard.pdf

importance of The Renewable Energy Directive target. The CA-RES paper recognised that there are a number of difficulties associated with obtaining reliable information on domestic wood fuel use, particularly within the "grey" wood market whereby householders gather their wood fuel or use waste wood. In addition, volume to mass conversion factors are difficult to determine because they vary depending on the species, and different moisture contents affect energy values.

The paper recognised that for countries such as the UK, with low penetration of wood fuel, a large scale survey is required to obtain reliable results. DECC thus commissioned Ricardo Energy and Environment to conduct the survey under the RESTATS (Renewable Energy STATistics database) contract.

Methodology

An advisory group was set up which included Bangor University, and The Forestry Commission both of whom have previous experience in household wood fuel surveys; The Forestry Commission through their Public Opinion of Forestry survey. The expert group advised on wood fuel properties, appliance performance properties, sampling strategy, and questionnaire design.

The group acknowledged the difficulties respondents experience, not only in recalling and judging the quantities and frequency of their fuel purchases but also in estimating the energy characteristics of the wood. A second approach which had proven more successful in previous surveys was to ask respondents how many hours they had used their appliance for, and using assumptions regarding the performance efficiencies of the appliance, an energy value could be calculated.

Although questions to enable both methodologies were included in the survey for comparison purposes, the results from the appliance usage methodology were used in updating the baseline for 2014 as agreed with the advisory group.

Sampling Strategy

The latest Forestry Commission Public Opinion of Forestry survey (based on a sample of about 2,000 households in 2013 in the UK) suggested that about 12 per cent of UK households make some use of wood as a fuel, though this varies by region and population densities.

To conduct this number of interviews and ensure representative sampling across the regions the IPSOS MORI CAPIBUS omnibus survey[3], a weekly face to face survey of around 2,000 adults, was considered to be the most cost effective, consistent and efficient method of collecting the data.

The advisory group concluded that a sample size of about 1,000 wood using responses from interviews for the UK. This sample size was expected to give 100 wood fuel users per region, 1,200 wood fuel users overall including 240 wood fuel users from rural areas.

Questionnaire Design

The key questions in the survey were designed to gather sufficient information in order to perform the comparison of the two methodologies; wood fuel quantity estimates and hours of operation. In addition to this, further questions were included to help inform the wider context of domestic wood fuel use. Below is a summary of the questions included;

For the quantity estimation approach;

- Type of fuel (logs, pellets etc.)
- Weight and/or volume (where respondents were not able to provide this, options were included to provide the number of bags or truckloads)

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[3] A separate survey was conducted in Northern Ireland; The Northern Ireland Omnibus Survey

For the appliance use approach;

- Length of summer and winter heating seasons
- Appliance type (open fire, closed stove, pellet stove, manual feed boiler, automatic feed boiler, range cooker)
- Age of appliance to estimate its likely efficiency
- Number of each type of appliance
- Number of hours of operation per week in winter and summer

General background questions;

- Demographic questions included in the overall omnibus questionnaire
- Rooms in which appliances are located
- What the heat is used for (space heating, water heating, cooking, aesthetic value)
- Where the fuel was sourced (general supplier, specialist, gathered, given)
- Whether the respondent was claiming under the Renewable Heat Incentive (RHI) scheme[4]
- Source of supplementary fuel (coal, mains gas, bottled gas, electricity, oil)

Results

Key summary tables for the survey are published alongside this article and are included in the methodology section for renewables statistics at: www.gov.uk/government/publications/summary-results-of-the-domestic-wood-use-survey.

The tables have been grouped into two sections; those providing background information (tables 1.X) and those which feed directly into the final energy calculation (tables 2.X).

Due to the low response rates to several questions, it was not possible to include a regional breakdown in conjunction with other disaggregated categories for some tables due to the risk of disclosure. However, respondents were classified into urban or rural categories[5] and for some tables; it was possible to include this split. Even then, however, some cells had to be suppressed.

Coverage

- 7.5 per cent of UK households use wood fuel for at least some of their heating
- London had the lowest proportion 3.9 per cent
- Northern Ireland had the highest proportion at 18 per cent

As discussed in the methodology section, a sample size of 1,000, which was expected to produce a minimum of 100 responses per region, was considered reasonable from which to draw robust conclusions. Although the 1,000 target for UK responses was achieved (1,206 actual responses), some regions did not achieve the 100 target, (notably The North East and East Midlands regions). This was mainly due to the overall percentage of wood users at 7.5 per cent being less than the expected 12 per cent. Table 1 shows the proportion of wood users by Government Office Region.

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[4] www.gov.uk/government/collections/renewable-heat-incentive-statistics
[5] In accordance with the Office for National Statistics 2011 rural/urban classification;
http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/2011-rural-urban/index.html

March 2016

Special feature – domestic wood use survey

Table 1

Government Office Region	Number of respondents in survey	Wood Fuel Users in sample	Percentage of Wood Fuel Users	Estimated proportion of "off gas" households[1]
England	**12,532**	**856**	**6.8%**	**9.1%**
Eastern	1,268	84	6.6%	15.1%
East Midlands	817	44	5.4%	7.2%
London	2,323	90	3.9%	7.7%
North East	473	19	4.0%	3.0%
North West	1,892	100	5.3%	3.9%
South East	1,407	223	15.8%	10.3%
South West	1,024	129	12.6%	18.8%
West Midlands	1,585	94	5.9%	8.4%
Yorkshire & Humber	1,743	73	4.2%	4.9%
Scotland	**1,587**	**76**	**4.8%**	**16.3%**
Northern Ireland	**1,024**	**188**	**18.4%**	**…**
Wales	**903**	**86**	**9.5%**	**14.2%**
United Kingdom	**16,046**	**1,206**	**7.5%**	**….**

1 Source

https://www.gov.uk/government/statistics/lsoa-estimates-of-households-not-connected-to-the-gas-network

There is considerable variation in the proportion of wood fuel users across the regions; from 3.9 per cent in London to 18 per cent in Northern Ireland. Some of this variation can be explained by certain regions having a particularly low proportion of households connected to the gas grid. For example, Northern Ireland has an especially high rate of domestic wood fuel users (18 per cent) and although The Northern Ireland Government do not publish statistics on this, one estimate indicates that 80 per cent of households in the region are not connected to the gas grid[6] resulting in higher use of other fuel sources, including wood fuel.

The relationship between gas grid connectivity and domestic wood fuel use is, however, not straight forward; although the South East has a smaller proportion of households not connected to the grid compared to the South West, it has a higher proportion using wood fuel; only 5 per cent of households in the South East (compared to 17 per cent in the South West) use wood fuel for all their heating therefore their wood fuel consumption is less likely to be a replacement for gas grid sourced fuel (table 1.5 in the summary tables).

The North East has the smallest percentage of wood fuel users at just 3.0 per cent of households although there is some uncertainty in this estimate due to the small number of respondents taking part in the survey. London has the next lowest rate of wood fuel users at 3.9 per cent of households. This reflects the high population density and associated concentration of smoke controlled areas.

The proportion of wood fuel users by region was applied to the number of households per region[7] to show the total number of wood fuel users. Chart 1 shows the number per region in descending order;

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[6] www.oft.gov.uk/shared_oft/market-studies/off-grid/OFT1380.pdf
[7] Source Department for Communities and Local Government; Live tables on household projections
www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections

Chart 1

Number of Wood Fuel Users
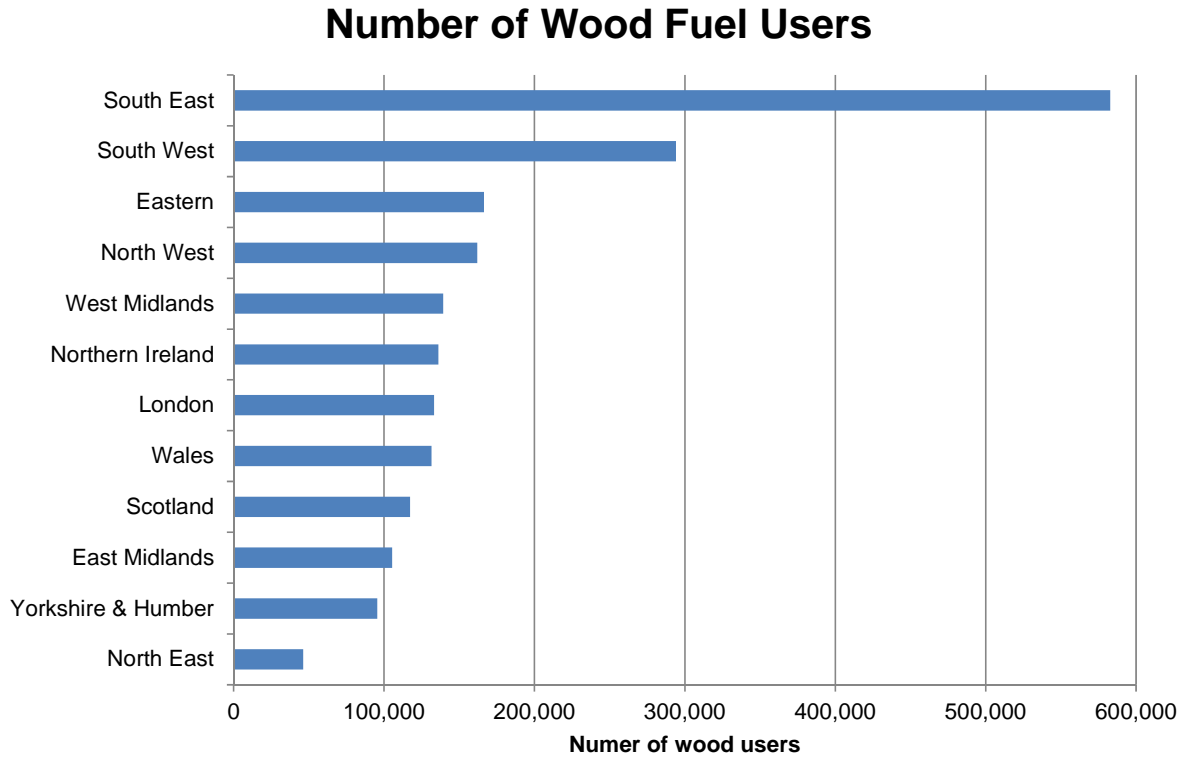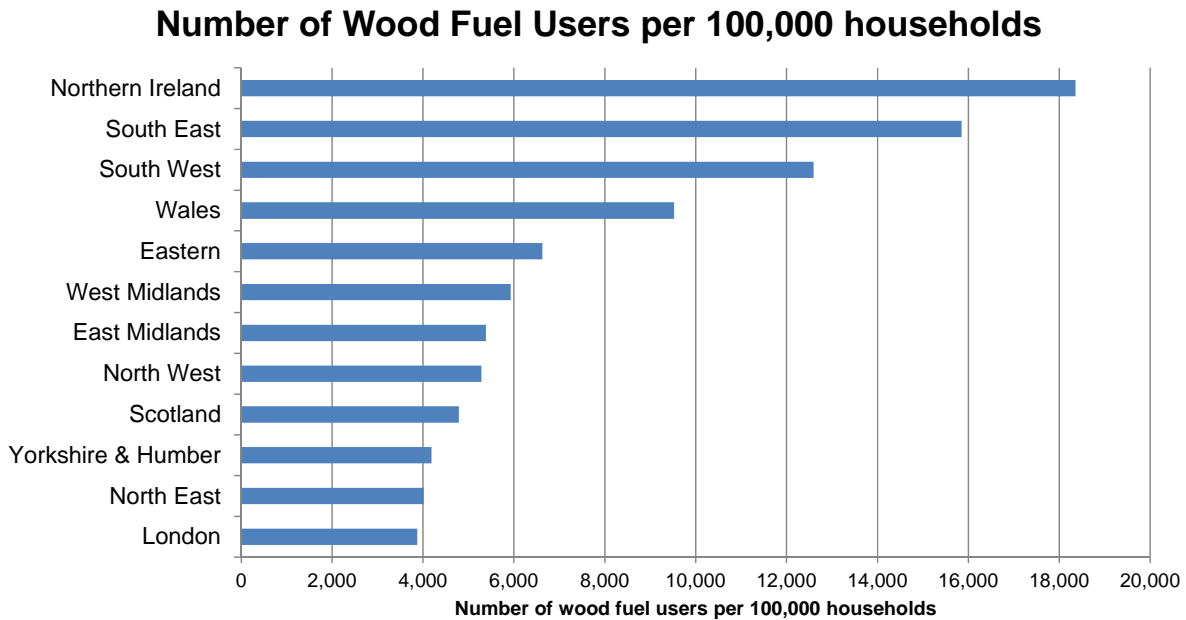

Chart 2 shows the number of wood users per 100,000 households. This shows the relative density of wood fuel users;

Chart 2

Number of Wood Fuel Users per 100,000 households

Northern Ireland has the highest number of wood fuel users at 18,359 per 100,00 households with London showing the lowest at 3,874 per 100,000 households.

Special feature – domestic wood use survey

Type of fuel used

- 92 per cent of respondents reported using logs either on their own or in conjunction with other fuel sources
- 22 per cent used waste wood and 18 per cent gathered their wood fuel
- 2.3 per cent of respondents did not use any additional fuel

Respondents were asked "Do you use any of the following types of wood fuel for heating your home, for cooking or for hot water, either on their own or with other fuels?" The options for fuel types were; wood logs, wood pellets, briquettes, waste wood, gathered, foraged or found wood, and wood chips as agreed with the expert advisory group. Although the wood fuel type was not used in the heat energy calculation (this was based on estimate of hours of operation and energy rating assumptions for each appliance type), it was a key question providing insights into consumer behaviour.

Chart 3 shows the percentage of wood fuel users who used each fuel type;

Chart 3
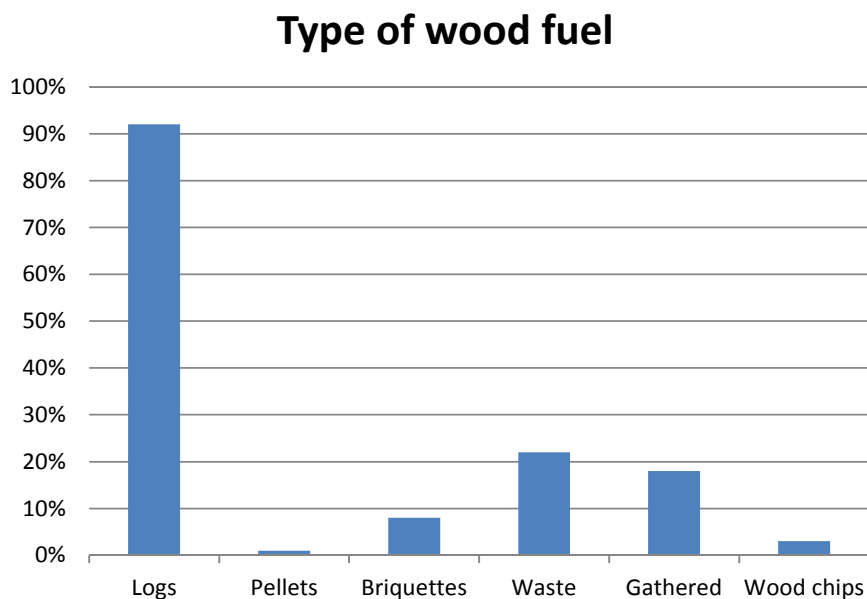
Type of wood fuel

Note; percentages add up to more than 100 per cent as 44 per cent of respondents used more than one fuel type

The majority of wood fuel users (92 per cent) burned wood logs either on its own or in conjunction with other fuel types. Waste and gathered wood were the next most commonly used fuels (22 per cent and 18 per cent respectively).

Respondents were also asked which additional fuels they used for heating and/or cooking aside from wood fuel. Table 1.3 in the summary tables shows that just 28 respondents (2.3 per cent) reported using no additional fuel type other than wood fuel. The largest proportion (65 per cent) used one additional fuel, and 25 per cent two additional fuel types. Mains gas was the most common additional fuel type, particularly in the urban areas, reflecting the higher rates of grid connectivity. Coal was the next highest additional fuel type representing 26 per cent of additional fuel types. Although this appears to be high compared to overall domestic coal consumption (just 1.1 per cent of total fuels on an energy basis[8]), the sample is not typical of the population as a whole as it is limited to those known to have a suitable appliance on which to burn coal. Oil and

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[8] Source; DUKES 2015 table 1.1;
www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes

electricity were the next highest proportion of additional fuels at 22 per cent and 20 per cent respectively.

<u>Source of wood fuel</u>

- 31 per cent of wood fuel was sourced from the informal "grey" wood market
- 19 per cent of respondents purchased their wood fuel from a general supplier and 19 per cent was given
- 16 per cent was purchased from a specialist supplier

Respondents were asked "Where do you usually get this type of wood fuel from", i.e. respondents were asked to source each fuel type they used. Chart 4 shows that the largest proportion of fuels was given.

Chart 4
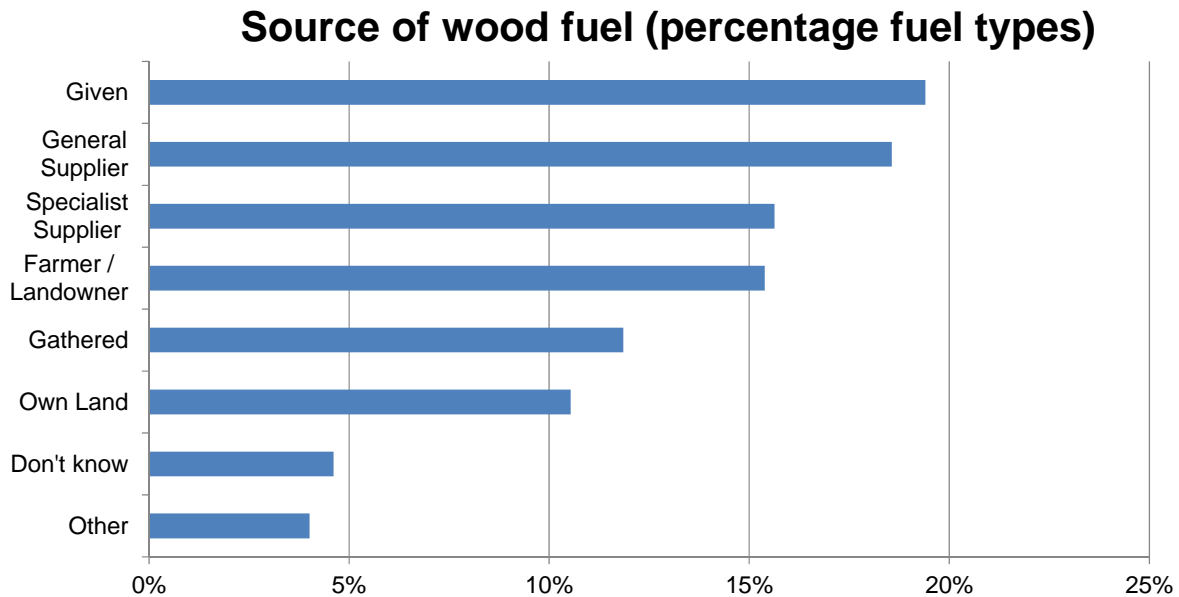
Source of wood fuel (percentage fuel types)

Table 1.4 in the summary tables shows the source of each fuel type, however, for some lesser used fuels, the majority of cells needed to be suppressed due to very low numbers.

Overall, 31 per cent of wood fuel was sourced from the "grey" wood market (own land or gathered), however, this is likely to be understated due to the uncertainty of the initial source. By fuel type, 98 per cent of gathered wood was sourced from the "grey" market, 68 per cent of waste wood, 26 per cent of wood chips, and 21 per cent of logs.

For most fuel types, the proportion sourced from the "grey" market was greater for rural areas compared to urban areas. However, more waste wood was sourced informally in urban areas (70 per cent compared to 63 per cent for rural areas).

<u>End use of wood fuel use</u>

- The majority of respondents (80 per cent) used wood fuel to provide some home heating
- 12 per cent of respondents were high wood fuel users[9]
- Only 1.3 per cent of respondents used wood fuel for either all or some of their cooking

Table 1.5 in the summary tables shows the end use of how respondents use wood fuel. The majority of respondents (over 91 per cent) reported using wood fuel for at least some of their

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[9] Those using wood fuel for either all their heating, or all their hot water, or all of their cooking

heating including 11 per cent who used it for all of their space heating. Chart 5 shows how usage is concentrated in providing some space heating and for aesthetics, though there could be some overlap within these categories;

Chart 5

Purpose of wood fuel use
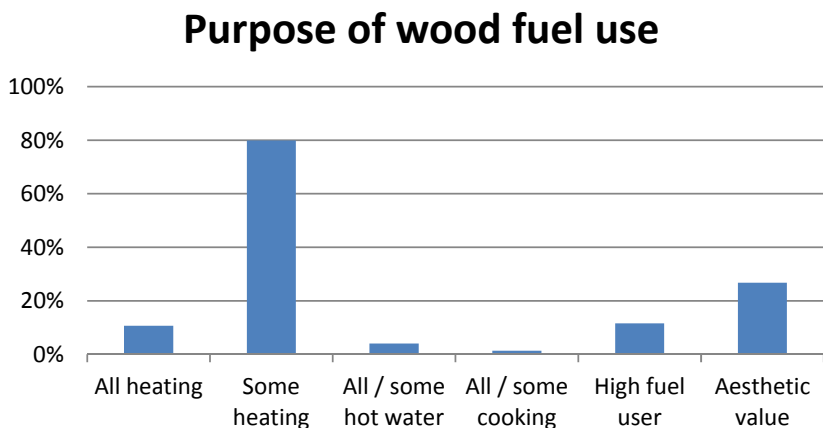
Note; percentages add up to more than 100 per cent as 35 per cent of respondents used wood fuel for more than one type of application

Only 4 per cent used wood fuel for at least some of their hot water and only 1 per cent for at least some of their cooking. High fuel users represented 12 per cent of wood fuel users.

Number of appliances

- 1,206 respondents reported a total of 1,264 appliances, an average of 1.05 appliance per household
- 96 per cent of appliances were either open fires or closed stoves
- The highest proportion of closed stoves is in Wales at 70 per cent
- London has the highest proportion of open fires at 68 per cent

The majority of appliances are either closed stoves or open fires at 52 per cent and 40 per cent respectively. There were very few pellet stoves, manual or automatic boilers, range cookers and "other" appliances reported in the survey hence these have been aggregated in summary tables 2.3 a, b, and c. Table 2.3a shows the number of appliances[10] by region and the proportion of appliances per region providing an indication of how prevalent each appliance is within that region. Open fires were most dominant in London (70 per cent of appliances) and least dominant in Wales (24 per cent of appliances). Chart 2.3 in the summary tables shows this trend though as open fires and closed stoves dominate overall appliance types, as the proportion of open fires decreases, the proportion of closed stoves increases. The East Midlands had the highest proportion of "other" appliances at 19 per cent of total appliances; 17 per cent of all "other" appliances were located in the East Midlands.

Table 2.3b in the summary tables show the number of appliances[11] split by urban and rural areas[12]. Overall, there is a greater proportion of appliances located in urban areas, particularly for open fires where 67 per cent of appliances are urban based. The table also shows the number of additional appliances though only open fires and closed stoves had more one appliance per household. However, the actual number of these appliances was so low; it was unlikely that the

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[10] Table 2.3a shows the number of appliances regardless of whether they were used during the periods in question
[11] Table 2.3b includes only those appliances which were actually used during the periods in question
[12] Source Department for Communities and Local Government; Live tables on household projections
www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections

survey would have included any households with more than one. Just 11 per cent of open fires were additional appliances compared to 8 per cent of closed stoves.

Location of appliances within the household

- Almost 90 per cent of first appliances are located within a reception / living room

Table 1.6 in the summary tables shows the proportion of appliances located in a particular room within the home. Due to the low response rate for this question, only open fires and closed stoves are included in the summary table and some room groupings have been aggregated. The majority of first appliances were located in the reception / living room (89 per cent of open fires and 86 per cent of closed stoves), with the majority of second appliances split between a second reception room and dining room.

Start and end of winter heating season

- Over one third of respondents considered October to be the start of their winter heating season for the year 2013-14
- March 2014 was considered the end of winter by the largest proportion of respondents (38 per cent)
- Compared to winter 2013-14, slightly less (one third) considered October to be the start of the winter heating season 2014-15 reflecting milder temperatures at that time

To ensure the 2014 calendar year was covered by the survey as required by DUKES reporting, respondents were asked about which month they considered to be the start of their winter heating season for winter 2013-14, the end of this season, and the start of the following winter (2014-15). Table 2.1 in the summary tables shows the results and also the subsequent chart. Table 2 summarises the percentage of respondents and the most common months during which they considered a change in their heating behaviours.

Table 2

Start of winter 2013-14		End of winter 2013-14		Start of winter 2014-15	
Oct-2013	36%	Mar-14	38%	Oct-2014	33%
Nov-2013	30%	Apr-14	33%	Nov-2014	30%

For both winters, the largest proportion of respondents considered October to be the month during which their winter fuel burning patterns began, with 36 per cent of respondents for 2013-14 and 33 per cent for 2014-15. November was the next most common month with 30 per cent of respondents considering this to be the start of their winter heating for both winters. March was the month marking the end of winter heating patterns for 38 per cent of respondents with slightly less for April, 33 per cent.

These results contradict slightly those published in the Energy Follow up Survey (EFUS)[13] in which the majority of respondents considered their key heating season to run from October through to April. However, it should be noted that in the EFUS survey, respondents were asked about a typical heating season rather than about specific years. Additionally, March and April 2014, the year referred to in this survey, temperatures were above the long term mean[14] by 1.1 degree Celsius and 1.7 degree Celsius respectively.

Using the start and end months of respondents' winter heating season, the average number of months was calculated at 4.8 months (see summary table and chart 2.2. Again, this differs to that

[13]

www.gov.uk/government/uploads/system/uploads/attachment_data/file/274772/4_Main_heating_systems.pdf
[14] Department of Energy and Climate Change Weather Statistics, table ET 7.1;
www.gov.uk/government/statistics/energy-trends-section-7-weather

calculated in the EFUS survey which produced an average of 5.8 months due to the average temperature for 2014 quarter one being 1.3 degree Celsius higher than the long term mean9.

Hours of Operation of appliances

- Average hours of operation for winter 2013-14 was 22 hours per week
- Average hours of operation for summer 2014 was 10 hours per week

Tables 2.4 and 2.5 in the summary tables show the hours of operation for winter 2013-14 and summer 2014. Breakdowns are provided for the key appliance types and by urban / rural split and also for all appliances by region; it was not possible to show each appliance by region due to the risk of disclosure.

Chart 6 shows the average hours of operation during winter 2013-14 for all appliances by region.

Chart 6

Average hours of operation winter 2013-14
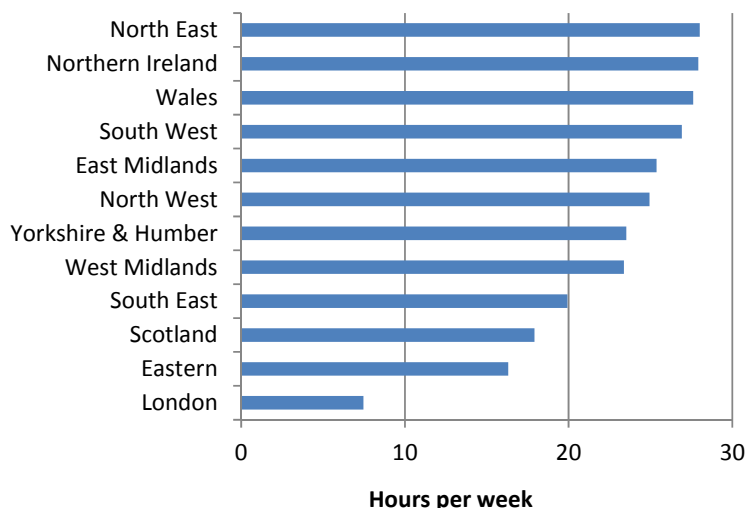
Hours per week

In winter 2013-14 The North East, Northern Ireland, Wales and the South West all had average hours of operation in excess of 25 hours per week. London had the lowest average number of operational hours at just 7 hours per week.

The average hours of operation (per week) by appliance and urban / rural split are summarised in Table 3.

Table 3

	Average hours of operation		
	Urban	Rural	Overall
Open fire	16	19	17
Closted Stove	26	28	27
Other*	33	16	26

* Includes pellet stoves, automatic and manual boilers, range cookers and "other" appliances

Certain appliances will tend to be used more intensively during a typical week; for example, an open fire is more likely to be used as a secondary source of heat compared to an automatic pellet boiler. Chart 7 shows the number of appliances grouped by hours of operation for open fires and

closed stoves. Overall, use of open fires is more concentrated in the lower hours of operation, perhaps reflecting their lower efficiency compared to closed stoves making it more likely they'd be used as secondary heating or for aesthetic purposes. Unfortunately, this breakdown was not possible for all appliance types due to small numbers.

Chart 7

Hours of use; winter

Number of appliances

■ Open fire ■ Closed stove

Number of hours per week
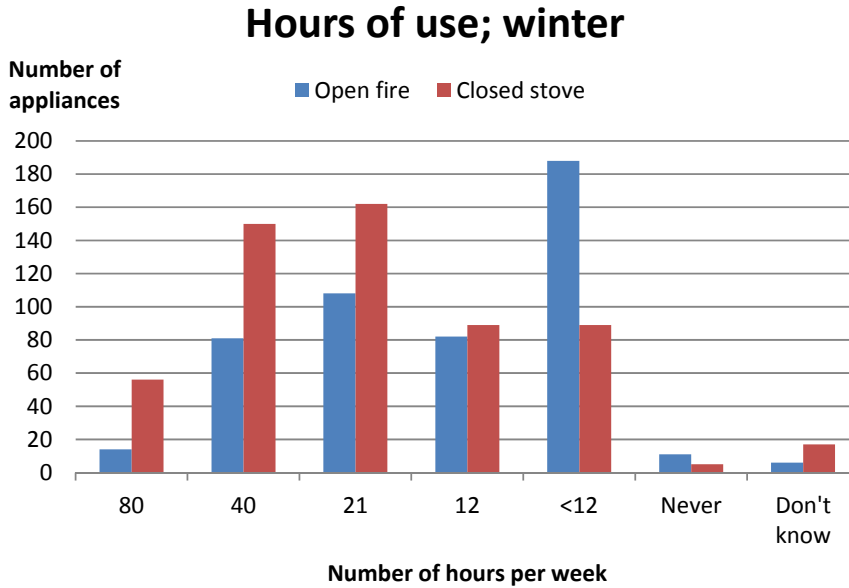
Age of appliances in sample and appliance property assumptions

- Over two thirds of open fires were older than 15 years compared to just 11 per cent of closed stoves

In order to assess the likely efficiency of appliances, the survey included a question asking respondents to estimate the age of their appliances. Many respondents were not able to provide a response so an average age was used to estimate appliance efficiencies. Chart 8 shows the proportion of open fires and closed stoves within each age band;

Chart 8

Age of appliance

■ Open fire ■ Closed stove
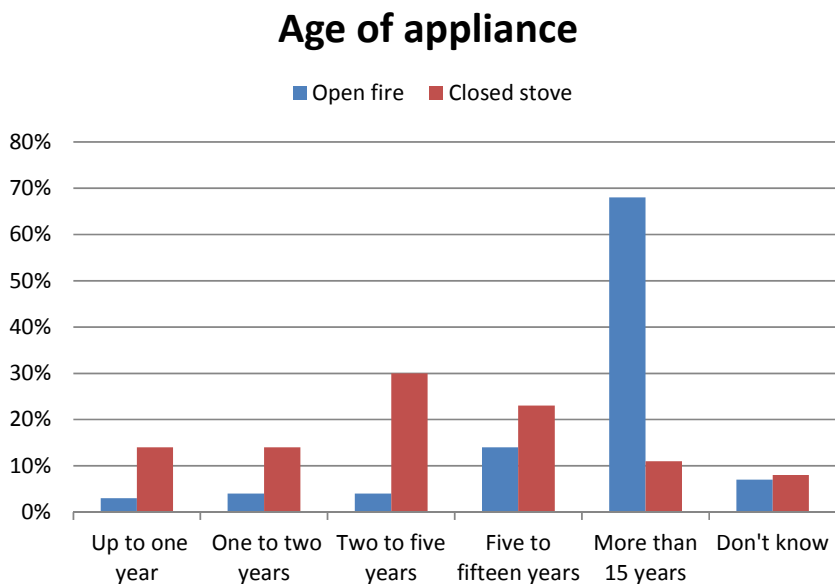
Almost 70 per cent of open fires were installed more than 15 years ago partly reflecting the average age of the UK housing stock and the high numbers of Victorian properties in which open fires in multiple rooms were common. The age of closed stoves is more evenly spread over the relatively short timeframe with 53 per cent aged between two and fifteen years, reflecting the shift from less efficient open fires to the increasingly efficient closed stoves.

Table 2.6 in the summary tables shows the average age of appliances together with their associated efficiency assumptions and typical heat output; Table 4 summarises the key assumptions.

Table 4

	Typical heat output (kW)[1]	Overall efficiency assumption	Wood fuel use per hour (kWh)[2]
Open fire	3	17%	17.6
Closed stove	6	65%	9.2
Pellet stove	6	80%	7.5
Manual boiler	16	80%	20.0
Automatic boiler	30	80%	37.5
Range cooker	4	45%	8.9

The typical heat output assumptions were based on typical product properties and agreed with the expert advisory group. The group also agreed the efficiency values for the various appliances depending on their age. The average efficiency was then calculated weighted by appliance age within the sample. The wood fuel used per hour was then calculated using the typical heat output divided by the average efficiency. i.e.

Wood fuel use per hour = typical heat output
efficiency

Unsurprisingly, open fires were the least efficient appliances at an average of 17 per cent due to the inefficiency typical of open fires and the proportion of installations older than 15 years. Range cookers had the next lowest efficiency at 45 per cent.

Energy Calculations

In order to calculate the total energy value of the fuel consumed by appliances during the year, wood fuel use per hour for each appliance type (see previous section) is multiplied by the total hours of operation for that particular season (i.e. winter 2013-14 and summer 2014);

Energy = Wood fuel use per hour X number of operational hours

Note; number of hours operational are the total hours of use per appliance sourced from table 2.4 for winter and 2.5 for summer. This is then multiplied by the average season length from table 2.2 (in number of weeks)

The calculated energy values in row 20 of table 2.7 can be replicated using the above methodology though only for open fires and closed stoves. This is not possible for the other appliances as they have been aggregated following the above calculation. To enable this would have risked disclosure.

The energy values were then converted into thousand tonnes of oil equivalent to be consistent with DUKES tables.

Revisions

- New baseline for 2014 was set at 1,554 ktoe
- Consumption for 2013 was revised up by a factor of 3

Table 2.8 in the summary tables shows the extent of the revisions made for DUKES 2015; the series is replicated in Table 5.

Table 5
Previous and revised series (DUKES 2015)
Thousand Tonnes of Oil Equivalent (ktoe)

	2008	2009	2010	2011	2012	2013	2014
DUKES 2014	327	358	458	402	508	600	-
DUKES 2015	896	976	1,258	1,097	1,392	1,627	1,554
Revision	568	618	799	695	885	1,026	-

With the new baseline established for 2014 at 1,554 ktoe, historic revisions were made going back to 2008 using sales trend data and weather correction factors. The resultant revision to 2013 was from 600 ktoe (DUKES 2014) to 1,627 ktoe (DUKES 2015), i.e. a threefold upward revision.

Uncertainties

There are significant uncertainties inherent in using a large scale household survey to estimate domestic wood fuel use. General uncertainties arise regardless of the methodology used. These relate specifically to;

- How representative the survey is, as it is based on a sub sample of UK households and the current proportion of wood fuel users in the UK is low (7.5 per cent), with an even lower number of high wood fuel users
- Limited profile information available to sense check wood fuel use, e.g. quantities of fossil fuels used, the size of the household, and number of occupants was not recorded.

The survey choices were made for pragmatic reasons; time, budget, and access to a suitable survey vehicle. Notwithstanding these limitations, this survey is the largest survey to date in the

Special feature – domestic wood use survey

UK of wood fuel use, and was agreed by the expert advisory group that the survey and questionnaire design were the best that can be achieved within the outlined constraints.

In addition to general uncertainties around sampling and limited demographic data on respondents, there are risks inherent in the methodology used (appliance use);

- Respondents' recollection of the start of the heating season over a year previously would have introduced some inaccuracies

- The number of hours of operation per week was a fairly crude scale (options offered were; 80 hours per week, 40, 21, 12, or less than twelve hours per week), though the advisory group agreed that this would offer a compromise between ease of estimating which band and accuracy. Also, there are a substantial proportion of both open fires and stoves that have lower weekly hours of operation, or occasional use. These are considered to be more likely to be inaccurate in their recall of hours of use.

- The appliance ratings and efficiencies are expected UK averages estimated by expert opinion

The alternative methodology (wood fuel quantity estimation) would have presented more uncertainties as considered by the expert group and, although the methodology used (appliance use) could be considered crude in some regards, the additional uncertainties associated with the quantity estimation methodology were deemed to pose a greater risk to the accuracy of the results.

Specifically these related to;

- Difficulty in estimating quantities of wood fuel delivered

- Estimates of quantities purchased are in anticipation of heating requirements rather than how much was actually used during the period being surveyed

- The moisture content of wood fuel is difficult to ascertain

- Length of heating season

These uncertainties are especially hard to quantify as they depend on the judgement of individuals. Quantity of logs delivered is a critical parameter, as logs make up 76% of the total wood fuel. It is subject to uncertainty both due to estimating the quantity and to understanding the moisture contents of the logs. Units such as 'trailer loads' are particularly uncertain. However, 93% of the total logs were quoted in tonnes, so the primary uncertainty is in moisture content and in the accuracy of assessment of quantity.

Conclusion

Although the survey resulted in a large volume of data being collected, several categories resulted in such a small sample that disclosure was a risk resulting in a large proportion of cells being supressed and also resulted in limited statistical value. This applied in particular to certain geographic regions, particularly the North East, certain appliance types (most types with the exception of open fires and closed stoves), and fuel types.

We would welcome any feedback on these statistics, including the appliance property assumptions.

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