

Domestic wood consumption revised baseline

Key headlines

In December 2020, The Department for the Environment, Food, and Rural Affairs (Defra) published the results of research conducted by Kantar Public to understand people's domestic burning behaviours including an estimate of wood fuel consumption for the residential sector. As part of the publication a summary report compared the results of the Kantar survey data for 2018-19 with consumption published in The Digest of UK Energy Statistics (DUKES) for 2018. It is now proposed that this new estimate is incorporated into the DUKES energy balances. This will result in a downward revision, provisionally estimated to be by 1.5 mtoe, from 2.2 mtoe to 0.7 mtoe.

Introduction

The most recent review of the baseline for domestic wood consumption was in 2014 in response to a paper by The Concerted Action on the Renewable Energy Directive (CA-RES¹) recommending a large-scale survey to address suspected weaknesses in existing baselines for EU member states. The paper acknowledged the challenges in obtaining reliable estimates particularly for countries with low wood use such as the United Kingdom. The department for Business Energy and Industrial Strategy (BEIS, Department of Energy and Climate Change at the time) commissioned a survey to address this and the results can be viewed via the following link:

<https://www.gov.uk/government/publications/summary-results-of-the-domestic-wood-use-survey>

This survey focussed solely on burning wood fuels indoors and specifically excluded outdoor burning as this is not a requirement for DUKES energy balances. The scope of Defra's survey, 'Burning in UK Homes & Gardens', published in December 2020, was wider and included outdoor burning and other non-wood fuels, as the policy context was to improve the evidence base on the overall contribution of domestic combustion to air pollution, particularly fine particulate matter (PM_{2.5}) which can have an impact on human health and the environment. The research was not only quantitative but also included qualitative research to assess individuals' practices and attitudes to burning fuels

The full results of Defra's survey can be found via the following link;

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20159&FromSearch=Y&Publisher=1&SearchText=AQ1017&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

Annex A of the results, 'UK domestic solid fuels use estimates paper', discusses several reasons why the results may have differed so significantly. These are summarised in the following paragraphs.

Difference in methodologies

There are two established approaches to estimating wood fuel consumption;

1. Hours of operation; this takes the number of hours a respondent has said they used their appliance and an energy value is calculated using typical fuel input for a particular type of appliance.
2. Quantity estimates; an energy value is calculated using the weight or volume of wood fuel and uses assumptions for wood fuel properties such as calorific values and moisture content.

¹https://ec.europa.eu/eurostat/documents/38154/4956233/Quality_standard_statistics_wood_fuel_consumption_households_CA-RES_2012.pdf/52593e32-cb01-0fc9-0d19-33e03c0d6ad0?t=1607942361438

Each approach has its drawbacks but stakeholder views from both surveys confirmed that the hours of operation is more reliable as there are fewer assumptions to consider. Despite this both the BEIS and Defra surveys included questions to enable either methodology to be used.

Where the BEIS and Defra approaches differed, is that BEIS used the first methodology only. As this survey asked questions only relating to wood fuel, it was assumed that all fuel was wood. Defra on the other hand were interested in other fuels such as coal so used a hybrid methodology whereby the first methodology was used to produce an energy value for each respondent. This was then apportioned to the energy values of each fuel calculated from the second methodology.

Table 1 Comparison of key assumptions and variables;

Key variable comparisons	BEIS 2018 ¹	Defra 2018 19	Source of Defra figure ²
Proportion of households burned in previous year	7.5%	6.9%	Section 4.1.1 Annex A
Proportion of households burned in previous week	-	Min 1%, max 6.5 %	Section 4.1.1 Annex A
Average hours of operation;			Table 8, Annex A
Spring	-	15.1	
Summer	10.0	8.7	
Autumn	-	20.8	
Winter	22.0	27.9	
Proportion of fuel type			Table 7 Annex A
Wood fuel	100%	52%	
Coal	-	47%	
Other	-	1%	
Appliance proportions			Table 10 Annex A
Open Fire	45%	32%	
Closed Stove	52%	60%	
Pellet stove	0.5%	-	
Manual boiler	0.4%	-	
Range cooker	1.3%	-	
Other	0.8%	8%	
Fuel use assumptions (kWh/h)			Table 10 Annex A
Open Fire	17.6	17.6	
Closed Stove	9.2	9.2	
Pellet stove	7.5	-	
Manual boiler	20.0	-	
Automatic boiler	37.5	-	
Range cooker	8.9	-	
Other		18.5	
Total consumption (mtoe)	2.2	0.7	

Both surveys used the same typical fuel consumption assumptions for open fires and stoves, differing only for more niche appliances which were so few, this would not have had a material impact on the final results.

The average hours of operation were not directly comparable as BEIS' survey took a two-season approach compared to Defra's four seasons. However, as they appear to be sufficiently similar it is unlikely that that this would have accounted for much of the difference.

¹ Although BEIS survey covered the year 2014, the value for 2018 is shown as the most relevant period for comparison with Defra's 2018-19 period.

² Data relating to the BEIS survey can be found in the publication tables;

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/576953/Summary_Tables_Domestic_Wood_Survey.xlsx

Number of wood fuel burners

Although the proportion of households who had burned wood fuel in the previous year (6.9 per cent) was similar to that reported in BEIS' survey (7.5 per cent), on a week-by-week basis, the proportion was considerably lower, inferring that respondents were not consuming wood fuel on a regular basis and was as low as 1 per cent over the summer months (section 4.1.1 of Annex A). BEIS' survey was conducted as a one off, asking respondents to refer to just two historic seasons so it is possible that the average hours reported related to just those weeks they had burned, not accounting for periods when they did not burn anything. In contrast, the Defra survey asked respondents had they burned any fuel in the previous week, ensuring non-burning weeks were captured. It is likely that this is the main cause of difference between the two sets of results.

Alternative fuels burned

Although BEIS' survey asked respondents had they burned other fuels, this was framed as additional information and the key survey questions related to just wood fuel. The calculations were thus based solely on the hours of operation in conjunction with appliance assumptions. It is possible that respondents did in fact burn other fuel types during those hours reported. In contrast, the Defra survey used both the hours of operation but then allocated to fuel types gathered from the quantity questions. This resulted in a significant amount of coal being assigned to both open fires and wood stoves; Table 7 in Annex A (of the Defra publication) showed that just over half (52 per cent) of heat generated by all appliances was allocated to wood fuel with the remainder being from coal (47 per cent) and 'other' fuels (1 per cent).

Summary

Obtaining accurate estimates for heat generated by wood fuel in domestic appliances is challenging, given the difficulty in independently estimating supply of a fuel with both formal supply channels but also informal channels from waste and gathered wood, and although it is considered that user surveys will produce the best estimates it remains an imperfect methodology. By asking respondents to recall their burning habits in the previous week, the Defra survey will no doubt have improved accuracy compared to the BEIS survey which relied on respondents recalling their behaviour up to a year previously. However, there are still some areas for consideration such as the high proportion of coal being burned on indoor appliances, particularly as the share of stoves has increased since the BEIS survey was undertaken (from 52 per cent to 60 per cent). Although anecdotal evidence suggests few indoor burners burn coal on stoves, the results from Defra's research shows that this may be more prevalent than originally thought.

The Defra-funded survey covered the period April 2018 to March 2019 and BEIS intends to adjust this using a methodology based on heating degree days³ to obtain a calendar year estimate for 2018 to incorporate into its baseline. The impact of this adjustment is unlikely to materially affect the estimated downward revision (from 2.2 mtoe to 0.7 mtoe). The final figure will be published in DUKES 2021 (to be published in July 2021). Any user feedback will be welcomed and can be submitted via the following email address; renewablesstatistics@beis.gov.uk.

³ Heating degree day statistics can be found via the following link; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/963776/ET_7.1_FEB_21.xls



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