

**Documentation of statistics for  
Use of firewood and other types of biomass for heating  
purposes in dwellings and holiday cottages 2023**

## 1 Introduction

The purpose of the study is to assess the number of wood stoves, etc., and to calculate the consumption of firewood and other biomass for heating in Danish households' homes and holiday homes. The results of the study are used, among other things, for the Danish Energy Agency's annual energy statistics and the Ministry of the Environment's assessment of emissions from wood stoves in Denmark. The study is based on a survey sent to a sample of households in Denmark. The study is conducted every two years, and reports dating back to 2009 can be found on the Danish Energy Agency's website. Statistics Denmark carried out the current study in collaboration with the Danish Energy Agency.

## 2 Statistical presentation

The statistics calculate the number of homes and holiday homes that are entirely or partially heated by wood stoves, etc., and the proportion these homes represent of the total housing stock. Additionally, the total consumption of firewood, etc., corresponding to the year 2023 is calculated. The results are presented as totals and broken down by geography, primary heat sources, wood stove types, and housing types.

### 2.1 Data description

The data basis for the statistics is a sample-based survey. The statistics calculate the number of homes and holiday homes in Denmark that are entirely or partially heated by wood stoves, etc., and the proportion these homes represent of the total housing stock. The statistics cover private homes and holiday homes, and therefore do not include businesses and their use of firewood or other biomass for heating. The total consumption of firewood, etc., measured in Gigajoules (GJ) for the year 2023 is calculated, and the results are presented as totals and broken down by geography, primary heat sources, wood stove types, and housing types.

### 2.2 Classification system

**Geography:** Some results are broken down by geography, i.e., municipalities or regions.

**Housing Types:** The statistics distinguish between the following housing types: - Single-family houses (includes the following BBR application codes: 1040099 Parcel, single-family house, 1040084 Farmhouse, 1040089 Row, chain or semi-detached house, 1040097 Other unit for permanent residence). - Apartment buildings (includes the following BBR application code: 1040100 Apartment building complex). - Holiday homes (includes the following BBR application codes: 1040090 Summerhouse, 1040092 Allotment garden house).

For single-family houses, the selection of the sample distinguishes between whether the building's primary heating installation, according to BBR, is district heating (1000363 District heating/block heating) or not.

For holiday homes, a distinction is made between whether residents are registered or not according to the CPR register, to distinguish between holiday homes with or without permanent residents.

### **2.3 Sector coverage**

The statistics exclusively concern private households' use of firewood and other biomass for heating purposes. Where a business is located together with the home, the heating often also covers this purpose.

### **2.4 Statistical concepts and definitions**

Wood pellet stoves, etc. : Pellet stoves, etc. are primary or secondary heat sources in private homes and holiday homes, typically using wood pellets for space heating and possibly production of hot water. Pellet stoves, etc., include: - Pellet furnace: Usually the main heating source, using wood pellets for space heating and hot water. - Pellet stove: Often a supplementary heating source, using wood pellets for space heating. The two terms are often used interchangeably.

### **2.5 Statistical unit**

Homes and uninhabited holiday homes.

### **2.6 Statistical population**

Dwellings and uninhabited holiday cottages using firewood and other biomass for heating

### **2.7 Reference area**

Denmark.

### **2.8 Time coverage**

The statistics cover the year 2023, but similar surveys for 2021 and earlier years are available on the Danish Energy Agency's website.

### **2.9 Base period**

Not applicable for these statistics.

### **2.10 Unit of measure**

The results are presented in terms of the number of homes with wood stoves, etc., and their share of the total number of homes, as well as the total consumption of firewood measured in Gigajoules (GJ) or Terajoules (TJ). The statistics may eventually be expanded to include pellet stoves, etc., as well as straw and wood chip furnaces. During data collection, consumption is asked for in cubic meters, firewood towers, sacks, or weight, depending on the fuel type.

### **2.11 Reference period**

The data collection concerns the respondents' use of firewood, etc., during the heating season 2023/2024, i.e., from June 1, 2023, to May 31, 2024. The results for firewood consumption are converted to the calendar year 2023 by adjusting for the ratio between the number of degree-days in the heating season 2023/2024 and the calendar year 2023.

### **2.12 Frequency of dissemination**

The statistics are compiled every other year.

### **2.13 Legal acts and other agreements**

Participation in the survey is voluntary and therefore does not require data collection authority.

### **2.14 Cost and burden**

The reporting burden has not been calculated for these statistics, as participation in the survey is voluntary.

### **2.15 Comment**

For further information, please refer to the statistics' [topic page](#)

## **3 Statistical processing**

The firewood survey is a sample-based survey. The interviews were collected via a web-based questionnaire, with approximately 20,000 responses most recently collected. The selected respondents are scaled to a national level using background information from population and housing statistics registers. The results are adjusted for non-responses, and data is error-checked at both micro and macro levels. During data processing, a limited number of responses are corrected due to inconsistencies or obviously incorrect answers. Household use of firewood, wood briquettes, and wood pellets is converted from physical quantities to total energy consumption based on standard values for energy content.

### **3.1 Source data**

The data basis for the 2023 survey is a web-based survey sent to a sample of 49,325 households, stratified by housing type: single-family houses (typically detached houses, terraced houses, etc.), apartments, and holiday homes used for year-round living. Single-family houses are further divided by primary heating source, i.e., whether they have district heating according to the BBR (Building and Housing Register). Dormitories and residential institutions are not included in the selection. Holiday homes without year-round residence are addressed by asking respondents who indicated that they own or have access to a holiday home to complete a questionnaire on heating sources and the use of firewood, etc.

### 3.2 Frequency of data collection

The statistics are compiled every other year.

### 3.3 Data collection

The questionnaire has been integrated into a digital platform/web survey, allowing for the addition of illustrations, photos, and detailed explanations of technologies, measurement units, and concepts. See the attached questionnaire for 2023 (heating season 1 June 2023 - 31 May 2024).

For the 2023 survey, 49,325 households were selected to participate. They were chosen from a population of 2,806,291 households. The criteria for inclusion in the population are that it must be a unique address in the Building and Housing Register (BBR) with at least one registered CPR number according to the CPR register. A unique address could be, for example, an apartment in a multi-story building. At least one CPR number means that there must be at least one person who has registered the address as their official residence. The sample is stratified by housing type: single-family houses (typically detached houses, terraced houses, etc.), apartments, and holiday homes used for year-round living. Single-family houses are further divided by primary heating source, i.e., whether they have district heating according to the BBR. Dormitories and residential institutions are not included in the selection. The stratification follows the distribution below.

Strata: - Houses with district heating 16,957 - Houses without district heating 23,085 - Apartments 5,674 - Occupied holiday homes 3,609

Total 49,325

Apartments are deliberately underrepresented in the sample because the incidence of wood-burning installations in apartments is low, but they occur more frequently in single-family houses or occupied holiday homes. For houses with district heating, a lower selection rate is used than for houses without district heating, as wood-burning installations are more common in the latter category.

Data collection was carried out from 23 May 2024 to 26 June 2024. The first invitation letter was sent from 23 to 27 May 2024 via digital mail (e-Boks or digital mail through the public sector). The survey was sent to 49,325 individuals, of which 3,271 did not receive it due to opting out of e-Boks or digital mail, or due to rejection upon loading. 46,054 households had the opportunity to respond to the survey, of which 18,990 chose to do so, giving a net response rate of 38.5%.

### 3.4 Data validation

In the questionnaire, there is an advanced validation of respondents' statements with maximum limits for different types of firewood measurements. The maximum values for consumption are set at 50 for firewood sold in cubic meter measures or wood towers, while for wood briquettes and wood pellets, an upper weight limit of 25,000 kg is set.

The questionnaire also includes an advanced validation of respondents' statements regarding the consumption of firewood, etc., with different maximum limits for different firewood measurements. The maximum values for consumption are set at 50 for firewood sold in cubic meter measures or wood towers, while for wood briquettes and wood pellets, an upper weight limit of 25,000 kg is set.

The response dataset has also been reviewed for various types of errors using both manual and automated methods. - Obvious errors and misunderstandings. - In some cases, residents in occupied holiday homes have erroneously reported the same consumption in both the dwelling (holiday homes for year-round living) and under holiday homes. The consumption in the holiday home is set to 0 to avoid double counting and potential overestimation of total firewood consumption. - In cases where "other" or "unknown" heating systems were selected as the primary heating source, but one or more heating sources were specified in the detailed text, the primary and possibly secondary heating sources have been recoded.

- Automatic corrections
- If a primary heating source based on burning wood, etc., is indicated, there must be a physical consumption of firewood, wood briquettes, or wood pellets. The same applies to any secondary heating sources unless it is stated that they were not in use during the season. Responses where no consumption quantities are indicated are imputed based on median values from the total energy consumption of other respondents, converted to equivalent cubic meters of sawn, split, and stacked wood. This type of firewood was chosen as it is the most common.
- Outliers at the top and bottom of firewood consumption have been identified and corrected. Data includes outliers with unrealistically high consumption as well as responses without reported consumption, even though this is unrealistic. In principle, excessively high values are imputed with the 97.5th percentile of comparable responses, while very low responses are imputed with the 2.5th percentile.

### **3.5 Data compilation**

The response dataset is manually and automatically reviewed for obvious errors and misunderstandings, logical errors, and inconsistencies, as well as for missing or excessively high/low values. Missing values are imputed based on the other responses, and very high or low values are adjusted down or up based on the 97.5th or 2.5th percentiles, respectively. The adjusted data is corrected as described in section 3.6, and the results are then scaled to the population level. The scaling weights used are calculated to reflect all households in Denmark and result from stratification. In line with previous surveys, these scaling weights are also used in a corrected form to scale the results for unoccupied holiday homes; see section 3.06 for correction. Finally, the scaled and corrected data is tabulated.

Energy consumption is calculated as the calorific value of the consumed amounts of firewood, etc., using the following conversion factors:

- Cubic meters of firewood: 5.94 GJ per unit
- Cubic meters of sawn, split, and stacked firewood: 7.40 GJ per unit
- Box cubic meters of firewood: 4.39 GJ per unit
- Wood tower: 14.50 GJ per unit
- Wood briquettes: 17.50 GJ per 1,000 kg
- Wood pellets: 17.50 GJ per 1,000 kg

### 3.6 Adjustment

Three corrections have been made to the edited consumption data:

*Correction for unreported firewood consumption in rented holiday homes:* For holiday homes rented out from September 2023 to April 2024, where the reported consumption quantities do not cover tenants' or borrowers' consumption, this is corrected by multiplying the consumption by the ratio of the number of weeks rented out during the period to its total length. The correction factor is calculated as (Number of weeks rented/(Number of weeks from September to April - Number of weeks rented)). The respondent's reported consumption is corrected as follows:

Corrected consumption = Immediate response on consumption · (1+correction factor).

This correction is specific to each relevant response, i.e., for holiday homes without permanent residents that were rented out from September to April and where the reported consumption does not cover the tenant's consumption of firewood, etc.

*Degree day correction:* The survey asks about firewood consumption, etc., during the period from June 2023 to May 2024. To convert consumption from the 2023/2024 heating season to the calendar year 2023, the consumption is corrected for temperature variations using the ratio between the number of degree days in the heating season and the calendar year. The Danish Meteorological Institute (DMI) publishes [månedsvise opgørelser](#) on the number of degree days, and for the calendar year 2023, the total number of degree days was 2754, while the number of degree days in the 2023/2024 heating season was 2696.

The correction factor is therefore calculated as  $2754/2696=1.0218$ , meaning that the consumption calculated from the collected data is multiplied by this factor.

This correction applies to all calculated consumption quantities and derived energy calculations, but not the number of firewood installations.

*Correction of scaling weights for unoccupied holiday homes:* To scale the responses for unoccupied holiday homes, the scaling weights calculated for responses regarding dwellings are used. Without correction, these weights would lead to an overestimation of the number of unoccupied holiday homes in the survey compared to the official statistics from BBR and Statistics Denmark (BOL101) [[www.Statbank.dk/BOL101](#)]. Based on how many respondents in the survey state that they own/use a holiday home in Denmark, this corresponds to 360,572 unoccupied holiday homes in Denmark. The official figure for 2023 is 222,066, and the difference is partly due to several households jointly owning a holiday home. To provide a more accurate picture of unoccupied holiday homes, the scaling weights are adjusted by the ratio between the calculated number and the official figures.

The correction factor for holiday homes in 2023 is as follows:  $360,572/222,066 = 1.62372$ .

All results concerning the number and total firewood consumption for unoccupied holiday homes are divided by a correction factor of 1.62372 (or multiplied by 0.6159) to avoid overestimation.

## 4 Relevance

The survey was developed with support from a working group with representatives from the Danish Energy Agency and the Danish Environmental Protection Agency, who use the results for calculating energy consumption and particle emissions from wood-burning stoves. Additionally, the statistics are of interest to others concerned with energy and the environment. As the survey is new under Statistics Denmark, there is no experience yet with user satisfaction.



#### **4.1 User Needs**

The statistics are of particular interest to the Danish Energy Agency and the Danish Environmental Protection Agency, who can use the results to account for energy consumption and calculate particle emissions from wood-burning stoves. Additionally, the statistics are of interest to others with an interest in energy and the environment, contributing to Statistics Denmark's overall energy consumption accounts.

#### **4.2 User Satisfaction**

The survey was developed with support from a working group with representatives from the Danish Energy Agency and the Danish Environmental Protection Agency. As the survey is new under Statistics Denmark, there is no experience yet with user satisfaction.

#### **4.3 Data completeness rate**

Not relevant for this statistic.

### **5 Accuracy and reliability**

There will always be errors associated with sample-based and questionnaire-based statistics. The survey framework was reviewed and quality assured before distribution, but it is rare to avoid identifying sources of error afterward. The results of the statistics are compared with previous, relevant studies on wood consumption, etc., and deviations are to be expected due to normal sampling uncertainty, minor differences in data processing, and real changes in the prevalence and consumption patterns regarding heating in private homes and holiday homes.

#### **5.1 Overall accuracy**

The statistics are associated with a certain level of uncertainty, as especially very small consumptions can be difficult for the respondent to assess. Similarly, the consumption of wood, etc., not purchased in standard trade measures (from gardens, wood waste, gathering wood) is difficult to assess.

#### **5.2 Sampling error**

No sampling error has been calculated for the survey.

### 5.3 Non-sampling error

There will always be errors associated with sample-based and questionnaire-based statistics. The survey framework was reviewed and quality assured before distribution, but it is rare to avoid identifying sources of error afterward. To address the following sources of error, the dataset is reviewed to identify potential errors or to justify large consumptions, etc. In the wood survey, it is a source of uncertainty that respondents are unlikely to have a detailed record of wood consumption and may not fully understand the wood measurement units used (wood stacks, cubic meters, forest cubic meters, etc.). Consumption responses are therefore in some cases best estimates. Note, however, that wood measurements in the questionnaire are illustrated for the respondents. It can be difficult to convert how many wood baskets, number of days with a fire in the fireplace, or how much the woodpile has shrunk into the measurement units presented in the questionnaire.

People who primarily burn "other materials" (e.g., pallets, used wooden items) may not be able to answer the consumption questions accurately, as their consumption pattern is not measured in cubic meters. In future surveys, a free text field with the option to describe what is being burned and how much may improve the precision of the statistics. Misunderstanding of heating methods: It cannot be ruled out that some respondents simply do not know what type of stove they have in their home. In addition to this source of error, language difficulties must be mentioned, as the survey asks detailed questions about heating terms, heat sources, etc., which for people without a Danish upbringing can lead to misunderstandings.

Movements in the housing market: People move and may mistakenly answer for heating and consumption in a different home than the selected one.

Holiday homes and summerhouses with year-round occupancy: People who have registered their address in their (now) former holiday home may find it difficult to feel comfortable with the survey framework. In some cases, it may seem that the respondent answers that there is both a wood-burning stove in the home (where the address is registered) and in a holiday home, and it is assumed that this is a case of double counting (see section 5.2).

Responses with large consumption: For some households, wood-fired heating is the primary heating method, and therefore it is necessary in the survey framework to allow responses where a significant amount of wood consumption is reported.

There may be a bias in who chooses to respond to the survey. For example, it is conceivable that people who are particularly interested in the topic of "heating" respond to the questionnaire and that these have a particularly high or, conversely, particularly low rate of wood-burning stoves. Additionally, people without digital mail have not participated.

### 5.4 Quality management

Statistics Denmark follows the recommendations on organisation and management of quality given in the Code of Practice for European Statistics (CoP) and the implementation guidelines given in the Quality Assurance Framework of the European Statistical System (QAF). A Working Group on Quality and a central quality assurance function have been established to continuously carry through control of products and processes.

## **5.5 Quality assurance**

Statistics Denmark follows the principles in the Code of Practice for European Statistics (CoP) and uses the Quality Assurance Framework of the European Statistical System (QAF) for the implementation of the principles. This involves continuous decentralized and central control of products and processes based on documentation following international standards. The central quality assurance function reports to the Working Group on Quality. Reports include suggestions for improvement that are assessed, decided and subsequently implemented.

## **5.6 Quality assessment**

There will always be errors associated with sample-based and questionnaire-based statistics. The survey framework was reviewed and quality assured before distribution, but it is rare to avoid identifying sources of error afterward.

## **5.7 Data revision - policy**

Statistics Denmark revises published figures in accordance with the [Revision Policy for Statistics Denmark](#). The common procedures and principles of the Revision Policy are for some statistics supplemented by a specific revision practice.

## **5.8 Data revision practice**

The statistics are new under Statistics Denmark, and there has been no need for revisions.

## **6 Timeliness and punctuality**

The survey is conducted every two years, and the publication time is two months from late May to late August. It is not possible to assess punctuality as the statistics are new under Statistics Denmark.

### **6.1 Timeliness and time lag - final results**

The statistics do not operate with preliminary and final data.

### **6.2 Punctuality**

It is not possible to assess punctuality as the statistics are new under Statistics Denmark. The statistics do not operate with preliminary and final data.

## **7 Comparability**

The statistics replace previous versions of the Wood Survey, which, at the initiative of the Danish Energy Agency, has generally been conducted every two years, most recently in 2021.

### **7.1 Comparability - geographical**

No comparisons have been made with similar international statistics.

## 7.2 Comparability over time

The statistics replace previous versions of the Wood Survey, which, at the initiative of the Danish Energy Agency, has generally been conducted every two years, most recently in [2021](#) og [2019](#).

## 7.3 Coherence - cross domain

In addition to previous versions of the Wood Survey (see section 7.02 Comparability over time), reference can be made to the Danish Energy Agency's [Biomass Analysis](#) and Ea Energy Analyses' [The Danish Wood Pellet Market 2022](#).

## 7.4 Coherence - internal

Not relevant for this statistic.

## 8 Accessibility and clarity

The plan is for the statistics to be published every other year in the StatBank under the topic [Energy Consumption](#) with the title *Firewood and Other Biomass for Heating* and in News from Statistics Denmark on Energy Consumption. More detailed results can also be retrieved on the statistics' [theme page](#).

### 8.1 Release calendar

The publication date appears in the release calendar. The date is confirmed in the weeks before.

### 8.3 User access

Statistics are always published at 8:00 a.m. at the day announced in the release calendar. No one outside of Statistics Denmark can access the statistics before they are published.

### 8.2 Release calendar access

The Release Calendar can be accessed on our English website: [Release Calendar](#).

### 8.4 News release

Upon the release of new results, a NEWS will be issued by Statistics Denmark in the series *Firewood and Other Biomass for Heating*.

### 8.5 Publications

Not relevant for this statistic.

## **8.6 On-line database**

The results of the statistics are published in the form of tables in the StatBank under Environment and Energy/Energy Consumption/Firewood and Other Biomass for Heating. - BRANDE01 - BRANDE02 - BRANDE03

## **8.7 Micro-data access**

Microdata is made available through DST's Research Service after publication, following the applicable rules on anonymization of respondents.

## **8.8 Other**

There are no data deliveries to Eurostat or other international organizations.

## **8.9 Confidentiality - policy**

The statistics follow DST's data [confidentiality policy](#).

## **8.10 Confidentiality - data treatment**

The statistics are published at a level where there are no issues with the confidentiality of individual cells.

## **8.11 Documentation on methodology**

Not relevant for this statistic.

## **8.12 Quality documentation**

Results from the quality evaluation of products and selected processes are available in detail for each statistics and in summary reports for the Working Group on Quality.

## **9 Contact**

Administratively, the statistics are placed within the office of Research, Technology, and Culture. The statistician in charge is Henrik Huusom, phone: 39 17 38 66, email: [hhu@dst.dk](mailto:hhu@dst.dk).

### **9.1 Contact organisation**

Statistics Denmark

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