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# HEATING WITH WOOD – THE PROPER WAY



SINGLE-ROOM  
APPLIANCES

With support from



Federal Ministry  
of Food  
and Agriculture



**FNR**  
Fachagentur Nachhaltende Rohstoffe e.V.

by decision of the  
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# FOREWORD

Dear Ladies and Gentlemen,  
an important sector of the use of bioenergy is the production of heat from wood. In 2014 about 87 percent of renewable heat in Germany was based on biomass. Around 50 percent of the heat in households is provided by using wood fuel in furnaces and biomass boilers.

The number of wood fired heating systems and in particular single-room fireplaces, like stoves and boilers for wood log or woodpellet use in households has increased enormously in recent years. Also the amount of wood fuel used to heat entire houses is increasing significantly.

Heating with wood is largely carbon neutral. On the one hand, considerable amounts of greenhouse gases can be saved by using wood instead of fossil fuels. On the other hand, particulate emissions are – despite technological progress and stricter emission standards – on a relatively high level.

New acquisitions of more efficient and low-emission wood fired heating systems can only in the longer term contribute to a reduction of particulate emissions. The proper use and operation of existing furnaces comes more and more in the point of view to reduce particulate matter. Studies at research institutions and by Stiftung Warentest show, that a proper operation can significantly reduce particulate and other pollutant emissions.



Therefore, the Federal Ministry of Food and Agriculture supports a project of HKI Industrieverband Haus-, Heiz- und Küchentechnik e.V. to clarify the proper use of wood fuel and wood fired systems.

This publication provides you valuable tips and recommendations for an eco-friendly use of wood fuels in heating systems. And by proper use of firewood wood you can help to contribute to reduce environmental pollution and neighborhood nuisance.

I wish you much pleasure in heating with wood.

A handwritten signature in black ink, appearing to read 'Andreas Schütte'.

Dr.-Ing. Andreas Schütte  
Managing Director Fachagentur  
Nachwachsende Rohstoffe e.V. (FNR)

Ladies and Gentlemen,  
Germany's federal government is pursuing the goal of expanding the use of renewable energy. The share of renewables in power, fuel and heat generation is to be boosted from 10 percent in 2010 to 60 percent in 2050, thus making a significant contribution toward achieving its climate-protection targets.



The use of biomass to generate heat is largely CO<sub>2</sub>-neutral and does not amplify GHGs. The regrowing resource “wood” is available from sustainably managed domestic forests as a renewable energy carrier. The deployment of wood and its proper use in the stove or fireplace (the “appliance”) help promote the utilization of renewables, thus sparing the environment. If an appliance is operated properly, particulates and other emissions are minimized.

In this brochure, we have compiled for you the chief information on correct heating with wood and on the appropriate storage and handling of wood. You are also given an overview of the appliances usually employed in Germany. If you do not yet own a stove and are thinking about buying one or about replacing your old system with new equipment, this brochure has important facts for you. We give you useful tips for the proper operation of your fireplace and how to avoid its maloperation.

On our homepage, [www.richtigheizenmitholz.de](http://www.richtigheizenmitholz.de), you will also find a short video (in German) on proper heating with wood and other essential information.

Happy reading!

A handwritten signature in black ink, appearing to read 'Frank Kienle', written in a cursive style.

Frank Kienle  
Managing director of HKI  
Industrieverband Haus-, Heiz- und  
Küchentechnik e.V.

# 1 THE FUEL “WOOD”

There are many reasons for using wood as a fuel in single-room appliances. Besides ecological aspects, there are also economic considerations. The clear ecological benefits of heating with wood in auxiliary-heating systems may be seen in the fact that wood, unlike fossil energy carriers, can be described as CO<sub>2</sub>-neutral. This means that, when wood is burned, the carbon dioxide (CO<sub>2</sub>) released is equal to the amount that the tree previously absorbed when growing. Sustainable forestry, moreover, ensures that a sufficient

number of trees is regrowing at all times. So among the economic advantages we find that wood is a regionally available, continuously regrowing fuel. The utilization and production of domestic wood creates numerous jobs in industry, commerce, services, agriculture and forestry, thus doing their bit to add value in a region.

## 1.1 Fuels permissible in Germany under its 1<sup>st</sup> Immission Control Ordinance (BImSchV) (Ordinance on Small Combustion Facilities)

Under Germany's 1<sup>st</sup> BImSchV, a whole host of fuels may be used among biogenic fuels in single-room appliances. For practical implementation, absolute heed must be paid that the fuel to be used is listed explicitly as being suitable in the operating instructions of the fireplace's manufacturer.

In practice, this means use of the following biogenic fuels:

- natural (untreated) lumpy wood, incl any attached bark, specifically in the form of split logs; pressed blocks made from natural (untreated) wood in the form of wood briquettes or in the form of wood pellets, each with quality certificate.





*Remember: Your appliance is no waste-incineration plant!*

Not admissible are, for example:

- Treated woods/waste wood
  - Wood treated with preservatives
  - Painted, lacquered or coated wood
  - Plywood, chipboard, fibreboard or otherwise glued wood
- Bark briquettes
- Plastics of any kind
- Any type of refuse!

Owing to the high amount of pollutants emitted, use of inadmissible fuels has an adverse impact on the environment and leads to neighbourhood disputes. In addition, the pollutants produced can damage your appliance and chimney and entail high clean-up costs.

## 1.2 Buying wood and the varieties on offer

Wood as fuel for fireplaces is available in several varieties. They are split logs, wood briquettes and pellets.

Usual firewood types in Germany are the deciduous woods birch, beech and oak, and the coniferous woods spruce, fir and pine. Depending on the tree type, the wood has different net calorific values.

One frequently used way to obtain firewood is self-supply in the forest. For non-forest owners, this requires a wood-gathering certificate (Leseschein) available from the forestry commission office (Forstamt). Make sure you also heed the necessary safety rules for your wood harvest, like having a chainsaw “driving licence” and suitable safety clothing. A more practical, but also more expensive way is to buy fireplace-ready logs that are available commercially. You have the option of buying firewood by the sack-load in DIY stores, from cooperatives or fuel dealers. But you can also have it delivered to your home – the convenient solution. The firewood supplier delivers the wood as stere, cubic metre or loose cubic metre fireplace-ready free to your door.



### 1.2.1 Measurement units in buying split logs

When buying split logs, different measurement units are used. The most usual are:

#### Solid cubic metre (Fm)

A solid cubic metre is one cubic metre of wood without spaces in between. This is equivalent to the size of a cube with the edge lengths: 1 metre wide, 1 metre long and 1 metre high.

#### Cubic metre (Rm)

A cubic metre is loosely stacked wood, including spaces in between. In southern Germany, instead of the term cubic metre, the term stere (Ster) is often used.

#### Loose cubic metre (Srm)

A loose cubic metre is loosely heaped wood with spaces in between.

Using conversion factors, you can compare the various measurement units. Here, heed should be paid to the type of wood (soft/hard wood) and to the length of the logs. While wood briquettes and pellets are available as industrial fuels in an unvarying quality, split logs come in different dimensions and water content. The dimensions of the logs are set by the appliance maker and may be found in the operating instructions. Usually, log circumference should be 20 to 30 centimetres. Roundwood should be split. Common log lengths are 25 centimetres, 33 centimetres or 50 centimetres.

Other wood products you can also use in your fireplace are wood briquettes and wood pellets. Both products are commercially available in practical packaging units.

### COMPARISON CUBIC METRE – LOOSE CUBIC METRE\*

	Loose cubic metre Log length: 33cm	Cubic metre Log length: 33cm	Solid cubic metre Wood block
Beech	1.00	0.68	0.42
Fir	1.00	0.62	0.40
Beech	1.48	1.00	0.62
Fir	1.62	1.00	0.64
Beech	2.38	1.61	1.00
Fir	2.52	1.55	1.00

Source: excerpt Technology and Support Centre (TFZ), Straubing, conversion factors for various solid measures for split logs

\* Example: One loose cubic metre of beech wood is equivalent to 0.68 cubic metres/stere or 0.42 solid cubic metres. One cubic metre of beech wood is equivalent to 1.48 loose cubic metres or 0.62 solid cubic metres.

### 1.2.2 Moisture content of wood

When using split logs, absolute heed should be paid that the moisture content prescribed by law falls short of 25 percent; a 25 percent moisture content is equivalent to a water content of approx. 20 percent. Harvest-fresh wood at any event must be dried for one to two years before being used – depending on the properties of the storage site and the state of processing (sawn and split).

A distinction must be made between the water content and the moisture content of the wood. What is meant by water content is the mass of the water in the wood relative to the total mass of the wood. The moisture content of the wood refers to the mass of the water relative to the dry mass of the wood.

### NET CALORIFIC VALUE OF WOOD, DEPENDING ON WATER CONTENT

Water content		15	20	30	50
Tree type	Unit	Net calorific value			
Fir	kWh/kg	4.32	4.02	3.44	2.26
	kWh/Fm	1,926	1,904	1,863	1,713
	kWh/Rm	1,348	1,333	1,304	1,199
Pine	kWh/kg	4.32	4.02	3.44	2.26
	kWh/Fm	2,190	2,166	2,118	1,948
	kWh/Rm	1,533	1,516	1,483	1,364
Beech	kWh/kg	4.15	3.86	3.30	2.16
	kWh/Fm	2,724	2,692	2,631	2,411
	kWh/Rm	1,907	1,885	1,841	1,687
Birch	kWh/kg	4.15	3.86	3.30	2.16
	kWh/Fm	2,568	2,538	2,480	2,272
	kWh/Rm	1,798	1,777	1,736	1,591

Source: excerpt Bavarian State Institute of Forestry (LWF), instruction sheet 20 of December 2011

### 1.2.3 Drying and storing split logs

If the fuel is too wet or too dry, unnecessary emissions emerge during combustion. To achieve a water content in the wood of 15 to 20 percent that is optimal for combustion, the logs must be stored at a well-ventilated site protected from rain.

The individual logs should be stacked in such a way that air can flow through the wood pile, and that the wood doesn't touch the ground directly. The storage time amounts to one to two years, depending on wood type and the ventilation of the storage site. Before using the wood, you should check its water content. The trade has low-cost meters. If you note that your wood is too dry or too wet, store it for a few more weeks at a well-ventilated site before using it. Before firing the logs, you should also make sure that they are free of alien matter, like earth, moss and other impurities.



*Two electrodes are driven into the wood. The resistance of the current flow shows the residual water content.*

*The stock of wood is roofed-over and away from the ground.*



### 1.2.4 Storing other wood fuel

Caution should be exercised when transporting and storing pellet sacks. To avoid dust and chaff, the sacks must be transported carefully and should be stored in a dry place. The same is true of wood briquettes and kindling wood.



*Wood pellets*



*Split logs*



*Hardwood briquettes*



*Kindling wood*

## 2 SINGLE-ROOM APPLIANCES FOR SOLID FUELS

Germany currently has some 14 million single-room appliances installed.

The most usual fireplaces are:

- Open-fire stoves
- Tiled stoves
- Storage heating stoves
- Closed fireplaces
- Range cookers
- Pellet stoves

### **How do these appliances work?**

The basic principle behind all these appliances is the burning of split logs, wood briquettes or pellets in a closed firebox. The necessary combustion air is taken from the installation room and/or from another room in the building that is connected to the installation room. It may also be supplied from outside. The correct amount of combustion air is set manually, depending on appliance type and design. Some appliances have a so-called automatic system (air-inlet control and/or air regulation). The effect is that the fire is optimally supplied with the right amount of combustion air.

The heat that emerges during combustion is distributed via heating surfaces to a heat-transfer medium (air/water) and, by heat radiation, to the installation room and any connected adjacent rooms. In particular, the heat radiation given off to the installation room is perceived as very pleasant. In

addition, the visible play of flames creates a cosy mood.

What follows describes the basic features of the various appliance types, although not every variant or special design will be discussed. You will find the precise working mode of your stove in the manufacturer's installation and operating instructions. The specifications laid down in the following instructions are of general application. No matter what appliance you opt for, apply to your district chimney sweep and a specialist company for advice, planning and installation.

### **2.1 Open-fire stoves**

The open-fire stove is an appliance manufactured in series with a basic metal design. It is enclosed in the most varied of materials, eg lacquered or enamelled metal, tiles or natural stone.

The firebox is usually lined in minerals and fitted with a shallow-bed firing system with or without grate. Shallow-bed firing means that merely one layer of split logs is placed on the existing embers and burnt.

This burn-out process takes about 30 to 45 minutes, after which new fuel has to be put on the fire. The heat output to the installation room is mainly by warm-air convec-



*The open-fire stoves*

tion (cold air near the floor warms up and rises) and less by heat radiation. Operation of an open-fire stove at other than the output specified in the operating instructions, so-called light-load operation (slow combustion), is not envisaged.

## 2.2 Tiled stoves

DHot-air tiled stoves consist of an industrially made metallic firebox with downstream heat exchanger. It is surrounded by an individually faced, professionally set up heating chamber made from mineral construction materials (e.g. tiles). Pre-fab modules, too, are available. The firebox is usually lined in minerals and, depending on the appliance type, fitted with a shallow-bed firing system or a full-bed firing system.

Firing involves adding a sufficient quantity of split logs to existing embers and burning at the rated heat output. This burn-out process takes about 70 to 100 minutes, after which new fuel has to be put on the fire. Heat is distributed into the installation room mainly via

warm-air convection and less by heat radiation. Operation of a tiled stove at other than the output specified in the operating instructions, so-called light-load operation (slow combustion), is not envisaged.

A basic tiled stove, also referred to as storage heater, consists of a metal or mineral firebox in which a large amount of split logs is burned in one or several loads. The released heat is transferred to a large mass of storage material (e.g. fireclay) via the heating gases on their way to the chimney.

The heat is slowly released into the installation room with a low output, mainly via heat radiation and some outer-wall convection. These stoves are installed individually or offered industrially as modules.

A combination of these two systems is a hot-air tiled stove with the mineral store downstream of the firebox. Although it does not have the storage capacity of a basic tiled stove / storage heater, it signifi-



*The tiled stove*

cantly prolongs the heat release after the fire extinguishes compared with a straight convection stove.

### 2.3 Closed fireplaces

Closed fireplaces have a similar design to hot-air tiled stoves. They consist of an industrially manufactured metallic firebox with a large viewing panel and only rarely have a downstream heat exchanger.

They are faced individually by a professional or built industrially using pre-fab modules. Their firing and heat release are comparable with those of open-fire stoves.



*The closed fireplace*

### 2.4 Range cookers

Range cookers are used above all for cooking and baking. As a side effect, they also heat the installation room. One exception is the heating range which can feed some of the emerging heat via a water heat exchanger into the central heating system. Often, range cookers have a height-adjustable grate. Its position determines the fuel amount and the refuelling interval.



*The range cooker*

## 2.5 Pellet stoves

Depending on its design, a pellet stove is suitable for a broad output range. It is designed to operate in the lower output range (low position) as well. From a fuel storage container, the pellets are mechanically delivered to a combustion device and ignited automatically there. The correct fuel amount is added automatically, depending on the preset output. Depending on the size of the fuel storage container and on the output set, a pellet stove can be operated for several days without refilling any fuel. Operating a pellet stove requires electric energy.

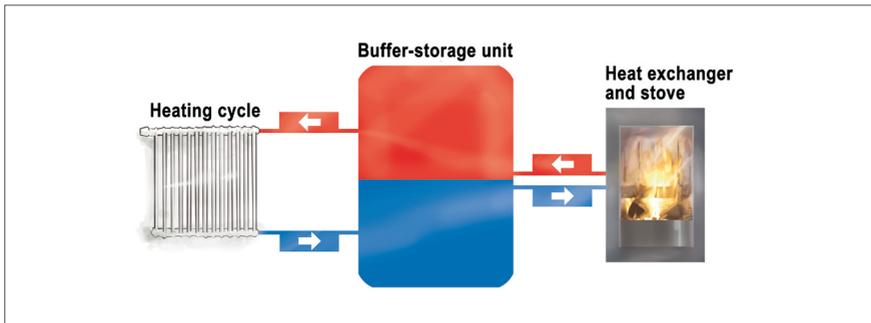


*Pellet stove*

## 2.6 Single-room appliances with boilers

The technology of single-room appliances with boilers enables the heat generated to be released to other rooms in the house. Here, use of buffer storage is meaningful. This is also fed by the house's main heat

source, the central-heating system. Here again, it must be ensured, at all events, that installations of this type are planned and executed by a specialist firm.

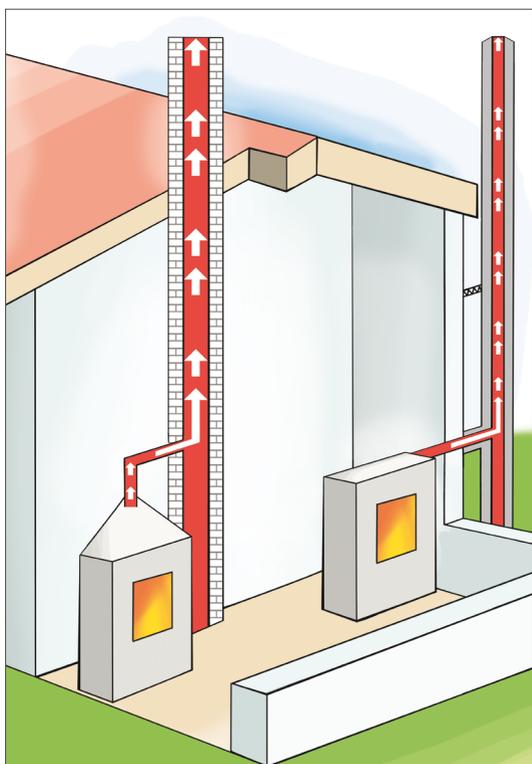


*Use of a wood-burning stove in combination with a buffer-storage unit is possible.*

### 3 CHIMNEY

The chimney is the engine of your appliance. Irrespective of whether a chimney is already in place, must be built after the event or is planned for a new building, the chimney ensures safe discharge of the combustion gases emerging when the appliance is in operation. For this purpose, it is necessary to match chimney and appliance.

The data (minimum feed pressure, flue-socket temperature, flue-gas mass flow, rated heat output, possibly thermal rating) necessary for this may be found in the documents for your appliance and on its type label. Using these data, your chimney sweep or specialist firm can assess your existing chimney's suitability or can design a new chimney.



*A chimney can also be installed outside after the event by fixing it to the façade.*

As operator of a fireplace, you have a duty before commissioning it to inform the (licensed) district chimney sweep about the installation. It is meaningful to have a word about your ideas with the chimney sweep and specialist firm before buying the appliance, in order to define, among other things, its optimal output.

## 4 HEATING PROPERLY USING WOOD – FROM LIGHTING UP TO HEATING

Anyone can light a fire. Efficient and low-emission heating needs learning.

Operating a fireplace on a completely emission-free basis is not possible. Combustion products, like carbon dioxide, carbon monoxide, as well as hydrocarbons and sulphur oxides emerge. Particulates, too, arise.

What follows describes how you can avoid unnecessary emissions, eg particulates, by proper ignition and firing. To get off to a good start, make sure the appliance is clean and in a technically unobjectionable condition. It must also be connected to a matching chimney. Every installed system is checked by a chimney sweep. Regular maintenance by a specialist firm is recommended.

### 4.1 Lighting up/kindling

A fundamental distinction must be made between two types of lighting-up process: lighting up from above and lighting up from below. Kindling from above must be given preference in grate-less firing systems. Kindling from below is recommended where a floor grate exists.

#### **For both lighting-up types you'll need:**

- Suitable kindling material in a sufficient quantity. Suitable forms include, eg, fire-lighter cubes, fire-lighter pads or wood wool. These are commercially available.
- Kindling wood cut roughly into pieces about the thickness of your thumb. They are also commercially available.
- Split logs with a circumference of about 20 centimetres.

#### **Not to be used are:**

- Flammable liquids, like spirit or kerosene, because of the risk of deflagration
- Unsuitable flammable substances (see chapter 1.1, p. 7)

#### 4.1.1 Lighting up, top-down

Place two to three logs at a short distance next to each other on a clean firebox floor. Here, the split edges of the logs should face upward. The kindling wood is placed crisscross on the logs. Placed in-between this kindling wood is sufficient kindling material. Since the ignition process needs large amounts of combustion air, set the air vent to the “Anzünden” (ignite) or “max” position. The precise position of the air-vent slider may be found in the operating instructions under the keyword “Anzünden”. Make sure that any existing flue dampers and gate valves are opened. Ignite the fire-lighters and then shut the firebox door. After a brief time already, visible flames will develop in the firebox.



*Open air supply*



*Firing element positioned on the split logs*



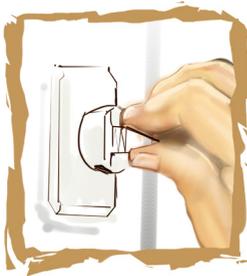
*Light up kindling material*

Please note: the operating instructions of some grate-less appliances recommend not removing all of the wood ash from previous firing sessions before lighting a new fire. If this is true of your appliance, kindly act accordingly.

#### 4.1.2 Lighting up, bottom-up

In this method, the kindling materials are laid on the opened floor grate, with the firelighters placed between the kindling wood. On these are stacked approx. two layers of kindling wood. On the kindling wood, at a short distance and with the split edge facing down, come two to three not-too-thick logs.

Since the ignition process needs large amounts of combustion air, set the air vent to the “Anzünden” (ignite) or “max” position. The precise position of the air-vent slider may be found in the operating instructions under the keyword “Anzünden”. Make sure that any existing flue dampers and gate valves are opened. Ignite the firelighters and then shut the firebox door. After a brief time already, visible flames will develop in the firebox.



*Open air supply*



*Firing element positioned under the split logs*



*Light up kindling material*



*The fire has reached the entire amount of the wood. Now throttle the air supply.*



*Small flames are still very visible above the basic embers.*



*Seemingly cold ash? Dispose of it in a metal bucket.*

## 4.2 Heating

As soon as the flames have reached the entire amount of wood and lit it up, the air supply is lowered. Here again, please refer to the operating instructions for the exact settings of your appliance.

The correct time for putting more wood on has come when basic embers have formed and merely smaller flames can still be seen. Slowly open the firebox door to avoid smoke escaping.

To go on heating, logs are placed on the embers with their split edge facing down. If the manufacturer says so in the operating instructions, you can now also use wood briquettes.

Before carefully putting more fuel on the fire, push together the embers to make a compact fuelbed. On no account should you throw the fuel into the firebox. This could damage the firebox's lining and cause embers to escape.

To achieve quick cross-ignition of the added fuel, the air vent can be opened further. As

soon as the logs or briquettes have lit up, reduce the combustion-air supply to normal.

Design-related changes might also have to be made to the floor grate's settings, as described in the operating instructions. You can repeat the heating process as often as you like. In the case of fireplaces that are operated using larger amounts of fuel, as intended, it must be ensured that the split logs are not placed in the firebox crisscross, but – as in wood storage – layered loosely in the firebox in one direction.

## 4.3 At the end of heating

No more fuel is added to the fire. After the residual embers have extinguished, the combustion-air supply should be shut. This prevents the installation room from cooling down. Please note that seemingly cold ash may still contain small embers. To avoid fires, therefore, it is recommended that you place the ash removed from the appliance in interim storage in a metal bucket with a lid suitable for this purpose before it is disposed of in the bin for residual waste.

## 5 BUYING A NEW APPLIANCE

Before you buy a new fireplace, give a thought to the personal requirements that your appliance must meet. Here, account should be taken of the size of the installation room and adjacent rooms. In addition, clarify in advance how often you intend to operate the appliance, and how much money and effort you want to expend on fuel procurement and handling.

Also to be heeded at this point are the statutory requirements to be met by an appliance's emission values. The requirements have been tightened in Germany. Fireplace owners have a duty to provide their chimney sweep with evidence that their systems meet the requirements under the 1<sup>st</sup> Immission Control Ordinance (BImSchV). If an appliance does not meet these requirements, it must be retrofitted, exchanged or shut down.

HKI has a database with technical information on appliances. This database also contains information on whether an appliance meets the applicable requirements of the 1<sup>st</sup> BImSchV. Please find the appliance database at: [www.cert.hki-online.de](http://www.cert.hki-online.de) (in German).

The evidence for your (licensed) district chimney sweep that you meet the statutory requirements may be provided by submitting a test certificate/manufacture's declaration or using the HKI database. Of course, you can also task your chimney sweep with

measuring the emissions in your home, although this is associated with certain outlays, ie costs. Moreover, it is not certain that your fireplace adheres to the prescribed emission thresholds. Retrofitting your appliance with emission-reducing measures, eg a catalyst or an electrostatic precipitator, too, is possible. Please note that there must be sufficient space for the installation work, that costs will be incurred and that the installed equipment must be maintained.

An exchange of an old for a modern new fireplace with a high efficiency (fuel savings!) is recommended by many experts. Modern, commercially available units meet the statutory requirements under the 1<sup>st</sup> BImSchV.

Whatever you opt for, always contact your district chimney sweep and have any upcoming work done by a specialist firm.

Besides emission-law requirements, appliances and any accessories, like dust separators, also have to meet construction-law and safety-related specifications, of course. These are usually stipulated in national and European standards and are checked within the scope of a type test by a notified inspection office, as is the emission behaviour.

For instance, the data on the chimney's dimensions mentioned above and fire safety are tested in a fire trial where the appliance is significantly overloaded. This test also yields the safety distance to flammable elements

in the installation room, as indicated in an appliance's manual and type label. Make sure that this evidence is available when buying an appliance. Please find further information in the above appliance database: [www.cert.hki-online.de](http://www.cert.hki-online.de) (in German).

## 5.1 New unit – The decision to buy

Before deciding to buy, you should clarify the following points:

- What is my heat requirement, what do I want to heat? Is it only the installation room or adjacent rooms as well? Is the appliance to have a water heat exchanger and thus feed into the central heating system? (Attention: only specialist firms – no DIY job!)
  - Do I wish to heat for short periods only or constantly?
  - What do I personally find more agreeable: heat output via warm-air convection, via radiation, or do I want both?
  - Does watching the fire matter to me?
  - How much may the appliance cost?
  - Who will install the appliance?
  - Can I store the fuels properly?
  - Can I dispose of the ash that occurs?
  - Can the floor of the installation room bear the load? Storage heaters, but also tile- / stone-faced appliances can be very heavy.
  - Is the floor of the installation room flammable? Precautions must be taken into account!
  - Is my existing chimney suitable for the appliance of my dreams?
- What about the manufacturer's service if something goes wrong?
  - May I operate a wood-fired appliance where I live at all?
  - Are ventilation systems planned or existing that might impact on the fireplace's operation?
  - Is a shared flue system planned for the chimney? Seek prior review with the district chimney sweep!

## 5.2 Combustion bans

Before planning and obtaining a new appliance, you must clarify whether there is a combustion ban in the locality where you live. Such bans may be found in municipalities' development plans or land-sale contracts. Municipalities may define certain emission thresholds in solid-fuel regulations (BSTV) or prohibit the use of certain systems. By-laws may prescribe a connection to the local- / district-heating grid.

## 6 FURTHER INFORMATION

Information film on correctly heating with wood at: [www.richtigheizenmitholz.de](http://www.richtigheizenmitholz.de) (in German)

Also under:

[www.hki-online.de](http://www.hki-online.de)

[www.cert.hki-online.de](http://www.cert.hki-online.de)

[www.ratgeber-ofen.de](http://www.ratgeber-ofen.de)

[www.schornsteinfeger.de](http://www.schornsteinfeger.de)

[www.verbrennungsverbote.de](http://www.verbrennungsverbote.de)

[www.bmel.de](http://www.bmel.de)

[www.umweltbundesamt.de](http://www.umweltbundesamt.de)

[www.fnr.de](http://www.fnr.de)

<http://bioenergie.fnr.de>

<http://heizen.fnr.de>

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[www.hki-online.de](http://www.hki-online.de)

### **References:**

First Ordinance on the Implementation of Germany's Federal Act on Air Pollution Control and Noise Abatement (Small and Medium-sized Firing Installations Ordinance – 1<sup>st</sup>BlmSchV) dated 26.01.2010

Bioenergy manual for small systems:

<http://mediathek.fnr.de/handbuch-bioenergie-kleinanlagen.html> (in German)

Please find free German-language FNR brochures for downloading in the media library under: <http://mediathek.fnr.de>





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