

FIREWOOD HEATING SYSTEMS

Countries in South Eastern Europe have high but often unused wood resources. Therefore, the main objective of the EU-funded project “BioVill” is to foster the local use of wood and biomass for energetic purposes. Bioenergy offers a great way to save fuel costs and to strengthen the local economy. This factsheet provides information on firewood heating systems - their main features, important aspects regarding installation as well as characteristics of firewood.

WHY HEATING WITH WOOD?

Wood offers high value for money

The costs for heating with firewood are usually lower and more stable compared to fossil fuels or electricity.

Wood heating is clean, comfortable and efficient

Modern heating systems are very clean and comfortable and their high efficiency reduces fuel costs.

Wood is a regional resource

The local community is usually able to produce their own firewood which shortens transport distances and keeps the money in the region.

Wood is sustainable

Sustainable forest management secures long-term fuel supply as well as balances ecological, economic and socio-cultural aspects.

Wood is energy security

Wood fuel is available in the local community, regardless the season or economic and political developments.

Wood is climate friendly

The emitted CO₂ during burning wood fuel equals the amount of CO₂ the tree assimilated for growing.

TYPES OF HEATING SYSTEMS:

There are two different types of wood based heating systems available on the market:

- **Stoves – Single Room Heating Systems**

Stoves are very common small burners in the living area (Figure 1). They are used for cooking, space heating or hot water preparation. By using ventilation, additional rooms can be heated or heat exchangers are used to connect a central heating system. Usually, stoves have simple mechanisms to control the burning and require regular attention and maintenance. Stoves are much more efficient than open fireplaces.



- **Boilers – Central Heating Systems**

If the whole house is heated, it would be advisable to use a boiler system based on hot water circulation and buffer storage to increase the energy efficiency. Such boilers usually have to be loaded manually. More comfortable are boilers equipped with a one day fuel reservoir (Figure 2) but can slightly increase the investment. The combustion process in modern boilers is optimized by an automatic or manual air flow control.

Natural flue boilers are the most common firewood heating system. The combustion is regulated manually or via a thermostat.

Wood gasification boilers are even more efficient and have fewer emissions. These boilers are characterised by two burning chambers. In the gasification chamber, the wood is decomposed to charcoal and to gas which is burned in the second chamber. This system offers electronic control, high energy efficiency and comfort.

Modern boilers are clean and offer high comfort & efficiency

- Wood is automatically loaded and gasified
- The gas is burned in a second chamber
- Combustion is electronically controlled

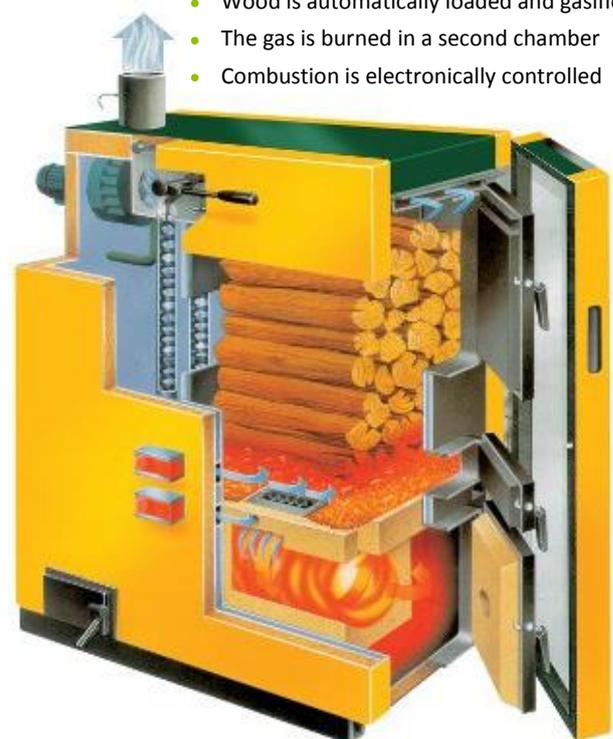


Figure 1: Stove – Single Room Heating System; © viki2win / shutterstock.com
Figure 2: Wood gasification boiler; © KWB

WOOD BOILERS AND EXISTING HEATING SYSTEMS:

A new wood boiler can easily be combined with an existing central heating and buffer storage system. An additional buffer tank stores the heat generated from burning and ensures a demand-driven supply of heat (e.g. night/day or seasonal differences). A partial load operation is avoided and money is saved. Biomass heating systems can be very well combined with a solar collector system which provides warm water during sunny days.

ASPECTS TO CONSIDER BEFORE CHANGING THE HEATING SYSTEM:

- ✓ **What is the intended purpose?**
It is a difference if a single-room or your whole house should be heated. Thus, different technologies are available: stoves, boilers, etc.
- ✓ **Available space for the boiler and the fuel storage?**
For a single family home you need about 10 m³ firewood per year. A boiler requires a minimum of 2 m² space.
- ✓ **Is the combination with an existing heating system useful?**
Firewood heating systems can be combined with existing heating systems. Additional adaptations such as buffer storages can additionally increase the energy efficiency.
- ✓ **What is the proper location for your stove or your boiler?**
Stoves are typically installed in the living area. Thereby, the exact location affects highly their efficiency, e.g. good radiation and convection should be possible. Central heating boilers instead are usually located in a boiler room.
- ✓ **What is the proper capacity of my heating system?**
A heat demand calculation helps you in choosing the right dimension, avoids partial operation load and saves money.
- ✓ **Which fuel do you want to use?**
Make sure to use wood with a good quality (moisture content <20%), the better the quality, the higher is the efficiency rate.
- ✓ **Where can I get the firewood?**
If you cannot prepare firewood yourself, look for a local supplier as firewood is a regional resource.
- ✓ **What are the investment costs?**
Single-room heating systems cost usually up to 1,000 Euro and boilers cost up to 10,000. In general, the comfort increases with the price. The most comfortable and expensive system is based on wood gasification.
- ✓ **Are constructional adaptations necessary?**
Check potential adaptations with the chimney sweeper or a local planner. They can also give advice in the design of the system and which components should be adapted.
- ✓ **Are there regulations or laws concerning heating systems?**
This can be clarified by the municipality and the regional experts at the local BioVill information point.

WHAT IS FIRE/LOG WOOD?

Firewood is cut and split fuel wood of up to 100 cm length used in household wood burning appliances like stoves, fireplaces and central heating systems. **Logwood** is oven-ready fuel wood with a typical length of more than 20 cm.



Figure 3: Staked firewood, © Martin Höher / AEA

Supply

In comparison to wood chips and pellets, the production of firewood is relatively simple. You may prepare it by your own or buy it from local producers or traders. The production should be based on sustainable forest management.

Price

The price will highly depend on local circumstances and the season you buy the firewood. Normally, the market prices decrease in spring and raise in autumn. Compared to pellets and wood chips, firewood is usually cheaper.

Quality

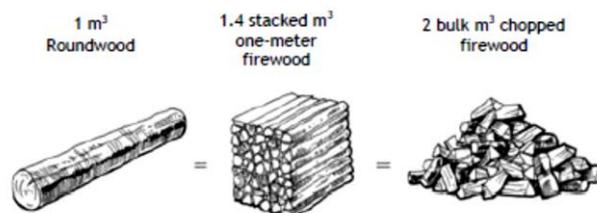
Firewood should be dry, clean and of right size. This ensures efficient burning and high energy yields. Air-dried fire wood requires at least 2 years of storage to reach a moisture content of less than 20%.

Drying & Storage

Proper storage is necessary to achieve low moisture contents:

- A sunny, windy and dry place is ideal for firewood
- Split thick wood; non-split wood takes twice the time to dry
- Do not place wood directly on the ground and cover the stack

Wood requires a certain space for storage. Note that the energy content of 1,000 liters of heating oil required corresponds to about 7 to 8 m³ of softwood or 5 to 6 m³ of hardwood.



In the long term perspective wood is a low cost and sustainable energy source!

FURTHER INFORMATION:

Bioenergy Villages BioVill www.biovill.eu
Austrian Energy Agency www.energyagency.at
European Biomass Association www.aebiom.org

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