

## PELLET 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 wood pellet heating systems - their main features, important aspects regarding installation, as well as characteristics of pellets.

### 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

Wood is often produced locally 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 CO<sub>2</sub> during burning wood fuel equals the amount of CO<sub>2</sub> the tree assimilated for growing.

### TYPES OF HEATING SYSTEMS:

In general, heating with pellets (and warm water supply) is possible in a range from single rooms, family homes up to larger buildings (apartment blocks, agricultural buildings, etc.).

#### ▪ Stoves - Single Room Heating Systems

Usually, a single room heating system (stove) has a capacity of up to 15 kW and heats via radiation and convection. To increase comfort, the system can be combined with a fuel tank, storing pellets for up to two days. This makes pellet heating more comfortable than most firewood heating systems. Space and flue connection is the same as for firewood heating stoves. Be aware that pellet stoves need an electricity connection for operation.

#### ▪ Boilers – Central Heating Systems

They are used as single heating system for one or more family homes with a heat demand above 4 kW. Water is heated in the pellet boiler and circulated in the house. Normally, constructional changes in the house are not necessary except for the fuel storage which is in terms of size comparable with a heating oil tank. The market offers these central heating systems fully automatic and semiautomatic.

The **automatic systems** (Figure 1) offer the same high comfort as oil or gas heating systems. A vacuum suction system or screw conveyor feeds the fuel automatically into the burning chamber.

The comfort of pellet systems is very high due to the following characteristics:

- Ignition and combustion is electronically controlled.
- Temperature and the fuel demand are controlled.
- Due to higher energy density Pellets produce less ash than firewood or wood chips. So ash removal can be reduced to once a year.
- Automatic cleaning system can be installed. Regular cleaning and maintenance is necessary, normally only once a year.
- A heat buffer increases the performance and avoids long warm-up phases when starting.

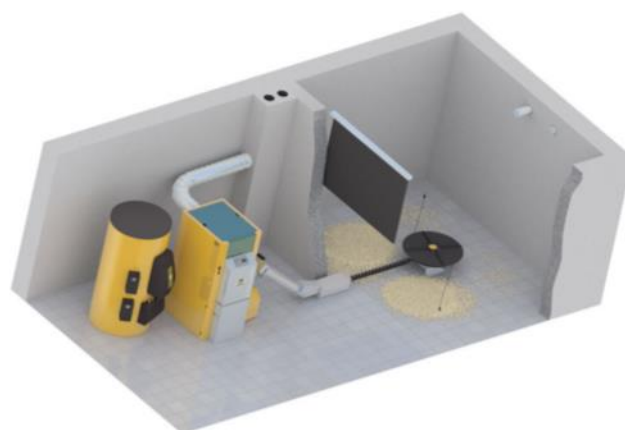


Figure 1: Automatic pellets heating system with separated pellet storage, © KWB

The **semiautomatic system** includes the boiler and an integrated fuel storage of 200-800 litres. If there is no space for storing pellets for a whole season, the semiautomatic system might be more suitable.



Figure 2: Semiautomatic pellet heating system with integrated tank, © Ökofen

## PELLET BOILERS AND EXISTING HEATING SYSTEMS:

Pellet heating systems can be easily integrated in existing central heating systems with buffer storage tanks. The space requirement for storing pellets is comparable to heating oil. In addition, pellet boilers are highly flexible in heat production and able to cover peaks in energy consumption during the whole year. This makes them preferable for combinations with other renewable heating systems such as solar thermal systems or heat pumps.

## ASPECTS TO CONSIDER BEFORE CHANGING YOUR HEATING SYSTEM:

- ✓ **What is the intended purpose?**  
Heating a single-room or your whole house demands different requirements – stove or boiler, size etc.
- ✓ **Available space for the boiler and the fuel storage?**  
If the heating demand is low, a pellet heating system with integrated fuel tank is advisable. Though it provides less comfort, it needs less space than a boiler with storage room. In case of replacing oil heating systems, the size of the required fuel storage would be similar.
- ✓ **What is the proper location for your stove?**  
The location of the stove for single-room heating affects its efficiency, e.g. next to a window it loses energy. Also it has to comply with fire safety regulations.
- ✓ **What is the proper capacity of my heating system?**  
A heat demand calculation helps to choose the right dimension, avoids partial operation load and saves money.
- ✓ **Which fuel do you want to use?**  
Make sure to use pellets with a good quality - the better the quality, the higher the efficiency. Standards e.g. EN plus can help to secure the quality of the pellets!
- ✓ **How much fuel is needed?**  
For heating a single family home with good insulation 3-5 tons of pellets per year are needed.
- ✓ **What are the investment costs?**  
The investment ranges from a few hundred Euros up to several thousand. Single-room heating systems are the cheapest possibility, but also less comfortable. Most expensive, but highly comfortable and efficient is a pellet condensation boiler with storage room and vacuum suction.
- ✓ **Are constructional adaptations necessary?**  
Check with your chimney sweeper and local planner if you have an appropriate chimney. They can also advise you where to buy a heating system. Sometimes changes have to be made for the fuel storage room and feed in system.
- ✓ **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 ARE PELLETS?

Pellets (Figure 3) are produced under high pressure from saw dust, wood shavings and sometimes also from logwood. They have a diameter of 6-10 mm and are some centimetres long. The wood material is milled, dried and pressed through a matrix. The pressing and the heat is bonding the wood by natural lignin. Adding binder material (starch) is only allowed up to a maximum of 2%. The result is a homogenous, solid fuel with high energy density. One ton of pellets corresponds to 5,000 kWh heat which is about 500 litres heating oil.



Figure 3: High quality wood pellets © Martin Höher / AEA

### Application areas

Pellets are ideal for small and medium scale households (stoves, boilers) because of

- high comfort and automatic heating system,
- easy and long storage by keeping high energy content,
- low costs, but high energy density,
- clean and homogenous combustion,
- low ash content and
- low CO<sub>2</sub> emissions.

Additionally, large heating plants often combine pellets with wood chips in order to increase the energy content of the fuel.

### Price

The pellets price depends mostly on the season. Normally, the market prices decreases in spring and raise in autumn. If storage is available during summer, it is highly recommended to buy the pellets in spring. Related to the energy content, the pellets price can be slightly higher than the price for firewood or woodchips.

### Quality

Good quality pellets have a low moisture content (<10%), a low ash content (<2%) and a low fine material portion (<1%). Different certification schemes help to ensure good quality of pellets. For example, the independent ENplus certification guarantees a certain quality according to the ISO 17225-2.

### FURTHER INFORMATION:

BioVill - Bioenergy Villages [www.biovill.eu](http://www.biovill.eu)  
 Austrian Energy Agency [www.energyagency.at](http://www.energyagency.at)  
 proPellets Austria [www.propellets.at](http://www.propellets.at)

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