



Renewable Energy Solutions

Biomass - wood chips and wood pellets- heating systems

2. Technical Information

Since people first learned to control fire, we have used wood for heating. Today, heating with wood has become even cleaner, safer and more efficient than before

How does a biomass system work?

By using the term “biomass” we refer to “the biodegradable fraction of products, wastes and residues from biological origin from agriculture (including vegetable and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste”(RES Directive). The most common way for transforming biomass in heating is to burn it during a process called “combustion”. Combustion of solid biomass of wood for heat production is the main bioenergy route in the world, with a constant drive for improved efficiency and reduced pollutant emissions. Depending on their size, different systems can be used: small-scale heating systems for households typically use firewood or pellets; medium-scale users typically burn wood chips in grate boilers.

Pellets: they are small cylindrical pieces produced from saw dust and wood shavings compressed under high pressure Wood chips: they are small pieces of wood that can be made from a broad variety of raw material such as wood residues (i.e. logging residues, small trees from forest thinning operations, stumps and roots, wood waste) or dedicated energy crops such as miscanthus, willow, poplar, reed canary grass, etc.

Pellet boiler for hot water and space heating

Pellet boilers tend to be physically smaller than chip fired equivalents as less robust feed and burning systems are needed. Installations are available from around 15kW upwards, there is no significant technological upper limit to installation size (there are a number of power stations in Europe that run exclusively on pellets.)

Pellet boilers are available with either a built in hopper, filled manually from bags, or with a separate, bulk storage hopper. The latter allows pellets to be delivered by tanker, down a long pipe, typically just once a year, with the minimum of disruption.

Buying in bulk is also cheaper, provided a minimum order size can be achieved, but the additional cost of a bulk hopper, and pellet feed to the boiler may not be justified.

It is very important to ensure that pellet fuel stores are well sealed and do not allow dust to enter the boiler room or other parts of the building.





Chip boiler for hot water and space heating

Wood chip boilers are most appropriate for medium and large scale installations. Buildings that currently use wood chip boilers include blocks of flats, visitor centers, office buildings and even airport terminals. It is very important to ensure that wood chip boilers are supplied with the appropriate type of fuel. This will vary between boiler types and sizes. The two most important variables are particle size and moisture content.

Wood chips can be produced from round wood by using specialized wood chippers. These are designed to produce a uniform size of chip that works well in automated fuel feed systems. There is a large number of wood chip suppliers in Europe, alternatively if the boiler is going to be installed on a farm or other site with its own woodland it may be possible to use this resource to provide at least part of the fuel requirement. The use of a specialist, contract chipper service can avoid the need to buy a chipper.

Since wood chips require less processing than pellets and less manual handling than logs, they can be an extremely energy efficient use of biomass. Country estates, farms and other sites where there is woodland near to the point of end use are particularly well suited to wood chip systems. Many of these sites also find that they are able to offset forestry and heating costs within the organization.



Wood chips

Link with other solutions

Easy combination with Solar thermal – decentralized energy units like “energy cabin” – using solar thermal & biomass - also available on the market.

How Pellets Are Made

Raw Material

The production of wood pellets begins with the generation of the raw material. In most cases this raw material is a byproduct of some other wood processing operation. Hardwood flooring mills are one example: They produce large quantities of clean (no bark or dirt), dry sawdust and small scrap blocks in their operations. This byproduct makes an ideal raw material for pellet production; however, as the interest in pellet production grows, some mills are generating pellet-making raw materials directly from trees (i.e. “roundwood”).

Drying

The pellet raw material must be uniformly dried to a low moisture content feedstock (below 4 percent on a dry-weight basis). Because of the high temperatures and pressures in the manufacturing process, excess moisture can cause problems – for example, poor consolidation of the pellet (resulting in dust in the final product). However, this low moisture content is also the main reason that wood pellets burn so well.



Wood pellets





Processing Material

Once the feedstock has been dried, it is fed into a hammer mill to produce wood particles that are a consistent size. This process helps make the pellets a uniform density so that they provide a consistent heating value.

Formation of the Pellets

Pellets are extruded using special dies. High pressure and temperatures are generated in this process, which softens lignin in the wood and binds the material in the pellet together. No additional adhesives are required, although sometimes small amounts of lubricants may be added to improve processing.

BENEFITS FOR THE HOTEL



STAFF INVOLVEMENT

Train your staff as guides to show guests the biomass system you have installed and explain them how it is warming up your hotel, you can both attract more tourists and further involve your staff in order to get them feeling more responsible for their working place!

GUEST INVOLVEMENT

Install a demonstration diagram to show your guests how your biomass boiler is producing warm/hot water for your hotel. By motivating your guests, they will also feel more responsible and involved in taking care of your hotel! Guests will value the fact that your hotel is environmentally conscious.

BENEFITS FOR THE ENVIRONMENT



CARBON EMISSIONS REDUCTION

Biomass used in biomass boilers are a carbon neutral form of fuel.

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