

Biomass Boilers



Biomass Grate Boilers

The use of biomass for power generation has been growing over the past 20 years due to the increasing demands for limiting the greenhouse gas emission (CO₂). The agreements reached by the EU in 2007 aiming at the use of renewables for 20% of the power production will support the use of biomass in the power production further.

For small boilers, up to a fuel input of 150 MW, the use of the grate firing technique is available. Grate firing requires less fuel preparation than e.g. pulverized fuel firing, thus the fuel handling and the preparation equipment are substantially reduced compared to burner operation.

BWE uses a water cooled vibrating grate for biomass combustion. The grate is made of panel walls with drilled holes in the fins for the combustion air. The grate is integrated as a part of the boiler pressure water/steam cycle and connected to this by flexible connection pipes designed for the vibrations. The fuel, ash and slag are transported down the grate to the slag fall along with the final burn out of the fuel.

Grate firing can be used both for drum boilers and once-through boilers (Benson). The steam temperature is at present, with the BWE firing system, as high as 540 °C. Above this temperature, corrosion of the super heaters, caused by the rather high



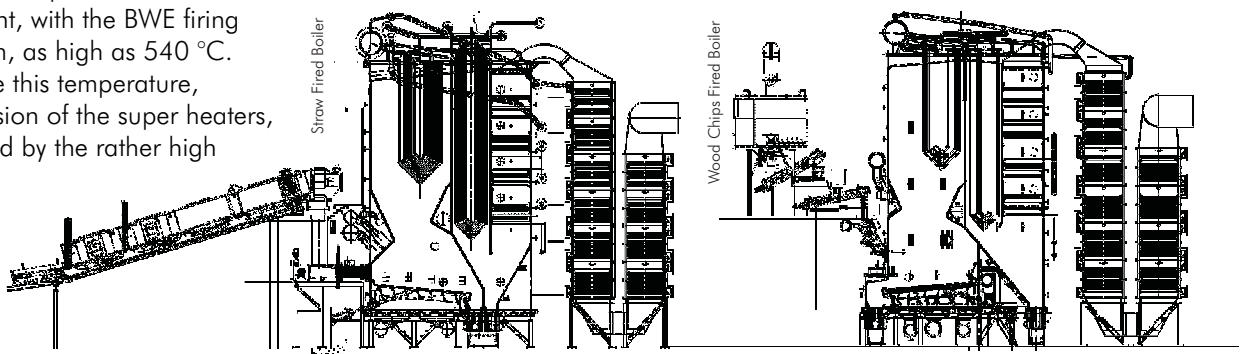
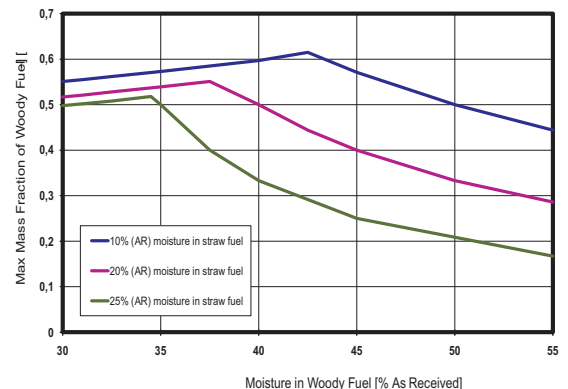
content of chloride in the fuel, exceeds an acceptable level. The final super heaters are arranged as suspended platen super heaters at the top of the furnace. This type of super heater is self cleaning as the slag is only able to build to a certain thickness until it loosens and falls down. The slag protects against corrosion and is therefore not removed by soot blowers.

Because of the different ways of leading the fuel into the furnace and the different combustion air systems, there are two different types of biomass grate boilers, one type for straw-like fuels tied in bales and another type for fuel based on wood chips.

By wood chips firing, the fuel is blown into the furnace and onto the grate by air-swept spreaders.

By straw firing, the straw bales are conveyed through seal gate arrangements to the scarifiers where the straw bale is loosened before it is pressed through water cooled ducts to the grate. Only one type of bales (Hesston, Claes etc.) can be used at a time.

On a straw fired boiler it is possible to co-fire with wood up to 50% wt/wt-% (see figure below).



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Biomass in Pulverized Fuel Fired Boilers

Biomass pellets is a rather standardised fuel that can be utilized using the traditional coal firing technology. This includes milling plant, pneumatic transport and burners which can be used for coal and biomass pellets.

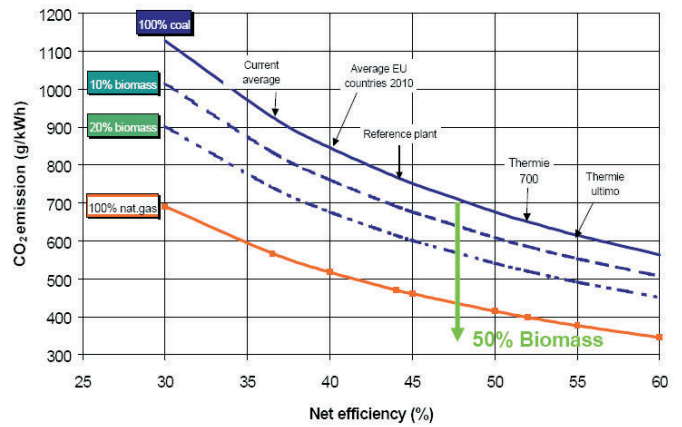
BWE has developed this system to a degree where the fuel range goes from 100% coal to 100% biomass pellets. Thus large quantities of biomass can be utilised while maintaining the full fuel flexibility.

Pulverized biomass is primarily used on utility boilers, often in combination with fossil fuels, substituting a part of these.

When substituting fossil fuel in boilers not especially designed for biomass firing there may be limitations in the biomass fuel input. The reasons for these limitations can be corrosion, slagging or rating.

When firing biomass exclusively the steam temperature is limited to 540 °C because of the risk of high temperature corrosion of the super heaters.

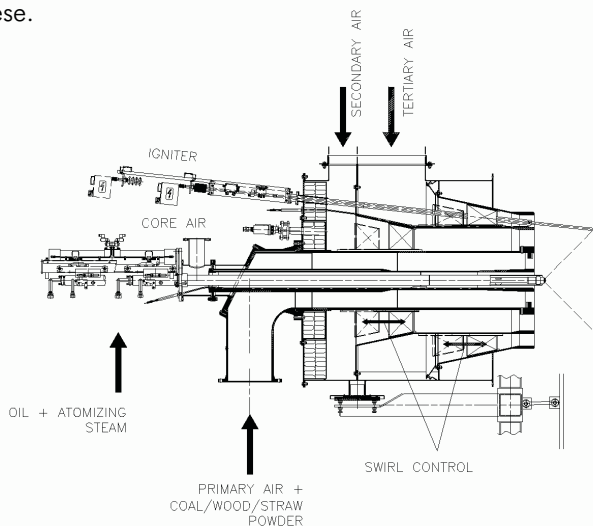
Burners for biomass firing are designed similar to burners for coal firing, and can be designed as multi fuel burners.



Specific CO₂ emission dependent on plant efficiency for different fuels and fuel combinations.



Wood pellets. Made of wood chips after grinding, drying and compression.

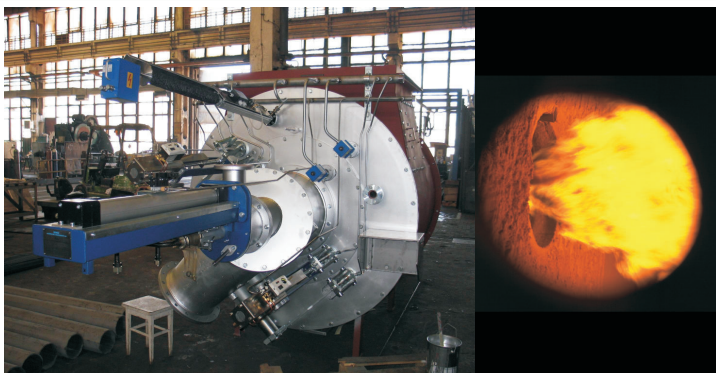


World leader in steam power technology

Burmeister & Wain Energy A/S has specialized in the development and design of advanced steam boiler plants for utility and biomass fired power stations.

Furthermore, BWE designs a wide range of auxiliary power station equipment such as the BWE Low-NO_x coal/oil/N-gas/biomass burners, Air Preheaters and Gas-Gas Heaters.

BWE is part of the Italian STF S.p.A. Group.



BWE Low-NO_x burner

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