

## Technical Bulletin Nr.

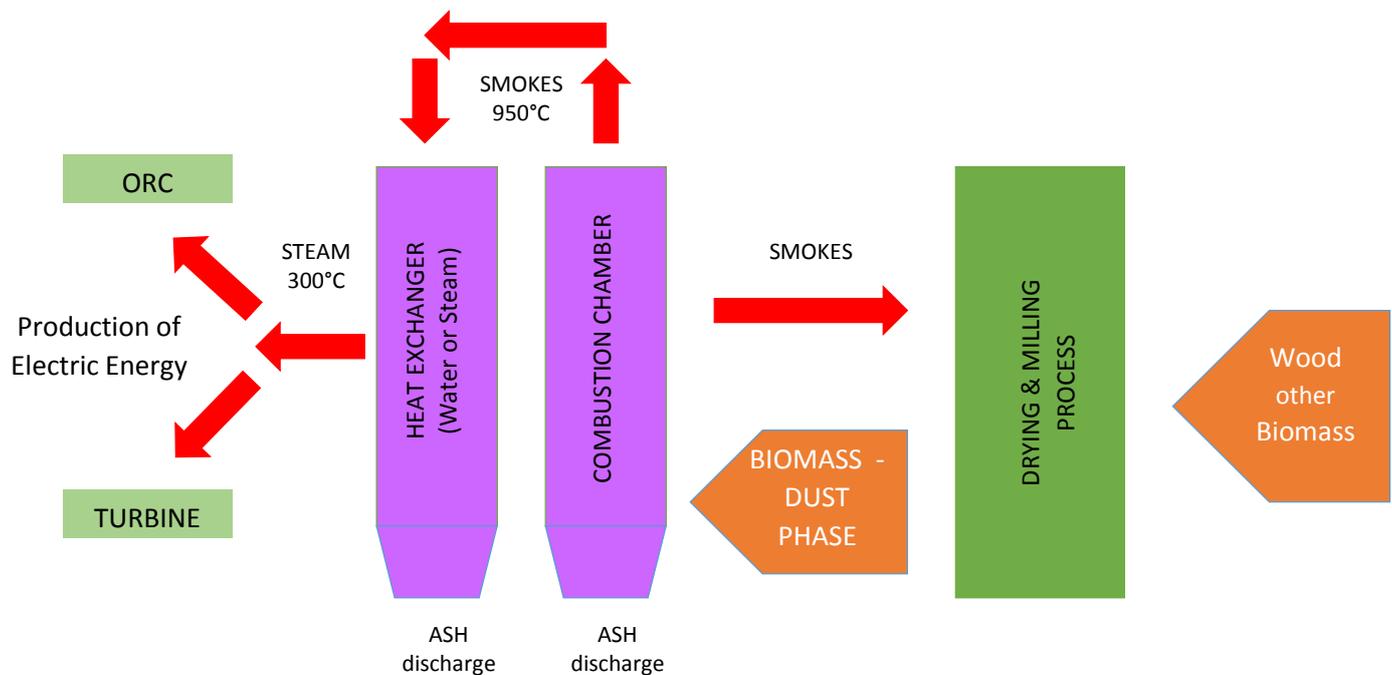
**Object:** Burners operating with biomass, wood dust and coal dust

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General Bruciatori goes further and developed new technology able to operate with traditional fuel (i.e. NG or HFO) and biomass fuel. Biomass fuel has to be provided in dry and dust phase. Through this system it's now possible to convert into energy product and material that might be considered waste of main production like sawdust or other kind of mass that might derive from main production. The system then can change a waste product (that might cost to be disposed) into energy source.

The Pic.1 describe, in general, the principle of operation of a biomass system



As first step it's necessary to bring the wood (or other biomass) to a grinder process. The milling process first and drying process later are required in order to achieve the optimum size for perfect combustion. Generally the best dust dimensions is with mean of 100 $\mu$  but satisfying combustion values are also reachable with 200 $\mu$  dust dimensions. These values always refer to the average dimension of the dust.

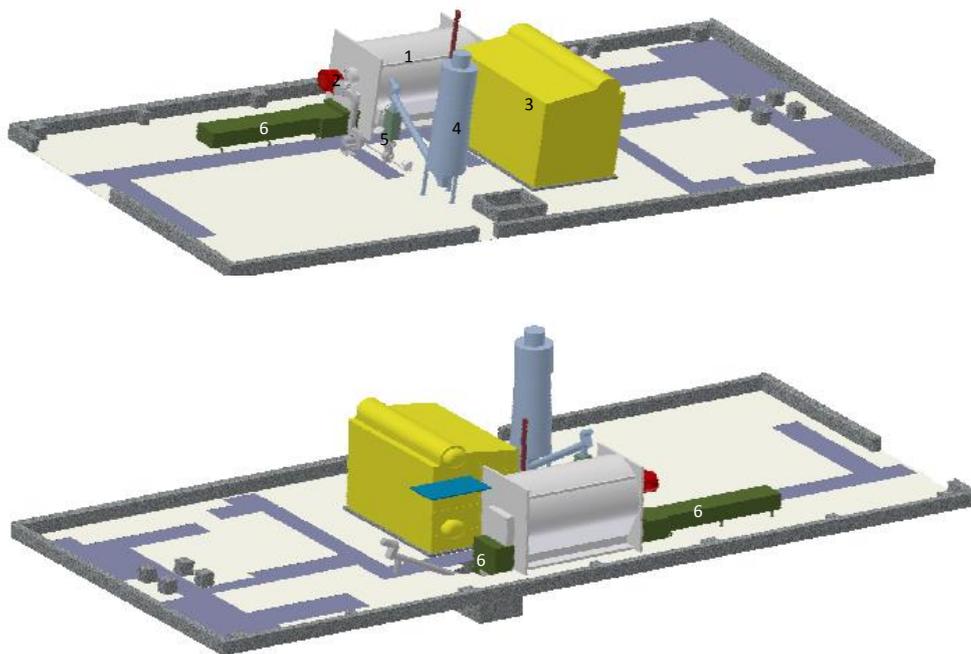
With reference to above mentioned dust size between 100 $\mu$  and 200 $\mu$  this refers to achieve high quality combustion values and high combustion efficiency by running the system with 10%NG and 90%biomass.

In case of bigger dust dimensions it's possible, from technical side, operate with dust up to 500 $\mu$  but in this case the combustion values and overall combustion efficiency will drop down. If due to dust size the biomass combustion efficiency will drop down it's possible to modify the percentage of operation between biomass and traditional fuel. In this case by increasing the quantity of N.G (or Oil) and decreasing the percentage of biomass will be possible to improve the overall combustion values.

## GENERAL BRUCIATORI EXPERIENCE

- Location: North Italy
- Fuel: Wood dust / Natural gas
- Boiler thermal capacity: 5MW
- Burner: AM 5 R duoblock with flame register suitable for Natural Gas (NG) and Dust operation

Pic.2 Rendering of a sample project done in Italy



### Note:

1. 5MW combustor system
2. AM 5 R NG/Dust
3. Boiler
4. Buffer tank for dust storage
5. Dust pushing unit to burner
6. Automatic ash drain system

Pic. 3



The picture shows as well the piping network for dust handling from storage silos to burner

Pic.4



From the silos storage tank to the dust dosing / pushing unit to the burner. The unit has small dust tank and pushing system to deliver the dust to the burner.

Due to fuel in dust phase the dosing / pushing unit might be installed outside the boiler room. This also depends from local safety regulation.

Pic. 5



Combustor system with 5MW duoblock GB burner model AMR 5. The burner is installed on combustor system provided with automatic ash drain system. This is required to keep the combustion chamber clean and free from the ash coming from the dust biomass combustion.

The automatic ash drain system convey the ash outside by means of Archimedean screw. It's suggested to have an ash drain system also on



the heat exchanger side as some ash might remain into the overheated generated air.

Pic.6



**Steam Boiler.**

The exhaust coming from the combustor chamber are with temperature up to 950°C and then recovered into the steam boiler for steam production.

The picture shows also the boiler ash discharge system by means of ash blower.

## TARGHET ACHIEVEMENT

### Overall consumption in quantity.

#### Before dust burner system installation:

- Yearly hour of operation: 8.000
- Steam production: 7,5T/h
- Gas consumption: 550m<sup>3</sup>/h
- Total year gas consumption: 4.400.00m<sup>3</sup>

#### Achievement with Dust Burner installation:

- Yearly hour of operation: 8.000
- Gas consumption: 50m<sup>3</sup>/h
- NEW Gas consumption: 400.000m<sup>3</sup>
- TO BE ADDED: biomass cost handling.

#### Payback calculation related to Italian operating cost:

- Original overall Gas cost: 1.760.000,00Eur

#### After installation of dust biomass burner the consumption values are:

- New Gas Cost: 880.000,00Eur
- Powder handling cost: 66.000,00Eur
- Total Cost: 946.000,00Eur.

With an overall saving of 814.000,00Eur per year. Based on this figures the estimated Payback period of dust burner system is about 2 to 3 years. Burner / boiler lifetime is between 10 to 20 years.