

Biomass gasification

Biomass gasification is applied for the conversion of biomass to producer gas where the fuel is partially oxidized to a secondary energy carrier. The resulting gas mixture is called syngas or producer gas and consists of hydrogen, carbon monoxide, carbon dioxide and methane [1]. Producer gas is in most cases currently used as a fuel for heat and power generation in highly efficient CHP systems.

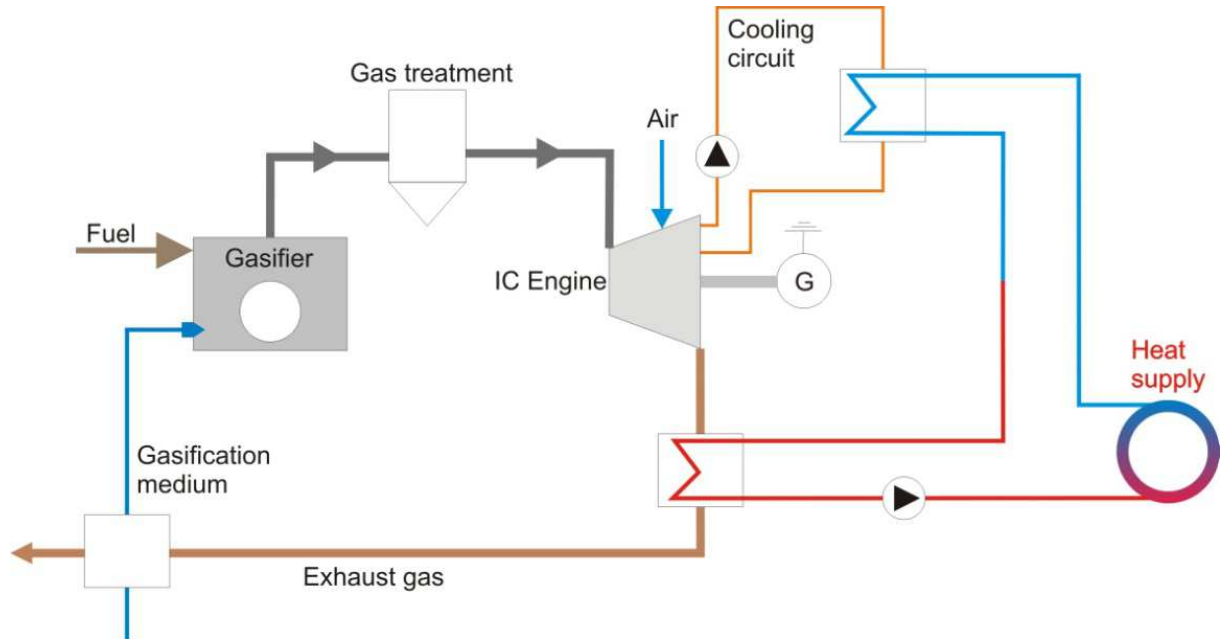


Figure 1: Biomass gasification based CHP plant.

The main advantage of biomass gasification is the high power-to-heat ratio which enables a considerable reduction of pollutant emissions from power generation. Other advantages of biomass gasification are the multiple possibilities for the use of producer gas which can be applied for the production of heat, power and biofuels. The disadvantages of biomass gasification are the relatively complex plant operation, problems with gas cleaning and the lack of long term practical experience from biomass gasification plants.

Biomass gasification along with; the water-steam power process and the ORC process one of the few proven technologies for heat and power generation from biomass fuels. The rising fuel prices and the good performance of gasification plants are the main reason for a rapid expanding use of this technology [2].

Table 1: Technical specifications of biomass gasification CHP plants

Biomass gasification CHP plant parameters	
Typical performance range	50 kW to 500 kW
Energy output	Hot water 90°C/60°C Electricity ($\eta_{el} \approx 22-40\%$)
Fuel	Wood-chips, pellets,

	sawdust
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- [1] Balat, M., Balat, M., Kirtay, E., & Balat, H. (2009). Main routes for the thermo-conversion of biomass into fuels and chemicals. Part 2: Gasification systems. *Energy Conversion and Management* (50) , pp. 3158-3168.
- [2] FNR (2005). Road map bioenergy: planing, operation and economic efficiency of biomass based systems (in German). Gülzov: FNR.