

1.4.2. Wood-fired ORC in Esslingen

Abstract: Wood fired trigeneration with ORC module producing power and heat to supply district heating network. One of the heated buildings uses part of the heat to power an absorption chiller.

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Photo:	

The project concerns wood fired cogeneration plant with ORC generator. The installation delivers electricity and heat to power 13.5 km long district heating network (70-90°C /55-65°C) operating at the residential district of Scharnhäuser Park.

The heat produced in the biomass combustion chamber is transferred to a thermo-oil circuit via a special heat exchanger on top of the vessel. This allows a variable performance of the plant either in cogeneration-mode with production of electrical power or as a common district heating station. In this case the ORC module is bypassed and the heat is provided directly to the heat net.

Combustion is designed to burn very wet material with up to 60% water content. Dry material leads to high combustion temperatures, slagging problems and high exhaust temperatures. The exhaust gas cleaning is performed by a dust separator (cyclone) installed after the boiler, which retains the dust particles from the combustion chamber. The cyclone is attached to an electro-filter, which ensures that a dust content of 20 milligrams per cubic meter is not exceeded. The generation of the electrical power takes place in an ORC process. This process does not require high pressure and can therefore be installed with relatively little operating and personnel costs. Additionally ORC units in general are characterised by a good partial load performance, a fact that is particularly significant, when the plant is operated within a heating network. The plant covers around 80% of seasonal heat demand. The rest of the heat is provided by natural gas fired auxiliary source.

The DH network, apart from delivering the heat for space heating and DHW in the district, powers an absorption chiller situated in an office building in Scharnhäuser Park. The cold is used for air-conditioning of office space [8].

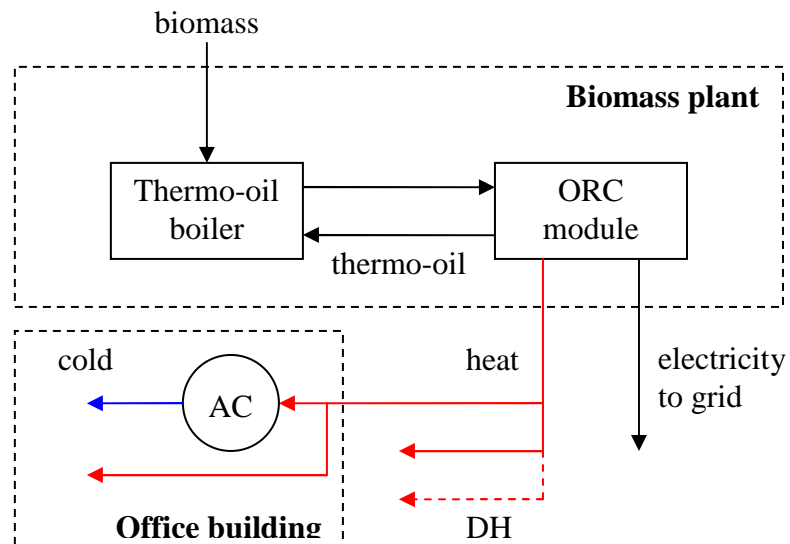


Figure 1-13 System schema

Generation system	
Engine type:	Organic Rankine Cycle engine using silicone oil (300/240°C) produced by GMK Rostock
Fuel:	biomass
Power:	1000 kW _{el}
Power output:	5,4 GWh/a
Thermal capacity:	5300 kW _{th}
Thermal output:	27 GWh/a
Woodchip demand:	10000 t/a

Cooling system	
Machine type:	Li-Br absorption (Yazaki WFC 30)
Cooling capacity:	105 kW