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Wood micro-cogeneration of electricity and heat for domestic applications

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The thermal engineering institute of the HEIG-VD is developing a heat and electricity cogeneration system adapted to low power wood fired boilers.

Motivation

The highest possible exergy yields from fuels are obtained using combined heat and power (CHP) processes.

The development of a small, wood-fired CHP unit for domestic use would make it possible to increase decentralized power production from local renewable resources.

Objective

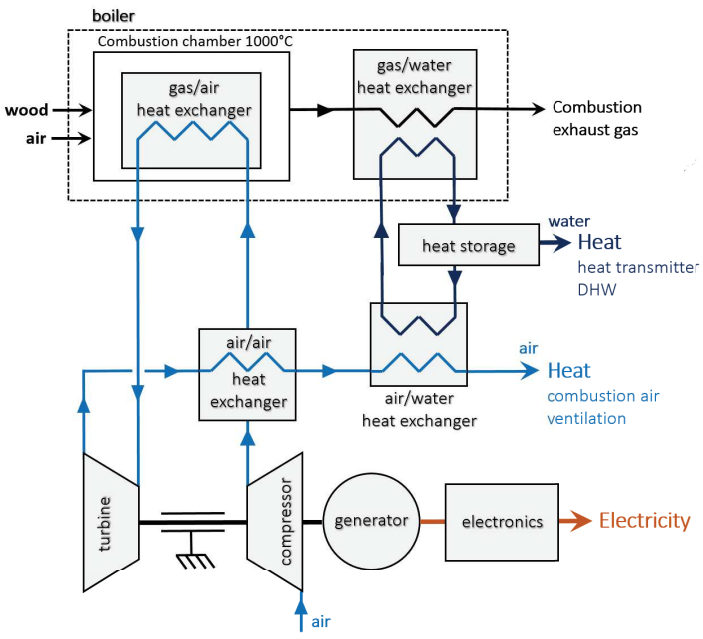
Develop a prototype having 1 kW electric power production capacity integrated within a wood pellet boiler having 10 kW thermal capacity.

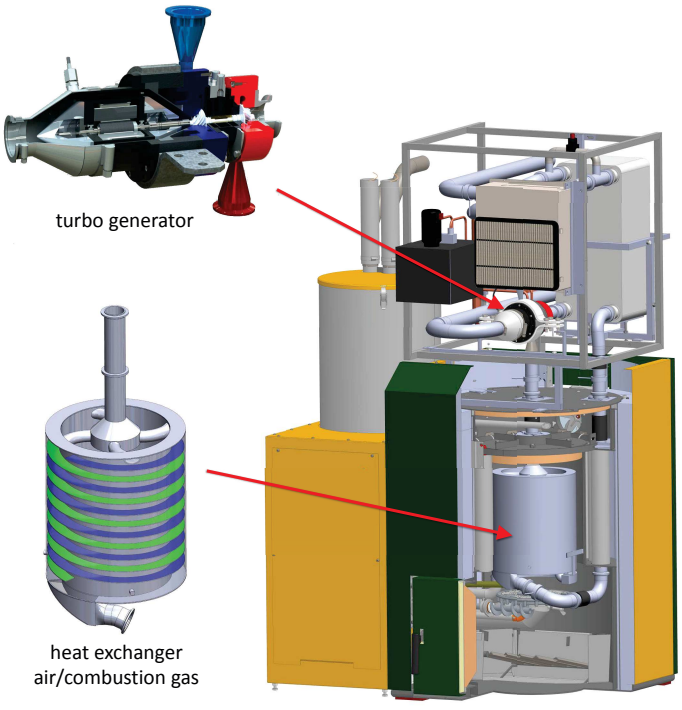
Technology

The system is based on the Brayton cycle using an external combustion micro-turbine and ambient air as the working fluid.

Following compression, the air is warmed in a heat exchanger located in the boiler combustion chamber before releasing the pressure of the hot air across the turbine.

The thermal energy extracted from the combustion chamber is thus transformed into mechanical energy and then to electrical energy by the generator.





Combined heat and power boiler

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