

CHARACTERIZATION TESTS OF AN EFMGT (EXTERNALLY-FIRED MICRO GAS TURBINE) POWER PLANT WITH CONVENTIONAL AND NON-CONVENTIONAL BIOMASS FEEDSTOCKS

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The electric power generation from renewable resources is usually based on the distributed generation, *i.e.* on several small-sized power plants spread on a broad territory and connected to the distribution line. This solution, in particular for biomass, is due both to technological and geographical reasons.

One of the most promising innovative generation technologies from biomass is based on the power production by means of an EFMGT (Externally-Fired Micro Gas Turbine) power plant, consisting in a Brayton cycle with external biomass combustion.

A 70-kW_{el} EFMGT power plant is installed in the Enel Experimental Area in Livorno. In order to support the business of the Company in the biomass field, a series of characterization tests was carried out on this plant with four different biomass feedstocks: virgin wood chips, urban green waste, olive kernel, giant cane (*Arundo donax*). The impact of each biomass feedstock on the plant operation was evaluated in terms of energy production and environmental performances.

Thanks to a properly installed additional instrumentation, included pyrometers in the combustion chamber, the main process parameters could be accurately monitored in different operational configurations. The best EFMGT operating conditions, characterized by the highest efficiency and the lowest CO emission, were identified.

Samples of biomass and ashes were analyzed in laboratory. The main micro-pollutant emissions were investigated in terms of acidic gases (HCl, HF) and particle concentration and distribution.

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