

Wood pellet stoves and boilers: from evaluation of emission factors to development of primary and secondary actions to reduce PM and NO emissions

Climate change connected to greenhouse gases production is shifting interest to exploitation of renewable energy sources that are carbon neutral. Biofuels play an important role in this scenario. Unfortunately, a poor exploitation of biomass can cause high amount of pollution, therefore international and national regulations are enforcing more stringent limits of emissions for biomass appliances.

The necessity to get a combustion that minimize harmful emissions, especially particulate matter (PM), is the basis of the collaboration between AICO S.p.A and DIMI of the University of Brescia. This project has the aim to develop a pellet stove with very low PM and NO emissions. It is divided in three different steps: the first step has the aim to analyze the influence on emissions of the stove operation parameters; the second step has the aim to develop a new burning pot model that reduces PM emissions by minimizing soot; the third step has the aim to develop some post-combustion devices to abate inorganic particles and NO emissions that are not possible to reduce with primary measures only.

In this first period, an extensive set of experiments on different typologies of wood pellet stoves (8-25 kW burning power) has been performed to investigate the relations between the main operation parameters of the stove and its emissions.

It has been proved the importance of the burning pot geometry and inlet air amount and distribution for emission reduction.