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High efficiency pellet boilers characterized by low PM emissions compared to traditional (oil, natural gas, pellet) boilers through LCA analysis.

The research has been carried on in the framework of the EU FP7 Project "BioMaxEff" (Cost efficient biomass boiler systems with maximum annual efficiency and lowest emissions, Period: 2011-2014) that aims at the demonstration of ultra-low emissions and high efficiency small scale pellet boilers from 6 up to 26 kW that could mainly replace old and more pollutant biomass combustion technologies (with particular reference to PM emissions) in the mid-term for residential applications at EU level. The work focuses on the environmental impact assessment (through LCA analysis) of both Austrian high efficiency pellet boilers and traditional boilers using data coming from experimental tests and from the most updated Ecoinvent database (v. 3). Differences among pellet boilers technologies mainly concern burners, TSP abatement systems (electrostatic precipitators) and fuel delivery systems (manual vs automatic). The SimaPro SW (v. 8.01, Eco-Indicator 99 Impact Assessment method, Egalitarian version) has been used. Energy production for a reference 12 kW high efficiency pellet boiler (VW12) over its lifetime (20 years) has been considered as functional unit for comparisons. LCA system boundaries include pellet production (raw biomass transport to the pelletisation plant till the pelletisation process itself), different pellet transport phases, the boiler manufacturing process, the boiler transport from the manufacturer to the customer, the boiler use phase till the final boiler and ashes disposal (including transports to the disposal sites). Among the project experimental data considered there are pellet boilers emission factors (NOX, OrgC, TSP and CO) thanks to different lab tests performed in the project partner Countries where boilers have operated through an optimised load cycle, representative of different climatic conditions and energy demands. LCA performed on the VW12 pellet boiler compared to the worst case (oil fuelled boiler) has shown an overall impact assessment three times lower.

Working group IAS (WG1, WG2, WG3) o sessione speciale (SPR)

WG1

Tipo di presentazione (orale o poster)

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