Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.5074

A parametric study on the co-combustion of agricultural waste chips in a residential boiler

KATERINA ESSER AND DESPINA VAMVUKA

Technical University of Crete

Presenting Author: esserkaterina@gmail.com

A parametric study on the co-combustion of agricultural waste chips in a residential boiler

D.Vamvuka, K. Esser, S. Sfakiotakis

School of Mineral Resources Engineering, Technical University of Crete,

Chania 73100, Greece

Fruit and nut chips were burned in a prototype low-investment residential combustion unit, comprising of two silos, an exhaust fumes dryer, a continuous feedstock and air supply system, a hydraulic cross flow boiler and a heat exchanger. The inlet and outlet temperatures of boiler water, flue gas temperature, gaseous emissions, combustion and thermal efficiencies were measured, as a function of fuel-to-air ratio and feed flow rate. A combustion efficiency of over 80% was obtained for all fuels. Thermal efficiency was higher for peach kernel, 93.4%, due to lower sensitive heat losses and losses from incomplete combustion. CO and NO_x emissions at steady state, during the whole operation of the unit, were below allowable European Union limits, while SO_2 emissions were negligible. An increase in feeding rate from ~14kg/h to 25kg/h improved the heat recovery in system tubes and boiler efficiency, which reached a value of 97% in case of almond kernels. Gaseous emissions were increased with the amount of residues fed into the unit, however they were kept below legislation limits.