Energetic utilisation of paper sludge by means of co-combustion under fluidised bed conditions

The scope of the paper is the assessment of the technical feasibility of fluidized bed combustion technology for thermal utilization of paper sludge in combined combustion with coal and with a high alkali-biomass content like straw. An experimental program at a fluidised bed, electrically stabilised, test facility (30 kW) has been carried out in order to establish the range of conditions for which co-combustion of paper sludge is environmentally acceptable without affecting the combustion efficiency. Different fuel blends were tested by gradually replacing coal with an equivalent share on an energy basis of paper sludge. Both coal-based blends and coal-straw based blends were investigated. Tests were effected under both bubbling and circulating fluidised bed conditions. Main focus of the research was to study the impact of the addition of paper sludge on the toxic emissions and on the fate of mineral matter constituents, with emphasis on bed agglomeration tendencies. Also the impact of addition of paper sludge on the fate and the partitioning of heavy metals in different ash output streams was evaluated. The aim was not only to assess the potential problems associated to the harmful elements under co-combustion, but also to ascertain whether and how paper sludge could affect the reaction environment. The results show that the properties of the main fuel in the blend have a relevant impact on the observed trends.