Exergy losses of resource recovery from a waste-to-energy plant - DTU Orbit (09/11/2017)

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Metal resources recovered from waste incineration bottom ash (BA) are of lower quality as compared to primary resources, but to date no framework for expressing the quality losses exists. Exergy is a concept that may have the potential to evaluate the resource quality in waste management. In this study, focusing on recovery from waste-to-energy plants with basic and advanced BA treatment, the goal is to give an indication about quality of selected recovered resources (Fe, Al, and Cu) by means of exergy analysis. Metal flows are modeled through both incineration scenarios, and then chemical exergy values are assigned to all flows, allowing for quantifying various types of exergy losses. The exergy losses determined here are those caused by (1) oxidative changes in the thermal process (irreversible exergy destruction), (2) material losses (low recovery efficiencies), and (3) mixing of metals. The results indicate that exergy losses due to mixing are insignificant as compared to chemical exergies of metals in all flows. Total exergy losses for Fe, Al, and Cu recovery in the two WtE systems range from 38% to 90%.

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