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Evaluation of resource recovery from waste incineration residues – The case of zinc

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ABSTRACT

Solid residues generated at European Waste to Energy plants contain altogether about 69,000 t/a of Zn, of which more than 50% accumulates in air pollution control residues, mainly boiler and filter ashes. Intensive research activities aiming at Zn recovery from such residues recently resulted in a technical scale Zn recovery plant at a Swiss waste incinerator. By acidic leaching and subsequent electrolysis this technology (FLUREC) allows generating metallic Zn of purity > 99.9%. In the present paper the economic viability of the FLUREC technology with respect to Zn recovery from different solid residues of waste incineration has been investigated and subsequently been categorised according to the mineral resource classification scheme of McKelvey. The results of the analysis demonstrate that recovery costs for Zn are highly dependent on the costs for current fly ash disposal (e.g. cost for subsurface landfilling). Assuming current disposal practice costs of 220 €/ton fly ash, resulting recovery costs for Zn are generally higher than its current market price of 1.6 €/kg Zn. With respect to the resource classification this outcome indicates that none of the identified Zn resources present in incineration residues can be economically extracted and thus cannot be classified as a reserve. Only for about 4800 t/a of Zn an extraction would be marginally economic, meaning that recovery costs are only slightly (less than 20%) higher than the current market price for Zn. For the remaining Zn resources production costs are between 1.5 and 4 times (7900 t/a Zn) and 10–80 times (55,300 t/a Zn) higher than the current market value. The economic potential for Zn recovery from waste incineration residues is highest for filter ashes generated at grate incinerators equipped with wet air pollution control.

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