RESOURCE RECOVERY POTENTIAL OF MSWI FLY ASH ACID EXTRACTION: A CASE STUDY

Ekaterina, Korotenko*, Michal, Šyc*, Josef, Jadrný**, Pavel, Mašín***, Pavel, Krystyník*, Petr, Klusoň*

** Institute of Chemical Process Fundamentals of the CAS, v.v.i., Department of Environmental Engineering, Rozvojová 2/135, CZ-165 02 Prague 6 - Suchdol, Czech Republic*
*** TERMIZO a.s., Dr. M. Horákové 571/56, 460 07 Liberec, Czech Republic*
**** Dekonta a.s., Dřetovice 109, 273 42 Stehelčeves, Czech Republic*

Changing legislation in the field of waste management is shifting waste management strategies towards waste-to-energy, recovery, and recycling. Historically, municipal solid waste incineration plants (MSWI) were seen only as a way of waste disposal, but today's reality is that MSWI can also participate in recycling.

Fly ashes (FA) and air pollution control residues (APCr) are the main solid residues from municipal solid waste incineration process, together with bottom ash. Fly ash is generally made up of fine solid particles entrained by flue gas from the combustion chamber. It is captured by electrostatic precipitators or baghouse filters in flue gas treatment systems. FA/APCr are considered hazardous waste and their hazardous properties come from high content of soluble salts, heavy metals and/or POPs. The environmental policy of EU is currently focusing on diminishing of hazardous materials production or methods for removal of their hazardous properties instead of landfilling.

Recycling and recovery of secondary materials from fly ash is an actual topic nowadays. Fly ash is considered as a secondary source of elements that are relatively easily volatilized, like Zn, Pb, and Cu, and/or salts. Technologies for the recovery of metals (particularly Zn) and/or salts are based mainly on hydrometallurgical principal and can use acid water from wet scrubber of air pollution control devices with advantage. Several technologies are under development or on a lab scale level. However, FLUWA/FLUREC technology works on a full-scale and HALOSEP full-scale plant is under construction.

The Termizo MSWI in Liberec is equipped with FLUWA acid leaching technology for fly ashes. Up to now, it is used only for the removal of heavy metals from FA, i.e. for the removal of their hazardous properties. However, recent efforts have been focused also on reviewing the possibility to recover metals and salts within this technology.

The aim of the case study is, firstly, to assess the possibilities of recycling and recovery of metals (mainly Zn, Cu and Pb) and salts in the Termizo plant; secondly, to assess the impacts of resource recovery on the process and the whole MSWI plant technology; and, finally, to estimate economic effects and economic feasibility of the technology.

For this purpose, the composition and properties of solid and liquid streams, including their short- and long-term variability, were examined and preliminary experiments of metals and salts recovery have been performed. The detailed description of the MSWI, used technologies and material flow analysis for metals and

salts is provided in the presentation as well as recovery potential estimation. The example of zinc mass balance of the process is shown in Figure 1.

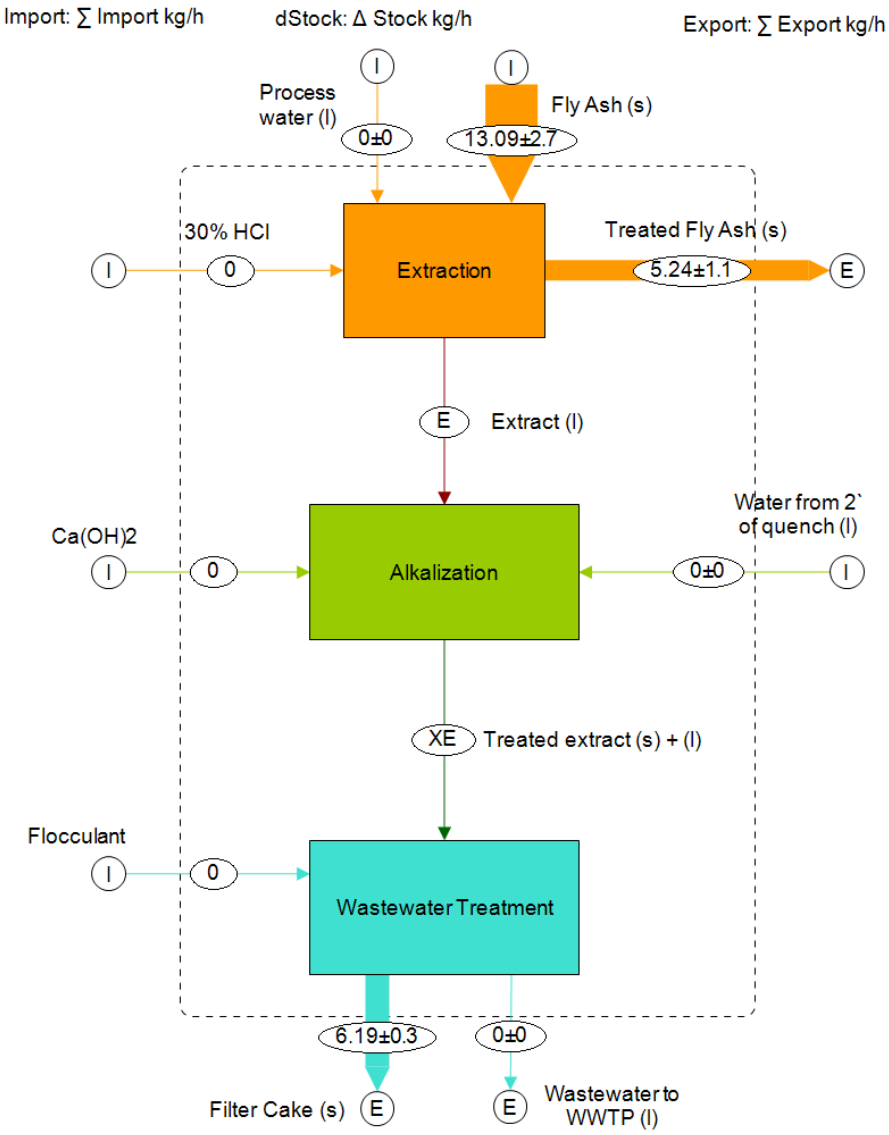

Figure 1. Material flow analysis of zinc in kg per hour. Average annual production of fly ash, treated fly ash, and filter cake (in dry matter) is 3000 tonnes, 2300 tonnes and 235 tonnes respectively.

Current Zn potential for recovery is ca 50 tonnes per year. Zn content in the produced filter cake is 4-8 times lower than the content required for filter cake processing in the smelting industry. Therefore, several optimization steps are considered and will be tested, of course, also with respect to Zn recovery economic feasibility. Results of the process optimization will be also presented.