

In the field of energy and resource efficiency

Title of the work:

„Investigation of selected technologies in the zinc-recovery process from steel and lead slag“

Background:

The project GreenZinc investigates the recovery of zinc from the dust of steel mills, the slag of lead mills and dumped lead slags. State of the art recovery technologies (e.g. Waelz-Process) work with solid slag and fossil coke. This project investigates a recovery process (ZEP, 2-step-zinc extraction) working with molten slag, allowing high extraction rates of high-quality zinc together with the extraction of iron and producing a unproblematic residue. Furthermore, replacing the reducing agent of fossil coke by bio-coke and H_2 is investigated. The EVT investigates the ideal design of the process chain and its techno-economics.

Therefore, interesting fields for final theses and project works, in German or English language, are possible in the following topics:

- Development of models for process steps (fuming of lead and halogens, reduction of Zn and Fe, cooling of process gases before filtering, cooling of products)
 - Describing fundamental processes
 - Theoretical description (chemistry, thermodynamics, mathematics)
 - Numeric solution (Python, Matlab, ...)
- Ideal dimension of electrolysis and H_2 storage, considering the investment and energy costs (optimization)
- Developing a framework for the risk and techno-economic assessment considering fuel- and commodity prices (fossil coal, bio-coke, CO_2 , H_2 , CAPEX, OPEX)

The size and depth of topic can be adjusted according to the type of project.

Contents of possible works:

- Literature studies concerning the chosen topic
- Developing the modelling/assessment framework
- Visualizations of the results
- Written documentation of the performed work

Requirements:

Basic knowledge of physical and chemical processes

Interest in metal recycling routes

Readiness to learn or knowledge of modelling environments (Python,...)

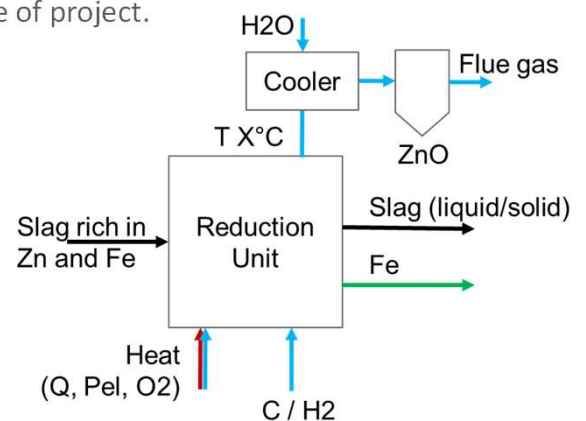


Fig. Slag reduction step

Workload: ca. 7 Months (MA) / 4 Months (BA) / 75h per person (PD)