

Proposal for an EC-funded Research Project according to the call
ENV.2011.3.1.9-1 Eco-Innovation!

Recovery of Phosphorus from Sewage Sludge and Sewage Sludge Ashes with the thermo-reductive RecoPhos-Process

Natural phosphate sources low in heavy metals are getting scarce. Containing about 15 mass-% of P_2O_5 , sewage sludge ash can be considered a secondary phosphorus (P-) source. Today, the P-content in the European sewage sludge could currently replace roughly 15 % of the phosphate imports into the EU.

Hence already for many years, almost decades, it has been tried to recover phosphorus from sewage, sludge and ashes in various ways of which none has yet been realised at industrial scale. The reason for this failure lies firstly in the wet chemical approach, meaning complex and little efficient processes, often by means of liquids hard to handle; and secondly in the use of liquid or dewatered sludge as well as waste water, which results in a further decrease in efficiency mostly because of high mass flow and matrix effects.

The RecoPhos process is a thermal process using ash from sludge mono-incineration. The chemical principle of the core reaction in the so-called InduCarb reactor is similar to the one of the known Wöhler process; dried sludge can be added as heat source or reducing agent as an option. The phosphate (amongst other constituents) is reduced on an inductively heated coke bed to white phosphorus, which can either be condensed to recover white Phosphorus, or, after combustion of the off-gas, retrieved as phosphoric acid. Further products can be an iron alloy as well as a heavy metal mixture, both usable in steel industry, as well as a silicate slag for the use in cement ovens and occasionally a high calorific gas (mainly CO).

The core of the RecoPhos process is an innovative reactor (InduCarb) designed for the reductive recovery of steel work dusts. By the use of ashes the material flow is minimal; if only sludge is available, it can be also used as input, adding flexibility to the concept. If additives are needed, suitable industrial wastes can be used.

Project Partners:

Montanuniversität Leoben (A) (Coordinating Partner)

Universität Stuttgart (D)

SGL Carbon GmbH (D)

Holcim Group Support Ltd. (CH)

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