ReNEW
Resource innovation Network for European Waste

Metal Recovery from Waste Electrical and Electronic Equipment (WEEE)

Investing in Opportunities
This project has received European Regional Development Funding through INTERREG IV B.
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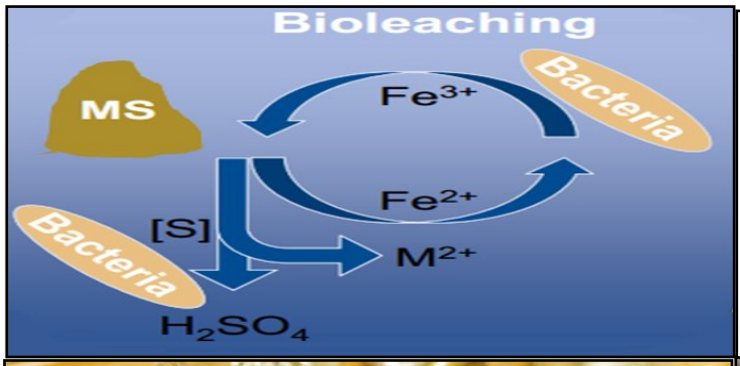
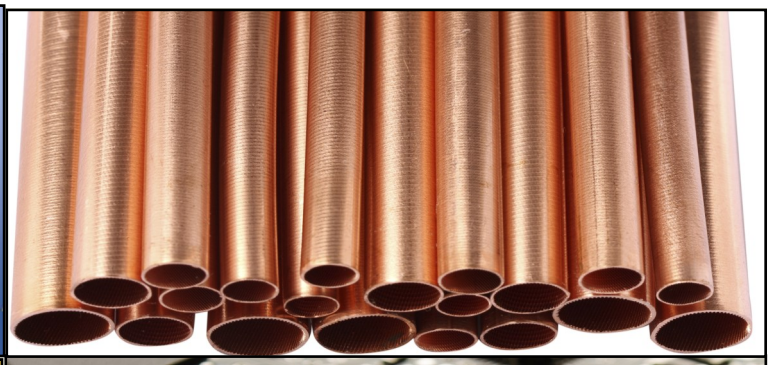
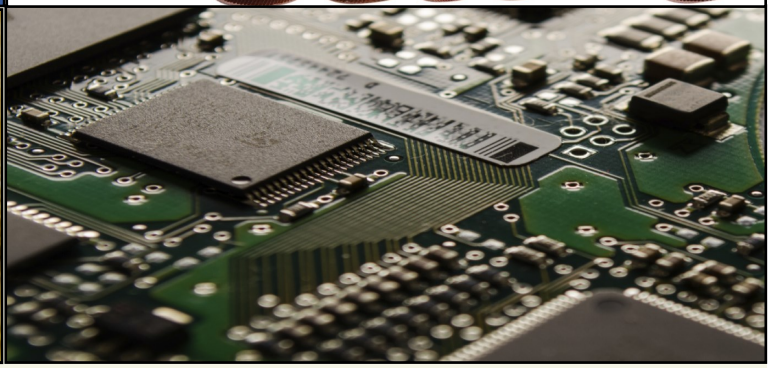
INTERREG IVB

Transnational Demonstration Process







The Problem

Europe produces around 9 million tons of waste electrical and electronic equipment (WEEE). New EEE products are commercialised at a high rate, increasing the amount of WEEE which grows 3-5 % per year in the EU.

This waste contains valuable as well as hazardous materials which require special handling and recycling methods. For example: computers, LCD / CRT screens, cooling appliances, mobile phones, etc., contain precious metals, flame retardant plastics, CFC foams and many other substances. If WEEE is treated inadequately, it will pose considerable environmental and health risks.

Potential Valuable Products:

Zinc, Arsenic, Cadmium, Chromium, Manganese, Magnesium, Copper, Gold, Aluminium, Platinum, Lithium, Nickel, Iron, Silver, rare earth metals.

The Solutions

Since February 2003, EU legislation has promoted the collection and recycling of WEEE (Directive 2002/96/EC on WEEE). Nowadays, re-use, recycling and material recovery from WEEE is increasing. In 2016 new EU regulations will come into force, increasing WEEE recycling and recovery targets to 45%.
ReNEW is focusing on 2 secondary recovery treatments: chemical and biological leaching.

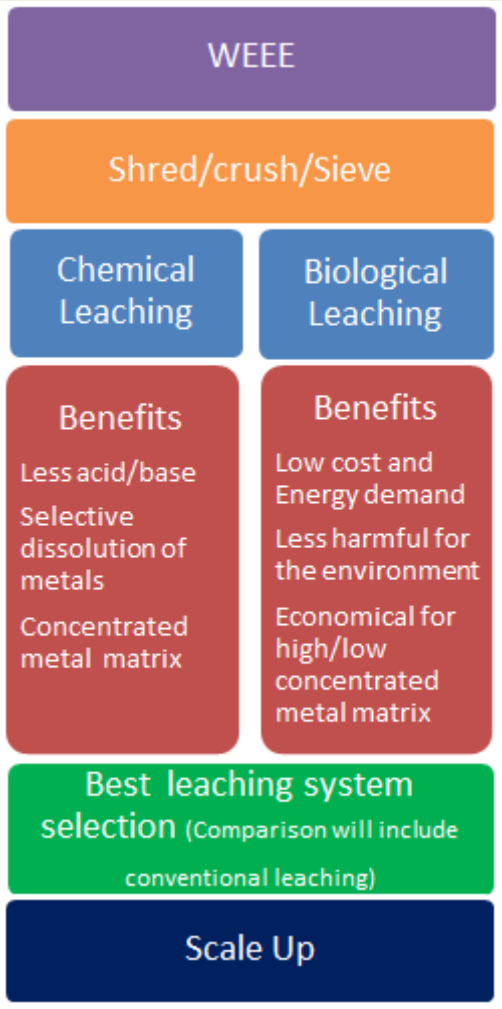
Chemical leaching technology can be used to recover valuable critical raw material from industrial mixed waste materials. It will integrate innovative environmental friendly chemical leaching procedures that allow for the valorisation of both valuable critical raw materials and matrix materials of the WEEE.

Biological leaching aims to extract metals from insoluble compounds, such as inorganic waste, by microorganisms. Following the bioleaching process the metals are recovered from the leaching solution. Bioleaching is a well known process in metal extraction from natural ore deposits.

Aim

Chemical leaching has the potential to remove contaminating heavy metals and to recover valuable metals from the matrix by advanced leaching (small amount, high value). The aim of the ReNEW project is to reach a proof-of-concept of the chemical leaching process on a range of different mineral waste streams, including WEEE.

Biological leaching has the potential to gain valuable metals from waste materials, such as mixed municipal wastes from landfill sites or WEEE. The pilot plant built under ReNEW will evaluate the release of valuable metals and investigate the boundary conditions for an optimal growth and activity of the relevant bacteria.



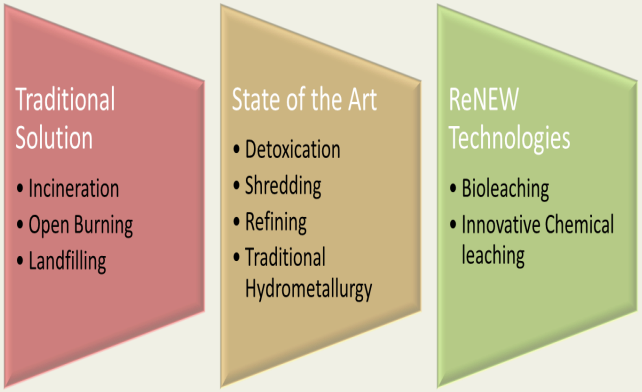
Chemical Leaching

Inorganic waste is generally treated using physical or chemical processes. Physical treatment processes are generally resource intensive and have a high energy demand, while chemical treatment processes need a range of chemical inputs. Biological treatments typically have a low energy demand and relatively low costs.

Biological Leaching

Traditionally mineral waste is landfilled without recovery of heavy metals or low concentrations of valuable metals. Environmental leaching under the influence of contact with surface, ground or rain water of heavy metals from landfilled mineral waste can pose environmental threats.

The chemical leaching technology aims to recover the heavy metals from mineral waste. In an integrated process both the metals and the matrix material are recovered.



Economic barriers/drivers for market introduction of this output stream

The identification of the (most) valuable landfill sites is needed. The data with regard to location, amount and quality (composition) of the waste is often partially or not available.

There is a need for a detailed map of different waste streams in different sectors.

Main technological barriers for market introduction

The separation and recovery of valuable metals can be a technological challenge: fine grained mineral waste is difficult to handle and separate physically, and the embedded metals can be thermodynamically stable such that (chemical) recovery can be hindered.

The process of bioleaching is well known from the ore mining process. But it is necessary to collect more information and experience to scale up production plants for waste streams.

The challenge is to develop new and/or improve the existing chemical/biological leaching systems.

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Case study produced by the ReNEW Project under Action 13 (Demonstration, Promotion and Dissemination Activities) examining how facilities for scale up, testing and training are a vital part of developing processes for resource recovery.

For further information: www.renew-network.eu