

Summary description of the project context and main objectives

The recycling business is traditionally dominated by small and medium sized enterprises. The latest data from Eurostat show for EU27 the following key data for the recycling sector:

Number of companies	14.400
% SME	80%
Turnover (in Mio €)	30.000
Value creation (in Mio €)	6.300
Employees	130.000

In the last 2-3 years a general trend in the electronics (including batteries and lamps) recycling sector to bigger companies is very visible. Multinational, multisector companies like STENA, Remondis, Van Gansewinkel, AVE, One51,... are buying several smaller recyclers every year.

This trend is mainly caused by 2 factors:

- Many countries transposed the WEEE- and Battery Directives in a way relying heavily on collective systems. These collective systems want to make their lives as easy as possible and normally contract only 2 or 3 recycling companies covering the whole country. This very much favours bigger multinational groups that are able to invest in very expensive mechanical recycling and separation machinery (e.g. MEWA lines starting at 5 million €).
- Also the big secondary raw material processors like Umicore, Boliden, NA,... are more interested in few big contracts instead of a lot of small contracts as this brings down their administrative costs (notification for transborder shipments, sampling, billing, ...). Therefore it is close to impossible to sell materials with a high concentration of base and precious metals (e.g. printed circuit boards) for SMEs at the moment.

Therefore the HydroWEEE project deals with the recovery of base and precious metals from WEEE including lamps and spent batteries by hydrometallurgical processes. The idea is to develop a mobile plant using hydrometallurgical processes to extract metals like Copper (Cu), Manganese (Mn), Zinc (Zn), Yttrium (Y), Indium (In), ... in a high purity (above 95%). By making this plant mobile (in a container) several SMEs can benefit from the same plant at different times and therefore limit the necessary quantities of waste as well as investments. In addition this new HydroWEEE process will produce pure enough materials that they can be directly used by end-users for electroplating. Because of this 2 levels of intermediaries from today (bigger recyclers and secondary material processors) will be bypassed. This

will make the SMEs much more competitive than today and reverse the general trend to bigger companies.

The SMEs involved in the project have their core businesses in the following subjects:

- recycling of WEEE;
- recycling of spent batteries according the latest EU Directive 2006/66/CE;
- using of metals (recoverable during WEEE including lamps and batteries recycling) for final application (i.e. electroplating)

Summarised, most of the SME partners of the HydroWEEE consortium deal with waste management and are interested in the recovery of base and precious metals from some kind of wastes such as WEEE including lamps and spent batteries.

In particular, HydroWEEE will reach its main goal - that is to strengthen the competitiveness and innovation capacity of European SMEs dealing with waste management - throughout the following objectives:

- to develop new hydrometallurgical processes aimed at WEEE valorisation focused in particular on:
 - the recovery of indium from liquid crystal display (LCD) with more than 95% purity;
 - the recovery of yttrium and zinc from spent lamps and cathode ray tubes (CRT) with more than 95% purity;
 - the recovery of copper from printed circuit boards (PCB) with yields higher than 99% and economically usable by SMEs
- to improve the already existing and develop new know how for the recovery of manganese, zinc, lithium and cobalt from spent batteries
 - extending the available know-how for alkaline to other battery types, such as Lithium ones;
 - making the developed processes applicable for SMEs (=downsizing for smaller quantities);
 - focusing on environmentally friendly technologies (using for example bio-leaching);
- to follow a “zero-waste” approach, recycling also not metallic by-products (e.g. for ceramic and building materials);
- to demonstrate the developed technologies in a multi functional prototype, that will be first realised in Italy under the responsibility of EcoRecycling and Relight and later on in the project optimised also at the other partners’ facilities SETrade in Serbia and Greentronics in Romania;
- to increase the market penetration of recovered metals from the HydroWEEE process and proof their processability by EcoRecycling for electroplating;

- to create a spin off company at the end of the project, jointly owned by all SMEs of the HydroWEEE consortium, which will be the owner of the multifunctional pilot plant and of the intellectual property developed within HydroWEEE project;
- to create a network among European SMEs dealing with waste management;
- to realise training activities transferring expertise from RTD performers to SMEs;
- to disseminate the project results by means of specific workshops, presentation to international conferences, publications, participation to trade fairs.

The research activities will be carried out by several RTD performers with strong and verifiable competences in the development of hydrometallurgical processes and environmental technologies:

- UNIROMA, UNIVAQ and UNIVPM - hydrometallurgical process development (WEEE incl. lamps and spent batteries); chemical engineering competencies and process design;
- Pupin - Mobile treatment plants;
- SAT - Logistic, dismantling and mechanical processes (WEEE: LCD, CRT, etc.).

Each partner will contribute to the building of the pilot plant, whose block diagram is shown in Fig. 1. In this way, a common research facility for the future will be realised and shared with the other enterprises.

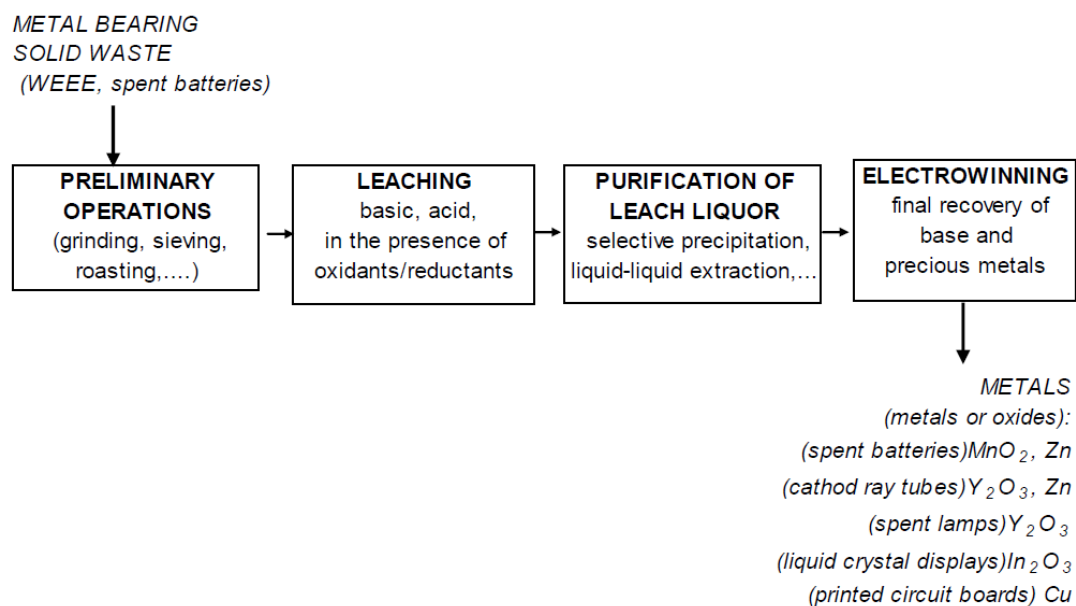


Fig. 1: Block diagram of the processes that will be demonstrated in the multifunctional prototype

A consortium agreement will be signed before the signature of the grant agreement with the European Commission. It will establish rules about:

- Intellectual properties of the Consortium (already agreed with the HydroWEEE consortium);
- Rules of Management of the joint company;
- Rules for Publications of project results;
- Detailed rules for conflict resolution and management within the HydroWEEE consortium.