

H2020 project: Draft v5.0

ID4E project: Improving the preconcentration processes of high value raw material for a better WEEE recycling in European cities

H2020 topic of interest: [WASTE-6a-2015: Eco-innovative solutions](#) (deadline stage 1: 21/04/2015)

Coordinator: under discussion

Contact person: Thibaut JACQUET – t.jacquet@retrival.be

Project provisional title:

Project idea in short: Reframe the WEEE management chain to allow a better recovery of high value raw materials in three different European cities. This project includes cultural and social specificities while moving towards activities within the cities.

Facts

The problem of WEEE's management in urban areas considered at three levels:

1. A large amount of WEEE with a high recycling potential are not discarded properly at the household level.
2. Waste from SMEs and offices are even more complicate to collect separately in an appropriate manner since they are even more diffuse and often present in very small quantities.
3. Currently, recycling chain loses nearly 50% of collected precious metals.

This project aims to reframe the WEEE management chain in an economically viable and more environmental friendly manner.

The possible gains in recovery of high value raw materials are highlighted by a communication from European "DG Environment": [1] *"The substance flow analysis (SFA) demonstrated that after the pre-processing stage, only about a quarter of the gold and palladium and a tenth of the silver that could potentially be recovered ends up in output streams from which they will actually be recovered. This implies that process operators lose the revenue for nearly three-quarters of the gold and palladium contained in the WEEE input.*

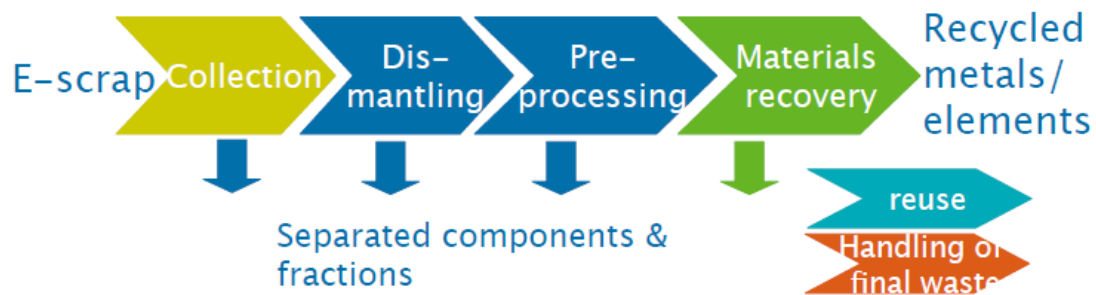
Unselective fine shredding in the pre-processing stage disperses precious metals amongst other materials causing unwanted losses.

In order to recover greater quantities of precious metals from WEEE, the researchers suggest:

- *more attention should be paid to separate materials rich in precious metals before shredding;*
- *process operators need more detailed knowledge of where precious metals are located in WEEE;*
- *sorting technologies could be adapted to recover higher proportions of precious metals".*

All the different steps of the recycling chain are intimately bound to each other and the ultimate recovery rate of high value raw materials is the product of the recovery rates at all the various stages:

Example: 70% x 80% x 70% x 95% = 37%!!



Improvements are thus possible through visual inspection and manual dismantling of WEEE's. It concerns all the PGM (platinum group metals) and other rare metals, as well as some critical metals cited in the obstacles to the SET plan.

Goal and targets

The goal is to develop a **valorization scheme** that reduces losses of **valuable metals**, by optimizing its efficiency, its proximity to the user, and adapted to the local cultural and economical situation.

In other words, the management chain (ranging from the residential user to the concentrator) will be reframed, so as to: (i) solve the problem **locally**; (ii) ensure **preservation of the metals**; (iii) provide low **qualified jobs**. At the city level, neither the government nor the private sector are willing to work on this local approach of waste.

In addition to the existing waste collection for **households** (papers, tools, ...), this project aims at collecting WEEE from **SMEs, administrations, offices,...**

The project does not directly act on the recycling step itself, but on prior separation of components. Increasing the separation rate will lead to better recycling rate at the recovery companies.

Goal: increase of the recycling percentage of at least 30% in PGM and new critical metals

Assumption and research problem to be solved

Assuming that social economy brings added value (economic/environmental) in recycling waste, how to develop an optimum management of WEEE waste in cities? How to collect these flows close from their source, until their pre-concentration or reuse?

Which role do the stakeholders play, in the local habits of citizens and industrials? How to involve by consultation citizens and authorities?

For which flows is the added value maximized?

What dismantling and pre-concentration techniques should be adapted or developed, to be used in social economy?

Innovations

From the technical point of view, innovation will be the **selection** of the high value flows themselves (identification of materials) but also the **recovery** of strategic metals (rare earth, Ta, Nb,...) in miniaturized devices. This would improve the independence of Europe with respect to strategic metals.

At the technical level what else could be done? -> Rapid recognition?

From the social point of view, the use of short value chains in urban context increases the durability (local stakeholders, local ores), as well as the social inclusion of low qualified workers. This **innovation through inclusion** consists of creating new sorting jobs, but also jobs for low qualified, people exposed to discrimination (gender, immigration, ...) or disabled people in the field of sorting and dismantling to facilitate further concentration. It also enables operational complementarity, by bringing back employment inside the cities where waste remains inadequately recycled / recovered.

Project content

In a few words, the different actions to be undertaken are the following:

- Identification of different WEEE with a high potential for a better recovery of high value raw materials;
- Analysis of the cultural and structural barriers for a separate collection in WEEE;
- Creation of innovative collection channels to collect separately the identified WEEE;
- Strategy to improve the correct discarding of the identified WEEE;
- Promotion of the use of manual dismantling tools and implementation of manual dismantling processes to identify relevant materials and to isolate them;
- Analysis of the performances of the new sorting technologies in the recovery of high value raw materials;
- Analysis of the benefits of the sorting technologies on the recycling phase efficiency.
- Verifying the transferability of the proposed value chain between countries, especially from countries with developed collection systems (Belgium) to less developed countries (Eastern Europe).

Beneficiaries

Beneficiaries include:

- European cities involved in the project that combine a high density of WEEE holders and low WEEE collection rate, due to infrastructure and cultural barriers;
- Social enterprises involved in manual dismantling of WEEE's;
- Include in some parts of this new business, a significant place for people prone to discrimination (gender, immigration, disabled people, ...)
- Recycling companies, already in charge of processing large volumes through selective collections (e.g. WEEE recyclers for RECUPEL), by providing a solution to clean or preconcentrate the components to be recycled (removing of capacitors, concentration of valuable components, ...).

Environmental, economic and social benefits of the project

- New kind of jobs

- **Job creation:** preconcentration activities are labor-intensive activities and may be located in urban areas. Created jobs are suitable for low skilled or disabled person, therefore being in line with the urban mining, circular economy and sustainable development objectives of the EU.
- **Reduction of the European dependency to high value critical materials.**
- **Limited investments** needed for preconcentration.
- **New routes** for the recovery of high value raw materials

Partners

Partners from the social economy:

- CF2M/CF2D: sorting/recycling potential for DEEE. Experience in technical solutions and public-private partnership.
- RETRIVAL: collection and sorting in SMEs; collection and preservation of municipal waste.

Other stakeholders in social economy, federations:

The project is in contact with partners like: SAWB; FEBRAP; 21Solutions.

University:

- Marc DEGREGZ, ULB - service 4MAT « Processing, Characterization, Synthesis and Recycling » for technical, environmental and sociological aspects.

Possible partners:

- ACR+: European dimension and urban waste management; coordination (to be confirmed), especially between cities.
- RESSOURCES
- RREUSE: transversal cooperation in social economy, at European level. Others companies working in the business than CF2D and Retrial in another country/city.
- STENA: WEEE recycling, European level.
- Brussels Region.

Desired partners:

- Policymakers in the range of environment but also involved in big cities policy.
- Regions or municipalities > 1.000.000 inhabitants with associations active in the field of waste.
- Research centers or universities with expertise in waste management (sociology/field innovation).
- Industrials: recyclers who are seeking higher recycling rates of metals (ferrous, non-ferrous, rare) or polymers. Their activity should be between collection and refining, ideally in several European countries.

[1] DG Environemnt, European Commission, 2010, "Precious metal recovery from WEEE", available on: http://ec.europa.eu/environment/integration/research/newsalert/pdf/186na3_en.pdf