

## LIFE CRMRecovery - Critical Raw Material Closed Loop Recovery

Environment and Resource Efficiency – Waste

Coordinating Beneficiary: WRAP

Partners within: Germany, Italy & Turkey

Project website: <http://www.criticalrawmaterialrecovery.eu/>

### B1 - SUMMARY DESCRIPTION OF THE PROJECT

#### Project Objectives

Each year around 9.9 million tonnes of WEEE is generated in the EU. Only 30% of WEEE generated is reported as properly collected and recycled. Many modern electrical and electronic products contain metals which have been classified as Critical Raw Materials (CRMs) by the EC. CRMs are those where supply and their economic impact to the EU is at risk and higher than for other raw materials. Most CRMs are virtually unrecovered from WEEE. The high losses of CRMs are attributed to the current collection and recycling arrangements. In the UK, WRAP has undertaken work to explore the viability of recovery of critical raw materials and precious metals from the EEE waste stream, mapping product and material flows and looking at critical technologies and hotspots blocking progress. The work highlighted the need to find a solution which spreads much further than the UK.

This Project has therefore been developed to take forward this work in partnership with European experts and practitioners e.g. collectors and recyclers.

#### Primary Project Objective

To demonstrate viable approaches to increase the recovery of target CRMs by 5% within the project lifetime. The target product categories are: Display, Consumer Electronics, Information and Communication Technologies (ICT) and Small Household Appliances. The target materials are graphite, cobalt, antimony, tantalum, rare earths, silver, gold and platinum group metals (PGMs), but the project will not be limited solely to these materials. These targets have been picked because previous work by all partners has indicated that these are the CRMs with the highest value and concentration and these are the product categories where they are found in greatest volumes.

Supporting objectives are to demonstrate:

- The environmental, economic & social benefits that an innovative circular economy for CRMs could deliver for the EU;
- Innovative collection, reuse, recycling and other forms of recovery of WEEE;
- Key inputs to a European infrastructure plan for collection and recovery of products, parts, components & CRMs from WEEE;
- Innovative methods to support the 7th Action Programme, Priority Objective 5: To improve the evidence base for environmental policy & Citizen support to improve transparency of fate of end-of-life products, parts, components and materials
- How through positive price mechanisms WEEE shipped to non OECD countries can be reduced

#### Actions & means involved

Proposed Actions:

- A1 Project Set-up
- A2 Bringing together Flows Work across Europe
- B1 Collection Trials
- B2 Recovery Trials
- B3 Policy Ideas
- B4 Pan European Infrastructure Development Recommendations
- C1 Monitoring and Evaluation of Collection and Recovery Trials
- D1 Communication, Dissemination and Networking Activity
- E1 Project Mgt, Monitoring and Reporting
- E2 AfterLIFE Plan
- E3 *Indicators*

## Overview

This Project will build on partners' experience to identify a range of collection, disassembly and reprocessing trials to take place in EC member states and in Turkey to understand the potential to increase the recovery of target CRMs. The new knowledge gained will feed in to the development of potential policy ideas and an infrastructure plan for the EU. The reason we have chosen to include Turkey is that it is a major manufacturer and user of EEE products, which means it is inherently linked to the EU market and could provide a ready outlet for CRMs recovered in the EU. However, this accounts for a very small part of the overall budget.

**Stage 1** Collection Trials: Collection routes/mechanisms will be identified through the development of a matrix and trialled. The trials are likely to include incentivised takeback, collection events and specific collection facilities. These collections will target product for multiple purposes: re-use, repair and recovery. Up to 4 trials with the greatest collection potential will be delivered in each of the 4 host countries (Germany, Italy, Turkey and the UK).

**Stage 2** Recovery Trials: Of the collected products, items suitable for re-use will be separated out, the remaining products will be disassembled to segregate target components for further reprocessing or component re-use. A series of recovery trials will then be carried out with the aim of understanding the impact on recovery where products are pre-sorted and concentrated. There will also be trials on processed components to identify the value-added by an intermediary step. The trials and their location will be defined as activity progresses and will include both chemical and physical technologies.

**Stage 3** Trial and project evaluation: Data gathered will be used to assess the potential of the collection and recovery processes to increase CRM recovery.

**Stage 4** Policy and Infrastructure recommendations: Using the trial data and evaluation, policy ideas and infrastructure recommendations will be developed to deliver the most effective resilience for EU businesses and the wider EU economy.

## Expected results

The current annual collection of WEEE is approximately 30% (3.1 million tonnes) of the WEEE generated in the EU [1]. This covers all categories of WEEE. This project will focus on the smaller but more CRM rich streams.

**Each of the collection trials will collect a minimum of 10 tonnes of target WEEE products per trial equalling a minimum of 100 tonnes.** The 100 tonnes of collected product will be reprocessed through re-use, component recovery and recycling operations. **Once the learnings from this Project have been applied across the EU, this will lead to a 20% increase in collection tonnage of the target WEEE products - around 0.2 million tonnes per annum. Currently the WEEE products targeted for recovery in this project account for 30% of the total WEEE collected.**

Current estimates of the potential amount of CRMs and precious metals in the WEEE waste stream are:

Gold – 24 tonnes per annum in EU WEEE  
Silver – 186 tonnes per annum in EU WEEE  
Platinum Group Metals (PGMs) – 7.7 tonnes per annum in EU WEEE

**This project will target an increase in recovery of target CRMs by weight of 5% by 2020 and an increase of 20% by 2030.** This will result in a 20% increase in value as reuse will also deliver high values. This will mean **annual** volume and economic value increases of:

Material	5% improvement In tonnage captured	20% improvement in tonnage captured	20% improvement in extra value captured
Gold	1.2	4.9	€150 m
Silver	9.3	37	€16 m
PGMs	0.4	1.5	€215 m

[1] Huisman, J. (2012). Eco-efficiency evaluation of WEEE take-back systems. Waste Electrical and Electronic Equipment (WEEE) Handbook, Woodhead Publishing Limited: 93-119.

## **Climate**

N/A

## **Biodiversity**

N/A

### **Project Topic(s)**

Projects using innovative methods, technologies, and actions primarily at the waste source for the prevention, preparation for reuse /reuse, recycling and separate collection of the following waste streams:

- waste electric and electronic equipment (WEEE), batteries and accumulators, end of life vehicles (ELV's), packaging, construction, demolition, and medical waste;
- bio-waste, including food waste throughout the food chain.

This project directly addresses the Project topic relating to Waste and specifically Point 2, which asks for projects using innovative methods, technologies and actions primarily at the waste source for the prevention, preparation for reuse/reuse, recycling and separate collection of waste electric and electronic equipment (WEEE) batteries .....

The EU 7th Action programme to 2020 identifies the need for the EU to “step up the contribution of environmental policy to the transition towards a resource-efficient, low carbon economy”. It recognizes that “resource use is still largely unsustainable and inefficient and waste is not yet properly managed. As a result, EU businesses are foregoing the significant opportunities that resource efficiency offers in terms of competitiveness, cost reductions, improved productivity and security of supply.”

This project will make a significant contribution to delivering key parts of the 7th Action Programme and in particular:

- Priority Objective 2- To turn the EU into a resource-efficient, green and competitive low- carbon economy
- Priority objective 5: To improve the evidence base for environment policy
- Priority objective 6: To secure investment for environment and climate policy and get the prices right
- Priority objective 8: To enhance the sustainability of EU cities
- Priority objective 9: To increase the EU’s effectiveness in addressing regional and global environmental and climate challenges

The project will support the EU “Roadmap to a Resource Efficient Europe” and the work of the EU Resource Efficiency Transition Platform by demonstrating how to recover and reuse CRM's. This work will make a major contribution to the European Innovation Partnership (EIP) and show how to improve recycling of CRMs from WEEE.

It is not possible to accurately estimate to what extent CRMs are recycled as they are largely only covered as a by-product of other primary smelting activity e.g. to recover copper and the content in product is not known.