



Life-Recumetal

DEMONSTRATION OF THE RECOVERY OF CRITICAL METALS SUCH AS INDIUM AND YTTRIUM BY RECYCLING DISCARDED FLAT PANELS

LIFE14 ENV/ES/000450 RECUMETAL

Deliverable D3.1: Layman report

Project start date:

September 2015

Duration:

42 months

Name of the project coordinator:

Claudio Fernández Acevedo

Name of the organization coordinating the project:

Centro Tecnológico L'Urederra

LAYMAN REPORT

DEMONSTRATION OF THE RECOVERY OF CRITICAL METALS SUCH AS INDIUM AND YTTRIUM BY RECYCLING DISCARDED FLAT PANELS



Life-Recumetal



LIFE14/ ENV/ES/000450

Life Environment and Resource Efficiency

Project funded by the European Commission

LAYMAN REPORT



Life-Recumetal

PARTICIPANTS:

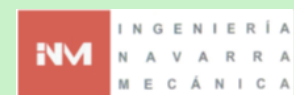
CENTRO TECNOLÓGICO LUREDERRA



FUNDACIÓN ASPACE NAVARRA PARA EL EMPLEO
(ECOINTEGRA)



INGENIERÍA NAVARRA MECÁNICA SL



Project acronym	RECUMETAL
Project number	LIFE14 ENV/ES/000450
Project title	Demonstration of the recovery of critical metals such as indium and yttrium by recycling discarded flat panels
Project demonstration place	Los Arcos (Navarra), Aoiz (Navarra)
Project duration	01/01/2015 – 28/02/2019
Financed budget	810.720 €
EC financing	486.432 €

CONTACT:

CENTRO TECNOLÓGICO LUREDERRA

Area Industrial Perguita C/ A, nº 1

31210 Los Arcos (Navarra)

Tfno: +34 948 64 03 18 Fax: +34948 64 03 19

email: lurederra@lurederra.es

Web: <http://life-recumetal.eu>

LAYMAN REPORT



Life-Recumetal

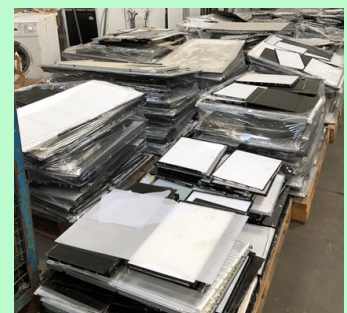
1-PROBLEMATIC:

Nowadays the amount of wastes from electric and electronic equipment (WEEEs) generated in Europe is about 13 million tons/year (13% of urban wastes). Recent studies foresee that this amount will be increased about 3-5% annually in the coming decades.

Specifically flat panels will have special relevance. In Europe around 150.000 tons of flat panels are collected every year, from which 120.000 are LCD and 30.000 are plasma. These emerging wastes will presumably be a problem in coming years, when their useful life finish, reason why the management of these wastes represents a great challenge in the recycling industry. Currently only one third of WEEEs are collected and treated according to European Directives, and specifically recovery and recycling of valuable metals and rare earths represent just a 3%.

On the other hand, 13% of these wastes are directly sent to landfills, burnt or simply left elsewhere, while 54% is illegally exported to Third World Countries or treated in non-authorized plants in the EU.

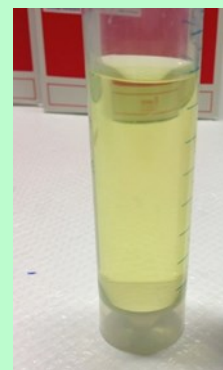
All these facts, together with the excessive increase on the demand of critical materials are causing that the demand remains highly above the offer. Nowadays the supply of these materials is mainly controlled by China, which for instance controls 53% of the worldwide production of indium and 99.9% of the production of yttrium. When in 2005 the Chinese Government limited exportations of its RE to the rest of countries, the supplies were hardly affected, causing the implementation of new uncontrolled extraction mines out of China and unsafe procedures for processing them.



Waste from flat screens



Crushed fractions of LCD panels



Metal content analysis

LAYMAN REPORT



2-OBJECTIVES:

The main objective of this project is to demonstrate the recycling of discarded flat screens for the recovery of key metals such as Indium (In) and Yttrium (Y), in such a way that their extraction allows their reuse in current applications.

The scientific, technological and environmental objectives proposed are the following:

- Development of a pilot plant with capacity to process 200kg/h of discarded flat screens, to recover up to 80% of Indium and Yttrium contained in them with a purity of 95%, in such a way that they allow their reuse in current applications.
- Recovery of 80% of other valuable metals contained in certain flat screens, such as silver.
- Recycling of at least 70% of fractions such as iron, aluminium or recyclable plastics by traditional methods.
- Demonstration of the processes developed through the collection and recycling of flat screens from different sectors in areas close to the location of the plant.
- Reduction of Europe's dependence on rare earths, mainly from China, to meet the requirements established by the Communication of February 2, 2011 in relation to imports of rare earths.
- Contribution to the European Directive 2012/19/EU to reduce environmental waste and recycle electronic devices.
- Reuse of Indium, Yttrium and other valuable metals recovered as high added value products in various applications.



Life-Recumetal

LAYMAN REPORT

3-DEVELOPED ACTIONS:

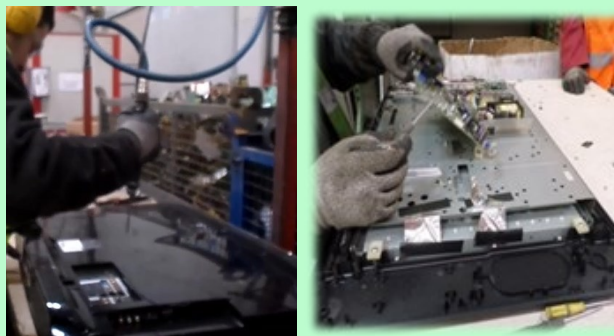
A pilot plant for the recycling of flat screens with a processing capacity of 225 kg / h has been developed consisting of two independent lines:



- ⇒ **LINE 1:** Mechanical screen processing
- ⇒ **LINE 2:** Chemical treatment of obtained fractions

The LINE 1 of mechanical processing is composed of 2 Modules:

- ⇒ **Module I:** where the manual disassembly of the components of the screens that are easier to separate is done
- ⇒ **Módulo II:** where the screen modules obtained in Module I are automatically processed

MODULE I.



FRACTION		DESTINY
Plastics		Traditional recycling
Metals		Traditional recycling
Loudspeakers and cables		Traditional recycling
Printed circuit boards		Traditional recycling
LCD Panel		Chemical processing line (In extraction)
Screen module		Module II mechanical processing line (Y extraction)

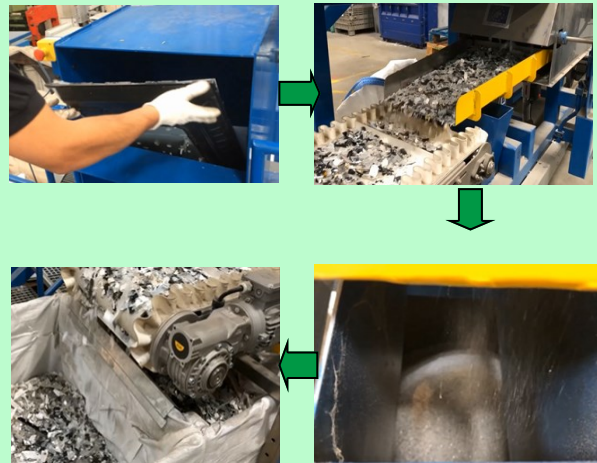




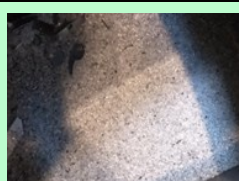
Life-Recumetal

LAYMAN REPORT

3-DEVELOPED ACTIONS:

MODULE II



FRACTION		DESTINY
Magnetic fraction (FM)		Traditional recycling
Non magnetic fraction (FNM)		Traditional recycling
Glass powder fraction (FP)		Chemical processing line (Y extraction)



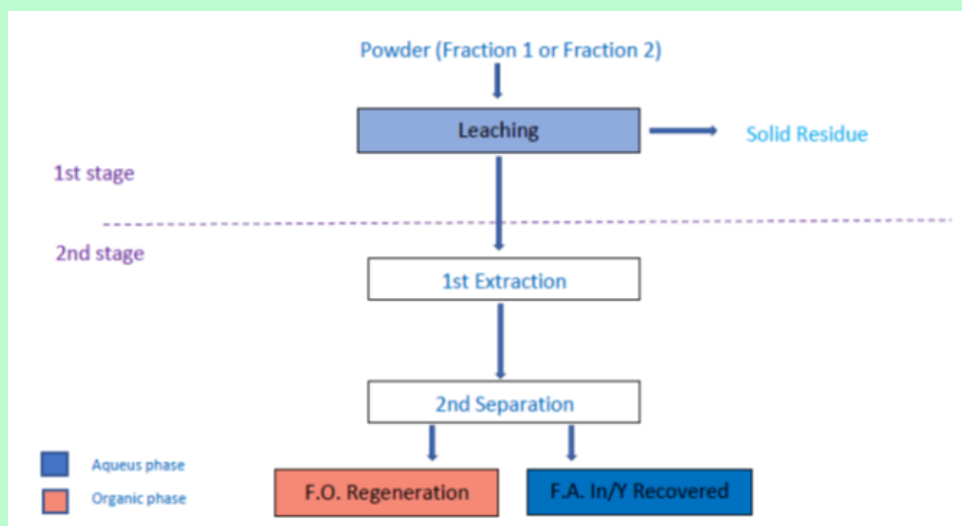
Life-Recumetal

LAYMAN REPORT

3-DEVELOPED ACTIONS:

⇒ **LINE 2:** Chemical treatment of obtained fractions

In the chemical treatment line, the treatment of the fractions obtained in the mechanical processing line for the extraction of Indium and Yttrium is carried out.



Life-Recumetal

LAYMAN REPORT



Life-Recumetal

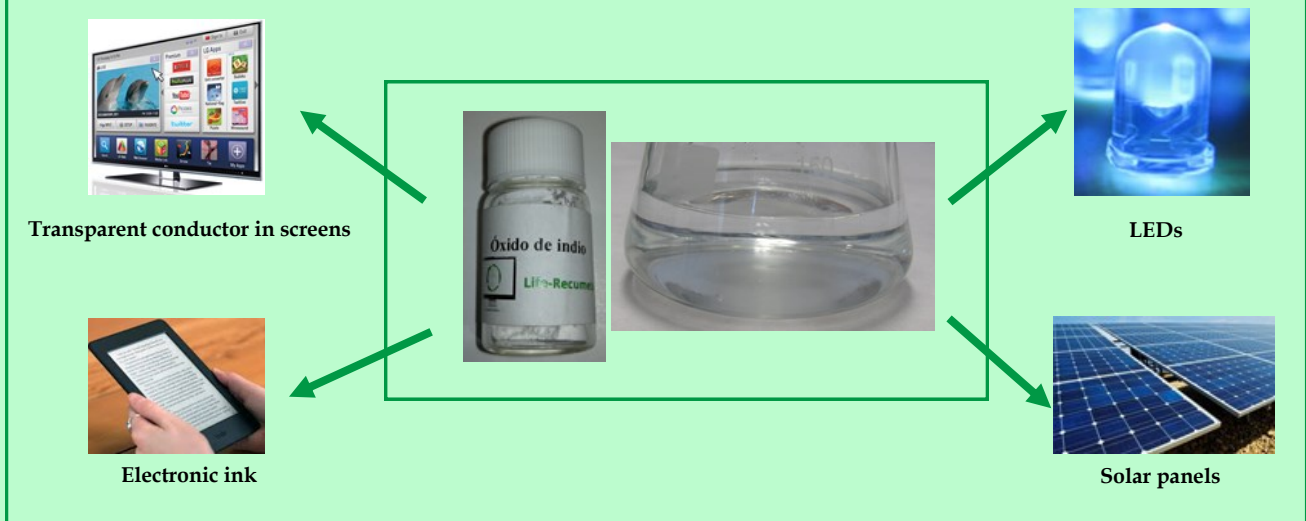
4-GENERAL RESULTS:

RECUMETAL PROJECT OBJECTIVES	PROVIDED	REACHED
Screen processing capability	200 kg/h	225 kg/h
Recycled flat screens	100 ton	89 ton
Recovery capacity In and Y	>80% >3gr/h	>98% In >87% Y >3 gr/h
Purity In and Y	>95%	
Other recyclable fractions obtained	70%	83%
Adaptability of the pilot plant	Flat screens of different sources and characteristics	Flat screens of different sources and characteristics
Environmental impact	Reduction of the environmental impact associated with the primary extraction of In and Y	Reduction of the environmental impact associated with the primary extraction of In and Y
Reuse	In and Y as high quality materials for it and other applications	In and Y as high quality materials for it and other applications
EU dependence on rare earths and valuable metals	Reduction by recycling of discarded flat screens	Reduction by recycling of discarded flat screens

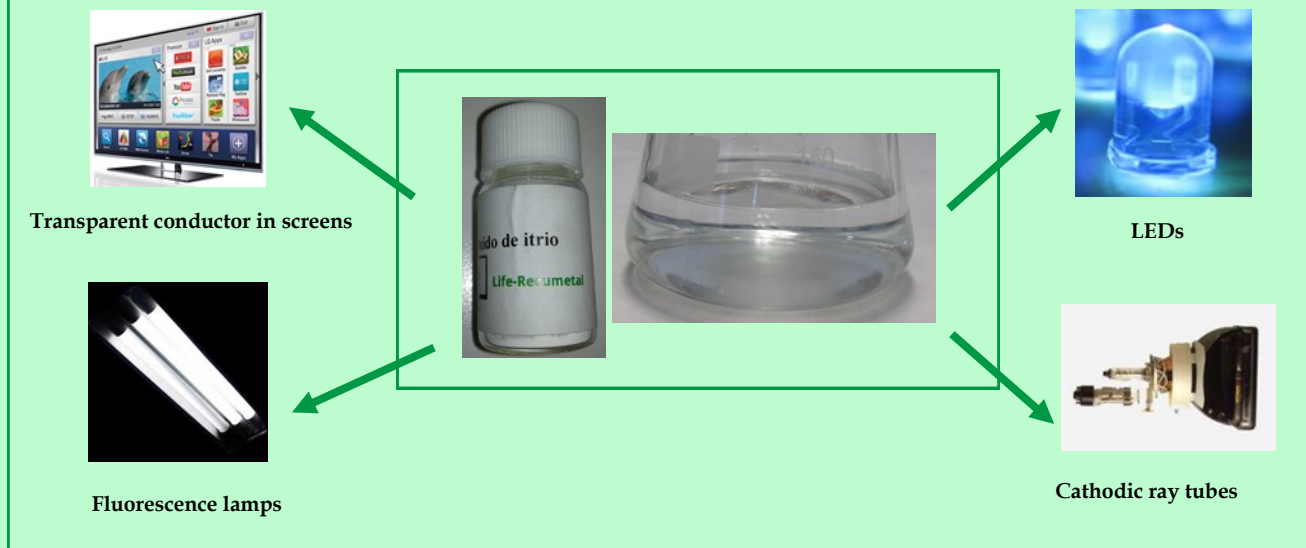
LAYMAN REPORT

5-RECYCLABILITY AND REUSE OF RESIDUES:

FINAL PRODUCT BASED ON INDIUM



FINAL PRODUCT BASED ON YTTRIUM



Life-Recumetal

6-LONG-TERM BENEFITS:

ENVIRONMENTAL BENEFITS

REDUCTION OF ENVIRONMENTAL IMPACT:

- ◇ By means of studies carried out on Life Cycle Analysis and Environmental Impact Assessment of the project's results, it can be deduced that there is a reduction of the environmental impact with respect to that associated to the primary extraction of rare earths and valuable metals through traditional methodologies.
- ◇ Re-use of indium and yttrium obtained as high quality materials for it and other applications.

REGULATORY COMPLIANCE:

- ◇ Contribution to the European Directive 2012/19 / EU to reduce environmental waste and recycle electronic devices.
- ◇ Reduction of Europe's dependence on rare earths, mainly from China, to meet the requirements established by the Communication of February 2, 2011 in relation to imports of rare earths.



ECONOMIC BENEFITS

MARKET:

- ◇ The market strategy is to publicize the results of the project and subsequently to implement pilot plants such as the one developed in other WEEE recycling plants nationwide.
- ◇ For this, it is planned to start an Action Plan with the main WEEE recycling plants nationwide (Recytel (Madrid), Indumetal (Bilbao), Electrorecycling (Barcelona), Recilec (Seville)) to show the recycling technology developed during the project.

