RECOVERY OF KEY-METALS FROM WASTE ELECTRIC AND ELECTRONIC EQUIPMENT IN CIRCULAR ECONOMY
Manufacturing & Remanufacturing Community

AFIL & CFI

A vision on Italian Smart Factory

TERESA SESSA, RELIGHT R&D MANAGER – MANUFUTURE CONFERENCE 2019
Intelligent Factory National Cluster (CFI)
CFI Mission/Objectives

CFI aims to transform Italian manufacturing sector with

• **new service/products, processes and technologies** that can successfully leverage and develop national resources;

• creation of a stable and **more competitive national Manufacturing & Remanufacturing Community** active in the development and implementation of a research and innovation Strategy;

• **link between National and Regional and International research policies**, with the scope to increase the ability of companies to use funds European research.

### COMPOSITION OF THE CLUSTER

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<table>
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<tbody>
<tr>
<td>Total number of the members</td>
<td>300</td>
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<tr>
<td>Number of SME and larger company members</td>
<td>226</td>
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<tr>
<td>Number of Research Institutions/Universities/Technology Centers</td>
<td>74</td>
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<tr>
<td>Number of Italian Regions</td>
<td>15</td>
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<tr>
<td>Number of Research Projects</td>
<td>4</td>
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Link to the cluster members’ list [https://www.afil.it/associati/i-nostri-soci/](https://www.afil.it/associati/i-nostri-soci/)
Relight & Trenee Group

Collection, Treatment, Recycling and Reuse of WEEE
Our Mission

Since its establishment, the main aim of Relight is to ‘close the loop’ and find solutions for the recycling of different fractions that constitute WEEE, especially for critical materials.
1999 - Relight is a private company, born from a collaborative project with Philips for the collection and recovery of lamps in Italy.

2017 - Relight is part of TREEE Group, a leading industrial player in the Italian e-waste sector, that integrates electrical appliances delivery and WEEE collection, treatment, recycling and reuse into supply chain.
Manufacturing: Challenges & Opportunities

Research And Innovation Strategy
Research and Innovation Strategy

An integrated approach in addressing the challenge is of crucial importance.

Challenges & Opportunities
- economical
- social
- environmental
- new products markets

Opportunities
- Sustainable Re-manufacturing
- Valuable materials recycling – key metals recovery through «advanced integrated Technologies»

Challenge
- Social needs for a wide range of products
- Scarcity of the primary raw materials
- Unstable geopolitical relations

the right technologies for the right challenges/opportunities, measuring the (potential) impact of technologies
Key-Metals Recovery: Integrated Leading Technologies for Cobalt Recovery

Crocodile Project
Demand for cobalt is expected to soar with the growth of LIB, particularly EV batteries. Source: CANACCORD Genuity report, May 2018

Large deficit in cobalt supply and demand is expected in the coming few years. Source: Exane BNP Paribas

Cobalt price increased by ~ 250% in 2017- between the submission and approval of CROCODILE!

- Primary production = 65% (approx. 10,000 tons/year). Imported from geopolitically unstable countries such as Democratic Republic of the Congo (DRC) or Central African Republic.
- Secondary production = 35%. Mainly from recovered from spent batteries, superalloys and hard metals
- high performance applications = jet engines and electrical power generation turbines, high strength steel, super alloys, samarium cobalt magnets, batteries and catalysts, etc.
A Best Practice of Novel Integrated Technologies for Cobalt Recovery from WEEE - Crocodile Project

Challenge
Improve the economic and environmental values of recovery processes of cobalt in Europe

Solution
Provide a zero-waste strategy for important waste streams rich in cobalt such as batteries.

Targeted feedstocks
The targeted primary and secondary raw materials are laterite mines, autocatalysts and batteries.

Funding & Duration:
Horizon 2020 - Grant Agreement No. 776473- EC contribution: 11 625 289€
4 years: from June 2018 to May 2022

CROCODILE is a project funded by the European Commission. This project has received funding from the European Union’s Horizon 2020 Research and Innovation program under Grant Agreement n° 776473

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The CROCODILE Consortium Activities

CROCODILE is a project funded by the European Commission. This project has received funding from the European Union’s Horizon 2020 Research and Innovation program under Grant Agreement n° 776473
The CROCODILE Overall Process

CROCODILE is a project funded by the European Commission. This project has received funding from the European Union’s Horizon 2020 Research and Innovation program under Grant Agreement n° 776473.
Key–Metals Recovery from WEEE - Rare Earth Elements

HydroWEEE Demo Project
HydroWEEE Demo Project

Innovative Hydro-metallurgical Processes to recover metals from WEEE including lamps and batteries

- Coordinator: ISL
- 9 partners from 4 countries
- Duration: 48 months
- Costs: 3,8 mio €
- Start: October 1, 2012
HydroWEEE Demo Process

Pre-treatment

Flourescent Powders

Roasting

Leaching

Filtration

Precipitation

Filtration

Rare Earth Oxalates
Thank you!

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