

## EERA Linked Third Partners in CEWASTE project - sharing experiences 09/02/2021

### Introduction CEWASTE

CEWASTE is a two-year project funded by European Union's Horizon 2020 research and innovation program. It will develop a voluntary certification scheme for waste treatment. Specifically, the project will create, validate and launch the scheme for collection, transport and treatment facilities of key types of waste containing significant amounts of valuable and critical raw materials such as waste electrical and electronic equipment (WEEE) and batteries. The pilot audits at WEEE recyclers are a main part in the project and the tool to review the voluntary certification scheme [www.cewaste.eu](http://www.cewaste.eu).

### Introduction EERA

EERA is the European association that represents the interest of recycling companies that are treating waste from –electrical and electronic equipment (WEEE). It membership includes 30 specialist recycling companies (pre- processors and end- processors ) in 23 countries across Europe.

EERA aims for:

- a level playing field for fair competition of all actors in the WEEE chain, by making the standards (EN 50625 series) mandatory in the EU member states,
- effective and efficient processing of WEEE in order to:
  - achieve a high level and quality of material recovery,
  - assure protection of human health and safety,
  - prevent pollution and
  - minimise emissions.
- auditable tracking of WEEE and materials throughout the treatment and re-processing chain,
- prevention of export of any whole and untreated WEEE and hazardous sub-streams for treatment and recycling outside the European Union, unless it complies fully with all applicable European environmental, health and safety regulations,
- strict criteria for reuse of electrical and electronic equipment.

Together with 5 EERA members, EERA is contributing to the aims of the CEWASTE project. EERA and EERA LTP's, Umicore Precious Metals refining, Coolrec BV, Stena Technoworld Srl, Indumetal S.A. and Relight SRL (now TREEE Group) are proud to contribute to the CEWASTE project and happy to share our experiences, focussing on the pilot audits in the project, in this document.

[www.eera-recyclers.com](http://www.eera-recyclers.com)

### EERA Norbert Zonneveld, Senior Advisor

Observations on the CEWASTE standard and audits: The CEWASTE project is challenging. The ambitions to formulate normative requirements and to develop an auditing system for Critical Raw Materials – CRM recovery as well as to test these in real practice for collection, transport and treatment of WEEE and Batteries has not been shown before. Starting with the question which CRMs in which products can be considered 'low hanging fruit' was already a big puzzle. Questions such as which CRMs are in which products and are there technologies available for their recovery in both pre-treatment and final treatment, had to be answered for each CRM. CRMs are thinly spread in materials and not always applied in similar electronic and electrical products of the different producers. But finding a way forward in the paradox of recovering materials, which are classified as critical because they are important for the EU economy, while most CRMs in WEEE and Batteries cannot be recovered in an economic viable way, goes beyond normative requirements for collection and treatment and must include strong long lasting drivers like EU wide mandatory standards, subsidies and harmonized legislation. In addition the ever-changing EU CRM list does not help to create the necessary long term stable market for CRMs in Europe, which are not necessarily scarce on a global scale.

Despite these challenges companies and especially EERA members are motivated to contribute to the way forward because they believe it is necessary for the holistic sustainable economy in future. It is with some pride that I would like to tell you that there have been organisations in the field of collection

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and processing that have voluntarily opened themselves up to be audited and thus to provide proof that the strict normative requirements and an audit system can contribute to this higher goal. “The proof of the pudding is in the eating” and that is what the 5 EERA members did and are sharing with you hereafter. The lessons learned in the audits have led to improvements of the requirements and the audit questions and manuals. The following steps are mainly in the hands of the authorities and of producers, who in the framework of the Producers Responsibility principle can ensure that the necessary solutions and conditions for the success of the CEWASTE standard and audit scheme are created.

**Umicore Precious Metals Refining, Belgium: Steven Art Project & Supply Manager at Umicore Precious Metals Refining and Margaux Desmedt, Commercial Manager at Umicore NBI (New Business Incubation)**

Umicore is a materials technology group focusing on clean technology. Recycling is one of the business groups of Umicore built on a long expertise in chemistry & metallurgy for recovering of precious and other non-ferrous metals out of complex raw materials. The business unit Precious Metals Refining is active in the recycling of e-waste since many decades. In the last 10 years, also expertise has been gained in the recycling of rechargeable batteries.

It was a pleasure and nice experience for Margaux and Steven to contribute to the CEWASTE project on behalf of Umicore. Umicore mainly contributed as expert in end-processing of some key CRM materials. In particular, Umicore contributed to the identification of key materials with CRM's and participated in the pilot audit for the end-processing of printed circuit boards and rechargeable batteries. This audit took place fully remotely due to the known measures related to Covid-19. Nevertheless, it went very well. The audit was well organized despite of this restriction; a thorough list of requirements was shared before the audit. This gave Margaux & Steven the opportunity to prepare well and gather all relevant information. It resulted in a nice flow of information sharing during the audit meetings. This also made it possible to take enough time for the most important topics and interesting discussions. The auditors were well prepared and focused on relevant topics and details. A good audit should indeed imply a common sense and pragmatic approach whereby existing certificates and permissions are relied on in order that the relevant aspects can be focused on for critical review.

**Coolrec BV, part of the Renewi Group, the Netherlands, Tom Caris, Manager Business Development**

Established in 1991, Coolrec is the division within the Renewi Group that recycles electrical and electronic equipment (WEEE), with recycling centres in the Netherlands, Belgium and France. The group has dedicated semi- and full-automatic processes for all WEEE categories, with the exception of lamps, and WEEE plastics. Preparation for automated recycling, i.e. manual sorting and, or removal of dangerous components, is done on all locations. The recycled plastics are compounded in-house into new raw materials.

In Liège (Belgium) we operate a large shredder installation which is dedicated to SDA and IT equipment. The installation incorporates metal shredder and post-shredder technology in one. All processes are directed at optimal recovery of precious metals, which is how Coolrec manages to distinguish itself from classical metal shredders. With this in mind, we see great potential value in the uptake of CEWASTE as a standard and certification scheme. As with WEEELABEX in the past, Coolrec wishes to be in the forefront, and decided to participate in the piloting of this project. We believe that such standards should be challenging but feasible. This means the bar must be set low enough as to be able to go over, but not so low that anyone can pass without effort.

The greatest strength we see in CEWASTE is that it can be set up as an extension or add-on to existing standards (EN50625) and certification schemes (WEEELABEX). This allows the best recyclers to distinguish themselves from the good ones.

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We also see several important opportunities to further improve the CEWASTE standard and scheme:

1. The standard was written with the idea that mechanical processes by definition do not recover CRM or Precious Metals - PM properly. Although that is probably true for large metal shredders, it is certainly not (always) the case for specialized WEEE shredders. The auditors were very much impressed by the processes at Coolrec and stated that they believe our performance in terms of PM recovery from SDA and IT was at least as good, and probably better, than manual processes.
2. The standard is currently limited to certain CRMs, of which some are not economically interesting to recover. Others, which are recovered in current practices, were not included, even though clearly identified by recyclers at the start of the project. E.g. the fluorine which is recycled from refrigerants and blowing agents in the process of Daikin Refrigerants. This avoids mining of fluorite (or fluorspar), which is on the CRM list.
3. Standards by definition have to reflect state-of-the-art. The requirements on CRM recovery from magnets are to date still beyond state-of-the-art. Similarly for fluorescent powders, the technology exists, but economically it is not viable. However, we see the interest to keep these requirements. A solution with a two-level certification could be envisaged: a basic level where the economically viable CRM and PM are recovered; and an expert level for recyclers who recover (a minimum threshold) of non-economically viable CRM.
4. The standard / audit scheme are missing a metric (performance measurement). The risk is that the audit then becomes a simple paper exercise, which is prone to fraud. Admittedly, it is not self-evident to set a target with the input being extremely variable (variance in SDA and IT appliances), and PM and CRM content in the input appliances being unknown. However, it seems worth to do the exercise.

On some important topics the CEWASTE requirements need to be revised:

- In WEEELABEX it is considered compliant when the recycler sends batteries to an EPR compliance scheme, even though the recycler doesn't have any information on the downstream processes of that scheme. CEWASTE sees this as a non-conformity.
- The standard contains certain requirements with no added value in practice. E.g. there is a requirement that damaged batteries must be stored separately from non-damaged ones. A situation where they are not separated, but all are treated and stored as if all are damaged, is seen as a non-compliance. E.g. there is a requirement that Lithium batteries are sorted by chemistry. Apart the fact that it is costly, and sorting errors will likely be huge, this makes no sense since there are no separate downstream processes.
- The upstream traceability requirements are practically impossible to comply with. The idea to take a chain-of-custody approach is to some extent understandable, but the limits have not been set clearly. Specifically it is not clear where that chain should start. The question is even why it is important that CEWASTE compliant input is treated separately from non-compliant input. What counts in our view, is that the CRM / PM are recovered, irrespective of their origin.

Finally about our experience within the CEWASTE project itself, in spite of Covid restrictions, we believe the piloting audits were well prepared and performed. However, we warn that the pilot audit sadly did not go into depth. It was explained during the audit that the intention was more to check feasibility of the requirements, rather than compliance to them, which is well understood. However the lack of thoroughness might lead to unpleasant surprises once the audit scheme is put in place, as it is not guaranteed that all recyclers actually understood the requirement correctly when he claims compliance in the pilot audit.

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### **Stena Recycling Srl a.k.a Stena Technoworld, Martina Scoconi, Manager Health and Safety**

Stena Recycling Srl. is a WEEE treatment company that treats around 120.000 ton per year of WEEE and non-WEEE in Italy and has two main sites in Angiari (VR) and in Cavenago (MB). and in 2018 acquired TRED Carpi SpA near Modena, in order to enlarge the market and the services offered.

Stena strongly believe in developing industrial solution for the waste management and has invested in its plant and has installed a “second treatment” facility in Angiari, where the aim is to treat SDA and components, also from the non-WEEE stream, to obtain End of Waste fractions and fractions containing “Precious Metal” to be sent to refineries.

This perspective was the main drive for Stena to take part to the CEWASTE project, with the aim to better understand the content of WEEE and to improve the recovery of some critical material by sharing our processes and knowledge with others.

Stena’s role in the project was to take part in the planning phases of the selection of CRM containing equipment and components in the WEEE, which is daily treated in our plant and to check whether our treatment process could be optimized. in order to simplify the downstream recovery or in some case to reach a higher recovery. Stena has always tried to focus on feasibility of the treatment which need to be sustainable not only environmentally but also socially and economically. Stena has an active role in the development of the voluntary scheme to increase the recovery of the target component/material and in the phase 4 one of our sites was audited by a third party to evaluate our processes and carry out a gap analysis based on current status quo and how the recycling rates can be improved.

Usually the main challenge in these projects is to work together with other companies operating in different countries, but for CEWASTE there was another challenge: COVID -19 restrictions.

From the audit experience, there were some positive and negative aspects to take away:

- Positive: There are ways to increase CRM recovery.
- Positive: Cooperation between countries and stakeholders.
- Negative: The first part of the compliance check was more on bureaucracy than on technology.
- Negative: There is still a lot to do to unify and simplify waste treatment procedures in the European Union and that effort is needed in developing economically viable treatment for CRMs.

### **Indumetal, S.A, Spain, Dorleta Guardede, head of the Innovation Department and Ainhoa Urkitza Innovation Department technician.**

Indumetal Recycling S.A, (From now on, INDUMETAL) is participating in the CEWASTE project as a linked third party, with its participation mainly focused on the pilot audits (WP4) of the project. INDUMETAL’s extensive experiences and facilities made it a perfect candidate for validating the CEWASTE normative requirements for recycling of CRMs from WEEE.

#### **Experiences related to the voluntary audit for the recovery of CRM’s:**

CEWASTE audit has been a very positive experience for the company. Overall, the audit scheme was very well organized, and the questions were clearly formulated. The method for document sharing was also very appropriate, making the audit run on time, and coordinated in an efficient manner.

Focusing on more technical aspects, from our point of view, the evaluation and result of the audit should be considered for each CRM’s enriched stream separately, giving the possibility to the company to be certified in, for example, consider only one waste stream. This criterion is based on the differences of the estate-of the art for each waste stream:

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- Lack of recovering technologies: for example, in the case of neodymium magnets, the existing pyro-hydro technologies are not available for these materials.
- Lack of market for the recovered material: The fact that there is no market for some materials make their recovery efforts non-feasible. This also applies to magnets, even if it is feasible to recover them, there would be no market for them afterwards. In the case of lithium-ion batteries, even though the lithium batteries are recovered, they are been recycled because there is no market demand.
- Low concentration of CRM in the waste stream: resulting in non-feasible downstream recovery, both economically and technically. This is the case of the indium contained in the flat screens, where indium recovery in downstream fractions is not feasible due to its very low concentration.

Other aspect to be considered is related to the battery codes. We suggest to include as acceptable other battery related waste codes, for example, 16 06 11\* for lead-acid batteries. The lead-acid batteries and other batteries might come from different sources. It would be good to include 16 06 11\* and other codes from the “16 group” for when it comes from non-municipal sources, as regulated by the national legislation, at least in Spain.

Additionally, the experience reveals two things: (1) on the one hand, the need for new recycling policies coordination to European Administration; and; (2) on the other hand; the need of focus groups to work both on: new technologies for materials recovery and on new markets for the recovered materials.

With all this said, we believe that the audit has been an enriching learning experience and we consider it has been a great opportunity for INDUMETAL to be able to participate. In addition, it has been the company’s first experience performing a semi-online audit, a format that we believe will be increasingly common. A reason why we consider that is good to be familiar with it. Last but not least, INDUMETAL is highly interested in seeing the results of the project and willing to learn from the final results of the project.

Best practices regarding CRM containing WEEE
<b>RECEPTION</b>
<ul style="list-style-type: none"> <li>• All the material entering the facilities need an acceptance contract (treatment contract) approved by INDUMETAL in advance.</li> <li>• All the receptions are recorded in an entry register. Where if any incident occurs, as out of contract waste arrivals, these are reported with photographic evidence.</li> </ul>
<b>SORTING</b>
<ul style="list-style-type: none"> <li>• The WEEE that arrives as “sorted WEEE” is checked to verify if it corresponds to the referred category and if it complies with quality requirements, then it is re-sorted if necessary.</li> <li>• The WEEE that arrives as “mixed WEEE” is manually sorted and each category is weighed and recorded into the entry weighing or manufacturing order. Among KCE sorted at INDUMETAL we have computers, CRTs, Lamps, mobile phones, tablets and laptops.</li> <li>• In the case of batteries, at INDUMETAL two categories are sorted: Lead-acid batteries and MIX PILAS (battery mix). The battery mix is then sorted in RECYPILAS in eight categories: (i) primary Li: Thionyl and primary lithium; (ii) Li-ION batteries: with high and low cobalt; (iii) NiCd: with and without plastic casing; (iv) NiMH; (v) Button batteries: lithium and others; (vi) Alkaline and Coal-Zink; (vii) Lead acid; and, (viii) Big lithium: e-mobility. When unusual or unknown batteries appear, they are put aside to decide about their management later.</li> <li>• Battery sorting is a particularly complex job where a great deal of knowledge is required for its correct performance. To that aim, workers, both from RECYPILAS and INDUMETAL, are trained with different supporting material. In addition, the most experienced workers work close to the most beginners in order to guide their training.</li> </ul>
<b>CRM CONTAINING COMPONENT REMOVAL</b>
<p>All the CRM materials are removed in a way that no hazardous substance or CRM are emitted to the environment, except magnets (which cannot be separated from the ferrous fraction neither from the light shredder fraction):</p> <ul style="list-style-type: none"> <li>• <b>PCB:</b> These components extraction is carried out from treatment lines. INDUMETAL mechanically concentrates the PCB cards in an output fraction, after a not aggressive grinding.</li> <li>• <b>Fluorescent lamps and CRT:</b> These are dismantled in Indumetal and then sent to Recypilas to undergo the treatment process in order to obtain the fraction rich in Mercury and CRMs.</li> </ul>

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<b>TREATMENT OF NON-DEPOLLUTED WEEE</b> <ul style="list-style-type: none"> <li>Lamps, CRT, FPD and IT fractions, as contain both hazardous components and CRMs, are treated in a manner to ensure effective de-pollution as well as high recycling efficiency (except magnet retrieve).</li> </ul>
<b>BATTERY MANAGEMENT</b> <p>Best available technique energy storage and logistic worldwide:</p> <ul style="list-style-type: none"> <li>Lithium-ION batteries are stored in a bunker with a fire detection alarm and fire extinguishers.</li> <li>Batteries are stored in containers filled with vermiculite.</li> <li>Stored batteries' temperature is highly controlled with measurements taken every 3 hours.</li> <li>Workshops are equipped with anti-fire systems: smoke detectors, fire extinguishers, surveillance cameras, alarm...</li> </ul> <p>In addition, INDUMETAL collaborates with local firefighters in their trainee in less usual fire types.</p>
<b>MONITORING</b> <ul style="list-style-type: none"> <li>All the output fractions are recorded at each step of manual and mechanical processes in a software (NAVISION) that has specifically been designed for the company's activity.</li> <li>Traceability: data monitoring between offices and plant is already implemented internally. The company is now working to improve the digital connection with external personnel: customers, suppliers, logistics ...</li> </ul>

**Relight srl, Italy Teresa Sessa, R&D Manager and Matteo Sicolo H&S Manager.  
 Since 1<sup>st</sup> January 2021, Merger Relight and TREEE Group (December 2020)**

TREEE Group (*Treatment & Recycling of Electrical & Electronic Equipment*) was born in June 2017 and, for the first time in Italy, integrates electrical appliances delivery and WEEE collection, treatment, recycling and reuse into supply chain. TREEE is located on the whole Italian territory with five WEEE Recycling Treatment Plants, able to manage 80'000-90'000 tons of e-waste per year.

#### Experiences related to the voluntary audit within CEWASTE Project

Relight (From now on, TREEE) is involved in the CEWASTE project as a EERA linked third party, mainly in activities: gap analysis, the design of the Voluntary Certification Scheme in section related to "pretreatment for CRMs" and in the pilot audits. The pilot audit took place in September 2020 at TREEE Facilities located in Rho, in northern Italy. It has been an interesting opportunity for discussion on different topics and a well-done audit in time management, in the clear formulation of the questions. Below a SWOT Analysis is presented to summarize the final feedback

#### Strengths of CEWASTE Certification

- THE SUPPORTING LEGISLATIVE FRAMEWORK based on EN50625 and WEEELABEX.
- INNOVATION IN THE BASIC CONCEP: CEWASTE Certification is based on requirements for the proper WEEE Management & Treatment, but this scheme for the first-time places as a pillars two fundamental objectives: CRMs Recovery and Traceability

#### Weaknesses of CEWASTE Certification

- A MORE SIGNIFICANT INVOLVEMENT OF WEEE RECYCLERS DURING THE WRITING OF REQUIREMENTS WOULD HAVE BETTER:  
 WEEE Recyclers were not involved sufficiently during the normative text writing or involved only for topics: "collection", "pre-treatment", "treatment", etc. A total involvement of the Recyclers, also through the organization of discussion tables by topics, during writing phase, would have brought a more technical and continuous character to the standard.

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- THE MAIN FEATURE OF THE AUDIT WAS DOCUMENTAL:  
The pilot audit was mainly documental and not very operational: the questions on management were different and very thorough, while those on the technical part should have had a more technical-engineering approach, capable to investigate on the different approaches (manual, mechanical, chemical), different level of technologies (BAT, scale, etc.), able to analyse the methodology to define the recovery rates for CRMs and PMs.
- THE TRACEABILITY CONCEPTS IS APPLIED TO THE WHOLE WEEE CHAIN, CONNECTING KEY-PLAYERS OF THE PROCESSES UP-STREAM WITH THOSE DOWNSTREAM IN CEWASTE CERTIFICATION, THROUGHT REQUIREMENTS THAT ARE IMPOSSIBLE TO BE REALIZED WITHOUT FURTHER SUPPORTING REGULATIONS:  
The current framework, WEEE recyclers face long bureaucratic procedures and problems to receive statements from the first actors involved in downstream processes (such as documents from destination treatment plants for recovered materials), therefore without a regulatory support that requires a solid involving of both the EEE producer and the end user of secondary raw materials, CEWASTE traceability requirements cannot be met.
- THE CEWASTE SCHEME IS AIMED AT QUANTIFYING LOSSES AND MAXIMIZING CRM RECOVERY, BUT THE METHODOLOGY TO ACHIEVE THESE GOALS MUST BE EVALUATED MORE TECHNICALLY AND PROVIDED FOR EACH KEY-COMPONENT, COMPARED TO THE CRMs TO BE RECOVERED.  
This assessment should also take into account secondary but influential issues: such as the lack of market demand for some recovered CRMs, the potential applications and the relevant transitions/variations in the market and in the production process for CRMs secondary resources over the decades.
- LACK OF EXAMPLES AND GOOD PRACTICES TO HELP THE RECYCLERS/OPERATORS TO DEFINE THE MARKET AND APPLICATIONS FOR THEIR CRMs RECOVERED
- SOME GUIDELINES AND SUGGESTIONS ARE NOT APPLICABLE.  
CEWASTE provides some suggestions that are not technically applicable or inapplicable without the use of advanced optical sorting technologies such as the section dedicated to batteries sorting.

### Opportunities for CEWASTE Certification

- MORE LEVELS OF CERTIFICATIONS  
Distinguishing different levels of certification could be a good start to address opportunities which are totally different depending on the case: a Basic Level of Certification for CRMs and PMs economically viable; and an Expert Level of Certification for CRMs non-economically viable, this level should be supported by greater economic incentive measures (bonus, tax relief, etc.).The distinction in the Certifications could highlight those Operators who are in need of strategic support for their recycling process that is technologically able to recover CRMs but economically not sustainable.
- INTEGRATION WITH OTHER SIGNIFICANT REGULATIONS:  
The certification should integrate perfectly with product standards as REACH Directive, therefore in the pilot phase, the gaps should be already studied.
- CEWASTE CERTIFICATION SHOULD STIMULATE THE APPLICATION OF THE RESTRICTIVE RULES  
The certification must be a stimulus to restrictive regulations such as RoHs, the issues on the correct management of hazardous waste should be much more addressed in the text much.

### Threats for CEWASTE Certification

- THE RISK THAT THE AUDIT IS ONLY DOCUMENTAL  
The risk is that the CEWASTE Audit becomes too approximate; requirements on many documents supporting compliance with the Management Requirements and few on technical parameters on operational aspects, therefore unbalancing the total audit result.
- IMPOSSIBILITY TO APPLY TRACEABILITY REQUIREMENTS AND COVER THE ENTIRE CRM VALUE CHAIN:  
The starting point of the CRM supply chain and traceability requirements is not clear. Probably, the starting point could be the Recycler/Operator, perhaps through a parcelling approach on the incoming waste and on technical-operational and management aspects. Surely this approach, in addition to being a demanding exercise for the Operator / recycler, is also very expensive, therefore incentives and financial supporting initiatives are needed.