Creating a well-functioning EU market for WEEE plastics

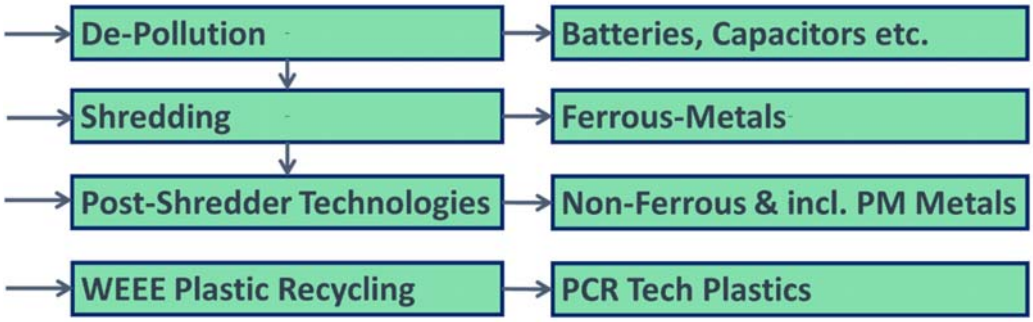
Input for the guidance document on the classification of plastics wastes.

EERA feels the need to provide some input for the guidance document on the classification of plastic wastes for quality recycling within the Europe, as EERA members need to be able to deliver WEEE plastics to compliant plastic recycling facilities in Europe without additional burdens (see also chapter 4.3 of the Circular Economy Action plan).

The recycling of WEEE (Waste of Electric and Electronic Equipment) follows a process, that is has developed based on a European TAC guidance document Annex II and article 6.1 of 2002/96:

"Substances, preparations and components may be removed manually, mechanically or chemically, metallurgically with the result that hazardous substances, preparations, and components and those mentioned in Annex II are contained as an identifiable stream or identifiable part of a stream at the end of the treatment process. A substance, preparation or component is identifiable if it can be (is) monitored to prove environmentally safe treatment."

In most of Europe, end-of-life large professional electronics and CRT displays are manually dismantled. By far most of the WEEE is treated in shredding processes, whereby the plastics are treated at the end of the recycling chain following this process:



In line with this TAC guideline, the shredder residues from WEEE are treated to recover a plastics mix from these residues and this plastics mix is treated by specialized plastic recycling plants, which produce Post-Consumer Recycled (PCR) plastics that need to comply with product legislation such as REACH but also RoHS if these PCR plastics are used for application in new electronic products. In order not to hinder compliant recycling these WEEE plastics should not be classified as hazardous wastes.

Plastics from WEEE are known mixtures which are grouped into mixed plastics from Small Domestic Appliances, Cooling Equipment, ICT, Large Domestic Appliances and Display equipment. Each of these groups contain typical contaminants or additives, which need to be properly treated by the WEEE plastics recycling facilities.

The non-recycled plastics, which include the additive substances that are restricted, are discarded in an environmentally sound manner. The most frequently used restricted additives in housing of electronic products is in the group of Brominated Flame Retardants (BFRs), but there are others, such as for instance Cadmium containing pigments. To stay with the BFRs, many BFRs are still permitted additives, but several BFR substance-groups are restricted, more specifically the substance group of the Poly-Brominated Biphenyls, Hexabromocyclododecane (HBCDD) and the substance group of the Poly-Brominated Diphenyl Ethers (PBDEs) which are restricted in several product legislations such RoHS and REACH.

In line with the EN 50625 standard there is no need to make any analyses of restricted substances during the recycling process, provided these are "contained in an identifiable (part of a) stream. EERA has produced a brochure to explain the logic applied by the EN 50625 regarding the Environmental Sound Treatment of WEEE plastics with BFRs: eera-bfrs-folder-online-3-may-2020.pdf

The screening of BFRs in waste is based upon the use of the measurement of elemental Bromine. On large pieces of plastic from manual dismantling processes or in industrial separation machines, XRF can be applied as a yes/no analyser on the presence of Bromine as element. In that case the technique is used to separate BFR containing plastics from those without.

For shredded mixed plastics XRF can be used to measure elemental Bromine concentrations in a shredded mixed WEEE plastics pile. This is a complex and time-consuming and therefore costly task that follows the following steps for one valid XRF screening measurement:

1. There needs to be a **representative sample** – the Cenelec EN 50625 describes how a representative sample needs to be taken from a pile (for instance for a Batch Test).


2. This complete representative sample needs to be **size reduced to dust – cryogenically** (very cold as the plastic would otherwise melt in the grinding process).

3. The dust sample again needs to be **reduced in volume** until you have the volume to press an "analysis tablet"


4. **Tablet press:** The tablets are pressed with previously finely ground plastic dust into a tablet mould with an electro-hydraulic press with a pressure of 20to. Then the pressed plastic tablet is melted together in the drying oven at the respective melting temperature of the plastic.


5. Only then an **XRF measurement** can take place.

The reading of the XRF appliance does not necessarily represent the true value of the Br concentration.

The reading of the XRF can be influenced by many different aspects, amongst which the many types of other additives that might be present in the WEEE plastics. These can influence the result of the reading.

The easiest method for using the XRF as screening method is when the WEEE plastic recyclers apply this on the PCR plastic end-product, in other words at the end of the recycling process.

The PCR flakes from WEEE are typically blended before and/or during the extrusion process, so that this final product will have been homogenized. Measurements are typically taking place typically on test-bars.

These measurements to screen the content of Brominated Flame Retardants is based upon the analysis standard IEC EN 62321-3-1, which is a RoHS screening method. Although the readings of the XRF appliance can be lower, this measurement is validated for 1000 ppm for elemental Bromine because of the many influencing factors as other additives that are used in these plastics. The measurement can also screen the level of Cadmium, which was used in the past in certain pigments.

This description illustrates how difficult and tedious it is to produce a sample and to prepare this for a screening and that this screening value does not yet give insight in the amount of restricted additive substances. Any screening or measurement of Bromine, or Cadmium or any other element related to one or more of the additives used in WEEE plastics, during the recycling process therefore does not give any added value.

Recycling WEEE plastics has major advantages, as the energy needed for producing these Post-Consumer Recycled (PCR) plastics is only a fraction of the energy used to produce virgin tech plastics. The advantages on the Carbon Footprint are enormous. Per Metric Ton of WEEE plastics that can be recycled, over 4 Metric Tons of CO_2 are saved compared to the same tech plastics produced from fossil sources, as all of the energy used for the production of these tech polymers matrices is re-used.

If the WEEE plastics are recycled in specialized compliant recycling facilities, EERA calls for the EU not to request any screenings or analyses on restricted substances, before the end of the recycling chain, as such screenings and analyses:

- Take a lot of time and money resources
- Are not giving any added value, as it is not certain whether these values refer to restricted substances.
- And as the resulting PCR plastics need to comply with REACH and/or RoHS.

In conclusion:

WEEE plastics should not be classified as hazardous waste, as this would largely hinder compliant recycling within the EU.

The most cost-effective method of compliance control is on the Post-Consumer Recycled PCR plastic end-product.

EERA therefore requests that analyses on mixed WEEE plastics in the recycling chain are not made compulsory, if these plastics are delivered to and treated in compliant WEEE plastic recycling facilities in the European Union.

About EERA:
The European Electronics Recyclers Association (EERA) is a non-profit organization that promotes the interest of recycling companies who are treating waste from electrical and electronic equipment (WEEE) in Europe. EERA members include the largest electronics recyclers in Europe who, together, process over 2 million tons of WEEE annually.

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