Reaction EERA on papers Öko-Institute about a possible RoHS Restriction TBBPA & ATO.

EERA wishes to react to two papers produced by the Öko-Institut about the Assessment of TBBPA (tetrabromobisphenol-A) and ATO (Diantimony Tri-Oxide) "Methodology for Identification and Assessment of Substances for Inclusion in the List of Restricted Substances (Annex III) under the RoHS2 Directive".

One of the key requirements of the RoHS Directive is that certain hazardous substances (heavy metals such as lead, mercury, cadmium, and hexavalent chromium and flame retardants such as polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE)) are to be substituted by safer alternatives. The WEEE Directive and the resulting Treatment Standards ensure that the Waste from Electric and Electronic (WEEE) does not pose environmental and health risks. The papers of the Ökö-Institut go into quite some detail on the WEEE Waste treatment and EERA has several comments to particularly this element of the Study regarding TBBPA and ATO.

These comments can be summarized as follows:

1. TBBPA, be it as reactive flame retardant in Printed Circuit Boards or as Compounded Flame retardant in Polymers (often in combination with ATO) is embedded in the structure of the Epoxy or Polymer materials. With a melting point of some 180°C, TBBPA nor ATO stay within not only the Epoxy molecules with which it reacted, but also within the solid polymer structure in the case of compound plastic material. In both cases the health and environmental risks during the use-phase of the electronic appliances is close to zero.

2. The Chapter 5 goes into a lot of detail regarding the management of WEEE. The paper quie rightly describes that of the TBBP-A in the WEEE output streams up to > 90 % of additively applied TBBP-A content ends up in the polymer fraction.

3. The BAT/BREF requirements for shredder processes, ensure that the shredder dust is captured, and that this shredder dust is incinerated, hence the shredder processes do not pose a risk for human health or the environment. For CRT appliances a manual separation of the plastics is state of the art. At the workstations of the manual dismantling dust extraction systems ensure the reduction of any human health and environmental risks to an absolute minimum.

4. The study (chapter 5.4) states that Fraunhofer ITEM and IPA conclude from an extrapolation that a daily diffuse release of 130 g TBBP-A can take place per day. Out of this amount, a release rate of 0.52 g TBBP-A per ton WEEE treated in such a site can be calculated. EERA underlines that the same authors are basing their extrapolation data on completely outdated numbers from 2004 – this was the very start of the development of WEEE recycling activities in the EU. The EU did a BAT/BREF exercise exactly to reduce any diffuse emissions of any substances of concern from shredder activities for this reason and state-of-the-art recyclers work along these BAT/BREF requirements. Data of over 16 years old stemming from a

time that this recycling industry started its development, simply cannot be used for extrapolations of this nature.

5. More generally all citations and references to studies of before 2010 cannot seriously be used for todays' WEEE recycling practices. Many references to other studies in the report refer to studies of well before that time period and these cannot be used as reference in view of the technological improvements that have been made in this new industry since.

6. In the subsequent WEEE recycling processes the plastics should be shipped to recycling facilities that separate the plastics with BFR constituents (these can include both TBBPA and ATO as synergist) from those without BFRs. The Waste Shipment Regulation should ensure that WEEE plastics with BFRs are delivered to appropriate recycling facilities. It must be noted that the enforcement of the Waste Shipment Regulation at European Seaports has room for improvement, but this is not improved by adding substances on the RoHS restriction list.

7. The paper writes on page 31 that *Recycling of polymers (epoxy resins or ABS) containing TBBP-A is usually not practiced in the EU because market demand for recycled polymers containing flame retardants is missing. Hence, additive TBBP-A expected to be found in WEEE that contains ABS parts (such as inner and outer plastic housing, front or rear cover plates) need to be separated and disposed of.* The reality however is a different one. There would be a market for plastics with TBBPA, but the recycling technologies cannot make a distinction the different BFR substances compounded in the polymers materials in which they are used. The polymers with BFRs (which include not only TBBPA and ATO, but also already restricted BFRs such as PBDE's) need to be separated from those without and these separated plastics with BFRs need to be incinerated, as is required by the WEEE Directive and the Cenelec EN 50625 series. Any risks for human health and environment are thus reduced to an absolute minimum. Any Post-Consumer Recycled plastics must be produced in line with product legislation so that they can be re-used in new articles and products.

8. As to the Printed Circuit Boards, these are delivered to specialized end-processing steps, where the Epoxy material, that can contain BFRs such as reactive TBBPA, will be destroyed in the smelting processes.

9. The study refers in the same chapter 5.4 about possible releases of toxic degradation products as consequence of sub-standard incineration (even open-air burning was mentioned as scenario). EERA reminds the ÖKO-Insitut, that this study is a study as input for the RoHS legislation, i.e. EU legislation, and that this is not covering sub-standard treatment in developing nations where WEEE from the EU should not be delivered to.

10. A similar criticism must be added for Chapter 5.5 which refers to a.o. transboundary movements of WEEE outside the EU "that cannot be ruled out". We cite the study: *WEEE, exported towards non-OECD countries is likely to be subjected to all sorts of informal recycling and waste treatment processes, such as uncontrolled combustion, grilling, desoldering, uncontrolled dumping of residues, and generally uncontrolled treatment under crude circumstances. Due to their content of precious metals, PWBs are particularly prone to crude recycling treatment, including open burning, roosting, and hydro chemical acid leaching. The presence of reacted TBBP-A in FR4 PWB does impose special precautions to be applied in informal recycling businesses. The fate of plastic parts containing additive TBBP-A is uncertain. Some ABS plastic parts might be landfilled or burned*

while others are subjected to manual sorting and recovery of ABS. The latter pathway poses a risk of cross-contamination, which means an uncontrolled pollution of recycled ABS feedstock with a mixture of additives, among them TBBP-A. There is a risk of re-imports of products (not only EEE) containing cross-contaminated plastic recyclates into the EU. EERA is questioning how a serious study can refer to clearly illegal practices as valid reason to restrict a substance such as TBBPA within the EU? Or even more, refer to the possible import of these substances because of such illegal activities?

11. With regards to the possible substitutions for TBBP-A in additive applications (Chapter 8.1), EERA was extremely surprised to read that one of the alternative brominated compounds that is mentioned in the report includes Decabromodiphenylether, a flame retardant that was not only restricted since the first version of RoHS, but also a flame retardant that has created a lot of debate within the EU with the discussions about Deca-BDE in 2018. For EERA this discussion about Deca-BDE has shown how the development of legislation in the EU – including RoHS - can result in the breakdown of the recycling and a complete stop in investments in this recycling industry. Therefore, EERA believes that all substances should be regulated by one set of legal rules and not by many different ones.

12. On page 42 the study refers to pollution because of waste management and refers to this example in China. *Certain regions in China are exceptionally affected by pollution with TBBP-A according to IARC (2015). In Guiyu, Guangdong (a primitive e-waste dismantling site), concentrations reached 66,010 - 95,040 pg/m3 in air (mean, 82,850 pg/m3). In Shouguang, Shandong (a TBBP-A manufacturing site) concentrations ranged from 1.64 to 7,758 ng/g dry weight in the soil (mean, 672 ng/g). In Chaohu Lake, Anhui (industrial concentration site), concentrations in water reached 850 - 4,870 ng/l (IARC 2015).* European WEEE should not be delivered to China and examples like these have nothing to do with the development of this RoHS Directive in the EU.

13. On page 44 the study concludes that ABS from WEEE is not recycled. *This was the reason for DEPA (2010) to conclude that the presence of additively used TBBP-A plastic parts may hinder the recycling of the corresponding plastic. Recyclers oppose that this would not seem to be of relevance currently as ABS housings were usually not recycled (but incinerated) due to not economically relevant volume streams and chemical contamination. It is therefore concluded that TBBP-A used as additive flame retardant poses a negative impact on the recycling of WEEE.*
This is simply not a correct statement. ABS with TBBPA can be separated from ABS without and this indeed is one of the reasons why EERA believes that it would be good not to restrict the use of TBBPA. It is perfectly possible to separate the recyclable non BFR containing plastics from those with BFRs. ABS is a valuable plastic as Post-Consumer Recycled material from WEEE and this plastic is recycled from WEEE since at least 15 years. EERA is much more concerned about the substitution by non-halogenated substance substitutes. The possibilities of separating plastics with these halogen-free mainly organic phosphorus compounds is largely unknown. If these alternative flame retardants are not reviewed with regards to such parameters as separability or recyclability EERA requests not to list TBBPA and ATO in the RoHS restriction listing.

14. On page 46, the study again refers to recycling practices in third countries: *where informal recycling of WEEE take place, Fraunhofer ITEM IPA, Wibbertmann and Hahn (2018) note that "exposure to TBBPA and its decomposition products may be higher. Available monitoring data suggest that soil will probably be the most critical compartment for TBBPA exposure in these cases. Concerning degradation*

products information cited in the previous section concerning PCDD/F levels as well as further information published e.g. by Hu et al. [149] also suggests that other environmental compartments will show increased concentra- tions of these contaminant. However, it is not possible to quantify the influence of TBBPA on the overall exposure to these potential decomposition products. And EERA again has to remind the authors that WEEE and WEEE plastics cannot be exported unless there is a procedure of prior consent in place (notification procedure according the Waste Shipment Regulation). Arguments like these imply illegal treatment, which cannot be used as reason to restrict TBBPA nor ATO.

15. In Chapter 8, the study examines the alternatives for TBBPA and concludes that the human health hazards of the organophosphate esters are estimated to be lower than those of TBBP-A, though some substitution candidates still meet the PBT criteria regarding the environmental risks. EERA requests whether it would not be better to wait for a formal ECHA assessment before basing a conclusion on "an estimation" of health hazards and furthermore EERA believes that with regards to this assessment a risk-based approach would need to be made as well. To date at least one phosphoric flame retardant is already listed as SVHC namely Tris(2-chloroethyl) phosphate but there are two other phosphor-based compounds that are listed under ECHA such as Trilead dioxide phosphonate and Trixylyl phosphate. It is not excluded that alternative flame-retardant compounds mentioned in the report will eventually be restricted as well. In that case separation techniques would be required in order to ensure the future recycling of WEEE plastics. The separability of any of the alternatives is not reviewed in this paper and EERA believes that this was one of the elements agreed upon for the methodology of the RoHS review.

WEEE in Europe must be treated in line with the European legal framework (Waste Framework Directive, WEEE Directive, Waste Shipment Regulation and in most cases with the Cenelec series of standard EN50625). This study regularly refers to illegal export and illegal treatment of WEEE as arguments for a RoHS listing of both TBBPA and ATO. EERA disagrees with this approach.

The recyclers of the plastics fractions from WEEE are required to recycle WEEE plastics in conformity with the EU's product legislation, which is REACH for all products that are not used in the market of Electronic and Electronic Equipment (EEE) and RoHS for products that fall within the category of EEE. With regards to Brominated Flame Retardants and Diantimony Trioxide RoHS and REACH are currently aligned.

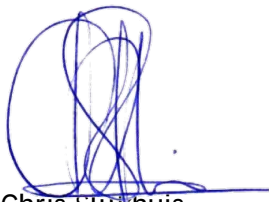
The recyclability and separability of any substitutions of TBBPA and ATO are not yet reviewed and EERA believes that this was agreed to be one of the elements that was agreed for the RoHS Review Methodology.

A good part of both the RoHS review papers on TBBPA and ATO are based upon non-relevant data as the basis of the conclusions why a RoHS listing is to be recommended. Many of the data sources are namely irrelevant as they are outdated. The WEEE recycling industry is new and developed since the first version of the WEEE directive in 2004. In view of the huge technological and legal developments that have taken place since, any data prior to 2014 cannot be considered useful anymore.

Any restriction of additional substances has the risk that an overregulation will follow. The recent Deca-BDE case within the POP Regulation re-cast is an excellent example. The consequence of such developments is that the reluctance for investments in the recycling industry will grow even more. Today the WEEE plastic recycling industry in the EU does by far not have enough capacity. EERA is requesting some legal stability and certainty allowing this important recycling industry to develop further.

For these reasons EERA believes that restricting both TBBPA and ATO will prove to be counterproductive for the development of a Circular Economy of WEEE materials and that a RoHS restriction of these substances is against the objectives of the EU's Green Deal objectives.

From a recyclers point of view, EERA requests that, in the absence of sufficient supporting and relevant facts as well as the lack of knowledge regarding the risks, recyclability and separability of the substituting substances, the restriction of Tetrabromobisphonol-A and Diantimony Trioxide in the re-cast of the RoHS Directive will not take place.



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About EERA:

The European Electronics Recyclers Association (EERA) is a non-profit organization that promotes the interest of recycling companies who are treating waste electrical and electronic equipment (WEEE) in Europe. EERA members include the largest electronics recyclers in Europe who, together process some 2.5 million tons of WEEE.

EERA is intensively following the debates around this revision of the Directive for Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS).

More information about EERA can be found on the website: www.eera-recyclers.com.