JOINT CONTRIBUTION TO THE PUBLIC CONSULTATION ON THE REGULATION ON PERSISTENT ORGANIC POLLUTANTS (ANNEX IV)

CREATOR COLLECT · PURIFY · REUSE

PLAST2bCLEANED

NONTOX

CREAToR, PLAST2bCLEANED and NONTOX, as EU-funded research projects focussing on the removal of non-compliant brominated flame-retardants from thermoplastic polymer waste streams, welcome the opportunity to provide comments on the European Commission's initiative to update the concentration limits of persistent organic pollutants in waste.

We believe that the issue is of high importance for the EU's transition to a circular economy.

With regard to the polymer recycling stream, especially WEEE and EPS/XPS insulation materials containing PBDEs or HBCDs, we agree with the aforementioned statements by polymer organisations that lowering the concentration limits will have a significant impact on the sector.

Currently several publically funded projects, like CREAToR (https://creatorproject.eu/), NONTOX (http://nontox-project.eu/) and PLAST2bCLEANED (https://plast2bcleaned.eu/) consider the full value chain of these substances and investigate not only their identification, sorting and removal within the recycling process but also the reuse of the purified polymers in 2nd generation applications. All these projects elaborate sorting and identification strategies via, for example, laser induced breakdown spectroscopy and analysis procedures using different chromatographic approaches. For recycling, variations of physical recycling via a solvent-based technology are developed. This technology is relatively young, yet and very promising. It has been demonstrated at higher TRLs for the CreaSolv process for polystyrene. The current projects aim to reintroduce purified petroleum-based polymer materials as a secondary material source into the market, and therefore to contribute to the transition to a circular polymer economy instead of the use of virgin materials.

For the considered waste streams, the following data has been compiled for the EU:

WEEE contains on average 20 % of plastics. The EEE (electrical and electronic equipment) industry accounts for 5-7 % of the total European plastic demand, i.e. 2.7 million tonnes out of a total 47.8 million tonnes. These plastics often contain flame retardants. It is estimated that flame retarded plastics make up around 5.5 % of WEEE by weight, or 25 % of all plastic used in EEE (Hedemalm et al, 1995). Of these flame retarded plastics, approximately 80 % are treated with brominated flame retardants (ENEA, 1995).

Polystyrene foams (PSFs) have a large market share - in Germany alone around 62.3 x 10^6 m^3 PSFs have been sold in the last 30 years, based on performance and cost efficiency in construction. Due to national fire regulations in EU countries a large portion has been manufactured with flame-retardant additives: the former chemical of choice for foam was HBCD. In 2008 HBCD was classified as PBT (persistent, bioaccumulative and toxic) and was also later classified as a POP (persistent organic pollutant) under the UNEP Stockholm Convention, leading many countries to set up plans for recycling HBCD building panels.

Considering the proposed limits in Annex IV and the expected new limits to be proposed in Annex I, the developments in the abovementioned EU-funded projects are put at risk. They have started the investigation aiming to ensure compliance with the current limits at technological readiness levels between 5 and 6 in 2023. Consequently, it cannot yet be stated which limits can be achievable in the subsequent development phase resulting in the commercialization of the processes investigated. For this reason, the debate on health risks versus plastic recycling for a circular economy cannot be conducted fully with the information currently available, since the potential of the best available techniques in the near future is not yet clear. We therefore strongly propose to include an exception for a timeframe until these technologies can be fully evaluated.

Far more serious, and highly relevant for the update of Annex IV, is the fact that the current analytics (based on IEC62321) are not yet reliable enough to detect the considered concentrations of PBDE in WEEE. The commonly used gas chromatography with mass spectroscopy (GC/MS) analysis of heavy components is sensitive to discrimination by contamination of the injector and start of the GC column, resulting in lower measured concentrations than present in the sample (reported e.g. in Konrad Grob, Split and Splitless injection in capillary GC, 3d edition); moreover, the decabromodiphenyl ether elutes very late from the analysis column and therefore often contaminates the devices. Corrections can be elaborated using several standards, however, IEC62321 proposes only one internal standard for the correction of injector errors. Atmospheric pressure chemical ionization based liquid chromatography with mass spectroscopy (APPI/LC/MS) shows more reliable analysis, due to less pollution and easier elution. However, this method is limited when too many components are present. These analyses, and also further analyses carried out by the Fraunhofer Institute for Chemical Technology ICT with HPLC measurements, show that there are also other decomposed products of HBCD. These could so far not be quantitated, but are the subject of ongoing work in in the abovementioned EU-funded projects. Impact or risk assessments of these smaller bromine contents are not taken into account in the new POP regulation.

For HBCD and polyBDE analysis only detection at 1000 ppm has been validated industrially (see also comment PlasticsEurope). Research institutes have been able to quantify amounts of 50 ppm; however a reliable analysis routine has not yet been developed. The CREAToR project is currently evaluating several methods based on different extraction procedures to enable the detection of lower contents for the future recyclers of EPS. However, the abovementioned development circle and timeframe applies here as well.

We believe strongly that the current development can contribute to obtaining the proposed lower values in a longer timeframe. If we want to transform to a circular polymer economy, we need to consider these relevant waste streams to be able to fulfil the demand of polymer material sources. Therefore, we recommend to set current limits to 1000 ppm, and to reevaluate the state of the art obtained in the currently ongoing projects in five years (approx. three years after completion at TRL 5-6). This will enable the polymer recycling market to stay as strong as it is, and help to avoid the incineration and landfill of these materials.