# Position Paper

## A call for rapid phase-out of Brominated and Chlorinated Flame retardants

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**Flame retardants are a hot topic** This is not only because we are dealing with fire and flammability, but because the most commonly used flame retardants which are made of bromine and chlorine compounds (so-called halogenated flame retardants), are nowadays recognized as highly hazardous substances. Health and environment concerns originally emerged when it was realized that the chemical structure of brominated flame retardants was similar to that of PCBs, dioxins or furans, all long known to be extremely hazardous pollutants.

**What are flame retardants?**
Flame retardants are chemical substances that are added to a vast amount of consumer goods to both prevent the chance of the material igniting and to slow the rate of combustion. They are mostly needed in products made of highly flammable materials, like plastics for example. There are some 200 different types of flame retardants worldwide, classified according to their major constituent elements[1]. Among them are brominated and chlorinated flame retardants (BFRs and CFRs). BFRs represent respectively 15% and 35% of the European and International market of flame retardants, whereas CFRs account for 25% and 17% of the European and International markets. The most used BFRs today are Deca-BDE[2], HBCD[3] and TBBPA[4].

**Where are they used?** Flame retardants are used in many categories of consumer products, ranging from electronics to upholstered furniture, buildings, wood, textiles, cables, transport and even toys.
The inflammability of consumer products was first seen as a major progress for better consumer protection and is still presented as very positive by the flame retardants industry. Today, inflammability has become one of the main criteria for product safety.

**The health issue behind inflammability** And yet, without denying the fact that inflammability increases the safety of goods, one cannot deny the potential risks of these compounds for health and the environment. Indeed, an emerging body of science on PBDEs – Polybrominated Biphenyl-Ethers (including, Deca-, Penta- and Octa-BDE) health and environment hazards raises concerns about their neuro-developmental toxicity, potential for endocrine disruption, and rising levels in human and the environment[5]. In addition, whereas some Flame retardants are physically blended with - or chemically bonded to - the host polymer, some others are not: this means they can be released in the environment, and greatly increases their harmfulness.

**Bioaccumulative and persistent compounds : the Stockholm Convention connection**
The "new" POPs[6], Penta-BDE and Octa-BDE have been listed in 2009 in Annex I of the Stockholm Convention: as a consequence, their industrial production is set to be eliminated [7].
Worldwide, POPs are considered the most hazardous pollutants ever, because they bio-accumulate and persist in human tissues and the environment. POPs include substances such as PCBs or the infamous insecticide DDT.
The Stockholm Convention nevertheless grants exemptions for :

- the recycling of articles containing Penta-BDE/Octa-BDE,
- the use and final disposal of articles manufactured from recycled materials containing Penta-BDE/Octa-BDE.

So far the provisions for Penta-BDE have entered into force for some 152 from the 173 Parties of

[1] Source : http://www.cefic-efra.com/content/Default.asp?PageID=200

[2] decabromodiphenyl ether
[3] hexabromocyclododecane
[4] tetrabromobisphenol A
[5] *Is Risk-Based Regulation Feasible? The Case of Polybrominated Diphenyl Ethers (PBDEs)*, Brian Hector MacGillivray,Ruth E. Alcock, and Jerry Busby, Society for Risk Analysis, 2010
[6] Persistent Organic Pollutants
[7] http://chm.pops.int/Convention/The%20POPs/tabid/673/language/fr-CH/Default.aspx

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the Stockholm Convention.

## How does the EU regulate brominated flame retardants (BFRs)?

Concerns about brominated flame retardants are not new: back in 1984, the EU decided to ban the use of PBB (polybrominated biphenyls) in textile articles[8]. But until 2006, PBB were still used in electronics.

## RoHS Directive: BFRs in electronics

RoHS – the European regulation for the restriction of the use of certain hazardous substances in electrical and electronic equipment – entered in force in1st July 2006, restricting the use of several brominated flame retardants but still allowing some exemptions.

## Do Penta- and Octa-BDE belong to history?

The use and placing on the market of substances, preparations and articles containing Penta-BDE and Octa-BDE has been banned in the EU since 2003[9]. Moreover, PentaBDE is on the list of priority hazardous substances under the EU Water Policy Directive. This designation requires the cessation or phasing out of discharges, emissions and losses within 20 years.

But due to their persistence, both Octa-and Penta- BDE may they are still to be found in the food chain and for example contaminate breastmilk, in turn exposing infants.

## DecaBDE

In 2005, on the basis of EU risk assessments and on the results of a stakeholder consultation on the exemptions to the RoHS Directive, the European Commission adopted a decision 2005/717/EC, exempting all polymeric applications of decaBDE from the RoHS Directive. The legality of this exemption was officially challenged by Denmark, and the European Court of Justice finally annulled the exemption of decaBDE in April 2008[10]. After an adaptation period its use had to be phased out by July 1, 2008.

**TBBP-A:** TBBP-A is one of the most commonly used BRF today. It is known to be very toxic to aquatic organisms, persistent and potentially very persistent, and to have potential endocrine disruption effects[11].

## HBCD – a flame retardant subject to REACH Authorization process

The European Chemicals regulation, REACH – Registration, Evaluation, Authorization of Chemicals – has recently moved HBCD[12], one of the BFR, from the Candidate List to Annex XIV[13] (substances subject to authorization – in fact substances banned from use in products except if granted an authorization at EU level). HBCD is considered PBT (persistent, bioaccumulative and toxic) and is used in polystyrene building insulation. The ban of HBCD will be fully instituted by July 21, 2015.

## RoHS: a potential driver for greener electronics worldwide

It should be noted that RoHS could be a driver towards safer electronic and electrical goods, even at international level, since European standards, adopted by major manufacturers worldwide, subsequently are also applied in other markets.

Several international firms have joined NGOs to support a ban of BFRS in electronic and electrical equipment in 2010 at the time when the regulation was adopted by the European Parliament.

## Waste and disposal of BFRs: WEEE (Waste Electrical and Electronic Equipment) and beyond

The waste and disposal issue is one of the most problematic issues connected to flame retardants, since the amount of electronic and electrical equipment becoming waste keeps increasing in the EU: in 2005, at EU level, estimates of annual WEEE production ranged from 5 to 9 million tons per year, with an annual growth of between 2.5% and 2.7%[14].

On 27 January 2003 the European Parliament and the Council passed Directive 2002/96/EC on WEEE. Knowing that the incineration of brominated flame retardants can form dioxins or furans, is one more reason to push for a rapid development of safe alternatives.

## Standardization at European and international level

Standardization, together with regulation, is one way to reach the phase-out of BFRs. Typical discussions involving the potential use of BFRs are the ones on the application of the "external ignition requirement" to certain electronic and electrical equipment, since BFRs are the cheapest way for producers to meet the requirement.

## Debromination : a key measure for safe disposal of BFRs

Worldwide, some 100,000 tonnes and up to 1,000,000 tonnes PBDE

[8] http://www.inchem.org/documents/hsg/hsg/hsg083.htm#PartNumber:6

[9] DIRECTIVE 2003/11/EC relating to restrictions on the marketing and use of certain dangerous substances and preparations (pentabromodiphenyl ether, octabromodiphenyl ether)

[10] Judgment of the Court, 1st April 2008, http://www.eiatrack.org/docs/ECJ_Judgment_in_DecaBDE_case_April_2008.pdf

[11] Joint Position Paper on RoHS revision, February 2010, EEB, HEAL, WECF.

[12] hexabromocyclododecane

[13] http://www.buildinggreen.com/live/index.cfm/2011/2/22/F/ame-Retardant-Used-in-Polystyrene-to-be-Banned-by-EU

[14] *Toxic Transformers;- a review of the hazards of brominated & chlorinated substances in electrical and electronic equipment*, Alan Watson, Kevin Brigden, Melissa Shinn and Madeleine Cobbing. Greenpeace Research Laboratories Technical Note, January 2010

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are deposited in landfills. And DecaBDE is the largest PBDE stock. Its production still continues, making debromination a key element for preventing the formation of even more hazardous POP-BDE: currently, several methods of debromination are being experimented, including microbial debromination[15].

## The road towards the substitution of flame retardants

WECF calls for immediate control and minimization of industrial emissions of brominated flame retardants into the environment via technical measures followed by a rapid phase-out.

**WECF supports a rapid phase-out of all BFRs and CFRs from consumer products:** BFRs and CFRS have been linked to the **following health effects**[16]:

- reduced IQ in children,
- endocrine and thyroid disruption
- changes in male hormone levels and reduced fertility
- increased time to become pregnant
- adverse birth outcomes
- impaired development
- cancer

- After a flame retardant has been listed in international conventions like the Stockholm Convention, the EU should automatically provide for a ban or substitution of the substance (by safer alternatives), to ensure a conformity of European standards and regulations with international instruments;

- An increased coherence of EU regulations (RoHS, REACH, WEEE, etc.) connected to brominated flame retardants is required;

- Methods to enhance the flame retardance of consumer goods without the use of harmful chemicals are numerous. The EU and international policies should give priority to support for development and commercialization of safer alternatives to BFRs and CFRs.

## WECF supports the San Antonio Statement on Brominated Flame Retardants of November 2010[17]:

The "San Antonio Statement on Brominated and Chlorinated Flame Retardants" addresses the growing concern in the scientific community about the persistent, bioaccumulative, and toxic properties of brominated and chlorinated organic flame retardants (BFRs and CFRs, respectively) and the exposure to humans and wildlife as a result of intensive use. Nearly 150 scientists from 22 countries have signed the statement since it was presented at the 30th International Symposium on Halogenated Persistent Organic Pollutants (Dioxin 2010), held 12–17 September 2010 in San Antonio, Texas.


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[15] *Debromination of highly brominated PBDEs to POP-BDEs*, Roland Weber POPs Environmental Consulting, Stockholm Convention POPRC, October 2010

[16] *The Case against Candle Resistant Electronics,* Blum et al , 2008

[17] Available at : http://ehp03.niehs.nih.gov/article/info:doi/10.1289/ehp.1003089