Comments on the second call for evidence and information on Aromatic Brominated Flame Retardants

28 June 2024

The undersigned thank ECHA for the opportunity to provide comments for the second call for evidence on alternatives to aromatic brominated flame retardants (ABFR), with a focus on uses identified in the first call for evidence concluded in April 2024 for the preparation of the investigation report on flame retardants. The proposed Regulatory Strategy for flame retardants and the preparation of the investigation report are important steps towards a broad and grouped restriction approach for flame retardants, and for a better protection of health and the environment. **However, it is not fully encompassing the actions needed to properly regulate flame retardants.**

We appreciate that the investigation report on flame retardants has been commissioned to ECHA by the European Commission in the framework of the 'Regulatory Strategy for Flame Retardants' published in March 2023. Article 69 of REACH states that the Commission shall ask ECHA to prepare a restriction dossier where it considers that the manufacture, placing on the market, or use of a substance on its own, in a mixture, or in an article **poses a risk to human health or the environment that is not adequately controlled and needs to be addressed.** This risk has already been largely identified, as exemplified by the first call for evidence and the large body of peer-reviewed scientific literature showing "that exposure to flame retardants increases risks of deleterious health effects including developmental and behavioural disorders, neurotoxicity, endocrine disruption, metabolic disruption, cancer, and many other effects" (Page et al., 2023). **This justifies the need to start preparing a group restriction dossier for flame retardants without delay.**

The EU Restrictions Roadmap published in April 2022 identified brominated flame retardants as a priority group for restriction (European Commission, 2022) and the Regulatory Strategy for flame retardants acknowledged that "*flame retardants with aromatic bromine are of a general concern due to their known or potential PBT/vPvB properties [and that] a wide and* *generic restriction seems to be the most appropriate regulatory approach*" (ECHA, 2023, p. 34). **It is crucial that the scope of the planned restriction encompasses all ABFR as well as their transformation and degradation products, which are also sources of concerns (Smollich et al., 2022). Moreover, other flame retardants, such as aliphatic brominated flame retardants, organophosphorus flame retardants (OPFR), polymeric flame retardants, recycled products containing flame retardants, should be included in the scope of a broad group restriction for flame retardants as they all share similar toxicological profiles, as underlined in our comments below.**

Beyond a broad and generic restricting approach to flame retardants, **there is also an urgent need to rethink the way fire safety is ensured in the EU** and for the efficacy of chemical flame retardants to be measured against the harms associated with exposure to toxic fumes and smoke during a fire, their overall toxicity, as well as the challenges associated with their end-of-life.

To this end, we would like to provide additional information to be considered for a more comprehensive restriction of flame retardants and for a broader reflection on how fire safety could be adequately ensured in Europe with much less use of harmful chemicals. We choose not to contribute to the Excel sheet accompanying the call for evidence as we do not support regrettable substitutions of ABFR by alternatives with possibly very similar profiles. **We are calling for a discussion on fire safety going beyond this investigation report and restriction process with the European Commission and all relevant stakeholders**. For example, studies by the U.S. Consumer Product Safety Commission (CPSC) and others have shown that eliminating the use of chemical flame retardants does not weaken fire safety[1], and as a result, major manufacturers and retailers are already making and offering furniture without flame retardants, often at a lower cost. A recent study (Gill et al., 2024) demonstrates the positive impact and efficacy of this regulatory intervention, with environmental exposure to flame retardants expected to decrease.

In particular, we would like to offer feedback on the following areas:

- **Recommended alternatives to flame retardants**
- **Regrettable substitutes (non-halogenated flame retardants are not a safer alternative)**
- **Benefit vs risk of flame retardants**
- **Problematic end of life: disposal and recyclability of flame retardants.**

Recommended alternatives to flame retardants

Substitution of hazardous flame retardants can happen at four different levels. 1) Drop in substitution of one chemical with another 2) Choosing a different material that does not

[1] Chemical Flame Retardant-Free Toolkit and Buyer's Guide.pdf

require flame retardants 3) substituting the product with another product, achieving the required function through other measures and technologies or 4) keeping flammable material away from sources of flames. This was already acknowledged 20 years ago for example by the Swedish authorities (Kemi, 2003) and **we urge ECHA to make sure to thoroughly cover all these possibilities, when assessing the availability of alternative solutions to using brominated flame retardants.** For the latter points, restrictions with sufficiently long timelines could support a smooth transition.

Considering the toxicity to human health, contribution to environmental pollution, and the limits to recyclability of products containing flame retardants, **the best alternative for substitution is a product redesign approach**, in line with the Ecodesign Directive 2009/125/EC and the recently adopted Ecodesign for Sustainable Products Regulation. The need for chemical flame retardants could be rendered unnecessary by rethinking the product design, for example, by using inherently flame-resistant materials such as vitreous fibres, metal, glass, hemp, and wool, especially in lieu of plastics that release toxicants when incinerated (Janssen, 2005).

For electronic products, a product redesign approach that aligns with the first step, Prevention, of the Waste Hierarchy (European Commission, 2008) is to separate highly flammable components from heat-generating components. Similarly, lower temperature generating components can be used to minimise the risk of fire (Janssen, 2005).

For hospitals in the region, the Västra Götaland Regional Council in Sweden[2] procures bed linen manufactured with natural flame-retardant fibres of the brand Trevira CS[3] for their hospitals. Another example is the global furniture retailer IKEA who has removed all chemical flame retardants for the entire US market, beginning in 2015, by developing an interliner that enables fire-resistant products made of a dual layer carded non-woven material which slows down burning time and increases fire safety in their products[4].

Non-halogenated flame retardants are not a safer alternative

Non-halogenated flame retardants, such as Organophosphorus flame retardants (OPFR) are increasingly used as replacement for brominated flame retardants and hailed as safer alternatives (Blum et al., 2019). **There is however strong evidence that OPFR share similar concerns as ABFR.** Despite OPFR being expected to be less persistent in the environment than ABFR, they have been detected at high levels in all environmental compartments, as well as in indoor dust and in monitoring programs (Blum et al., 2019, Hoffman et al. 2024, Liu et al. 2024). Also, the results from the HBM4EU aligned studies found high detection frequencies of organophosphate flame retardants, as described in Van der Schyff et al (2023). The authors

[2] Email correspondence (2024) between Health Care Without Harm Europe and Region Västra Götaland.
[3] https://www.trevira.de/en/trevira-cs/flame-retardant-textiles
[4] https://www.ikea.com/global/en/our-business/our-view-on/flammability/

conclude that ´*OPFR concentrations should be critically evaluated by regulatory institutions due to their high prevalence and indications of endocrine-disrupting effects*.´

From a toxicity standpoint, the scientific consensus indicates environmental and "health concerns for both halogenated and nonhalogenated OPFRs", similar to brominated flame retardants (Blum et al., 2019). A growing body of evidence have demonstrated that OPFRs may be associated with carcinogenesis, neurotoxicity, adverse metabolic (Tan et al., 2024), reproductive (Kant Negi 2023), and neurodevelopmental effects (Cheng et al., 2024), adverse childhood respiratory outcomes (Mendy et al., 2024), and endocrine-disrupting activity (Yao et al., 2021; Ren et al. 2016, 2019, İyigündoğdu and Çok, 2024). Experimental animal models have also demonstrated that OPEs may lead to neurotoxicity, disruption of the endocrine system, developmental toxicity, adverse reproductive issues (Oh et al., 2024), effect on bone mineralisation (Guo et al., 2024), mental health disorders (Foster et al., 2024) and other systemic effects.

A more comprehensive review of recent in vitro, in vivo, and human studies on the adverse effects of OPFRs and BFRs is included in an annex to this contribution (Annex 1).

A group restriction for three OPFR, tris(2-chloro-1-methylethyl) phosphate (TCPP), tris(2-chloroethyl) phosphate (TCEP), and tris[2-chloro-1- (chloromethyl)ethyl] phosphate (TDCP) has been on hold since 2019 due to carcinogenicity studies expected from the United States National Toxicology Program (US NTP). The results of the NTP studies were published last year showing TCPP caused cancer in mice (National Toxicology Program, 2023). Moreover TCEP, TCPP, and TDCP are included in three entries of the Restriction Roadmap, including regarding CMR properties in the entry on childcare articles.

In the light of all these concerns, **we find that a broad group restriction of both halogenated and non-halogenated flame retardants, including aliphatic brominated flame retardants is urgently needed to avoid regrettable substitution of aromatic brominated flame retardants with other substances with similar properties**, and that the health and environmental effect of any potential alternatives to these flame retardants must be thoroughly evaluated.

<u>Benefit vs risk of flame retardants</u>

In its mandate to ECHA for the investigation report, the Commission stated that "*the report should outline as far as possible which alternative substances or technologies are available that provide flame retardancy in the materials or for the uses in which currently aromatic brominated flame retardants are used*." We welcome this approach to move away from chemical alternatives to ABFR and **we underline the need to favour materials which are non-toxic throughout their entire life cycle, and with inherent fire-resisting properties to the use of flame retardants**. Ironically, traditional materials were much less flammable than modern synthetic materials, and flame retardants which are ostensibly added to delay ignition have brought a raft of problems which we are still dealing with today. There is a growing body of evidence showing that "during a fire, some flame retardants may exacerbate yields of toxic gases and smoke formed by burning foams which are a major cause of death” (Page et al., 2023; Stec, 2017; McKenna et al., 2018, Lane and Hull, 2024).

The use of gas phase flame retardants is particularly problematic in materials where flame retardants exacerbate the high flammability and smoke toxicity of these materials. For example, polyurethane foam is highly flammable and forms carbon monoxide, hydrogen cyanide and other toxic products on combustion (McKenna and Hull., 2016). Adding gas phase flame retardants exacerbates the yield of these toxic gases due to incomplete combustion (Lane & Hull, 2024).

Building on the mandate of the Commission, we believe this report is an excellent opportunity to **reconsider fire safety as a whole by taking into account the whole life cycle of flame retardants, by reconsidering materials used (such as insulation foam or soft furnishings), and to weigh the risk of fire against the increased potential health risk related to flame retardants.**

We would like to draw attention to the example of furniture, which is very informative in that regard. In an opinion from 2015 on the fire safety of domestic upholstered furniture, the French Agency for Food, Environmental and Occupational Health & Safety (ANSES, 2015) concluded that “data are insufficient to conclude that fire-retardant treatment of upholstered furniture significantly contributes to reducing the frequency and severity of domestic fires [and it] therefore seems impossible to determine the possible safety benefit of using flame retardants in upholstered furniture”. ANSES (2015) further advises against the generalisation of treatment for domestic upholstered furniture with flame retardants and advocates for “other measures to improve fire safety in housing that are likely to reduce frequency and/or severity, and that have proven their effectiveness in the countries where they have been adopted [to] be given preference and reinforced”. The same change is advocated for in the UK, where “there is a need to amend the [Furniture and Furnishings (Fire) (Safety) Regulations 1988], to lead to reduced use of [chemical flame retardants] in furniture and the development of more sustainable alternatives. This push is underpinned by extensive and ever-growing research demonstrating the health risks and widespread environmental contamination posed by CFRs as well as new research into appropriate substitutes” (Page et al., 2023b). In the US, the State of Massachusetts has banned in 2020 several chemical flame retardants (including TCCP) from bedding, carpeting, and other products to protect children, families and firefighters.[5]

The use of flame retardants should only be permitted where it is proven that they can actually contribute to enhancing fire safety.

<u>**Disposal and recyclability of flame retardants.**</u>

Reducing downstream impacts from flame retardants must be a key aspect of a future restriction of flame retardants, as articles treated with flame retardants are difficult to

[5] https://malegislature.gov/Laws/SessionLaws/Acts/2020/Chapter261

recycle, and often end up in landfill or are incinerated (Ma et al., 2021; Balasch et al., 2022, Page et al., 2023). Monitoring of halogenated flame retardant content is not cost-effective, resulting in many products having to be incinerated. Following ecodesign requirements, halogenated flame retardants are already banned in electronic displays due to their hindrance to a circular economy (Regulation (EU) 2019/2021). Adhering to the essential use concept (European Commission, 2024), the ban on halogen should be extended to all products where there are acceptable alternatives and where it is not necessary for health nor safety.

We welcome the conclusion of the Regulatory strategy for flame retardants that "*the release/exposure potential to hazardous brominated substances during dismantling, recycling and disposal operations may not be sufficiently controlled (or excluded), and [that] the presence of brominated flame retardants may encumber the move towards toxic-free material cycles, to achieve the objectives of Circular Economy*" (ECHA, 2023). This conclusion extends to all problematic flame retardants and is corroborated by independent literature (Page et al., 2023) with the possible consequence of these chemicals inappropriately ending up "in recycled goods such as cookware" (Strakov´a et al. 2018).

We encourage ECHA to make this aspect a key consideration and to recommend including recycled materials in the scope of the restriction. Going further, it is key that the European Commission ensures that products manufactured with recycled materials comply with the same standards as those of substances used in primary materials in order to achieve a non-toxic, circular economy.

Conclusion

In the light of the hazardous properties of both halogenated and non-halogenated flame retardants and the difficulties in handling materials treated with flame retardants during the end-of-life and recycling phase, **we urge ECHA to recommend as fast as possible a broad group restriction encompassing all hazardous flame retardants, giving preferences to materials which are non-toxic throughout their entire life-cycle, and with inherent fire-resistant properties (such as stone or glass wool, or natural fibre-based insulation) over chemical flame retardants,** and restricting the use of flame retardants where they are not required by regulatory standards and where other measures to improve fire safety can be implemented. Following up on the conclusion of McKenna and Hull (2016) materials treated with reactive flame retardants should not be regarded as inherently fire-resistant materials.

Moving forward, as already initiated by some countries and companies, **it is also critical to reconsider existing fire safety standards and to consider the efficacy of flame retardants in mitigating the risk of fire weighed against the increased potential health risk related to flame retardants**. Reports are showing that some flame retardants are aggravating factors in case of fire due to toxic gases and smoke formed by burning foams which are a major cause of death (Page et al., 2023; Stec, 2017; McKenna et al., 2018, Lane and Hull, 2024).

There is an urgent need to change perspective about fire safety and to move from a chemical discussion to a material science discussion. We urge ECHA and the European Commission to build on the Regulatory Strategy for flame retardants **to reconsider fire safety regulation in the EU as a whole and to move toward fire prevention standards that do not present risks for health and the environment, using different materials coupled with other prevention measures.**

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Annex 1: Literature review of in vitro, in vivo and human studies on effects of OPFR and BFR

In vitro studies:

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