Sustainable Fire Safety: promoting fire safety through intelligent furniture design and sound chemical management

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The excessive and unnecessary use of harmful chemical flame retardants in UK household products is harming public health, undermining the safety of the circular economy, fueling the biodiversity crisis, and failing to protect the UK public from the risk of fatal domestic fires.

Fidra asks that the UK Government:

- Update the UK Furniture and Furnishings (Fire) (Safety) Regulations 1988 to remove ineffective testing requirements that do not confer real-world fire safety, and that promote the excessive use of chemical flame retardants.
- Ensure the revised regulations promote durable and sustainable fire safety through innovation and intelligent product design.
- Require full transparency and traceability where chemical flame retardants continue to be applied.

The current approach to product fire safety in the UK is ineffective, and is contributing to the global chemical pollution crisis. Chemical flame retardants lost from our furniture and everyday products are now ubiquitous in our environment, fuelling the biodiversity crisis and impacting our health. And we're using huge amounts of these chemicals. Up to 30% of the weight of the foam cushioning in our furniture can be chemical flame retardants alone[i]. But it doesn't have to be. **We can make our products safer and more sustainable through intelligent product design**, rather than through additive chemicals that wear off over time.

By reducing the need for chemical flame retardants, and by improving traceability throughout supply chains, we can reduce chemical pollution, protect our circular economy and ensure effective fire safety.

Chemical flame retardants: A health and environmental risk

Chemical flame retardants are designed to delay the onset of fire when a material or product comes into contact with an ignition source. They are *intended* to save lives. For this reason, chemical flame retardants are now added to a wide range of everyday products from furniture, bedding and carpets, to computers, TVs and other electronics. But these chemicals don't always stay where they are intended. **They migrate into house dust and indoor air, they settle on worksurfaces and they contaminate our homes**. Multiple studies have highlighted young children and infants as particularly at risk of high exposure due to their proximity to the floor and hand to mouth behaviours, both of which increase the amount of dust they ingest and inhale. Once in our bodies, flame retardants have been linked to a wide range of human health concerns from behavioural and developmental problems to increased propensity to certain cancers, hormone disruption and neurotoxicity[ii].

Chemicals that were originally intended as **flame retardants are also increasingly found in secondary materials and recycled products,** where they pose an unacceptable risk of human exposure. For example, recent studies have found harmful and inappropriate chemicals in food contact materials and children's toys, thought to originate from the flame retardants in recycled electronics[iii]. Not only does this increase public exposure to hazardous chemicals, **it also threatens the safety of our circular economy and undermines public confidence in recycled materials.**

And this problem is not contained within the boundaries of our homes and public spaces. **Chemicals initially added to consumer products as flame retardants have now been recorded in wildlife across the globe**. They are found in UK gannet and otter populations, seals in the Baltic Sea, penguins in Antarctica and gulls and polar bears across the Arctic[iv]. Once in these populations, they impact behaviour, fertility and ultimately, population survival. Some of these chemicals are known to bioaccumulate within food chains, with dose and consequently risk of harm, highest in some of our iconic top predators[iv]. The ability to travel over long distances, through ocean currents or the movement of air masses, is well documented in many flame retardants. This long-range mobility is recorded in both legacy chemicals, already heavily restricted, and increasingly in the newer chemicals that have been brought in to replace them[v,vi]. **Flame retardants, new and old, therefore represent a significant and global risk to already vulnerable wildlife populations and the natural environment.**

Young children and infants are at high risk of exposure due to increased dust inhalation and hand to mouth behaviour[ii].

Chemical Flame Retardants in UK Furniture: An outdated approach to fire safety

Chemical flame retardants are designed to delay the onset of fire when a material or product comes into

contact with an ignition source. **But the big question for policy, and for the UK public, isn't how quickly an item of furniture catches fire, it is whether or not this translates to saving lives**.

The UK Furniture and Furnishings (Fire) (Safety) Regulations 1988 require UK furniture to pass a series of tests that do not reflect real world scenarios and do not result in effective fire safety. In particular, the UK requires that all domestic furniture and furnishings meet what is known as the 'match test', a simulated fire started by a flaming ignition source such as a match or small flame.

UK mothers have some of the world's highest concentrations of flame retardants in their breast milk[ii]

Meeting this test requires manufacturers to apply excessive amounts of harmful chemicals. This means the **UK public are exposed to some of the highest levels of chemical flame retardants across the world[ii].**

Effective alternatives

Most countries do not require testing based on a flaming ignition source for domestic furniture. It is not required in the EU, and was recently abandoned by the US due to evidence of its ineffectiveness in providing fire safety. Despite the much higher chemical use on UK furniture, **fire deaths across European countries have fallen at rates equal to or exceeding that in the UK[vii,viii]**. A report by the European Commission clearly states 'non-flammability requirements do not visibly decrease the number of fire deaths'[viii].

In 2013, California introduced its new regulation, TB117-2013, which dropped the requirement for testing based on a flaming ignition source. The result was **an almost immediate drop in the use of chemical flame retardants, with no consequent impact on fire safety**. In 2021, the California TB117-2013 regulation was accepted into US federal law[ix], displaying clear confidence in its ability to protect US citizens from the risk of domestic fires.

Recognising that sustainable, effective and long-lasting fire safety can be achieved through intelligent product design, in 2019, the UK Environmental Audit Committee recommended the UK adopt regulations based on the EU's smoulder test and California's standard Technical Bulletin 117–2013[ii].

Failings of the current 'match test'

There are many different reasons why current testing requirements fail to translate into lower fire fatalities. Firstly, **the vast majority of fires in UK homes are started through the careless use of smoking materials**, not by a match or small flame. The impact of smoking related fires is assessed by the 'smoulder test'. The 'match test' therefore adds little extra benefit in these cases.

Even in cases where an open flame does ignite domestic furniture, **the match test fails to accurately replicate a real-world scenario**. In most incidents, the flame that ignites furniture is not a small match or candle, rather it's the pile of papers on the sofa or the bedding on top of a mattress. A flame of this size is much greater than what furniture is tested to withstand. It will quickly overwhelm the chemicals and the furniture will ignite, regardless of whether or not it complies with the 'match test'. Again, the match test adds little genuine protective benefit in a real-world situation.

And finally, **upholstered furnishings are not the primary cause of fire fatalities in UK homes**. Upholstered furniture is very rarely the main source of material responsible for fire development in UK domestic fires[x]. Nor are upholstery fires a major cause of death[x]. Focussing on test criteria for furniture and furnishings therefore misses the cause of real fire fatalities.

Flame retardants or smoke accelerators?

While they may act to slow the rate of burn, flame retardants also **increase the production of toxic gases, including carbon monoxide and hydrogen cyanide[xi]**. Smoke inhalation is now the leading cause of death in domestic fires, estimated to be responsible for between 40-70% of fire fatalities.

Chemical flame retardants also cause smoke to become more opaque, making it more difficult for residents to escape from burning buildings, and for firefighters to safely evacuate and extinguish the fire.

Conclusions and recommendations

Chemicals wear off, wash off and off-gas. Their use as flame retardants on UK furniture and furnishings offers little protection against domestic fires, and what protection they do provide is short lived.

By bringing the UK fire safety regulations in line with other countries, we can achieve greater fire safety for the UK public, cut the unnecessary use of harmful chemical flame retardants, drive UK innovation towards intelligent product design, and protect the public and environment from the growing impact of chemical pollution. Fidra therefore recommends the UK government revise current UK Furniture and Furnishings Fire Safety Regulations to support healthier and more sustainable fire safety.

[i] Building Green: Flame Retardants Under Fire https://www.buildinggreen.com/feature/flame-retardants-under-fire

[ii] Environmental Audit Committee: Toxic Chemicals in Everyday Life (2019) https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1805/1805.pdf

[iii] Straková, J., J. DiGangi, and G.K. Jensen, Toxic Loophole: Recycling Hazardous Waste into New Products (2018) Arnika.

[iv] Fidra: Flame Proof Gannets: Tracing Toxic Chemicals through our Wildlife (2019) https://www.fidra.org.uk/flame-proof-gannets-tracing-toxic-chemicals-through-our-wildlife/

[v] Aznar-Alemany, Ò., et al., Preliminary study of long-range transport of halogenated flame retardants using Antarctic marine mammals. Science of The Total Environment, 2019. **650**: p. 1889-1897.

[vi] Ma, Y., et al., Organophosphate Ester Flame Retardants and Plasticizers in Ocean Sediments from the North Pacific to the Arctic Ocean. Environmental Science & Technology, 2017. **51**(7): p. 3809-3815.

[vii] Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2018. http://ghdx.healthdata.org/gbd-results-tool

[viii] Arcadis EBRC, Report for European Commission (DG Health and Consumers) - Evaluation of data on flame retardants in consumer products – Final report 17.020200/09/549040, Brussels, 2011. http://ec.europa.eu/consumers/safety/news/flame_retardant_substances_study_en.pdf

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[x] Fire statistics data tables https://www.gov.uk/government/statistical-data-sets/fire-statistics-data-tables#dwelling-fires-attended

[xi] McKenna, S.T., et al., *Flame retardants in UK furniture increase smoke toxicity more than they reduce fire growth rate.* Chemosphere, 2018. **196**: p. 429-439.

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