

Chemicals and the Circular Economy

It is widely accepted that the current linear economic model is not sustainable. To achieve long-term environmental and economic security, societies must transition towards a circular approach in which products and services are designed to be in use for as long as possible, maximising their value and minimising waste.

However, **the impact of chemical content within a circular economy is often overlooked**. Numerous case studies have demonstrated how lack of chemical transparency, coupled with cases of regrettable substitution, can **leave recycling efforts vulnerable to contamination** with newly restricted or otherwise harmful chemicals:

- Bisphenol-A (BPA) found in recycled napkins and toilet paper
- Per- or poly-Fluorinated Alkyl Substances (PFAS) found in paper and cardboard food packaging labelled suitable for recycling or composting
- Chemical Flame Retardants (CFRs) found in recycled plastic products such as kitchen utensils and toys

Current chemical management practises must therefore evolve to support a safe and successful circular economy.

Mattress Case Study

An estimated 6.4 million mattresses were disposed of in the UK in 2020. To stimulate improved waste management, the National Bed Federation are working towards a target of diverting 75% of mattresses from landfill by 2028. Bulky waste items, including mattresses, were also listed as priority items for Extended Producer Responsibility (EPR) schemes in England's 2018 Waste Strategy.

The current UK Furniture and Furnishings (Fire) (Safety) Regulations (FFRs) 1988 have been widely criticized as being outdated and ineffective. Prescriptive requirements within

the FFRs have led to **large volumes of chemical flame retardants (CFRs) being used within mattresses, contributing to the exceptionally high CFR exposure rates recorded amongst the UK public**. Other countries with less prescriptive furniture fire safety requirements have demonstrated similar declines in fire fatality trends to the UK without relying in CFRs. This, combined with increasing evidence of the detrimental health and environmental effects of CFRs, has resulted in **a call to amend UK fire safety regulations and reduce reliance on flame retardant chemicals**.

CFRs also present **a significant barrier to product circularity**. This was highlighted in new research commissioned by the Environment Agency which identified high levels of decabromodiphenyl ether (decaBDE), a CFR now restricted under Annex A of the Stockholm Convention, in UK waste upholstered domestic seating. Affected items are now required to be incinerated, rather than reused or recycled. The known use of decaBDE in mattresses prior to its restriction, alongside emerging evidence connecting alternative CFRs, such as tris(2-chloroethyl) phosphate (TCEP) and tris(1,3-dichloroisopropyl) phosphate (TDCPP), with similar human and environmental health effects, demonstrates a significant and ongoing challenge for mattress recycling.

Working towards Solutions

CFR use in mattresses highlights the potential impacts of chemicals of concern within recycling initiatives, as well as an **opportunity to demonstrate workable solutions**. Options such as EPR schemes, increased chemical transparency and traceability, and changes to the FFRs, could help reduce reliance on CFRs, incentivise innovative and sustainable product design, and support successful long-term recycling initiatives. A summary of key barriers (Box 1) and recommendations for future chemical management practises (Box 2) based on

Fidra's evidence review are summarised below.

Fidra's Sustainable Fire Safety Project

This evidence review forms part of Fidra's Sustainable Fire Safety project that investigates the role of effective chemical management within a circular economy,

using CFR use in mattresses as a case study. Following the findings of this report, Fidra will continue to engage with relevant stakeholders in working towards pragmatic solutions. For further information on opportunities to input, please contact Fidra directly via info@fidra.org.uk.

To access the full evidence review and references therein, visit our website.

Box 1. Barriers presented by existing chemical management practises.

- Focus on a chemical's primary use results in minimal to no consideration for the extended life of chemicals within a circular economy.
- Time delays between risk recognition and removal of chemicals from the market results in long-lived items being particularly vulnerable to containing newly restricted substances.
- A substance-by-substance approach to chemical regulation allows for repeated cases of regrettable substitution.
- Lack of chemical transparency and traceability means manufacturers and retailers have limited abilities to future-proof against future restrictions and make informed decisions about the chemicals used in their products.
- Lack of chemical transparency and traceability allows chemicals to be recycled into products unintended for their use, without means of identification or extraction.

Box 2. Recommendations for future chemical management practises.

- Update the current Furniture and Furnishing (Fire) (Safety) Regulations 1988 in line with latest evidence on effective fire safety and the established need to reduce public and environmental exposure to harmful chemicals.
- Incentivise development of products made sustainable by design to minimise the use of harmful chemicals and maximise reuse and recycling rates.
- Adopt full chemical transparency and traceability to ensure products are reused, recycled, or disposed of appropriately and without unintended adverse effects on human health, the environment or recycled material safety.
- Adopt full chemical transparency and traceability to allow manufacturers, retailers, and consumers to make informed decisions on the products they make, sell and purchase.
- Factor potential unintended uses of chemicals within a circular economy into chemical risk assessments and decision making.
- Adopt a group-based approach to chemical management to reduce cases of regrettable substitution.