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Detoxing Carpets

Pathways towards safe and recyclable carpet in a truly circular economy

This briefing summarises the findings of research by Anthesis Consulting on hazardous substances found in carpets sold in Europe.[1] The study, *Toxics in carpet in the European Union* (March 2018), reveals how toxic substances in carpets can affect consumers' and workers' health and pose obstacles for the industry to move towards a circular economy, as toxic substances might persist in recycled products and harm health. The report concludes with recommendations for how the carpet sector must redesign its products and eliminate toxic substances to move towards a circular economy. Doing this will improve the products' quality and safety for consumers in their daily lives, as well as for workers who come into contact with carpets through installation and recycling activities. Policy-makers can support this transition by adopting product-specific legislation on carpets and creating an Extended Producer Responsibility (EPR) scheme to support the market for toxic-free and recyclable products.

1 The information in this briefing is taken from the Anthesis report, unless stated otherwise.

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Designed by Pietro Bruni - helloo.org

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Key findings

- Carpets sold in the European Union (EU) can contain over 59 hazardous substances, which impact human health and the environment at all life stages. Over the lifetime of a carpet, exposure to toxic substances can take place via inhalation, ingestion and dermal contact as phthalates, flame retardants and perfluorinated chemicals (PFCs) make their way into the air, dust and environment. Among the identified substances are known carcinogens, mutagens, chemicals toxic for reproduction and endocrine disruptors.

- Of the 59 identified substances, 10 are currently identified by the EU as substances of very high concern (SVHC)[2], but only of these 4 are on the Authorisation List and banned from commerce. In addition, 12 substances are restricted for their use in carpet materials. Even despite their ban and/or restriction, there is the potential for these substances to end up in recycled material. This means at least 37 toxic substances have not been restricted and/or banned for use in carpets, many of which have not even been fully evaluated for their health and environmental impacts.

Health effects

- Toxic substances can be especially harmful for the most vulnerable people, notably babies, small children and pregnant mothers. Exposure via inhalation, ingestion and dermal contact at a young age or during pregnancy can be problematic due to the unique biological make-up and behaviours of children, which make them particularly vulnerable to the harmful effects of exposure to chemicals. Controlling and reducing exposure during critical stages of physical and cognitive development is of particular importance; some health impacts might only show decades after the exposure time, and sometimes only one or two generations later.

- Workers involved in the manufacture, installation and removal of carpet, as well as those working in incineration and recycling facilities, are highly exposed, and not all are protected adequately by safety measures. For instance, there are few safety measures in place for carpet installation, while the most toxic time to be around a carpet is within the first 72 hours following installation. Carpet-manufacturing workers – particularly those involved in producing carpet materials, pre-treating of fibres, dyeing, washing and finishing – are vulnerable to toxic effects in the process.

- Due to possible cumulative health effects of numerous toxic substances present in carpets, the report recommends a precautionary approach of reducing the amount of hazardous chemicals in products as much as possible, and working towards removal and/or ban.

BOX 1: Hidden costs of toxics exposure

There are 'hidden costs' associated with the use of and exposure to chemicals identified in this report. For example, the cost of diseases and health dysfunctions linked to exposure to endocrine disruptors are estimated to be at least €163 billion each year in Europe alone (Trasande et al., 2016). There are also hidden costs associated with environmental contamination, such as the necessary infrastructure for clean-up.

Environmental effects

- The main environmental hazard happens when these toxics enter waterways. This is particularly likely to happen during carpet manufacturing, which is a very water-intensive process. Toxicv effluent may enter the waterways via direct discharge, partial on-site treatment, municipal waste-water treatment or incineration (with toxic sludge as a waste product). Substances that are persistent, bio-accumulative and toxic will continue to impart their toxic effects in the aquatic biota for years to come. Released over time, even seemingly insignificant amounts of these substances can create problems in the future.

2 An SVHC is a chemical substance (or part of a group of chemical substances) for which it has been proposed that its use within the EU be subject to authorisation under REACH regulation.

Circular economy

- In addition to the health and environmental hazards posed by hazardous toxics in carpets, their presence brings technical challenges to recycling processes. Reuse and recycling of hazardous toxics should be avoided; toxics should be removed prior to or during recycling. Besides the health impacts, unremoved toxic substances can affect the quality of the recycled end material and the cost-effectiveness of recycling, particularly in mechanical recycling. In addition, less restrictive regulations for recycled materials can lead to a situation in which chemicals that are restricted in new products persist in recycled products, undermining health and consumer trust (see Box 2).

BOX 2: Double standards: recycled materials not always as strictly regulated as virgin materials

At the EU level, there is incoherency between policy frameworks on hazardous substances, products and waste. Lower standards or exemptions for toxic substances in reused or recycled materials mean those materials are not subject to the same health standards as new materials. Currently, for instance, the flame-retardant pentaBDE, regulated under the Persistent Organic Pollutants regulation, has a concentration limit of 0.001% w/w for virgin material but 0.1 % w/w in recycled material.

Ways forward

- Some manufacturers have taken first steps to eliminate some toxic substances from their products, such as fluorinated stain repellents, while at the same time increasing their reusability and recyclability. Even when non-regrettable[3] substitution of toxics take place, voluntary manufacturers' efforts do not go far enough, and are insufficient to protect public health and the environment.

- Regulations for new products need to be strengthened, as currently only 4 out of 59 identified hazardous substances are banned and only 12 restricted. The identification and regulation of SVHC has been slow, and implementation is lagging behind. This needs to change to protect public health and provide an incentive for innovation.

- A multipronged approach is needed, and a health-first approach towards the circular economy needs to be adopted to prevent consumer distrust in recycled products. The identified hazardous substances should be banned, leading to the redesign of carpets – and other products – without such toxics. Once disposed, carpets currently on the market need to be screened for toxics, so they can be safely treated and the recycling of hazardous toxics into new products prevented. Finally, EPR and harmonised EU regulation play a key role in ensuring carpet – as example for other products – transitions to a healthy and circular product (see full recommendations on page 9).

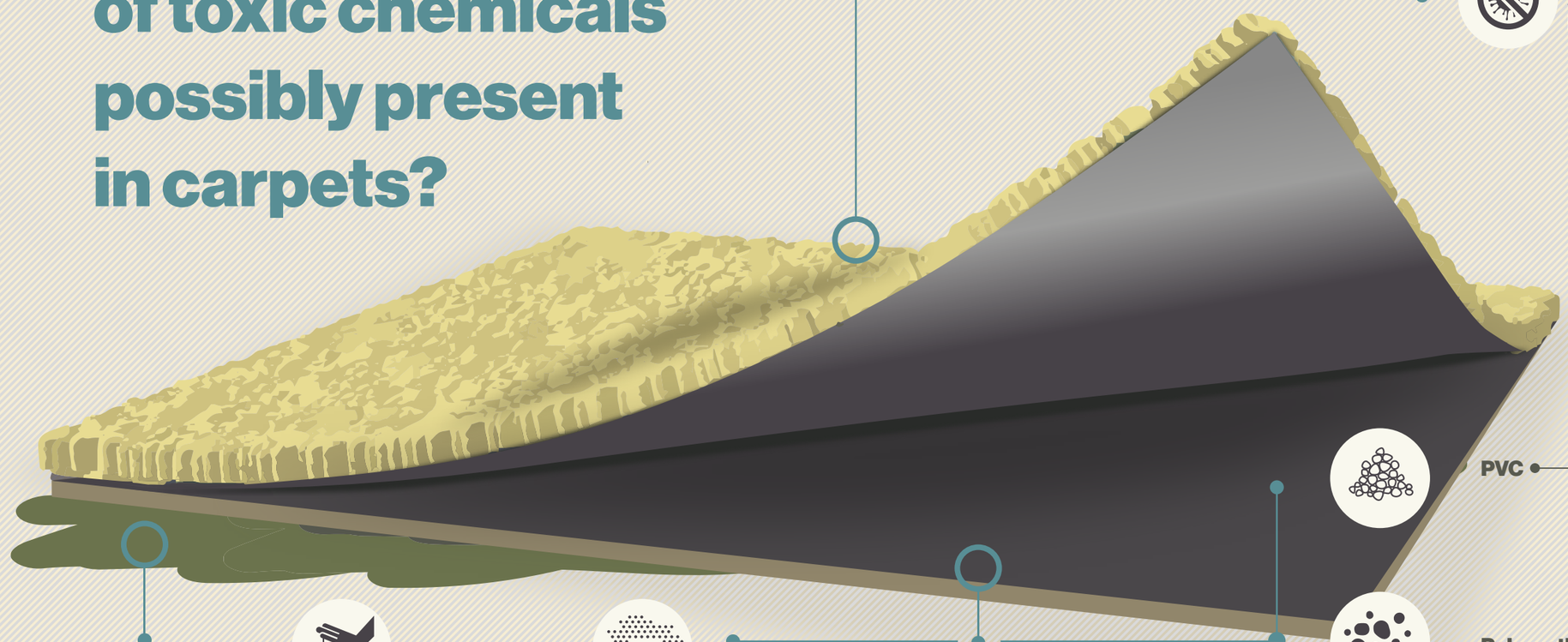
BOX 3: Certification fails to offer protection

The report investigated several certification schemes that apply to carpets, and their levels of protection in terms of restricting the toxic substances identified in this report. The study shows that the least progressive is the GUT label, an industry-led certification scheme established uniquely for carpets and displayed by many carpet manufacturers. The GUT label only eliminates or restricts 13 of the 59 identified hazardous chemicals.

The best option for consumers currently is the German government's ecolabel Blue Angel, which bans or restricts 51 of the 59 substances. It is recommended that Blue Angel expands to include the remaining eight identified toxics. However, the label is mainly used in the German market; there is a need for an accessible, EU-wide label, and the report recommends re-introducing an EU Ecolabel for textile floorcovering.

3 A regrettable substitution occurs when a material or process believed to be less hazardous turns out to have an unexpected hazard.

What are the health impacts of toxic chemicals possibly present in carpets?



Face Fibre

- **Stain Repellants** — PFASs
- **Antimicrobial Preservatives** — Silver; Permethrin

Adhesives

- Nonylphenol Ethoxylates

Backing

- **Heavy Metals**
  - Mercury
  - Cadmium
  - Lead
- **PVC**
  - Organotins
  - Phthalate Plasticizers
- **Polyurethane** — Isocyanate
- **Halogenated Flame Retardants**
- **Non-Halogenated Flame Retardants**

Health hazards:

- Developmental Disorders
- Endocrine Disruptor
- Health hazards not fully understood yet
- Asthma
- Reproductive Disorders
- Carcinogen
- Neurological Disorders

"This graphic outlines some of the most hazardous substances and some of their highest possible or suspected hazards, but does not reflect all hazardous content that can be found in carpet, or all associated hazards for the chemicals and chemical groups listed. See the report text and appendices for additional information on specific chemical hazard associations."

European carpet market

The EU is the second-biggest market in the world for carpet (after the US) and home to some of the largest carpet producers. Belgium, the Netherlands and the United Kingdom are the EU's leading manufacturing countries. Overall, it is estimated that 65% of EU demand for carpets is fulfilled by EU-based manufacturing. The industry has an annual revenue of €47 billion.[4] An estimated 1.6 million tonnes of carpet are disposed of in the EU annually, mostly ending up in landfills and incinerators. It is estimated that currently, less than 3% of carpet placed on the market is recycled in the EU.[5]

Carpet in the circular economy

The carpet sector has the potential to move towards circularity, but one of the main obstacles to carpet recycling is that most carpets currently sold were not designed with reuse and recycling in mind. Certain materials used are not recyclable, and layers are hard to separate, preventing proper recovery of materials. Moreover, materials are often mixed, which makes recycling more difficult. The use of toxic substances in carpets represents another obstacle to circularity.

When carpets are not recycled, besides being a waste of valuable resources, they can pose problems in landfills and via incineration.

Incineration capacity has grown rapidly in recent years in the EU, and plays a major role in the waste-management strategies of multiple Member States. Carpet is disposed of either in incineration (energy from waste) plants to generate electricity and heat or in cement kilns, and is used as a waste-derived fuel source due to its high calorific value. Incineration of toxic-containing carpet can lead to the release of toxic emissions. Extra-high (and therefore energy-intense) burning temperatures are required to secure complete combustion of the toxics, and toxic substances captured from emissions end up in hazardous toxic fly ash, which is either sent to landfill as waste or ends up in applications such as concrete.Carpet is more or less a permanent material in landfill, with an extremely low degradation time. However, there is potential for the toxic substances within carpets to be leached out by precipitation. While there are standards for leachate and sludge management from landfill, some of the substances identified in the Anthesis study can be difficult to manage, and may be discharged after treatment.

Hence, increasing market share of better-designed carpets must play a key role in scaling up the toxic-free circular economy. Several manufacturers have made efforts to offer more recyclable products, phasing out certain toxics and investing in innovative solutions such as monomaterial carpet and reversible adhesives. However, these voluntary efforts do not go far enough to eliminate harmful chemicals, and often represent only a small share of the market. With solutions existing, policy-makers must ensure a level-playing field to enable circular and toxic-free carpets to be taken to scale.

4 Grand View Research (2016).
5 Zero Waste France, Deutsche Umwelthilfe and Changing Markets (2017)

Recommendations

European Union

The EU can play a leading role to ensure carpets are toxic-free and recyclable.

Policy coherence to ensure health comes first

All EU policies and activities need to ensure a high level of health protection, as required by the Lisbon Treaty (see Box 4). This study shows the need to assess and prevent hazardous health impacts as part of the EU's transition to a toxic-free circular economy. The European Commission (EC) should:

- **Undertake detailed health-impact assessments** when preparing initiatives in all policy areas.
- **Undertake a critical appraisal of the track record of voluntary industry initiatives** (self- and co-regulation) – for the scope of this report, specifically the carpet and textile industry – to protect and improve public health at the European level, especially regarding non-communicable diseases such as cancer, diabetes and asthma.

BOX 4: Lisbon Treaty requires an integrated approach to health protection

> A high level of human health protection shall be ensured in the *definition and implementation of all Union policies and activities*. Union action, which shall complement national policies, shall be directed towards improving public health, *preventing physical and mental illness and diseases, and obviating sources of danger to physical and mental health*. Such action shall cover the fight against the major health scourges, by promoting research into their causes, their transmission and their prevention, as well as health information and education, and monitoring, early warning of and *combating serious cross-border threats to health*.
>
> – Article 168(1) of the Lisbon Treaty (emphasis added)

Strategy towards a non-toxic environment

The EC must deliver on its commitment under the Seventh Environment Action Programme to publish a strategy towards a non-toxic environment by 2018, and come forward with sets of clear proposals for implementation as soon as possible, including:

- Clear commitment to address chemicals of concern (e.g. endocrine disruptors and flame retardants, among others) due to their harmful impacts on vulnerable populations, such as infants, small children or pregnant women, including concrete measures to protect these groups.
- Clear guidance on what can be done to assess and avoid cumulative chemical exposure.
- Clear guidance to change the regulation of chemicals of concern by shifting from a chemical-by-chemical approach to an approach that looks into groups of chemicals.
- Clear guidance on how to progress the use of safer alternatives and avoid the case of regrettable substitutions.
- Clear guidance to make sure chemicals regulated under REACH are regulated consistently in other regulations.

EUROPEAN CARPET MARKET

CARPET DEMAND BY SECTOR

RESIDENTIAL BUILDINGS

55%

NON-RESIDENTIAL BUILDINGS

39%

OTHERS

6%

DEMAND

698

MILLION METRES²

NET REVENUE

€47

BILLION*

WHAT HAPPENS TO POST CONSUMER CARPETS IN EUROPE?

YEARLY

1.6 MILLION TONNES = AS HEAVY AS **160X**

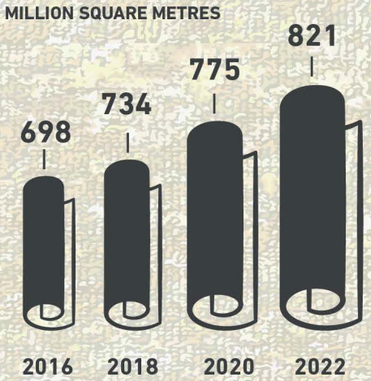
LANDFILL **60%**

INCINERATION **37–39%**

ESTIMATED RECYCLED **3%**

PROJECTED GROWTH OF THE EU CARPET MARKET*

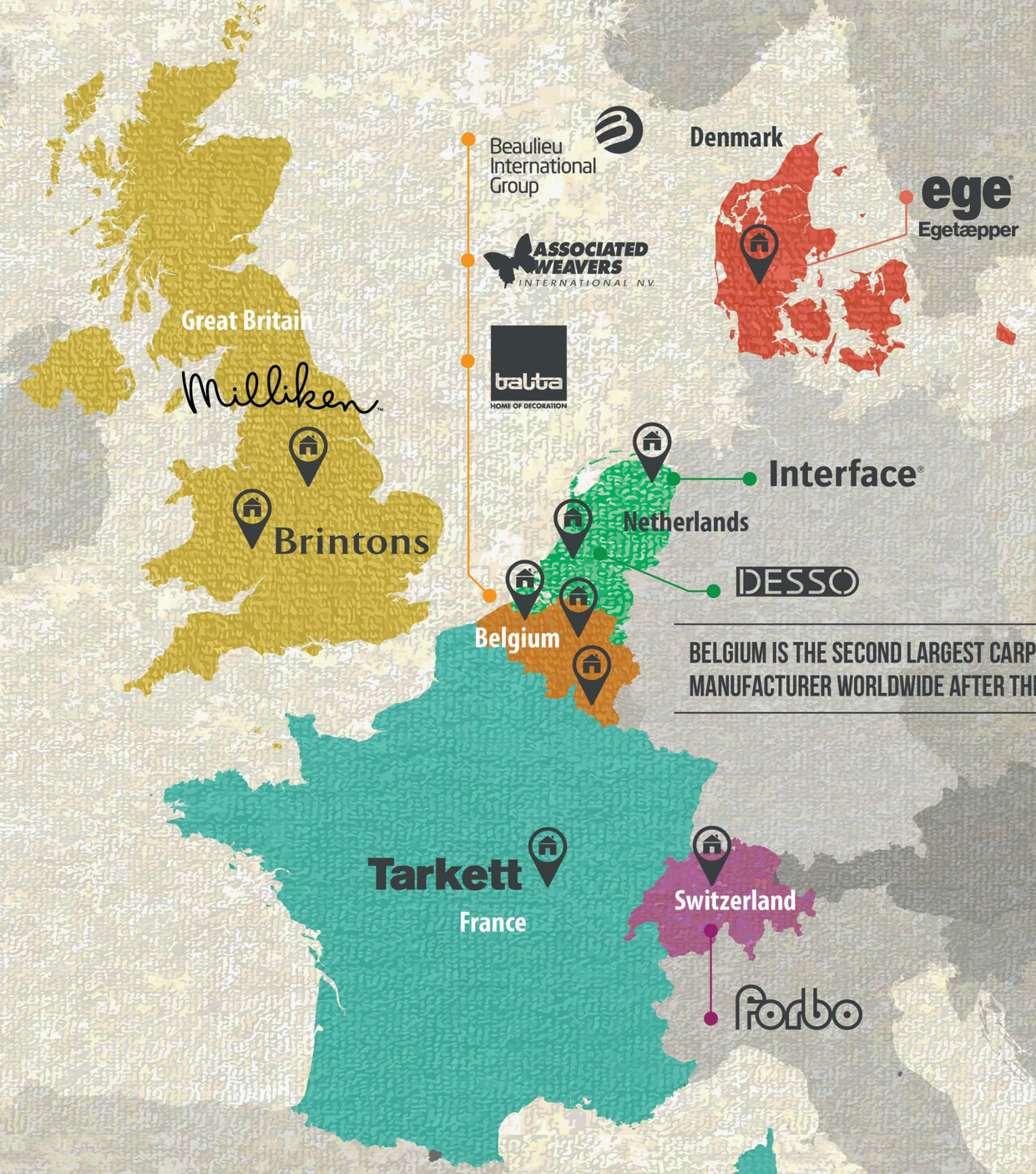
MILLION SQUARE METRES



ANNUALLY **2.7%**

VALUED AT **€56 BILLION**

*Source, Grand View Data, 2016



BELGIUM IS THE SECOND LARGEST CARPET MANUFACTURER WORLDWIDE AFTER THE US

EUROPE IS THE WORLD'S SECOND LARGEST MARKET FOR CARPETS

65% OF EU DEMAND FOR CARPETS IS FULFILLED BY EU-BASED MANUFACTURING

Improving REACH

The ongoing REFIT evaluation of REACH is an opportunity for the EC to address the following:

- **Hazardous substances identified in carpet should be banned.** The 59+ chemicals of concern identified in the report should be restricted and/or banned to ensure consumer safety and environmental protection, and to enable the achievement of a truly circular economy.

- **No lower standards or exemptions for recycled materials**. The same level of human and environmental protection for recycled materials as for virgin materials is necessary at the EU level. Recyclable materials should not perpetuate the use of hazardous chemicals at increased concentrations. Therefore, when restricting and setting limits for chemicals under REACH, it is recommended that the European Chemicals Agency sets the same limits for recycled materials. Materials that do not meet these limits should either be treated in such a way that the substance is removed or made ineligible for reuse or recycling.

Product-specific policy measures

- **Introduce Carpet Product Directive.** The EC should establish a Carpet Directive that meets minimum chemical and resource efficiency requirements. Given the amount of time small children spend on carpets and their vulnerability to chemical exposure – through skin contact, inhalation of volatile organic compounds (VOCs) and ingestion of carpet (micro)fibres through their hand-to-mouth behaviours – the introduction of such a directive is warranted to ensure the same level of protection as the Toys Safety Directive. Ideally, a Carpet Directive would integrate health and circular economy aspects at once, including EPR requirements, eco-design standards and transparency elements (via mandatory product passports), to ensure safe and recyclable design.

- **Extended Producer Responsibility (EPR).** It is recommended that the EC uses the framework of the Circular Economy Package and the Plastic Strategy to set out EU-wide principles and targets for EPR on carpets.

- **Eco-design measures.** Given the complex nature of carpets and the various materials and chemicals used in their manufacture, a minimum set of eco-design standards should be established to ensure carpets are designed for the circular economy. These standards for eco-design (see Box 5) could become part of the proposed Carpet Directive.

BOX 5: Minimum eco-design standards

- Multi-fibre carpets should only be allowed for use when EPR initiatives have been in place, to ensure appropriate take-back procedures for end of life removal in which manufacturers sort fibres for proper recycling.
- The use of all the chemicals identified in the report should be restricted or banned.
- PVC should be banned from use as a material in carpet.
- Materials, such as adhesives, that impact recycling should not be used.

- **EU Ecolabel for textile floor coverings**. The EC should reintroduce an ambitious EU Ecolabel for textile floor coverings, which should cover all 59 substances identified in this report and set design criteria so carpets can be recycled at the end of life. As a next step, the EU Ecolabel should be integrated and set as standard for public procurement policies, thereby creating secure demand for carpet products that are safe and recyclable.

Member States

- **Nominate substances identified in the report as SVHC for inclusion in the Candidate List where possible**. Also, member states should aim to speed up the pace of SVHC identification and be more proactive in proposing substances for SVHC identification.

- **Establish Extended Producer Responsibility scheme.** While regulatory processes to restrict the use of the identified chemicals mainly takes place at EU level, the introduction of an EPR scheme at Member States level is recommended to set mandatory targets and modulated fees to incentivise recyclable, reusable and toxic-free carpets and cover the costs of responsible end-of-life management options.

Carpet manufacturers

Carpet manufacturers need to redesign their products and make them safe, toxic-free and recyclable.

- **Remove chemicals of concern from carpets**. While regulatory processes are put into motion, as they are necessary, manufacturers should take immediate action to phase out these toxics to ensure consumer safety. Industry should avoid the use of PVC as well as the substances identified in the report. Incoming recycled content should be tested to avoid toxic legacy chemicals.

- **Redesign products.** Design carpets with health and circular economy in mind: non-toxic and recyclable. Existing best practices in industry show that solutions exist for many of the toxicity and recyclability issues.

- **Transparency on chemicals in products.** Information on chemical content in carpet materials is rarely passed on from manufacturers to consumers, and even more rarely to waste/recycling facilities. This lack of information makes it difficult to make informed buying decisions and to recycle carpet safely. It is recommended that carpet manufacturers work towards the use of an information exchange system, such as the Chemicals in Products Programme, that enables all actors in a carpets supply chain to access and input material and chemical-related information.

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