



Smoke and Mirrors

Exposing the reality
of carpet 'recycling' in
the UK

This briefing is based on research by Eunomia Consulting, the UK Without Incineration Network (UKWIN) and the Changing Markets Foundation into carpet recycling in the UK and other countries. The purpose of this briefing is to shed light on industry-specific issues related to carpet manufacturing and carpet recycling in the UK. The information in this document has been obtained from sources believed to be reliable and in good faith. The authors accept no liability whatsoever for any direct or consequential loss arising from the use of this document or its contents.

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1. Summary

Europe is the second largest carpet market (after the US) and plays a significant role in manufacturing. Overall, approximately 65% of the EU carpet demand is fulfilled by EU-based manufacturing, with Belgium, the Netherlands and the UK being leading manufacturing countries. European carpet demand was estimated to be 698 million m² in 2016; in 2018, the European carpet market size was valued at £41.4 billion. A significant portion of Europe's carpet demand is driven by the UK, where carpets made up 73% (or 210 million m²) of the total volume of the UK's flooring sector in 2010.¹

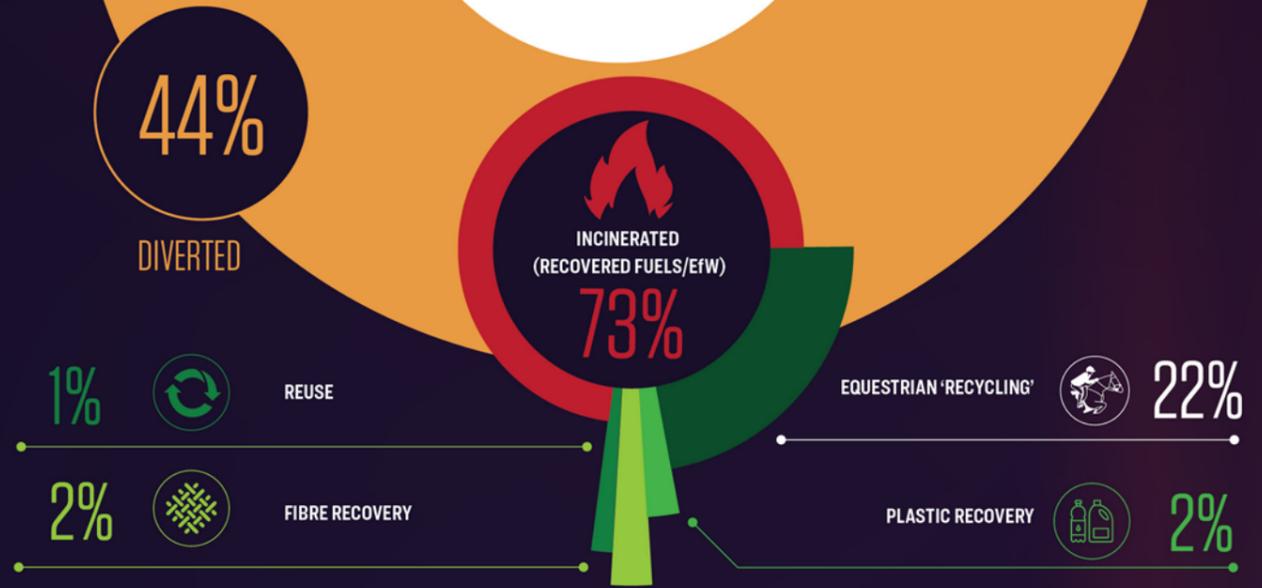
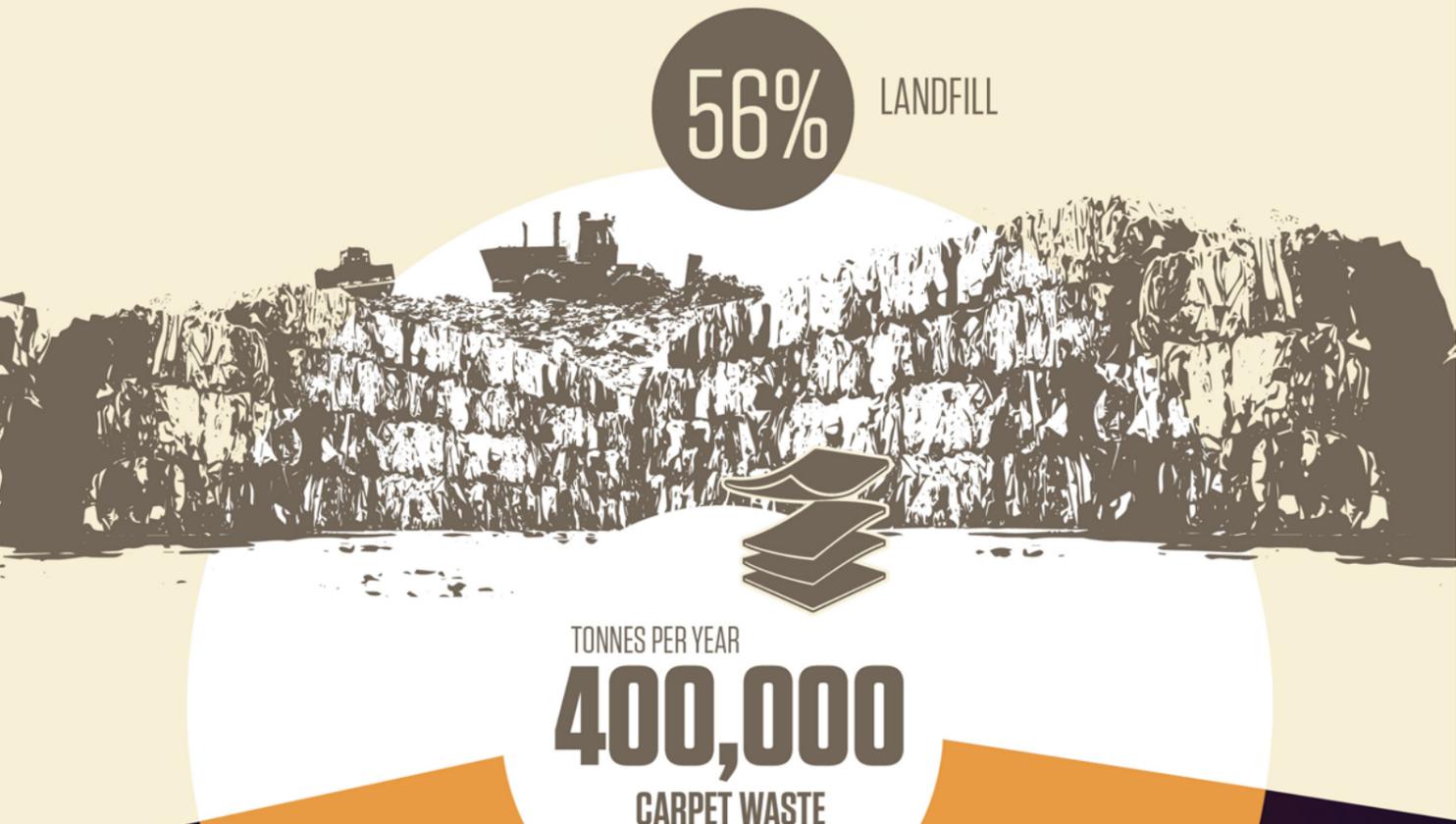
Carpet represents a significant waste stream in the UK. It is estimated that 400,000 tonnes of carpet are discarded in the UK every year² - roughly equivalent to 256 million m², or 36,000 football fields. The UK's market, in terms of volume, is expected to expand at a rate of 3.3% between 2019 and 2025.³ At the same time, there is an increasing focus in the UK and globally on the urgent need to address waste; not only single-use plastics - an area of huge public concern over the past few years - but also bulkier items, such as mattresses, furniture and carpet. In December 2018, the UK government's *Resources and waste strategy for England* listed carpet as one of its five areas of priority for assessing policy options, under 'bulky waste'.⁴

Eleven years ago, a voluntary organisation was founded in the UK with the aim of diverting carpet from landfill. While the organisation, Carpet Recycling UK (CRUK), has publicly celebrated an increase in landfill diversion (from 2% in 2007 to 44% in 2018), the majority of this diversion (73% of overall 'recovery') takes the form of incineration - leading to negative health and climate impacts and burning valuable resources that could have been recycled.⁵ Of the remaining diverted carpet, 22% is downcycled into equestrian products, whereby old carpet is shredded for use in outdoor equestrian areas (*manèges*); 2% is classified as plastic recovery; 2% is classified as fibre recovery (such as carpet underlay, automotive wadding and growing media for plants); and just 1% is reused.⁶

This briefing, based on research by Eunomia Consulting⁷, the UK Without Incineration Network (UKWIN) and the Changing Markets Foundation, takes a look at CRUK's performance over the past decade and exposes both a severe case of greenwash and the failure of voluntary industry initiatives to drive the transition towards circular economy. Instead of focusing on increasing carpet-to-carpet recycling, CRUK has relied heavily on incineration and downcycling. With regard to incineration alone, the cost to society of the adverse climate impact of the CO₂ released from burning carpets is estimated to be £16.5 million in the UK in 2019.⁸

Given that so little progress has been made over the past decade, it is time for the UK Government to introduce mandatory legislation for Extended Producer Responsibility (EPR) in the carpet industry. We propose a toolkit of measures developed by Eunomia Consulting, which have already been supported by leading European carpet manufacturers, as a blueprint for the UK government to kick-start circularity in the sector.

A Based on 128,480 tonnes incinerated (73% of 55% of total carpet, based on percentages stated for % diverted from landfill and % of that incinerated), 1.89 tonnes of CO₂ per tonne of carpet incinerated and a BEIS central abatement carbon cost of £68.25, incinerating carpets is currently around £16.57m for 2019. The 1.89 figure is from WRAP and is the GWP in CO₂ of incinerating carpet. According to WRAP: "This product represents a rolled (broadloom) carpet which is assumed to weigh 35kg and cover 15.8m. Average first and second lifetime is assumed to be 10 years." Benefits of Reuse - WRAP (Created 2011, Updated 2014).



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2. Who are Carpet Recycling UK?

Carpet Recycling UK (CRUK) is a non-profit organisation launched in 2008 with the aim of diverting carpet from landfill and recovering raw materials.⁸ The organisation has over 100 members, which include retailers, such as John Lewis, manufacturers Brintons, Milliken and Desso, and recyclers and collectors of carpet waste.⁹

For the past 11 years, CRUK has focused on signposting those in the carpet supply chain and waste-management sectors to alternative avenues for their carpet waste. Since 2008, CRUK prides itself on increasing diversion from landfill from 2% to 44%.¹⁰



It's estimated that 400,000 tonnes of carpet are discarded annually in the UK (Credit: David Mirzoeff)

3. Where does the diverted carpet go?

Incineration: 73%

Despite the term 'recycling' appearing in the name of the association, most of CRUK's diversion from landfill has involved sending carpets to incineration. Incineration is not a form of recycling, but rather comes at the expense of recycling. Incineration appears within CRUK reporting under two names: *'Recovered Fuels'* and *'Incineration - EfW'* (energy-from-waste).¹¹ CRUK even goes so far as to name carpet for cement kilns as a *'renewable resource to replace fossil fuels'*, despite the fact that carpet is a majority-plastic product itself derived from fossil fuels.¹²

The use of incineration as a form of landfill diversion is problematic in terms of the environment, health and resource efficiency. Burning old carpets comes with a significant adverse climate cost, both in terms of the greenhouse gases released through combustion and because of the environmental impact of extracting new resources to replace the carpet that was incinerated. Eunomia research found that burning waste carpet, which is predominantly plastic, is likely to be a higher carbon route than burning gas, and that the burning of waste is generally more carbon intensive than all but coal. Previous research into the California market (also conducted by Eunomia for Changing Markets) showed that, for every tonne of carpet sent to incineration instead of being recycled, the climate cost is 3.46 metric tonnes CO₂ equivalent per tonne of carpet.¹³

From a health perspective, incinerating carpet releases persistent organic pollutants and other toxics. Research has found that carpets in the EU can contain 59+ toxic chemicals, including suspected carcinogens, endocrine disruptors and reprotoxics.¹⁴ Carpet made with PVC backing releases dioxin when burnt, which is a known carcinogen, while a recent report by the Center for International Environmental Law in the US stated that incinerating plastic waste (which includes many types of carpets) *'releases toxic substances including heavy metals such as lead and mercury, acid gases and particulate matter'*.¹⁵ While modern incinerators filter emissions, they still release significant levels of particulate matter, dioxins and NO_x, which are harmful to human health and the environment.¹⁶



Carpet incineration: The unpaid climate cost to society

The unpaid cost to society of the adverse climate impact of the CO₂ released from burning carpets is estimated to be £16.5 million in the UK in 2019. This cost is not being paid by the carpet industry, so society is in effect subsidising carpet incineration.

The £16.5 million figure is based on the assumptions and calculations set out below, taking into account the Government's central carbon price estimate of £68.25 per tonne of CO₂. Taking the Government's different carbon prices into account, the cost to society ranges between £8 million and £25 million of unpaid cost in 2019.

- > 400,000 tonnes of waste carpet [UK carpet industry figure for 2018]
- > 44% of which (176,000 tonnes) is diverted from landfill [UK carpet industry figure for 2018]
 - 400,000 tonnes × 0.44 = **176,000 tonnes**
- > 73% of which (128,480 tonnes) is incinerated [UK carpet industry figure for 2018]
 - 176,000 tonnes × 0.73 = **128,480 tonnes**
- > 1.89 tonnes of CO₂ is released per tonne of carpet incinerated [WRAP Reuse Tool figure]
- > £68.25 per tonne of CO₂ carbon abatement cost [BEIS Non-Traded Carbon, Central Estimate]
 - 128,480 tonnes carpet × 1.89 tonnes of CO₂ × £68.25 = **£16,572,956.40**

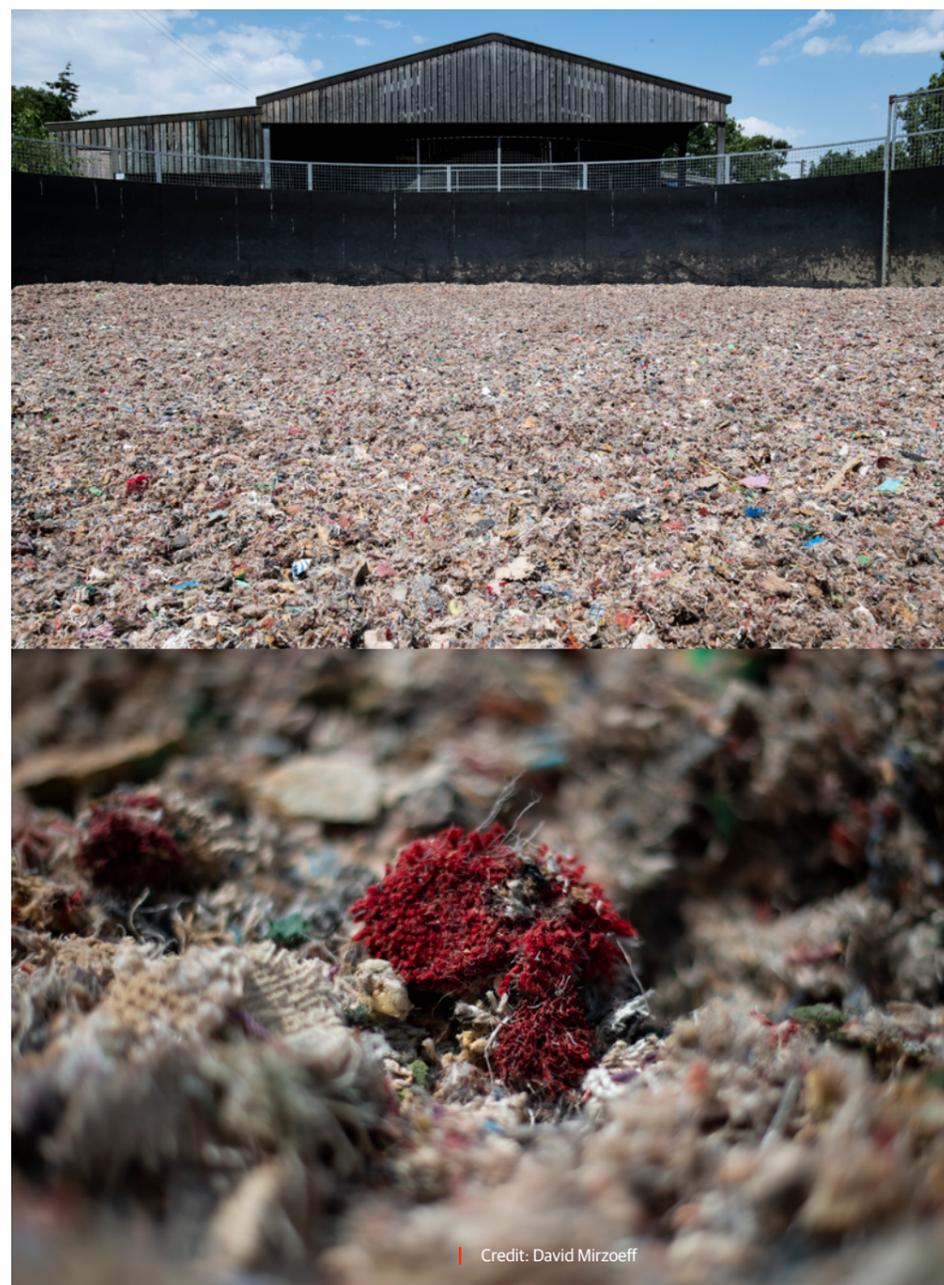
From a resource-efficiency perspective, a heavy reliance on incineration is both a waste of valuable resources and removes the incentive to increase recycling rates and move to a truly circular economy. With regards to greenhouse gas (GHG) emissions, since the UK Parliament's declaration of climate emergency in May 2019,¹⁷ the UK has committed to net zero emissions by 2050;¹⁸ therefore incineration of waste must be phased out as fast as possible to help achieve this goal.

Equestrian: 22%

According to figures reported at CRUK's annual conference in July 2019, 22% of diverted carpet is used for equestrian purposes.¹⁹ In this sector, post-industrial and post-consumer carpet is shredded into small pieces and used as the surface for outdoor equestrian arenas (*manèges*). The process, as one producer of this product described, involves shredding carpet to a 25mm size, extracting the microfibre dust and encasing the remaining fibres in a wax coating, which acts as a seal and extends the product's lifespan once laid as a surface. The shredded carpet is not applied directly to the land; rather, it is separated from the land by a 100mm-thick layer of aggregate plus, followed by a membrane to retain the fibres, which are mixed with silica sand.

As with incineration, this form of landfill diversion (which is actually *down-cycling*) poses some serious questions relating to wasteful use of resources and health risks. As mentioned previously, 59+ toxic substances have been identified as potentially present in carpets sold on the EU market,²⁰ including suspected carcinogens, endocrine disruptors and reprotoxics. This raises concerns about the risk of the release of these toxins into the environment.

Eunomia researchers spoke with representatives from the Welsh and Scottish Governments about this use of carpet at end-of-life, as well as members of civil society. They encountered a range of opinions as to whether carpet waste ought to be used for equestrian purposes, and a corresponding lack of uniformity regarding regulating this use of end-of-life carpet across the UK's devolved environment agencies.³ In the UK, the use of post-consumer carpet for equestrian purposes is legal. However, in Wales this practice requires a waste-licence exemption, and in Scotland it requires a permit. In England, no permit is needed due to it being classified as a 'low-risk' activity.²¹



Credit: David Mirzoeff

In conversation with Eunomia, a representative of the Scottish Environment Protection Agency confirmed they would only authorise carpets to be processed into equestrian surfaces under a waste-management licence where there was proof that the material was tightly controlled, to avoid the risk of synthetic fibres polluting watercourse or being worn into the ground.²²

In both Scotland and Wales, individuals interviewed were against the use of carpet waste in equestrian surfacing, based on the risk of fibre particles being released to land and air as well as wider concerns over the hazardous substances used in carpet. Even where the material is properly processed to reduce dust, and laid onto a membrane, one interviewee said it still seems likely that:

'Fibres will be shed when horses trot over it and that the material will have some hazardous substances present. And what happens to it at its end of life?'

^B Researchers were not able to speak with the Northern Ireland Environment Agency due to time constraints

'Growing media' (peat replacement and soil enhancer)

One small but significant stream of landfill diversion under the CRUK programme is the use of carpet as a 'peat replacement and soil enhancer for contained growing media'. The CRUK website explains that, 'due to the high nitrogen content, the fibres from wool-rich carpet are ideal' for this purpose.²³ While one company offering this product does state that 'products are microbiologically tested in an independent laboratory', these products do not appear to be tested for chemicals.²⁴ Considering the toxic chemicals identified as being used in EU carpets, this raises some important questions about the safety of such applications.

Credit: David Mirzoeff



4. Carpets and a true circular economy

Shifting the carpet industry to a circular economy model is crucial to tackling its substantial waste problem. The current system means society is throwing away billions of pounds of valuable products, while polluting the environment with negative impacts on human health.

Carpet companies must redesign their products to reduce waste at source, and enable reuse and closed-loop recycling of their products at the end of life. The way in which carpet is currently designed (mixed fibres, latex secondary backing, glued, use of potentially hazardous chemicals) makes it difficult to recycle. As such, there needs to be an ambitious overhaul of how carpets are designed; carpets need to be made of one fibre, easily separable and non-toxic. They should also include a percentage of recycled content, to drive demand for recycled materials.

Companies such as Tarkett Desso, Milliken, Interface and Betap have developed new, innovative designs and products in recent years. Such innovations include carpets made from only one or two materials; greater use of recycled materials; leaving out latex and bitumen in backings; and offering takeback schemes for reuse and recycling. On the recycling side, Anglo Recycling is able to recycle wool-rich carpet into carpet underlay, 100% of which can then be recycled back into underlay. While this is technically downcycling in the first instance, the underlay is then captured into a closed-loop system. However, these products and processes remain niche - they are mainly used in commercial tiles and/or using post-industrial waste (as opposed to post-consumer waste) - and have not yet been adopted across the industry, with very little transfer into broadloom. In order for the whole industry to move towards circular economy, niche innovations need to be rapidly scaled up.

5. Conclusion

More than 10 years after the creation of CRUK, just 2% of carpet waste is recycled back into a non-shredded product from carpet fibres. Of this 2%, an even smaller amount is recycled into a high-quality product, as opposed to being downcycled. Less than 1% is reused - the most favourable option (after source reduction) in the waste hierarchy.²⁵

These statistics demonstrate that, over the past decade, CRUK has been unable to deliver the ambitious, bold and sweeping changes needed within the carpet industry to drive the shift to a circular economy. Instead, the organisation has used its landfill-diversion rates as a smokescreen for what is essentially mass incineration of valuable resources, as well as downcycling into low-value products - some of questionable safety - that cannot be recycled again, and therefore presumably end up either in landfill or being incinerated anyway further down the line.

As carpet is a long-life product, changes need to be made immediately to ensure the problem starts to be resolved within the next decade. Had CRUK integrated better design and carpet-to-carpet recycling in its mandate from its inception in 2008, and given less leeway to incineration and downcycling, more recyclable carpets would have come onto the market and into the waste stream by now, enabling the industry to steadily move away from its current reliance on incineration and downcycling.

These disappointing results from CRUK show that a voluntary approach to managing carpet waste, whereby the industry sets its own targets and caters to the lowest common denominator of its members, has clearly failed. The UK government must therefore take carpet as a priority bulky waste and rapidly develop a mandatory EPR scheme, where manufacturers are responsible for the end-of-life of their products.

6. Recommendations

With the UK government naming carpet as one of its five areas of priority (under 'bulky waste') in its *Resources and waste strategy for England*, the time for ambitious legislation - in the form of Extended Producer Responsibility (EPR) - is now. EPR in the carpet industry would formalise the responsibility of carpet producers to manage the waste arising from its products, thus incentivising a shift towards recyclable products; these, in turn, could once again become a resource for the industry at end of life.

Eunomia's recently published *Policy toolkit for carpet circularity in EU Member States*²⁶ identifies a range of policy options the UK could use to take a lead on this important product group, helping to fulfil carpets' huge circular economy potential and offering an example for other countries to follow. Many carpet manufacturers already support the implementation of these measures at the EU and Member State level, including Interface and Tarkett (itself a member of CRUK through its subsidiary Desso).²⁷

Recent communications from CRUK demonstrate that the organisation seems to be aware of the need to focus on improved design to increase reuse and recycling rates in the industry.²⁸ CRUK should publicly support the development of EPR legislation in the UK, and related measures to increase carpet-to-carpet recycling. The Eunomia report concludes that CRUK could potentially become one of the Producer Responsibility Organisations (PROs) under a mandatory EPR scheme, in conjunction with representatives from the UK Government, devolved administrations, industry and civil society. In our experience, it remains to be seen whether an industry membership-based organisation can rise above the lowest common denominator and support ambitious mandatory measures. Additionally, the existing financial and governance structure of CRUK, whereby the organisation is funded by carpet manufacturers that also sit on its steering committee, is problematic in relation to the fact that CRUK is directed by the very industry that it would need to challenge as a PRO.

In a world increasingly aware of its planetary boundaries, limited resources and rising restrictions on carbon emissions, and with the UK Government committed to achieving net zero emissions by 2050, it's imperative that every sector within the UK dramatically shifts to a circular economy model. It is essential that manufacturers - including those in the carpet industry - begin to take responsibility for the products they put on the market, including collection and recycling. Carpet must be designed with waste reduction, reuse and recycling in mind - and this recycling must be carpet-to-carpet in order to close the loop.

Annex: Essential features of Extended Producer Responsibility in the carpet industry

- > **Mandatory green-design measures** - minimum 'essential requirements' to:
 - progressively phase out all substances of very high concern on the REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) candidate list,²⁹ and ideally all those on the SIN (Substitute It Now) list;³⁰
 - provide a minimum five-year manufacturer's warranty;
 - set minimum post-consumer recycled/organic content levels;^c
 - set minimum recyclability requirements around material separation, mono-material designs, etc.;
 - provide 'product passports': detailed information (including all chemical content) to assist recyclers, collectors, etc.; and
 - mandate installation techniques that allow easy removal and recovery of carpet.

- > **Mandatory Extended Producer Responsibility**, including:
 - mandatory - and gradually increasing - 'preparing for reuse' and recycling targets, with producers covering the full costs of collections from consumers and appropriate treatment;^d
 - modulated producer fees, to reward eco-design that goes beyond the minimum 'essential requirements' and penalise sub-optimally designed products to reflect negative health and environmental impacts; and
 - supporting initiatives for circular economy innovation in the sector, combined with tax breaks, grants and/or low interest loans for circular economy carpet manufacturers and carpet-recycling companies.

- > Better labelling for consumers - ideally a mandatory Green Carpet Mark (GCM) with an A-G rating (G=mandatory to meet the 'essential requirements' minimum) or similar (e.g. bronze, silver and gold, as per Cradle to Cradle) - giving full transparency on eco-design features to help inform purchasers (public and private).
- > Mandatory Green Public Procurement for carpet - ideally linked to the GCM, and with common criteria and minimum GCM level required (e.g. C or B rating) - to drive demand for more sustainable carpets.
- > Clear end-of-waste criteria and high standards for recycled materials and related products.
- > Consumer information campaigns to support separate collection and understanding of labelling (e.g. the GCM).

C Note that these two ERs could potentially be dropped where the EPR modulated fee and recycling targets in combination are deemed sufficient to drive change

D Note that 'preparing for reuse' is the legal term used for sorting and refurbishment to allow reuse whereas direct reuse is where the item never becomes waste and is simply passed on with that intention.

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