

How is plastics material to different sectors?

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Apparel

How is plastics material to the apparel sector?

The apparel industry has faced **reputational** damage in recent years due to its significant consumption of resources and the millions of clothes that end up in landfills every year. Half of the garments sold by leading fast fashion brands are made of **non-recycled plastics** like polyester and nylon¹. Many apparel companies have been slow to transition to recycled materials – for some online stores just 1% of items contain recycled materials².

Every time these garments are used or washed, they shed millions of plastic **microfibres** which pass through wastewater treatment plants and end up in the ocean. In fact, the apparel sector is one of the major contributors of microplastic pollution in our oceans³. Microplastics are small plastic pieces less than five millimeters long which can be harmful to marine and aquatic ecosystems. There is growing evidence that humans are exposed to microplastics via ingestion of food and drink and through inhalation. While there is limited research on the impacts of microplastics on **human health**, some correlative studies indicate that exposure to high concentrations of microplastics could provoke immune and stress responses and induce reproductive and developmental toxicity⁴.

¹ Kirchain et al (2015). [Sustainable Apparel Materials: An overview of what we know and what could be done about the impact of four major apparel materials: Cotton, Polyester, Leather, & Rubber.](#)

² RSA (2021). [Fast Fashion's Plastic Problem: Sustainability and material usage in online fashion.](#)

³ Ellen MacArthur Foundation (n.d.). [Redesigning the future of fashion.](#)

⁴ Blackburn and Green (2021). [The potential effects of microplastics on human health: What is known and what is unknown.](#)

Due to microplastics' larger surface area to volume ratio relative to macroplastics, microplastic pollution can absorb persistent, bioaccumulative, **toxic chemicals**, such as polychlorinated biphenyls (PCBs), polybrominated biphenyl ether (PBDE) flame retardants and dioxins, which may be ingested by organisms and accumulate up the food chain⁵.



Biotech, Health Care & Pharma

How is plastics material to the Biotech, Health Care & Pharma sector?

Plastics – usually **single-use** and **disposable** – are ubiquitous in the medical sector owing to their high versatility. The COVID-19 pandemic caused a growing demand for single-use plastics, and the environmental presence of plastic personal protective equipment (**PPE**) debris is an emerging source of plastic pollution⁶. A large amount of plastic waste produced at healthcare facilities, with only a small fraction being **recycled**. Medical plastic recycling challenging due to difficulties involved in sorting and cleaning the plastics⁷.

Practice Greenhealth estimates that 'blue wrap' makes up almost 20% of all operating room waste⁸. Other common medical applications of plastics include sterilization wrap, irrigation bottles, basins, pitchers, trays, Tyvek, and flexible clear packaging.



Food, Beverage & Agriculture

How is plastics material for the Food, Beverage & Agriculture sector?

Plastics have become ubiquitous in **agrifood systems** due to their low cost and adaptability. Examples include mulch films, irrigation pipes, fishing nets, and coatings on fertilizers, pesticides, and seeds. These agricultural plastic products, which are often single-use, can degrade into **microplastics** and **contaminate soil** and aquatic ecosystems, posing a threat to human and environmental health and agricultural productivity. Microplastic pollution has the potential for bioaccumulation, as well as the risk of carrying other **contaminants**, like pesticides, which can also enter the food chain. In a recent report⁹, the Food and Agriculture Organization suggested that the land we use to grow our food is contaminated with large quantities of plastic pollutants, and the IUCN¹⁰ suggests that macroplastic pollution from lost

⁵ Chemtrust (2015). [Chemical pollution and microplastics: a present danger to marine life.](#)

⁶ Ammendolia et al (2021). [An emerging source of plastic pollution: Environmental presence of plastic personal protective equipment \(PPE\) debris related to COVID-19 in a metropolitan city.](#)

⁷ Blessy et al (2021). [Recycling of medical plastics.](#)

⁸ Practice Greenhealth. [Medical plastic recycling.](#)

⁹ FAO (2021). [Assessment of agricultural plastics and their sustainability: A call for action.](#)

¹⁰ IUCN (2020). [The marine plastic footprint.](#)

fishing nets constitutes a significant proportion of yearly marine plastic leakage.

Plastic packaging for food and beverage products is also a major source of pollution; a recent study¹¹ found that plastic items from take-out food and beverages dominate global litter, followed by those from fishing activities. Plastics Europe reports that agriculture, farming, and gardening products contained only 25.4% post-consumer recycled content in 2021¹².

The World Health Organization has highlighted **tobacco products** as the most littered item on the planet¹³. Products like cigarettes, smokeless tobacco, and e-cigarettes add to the build-up of plastic pollution. Cigarette filters contain microplastics and make up the second highest form of plastic pollution worldwide. Awareness campaigns like Client Earth's legal warnings¹⁴ and Break Free from Plastic's (BFFP) Brand Audit Reports pose significant **reputational risks** to food, beverage, and tobacco companies. BFFP's Branded report¹⁵ summarized the thousands of audit events that took place across the globe from 2018-2022 and found that smoking materials and food and beverage packaging were the most common items of plastic pollution across all regions.



Fossil Fuels

How is plastics material for the Fossil Fuels sector?

Petrochemicals that are derived from fossil feedstocks form the building blocks of 90% of all plastics¹⁶. Currently about 4% of annual total use of oil and gas globally is for plastic production¹⁷. The global response to climate change will reduce demand for fossil fuels in the transportation and energy generation sectors, which will cause petrochemical companies to invest more in plastics production. This is expected to drive half of **oil** demand growth between now and 2050¹⁸. The World Economic Forum predicts plastic production will double in the next 20 years¹⁹. This move away from transportation and energy generation and towards plastic production has been widely publicized and poses a significant reputational risk to petrochemical companies undertaking this controversial transition. Michael Bloomberg has launched an \$85 million campaign to block the planned construction of plastic and petrochemical plants across the United States²⁰, and the Minderoo Foundation has published a list of 100 petrochemical companies that produce 90% of all **single-use** plastic waste generated globally²¹.

¹¹ Morales-Caselles et al (2021). [An inshore-offshore sorting system revealed from global classification of ocean litter.](#)

¹² Plastics Europe (2022). [Plastics – the facts 2022.](#)

¹³ WHO (2022). [Tobacco: poisoning our planet.](#)

¹⁴ Client Earth (2022). [We've issued legal warnings to Nestlé, Danone and others over plastic.](#)

¹⁵ BFFP (2022). [Branded: five years of holding corporate plastic polluters accountable.](#)

¹⁶ Plastics Europe (2022). [Plastics – the facts 2022.](#)

¹⁷ British Plastics Federation (2019). [Oil Consumption.](#)

¹⁸ Client Earth (2020). [Big Oil's Plan B: Plastic.](#)

¹⁹ WEF (2016). [The New Plastics Economy: Rethinking the future of plastics.](#)

²⁰ Volcovici (2022). [Bloomberg to spend \\$85 million against U.S. plastic, petrochem buildout.](#)

²¹ Minderoo Foundation (2022). [Plastic Waste Makers Index: Top 100 Polymer Producers.](#)



Hospitality

How is plastics material for the Hospitality sector?

Plastic packaging plays a significant role in the hospitality and food service industries and many of the plastic items used in these sectors are **single-use**²². Examples of single-use plastics in hospitality may include food packaging, water bottles, coffee cups, toiletries, and laundry bags. 'Back of house' uses of plastic include packaging, cling film, plastic cups, single-use wipes, gloves, and masks²³. These plastic products are generally not captured for recycling and end up in landfill, incineration, or as pollution in the natural environment. The contribution of the hospitality sector to plastic use and pollution is becoming more widely recognized. The UK Plastics Pact urges the hospitality sector, among other sectors, to set ambitious targets for reducing plastics impacts at all levels of the supply chain²⁴.



Infrastructure

How is plastics material for the Infrastructure sector?

Well-developed **waste management** is essential to reducing leakage of plastic into marine, aquatic, and terrestrial environments. **Infrastructure companies** play an important role in the circulation of materials back to cooperating firms²⁵. But at present, conventional grey infrastructure does not adequately address **circular economy** requirements and plastic pollution issues. Plastics Europe reports that plastic waste recycling rates are 13 times higher when collected separately compared to mixed waste collection schemes²⁶.

The majority of marine macroplastic pollution comes from **coastal mismanaged waste**, and an additional 2 Mt per year of marine macroplastic pollution comes from **inland mismanaged waste**²⁷. **Microplastic** leakage is also pervasive and tends to be released through household wastewater and road run-off, passing through treatment systems and ending up in aquatic environments.

Construction was one of the largest applications of plastics globally in 2021. In the construction industry, plastic is used for seals, pipes, cables, flooring, and insulation, as well as plastic films for packaging. Post-consumer recycled plastics accounts for only 18.1% of all building and construction products²⁸.

²² WRAP (n.d.). [Hospitality and food service](#).

²³ Sustainable Hospitality Alliance (2021). [Single-use plastic factsheet](#).

²⁴ WRAP (2022). [A Roadmap to 2025: The UK Plastics Pact](#).

²⁵ UNEP (2021). [Future-proofing Infrastructure to address the climate, biodiversity and pollution crises](#).

²⁶ Plastics Europe (2022). [Plastics – the facts 2022](#).

²⁷ IUCN (2020). [The marine plastic footprint](#).

²⁸ Plastics Europe (2022). [Plastics – the facts 2022](#).



Manufacturing

How is plastics material for the Manufacturing sector?

Packaging was one of the largest applications of plastics globally in 2021, using 44% of all plastics. Post-consumer recycled plastics accounted for only 8.5% of all packaging²⁹. Flexible packaging is the fastest growing plastic packaging category and is mostly single-use with very low recycling and high leakage rates³⁰.

Automotives account for 8% of global plastics applications, **electrical & electronics** account for 7%, and household, leisure, and sports, for 7%³¹. These non-packaging applications of plastics can be challenging to recycle due to mixed materials within complex products and the presence of additives that are hazardous or may reduce the cost-effective reuse of materials³².



Materials

How is plastics material for the materials sector?

Petrochemicals that are derived from fossil feedstocks form the building blocks of 90% of all plastics, therefore companies that convert fossil feedstocks into **polymers**, or produce/ use plasticizers and other additive chemicals play a significant role in marine plastic pollution. The global response to climate change will reduce demand for fossil fuels in the transportation and energy generation sectors, which will cause petrochemical companies to invest more in plastics production. The World Economic Forum predicts plastic production will double in the next 20 years³³. This move away from transportation and energy generation and towards plastic production has been widely publicized and poses a significant reputational risk to petrochemical companies undertaking this controversial transition. Michael Bloomberg has launched an \$85 million campaign to block the planned construction of plastic and petrochemical plants across the United States³⁴, and the Minderoo Foundation has published a list of 100 petrochemical companies that produce 90% of all single-use plastic waste generated globally³⁵.

Plastic pellets, or nurdles, can be released into the environment from plastic plants or during

²⁹ Plastics Europe (2022). [Plastics – the facts 2022](#).

³⁰ Ellen MacArthur Foundation (n.d.). [Flexible packaging](#).

³¹ Plastics Europe (2022). [Plastics – the facts 2022](#).

³² European Environment Agency (2022). [Managing non-packaging plastics in European waste streams – the missing part of the plastic puzzle](#).

³³ Plastics Europe (2022). [Plastics – the facts 2022](#).

³⁴ Volcovici (2022). [Bloomberg to spend \\$85 million against U.S. plastic, petrochem buildout](#).

³⁵ Minderoo Foundation (2022). [Plastic Waste Makers Index: Top 100 Polymer Producers](#).

shipping. This form of plastic pollution can absorb persistent, bioaccumulative, toxic chemicals which may be ingested by organisms and accumulate up the food chain³⁶. Nurdle spills have devastating ecological impacts and pose a reputational risk to organizations involved in the production and/ or transportation of plastic pellets³⁷.

Plastic ingredients and **microbeads** are also applied in a variety of **personal care and cosmetics products** (PCCPs), such as deodorant, shampoo, insect repellent, and baby care products. Plastic ingredients in PCCPs are poured down the drain after use, and therefore cannot be collected for recycling. These plastic ingredients pass through wastewater treatment systems and are then emitted via raw sewage, treated effluents, landfilled, or dumped at sea³⁸.



Mineral Extraction

How is plastics material to the mineral extraction sector?

There are many applications of plastics in the mineral extraction/ mining sector, including acrylic, HDPE, and PC sheeting, PVC pipes for waste transfer, and UHMW-PE in sheaves, gears, and other components³⁹.



Power Generation

How is plastics material to the power generation sector?

Plastics are commonly used the power generation sectors, for example in wind turbines, solar panels and wave booms⁴⁰. Plastics that are difficult and/or expensive to recycle may go through a process of energy recovery. This is where combined heat and power recovery plants (CHP plants) use plastics waste and other types of waste to generate energy⁴¹. Waste incineration produces greenhouse gas emissions, for example, in 2016, U.S. waste incinerators released the equivalent of 12 million tons of carbon dioxide, more than half of which came from plastics⁴². The incineration of plastic a highly carbon-intensive source of electricity⁴³.

³⁶ Chemtrust (2015). [Chemical pollution and microplastics: a present danger to marine life.](#)

³⁷ McVeigh (2021). [Nurdles: the worst toxic waste you've probably never heard of.](#)

³⁸ UNEP (2015). [Plastic in cosmetics: Are we polluting the environment through our personal care? Fact sheet.](#)

³⁹ A&C Plastics Inc. [5 popular types of plastic for mining applications.](#)

⁴⁰ British Plastics Federation. [Plastics applications.](#)

⁴¹ [Plastics Europe. Recycling and energy recovery.](#)

⁴² EPA (2016). [Inventory of U.S. Greenhouse Gas Emissions and Sinks.](#)

⁴³ Greenpeace (2022). [The Big Plastic Count Results.](#)



Retail

How is plastics material to the retail sector?

Plastics have become ubiquitous throughout **retail supply chains** their low cost and adaptability, e.g. in processing, packaging, distribution, and retailing. An estimated 37% of **food** sold in the EU uses plastic as a packaging material⁴⁴, and grocery retailers are especially dependent on **single-use** plastic packaging. Public concern about the plastic pollution crisis constitutes a significant reputational risk for retailers; a poll by YouGov found that 85% of people in the UK want the government to make retailers cut the amount of plastic packaging⁴⁵ they use. In addition, plastic packaging recycling **targets** and Extended Producer Responsibility requirements constitute significant regulatory risks for retailers⁴⁶.



Transportation Services

How is plastics material to the transportation services sector?

Plastic pellets, or nurdles, can be released into the environment from plastic plants or when shipped to factories. This form of plastic pollution can absorb persistent, bioaccumulative, toxic chemicals, such as polychlorinated biphenyls (PCBs), polybrominated biphenyl ether (PBDE) flame retardants and dioxins, which may be ingested by organisms and accumulate up the food chain⁴⁷. Nurdle spills have devastating **ecological impacts** and pose a **reputational risk** to organizations involved in the production and/ or transportation of plastic pellets⁴⁸.

⁴⁴ Rethink Plastic Alliance (2022). [What the EU can do to support the grocery retail sector in reducing packaging and plastic pollution: Policy Briefing.](#)

⁴⁵ Greenpeace (2021). [Trashed: How the UK is still dumping plastic waste on the rest of the world.](#)

⁴⁶ DEFRA and EA (2022). [Packaging waste: prepare for extended producer responsibility.](#)

⁴⁷ Chemtrust (2015). [Chemical pollution and microplastics: a present danger to marine life.](#)

⁴⁸ McVeigh (2021). [Nurdles: the worst toxic waste you've probably never heard of.](#)