

What if fashion were good for the planet?

Fashion is the second most polluting industry in the world, coming just after oil. Clothing manufacture and consumption have a huge negative impact on both the environment and people. Sustainability is not only about the environment, but is also an economic and social indicator, and the clothing industry is a good example illustrating their interconnections. Are technological innovations alone enough to 'tailor' a green and fair future for fashion?

The fashion industry is [an important sector in Europe](#), constantly making and selling new clothes, shoes and accessories. Rapid changes in trends, continuous availability of new products and a huge drop in prices have created 'fast fashion' and a throwaway consumer culture. In its current state, the fashion industry (here, mainly focusing on clothes) has massive environmental and social costs in Europe and other parts of the world, which are incompatible with the Commission's European Green Deal and circular economy objectives.



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From the production of raw materials, manufacturing, transport and distribution, to consumer behaviour and care, the clothing lifecycle has a high [environmental footprint](#), with massive usage of natural resources, water and land pollution, and high carbon emissions. Firstly, the fashion industry consumes [1.5 trillion litres](#) of water annually. It causes 20 % of global clean water pollution, due to [dyeing](#) and treatment of fabrics with toxic chemicals, and [pesticide usage](#) to grow raw materials. Plastics, commonly utilised in synthetic fibres, end up in the oceans, contaminating the food chain as micro-plastics. Furthermore, 87 % of clothes end up as waste in landfill or are incinerated, whilst 30 % of garments are [over-produced](#) and disposed of without being worn even once. The fashion industry also accounts for 10 % of annual [global carbon emissions](#) and is a major player in deforestation and soil degradation.

Another challenge is societal, including tackling unethical working conditions and hazardous processes. Western fashion companies mostly [outsource production](#) to developing countries, not only to circumvent strict environmental regulations, but also to take advantage of cheap labour. Low salaries, long working hours and lack of safe working conditions are common.

Potential impacts and developments

While [11 % of Europeans](#) and [25 % of the world population](#) is affected by water scarcity, making a single cotton shirt requires [2 700 litres](#) of [fresh water](#). This amount equals a person's drinking needs for 2.5 years. Could seawater replace fresh water in clothing manufacture? Research shows this is possible for [certain steps](#) in processing. A new fabric technology is also being developed that uses [saltwater-grown plants](#). [One-fifth](#) of cotton's global water footprint is related to pollution. Wastewater is often directly discarded into waterways, where it mixes with fresh water sources. While conventional wastewater treatments are energy-intensive, [innovative technologies](#) can allow more environmentally friendly separation of water and toxins. As water is key to sustainable development, more research on water filtering technologies for recycling and reusing is necessary.

To mitigate the environmental impact of manufacturing, industrial applications of biotechnology already offer innovative solutions for more sustainable materials and production processes. Genetically modified bacteria produce [spider silk](#), which is strong, elastic and waterproof, while bio-leathers are produced by yeast making collagen, the major component of skin, or [bacterial cellulose](#). [Fungi](#) are engineered to grow novel fibres, and to decontaminate textile waste. Pigments produced by [algae](#) replace toxic chemical dyes, and [enzymes](#) replace chemical treatment steps, reducing water consumption and providing non-toxic alternatives. Gene-editing

techniques are advantageous for generating new plant varieties for raw materials. While food is an emotive topic, there might be fewer concerns over gene editing of non-food crops. New plant variants that are more [resilient](#) to climate change, such as droughts or floods are being generated. Manipulation of lifecycle characteristics could allow for cultivation outside of the normal seasonal range, and [disease resistant](#) plants could decrease the use of chemical pesticides. Such increased production efficiency can cut resource usage and minimise waste.

Products of fast fashion usually have a short lifetime. This is reflected in European consumer behaviour, where people purchased [40% more clothing](#) in 2012 compared to 1996, but wore it for a duration half as long. Better quality and sustainable material is part of the solution, but this is inseparable from [consumer awareness](#). What if consumers were involved in the design process? Artificial intelligence applications have been exploited to [predict trends](#) and match supply with demand. Algorithms that can calculate all body measures and fabric types design [custom-fit clothes](#). Furthermore, [blockchain](#) can help with supply chain transparency. These developments could reduce over-production, waste, and the online buy/return cycle. However, they do not eliminate the challenges of workforce ethics and excessive consumption. What if production was not outsourced? While people in developing countries depend on the industry for their living and these jobs help to bring poverty rates down, labour conditions should be fair. Would people be willing to pay more for higher quality, robust, adaptable and [modifiable](#) clothing? Surveys show people would [pay more](#) for sustainability. Legislative efforts to increase consumer awareness are undeniably part of a move towards a more planet-friendly fashion industry.

Anticipatory policy-making

EU legislation regulates textile production, labelling and marketing. The [EU Textile Regulation](#) sets labelling requirements for fibre composition; [REACH](#) provides protection regarding chemicals in [production](#); and the [Emissions Trading System](#) controls emissions allowances. Furthermore, the updated [waste management rules package](#) imposes separated collection of textiles by 2025. A 2019 European Commission [working document](#) identifies textiles (i.e. clothing) as a 'priority product category for the circular economy'. While current EU regulations focus on consumer health, safety and waste management aspects, equivalent standards and transparency for textile imports are still lacking. Policy-makers will need to pay particular attention to achieving the relevant [Sustainable Development Goals](#), as well as compatibility with the [Green Deal](#) and [circular economy](#) goals.

Both the [EU Ecolabel](#) and [Green Public Procurement](#) are voluntary instruments encouraging sustainability, however, there is no minimum standard for textile sustainability and circularity in Europe. To promote the discovery of new materials and processes, such as biotechnology applications, research and development need more support. Rules for design and durability criteria could also improve clothing longevity and support slow, sustainable fashion. Instead of voluntary schemes, regulation on energy efficiency and resource management could address environmental issues. To tackle the water footprint in textile production, the industry can improve sustainable water use, and rules, taxation and financial sanctions could enforce them to do so. The use of certain chemicals in manufacturing could be banned and alternative methods used, to protect workers' health, the environment and consumers. Furthermore, [France](#) is currently the only country with an [extended producer responsibility](#) (EPR) policy for clothing – a strategy to hold the producer accountable for waste management – contributing to recycling and reuse. Such EPR principles could be harmonised at European level. Policies can also [support](#) circular business models for safe and clean material cycles as well as sustainable production.

The fashion industry raises many [ethical issues](#), but fair working conditions outside the EU, human rights and gender equality are key. Several measures have been proposed, including through European Parliament [resolutions](#). After the [Rana Plaza disaster](#), over 200 mostly European companies joined the [Bangladesh Accord](#). However, a lot more still needs to be done to improve [textile workers' conditions](#). The EU [supports](#) internationally recognised guidelines from the [OECD](#) and [ILO](#), but there is no legislation to ensure a socially sustainable supply chain. Furthermore, [fair trade](#), an arrangement for international standards of ethical production, labour and environmental policies, should be endorsed on a wider scale. Lastly, consumer behaviour can significantly influence the fashion industry, and policies that encourage conscious consumer choices can ensure sustainability in the long-term.

