

# SUSTAINABLE FASHION: A CONTRADICTION IN TERMS?

## White Paper

For Professional Investors in Switzerland or Professional Investors as defined by the relevant laws.



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The fashion industry is a microcosm of the challenges faced by the wider manufacturing sector. While it is attracting more and more attention for its environmental and social footprint, it has a long way to go before becoming sustainable. However, a host of promising initiatives points to a greener future ahead.

### Key points

- *Reforming the way clothes are made and sold is an essential milestone on the path to a more sustainable world.*
- *Much of the fashion industry remains oriented towards producing high volumes of garments with a short shelf life.*
- *The consequences of this are the depletion of natural resources, intensive farming and pollution, as well as social issues, such as unhealthy working conditions.*
- *None of us can possibly come close to knowing the full history behind each item we wear, but each small improvement at every single step of the manufacturing process can produce a big result.*
- *The fashion industry offers a higher potential for environmental and social improvement than most other manufacturing sectors.*

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### The status quo: what's wrong with it?

"Fashion is a reflection of our time", as a well-known designer likes to say. Arguably, herein lies the problem: overconsumption, the depletion of natural resources, intensive cotton farming, pollution and the production of vast quantities of unrecycled textile waste are some of the most prominent consequences of the way the garment industry operates, on top of social aspects, such as forced labour and unhealthy working conditions.

To begin with a notable figure, textile production is estimated to emit 1.2 billion tonnes of greenhouse gases per annum, more than every international flight and maritime shipping voyage combined. At this rate, the industry will claim 26% of the carbon budget under the 2°C scenario by 2050 (Source 1). This comes right at the time when, according to the Boston Consulting Group, the industry's operating margins are bound to shrink by 3% before the end of 2030 under a "business-as-usual" scenario, mainly due to rising labour, material and energy costs (2). Therefore, innovative efficiency gains are going to be inevitable. It has been estimated that improvements in the production, consumption and end-of-life stages of the garment value chain could potentially lead to savings of approximately EUR 160 bn per annum, while at the same time improving the industry's energy and water use, as well as its labour practices<sup>1</sup>.

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<sup>1</sup> EUR 160 bn value lies in: water consumption (EUR 32 bn), energy emissions (EUR 67 bn), chemicals (EUR 7 bn), waste (EUR 4 bn),

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### Design

*We need to design with circularity in mind. If fashion became circular in its manufacturing, that would be the Holy Grail: at the end of its life, the product comes a new product.*

– Tom Kay, Founder of Finisterre

Every garment starts with a designer's vision. Each single decision taken at this stage, be it the choice of material, the colour or the detailing, affects the environmental footprint of the item being created and its ability to be recycled when it reaches the end of its useful life. Beyond any aesthetic considerations, the price of the raw materials used and the cost-effectiveness of its production are typically the main determinants that influence these decisions. In other words, sustainability is not usually integrated into fashion design. Indeed, up to 15% of the fabric used in the production of each single item of clothing typically goes to waste right at the beginning of the manufacturing process by being left on the cutting room floor (3), simply because of inefficient design processes. These scraps mostly end up as landfill or get incinerated.

Sporadically, a few manufacturers are known to launch isolated initiatives to reduce this waste, either by donating unused fabrics (4) or by using them to produce accessories, such as backpack covers (5). Alas, these initiatives, however laudable, remain few and far between, with scant effect on global garment production at large; they represent the proverbial drop in the ocean. More effective would be a structural improvement in the estimation of fabric consumption, given that up to 80% of the environmental impact of the product is determined at the design stage (6) and considering that there are very few technical obstacles standing in the way of including such considerations in the design process.

Currently, virtually no clothes are developed with recycling in mind. Simple steps, such as designing garments that are easy to disassemble, would already go a long way towards facilitating recycling. For that to happen, the potential for "remanufacturing" would have to be integrated into the planned life cycle, as commonly happens in other industries. Car manufacturers, for instance, have been integrating recycling considerations into their design processes for years, in some cases leading to a recycling rate of up to 90% (7). Adopting similar practices in the textile industry would, in itself, significantly improve its sustainability along the entire supply chain.

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### Production

*The other idea is to look at production processes to make sure that we can continue doing this but in a benign, circular way. Especially in raw materials, chemicals and energy use. I am pleading for innovation.*

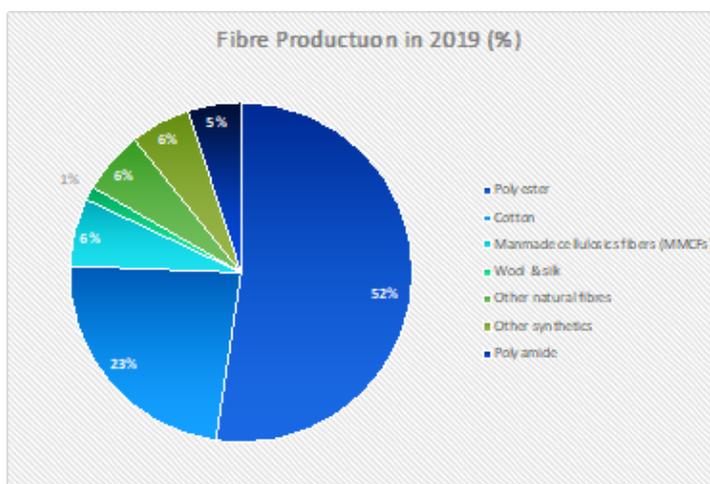
labour practices (EUR 5 bn), health & safety (EUR 32 bn), community spending (EUR 14 bn).

## – Anonymous industry expert

In fashion, the prevailing business model is based on producing as much as possible at the lowest cost. Over time, production costs have been squeezed to the point where the price of a dress from a UK fast-fashion brand can be almost as cheap as an average lunch for an office worker in London<sup>2</sup>. Digging deeper into the cost structure, even at this price point the actual cost of manufacturing the said item is typically only a fraction of what the consumer pays for it, with the bulk of its price covering marketing expenses and the cost of shop floor leases.

The largest part of the fashion footprint consists of the sourcing and processing of raw materials, accounting for over two-thirds of the climate impact in the value chain (9). It is estimated that the textile industry (including cotton farming) uses close to 93 billion cubic metres of water annually, accounting for 4% of the global freshwater withdrawal (10).

## Raw materials



Based on Preferred Fibre & Materials Market Report 2020 data, Textile Exchange.

Polyester is the most common synthetic textile used in garment production, making up over 50% of the market (13). It is cheap to produce and less resource-intensive than natural fibres in terms of water use and wastewater generation<sup>3</sup> (14). Given that it is an oil-based material, polyester is not biodegradable, and takes between 20 and 200 years to disintegrate in landfill (15).

Additionally, washing synthetic clothes releases microplastics, which are usually not filtered out in the wastewater treatment process. According to some estimates, as much as half a million tonnes of microplastics from synthetic clothing end up in the ocean every year (16). Not only is this harmful to marine ecosystems, but it can also end up in the seafood we consume, presenting a hazard to human health. By consuming shellfish and drinking water from plastic bottles, the volume of plastic the average Western citizen ingests per week is equivalent to the weight of a credit card (17).

<sup>2</sup> Price of a basic lunch (including a drink) in London is GBP 12 (Revolut, 2020), compared with Boohoo's average price per dress of GBP 13.95 on the website (Boohoo's own estimate, 2018).

In contrast, cotton is entirely natural and has been used for millennia. It is harvested in 80 countries around the world and generates income for over 250 million people (18). While it is biodegradable and recyclable, the environmental downsides of intensive farming to which cotton is all too often subjected threaten to outweigh its substantial benefits. To begin with, natural fibres require substantial land for production, with cotton currently taking up 3% of arable land (19). Intensive land usage is a frequent cause of deforestation and biodiversity loss, since it diverts acreage away from growing food or forests that capture carbon. Growing and harvesting cotton is a water-intensive process, which is especially inconvenient since over 50% of it is cultivated in regions that suffer from a lack of drinking water. Additionally, conventional cotton agriculture requires significant amounts of chemicals, using up to 16% of all pesticides used in the world (20). These harsh additives pollute ecosystems, contaminate water supplies and poison millions of farmers every year.

Organic cotton, grown without pesticides, uses 62% less energy and 88% less water than its conventionally farmed peer (21). While it is a less harmful option, it is not the perfect solution either. Organic yields are between 5–34% lower than conventional yields, depending on soil conditions (22), implying that additional land needs to be cleared to achieve a comparable yield, thus increasing the threat of deforestation.

Wild-grown cotton, on the other hand, suffers from none of the aforementioned shortcomings. It requires no irrigation, no fertilisers and is incomparably stronger than artificially planted cotton, meaning that it can be spun into much thinner fibres without breaking, thereby allowing for more fabric to be obtained from a given amount of raw material, which represents a significant efficiency gain. The downside, unsurprisingly, is the cost. For obvious reasons, wild cotton only grows in very few parts of the world, mainly in Egypt, and requires a functioning ecosystem to thrive. Given its coexistence with other plants, it can't be harvested mechanically, and thus needs to be hand-picked. It is a rare luxury product that is unlikely to go mainstream.

Linen benefits from similarly beneficial ecological credentials and is more widely available than wild-grown cotton. It grows virtually without any need for chemical intervention or irrigation on the cold and wet plains of Flanders and represents a first-rate fabric in warm temperatures thanks to its natural cooling properties. Its use could easily be increased, although, once again, it will never be able to compete on price and availability with industrially grown and intensively farmed fibres.

Therefore, the future of a more sustainable mass market may partly lie in alternative materials. Hemp crops can be grown without using any chemical pesticides and they yield three times more fibre than cotton per acre (23). Just 300–500 litres of water are required to produce 1 kg of hemp, compared with the 10,000 litres needed to produce 1 kg of cotton (24). Moreover, hemp replenishes soil nutrients during the growing process, and it absorbs more CO<sub>2</sub> from the atmosphere than any other crop, making it a very sustainable, carbon-negative raw material (25).

<sup>3</sup> Polyester generates 100 litres vs. 250 litres for cotton (per kg); it takes 10,000 litres to cultivate 1 kg of cotton vs. an average 17 litres for polyester (Defra, 2010).

The USD 40.6 bn eco-fibre market is developing rapidly, with an expected 4.6% compound growth rate to 2027 (26). A large number of producers in this space try to use regenerative practices, including recycling, to create new textiles. For instance, a fabric called Lyocell, made from sustainably sourced wood pulp, is a popular substitute for plastic-based synthetics and boasts up to 50% lower emissions and water impact than generic viscose (27). Some more exotic alternatives being explored include coffee grounds and seaweed fibres (28).

## Processing

The textile manufacturing process is a heavy user of resources and involves raw material sourcing, spinning, weaving, dyeing and finishing. Excessive water extraction has been known to lead to droughts in many parts of the world. A major share of this water is used during the dyeing phase, namely 200 litres per 1 kg of fabric (30). 43 million tonnes of chemical dyes used annually pose another threat, since careless wastewater treatment can release toxic substances into the environment.

Low-impact dyes require less water in the process and are non-toxic and non-allergenic, making them safer for both humans and the environment. A company called Colorfix uses synthetic biology to grow colours from engineered microorganisms using by-products, such as molasses (31). These microorganisms replace toxic dyes, and the dyeing process uses ten times less water than conventional chemical colouring.

## Consumption

According to Euromonitor International, 130.6 billion items of clothing and shoes are bought annually, representing fifteen garments and two pairs of footwear per human being (33). Excess clothing is constantly disposed of, often without consideration of where it ends up: 73% of these items end up in landfill or incinerated (34).

It is estimated that the usage rate of garments worldwide has decreased by 36% over the last fifteen years. The constant changes in style dictated by the popular “cheap & fast” fashion brands encourage consumers to buy and discard clothes with ever-increasing frequency, constantly moving between “new season” and “sale” items. Many garments are only worn ten times on average before they are disposed of (36). The incessant promotion of new outfits on social media further exacerbates excessive consumption. Unsurprisingly, the vast majority of clothes displayed on social media are of the “fast-fashion” type, meaning cheap, low-quality garments that are designed to fall apart after a couple of washing cycles. Simply extending the wear period of the average garment would lead to savings of up to USD 460 bn per annum<sup>4</sup>. Therefore, by selling marginally more expensive clothes that last slightly longer, the main clothing brands could drastically reduce their environmental impact without being left out of pocket.

<sup>4</sup> Calculation presented in the Ellen MacArthur Foundation’s report on the New Textile Economy (2017). “46% (in mass) of collected garments were reused. If 100% of discarded clothing were collected, 22.2 million tonnes would be

## Raising consumer awareness

*It all boils down to educating people in the right way [...] and to people wishing to keep these garments for longer so that they get the value out of them, finding happiness in the clothing in a different way.*

– Patrick Grant, designer

It is no secret that the vast majority of consumers are kept blissfully unaware of the impact that their clothes have on the environment. In other words, educating consumers is indispensable in order to change the status quo.

Thinking about clothes from a “cost-per-wear” perspective can re-evaluate the way people react to higher prices. It is often tempting to buy a USD 10 synthetic jumper from a high street brand instead of paying USD 100 for a high-quality, wool option because the price tag is so attractively low. However, a well-made wool jumper can be worn many more times before it loses its shape, resulting in a lower cost per wear.

	Price	No. of wears	Cost per wear
High street sweater	\$ 10.00	3	\$ 3.33
High quality wool sweater	\$ 100.00	50	\$ 2.00

Investing your money in a pricier, well-crafted item is, undoubtedly, a serious commitment, but it also brings comfort and joy to the owner for a long time. Scottish fashion designer Patrick Grant claims that people should feel happy every time they wear something from their wardrobe instead of buying a new item: a quality item forms a strong attachment and a willingness to take better care of a favourite jumper or pair of trousers. Making such a choice is also beneficial for the planet: doubling the number of times an item is worn on average could decrease greenhouse gas emissions from clothing by a whopping 44% (37).

When we are emotionally connected to our clothes, we want to prolong their life. Some mainstream brands have even started offering in-house repairs for some of their items in an attempt to reduce waste (38). Of course, consumers do not need to wait for producers to offer such services, since nothing prevents them from getting their damaged clothes mended at independent repair shops, which do exist. The positive impact of repairing one garment per season instead of disposing of it is equivalent to 8.6 kg in emissions savings (39).

There are encouraging signs that consumers’ awareness is evolving. In a recent survey, 88% of consumers state that they believe more effort should be put into tackling pollution (41) and respondents are voicing a willingness to pay 66% more for sustainable goods (42). If people’s behaviour follows up on these noble intentions, manufacturers will be forced to adjust their business models accordingly. In Japanese there is even a specific term, “cospa” (コスパ), short for “cost performance”, that indicates the economic advantage of durable items that can be worn for years. This approach is a great example of

reused instead of 5.6 million tonnes as at present, meaning 16.6 million tonnes of new garment sales would be avoided, with a value of USD 460 billion.”

more mindful consumption that carries cultural, financial and ecological benefits.

## New consumption patterns

It has to be acknowledged that people have always had an emotional and social connection with clothing. So much of who we are or want to be is represented in the clothes we wear every day. Indeed, the urge for novelty in clothing is unlikely to go away. Yet, there are ways to curb excessive consumption habits.

The rental market for clothing is one interesting development in this direction. Rental services exist for the most disparate types of clothing, from luxury goods to baby clothes, maternity items, formal wear, casual items and so forth. Services in this market include both one-off rentals, as well as subscription-based rentals. Another promising development is the increasing social acceptance of second-hand goods. Once confined to charity shops, the concept of used clothing is making its way into the mainstream. Some recent surveys suggest that over half of young people, who, by and large, are some of the most avid shoppers, are expected to purchase more second-hand items (43), seeing it as a budget-friendly way to try new styles. When choosing more sustainable options, some respondents are even known to report that buying second-hand makes them feel as good as adopting a puppy does (44).

Thanks to its 39% compound annual growth rate, the resale segment is due to hit a value of USD 36 bn in five years. According to calculations made by thredUP, if every person bought a second-hand item instead of a new one this year, it would save<sup>5</sup>:

1. 2.6 million tonnes of CO<sub>2</sub>e, i.e. equivalent to planting 66 million trees.
2. 113.7 billion litres of water, equivalent to taking 1.25 billion showers.
3. 203,663 tonnes of waste, equal to 18,700 filled garbage trucks.

A lasting push towards second-hand buying could save 239 kg of emissions associated with an average wardrobe (45), according to some estimates.

What is known as the “ethical” fashion market is valued at USD 6.35 billion and is set to grow to USD 8.25 billion by 2023 at a compound annual growth rate (CAGR) of 6.8% (46). Some third-party retail platforms, such as ASOS and Zalando, enable filtering based on brand sustainability, allowing their clients to make better-informed decisions. Some companies use technology to support their clients’ willingness to shop better. For instance, Stitch Fix is an AI-powered platform that uses algorithms to provide 3.9 million clients with personalised recommendations based on their requirements (47). The

<sup>5</sup> Estimates provided in pound and gallon equivalents of thredUP’s numbers.

<sup>6</sup> 100-year-old global warming potential. The ratio is 84–86 times more than CO<sub>2</sub> when measured over a 20-year period (UNECE).

company focuses on stocking more sustainable and durable clothes that can be worn for a long time.

## End of life

The current value chain in the fashion industry does not have a well-established process for dealing with clothes that are past their prime. There is a lack of centrally organised collection services and large-scale recycling, with only about 1% of the materials used for clothing production recycled into new styles (48). Lack of awareness and alternative ways of disposal condemn 20.5 billion garments to landfill each year (49), with catastrophic implications for the environment. For example, cotton generates methane as it decomposes and methane has a high heat-trapping ability, with a 28–34 times higher global warming potential<sup>6</sup> than CO<sub>2</sub> (50).

## Collection and sorting

Before textiles are sent to recycling plants, they need to be collected and sorted as natural, synthetic or blended fabrics. For the most part, this is still done manually, which is inadequate for large quantities of clothes. More investment in automated sorting is a precondition for being able to obtain a circular textile economy. Innovations, such as the European Fibersoft project that can sort clothes into 45 different categories and recycle 900 kg of textiles per hour, are a step in the right direction (52).

***I do not believe in decline in consumption. Solutions must be provided by technological advancements***

– Martin Stephan, Deputy CEO of Carbios

## Recycling

In terms of recycling, 62% of recyclers surveyed by Circle Economy<sup>7</sup> are deploying mechanical recycling and the rest are advancing in the field of chemical recycling technologies (53). A mechanical process is mainly used for natural fibres, such as cotton and wool, where fabrics are deconstructed and used to make new yarn and fabrics. Recyclers, like Wolkat, state that recycled wool can be up to 40% cheaper than virgin wool (54). Hilaturas Ferre’s Recover™ Recycled Cotton Fiber is, “the most sustainable cotton solution that is available today according to the Higg MSI Index” and can go through multiple recycling cycles (55). The disadvantage of this approach is that the shredding process damages and shortens natural fibres, reducing their quality, meaning that they need to be mixed with virgin fibres before they can be spun into new yarn (56).

Another, much more radical approach is to recycle PET bottles into fibre. Like cotton, the bottles are sorted by colour and type and then shredded, decontaminated and reprocessed. A clear advantage is that the supply of plastic bottles is, essentially, infinite: up to one million single-use water bottles are bought every minute, adding up to 1.5 billion plastic bottles per day (57). However, recycled PET garments still release microplastics during washing, which then seep into the oceans.

Mechanical recycling is not an ideal solution, yet it is a step in the right direction. For instance, the company Pure Waste produces T-shirts made of 60% recycled cotton and 40% recycled polyester, saving about 50% in CO<sub>2</sub>-equivalents and energy, and using 99% less water compared with a T-shirt of similar

<sup>7</sup> Number of companies not specified but total survey included 65 participants (including collectors, sorters, recyclers, brands, retailers and academic experts).

composition made from virgin fabrics (58). While encouraging, this reminds us that we are only at the beginning of the journey: these solutions require substantial scaling up before they can make a difference.

Chemical recycling is more advanced, as it breaks the fabric down into polymers (and in some cases into monomers), while retaining the chemical structure of the material. It can be used to create new fibres and recycled materials as sturdy as their virgin counterparts (59). Moreover, chemical recycling has the potential to process blended materials, something that cannot be done mechanically. Worn Again, a recycling company in the UK, has developed a polymer-recycling procedure that can be applied to blends of polyester and cotton. This process breaks the textiles down into polymers, so that polyester and cotton can be separated by filtration before being spun back into new polyester fibre (60). One company even manages to recycle fishing nets and carpets, and turns them into a type of nylon that boasts 90% less environmental impact than virgin nylon. (62) The problems that come with trying to recycle mixed fabrics can be overcome as well, as one pioneering recycler in Sweden shows (63). However, once again, more investment is needed before these solutions can be viable for the mass market. While some mainstream fashion brands have started investing in recycling technology and innovative materials, it remains to be seen whether or not their commitment will remain sporadic or become permanent (68).

### **Beyond environmental impact: the struggle for sustainable working conditions**

For the sake of brevity, this White Paper has focussed mainly on the environmental implications of apparel production. However, the issue of labour standards for garment workers in developing countries is equally important for a sustainable fashion industry. After many years of languishing below the radar of public opinion, working conditions came to the fore in 2013, when a garment factory building in Bangladesh collapsed, claiming the lives of over a thousand textile workers. What turned this accident into a day of reckoning for the industry was that the structural faults in the building were well known, but ignored in order to avoid falling behind the deadlines mandated by a series of popular fast-fashion brands. Additionally, several children were found on the

factory floor, not something the public expected to witness in connection with Western brands. Arguably, much closer cooperation between clothing companies, developing countries and legislators, as well as the arbiters of international labour standards, is required in order to bring about lasting change for the better.

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### **Conclusion**

One could be forgiven for concluding that the sheer complexity of the task at hand makes the endeavour of reducing waste and pollution in the garment industry intractable. On the other hand, there is no lack of promising initiatives under way, as this White Paper has shown. The missing link between sporadic initiatives and structural change is investment. This is partly due to the fragmented nature of the industry, but another reason may well be that, in contrast to other industries, such as pharma, the textile industry does not have a well-defined, standardised process for assessing the effectiveness of innovations (69). Closer collaboration across the entire value chain would be required to encourage the funding of innovative ideas. Only by creating brand consortiums and engaging with supply-chain partners can new technologies have a chance of being funded and applied.

The public sector has started jumping on the bandwagon of a more sustainable textile industry as well. In the EU, the Circular Economy Action Plan is an initiative that focuses on garment design, new materials and recycling techniques (64). In the UK, the government's Producer Responsibility scheme, part of its Resources & Waste Strategy, aims to, "boost reused garments, better collections, and recycling, drive the use of sustainable fibres, and support sustainable business models such as rental schemes" (66). Some non-profit organisations are equally known to support new ways to reuse and recycle textiles by offering grants (67).

We believe that, rather than waiting for governments to act and producers to change their ways, consumers and investors can make a difference by taking the lead. They have the power over what they purchase and where they invest. If they exercise this power, producers will be forced to adapt, regardless of their current business models.

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