A NEW TEXTILES ECONOMY: REDESIGNING FASHION'S FUTURE

ELLEN MACARTHUR FOUNDATION

CIRCULAR FIBRES INITIATIVE

SUMMARY OF FINDINGS

EXECUTIVE SUMMARY

It is hard to imagine living in a world without textiles. Nearly everyone, everywhere comes into contact with them nearly all the time. This is especially true of clothing, the focus of this report. Clothes provide comfort and protection, and for many represent an important expression of individuality. The textiles industry is also a significant sector in the global economy, providing employment for hundreds of millions around the world.

These benefits notwithstanding, the way we design, produce, and use clothes has drawbacks that are becoming increasingly clear. The textiles system operates in an almost completely linear way: large amounts of non-renewable resources are extracted to produce clothes that are often used for only a short time, after which the materials are mostly sent to landfill or incinerated. More than USD 500 billion of value is lost every year due to clothing underutilisation and the lack of recycling. Furthermore, this take-make-dispose model has numerous negative environmental and societal impacts. For instance, total greenhouse gas emissions from textiles production, at 1.2 billion tonnes annually, are more than those of all international flights and maritime shipping combined. Hazardous substances affect the health of both textile workers and wearers of clothes, and they escape into the environment. When washed, some garments release plastic microfibres, of which around half a million tonnes every year contribute to ocean pollution – 16 times more than plastic microbeads from cosmetics. Trends point to these negative impacts rising inexorably, with the potential for catastrophic outcomes in future. This linear system is ripe for disruption.

This report outlines a vision for a system that works, delivering long-term benefits – a new textiles economy based on the principles of a circular economy. It offers a direction of travel on which the industry can agree and focus its efforts. In a new textiles economy, clothes, textiles, and fibres are kept at their highest value during use and re-enter the economy afterwards, never ending up as waste. This vision is distinct from, and complements, ongoing efforts to make the textiles system more sustainable by minimising its negative impacts. With specific emphasis on innovation towards a different system, a new textiles economy presents an opportunity to deliver substantially better economic, societal, and environmental outcomes.

Transforming the industry to usher in a new textiles economy requires system-level change with an unprecedented degree of commitment, collaboration, and innovation. Existing activities focused on sustainability or partial aspects of the circular economy should be complemented by a concerted, global approach that matches the scale of the opportunity. Such an approach would rally key industry players and other stakeholders behind the objective of a new textiles economy, set ambitious joint commitments, kick-start cross-value chain demonstrator projects, and orchestrate and reinforce complementary initiatives. Maximising the potential for success would require establishing a coordinating vehicle that guarantees alignment and the pace of delivery necessary.

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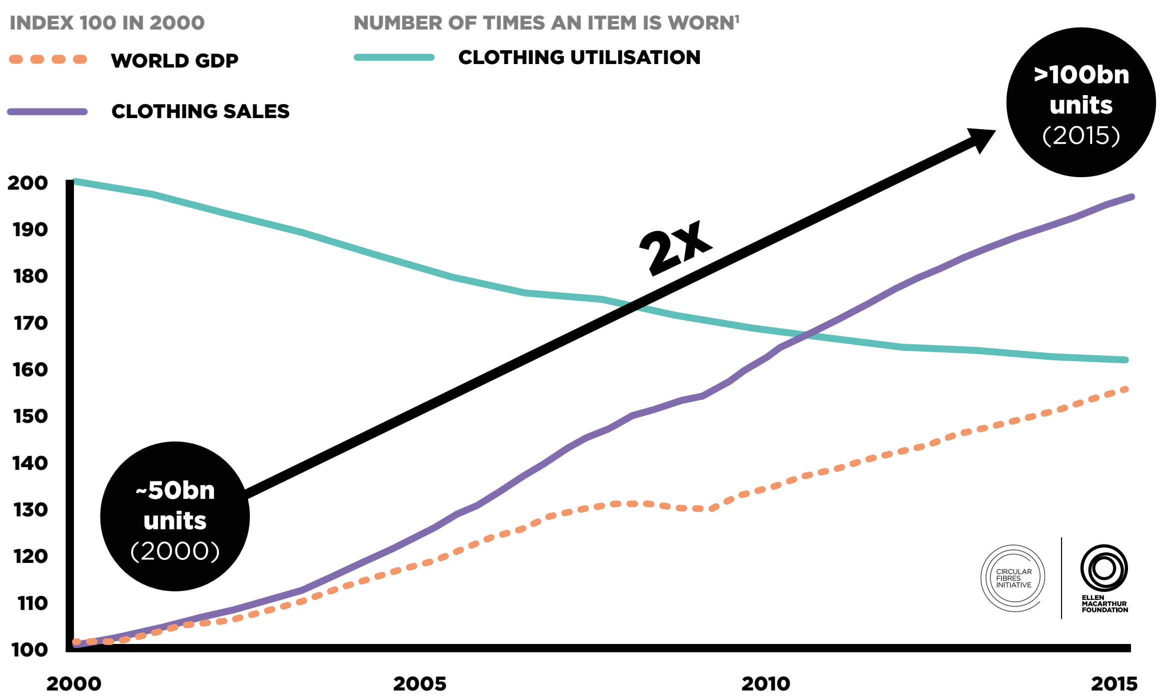
SUMMARY OF FINDINGS

The case for rethinking the global textiles system, starting with clothing

Textiles and clothing are a fundamental part of everyday life and an important sector in the global economy. It is hard to imagine a world without textiles. Clothes are worn by almost everyone, nearly all the time, and for many are an important expression of individuality. Globally, the USD 1.3 trillion clothing industry employs more than 300 million people along the value chain; the production of cotton alone accounts for almost 7% of all employment in some low-income countries.[1] Clothing[2] – the focus of this report – represents more than 60% of the total textiles used and is expected to remain the largest application.[3]

In the last 15 years, clothing production has approximately doubled (see Figure 1), driven by a growing middle-class population across the globe and increased per capita sales in mature economies. The latter rise is mainly due to the 'fast fashion' phenomenon, with quicker turnaround of new styles, increased number of collections offered per year, and – often – lower prices.

FIGURE 1: GROWTH OF CLOTHING SALES AND DECLINE IN CLOTHING UTILISATION SINCE 2000



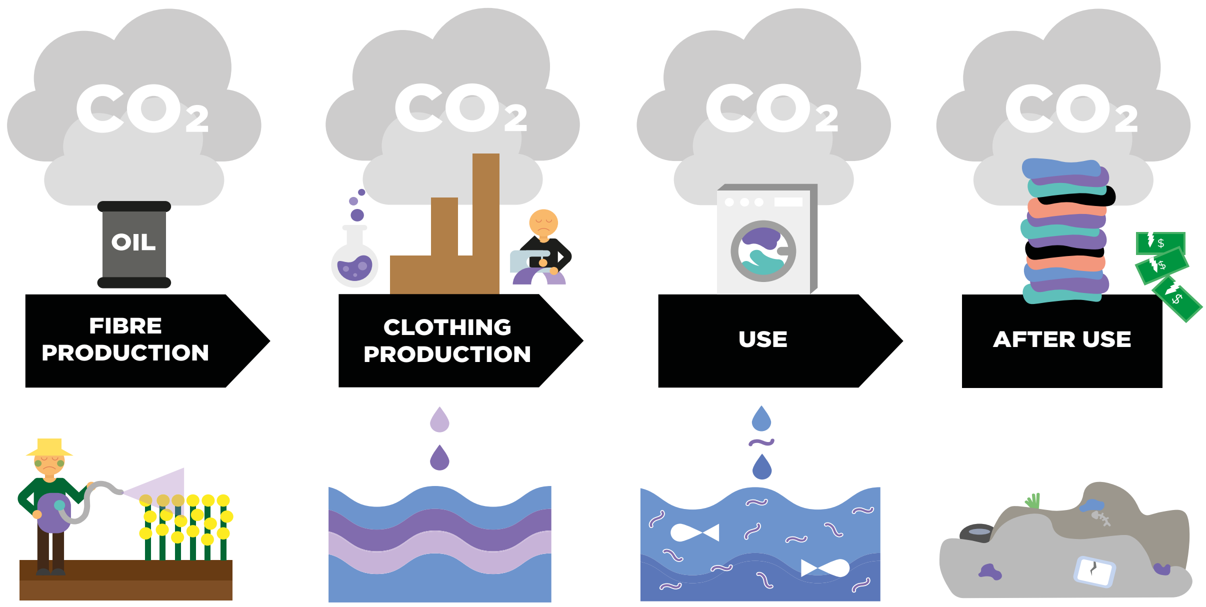
1 Average number of times a garment is worn before it ceases to be used

Source: Euromonitor International Apparel & Footwear 2016 Edition (volume sales trends 2005–2015); World Bank, *World development indicators – GD* (2017)

The current clothing system is extremely wasteful and polluting

The current system for producing, distributing, and using clothing operates in an almost completely linear way. Large amounts of non-renewable resources are extracted to produce clothes that are often used for only a short period,[4] after which the materials are largely lost to landfill or incineration. It is estimated that more than half of fast fashion produced is disposed of in under a year.[5] This linear system leaves economic opportunities untapped, puts pressure on resources, pollutes and degrades the natural environment and its ecosystems, and creates significant negative societal impacts at local, regional, and global scales (see Figure 2). The economic value of these negative externalities is difficult to quantify, although the recent *Pulse of the fashion industry* report estimated that the overall benefit to the world economy could be about EUR 160 billion (USD 192 billion) in 2030 if the fashion industry were to address the environmental and societal fallout of the current status quo.[6]

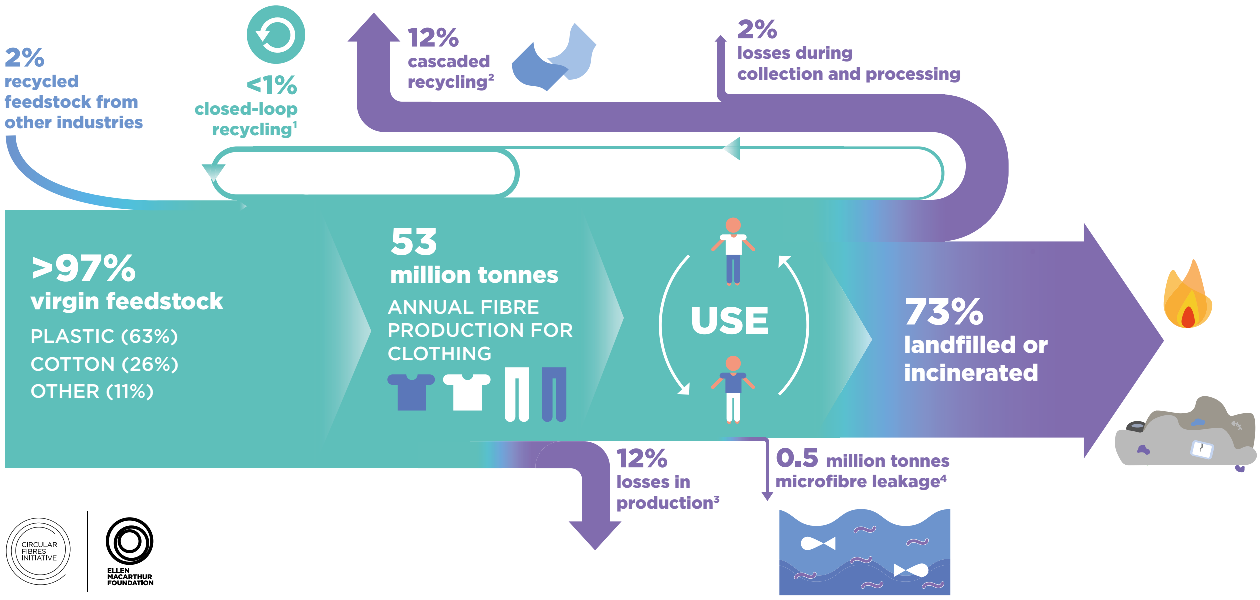
FIGURE 2: TODAY'S CLOTHING SYSTEM PUTS PRESSURE ON RESOURCES, POLLUTES THE ENVIRONMENT, AND CREATES NEGATIVE SOCIETAL IMPACTS



Clothing is massively underutilised. Worldwide, clothing utilisation – the average number of times a garment is worn before it ceases to be used – has decreased by 36% compared to 15 years ago.[7] While many low-income countries have a relatively high rate of clothing utilisation, elsewhere rates are much lower. In the US, for example, clothes are only worn for around a quarter of the global average. The same pattern is emerging in China, where clothing utilisation has decreased by 70% over the last 15 years.[8]

Globally, customers miss out on USD 460 billion of value each year by throwing away clothes that they could continue to wear,[9] and some garments are estimated to be discarded after just seven to ten wears.[10] Clothing users are acknowledging this as a problem, with, for example, 60% of German and Chinese citizens admitting to owning more clothes than they need.[11]

FIGURE 3: GLOBAL MATERIAL FLOWS FOR CLOTHING IN 2015



1 Recycling of clothing into the same or similar quality applications
2 Recycling of clothing into other, lower-value applications such as insulation material, wiping cloths, or mattress stuffing
3 Includes factory offcuts and overstock liquidation
4 Plastic microfibres shed through the washing of all textiles released into the ocean

Source: Circular Fibres Initiative analysis – for details see Appendix B of the full report

Less than 1% of material used to produce clothing is recycled into new clothing,[13] representing a loss of more than USD 100 billion worth of materials each year.[14] As well as significant value losses, high costs are associated with disposal: for example, the estimated cost to the UK economy of landfilling clothing and household textiles each year is approximately GBP 82 million (USD 108 million).[15] Across the industry, only 13% of the total material input is in some way recycled after clothing use (see Figure 3). Most of this recycling consists of cascading to other industries and use in lower-value applications, for example, insulation material, wiping cloths, and mattress stuffing – all of which are currently difficult to recapture and therefore likely constitute the final use.[16]

Even though some countries have high collection rates for reuse and recycling (such as Germany, which collects 75% of textiles),[17] much of the collected clothing in such countries is exported to countries with no collection infrastructure of their own. These valuable efforts increase clothing utilisation, though ultimately most of these clothes end up in landfills or are cascaded to lower-value applications.[18]

Today's linear system uses large amounts of resources and has negative impacts on the environment and people. The textiles industry relies mostly on non-renewable resources – 98 million tonnes in total per year – including oil to produce synthetic fibres, fertilisers to grow cotton, and chemicals to produce, dye, and finish fibres and textiles.[19] Textiles production (including cotton farming) also uses around 93 billion cubic metres of water annually,[20] contributing to problems in some water-scarce regions. With its low rates of utilisation (leading to high levels of throughput) and low levels of recycling, the current wasteful, linear system is the root cause of this massive and ever-expanding pressure on resources.

The industry's immense footprint extends beyond the use of raw materials. In 2015, greenhouse gas (GHG) emissions from textiles production totalled 1.2 billion tonnes of CO_2 equivalent,[21] more than those of all international flights and maritime shipping combined.[22] The industry also has direct local impacts. The use of substances of concern in textile production has negative effects on farmers, factory workers, and the surrounding environment. While there is little data on the volume of substances of concern used across the industry, it is recognised that textile production discharges high volumes of water containing hazardous chemicals into the environment. As an example, 20% of industrial water pollution globally is attributable to the dyeing and treatment of textiles.[23]

In recent years, the textiles industry has been identified as a major contributor to the issue of plastic entering the ocean, which is a growing concern because of the associated negative environmental and health implications. It has been estimated that around half a million tonnes of plastic microfibres shed during the washing of plastic-based textiles such as polyester, nylon, or acrylic end up in the ocean annually.[24]

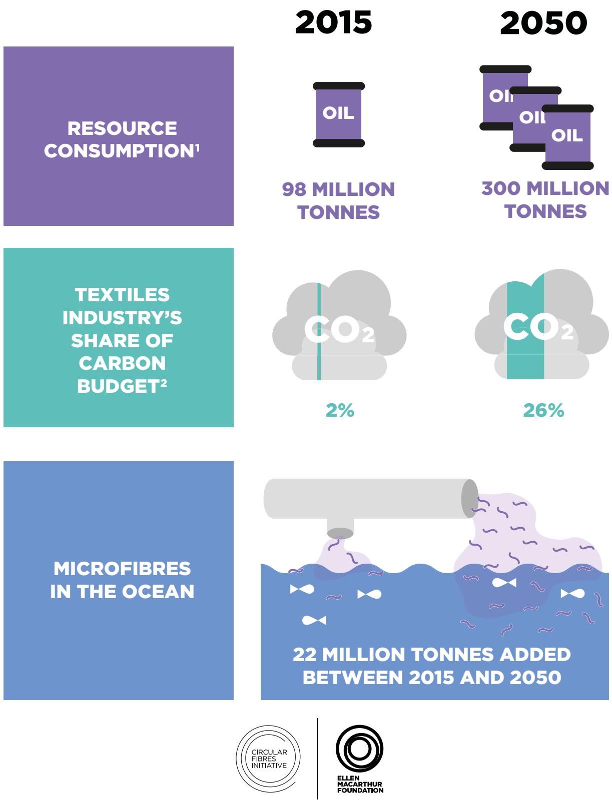
Today's textiles system also has multiple negative societal impacts. Many workers face dangerous working environments due to unsafe processes and the hazardous substances used in production. High cost and time pressures are often imposed on all parts of the supply chain,[25] which can lead to workers suffering poor working conditions with long hours and low pay,[26] with evidence, in some instances, of modern slavery and child labour.[27] The potential for negative societal impacts does not stop at the factory door. Local communities, while benefitting from employment in the industry, may suffer from its poor environmental practices. For example, discharging untreated production wastewater pollutes local rivers used for fishing, drinking, or bathing.

The trajectory of the industry points to the potential for catastrophic outcomes

Demand for clothing is continuing to grow quickly, driven particularly by emerging markets, such as Asia and Africa. Should growth continue as expected, total clothing sales would reach 160 million tonnes in 2050 – more than three times today's amount.[28] This would result in a substantial increase in the negative impacts of the industry (including those shown in Figure 4).

On current trend, the negative impacts of the industry will be potentially catastrophic. If the industry continues on its current path, by 2050, it could use more than 26% of the carbon budget associated with a 2°C pathway.[29] Moving away from the current linear and wasteful textiles system is therefore crucial to keeping within reach the 2°C average global warming limit.

FIGURE 4: THE NEGATIVE IMPACTS OF THE TEXTILES INDUSTRY ARE SET TO DRASTICALLY INCREASE BY 2050



1 Consumption of non-renewable resources of the textiles industry, including oil to produce synthetic fibres, fertilisers to grow cotton, and chemicals to produce, dye, and finish fibres and textiles

2 Carbon budget based on 2 degrees scenario

Source: Circular Fibres Initiative analysis – for details see Part I of the full report

Under a business-as-usual scenario, the growth in material volume of textiles would see an increasing amount of non-renewable inputs, up to 300 million tonnes per year by 2050. On current trend, the amount of plastic microfibres entering the ocean between 2015 and 2050 could accumulate to an excess of 22 million tonnes – about two thirds of the plastic-based fibres currently used to produce garments annually.

Profitability of the industry is at risk. The *Pulse of the fashion industry* report projects that, by 2030, fashion brands would see a decline in earnings before interest and tax (EBIT) margins of more than three percentage points, if they were to continue business as usual. This would translate into a profit reduction of approximately EUR 45 billion (USD 52 billion) for the industry.[30]

Additionally, the negative impacts of the industry are becoming more transparent and understood by digitally-enabled customers, leading to reputational risks for brands and to regulatory trends that could affect the profits of businesses that fail to respond. High-profile incidents, like the Rana Plaza disaster in 2013 in which over 1,000 workers were killed,[31] have drawn international attention to the societal impacts associated with the clothing value chain and NGOs are generating awareness of the industry's negative environmental impact.[32] Recently, the industry has also been challenged to find systemic solutions to tackle 'overconsumption', moving beyond downstream, short-term approaches to reduce the industry's impact.[33]

A new textiles economy – based on circular economy principles – would lead to better outcomes

In recent years, the industry and its customers have become increasingly aware of the negative environmental and societal impacts of the current system. Brands and retailers have started to address specific environmental or societal challenges within their supply chains, both individually and through industry-wide organisations and initiatives. However, most of these efforts are focused on reducing the impact of the current linear system – for example, by using more efficient production techniques or reducing the impact of materials – rather than taking an upstream, systemic approach to tackling the root cause of the system's wasteful nature directly, in particular, low clothing utilisation and low rates of recycling after use.

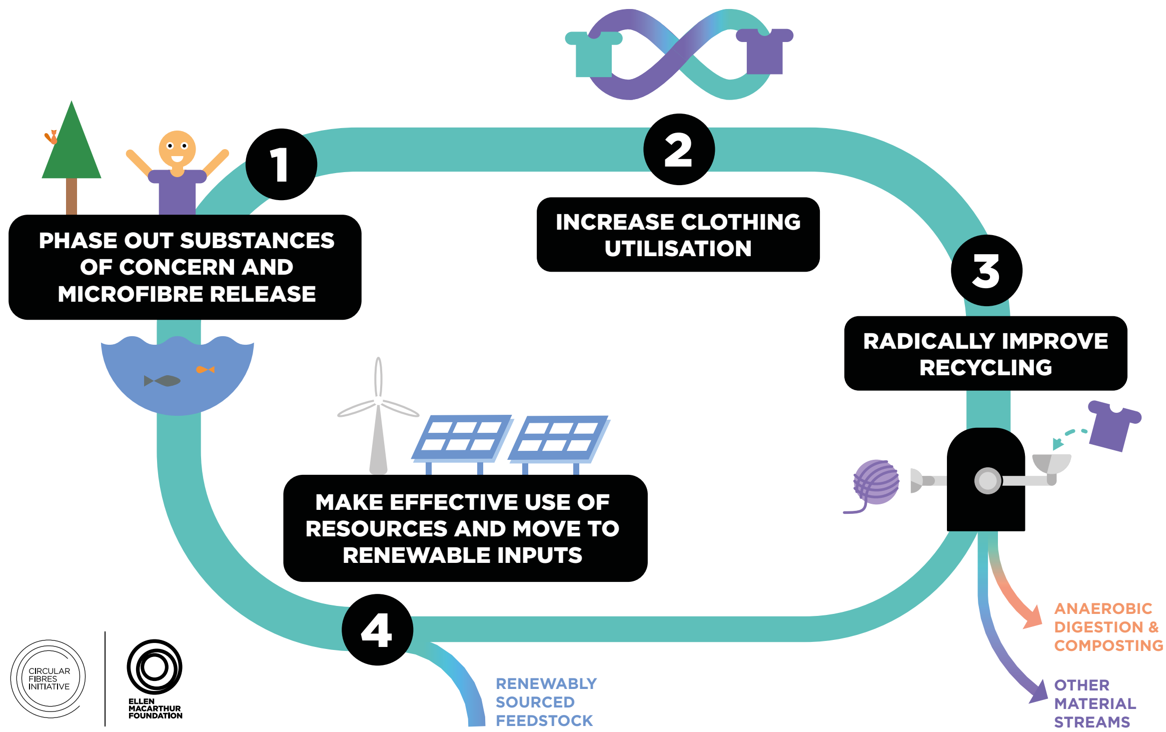
This report proposes a vision for a new textiles economy aligned with the principles of a circular economy:[34] one that is restorative and regenerative by design and provides benefits for business, society, and the environment.[35] This vision is distinct from, and complements, ongoing efforts to make the textiles system more sustainable by minimising its negative impacts.

In such a new textiles economy, clothes, fabric, and fibres are kept at their highest value during use, and re-enter the economy after use, never ending up as waste. This would provide a growing world population with access to high-quality, affordable, and individualised clothing, while regenerating natural capital, designing out pollution, and using renewable resources and energy. Such a system would be distributive by design, meaning value is circulated among enterprises of all sizes in the industry so that all parts of the value chain can pay workers well and provide them with good working conditions.

A new textiles economy relies on four ambitions (see Figure 5). It would lead to better economic, environmental, and societal outcomes, capturing opportunities missed by the current, linear, textiles system. When implementing these ambitions, each will come with a variety of different solutions for different applications, and their interactions need to be taken into account.

Realising these ambitions will not happen overnight. While there are some immediate profit opportunities for individual businesses, collaborative efforts across the value chain, involving private and public sector actors, are required to truly transform the way clothes are designed, produced, sold, used, collected, and reprocessed. However, this should not discourage or delay action. The time to act is now, and the ambitions below offer an attractive target state for the industry to align on and innovate towards.

FIGURE 5: AMBITIONS FOR A NEW TEXTILES ECONOMY



1

Phase out substances of concern and microfibre release

First and foremost, a new textiles economy needs to ensure that the material input is safe and healthy to allow cycling and to avoid negative impacts during the production, use, and after-use phases. This means that substances that are of concern to health or the environment are designed out and no pollutants such as plastic microfibres are inadvertently released into the environment and ocean.

The following two areas of action could kick-start this transition:

- **Align industry efforts and coordinate innovation to create safe material cycles.** Elimination of substances of concern is needed to enable large-scale recycling, as well as to avoid various negative impacts at all stages of the value chain. Improved transparency along the value chain, a robust evidence base, and common standards would facilitate the phase-out of substances of concern. While some hazardous substances could be phased out quickly, innovation will be required to create new process inputs (e.g. dyes and additives), production processes, as well as textile materials, to fully phase out negative impacts related to substances of concern.
- **Drastically reduce plastic microfibre release.** New materials and production processes that radically reduce the number of plastic microfibres shed by clothing, alongside technologies that work effectively at scale to capture those that do still shed, are essential for this to be feasible. A better understanding of the causes of microfibre shedding will continue to inform solutions and identify gaps.

2

Transform the way clothes are designed, sold, and used to break free from their increasingly disposable nature

Increasing the average number of times clothes are worn is the most direct lever to capture value and design out waste and pollution in the textiles system. Designing and producing clothes of higher quality and providing access to them via new business models would help shift the perception of clothing from being a disposable item to being a durable product. As the acts of buying and wearing clothes fulfil a complex array of customer needs and desires, a variety of sales and service models is needed in a new textiles economy. Economic opportunities already exist in various market segments, and brands and retailers could exploit these through refocused marketing. The take-up of new opportunities would benefit from collaborative action to stimulate the development of innovative business models. Such action would also help unlock potential where the immediate economic case is not yet evident at scale.

Three areas of action would speed the transition towards this ambition:

- **Scale up short-term clothing rental.** When garments can be worn more often than a customer is able or willing to do, rental models could provide an appealing business opportunity. For customers desiring frequent outfit changes, subscription-based models can offer an attractive alternative to frequently buying new clothes. For garments where practical needs change over time, for example, children's clothes or those for one-off occasions, rental services would increase utilisation by keeping garments in frequent use rather than in people's closets. For all these models, refocused marketing – using the vast experience and capacity that brands and retailers have – and optimised logistics are key enablers for stimulating growth of new service offerings.
- **Make durability more attractive.** While short-term clothing rental can capture the value of durability by distributing clothing use between many different people, for certain clothing types and customer segments, quality and durability can be of value even if there is only one or a few users. In these segments, many customers value high-quality, durable clothes, but a lack of information prevents the full value capture. For clothes that have already been used and become unwanted, but which are still durable enough to be used again, enhanced resale models offer an attractive opportunity. A focus on delivering quality purchases that last longer also encourages new technologies to be exploited that offer better fit and customisation for maximum customer satisfaction.
- **Increase clothing utilisation further through brand commitments and policy.** Driving high usage rates requires a commitment to design garments that last – an industry transition which could be advanced through common guidelines, aligned efforts, and increased transparency. Policymakers can also have an important role in further increasing clothing utilisation.

3

Radically improve recycling by transforming clothing design, collection, and reprocessing

There is a compelling case for radically improving recycling to allow the industry to capture the value of the materials in clothes that can no longer be used. Increasing recycling represents an opportunity for the industry to capture some of the value in more than USD 100 billion worth of materials lost from the system every year, as well as to reduce the negative impacts of their disposal.[36]

A combination of demand and supply-side measures in the following four areas would be needed to realise this ambition:

- **Align clothing design and recycling processes.** Currently, clothing design and production typically do not consider what will happen when clothes cannot be used anymore. Converging towards a range of materials (including blends where those are needed for functionality), and developing efficient recycling processes for these, is a crucial step in scaling up recycling, as is the development of new materials, where current ones do not provide the desired functionality and recyclability. Alignment is also needed to provide tracking and tracing technologies to identify materials in the recycling process.

- **Pursue technological innovation to improve the economics and quality of recycling.** Existing recycling technologies for common materials need to drastically improve their economics and output quality to capture the full value of the materials in recovered clothing. A shared innovation agenda is needed to focus efforts and investments towards recycling technologies for common materials. Improved sorting technologies would also support increased quality of recycling by providing well-defined feedstock, in particular in the transition phase until common tracking and tracing technologies exist.
- **Stimulate demand for recycled materials.** Increasing demand for recycled materials through clear commitments to using more recycled input could drastically accelerate the uptake of clothing recycling. Better matching supply and demand through increased transparency and communication channels, as well as policy, would further help stimulate demand.
- **Implement clothing collection at scale.** Clothing collection needs to be scaled up dramatically alongside recycling technologies and, importantly, implemented in locations where it currently does not exist. Creating demand for recycled materials will increase markets for non-wearable items, dramatically improving the opportunity for collectors to capture value from these materials. Guidelines on comprehensive collection – based on current best practices and further research on optimal collection systems – would help scale up collection. These guidelines should include a set of global collection archetypes, allowing for regional variation but building on a set of common principles.

4

Make effective use of resources and move to renewable inputs

The need for raw material inputs in a new textiles economy would be drastically reduced due to higher clothing utilisation and increased recycling (Ambitions 2 and 3 above). However, virgin material input will likely always be required. Where such input is needed and no recycled materials are available, it should increasingly come from renewable resources. This means using renewable feedstock for plastic-based fibres and regenerative agriculture to produce any renewable resources.

In addition, transitioning to more effective and efficient production processes – that generate less waste (such as offcuts), need fewer inputs of resources, such as fossil fuels and chemicals, reduce water use in water-scarce regions, are energy efficient, and run on renewable energy – can further contribute to reducing the need for non-renewable resource input. Accounting for and reporting the costs of negative externalities would further support the shift to better resource use and production processes, and thereby generate system-wide benefits.