

**A NEW TEXTILES ECONOMY:
REDESIGNING FASHION'S FUTURE**

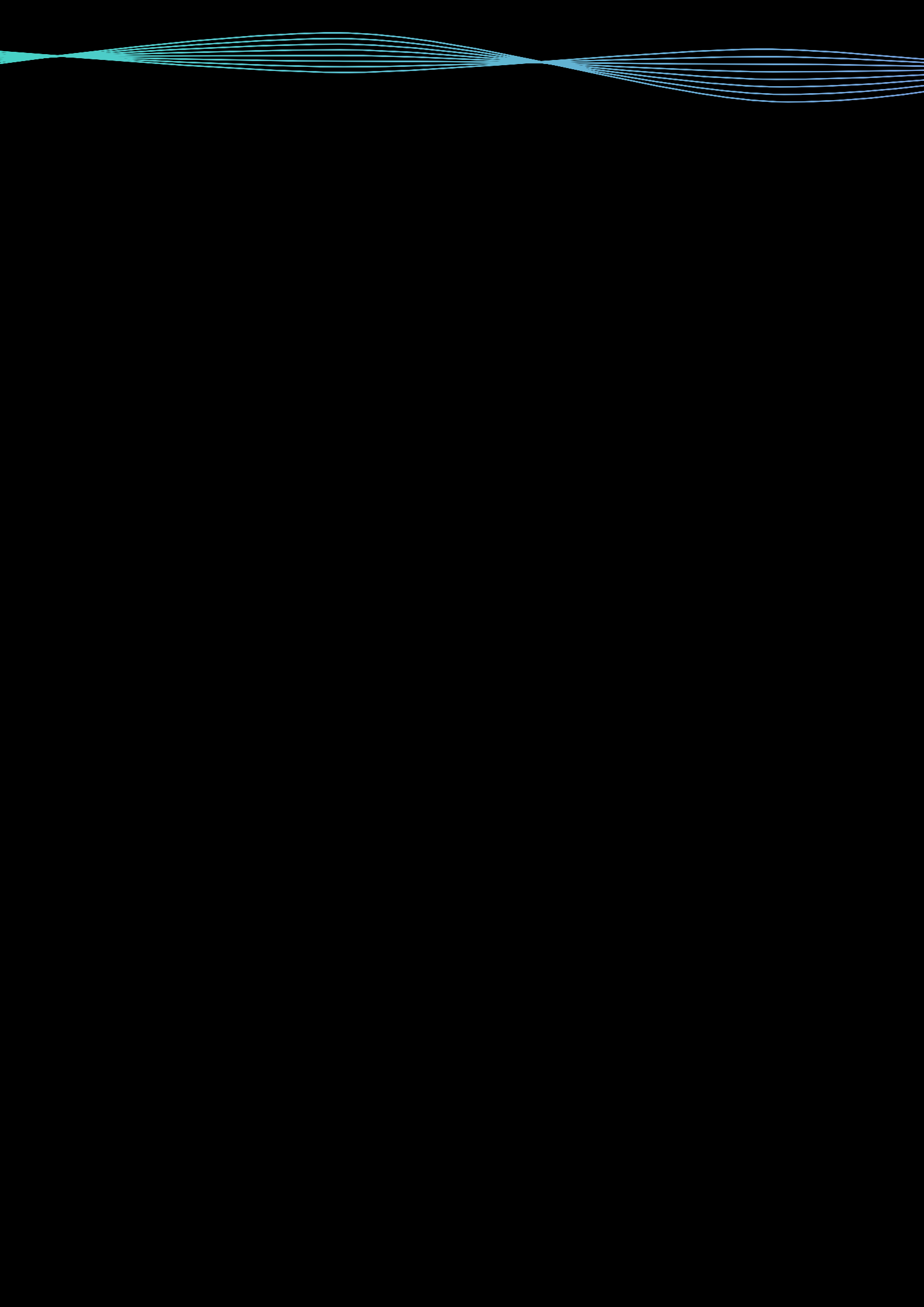


ELLEN
MACARTHUR
FOUNDATION



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 microfibrils, 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.



IN SUPPORT OF THE REPORT

“This ground-breaking report lays the foundation for a new mindset and creates a shared vision for a circular fashion industry. It’s a call for action for systemic collaborations and is aligned with our efforts in making sure that economic and social development can happen in a way that the planet can afford.”

KARL-JOHAN PERSSON, CHIEF EXECUTIVE OFFICER, H&M GROUP

“Each year more than 18,000 tons of textiles find their way into the City of Phoenix waste and recycling streams. Our city is working on creative solutions to redirect textiles from the waste stream and back into the circular economy as a valuable resource, to ultimately stimulate the local economy. This report puts these efforts in the context of a system-level change that delivers long-term benefits.”

GREG STANTON, MAYOR, CITY OF PHOENIX

“How can we change a wasteful global apparel industry into one that is restorative and regenerative? This is a question that we, at C&A Foundation, are trying to answer. Through our partnership with the Ellen MacArthur Foundation, we are pleased to support this report – an important first step towards aligning the industry on what it takes to build a circular fashion industry.”

LESLIE JOHNSTON, EXECUTIVE DIRECTOR, C&A FOUNDATION

“The Circular Fibres Initiative and the partnership with Ellen MacArthur Foundation intends to bring circular economy to scale in the textile industry. From our experiences, we are convinced of the benefits that circular economy can bring, in both the technical and biological cycles. With our innovative Refibra™ branded lyocell fibres, we are closing the loop on textiles using cotton scraps from the value chain. I sincerely recommend this report as it provides the vision and first steps to make progress towards a regenerative system for fibres.”

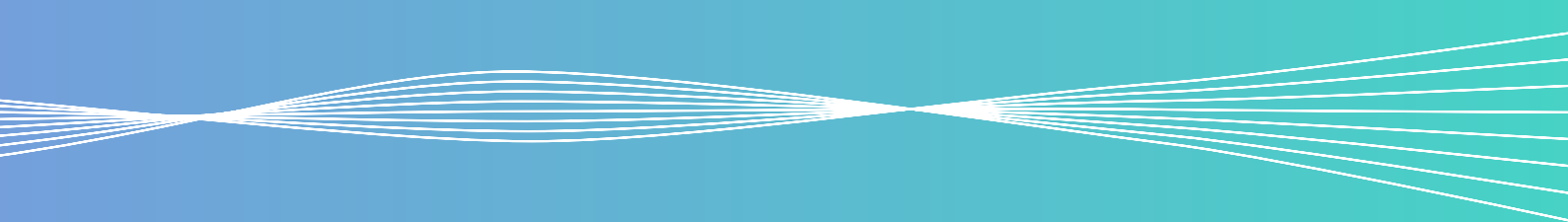
ROBERT VAN DE KERKHOF, CHIEF COMMERCIAL OFFICER, LENZING GROUP

“At Nike, we are pursuing new business models that move away from the take, make, and waste linear models of the past. Our success depends not only on the work within our own value chain, but on disruptive partnerships across a broader textile production and manufacturing ecosystem. This report is an important step in signaling the type of systemic innovation and collaboration required to unlock a future that protects our athletes and the planet while also powering sustainable business growth.”

CYRUS WADIA, VP, SUSTAINABLE BUSINESS & INNOVATION, NIKE, INC

“It is evident that the moment for mainstreaming circularity and changing our consumption and production system is here. There are strong signals and evidence from the science on current and future resource constraints and planetary limits, and growing political and business leadership around the opportunities it offers. This report will surely inspire many success stories, new solutions and practices from all actors which are called to transform the textile value chain”.

TIM KASTEN, DEPUTY DIRECTOR, ECONOMY DIVISION, UN ENVIRONMENT



“This report reimagines the textiles system. New business models, technological innovation, radical collaboration, and most importantly, rapid acceleration are critical steps the report identifies to catalyse this critical transformation.”

JASON KIBBEY, CEO, SUSTAINABLE APPAREL COALITION

“At the Hong Kong Research Institute of Textiles and Apparel (HKRITA) we are very excited about the release of this report. Having seen the issues and challenges of the current fashion and apparel supply chain, we know there is an urgent need for a new model for sustainable production and consumption. Suboptimal production practices, the lack of logistics coordination, and our current linear incomplete business models have resulted in the unnecessary creation of huge volumes of waste, and the shortening of the useful life of materials. We want to understand the facts and participate in the solutions.”

EDWIN KEH, CEO, HONG KONG RESEARCH INSTITUTE OF TEXTILES AND APPAREL

“I believe the circular economy provides unprecedented business opportunities for the fashion sector. The report is a much needed push towards a fundamental shift in industry practices providing the necessary arguments for change, both financially and environmentally. Global Fashion Agenda is excited to further build momentum around the important report recommendations and amplify its messages to a mainstream audience using the convening power of our many wide-reaching platforms, including the Copenhagen Fashion Summit.”

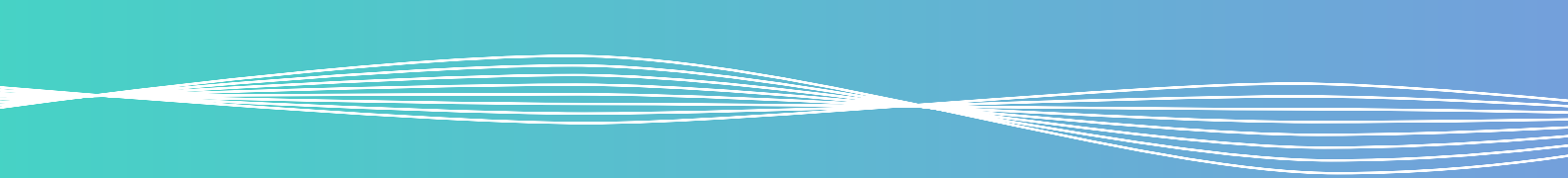
EVA KRUSE, CEO, GLOBAL FASHION AGENDA

“The British Heart Foundation (BHF) welcomes this timely report on clothing impacts and challenges. The BHF’s 560 clothing shops re-use thousands of tonnes a year and, along with the wider charity retail and re-use sector, have a vital role in keeping them in circulation. We also have appetite and capacity to further improve the circularity of textile flows, working with manufacturers, retailers and other partners in this initiative. The charity retail re-use model not only improves the environmental footprint of textiles, it creates social and economic resilience through employment, volunteer opportunities and supply of affordable goods, whilst raising millions of pounds for good causes. We hope this call to action will drive a more joined up re-use and recycling supply chain and look forward to playing a part in future developments.”

MIKE TAYLOR, DIRECTOR, BRITISH HEART FOUNDATION

“The Circular Fibres Initiative and this report serve as a launchpad moment for those of us actively engaged in working to shift the global textiles economy towards a circular framework. Through our Fashion Positive initiative, the Cradle to Cradle Products Innovation Institute is proud to have been part of developing the report, which represents a monumental re-thinking of textile production and use throughout the entire value chain – establishing a truly circular platform for the industry and our economy. We encourage other organisations, businesses and governments to use this report as their own platform for taking immediate action.”

LEWIS PERKINS, PRESIDENT, CRADLE TO CRADLE PRODUCTS INNOVATION INSTITUTE



“The potential for circularity in clothing and apparel, where raw materials are kept in continual circulation, is completely achievable yet the barriers preventing it are challenging. We are extremely excited to see the dedicated team at the Ellen MacArthur Foundation applying its systemic approach to aggregating key players in the industry to work together and overcome these challenges. This report will no doubt play a crucial role in increasing exposure, intensifying efforts, and driving momentum towards a circular resource model for clothing and textiles to a time where the concept of textile waste has been relegated to the history books.”

CYNDI RHOADES, CEO, WORN AGAIN

“The circular economy provides an unprecedented opportunity to build restorative and fair approaches in the apparel industry. For the first time this report illuminates the challenges and resulting opportunities in creating endless flows of fibres. The report sets the stage for businesses to embrace and embed circular business models and technologies and more importantly forms a basis for systemic collaboration and convergence toward a new normal.”

JEFFREY HOGUE, CHIEF SUSTAINABILITY OFFICER, C&A

“It is easy to say that we need to change from a linear economic system to a circular one, it is much more difficult to do it. The report is addressing the textile story in a concrete and comprehensive way. Worth reading and even more worth supporting in practice the steps proposed.”

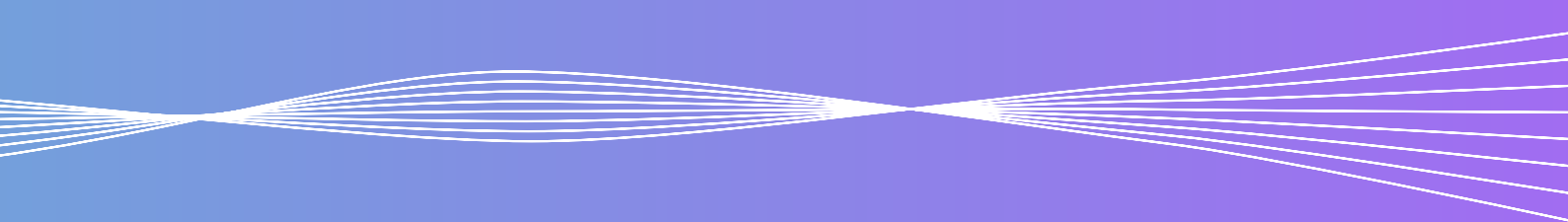
JANEZ POTOČNIK, CO-CHAIR, INTERNATIONAL RESOURCE PANEL

“Understanding the true impact of the fashion industry requires an in-depth review of the value-chain. Fibres are the first building block of this chain and a core element that needs to be understood to support the efforts on sustainable solutions for the industry. Based on the analysis provided through this report, it is possible to see new opportunities for rethinking the fashion systems that can be adapted both by designers and fashion businesses around the world.”

BURAK ÇAKMAK, DEAN SCHOOL OF FASHION, PARSONS SCHOOL OF DESIGN

“Painting a new vision of a future fashion system is a challenging task. This report accurately portrays the complexity of issues in the current failed system, and articulates in a holistic way to all stakeholders what needs to be done. Today’s garments cannot be reproduced into garments, and globally we lack collective focus on innovations that enable massive investments in global recycling systems. We at Mistra Future Fashion, a research program on sustainable fashion since 2011, see that this important report can play a key role globally in highlighting the challenges, especially within recycling, and mobilising multiple stakeholders towards a joint systemic goal.”

SIGRID BARNEKOW, PROGRAM DIRECTOR, MISTRA FUTURE FASHION



“Circular is the new black! We need a fashion industry based on three principles: clean, fair and good.”

ANTOINETTE GUHL, DEPUTY MAYOR OF PARIS, IN CHARGE OF CIRCULAR ECONOMY

“This is an incredibly thorough investigation of the problem and the opportunities that a circular economy for textiles presents to business and to society. We are honored to be included in this research, and are excited about the potential to collaborate to see regenerative textile technologies commercialised at scale.”

STACY FLYNN, CEO, EVRNU

“It is obvious that the current fashion system is failing both the environment and us. This report sets out a compelling vision of an industry that is not only creative and innovative, but also circular. To achieve such a necessary system change that will benefit society as a whole will require strong political will. Whilst this may not be straightforward, the way is now clear.”

IDA AUKEN, MEMBER OF PARLIAMENT, DENMARK

“At Fashion for Good, our ambition is to reimagine the way fashion is designed, made, worn and reused. But this type of systemic change can not happen in a bubble. An open innovation culture is crucial, and this report makes a strong case that pre-competitive collaboration between brands and producers is a key step in the transition to a circular textiles system.”

KATRIN LEY, MANAGING DIRECTOR, FASHION FOR GOOD

“The textile, apparel, and footwear industries have long been a strong force of industrialisation across the globe. At VF, we believe this unique position will be even stronger if the overall industry continues to transition to a new textiles economy based on a circular system that regenerates materials by offering opportunities for innovative design and increased consumer engagement while capturing economic value. This report illuminates the exciting opportunities for our sector, helping companies to understand circularity in practice.”

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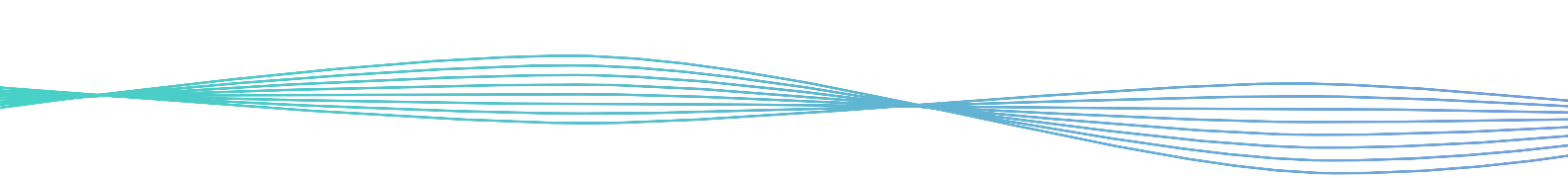
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DISCLAIMER

This report has been produced by a team from the Ellen MacArthur Foundation, which takes full responsibility for the report's contents and conclusions. McKinsey & Company provided analytical support. While the Participating Organisations, Affiliate Partners, members of the Advisory Board and Expert Panel, and those experts who were consulted and acknowledged on the previous pages have provided significant input to the development of this report, their participation does not necessarily imply endorsement of the report's contents or conclusions.

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CONTENTS

EXECUTIVE SUMMARY	3
IN SUPPORT OF THE REPORT	4
ACKNOWLEDGEMENTS	8
SUMMARY OF FINDINGS	18
ENDNOTES	34

The full version of this report is available to download from www.ellenmacarthurfoundation.org/publications and includes the following:

PART I: THE CASE FOR RETHINKING THE GLOBAL TEXTILES SYSTEM, STARTING WITH CLOTHING⁵

PART II: A NEW TEXTILES ECONOMY IS AN ATTRACTIVE VISION OF A SYSTEM THAT WORKS

1. Phase out substances of concern and microfibre release
2. Transform the way clothes are designed, sold, and used to break free from their increasingly disposable nature
3. Radically improve recycling by transforming clothing design, collection, and reprocessing
4. Make effective use of resources and move to renewable inputs

Appendix A. Overview of common textile materials

Appendix B. Methodology overview

SUMMARY OF FINDINGS

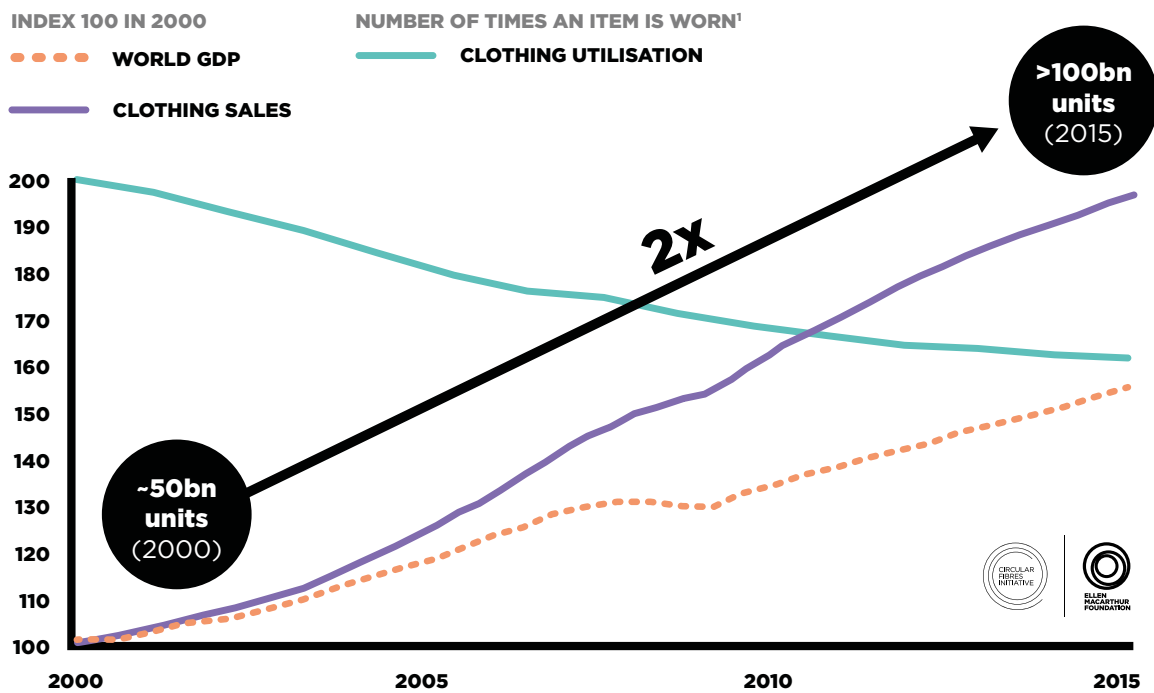
The case for rethinking the global textiles system, starting with clothing

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 Clothing² – 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

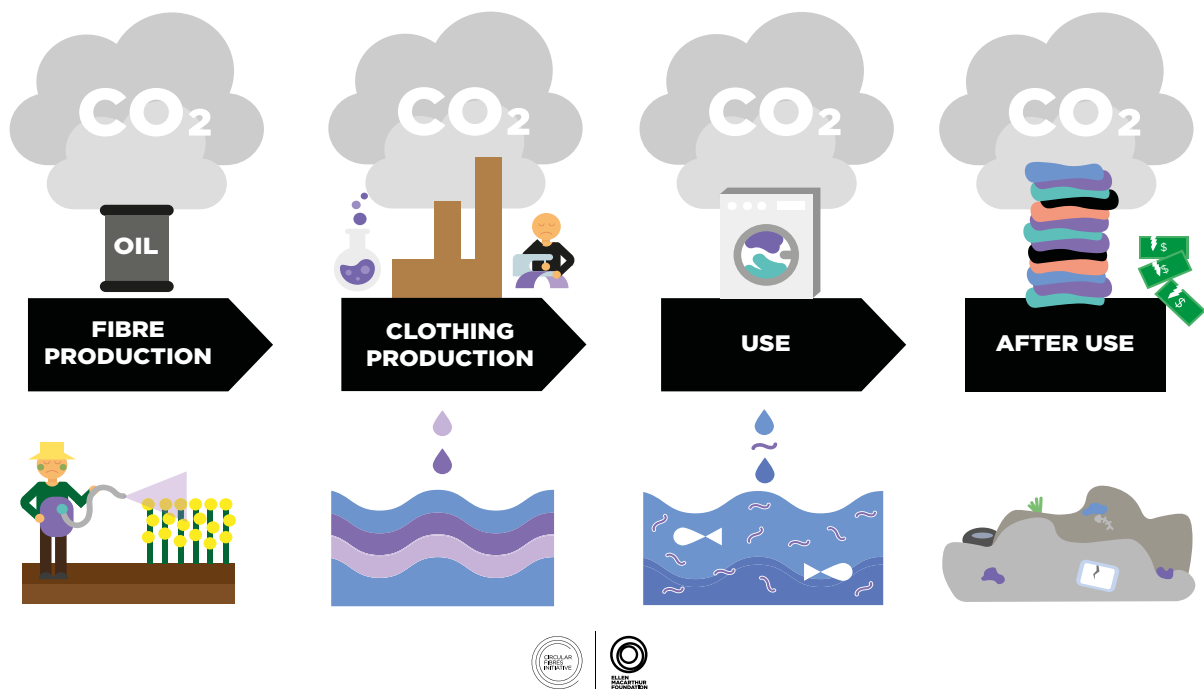
Source: Euromonitor International Apparel & Footwear 2016 Edition (volume sales trends 2005-2015); World Bank, *World development indicators - GD* (2017)

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

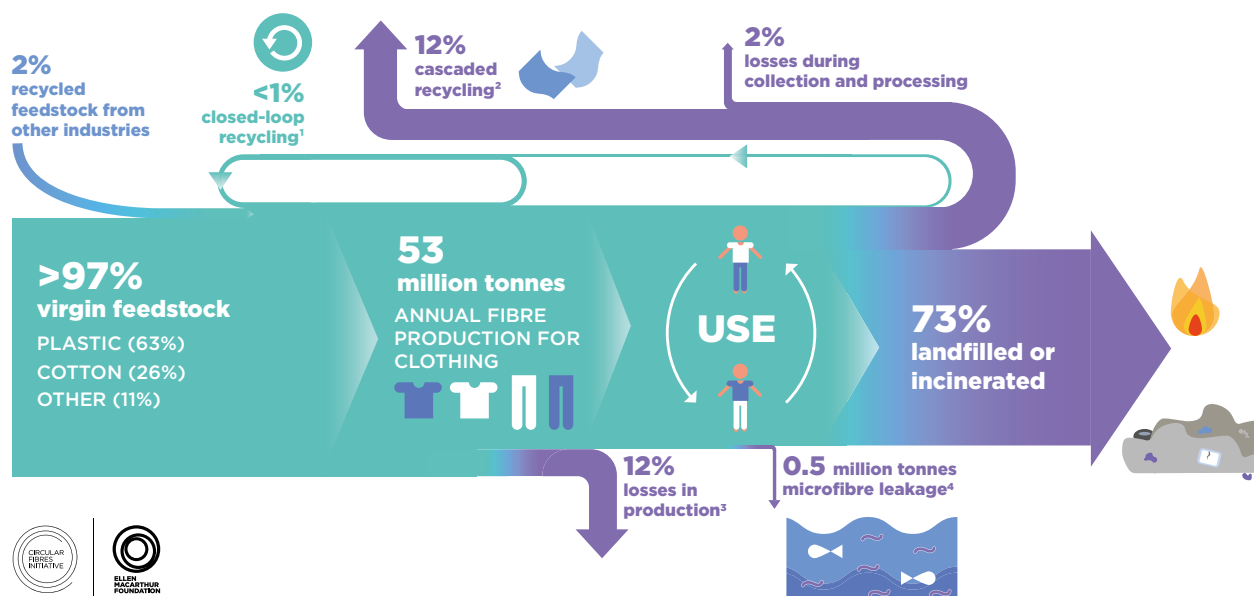
FIGURE 2: TODAY'S CLOTHING SYSTEM PUTS PRESSURE ON RESOURCES, POLLUTES THE ENVIRONMENT, AND CREATES NEGATIVE SOCIETAL IMPACTS



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 CO₂ 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

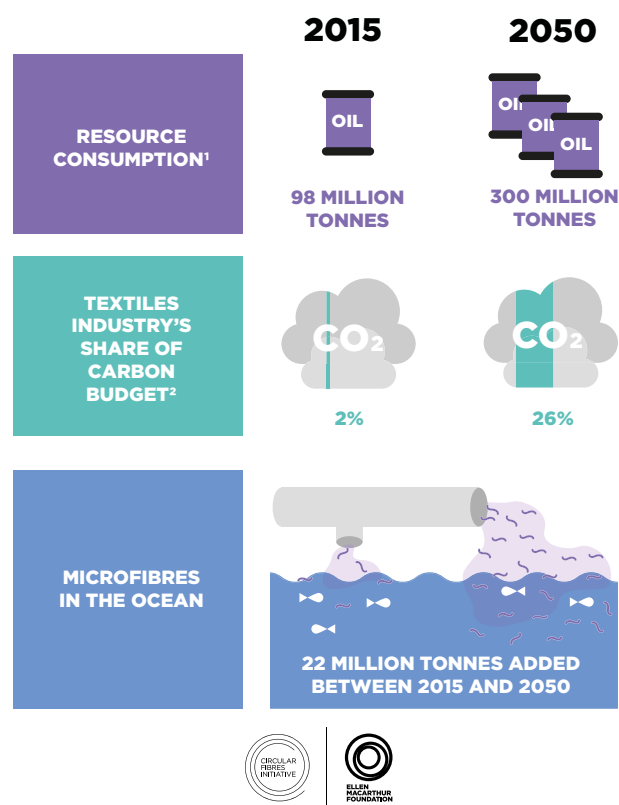
Today's textiles system also has multiple negative societal impacts. Many workers face dangerous working environments due to unsafe processes and the hazardous substances used in production. High cost and time pressures are often imposed on all parts of the supply chain,²⁵ which can lead to workers suffering 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



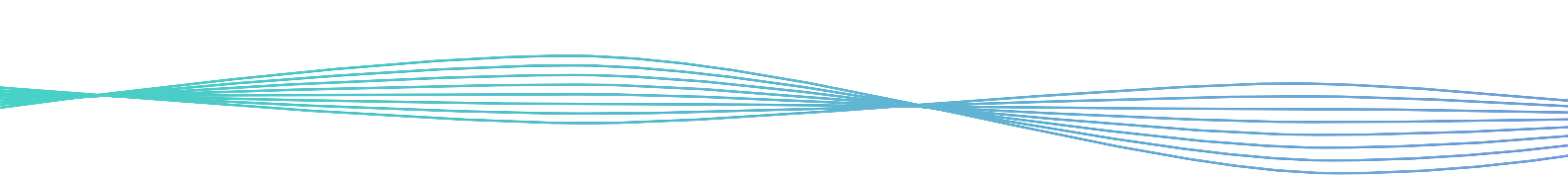
1 Consumption of non-renewable resources of the textiles industry, including oil to produce synthetic fibres, fertilisers to grow cotton, and chemicals to produce, dye, and finish fibres and textiles

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.

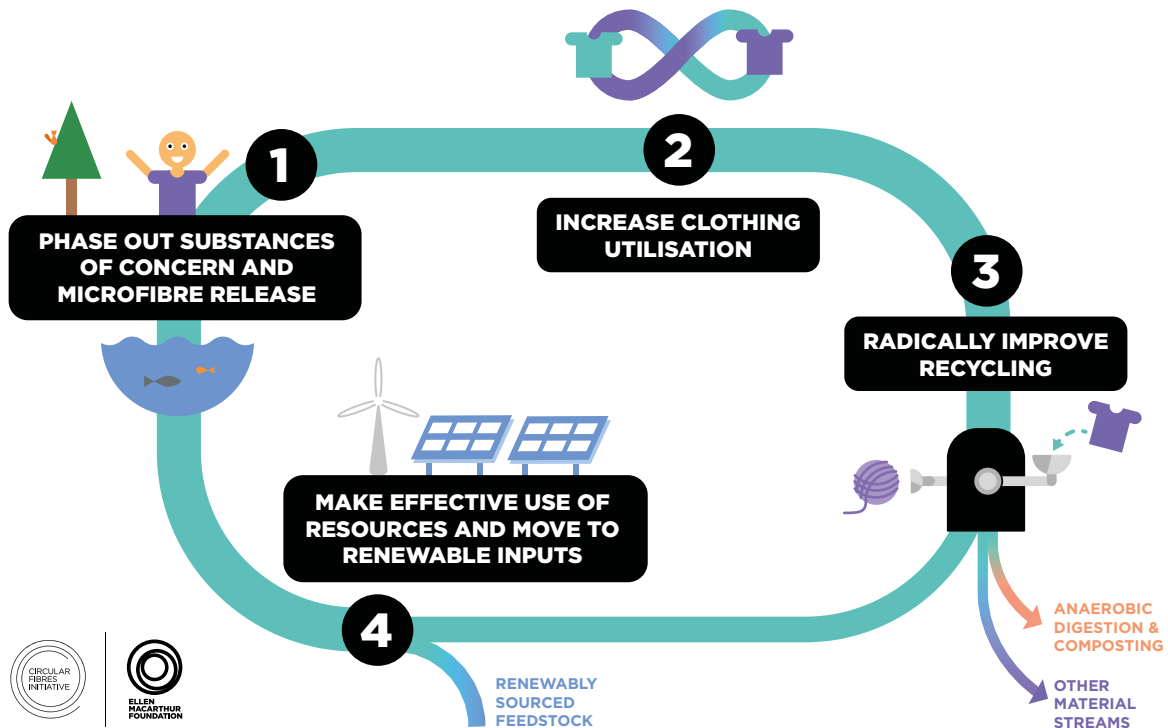
In such a new textiles economy, clothes, fabric, and fibres are kept at their highest value during use, and re-enter the economy after use, never ending up as waste. This would provide a growing world population with access to high-

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.



Achieving a new textiles economy demands a new level of alignment and collaboration

To move beyond incremental improvements and achieve a shift to a new textiles economy, a concerted, global, systemic, and collaborative approach is needed that matches the scale of the challenge and the opportunity.

Transforming the textiles industry into a circular economic model requires system-level change

Moving towards a circular economy goes far beyond traditional measures to reduce the negative impacts of the current linear system. It entails shifting to an entirely new system, and cannot be achieved merely through incremental improvements.

Systems thinking has gained increased attention in recent years as a required approach for overcoming complex, systemic issues. It is still a new science and only a few case studies and enabling tools are available to support companies and industries to transform. Even if such tools were available, changing a complex system is not something that can be planned and executed in a static, deterministic way. A design-thinking approach is required, bringing actors together from across the system to collaborate, prototype, learn, refine, and scale what works.

The key characteristics of a system-level change approach to move a value chain towards a circular economy are emerging, and some of them are already partially in place in the textiles industry

Based on the Ellen MacArthur Foundation's research on the theory and practice of system-level change and the experience of the Foundation from working with business and government on the transition to a circular economy – including the New Plastics Economy initiative³⁷ – some key characteristics that support system shifts have been identified:

- Alignment on the case for change
- A positive vision for a new system

- Broad stakeholder buy-in and time-bound commitments to a vision-led transformation
- Demonstration that the vision is possible, with large-scale, pre-competitive, cross-value-chain collaboration
- Unprecedented levels of collaboration and alignment in areas of action

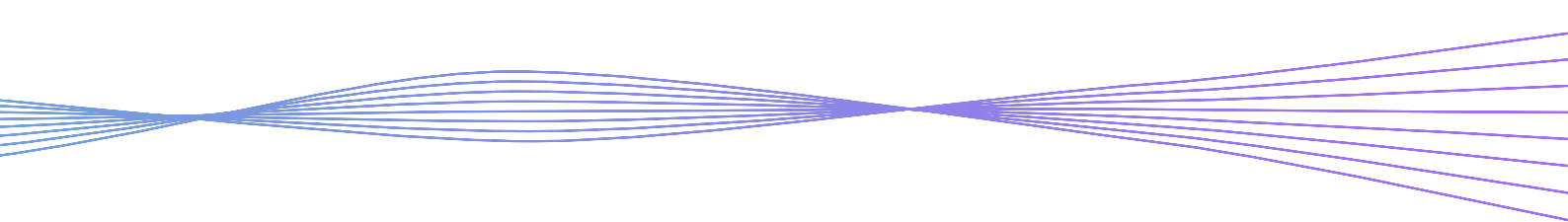
Research undertaken for this report, including numerous interviews with textiles industry experts, small and large brands, textile collectors, academics, and stakeholder workshops, concluded that many efforts are already being made by brands, retailers, and other organisations to change the industry. These efforts offer solutions and demonstrate promising progress in various areas, but are fragmented and often only effective at small scale. Ensuring the critical characteristics for system-level change are in place would harness this momentum and accelerate the transition.

Alignment on the case for change.

Transforming a system requires a great deal of effort and therefore a compelling rationale.

Together with other recent publications,³⁸ this report presents a clear need to change the current textiles system, capture economic opportunities and prevent potentially catastrophic outcomes. Crucially, Part I of the full version of this report reinforces the case for change at the systems level, identifying the current linear business model, with its low rates of utilisation (leading to high levels of throughput) and low levels of recycling, as a root cause of many issues of the current system.

A positive vision for a new system. By its very definition, system change entails moving from an existing system to a new one. This requires a positive vision of the system to move towards: “If we can imagine it, we can achieve it”.³⁹ The extent of the take-up of the circular economy framework – virtually unknown until just a few years ago – is an example of the power of such a positive vision to mobilise action.



Recently, various efforts have been made to identify the elements of a better textiles industry and this report presents for the first time a detailed vision of a new textiles economy based on the principles of a circular economy (see Part II of the full report).⁴⁰ 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 for delivering substantially better economic, societal, and environmental outcomes.

Broad stakeholder buy-in and time-bound commitments to a vision-led transformation.

To achieve system change, buy-in to the vision needs to be built across different actors, including industry, government and cities, civil society, and the broader public. None of these groups can do it alone. In particular, ambitious, common, time-bound commitments to the vision are required.

The extent of ongoing activities in the textiles industry, both individual and multi-stakeholder, shows an increasing buy-in to the need to address the range of issues; many significant sustainability initiatives are gaining momentum. This report demonstrates the need to complement these with commitments towards the vision and ambitions of a new textiles economy. Such commitments would need to be made by industry leaders, for example major brands. While existing individual brand commitments are a first important step, concrete collaborative commitments towards this positive vision would be needed to deliver a step-change towards a more circular system. There are already efforts underway to get commitments to some of the ambitions of a new textiles economy. For example, the Global Fashion Agenda is gathering commitments to immediate action points for cycling clothes within the system, to be achieved by 2020.⁴¹ The Detox campaign by Greenpeace collected commitments to the phase-out of substances of concern.⁴²

Demonstration that the vision is possible, with large-scale, pre-competitive, cross-value-chain collaboration. Demonstrator projects, conducted collaboratively by various stakeholders along the value chain, are required to test new models at scale and provide evidence for their success. This is particularly

important, as no single actor can achieve system change alone.

No large-scale demonstration project representing the full extent of the vision currently exists, but there are promising small-scale efforts. One example of such a collaborative initiative is ‘ReLooping Fashion’ in Finland, which pilots a unique production experiment of cotton clothing recycling, and has developed a cross-value-chain business ecosystem in line with the principles of the circular economy.⁴³

Unprecedented levels of collaboration and alignment on areas of action. Various actions are needed to support the transition, including: a dialogue mechanism (involving the whole value chain and existing initiatives), an open evidence base, innovation for system solutions, informed enabling policy, and new industry standards and guidelines. These actions are interrelated and mutually reinforce each other. As such, the intended large-scale system change can only be achieved by orchestrating them in a coordinated manner.

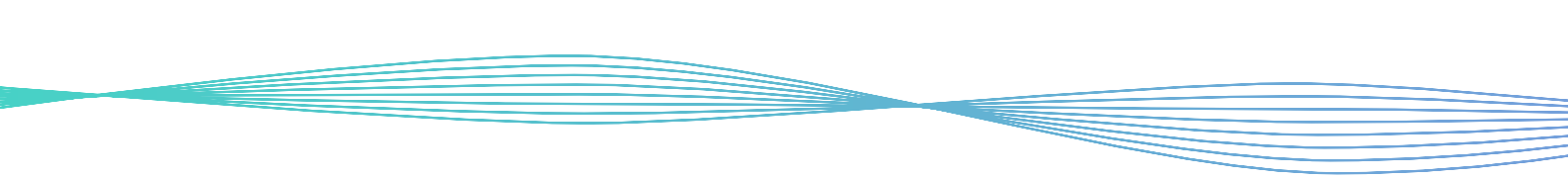
For the textiles industry, research to date has identified a large number of industry efforts aimed at enabling the transition. The main gap is not necessarily the lack of activity in any of these areas; rather it is coordination, alignment, and the deepening of the impact of existing initiatives. See Box A, p.30, for the areas of action to move towards a new textiles economy and existing industry efforts.

A new approach is needed to close gaps, reinforce current efforts, and unlock system-level change

The case for changing the textiles system is clear, and the vision proposed in Part II of this report represents an attractive target state. To reach unstoppable momentum towards a new textiles economy, the existing efforts to change the system should be consolidated by a new approach that would serve to:

1. ALIGN KEY INDUSTRY PLAYERS ON A CLEAR VISION AND SECURE THEIR COMMITMENT TO IT

Commitments of leading industry players towards the new vision and ambitious targets would enable more effective system-wide progress. New, aligned commitments,



together with a joint action plan to achieve them – covering all four ambitions of a new textiles economy and building as appropriate on existing initiatives – should consider, for example, targets on the phase-out of substances of concern and plastic microfibre release, quality and durability standards, requirements to design for recyclability, and minimum levels of recycled content in clothing.

2. DRIVE LARGE-SCALE, CROSS-VALUE-CHAIN DEMONSTRATOR PROJECTS

A new level of collaboration should be sparked by the undertaking of cross-value-chain demonstrator projects. Concrete collective actions, involving many brands working together pre-competitively, would in the short term initiate the transition and demonstrate progress. While further analysis is needed to identify what the most promising areas of these collective actions would be, examples include:

- Large-scale projects in major pilot cities, including several brands, city councils, collecting/sorting/reprocessing actors, jointly engaging the public in large-scale collection efforts, carried out as public-private initiatives, and realising the value of collected streams
- Joint implementation of common design and material selection standards or guidelines, developed as part of a pre-competitive collaboration between several designers, buyers, textile mills, and recyclers, taking into account all aspects of a new textiles economy, including durability, recyclability, the absence of substances of concern, and the minimisation of microfibre release
- Collaboration projects for implementing new business models at scale, jointly identifying barriers and pulling the levers to overcome them (e.g. new technologies, joint marketing, or informed public policy)

3. ORCHESTRATE COMPLEMENTARY INITIATIVES AND REINFORCE THEIR IMPACT

Orchestration should take place to steer existing and future key initiatives in such a way that they complement each other, to ensure that progress in the different areas of action (see Box A, p.30) is amplified, and that progress towards one ambition does not impede progress towards another. A comprehensive mapping

of ongoing activities is required to understand the landscape and to quickly identify not only gaps and barriers in any area of action, but also opportunities to spark high levels of collaboration. Monitoring and broadcast of new crucial findings surfacing from any area of action would reinforce each initiative's impact.

4. BROADLY ENGAGE STAKEHOLDERS AND ENSURE WIDE PROMOTION OF THE VISION

Further actions to more widely engage stakeholders along the textiles value chain and provide them with the relevant support, tools, and insights to progress towards the vision.

Critical actions include:

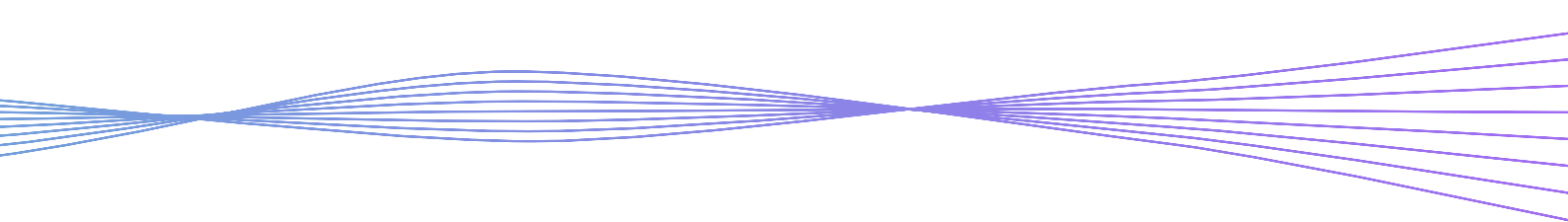
- Broadcasting evolving best practices and insights gained to stakeholders along the global textiles value chain
- Engaging policymakers and sharing of policy best practices
- Broadly communicating the nature of the current situation and the vision of a new textiles economy
- Continually involving additional actors in commitments

5. ESTABLISH A COORDINATING VEHICLE THAT TAKES ON THESE FOUR ACTIVITIES

To ensure a step change in industry mobilisation, an independent vehicle would need to be established to drive and coordinate the four activities of the new approach. It would need to be set up in a way that is complementary to, and value-adding for established programmes, convening the many stakeholders relevant for the transition.

Different organisations can contribute to the transition in their own unique ways

Businesses throughout the textiles value chain, policymakers at various levels, as well as other organisations, all have an important role to play in the transition towards a new textiles economy. Any approach to systemic change in the textiles system must recognise the unique roles of these actors and engage them in the transformation. Alignment, collaboration, and coordination between them is critical to create large-scale change and overcome issues such as the lack



of standards in certain areas and the absence of alignment between clothing design and what happens after their use.

Businesses are naturally placed to play a leading role in the transition. Businesses of all sizes throughout the textiles value chain – from big brands, through manufacturers and textile collectors, to small enterprises and innovators – can contribute to systemic change in the textiles system. In particular, brands and retailers are in a unique position, given that they are the ones who design and sell clothing in the first place. They can drive change through their visibility, global supply chains and power in the market. They have the ability to influence purchasing behaviour by changing their value proposition and using their strong marketing know-how. They also determine the pace of introduction of new products and the material composition of clothing. Clothing manufacturers and fibre producers are also crucial as so many of the system impacts occur during their activities. Businesses involved in collection, sorting, processing, refurbishing, and recycling can play a key role in developing the techniques and technologies to ensure that garments and materials stay within a closed-loop system, as well as in providing valuable feedback that can inform designers and manufacturers about what is needed to maximise value after use.

Policymakers at various levels can set direction for the transition and create the right enabling conditions. Cities and municipalities often control the after-use collection infrastructure and can be key partners in initiatives related to textile collection and processing. Policymakers are well positioned to contribute to the change through realigning incentives, connecting different players pre-competitively, influencing aspects of design and standards in a positive

way, and stimulating innovation. Setting the right policy can also support the transition in several ways (see Box A, p.32).

Education and research institutions can support the transition through embedding circular economy principles in their teaching and creating evidence and proof points. Bringing circular economy principles into education, from school through to professional development, will equip learners with the systems-thinking skills and mindsets needed to become active shapers of a circular economy in general, and a new textiles economy in particular. Further research – at universities, other research institutions or in targeted initiatives and programmes – is needed to develop the evidence base for a new textiles economy and establish the best ways to implement it. Collaboration between researchers, businesses, and other relevant organisations is crucial, for example to address specific knowledge gaps identified in the market or to demonstrate feasibility through pilot projects.

Other organisations, including industry associations and initiatives, NGOs, and international bodies, also play important roles. Industry associations and initiatives could facilitate and foster collaboration among businesses across the value chain and create alignment between actors on the broad transition to a new textiles economy as well as on individual aspects of it. They connect stakeholders and could also help share information, case studies, best practices, and lessons learned. The involvement of NGOs and international bodies is required to ensure that broader environmental and societal considerations are taken into account in future solutions.

BOX A: AREAS OF ACTION TO MOVE TOWARDS A NEW TEXTILES ECONOMY

Analysis and research to date have identified areas of action with the potential to collectively realise the required impact. These enablers interact and mutually reinforce each other, and the large-scale systemic change intended can only be achieved by addressing them in a coordinated manner.

A ROBUST EVIDENCE BASE

To guide the transformation towards, and to evolve the vision of, a new textiles economy, a robust evidence base is needed to create transparency on the impacts of the system and to aid stakeholders in defining actions required to change the system. While this report, together with a number of other recent efforts, aims to provide initial answers, more research is required.

In addition to this, existing economic and scientific evidence needs to be consolidated and made readily accessible to stakeholders across the value chain, for example via a highly referenced open-source platform, to make it easier to make decisions in line with the principles of the new textiles economy. This would also highlight knowledge gaps and prompt different actors to undertake complementary research to bridge those gaps. Initial further studies could include:

Investigating customers' motives for using and buying clothes as well as the business models that can meet their needs

- Determining the size of the different market segments based on customer needs and desires, the opportunities for different models to satisfy them, and the current barriers to customer adoption to provide a starting point for business model transformation
- Undertaking research on the key criteria for assessing durability and quality that would drive customers' demand for quality
- Investigating the elements needed for innovative business models to confidently lead the way to increased clothing utilisation

Researching the optimal balance of collection and recycling systems

- Building a comprehensive understanding of the current landscape of informal recycling and collection activities
- Understanding local cultures and which collection infrastructures would succeed in different regions
- Further researching the barriers and opportunities for the recycling of cellulose-based fibres, as well as economically attractive options for the recycling of blended materials
- Investigating the most efficient logistics to return materials to processors, for example centralised vs localised solutions and the best mix of these

Better understanding the different actors in the textiles system and their interactions

- Creating a detailed overview of the different actors and their interactions, for example through a systems map
- Identifying key actors to create starting points for change
- Creating a better understanding of the specific stakeholders that need to act in consort to create large-scale change

Better understanding the economic, environmental, and societal impacts of substances of concern and microfibres in the ocean

- Developing a robust evidence base on the usage of chemicals, including the amount used, as well as identification of substances of concern and the impacts of these
- Exploring of the socioeconomic impacts of microfibres in the ocean
- Better understanding the root causes of the release of plastic microfibres from textile washing in order to inform innovations in textiles construction and to create materials fit for a circular system

Further understanding the relevance and value of cross-flows into other industries

- Conducting investigations into the viability of creating high-value cross-sector material flows that would allow multiple applications in different industries

Research is already underway in several of these areas. Some approaches aim to cover all aspects of the clothing system, such as Mistra Future Fashion with its mission to provide “research for systemic change in fashion – via closed loops and changed mindsets”.⁴⁴ WRAP has also undertaken extensive research into the efficiency of the textiles system with a focus on the UK.⁴⁵ Many other organisations are investigating individual aspects, such as Fashion Positive, which is focusing on “positive materials” for clothing,⁴⁶ or the European Outdoor Group Microfibre Consortium, which is looking at enhancing the evidence base on microfibres.⁴⁷

INNOVATION

A significant number of innovators exist today and brands are starting to engage with them in various ways. With a growing evidence base (see above), these innovators can be steered towards the vision of a new textiles economy. Two key actions should support future innovation:

Steer innovation investments towards the common vision. Innovators should be supported at all stages, whether at the initial concept stage or when launching to market. They should be guided in the right direction, and promising innovations should receive the financial support needed to achieve scale. Brands should be involved in defining which innovations are needed, mindful of the common vision.

Innovation could include, for example, the search for material flow opportunities from other industries as an input into clothing manufacturing; the development of patterns that generate no leftover fabric when manufactured; innovative collecting and sorting technologies; textile-to-textile chemical recycling technologies that are able to separate and extract polyester and cotton; or the development of garments that last but which adapt themselves to changing styles.

Mobilise large-scale, targetted ‘moonshot’ innovations. In areas where existing innovation is sparse but a significant impact could be expected, innovation ‘moonshots’ should be mobilised. Stakeholders from across the industry would gather and spark innovation. One area for such innovations could be the search for a ‘super-fibre’ with similar properties to mainstream ones, but suitable for a circular system, with no negative externalities.

Existing programmes are already supporting and steering innovation, such as Fashion for Good, an initiative supporting fashion innovators at various stages;⁴⁸ Fabric for Change, a global initiative by Ashoka and the C&A Foundation “to support innovators for a fair and sustainable apparel industry”;⁴⁹ or the H&M Global Change Awards, an innovation challenge run by the H&M Foundation, to seek innovations that can support fashion to become circular.⁵⁰



POLICY

Policies at supranational, national, regional, and city/municipality levels can support the transition. Policymakers should be engaged with the common vision and provided with the relevant tools, data, and insights related to textiles so that they can make informed decisions to support the industry in key areas.

Policies that set direction and show commitment. Clear policies and communication can encourage private and public investment in relevant research and business development. Advancing the transition requires a coherent focus and systematic approach, including integration of the ambitions of a new textiles economy into existing government initiatives. For example, policies could provide targets and strategies for substances of concern, microfibres, durability, or recyclability. Clear and binding policies, laid out as a roadmap, would provide the visibility needed to coordinate infrastructure development and investment planning. Existing efforts can be seen in the EU's Circular Economy Action Plan, adopted in 2015, with a package including long-term targets to reduce landfilling and increase recycling and reuse.⁵¹

Regulatory frameworks that enable transition and remove current policy barriers. Some current policies, typically focused on individual areas rather than taking a systemic view, cause unintended barriers to adopting circular economy models. Detailed analysis of regulations – conducted with businesses and other relevant stakeholders – could identify these barriers and provide a basis for recommending policy changes that support a new textiles economy. For example, policymakers could set targets or incentives for collection. They could, for example, create extending producer responsibility (EPR) schemes for textiles, such as that existing in France, obliging clothing companies to contribute to the recycling and waste management of the clothes they put on the market. New policies could remove barriers that are caused by the definition of used textiles as waste, or address barriers to trade, such as import or export bans. Policymakers can also play an important role in stimulating demand by incentivising the use of recycled materials and/or disincentivising the use of virgin materials.

Public procurement and infrastructure investments. As governments often control large budgets for procurement and infrastructure spending, acquiring textiles through new service models and directing infrastructure spend where it most supports a new textiles economy would not only have a clear impact but would also lead the way for the private sector to follow. For example, public procurement recommendations that support promising, scalable circular business models for textiles could help kick-start such models and stimulate their wider adoption in the market. Public procurement policies can also increase demand for recycled materials by specifying targets for recycled content in clothing used by the public sector. Focusing infrastructure investments on schemes such as integrated after-use collection systems and sorting and reprocessing facilities could support circular economy activity and investment by the private sector.



TRANSPARENCY

Transparency on a product's content, production history, and properties for use and after-use, for example information on substances of concern and resource use, durability and care information, or details on material content and recycling options is crucial to inform actions. Measurement tools, for example, can help assess products' content and the negative impacts of individual actors within the textiles industry, as well as their ongoing efforts to transform their practices for a new textiles economy. The Sustainable Apparel Coalition, for example, is contributing to this with the Higg Index.⁵²

MARKETING

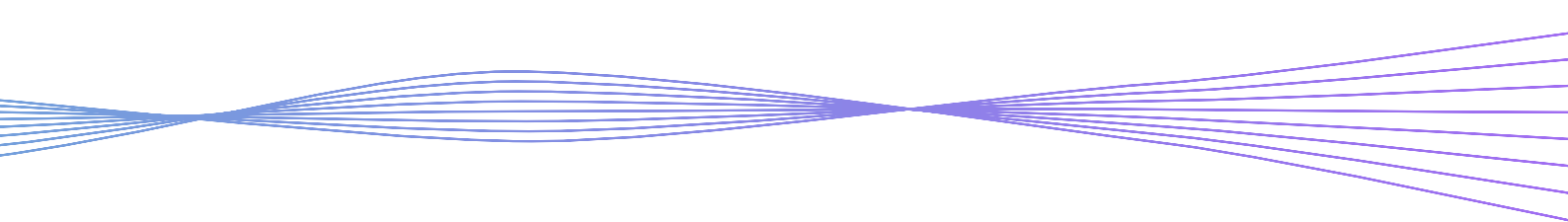
Implementing a new textiles economy depends upon customers embracing alternative models of accessing clothing. With their vast experience in marketing traditional sales, and great expertise and capacity, brands are in a good position to market new models as an attractive and fashionable option.

CIRCULAR-ECONOMY-DRIVEN INTERNAL STRATEGIES

Taking maximum advantage of circular models requires decision makers throughout organisations to appreciate the benefits of a circular economy and take these into account in business decisions. To put the ambitions of a new textiles economy into practice, current and prospective employees need training to better understand the aspects and advantages of circular economy models in general, and a new textiles economy in particular. In addition, the right incentives need to be in place to take the ambitions of a new textiles economy into account in business decisions.

ENDNOTES

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- 6 Global Fashion Agenda and Boston Consulting Group, *Pulse of the fashion industry* (2017), p.19
- 7 Circular Fibres Initiative analysis based on Euromonitor International Apparel & Footwear 2016 Edition (volume sales trends 2005–2015). All numbers include all uses until the garment is discarded, including reuse after collection and resale.
- 8 Ibid.
- 9 Calculation based on Circular Fibres Initiative materials flow analysis (for details see Appendix B of the full report) and Euromonitor International Apparel & Footwear 2016 Edition (volume sales trends 2005–2015). In 2015, 46% (in mass) of collected garments were reused. If 100% of discarded clothing were collected, 22.2 million tonnes would be 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.
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- 17 Fachverband Textilrecycling, *Konsum, Bedarf und Wiederverwendung von Bekleidung und Textilien in Deutschland* (2016), p.37
- 18 Watson, D., et al., *Exports of Nordic used textiles: Fate, benefits and impacts* (2016), p.67
- 19 Circular Fibres Initiative analysis – for details see Part I of the full report
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- 21 Circular Fibres Initiative analysis – for details see Appendix B of the full report
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- 27 Bureau of International Labor Affairs, *Findings on the worst forms of child labor* (2013), pp.10, 30, 31, 56, 59, 110, 146, 171, 368, 369, 561, 775, 776; Verité, *Help Wanted* (2010), p.5; Anti-Slavery International, *Slavery on the high street* (2012); see <http://www.safia-minney.com/slave-to-fashion.html>; <https://labs.theguardian.com/unicef-child-labour>
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- 29 Compared to the IEA 2°C pathway 2050 which allows for 15.3 giga tonnes of CO₂ equivalent
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- 32 See, for example, <http://www.greenpeace.org/international/en/campaigns/detox>; Changing Markets Foundation *Dirty fashion: How pollution in the textiles supply chain is making viscose toxic* (2017); WRAP, *Valuing Our Clothes: The cost of UK fashion* (2017); Greenpeace, *Time out for fast fashion* (2016)
- 33 Greenpeace, *Fashion at the crossroads* (2017)
- 34 See <https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>
- 35 These benefits have been investigated for example in: Ellen MacArthur Foundation, *Circular economy in India: Rethinking growth for long-term prosperity* (2016) and Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment, *Growth Within: A circular economy vision for a competitive Europe* (2015)
- 36 Estimate based on the material cost of yarn
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- 45 See <http://www.wrap.org.uk/category/materials-and-products/textiles>
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- 51 See http://ec.europa.eu/environment/circular-economy/index_en.htm
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ABOUT THE ELLEN MACARTHUR FOUNDATION

The Ellen MacArthur Foundation was established in 2010 with the aim of accelerating the transition to a circular economy. Since its creation the charity has emerged as a global thought leader, establishing circular economy on the agenda of decision makers across business, government, and academia. With the support of its Core Philanthropic Partners, MAVA and SUN, and Knowledge Partners (Arup, IDEO, McKinsey & Company, and SYSTEMIQ), the Foundation's work focuses on five interlinking areas:

EDUCATION

Inspiring learners to rethink the future through the circular economy framework

The Foundation has created global teaching, learning, and training platforms built around the circular economy framework, encompassing both formal and informal education. With an emphasis on online learning, the Foundation provides cutting edge insights and content to support circular economy education, and the systems thinking required to accelerate a transition.

The Foundation's formal education work includes Higher Education programmes with partners in Europe, the US, India, China, and South America, international curriculum development with schools and colleges, and corporate capacity building. The informal education work includes the global, online Disruptive Innovation Festival.

BUSINESS AND GOVERNMENT

Catalysing circular innovation and creating the conditions for it to reach scale

Since its launch, the Foundation has emphasised the real-world relevance of the circular economy framework, recognising that business innovation sits at the heart of economic transitions. The Foundation works with its Global Partners

(Danone, Google, H&M, Intesa Sanpaolo, NIKE Inc., Philips, Renault, and Unilever) to develop scalable circular business initiatives and to address challenges to implementing them.

The Circular Economy 100 programme brings together industry leading corporations, emerging innovators, affiliate networks, government authorities, regions, and cities, to build circular capacity, address common barriers to progress, understand the necessary enabling conditions, and pilot circular practices, in a collaborative, pre-competitive environment.

INSIGHT AND ANALYSIS

Providing robust evidence about the benefits and implications of the transition

The Foundation works to quantify the economic potential of the circular economy model and develop approaches for capturing this value. These insight and analysis feeds into a growing body of economic reports highlighting the rationale for an accelerated transition towards a circular economy, and exploring the potential benefits across stakeholders and sectors.

The circular economy framework is evolving, and the Foundation continues to widen its understanding by working with international experts, key thinkers, and leading academics.



SYSTEMIC INITIATIVES

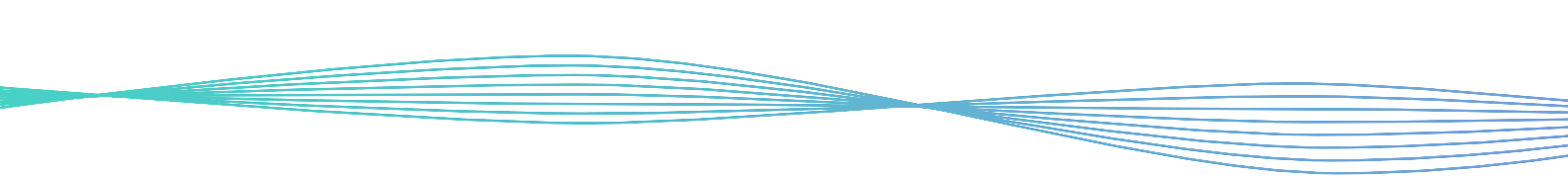
Transforming key material flows to scale the circular economy globally

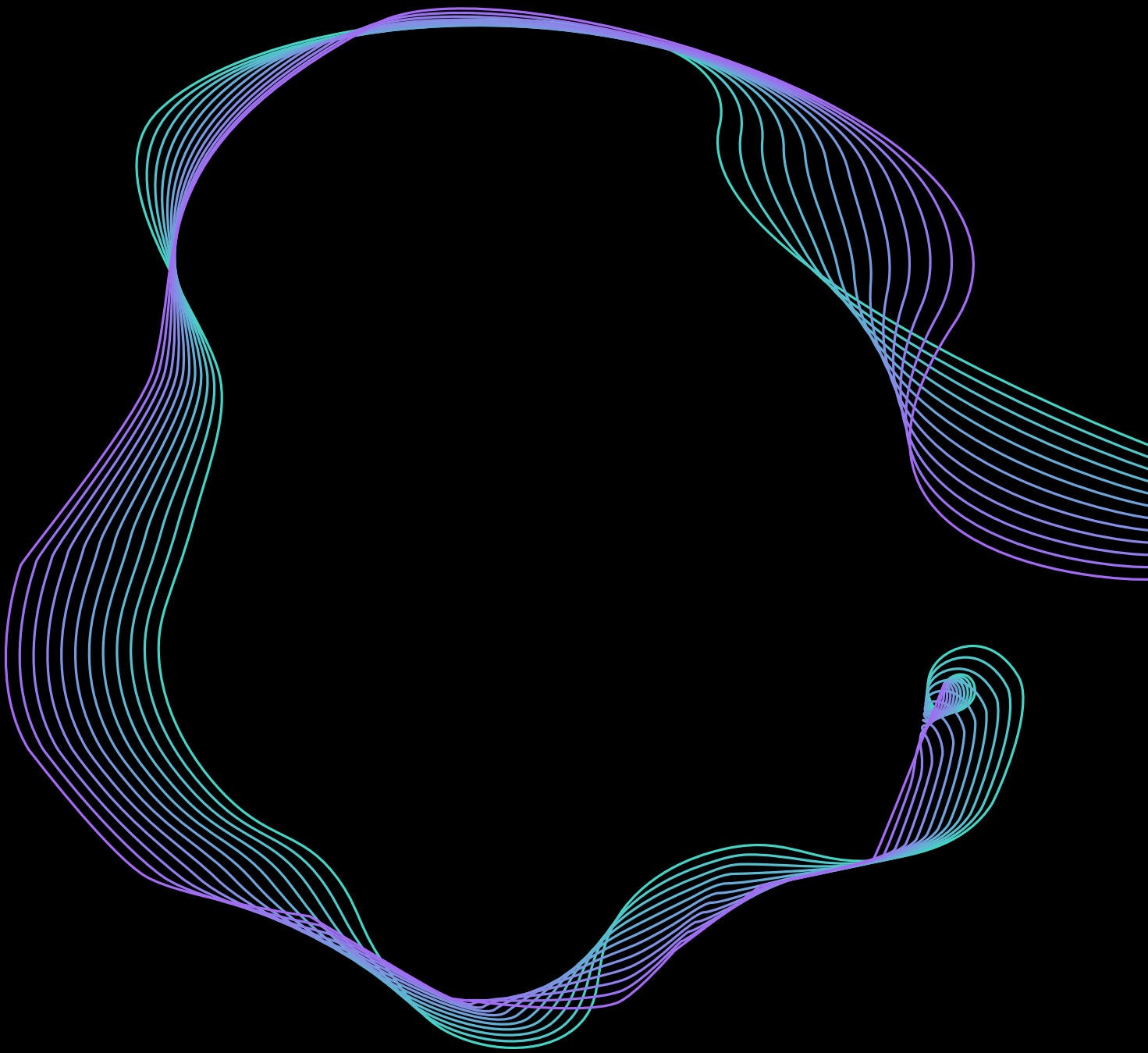
Taking a global, cross-sectoral approach to material flows, the Foundation is bringing together organisations from across value chains to tackle systemic stalemates that organisations cannot overcome in isolation. Plastics was identified through initial work by the Foundation with the World Economic Forum and McKinsey & Company as one of the value chains most representative of the current linear model, and is the focus of the Foundation's first Systemic Initiative. Applying the principles of the circular economy, the New Plastics Economy initiative, launched in May 2016, brings together key stakeholders to rethink and redesign the future of plastics, starting with packaging. Building on the success of this first Systemic Initiative, textile fibres became the Foundation's second material stream focus, with the launch in May 2017 of the Circular Fibres Initiative.

COMMUNICATIONS

Engaging a global audience around the circular economy

The Foundation communicates cutting edge ideas and insight through its circular economy research reports, case studies, articles and books. It uses relevant digital media to reach audiences who can accelerate the transition, globally. The Foundation aggregates, curates, and makes knowledge accessible through Circulate, an online information source dedicated to providing unique insight on circular economy and related subjects.





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