TOMRA

Transforming textiles: 4 key beliefs to enable textiles circularity

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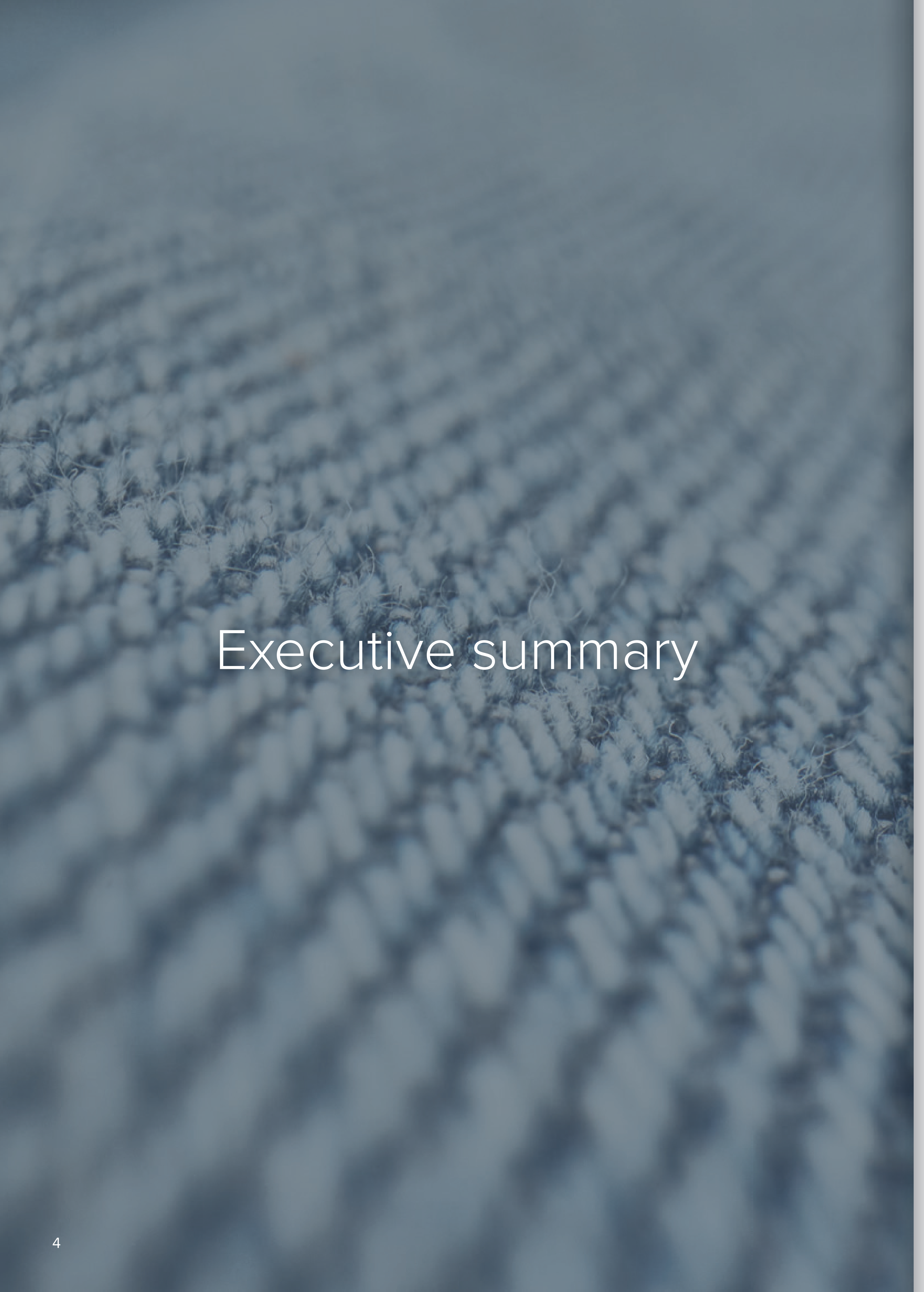


Executive summary

The global textile fiber market, which is now estimated to be worth €270 billion, is an essential part of the global economic landscape. However, as textile production has doubled worldwide in the last 20 years, it is also an industry putting tremendous strain on our already dwindling virgin resources and compromising the health of our planet. Today, the textile industry is one of the largest contributors to global emissions, releasing an alarming 1 gigaton (Gt) of carbon dioxide (CO_2) into the atmosphere each year - accounting for approximately 3% of the world's total emissions.

Inevitably, with rising production rates comes increasing waste. To improve textile circularity, the Resource Hierarchy emphasizes the importance of waste prevention and reduction as top priorities. Over-production and over-consumption are the main causes of post-consumer textile waste, which accounts for 85% of the textile waste generated in both Europe and North America. In fact, in Europe alone, over 15 kilograms[1] of textile waste is generated per person per year, with the largest proportion being clothes and household textiles.

Reuse and repair are placed on one of the top tiers of the Resource Hierarchy when it comes to tackling post-consumer textile waste, followed by closed-loop recycling as the best approach to ensure that materials are returned to the production cycle and used to create new products of the same or similar application. Currently, however, only 1% of textiles that have reached the end of their lifecycle are recycled in a closed loop. The remaining textile waste (over 90%) ends up in landfills, burned in incinerators, or downcycled into lower-grade applications, such as cleaning rags or insulation.

As it stands, the designing, manufacturing, consuming and then disposing of textiles moves in a linear fashion — non-renewable, virgin materials are extracted and used to create textiles that are designed to feed into society's demand for 'the next best thing'. To keep up with that consumer demand, textiles are rapidly produced according to fleeting trends with low quality materials that further decrease their lifespan. They are then priced inexpensively and once bought, they are used, or buried in wardrobes, and discarded far too quickly to be worthy of the detrimental impact their production has had on the environment. This is an immense problem, but it can also be seen as an immense opportunity to take action.

To create a circular textiles value chain, all stakeholders must collaborate to transform design and production processes, improve technological efficiencies, and alter the way consumers purchase, use, and dispose of textiles. Stakeholders willing to transition to a circular textiles value chain prioritize designing and manufacturing textiles for durability and longevity with sustainable and recycled fibers. Additionally, when these textiles are collected, sorted, and recycled in a closed loop, they can reduce the environmental impact of the textile industry and create a more profitable and resilient business model.

To address the relentless growth of fast fashion, textile production, and its subsequent waste, bold and collective action must be taken. We must work collaboratively to create and implement innovative sorting and recycling technologies.

Over the last few decades, TOMRA has dedicated itself to the development of sensor-based collection and sorting solutions for plastic recycling. It continues to be committed to building on this proven technology by providing automated fiber sorting technology to bridge the gap between collected textile waste and the amount of it that gets recycled with emerging fiber-to-fiber recycling systems. TOMRA is dedicated not only to the further development of the technologies that enable fiber-to-fiber recycling, with the aim to eventually implement those advancements globally, but to the continuous collaboration with stakeholders across the value chain that is necessary to build a true circular value chain for textiles.

In this white paper, we identify and highlight 4 key beliefs to underpin a new, circular textiles value chain: These key beliefs cover:

#1 **Supportive policy, legislation, and incentives** to guide and motivate the shift towards circularity in textiles

#2 **Cross-industry collaboration and business model innovation to support profitable and long-term value creation across the textile value chain**

#3 **Investments to scale infrastructure for automated sorting and mature recycling technologies** to enable fiber-to-fiber textiles across material types and compositions

#4 **A robust digital core to capture data and insights across the textile value chain** to allow for transparency and traceability and keep consumers, industry players, and regulators informed

In summary: 4 key beliefs to enable textiles circularity

#1 Supportive policy, legislation, and incentives

Develop supportive and effective policy solutions (based on global experience and evidence-based practice) that prioritize the Resource Hierarchy*, facilitate the implementation and scaling of relevant infrastructure and mature technologies to minimize the industry's reliance on virgin materials. Create legislation that sets ambitious, mandatory eco-design and waste management targets, and provides guidance and encouragement in the transition towards a circular economy for textiles.

#2 Cross-industry collaboration and business model innovation

Initiate collaboration between key players in the value chain to overcome silo mentality and stimulate innovation and systemic improvements through the exchange of knowledge and data. Strengthen the connection between policymakers and industry to accelerate investment in profitable and sustainable solutions that establish innovative, circular business models and generate value for all stakeholders.

#3 Investments to scale infrastructure for automated sorting and mature recycling technologies

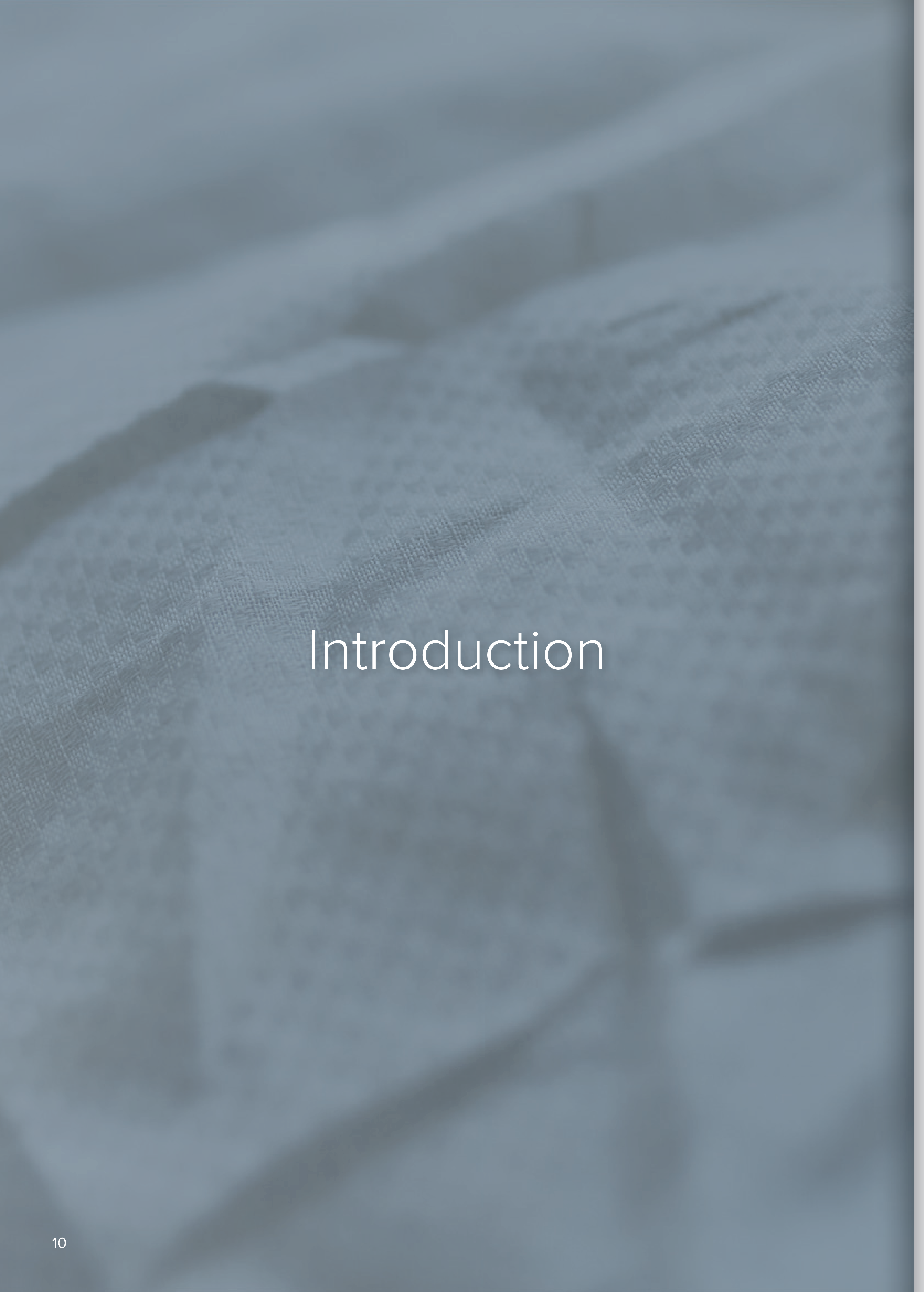
Utilize existing as well as emerging technologies to enable textile waste collection, sorting, and fiber-to-fiber recycling. Invest in the scale-up of circular infrastructure, such as automated sorting facilities, to produce high-quality feedstock (textile waste that is fed into the recycling process to create new products) and enable textiles of various materials and compositions to be recycled into new fibers. Complement closed-loop mechanical recycling with various chemical recycling technologies to increase efficiency.

#4 A robust digital core to capture data and insights across the textile value chain

Increase transparency and traceability across the textiles value chain with the establishment of a digital core. Provide consumers, industry players, and regulators with product-specific sustainability data to expand knowledge and awareness around the lifecycle and impact of textiles. Inhibit brand ability to greenwash, while positively informing consumer choices and behaviors.

When these four core principles are realized, we expect to see a thriving marketplace. This marketplace will be characterized by well-defined policies that govern the collection, sorting, and recycling of textiles. It will also offer incentives to off-takers who actively engage in acquiring recycled materials. Ultimately, this will establish a new circular value chain that benefits all stakeholders within it.

* View the Resource Hierarchy on page 27.



Introduction

From function to fashion – textiles have formed part of the daily fabric of society for thousands of years. Textiles are an important part of expressing who we are and showing our individual personalities. Not only are they a form of artistic expression, but they are also the material used by craftspeople, engineers, and innovators across cultures to create the essential items that we use in our everyday lives. In short, textiles are everywhere.

These interlacing fabrics, whether made from natural (e.g., cotton) or man-made (e.g., polyester) fibers, encompass a diverse range of products and applications. That diversity, however, is a double-edged sword: It makes the textiles industry one of the most vital to our economy, employing approximately 300 million[2] people around the world, but it also renders it one of the most resource-heavy and, as such, one of the most harmful to the health of the environment.

The state of textiles today

Global fiber production for textile manufacturing has almost doubled in the last 20 years, reaching 109 million tonnes in 2020[3]. In Europe*, the textiles industry is the fourth biggest4 consumer of primary raw materials and water following food, housing, and transportation. Due to the remarkably low rates of reuse and recycling, Europe generates approximately 6 million tonnes of post-consumer textile waste annually. That number is expected to reach more than 7 million tonnes by 2035[5].

The vast majority of textiles production is based in the Global South, where workers are paid substantially lower wages, contributing to the lower manufacturing costs – a fact that illustrates how consumers in the Global North have access to relatively inexpensive clothing. According to the European Parliament, 59%[6] of clothing and footwear imported by EU countries were produced outside the EU in 2019, while 41% were from other EU countries. In reality, many of the imports from within the EU had been re-exported from outside of the EU, meaning the actual share of textiles consumed in the EU but produced elsewhere is around 80%. Of course, there are advantages and disadvantages to the status quo. On the one hand, it provides jobs and economic growth in the developing countries of the Global South. On the other hand, it shines a light on the unequal power dynamic between the 'consuming' Global North and the 'producing' Global South.

*This white paper provides an in-depth look at textiles circularity, particularly with regards to post-consumer textile waste, drawing on the latest EU-centric data and research.

Most of the carbon emissions released from the textiles industry come from the manufacturing of textiles, fiber and yarn production, and wet processing in particular[7]. Whether producing natural or man-made fibers to eventually manufacture clothing and other textiles, the amount of land, water, and fossil fuels required in textiles production is enormous. Harvesting cotton, for example, which is the second most produced fiber in the world, uses 2.5%[8] of the world's cultivable land, and is estimated to account for 16% of the world's pesticide usage and 4% of its fertilizer usage. On the other hand, synthetic fibers, like polyester, which is the most produced fiber in the world, account for approximately 20-30%[9] of the world's microplastic pollution. Estimates also indicate that 25%[10] of all freshwater pollution comes from treatments (e.g., dyeing) used in textile production.

The picture does not become prettier during the use phase of a textile's lifecycle. According to the UN Alliance for Sustainable Fashion, half a million tonnes of plastic microfibers[11] (the equivalent of 50 billion plastic bottles) are released into the ocean every year from washing textiles over their lifetimes. Hundreds of thousands of microfibers are flushed out with the wash water, and due to their small size, microplastic particles pass through filters during wastewater treatments, ending up in our water supply, and even in our food chain. According to recent research, humans consume approximately 5 grams of plastic particles every week[12]. According to that same research, that is the equivalent of a credit card.

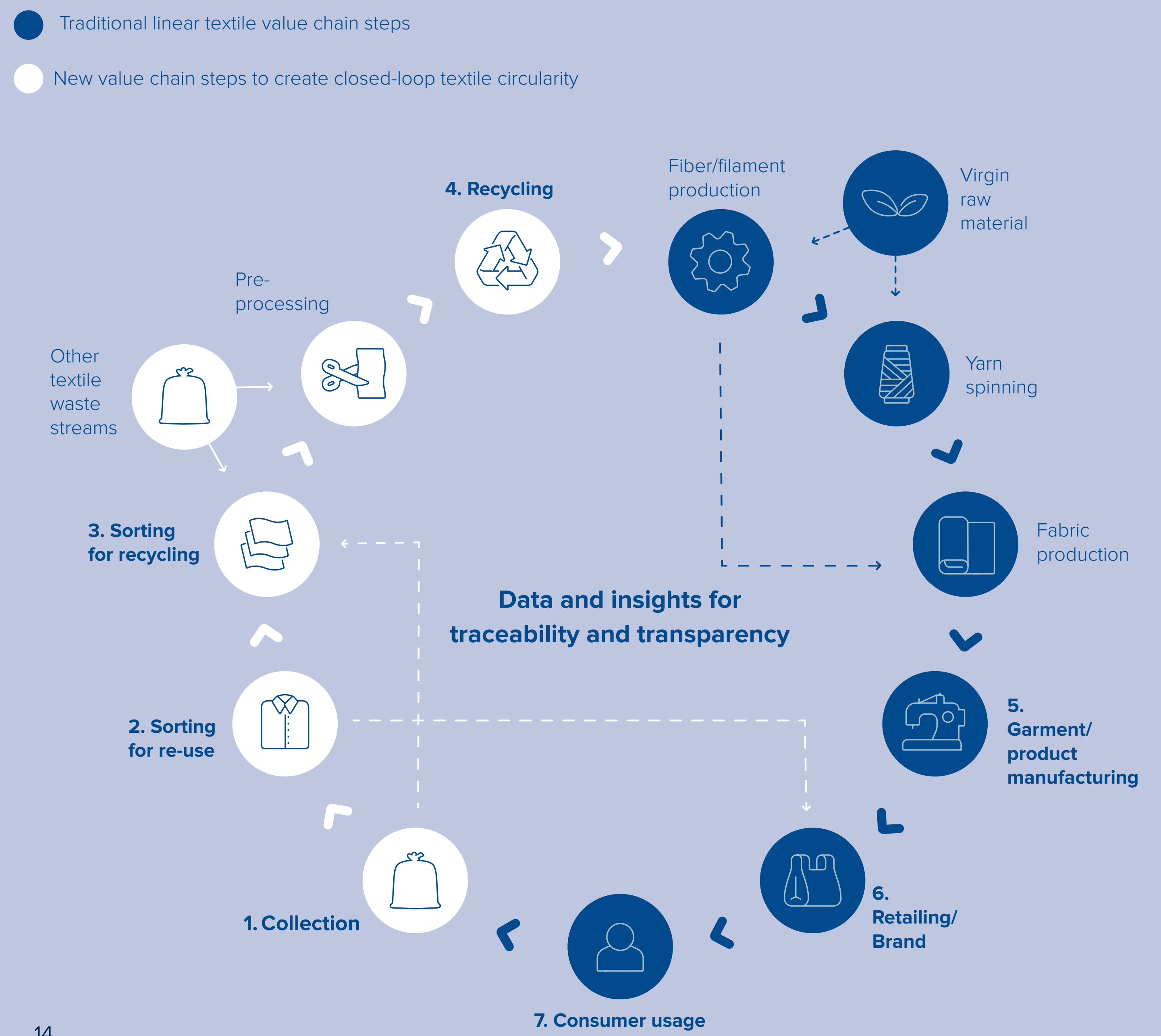
As the biggest driver of textile product demand, a real shift in consumer mindset and behavior has the power to create a ripple effect throughout the textiles value chain. Consumers have tremendous influence on the way in which suppliers and brands move to create more circular business models, such as by demanding more products be made with recycled fiber. However, their influence does not end there.

Around 88% of Europeans think that clothing should be made to last longer[13]. A few ways consumers can increase the lifespan of their textiles is by ignoring the trends and choosing quality over quantity. They can also choose to purchase items made with mono-materials, ensuring that those items can then be recycled in the future. In addition, consumers can learn how to take care of those products in a sustainable way during use (by reducing how often those products are washed and dried, for example), as well as after their original use has been fulfilled (either by repairing and repurposing those products, or by ensuring that they get sent for recycling). Industry and government can collaborate here to strengthen consumer awareness on the environmental impact during textile use and disposal phases.

After production and use, only a small amount of textile waste is collected, with much of it being disposed of in landfills or incinerated. Of the limited amount that is collected, some is exported to the Global South, where it is often processed under hazardous and unsanitary conditions. In a circular textiles value chain, textile waste would not be exported and would instead be collected, sorted, and either reused or recycled in a closed loop. This would not only lessen the amount of CO_2 released into the atmosphere due to fewer new materials being produced, but it would also significantly reduce the amount of air, water, and soil pollution produced during each phase of a textile's lifecycle.

From linear to circular: transforming the textiles value chain

The textiles value chain refers to the collective string of activities and processes that enable the production, use, and disposal of textiles. Included in these processes are stakeholders such as designers, manufacturers, distributors, brands and retailers, consumers, sorters, and recyclers. Essentially, the value chain covers all phases of a product's lifecycle - from raw material production and energy use through to disposal. It also encompasses the activities linked to value creation, such as policy and legislative frameworks, new business models, and investments to scale technologies and infrastructure.



1. Collection
Access to textile waste is driven by increased collection rates: in Europe, rates are expected to increase significantly, from 30-35% to 50-80%, due to stringent regulations. In the United States, rates are predicted to increase from 15% to 30-40% by 2030.

2. Sorting for reuse
As the quality of materials collected for reuse decreases, more capacity is needed to sort and recover all the reusable items. As such, the sorting capacity for reuse needs to be expanded. In Europe, this would require approximately 4 - 5 times more capacity than the current sorting capacity, and 3 times more capacity than the current retail reuse capacity.

3. Sorting for recycling
As the proportion of reusable quality in the overall volume of collected textiles continues to decline, a larger share is available to automated sorting technology for recycling purposes. Sorting for recycling must be established from 0 to 2 million metric tonnes in Europe, which corresponds to 40 times the capacity for each site (at 50 thousand tonnes).

4. Recycling
Demand for automated sorted material has significantly increased, driven by the maturation and scaling of downstream recycling technologies, and contracts for delivery of the material by 2024/25 have already been signed. A European recycling scenario of 65% collection needs 1.4 million tonnes of fiber-to-fiber recycling.

5. Garment production/manufacturing
Recycled yarns are used to manufacture a wide range of clothing items, from T-shirts and jeans to outerwear and accessories.

6. Retailing/brand
Brands that are committing to ambitious targets for recycled fibers and signing long-term captive demand contracts are driving an increased demand for recyclable materials. If brands meet their targets for recycled content by 2030, demand will be twice as high as the supply.

7. Consumer usage
Consumers who are increasingly conscious of the environment are driving both access to textile waste (through higher collection rates) and demand, as they wield their influence and urge brands to be more sustainable.

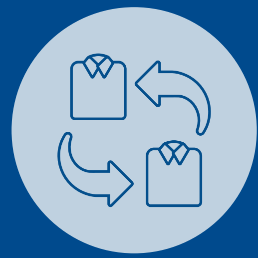
Key stakeholders responsible for achieving textiles circularity

Policymakers and legislators must collaborate with leaders in resource management to introduce and reinforce policies such as extended producer responsibility (EPR) schemes and robust waste management infrastructures. They should also utilize economic instruments, such as tax breaks and subsidies, to promote textiles recycling.

Brands, designers, and manufacturers must make sustainable decisions from concept phase (e.g., designing textiles based on longevity, not trends) to production phase (e.g., designing for re-manufacturing, sorting, and recycling by using high-quality materials and incorporating recycled fibers, including mono-materials that are easier to recycle and reuse).

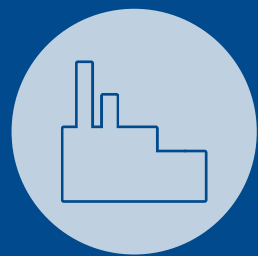
Approximately 80%[14] *of a textile product's environmental impact, positive and negative, is dictated in the design phase.*

Retailers should encourage designers and brands to create more sustainable textiles, for example, by giving more store space to products that are verified as sustainable.



Textile collectors must take measures to minimize landfill and incineration by implementing collection systems that place value on reuse and fiber-to-fiber recycling to help close the loop.

Sorters and recyclers must invest in, and upgrade sorting technology and infrastructure, as well as existing mechanical and emerging chemical recycling technology to maximize the recovery of valuable materials and enable high-quality feedstock for fiber-to-fiber recycling.



Waste management companies must design and implement strategies to ensure that textiles are properly sorted and collected for reuse, repair, recycling, or disposal. They will also need to ensure that all collection sites are properly maintained and that the textiles collected are of the highest quality.

Investors should invest in infrastructure to support collection, sorting, and fiber-to-fiber recycling systems, thereby supporting the industrial sector and creating jobs to boost the economy.

Consumers can take steps to make their everyday use of textiles more sustainable. Every purchase has the potential to impact environmental trends, so it's advantageous to purchase items that are designed to be recycled and made with recycled materials whenever possible.

The **media** can help to educate the public about the importance of separating and recycling textiles. This can include providing information about the types of textiles that can be recycled, as well as providing information about the benefits of recycling textiles. The media can also play a role in keeping all stakeholders accountable.

Circularity interrupted: today's challenges

From policymakers and brand owners to the public - stakeholders recognize the urgent need to implement solutions to overcome the bottlenecks that prevent textiles circularity. Consumers can make a substantial positive impact by transitioning from the throwaway culture of fast fashion to purchasing sustainable, high-quality products and extending their use through repair, repurposing, or recycling. This shift away from overconsumption represents a significant step towards improving the status quo in the fashion industry. However, there are challenges further upstream that must be addressed to achieve true circularity for textiles.

Gaps in policy and legislation

Despite its huge market power and impact on environmental health, policy measures taken on the textile industry are currently limited. Given the sheer volume of post-consumer textile waste produced annually, there is an urgent need to implement more effective policy frameworks to create market certainty and stimulate investments in the infrastructure needed to close the loop.

Implementing policies such as EPR with eco-modulated fees, as well as supporting policy measures, such as the introduction of legislation with mandatory eco-design (e.g., design for recycling) for textiles, as well as measures to ensure reliable, comparable, and verifiable environmental information on products (including, clear criteria on green claims, independent verification, and labelling schemes) will reinforce sustainable waste management and stimulate the industry to increase its use of recycled fibers, all while securing demand and investments in infrastructure for fiber-to-fiber recycling.

Lack of cross-industry collaboration

Systemic change requires an 'all-hands-on-deck' approach. The more stakeholders share their experiences, knowledge, and insight, and merge them with complementary skills and ideas, the more powerful, innovative solutions will emerge. As it stands, many stakeholders are disconnected from other parts of the value chain and their inability to see beyond their own activities, processes, and goals contributes to the fragmented value chain of today.

Silo-thinking renders different market players unable to make educated, strategic decisions that benefit every stakeholder – and the environment – and it will only continue to deter improvements and innovation, ensure missed economic opportunities, and ultimately hinder the successful transition from a linear economy to a more circular one. Now is the time for stakeholders to go beyond their usual limits and find new ways to innovate, become empowered, and receive support.

Low collection rates

Textile collection rates are low (in the EU, they are around 30-35% and in the US they stand between 5 - 15%[15]). If textiles are collected, most are collected for reuse, with a very small percentage collected for recycling. In the EU, for example, consumers drop their old textiles off at designated curbside bins or bring-back sites, which are typically run by the charity sector. These textiles are then manually sorted and graded for reuse.

In a new, circular textiles value chain, reusable textiles would still get sorted and reused, however, instead of downcycling non-reusable textiles, or sending them to landfills and incinerators, they would get prepared for fiber-to-fiber recycling and eventually be turned into new textiles products.

Lack of sorting and recycling infrastructure

Currently, only 1% of textiles are recycled back into new textiles, while 12% are downcycled and the remaining 85% end up in landfills or incinerators. Of the 97% of textiles made with virgin feedstock, cotton (25%) and plastics (63%) make up the majority, while only 2% are made from recycled materials. That recycled material is predominantly made up of recycled polyethylene terephthalate (PET) bottles, which interferes with PET's own closed-loop (bottle-to-bottle) process flow.

To decrease raw material production (and the associated environmental impacts) and reduce the amount of textile waste that ends up landfilled or incinerated, closed-loop, fiber-to-fiber recycling is essential. As it stands however, the demand for recycled materials significantly outweighs the available supply, and access to feedstock is the main bottleneck. Automated sorting on a large scale can be an effective solution to this problem, however significant investments are needed in order to enhance the accuracy and capacity of this technology, ultimately unlocking the full potential of fiber-to-fiber recycling.

Why plastic bottles don't belong in textiles

The use of recycled plastic bottles to make textiles (bottle-to-fiber recycling) has become a common practice in the textiles industry. Crucially however, this process falls short of the full potential of closed-loop recycling, where materials can be turned back into the same type of product repeatedly.

Thecnically, PET bottles have the remarkable ability to be recycled multiple times and transformed into food-grade bottles, which makes them safe to store the drinks we consume. However, when these bottles are used to produce textiles, their material becomes permanently embedded the fabric. Unfortunately, current technology does not enable us to restore the PET from fabric back to its original food-grade quality, thus limiting it to be used only in this lower-grade application. In addition, the presence of PET in the textile supply chain reduces the demand for and investments in recycled fibers, which further impedes the establishment of a circular economy for textiles. It is clear: fiber-to-fiber recycling is the only way to ensure true circularity for textiles.

Fortunately, there are brands making efforts to become more sustainable in their production. For example, in its latest sustainability report, 'Planet Report', outdoor clothing company Ortovox[16] has highlighted that it will focus on exploring textile-to-textile recycling in the future instead of using PET bottles to create its products.

Insufficient transparency and traceability

Lack of data transparency and textile product traceability hinders necessary system improvements and technological upgrades in the textiles value chain. In addition, it enables stakeholders to lay false claims of sustainability, rendering it near impossible for other stakeholders and consumers to identify and select sustainable partners or products.

Increased data transparency and traceability would not only help to build an accountable value chain, but it would allow stakeholders to optimize current processes by highlighting key areas of improvement. For example, it would provide recyclers with information on the source, composition, and chemical content of their feedstock, which would enable them to optimize material recovery. Furthermore, brands would be able to trace their materials back to their source and keep track of every step in between, thus satisfying consumer sustainability demands.

Lack of brand commitment

In the past, many brands focused on short-term goals, rather than long-term objectives, in order to reduce costs and remain competitive. This has resulted in the industry's dependence on unsustainable practices, such as the overuse of natural resources and the exploitation of workers. But, as resources become scarcer, brands are being forced to invest in sustainable practices and commit to long-term targets up-front. In fact, 44 out of the top 100 brands have set a goal of an 89% average replacement rate of recycled polyester by 2030. Furthermore, 50% of fashion brands are currently setting ambitious targets, with 1081 having approved targets and 288 taking action.

It is important to note, however, that these commitments are essentially empty without investment in the necessary infrastructure. Collection, sorting, and recycling are all vital steps in the process, and without them, the commitments are not achievable. Therefore, in addition to making commitments, brands need to support the system by helping to fund it.

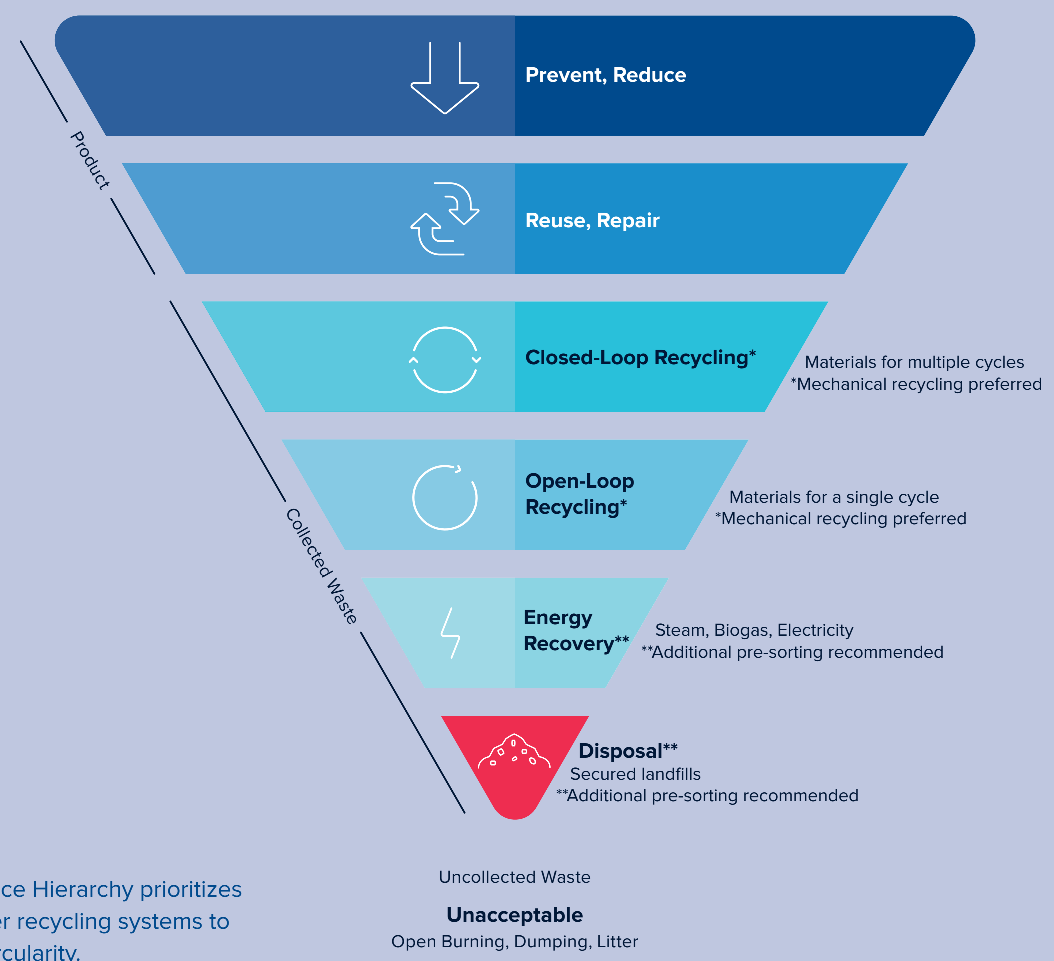
4 key beliefs to enable textiles circularity

#1 Supportive policy, legislation, and incentives

When it comes to reshaping the textiles value chain, prioritization must be given to the top tiers of the Resource Hierarchy: using less, reusing more, and collecting, sorting, and recycling the rest. To achieve this, industry and governments must establish effective systems for the collection, sorting, and fiber-to-fiber recycling of textile waste. Legislation provides a framework to create those systems and stimulates the investments in technology and infrastructure that are needed to close the loop on textiles.

The EU Waste Framework Directive has legislated that EU Member States must set up separate collections for textiles by 2025. In order to achieve this, textile waste must be kept in the EU, and Member States must ensure that there are efficient, environmentally-sound systems and technology in place to manage this waste. The ability to expand collection infrastructure and scale-up automated sorting and recycling, and ultimately ensure that textiles remain in circulation, will require an appropriate legislative push.

The Resource Hierarchy



The Resource Hierarchy prioritizes fiber-to-fiber recycling systems to advance circularity.

The EU's vision for the future of textiles

In March 2022, the European Commission published its EU Strategy for Sustainable and Circular Textiles, proposing necessary actions to improve the way textiles are designed, produced, consumed, and disposed of. If these actions are followed up with the ambitious targets and well-designed policies required, they have the potential to achieve the systemic change required to advance textiles circularity.

The strategy covers vital actions to address eco-design, requirements for minimum recycled fiber content, and waste management (e.g. limiting the export of textile waste and banning the destruction of unsold or returned textiles), with the support of legislation (e.g. implementing EPR with eco-modulated fees), digitalization (e.g. enabling transparency with digital product passports), existing and emerging technological solutions, and new, circular business models.

Over the course of the last year and a half, the European Commission has introduced several legislative proposals to implement the objectives of the EU Textiles Strategy. Of particular relevance, in March 2022, it introduced a proposal for an Ecodesign for Sustainable Products Regulation[17], which aims to establish a framework to enhance the eco-design of products, by setting performance requirements (repairability, recyclability, recycled content, etc.) on specific products or product groups, as well as a digital product passport. Once the Regulation is adopted (expected in 2024), textiles will be one of the priority sectors for which such eco-design requirements will be set, with the aim of ensuring that they are designed to be more durable and recyclable.

Furthermore, in July 2023, the European Commission brought forward a proposal[18] to revise the Waste Framework Directive (WFD), focusing on downstream aspects of the textiles sector, among others. The Commission's proposal would strengthen and clarify the aforementioned separate collection requirement, introduce mandatory EPR schemes with eco-modulation of fees that would cover the collection, transport, and sorting of waste textiles, and prioritize the fiber-to-fiber recycling of items that are unsuitable for reuse. Despite calls from stakeholders and the European Parliament, the proposed revision of the WFD does not however set numerical targets for reuse and recycling of textiles.

EPR - a catalyst for change upstream and downstream

Seen as a guiding policy principle for preventative environmental policymaking, EPR ensures that companies – referred to as producers – are responsible for the collection, sorting, and recycling of its waste. Essentially, the producer takes financial and organizational responsibility for the waste it produces and contributes to the setup and infrastructure necessary for circular resource management. EPR schemes would also help finance the necessary scaling up of collection, sorting, and recycling infrastructure, in line with the 'polluter pays' principle.

EPR with eco-modulated fees ensures that producers pay less for textiles that have lower waste management and recycling costs. EPR schemes assign producer fees based on design-for-recycling criteria and/or the percentage of recycled fiber content. Textiles that are difficult to recycle therefore incur higher EPR fees, while mono-material products that are easier to sort and recycle result in lower fees.

While the goal of design-for-recycling is for a product to be both technically recyclable and effectively recycled, the integration of recycled content into a product goes a step further in achieving circularity. New design requirements for textiles under the Eco-design for Sustainable Products Regulation have set mandatory minimums for the inclusion of recycled fibers in textiles, rendering them easier to recycle. Under the proposed regulation, the destruction of unsold products under certain conditions would be banned, including unsold or returned textiles.

Until recently, the sole mandatory Extended Producer Responsibility (EPR) scheme in the EU was in France. This scheme, established in 2007 and legislated in 2020, is overseen by ReFashion[19], a non-profit organization funded through eco-contributions from brands. Initially designed for collection and sorting for reuse, it covered only a fraction of the end-of-life costs. However, upcoming changes will broaden its scope to include funds for collection and sorting for recycling, as well as fiber-to-fiber recycling.

Effective July 1, 2023, the Netherlands has implemented its own comprehensive EPR framework for textiles. This regulation encompasses manufacturers within the country, regional retailers, and foreign retailers catering to Dutch consumers. Significantly, it also applies to importers introducing textiles into the Dutch market, ensuring thorough oversight of the entire textile industry.

Setting meaningful recycling and recycled fiber content targets

Policies, such as EPR, to address textile waste also need to include mandatory targets that directly stimulate the demand for high-quality feedstock and investments in the infrastructure that will ensure high volumes of that high-quality feedstock. These targets are a powerful tool in advancing circularity and reducing dependency on virgin materials.
As it stands, the Waste Framework Directive currently sets a separate collection obligation without specific recycling targets for textile waste. In order to ensure that the collected textile waste is indeed recycled, the EU must set mandatory recycling targets for textile waste, following the approach set for other waste streams. Recycling targets will boost the supply of secondary raw materials and should take into account the share of reusable and non-reusable textiles.

Recycled content targets would promote the uptake of recycled materials in textiles, and would drive the demand side for recycled materials, as well as create the predictability the recycling industry needs to engage in long term infrastructure investments.

By applying a holistic approach to textiles waste management, industry and government can collaborate to create supportive policy frameworks, legislation, and incentives that ensure textiles are able to be effectively recycled in the markets where they are placed.

4 key beliefs to enable textiles circularity

#2 Cross-industry collaboration and business model innovation

To transform the value chain from the inside out, shifting from silo mentality to a collaborative mindset must be at the forefront of stakeholder efforts. This means open dialogue, alignment, and action among different parts of the textiles industry of course, but it also includes communication between other industries, such as the waste management sector, as well as between business leaders, investors, and consumers. In this way, all stakeholders have the ability to make decisions based on a holistic view of the value chain, rather than from their own silos.

Currently, there are many successful examples of collaboration, but the concept is still in its infancy. It is time to stand together behind our unified goal, and the United Nations' 12th Sustainable Development Goal: to ensure sustainable consumption and production patterns by 2030.

Creating shared value

Collaboration plays a critical role in optimizing the eco-effectiveness of the entire value chain. It not only provides stakeholders with exposure to varying levels of expertise and resources, but it also provides them with unprecedented opportunities to explore innovative ideas to improve existing solutions as well as create new, more resource-efficient business models. Collaboration can also help to establish unified standards on data collection and performance reporting to produce accurate information and increase transparency – critical components of a circular economy.

> Renewcell has been actively involved in transforming the value chain for textile waste for over 5 years, and it is evident that collaboration across the value chain is crucial in accelerating this change. The proposed EU legislation, which is expected to result in increased collection rates, combined with the growing recycling capacity in Europe and worldwide, further emphasizes the importance of this transformation. Renewcell is currently engaged in several projects aimed at establishing an efficient value chain for textile waste as feedstock for recycling operations, and we see TOMRA as a key partner in expanding the collection and sorting necessary for recycling not only in Europe, but also globally. It is essential that if a garment cannot be reused or resold, we ensure that the ecosystem for salvaging those fibers from incineration or landfills is active, and that they are recycled back into the textile value chain.
>
> **Martin Stenfors, Head of Strategy and Sustainability at Renewcell**

In addition, collaborative partnerships can help overcome barriers to scale technology and infrastructure by providing the necessary financial support. Moreover, collaboration between industry and policymakers can transcend national borders and initiate more policy frameworks, and stronger governance of those policies, for the implementation and success of circular solutions.

Ensuring successful collaboration

Successful, balanced collaborations are united by a shared strategic goal and harness collective capabilities by building on each party's strengths. Good partnerships are mutually beneficial and have the infrastructure and processes in place to provide a strong foundation for collaboration. This could include a team of representatives from all parties who are involved in the design of the partnership, from defining the objectives and considering the myriad of operational logistics and potential pitfalls, to developing road maps that highlight potential future projects.

For collaborative ventures to thrive, all parties must agree on what kind of information and resources will be shared and how. They must align on standards for this data exchange, agree on rights over data access and ownership, and use the same metrics and performance-management systems.

> "Huge progress has certainly been made over the last decade in terms of advancing the collective understanding, need and demand for fiber-to-fiber recycling as an enabler for circular materials and achieving significant CO2 reductions in raw materials production. While technical, economic and social challenges are still cited as major hurdles to feasibility, a broad range of solutions to overcome them are underway. It's essential that all stakeholders take an active role in driving the textiles industry over the circularity innovation hump by investing in and implementing the required changes. Only then will we all start realizing circularity's benefits, such as, reduced material cost volatility, lower working capital and finance costs, closer engagement with customers, and, of course, real progress toward net zero targets.
>
> **Cyndi Rhoades, CEO, Circle-8 Textile Ecosystems and Founder, Worn Again Technologies**

Collaboration in action

Collaboration underpins every aspect of creating a new, circular value chain. Whether it is partnering up on pilot projects with the aim of enabling fiber-to-fiber recycling, like TOMRA's collaboration with Stadler to build the world's first automated sorting facility for textiles (explored in detail on page 17) or working together to produce high-quality materials from recycled textiles – like Renewcell's partnership with Kelheim Fibres[20]. This collaboration resulted in the successful commercial production of Renewcell's 100% textile recycled material, Circulose (made with pre-worn jeans and t-shirts), and spurred further collaboration with fashion brands like Levis and H&M. Today, Renewcell operates an industrial-scale, textile-to-textile recycling plant in Sweden that plans to recycle the equivalent of more than 1.4 billion t-shirts every year by 2030[21]. With the aim of opening similar facilities in other parts of the world, this startup could potentially replace millions of tonnes of new fabric with recycled material.

Circle-8 Textile Ecosystems[22] is collaborating in the ACT UK project, a two-year initiative led by the UK Fashion and Textile Association, to advance circular textiles. With a budget of £4 million, the project aims to design and develop a 50 000 tonne per year automated sorting and pre-processing facility for non-reusable textiles in the UK, employing technologies such as AI, optical scanning, and robotics. This will enable thousands of tonnes of textiles to be diverted from landfills and incineration.

Additionally, a multi-enterprise collaboration involving specialty fibers provider, Lenzing, ARA (Altstoff Recycling Austria AG), textile service provider Salesianer Miettex and Caritas, and Swedish pulp producer Södra aims to collect and reprocess textile waste unsuitable for reuse to produce pulp (OnceMore® pulp) and eventually create new lyocell and viscose fibers. By combining resources and technology and setting ambitious targets to reach an annual processing capacity of 50 000 tonnes of textile waste by 2027 these companies set a positive example for others to follow.

Ultimately, successful collaboration is the only way to ensure a global transition towards a circular textiles value chain – one that is environmentally sound and economically favorable for all stakeholders.

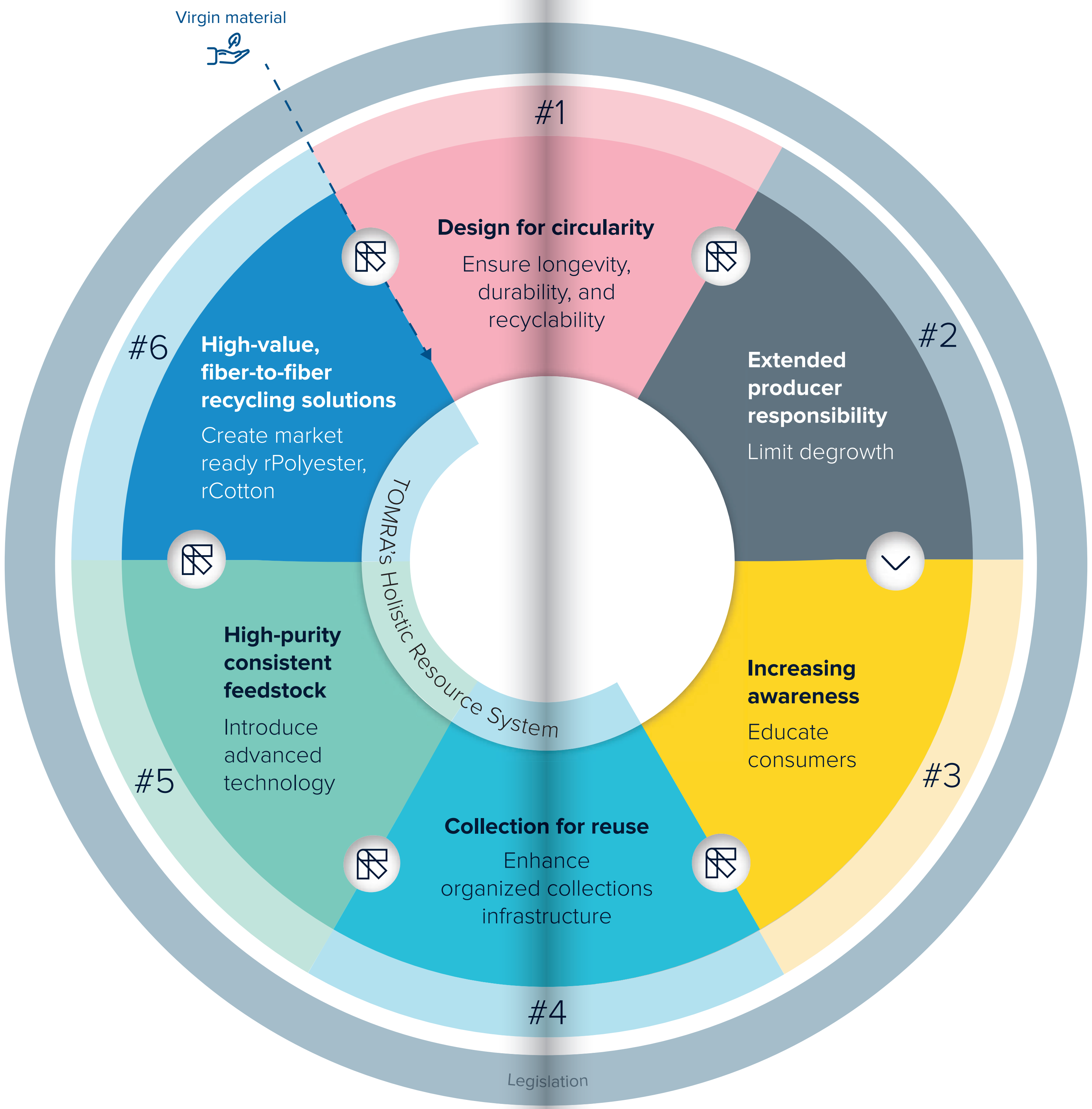
4 key beliefs to enable textiles circularity

#3 Investments to scale infrastructure for automated sorting and mature recycling technologies

In a circular value chain, the entire lifecycle of a textile product is considered. The product is designed for longevity as well as recycling, incorporating sustainably-sourced materials and a portion of recycled fiber content. Once the product is placed on the market, consumers have access to accurate information regarding the materials and processes that went into manufacturing and distributing that product. This ensures that those consumers can make purchasing decisions that reflect their desire for sustainability. Once that product has fulfilled its original purpose, it is collected, automatically sorted, and eventually recycled to make new textiles (closed-loop or fiber-to-fiber recycling).

> “Automated sensor-based sorting enables us to accurately sort and categorize a bale of mixed materials, into high-purity single material products, to suit multiple different recycling technology feedstock specification requirements.”
>
> **Louisa Hoyes, Director Strategic Partnerships, TOMRA Textiles**

What a circular textiles value chain looks like



1 • Design for circularity
Underpinned by extended producer responsibility (EPR) schemes, textiles are designed with longevity, durability, and recyclability in mind and incorporate the use of recycled fibers.

2 • Extended producer responsibility
Textiles are released and sold to consumers in a variety of outlets, including retail stores, e-commerce sites, etc.

3 • Increasing awareness
Consumers are offered clear and accurate information on the products they buy to inform their choices and raise their awareness around sustainability.

4 • Collection for reuse
Used textiles are collected for reuse and fiber-to-fiber recycling via organized collection infrastructures.

5 • High-purity consistent feedstock
Collected materials are identified and sorted using existing, advanced technology to produce consistent, high-quality feedstock.

6 • High-value, fiber-to-fiber recycling solutions
Sorted materials are turned into market-ready rPolyester and rCotton to make new textiles via fiber-to-fiber recycling technologies.

Designing products for longevity and recyclability

The first opportunity to achieve circularity for textiles occurs in the design phase, when decisions that affect longevity and recyclability are made, such as choosing quality materials that will last, and implementing design elements to facilitate easy material separation. At this stage, it can also be determined whether a textile product will incorporate complex combinations of fibers, such as natural and synthetic fiber blends, and components, such as labels, buttons, and zips, which will affect how easily a textile product can be sorted and recycled.

Textile recycling can be categorized into two major practices:

Closed-loop recycling (fiber-to-fiber)

Textile waste is recycled again and again, creating new textiles (of the same or similar application).

This ensures materials are kept in constant circulation, decreasing raw material production and reducing the amount of textile waste that ends up landfilled or burned.

Open-loop recycling

Textile waste is recycled into products that are distinct from the original (downcycled for less demanding applications such as carpet fibers and insulation), merely delaying disposal.

Eventually, materials reach a point where they can no longer be recycled and must be disposed of in landfills or incinerators.

“The European Union’s strategy for sustainable textiles emphasizes the need to make old fibers into new fibers, and not plastic bottles into fibers.”

Vibeke Krohn, Head of TOMRA Textiles

In accordance with the Resource Hierarchy, waste reduction and reuse should always be prioritized first. However, when there is no way to avoid textiles from becoming waste, fiber-to-fiber recycling offers a viable, existing solution to ensure that waste is dealt with in a sustainable way.

Generally, fiber-to-fiber recycling technologies can be separated into four archetypes: mechanical, thermo-mechanical, chemical, and thermo-chemical. While mechanical recycling remains the most environmentally-friendly closed-loop recycling process[24] and, when technically possible, should be the preferred method, there is potential to reduce textile disposal in landfills and incinerators, and increase the quality of feedstock, with emerging chemical recycling technologies.

The complementary role of chemical technologies in fiber-to-fiber recycling

In addition to complementing mechanical recycling in plastic waste streams, chemical recycling (a broad term that includes several emerging technologies and processes that convert textile waste into feedstock for new textiles) can play an important role in achieving circularity for textiles. As it stands, more than 50% of the textiles put on the market today are made of synthetic fibers, and this percentage is set to increase. Although chemical recycling technologies are still in their infancy, they have the potential to produce material output of the same or similar quality to that of virgin material.

Currently, there are limitations for mechanical recycling processes when there are multiple materials in one textile product (e.g., a cotton t-shirt with polyester embroidery). Chemical recycling technologies produce high-quality fibers for cotton, polyester, and nylon. In fact, the most advanced and scaled recycling technology today is used at Renewcell. This chemical cotton recycling process takes waste cotton and other cellulosic materials, like viscose, and chemically recycles it into man-made cellulosic fibers such as viscose.

Chemical recycling technologies could also have the potential to recycle natural and synthetic fiber blends (e.g., 20% polyester and 80% cotton) by enabling the separation of the two fibers, so that each may be recovered.

In both mechanical and chemical recycling, the initial stages of the process are identical. Textile waste undergoes collection, sorting, and cleaning to eliminate impurities or contaminants, preparing it for the specific requirements of each recycling method.

Mechanical recycling for textiles

Materials are then shredded and broken down into their individual fibers so that they may be re-spun back into recycled yarn to create new textiles.

The recycled yarn is often mixed with virgin material because, currently, this recycling process leads to a decrease in fiber quality.

Chemical recycling for textiles

Textile waste is broken down into building block chemicals, called polymers or monomers.

These materials can then be recovered, processed, and re-spun into recycled fibers (replacing virgin fibers altogether) to create new textiles.

Both mechanical and chemical recycling processes have strengths, limitations, environmental footprints, and specific requirements, however they also share a common goal: to achieve textiles circularity. An ecosystem of different types of recycling technologies will be required to handle the varying types of materials that the industry is producing today.

Regardless of which recycling system is used for which material, what is clear is the need to keep materials in constant circulation by recycling them in a closed loop. Scaling the efficient sorting of textile waste is imperative to achieving the full potential that fiber-to-fiber recycling technologies offer.

Connecting the dots between textile collection and fiber-to-fiber recycling

While the manual sorting process for reuse should not change significantly, sorting textiles into different fibers and material types by hand does not provide the consistent quality and large volumes that are required for large-scale fiber-to-fiber recycling. As a result, only 1% of discarded textiles are recycled back into new textiles.

Scaling the automated sorting of waste offers an immense opportunity to connect the dots between textile collection and high-quality textile recycling. Building on TOMRA's decades' worth of experience in successfully enabling the recycling of waste, which includes plastics, metals, paper, and the automated return of beverage containers, the company developed automated sorting technology which has demonstrated a high level of efficiency and precision. In February 2021, this technology helped deliver the world's first large-scale, fully automated textile sorting plant in Malmö, Sweden.

Constructed after years of assessing and testing current sorting capabilities and feedstock compositions, this plant uses TOMRA sorting technology to sort textiles by color and fiber composition. This technology also makes it possible to handle large amounts of material and produce textile fractions that are adapted to different recycling processes (e.g., cotton, polyester, or blends of both).

Currently, the plant can sort up to 4.5 tonnes of textile waste an hour, but, owing to its modular design, there is enormous potential to increase its capacity in the future.

The automated sorting process in action

#1

Reusable textiles are manually sorted out, while non-reusable textiles are delivered in bales, typically weighing between 140 and 500kg.

Textile waste includes:

- **Post-industrial waste** (e.g., factory floor clippings)
- **Pre-consumer waste** (e.g., unsold clothing)
- **Post-consumer waste** (e.g., clothing and household textiles)
- **Textile waste from municipal solid waste** (e.g., textiles disposed of in household bins)
- **Post-commerical waste** (e.g., hotel or hospital linen, work uniforms)

Textile waste could also include:

- **Unsorted material from separate collection sources** (e.g., from recycling centers)
- **Manually pre-sorted and industrial waste** (e.g., from textile leasing and rental services)

#2

Using TOMRA AUTOSORT™ technology (near-infrared and visual spectroscopy scanners), textiles are separated and sorted by fiber type and color.
Number of scannings required depends on fiber type

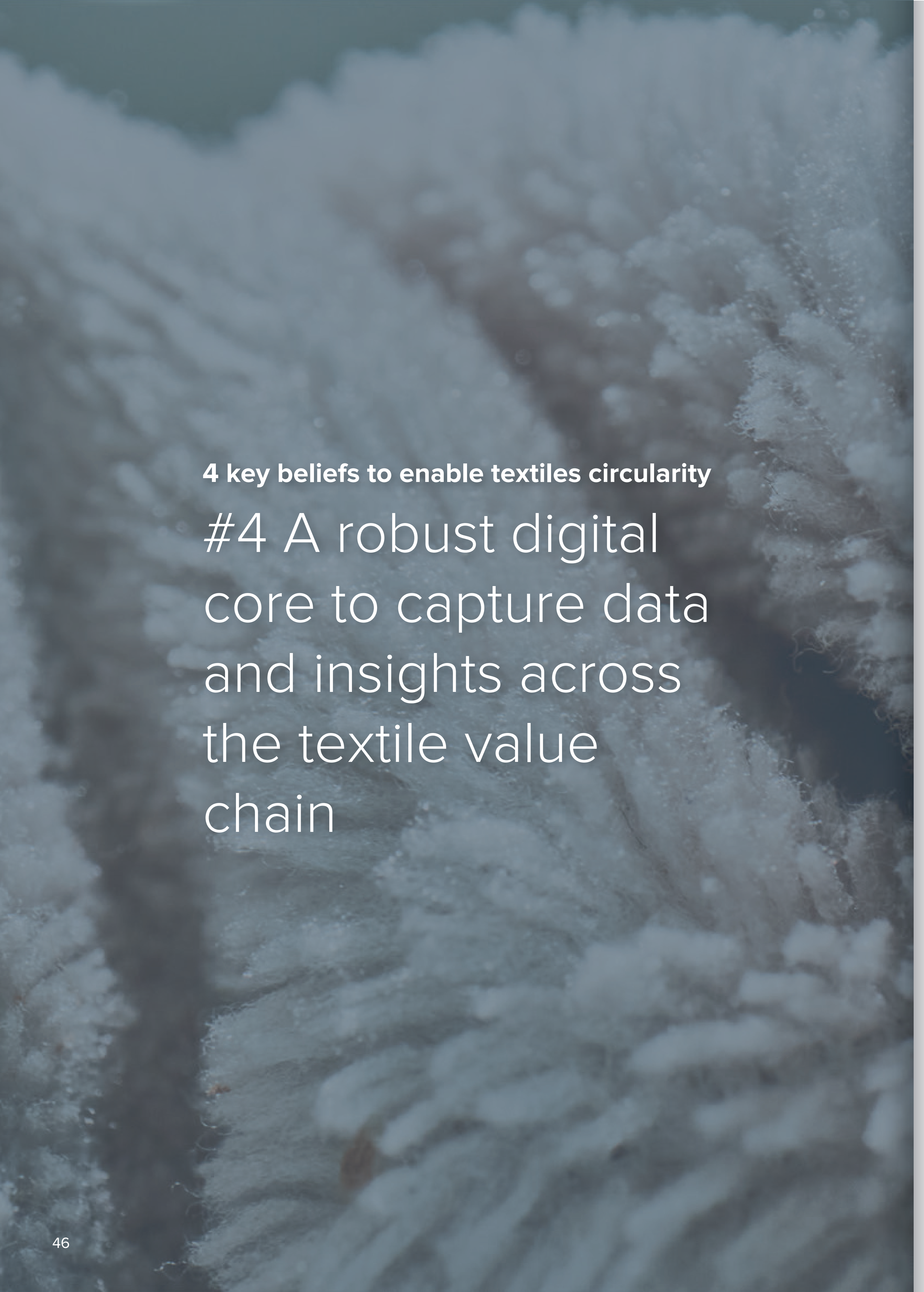
#3

Today, pre-processing (which could involve cutting materials down, shredding, and removing any additional material components), is usually done by recyclers. In the future, however, this important step would ideally become part of this process.

#4

The different output products are pressed into bales and sent to the appropriate recycling facility.

- **Cotton**
- **Polyester**
- **Blends**



4 key beliefs to enable textiles circularity

#4 A robust digital core to capture data and insights across the textile value chain

Improving data transparency and textile product traceability offers crucial opportunities for suppliers and brands to remain competitive, optimize their operations, increase efficiency, minimize waste, and meet stakeholder and legislative requirements. By leveraging the power of data and analytics, companies can also gain a better understanding of their customers' needs and preferences. This can be achieved by implementing a comprehensive data management system that captures information and insights from all stages of the value chain, from raw materials and production to product delivery and customer service. Increased transparency and traceability also provide consumers with access to accurate sustainability information on the products they use, thus empowering them to make truly informed purchasing decisions.

Transparency

Transparency is the practice of providing accurate information on the ecological footprint of textiles to protect human rights and the environment, drive value chain optimization, and inform consumer decisions.

Traceability

Traceability is the capability to track the entire lifecycle of a textile product, from raw material production, manufacturing and distribution to consumption and end-of-life.

Current attempts to increase transparency online

The Fashion Transparency Index is an annual review of 250 of the world's largest fashion brands and retailers ranked according to their level of transparency. The index reviews aspects such as brand policies and commitments on various issues (e.g., waste and recycling), supply chain traceability, as well as human rights and environmental issues. This index presents interesting key findings each year, and while some statistics show improvements in certain areas with each publication, progress in increasing transparency is moving at a glacial pace.

”Progress on transparency in the global fashion industry is still too slow among 250 of the world’s largest fashion brands and retailers, with brands achieving an overall average score of just 24%, up 1% from last year.“

Most (85%) major brands still do not disclose their annual production volumes despite mounting evidence of overproduction and clothing waste.

Despite the urgency of the climate crisis, less than a third of major brands disclose a decarbonization target covering their entire supply chain which is verified by the Science-Based Targets Initiative.

2022 Fashion Transparency Index

Growing in popularity are ethical brand directories, such as Good on You[25]. Directories like these not only offer consumers a way to discover new sustainable and ethical fashion brands, but they also encourage them to conduct their own research prior to purchasing by providing easy access to brand sustainability rankings. Good on You, for example, looks at material sourcing, supply chain activities (including worker conditions, hours, and wages), production methods, and waste management, among other criteria. While many brands have not yet been evaluated and ranked, and verification and accuracy issues abound, Good on You’s mere existence, and the existence of similar directories, demonstrates consumers’ growing appetite for reliable sustainability information on the textiles they buy.

While directories and indexes are a step in the right direction in terms of increasing consumer awareness, more must be done to enhance transparency and traceability across the value chain. Digitalization offers exciting possibilities in this regard.

The digital transformation of the textiles value chain

There is an impressive array of emerging technologies that have the potential to increase transparency and traceability. Digital product passports (DPP) will be required for all textiles in the EU by 2030, according to the EU Strategy for the Sustainability and Circularity of the Textile Sector[26]. This digital record of the complete lifecycle of textiles has enormous potential to bring transparency and traceability to new and exciting levels by enabling increased communication and collaboration across the value chain, as well as improving conscious consumerism.

What is a DPP?

A DPP is just like a regular passport in many ways – it stores basic identification data such as product name, serial number, etc. But it goes a few steps further than that by storing data about the entire lifecycle of a product – right back to its raw material phase. The DPP will accompany a textile product throughout its journey (via radio-frequency identification, or RFID tags, or quick response, or QR codes, etc.), with new data added at every phase of the product’s lifecycle.

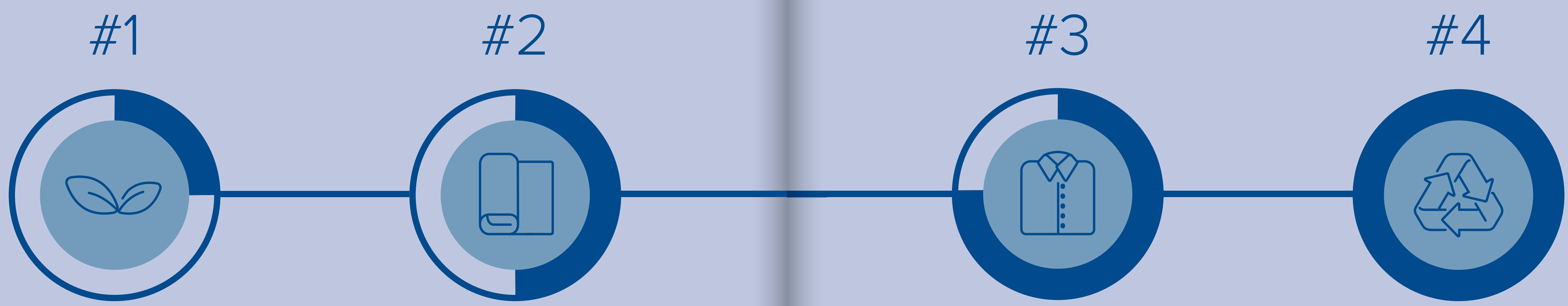
Currently, many textiles already have a basic DPP in the form of an RFID tag (typically placed on a textile product’s swing tag). These are used during stock-check, for example, to ensure that stores are aware of stock levels for each product variant on their shop floors or in their warehouses. For transparency and traceability to reach new and exciting levels, this digital identification technology must be developed and expanded further.

"Through the integration of digitalization and the Digital Product Passport (DPP), we unlock a wealth of information that enables us to build a more accountable and ethical supply chain. By using unique IDs to trace the intricate journey of textiles, we empower consumers to make informed choices, promote sustainable practices, and foster a culture of trust. Embracing these transformative technologies propels us toward a future where transparency and traceability drive positive change, enabling a textile industry that is both environmentally conscious and socially responsible."

Cyrus Gilbert-Rolfe, SVP Retail & Apparel, Kezzler

Potential data to be made available during each phase of a product's lifecycle

Along with basic textile product identification data (also known as 'master data'), here are a few examples of the kind of information that could be stored and made available during each lifecycle phase:



Raw material phase

- The origins of raw materials and components, as well as the processing activities of those materials (e.g., fossil fuel extraction for synthetic fibers and crop cultivation for natural fibers).
- The suppliers involved in sourcing raw materials.

Production and manufacturing phase

- The types of production and manufacturing factories and working conditions.
- The types of fiber used (e.g., natural and/or synthetic), as well as virgin material and recycled fiber content composition.
- Toxic substance content.
- The processing methods, water usage, and energy consumption involved in transforming materials into finished products (e.g., clothing, footwear, household textiles, etc.).
- Assembly methods and disassembly options.
- Transportation and distribution details.

Sales and consumption phase

- Sustainability certifications.
- Care instructions, such as user manuals that detail how to wash, dry, repair, and recycle textiles.

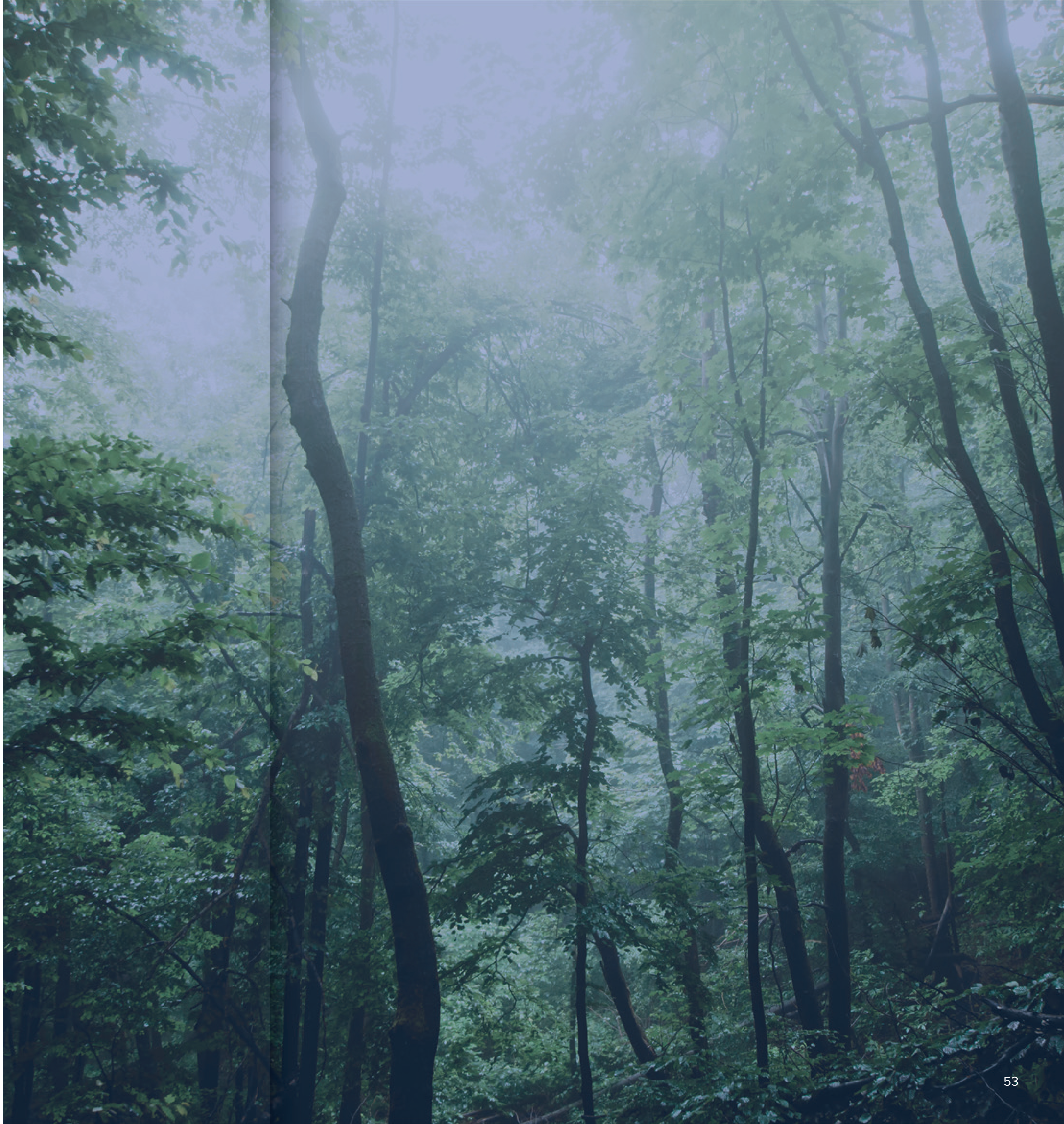
End-of-life phase

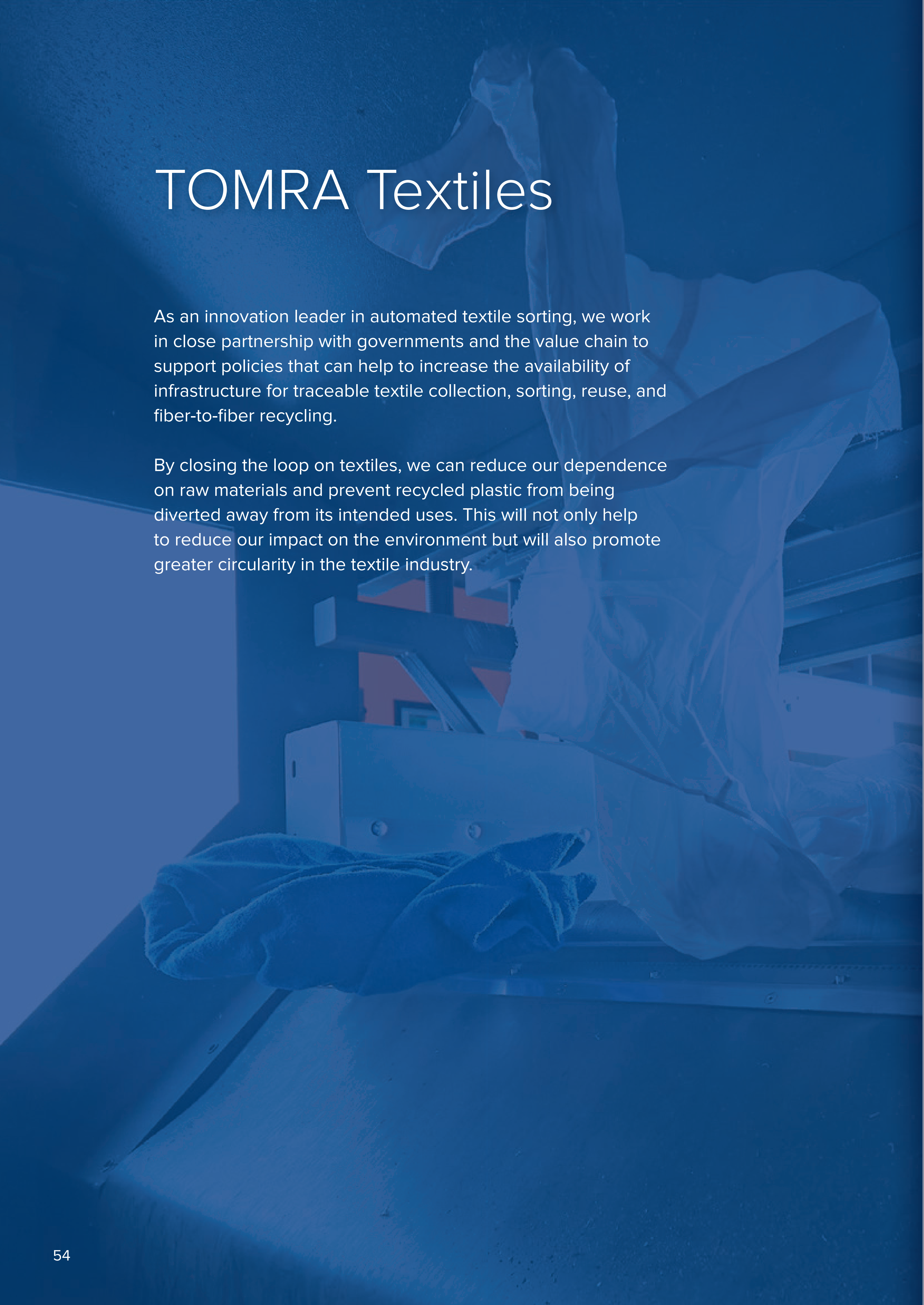
- Detailed component and material composition information to optimize reuse, sorting, and recycling.
- Information about the overall repairability of the product.
- Ideal recycling process (e.g., mechanical or chemical recycling).

Fighting greenwashing with data transparency

According to a 2019 study, "when greenwashing is identified in a product, it loses the aspects of loyalty, satisfaction, and benefits, as well as becoming a product that causes confusion of consumption."[27]

Greenwashing takes various forms, with some instances being unintentional, while others are crafted with the intent of escaping consumer scrutiny, all aiming to mislead consumers into believing a brand or product is more environmentally friendly than it truly is. While green jargon, vague language, and buzz-words abound, greenwashing cannot thrive in an atmosphere that prioritizes transparency. To be transparent not only gives brands the evidence to promote their sustainability efforts and prevent any misrepresentation, but also strives to improve their track record and push others to do the same. According to the EU Strategy for Sustainable and Circular Textiles, EU value chain members will need to provide solid evidence for environmentally safe or sustainable claims based on EU ecolabels or specific legislation. DPP provides a solid way to provide this evidence.





TOMRA Textiles

As an innovation leader in automated textile sorting, we work in close partnership with governments and the value chain to support policies that can help to increase the availability of infrastructure for traceable textile collection, sorting, reuse, and fiber-to-fiber recycling.

By closing the loop on textiles, we can reduce our dependence on raw materials and prevent recycled plastic from being diverted away from its intended uses. This will not only help to reduce our impact on the environment but will also promote greater circularity in the textile industry.

Enable **25%** fiber-to-fiber recycling by **scaling** automated sorting and **shaping** circular textile standards

25%:
25% fiber-to-fiber recycling (share of post-consumer waste recycled to fiber) implies +6Mt sorted fibers in Europe and North America by 2035. TOMRA can lead the way with a game-changing ambition of 1.5 Mt (~25% market share) automated sorting capacity.

Scaling:
We develop superior automated sorting solutions, integrate the value chain and scale automated sorting facilities by deploying blueprint through collaborations and partnerships to build, own, and operate automated sorting facilities.

Shaping:
We create standards and aggregate data for insights and traceability, while aiming to become the impact leader to enable textile circularity.

The time for transformation is now. We look forward to continued collaboration with members of the value chain to achieve higher textiles collection, sorting, and recycling rates, reduce emissions, and create a more sustainable future for the textiles industry, and beyond.

Conclusion

Only 1% of the textile waste that is produced every year gets recycled back into new products without downcycling. To increase that percentage, the current, notoriously linear textiles value chain must be reshaped and transformed into a more circular enterprise – one where textiles are thoughtfully designed, sustainably produced, and carefully taken care of until they are collected, automatically sorted, and recycled in a closed loop to be used again and again.

Creating this new, circular value chain will be possible when supportive policies, legislation, and incentives are established to address the complexities of waste management and provide guidance and motivation for transitioning to a circular economy for textiles; when cross-industry collaboration and business model innovation is fostered to enable profitable and sustainable solutions that benefit all stakeholders in the textile value chain; when investments to scale infrastructure for automated sorting and mature recycling technologies are made to enable textiles of various materials and compositions to be recycled into new fibers; and finally, when a digital core is established to capture data and insight across the textile value chain, allowing for transparency and traceability and providing important information to consumers, industry players, and regulators.

Glossary

Chemical recycling: Chemical recycling splits the polymer chains to change and convert waste into chemical building blocks that are used again as raw materials.

Closed-loop recycling: A system in which materials are collected, sorted, and recycled for the highest quality and used over multiple cycles for the same or similar application (e.g., fiber-to-fiber or bottle-to-bottle recycling).

Design for recycling: An eco-design strategy intended to ensure a product can be effectively recycled, with the goal of improving its environmental impact.

Digital product passport: A digital record of a unique product's complete lifecycle, storing key traceability data about the product.

Disposal: The burning or landfilling of residual materials that cannot be recycled or recovered from waste.

Downcycling: The process in which materials are downgraded to low-quality recycled content and used for a single cycle or less demanding application.

Eco-design: A principle and approach to designing packaging, products, systems, and services at the development stage to reduce their environmental impact.

Eco-modulated fees: A financial instrument to incentivize the eco-design of packaging by implementing a refined fee structure for a design that meets specified criteria. Also known as fee modulation.

Energy recovery: The conversion of waste that generates energy in the form of electricity or heat.

Extended producer responsibility (EPR): An environmental policy principle in which a producer's responsibility is extended to the entire lifecycle of their products.

EPR scheme or EPR system: A system set up to implement the EPR principle. It can be an individual system (or individual compliance system) where a producer organizes its own system, or a collective system (collective compliance system) where several producers decide to collaborate and thus fulfill their responsibility in a collective way through a specific organization.

Feedstock: Raw materials, such as textile waste, that are fed into a process for conversion into something new (recycling).

Greenwashing: A false, or misleading action or claim made by an organization about the positive impact that a company, product, or service has on the environment.

Mechanical recycling: The conversion of waste into secondary raw materials through mechanical processes such as sorting, shredding, tearing, density separation, and reprocessing.

Microfibers: Fibers that are fragmentized into smaller pieces and released into the environment from textiles.

Microplastics: Tiny pieces of plastic debris in the environment resulting from the disposal and breakdown of consumer products and industrial waste.

Open-loop recycling: A system in which materials are collected, sorted, and recycled for a single cycle instead of multiple cycles.

Producer: A company or importer that places products on the market.

Recyclability: The ability for a product or packaging to be technically and feasibly recycled at scale, which is dependent on both the design of the product and the local infrastructure for collection, sorting, and recycling.

Recycled content: Proportion of recycled material in a product, as opposed to the proportion of virgin material.

Recycling: The process of converting waste into secondary raw materials.

Resource Hierarchy: A standard for the circular economy that aims to keep materials at their highest and best use and establishes an order of waste management options from most to least preferred based on their environmental impact.

Reusability: The ability for a product or packaging to be feasibly used multiple times.

Secondary raw materials: Recycled materials that can be used in manufacturing processes to replace virgin materials.

Sorting: The process which separates waste according to material properties for recycling.

Source separation: An action taken by consumers, where they sort recyclable materials from their general waste and discard them in a dedicated container.

Swing tag (or swing ticket): Identification attached to a garment for sale.

Traceability: the capability to track the entire lifecycle of a textile product, from raw material production, manufacturing and distribution to consumption and end-of-life.

Transparency: The practice of providing accurate information on the ecological footprint of textiles to protect human rights and the environment, drive value chain optimization, and inform consumer decisions.

Virgin materials: Goods that are made of natural raw materials (such as cotton or animal fibers) or fossil raw materials (such as crude oil).

Waste disposal: The burning or landfilling of residual materials that cannot be recycled or recovered from waste.

Waste management: A collective term for the collection, transportation, processing, and disposal of waste.

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