GLOBAL FASHION AGENDA

Scaling Circularity

Lessons learned from the Circular Fashion Partnership for building pre-competitive collaborations to scale upstream circular fashion systems

About this Report

This report is authored by Global Fashion Agenda (GFA), supported by McKinsey as a strategic partner. Through a multi-year strategic knowledge partnership, Global Fashion Agenda and McKinsey aim to present research and a fact base to guide and mobilise fashion executives in taking bold action on sustainability.

The purpose of this report is to draw learnings from the Circular Fashion Partnership for scaling post-industrial recycling in textiles and demonstrate the potential for pre-competitive collaborations across all areas of circularity.
Global Fashion Agenda leads this partnership together with Reverse Resources and the Bangladesh Garment Manufacturers and Exporters Association (BGMEA). As a core partner, the software as a service provider and knowledge expert, Reverse Resources plays a key role in the Circular Fashion Partnership and has contributed data insights and expertise for the creation of this report.

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About Global Fashion Agenda

Global Fashion Agenda is a non-profit organisation that fosters industry collaboration on sustainability in fashion to drive impact. Its mission is to make sustainability fashion's first priority by mobilising and guiding the fashion industry to take bold and urgent action on sustainability. The organisation has been leading the movement since 2009 and is behind the renowned event on sustainability in fashion, Copenhagen Fashion Summit and it's digital edition CFS+, the Innovation Forum, and thought leadership publications including Fashion CEO Agenda and Fashion on Climate as well as its impact programme the Circular Fashion Partnership.

In partnership with its Strategic Partners, ASOS, BESTSELLER, Fung Group, Global Fashion Group, H&M Group, Kering, Nike, PVH Corp., Ralph Lauren Corporation, Sustainable Apparel Coalition, and Target, and our Strategic Knowledge Partner, McKinsey & Company, Global Fashion Agenda spearheads the fashion industry's journey towards a more sustainable future.

About McKinsey & Company

McKinsey & Company is a global management consulting firm deeply committed to helping institutions in the private, public and social sectors achieve lasting success. McKinsey supports clients in fashion and beyond on a wide range of sustainability related themes with a strong impact orientation. This ranges from executing broader sustainability transformation programmes to more targeted efforts on decarbonisation, circular business models and sustainable packaging. McKinsey & Company is a Strategic Knowledge Partner to GFA, with the joint aim to accelerate the pace and impact of the fashion industry's transformation towards sustainability.

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Executive Summary

1 *The environmental damage caused by the fashion industry is well documented. There is emerging consensus that transitioning to a circular economy is a win-win intervention, reducing environmental damage whilst creating value for the fashion ecosystem.*

— McKinsey & Global Fashion Agenda research shows that the industry is on track to overshoot its 1.5-degree pathway target almost twofold, with emissions of 2.1 billion tons of CO2 equivalents in 2030, compared to the 1.1 billion tons required to stay on the pathway. Adopting and scaling other abatement practices is critical.

— A scenario for radical emissions reduction will not be delivered without scaling circularity, which involves adopting circular design principles, extending the use-life of products and materials, and ensuring post-life that components are broken down and reused or recycled into future items. Scaling circularity should create value for industry stakeholders. Roughly 25% of emissions could be reduced through circular models.[1]

2 *The conditions are ripe for transformation of the fashion sector, but progress is slow. New models of action are required to accelerate systemic change.*

— Regulators, investors and consumers are setting higher expectations on overall environmental performance, and brands and manufacturers are setting ambitious commitments on both GHG emissions reduction and sustainable material use. The system is poised for transformation.

— Despite this momentum, less than 1% of textile waste is recycled into new fibres for clothing, and there is no evidence of a sharp change in growth rate. For major brands and manufacturers to deliver on their commitments, new strategies are required.

3 *Textile recycling is just one part of the circularity picture, but a necessary one to deliver on the sector's environmental goals. A largely circular fashion system will not be delivered without a scaled global recycling industry. We have reached a tipping point in the system, where recycling technologies exist and are ready to be scaled commercially.*

— Existing recycling technologies have the potential to drive 80% circularity in the fashion industry if fully scaled.

— The technologies exist to deliver recycling across single colour cotton, cellulosics, synthetic fabrics and solutions for blended fibres are coming, all delivering large improvements in environmental impact. These technologies have the potential to deliver better economics than virgin materials, at scale.[2]

— The challenge is providing conditions for scaling, which include: collection and sorting infrastructure, and investment in the recycling sector to scale up capacity.

1 McKinsey & Company and Global Fashion Agenda. (2020). Fashion on Climate

2 Exhibit 1: Fashion GHG emissions across the value chain

This investment requires confidence in supply of quality, usable feedstock and demand for recycled output.

4 *A Case Study in Action: The Circular Fashion Partnership (CFP) has set out to step-change the growth of the emerging textile recycling space, starting in Bangladesh, one of the largest garment producing countries in the world.*

— The Circular Fashion Partnership (CFP) is a cross-sectoral project, led by Global Fashion Agenda with Reverse Resources and the Bangladesh Garment Manufacturers and Exporters Association, with the support of Partnership for Growth (P4G). The Circular Fashion Partnership brings together brands, manufacturers and recyclers to reduce dependency on virgin materials by establishing a long-term, scalable transition to a circular fashion system in garment manufacturing countries. The Partnership builds supportive ecosystems through the Reverse Resources platform that enables capturing and recycling of post-industrial textile waste streams into valuable resources. It presents the global demand for recycled materials and improves access to consistent, high quality, transparently traced feedstock, in order to attract investment and scale the post-industrial recycling sector, starting with Bangladesh.

— From November 2020 until November 2021, the CFP has mapped and traced 1013 tonnes of textile waste on the Reverse Resources platform (0.2% of waste in Bangladesh), now regularly tracing over 200 tonnes a month. The project has achieved significant results despite multiple COVID-19 lockdowns.

— Some CFP success factors provide guidance for designing pre-competitive collaborations in other regions or parts of the value chain. These include (i) a multi-stakeholder engagement effort, particularly including policymakers (ii) tools to deliver transparency, traceability and tracking on material flows (iii) coordination on the ground, with deep engagement with existing local economy (iv) presenting an aligned industry voice on the demand for recycling capacity by brands, and the implied business opportunity for the local economy in scaling recycling capabilities.

— There is huge economic potential to scale this model beyond Bangladesh. McKinsey's analysis estimates a 4.5 bn USD market opportunity in six major manufacturing countries to scale this post-industrial recycling opportunity, these markets include Vietnam, Turkey, India, Malaysia, Indonesia and Bangladesh. These are all markets with high viability for such a model, given the economic significance of the textile industry, and the commitment of policymakers to support the sector.

5 *Learnings from the Circular Fashion Partnership: there are some critical prerequisites for scaling post-industrial recycling across production markets.*

— Formalising the informal waste management sector. The post-industrial recycling opportunity will not be captured without incentivising and regulating this group, ideally in a way which offers an opportunity to participate in the value creation - moving from downcycling to recycling and capturing domestic opportunities versus export.

— Providing alternatives for current use-cases for textile waste. Currently cotton waste is frequently incinerated for energy inside many manufacturing facilities. Access to affordable, clean alternative fuels must be developed to shift incentives towards channelling textile waste towards recycling and away from incineration. In Bangladesh and beyond, this will rely on energy and infrastructure investment and policy.

— Assuring supply of quality feedstock and demand for recycling output. Recycling capacity is relatively small in many manufacturing markets. This is at odds with the opportunity, given that post-industrial textile waste offers volumes of quality, consistent textile feedstock, making it much more recyclable than post-use waste. To attract investment to scale this capacity investors and recyclers need greater transparency that this feedstock exists and can be reliably channelled towards recycling.

6 *Moving beyond post-industrial textile recycling, pre-competitive action is a powerful and proven approach to circularity.*

The transition towards circular value cycles and business models across the value chain is relatively new; a pre-competitive space enables different stakeholders to collaborate and test new models. Since many obstacles related to circularity require collective action, or may have a first mover disadvantage, further pre-competitive collaborations are required to scale circularity. We have identified three areas beyond post-production recycling that are key for pre-competitive action: standardised consumer labelling, infrastructure for collection and sorting, and shared logistics. In some cases, there are existing pre-competitive efforts working on these topics which could be galvanised.

01

Circular system solutions for a more sustainable fashion industry

The environmental damage caused by the fashion industry is well documented. There is an emerging consensus that transitioning to a circular economy is a win-win intervention, reducing environmental damage whilst creating value for the ecosystem, yet action is subpar.

FASHION'S LOSS OF CREDIBILITY

The impacts are well established. In 2018, the clothing and textile industry produced 2.1 billion tonnes of CO2eq, representing ~4% of the global CO2eq emissions, equivalent to the emissions of the entire economies of France, Germany, and the United Kingdom combined. The clothing and textile industry is also a significant wastewater producer, accounting for ~20% of the global wastewater, with a mix of heavy metals, salts and chemicals rendering fresh water unsafe for marine life and human consumption. It also stands accountable for ~4% of the global fresh-water withdrawals, exacerbating water scarcity, particularly in cotton producing countries such as India and China. By 2050, the world's oceans will contain more plastic than fish by weight; textile fibres such as polyester cause up to 35% of all ocean plastic microfibre pollution.[3]

Despite efforts to reduce emissions, the industry is on a trajectory that will well exceed the 1.5-degree pathway to mitigate climate change set out by the Intergovernmental Panel on Climate Change (IPCC) and ratified in the 2015 Paris Agreement. To reach this pathway, fashion would need to cut its GHG emissions to 1.1 billion metric tons of CO2 equivalent by 2030. McKinsey & Global Fashion Agenda research shows that the industry is set to overshoot its target almost twofold, with emissions of 2.1 billion metric tons of CO2 equivalents in 2030, unless it adopts and scales additional abatement actions. Within the value chain of the fashion industry, the upstream production accounts for up to ~70% of the GHG emissions, of which material production is the largest polluter within the value chain. [4]

THE CLOTHING AND TEXTILE INDUSTRY ACCOUNTS FOR

~4%
of global CO2eq emissions in 2018

~20%
of global wastewater

~70%
of fashion's GHG emissions stem from upstream production

CIRCULAR ECONOMY AS A FRAMEWORK TO ADDRESS GLOBAL CHALLENGES

Aligning the industry with the 1.5-degree scenario can only happen with major reduction in use of virgin resources. Material production is responsible for 40% of greenhouse gas emissions with oil-consuming textiles being the most significant contributor [Exhibit 1]. The circular economy has received significant attention as a win-win system change to achieve this, significantly reducing the damaging environmental impacts of reliance on virgin resources, whilst also delivering more value creation for the industry. A circular economy is one where waste and pollution is eliminated, products and their materials are circulated, and natural systems are regenerated, all by design. [5]

Less than 1% of material used to produce clothing is recycled into new clothing, representing a loss of more than USD 100 billion worth of materials each year.

In practice, there are two major transformations needed to deliver a circular fashion system. First and foremost, there is a need to extend the use-life of products and materials through design for durability and reuse in circular business models; this serves to reduce demand for virgin materials, and analysis suggests that it can deliver the greatest overall environmental impact.[6] Secondly, we need to ensure components are broken down and reused or recycled into future garments. Interventions that support delivering circularity in fashion range from designing a product to be more easily robust and have longer use-life, to encouraging citizens to re-sell or repair their garments, to building a resale platform, and scaling textile recycling. There are also models that extend clothing and material use through outlets such as Vinted, ThredUp or a classic thrift shop, which offer items from a sweater made from recycled cotton to sneakers made from ocean plastic. Resale is growing eleven times faster than the overall sector and is set to be worth double the value of fast fashion by 2030.[7]

The upcoming EU Sustainable Products Initiative (SPI), which was announced in the New EU Circular Economy Action Plan (CEAP) in March 2020, is raising the bar on the sustainability standards required of new products placed on the market in the EU. Legal measures requiring design criteria for products´ durability, recyclability and reusability are expected by 2023.

Circulating products and their materials relies on coupling upstream design for reuse and recycling with an effective global infrastructure to support collection, sorting, resale and textile to textile recycling. Currently this infrastructure is massively sub-scale. The EU Textiles Strategy, to be published by the European Commission in early 2022, is expected to present measures related to for instance extended producer responsibility and incentives for innovation to boost sorting, re-use and recycling of textiles ultimately limiting overproduction.

5 Ellen MacArthur Foundation

6 Jarkko Levänen et al. (2021). *Innovative recycling or extended use? Comparing the global warming potential of different ownership and end-of-life scenarios for textiles.* Environmental Research.

7 Thredup. (2021). *2021 Resale Report*

In 2020, the overall uptake of recycled fibres compared to the total fibre production was only around 8.1 percent, with 7.6 percent recycled polyester from plastic bottles, i.e., not from recycled textiles.

Less than 1% of material used to produce clothing is recycled into new clothing, representing a loss of more than USD 100 billion worth of materials each year.[8] Cotton accounts for ~24% of the global fibre market in 2020 (or 26.5 million tonnes), whilst recycled cotton accounted for less than 1%.[9] There is a clear impact opportunity in building the enablers to scale textile recycling.

8 Ellen MacArthur Foundation. (2017). *New Textiles Economy: Redesigning Fashion's Future*

9 Textile Exchange, (2021) *Preferred Fibre and Materials Market Report 2021*

Circular materials are key to ensuring a more sustainable fashion industry as ~40% of GHG emissions come from material production

Apparel & footwear value chain GHG emissions
2018, 100% = 2,106 Mn ton CO2eq

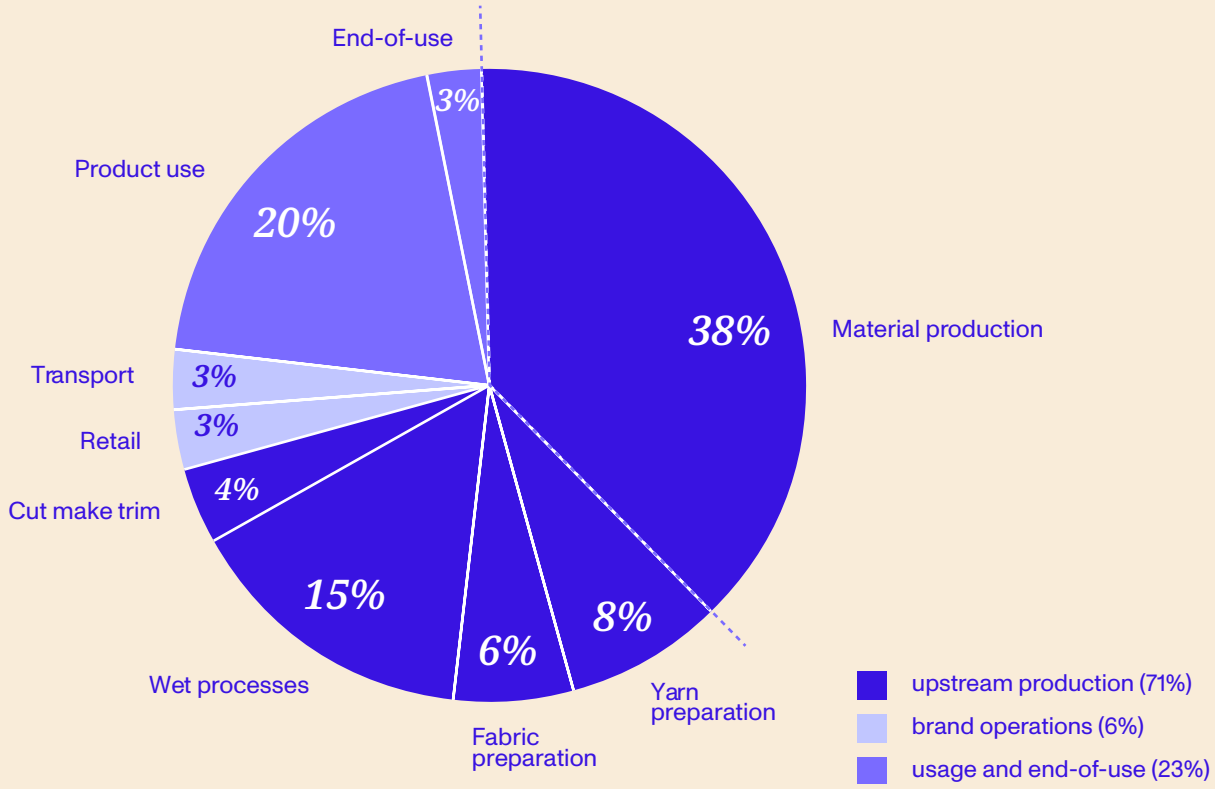


EXHIBIT 1 *Fashion GHG emissions across the value chain*

SOURCE: *Fashion On Climate*

Material is the most important driver of emissions

Material production has the highest impact on water consumption, water pollution, land and fertilizer use, and eutrophication.
~2% of the cost of the garment is made up by material cost.

02

From theory to action: Accelerating implementation

The conditions are ripe for transformation of the fashion sector, but progress is slow. New strategies are required to unlock investment and scale systemic change.

The conditions for wholescale transformation of the system are ripe, with various forces at play. Investors and consumers are starting to reward brands who demonstrate commitment to sustainability. Rapidly evolving regulatory pressures are forcing brands and manufacturers to take ambitious steps on circularity and technological innovations are at the cusp of scaling. But change is nowhere near the pace it needs to be.

Public sentiment has woken up to the industry's sustainability crisis, activated by both consumers and industry employees. Two thirds of apparel shoppers state that it has become even more important to them to limit impacts on climate change. While nearly 90% believe that pollution needs to be reduced further, over 60% have proceeded to recycle and purchase products in environmentally friendly packaging, and 60% want to move beyond the 'fashion cycle' of new trends every season, motivated by sustainability.[10] They are starting to 'vote with their wallet' creating 4 'mass market' resale Unicorns in recent years.[11]

Investors are shifting incentives as financial markets start to take the environment seriously. Funding deals for H&M, Adidas and Chanel all prove the opportunity for lower cost of capital tied to higher ESG performance.[12] Meanwhile, CEOs and CFOs are increasingly having to demonstrate to their investor base, whether in public or private markets, that they are taking their environmental and social impact and risks seriously.

The regulatory landscape in the European Union is rapidly shifting to encourage companies to invest in circularity. The EU launched its New EU Circular Economy Action Plan (CEAP) in March 2020, to ensure that products have long lifecycles, can be repaired or recycled. The European Commission has identified the fashion sector and its "large potential" to become part of the circular economy and named textiles as a priority for future work. The forthcoming EU Strategy for Sustainable Textiles will aim at helping the EU shift to a climate-neutral, circular economy where products are designed to be more durable, reusable, repairable, recyclable and energy-efficient.[13] It will also provide guidance to Member States to help them comply with the obligation to separately collect textiles introduced by the 2018 revision of the Waste Framework Directive.
Furthermore, the EU's upcoming measures on taxonomy will strongly impact how investors and companies measure sustainability in all industries including textiles. Another example is the European Apparel and Textile Confederation (EURATEX)'s work in line with the Green Deal, which proposes five recycling Hubs throughout Europe to capture and recycle post-use and

10 McKinsey & Company. (April 2020). *Post COVID-19 consumer survey*

11 Vinted, ThredUP, Depop, Zhuanzhuan

12 Nanda, M. C. (2021). *Fashion Goes Green to Raise Capital* [online]. Business of Fashion

13 European Commission. (2021). EU Strategy for Sustainable Textiles [online] <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12822-EU-strategy-for-sustainable-textiles_en>

post-industrial textile waste and develop a new raw material textile value chain in Europe.[14] The potential for an EU carbon border tax will have ramifications for the global supply chain even without textiles targeted in the first iteration. This regulatory context means corporate leaders are incentivised to invest in sustainability and circularity.

Not-for-profits and industry groups are setting a higher bar; the UNFCCC and Textile Exchange have set a 2025 Recycled Polyester Challenge, calling on the apparel industry to commit to bringing the percentage of recycled polyester up from 14% to 45% at 17.1 million metric tons by 2025.[16] This challenge has been signed by 85 brands and manufacturers as of April 2021. Meanwhile, organisations such as the Ellen MacArthur Foundation, Fashion for Good and Global Fashion Agenda's Innovation Forum are showcasing successful case studies of driving circularity and connecting established brands and their supply chain partners with innovators to accelerate the journey.

In this promising context, what else can be done to unlock the promise of circularity? We focus on two enablers. Financing is key; Chatham House indicates government and corporates investing in the circular economy still fall very short of what is required to deliver on potential.[17] This investment is an opportunity, not a cost. It will create and scale new business and create jobs.

Collaboration across industry players could also be an enabler. Scaling circularity in fashion requires us to build new sub-sectors of the economy at a record pace including R&D and infrastructure spend. Accelerating the usual pace of change requires a concerted effort to transcend new technologies and new sectors through 'adolescence' more quickly.

The opportunity for scaling circularity in post-industrial waste is often overlooked in the discourse on circularity in fashion, which tends to focus on the post-use opportunity. Consumer waste is the lion's share of textile waste, but the opportunity for recycling post-industrial waste is a low hanging fruit that we can't afford to miss. Waste streams are more consistent, higher quality, easier to trace, significantly larger than previously estimated and require much simpler sorting and collection than post-consumer waste. These textile waste volumes

14 EURATEX. (2020). ReHubs: A Joint Initiative For Industrial Upcycling Of Textile Waste Streams & Circular Systems. EURATEX, Sustainable Businesses.

15 McKinsey & Company and Global Fashion Agenda. (2020). Fashion on Climate

16 Textile Exchange. (2021). 2025 Recycled Polyester Challenge

17 Chatham House. (2021). *Financing an Inclusive Circular Economy*

The fashion industry has embraced the concept of a circular economy. Fashion leaders have made bold commitments towards usage of recycled cotton and synthetic fabrics, reduction of emissions, as well as transitioning towards more circular value cycles. H&M has committed to using 100% recycled or sustainably sourced material by 2030 and reducing water usage by 25% while recycling 15% of wastewater back into production; Inditex has committed to having all its eight brands use cotton, linen & polyester that is more sustainable, organic or recycled by 2025; and Adidas has committed to 100% recycled polyester by 2024, and to reduce its own and its suppliers' GHG emissions by 30% by 2030. Timberland has committed to zero waste, and that 100% of products be designed for circularity. The sector has seen many more companies setting science-based targets over the last two years. As of September 2021, 105 apparel and textile companies have set science-based targets, accounting for 25% of the sector by revenue [Exhibit 2]. The scale of emissions reduction implied by these commitments can only be achieved with a massive reduction in use of virgin materials, as McKinsey analysis demonstrates.[15]

are what recyclers need to scale capacity and a logical first step to build a fully circular system. In the next chapters, we deep-dive on textile recycling, specifically post-industrial textile recycling to understand what kind of actions could unlock financing for this element of the circular solution set, and what are the potential returns. We also examine a case study on pre-competitive action in the space, and what learnings we can take for similar efforts to scale circularity in the fashion supply chain.

105 apparel companies in the industry are committing to science based sustainability targets

Number of apparel and textile companies pledging to set science-based targets[1]

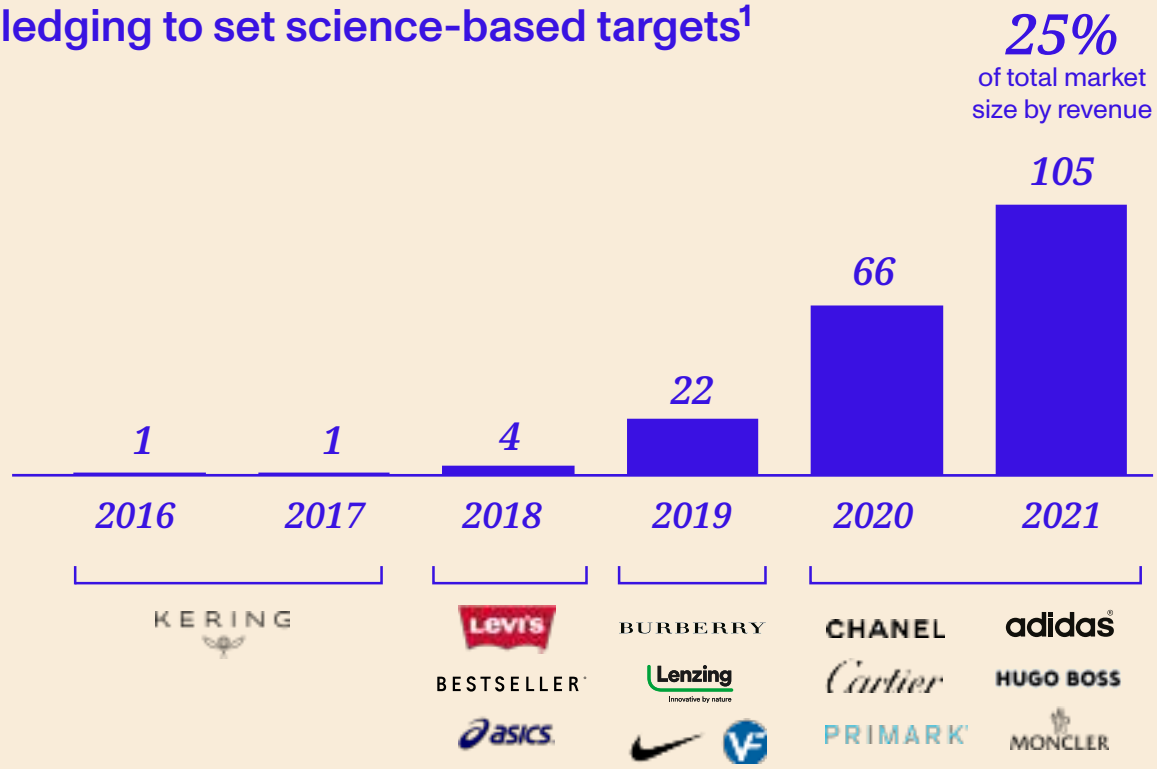


EXHIBIT 2 *Science-based targets commitments by fashion players, 2016-2021*

1. Targets in line with what climate science claims is necessary to meet Paris Agreement goals; Science-based Targets Initiative data retrieved April 2021, sector filtered: "Textiles, Apparel"
Source: Science based target initiative; UNFCC - UN Fashion industry charter; Management interviews

03

Textile recycling: A central element of circularity

Existing recycling technologies have the potential to drive 80% circularity in the fashion industry if fully scaled. The technologies exist and deliver huge improvements in environmental impact and the economics work at scale. The challenge is providing conditions for scaling.

There are two major opportunities for textile recycling across the value chain; post-industrial and post use. Post-industrial captures scraps or excess production of textile, whilst post-use recycles garments after their use phase. McKinsey has modelled the potential for scaling textile recycling across the full value chain in 2035 based on existing technologies. This analysis suggests current technologies have the potential to deliver 75% textile-to-textile recycling into the system, and a further 5% recycled feedstock from other industries [Exhibit 3].

This is a full potential vision and would require significant transformation of many parts of the sector. The end-state would include a different material mix. Man-made cellulosic increase in share from 6% today to 22%, taking volume from cotton and polyester. This enables the system to make the most of cotton waste through regenerative cellulosic recycling technologies. This potential would also require a major jump in global average collection rates, from 25% today to 80%. Such a leap would require a step change in public and private financing to build collection infrastructure. It is not unfeasible, given collection rates for textiles in Germany, and paper, glass and metallic packaging across the EU are in or above this range.[18] Investments in fibre sorting technologies will be required to ensure sorting is economical and can keep pace with this volume of collection. Such an ambitious transition would also rely on garment recyclability, major scaling of blended fibre recycling technologies, innovation in recyclability of input materials and garment design.

Those in the industry will know these assumptions are highly ambitious. They would require an increasingly favourable regulatory environment, laser focus from industry players and mobilisation of capital to build new industries across recycling technologies, sorting and collecting infrastructure for waste across all parts of the value chain. Yet, industry transformation at this ambition level is required to meet climate agreements and safeguard our planet and people on it.

There are five types of recycling technologies that will be at the heart of a circular fashion system and combined, could achieve an 80%

Eurostat. (2018). *Recycling Rates* [online]

SHARE OF FASHION THAT CAN BE CIRCULAR

80% (75% & 5%)

75%: textile-to-textile recycling

5%: recycled feedstock from other industries

closed loop [Exhibit 4]. They are (i) mechanical fibre-to-fibre recycling for cotton and viscose (ii) thermo-mechanical recycling (iii) chemical cellulosic recycling (iv) chemical synthetic mono recycling for polyester, nylon and (v) chemical blended recycling. Beyond these technologies, industrial symbiosis, whereby textile fibres are recycled into feedstocks for other industries such as plastics and chemicals, is a critical part of an efficient circular system.
Exhibit 4 describes these technologies, key players, readiness to scale and their scaling potential in the 2030 system we have laid out.

There is some debate about the benefits of recycling due to the energy intensity of the process. Our analysis indicates that the major recycling technologies deliver better environmental outcomes across both GHG emissions, water depletion and land use [Exhibit 5]. As energy generation and grids transition towards renewable electricity-based systems, the GHG emission dimensions of these recycling technologies will improve even further.

Critically, all technologies have the potential to be more cost effective than using corresponding virgin materials. As Exhibit 6 indicates, mechanical processes for both cotton and polyester are already cheaper than virgin, by 25% and up to 40% respectively. Chemical recycling processes are newer but are a critical piece of the puzzle due to higher quality output. Economies of scale are the single biggest driver to get costs down.

In order to fulfil the potential of these technologies to drastically scale up closed-loop textiles, these technologies require a major inflow of investment. At the plant level, our analysis suggests reaching cost parity on polyester will require ~250k ton plant, whilst getting to cost parity on cotton-to-cellulosics requires a ~60k ton plant. In aggregate, we estimate $5 - 7 bn total investment by 2026 in order to fulfil the 2030 scenario, driving towards a $10 – 20bnbn annual profit pool by 2030 [Exhibit 7]. This presents an incredibly attractive return on capital.

So, why are we not seeing capital flooding in at scale? The first part of the answer is we are

As a result, the system faces a chicken and egg marketplace challenge; the system cannot scale capacity without demand, but the demand can't be generated without capacity

at a tipping point where investors are starting to understand the promise of this space. The last few years has seen consistent investment flows into recycling companies, often with rounds oversubscribed, such as Renewcell's $5.37 million round in 2019 [Exhibit 8]. In order to accelerate this momentum, investors need an assured business case and confidence in the scale potential and economics of these technologies and their markets. The confidence in the business case requires a step-change in the transparency of the demand for recycled output and supply of quality, usable feedstock.

The technologies exist and deliver huge improvements in environmental impact. The economics work at scale, but the challenge is providing the conditions to scale.

As a result, the system faces a chicken and egg marketplace challenge; the system cannot scale capacity without demand, but the demand can't be generated without capacity and textile waste feedstock. We must create a stable supply of textile waste to these factories and clear scaled demand for output.

This textile recycling market will scale in its own time, but given the urgency for the sector to transform, we need to accelerate it.

More systemic interventions are needed to do this, particularly pre-competitive collaboration, which involves "two or more companies within the same industry coming together to address a shared problem or pain point that does not impact direct business competition and is often focused on joint social or environmental impacts." We will now review pre-competitive collaboration in action, to better understand its potential.[19]

19 Resonance Global. (2021).

Based on the three most used materials, the fashion industry has the potential to become ~80% circular with today's recycling technologies in end target state

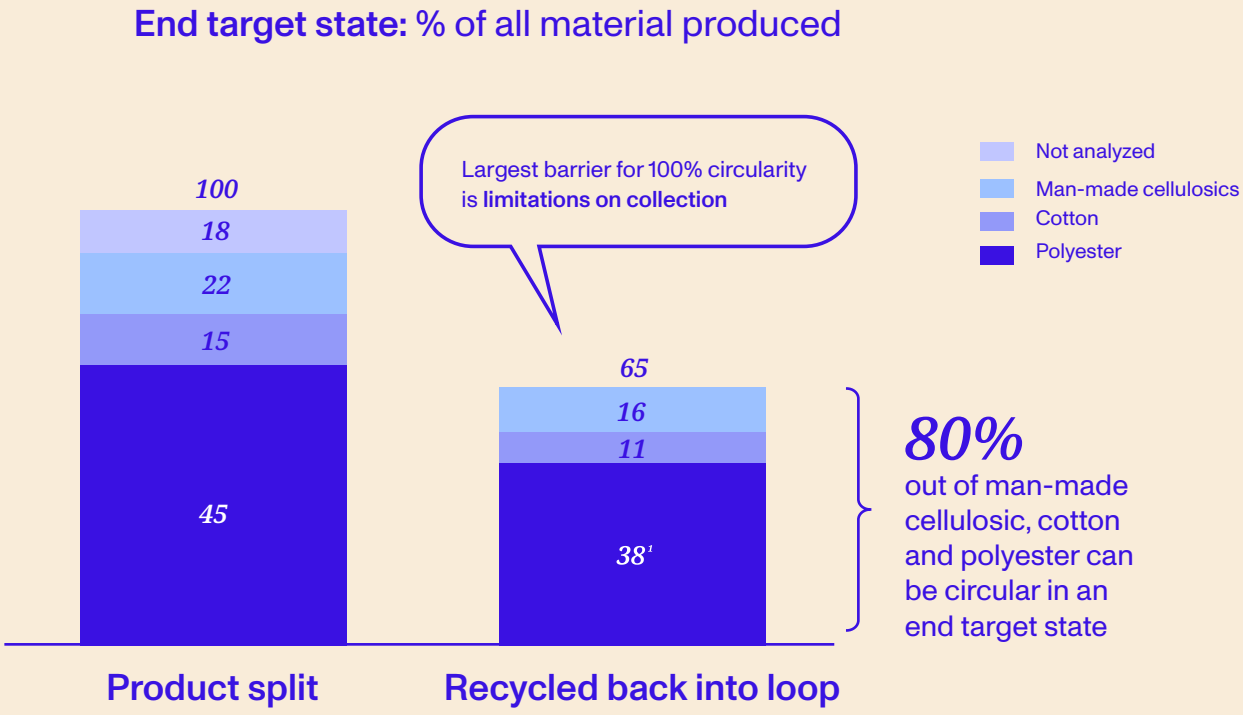


EXHIBIT 3 *Scope for a full potential recycling across the fashion system*

1. 5% of PET bottles are included as recycled material; although PET bottle recycling is not ideal for textile industry due to supply deficit and PET production needing the recycled content to keep the loop going

Image credit: Reverse Resources

04

A Case Study in Action: The Circular Fashion Partnership

Circular Fashion Partnership

The Circular Fashion Partnership has set out to step-change the growth of the emerging textile recycling space, starting in Bangladesh – one of the largest garment producing countries in the world.

ABOUT THE CIRCULAR FASHION PARTNERSHIP

The Circular Fashion Partnership (CFP) is a cross-sectoral programme, led by Global Fashion Agenda with Reverse Resources and the Bangladesh Garment Manufacturers and Exporters Association (BGMEA), with the support of Partnership for Growth.

The goal of the CFP is to reduce dependency on virgin materials and increase the availability of recycled materials by establishing a long-term, scalable transition to a circular fashion system in garment manufacturing countries.

The CFP has an ecosystem approach. It facilitates circular commercial collaborations between textile and garment manufacturers, recyclers and global fashion brands to capture and direct post-industrial textile waste back into the production of new fashion products. It also engages local stakeholders, both national and European policy makers and increasingly the investment community to create a conducive environment for a circular fashion system.

With its participants and partners, the CFP develops the needed infrastructure, identifies and addresses barriers and presents opportunities to scale circular fashion systems. By demonstrating the business model for recycling post-industrial textile waste domestically, the CFP aims to attract investment to the local recycling sector, to increase recycling capacity and quality of technologies, starting in Bangladesh.

HOW THE PARTNERSHIP WORKS

Through *circular commercial collaborations* and use of the Reverse Resources SaaS platform, the CFP provides a systematic way to build and communicate global demand from brands for products made with recycled materials, and improve access to consistent, high quality, digitally traced feedstock for recyclers. Brands encourage their manufacturing partners to segregate waste and channel it to recycling. Manufacturers receive a fair price for their waste and can transparently report how it has been captured and valorised, a service that can also be presented to other brand customers. Recyclers have access to consistent streams of competitively priced, high-quality feedstock with traceable proof of origin with which they can improve the quality of their recycled material.

Reverse Resources provides on-the-ground training in waste management practices and waste registration. The Reverse Resources SaaS platform maps the segregated waste and connects the different actors, matchmaking waste streams to recycling technologies. By providing transparency on waste flows, it functions as a source of data and traceability and can generate market analysis and insights to enable business decisions through moreover the generation of monthly waste flow reports.

The CFP currently facilitates *circular commercial collaborations* between 43 textile and garment manufacturers, 17 recyclers, one buying agent and 20 major global fashion brands.

Project participants include:

Brands

Bershka, Bestseller, Benetton, C&A, Fashion Cube, Gina Tricot, Greystate, Gymshark, H&M Group, Kiabi, K-Mart Australia, M&S, Next, OVS, Peak Performance, Pull & Bear, Primark, Target Australia, Teddy Group, The Very Group

Recyclers

Cyclo, Recover, Usha Yarns, Renewcell, Birla Cellulose, Lenzing, Infinited fibre Company, Bellda Llorens, Marchi & Fildi, Saraz Fibre tech, Bangladesh Petrochemical Company Ltd. (BPCL), Circ, Circular Systems, Worn again technologies , Blocktexx, Natural Fiber Welding (NFW), Officina+39, SC Grand

Manufacturers

AKM Knitwear, Active Composite Mills Ltd, Aman Group, Apex textile and printing Mills, APS Knit Composite Ltd, Asrotex , Beximco, Bitopi Group (Tarasima), Columbia Apparels Ltd, Cute Dress, Echotex Ltd, Executive High Fashions Ltd, Fakir Fashions, Fakir Knitwear, Fakruddin Textile Mills, GMS Composite Knitting Ltd, Hams Garment Ltd, Ibrahim Knit Garments Ltd, Impress-Newtex Ltd, Interstoff Apparels Ltd, Iris Design Ltd, Iris Fabrics ltd, Islam Garments Ltd JM Fabrics Ltd, Knit Asia Group, Liz Fashion Industry Ltd, MAS Intimates, Meghna Knit Composite, Micro Fibre Group, Modele de Capital, Natural Denim Ltd, P.A.Knit Composite Ltd, Ratul Group (Knitwear & Fabric), Renaissance Appaels Ltd, Risingtex Fashion Ltd, Sakura Dying and Garments, SB Style, Shasha Garments Ltd, Southern Garments Ltd, Tropical Knitex Ltd, Vintage (ABA Group), Yasin Knittex Ltd.

Affiliate partners such as McKinsey & Co, Avery Dennison, Fashion for Good and the Ministries of Foreign Affairs of Bangladesh and of Denmark, contribute moreover through sharing knowledge, network, exposure and unlocking investment opportunities for the development of the textile recycling industry in Bangladesh.

Global Fashion Agenda coordinates and communicates about the programme and works with moreover BGMEA, the Ministries of Foreign Affairs in Bangladesh and Denmark, and other public and private partners to create awareness, share knowledge and address barriers. Examples include presentations during the industry's leading sustainability event, the Copenhagen Fashion Summit, hosting Design for Circularity workshops with brand and recycler participants to discuss recycled material characteristics and use cases, and Policy Round Tables to address for instance the informal sector and foreign investment opportunities.

CLEAR SUCCESS FACTORS HAVE BEEN DEMONSTRATED

In assessing the successes of the project to date, the CFP stakeholders have identified four key success factors, many specific to its cross-sectoral nature.

A collaborative, multi-stakeholder engagement effort, particularly including policymakers.
A pre-competitive collaboration, by definition, relies on multiple stakeholders working together. Success requires the facilitation of global brands to create demand for recycled textiles in manufacturing countries, whilst supporting manufacturers and policymakers to make the shifts required to deliver supply at scale.

Transparency and tracking on material flows. In the case of the CFP, Reverse Resources provided the digital platform to track materials on collection, quality, description and delivery to

recyclers. This transparency is critical to assure supply and quality of feedstock and create trust that what is collected is delivered.

Coordination on the ground. On-the-ground coordination of the effort is needed by local stakeholders to establish relationships and practices for successful waste segregation and logistics with manufacturers, and engage with informal economy actors who currently handle manufacturing waste.

Aligning an industry voice. To create a conducive environment for circularity, an aligned industry voice must be presented on the importance of recycling for brands, the actions needed from policy makers and law enforcers to enable circular systems, and the implied business opportunity for the local economy to scale recycling capabilities.

TANGIBLE RESULTS AND PROOF OF CONCEPT WERE ACHIEVED

Since the CFP's inception in October 2020, project partners have facilitated multiple interventions to kickstart the transition to a circular fashion system. Segregation and inventory management practices have been set up at manufacturing facilities nominated by brand participants. Digitally traceable feedstock supply chains to recycler participants have been established. Workshops to improve design for and sourcing of recycled materials took place. Political barriers were identified and recommendations for approaching policy engagement and reform were developed. Awareness has been created amongst stakeholders and in global and national industry media.

Each of these activities have been crucial to create a supportive environment to facilitate brands scaling offtakes from recyclers and meet their commitments to use more recycled materials and overall scaling of textile recycling in Bangladesh.

Up to 1013 tonnes of waste has been registered on the Reverse Resource platform in Bangladesh, by a combined 43 factories currently segregating, expected to reach over 200 tonnes a month by the end of 2021. A significant achievement despite multiple COVID lockdowns, factory shutdowns, and outbreaks in factories which hindered project progress. The model and infrastructure are now tested and scalable. If identified barriers are sufficiently addressed, the model offers the potential to capture 10 - 20% of total textile waste in Bangladesh in the following years.

POTENTIAL FOR SCALING POST-INDUSTRIAL RECYCLING

According to Reverse Resources research, Bangladesh's current recycling capacity for apparel quality recycled yarns is estimated at 18,000 to 24,000 tonnes per year. This capacity is a mere 5 - 7% of the over 330,000 tonnes of 100% cotton and cotton-elastane waste that gets generated per year. This capacity gap clearly highlights the massive opportunity to scale Bangladesh's recycling capabilities.
If just half of the 100% pure cotton waste was mechanically recycled and made into a 50% recycled cotton yarn, it would save 490,000 tonnes of C02, equivalent to 6% of Bangladesh's total annual emissions, and 192,000 litres of water. [20]

There is opportunity to scale beyond cotton and we are at a critical moment to ensure investment in Bangladesh recycling systems serve evolving needs. Existing capacity is mainly suitable for cotton-rich materials, accounting for roughly 40% of Bangladesh waste. In the future, more chemical recycling capacity is required for polyester and blended materials that account for the remaining 60%. Our estimates suggest a fully scaled recycling system, across technologies and materials could build a domestic recycling market of $1.2bn annual revenue, supporting the creation of ~20,000 jobs, including new skills jobs and formalisation of informal jobs in waste handling and logistics.

20 Assessing cotton waste from mill and RMG processes, not spinning

BEYOND BANGLADESH

Based on Reverse Resources analysis, 35% of total waste from fibre to garment production is lost during production. To capture the full opportunity to close the loop on this part of the system, the CFP would need to be replicated in other major textile producing countries. McKinsey analysis estimates a 4.5 bn USD opportunity in six major manufacturing countries to scale this post-industrial recycling opportunity. These markets are identified as viable to replicate the successes of the CFP, given the major economic importance of the textile sector to the economy, as well as the engagement of governments and policymakers in the overall agenda.

There is a 4.5 billion USD opportunity across six major textile manufacturing markets

Full potential post-industrial recycling, USDbn revenue for recyclers

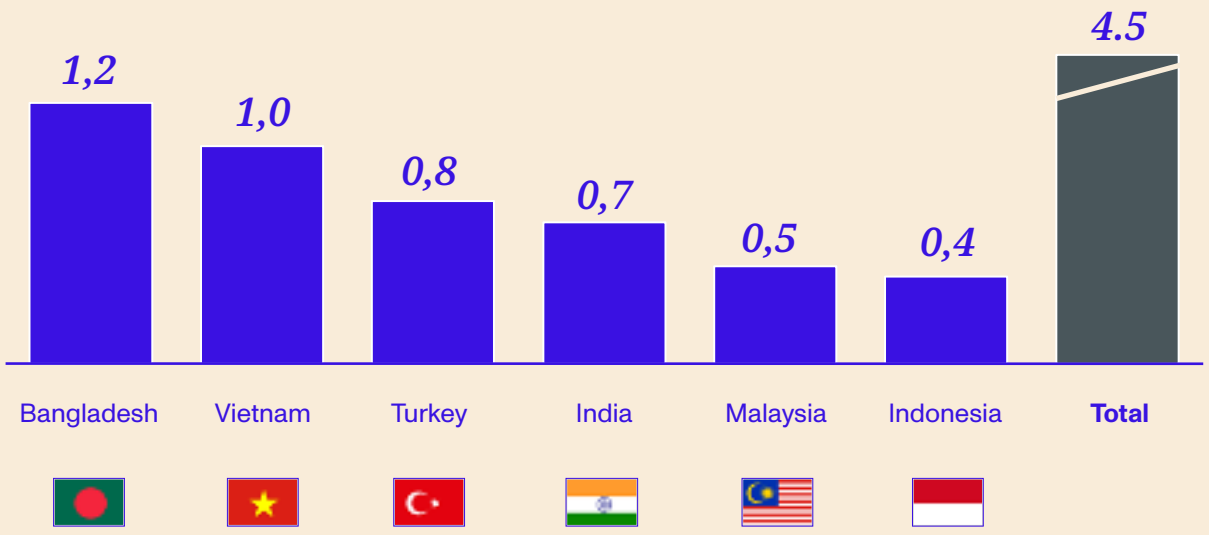


EXHIBIT 11
Potential market size for post-industrial recycling across major production markets

Source: WTO, fiber price scrapping, Statista, expert interviews

05

Barriers to be addressed to scale post-industrial textile recycling

Learnings from the Circular Fashion Partnership: success requires meaningful investment and coordination

The first iteration of the Circular Fashion Partnership has revealed a number of barriers that must be overcome to unlock the full potential of the post-industrial recycling opportunity. These learnings are gathered from interviews with brands, recyclers, manufacturers, NGOs and policymakers in the Bangladesh project, as well as project coordinators for similar projects in other markets and waste streams. They are relevant to many other major textile manufacturing markets, and all point to the importance of a coordinated ecosystem of actors driving system change.

a Formalising the informal waste management sector

In Bangladesh, as in many economies, textile waste is currently largely managed by informal and opaque networks. Manufacturers often have little control over waste flows, given local political dynamics and strong territorial disposition of these informal groups. Engaging with these informal players and networks is difficult, thereby making it challenging to uphold accountability, establish traceability and support the implementation of new circular solutions. These unregulated informal economies are often accompanied by social and human rights challenges. 'Formalising' them should present an opportunity to improve these degrading social impacts.

Almost all stakeholders involved in the effort, or driving similar efforts in other waste streams or markets, cited the dominance of the informal sector as the single biggest challenge. The post-industrial recycling opportunity will not be captured without incentivising and regulating these groups, ideally in a way which offers an opportunity to participate in the value creation from moving from downcycling to recycling and capturing domestic opportunities versus export. Many nations are developing national strategies for circularity; major textile manufacturing countries could benefit from elevating and integrating plans for circularity, given the primacy textile customers are facing on the topic. This requires wholehearted commitment from local ministries, a combination of hard, and well enforced regulations to gain better control of the informal networks, and softer incentives to participate in the new waste handling networks. Without such commitment, it may be challenging to attract the large-scale investment needed for regenerative chemical recycling plants.

b Providing attractive alternatives for current waste

Across manufacturing countries, the vast majority of existing textile waste is 'downcycled'. It is used in ways that do not capture full value potential. These volumes are either used in low grade textile use cases, such as insulation or stuffing, or used as fuel. In Bangladesh specifically, local manufacturing facilities often incinerate cotton to replace natural gas, which is expensive and hard to source. With no policy directives or limitations on cotton incineration, many manufacturers consider incineration of cotton (and possibly other textile waste types) as a sustainable, cost efficient and reliable energy source. Cotton is attractive to burn due it it's high energy levels, relatively clean burn, and fairly easy to capture toxins through filters. This has resulted in a system where large volumes of highly valuable and easily recyclable textiles are lost from the value cycle.

Again, a single actor, such a recycler, a brand, or a manufacturer cannot address this issue alone. First, introducing and enforcing restrictions on incinerating cotton is an important first step, but it is not enough. We can't expect manufacturers to shift their behaviours without affordable alternatives. Critically, these alternatives must be less costly than the returns manufacturers make on redirecting waste to recyclers. Manufacturers will only make the full transition when it makes economic sense. Policy levers to deliver on this outcome include (i) major subsidies in clean biofuels, targeting the manufacturing sector at a minimum and (ii) investment in clean energy infrastructure.

Both should be entirely feasible, especially given the co-benefits of investing in a clean energy transition. It also offers significant improvements for local air pollution. As Bangladesh is a Less Developed Country (LDC), it is exempt from decarbonisation targets. However, global incentives are increasingly aligning to support all emerging markets in decarbonising whilst maintaining rate of economic growth. As a result, we can expect many developed nations and capital providers to offer access to cheap capital for emerging markets to invest in clean energy infrastructures in the coming years.

Almost all stakeholders involved in the effort, or driving similar efforts in other waste streams or markets, cited the dominance of the informal sector as the single biggest challenge.

Hatching the egg: assuring demand and supply to enable investments to flow into the system

To stimulate flows of investment into recycling capacity in Bangladesh – and similar manufacturing countries – systems need to be in place to provide greater assurance of both supply of feedstock and demand for output. This is both at a macro view, so investors know this demand and supply exists, and at the micro view, so a particular recycler has transparency over waste source, quality and contamination. Currently, some recyclers lab test every batch of textile waste to check for quality and contamination, which adds significant cost into the system.

Reverse Resources' expertise and business model has been critical to assuring both elements of this equation in the Circular Fashion Partnership.

Its business model serves to remove market barriers by establishing transparency of textile waste, which then confers accountability on manufacturers and waste handlers involved in a transaction. Global Fashion Agenda has played a critical role in engaging global brand participants, driving demand for recycling output, whilst also developing a unified voice towards policymakers to drive the policy changes needed to unlock the full potential of the system. In the project, BGMEA represented the readymade garment industry and local stakeholders and engaged its community of manufacturers.

06

Moving beyond post-industrial recycling, pre-competitive action is a powerful and proven model for circularity

It is our thesis that we need to see many more pre-competitive collaborations if the fashion industry is to undergo the massive transition required to become a truly environmentally and socially responsible actor. The CFP programme in Bangladesh validates both the potential of such efforts and serves to reinforce the importance of collaboration.

We have identified a number of other opportunities for pre-competitive collaboration to accelerate the fashion sector's transition to circularity. Some already see some pre-competitive efforts underway, and we encourage brands and manufacturers to support successful efforts and replicate them where appropriate.

1 *Stepping up consumer engagement in sustainability through standardised labelling and definitions*

Consumers have an important role to play in scaling circularity. For the fashion industry to remain in line with the 1.5°C scenario, 1 in 5 garments will need to be traded on circular platforms.[21] The industry needs to encourage consumers to buy recycled materials, encourage them to make garments last longer, and importantly, send clothes back into the value cycle at the end of their life, for recycling or repurposing.

Current garment labelling is inconsistent, unclear and hard to navigate, which does not effectively guide consumers in purchase decisions, care and end of use behaviour. Standardising the metrics of communication around materials, their sustainability credentials, and their recyclability could better enable comparability and informed decision making.

Innovators in the industry are experimenting with what and how to communicate to influence consumer behaviour. The Allbirds X Adidas partnership to develop the world's lowest carbon shoe, the FUTURECRAFT.FOOTPRINT, has piloted a clear CO2 footprint label. Allbirds has open-sourced its carbon footprint calculator and is encouraging other brands to follow suit. The not-for-profit Lab30 is campaigning for a traffic-light system for garments, which would cover areas such as materials, manufacturing, garment footprint and impact.[22]

Whilst sustainability assessments for products and materials such as the Sustainable Apparel Coalition's Higg Index and standards such as Textile Exchange's Global Recycling Standard (GRS) are widely adopted by the industry and are expanding on product communication, there is not an industry aligned, standardised framework for consumer facing labelling of various features of the product being purchased. There is an opportunity for a pre-competitive collaboration to leverage these existing frameworks and standards and drive greater consistency of use.

2 *Build infrastructure for collecting and sorting textiles post-use*

With less than 1% of textiles recycled post-use, this element of the circularity puzzle must be solved to reach the full potential vision of 80% circularity. Regularly cited as a major barrier to post-use circularity, few countries have scaled textile collecting and sorting infrastructure, despite these services being well established for other recyclable goods such as glass, cardboard, plastic and food waste. Collection and sorting infrastructure is a limiting factor for post-use recycling.

21 McKinsey & Company and Global Fashion Agenda. (2020). *Fashion on Climate*

22 Lab 2030. (2021). EXPERIMENT 1.0 [online]. Other Day Organisation Ltd

Extended Producer Responsibility (EPR) is a policy framework whereby brands and manufacturers are held responsible for end of life of their products, both physically and financially. It is a well-established policy tool deployed in electronics, vehicles and increasingly in plastics and packaging. It is now under consideration in a number of European countries. EPR aligns incentives so that the manufacturer benefits from designing products that are more durable and reparable, as well as being more easily recyclable into high quality end products.

EPR often leads industries to establish a Producer Responsibility Organisations (PRO) in order to coordinate end of life collection and processing in as economical a manner as possible. This organisation is paid by members to conduct recovery and recycling services. A pre-competitive partnership could establish region PROs to build and manage collection and sorting textiles. In regions where EPR is being extended to textiles, the business case for this collaboration should be strong.

There are some emerging efforts on this topic including Euratex in Europe, and Accelerating Circularity Initiative in the US and Europe.

3 *Shared transport and logistics*

Approximately 3% of the emissions in the overall value chain are attributable to transport; shipping, aviation and road freight. These are areas of the value chain that have not received much attention in the overall transition to a sustainable apparel system, but there are enormous potential wins. Currently, an estimated 26% of EU freight trips are empty,[23] and that using excess vehicle capacity could save 55 million miles in the UK freight industry alone.[24]

There is a compelling business and sustainability case for sharing capacity, whether within fashion or across sector, given costs and emissions are relatively fixed per unit of transport. This is coming to life in the increasing calls to develop a freight sharing economy. The pandemic accelerated the growth in flexible logistics and delivery space, to meet sudden supply and demand shocks. There are more localised opportunities for shared logistics in post-industrial recycling, which could make collection more economically viable.

This opportunity could have a particularly high impact given shipping, aviation and heavy vehicles are unlikely to be decarbonised in the near future. It is also likely relatively easy to achieve since the industry already exists. Existing freight and logistics companies are setting up technology infrastructures to facilitate the 'freight sharing economy' and recognise the ESG gains they could benefit from by doing so.

The Clean Cargo Working Group is an example of a collective action organisation tackling shipping freight, sharing best practices and reporting on progress. Such existing working groups could be a suitable platform to launch such a pre-competitive collaboration in fashion.

23 UK Road Haulage Association

24 McKinsey analysis

Closing message

The climate emergency has never been more acute and there is an urgent need for pivotal actions. The fashion industry's significant contribution to global greenhouse gas emissions creates an onus on the industry to institute real change. Equitable economic systems with circularity and sustainability embedded at their core are feasible, and necessary.

This research proves that there are already circular solutions that can help to reduce fashion's harm and drive down GHG emissions, so now is the time to harness the opportunities of circular systems. Whilst progress will indeed require new innovations, we must also look to the promising technologies already available and bring them to scale to maximise their full potential.

Where the scale and value of post-industrial textile waste previously lacked in visibility and accessibility, the Circular Fashion Partnership has shown that it can be captured and valorised into a resource and simultaneously reduce the need for virgin material inputs when domestic post-industrial recycling is scaled. It presents a low-hanging fruit in the journey to circularity, and promises an opportunity to create a new valuable sub-sector, whilst keeping fibres in the fashion system longer.

It is time for the fashion industry, policymakers and investors to play their part and all are invited to join the Circular Fashion Partnership to kickstart their effort. Brands, manufacturers and recyclers are encouraged to work with peers in pre-competitive collaborations and establish circular commercial collaborations. Policymakers have the power and responsibility to ignite a transition to a circular industry by moreover incentivising recycling and use of recycled materials, recognising waste management sub-sectors as formal sectors and structuring policies and frameworks for the implementation of supportive infrastructures. Meanwhile, investors play a critical role and should apply their resources to grow solutions that facilitate the circular movement of resources, which can lead to an attractive profit-pool in the long-term.

Most importantly, we encourage cross-sector collaboration to foster transformation. The necessary scale of systemic change is not going to happen at the pace we need unless all actors work together with a clear vision for the future. We have a duty to help protect our planet and people, and we must act now to do so.

Appendix

KEY DEFINITIONS

Pre-competitive collaboration
Multiple companies working together to address a shared pain point that does not directly impact competitive dynamics

Circular Commercial Collaborations
A collaboration between two or more stakeholders such as a brand, manufacturer and recycler who cooperate to develop and implement a circular business model

Circular Value Cycles
A continuous flow of materials and value in a circular economy, contrasted against a linear value chain

Post-use textile waste
Textile waste after consumer use, e.g., disposed apparel or household textiles such as sheets and towels

Post-industrial textile waste
Any textile waste coming from an industrial process such as milling, spinning, printing and garmenting processes

Industrial symbiosis
A relationship between one industrial facility and another, whereby waste from one becomes raw material for another

Mechanical fibre to fibre recycling
mechanical recycling of cotton fibres to cotton fibres. In this process, typically textile cutting waste and yarns are torn and opened up into a fibre form ready to be re-spun again. Typically, this recycled fibre needs to be blended with a virgin fibre to achieve higher quality/strength

Regenerative cellulosic recycling
Non-mechanical methods to convert cotton and cellulosic fibres into virgin-like cellulosic pulp

Regenerative synthetic recycling
Non-mechanical methods to convert used mono-synthetic like polyester and nylon fibres into virgin equivalent PET chips or nylon flakes

Thermo-mechanical recycling
Converting PET bottles into virgin equivalent polyester fibre

Regenerative blended recycling
Non-mechanical methods to convert blended fibres into separated outputs of cellulosic pulps polyester fibres or pellets

Five types of recycling technologies will be at the core of the circular fashion system

Pilot Commercially ready

RECYCLING TYPE	INPUT/ FEEDSTOCK	OUTPUT	EXAMPLE PLAYERS	READINESS TO SCALE
Mechanical fibre-to-fibre	100% cotton (textile waste), solid colours and denim	Lower quality cotton – needs to be mixed with virgin cotton for most uses	CYCLO, HILATSUAN FERRE, recover	Commercial at scale today – however focused on pre-consumer fabric from production waste
Regenerative cellulosic	Man-made cellulosic fibers and cotton fabric (>80%)	Man-made cellulosic – has the same quality as virgin and can have cotton-like properties	RENEWCELL, INFINITED FIBER, Spinnova, EVRNU, SAXCELL, IONCELL	Technology is commercially scalable – however capacity is still limited
Regenerative synthetic	>80% Polyester (textile waste); solid colours, knits and woven	Polyester with same quality as virgin polyester	EASTMAN, loop, INEOS, gr€n, CARBIOS	Promising technologies at pilot scale Challenge to scale rapidly given "catch 22" (no demand until cost is down; higher cost than virgin until scale is up; risk of scaling due to technology uncertainty and uncertainty of feedstock supply)
Thermo mechanical synthetic	PET bottles	Polyester with same quality as virgin polyester	Toray Group, UNIFI, POLYLANA	Recycling of PET-bottles done at scale today – lack of feedstock to further scale
Regenerative blended recycling	Blended fabrics, i.e. printed, multi-coloured textiles	Cellulose powder/pulp and PET pellets/fiber/ monomers	BLOCK TEXX, Circ, worn again	Several technologies tested at pilot scale, need to improve purity and drive scale to improve economics

EXHIBIT 4 *The five major textile recycling technologies*

All recycled technologies are better across GHG, water and land usage

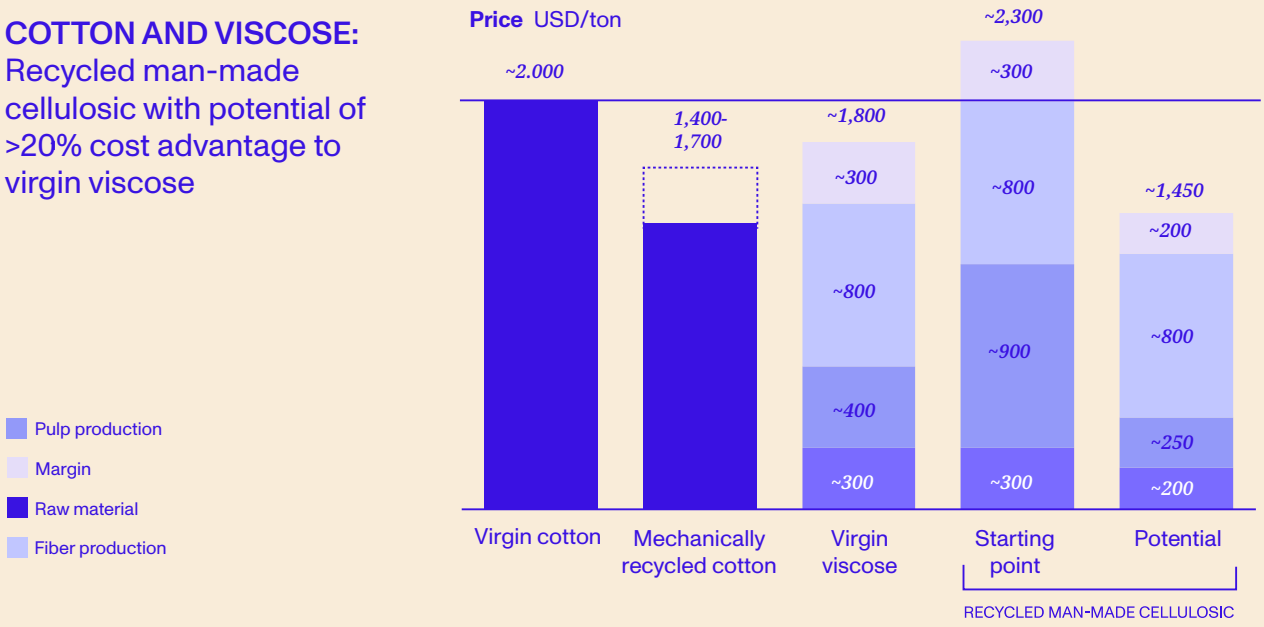
Source of origin	End product	GHG emissions material production, kg CO2/kg	Water depletion/ use, m^3/kg	Land use[1], hectares/ton	Other sustainability aspects
Polyester	**Virgin**				Leakage of microplastics, incineration of virgin polyester fabric add 2.3 kg CO2/kg
	Biobased				Leakage of microplastics and does not prevent the production of polyester (as made from PET bottles)
	Monomer recycling – all else equal				Leakage of microplastics but prevents production of virgin polyester
	Monomer recycling – optimized[2]				Leakage of microplastics but prevents production of virgin polyester
Cotton	**Virgin – conventional**				Degrades soil quality exhausting fields and the use of fertilizers and pesticides threaten soil and water quality as well as health of biodiversity
	Virgin – organic				Reduces use of fertilizers and pesticides typically impacting biodiversity and soil quality
	Recycled – all else equal				Recycling reduces quality – hence it cannot fully replace virgin cotton
	Recycled – optimized[2]				Recycling reduces quality – hence it cannot fully replace virgin cotton
Man-made cellulosic	**Virgin**				Modern pulp mills are able to produce additional excess heat and electricity to sell to the grid
	Recycled – all else equal				No excess heat and electricity sold to grid – limiting benefits compared to virgin
	Recycled – optimized[2]				No excess heat and electricity sold to grid – limiting benefits compared to virgin

EXHIBIT 5 *Comparison of environmental impacts of virgin and recycled textiles*

1 Ecological footprint; required to provide all the necessary resources and absorb associated CO2 waste to produce a given unit of textile
2 Optimized recycling technologies assume high degree of electrification, even in more energy intense process steps – hence possibility to reduce emissions to close to zero
Source: Articles: "Life Cycle Assessment of man-made cellulose fibers, "EcoCosy Climate Leadership White Paper 2020", EcoProfiles Plastics Europe, Gabi, Mistra fashion, Stockholm Environmental Institute, SCS Global Services Final Report, Fashion on Climate Report (Global Fashion Agenda/McKinsey), Expert interviews

All recycling technologies have the potential to produce materials at or below the cost of their virgin counterpart.

COTTON AND VISCOSE: Recycled man-made cellulosic with potential of >20% cost advantage to virgin viscose



POLYESTER: Mechanical recycling already below on cost, monomer recycling with potential for cost parity and lower CO2 impact

Fibre only makes up ~2% of a garment's retail price. A *10%* cost premium on fibers would therefore only imply *0,2%* of a garment's selling price

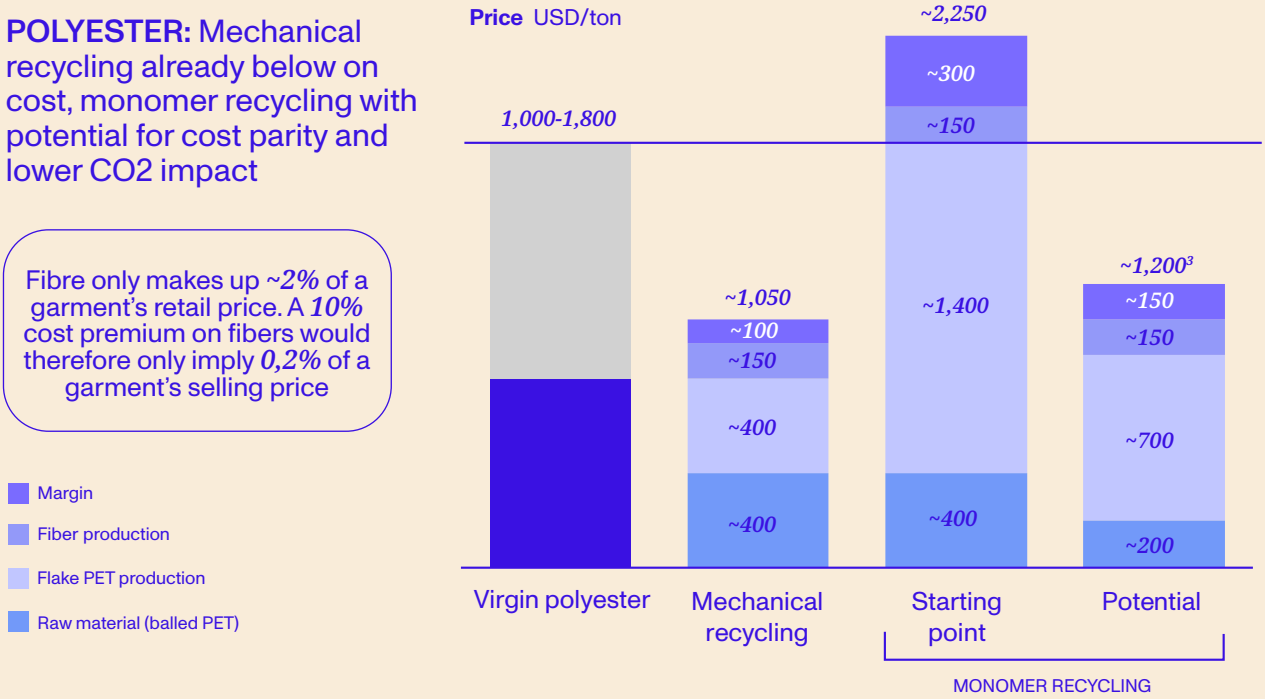


EXHIBIT 6 *Potential cost advantage of recycled textiles*

1 Price for recycled man-made cellulosics estimated as "steady-state" price, assuming a 15% margin for producers
Source: Research articles, SCS Global Services - "Life Cycle Assessment Comparing Ten Sources of Manmade Cellulose Fiber", expert interviews, Fashion on Climate 2020, Emerging textiles

If barriers to scale are overcome, recycling of textiles could create a 10-20 bn USD profit pool by 2030

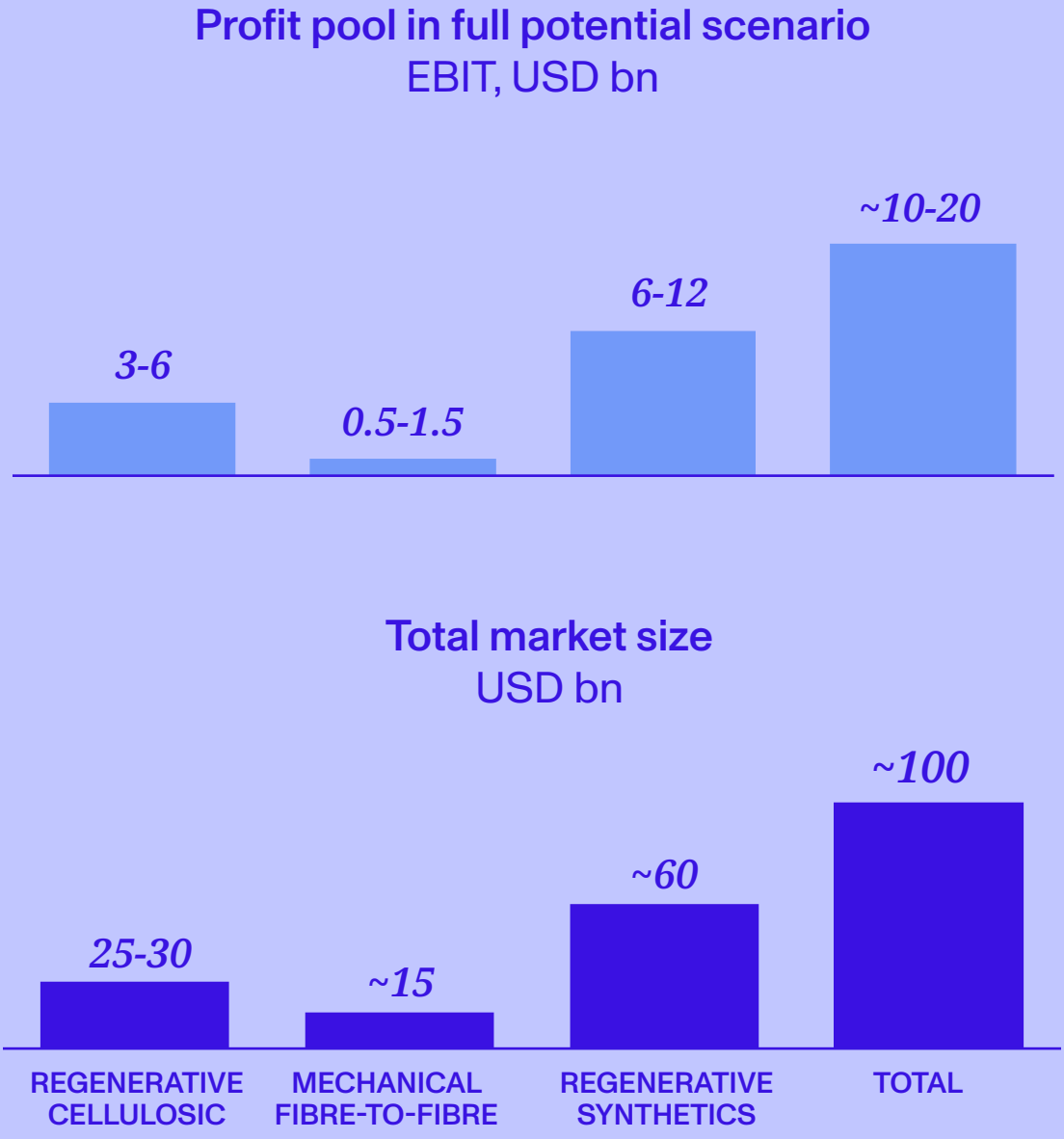


EXHIBIT 7 *Potential market size and profit pool of textile recycling industry*
Potentials include post-industrial and post-use

Investments into recycling technologies are accelerating, with 2020 being at an all time high

INVESTMENTS INTO RECYCLING COMPANIES, 2018-2021
Number of deals

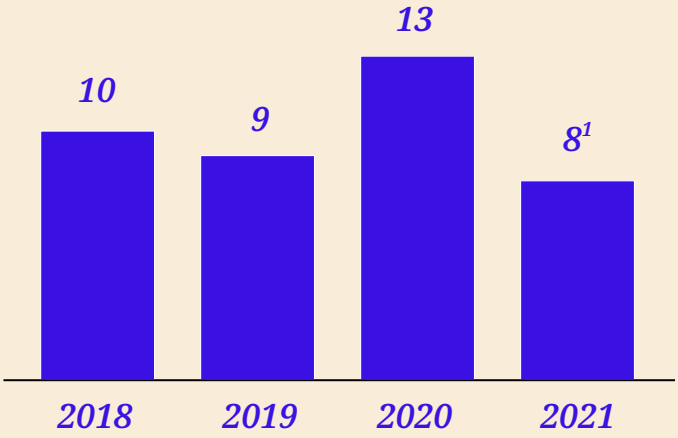


EXHIBIT 8 *Investment in recycling technologies, 2018 - 2021*

1. As of Sep/21
Source: Pitchbook

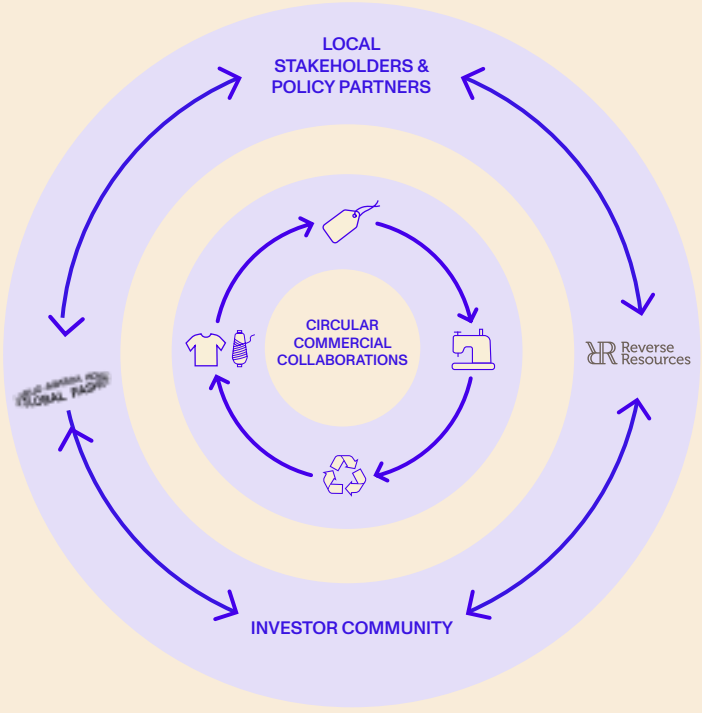
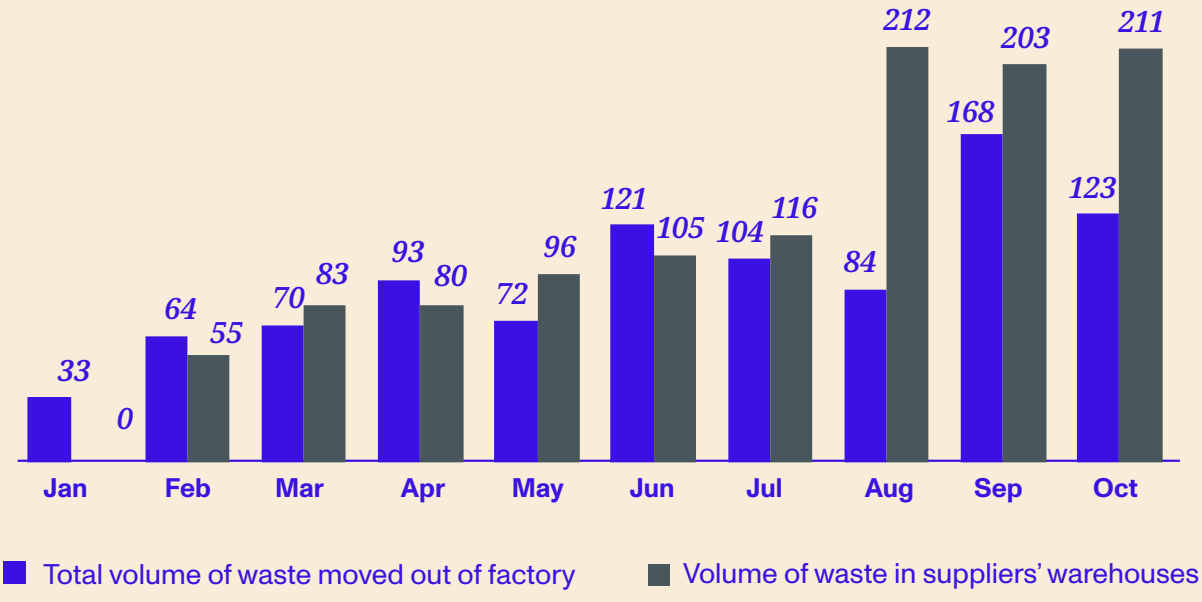


EXHIBIT 9 *The Circular Fashion Partnership Ecosystem*

Deep-dive: Segregation of waste volume is gaining momentum, despite ongoing COVID-19 pandemic

Volume of waste, ton



Suppliers and brands involvement, ton

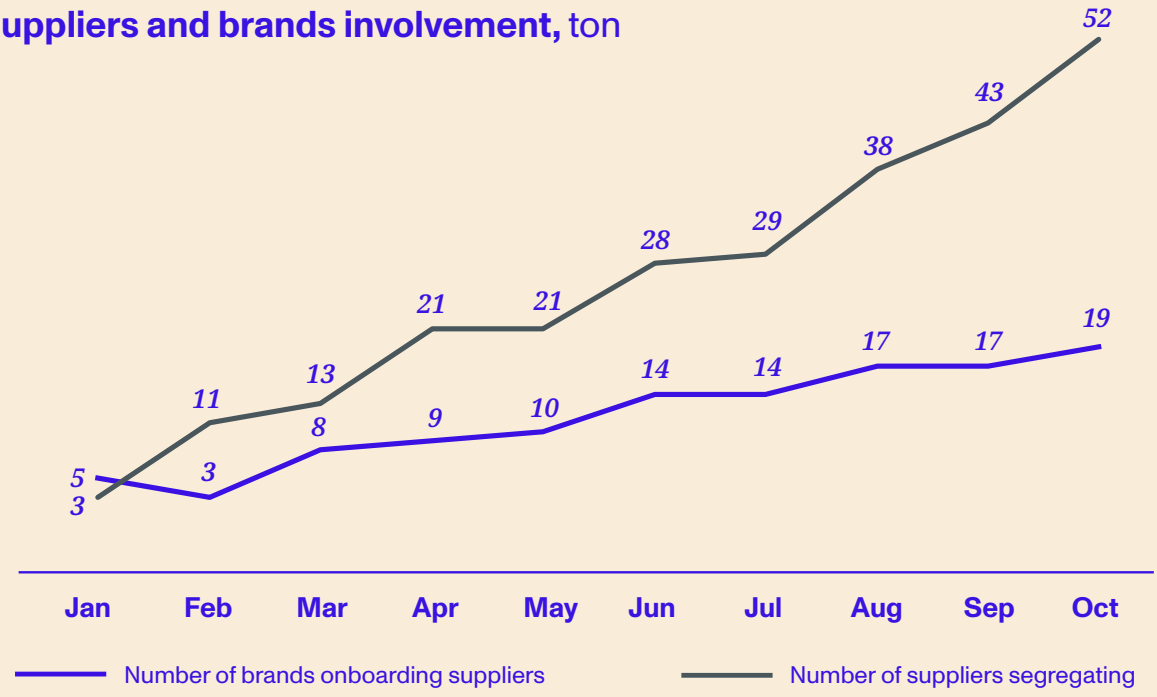


EXHIBIT 10 CIRCULAR FASHION PARTNERSHIP – PROGRESS IN TIME
CFP impact to date based on Reverse Resources project reports and data

Source: Reverse Resources

www.globalfashionagenda.com