



WASTE
TEXTILES



In Europe, the circular economy in textiles is being reinvented

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To reduce textile waste production and improve its management, laws and measures that specifically regulate the textile sector's circular economy model are being put in place, especially in Europe and China. Recent years have seen textile and clothing manufacturers in Europe increasingly accept their responsibility in the production and end-of-life treatment of their products. The EU Green Deal attempts to regulate, standardize and improve these initiatives.



DATA OVERVIEW

The textile industry is booming, accompanied by a trail of waste

Following the Covid-19 pandemic, the textile fibre market picked up again in 2021, when global production reached 113 million tonnes (FIG. 1), following 111 Mt in 2019, and 109 Mt in 2020.¹ Global fibre consumption per capita shot up from 8 kg in 2008 to 14 kg in 2021.

Recycled matter makes up 8.5% of the world market for textile fibres, a slight increase since 2016: 6.89% in 2016, 8.13% in 2020 (FIG. 2). According to Textile Exchange — an organization whose goal is a 45% reduction in greenhouse gas (GHG) emissions from the textile industry by 2030 – these indicators show that

the sector's growth is based on the production of virgin raw materials, shifting the industry away from its circular economy targets, and therefore from GHG reduction.² The value chain of an item of clothing comprises several stages that can take place in different geographical areas. Clothing starts out as fibre, which is transformed into yarn, then woven into fabric, and finally sewn. During the period from 2019-2020, the drop in turnover experienced by the textile (-9.2%) and clothing (-18.1%) industries in Europe due to the Covid-19 crisis underlined tensions in the supply of raw materials and the location of processing activities.³

In 2020, China was the leading exporter of textiles (43.5% of the market, for a total of \$296 billion), followed by the European Union (18.1%) and India (4.2%). The EU was the largest importing market (24.3%), ahead of the United States (12.6%) and Vietnam (4.4%).

FIGURE 1

GLOBAL PRODUCTION OF TEXTILE FIBRE IN 2021 (MT)

Source: [Textile Exchange, 2022](#)

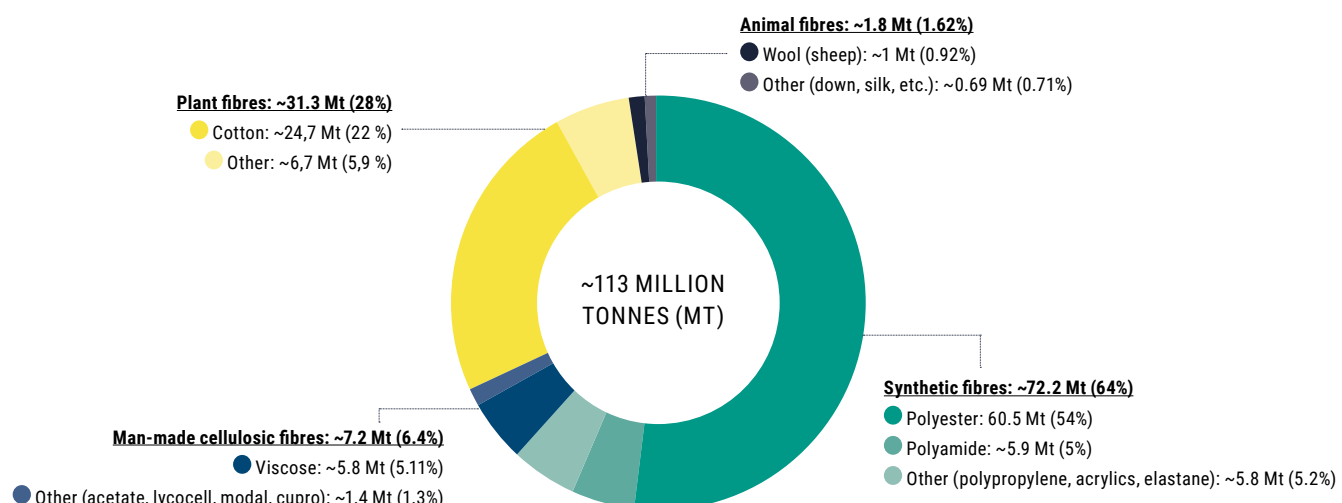
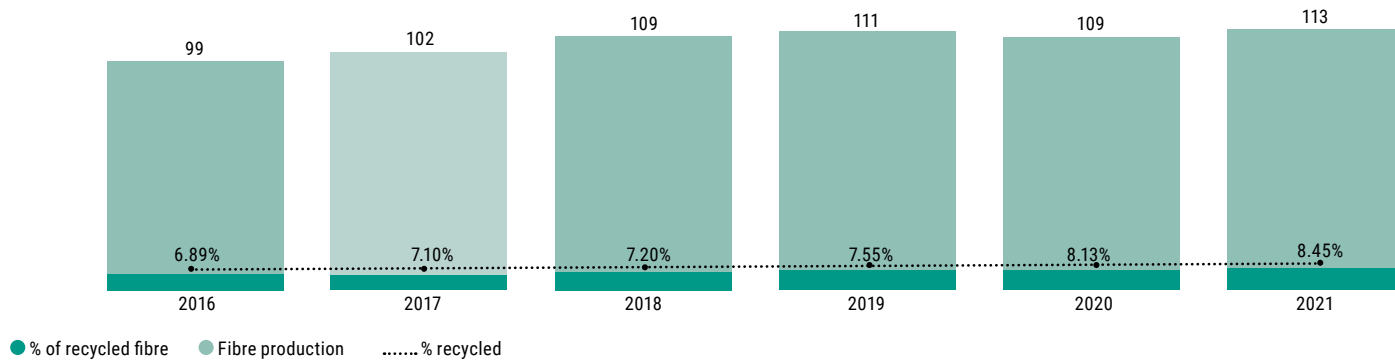




FIGURE 2

GLOBAL TEXTILE FIBRE PRODUCTION (MILLION TONNES), AND % SHARE OF FIBRES SOURCED FROM RECYCLED MATERIALS, 2016 - 2021

Source: *Textile Exchange, 2022*



More specifically, the main importers of clothing were the EU (34.1%), followed by the USA (16.8%) and Japan (5.3%), for a total value of \$415 billion. In this area, China is the biggest exporter (31.6%), ahead of the EU (27.9%) and Vietnam (6.4%),⁴ for a total market of \$386 billion.

China and the European Union, the two main textile and clothes markets, presented new strategies in 2020 to improve the sector's circularity. As part of its plan to reduce emissions to reach carbon neutrality by 2060, in April 2022 China published its objectives for the textile sector: a recycling rate of 25% by 2025, then 30% by 2030, and a target to increase its production of recycled textiles by 2 Mt in 2025. The government also indicates in the plan that it intends to promote recycling, apply eco-design standards, and establish labels to improve sorting and encourage socially responsible management systems.

As to the European Commission, in March 2022, it presented its strategy⁵ for sustainable, circular textiles as part of the European Green Deal to define its approach to life cycle, eco-design and extended producer responsibility (EPR).⁶ In 2018, the EU Joint Research Centre (JRC) published an analysis⁷ of textile flows with the aim of preparing for mandatory collection of used textiles by 2025. According to the analysis, the textile and clothing industry features over 160,000 companies and about 1.5 million employees, with a turnover of more than \$162 billion.

In 2018, the annual consumption of textile products per capita in the EU was 12.3 kg, 81% of which was clothing and the rest household textile goods. The textile market comprises fibres, yarn and fabric, for which the EU's volume of imports and domestic production in 2018 respectively amounted to: 3.4 million tonnes, 30% of it imported; 2.7 million tonnes, 44% of it imported; and 3.2 million tonnes, 40% of it imported (FIG. 3). The textile market in 2018 represented 6.1 million tonnes of finished stored products, of which 85% were imported. Of these finished products (clothes and household textile items), 88% were consumed in the EU. The JRC study estimates that under 38% of these finished products were collected for recovery (sold on the second-hand market) or for recycling.⁸

Europe generated 7 million tonnes of these textile flows in 2020, or 15 kg/cap./year. 85% of this waste is made up of clothes

and domestic textile items. However, only 38% is collected for sorting, reuse and recycling (about 10%).⁹ Given that the fibre and textile industry is steadily growing, and even seems set for a post-Covid boom,¹⁰ it is vital to come up with an economic model capable of reducing the generation of waste.



In Europe, used textiles in search of a second life

The EU's new strategy for a circular economy in textiles

The 2030 target of the European Green Deal is to increase the lifespan of textile products, their recycling rate, and the proportion of recycled matter in new items, and to reinforce standards on toxic substances in order to comply with social rights in force. The EU strategy also defines the role of manufacturers and underlines their responsibility towards the entire product value chain, comprising design, sale, usage and reuse.¹¹ The key points of the strategy are:

- The eco-design of products: improving their quality in order to make them last longer, easier to repair and recycle, as well as integrating more recycled materials
- The introduction of Digital Product Passports: clearer information for consumers on the composition, care and end-of-life of the product
- Tackling greenwashing and ensuring the eco-design of products through known labels and public authorities
- Reversing overproduction and overconsumption, and discouraging the destruction of unsold or returned textiles
- Extended Producer Responsibility (EPR) as a driver for an economy of recovery, separation, reuse and treatment of used textiles
- Reducing the quantity of microplastics from synthetic textiles that could end up in aquatic ecosystems

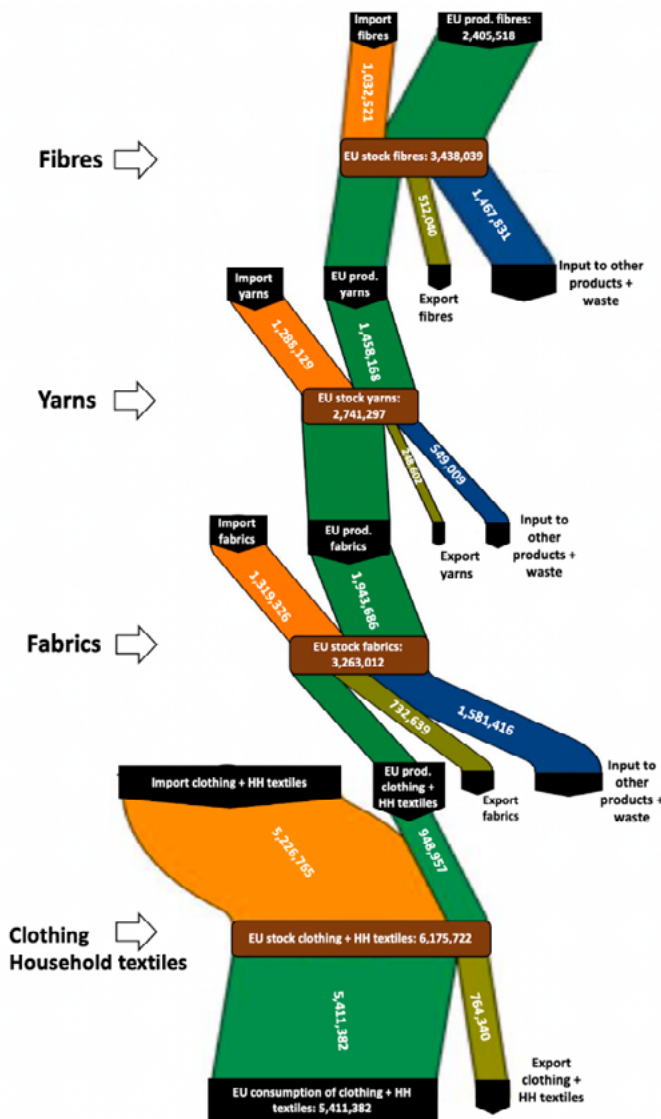


- Restricting the export of textile waste: the export of textile waste to non-OECD countries will only be authorised towards those aligned with the EU's goals and technologies for the treatment of this waste
- Encouraging the creation of businesses specialised in the reuse and repair of products
- Coordinating the implementation of the strategy with companies and Member States.¹²

80% of the environmental impacts of a product take place at the point of design: eco-design requirements would therefore avoid most environmental impacts and a large part of the volume of waste produced during this phase. In fact, designing clothing with a focus on its sustainable, repairable, reusable and recyclable aspects is an indispensable condition to diminish its environmental impact throughout its life cycle.¹³

FIGURE 3
FLOWS OF TEXTILE IN THE EU IN 2018 (IN TONNES)

Source: [European Commission, 2021](#)



In the EU, 62% of textiles collected are not recovered or recycled, due to inadequate sorting services and technologies for recycling used textile products. The separate collection systems in place in Europe are all voluntary and highly selective in order to only retrieve clothes that can be reused or recovered.¹⁴ Most clothes are made of cotton, polyester or elastane mixes, and polyester and elastane are polluting substances that make recycling and recovery almost impossible, in particular due to their complex chemical compositions.¹⁵

EPR is the cornerstone of the EU textile industry

Extended producer responsibility (EPR) programmes follow the polluter pays principle. They play a crucial role in the EU's strategy on sustainable, circular textiles by facilitating the development of circular circuits for collecting, recovering, recycling and depositing used textiles at their end of life. The revision of the EU Waste Framework Directive scheduled for 2023 requires Member States to establish a single, unified EPR system for textiles by 2025.¹⁶ This measure consists in involving producers of textile products and ready-made clothes in the management of their end of life. EPRs can be of two types: with "financial" EPRs, the companies that put products on the market pay a fee to an eco-organization in the private sector responsible for waste prevention and management. These financial contributions are based on eco-modulation, meaning that they are calculated according to the materials used in a product and circular economy principles (sustainability, reparability, reuse and recyclability).¹⁷ In "operational" EPRs, agencies use the funds to directly manage waste, outsourcing its collection, transport, sorting and treatment.

The EPR programmes currently in place in the EU consists mainly of mandatory targets for collecting used textiles by 2025. Most of the programmes are developed in countries like the Netherlands, Sweden and Denmark. They have already set up systems for the collection, sorting, recovery, recycling and final destruction of used textiles and are ready to implement laws to align existing EPRs with European Commission guidelines. France is the only country to have established a law regulating EPRs in the textile sector, dating from 2007. In 2019, the collection rate of textile waste was 38% in France, 45% in the Netherlands, 19% in Sweden, and 43% in Denmark.

Although the collection rate in France is not the highest, the French system is recognized for being particularly successful in federating textile market actors, by improving and standardizing collection, sorting, recovery and recycling flows. The implementation of the programme has enabled the French system to overcome some of the problems facing other countries. These challenges include, for example, the collection of low-quality fabric, which can be impossible to recover and reuse. It is also sometimes difficult to ensure that collected matter is homogenous, which makes it easier to sort and thus recycle. This means that some fabrics that could have been recycled are eliminated by incineration because they are mixed with other materials. The French system has created a model featuring collection points close to consumers, which improves collection rates and flows, and channels investments towards circular economy solutions concerning used textiles, so that the industry can innovate (SEE BELOW).¹⁸



BOX 1 • KEYS TO UNDERSTANDING

TYPES OF RECYCLING IN THE TEXTILE SECTOR

Once used, textile materials can be recycled to manufacture new textiles (“closed loop”) or in the case of materials such as plastic, used to manufacture other non-woven products or to produce energy (“open loop”). Another distinction concerns the way that the waste is ultimately used: upcycling (recovering used products by giving them a new, higher-quality life without destroying the raw material)¹⁹ or downcycling (recycling in such a way that the recycled product has a lower value than the initial product).²⁰

Depending on the technical process employed, textile recycling methods can be split into three categories:²¹

- Chemical: textile fibres, comprised of natural polymers (linen, latex, cotton, etc.) or synthetic fibres (PET, acrylic, etc.) are dissolved to separate the monomers^a in the fibre. A new recycled polymer can then be created with the same properties as a virgin polymer.
- Mechanical: the first step involves dismantling the used textiles (removing buttons, zips, etc.), which are then shredded, carded (transformed into long fibres by passing them through a Garnett machine), cut into pieces or split into fibres. After this stage, the fibres are mixed with other materials to make a new product.
- Physical: the physical separation of poly-fibres uses the different density of each material to separate them. This method is employed, for example, for cotton-PET and cotton-elastane mixes.

Since each of these processes comprises several steps, their environmental impacts are different. While most scientific publications underline the potential environmental advantages of recycling textiles, they also agree that reuse is preferable to recycling. Some exceptions exist: in the case of reuse, longer transportation distances reduce the environmental advantages. For recycling, if the process involved operates on fossil fuels or is less energy-efficient, the impact on the climate is greater.²²

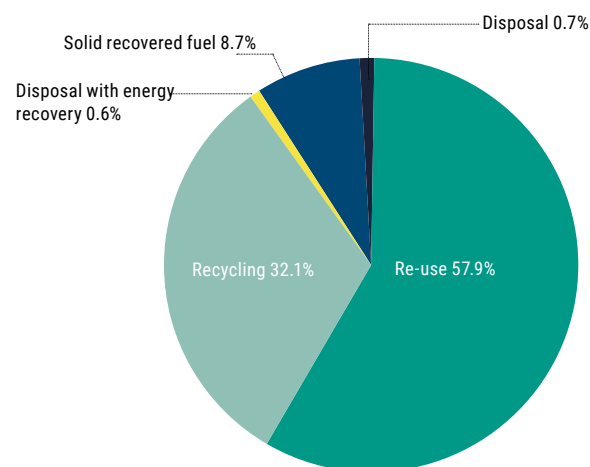
France puts the emphasis on EPR and input from civil society

In 2007, the French law establishing EPR for textiles – clothing, household textile articles and shoes – aimed to resolve the problem of used textiles, which amounted to 600,000 tonnes a year, or 10 kg per person. The law led to an increase in the amount of waste collected, from 100,000 tonnes in 2009 to 239,000 tonnes in 2018. The objective for the end of 2022 is to collect about 300,000 tonnes of waste annually. Once sorted, the collected textile waste is mainly reused (57.9%) or recycled (32.1%) (FIG. 4).

FIGURE 4

END OF LIFE OF TEXTILE WASTE AFTER SORTING IN FRANCE, ANNUALLY

Source: ReFashion, 2021



Collection, sorting and recovery are central to the EPR system for textiles in France. This programme is run by the eco-organization ReFashion, a private company that organizes handling the end-of-life of equipment put on the market by companies. Since its creation, ReFashion has set up 44,829 voluntary drop-off containers where citizens can deposit their textile waste. Over 50% of these drop-off points are containers in public areas, and under 10% are in private areas. In 2021, 244,448 tonnes of waste (3.6 kg/cap./year)²³ were collected at drop-off points. The waste is then taken to sorting centres.

In 2021, the ReFashion EPR system featured 66 accredited sorting centres, 51 of them in France and 15 elsewhere in Europe. In 2021, following the Covid-19 pandemic, sorting of textile products grew by 22% (190,000 t). In sorting centres, operators separate reusable textiles and shoes for recovery and non-reusable items for other activities like recycling, solid recovered fuel (SRF), and elimination.

Reuse represents about 57% of the treatment of textile waste collected in France according to a ReFashion report (FIG. 4). The EPR programme has observed a reduction in the percentage of reusable textile waste compared to 2014 (64%), due to the low quality and sustainability of products on the market, which makes resale and recovery more complicated. Reuse and recovery here refer to diverting used textiles to second-hand clothing markets in France and abroad (37% of reusable products are exported to Africa under the customs code “used clothing”).²⁴

With the idea of providing information on recycling market actors, ReFashion has launched Recycle, an internet platform that connects European recycling companies and producers. To date, 245 actors feature on the platform, of which 75% are French and 25% European.²⁵ They come from diverse industries (textile, buildings, plastics processing, automobile, etc.),

a Monomer: composed of simple molecules, capable of combining to form polymers.



thus extending the outlets for recyclable or recycled matter. Among the companies listed on the ReFashion website, 40% are suppliers of textiles and shoes, and 60% are processors offering semi-finished products to other industries.²⁶

In order to encourage short, local circuits for the recycled fibre market, the FIREX project was launched in July 2022 with a budget of €14 M. Its goal is to recover occupational clothing and the waste from its production (20,000 t/year) in order to recycle it mechanically. The idea is that the products resulting from the project will meet the demand for recycled raw materials in the textile industry. The initiators of the project are Synergies TLC, Tissages de Charlieu (LTC), TDV Industries, Mapea and the European Centre for Innovative Textiles (CETI). The partners should ensure that systems are in place for collecting, dismantling clothes to remove buttons, rivets, etc., automated sorting, carding and spinning activities, and sewing of fabrics, clothing and accessories.²⁷

In 2017, the Emmaüs Association^b warned of the difficulties of recycling collected clothing following an increase in the quantity to process after ReFashion set up drop-off points. Due to the difficulties encountered in recovering waste, the Ouatéco project emerged to finance a recycling process for old textiles that have not been reused. In 2021, Ouatéco set up an industrial dismantling and carding line for used textiles in order to manufacture thermal insulation. The project should lead to the recovery of around 1,000 tonnes of waste per year in the first phase.²⁸

The CE-PET project, launched by the Carbios company, kicked off in 2018, aimed at the chemical recycling of textile and PET waste using an enzyme that facilitates processing. For the moment, when the enzyme employed releases the PET monomers it does not distinguish between colours, sources, textiles and mixed matter. The objective of the project is to offer manufacturers products made from recycled PET that can be endlessly recycled, although there are some limitations, such as the quality of plastic fibres, which sometimes prevents recycling. The actors targeted by the project are upstream waste collectors, manufacturers, and companies that put PET products on the market.²⁹

Concerning reuse, sales in the second-hand clothing market grew by 140% in 2021 compared to 2019. Big brands like Veepee, Zalando, Aigle and Kiabi have their own second-hand websites and some online platforms specialize in the field, like Vinted, Leboncoin and Vestiaire Collective. Vinted, which has 16 million French users,³⁰ is the second most visited e-commerce website in France. Some big retailers like Printemps and Galeries Lafayette have set up second-hand sales and repair stations in their shops.³¹ Independent players have launched applications listing second-hand shops in France, like Unique, which indicates the location of local thrift stores.³² Upcycling is also becoming a feature of fashion markets, with two specialized marketplaces: Revibe and Reiner Upcycling, where creators put their designs online.^{33,34}



KEY TAKEAWAYS

Driven by the urgent global need to deal with used textile items, legislation is making progress and initiatives are being set up to make the textile chain more circular and sustainable, in countries like China, and especially in Europe. The European Union has made a significant step in unveiling its circular economy strategy for the textile and clothing industry for 2030, aimed at producing better, recycling better, and discarding fewer textile products. This strategy encourages a quest to identify new recycling strategies. In parallel, sales and purchases of second-hand clothing have made huge progress with users, involving both more availability and alternatives, and a change in practices. Nevertheless, selling second-hand clothing is not enough to resolve the problem of used clothing and textiles. As a result, research and innovation in the mechanical and chemical textile recycling sector are focused on boosting the performance of these activities.

^b Emmaüs is a French NGO created to carry out socially responsible action including helping to recuperate and upscale donated and discarded objects.



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