



Materials Market Report

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About this report

Welcome to the 10th edition of Textile Exchange’s annual Materials Market Report. The Materials Market Report (previously the Preferred Fiber & Materials Market Report) was first launched in 2013. This year, as we celebrate 10 years of this report, we want to say a huge thank you to the many contributors over this time. This annual report would not have been possible without all of your support.

The Materials Market Report is a comprehensive annual publication that provides unique data and insights into global fiber and raw materials production, helping the industry to measure and make progress towards its goals. We’ve seen a lot of progress over the years, but **much more still needs to be done in this decisive decade** to limit global warming and drive beneficial impacts for people and our planet. Without accelerated action, we won’t meet our 2030 [Climate+](#) goal of a 45% reduction in greenhouse gas emissions related to fiber and raw material productions.

For many years, we have reported on the total fiber and raw materials market, including programs for various levels of “preferred” fibers, as well as the conventional business-as-usual. To better reflect this, we **decided to update the report’s name** from the “Preferred Fiber & Materials Market Report” to the “Materials Market Report” this year.

This naming update is also reflective of our ongoing work to evolve our view on what we believe a “preferred” fiber or raw material should look like. In 2010, Textile Exchange began utilizing the term “preferred” to categorize fibers and materials that included environmental or social improvements over the conventional or status quo options. But in today’s climate, incremental improvements associated with doing less harm aren’t going to get us to our goals.

That’s why in January 2023, we published updated high-level guidance on the key concepts we believe should be included in a preferred material. In September 2023, we publicly launched the updated version of our [Preferred Fiber and Materials Matrix](#) (PFMM), which uses a holistic set of quantitative and qualitative criteria to consistently assess what is included in various standards systems. Our future aim is to in the future, expand the PFMM will be built out to include branded materials and other sustainability programs. as an assessment framework that also covers branded materials and sustainability projects.

We also want to note that the Materials Market Report covers **total fiber and raw materials production volumes**, independent of whether they are used for apparel, home textiles, footwear, or any other applications. For example, we know and report the overall total production volumes for cotton fiber. Breakdowns per usage are very rough estimates only and shared in a special chapter on the report scope.

Finally, we want to emphasize that the quality of data on the global fiber and raw materials market is limited. For many years, we’ve worked on improving data quality and increasing transparency in the industry by collating publicly accessible fiber and raw materials production volumes. However, there is still a lot more work to be done, and we want to encourage you all to **help continue to improve the quality and accessibility** of global fiber and raw materials production data. Only through collaboration and joint efforts can we measure our progress and achieve our goals.

We thank you for your contributions.

Where can we find the supplier-related information?

Textile Exchange continues to provide information about suppliers, production sites and branded materials. **However, a static PDF report is not the best place to house this increasing amount of information, so we decided to transfer our supplier-related information to a new, interactive online Materials Directory.**

This transition also allows us to update the information more frequently. Together with the 10th edition of the Materials Market Report, we are launching the pilot version of the new Materials Directory and hope, with your help, to continuously improve it and share information from around the world in the form of interactive maps and a filterable database. The development of the Materials Directory is also part of Textile Exchange’s tools harmonization process, which will merge previously existing fiber- and material-specific tools into one. Further alignment of Textile Exchange’s tools is planned for the coming years. You can access the [Materials Directory](#) here.

Where can we find information about companies’ commitments and targets?

Information about the Materials Challenges can now be found in the [Materials Challenges Dashboard](#).

Executive summary

The Global Fiber Market

Global fiber production increased from around 112 million tonnes in 2021 to a record 116 million tonnes in 2022, after a slight decline in 2020 due to COVID-19. In the last 20 years, global fiber production has almost doubled from 58 million tonnes in 2000 and is expected to grow to 147 million tonnes in 2030 if business continues as usual.

Without a rapid transition to preferred fibers and raw materials, including significantly reducing the industry's reliance on virgin fossil-based synthetics, we will not meet our 45% GHG emissions reduction target for raw material production by 2030, which would ensure we are doing our part to stay within the global 1.5°C pathway set out by the Paris Agreement.

After years of growth, the combined share of all recycled fibers slightly decreased from around 8.5% in 2021 to 7.9% in 2022. This was mainly due to an increase in production of fossil-based polyester which had lower prices than recycled polyester. **Still less than 1% of the global fiber market came from pre- and post-consumer recycled textiles in 2022.**

While the industry has made commitments to align with the 1.5°C pathway, virgin fossil-based synthetic fiber volumes continue to increase. Fossil-based synthetics production increased from 63 million tonnes in 2021 to 67 million tonnes in 2022.



[Cotton](#)

Cotton from the programs recognized by the 2025 Sustainable Cotton Challenge returned its market share to 27% of total cotton production in 2021/22, after declining from 27% in 2019/20 to 25% in 2020/21

due to a variety of factors, including weather variations, changes to the Better Cotton program, market conditions, and socio-political challenges.

In order to reach the goal of Textile Exchange's Sustainable Cotton Challenge—50% market share of more sustainable cotton by 2025—there needs to be a significant acceleration in the transition towards these programs. It has taken the industry 10 years to increase this proportion from around 3% (in 2011/12) to 27% (in 2021/22). Now, the industry's full attention and commitment is needed to increase its share to 50% by 2025/26, which is just two harvests away from now. There also needs to be continuous improvement to the environmental and social impacts of all cotton grown.



[Polyester](#)

Polyester fiber production volumes increased from 61 million tonnes in 2021 to 63 million tonnes in 2022.

Making up 54% of total global fiber production in 2022, polyester continues to be the most widely produced fiber. **The market share of recycled polyester fibers slightly decreased to 14% in 2022, down from 15% in 2021.**

Reasons for this include the growing competition for PET bottles as feedstock, systemic challenges in scaling in textile-to-textile recycling, and the growth of virgin fossil-based polyester. In April 2021, Textile Exchange and the UN Fashion Industry Charter for Climate Action launched the 2025 Recycled Polyester Challenge to scale the recycled polyester market. Between then and December 2022, over 151 brands and suppliers (including subsidiaries) have signed on to the Challenge and committed to jointly increasing the global share of recycled polyester to 45% by 2025.

Systems for textile-to-textile recycling are in development but are estimated to account for less than 1% of all recycled polyester. Recycled polyester is still primarily made from plastic bottles (99%). The interest in, and use of, ocean or ocean-bound plastic is also increasing, but overall market shares are also still very low and make up less than 0.01% of all recycled polyester.

The market share of biobased polyester fiber remained very low at around 0.01% of the polyester fiber market—mainly due to issues around price, availability, and questions about the sustainability of currently available biobased polyester.



[Polyamide](#) (Nylon)

Polyamide made up 5% of the global fiber market in 2022. **Due to technical recycling challenges and comparatively lower prices for virgin fossil-based polyamide, recycled polyamide only makes up 2% of the total polyamide market share.** As the second most used synthetic fiber, polyamide can represent a significant lever for improved environmental impact if producers switch to recycled and biobased polyamide. Most recycled polyamide is made from pre-consumer waste, or materials like discarded fishing nets and carpets, but more post-consumer textiles need to be used as feedstock. The market share of biobased polyamide fibers in 2022 remained low, at around 0.4% of the global polyamide fiber market. Similar to the reasons for the low uptake of biobased polyester, price, availability, and questions about the sustainability of biobased polyamide dampened growth in the market.

Executive summary

[Manmade Cellulosics](#)

Production of manmade cellulosic fibers (MMCFs) including viscose, lyocell, modal, acetate, and cupro increased from 7.2 million tonnes in 2021 to 7.3 million tonnes in 2022. FSC- and/or PEFC-certified MMCFs had an estimated market share of about 60-65% of all MMCFs in 2022. **Overall, the share of global forest area certified by FSC and/or PEFC decreased from around 11% in 2021 to around 10% in 2022, and is expected to further decline following the ban on timber from Russia, Belarus, and occupied Ukrainian territory as “conflict timber” in March 2022.**

The market share of “recycled” MMCFs increased from an estimated 0.47% in 2021 to 0.49% in 2022. These volumes are expected to increase significantly in the coming years thanks to ongoing research and development. With organizations such as bluesign® and ZDHC introducing standards at the pulp and fiber level, change is also likely at these stages of the supply chain.

[Wool](#)

Global wool fiber production remained relatively unchanged at around 1 million tonnes in 2022. The market share of wool produced according to the Responsible Wool Standard (RWS), ZQ, SustainaWOOL (GREEN and GOLD), and Climate Beneficial™ increased from around 3% in 2021 to 4.3% in 2022. RWS wool alone increased its market share from 2.6% in 2021 to 3.9% in 2022, with production rates as high as 74% of all wool in Falkland Islands, 53% in South Africa, 35% in Uruguay, and 21% in Argentina. **For the first time ever, the market share of RWS-certified wool was higher than the non-certified share in two**

countries in 2022. Transitioning to wool programs with criteria for animal welfare and responsible land use has the potential to create positive environmental, social, and biodiversity impacts. Recycled wool made up around 7% of the global total wool market in 2022, a slight increase compared to 2021.

[Mohair](#)

Approximately 4,550 tonnes of greasy mohair fiber were produced globally in 2022. **41% of all mohair produced in 2022 aligned with the Responsible Mohair Standard (RMS), which is only in its third year after being launched in March 2020.** The RMS covers both animal welfare and responsible land use criteria. It increased its market share to 79% of the total mohair production in South Africa and 38% of the total mohair production in Australia in 2022.

[Alpaca](#)

Global alpaca fiber production was around 6,250 tonnes in 2022. **Following on from its launch in April 2021, the market share for the Responsible Alpaca Standard (RAS) reached 3.1% in 2022.**

[Cashmere](#)

Global cashmere production came to about 26,801 tonnes of greasy fibers in 2022. The market share of the cashmere programs—AVFS, Good Cashmere Standard®, Responsible Nomads, and SFA Cashmere Standard combined—increased to 35% of all cashmere produced worldwide in 2022, up from 17% in 2021.

[Down](#)

Global down production volume was estimated at around 0.60 million tonnes in 2022. The market share of the Responsible Down Standard (RDS) slightly increased to 3.2% of the total down market in 2022. Downpass had a market share of around 1.2% in 2021, but due to the war in Ukraine, a major production country, data for 2022 is not available. RDS and Downpass are primarily animal welfare standards. While influencing change at the farm level is challenging, the use of these standards helps to reduce the risks along the down supply chain.

Other fibers

Other fibers—from hemp to elastane—are starting to gain traction in the industry. This report also highlights innovations from Pineapple Leaf Fibers (PALF) to fibers made from captured CO₂.



Photo: Crispin Jones

Executive summary

The Global Non-Fibrous Materials Market

[Leather](#)

Leather, measured in terms of fresh hides of cattle, sheep, goats, and buffalo, had a global production volume of around 13.4 million tonnes in 2022. Leather standards have primarily focused on processing risks such as tanning and chemical use, but there is growing interest in animal welfare, deforestation, land-use change (and associated biodiversity loss), and climate change issues. Textile Exchange has developed the Leather Impact Accelerator (LIA), which includes Impact Incentives, a tool that allows brands to directly support farmers who are addressing deforestation and land conversion, as well as animal welfare at all cattle farming levels. The first Leather Impact Incentives were verified in March 2022 as part of the LIA pilot. In June 2023, Textile Exchange and the Leather Working Group publicly launched the Deforestation-Free Call to Action for Leather asking brands to commit to sourcing their bovine leather from deforestation/conversion-free supply chains by 2030 or earlier.

[Rubber](#)

Global natural rubber production came to around 14 million tonnes in 2022, making up 48% of the total 29 million tonne rubber market. Fossil-based synthetic rubber accounted for the remaining 52% of the market. In 2022, 2.9% of all the global rubber-producing area was FSC- and PEFC-certified.

The number of certified sites increased sharply

The number of sites certified to Textile Exchange's portfolio of standards significantly increased from 48,868 in 2021 to 60,321 in 2022. This includes sites certified to the Global Recycled Standard (GRS), Organic Content Standard (OCS), Recycled Claim Standard (RCS), Content Claim Standard (CCS), Responsible Down Standard (RDS), and Responsible Wool Standard (RWS).



Photo: Pics Man24

Background and the big picture

At Textile Exchange, our goal is to help the industry achieve a 45% reduction in the greenhouse gas emissions that come from producing fibers and raw materials by 2030.

This goal underpins our [Climate+](#) strategy.¹ We're calling it Climate+ because it goes beyond accounting for greenhouse gas emissions; it is an interconnected approach that swaps siloed solutions for interdependent impact areas like soil health, water, and biodiversity. Progress towards our Climate+ goal is tracked through our [Climate+ Dashboard](#).

As in previous years, this edition of Textile Exchange's Materials Market Report shows that the textile industry's fiber and raw materials market is unlikely to be able to reduce its emissions enough to help limit global warming to unless it invests in the three key levers, as identified by modeling conducted by Textile Exchange.

The industry must:

1. Aggressively shift to and invest in known solutions

Many options for lower-impact fibers and raw materials exist today, yet more than half of global fiber production is still fossil-fuel-based.

2. Fill the innovation gap

This captures the potential impact reduction related to systems innovation such as regenerative agriculture—a known solution, but one that does not yet have standardized GHG impact reduction data or modeling methodologies available. New, “next-gen” technological innovations are also included here. However, the reality is that many of these will not be developed in time for the industry to reach its 2030 goals.

¹ Textile Exchange, “About Climate+.” <https://textileexchange.org/about-us/climate/>

3. Decouple value creation from resource extraction

Global fiber production reached an all-time high again in 2022. It is becoming increasingly important for the textile industry to rethink how it defines value, which is currently overwhelmingly tied to the extraction of new resources to make new products. Many sustainability concepts are connected here, including circularity, durability, and addressing overproduction and overconsumption.

The industry will need to make real, meaningful progress in this area if it is to meet its climate (and nature) targets.

Textile Exchange's vision is a new system that works in sync with nature, respecting planetary boundaries while protecting the people who sustain it. To get there, we're keeping our focus holistic and interconnected as we guide our global community in this collective climate strategy.

Getting to 45% in Tier 4: Apparel, home textiles and footwear

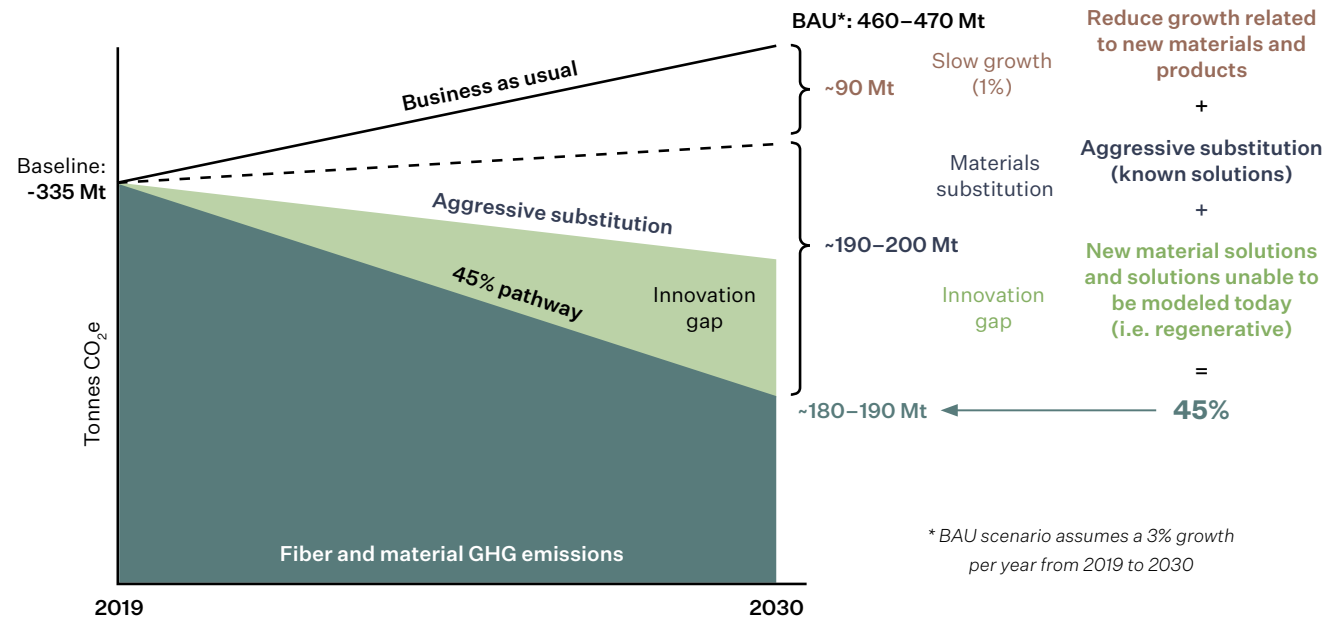


Figure 1: Modeling of interventions needed in the apparel and footwear raw materials extraction phase in order to achieve 45% GHG impact reduction by 2030, as measured against a 2019 baseline.

The Global Fiber Market

The global fiber market trends

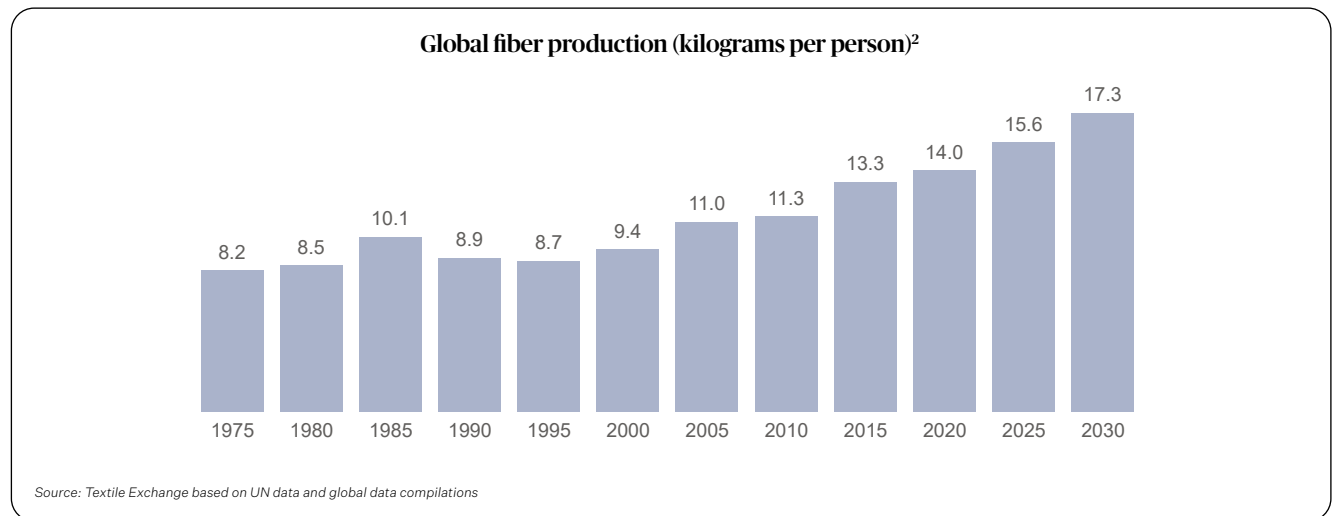
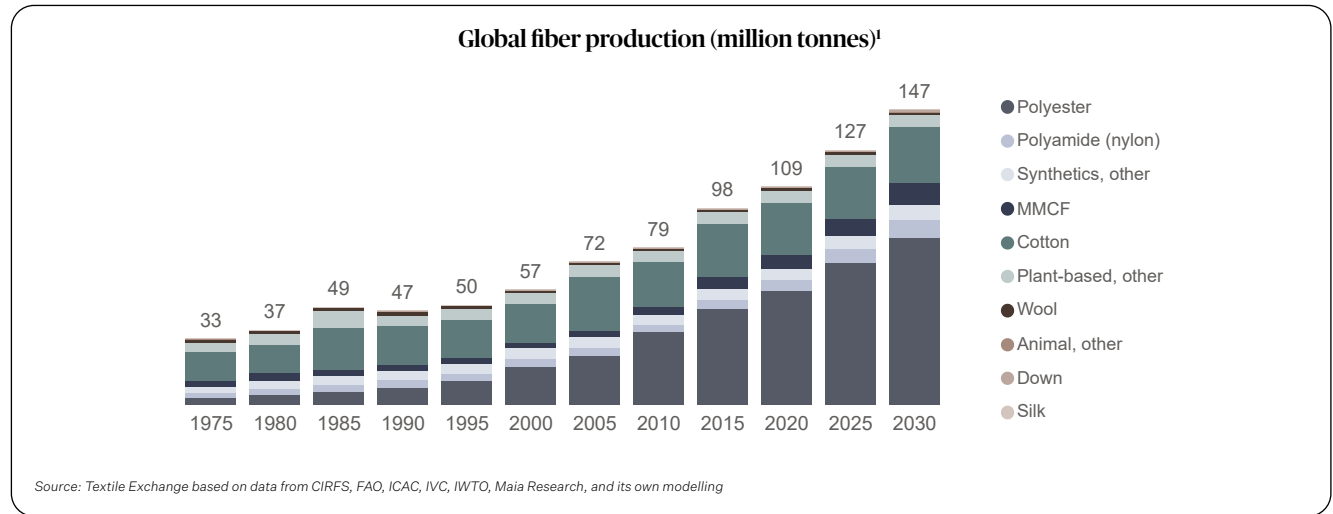
Global fiber production increased again to a record 116 million tonnes in 2022, up from 112 million tonnes in 2021, after a slight decline in 2020 due to COVID-19.¹ Over the last two decades, global fiber production has almost doubled from 58 million tonnes in 2000 to 116 million tonnes in 2022 and is expected to grow to 147 million tonnes in 2030 if business as usual continues.

Global fiber production per person has also increased, from 8.3 kilograms per person in 1975 to 14.6 kilograms per person in 2022.²

The growth in fiber production has significant impacts on people and the planet. Awareness of the urgent need for the more responsible use of resources and the decoupling of growth from resource consumption is growing; however, change is not yet happening at the scale and speed required.

¹ Textile Exchange compilation based on data from ICAC, FAO, IWTO, Mohair South Africa, CIRFS, IVC, Maia Research, and its own modelling. Volumes of certain minority fibers such as PTT, carbon, aramid, PLA, PBS, and PEF are not included. Textile Exchange allocates the ICAC year which ends in a calendar year to the respective calendar year (e.g. 2021/22 cotton production volumes to the 2022 calendar year). MMCFs and synthetic fibers volumes include staple fiber and filament. Please note that the percent market shares may differ from other sources because our overview includes other plant fibers, other wool, down and silk—all fibers which are often not included in other global statistics—and due to different ICAC cotton year allocations. In general, all global figures are estimates.

² Textile Exchange based on "UN Population Division, 2022. World Population Prospects 2022. [Link.](#)" and volume data as specified in footnote (1).



The global fiber market 2022

Synthetic fibers have dominated the fiber market since the mid-1990s, when they overtook cotton volumes. At around 76 million tonnes, this fiber category made up approximately 65% of global fiber production in 2022. Read more [here](#).

Polyester alone had a market share of around 54% of total global fiber production in 2022, with approximately 63.3 million tonnes produced. Read more [here](#).

Polyamide, the second-most used synthetic fiber, accounted for 6.2 million tonnes and approximately 5% of the global fiber market in 2022. Read more [here](#).

Other synthetics—polypropylene, acrylics, and elastane—had a market share of 5.1% in 2022, with a combined production volume of 6 million tonnes. Read more [here](#).

Plant fibers, including cotton, jute, hemp, flax, and others, had a combined market share of around 27% of the global fiber market in 2022.

Cotton is the second-most important fiber in terms of volume. At about 25 million tonnes, it had a market share of approximately 22% of global fiber production in 2022. Read more [here](#).

Other plant-based fibers, including jute, flax, hemp, and others, had a market share of about 6%. At around 0.38 million tonnes, flax had a market share of around 0.3%, while hemp made up 0.26% of total global fiber production in 2022 at 0.3 million tonnes. Read more [here](#).

Manmade cellulosic fibers (MMCFs)—including viscose, lyocell, modal, acetate, and cupro—had a market share of around 6.3% in 2022, with a global production volume of around 7.3 million tonnes. Read more [here](#).

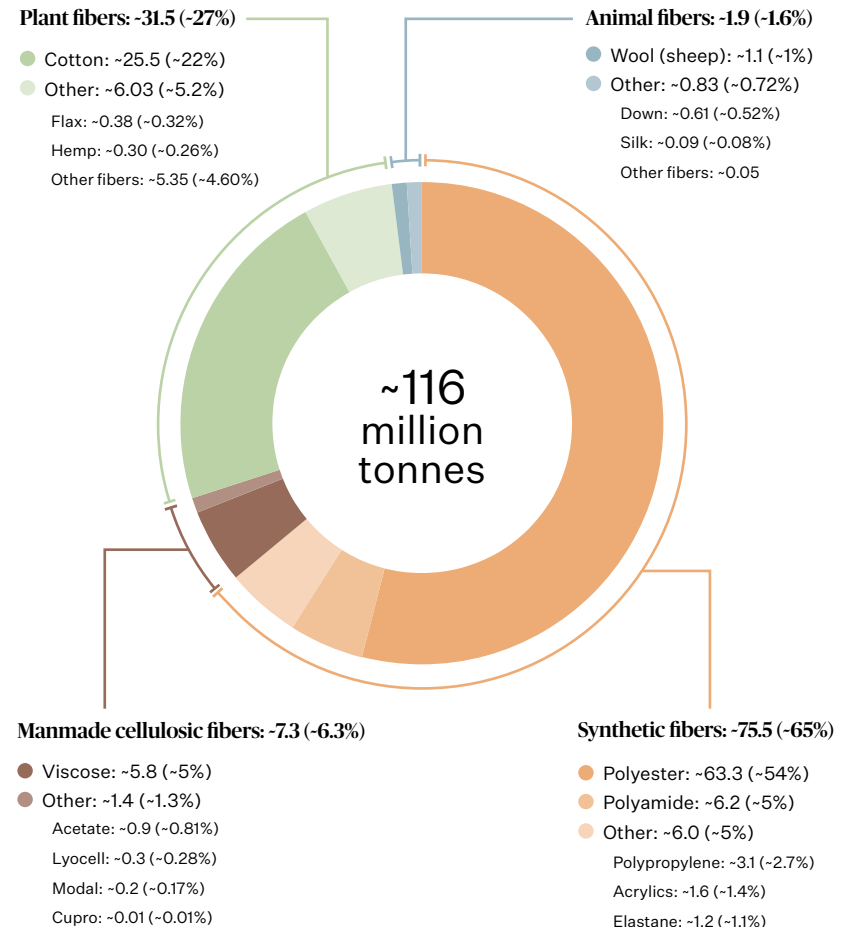
Animal fibers had a market share of 1.6% in 2022. Read more [here](#).

Wool had a market share of around 1%, with a global production volume of around 1 million tonnes. Read more [here](#).

Down and feathers had a market share of around 0.5% of the global fiber market. Read more [here](#).

Silk had a market share of around 0.08%. Read more [here](#).

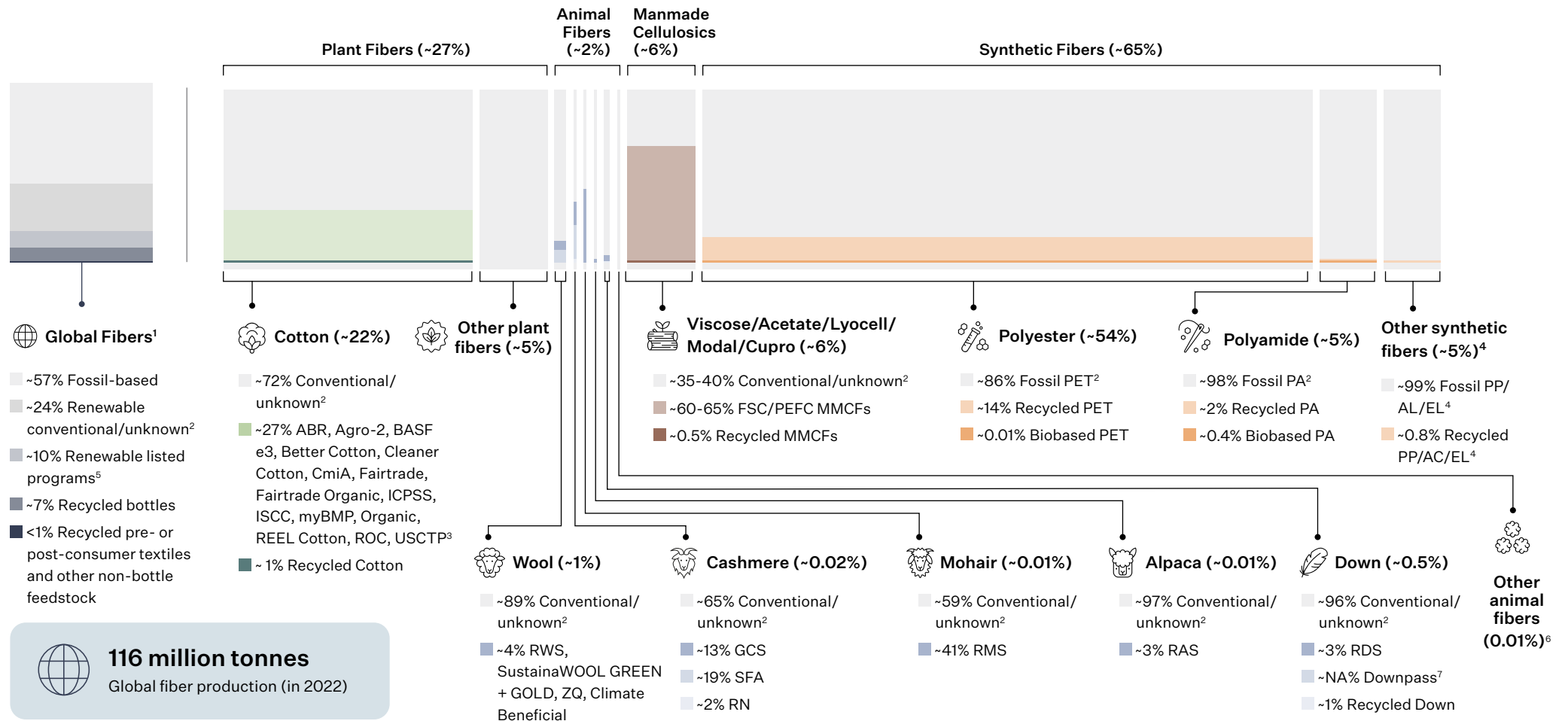
Global fiber production in 2022
(in million tonnes and % of global fiber production)



Source: Textile Exchange based on data from CIRFS, FAO, ICAC, IVC, IWTO, Maia Research, and its own modelling.

Note: This chart includes recycled fibers. Other animal fibers included here are alpaca, angora, camel, cashmere, guanaco, llama, mohair, vicuna, and yak. Other plant fibers included here are jute, coir, sisal, abaca, ramie, kenaf, kapok, and agave.

The global fiber market 2022: Program overview²



1 This graph aims to inform the industry about the global total production volumes and the shares covered by different programs. Our definition of "Preferred" is currently being updated, and the assessment of the programs along a continuum of different levels of preferred is work-in-progress. For more information see also our [methodology chapter](#).

2 Conventional and unknown. This includes volumes of programs for which data is not accessible or available.

3 The list of cotton programs is aligned with the programs recognized for the [2025 Sustainable Cotton Challenge](#). It includes the Better Cotton programs recognized as equivalent after the launch of the 2025 Sustainable Cotton Challenge. Climate Beneficial™ is listed separately. Organic cotton data could not be compiled for 2021/22 on a global level in time of the report launch. 2020/21 data were thus used as a proxy.

4 Other synthetic fibers include polypropylene (PP), acrylics (AC), and elastane (EL).

5 Renewable listed programs include here all the programs listed in this chart apart from the recycled fibers.

6 Other animal fibers include here angora, camel, guanaco, llama, vicuna, yak.

7 Global Downpass data was not available for 2022 in time for report due to war in Ukraine. In 2021, Downpass accounted for 1.2% of all down.

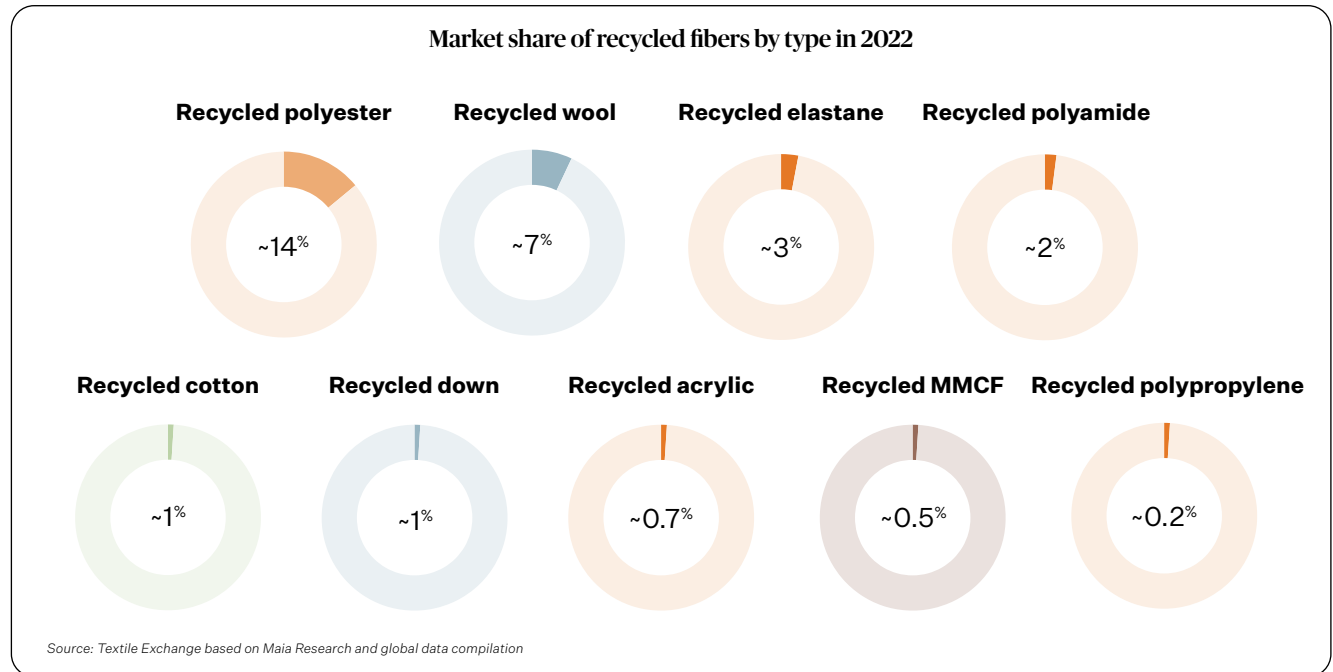
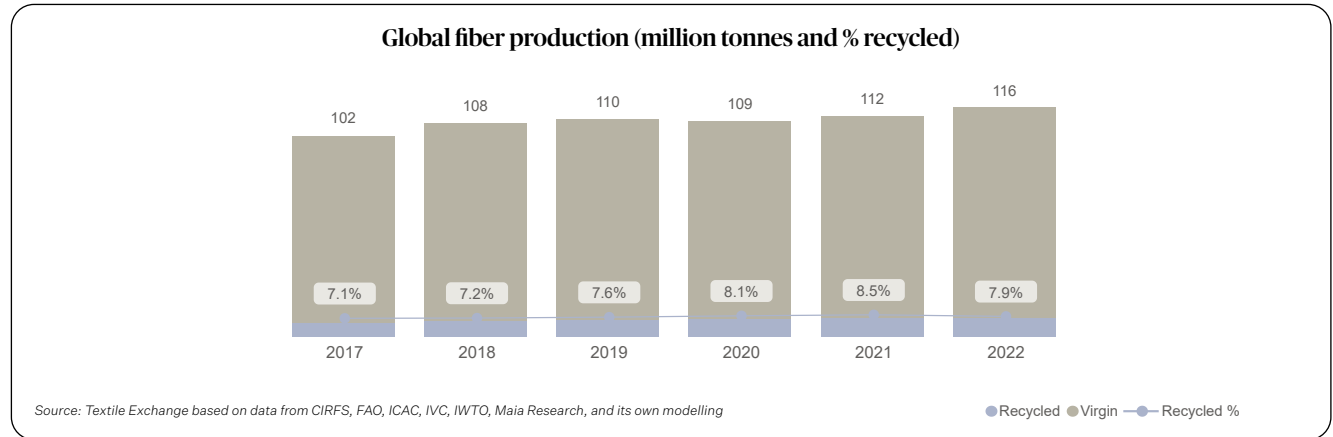
The global recycled fiber market

Increasing the uptake of textile-to-textile recycled fibers is a key strategy to help the industry achieve a 45% reduction in greenhouse emissions by 2030, with vast potential to mitigate climate change, prevent biodiversity loss, halt negative impacts on soil health, and reduce the water consumption that comes from producing fibers and raw materials.

After years of growth, the market share of recycled fibers decreased from 8.5% in 2021 to 7.9% in 2022. 7.3% of all fibers produced were recycled polyester made from plastic bottles. Overall, less than 1% of the global fiber market was from pre- and post- consumer recycled textiles in 2022.

Virgin fiber production volume increased from 102 million tonnes in 2021 to 107 million tonnes in 2022, primarily driven by an increase in virgin fossil-based fibers from 63 million tonnes in 2021 to 67 million tonnes in 2022.

Polyester had the highest proportion of recycled fibers in 2022, at around 14%. Around 99% of recycled polyester came from PET bottles. It is estimated that recycled elastane made up around 3% of total elastane production, while recycled polyamide made up around 2%, recycled acrylic around 0.5%, and recycled polypropylene around 0.2% of their respective fiber volumes in 2022. Wool had the second highest recycled fiber share of about 7% in 2022. The market shares for recycled cotton and recycled down are estimated to be roughly 1% of the total cotton and down production volume in 2022. The market share of recycled MMCFs is expected to increase in future years, but accounted for only around 0.5% of all MMCFs in 2022.



Plant Fibers & Materials

Cotton

Virgin cotton

Global cotton production

The market share of cotton covered by programs recognized by the 2025 Sustainable Cotton Challenge¹ increased again from 25% in 2020/21 to 27% in 2021/22—following a one-year decline in 2020/21 after years of growth.^{1,2} This equates to a production volume of 7 million tonnes, up from 6 million tonnes in 2020/21.²

The cotton programs exist within a spectrum and significantly vary in terms of their requirements, approach to assurance, and the degree of traceability throughout the supply chain.

All Better Cotton, including its equivalents ABR, Agro-2, CmiA, ICPSS, and myBMP, increased to around 21% of all cotton in 2021/22, and thus made up the majority of the 27% of cotton certified by the recognized programs in 2021/22. Better Cotton without its equivalents accounted for around 9%, ABR for around 8%, CmiA

for around 3%, MyBMP for around 2%, Agro-2 for 0.2% and ICPSS for 0.02% of all cotton in 2021/22.

All other cotton programs, including Climate Beneficial™, e3® Sustainable Cotton, Fairtrade, ISCC, organic,³ REEL cotton, Regenerative Organic Certified™ (ROC), and the USCTP, had a combined market share of around 6% of all cotton in 2021/22.

1 The programs recognized for virgin cotton include Agro-2, Better Cotton, Cleaner Cotton (for historical data since discontinued in March 2020), Climate Beneficial™, Cotton made in Africa (CmiA), e3® Sustainable Cotton, Fairtrade, Fairtrade organic, in-conversion cotton ("transitional" in US), Israel Cotton Production Standard System (ICPSS), International Sustainability and Carbon Certification (ISCC), myBMP, organic, REEL Cotton, Regenerative Organic Certified (ROC), Responsible Brazilian Cotton (ABR), and the U.S. Cotton Trust Protocol (USCTP). Climate Beneficial™ cotton is included for the first time and separately listed. The figures presented here are specific for virgin cotton and do not include recycled cotton.

Please see the chapter [Recycled Cotton](#) for more information on recycled cotton. In-conversion cotton is not included in the global trend data due to lack of data for most years, but an estimate for 2021/22 is reported in the program-specific section.

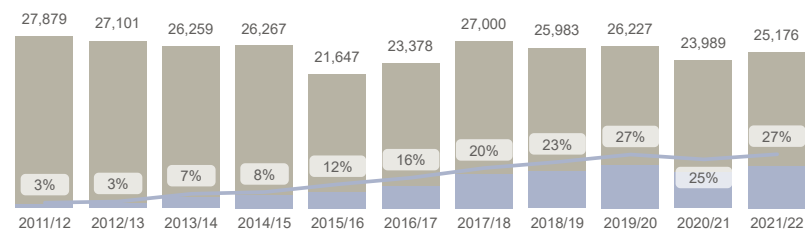
2 Textile Exchange based on "ICAC, 2023. World Cotton Statistics. Downloaded on July 18, 2023" for the total virgin cotton production volumes and the cotton programs received by email. Overlaps of programs excluded.

3 This includes organic cotton certified to Regenerative Organic Certification (ROC), and supplier-specific programs such as bioRe.

4 Better Cotton, including equivalents, as reported by Better Cotton. It slightly differs from the aggregate of the data provided by the individual programs because minor parts of their volumes are not accounted as Better Cotton equivalent and due to somewhat differing data collection and reporting methodology.

5 Better Cotton, 2013. Better Cotton sets 2020 growth target. [Link](#).

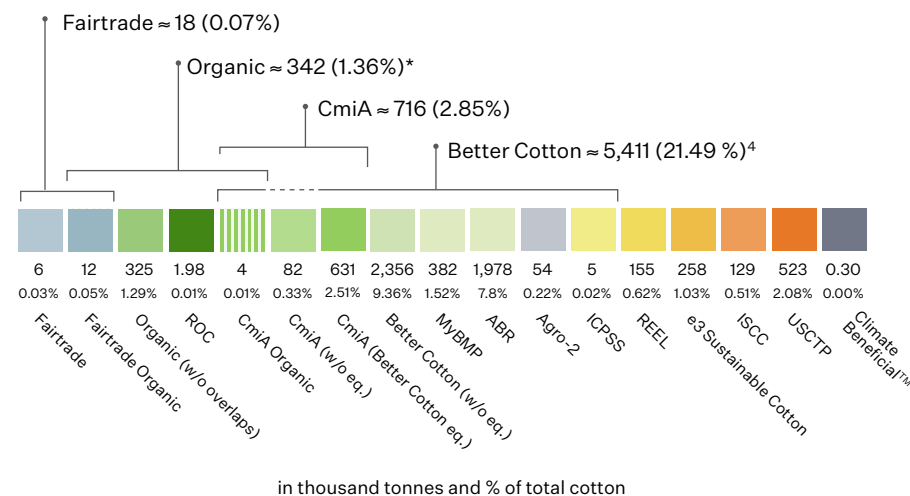
Global cotton fiber production (thousand tonnes and %)



Source: Textile Exchange based on ICAC and cotton program owners. Legend: Virgin, certified (blue), Conventional/unknown (grey), Virgin, certified % (line). Note: This chart only includes virgin cotton and not recycled cotton.

Global cotton fiber production by program in 2021-22

Total cotton: 25.2 million tonnes
Covered by the programs below: 6.9 million tonnes (=27%)



Virgin cotton

A closer look at the cotton programs

Agro-2 cotton production, recognized as equivalent to the Better Cotton Standard System since 2020, increased from 0.02 million tonnes in 2020/21 to 0.05 million tonnes in 2021/22. It accounted for around 18% of all cotton grown in Greece and 0.22% of all cotton grown worldwide in 2021/22.

Better Cotton including equivalents represented around 21% of all cotton production in 2021/22. Its production increased from 4.7 million tonnes in 2020/21 to 5.4 million tonnes in 2021/22, after a decline in 2020/21. This decline was due to a variety of factors, including weather variations, changes to the Better Cotton program, market conditions, and socio-political challenges. Better Cotton (without its equivalents) made up around 44% of all Better Cotton produced in 2021/22. The remaining 56% of Better Cotton was produced according to the Better Cotton equivalents Agro-2, CmiA, ICPSS, myBMP, and RBC. In 2022, Better Cotton production in Pakistan, a major cotton-producing country, was severely hit by flooding. The organization estimates that, because of the floods, Better Cotton production in Pakistan was likely 60% lower in 2022/23 compared to the previous 2021/22 year.¹

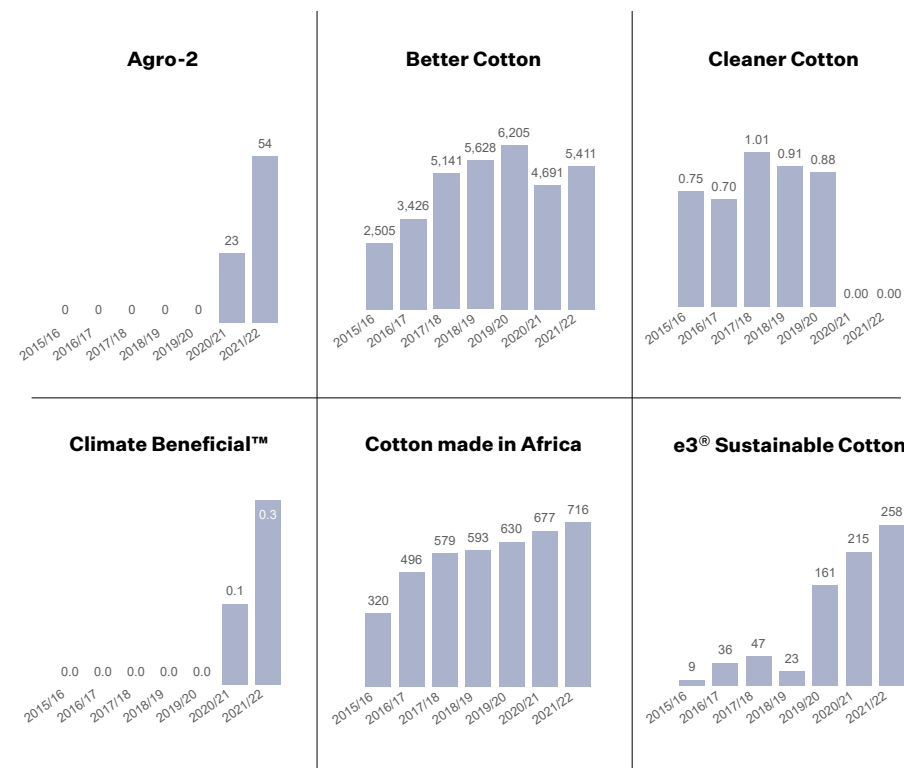
Cleaner Cotton production was discontinued in March 2020, when the funding for the regular farm program ended. We still include the chart with previous years' data in this report, since they are part of historical data on total certified cotton volumes.

Climate Beneficial™ cotton production increased from 131 tonnes in 2020/21 to 300 tonnes in 2021/22. All Climate Beneficial™ cotton was produced in the United States.

Cotton made in Africa (CmiA) production increased from 677,479 tonnes in 2020/21 to 716,397 tonnes in 2021/22. This equaled 2.8% of all cotton produced in 2021/22 and around 37% of all cotton production in Africa in 2021/22. Most (89%) of the CmiA cotton produced in 2021/22 was also accounted for as Better Cotton equivalent. At 3,542 tonnes, around 57% of the CmiA cotton produced in Tanzania was also certified organic.

e3® Sustainable Cotton cotton production increased from 214,861 tonnes in 2020/21 to 258,240 tonnes in 2021/22, equaling 6.8% of all US cotton production and around 1% global production in 2021/22.

Global cotton production by program (thousand tonnes)



The data is based on information from the standard owners, which we have received through email correspondence or from their websites. The production volumes reported here include the total volume produced per standard including equivalents and overlaps with other standards.

¹ Better Cotton. Email conversation. July 2023.

Virgin cotton

A closer look at the cotton programs

[Fairtrade](#) cotton production increased from 18,097 tonnes in 2020/21 to 18,255 tonnes in 2021/22, equaling 0.07% of all cotton produced in 2021/22. Fairtrade organic cotton production—i.e. the production of cotton that is certified by both Fairtrade and an organic standard—was around 11,866 tonnes in 2021/22. Approximately 65% of all Fairtrade cotton in 2021/22 was also certified to an organic standard.

The [Israel Cotton Production Standard System \(ICPSS\)](#)—Israel Cotton Production and Marketing Board (ICB)'s new standard, developed in 2018—was recognized as equivalent to the Better Cotton Standard System (BCSS) in 2020. ICPSS production was around 5,166 tonnes in 2021/22, equaling 0.02% of all cotton produced worldwide and 69% of all cotton grown in Israel in 2021/22.

[International Sustainability and Carbon Certification \(ISCC\)](#) cotton production decreased from 148,158 tonnes in 2020/2021 to 128,629 tonnes in 2021/22. This amount equaled around 0.5% of global cotton production in 2021/22. All ISCC-certified cotton in 2021/22 was produced in Greece where it accounted for 42% of all cotton and—for the first time—also in Kenya.

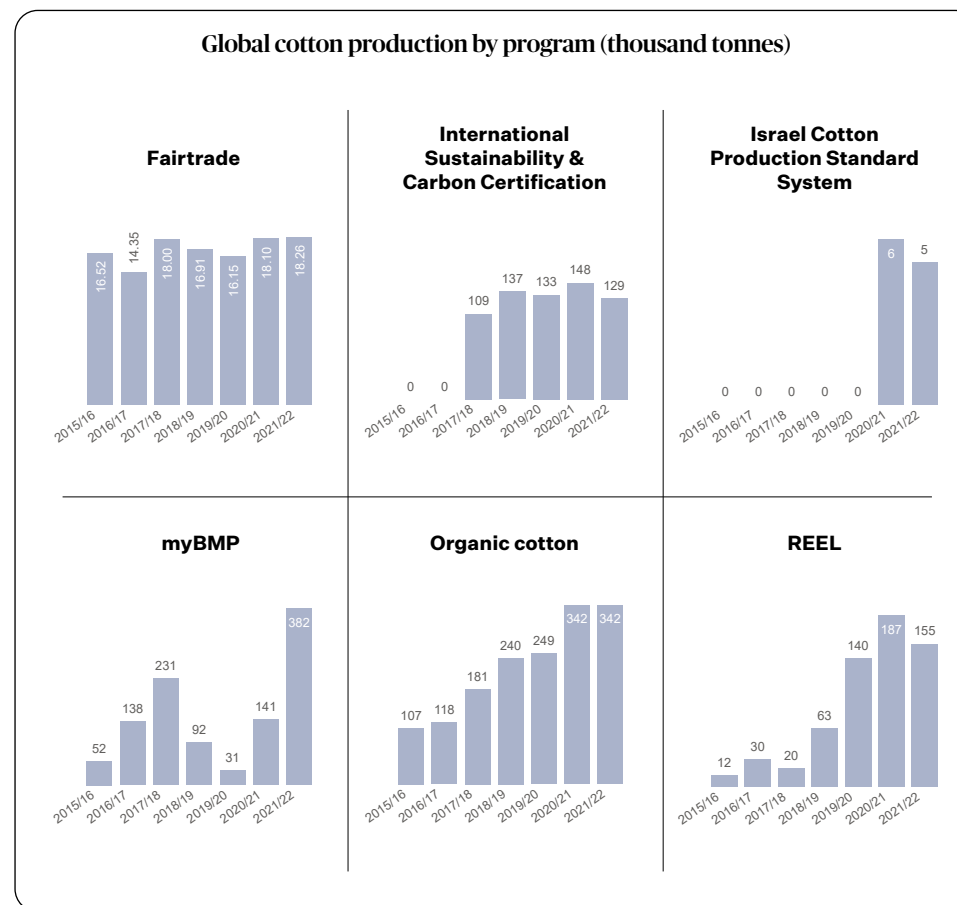
[myBMP](#) cotton production increased from 141,438 tonnes in 2020/21 to 382,263 tonnes in 2021/22, equaling around 30% of the cotton grown in Australia and 1.5% of all cotton produced worldwide in 2021/22. myBMP is also counted as a Better Cotton equivalent.

[Certified organic cotton](#) production data—cotton certified according to one or more of the 52 farm-level organic standards listed in the [IFOAM Family of Standards](#)—could not be completed for 2021/22 in time for the report release. The production volume of around 412,000 tonnes in 2020/21, equaling 1.4% of all cotton produced, is used as a proxy for 2021/22. For more information about the organic cotton market please see our [Organic Cotton Market Report 2022](#).

In-conversion cotton ("transitional" in the US) refers to cotton in the process of converting to organic production. For more details, please see the [Organic Cotton Market Report 2022](#).

[REEL](#) cotton production was around 155,449 tonnes in 2021/22. This amount equaled 0.6% of all cotton produced worldwide in 2021/22. CottonConnect is also piloting the REEL Regenerative Cotton Code.

Global cotton production by program (thousand tonnes)



Virgin cotton

A closer look at the cotton programs

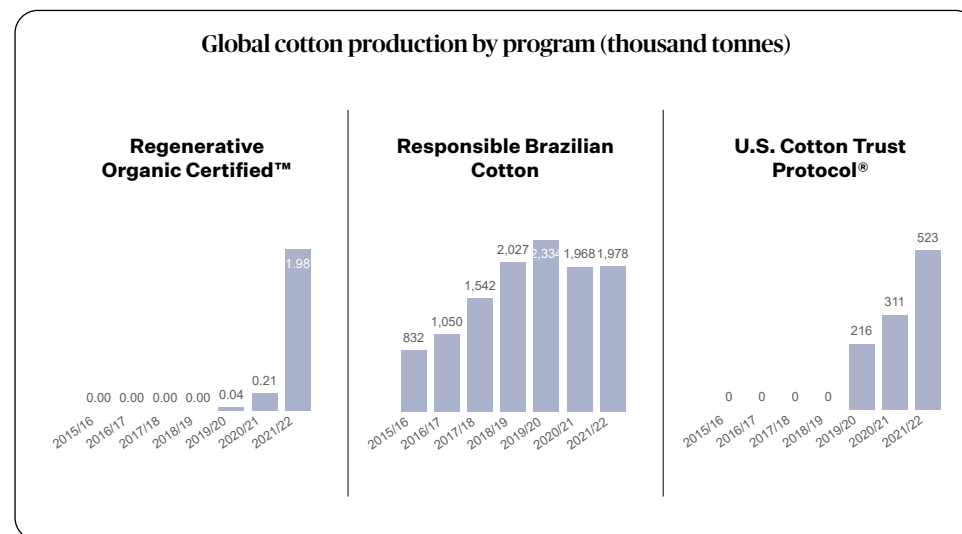
[Regenerative Organic Certified™ \(ROC\)](#)

cotton production increased from 208 tonnes in 2020/21 to 1,975 tonnes in 2021/22. This accounted for around 0.01% of all cotton produced worldwide in 2021/22. ROC further expanded its coverage in India and included cotton from Ecuador for the first time.

Production of [Responsible Brazilian Cotton](#)—ABRAPA's [Algodão Brasileiro Responsável \(ABR\)](#)—slightly increased from around 1.97 million tonnes in 2020/21 to 1.98 million tonnes in 2021/22. This volume equaled a market share of 8% of all cotton grown in 2021/22.

[U.S. Cotton Trust Protocol®](#) cotton

increased from 310,568 tonnes in 2020/21 to 523,380 tonnes in 2021/22. This equaled around 14% of all cotton produced in the US and around 2% of all cotton produced worldwide in 2021/22. The environmental performance of U.S. Cotton Trust Protocol cotton is measured and analyzed at the field level, using [Field to Market's Fieldprint Platform](#), and verified with Control Union Certifications.



Virgin cotton

A closer look at the cotton programs

New and discontinued cotton programs

[Agro-2](#) was recognized as equivalent to the Better Cotton Standard System in 2020.

[Cleaner Cotton™](#) was discontinued in March 2020, when the funding for the regular farm program ended.

The [QAI Transitional](#) program was discontinued in 2020, when NSF made the decision to discontinue textile certification.

[Field to Market](#) continues to be used as a tool but it is no longer considered a standalone program. Most of the cotton that uses Field to Market's Fieldprint Platform to measure and analyze environmental performance on the field is also enrolled in the U.S. Cotton Trust Protocol (USCTP), as Field to Market enrollment is a condition of the USCTP. Cotton that is part of Field to Market but not part of the USCTP is not otherwise certified or verified.

The [ICPSS](#) cotton standard was recognized as equivalent to the Better Cotton Standard System (BCSS) in 2020.



Photo: Jam Haroon

Key Milestones

- 1996** *IFOAM– Organics International set first international organic standard*

- 1996** *Sustainable Cotton Project (SCP) / Cleaner Cotton founded*

- 1997** *MyBMP founded*

- 2004** *Fairtrade standard for seed cotton established*

- 2005** *Better Cotton founded*

- 2005** *Cotton made in Africa (CmiA) founded*

- 2009** *ABRAPA's sustainability program started*

- 2010** *CottonConnect's REEL cotton program started*

- 2010** *International Sustainability and Carbon Certification ISCC started*

- 2013** *Field to Market launched*

- 2013** *Bayer CropScience's e3 cotton program (now BASF e3) launched*

- 2018** *Regenerative Organic Certified (ROC) launched*

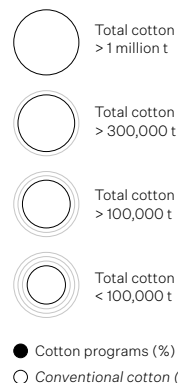
- 2019** *U.S. Cotton Trust Protocol started*

- 2020** *Climate Beneficial™ cotton first grown*

Virgin cotton

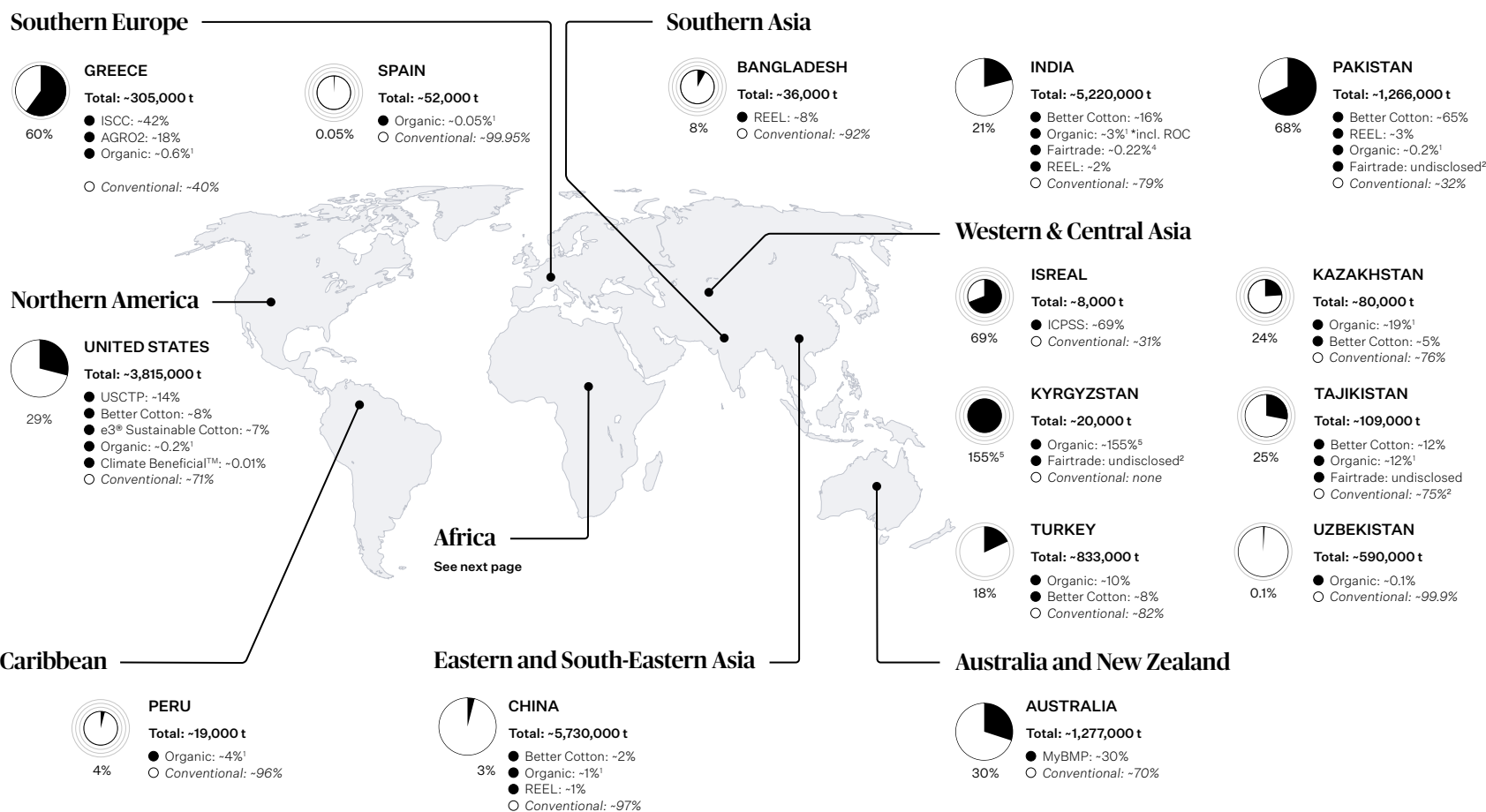
Cotton production by program globally in 2021/22

Legend:¹



This chart lists only countries where cotton is produced according to one of the listed cotton programs.

Big cotton producing countries (>100,000t) with no cotton covered by the programs are: Mexico, Turkmenistan, Argentina, Myanmar, Sudan.



1 Cotton program-specific data were collected from the programs. Total cotton production data is from ICAC. Conventional cotton volumes were calculated by Textile Exchange. Better Cotton refers here to Better Cotton (excl. equivalents). Better Cotton equivalents are listed separately. Volumes in metric tonnes (t). Organic cotton data for 2021/22 was not available in time for the report release. 2020/21 data from the [Organic Cotton Market Report 2022](#) is thus used as a proxy. Recycled cotton is not included in this map.

2 Fairtrade data are not disclosed on a per-country level due to confidentiality reasons. The volume for all programs in this country does not include Fairtrade cotton and is thus actually slightly higher.

3 Cotton volume covered by the programs as share (%) of the country's total global cotton production volume.

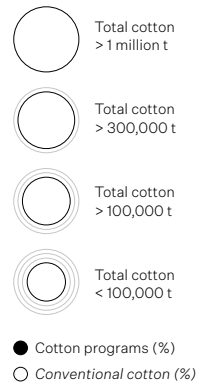
4 The total Fairtrade cotton production in India was 11,260 tonnes in 2021/22, including around 7,319 tonnes of Fairtrade organic.

5 The percentage of a country's cotton that is covered by the cotton programs is derived from the difference between Textile Exchange's reported cotton programs production for that country and the overall cotton production of that country reported by ICAC. In some countries, there is a discrepancy between the two. Both ICAC and Textile Exchange rely on secondary data. We are trying our best to understand more about this discrepancy. You can learn more about Textile Exchange's data collection methodology [here](#), and about the sources of ICAC's cotton statistics [here](#).

Virgin cotton

Cotton production by program in Africa in 2021/22

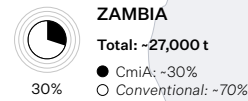
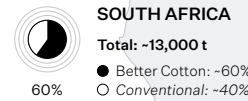
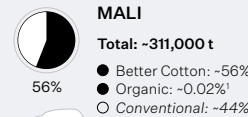
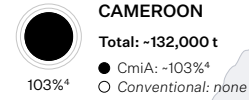
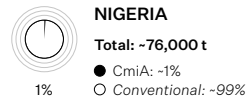
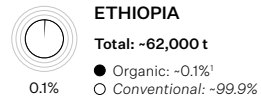
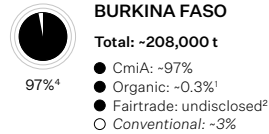
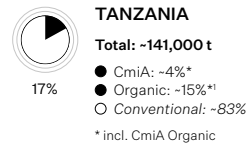
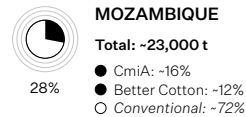
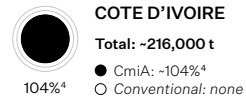
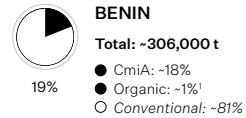
Legend:



This chart lists only countries where cotton is produced according to one of the listed cotton programs.

Big cotton producing countries (>100,000t) with no cotton covered by the programs are: Mexico, Turkmenistan, Argentina, Myanmar, Sudan.

Sub-Saharan Africa



Northern Africa



1 Cotton program-specific data were collected from the programs. Total cotton production data is from ICAC. Conventional cotton volumes were calculated by Textile Exchange. Better Cotton refers here to Better Cotton (excl. equivalents). Better Cotton equivalents are listed separately. Volumes in metric tonnes (t). Organic cotton data for 2021/22 was not available in time for the report release. 2020/21 data from the [Organic Cotton Market Report 2022](#) is thus used as a proxy. Recycled cotton is not included in this map.

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3 Cotton volume covered by the programs as share (%) of the country's total global cotton production volume.

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Recycled cotton

Market overview

Recycled cotton had an estimated production volume of 300,000 tonnes in 2022 (compared to approximately 25 million tonnes of virgin cotton), giving it market share of approximately 1% of total cotton production, but is expected to grow significantly in the coming years.¹

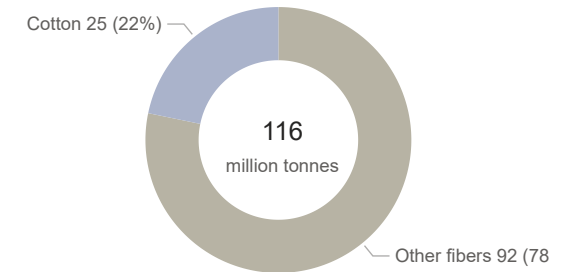
An analysis by the Circular Fashion Partnership, a cross-sectoral initiative to support the development of effective circular fashion systems, revealed the significant value of utilizing textile waste more efficiently. Its research, published in the [Scaling Circularity Report](#), found that Bangladesh alone produces approximately 330,000 tonnes of 100% pure pre-consumer cotton waste in its ready-made garment (RMG) and fabric mills per year, out of which only 5-7% are currently recycled.⁴

Please note that the data presented here refers to mechanically recycled cotton. Chemically recycled cotton is covered in the chapter on manmade cellulose since the end result is a “manmade cellulose,” fiber not “cotton.”

Key standards

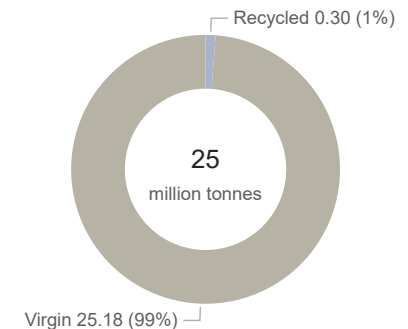
Textile Exchange’s [Global Recycled Standard](#) (GRS) and [Recycled Claim Standard](#) (RCS) are key third-party standards used for recycled cotton. Read more on the page about [Sustainability Standards](#).

Global fiber market in 2022



Source: Textile Exchange based on ICAC and other sources

Global cotton market in 2022



Source: Textile Exchange based on ICAC and Maia Research

¹ Calculated by Textile Exchange based on sources in (2) & (3) below.

² ICAC, 2023. World Cotton Statistics. Note: For the virgin cotton production volume in 2022, the ICAC harvest year data from the 2021/22 season are applied.

³ Maia Research, 2022. Global Recycled Cotton Market 2023 (customized report).

⁴ Circular Fashion Partnership, 15 June 2021—Press release. [Link](#).

Plant Fibers & Materials

Other Plant-based Fibers

Hemp, flax, and other plant-based fibers

Global overview

Other plant-based fibers include a diversity of natural sources such as jute, coir, flax, hemp, sisal, abaca, kapok, ramie, and agave fibers. It is estimated that more than 8 million households are involved in the production of these natural plant-based fibers.¹

With a global production volume of around 6 million tonnes, these non-cotton plant-based fibers had a market share of approximately 5% of total global fiber production volume in 2022.²

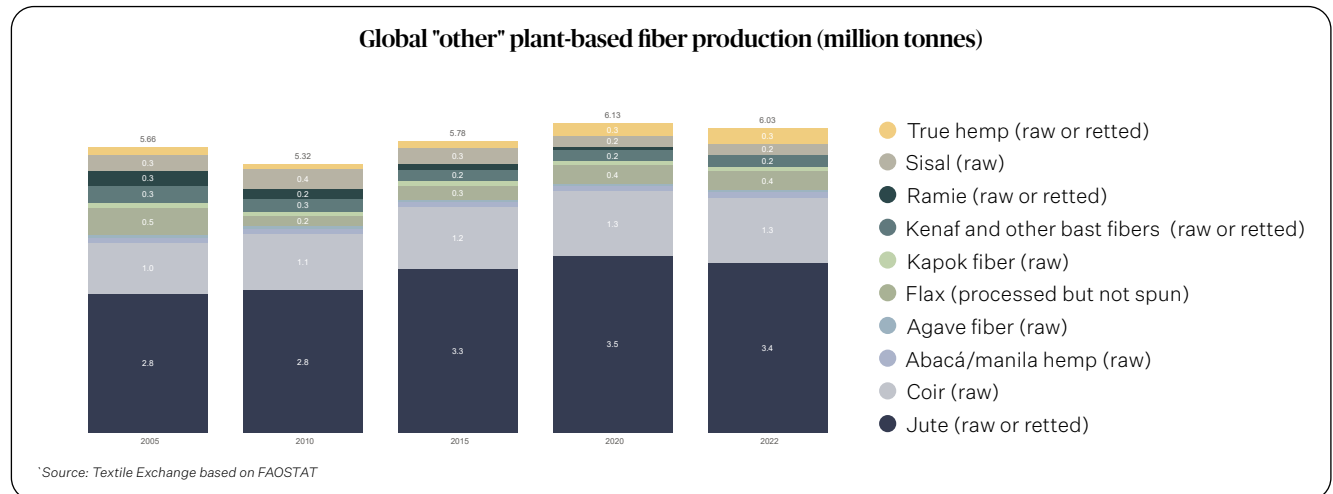
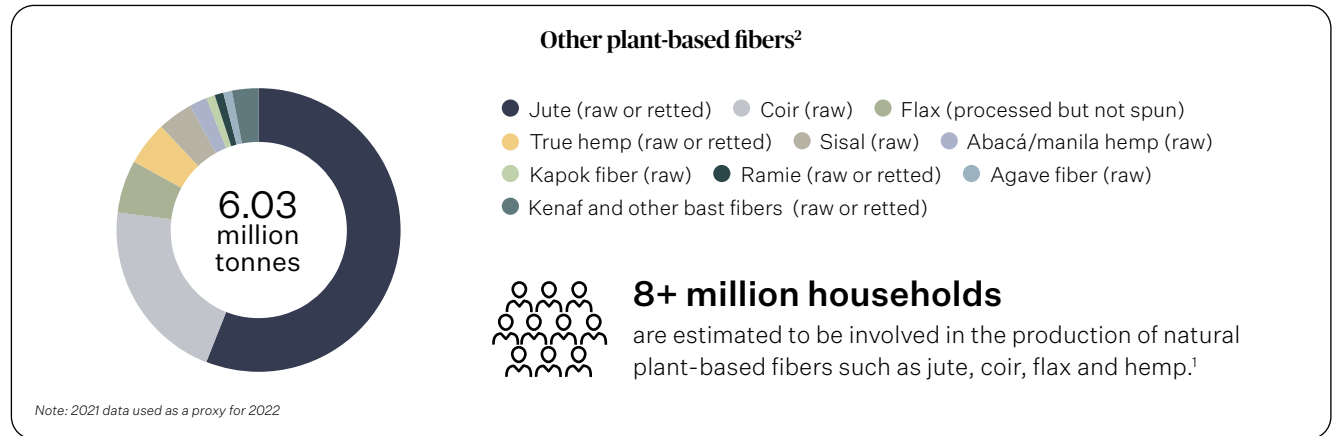
Jute had the largest market share of these plant-based fibers at around 56%.¹ Similar to hemp, flax, and ramie, jute is a bast fiber derived from the strands surrounding the “hurd,” or woody core of the stem. It is used to make twine, ropes, matting, and packaging materials, as well as home textiles such as curtains and carpets.

Coir had the second-largest market share of these non-cotton plant-based fibers at approximately 21%.³ Coir is the fiber extracted from the husks of coconuts and is used to produce home textiles such as floor mats, doormats, brushes, and mattresses.

Global **flax** fiber production in 2022, including short and long fibers, is estimated at around 0.4 million tonnes.⁴ Processed flax, also known as linen, is used for a variety of products including home textiles and apparel.

Hemp fiber had an estimated global production volume of around 0.3 million tonnes in 2022.⁵ A bast fiber, hemp is used in various industries including home textiles and apparel.

Further plant-based fibers include sisal, abaca, kapok, ramie, and agave.



1 DNFI, 2020. Press release “40 Million Households Produce Natural Fibres” published on 20 April 2020. [Link](#).

2 Textile Exchange based on [FAOSTAT](#) and total global production volumes compiled by Textile Exchange (see [Global Fiber Market](#)).

3 Textile Exchange based on [FAOSTAT](#). 2021 figures, the latest available data, are used as a proxy for 2022. Please note that the data quality of these other plant-based fibers is limited. Data adjustments are regularly made also for historical data and data gaps exist for some countries.

4 Textile Exchange flax figures are based on Alliance for European Flax-Linen & Hemp. Email correspondence, July 2023.

5 Textile Exchange based on FAOSTAT, USDA, and TURKSTAT. For more information, see Textile Exchange, 2023. Growing Hemp for the Future: A Global Fiber Guide. [Link](#).

Hemp, flax, and other plant-based fibers

Global overview

Hemp

Global hemp fiber production data is not easily accessible. It is roughly estimated that around 0.3 million tonnes of hemp fiber was grown worldwide in 2022, which would give it a market share of around 0.3% of the total fiber market.¹

Hemp production is not yet legal worldwide, but governments are increasingly authorizing their farmers to grow the crop. According to data from FAOSTAT, USDA, and TURKSTAT, roughly 21 countries grew fiber hemp in 2022: Austria, Bulgaria, Chile, China, Czechia, Democratic People's Republic of Korea (North Korea), France, Germany, Greece, Italy, Japan, Lithuania, the Netherlands, Poland, Republic of Korea (South Korea), Romania, Russian Federation, Spain, Turkey, Ukraine, and the United States. France appears to have been the leading fiber hemp-producing country by volume in 2022, followed by China, the US, North Korea, and Poland.¹

For more information, please read Textile Exchange's 2023 report "Growing Hemp for the Future."

Research into hemp and jute as feedstock for composite materials and manmade cellulosics is currently underway. See the [Manmade Cellulosics](#) chapter for more.

¹ Textile Exchange estimate based on FAOSTAT, 2023. Database. [Link](#). USDA, 2022. National Hemp Report. [Link](#). TurkStat 2023. Database. [Link](#). For more information, see Growing Hemp for the Future: A Global Fiber Guide. Textile Exchange, 2023. [Link](#). 2022 data assumed to equal 2021 data since 2022 data were not yet available at the release of the report.

² Alliance for European Flax-Linen & Hemp. Email correspondence and calls. July, 2023. Textile Exchange assumed that 2022 data were the same as 2021 data since global data for 2022 were not yet completed at the report launch.

Flax

Global production data for flax fibers is not easily accessible. Based on estimates by the Alliance for European Flax-Linen and Hemp, global flax fiber production—including short and long staple fibers—was roughly 0.4 million tonnes for 2022.² The market share of flax is therefore less than 1% of the global fiber market. Processed flax, also called linen, is used for various products including home textiles and apparel.

Around 64% of the flax used for fibers in 2022 was grown in Europe, with France being the largest producer. European flax is cultivated in a broad coastal band stretching from northern France through Belgium and the Netherlands. Other key flax fiber-producing countries are Belarus, Russia, Ukraine, and China.²

[European Flax™](#) is the Alliance for European Flax-Linen and Hemp's traceability standard for flax fiber grown in Europe. The revised European Flax™ Standard Version 3.0 was released on July 18, 2023 and takes effect February 17, 2024. MASTERS OF LINEN™ is the Alliance's registered trademark indicating linen that is 100% made in Europe, from field to fabric.

Organic flax—grown according to one of the [IFOAM Family of Standards](#)—is produced at small scales. According to estimates by the Alliance for European Flax-Linen & Hemp, around 0.5% of the flax grown in Europe is certified organic.²

CottonConnect is piloting the [REEL Linen Code](#), which builds on the REEL Cotton Code. The REEL Linen Code of Conduct consists of two parts: farming and processing (scutching and spinning). It outlines practices in management, social, and environmental areas.

Nettle, Kapok, and Others

There is increasing interest among the apparel and textiles industry in plant-based specialty fibers such as nettle, kapok, lotus, and others, as well as fibers from agricultural residues such as rice straw, pineapple leaves, banana tree trunks, and sugar cane bark. If these plants are dissolved into pulp, they are listed in the chapter on [Manmade Cellulosics](#). If polymerization is used to process them, they are listed as Biosynthetics.



Photo: Bits and Splits

Plant Fibers & Materials

Rubber

Rubber

Global natural rubber production was around 14 million tonnes in 2022, making up around 48% of the 29 million tonnes of rubber produced that year.¹ Synthetic rubber accounted for around 15 million tonnes, or 52% of the global rubber market in 2022.² The market share of natural rubber increased from around 41% of the total rubber market in 2000 to around 48% in 2022.^{1,2}

The largest natural rubber-producing countries in 2022 were Thailand (32% of global production), Indonesia (22%), and Vietnam (9%).¹ It is estimated that around 85% of the natural rubber is produced by smallholders, involving around 10 million farmers.³

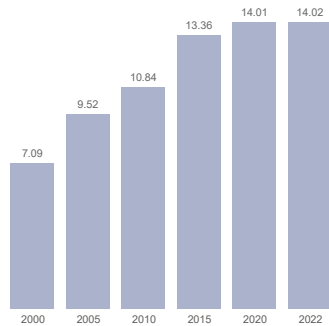
The market share of rubber forest certified by FSC and PEFC increased from around 2.4% in 2021 to 2.9% in 2022.^{1,4,5}

Around 0.26 million hectares of rubber forest (out of a total 12.9 million hectares) produced [FSC-certified rubber](#) in 2022, thus representing a market share of around 2%.⁴

[PEFC-certified rubber](#) forest had around 0.1 million hectares, representing a market share of around 0.9% of total rubber forest in 2022. The first PEFC-certified rubber was made available in 2021.⁵

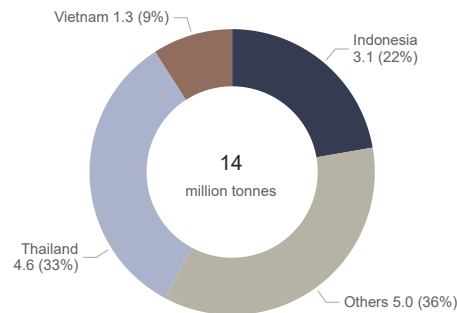
FSC and PEFC are founding members of the [Global Platform for Sustainable Natural Rubber](#) (GPSNR).

Global natural rubber production (in million tonnes)



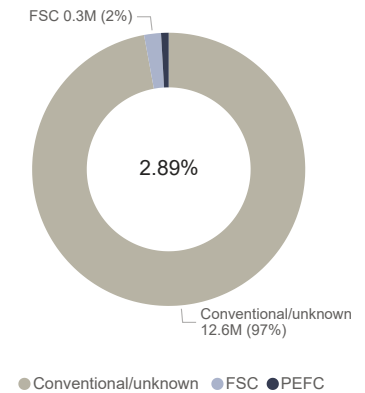
Source: Textile Exchange based on FAO
Note: 2021 numbers used as proxy for 2022

Global natural rubber production by country in 2022



Source: Textile Exchange based on FAO
Note: 2021 numbers used as proxy for 2022

Global rubber forest area by program in 2022



Source: Textile Exchange based on FSC, PEFC and FAO
Note: 2021 numbers used as proxy for 2022

1 FAOSTAT, 2023. Database. [Link](#). 2022 data not yet available at launch and therefore estimated to be similar to 2021.
2 Statista, 2023. Synthetic rubber global production 2000-2022. [Link](#). IRSG, 2023. IRS Group Release Latest Industry Outlook. [Link](#).
3 FSC, 2019. Responsible Sourcing of Natural Rubber. [Link](#).
4 FSC, 2023. Email correspondence.
5 PEFC, 2023. Email correspondence.

Animal Fibers & Materials

Down & Feathers

Virgin down

Production facts and figures

Global virgin down and feather production volume increased to around 602,357 tonnes in 2022, compared to 565,321 tonnes in 2021. 1 85-90% of down comes from ducks, the remainder comes mainly from geese.¹ China is the largest producer of down, responsible for 61% of all ducks worldwide.²

Concerns about the treatment of animals have led to the development of animal welfare standards for down. Key standards include the [Responsible Down Standard](#) (RDS) and Downpass.³ These standards ensure that there is:

- No live plucking
- No force-feeding
- Broader animal welfare (depending on the standard)

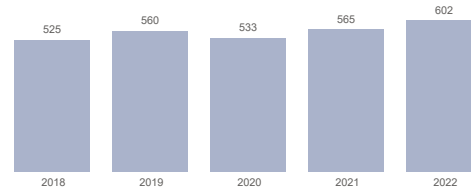
Multi-tier cage farming, increasingly used in China for ducks, is also prohibited by the RDS, as the animal welfare outcomes it describes cannot be delivered by these systems. China is the largest producer of RDS-certified down, so the growing uptake of multi-tier cage farming may reduce the volumes and market share of RDS-certified down in the future.

[RDS](#)-certified down production volume increased from 17,876 tonnes in 2021 to 19,233 tonnes in 2022, equaling

3.2% of total down production in 2022.

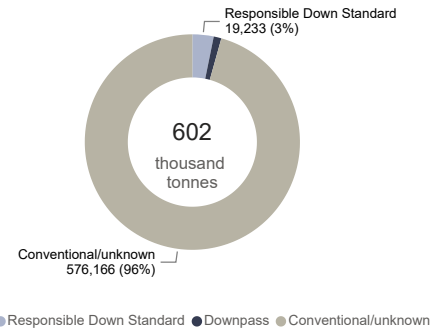
Downpass had 13% of its certified farms located in Ukraine in 2021, so the program was hit by the war, and data for 2022 was not available in time for this report. In 2021, the global Downpass-certified down production volume was 6,958 tonnes, equaling an estimated 1.2% of total global down production.

Global down production (thousand tonnes)



Source: Textile Exchange based on Maia Research 2023
Note: This chart covers only virgin down and not recycled down

Down market by program in 2022



Source: Textile Exchange based on Maia Research 2023 and standard owners
Note: This chart covers only virgin down and not recycled down

1 Maia Research, 2023. Global Down and Feather Market Report 2022. Customized report.
2 FAOSTAT, 2023. Database. [Link](#). Note: 2021 figures are used as a proxy for 2022 as 2022 figures were not yet available at the release of this report.
3 The Global Traceable Down Standard (TDS) was withdrawn in 2020 and is therefore no longer covered in this report.

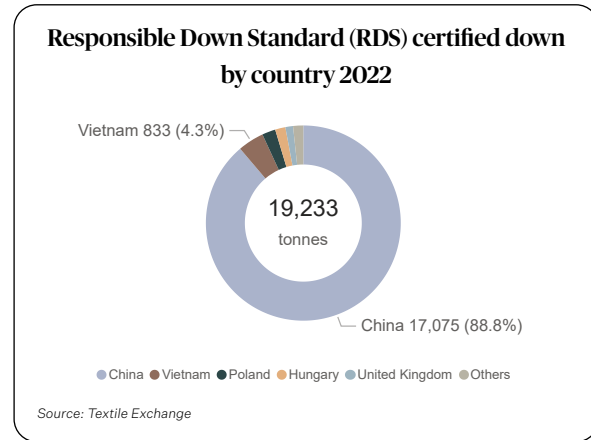


Photo: Georg Eiermann

Virgin down

Where to find down programs across the globe

Around 19,233 tonnes of Responsible Down Standard (RDS) down was produced in 11 countries in 2022. Global Downpass data for 2022 was not available in time for this report, primarily due to the war in Ukraine. Major production regions for certified down are China and Eastern Europe, including Poland and Ukraine. The war in Ukraine has therefore negatively impacted supply.



Western Europe

UNITED KINGDOM RDS: 245 tonnes	IRELAND Downpass: n/a	FRANCE Downpass: n/a
NETHERLANDS Downpass: n/a	GERMANY Downpass: n/a	PORTUGAL Downpass: n/a

Eastern Europe

BULGARIA RDS: 33 tonnes	HUNGARY RDS: 328 tonnes Downpass: n/a	POLAND RDS: 428 tonnes Downpass: n/a
RUSSIA RDS: 1 tonne Downpass: n/a	UKRAINE Downpass: n/a	

North America

CANADA RDS: 5 tonnes
UNITED STATES RDS: 2 tonnes

East and South-East Asia

CHINA RDS: 17,075 tonnes Downpass: n/a
TAIWAN RDS: 151 tonnes Downpass: n/a
VIETNAM RDS: 833 tonnes

Australasia

AUSTRALIA RDS: 132 tonnes Downpass: n/a
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Recycled down

Production facts and figures

Recycled down had an estimated market share of around 1% of global down production in 2022. While virgin global down production was around 602,000 tonnes in 2022, the production volume of recycled down is roughly estimated to be around 5,594 tonnes.

Key standards

Key standards used for recycled down include the [Recycled Claim Standard](#) (RCS) and the [Global Recycled Standard](#) (GRS). Further information on these standards can be found in the chapter on [Sustainability Standards](#).

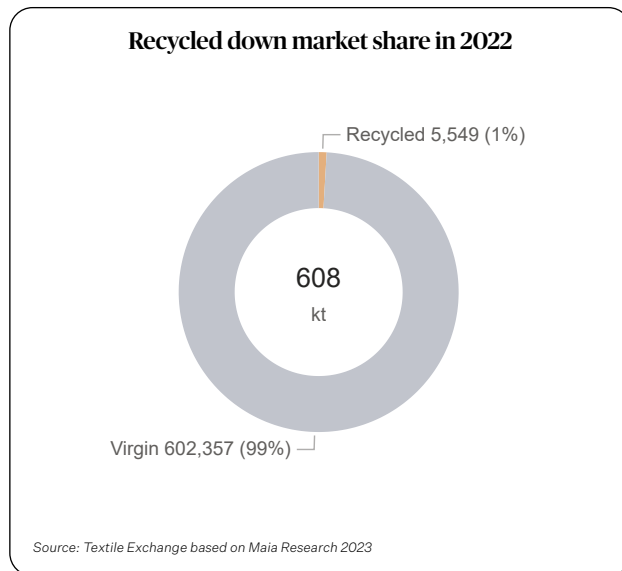


Photo: Krzysztof Bubel

Wool & Other Animal Fibers

Virgin animal fibers: Sheep wool

Production facts and figures

With an annual production volume of approximately 1 million tonnes of clean wool fiber (or 1.98 million tonnes of greasy wool fiber), sheep wool is the most used animal-based fiber.¹

While global wool production has been declining over the years, the market share of wool programs is increasing.

The market share of wool produced according to the Responsible Wool Standard (RWS) and the wool programs Climate Beneficial™, SustainaWOOL GREEN, SustainaWOOL GOLD, and ZQ and ZQRX increased from 58,524 tonnes (~3%) in 2021 to 85,902 tonnes (~4.3%) of total greasy wool production in 2022.

The RWS (including equivalents) accounted for approximately 89% of this 4.3% market share in 2022, equaling 3.9% of the global greasy wool market. ZQ (including equivalents) accounted for ~1% of global greasy wool production, and SustainaWOOL GREEN and SustainaWOOL GOLD together accounted for 0.5% of the greasy wool market. Due to the double certification of around 1% of global greasy wool production, around 4% (and not 5%) of global greasy wool production was certified according to these programs.

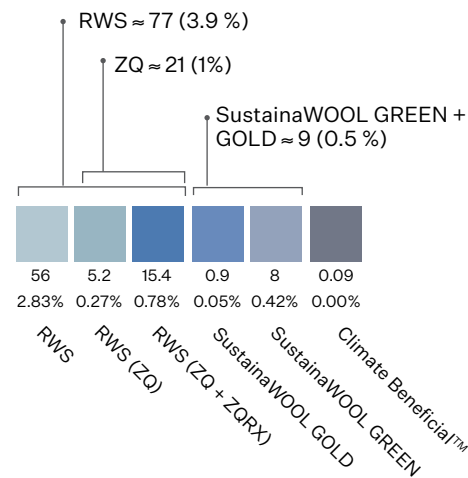
The increasing number of wool programs significantly vary in terms of requirements—their approach to assurance ranges from self-declaration to third-party audits—as well as the degree of traceability and oversight throughout the supply chain. Some are active in only certain regions or markets and others focus on particular impact areas.

The RWS was developed with the aim of providing a holistic global benchmark and definition for responsible wool production.

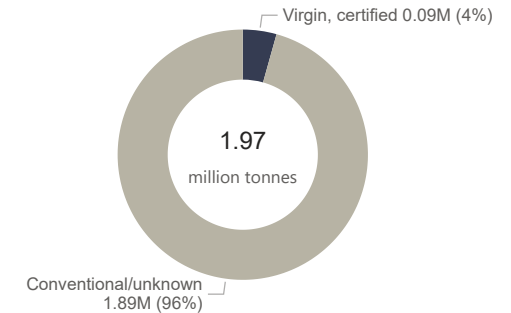
2022 data for the production volume of programs such as Certified Humane®, Land to Market, organic, Pasture for Life, and others was not available in time for the release of this report (see next page for details).

Global wool production by program (in '000 tonnes and % of total greasy wool)

86 thousand tonnes of greasy wool (4%)

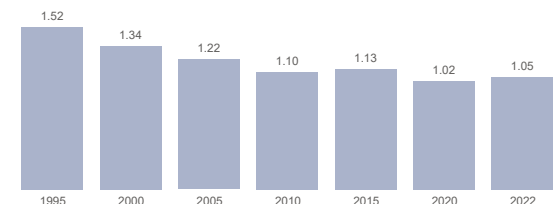


Global wool programs' greasy wool market share in 2022



Source: Textile Exchange based on IWTO and program owners

Global clean wool fiber production (million tonnes)



Source: Textile Exchange based on IWTO
Note: This chart covers virgin clean wool and not recycled wool

¹ IWTO, 2022. Market Information. Edition 18. [Link](#).

² This includes the volumes of wool programs for which data were unavailable or inaccessible at the launch of the report.

Virgin animal fibers: Sheep wool

Production facts and figures

[Responsible Wool Standard](#) (RWS)-certified greasy wool production increased from 51,078 tonnes (2.6% of the global total greasy wool production) in 2021 to 76,666 tonnes (3.9%) in 2022. In the key apparel wool-producing countries, RWS-certified wool has reached market shares as high as 74% of all wool in the Falkland Islands, 53% in South Africa, 35% in Uruguay, 21% in Argentina, 14% in New Zealand, and 5% in Australia. For the first time ever, the market share of RWS-certified wool was higher than the non-certified share in two countries in 2022.

To date, the majority of RWS-certified wool is Merino wool. With the release of the Communal Farmer Group Certification model, access to certification has broadened to cover farmers with no or limited land tenure, including nomadic and semi-nomadic farmers.

The RWS has also seen a strong adoption through the supply chain with a concentration in key apparel wool-processing countries such as Italy and China. With the release of the RWS 2.0, the supply chain certification for RWS, the Responsible Mohair Standard (RMS), and the Responsible Alpaca Standard (RAS) were combined into one scope of Responsible Animal Fibers (RAF).

The aim of the RWS (and RMS and RAS) is that farmers realize and achieve the potential for high animal welfare standards when it comes to animals that are raised in extensive grazing systems. This is possible through audited standards covering all aspects of the animals' lives to review farm practices and check whether these deliver a high standard of welfare. At the close of 2022, more than 15 million sheep were under RWS certification. In addition to animal welfare, the RWS addresses land management, and with the launch of the RWS 2.0 in March 2020, Textile Exchange introduced new biodiversity requirements and a



Photo: Alf Mancigli

Virgin animal fibers: Sheep wool

Production facts and figures

module addressing social welfare on farms. At the close of 2022, there were over 25 million hectares of land under RWS certification.

[Climate Beneficial™](#) wool production was around 90 tonnes in 2022. All Climate Beneficial™ wool was produced in the United States.

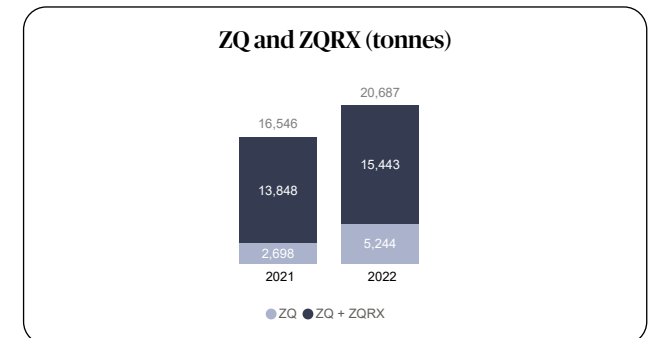
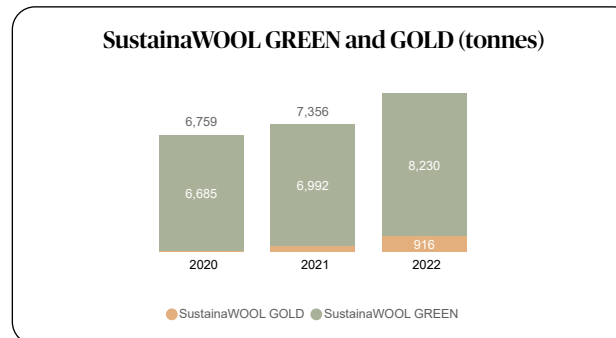
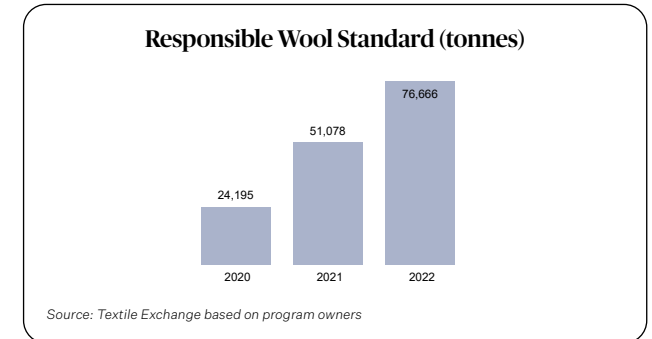
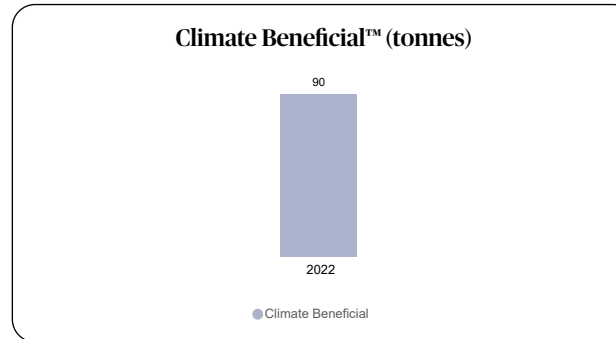
[Certified Humane®](#) wool was produced at small scale in 2022. However, production volumes were not available in time for the release of this report, and garments made from this wool were not labeled Certified Humane® since the entire supply chain had not been audited.

[Pasture for Life \(Pfl\)](#) wool was produced by around 25,000 sheep in 2022, but production volumes were not available in time for the release of this report.

SustainaWOOL GREEN production volumes increased from 6,992 tonnes in 2021 to 8,230 tonnes in 2022, and SustainaWOOL GOLD production volumes increased from 364 tonnes in 2021 to 916 tonnes in 2022. SustainaWOOL is produced in Australia.

[ZQ](#)-certified greasy wool (New Zealand Merino) production increased from 16,546 tonnes (0.85% of global production) in 2021 to around 20,687 tonnes (~1%) in 2022. All ZQ wool produced in 2022 was also RWS-certified. ZQ wool is produced in New Zealand and Australia. Additional outcome measurement according to ZQRX was carried out for around 75% of all ZQ wool produced in 2022.

More information on the market share of non-mulesed wool can be found in the section on the [Non-Mulesed Wool Market](#).

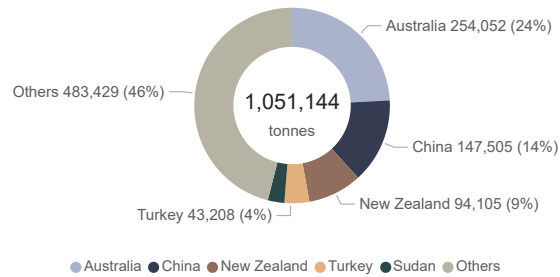


Virgin animal fibers: Sheep wool

Wool production by country

RWS-certified wool reached market shares as high as 74% of all wool in Falkland Islands, 53% in South Africa, 35% in Uruguay, 21% in Argentina, 13% in New Zealand, and 5% in Australia in 2022. In 2022, RWS wool was produced in Chile and the United Kingdom for the first time.

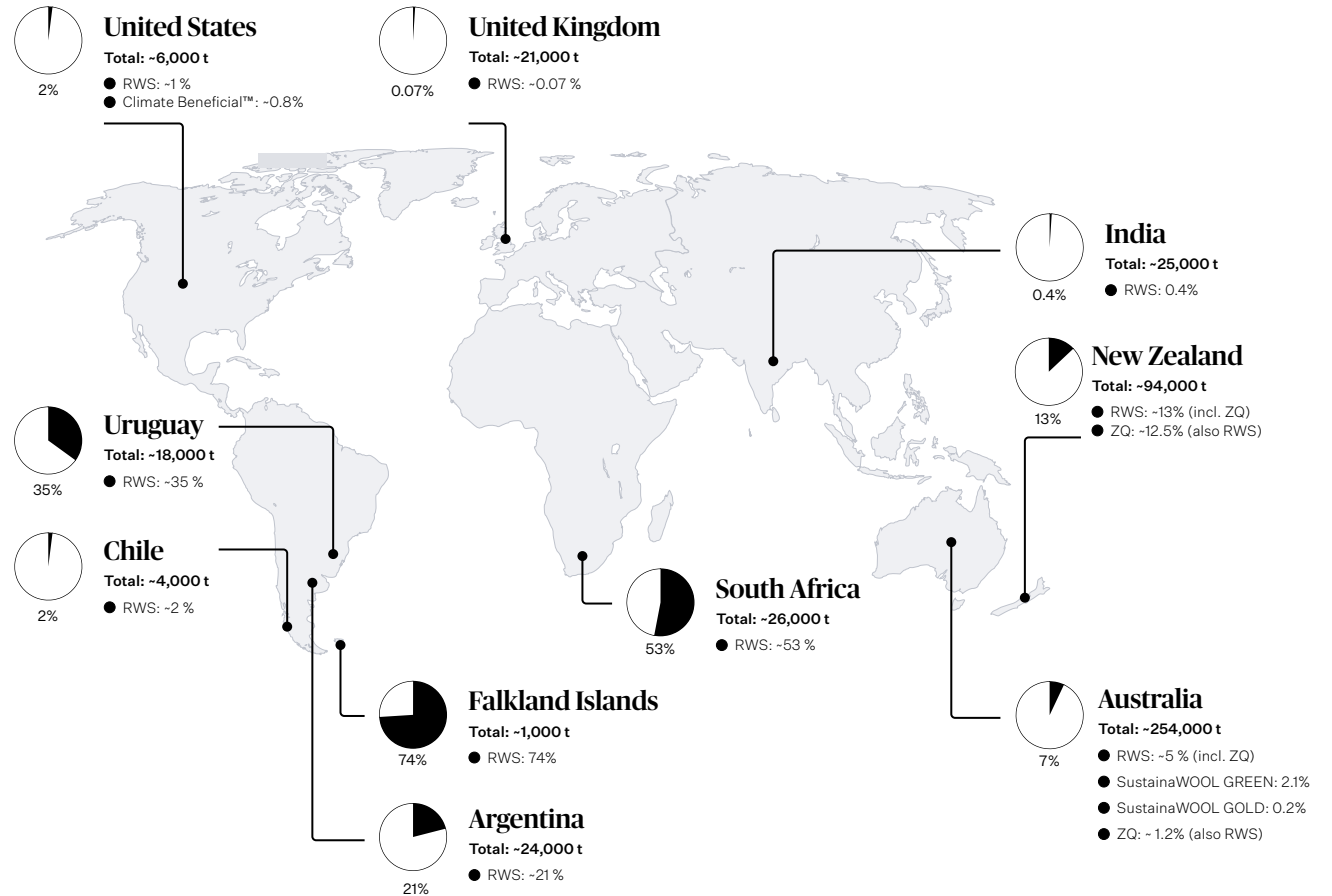
Global clean wool production by country in 2022



Source: Textile Exchange based on IWTO

Note: This chart covers virgin clean wool and not recycled wool

Market share of wool programs by country²



1 IWTO, 2023. Market Information. Edition 18. [Link](#)

Only including RWS and Climate Beneficial, SustainaWOOL GREEN, SustainaWOOL GOLD, ZQ and ZQRX as data was unavailable for Certified Humane®, Land to Market, organic, Pasture of Life and others at the time of this report's release. Market share given in percentages compared to overall wool production based on ITWO data as mentioned in (1). Greasy certified percentages are used as proxy for clean certified percentages.

2 Only wool producing countries with production according to these standards are displayed.

Virgin animal fibers: Sheep wool

The Non-Mulesed Wool Market

Mulesing, defined as the removal of wool-bearing strips of skin from between the hind legs of sheep (the “breach” area), tail skin folds, or tail skin wrinkles in an effort to avoid problems of fly strike, remains a key issue in wool production.

Since the ban of mulesing in New Zealand in 2018, the only country where mulesing is still practiced is Australia, which has a market share of around 24% of the global clean wool market.¹ The risk of sourcing wool produced with mulesing practices therefore remains high if no traceability system is in place to ensure that the wool is mulesing-free.

In this context, it is important to note that different forms of mulesing exist: the removal of skin can be done via cutting with shears, by the application of liquid nitrogen (sheep freeze branding or “steining”), and by the use of rubber rings—more commonly used for tail docking or castration to remove loose skin from the breach area. Four Paws and Humane Society International published a position statement opposing freeze mulesing (steining) in September 2019 because of the severe pain it inflicts on sheep. Both organizations, as well as Textile Exchange, are against any form of breach mutilation or modification.

While definitions of mulesing usually include any form of breach mutilation or modification, including steining, the mulesing definition adopted by the Australian Wool Exchange (AWEX) used to only include the removal of skin from the breach and/or tail of a sheep using mulesing shears.² This means that wool sold as non-mulesed per the AWEX definition could still be produced using freeze mulesing (steining) until July 2022. **AWEX published the latest version of its National Wool Declaration (NWD V9.3) in March 2022, which came into force in July**

2022 and includes a new separate labeling category for steining, ie. sheep treated with liquid nitrogen (LN). The first LN lots of wool were offered in 2022 but not reported in the AWEX annual report as “the small numbers do not produce a % for any analysis” per AWEX.²

[Responsible Wool Standard](#) (RWS), ZQ, and SustainaWOOL GREEN and GOLD certifications ensure that their wool comes from non-mulesed sheep. If organic wool is certified to the [Organic Content Standard](#) (OCS), it also has to be non-mulesed or from a farm with ceased-mulesing status based on the latest revised version (OCS 3.0) launched in April 2020. Additionally, the [Global Organic Textile Standard](#) (GOTS) 6.0, launched in March 2020, added mulesed wool to its list of prohibited fibers.

Australian National Wool Declaration (NWD) definitions until July 2022²

M = Mulesed = “some/all sheep in this mob have been mulesed”.

AA = Analgesic/Anaesthetic = “All sheep in this mob were mulesed and treated with a pre- and /or post-Analgesic &/or Anaesthetic product(s) registered by APVMA for use on sheep”.

ND = Not Declared

CM = Ceased Mulesing = “No lambs born on this property in the last 12 months have been mulesed. No mulesed (or mulesed with AA) ewes or wethers have been purchased.”

NM = Non Mulesed = “No sheep in this mob has been mulesed”.

Mulesing = “The removal of skin from the breach and/or tail of a sheep using mulesing shears.”

Source: Australian Animal Welfare Standards and Guidelines for Sheep.

It is important to note that the definition of “mulesing” of the Australian National Wool Declaration did not include freeze mulesing (steining) until July 2022.

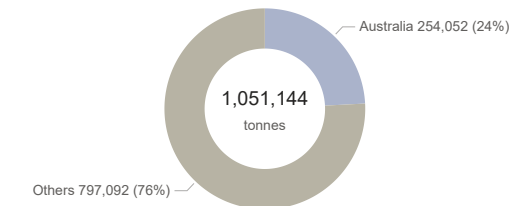
1 IWTO, 2023. Market Information. Edition 18. [Link](#).

2 AWEX website, Mulesing Status. Accessed on September 15, 2022 and on July 26, 2023. [Link](#).

3 Four Paws website “Timeline to End Mulesing” and “Brands Against Mulesing”—accessed on July 26th, 2023. [Link](#) and [Link](#).

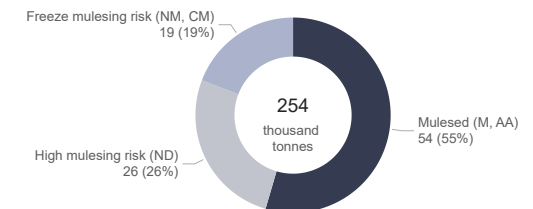
4 AWEX, 2023. Annual Report 2022. [Link](#).

Market share of Australian clean wool in 2022



Source: Textile Exchange based on IWTO

Mulesing status of wool in Australia 2022



Source: Textile Exchange based on Awex

Virgin animal fibers: Mohair

Production facts and figures

Mohair is the hair of the Angora goat (not to be confused with the Angora rabbit, which produces Angora wool). In 2022, around 4,550 tonnes of greasy mohair fiber were produced globally. Approximately half of the world's mohair (2,340 tonnes) was produced in South Africa. The remaining mohair came from: Lesotho with 750 tonnes (16%), Turkey with 420 tonnes (9%), Argentina with 360 tonnes (8%), the United States with 240 tonnes (5%), Australia with 90 tonnes (2%), New Zealand with 30 tonnes (1%), and other countries with 330 tonnes (7%).¹

The South African mohair industry has been governed by its own Sustainable Mohair Production Guidelines since 2009. These industry guidelines have been developed and regularly revised by the South African Mohair Growers Association.

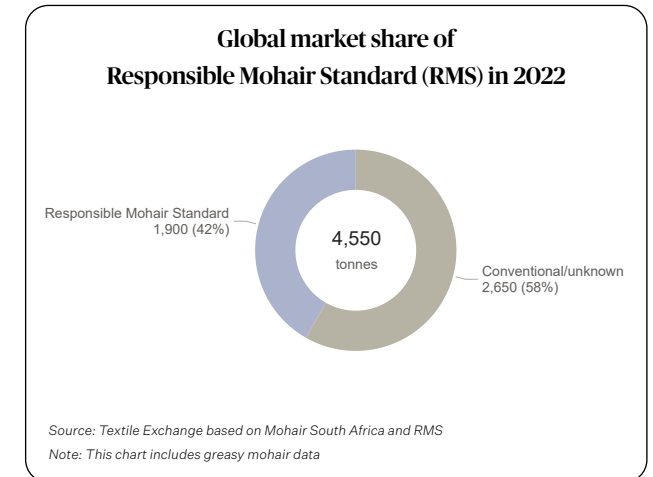
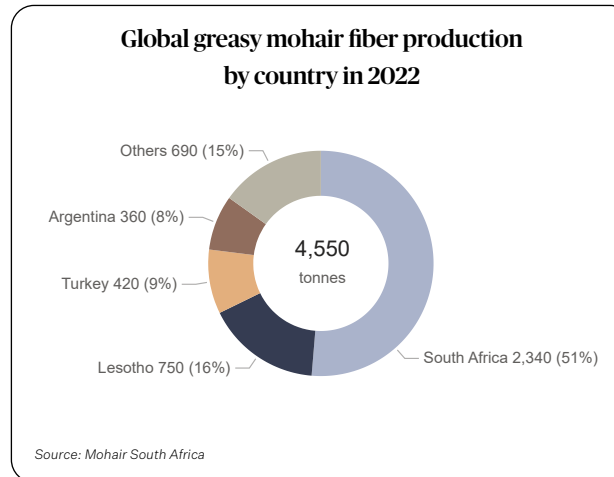
The Responsible Mohair Standard (RMS) was the evolution of the increasing importance of—and demand for—an independent, third-party audited, international standard.

Textile Exchange launched the RMS in 2020, in response to requests from stakeholders. It is based on the existing Responsible Wool Standard, which was launched in 2016. The latest version, RMS 1.2, was released in 2021.

The market share of RMS mohair increased from 35% of all mohair produced worldwide in 2021, to 42% in 2022, its third year in operation.

RMS fibers were produced in South Africa and Australia in 2022. The RMS market share reached 79% of all greasy mohair produced in South Africa and 56% of total mohair production in Australia in 2022.

¹ Mohair South Africa, July 2023. Email communication.

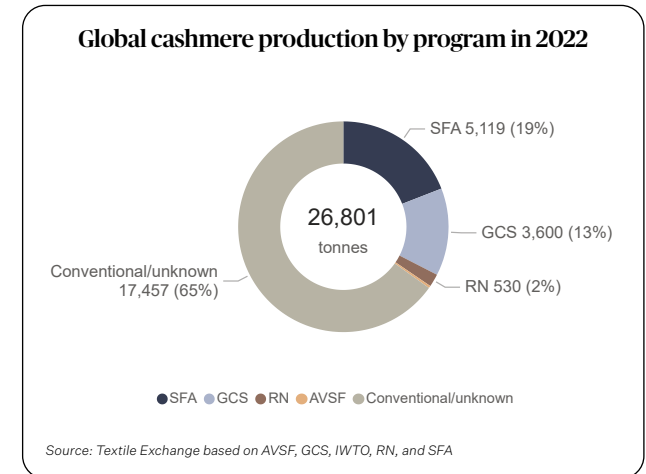
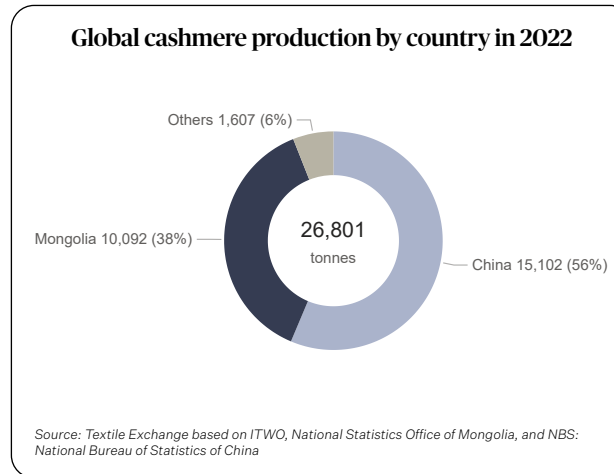


Virgin animal fibers: Cashmere

Production facts and figures

Cashmere is the hair of the cashmere goat. Around 26,801 tonnes of greasy cashmere fiber were produced globally in 2022.¹ Around 56% of the world’s cashmere was produced in China, 38% in Mongolia, and the remaining 6% in other countries.²

The global market share of cashmere produced according to the listed programs—[Agronomes et Vétérinaires Sans Frontiers \(AVSF\)](#), [THE GOOD CASHMERE STANDARD® \(GCS\)](#), [Responsible Nomads \(RN\)](#), and [Sustainable Fiber Alliance \(SFA\)](#)—increased from around 4,443 tonnes (~17%) in 2021 to 9,344 tonnes (~35%) in 2022.³



¹ IWTO, 2023. Market Information. Edition 18. [Link](#).

² Textile Exchange based on “National Bureau of Statistics of China, 2023. [Link](#)” and “Mongolia’s Statistical Information Service, 2023. [Link](#).”

³ Textile Exchange compilation based on data provided by the program(s): AVSF, GCS, RN, and SFA. Wildlife Conservation Society (WCS) is no longer included as program here (see details on next page).

Virgin animal fibers: Cashmere

Production facts and figures

[Agronomes et Vétérinaires Sans Frontières \(AVSF\)](#) greasy cashmere fiber production increased from 83 tonnes in 2021 to 95 tonnes in 2022. This equaled around 1% of all cashmere produced in Mongolia and 0.35% of all cashmere produced in worldwide in 2022. The AVSF project, which operates in Mongolia, involved 11 cooperatives including 756 herder families and covered around 1 million hectares of land with 252,000 goats in 2022.

[THE GOOD CASHMERE STANDARD® \(GCS\)](#) by the Aid by Trade Foundation (AbTF), developed in 2019, increased from 2,300 tonnes of greasy cashmere fiber in 2021 to 3,600 tonnes in 2022. This equaled around 24% of all cashmere produced in China and around 13% of all cashmere produced worldwide in 2022. It was produced by around 9,400 herder families and more than 4.2 million goats in China in 2022.

The [Responsible Nomads \(RN\)](#) program, previously referred to as Green Gold and Animal Health program,¹ covered around 17,667 herder families organized in 58 cooperatives on around 5 million hectares of land in 13 provinces in Mongolia in 2022. Its greasy cashmere production volume increased from 345 tonnes in 2021 to 530 tonnes in 2022.

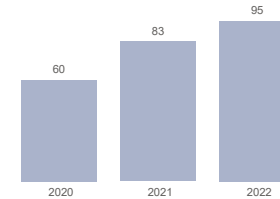
The [Sustainable Fiber Alliance \(SFA\)](#) with its SFA Cashmere Standard covered 18,072 herder families organized in 108 producer groups producing 5,119 tonnes of greasy cashmere fiber from around 5.7 million goats in 2022.

The [Wildlife Conservation Society \(WCS\)](#) program that we've previously report on has gone through a substantial review and changes. Moving forward, WCS will be focus on the scientific research and monitoring required for verifying practices and will transition away from direct engagement with the community and cashmere sale processes. The South Gobi Cashmere Program cooperatives are now managed by the [Good Growth Company \(GGC\)](#), one of the projects selected by Regenerative Fund for Nature in 2021. The project focuses on a landscape-based approach rather than a certified product approach. As such, we aim to include it in the Materials Directory going forward, rather than listing it here as standard system. This approach is subject to change depending on the future development of the project and our tools.

¹ Responsible Nomads: The Green Gold and Animal Health Project of the Swiss Agency for Development and Cooperation (SDC) and Mongolian National Federation of Pasture User Groups of Herders (MNFPUG) have partnered in the development and implementation of program.

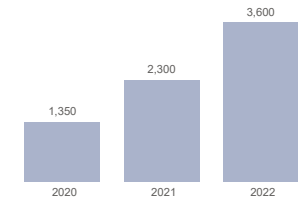
Cashmere production by program (in tonnes)

AVSF Cashmere Standard



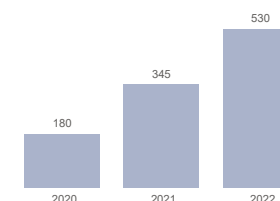
Source: Textile Exchange based on AVSF

Good Cashmere Standard®



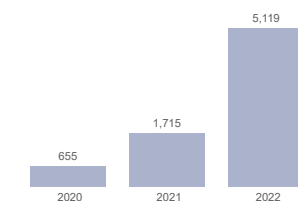
Source: Textile Exchange based on GCS

Responsible Nomads



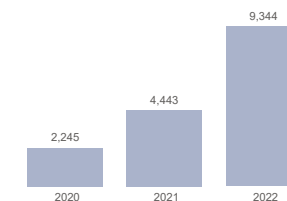
Source: Textile Exchange based on SFA

SFA Cashmere Standard



Source: Textile Exchange based on SFA

Total



Source: Textile Exchange based on AVSF, GCS, RN, and SFA

Virgin animal fibers: Alpaca

Production facts and figures

Alpaca fiber is the hair that has been gathered from alpacas, a species of South American camelid that is native to Peru. Historically, alpaca fiber was reserved for royalty due to its fine micron range.

Today, most alpacas still live in the highlands of Peru at an average altitude of 11,000 to 16,000 feet (3,500 to 5,000 meters). About 4 million alpacas live in Peru, with a small percentage residing in other countries such as Bolivia, Australia, the UK, and the US. The vast majority (95%) are classified under the Huacaya breed, while the rest are classified as Suri (5%).

Huacaya fleece is the main variation used in textile and knitwear production. The current supply chain is centralized in Peru, where around 90% of the processing is condensed through two main suppliers that have vertically integrated processing operations. There are also a number of smaller producer groups that operate independently. More than 90% of all fiber produced in Peru comes from smallholder farmers who have, on average, 45 animals. Currently, alpaca fiber is collected and sold by middlemen and then processed by the two large processors.¹

The global alpaca production volume was around 6,250 tonnes in 2022.²

¹ Minagri, 2019. Potencial Productivo y Comercial de la Alpaca. [Link](#).

² IWTO, 2023. Market Information. Edition 18. [Link](#).

Key standards

The Responsible Alpaca Standard (RAS) is a voluntary global standard that aims to address the welfare of alpacas, the land that they graze on, and social welfare at the farm level.

The market share of the Responsible Alpaca Standard (RAS) reached 3% (192 tonnes) in 2022 since its launch in April 2021.

The certified alpaca fiber is already committed to specific supply chains. It will take time to build the volume of certified fiber such that it is available on the open market.

Alpaca farming has high animal welfare potential thanks to its husbandry system, which is based on extensive grazing and free-ranging, with animals adapted to their environment.

The RAS was developed to ensure that this high welfare potential is realized, and to provide a mechanism to verify that alpaca fiber comes from responsible sources. The standard addresses farm-level animal welfare practices as well as land management and social welfare on the farm. Chain of custody certification helps to ensure that the fiber from certified farms is properly identified and tracked. The RAS is part of the Responsible Animal Fiber (RAF) framework along with the Responsible Wool and Mohair Standards.



Photo: Javier Gogna

Virgin animal fibers: Other

Production facts and figures

Additional animal fibers—apart from sheep, cashmere, mohair and alpaca—includes angora rabbit, camel, guanaco, llama, vicuna, and yak hair.

Angora wool is the hair of Angora rabbits (not to be confused with mohair, which is the hair of the Angora goat). 90% of Angora is produced in China, with Europe, Chile, and the US also producing the fiber in smaller quantities. Several major brands and retailers have banned Angora due to animal welfare concerns.

Camel hair comes from camels. Major suppliers of camel hair include Mongolia, Tibet, Afghanistan, Iran, Russia, China, New Zealand, and Australia.

Guanaco, llama, and vicuna are camelids mainly found in South America with hair that is used as fiber. While llamas are raised domestically, guanacos and vicunas are two wild camelids related to the llama and alpaca and live in the high alpine areas of the South American Andes. They are usually caught in the wild to be shorn, so their extremely fine wool is very expensive.

Yak fiber is the hair of yaks, which are mainly found in the Himalayas and some areas of Mongolia and Central Asia. Yak hair has been used in the Himalayan region for over a thousand years and more recently has been introduced as premium fiber in the international fashion industry.



Photo: Gonzalo Esteguy

Recycled wool

Production facts and figures

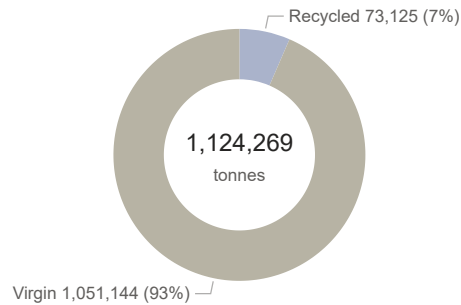
Wool recycling has a long history. With an estimated production volume of around 73 thousand tonnes,¹ recycled wool made up around 7% of the global total wool market in 2022, a slight increase compared to 2021.^{1,2}

The Italian district of Prato is a major producer of recycled wool, producing approximately 35,000 tonnes of the fiber in 2022.³ Other major production centers for wool recycling are China and the Indian city of Panipat.

Recycled standards

The key standards for recycled wool are [the Recycled Claim Standard \(RCS\)](#), [Global Recycled Standard \(GRS\)](#), and for recycled wool from Prato, Italy, [Cardato Recycled](#).

Global recycled wool market share 2022



Source: Textile Exchange based on IWTO and Maia Research

1 Maia Research, 2023. Global Recycled Wool Market Report 2022. Customized report.

2 IWTO, 2023. Market Information. Edition 18. [Link](#).

3 Cardato, 2023. Email correspondence.



Photo: Steve Lovegrove

Animal Fibers & Materials

Silk

Silk

A global overview

Another important animal-based fiber is silk. Though its share of the overall fiber market is small, it is estimated that around 300,000 households are involved in the production of raw silk.¹

In 2022, China and India together produced around 95% of all silk worldwide. Around 57% was produced in China and around 38% in India.²

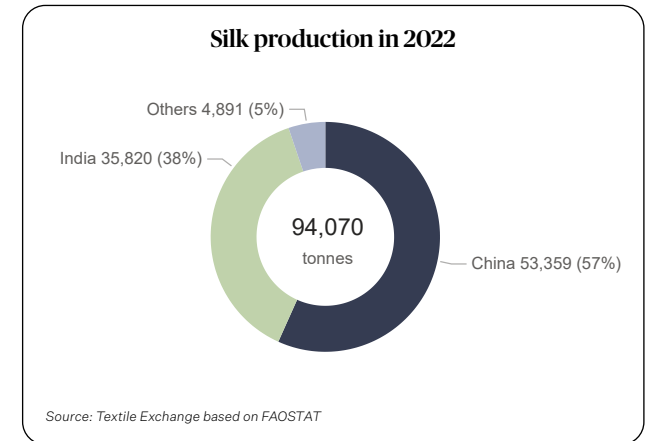
Around 94,070 tonnes of raw silk were produced in 2022.² Silk production volumes more than doubled between 1990 and 2015 but saw a decrease of around 54% between 2015 and 2020.²

The updated FAOSTAT data on silk production—including historical data for previous years—is significantly lower than the data shared by them in the previous year, but the reason for this was not clarified before the release of this report.

Silk programs include organic standards such as the Indian National Programme for Organic Production (NPOP), the Organic Content Standard (OCS), and the Global Organic Textile Standard (GOTS). Other options for standards include Certified Wildlife Friendly® and the World Fair Trade Organization (WFTO). For recycled silk, the Global Recycled Standard (GRS) and the Recycled Claim Standard (RCS) can be used.



Photo: Yutthana



¹ DNFI, 2020. "40 Million Households Produce Natural Fibers". [Link](#).

² FAOSTAT, 2023. [Link](#). Downloaded on August 7, 2023. 2020 data is the latest available data and used as proxy for 2022.

Animal Fibers & Materials

Leather

Virgin leather

A global overview

Global leather production—measured by weight of raw hides—was around 13.4 million tonnes in 2022.¹ The hides and skins of over 1.5 billion animals were used for leather production in 2022.¹

Cattle hides were the most used type of hide with 9.4 million tonnes produced in 2022, accounting for over two thirds of total hides production. China was the largest producer of cattle hides, accounting for 17% of the global production in 2022, followed by the US with 12%, Brazil with 10%, India with 9%, and Argentina with 5%.

Sheep hides were the second most used type of hide with a production of around 1.9 million tonnes in 2022. The largest producers were China with 31%, Australia with 8%, and New Zealand with 4% of global sheep hide production.

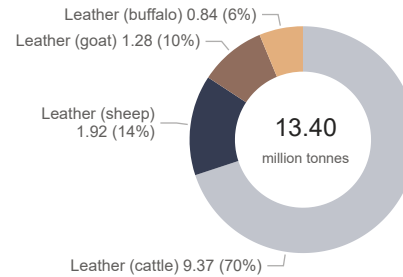
Goat hides were the third most used type of hide with a production volume of 1.3 million tonnes in 2022. The largest producers were China with 41%, Pakistan with 10%, and India with 8% of global goat hide production.

Around 0.8 million tonnes of Buffalo hides were produced in 2022. The largest producers were India with 43%, China with 23%, and Pakistan with 18% of global buffalo hide production volume.¹

¹ FAOSTAT. Accessed July 2023. [Link](#). Including raw cattle hides, buffalo hides, goat skins, and sheep skins. Other types of hides and skins not included. 2021 data used as proxy for 2022 as 2022 data was not yet available in time for the release of this report.

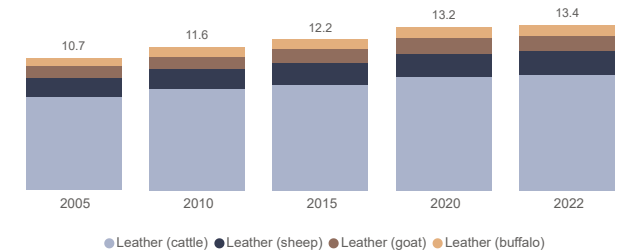
² FAOSTAT. Accessed July 2023. [Link](#).

Global leather production: Raw hides by type in 2022



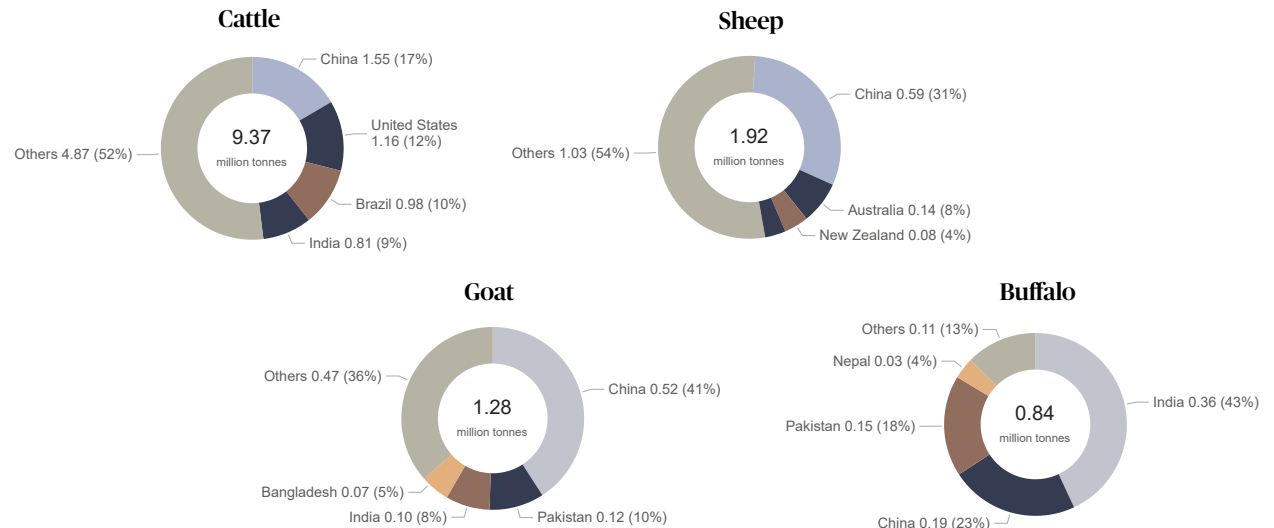
Source: Textile Exchange based on FAO. 2021 data is used as proxy for 2022.

Global hides production (in million tonnes)



Source: Textile Exchange based on FAO

Raw hides by country in 2022



Source: Textile Exchange based on FAO. 2021 data used as proxy for 2022.

Virgin leather

Standards and certification systems

Adopting standards and certification systems helps the leather industry to ensure compliance with relevant criteria and acknowledge good industry practice.

Different standards and certification systems significantly vary in terms of their requirements, approach to assurance—ranging from self-declaration to third-party audits—and the degree of traceability and oversight throughout the supply chain. Some are only active in certain regions or markets and others focus on particular impact areas.

For leather, most standards cover the processing stage. While there are multiple standards covering animal welfare for meat production, only a very few small supply chains currently manage to maintain traceability of the hides of certified animals through to finished leather goods. Aside from animal welfare concerns, the need for brands to know whether leather originates from land where deforestation takes place brings the necessity of joined up and certified supply chains to the fore.

The Leather Working Group (LWG)

The [Leather Working Group](#) (LWG), formed in 2005, is a multi-stakeholder group with over 1,800 members that offers a suite of auditing tools to assess the environmental performance of leather manufacturing facilities and certifies those that meet its standards. In 2022, approximately 4.7 billion square feet of wet blue leather and around 9.5 billion square feet of finished leather were produced in the 1,103 leather production facilities audited by LWG. The market share of LWG leather increased from around 29% of global total finished leather production in 2021 to 39% in 2022.¹

Certified Humane®

[Certified Humane®](#) aims to improve the lives of farm animals from birth through slaughter. The first Certified Humane® hides are currently being used in leather production. There are leather garments that are about to be labeled as Certified Humane®, namely jackets for men and women.

Global Animal Partnership (G.A.P.)'s Animal Welfare Certified

[Global Animal Partnership \(G.A.P.\)'s Animal Welfare Certified](#) program means that animals are raised without the use of animal by-products and that the animals' environment mimics their natural environment to varying degrees as specified on the label. The first companies have started using traceable hides from G.A.P.'s Animal Welfare Certified animals.

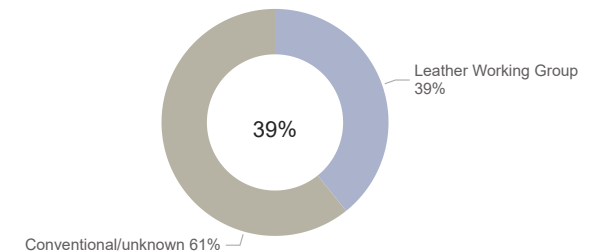
Pasture for Life

[Pasture for Life](#) promotes the unique quality of produce raised exclusively on pasture, and the wider environmental and animal welfare benefits that pastured livestock systems represent. The first Pasture for Life hides have now been used in leather production.

STeP by OEKO-TEX®

The first tannery became [STeP by OEKO-TEX®](#)-certified in 2021. The number of certified tanneries (including retanning facilities) increased to 4 in 2022.

Global market share of the
Leather Working Group (LWG)
(% of global finished leather in 2022)¹



Source: Textile Exchange based on the Leather Working Group (LWG)

¹ LWG, 2023. Email correspondence. Global leather production estimated based on FAO and further sources. 2021 is referring to the 2021/22 LWG year and 2022 to the 2022/23 LWG year.

Virgin leather

Standards and certification systems

Sustainable Leather Foundation

Established in July 2020, the Sustainable Leather Foundation's (SLF) vision is to enable collective improvement and education globally, for more sustainable practices in leather manufacturing and production. SLF is concerned with all aspects of sustainability—environmental, social, and governance. The foundation began listing tanneries and leather manufacturers on the SLF Transparency Dashboard in May 2021 and all facilities are evaluated based on SLF's own standards for environmental, social and governance aspects and some additionally to existing third-party certifications.

Responsible Wool Standard (RWS) for sheep skin and leather

The release of [RWS 2.0](#) in March 2020 introduced a new optional module to apply to slaughtering. Where this module is applied and the chain of custody is maintained, claims about the RWS origin of sheep skin and leather can be made.

Leather Impact Accelerator (LIA)

Textile Exchange has developed the [Leather Impact Accelerator](#) (LIA), which includes Impact Incentives, a tool that allows brands to directly support farmers who are addressing deforestation and land conversion, as well as animal welfare at all cattle farming levels. The first Leather Impact Incentives were verified in March 2022 as part of the LIA pilot. In 2023, LIA version 1.0 was launched.



Photo: Fernando Filmmaker

Recycled leather

Overview

Around 800,000 tonnes of leather waste are produced annually.¹ Using recycled leather—leather that is cut post-use and then repurposed—and bonded recycled leather fiber materials play a role in curbing the industry’s waste output.

Bonded recycled leather fiber materials are mainly made from pre-consumer production scraps, consisting of recycled leather fibers and binders, or recycled leather fibers attached to the surface of a synthetic material.

The European Outdoor Group (EOG) published a [Recycled Leather report](#) in 2019 that aims to support industry professionals to better understand recycled leather as an alternative to virgin leather.



¹ UNIDO, 2000. Wastes generated in the leather products industry. [Link](#).

Photo: Sustainable Composite, enspire leather®

Manmade Cellulosic Fibers

Virgin manmade cellulosic fibers

Production facts and figures

With an annual production volume of around 7.3 million tonnes, manmade cellulosic fibers (MMCFs)—including viscose, acetate, lyocell, modal, and cupro—had a market share of about 6% of total fiber production volume in 2022.¹

Global MMCF production volume has more than doubled since 1990 (when annual production was around 3 million tonnes), and is expected to continue to grow in the coming years.¹

Viscose is the most important MMCF, with a market share of around 80% of all MMCFs and a production volume of around 5.8 million tonnes in 2022.¹

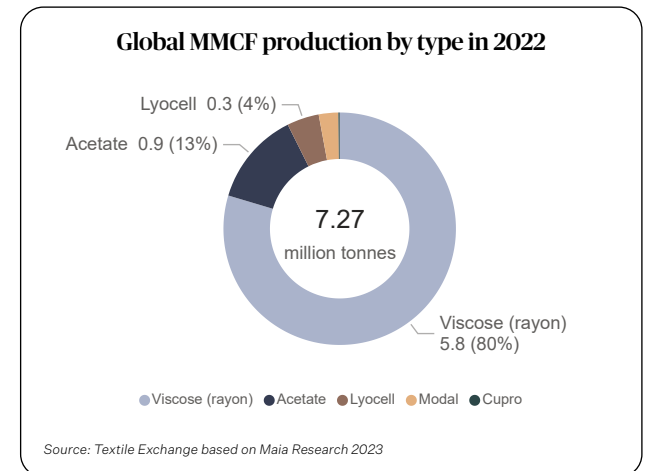
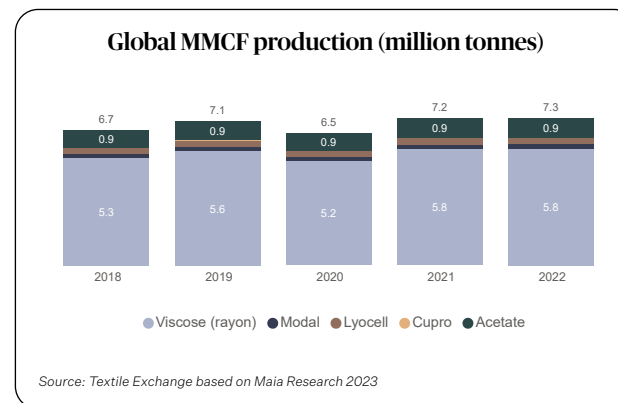
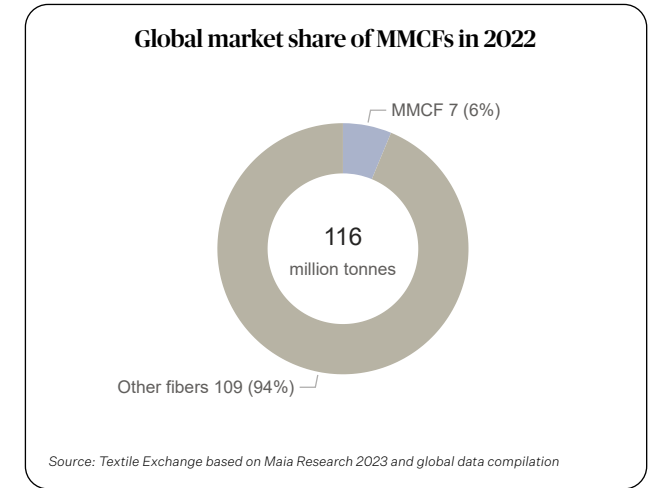
Acetate has a market share of around 13% of all MMCFs in 2022 with a production of approximately 0.9 million tonnes,¹ but is mainly used for non-textile applications.²

Lyocell was the third-most used MMCF type in 2022, after viscose and acetate. It had a market share of around 4% of all MMCFs with a production volume of around 0.3 million tonnes.¹

Modal had a market share of around 3% of the total MMCF market in 2022 with a production volume of around 0.2 million tonnes.¹

Cupro had a market share of around 0.2% of the total MMCF market. There was only one supplier of cupro producing around 0.01 million tonnes in 2022.

Manmade cellulosic fibers are currently primarily produced from wood. Less than 1% of the global market is currently made from recycled or other alternative feedstocks.



¹ Maia Research, 2023. Global Manmade Cellulosic Fiber Market Report 2023 (customized report).

² More information on the applications by fiber is available in the Report Scope: Beyond Apparel section of this report.

Virgin manmade cellulosic fibers

Standards for feedstock

FSC- and/or PEFC-certified MMCFs had an estimated market share of around 60-65% of all MMCFs in 2022.¹

FSC, founded in 1993, is an international member-led organization that sets standards for responsible forest management and chain of custody. The first textile products with consumer facing FSC labels hit the market in 2020.²

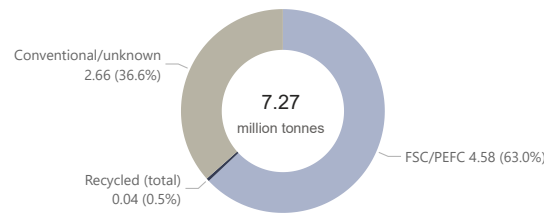
PEFC, founded in 1999, is a global alliance of national forest certification systems and is the largest forest certification system worldwide. Brands and retailers first started using consumer-facing communication for PEFC textiles with fully certified supply chains in 2022.²

Overall, the share of global forest area certified by FSC and/or PEFC decreased from around 11% in 2021 to around 10% in 2022, and is expected to further decline following the ban on timber from Russia, Belarus and occupied Ukrainian territory as “conflict timber” in March 2022.^{3,4,5,6} In total, around 8% of all certified forest was certified according to PEFC and its equivalents in 2022, with almost half of it SFI-certified. SFI is a key PEFC-endorsed forest certification system operational in Canada and the United States. Approximately 5% of all forests were

FSC-certified. Due to the double-certification of around 2% of all forests, 10.5% (and not 12.6%) of all forests were certified by FSC and/or PEFC.^{3,4}

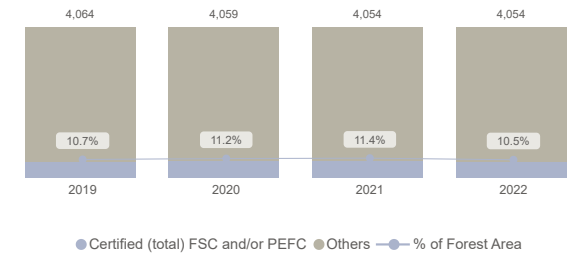
The first MMCFs have also been certified according to Textile Exchange's Organic Content Standard (OCS). The OCS is an international, voluntary standard that sets requirements for the third-party certification of organic inputs and chain of custody.

Global MMCF production by feedstock in 2022



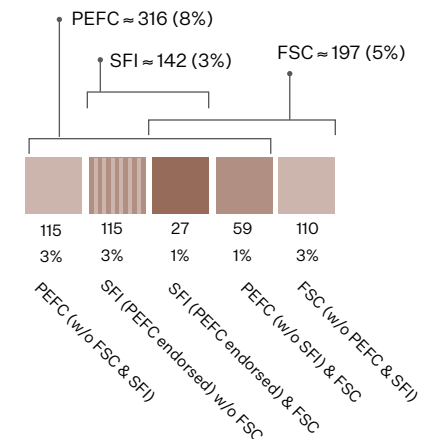
Source: Textile Exchange based on Maia Research, CanopyStyle audit reports, and other additional sources

Forest programs (million ha) and % of total forest area



Source: Textile Exchange based on FAO, FSC, and PEFC

Forest programs in 2022 (million ha and % of total forest area)



1 Textile Exchange estimates based on publicly available information and its own supplier mapping.

2 Information received from FSC and PEFC per email.

3 FAOSTAT, 2023. Database. [Link](#). 2022 figures not yet available at the launch of this report and therefore 2021 figures used as proxy.

4 Based on FSC and PEFC press releases from [February 2023](#), as well as the [FSC Database](#) and [PEFC Database](#) and email correspondence with FSC, PEFC and SFI.

5 FSC, 2022. No FSC Material from Russia and Belarus until the Invasion Ends. [Link](#).

6 PEFC, 2022. Timber from Russia and Belarus Considered "Conflict Timber". [Link](#).

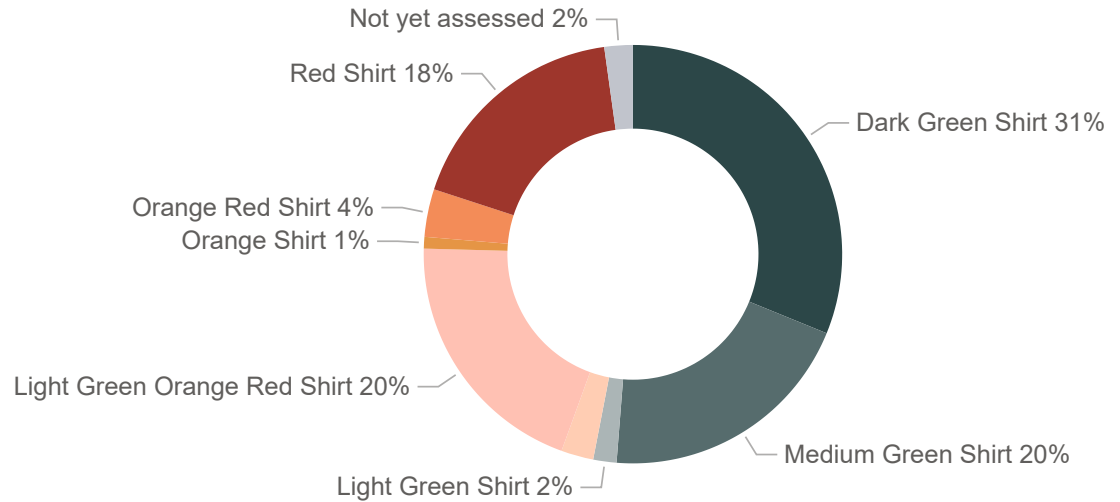
7 Maia Research, 2023. Global Recycled Manmade Cellulosic Fibers Market Report 2022. Customized report.

Virgin manmade cellulosic fibers

Standards for feedstock

The [CanopyStyle Audits](#) have become the leading assessment of MMCF suppliers on their raw material sourcing practices since their start in 2017. In 2022, 53% of the global MMCF production was awarded "green shirts" in Canopy's annual [Hot Button Report](#) and Ranking. These producers have been audited and assessed as being at low risk of sourcing MMCFs from ancient and endangered forests, or have taken substantive action to eliminate known risks in their supply chains. The market share of MMCF producers committed to the CanopyStyle initiative through public sourcing policies increased from around 35% of the global production in 2015 to nearly 93% in 2022. A summary of results is published in the annual Hot Button Report¹

Global market share of MMCF production capacity with CanopyStyle Shirts in 2022



Source: Textile Exchange based on Canopy Hot Button Report 2022

¹ Canopy, 2023. CanopyStyle Hot Button Report 2022. [Link](#).

Virgin manmade cellulosic fibers

Standards for pulp and fiber

Pulp and fiber

Bluesign has developed specific criteria for fiber production that was added in the annex “[Fiber Manufacturing](#)” to its “bluesign® CRITERIA for production sites” in March 2020. These criteria are applicable to the manufacturing of MMCFs as well as synthetic fibers, such as polyester and polyamide. Criteria for MMCFs address areas including feedstock, pulp, and fiber production. One MMCF supplier has already become a bluesign® SYSTEM PARTNER and produces bluesign® APPROVED fibers.

[ZDHC](#) has expanded the scope of its work to cover fiber production, to account for the environmental impact of fibers. In April 2020, the [ZDHC Man-Made Cellulosic Fibres \(MMCF\) Guidelines 1.0](#) were launched, together with the [ZDHC MMCF Responsible Fibre Production Guidelines 1.0](#), the [ZDHC MMCF Interim Wastewater Guidelines 1.0](#), and the [ZDHC MMCF Interim Air Emissions Guidelines 1.0](#). The guidelines, which are initially focused on viscose and modal, provide suppliers producing MMCFs with unified criteria for measuring output indicators like wastewater, sludge, air emissions, and other process-related parameters. They also offer an aligned approach to the recovery of sulfur compounds, part of the inputs, and by-products generated during the production process. Fiber producers are expected to engage in a continuous improvement roadmap defined by three levels of progress: foundational, progressive, and aspirational. The dissolving pulp production process will be considered and incorporated at a later stage.

Further standards that can be used at the pulp and/or fiber level include [Cradle to Cradle Material Health Certificate Standard](#), [STeP by OEKO-TEX®](#), and the [EU Eco Label](#). Another option is production in compliance with the [EU BREFs \(BAT Reference Documents\)](#).

For standards related to “recycled” MMCFs, see the chapter on [Recycled Manmade Cellulosics](#).

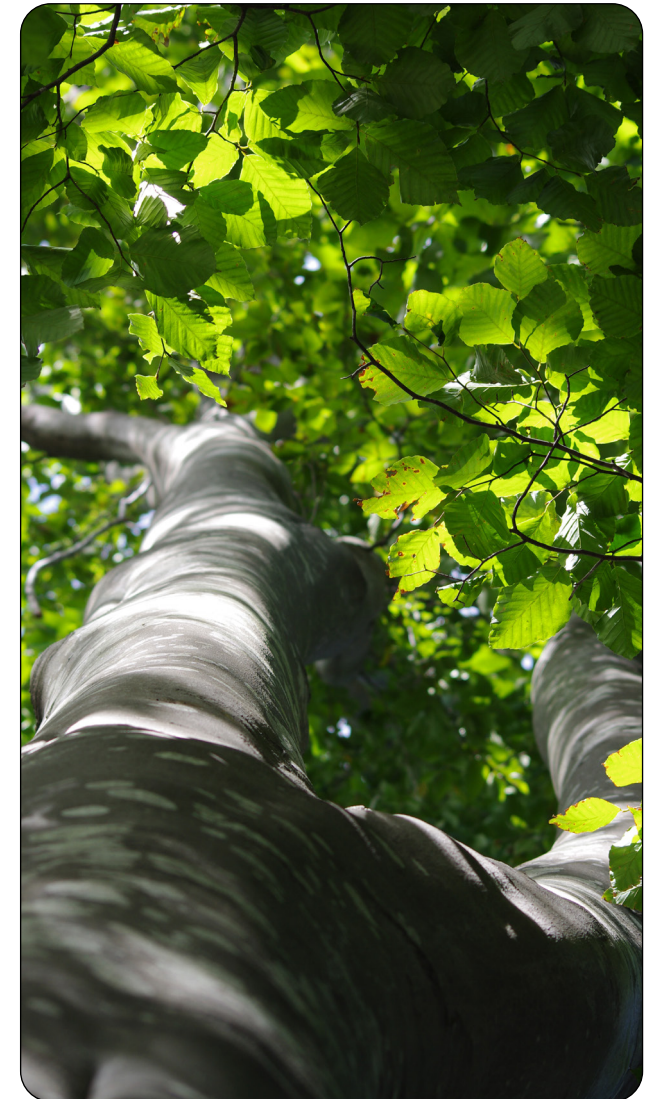


Photo: Taichi Nakamura

“Recycled” manmade cellulosic fibers

Supplier updates

The market share of “recycled” MMCFs increased from an estimated 0.47% in 2021 to 0.49% in 2022.¹ However, amid a lot of ongoing research and development, it is expected to increase significantly in the coming years.

Canopy estimates that recycling just 25% (5 million tonnes) of global pre- and post-consumer cotton textile waste, plus 25% (1.6 million tonnes) of MMCF textile waste, could replace all wood fiber currently used to manufacture dissolving pulp.²

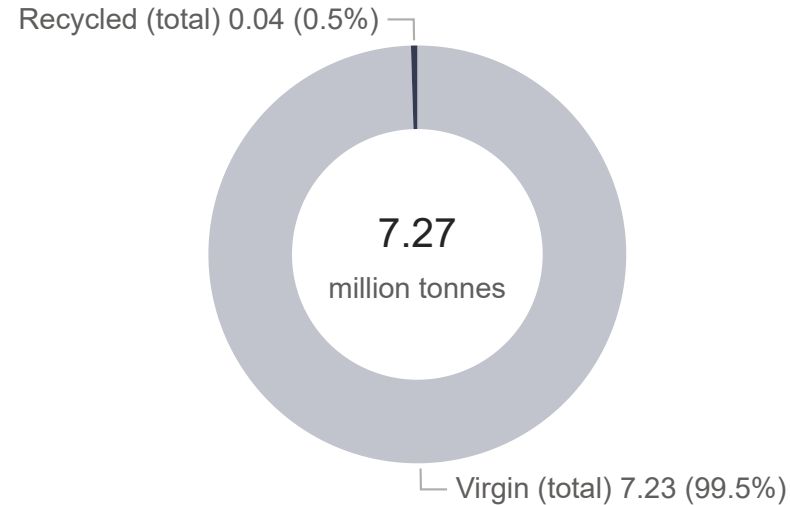
Many “recycled” MMCFs are still in development. The first commercially available MMCFs that are partially or wholly made from recycled materials use mainly cotton linter or pre-consumer cotton textile residues as feedstock. The share of MMCFs created from post-consumer textiles is still low but expected to grow.

For MMCFs made from recycled materials, the [Recycled Claim Standard \(RCS\)](#), [Global Recycled Standard \(GRS\)](#), and [SCS Recycled Content Certification](#) can be used. The first recycled MMCF suppliers have been RCS-certified.

¹ Textile Exchange based on Maia Research, 2023. Global Recycled Manmade Cellulosic Fiber Market Report 2022 and Global Manmade Cellulosic Fiber Market Report 2022.

² Canopy, 2020. [SURVIVAL. A Plan for Saving Forests and Climate: A Pulp Thriller.](#)

Global MMCF production in 2022 (million tonnes)



Source: Textile Exchange based on Maia Research 2023 and global data compilation

Synthetic Fibers
Polyester

Recycled polyester

Production facts and figures

Polyester is the most widely used fiber worldwide. With an annual production volume of around 63 million tonnes, up from around 61 million tonnes in 2021, polyester had a market share of approximately 54% of global fiber production in 2022.¹

The global recycled polyester (rPET) fiber production volume decreased from around 9 million tonnes in 2021 to around 8.6 million tonnes in 2022.² This equals a decrease in rPET's market share from around 14.8% of global PET production in 2021 to around 13.6% in 2022.³ A combination of factors including the increasingly competitive market for plastic bottles as feedstock, insufficient investment in textile-to-textile recycling, and the growth of virgin fossil-based polyester have contributed to this development.

Feedstock types

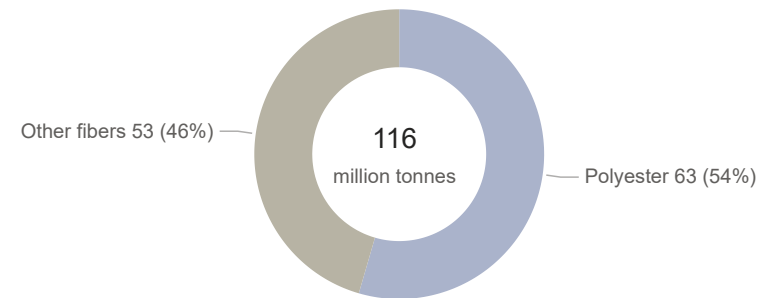
Recycled polyester is mainly made from PET plastic bottles, which make up an estimated share of 99% of all recycled polyester feedstock.⁴ Recycled polyester can also be made from other post-consumer plastics such as ocean waste, packaging waste, and discarded polyester textiles, or from pre-consumer processing residues such as fabric scraps.

Amid increasing demand for post-consumer bottles within the bottle industry, as well as the wider packaging industry and other sectors, competition for post-consumer bottles is increasing. Textile-to-textile recycling is an important strategy to ensure future feedstock supply for the rPET textile industry. Developing and scaling these technologies will be key to transitioning from conventional virgin fossil-based polyester to recycled.

Recycling types

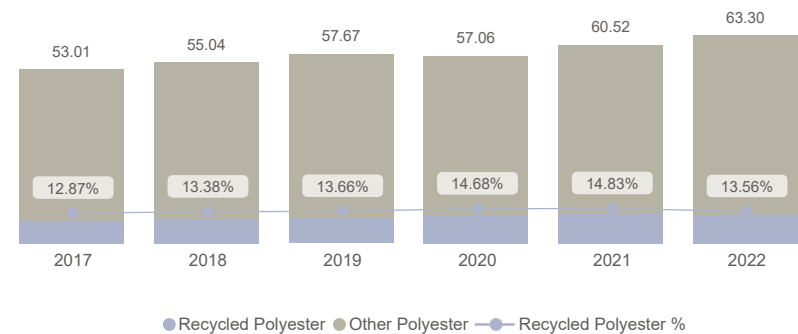
Most recycled polyester is currently mechanically recycled from PET bottles.¹ The market share of chemically or biologically recycled polyester is still very low (<1%). Key challenges associated with chemical and biological recycling include costs, technological challenges, feedstock suitability and availability, and energy use. With new operations starting the commercial production of chemically recycled polyester and companies in the research and development phase, the market share of chemically recycled polyester is expected to grow in the coming years. Scaling up textile-to-textile recycling will be key to reducing greenhouse gas emissions.

Global fiber production in 2022



Source: Textile Exchange based on Maia Research 2023 and global data compilation

Global polyester production (million tonnes)



Source: Textile Exchange based on Maia Research 2023 and global data compilation

Recycled polyester

Production facts and figures

Standards

The main standards used for recycled polyester include the Global Recycled Standard (GRS), the Recycled Claim Standard (RCS), and the SCS Recycled Content Standard. For further information, see the chapter on [Sustainability Standards](#).

Further standards and certifications for recycled polyester include the World Fair Trade Organization (WFTO) standard and the Ocean Bound Plastic (OBP) Certification.

Ocean-bound plastic

Zero Plastic Oceans launched the [Ocean Bound Plastic \(OBP\) Certification](#) in 2020, in collaboration with the certification body Control Union. The OBP Certification Program is designed to encourage the removal of ocean-bound plastic from the environment by adding value to the effective collection and treatment of plastic before it reaches the ocean. Around 4,000 tonnes of OBP feedstock was reclaimed in 2022. 425 tonnes of recycled polyester fibers were OBP-certified in 2022 but the volumes of recycled polyester fibers from OBP-certified feedstock that were not yet certified at the fiber-level were much higher. The reason is that only parts of the supply chains were certified.⁵

More than 8 million tonnes of plastic end up in the oceans every year.⁶ An increasing number of initiatives are working on the collection of ocean-bound or ocean plastic as feedstock for recycled polyester.⁷ While avoiding single-use plastic in the first place must be the priority, such initiatives can help reduce the plastics in our ocean as long as ocean and ocean-bound plastic exists.

While social conditions in textile and garment factories are at least on the radar of most companies in the industry, the livelihoods of waste-picking communities are seldom sufficiently considered. There are some initiatives that explicitly address the social impact of recycled polyester at the feedstock collection level, and social issues related to waste collection are expected to receive increasing attention in the coming years.



Photo: Recycle Man

1 Maia Research, 2023. Global Polyester Fiber Market Report 2022. Customized report.

2 Maia Research, 2023. Global Recycled Polyester Fiber Market Report 2022. Customized report.

3 Textile Exchange, 2023. Based on sources listed in footnote (1) and (2).

4 Textile Exchange estimate based on (2) and bottom-up estimate of non-bottle rPET fiber production based on supplier mapping, publicly available information, and market modeling.

5 Control Union, 2023. Email correspondence.

6 IUCN, 2021. Website. [Link](#).

7 Ocean-bound plastic is generally defined as abandoned plastic waste located within the range of 50km from shore. Source: Ocean Bound Plastic (OBP) Certification, 2023. Website. [Link](#).

Biobased polyester

An emerging material

The market share of biobased polyester is estimated at around 0.01% of the total polyester production.¹ Biobased polyester has the potential to reduce greenhouse gas emissions, but materials must be sourced and managed responsibly in order to achieve this. Further development of feedstocks is needed to provide the industry with innovative solutions to drive the uptake of biobased polyesters.

Many biosynthetic materials that exist on the market today are partially biobased. It is important that the industry continues to invest in and develop 100% biobased solutions to reduce reliance on fossil-derived raw materials. It is important to note, however, that not all biobased fibers are inherently sustainable or preferred. Further research is required in order to holistically assess their sustainability profiles.

While many sustainability standards for biobased feedstocks exist, the scale and adoption of these standards for biosynthetics is still limited. Key standards for biomass certification are RSB, ISCC Plus, and Bonsucro.

For more information, please see [Textile Exchange's Sustainability of Biosynthetics report](#).

¹ Estimate based on nova-Institute, 2023. Bio-based Building Blocks and Polymers: Global Capacities, Production and Trends 2020 – 2025. [Link](#) and Maia Research, 2023. Global Polyester Fiber Market.



Photo: Volodymyr

Synthetic Fibers
Polyamide

Recycled polyamide

Production facts and figures

Global total polyamide (nylon) fiber production increased again from 5.9 million tonnes in 2021 to 6.2 million tonnes in 2022, after a slight decline in 2020 due to COVID-19.¹ With this, polyamide fibers accounted for about 5% of the global fiber production market in 2022.²

The recycled polyamide fiber market is growing, but at a rather slow rate. Around 0.1 million tonnes of recycled polyamide was produced globally in 2022. Due to technical challenges, limitations related to feedstock quality and availability, and investment needs, the market share of recycled polyamide is still very low, accounting for around 2% of all polyamide fiber production.³

Recycled polyamide can be produced from pre- or post-consumer waste. Pre-consumer waste may include processing scraps, fabric cut-offs, or hard polyamide waste. Post-consumer polyamide is made from materials such as discarded fishing nets, carpets, or other used textiles. The recycling process can be mechanical or chemical.

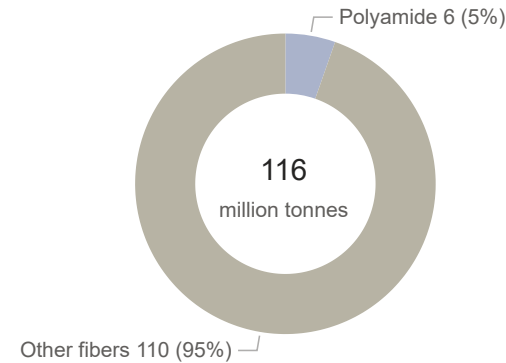
The main standards used for recycled polyamide include the Global Recycled Standard (GRS) and the Recycled Claim Standard (RCS). For further information, please see the chapter on [Sustainability Standards](#).

Recycling polyamide helps to decrease the industry's dependence on virgin fossil-based raw materials and reduce waste material.

¹ Maia Research, 2023. Global Polyamide Fiber Market Report 2022. Customized report.

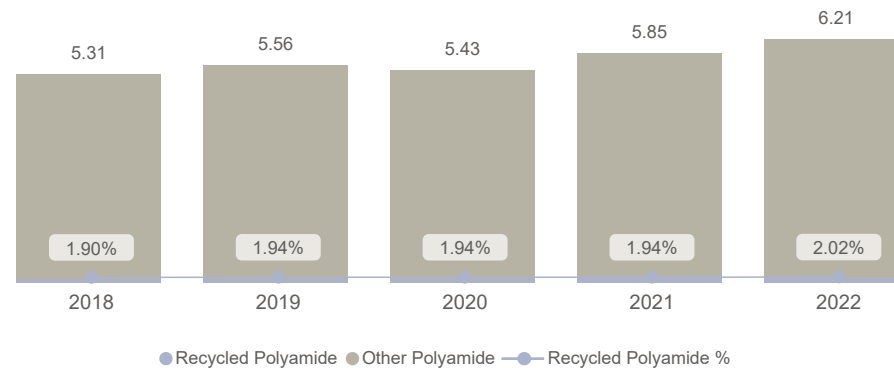
² Textile Exchange estimate based on various sources (see the chapter on the [Global Fiber Market](#)).

Global market share of polyamide in 2022



Source: Textile Exchange based on Maia Research 2023 and global data compilations

Global polyamide production (million tonnes)



Source: Textile Exchange based on Maia Research 2023 and global data compilations

Biobased polyamide

Introduction and supplier innovation landscape

The global production volume for biobased polyamide fiber is around 0.02 million tonnes.¹ It is estimated that biobased polyamide fibers make up around 0.4% of the polyamide fiber market.¹

For more information, please see [Textile Exchange's Sustainability of Biosynthetics Report](#).



¹ Estimate based on nova-Institute, 2023. Bio-based Building Blocks and Polymers: Global Capacities, Production and Trends 2020-2025. [Link](#) and Maia Research, 2023. Global Polyamide Fiber Market 2022. Customized report.

Photo: Hatori Shisuka

Synthetic Fibers

Other Synthetic Fibers

Other synthetics

Production facts and figures

Other synthetics—including polypropylene, acrylics, and elastane—had a combined production volume of 6 million tonnes and a market share of around 5% of the global fiber market in 2022.

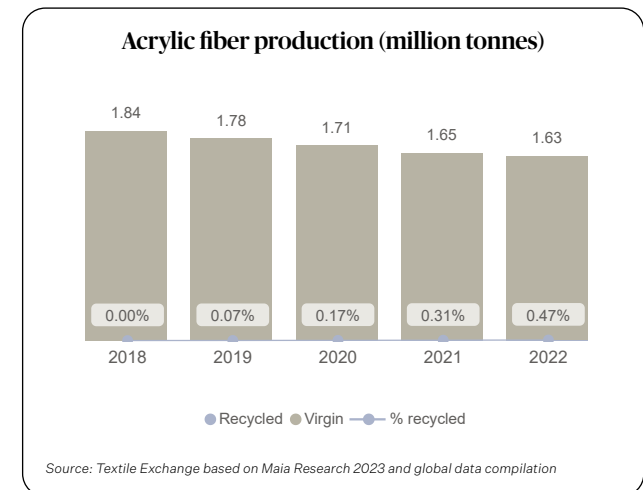
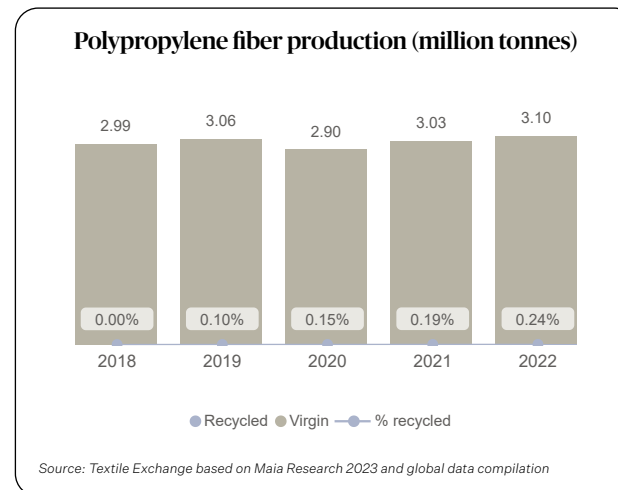
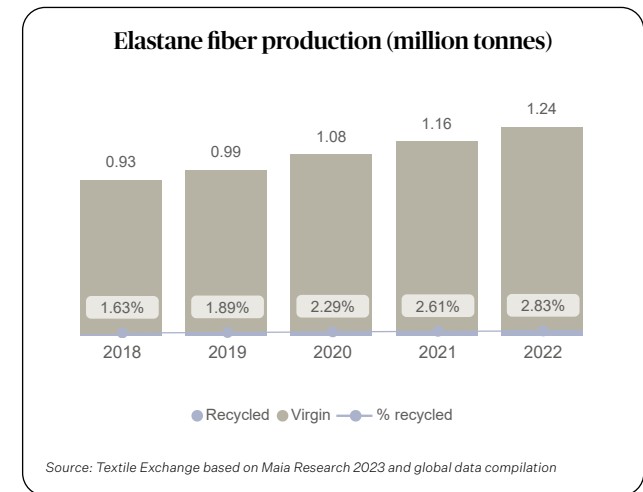
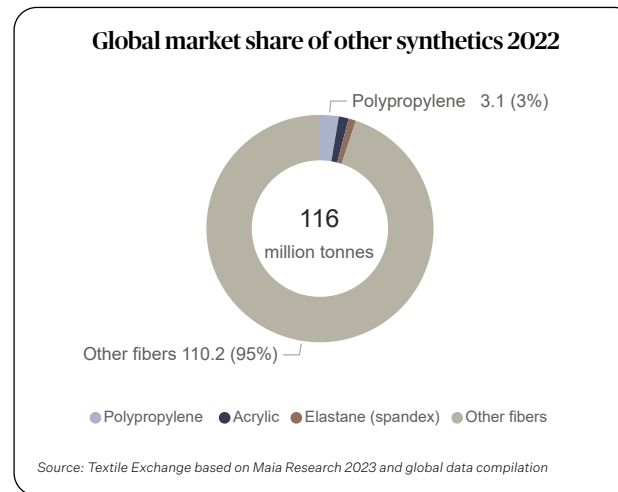
Polypropylene had a market share of 2.7% of the global fiber market in 2022. Polypropylene fiber production volumes slightly increased again from 3.0 million tonnes in 2021 to 3.1 million tonnes in 2022, after a slight decline in 2020 due to COVID-19. It is estimated that just about 0.2% of all polypropylene fibers are recycled.

Acrylic fibers had a production volume of around 1.6 million tonnes and a market share of 1.4% of the global fiber market in 2022. Global acrylic fiber production volumes have been declining over the years.¹ The market share of recycled acrylic is estimated at around 0.5% of total acrylic fiber production in 2022.

Global elastane fiber production increased from slightly below 1.2 million tonnes in 2021 to slightly above 1.2 million tonnes in 2022, accounting for a market share of around 1% of the global fiber market. The share of recycled elastane was estimated to be 2.8% of global elastane fiber production volumes in 2022.

The production volumes of further other synthetics such as polytrimethylene terephthalate (PTT), polylactic acid (PLA), and similar materials are very low and currently not included in this annual report.

For more information about biosynthetics, please see [Textile Exchange’s Sustainability of Biosynthetics report](#).



¹ Maia Research, 2023. Global Other Synthetics Fiber Market Report 2022. Customized report.

Other manmade fibers and materials

Recycled fibers from blended textiles

Many textiles produced today are made from fiber blends. Recycling fiber blends is particularly challenging because different materials require different conditions for chemical or mechanical recycling. The proliferation of mixed textiles in the apparel industry—such as cotton and polyester or elastane—poses significant challenges when it comes to recycling post-consumer textile waste. Thanks to a few innovative startups, there is the prospect that high-value fiber blend recycling will soon be possible.

Manmade protein fibers

Biobased manmade protein fibers are another example of material innovation. It is important to note, however, that not all biobased fibers are inherently sustainable or preferred. Further research is required in order to holistically assess their sustainability profiles.

CO₂-based fibers

Addressing climate change is one of the most urgent areas of action for the textile industry. A few companies are exploring innovative approaches to directly capture carbon dioxide (CO₂) from the air and use the carbon element as feedstock for textiles. The carbon can be processed into precursor chemicals that are used in the production of synthetic fibers such as polyester, or manmade cellulose such as viscose or lyocell. Direct Carbon Capture and Utilization (CCU) is a new technology in development. Its energy usage is currently very high but if technological challenges are overcome and the process is powered by renewable energy, it will have great potential as an alternative to virgin fossil feedstock. Additional information on this topic will be provided by Textile Exchange in the coming months.

Composite materials

A composite material is a material which is produced from two or more constituent materials with different chemical or physical properties. While most composite materials usually contain virgin fossil-based synthetics, there is a rapidly growing number of partially (and, on rare occasions, fully) recycled and biobased composite materials being developed. Many are still in development, as achieving some of the quality and properties that they want to mimic such as the durability of natural leather, is difficult. While partially (or, ideally, fully) substituting fossil-based content with biobased or recycled content is a start, it is important for producers and investors in this space to pursue continuous improvements and adopt a holistic approach that considers the wider material impacts, material health, and circularity.



Photo: Somsak Suwanput

Supply chain standards

Standards that can be used for multiple fiber types

Adopting sustainability standards and chain-of-custody systems can be one helpful tool for brands to meet market demand and regulatory requirements.

While the previous chapters in this report provide an overview of the most important fiber-specific standards covering materials such as cotton, wool, and down, this section includes standards that can be used for multiple fiber types.

As leading standards for organic textiles, both the Organic Content Standard (OCS) and Global Organic Textile Standard (GOTS) help to manage the chain of custody of fibers that have been certified as organic at the farm level as they make their way through the supply chain to the final product.

Organic Content Standard (OCS)

The Organic Content Standard (OCS) is an international, voluntary standard that sets requirements for the third-party certification of certified organic inputs and chain of custody. The goal of the OCS is to increase organic agricultural production.

Textile Exchange launched the OCS 3.1 in July 2020, with updates including updated manuals, more robust traceability between farm and first processor, GMO testing requirements, and non-mulesing for organic wool. More information can be found [here](#).

The number of OCS-certified sites increased from 11,885 in 2021 to 12,131 in 2022.

Global Organic Textile Standard (GOTS)

GOTS is the leading worldwide textile processing standard for organic fibers, covering ecological and social criteria, backed up by independent certification of the entire textile supply chain.

The GOTS version 7.0 was released in March 2023. The revised version includes, among further updates, stricter criteria for incoming organic material and residue limits. Read more information [here](#).

The number of GOTS-certified sites increased from 12,338 in 2021 to 13,549 in 2022.

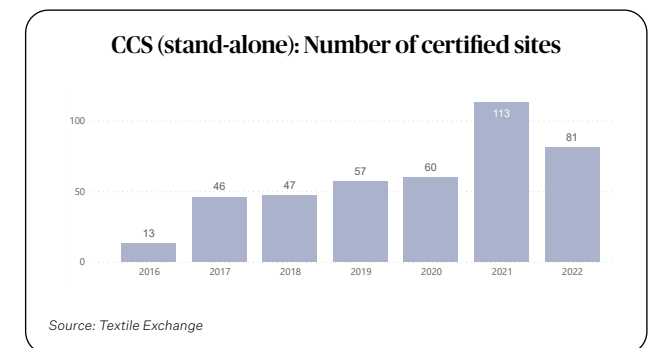
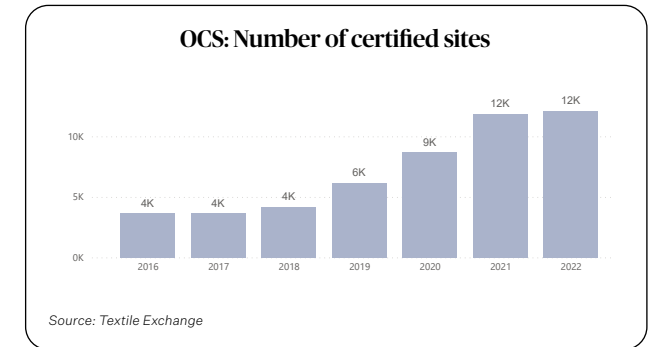
Content Claim Standard (CCS)

The Content Claim Standard (CCS) is the foundation of all Textile Exchange standards. It is a chain of custody standard that provides companies with a tool to verify that one or more specific input materials are in a finished product.

The CCS 3.1 was released in June 2022 and includes an updated certification eligibility section. More information can be found [here](#).

Its use as a foundational standard for the other Textile Exchange Standards (GRS, OCS, RCS, RDS, and RWS) has increased significantly, from 48,868 sites in 2021 to 60,321 in 2022.

The number of CCS-certified sites—where CCS is used as a standalone standard beyond Textile Exchange's portfolio of standards—decreased from 113 in 2021 to 81 in 2022.



Supply chain standards

Standards that can be used for multiple fiber types

The two leading standards for textiles made with recycled materials—the Recycled Claim Standard (RCS) and the Global Recycled Standard (GRS)—are growing too.

Recycled Claim Standard (RCS)

The Recycled Claim Standard (RCS) is an international, voluntary standard that sets requirements for the third-party certification of recycled input and chain of custody. The goal of the standard is to increase the use of recycled materials.

The RCS 2.0 has been in effect since July 2018. In a key update, it introduced the Reclaimed Materials Supplier Agreement, a document that provides more visibility into the suppliers of reclaimed materials.

The number of RCS-certified sites increased from 8,004 in 2021 to 10,139 in 2022.

Global Recycled Standard (GRS)

The GRS, which goes beyond the RCS, includes additional criteria for social and environmental processing requirements and chemical restrictions.

The GRS 4.0 was released in parallel to the updated RCS version and has been in effect since July 2018. A key change was the adoption of ZDHC's Manufacturing Restricted Substance List V1.1 (MRSL), which replaced GRS's previous Prohibited Substance List.

The number of GRS-certified sites increased significantly from 25,763 in 2021 to 34,178 in 2022.

In April 2021, Textile Exchange initiated the early phases of another revision of the GRS and RCS. Soon after, the review of GRS/RCS criteria was rolled into the development of the unified standard.¹ Read more [here](#).

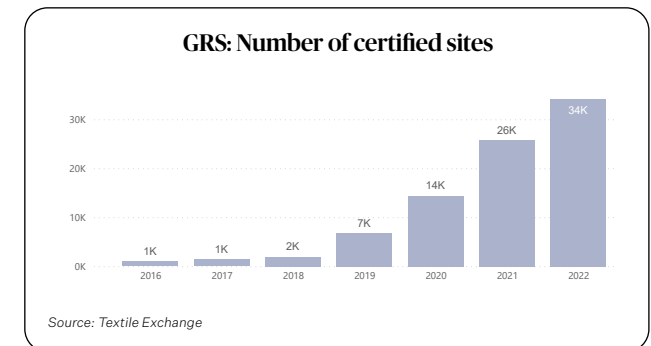
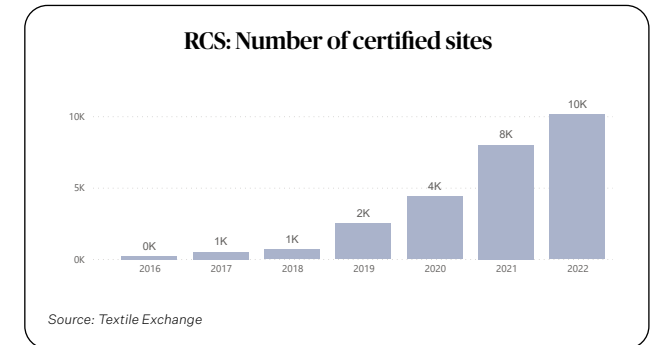
Towards a unified standard

In July 2021, Textile Exchange began a comprehensive revision of its standards framework with the intention of embedding its Climate+ strategy into a more unified standard system across its eight standards.¹ Textile Exchange anticipates that this unified standard system will be published in the beginning of 2024. To learn more about its progress, see [here](#).

Cradle to Cradle (C2C)

Cradle to Cradle Certified® is a globally recognized measure of safer, more sustainable products made for the circular economy.

The Cradle to Cradle Certified® Standard Version 4.0, released in March 2021, features new and enhanced requirements in all performance categories, including new frameworks for Product Circularity and Social Fairness that define global best practices, more rigorous requirements for clean air and climate protection that promote urgent action to address climate change, expanded requirements in water and soil stewardship to ensure clean water and healthy soils are available to people and all other organisms, and improved alignment with leading chemical regulations and other standards on material health requirements, including a new Restricted Substances List. Read more [here](#).



Policy updates

Influencing market developments

Government policy can significantly influence and impact market developments.

In particular, the European Union, through its EU Green Deal, is leading the development of a number of policy initiatives to drive more sustainable apparel and textile materials and products. Below is a non-exhaustive overview of some of the relevant EU policy initiatives Textile Exchange is monitoring.

EU Textiles Strategy

The [EU Strategy for Sustainable and Circular Textiles](#), published in March 2022, aims to create an overarching framework and vision for the transition of the textile sector, whereby: “By 2030 textile products placed on the EU market are long-lived and recyclable, to a great extent made of recycled fibres, free of hazardous substances and produced in respect of social rights and the environment. Consumers benefit longer from high quality affordable textiles, fast fashion is out of fashion, and economically profitable re-use and repair services are widely available. In a competitive, resilient and innovative textiles sector, producers take responsibility for their products along the value chain, including when they become waste. The circular textiles ecosystem is thriving, driven by sufficient capacities for innovative fibre-to-fibre recycling, while the incineration and landfilling of textiles is reduced to the minimum.”

The EU Textiles Strategy highlights the impacts on our sector of key pieces of legislation developed under the EU Circular Economy Action Plan. The following legislative proposals are considered by lawmakers and environmental experts to be cornerstones of the EU Textiles Strategy:

Empowering Consumers

The [Proposal for a Directive on empowering consumers for the green transition \(Empowering Consumers Directive\)](#), published in March 2022, aims to review two pieces of existing legislation: the Unfair Commercial Practices Directive (UCPD) and the Consumer Rights Directive.

The UCPD revision will increase the protection of consumers against “greenwashing” and early obsolescence by:

- Stopping misleading communication on environmental and social aspects, durability, and reparability.
- Banning generic and vague environmental claims.
- Banning voluntary sustainability labels not based on third-party verification schemes or established by public authorities.
- Restricting companies’ sustainability claims.
- The Consumer Rights Directive revision aims to provide consumers with more information on a product’s durability and reparability at the point of sale by harmonizing rules on pre-contractual information requirements, such as a commercial guarantee of durability and product reparability.

The final legislation is expected by the end of 2023, with an implementation deadline by 2025.

Green Claims

The [Proposal for a Directive on substantiation and communication of explicit environmental claims \(Green Claims Directive\)](#), published in March 2023, aims to ensure consumers receive reliable, comparable and verifiable environmental information. The proposal targets explicit environmental claims (text or label) that are made on a voluntary basis by businesses towards consumers. The Directive covers the environmental impacts, aspects or performance of a product, service or the company itself, defining a detailed process for environmental claims to be substantiated by scientific evidence and taking into account life cycle thinking, to be verified through accredited verifiers.

The EU Product Environmental Footprint (PEF) methodology (see more details below) remains an option to be assigned as a common methodology per each product category, with details to be defined under a delegated act. The EU PEF also defines new rules regarding the governance of environmental labeling schemes to ensure they are solid, transparent, and reliable.

It is important to note that the Ecodesign for Sustainable Products Regulation (ESPR) (see more details below) and the Empowering Consumers Directive will also define sustainability information requirements for the apparel and footwear industry. The ESPR information requirements will be mandatory for all companies, and the Empowering Consumers Directive will define the general framework for voluntary claims.

The final legislation is expected by the end of 2024, with an implementation deadline by 2026.

Policy updates

Influencing market developments

EU Apparel and Footwear Product Environmental Footprint Methodology

Developed by the Apparel and Footwear Technical Secretariat since 2019, the EU Product Environmental Footprint (PEF) methodology leverages a Life Cycle Assessment (LCA) approach, which is a scientifically validated methodology to measure environmental impacts. PEF considers all stages of a product's life cycle, from the extraction of raw materials to the production, transport, sale, use (taking into account the durability of the item), and end of life of the product. It evaluates 16 environmental indicators, including climate change, water, land use, and human health. The Apparel and Footwear PEF Category Rules (PEFCR) lay out 13 sub-categories of products for which PEF will apply.

The Technical Secretariat is investigating how microplastics will be added to the scope of the impact categories under the Apparel and Footwear PEFCRs, including extending the scope to fiber fragments at large, not only microplastics. Other impacts are also under consideration as conditions for other product categories, including biodiversity for food and agricultural products. Should our industry want to see biodiversity included as a condition for the Apparel and Footwear PEF, further engagement with policymakers will be needed.

The Apparel and Footwear PEF methodology could also be referred to by the delegated act focusing on textiles under the ESPR.

The final methodology is expected by end of 2024.

Revision of the Textile Labelling Regulation

Implemented for the first time in 2011, the EU Textile Labelling Regulation (TLR) established the textile fiber classification system and regulated what information needs to be provided on textile labels. In March 2022, the EU Commission's Textile Strategy announced the need to revise the TLR, updating it to include new textile fibers and additional information requirements for brands. The Commission's TLR proposal will be published in Q4 2024.

Besides new labelling requirements, the EU Commission is planning to revise the procedure for classifying new fibers, making it more accurate and transparent. The Commission is also considering adding a leather/fur authenticity label, which would harmonize leather-related rules across the EU Member States and could include information such as animal species and deforestation aspects. The new requirements will likely start applying from 2026/2027.

Ecodesign for Sustainable Products Regulation

Published in March 2022, the Ecodesign for Sustainable Products Regulation (ESPR) aims at making sustainable products the norm in the EU by setting mandatory product design and information requirements. Within the ESPR, nearly all physical goods could potentially be required to comply with design requirements related to:

- Durability, recyclability, reusability, upgradability and reparability of the product, as well as its recycled content;
- Energy and resource use and efficiency of the product, based on a life cycle assessment;

- Carbon and environmental footprints, based on a life cycle assessment; and,
- The presence of substances of concern in the product which could limit its circularity.

The ESPR requires certain products to have a Digital Product Passport (DPP), through which consumers, authorities and other operators can access specific information on the product, possibly including its environmental performance. It also requires operators to disclose the amount of their unsold products and empowers EU authorities to ban their destruction.

Final legislation is expected to be adopted in Q1 2024. Specific ecodesign requirements for textile products are expected to be adopted in summer 2025, with an implementation deadline by 2027.

Textile Exchange is also monitoring several relevant policy initiatives in the United States, including:

- The forthcoming revision of the Federal Trade Commission Green Guides, designed to help marketers avoid making environmental claims that mislead consumers;
- The New York Fashion Act, re-introduced in the New York State Senate in February 2023, which would, among other provisions, require fashion and apparel sellers to be accountable to standardized environmental and social due diligence policies; and,
- The reauthorization of the Farm Bill, which could have implications for efforts to scale regenerative, organic, and "climate-smart" agriculture in the United States.

Methodology & Disclaimer

Methodology

Key information shared in the report

The Materials Market Report contains 1) global production volumes of various fibers and materials, and 2) program-specific data such as the number of certified sites or production volumes per program.

Textile Exchange has collected, analyzed, and compiled all this information in all good conscience and cross-checked the data and information wherever possible. A guarantee for all the information is not given. This report is intended for general guidance and information purposes only. It is not the report's intention to be used or considered as advice or recommendation in any direction.

1. Global production volumes*

The compilation of global market data is challenging. The collection of primary data from the suppliers is beyond what is possible within the scope of this report, so we rely on secondary data from industry associations, international organizations, governmental organizations, standard setters, and research institutes. We do our best to provide an accurate and reliable picture of the market, but data gaps and inconsistencies are very common for global market data and modelling has to be applied for some data. Specific data sources are directly mentioned on the pages.

a) Data quality checks and triangulation

Textile Exchange tried to identify the most reliable sources for each fiber category and conducted triangulations with at least 2 to 3 sources wherever possible. In general, all global market data are rounded estimates.

b) Production volume scope

The production data in this report cover the total amount of fibers produced. The report does not differentiate between different usages and is thus not specific to the apparel industry. The fibers may be used for apparel, home textiles, technical textiles, or any other application.

Minority fibers such as PLA, PTT, protein fibers are not included.

c) Definition of fiber and materials

Fiber includes staple fiber and filament. All numbers reported on manmade cellulose and synthetics include staple fiber and filament production volumes. Materials include fibers and non-fibrous materials such as leather and rubber.

d) Allocation of years

Textile Exchange reports data based on calendar year. Some data sources collect data on a seasonal basis. The cotton production volumes are collected in ICAC harvest years starting from August 1 and ending on July 31, and could thus be allocated to the calendar years in different ways. This report allocates the ICAC year which ends in a calendar year to the respective calendar year (e.g. 2021/22 cotton production volumes to the 2022 calendar year). ITWO applies the same approach for wool production data in several countries (e.g. 2021/22 wool production volumes are allocated to the 2022 calendar year).

e) Modelling

To close data gaps, modeling as well as assumptions and inference have been used (e.g. applying country average yields instead of program-specific yields).

f) Fiber specific methodology

Organic cotton data: For a detailed description of the methodology behind the organic cotton production volumes, please see our [Organic Cotton Market Report 2022](#). Since organic cotton data for 2021/22 were not available in time for the release of this report, we used the 2020/21 data as proxy for 2021/22.

Recycled cotton, wool, down: As ICAC's cotton data, IWTO's wool data, and Maia Research's down data refer to virgin production volumes, the recycled cotton, wool, and down production volumes were added on top. The total cotton, wool, and down production volumes is thus higher than the volumes reported by ICAC, IWTO, and Maia Research.

Recycled manmade fibers: The total synthetic fiber production volumes reported by Maia Research, CIRFS, and IVC, in contrast, include the recycled share. Recycled manmade cellulosic fibers are also assumed to be included in the total manmade cellulosic fiber production as reported by Maia Research, CIRFS, and IVC.

Methodology

2. Program specific data

The program-specific data such as the number of certified sites per standard or production volumes are based on information collected from the programs and initiatives. In selected cases, the estimates are based on publicly available information (e.g. FSC/PEFC-certified MMCFs).

Methodological changes, data revision, and comparison to previous years

Textile Exchange continuously improves its data collection and analysis. Some data reported in previous years has been revised or updated since the actual data has become available for initial estimates, or the methodology has been improved. A simple comparison between previously reported numbers and data reported in this year does not show the actual change over time but is caused by these reasons. The latest data for the reporting period and previous years is always published in the latest report.

Key revisions from the 2022 to 2023 report

The following methodological changes were applied in the 2022 version:

- Updated ICAC cotton statistics were applied, including revision of the data of a couple of previous years.
- Updated organic cotton statistics were included, including updated data for previous years.
- Updated FAO statistics for other plant-based fibers, rubber, and leather were applied.
- Updated figures for the production volume of synthetics (including recycled polyester), MMCFs, and down were applied.

- Updated figures were applied for SFA, including revision of historical data.
- The latest figures for the number of certified sites per standard were applied, including updates for previous years.
- Updated data for GOTS

This means that the following data reported in the 2023 report slightly differ compared to previous versions:

- Global fiber production volumes.
- Cotton production volumes.
- Global plant-based fiber production volumes.
- Global synthetics (incl. recycled polyester), MMCFs, and down production volumes.
- Number of certified sites for several standards.



Photo: Gretchen Seelenbinder Samuel

Report scope: Beyond apparel

Fiber and materials are used for a broad range of applications. This report covers the overall fiber and materials production independent of their usages. The fibers and materials may be used for apparel, home textiles, technical textiles, or any other application.

Textile Exchange has conducted a desk research and stakeholder consultation to estimate the percentages of the global fiber and materials volumes by application. While solid figures do not exist on a global level, the graphic on the right side is meant to visualize the rough average percentage estimates by application for the different fibers and materials. The main purpose of the graph is to show that the percentages used for apparel vary by fiber and material and that only parts of all fibers and materials produced and covered in this report are used by the apparel and home textile industry.

Please note that the percentages keep changing over time and that huge regional differences exist as well.

Cotton is mainly used for apparel accounting for around 60-70% of the total cotton fiber production. Around 20-30% of all cotton is used for home textiles, and about 10% for other products.

Wool is also mainly used for apparel accounting for around 60-70% of the total sheep wool. Approximately 30-40% of all sheep wool is used for home textiles and the remaining part for other applications.

Other animal fibers such as cashmere, mohair, alpaca, and silk are predominantly used for apparel.

Around 60-80% of **down and feathers** are used for home textiles such as bedding and pillows. A smaller percentage is used for apparel.

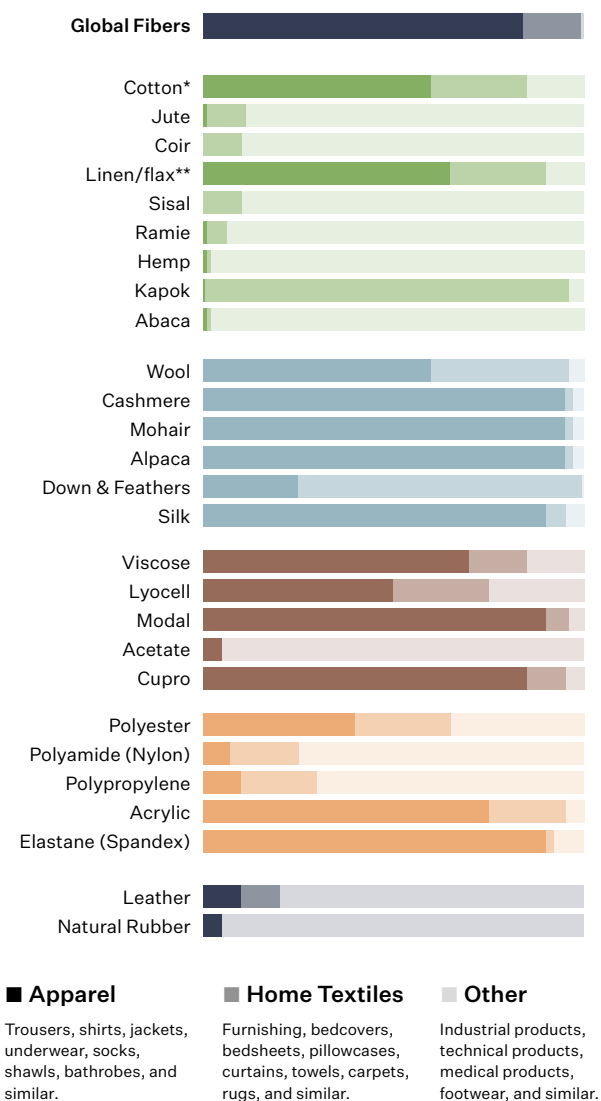
Around 30-60% of **polyester** fibers are used for apparel, 20-35% are used for home textiles, and the remaining part for various other applications.

Polyamide fibers are used in various applications. The percentage estimates range widely from less than 10% to more than 50% of the global polyamide fiber production being used for apparel. A significant share of polyamide fibers is used for home textiles such as carpets as well as technical and industrial applications.

Manmade celluloses such as viscose, lyocell, modal, and cupro are mainly used for apparel with around 50-80% of their production. An exception is acetate fibers, used primarily for cigarette filters, and only a small percentage (about 5%) is used for apparel.

Leather is mainly used for footwear with around 40-50% of its production. Around 5-10% are used for apparel, 10-15% for home textiles, and the remaining part for other applications such as leather goods (bags), the automotive industry or other products.

Natural rubber is mainly used for tires with around 65-70% of its production. Only a small percentage is used for apparel.



Acknowledgements

Acknowledgements

We would like to extend our sincere gratitude to all that have contributed data and expertise to this report. Without this valuable cooperation and support, this report would not have been possible. Textile Exchange discontinued disclosing the names of specific companies as well as the report production team for data protection and privacy reasons. Data sources deemed to be public are listed on the specific pages. Please see the [methodology](#) section for further information.



Photo: Geronimo Giqueaux