



Preferred Fiber & Materials Market Report 2021



Welcome

First, the good news: The preferred fiber and materials market is growing. The report shows the expansion of recycled polyester, preferred cotton, responsible mohair, preferred cashmere, certified rubber forests, and more. Upon Textile Exchange's release of the Responsible Mohair Standard in 2020, almost 30 percent of all mohair became certified within the year!

Indeed, 2020 saw an impressive 75 percent increase in the number of facilities (~30,000) around the world becoming certified to our [portfolio of standards](#) compared to the previous year!

We celebrate this growth. It's taken a lot of learning and collaborating to get to this point. But even with this growth, preferred fibers still only represent less than one fifth of the global fiber market. That's not enough. Not in 2021. Not with climate at the brink of major change.

Global fiber production has almost doubled in the last 20 years, increasing from 58 million tonnes in 2000 to 109 million tonnes in 2020, and is expected to increase another 34 percent in the next 10 years.

As the industry builds back post-pandemic business, production and use of preferred fibers must be a non-negotiable decision. Overall, less than 0.5 percent of the global fiber market was from pre- and post-consumer textiles in 2020. We can, and must, do better!

Textile Exchange recognizes the urgency of climate action and in 2020 announced a [Climate+ strategy](#) calling on textile brands and the supply chain network to reduce greenhouse gas (GHG) emissions by 45 percent by 2030 in the pre-spinning phase of textile fiber and materials production, while also addressing other impact areas interconnected with climate such as water, biodiversity, and soil health.

There isn't time for the textile industry to pretend it can continue to go down the same path it has been on. In fact, the greater the growth of the conventional fiber and materials market, the greater the challenge to address GHG emissions reductions will be.

Instead, courageous, ambitious, decisive, and innovative action have to guide us in the next nine years that are so decisive for the future of our planet and all life on earth. This report highlights inspiring examples, and we urge you to add more of your own stories in the years to come.

Together we are making a difference.



La Rhea Pepper
CEO,
Textile Exchange

Thank you

The production of this report is only possible thanks to each and every one who has taken the time to share data, expertise, updates, insights, and photos for this report. Please take time to look at the full list of acknowledgments at the end of this report. Thank you all for your continued and valuable co-operation.

Finally, and most importantly, thank you to all those working to create material change through preferred fibers and materials. From the secondary raw material collectors and farmers to the material producers and processors, certifiers, NGOs, brands, retailers, and users - **THANK YOU** for your dedication and contribution to the industry growth that we are now seeing.



We also want to thank Textile Exchange members for their continued support and leadership.

Together, we can collectively accomplish what no individual or company can do alone.

Look out for this icon  throughout this report to read insights from Textile Exchange members.

Visit our [website](#) to learn more about how Textile Exchange membership can benefit you.

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Executive Summary

State of the preferred fiber and materials production

The Global Fiber Market

Global fiber production, hit by the COVID-19 pandemic, decreased from 111 million tonnes in 2019 to 109 million tonnes in 2020 after years of growth.

While the overall fiber production declined in 2020, the market share of preferred fiber and materials is increasing. But even with this growth, preferred fibers still only represent less than one-fifth of the global fiber market. This number includes - in descending order - recycled polyester (8.4 million tonnes), preferred cotton as defined by a list of recognized standards (7.8 million tonnes), FSC/PEFC certified manmade cellulosic fibers (~3.9 million tonnes) and other recycled and biobased fibers produced according to recognized standards (0.57 million tonnes).

The market share of recycled fibers increased from 6.9 percent in 2016 to 8.1 percent in 2020 - with the majority (7.6 percent) coming from recycled PET bottles - and only a minor part (0.5 percent) from other recycled feedstock.

Overall, less than 0.5 percent of the global fiber market was from pre- and post-consumer recycled textiles in 2020.

The increase of the preferred fibers market should not make us forget that the overall fiber and materials market continues to grow and with this also its overall impacts.

The global fiber production has almost doubled in the last 20 years from 58 million tonnes in 2000 to 109 million tonnes in 2020. While it is not yet clear how the pandemic and other factors will impact future development, global fiber production is expected to increase by another 34 percent to 146 million tonnes in 2030 if the industry will build back business as usual. **In absolute numbers, virgin fossil-based fibers also increased from 55.7 million tonnes in 2016 to 59.7 million tonnes in 2020.**



Cotton

While the overall cotton production remained relatively stable over the last few years with a production volume of 26.2 million tonnes in 2020 (i.e., the 2019/20 ICAC harvest year), the market share of preferred cotton increased from 24 percent in 2018/19 to 30 percent in 2019/20. Yet, to grow the market share of preferred cotton to 50 percent by 2025 requires further acceleration of the preferred cotton market. Also, continuous improvement in terms of the impacts of all cotton grown is needed.



Polyester

With a production volume of 57 million tonnes, polyester was the most used fiber accounting for 52 percent of the global fiber market in 2020. **The market share of recycled polyester increased from 13.7 percent in 2019 to 14.7 percent in 2020.** Due to the low prices of fossil-based polyester, the recycled polyester market has been growing slowly in the past years. The new 2025 Recycled Polyester Challenge was launched in 2021 by Textile Exchange and the UN Fashion Industry Charter for Climate Action to accelerate the recycled polyester market. By July 2021, over 100 brands and suppliers (including subsidiaries) have signed the challenge and committed to jointly increasing the share of recycled polyester to 45 percent by 2025. Due to increasing competition for reclaimed plastic bottles from the packaging and plastics industry, systems for textile-to-textile recycling are in development but most recycled polyester is currently still made from plastic bottles. The interest in and use of ocean or ocean-bound plastic is also increasing.

The market share of biobased polyester fiber remained very low at around 0.03 percent of the polyester fiber market. Key reasons are prices, availability, and also questions around the sustainability of biobased polyester.



Polyamide (Nylon)

Polyamide had a market share of 5 percent of the global fiber market in 2020. **Due to technical challenges and low prices for fossil-based polyamide, the market share of recycled polyamide is only 1.94 percent of all polyamide fiber.** As the second-most used synthetic fiber, polyamide offers significant impact potentials by transitioning to recycled and biobased polyamide. Most recycled polyamide is currently made from pre-consumer waste, some also from discarded fishing nets. Increasing the use of post-consumer textiles is needed.

The market share of biobased polyamide fibers in 2020 remained low at around 0.4 percent of the global polyamide fiber market. Similar to the reasons for the low uptake of biobased polyester, prices, availability, and also questions around the sustainability of biobased polyamide counteracted the increase of the market.



Manmade Cellulosics

Production of manmade cellulosic fibers (MMCFs) decreased to 6.5 million tonnes in 2020 due to COVID-19. While the overall production volume of MMCFs decreased, the market share of preferred MMCFs increased. **The market share of FSC and/or PEFC certified MMCFs increased to around 55-60 percent of all MMCFs in 2020⁽¹⁾.** First MMCF textile products with consumer-facing FSC labels hit the market in 2020. **While this is a significant achievement, eliminating the risk of sourcing MMCFs from ancient and endangered forests such as the carbon-rich peatlands of Indonesia and old-growth boreal forests of Canada should be the minimum bar for all MMCFs.**

The market share of “recycled MMCFs” is estimated at around 0.4 percent. However, a lot of research and development is ongoing, so it is expected to increase significantly in the following years. With new standards such as bluesign® and ZDHC introduced for the pulp and fiber level, action is also likely to accelerate on the pulp and fiber level.

Executive Summary

State of the preferred fiber and materials production



Wool

Global wool fiber production was around 1 million tonnes in 2020. Conventional wool dominates the wool market but the market for non-mulesing and preferred wool programs is increasing. **The Responsible Wool Standard (RWS) market share increased to 1.25 percent in 2020 on a global average. In its initial focus countries, the market shares were as high as 25 percent in South Africa, 11 percent in Uruguay, and 9 percent in Argentina.** Transitioning to wool programs with both animal welfare and responsible land use criteria in place offers the potential to create positive impacts on animal welfare, land use, and biodiversity.

Recycled wool had a market share of around 6 percent of the global total wool market.

Mohair

Global mohair fiber production in 2020 was around 4,320 tonnes of greasy fibers. **The Responsible Mohair Standard (RMS), covering both animal welfare and responsible land use criteria, was launched in March 2020. Its market share jumped from 0 to 27 percent of all mohair produced worldwide in its first year of existence.** In South Africa, it even increased to 51 percent in 2020.

Alpaca

The global alpaca fiber production was around 6,000 tonnes in 2020. **In April 2021, the Responsible Alpaca Standard (RAS) was launched with animal welfare and responsible land use criteria.** First RAS certified alpaca is expected to hit the market soon.

Cashmere

Global cashmere production was around 25,208 tonnes of greasy fibers in 2020. About 60 percent of the cashmere was produced in China, 20 percent in Mongolia, and the remaining 20 percent in other countries. **The market share of preferred cashmere programs increased from 0.8 percent in 2019 to around 7 percent of all cashmere produced worldwide in 2020.** More information on the programs is included in the cashmere chapter.



Down

Global down production volume was estimated at around 0.5 million tonnes in 2020. **Awareness of animal welfare issues has led to successful growth in the use of standards such as the Responsible Down Standard (RDS) with a market share of 3 percent and Downpass with a market share of around 1.1 percent of the total down market.** While influencing at the farm level is challenging, the use of preferred down standards helps to reduce the risks along the supply chain.

Other fibers

Other fibers - from hemp to elastane - are often not in the focus of the industry's attention despite significant sustainability potentials and challenges. The report highlights a few innovative examples.

The Global Non-Fibrous Materials Market



Leather

Leather - measured in terms of fresh hides of cattle, sheep, goat, and buffalo, had a global production volume of around 12.5 million tonnes in 2020. **Until recently, leather processing risks (tanning, chemical use) have been the main focus, but there is a growing interest in animal welfare, deforestation, land use (and associated biodiversity loss), and climate change issues.** Textile Exchange has developed the Leather Impact Accelerator (LIA) to speed up positive actions along the full beef/leather value chain. The market share of Leather Working Group (LWG) leather increased from 19 percent of the global total finished leather production in 2019 to 22 percent in 2020.

Rubber

The global natural rubber production was around 14.6 million tonnes in 2020. Natural rubber had a market share of around 50 percent of the global total 29.05 million tonnes rubber market in 2020. Synthetic rubber accounted with 14.4 million tonnes for the other 50 percent of the global rubber market in 2020. **In 2020, FSC and PEFC certified rubber was introduced and reached a market share of 2.27 percent.**

The number of certified sites

The number of sites certified to Textile Exchange's portfolio of standards increased to around~30,000 in 2020 which equals a 75 percent increase in one year. 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).

Member Spotlights and Insider Series

Member Spotlights

We invited select members to share inspiring insights into their work with us. You can find the links to the interviews with these fiber and material suppliers below. Read the complete compilation of Member Spotlights [here](#).



Cherie Tan

VP Sustainability and Communications,
Asia Pacific Rayon

[Link to interview](#)



Mukul Agrawal

President & Chief Sustainability Officer,
Birla Cellulose

[Link to interview](#)



Federico Paullier

Managing Director,
Chargeurs Luxury Materials

[Link to interview](#)



Walter Bridgham

Senior Business Development Manager,
Lenzing

[Link to interview](#)



Krellyne Andrew

General Manager
Sustainability Dissolving Pulp,
Sappi

[Link to interview](#)



Dr Wu Xiaodong

Technical Deputy General Manager,
Sateri

[Link to interview](#)



**Ramakrishnan Sabhari
Girish**

CEO,
Sulochana Cotton Spinning
Mills Pvt. Ltd.

[Link to interview](#)



**Thanks to all our
Members and friends
for their support!**

Visit our [Membership website](#) to
learn how to become a Textile
Exchange Member.

Insider Series

We invited key stakeholders to share inspiring insights into their work with us. You can find the links to the interviews with these suppliers and other stakeholders that recently submitted an Insider Series story below. Read the complete compilation of Insider Series stories [here](#).

Shikha Shah

Founder and CEO,
AltMat

[Link to interview](#)

MeiLin Wan

Vice President Textiles,
Applied DNA Sciences

[Link to interview](#)

Giusy Bettoni

CEO and Founder,
C.L.A.S.S. Eco Hub

[Link to interview](#)

Laura Vinha

Communications Director,
Infinited Fiber

[Link to interview](#)

Alissa Baier-Lentz

Co-Founder and COO,
Kintra

[Link to interview](#)

Marion Mollenhauer

Sales and Marketing Europe,
Mantis World

[Link to interview](#)

Dave Maslen

GM Markets and Sustainability,
The New Zealand Merino
Company*

[Link to interview](#)

Helene Smits

Chief Sustainability Officer,
Recover

[Link to interview](#)

Tom Tymon

Partner,
Sustainable Composites

[Link to interview](#)

Takehiro Sugiyama

Sustainable Team Manager,
Takiho

[Link to interview](#)

Meredith Boyd

Sr. Vice President, Innovation
and Technology,
Unifi

[Link to interview](#)

Julie Stein

Executive Director and Co-
founder
Wildlife Friendly Enterprise
Network

[Link to interview](#)

The Global Fiber Market

The Global Fiber Market⁽¹⁾

The big picture

The global fiber production, hit by the COVID-19 pandemic, decreased from 111 million tonnes in 2019 to 109 million tonnes in 2020 after years of growth. Compared to significant downturns in the global apparel retail market, this is a relatively minor decline. Reasons include that the cotton season was already in full swing when the pandemic started, that lower sales in the apparel market were partly compensated by higher sales in other segments such as medical and hygiene textiles and home textiles, and that the production volumes in China continued to be very high all in all.

Fiber production has almost doubled in the last 20 years from 58 million tonnes in 2010 to 109 million tonnes in 2020. While it is not yet clear how the pandemic and other factors will impact future development, it is expected to increase by another 34 percent to 146 million tonnes in 2030 if the industry will build back business as usual.

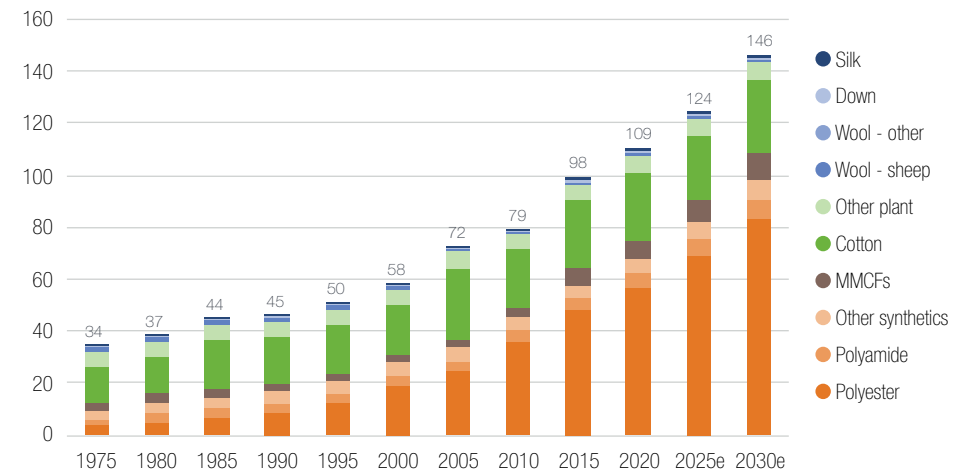
The global fiber production per person increased from 8.4 kilograms per person in 1975 to 14 kilograms per person in 2020⁽²⁾.

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

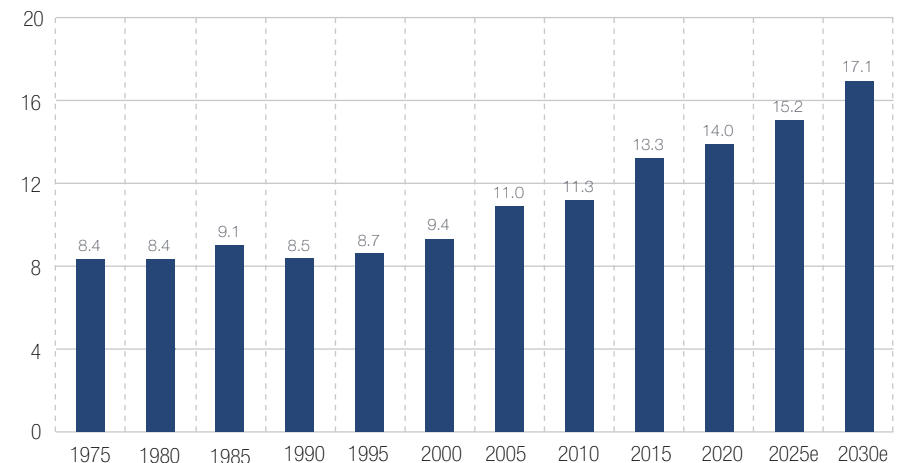
(1) Textile Exchange compilation based on data from ICAC, FAO, IWTO, Mohair South Africa, inserco, CIRFS, IVC, maia research, and its own modelling. Volumes of certain minority fibers such as PTT, carbon, aramid, PLA, PBS, and PEF are not included. The year 2020 includes estimates for the cotton production of the ICAC harvest year 2019/20 (see the chapter on [data revisions](#)). 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, 2020 - World Population Prospects 2019. [Link*](#) and volume data as specified in (1).

GLOBAL FIBER PRODUCTION
IN MILLION TONNES



GLOBAL FIBER PRODUCTION
IN KILOGRAMS PER PERSON



The Global Fiber Market ⁽¹⁾

The big picture

Synthetic fibers have dominated the fiber market since the mid-1990s, when they overtook cotton volumes. With around 68 million tonnes of synthetic fibers, this fiber category made up approximately 62 percent of the global fiber production in 2020. More [here](#).

Polyester alone had a market share of around 52 percent of total global fiber production. Approximately 57 million tonnes of polyester were produced in 2020. More [here](#).

Polyamide, the second most used synthetic fiber, accounted for 5.4 million tonnes and approximately 5 percent of the global fiber market in 2020. More [here](#).

The other synthetics, polypropylene, acrylics, and elastane, had a market share of 5.2 percent, with a combined production volume of 5.7 million tonnes in 2020.

Plant fibers had a market share of around 30 percent of the global fiber market in 2020.

Cotton is the second most important fiber in terms of volume. With about 26 million tonnes, it had a market share of approximately 24 percent of global fiber production in 2020. More [here](#).

Other plant-based fibers, including jute, linen, hemp, and others, had a market share of about 6 percent. More [here](#).

An increasingly important fiber category is **manmade cellulosics fibers (MMCFs)**, with a global production volume of around 6.5 million tonnes and a market share of around 6 percent in 2020. More [here](#).

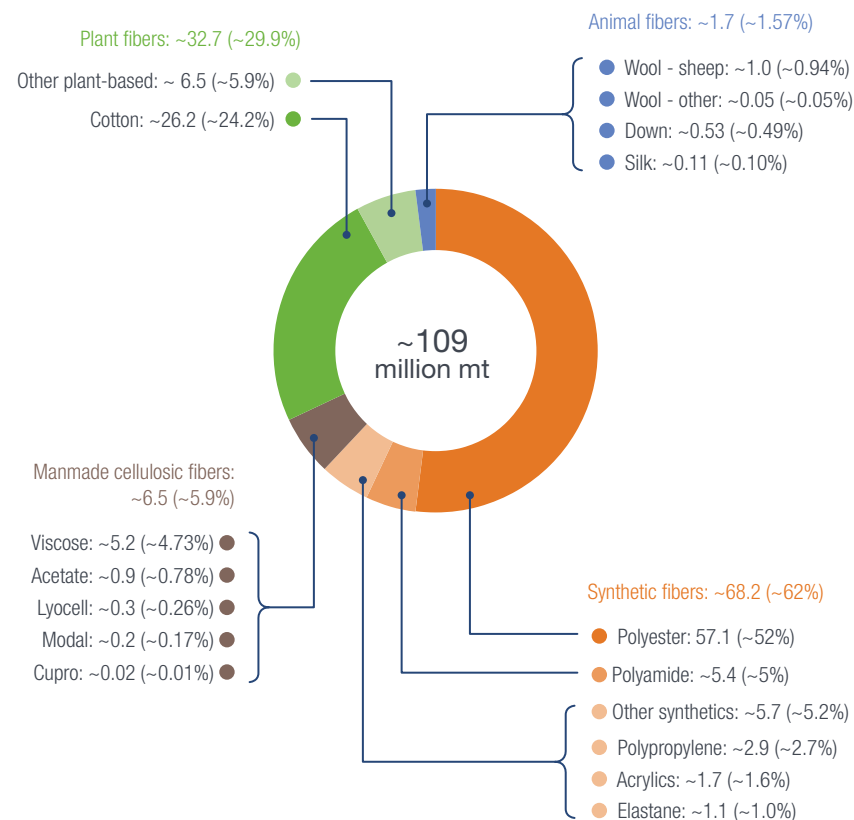
Animal fibers had a market share of 1.57 percent in 2020.

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

Down had market shares of around 0.5 percent of the global fiber market. More [here](#).

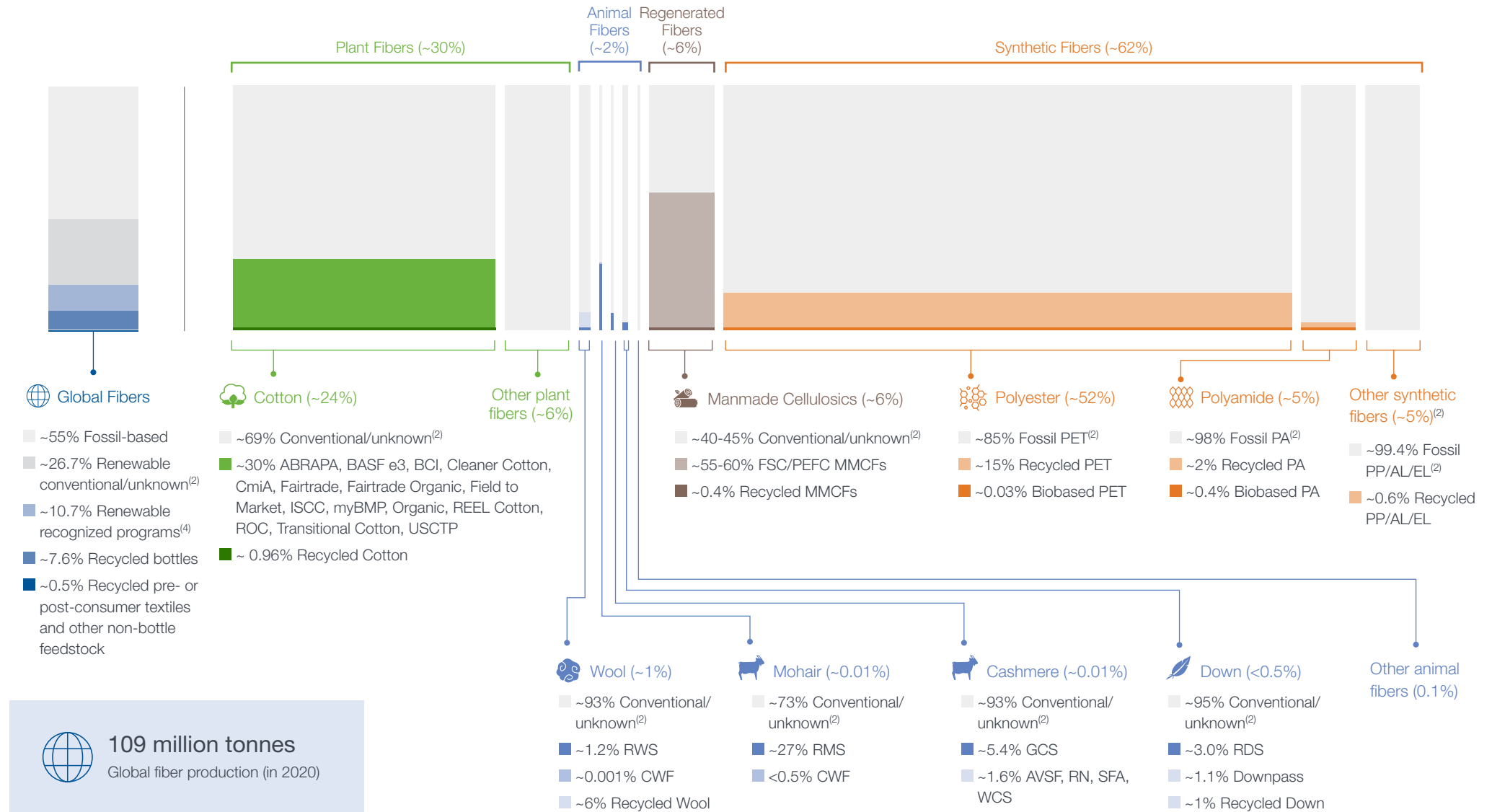
Silk had market shares of around 0.1 percent. More [here](#).

GLOBAL FIBER PRODUCTION IN 2020
IN MILLION TONNES (+%)



(1) Textile Exchange compilation based on data from ICAC, FAO, WTO, Mohair South Africa, inserco, CIRFS, IVC, maia research, and own modelling. Volumes of certain minority fibers such as PTT, carbon, aramid, PLA, PBS, and PEF are not included. The year 2020 includes estimates for the cotton production of the ICAC harvest year 2019/20 (see the chapter on [data revisions](#)). 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 that are often not included in other global statistics - and due to different ICAC cotton year allocations. In general, all global figures are estimates.

The Global Preferred Fiber Market 2020 ⁽¹⁾



(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 preferred or potentially preferred but unassessed programs for which data are not accessible or available.

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

(4) Renewable recognized programs include here all the recognized programs listed in this graph apart from the recycled fibers.

Plant Fibers & Materials



Cotton

Photo: Farmer Association For Rural Management (FARM), India

Virgin Cotton

Global preferred cotton production⁽¹⁾

The market share of preferred cotton increased from 24 percent of the total cotton production in 2018/19 to 30 percent in 2019/20^(1,2).

This growth equals an increase in global production volume of preferred cotton from 6.4 million tonnes in 2018/19 to 7.8 million tonnes in 2019/20⁽²⁾.

Preferred virgin cotton includes ABRAPA, BASF e3, Better Cotton Initiative (BCI), Cleaner Cotton, Cotton made in Africa (CmiA), Fairtrade, Fairtrade Organic, Field to Market, In-Conversion Cotton (Transitional in USA), ISCC, myBMP, Organic, REEL Cotton, Regenerative Organic Certified (ROC), and the United States Cotton Trust Protocol (USCTP). The preferred cotton options included here align with all virgin cotton options included in the 2025 Sustainable Cotton Challenge (see more on page "[Commitments to Preferred Cotton](#)")⁽¹⁾.

Preferred cotton initiatives exist within a continuum, and Textile Exchange sees regenerative organic cotton production systems operating under Fairtrade principles

as the "gold standard." To learn more about the specific programs, check out the Textile Exchange [Sustainable Cotton Matrix](#).

All BCI cotton, including its equivalents ABRAPA, CmiA and myBMP, made up around 23.64 percent of all cotton in 2019/20 and thus, the large majority of the 30 percent of preferred cotton in 2019/20. The BCI Standard, without equivalents, accounted for around 12 percent, the ABRAPA for around 11 percent, CmiA for around 2 percent, and MyBMP for below 1 percent of all cotton in 2019/20. BCI aims to increase its market share including equivalents to 30 percent of the global cotton production by 2020 (i.e. 2020/21 season).

All other cotton programs together, including BASF e3, Cleaner Cotton, Fairtrade, Field to Market, ISCC, Organic⁽³⁾, REEL cotton, and the USCTP, had a combined market share of around 5 percent of all cotton in 2019/20.

(1) The recognized programs for virgin cotton include ABRAPA, BASF e3, Better Cotton Initiative (BCI), Cleaner Cotton, Cotton made in Africa (CmiA), Fairtrade, Fairtrade Organic, Field to Market, In-Conversion Cotton (Transitional in USA), ISCC, myBMP, Organic, REEL Cotton, Regenerative Organic Certified (ROC), and the U.S. Cotton Trust Protocol (USCTP). 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. They also do not yet contain any data for In-Conversion Cotton (no global data available). QAI's Certified Transitional Cotton production has not yet started in 2019/20.

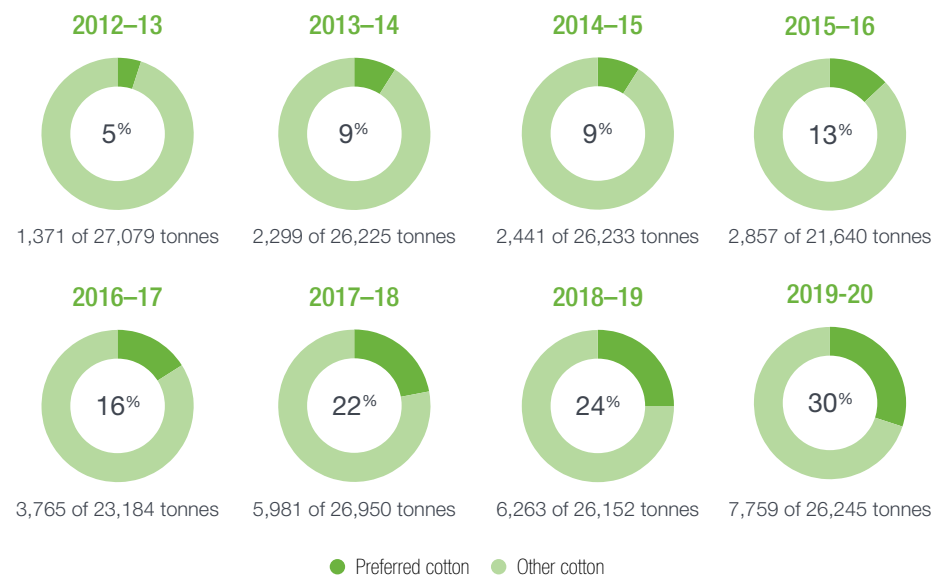
(2) Textile Exchange based on "ICAC, 2021 - World Cotton Statistics May 2021" for the total virgin cotton production volumes and standard owner data received by mail. Overlaps of standards excluded.

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

(4) The BCI equivalency as reported by BCI. It slightly differs from the aggregate of the data provided by the individual initiatives because minor parts of their volumes are not accounted as BCI equivalency and due to somewhat differing data collection and reporting methodology.

PREFERRED COTTON FIBER PRODUCTION^(1,2)

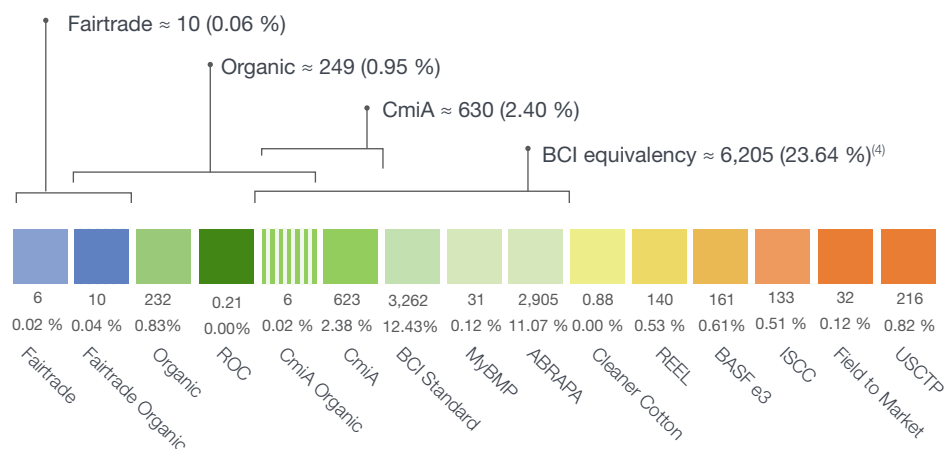
in percent of total cotton and ,000 tonnes



PREFERRED COTTON FIBER PRODUCTION IN 2019-20^(1,2)

7.8 million MT

in ,000 tonnes and percent of total cotton



Virgin Cotton

A closer look at the preferred virgin cottons⁽¹⁾

[ABRAPA's Responsible Brazilian Cotton/ Algodão Brasileiro Responsável \(ABR\)](#) production increased from 2.2 million tonnes in 2018/19 to around 2.9 million tonnes in 2019/20. This volume equaled a market share of 11 percent of all cotton grown in 2019/20. Approximately 80 percent of all ABRAPA cotton was accounted for as BCI in 2019/20.

The [BASF e3](#) cotton production increased from 22,852 tonnes in 2018/19 to 160,754 tonnes in 2019/20 equaling 3.4 percent of all USA and 0.61 percent of all cotton produced worldwide in 2019/20.

[Better Cotton Initiative \(BCI\)](#) cotton production, including equivalents, increased from around 5.6 million tonnes in 2018/19 to 6.2 million tonnes in 2019/20. The BCI Standard made up around 53 percent of all BCI cotton produced in 2019/20. The remaining 47 percent of BCI cotton was produced according to the BCI equivalents ABRAPA, Cotton made in Africa, and myBMP. BCI, including equivalents, represented around 24 percent of all cotton production in 2019/20⁽²⁾.

[Cleaner Cotton](#) production was around 878 tonnes in 2019/20. This equaled 0.003 percent of all cotton produced in 2019/20. In March 2020, the funding for the regular farm program ended. However, the formerly

enrolled growers continue to produce cotton according to previously established practices without the project's support. Educational work, such as the annual cotton farm tours, will be continued, and Cleaner Cotton™ fiber will still be available upon request.

[Cotton made in Africa \(CmiA\)](#) production increased from 593,067 tonnes in 2018/19 to 629,789 tonnes in 2019/20. This equaled 2.4 percent of all cotton produced in 2019/20 and around 36 percent of all cotton production in Africa in 2019/20. Almost all (92 percent) of the CmiA produced in 2019/20 was also accounted for as BCI equivalent. With 6,297 tonnes, nearly half of the CmiA cotton produced in Tanzania was also certified organic.

[Fairtrade](#) cotton production reached 16,150 tonnes in 2019/20, equaling 0.06 percent of all cotton produced in 2019/20⁽³⁾.

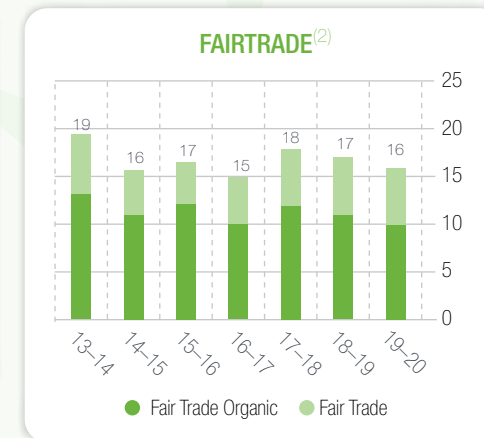
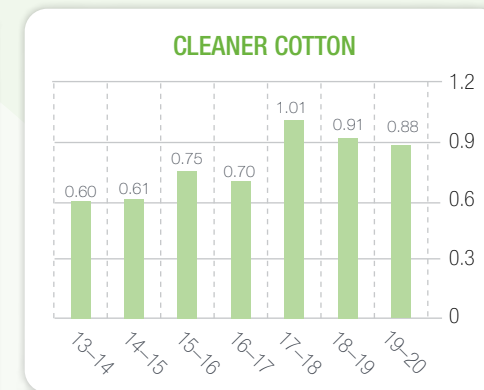
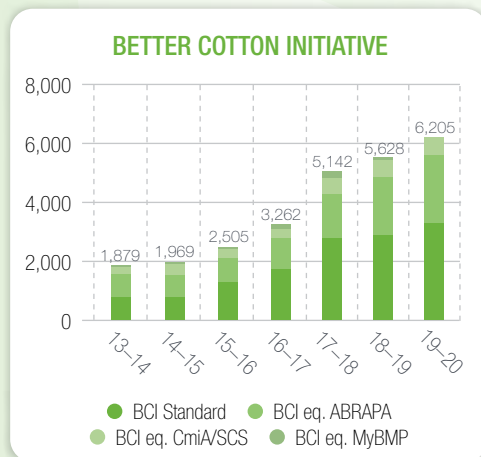
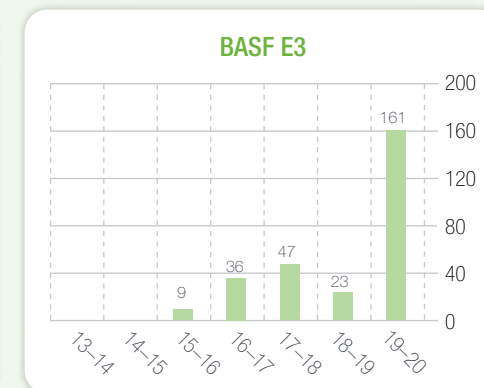
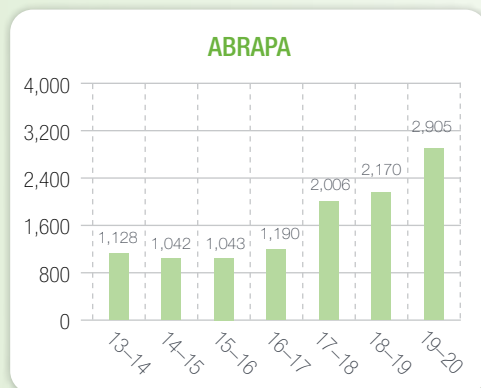
Fairtrade Organic cotton production, i.e. the production of cotton that is certified to both, Fairtrade and an organic standard, was around 10,497 tonnes in 2019/20. Approximately 65 percent of all Fairtrade cotton in 2019/20 was also certified to an organic standard⁽²⁾.

(1) The data are 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.

(2) In March 2020, BCI suspended its assurance program in the Xinjiang Uyghur Autonomous Region (XUAR) of China. Later in October, it ceased all field-level activities including capacity building and data monitoring and reporting. The data in this report refers to the 2019/20 ICAC harvest season and was thus not yet influenced by the suspension. The BCI volumes for 2020/21 are expected to be lower due to the suspension.

(3) The allocation of Fairtrade cotton data, collected by calendar year, to ICAC harvest year has been adjusted. More details in the chapter on [Data Revisions](#).

The production volume of preferred cotton is growing (in '000 tonnes).



Virgin Cotton

A closer look at the preferred virgin cottons⁽¹⁾

Field to Market certified cotton increased from 19,107 tonnes in 2018/19 to 32,027 tonnes in 2019/20. This amount equaled 0.12 percent of all cotton produced worldwide in 2019/20. Field to Market cotton was produced in seven states in the USA in 2019/20.

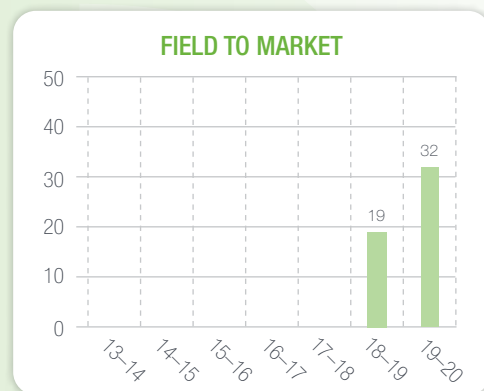
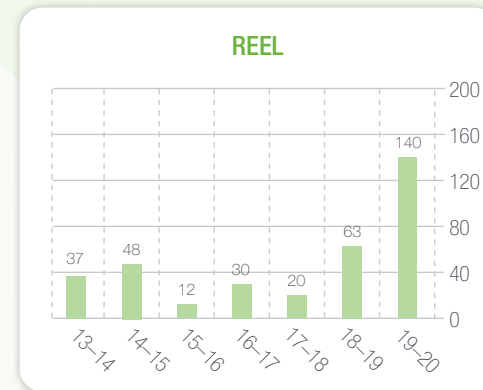
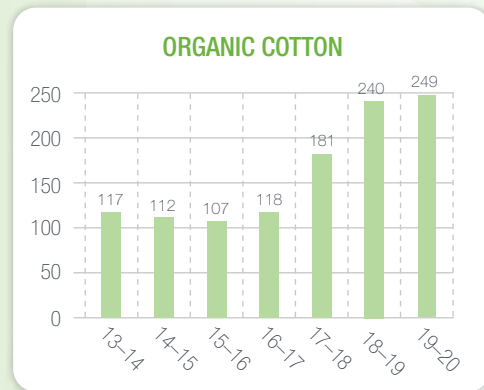
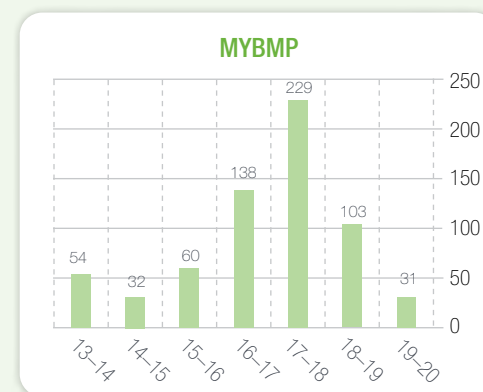
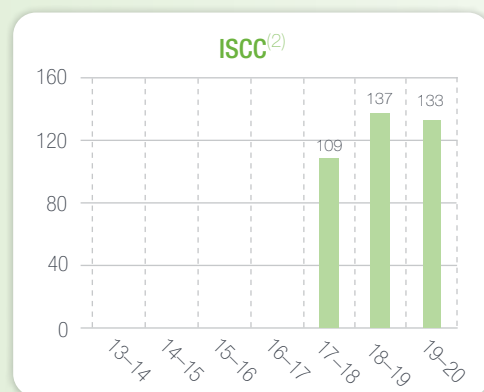
ISCC cotton production reached around 132,626 tonnes in 2019/20. This amount equaled 0.51 percent of all cotton produced in 2019/20⁽²⁾. All ISCC certified cotton in 2019/20 was produced in Greece.

myBMP cotton production was around 31,411 tonnes in 2019/20 equaling 0.12 percent of all cotton produced worldwide in 2019/20. The drop compared to previous years was the result of a severe drought in Australia. myBMP is also accounted as BCI equivalent.

Organic cotton production increased from 239,787 tonnes in 2018/19 to 249,153 tonnes in 2019/20. Organic cotton equaled a market share of 0.95 percent of all cotton produced in 2019/20. The organic cotton production volume includes CmiA Organic, Fairtrade organic, ROC, and supplier-specific programs such as bioRe®. For more information on organic cotton please see our [Organic Cotton Market Report 2021](#).

REEL cotton production increased from 63,313 tonnes in 2018/19 to 140,067 tonnes in 2019/20. This amount equaled 0.53 percent of all cotton produced worldwide in 2019/20.

The production volume of preferred cotton is growing (in '000 tonnes).



(1) 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.

(2) ISCC cotton volumes are collected by calendar year, not ICAC harvest year. The data from the 2020 calendar year have been allocated to the 2019/20 ICAC harvest year, the 2019 calendar year data to the 2018/19 ICAC harvest year.

Virgin Cotton

A closer look at the preferred virgin cottons⁽¹⁾

Regenerative Organic Certified™ (ROC)

cotton production increased from 40 tonnes in 2018/19 to 208 tonnes in 2019/20. This was less than 0.01 percent of all cotton produced worldwide in 2019/20. It included two projects in India, one in Maharashtra and one in Madhya Pradesh.

In-Conversion Cotton (Transitional in the USA)

is the cotton-in-conversion to organic. 50,552 ha of land were in-conversion in 2019/20. For more details, please have a look at the [Organic Cotton Market Report 2021](#). Several certifiers have in-conversion programs. Branded In-Conversion Cotton is still very rare. [QAI's Certified Transitional](#) Program, launched

in 2016 to recognize and incentivize farmers to transition their land from conventional to organic growing methods, is an example of a program offering such branding. As the initial focus was on food crops, no QAI Certified Transitional cotton was produced in 2019/20 yet. Another example is the Pre Organic Cotton (POC) program initiated by Itochu and kurkku.

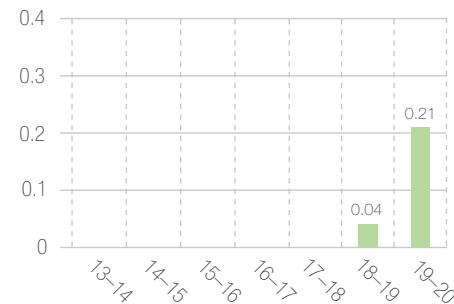
[U.S. Cotton Trust Protocol®](#) cotton reached 215,683 tonnes in 2019/20. This equaled around 5 percent of all cotton produced in the USA and 0.82 percent of all cotton produced worldwide in 2019/20.

Tip: How to find out more about the different cotton programs.

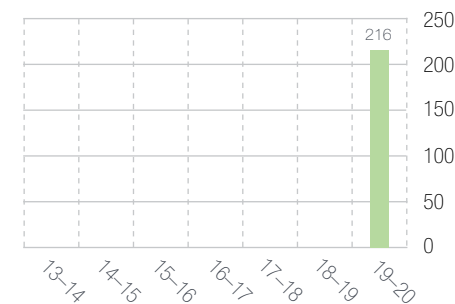
To learn more about the specific programs, what they cover, and how they differ, check out the Textile Exchange [Sustainable Cotton Matrix](#).

The production volume of preferred cotton is growing (in '000 tonnes).

ROC



USCTP



KEY MILESTONES

- 1996 IFOAM set first international organic standard
- 1996 Sustainable Cotton Project (SCP) / Cleaner Cotton founded
- 1997 MyBMP founded
- 2004 Fairtrade standard for seed cotton established
- 2005 BCI founded
- 2005 Cotton made in Africa (CmiA) founded
- 2009 ABRAPA's sustainability program started
- 2010 CottonConnect's REEL cotton program started
- 2010 ISCC started
- 2013 Field to Market launched
- 2013 Bayer CropScience's e3 cotton program (now BASF e3) launched
- 2016 QAI's Certified Transitional Program launched
- 2018 Regenerative Organic Certified (ROC) launched
- 2019 U.S. Cotton Trust Protocol started

(1) The data are 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.

Virgin Cotton

2019/20 preferred cotton production snapshot

Preferred cotton - defined by the list of recognized standards⁽¹⁾ - was grown by more than 2.9 million farmers on more than 7.8 million hectares of land in 32 countries.

The 10 largest preferred cotton-producing countries in 2019/20 produced around 97 percent of the global preferred cotton: Brazil (37%), India (16%), Pakistan (13%), China (12%), USA (8%), Côte d'Ivoire (3%), Burkina Faso (2%), Cameroon (2%), Greece (2%), and Turkey (2%).

Expansion to new countries

For the first time, organic cotton was also produced in Uzbekistan, thanks to a GIZ supported project. Organic cotton was also produced in Senegal again in 2019/20 after

it temporarily dropped out of certification the year before. CmiA expanded its program to Chad, and REEL cotton to Bangladesh. Field to Market and USCTP cotton was produced in the USA in 2019/20 for the first time where BCI, BASF e3, organic, and Cleaner Cotton are produced as well.

Compared to the 2018/19 cotton season, the global preferred cotton production volume increased by 24 percent in 2019/20.

In 10 countries, the market share of preferred cotton - defined by the list of recognized standards⁽¹⁾ - was between 50 to 100 percent of the total cotton production in the country: Brazil, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Israel, Kyrgyzstan, Mozambique, Pakistan, and Zambia,



2.9 million
Preferred cotton farmers



7.8 million
Preferred cotton land (ha)



↑ 24%
Preferred cotton fiber
(over 2018/19)



7.8 million
Preferred cotton
fiber (tonnes)

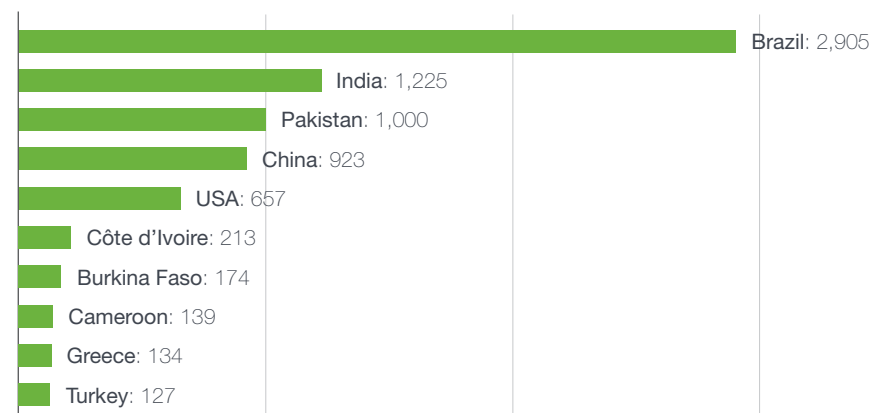


30%
Preferred cotton
market share



32
Countries growing
preferred cotton

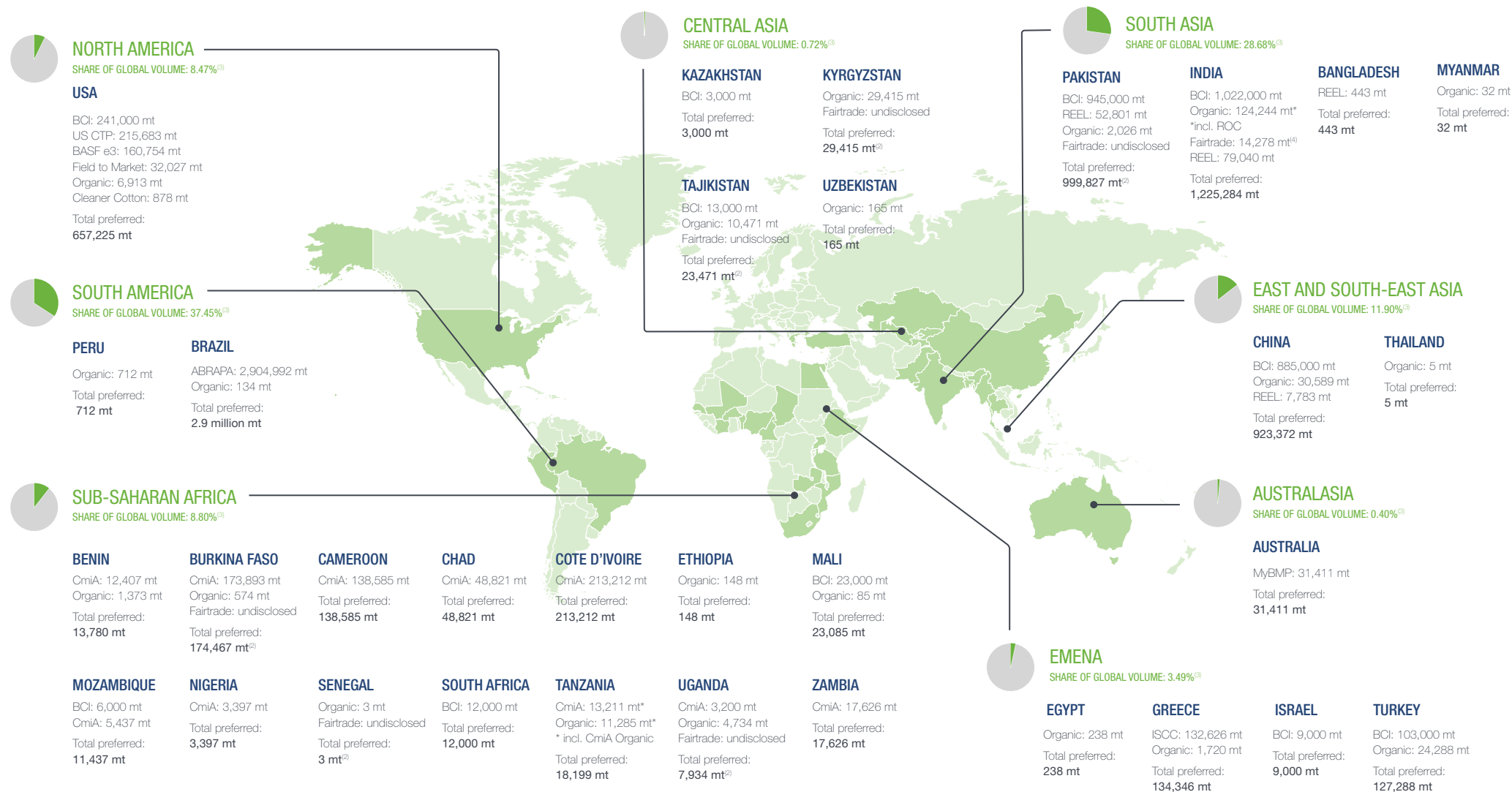
TOP 10 PREFERRED COTTON COUNTRIES BY VOLUME ('000 TONNES)



(1) Includes: ABRAPA, BASF e3, Better Cotton Initiative (BCI), Cleaner Cotton, Cotton made in Africa (CmiA), Fairtrade, Fairtrade Organic, Field to Market, In-Conversion Cotton (Transitional in USA), ISCC, myBMP, Organic, REEL Cotton, Regenerative Cotton, and the USCTP.

Virgin Cotton

Preferred cotton across the globe⁽¹⁾



(1) Email correspondence with cotton initiatives; BCI refers here to BCI standard; BCI equivalents are listed separately. Volumes in metric tonnes (mt).

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

(3) Preferred cotton production volume in this region as share (%) of the total global preferred cotton production volume.

(4) The total Fairtrade cotton production in India was 14,278 tonnes in 2019/20, including around 9,281 tonnes of Fairtrade Organic.

Virgin Cotton

Accelerating the transition to preferred cotton

Accelerating the transition to preferred cotton needs the commitment, action, and collaboration of multiple stakeholders.

Call to action

Join the Organic Cotton Round Table: The Global Organic Cotton Round Table and the Regional Organic Cotton Round Tables bring together stakeholders to accelerate the transition to organic cotton.

Sign the 2025 Sustainable Cotton Challenge: Signatories commit to using 100 percent sustainable cotton by 2025. The progress is tracked through the Corporate Fiber and Materials Benchmark program.

Joint initiatives

The [Sustainable Cotton Aligned Impacts Measurement and Reporting Commitment](#) signatories have worked together, convened by Cotton 2040 and [The Delta Project](#), to agree on a meaningful, credible and practically feasible set of shared core impact indicators and metrics. As of September 2020, it has been signed by the Better Cotton Initiative, Cotton Connect, Cotton Made in Africa, Fairtrade, MyBMP, The Organic Cotton Accelerator, and Textile Exchange. Cotton 2040 is convened by Forum for the Future with funding from Laudes Foundation and The Delta Project is delivered by The Better Cotton Initiative with funding from the ISEAL Innovations Fund.

The global [ISO IWA 32:2019 proficiency test initiative](#) is a collaboration between GOTS, OCA and Textile Exchange with technical support from Wageningen Food Safety Research. The joint project has reached a significant milestone: fourteen laboratories from China, Germany, India, the Netherlands, and Portugal have successfully passed the proficiency test.

Key organizations

Cotton 2040, founded in 2016 and led by Forum for the Future, is a platform that aims to accelerate progress and maximize the impact of existing sustainable cotton initiatives, bringing together leading international brands and retailers, sustainable cotton standards, and other stakeholders across the value chain. In 2021, Cotton 2040 and Acclimatise published the new report "[Physical Climate Risk for Global Cotton Production](#)" as well as a "[Cotton 2040 Climate Risk Explorer](#)". The analysis shows that 50 percent of cotton-growing regions face high or very high exposure to climate risk. In 2019, Cotton 2040 launched [CottonUpGuide.org](#) that provides practical information and resources to either start sourcing sustainable cotton or increase volumes.

CottonConnect, founded in 2009, is an enterprise with a clear mission to transform the cotton industry for good. To further investigate the benefit and opportunities for regenerative agriculture in cotton farming, for the

2020/2021 growing season, CottonConnect started a [Regenerative Agriculture and Carbon Sequestration Pilot Project](#) with 100 organic farmers in Madhya Pradesh, India.

GIZ, a service provider in the field of international cooperation, started its project "[Sustainability and Value Added in the Cotton Economy](#)" in 2019. The project aims to increase the added value gained from sustainable cotton in Burkina Faso, Cameroon, India, and Uzbekistan.

Laudes Foundation (formerly C&A Foundation), launched in 2020, is here to challenge and inspire the industry to harness its power for good. The Laudes Foundation supports various projects related to preferred cotton.

Organic Cotton Accelerator (OCA), founded in 2016, is a multi-stakeholder initiative focused on creating a prosperous organic cotton sector which benefits everyone — from farmer to consumer. In 2021, OCA released the [Non-GM Cottonseed Production Guidelines](#), which provide the textile sector with a key tool for safeguarding the integrity of organic cotton at the seed level; the very start of the supply chain.

Soil Health Institute (SHI), a USA based nonprofit organization, launched "Healthy Soils for Sustainable Cotton" in 2019, a continuous engagement project to help USA cotton

farmers increase their soil health. The initial pilot program, conducted during 2019, started in two USA states and expanded to another three states in 2020.

Textile Exchange, founded as Organic Exchange in 2002, is a global nonprofit that works closely with its members to drive industry transformation in preferred fibers, integrity and standards, and responsible supply networks. Flagship projects related to cotton include the Organic Cotton Market Report, the Global and Regional Organic Cotton Round Tables, and the 2025 Sustainable Cotton Challenge commitment (progress measured through the Corporate Fiber and Materials Benchmark program). In 2020, Textile Exchange also conducted an organic cotton demand survey.

West Africa Organic and Fairtrade Coalition was launched at the International Cotton and Textile Conference (SICOT) in Koudougou, Burkina Faso in September 2018. This coalition aims to establish reliable market access for tens of thousands of smallholder farmer families in West Africa who are producing organic-Fairtrade cotton and other organic crops.

Please see also the pages on [preferred cotton commitments](#) and [programs that include standards and certification](#), and the [Textile Exchange's Organic Cotton Market Report 2021](#) for more information.

Recycled Cotton

Market overview

Recycled cotton had an estimated market share of just around 0.96 percent of the total cotton production in 2020 but is expected to grow significantly in the coming years⁽¹⁾. While approximately 26 million tonnes of virgin cotton was produced in 2020 (ICAC harvest year 2019/20)⁽²⁾, the production volume of recycled cotton is roughly estimated at around 255 thousand tonnes⁽³⁾.

The potential to scale the recycled cotton production is enormous and could significantly contribute to GHG emission reductions.

A recent analysis conducted by the Circular Fashion Partnership has revealed the significant value in utilizing textile waste more efficiently, focusing on Bangladesh. Its research has found that Bangladesh alone produced approximately 250 thousand tonnes of 100 percent pure pre-consumer cotton waste in their Ready-Made Garments (RMG) and fabrics mills in 2019. The study estimates that factories in Bangladesh could sell this 100 percent pre-consumer cotton waste to the recycling market for up to 100 million USD. The Circular Fashion Partnership is a cross-sectorial project led by Global Fashion Agenda, with partners Reverse Resources, the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) and is supported by P4G, that aims to achieve a long-term, scalable transition to a circular fashion system⁽⁴⁾.

Please note that the data presented here refer to mechanically recycled cotton. Chemically recycled cotton is covered in the chapter on [manmade cellulose](#) since the result is a “manmade cellulosic,” not a “cotton.”

Key standards

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

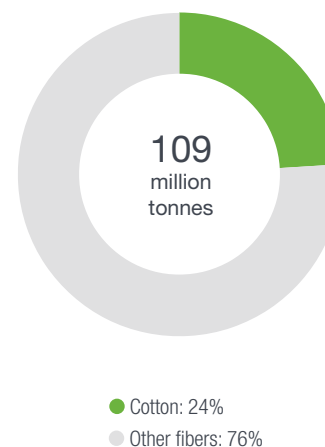
Textile Exchange Member Action

Textile Exchange member [Recover](#) forged a strategic partnership with Story3 Capital last year and announced its plan to increase its annual production capacity to 200,000 tonnes of recycled cotton fiber by 2025. More in this [interview](#).

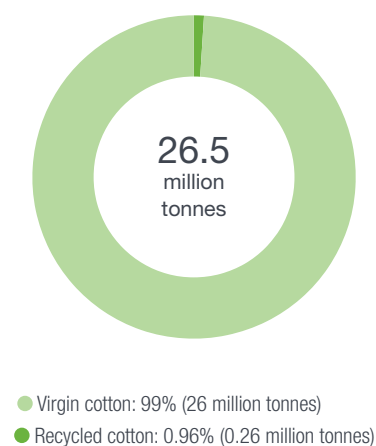
We aim to increase our annual production capacity to 200,000 tonnes of recycled cotton fiber by 2025. We are currently building our second facility in Bangladesh and are planning for more to come, which is very exciting!

 **Helene Smits,**
Recover

GLOBAL FIBER MARKET 2020



GLOBAL COTTON MARKET 2020^{(2),(3)}



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

(2) ICAC, 2021 - World Cotton Statistics May 2021. Note: For the virgin cotton production volume in 2020, the ICAC harvest year data from the 2019/20 season are applied.

(3) maia research, 2021 - Global Recycled Cotton Market 2021 (customized report).

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

Recycled Cotton

A closer look at recycled cotton

Textile Exchange Member Action

Circular Systems Texloop converts pre-consumer and post-consumer materials into high-value materials through a purely mechanical and hydrothermal process. An example of a Texloop material is a fabric consisting of 50 percent recycled cotton and 50 percent organic cotton. Texloop™ “Lightest-Touch” processing preserves original fiber quality for the next generation of recycled materials. More in the [supplier mapping](#).

Taishoboseki, based in Japan, offers recycled pre-consumer cotton waste yarn under the brand name Raffy. More in the [supplier mapping](#).

Geetanjali Woolens is a 40-year-old company that has been recycling post-consumer used clothing for as many years. It is Global Recycled Standard (GRS) certified. More in this [interview](#) and the [supplier mapping](#).

Giotex is a USA based company offering recycled cotton yarns and fabrics from pre-consumer feedstock. The company is certified to the Global Recycled Standard (GRS) and Recycled Claim Standard (RCS). More in the [supplier mapping](#).

Sāntis launched RCO100 in 2016. RCO100 products are made from 100 percent pre-consumer recycled cotton yarns without blending. More in the [supplier mapping](#).

Takiho, a Japanese company, launched Takiho's Circular System in 2019. It includes two projects: a partnership with The New Denim Project (TNDP) that mechanically recycles pre/post-consumer cotton materials into upcycled denim and cotton in Guatemala and the No Waste project that mechanically recycles pre/post-consumer natural fiber-based materials in Thailand. More in these interviews about the [New Denim Project](#) and the [No Waste project](#).

The Movement, a start-up from The Netherlands, and the spinner Belda Lloréns from Spain signed an agreement to make 100 percent traceable recycled cotton yarns available from Europe.

WP Home has been a home fashion pioneer for over 200 years. The WestPoint Home Hospitality Team recognized the huge circular opportunity in the hospitality industry where most of the products are white, and many are 100 percent cotton. They have partnered with one of their customers in a pilot project to start taking back retired sheets and towels for recycling. This has led to an expansion of the initiative to include other stakeholders in the Textile Exchange Home and Hospitality Working Group. More in this [interview](#).

Tip: Visit the [Textile Exchange database](#) for a list of RCS and/or GRS certified suppliers.



Commitments to Preferred Cotton

Examples

Overall industry goal

The vision of the [2025 Sustainable Cotton Challenge](#) is that **more than 50 percent of the world's cotton in 2025 is converted to more sustainable growing methods**, defined as grown according to a clear list of recognized programs⁽¹⁾. In the last five years, the market share of preferred cotton increased from 13 percent in 2015/16 to 30 percent in 2019/20. The industry is thus on a good track, but a further significant increase in the uptake of preferred cotton is required in order to meet the goal to grow 50 percent according to the recognized programs by 2025. The aim is also to drive continuous improvement across the programs. A focus will be the dissemination of best practices for soils and implementing regenerative practices, which put carbon back into the soil to mitigate and reduce the climate crisis.

Company commitments

Through the [2025 Sustainable Cotton Challenge](#), 127 brands and suppliers (including subsidiaries) have pledged to source 100 percent of their cotton from the most sustainable sources defined as cotton grown to recognized standards⁽¹⁾ by 2025. Of the 127 companies, 96 brand signatories

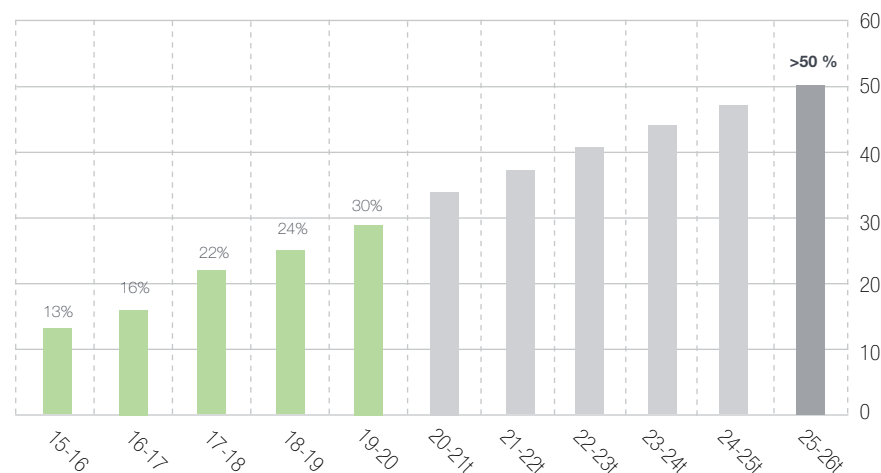
measured their progress through Textile Exchange's Corporate Fiber and Materials Benchmark (CFMB) in 2020. The full list of companies is shared on the 2025 Sustainable Cotton Challenge website. A detailed analysis of the state of fiber and materials sourcing is provided by [Textile Exchange's Material Change Insights Report 2020](#).



We've piloted our first crop of cotton in India on more than 150 farms working toward the highest organic standard, Regenerative Organic. This farming method aims to rehabilitate soil, respect animal welfare and improve the lives of farmers.

 **Patagonia⁽²⁾**

PROGRESS TOWARDS THE 2025 SUSTAINABLE COTTON CHALLENGE TARGET (% OF SUSTAINABLE COTTON)



Call to action

Sign the [2025 Sustainable Cotton Challenge](#)

Call to action

Join the [Organic Cotton Round Table](#)

(1) Recognized programs include *ABRAPA, *BASF e3, Better Cotton Initiative (BCI), *Cleaner Cotton, Cotton made in Africa (CmiA), Fairtrade, *Fairtrade Organic, *Field to Market, *In-Conversion Cotton (Transitional in the USA), *ISCC, *myBMP, Organic, Recycled cotton (that is certified to an independently verifiable standard such as the Global Recycled Standard or the Recycled Claim Standard), *REEL Cotton, *Regenerative Cotton, and the **United States Cotton Trust Protocol. *Initiatives added in 2019, **Initiatives added in 2020.

(2) Patagonia, 2021 - website. [Link](#).



Other Plant- Based Fibers

Photo: Jute - Pixabay - Public Domain Image

Other Plant-based Fibers

Flax, hemp, and beyond

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

With a global production volume of around 6.5 million tonnes, the market share of these other plant-based fibers was approximately 6 percent of the total global fiber production volume in 2020⁽²⁾.

Jute, Kenaf, and allied fibers had the largest market share of all other plant-based fibers with around 50 percent⁽³⁾. Similar to hemp, flax, and ramie, they are bast-fibers. Jute is used to make twines, ropes, matting, and packaging materials but also for home textiles such as curtains and carpets.

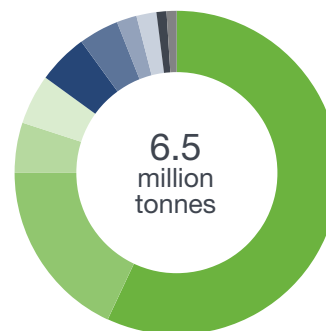
Coir had the second largest market share of other plant-based fibers at approximately 20 percent⁽³⁾. Coir is the fiber extracted from the husks of coconuts. It is used to produce home textiles such as floor mats, doormats, brushes, and mattresses.

The global **flax** fiber and tow production in 2020 is estimated at around 1 million tonnes⁽³⁾. Processed flax, also called linen, is used for a variety of products including home textiles and apparel.

Hemp fiber and tow had an estimated global production volume of around 174,027 tonnes in 2020⁽³⁾. The bast-fiber hemp is used in various industries including home textiles and apparel.

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

OTHER PLANT-BASED FIBERS ⁽¹⁾

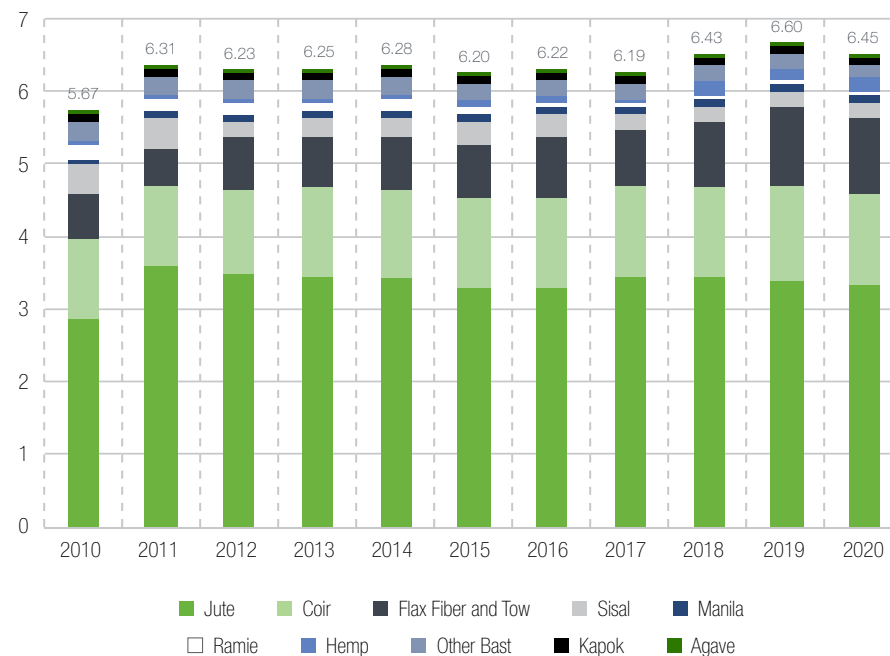


8+ million households

are estimated to be involved in the production of natural plant-based fibers such as jute, coir, flax and hemp.⁽²⁾

● Jute, Kenaf & Allied Fibers ● Coir ● Flax fiber and tow, ex scutching mill ● Other, not specified elsewhere
● Sisal, Henequen & similar hard fibers ● Bast fibers ● Ramie ● Kapok ● Abaca ● Hemp fiber and tow

OTHER PLANT-BASED FIBER PRODUCTION (MILLION TONNES) ⁽¹⁾



(1) DNFI, 2017 - Press release "Natural fibers production reaches 30 million tonnes" published on 29 July 2017. [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](#). 2020 figures estimated similar to the 2019 figures.

Other Plant-based Fibers

Hemp

Hemp fiber and tow had an estimated global production volume of around 174,027 tonnes in 2020⁽¹⁾. The market share of hemp is thus less than 0.2 percent of the total fiber market in 2020. Hemp for fibers has mainly been grown in China, but there are also emerging initiatives in other countries, including the USA. The United States Farm Bill, signed into law in December 2018, makes the growing of hemp in the USA much easier as cannabis with less than 0.3 percent THC is now considered an agricultural crop rather than a controlled substance.

The bast-fiber hemp is used in various industries, including home textiles and apparel.

Research is underway into hemp and jute as feedstock for manmade cellulose (see “[Manmade Cellulose](#)” Chapter) and even biobased leather imitations (see “[Non-Animal-Based Leather Alternatives](#)” chapter).

Textile Exchange Member Action

[AltMat](#) is developing fibers made from residues of food and medicinal crops. First commercialized Alt fibers were created from the stalks of oilseed hemp. More in the [supplier mapping](#) and this [interview](#).

[Bear Fiber](#) is developing a novel alkaline hemp cottonization process and manufacturing platform to produce cotton-like hemp fiber that can be easily spun with and complement cotton. More in the [supplier mapping](#).

[Circular Systems](#) launched The Agraloop Bio-refinery 1.5 pilot facility in Belgium in January 2020, using food crop residues as feedstock and powered by 100 percent renewable energy. Oil-seed hemp is one of the feedstocks that can be utilized for these fibers. The first Agraloop BioFibre™ products hit the market in 2020 with French oilseed hemp used as feedstock - more in this [interview](#) and the [supplier mapping](#).

[Hemp Fortex](#) is a leading supplier of hemp textiles. This vertically integrated company uses hemp grown in China and manufactures yarn, knitted, and woven fabrics made from hemp. More in this [interview](#).



(1) FAOSTAT, 2021 - database. [Link](#). Note: 2020 figures estimated similar to the 2019 figures by Textile Exchange as 2020 figures were not yet available at the launch of this report.

Other Plant-based Fibers

Flax

The global flax fiber and tow production in 2020 is estimated at around 1 million tonnes⁽¹⁾. The market share of flax is thus less than 1 percent of the global fiber market. Processed flax, also called linen, is used for various products including home textiles and apparel.

Around 80–85 percent of the flax used for fibers is grown in Europe. France is the largest producer of flax fibers. 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.

Standards

A small percentage of flax is certified organic. According to estimates of the European Confederation of Linen and Hemp (CELC), around 0.5 percent of the flax grown in Europe is certified organic⁽²⁾.

The [REEL Linen Code](#) is a new code of conduct to support the more sustainable production of linen. The Code requires farmers and processors to adopt more sustainable practices when producing the flax fibers which are spun into linen yarn. Building on the success of the REEL Cotton Code, which is proven to increase yields and farm profits, while reducing environmental impacts, CottonConnect developed the REEL Linen Code in partnership with Kingdom, one of largest linen yarn manufacturers in the world.



[Circular Systems' Agraloop Bio-refinery](#) is currently developing BioFibre™; fibers made entirely from food crop residues. Oil-seed flax is one of the feedstocks that can be utilized for their fibers. More in this [interview](#) and the [supplier mapping](#).

(1) FAOSTAT, 2021 - database. [Link](#). Note: 2020 figures estimated similar to the 2019 figures by Textile Exchange as 2020 figures were not yet available at the launch of this report.

(2) European Confederation of Linen and Hemp (CELC), 2019 - Email correspondence.



Other Plant-based Fibers

Nettle, kapok, and others

There is an emerging interest in using plant-based specialty fibers such as nettle, lotus, kapok, and others. The use of agricultural residues is also gaining much attraction.

Further plant-based fibers used in the textile industry include nettle, kapok, lotus, and others. The use of crop residues, such as rice straw, pineapple leaves, banana tree trunks, and sugar cane bark, is another emerging field. Please note that the examples listed here do not chemically dissolve the plants into pulp, nor do they depolymerize them. If the same plants are dissolved into pulp, they are listed in the chapter on Manmade Cellulosic Fibers. If depolymerization is used to process them, they are listed as biosynthetics.

Textile Exchange Member Action

[AltMat](#) is developing fibers made from residues of food and medicinal crops. The technology is applicable for various kinds of biomass including stalks and leaves of fruit crops like banana and pineapple, wild or medicinal crops like nettle, and industrial crops such as cotton. A combination of mechanical, chemical, and microbial sciences is used to transform the low-value materials into soft and strong fibers. More in the [supplier mapping](#).

[Circular Systems' Agraloop Bio-refinery](#) is currently developing BioFibre™, fibers made entirely from food crop residues. The

Agraloop™ can utilize a range of feedstocks - apart from oil-seed hemp and oil-seed flax - for example, rice straw as well, as pineapple leaves, banana tree trunks, and sugar cane bark can be used. In 2019, Agraloop presented the first prototype fibers, yarn, and fabrics. More in this [interview](#) and the [supplier mapping](#).

[Himalayan Wild Fibers](#) extracts textile fiber from a nettle plant that grows wild in the mountain forests of the Himalayas. More in this [interview](#) and the [supplier mapping](#).

[Spinnova](#) is a Finnish R&D company developing an innovative mechanical approach to produce micro-fibrillated cellulose (MFC) for the production of a new cellulosic fiber. In 2020, Spinnova and the world's largest wood pulp producer Suzano launched the construction of their first commercial-scale SPINNOVA® fiber production facility, called Woodspin, in Finland. The facility, producing SPINNOVA® fiber, is the first step towards the ambition of scaling production volume to 1 million tonnes of annual capacity by 2031. Construction has already started in Jyväskylä, and the fiber is expected to be available at the end of 2022. More in this [interview](#) and the [supplier mapping](#).

Other

[FLOCUST™](#) produces yarn blends and filling made with kapok. More in the [supplier mapping](#).



Rubber



Photo: FSC

Rubber

The global natural rubber production was around 14.6 million tonnes in 2020⁽¹⁾. Natural rubber had a market share of around 50 percent of the global total 29.05 million tonnes rubber market in 2020. Synthetic rubber accounted with 14.4 million tonnes for the other 50 percent of the global rubber market in 2020⁽²⁾. The market share of natural rubber increased from around 40 percent of the total rubber market in 2010 to around 50 percent in 2020⁽¹⁾⁽²⁾.

The largest natural rubber producing countries in 2020 were Thailand (33 percent), Indonesia (24 percent), and Vietnam (8 percent) - in percentage compared to the global total rubber production⁽¹⁾. It is estimated that around 85 percent of the natural rubber is produced by smallholders, involving around 10 million farmers⁽³⁾.

The market share of rubber forest certified to FSC and PEFC was around 2.27 percent in 2020^(1,4,5).

FSC certified rubber forest had around 0.22 million hectares⁽⁴⁾ compared to a total of 12.34 million hectares of rubber forest⁽¹⁾ and thus a market share of around 1.78 percent in 2020. 112 chain of custody certificates for FSC rubber were active end of 2020 and FSC certified rubber is already used in the textile industry (see Textile Exchange member action below)⁽⁴⁾.

PEFC certified rubber forest had with around 0.06 million hectares a market share of around 0.49 percent of the total rubber forest in 2020. The first PEFC certified rubber has been available since 2021⁽⁵⁾.

FSC and PEFC are founding members - and together with several other organizations - members of the [Global Platform for Sustainable Natural Rubber \(GPSNR\)](#).

Textile Exchange Member Action

From the 15 companies that signed the FSC call to commit to sourcing deforestation-free, environmentally-conscious and socially responsible rubber, 11 companies are Textile Exchange members: Allbirds, Avocado, Clarks, H&M, Ikea, Inditex, Patagonia, The North Face, Timberland, Vans, and the VF Corporation⁽⁶⁾.

The Textile Exchange members Allbirds, Clarks, and Patagonia are already using FSC certified rubber⁽⁴⁾.

In 2021, the VF Corporation including Timberland, Vans and The North Face, announced its new partnership with Terra Genesis International in Thailand to build the fashion industry's "first regenerative rubber supply system"⁽⁷⁾.

(1) FAOStat, 2021 - Database. [Link](#). 2020 data not yet available at launch and thus estimated to be similar to 2019.

(2) Statista, 2021 - Synthetic rubber global production 2000-2020. [Link](#).

(3) FSC, 2019 - Responsible Sourcing of Natural Rubber. [Link](#).

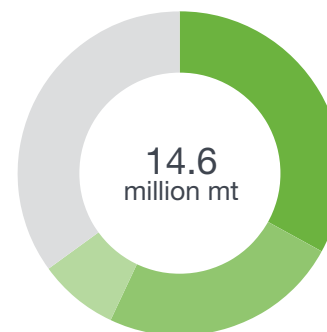
(4) FSC, 2021 - Email correspondence.

(5) PEFC, 2021 - Email correspondence. The 60,000 hectares per January 2021 are used as an estimate for the end of the year 2020.

(6) Textile Exchange member list as of 18 June 2021.

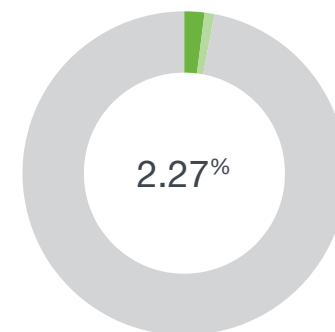
(7) Timberland, 2021 - Press Release. [Link](#).

GLOBAL RUBBER PRODUCTION BY COUNTRY IN 2020 ⁽¹⁾



● Thailand: 33 %
● Indonesia: 24 %
● Vietnam: 8 %
● Other: 35 %

GLOBAL RUBBER FOREST AREA BY PROGRAM IN 2020 ⁽¹⁾



● FSC: 1.78 %
● PEFC: 0.49 %
● Uncertified / unknown: 97.73 %

GLOBAL NATURAL RUBBER PRODUCTION (MILLION TONNES) ⁽¹⁾



Animal Fibers & Materials

Down & Feathers



Photo: Pixabay - Public Domain Picture

Virgin Down

Production facts and figures

The global down and feather production volume was around 532,528 tonnes⁽¹⁾ with a Responsible Down Standard (RDS) market share of 3 percent and a Downpass market share of 1.1 percent in 2020.

While the market has been growing over the years and is expected to grow further in the coming years, 2020 saw a decline in the global down production volume due to COVID-19⁽¹⁾.

The global down and feather market is highly fragmented, with many small and medium producers.

Around 85–90 percent of the down comes from ducks; the remaining down comes mainly from geese⁽¹⁾.

China is the largest producer of down, responsible for around 60 percent 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:

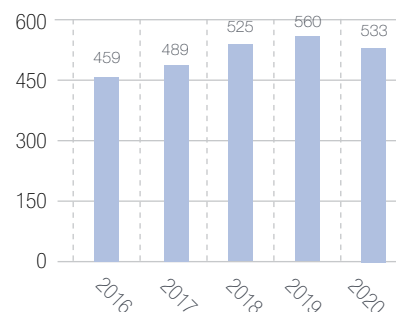
- no live-plucking
- no force-feeding
- broader animal welfare (depending on standard)

Multi-tier cage farming, increasingly used in China for ducks, is also prohibited in RDS as the animal welfare outcomes described by RDS cannot be delivered by these systems. China is the largest producer of RDS certified down and this trend may have an impact on the availability of RDS certified down in the future.

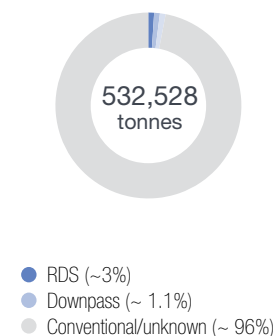
[RDS](#) certified down had a market share of around 3 percent of the total down production in 2020, equating around 16,022 tonnes. The number of RDS certified farms was 5,806⁽⁴⁾ in 2020, while the number of certified processing sites increased to 1,290. The RDS was launched in 2014. The latest revision, the RDS 3.0, was published in July 2019 and is gaining importance in the industry.

The global [Downpass](#) certified down production volume increased from 3,411 tonnes in 2019 to 5,780 tonnes in 2020. This is equivalent to an estimated 1.1 percent of the total down production volume in 2020. The number of Downpass certified farms increased from 4,503 in 2017 to 7,942 in 2020. The number of certified processing sites increased from 209 in 2017 to 479 in 2020. Out of this, approximately 5,320 tonnes were used for Downpass certified bedding, while around 460 tonnes were used for Downpass certified outdoor and fashion products. The first version of the Downpass standard was launched in June 2016, an updated version in 2017.

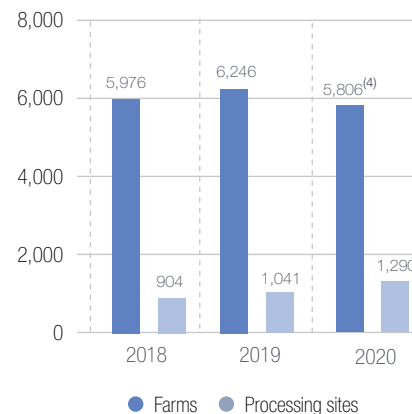
GLOBAL DOWN PRODUCTION IN '000 TONNES



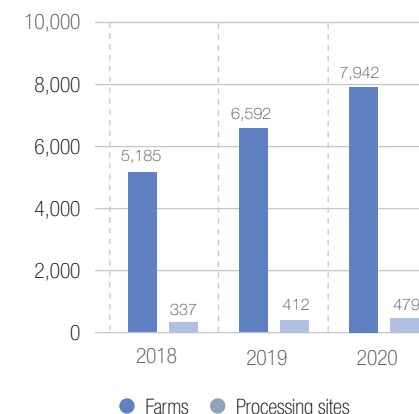
PREFERRED DOWN MARKET SHARE IN 2020



RESPONSIBLE DOWN STANDARD (NO. OF SITES)



DOWNPASS (NO. OF SITES)



(1) maia research, 2021 - Global Down and Feather Market Report 2021. Customized report.

(2) FAOSTAT, 2021 - database. [Link](#). Note: 2020 figures estimated similar to the 2019 figures by Textile Exchange as 2020 figures were not yet available at the launch of this report.

(3) The Global Traceable Down Standard (TDS) was withdrawn in 2020 and is thus no longer covered in this report.

(4) This includes a total of 6 farm areas (more than 295,000 small farms).

Virgin Down

Directory: Where to find preferred down across the globe

Around 21,802 tonnes⁽¹⁾ of preferred down was produced on 13,748 farms⁽¹⁾ in 17 countries in 2020. Major production regions for preferred down are China and Eastern Europe, including Poland and Ukraine.

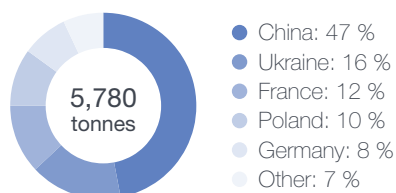
Tip: How to find suppliers of preferred down.

Check out the [Textile Exchange database](#) for Responsible Down Standard (RDS) certified down suppliers or contact Downpass for a list of Downpass certified suppliers.

RDS CERTIFIED DOWN BY COUNTRY 2020⁽²⁾



DOWNPASS CERTIFIED DOWN BY COUNTRY 2020⁽³⁾



WESTERN EUROPE

UK

RDS: 146 tonnes

IRELAND

Downpass: n.a.

FRANCE

RDS: 4 tonnes
Downpass: n.a.

NETHERLANDS

RDS: 126 tonnes
Downpass: n.a.

GERMANY

RDS: 173 tonnes
Downpass: n.a.

PORTUGAL

Downpass: n.a.

EASTERN EUROPE

BULGARIA

RDS: 25 tonnes

HUNGARY

RDS: 63 tonnes
Downpass: n.a.

POLAND

RDS: 247 tonnes
Downpass: n.a.

RUSSIA

RDS: 131 tonnes
Downpass: n.a.

UKRAINE

RDS: 30 tonnes
Downpass: n.a.

NORTH AMERICA

CANADA

RDS: 4 tonnes

USA

RDS: 2 tonnes

EAST AND SOUTH EAST ASIA

CHINA

RDS: 14,962 tonnes
Downpass: n.a.

TAIWAN

RDS: 72 tonnes
Downpass: n.a.

VIETNAM

RDS: 38 tonnes

AUSTRALASIA

AUSTRALIA

Downpass: n.a.

(1) This assumes that no down and farms were double-certified to RDS and Downpass. Information on double-certification was not available at report launch.

(2) Based on 14.5 percent loss from birds to down and on 60:40 duck:goose ratio.

(3) Downpass production volumes were only available at global level but not at country level. The percentages indicated here are based on the number of farms by country. As the number of farms do not necessarily correlate with the production volumes, the percentages in volumes may differ from the percentages listed here.

Virgin Down

Accelerating the transition to preferred virgin down

The acceleration towards preferred down has mainly been driven through the development and regular revision of three key preferred down standards in multi-stakeholder dialogues and their implementation: The Responsible Down Standard (RDS), Downpass, and the Global Traceable Down Standard (TDS) which was withdrawn though in 2021 because the gaps that it initially set out to address have been closed in the meantime. More information on the standards [here](#).

In 2014, [Four Paws International](#), an Austrian-based international animal welfare organization, invited leading outdoor brands to take on the “[Cruelty Free Down Challenge](#).” Today, Four Paws is actively involved in the Responsible Down Standard International Working Group to strengthen the animal-welfare criteria of the standard.

Allied Feather and Down, Downlite, Interplume, Navarpluma, Rohdex, and Sustainable Down Source are leading suppliers that have actively supported the development of the Responsible Down Standard. Another organization actively involved in the International RDS Working Group is IDFL, the world’s largest down and feather testing institute with laboratories in the USA, Europe, China, and Taiwan. Several brands and retailers have also joined the Working Group.

From the year 2014 to 2018, **The Global Stakeholder Roundtable on “Responsible Down and Animal Welfare”** was facilitated by the European and US outdoor industry.

Textile Exchange Member Action

[Applied DNA Sciences](#) announced a [collaboration with Navarpluma](#) in 2019 to allow for traceability of materials in the down and feather industry by utilizing the Applied DNA Sciences’ SigNature® DNA system.

Other

Several down suppliers started traceability initiatives, for example: Allied Feather and Down (TrackMyDown.com), Sustainable Down Source (QR code), and Navarpluma (DNA based with Applied DNA Sciences).

Tip: How to find suppliers of preferred virgin down.

Check out the [Textile Exchange database](#) for a list of RDS certified suppliers, or contact Downpass or NSF for a list of certified suppliers.



Recycled Down

Production facts and figures

Recycled down had an estimated market share of around 1 percent of the global down production volume in 2020. While the virgin global down production was around 533 thousand tonnes in 2020, the production volume of recycled down is roughly estimated at around 5,124 tonnes. The market for recycled down is growing⁽¹⁾.

Key standards

Key standards used for recycled down include the [Recycled Content Standard \(RCS\)](#) and the [Global Recycled Standard \(GRS\)](#). Further information on these standards is provided in the chapter on "[Sustainability Standards](#)."

Key suppliers for third-party certified down

Major suppliers for GRS certified recycled down are:

- [Allied](#) with its GRS certified TITANIUM: RENU™
- [Downlite](#), a USA based company, with its GRS certified Re/charged down, launched in 2017
- [Navarpluma](#), a Spanish GRS certified company, with its 100 recycled down branded NEOKDUN® originating from the recycling of bedding/apparel finished products that have reached the end of their product life cycle
- [Rohdex](#) with its recycled down certified to the GRS.



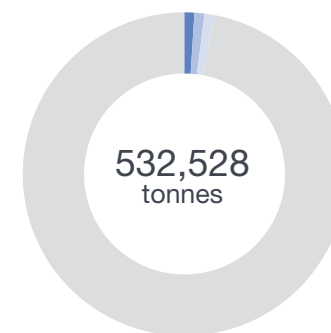
Textile Exchange Member Action

[Re:Down](#) is a company specialized in the down recycling made from post-consumer products. Re:Down produce a garden fertilizer from feathers that do not make the grade. Read more in the [interview](#).

Tip: How to find suppliers of recycled down.

Check out the [Textile Exchange database](#) for a list of RCS and/or GRS certified suppliers.

RECYCLED DOWN MARKET SHARE 2020



- Recycled down (~1%)
- Virgin down (~99%)

(1) maia research, 2021 - Global Down and Feather Market Report 2021 (customized report).

Commitments to Preferred Down

Examples

The number of apparel, outdoor and home textile companies that have publicly committed to preferred down is increasing every year.

Examples of public commitments by Textile Exchange members

All down used by **Arc'teryx** is certified to the RDS. More information [here](#).

Aritzia uses only down that's certified to the RDS. More information [here](#).

BESTSELLER only uses virgin down sourced according to the RDS. More information [here](#).

Since fall 2016, all the down and feathers in **C&A's** products are RDS-certified. More information [here](#).

Columbia has committed to 100 percent RDS certified down and feathers throughout its global line (excluding its Japanese subsidiary). More information [here](#).

Eileen Fisher is committed to 100 percent RDS certified down and feathers. More information [here](#).

Esprit ensures that 100 percent of their down and feathers are sourced according to the RDS, or RCS/GRS certified recycled down. More information [here](#).

All down sourced by **GANT** is compliant to the RDS. More information [here](#).

Gucci's sustainability principles state that the supplier and its sub-supplier ensure that feathers or downs are RDS or Global TDS certified or that they adopt, maintain, and verify a sourcing policy that ensures there has been no live-plucking and they don't derive from animals that have undergone force-feeding during the reproductive phase of their lives. More information [here](#).

H&M only accepts down from farms that have been RDS certified and recycled down since 2015. More information [here](#).

100 percent of the down in **Kathmandu** products is certified under the RDS. More information [here](#).

All down sourced by **Marks & Spencer** must be certified by RDS or Global TDS, or RCS/GRS certified recycled down. More information [here](#).

Norrone only uses down that is RDS certified or recycled. More information [here](#).

From the Fall 2017 product season, all **Patagonia's** virgin down was certified to the advanced certification level of the Global TDS. More information [here](#).

prAna is committed to only sourcing RDS certified down. More information [here](#).

PVH Corp requires all down and feathers to adhere to the RDS. More information [here](#).

100 percent of the down sourced by **Ralph Lauren** is RDS or Global TDS certified down by 2023. More information [here](#).

100 percent of down insulation used by **REI** has been RDS certified since 2015. More information [here](#).

The North Face started using RDS-certified down in Fall 2015 and since Fall 2016 they have only purchased RDS-certified down. More information [here](#).

Varner is committed to 100 percent RDS down. More information [here](#).

All virgin down purchased by **VF Corporation** in 2017 and 2018 was certified to the RDS. 2018 was the first year that VF purchased recycled down, which was all certified to the GRS. More information [here](#).

Since 2017, 100 percent of the down sourced by **Volcom** is RDS certified. More information [here](#).

Other examples

All down used in **Deckers**-branded products is certified in accordance with the RDS. More information [here](#).

Starting with its fall/winter collection 2016, **Hugo Boss AG** exclusively uses down that is produced without live-plucking or forced feeding and has documented origins. More information [here](#).

From Fall 2017, **Tommy Hilfiger** confirmed that all their down products are certified to the RDS. More information [here](#).

Since 2018, all down used by Helly Hansen is RDS certified. More information [here](#).

Make a Standards Commitment

Whether you have already made a commitment to one or more of Textile Exchange's Standards, or you want to share a new one, you may [use this form to register details of your commitment\(s\)](#).



Photo: Fuhrmann

Wool

Virgin Wool - Sheep Wool

Production facts and figures

With an annual production volume of around one million tonnes, sheep wool is the most used animal-based fiber⁽¹⁾.

While the global wool production has been declining over the years, the market share of programs such as the Responsible Wool Standard (RWS) is increasing.

The Responsible Wool Standard

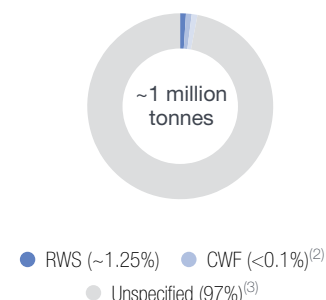
With a production volume of more than 24,000 tonnes, the market share of [Responsible Wool Standard \(RWS\)](#) certified wool increased to around 1.25 percent of the global virgin wool production volume in 2020 - on global average. **In the key apparel wool producing countries, RWS certified wool has reached market shares as high as 25 percent of all wool in South Africa, 11 percent in Uruguay, and 9 percent in Argentina.**

The number of RWS certified farms increased from 745 in 2019 to 1,519 in 2020. The leading production country for RWS remains South Africa, both in terms of farms certified as well as volumes of certified wool produced. Strong growth in the adoption of RWS has been seen across all key production countries, including Uruguay, Argentina, Australia, and New Zealand.

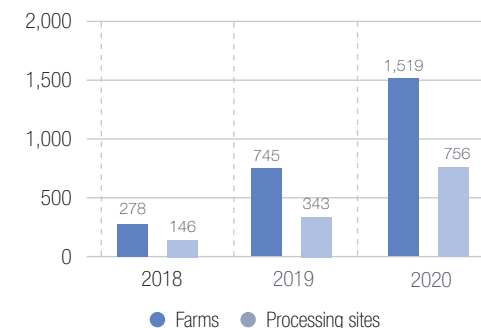
RWS has also seen a strong adoption through the supply chain with a concentration in key apparel wool processing countries such as Italy and China. With the release of RWS 2.0 the supply chain certification for RWS, Responsible Mohair Standard (RMS), and Responsible Alpaca Standard (RAS) were combined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

The aim of RWS (and RMS, and RAS) is to ensure that the potential for high animal welfare for animals raised in extensive grazing and free ranging farming systems is realized. This is through audited standards covering all aspects of the animal's life to ensure best practice from the farmers and to deliver good welfare for the animals. At the close of 2020 there were 6.8 million sheep 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 new biodiversity requirements and a new module addressing social welfare on farms was introduced. At the close of 2020 there was over 12 million hectares under RWS certification.

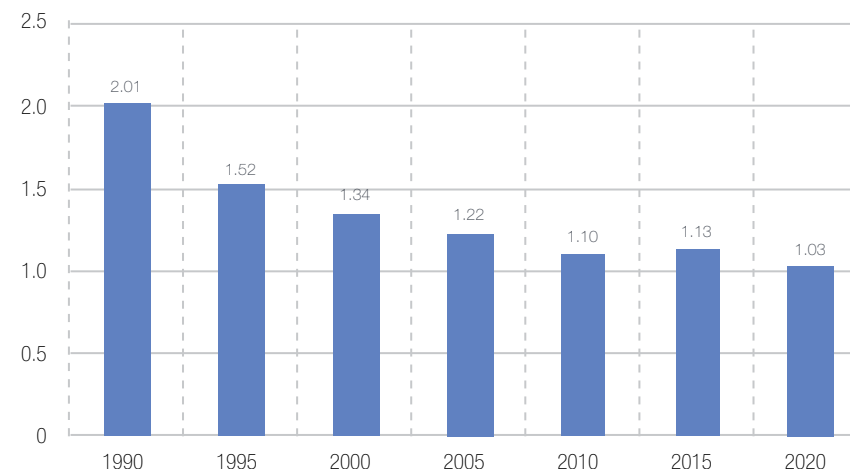
PREFERRED SHEEP WOOL MARKET SHARE IN 2020



RESPONSIBLE WOOL STANDARD (RWS) CERTIFIED SITES



GLOBAL WOOL FIBER PRODUCTION (MILLION TONNES)⁽¹⁾



(1) WTO. 2021 - Market Information. Edition 16. [Link](#).

(2) This includes CWF production in Argentina only as data for other countries were not available at the report launch.

(3) This includes the volumes of wool programs for which data were not available or accessible at the launch of the report.

Virgin Wool - Sheep Wool

Production facts and figures

To date, the majority of RWS certified wool is merino wool. With the release of the Communal Farmer Group Certification model, access to certification is broadened to cover farmers with no or limited land tenure including nomadic and semi-nomadic farmers; adoption in wool producing countries with such production systems is therefore expected shortly.

As an industry, we need to support and recognize the efforts made by herding families with no or limited land tenure to help ecosystem restoration. RWS certified wool from communities practicing transhumance - moving livestock from one grazing ground to another in a seasonal cycle - in India are expected shortly.

Amish Gosai,
Textile Exchange

Other wool schemes and initiatives

The RWS was developed with the aim of providing a holistic global benchmark and definition for responsible wool production. In addition to RWS there are a number of wool assurance scheme and private supplier programs. Some are active in only certain regions or markets and others focus in on particular impact areas, such as Certified

Wildlife Friendly® or Land to Market and verification of ecological outcomes. Schemes and initiatives also vary in terms of their approach to assurance ranging from self-declaration to third-party audits as well as degrees of traceability and oversight through the supply chain. Many of these schemes and initiatives are also certifying to the RWS which needs to be factored into estimates of the combined market share, as combined certifications are common and likely to increase.

[New Zealand Merino / ZQ](#) farm audits certify farms to both RWS and ZQ at the same time, with the release of the RWS 2.0. This means that all ZQ certified farms in New Zealand are also RWS certified.

[Certified Wildlife Friendly® \(CWF\)](#) wool had a production volume of more than 12.7 tonnes in 2020 in Argentina alone, a growing fibershed for this program⁽¹⁾. The program's aim is to protect threatened and endangered wildlife species and facilitate a coexistence with wildlife. The Wildlife Friendly Enterprise Network (WFEN) manages the certification, and Wildlife Conservation Society (WCS) Argentina provides monitoring and research support on the ground.

Data for the production volume of **organic, Land to Market, and ZQ certified wool** were not available for 2020 at the launch of this report. More information on the market share of non-mulesed wool can be found in the chapter on [“Non-Mulesed Wool”](#).

⁽¹⁾ Certified Wildlife Friendly®, 2021 - email correspondence. The production volume reported here is for the largest CWF certified wool project in Argentina. Some other producers in Argentina and in other countries are not included as their data was not available at the report launch.



Virgin Wool - Sheep Wool

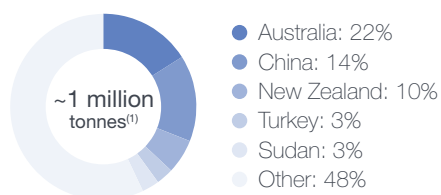
The preferred wool market by country

The market share of Responsible Wool Standard (RWS) certified wool increased to around 1.25 percent of the wool production volume in 2020 - on global average. In the key apparel wool producing countries, RWS certified wool has reached market shares as high as 25 percent of all wool in South Africa, 11 percent in Uruguay, and 9 percent in Argentina.

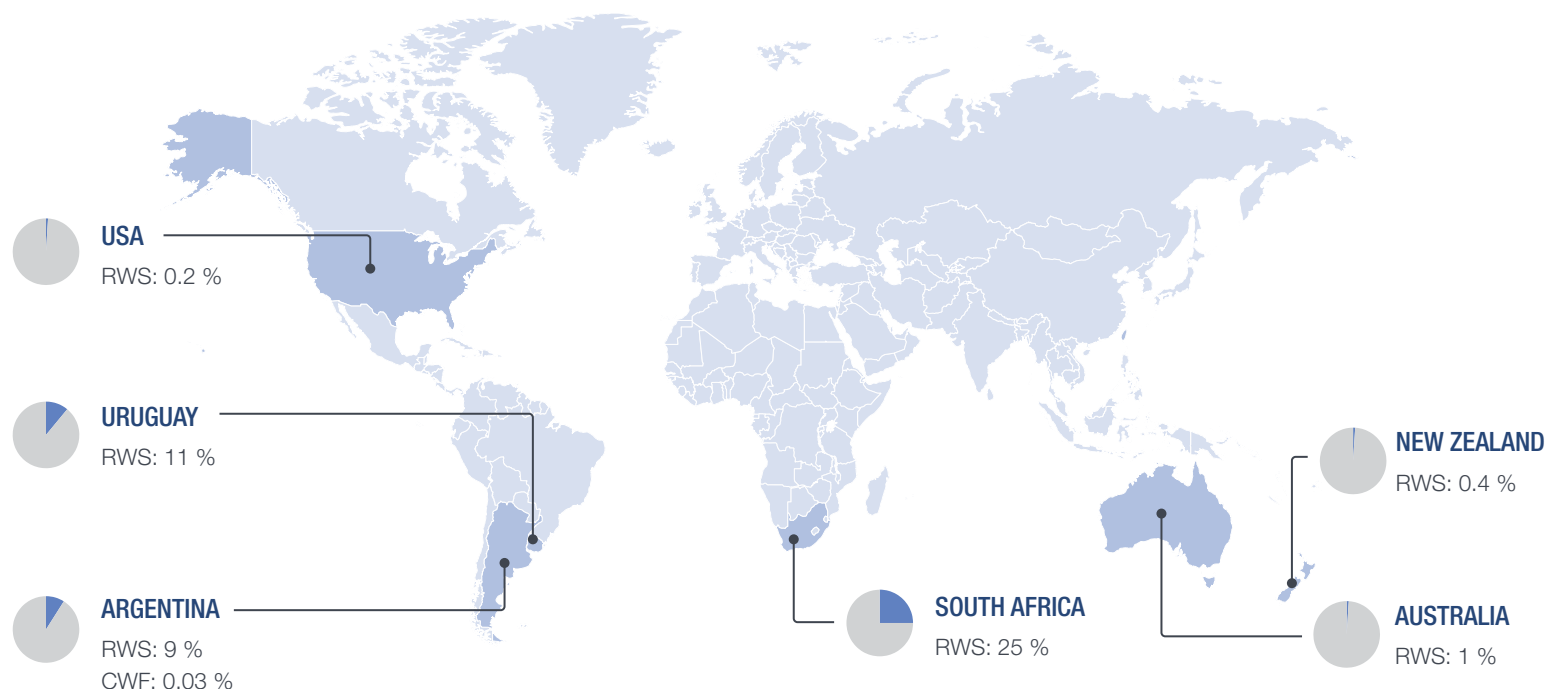
Tip: How to find suppliers of preferred wool

Check out the [Textile Exchange database](#) for certified suppliers of RWS, OCS and recycled wool, the [Responsible Wool Standard Brand Sourcing Guide](#) for support related to the RWS and the [GOTS database](#) for GOTS certified wool suppliers⁽²⁾.

GLOBAL WOOL PRODUCTION BY COUNTRY 2020 ⁽¹⁾



MARKET SHARE OF PREFERRED WOOL BY COUNTRY ⁽²⁾



(1) IWTO 2021 - Market Information. Edition 16. [Link](#)

(2) Only including RWS and CWF as no data available for ZQ, Land to Market, organic, and Fibershed Climate Beneficial Wool at report launch. Market share given in percentages compared to overall wool production based on ITWO data as mentioned in (1). Only wool producing countries with RWS and CWF production highlighted in dark blue.

Virgin Wool - Sheep Wool

The Non-Mulesed Wool Market

Mulesing, i.e., the removal of wool-bearing strips of skin from between the hind legs of sheep (the “breach” area) in an effort to avoid problems of fly strike, remains a key issue related to wool production.

With the ban of mulesing in New Zealand in 2018, the only country where mulesing is still practiced is Australia. As Australia has a market share of around 22 percent of the global clean wool market⁽¹⁾, the risk of sourcing wool produced with mulesing practices 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 via cutting with shears and by the application of liquid nitrogen (steining).

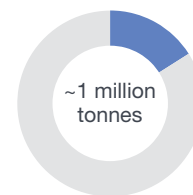
While definitions of mulesing usually include any form of breach mutilation or modification including steining, the mulesing definition of the Australian Wool Exchange (AWEX) only includes the removal of skin from the breach and/or tail of a sheep using mulesing shears⁽²⁾. **This means that wool sold as non-mulesed as per the AWEX definition could still be produced using freeze mulesing (steining).**

Four Paws and Human Society International published a position statement opposing freeze mulesing (steining) in September 2019 because of the severe pain this inflicts on sheep. Both organizations are against any form of breach mutilation or modification.

The number of “brands against mulesing” listed by Four Paws increased from 100 in April 2020 to 203 in June 2021. This includes 129 companies with a published non-timebound commitment against mulesing and 74 with a time-bound commitment including the use of robust certification systems such as the RWS⁽³⁾.

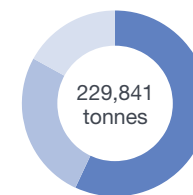
Responsible Wool Standard (RWS) certification ensures that wool is from non-mulesed sheep. If organic wool is certified to the Organic Content Standard (OCS), it also has to be non-mulesed or from a farm with ceasing-mulesed status based on the latest revised version (OCS 3.0), launched in April 2020. Additionally the Global Organic Textile Standard (GOTS) 6.0, launched in March 2020, added mulesed wool to their list of prohibited fibers.

MARKET SHARE OF AUSTRALIAN WOOL IN 2020⁽¹⁾



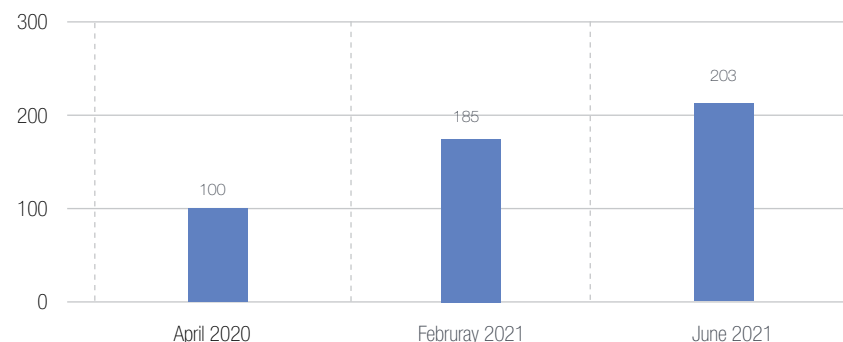
- Australia: 22%
- Other: 78%

MULESING STATUS OF WOOL IN AUSTRALIA 2020⁽⁴⁾



- Mulesed (M, AA): 57%
- High mulesing risk (ND): 26%
- Freeze mulesing risk (NM, CM): 18%

NUMBER OF BRANDS AGAINST MULESING - FOUR PAWS LIST⁽³⁾



Australian National Wool Declaration (NWD) Definitions⁽²⁾

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 does not include freeze mulesing (steining).

(1) WTO, 2021 - Market Information. Edition 16. [Link](#).

(2) AWEX website “Mulesing Status” - accessed on June 15, 2021. [Link](#).

(3) Four Paws website “Timeline to End Mulesing” and “Brands Against Mulesing” - accessed on June 15, 2021. [Link](#) and [Link](#).

(4) AWEX, 2020 “NWD Wool Market”. [Link](#).

Virgin Wool - Sheep Wool

Land, biodiversity, regenerative practices, carbon sequestration

The majority of fiber animals are kept in extensive, free-ranging, pasture-based systems. The management of land is therefore a key consideration.

Grazing management for fiber producing animals can degrade soil but using regenerative methods can not only arrest degradation but also improve soil health. The vegetation coverage, diversity of species in the sward, timing of grazing, stocking rates and use of manures and other inputs can all be monitored and managed to deliver a positive outcome. Regenerative livestock management not only has the potential to deliver better soil health and better quality and quantity of vegetation for grazing (and thus better animal welfare) but it also has the potential to mitigate greenhouse gas emissions from grazing livestock through carbon sequestration and therefore reduce the carbon footprint of animal fibers.

Transitioning to regenerative practices is going to require collaboration and financial support. This need for funding has been recognized by governments and the private sector as the examples below show:

The **Australian Government** has introduced a \$34 million Agriculture Stewardship Package focusing on biodiversity. Part of the [Agriculture Biodiversity Stewardship Pilot Program](#) will be to make grants available to incentivize the adoption of improved biodiversity practices on farms.

In 2021 the global luxury group Kering, working with Conservation International, launched the [“Regenerative Fund for Nature”](#) to transform one million hectares of farms and landscapes producing raw materials in fashion’s supply chains to regenerative agriculture over the next five years. This fund intends to provide grants to farmers, NGOs and key stakeholders who are on the frontlines of developing and scaling agricultural change on the ground.

Outside of these funding initiatives there are many groups already working with farmers to deliver regenerative solutions. As well as working with a network of RWS certified sheep wool producers in Argentina, Chile and Uruguay, [Ovis 21](#) has trained over 700 people in holistic, regenerative land management. The earlier work of Ovis 21 led to the development of the [Savory Institute’s Ecological Outcome Verification \(EOV\)](#), an empirical soil and landscape assessment methodology. EOV underpins the [Land to Market](#) program that offers a range of products from foodstuffs to leather and fiber. Ovis 21 has over 400,000 ha of land with the EOV seal and is able to market regenerative wool.

[Fibershed](#), a California based organization, develops regional fiber systems to build soil and protect the health of the biosphere. Fibershed is the initiator of the [Climate-Beneficial™ wool](#) program, which is grounded in an effort to scale the implementation of Carbon Farming to create carbon sinks.



Virgin Wool - Sheep Wool

Supplier update

Preferred wool is based on the commitment and support of leading suppliers.

Textile Exchange Member Action

[Chargeurs Wool](#) is an internationally operating company that supplies RWS merino wool. Read more in this [interview](#).

[Shaniko Wool Company](#) was established to continue the work of their family ranch (**Imperial Stock Ranch**) and others like them, in supporting the use of wool. At the request of a leading outdoor recreation brand, Shaniko has been involved with the RWS since 2015. They were a pilot audit site in 2015, and the following year, they were the first ranch in the world to receive RWS certification. Working with additional ranches and scaling the effort, Shaniko Wool Company is an approved USA Group supplier of RWS wool. In 2020, Shaniko launched its Shaniko Wool Carbon initiative. Read more in this [interview](#).

Tip: How to find suppliers of preferred wool

Check out the [Textile Exchange database](#) for certified suppliers of RWS certified suppliers.

Other key suppliers of RWS certified wool include:

- [BKB](#), a wool broker operating in South Africa and Lesotho and the leading producer of RWS certified wool globally.
- [Fox and Lillie](#), one of the largest buyers and exporters of Australian wool operating a rapidly expanding RWS farm group.
- [Fuhmann](#), part of the Schneider Group and based in Argentina, managing 11 farms and combing 9 million kg of wool per year, including organic and RWS certified wool.
- [Lanas Trinidad](#), jointly owned by Chargeurs and the Otegui Family and main producer and exporter of combed wool tops in Uruguay, operating an RWS farm group that is rapidly growing.
- [Ovis 21](#), a network of more than 160 producers and professionals in Argentina, Chile, and Uruguay who seek to change the paradigm of farming from extractive to regenerative, working with over one million sheep.
- The [Schneider Group](#) is adopting the RWS in their Authentico program and all Authentico top making facilities and several Authentico farms are now RWS certified.



Photo (right): Fuhmann

Virgin Wool - Mohair

Mohair is the hair of the angora goat (not to be confused with the angora rabbit which produces Angora wool). In 2020, around 4,320 tonnes of raw mohair fiber were produced globally. Around half of the global mohair (2,160 tonnes) was produced in South Africa. The remaining mohair was produced in Lesotho (740 tonnes), Turkey (460 tonnes), Argentina (360 tonnes), USA (230 tonnes), New Zealand (30 tonnes), Australia (10 tonnes), and other countries (330 tonnes)⁽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. They provided background information on the principles, criteria, and indicators supported by self-assessment checklists.

The [Responsible Mohair Standard \(RMS\)](#) is the evolution of the increasing importance and demand for an independent, third-party audited, international standard.

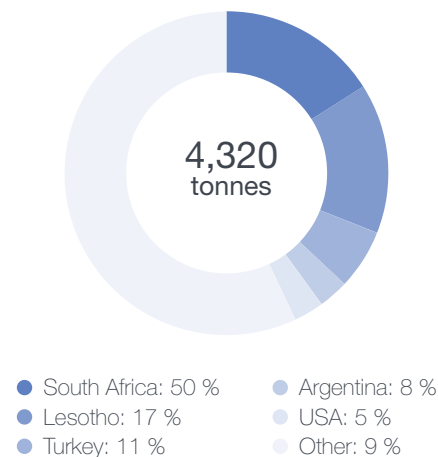
In response to requests from stakeholders, Textile Exchange launched the RMS 1.0 in 2020. It is based on the existing Responsible Wool Standard, which was released in 2016.

The market share of the RMS reached an impressive 27 percent of the global mohair production in 2020, the first year of its existence.

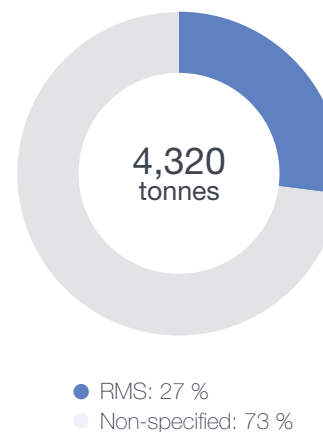
All of these RMS fibers were produced in South Africa where the market share of RMS was even 53 percent of the market. It is expected that the RMS has further grown in the meantime both in South Africa and other mohair producing countries and its market share is likely to be higher in 2021.

[Certified Wildlife Friendly® \(CWF\)](#) mohair had a production volume of 16 tonnes of greasy mohair, out of which 0.5 tonnes of clean mohair were sold as CWF in 2020. All CWF mohair was produced in Argentina in 2020.

GLOBAL MOHAIR PRODUCTION BY COUNTRY 2020



GLOBAL MARKET SHARE OF RESPONSIBLE MOHAIR STANDARD (RMS) IN 2020⁽¹⁾



⁽¹⁾ Mohair South Africa - received by email on 21 June 2021.

Virgin Wool - Mohair

Supplier Insights

Textile Exchange Member Action

[Mohair South Africa](#) is the organization that represents the South African mohair industry. It has been actively involved in the development of the new Responsible Mohair Standard and is supporting the industry in the implementation of the RMS.

[Margarete Steiff GmbH](#), the 120-year-old teddy bear company, partnered with Katharine Hamnett, London-based fashion designer, to produce Bio-Fur. The new “bio-fur” is made from mohair fiber trapped in a cotton backing fabric. It is an alternative to synthetic faux fur and biodegradable. The mohair is sourced from farms in South Africa.

Tip: How to find suppliers of preferred mohair

Check out the [Textile Exchange database](#) for RMS certified suppliers.

Other key suppliers of RMS certified mohair include:

- [BKB](#), a wool and mohair broker operating in South Africa and Lesotho is a leading supplier of RMS mohair globally.
- Cape Mohair & Wool (OVK), part of the [OVK](#) group of companies, and the mohair handling and marketing leader in South Africa and worldwide. Around 50 percent of all the mohair produced globally passing through OVK's handling and warehouse facilities. OVK is also a leading supplier of RMS mohair.
- The [House of Fibre](#) is a leading mohair and wool broker and supporter and supplier of the RMS.
- The [Stucken Group](#) in South Africa is a vertically integrated niche-focused processor and trader of South African Wool and Mohair and key supplier of RMS mohair.
- [South African Mohair Industries Limited \(SAMIL\)](#) is a leading trader of mohair from South Africa and a key supplier of RMS mohair.

The [Mohair Empowerment Trust](#) is another key organization for supporting the implementation of the RMS.



Virgin Wool - Cashmere

Cashmere is the hair of the Cashmere goat. Around 25,208 tonnes of greasy cashmere fiber were produced globally in 2020⁽¹⁾. Around 60 percent of the cashmere was produced in China, 20 percent in Mongolia, and the remaining 20 percent in other countries⁽²⁾.

The global market share of preferred cashmere increased from 0.8 percent in 2019 to 7 percent in 2020 with a production volume of 1,748 tonnes⁽³⁾.

[Agronomeset Vétérinaires Sans Frontiers](#) (AVSF) greasy cashmere fiber production increased from 50 tonnes in 2019 to 60 tonnes in 2020. The AVSF project, located in the Bayankhongor province in Mongolia, involved 7 cooperatives including 360 herder families and covered 6 million hectares of land with 155,000 goats in 2020⁽³⁾.

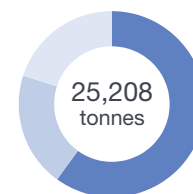
[THE GOOD CASHMERE STANDARD®](#) (GCS) by the Aid by Trade Foundation (AbTF), just developed in 2019, covered 1350 tonnes of greasy cashmere fiber produced by 4756 herder families and almost 2 million goats in China in 2020⁽³⁾.

The [Responsible Nomads](#) (RN) program, previously referred to as Green Gold and Animal Health program⁽⁴⁾, covered 5000 herder families organized in 1600 pasture groups and 76 cooperatives on 18 million hectares of land in 18 provinces in Mongolia in 2020. The greasy cashmere production volume increased from 50 tonnes in 2019 to 180 tonnes in 2020. 5 million hectares of land have been rehabilitated through this program in 8 years⁽³⁾.

The [Sustainable Fiber Alliance](#) (SFA) with its SFA Cashmere Standard covered 4104 herder families organized in 41 producer groups producing 138 mt of greasy cashmere fiber from 498,543 goats in 2020, independently assessed as compliant with the standard. The total cashmere produced by all registered herders including not independently assessed ones was 267 tonnes in 2020⁽³⁾.

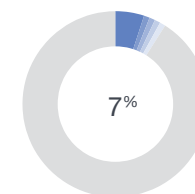
The [Wildlife Conservation Society](#) (WCS) program covered 131 herder families with 45632 goats organized in 2 cooperatives producing 20 tonnes of greasy cashmere fiber in 2020⁽³⁾.

GLOBAL CASHMERE PRODUCTION BY COUNTRY 2020



- China: ~ 60 %
- Mongolia: ~ 20 %
- Other: ~ 20 %

GLOBAL MARKET SHARE OF PREFERRED CASHMERE IN 2020



- GCS: ~5.36%
- RN: ~0.71%
- SFA: ~0.55%
- AVSF: ~0.24%
- WCS: ~0.08%
- Unspecified: ~93.07%

CASHMERE PRODUCTION BY PROGRAM (IN TONNES)



(1) WTO, 2021 - Market Information, Edition 16. [Link](#).

(2) The Schneider Group, 2019 - Annual Cashmere Market Report 2018. [Link](#).

(3) Textile Exchange compilation based on data provided by the program(s): AVSF, GCS, RN, SFA, WCS. 2019 figure for SFA estimated as no data available.

(4) 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. Green Gold is handing over the management of the Green Gold Sustainable cashmere certification project to the MNFPUG.

Virgin Wool - Cashmere

Overview

In response to interest and queries from brands, Textile Exchange established the [Responsible Cashmere Round Table \(RCRT\)](#) in March 2019 with the aim to better understand the issues and opportunities surrounding global cashmere production, as well as to have a collective voice in the development of any market-based solutions. Since 2020, the RCRT is part of the new [Animal Fibers Round Table \(AFRT\)](#) which brings together the different animal fiber round tables into one joint Round Table covering all animal fibers. Many important topics for animal welfare and land management cut across different animal species and fibers so a single Round Table gives all stakeholders access to relevant information as well as the chance to collaborate and exchange knowledge.

Over two dozen global brands have signed a statement of support for the establishment of the **Mongolia Sustainable Cashmere Platform (MSCP)**, a national-level umbrella mechanism with collaborative leadership and facilitated by the **United Nations Development Program (UNDP)**.

The Platform has four key objectives in its two-year Collection Action Plan:

1. To formulate and implement a collective action plan that addresses the root causes limiting the sustainability of cashmere in Mongolia.
2. To influence and harmonize government policy that ensures a strong and coherent legal and institutional framework for sustainable cashmere in Mongolia.
3. To establish partnerships and coordinated investments and actions that accelerate current efforts.
4. To position Mongolia as a global leader for sustainable cashmere.

Textile Exchange is leading the Market Sector Advisory group (MSA), which brings together several cashmere buyers that will provide valuable input and guidance into the work of the Platform (MSCP). Its first meeting was held on June 11, 2020.



Virgin Wool - Alpaca

Overview

Alpaca fiber is the hair that has been gathered from alpacas. Alpaca, a South American camelid, is native to Peru. Historically, alpaca fiber was reserved for royalty due to its fine micron range of 12 μ to 14 μ . Today, the majority of alpaca still live in the highlands or Peru at an average of 11,000 to 16,000 feet (3,500 to 5,000 meters). About 4 million alpacas live in Peru, with the other small percentage residing in other countries such as Bolivia, Australia, UK, and the US. The vast majority of alpaca are classified under the Huacayo breed (95 percent), while the remaining are classified as Suri (5 percent). Huacayo fleece is the main variation used in textile and knitwear production. The current supply chain is centralized in Peru, where around 90 percent of the processing is condensed through two main suppliers who have vertically integrated processing operations. There are a number of smaller producer groups that operate independently. More than 90 percent of all fiber produced in Peru comes from smallholder farmers. These farmers have on average 45 animals. This fiber is currently collected and sold by middlemen and then processed by the two large processors⁽¹⁾.

The global alpaca production volume was around 6,000 tonnes in 2020⁽²⁾.

Key standards

The Responsible Alpaca Standard (RAS), 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, was launched in April 2021.

Alpaca farming has a high animal welfare potential due to a husbandry system 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 at the farm. Through production, chain of custody certification ensures that the fiber from certified farms is properly identified and tracked. The RAS will join the Responsible Animal Fiber (RAF) framework along with the Responsible Wool and Mohair Standards. Visit the RAS website [here](#).



(1) Minagri, 2019 - Potencial productivo y comercial de la alpaca. [Link](#).

(2) IWTO, 2021 - Market Information. Edition 16. [Link](#).

Virgin Wool - Other Wool

Overview

Further wool - 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 mohair which is the hair of the angora goat). 90 percent of Angora is produced in China. Europe, Chile and the USA also produce smaller quantities. Several major brands and retailers have banned Angora due to animal welfare concerns.

Camel hair is the hair of camels. Major suppliers of camel hair are Mongolia, Tibet, Afghanistan, Iran, Russia, China, New Zealand and Australia.

Guanaco, Llama and Vicuna are camelids mainly found in South America. Their hair is used as wool. While llamas are raised domestically, guanacos and vicunas are two wild camelids, which are relatives to the llama and alpacas and live in the high alpine areas of the South American Andes. They are usually caught from the wild to be shorn. Their extremely fine wool is thus very expensive.

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

Examples of initiatives

The [Mongolian National Chamber of Commerce and Industry](#) announced in a press release the development of a cluster to manufacture products from yak and camel wool as part of the European Union funded project "Trade Related Assistance for Mongolia (EU TRAM)."

[Shokay](#) is a social enterprise in China that works with farmers on the Tibetan plateau to promote yak wool.

As part of a poverty alleviation project [Orient Hongda](#) have also been working on sustainable yak farming encompassing environmental management, animal welfare, and social factors.

Textile Exchange has initiated research into yak farming practices and how yak could fit into the Textile Exchange animal welfare framework.



Recycled Wool

Recycled wool has a long tradition. With an estimated production volume of around 70 thousand tonnes⁽¹⁾, the market share of recycled wool is estimated at around 6 percent of the total wool market⁽²⁾.

The Italian district of Prato is a major producer of recycled wool, where approximately 22,000 tonnes of wool are recycled every year⁽³⁾. Other major production centers for wool recycling are Panipat in India and China.

Recycled standards

The key standards for recycled wool are the **Recycled Content Standard (RCS)**, **Global Recycled Standard (GRS)**, and **Cardato Recycled** for recycled wool from Prato in Italy.

Please see the page on "[Sustainability Standards](#)" for more information.



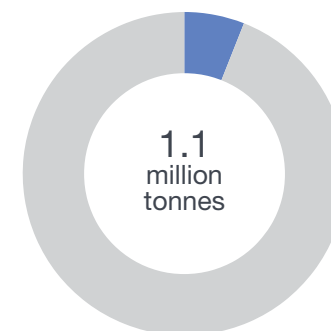
Textile Exchange Member Action

[Geetanjali Woollens](#) is a 40 year old company that has been recycling post consumer used clothing for as many years. It is Global Recycled Standard (GRS) certified. Geetanjali Woollens offers, amongst other recycled fibers, recycled sheep wool and recycled cashmere. More in this [interview](#) and the [supplier mapping](#).

Tip: How to find suppliers of recycled wool.

Check out the [Textile Exchange database](#) for a list of RCS and GRS certified suppliers. The [Cardato Recycled website](#) provides a list of certified recycled wool suppliers from Prato.

GLOBAL RECYCLED WOOL MARKET SHARE 2020



- Recycled wool: 6 % - 0.07 million tonnes
- Virgin wool: 94 % - 1.03 million tonnes

(1) maia research, 2021 - Global Recycled Wool Market Report 2021. Customized report.

(2) IWTO, 2021 - Market Information. Edition 16. [Link](#).

(3) Cardato, 2015 - website. [Link](#).

Commitments to Preferred Wool

Examples

An increasing number of brands and retailers are committed to preferred wool, such as RWS, organic, or recycled wool.

Examples of public commitments by Textile Exchange members

Allbirds has committed to sourcing 100% regenerative wool by 2025. More information [here](#).

Arc'teryx is working to transition its wool supply to the RWS. More information [here](#).

Armedangels uses organic raw wool which is RWS certified. More information [here](#).

BESTSELLER has committed to sourcing 100 percent RWS by 2025. More information [here](#).

Eileen Fisher has published the objective that all suppliers will source wool that meets the Responsible Wool Standard (RWS). More information [here](#).

Esprit has made the commitment that 50 percent of their wool will be certified according to the Responsible Wool Standard by 2022. More information [here](#).

H&M is committed to using 100 percent Responsible Wool Standard certified, recycled or regenerative wool in their products by the end of 2025. More information [here](#).

IKEA committed to transforming all wool to 100 percent Responsibly Sourced Wool by 2025. More information [here](#).

Kmart Australia has the target that 100 percent of wool used in their own Kmart-branded (Anko) clothing and bedding will be either: farms certified under the Responsible Wool Standard or equivalent standard; or farms that are fully traceable and verified as non-mulesed; or from recycled wool materials by July 2023.

Index has committed to 100 percent either RWS certified, recycled or derived from responsible agricultural practices by 2025. More information [here](#).

Marks & Spencer have committed to use 50 percent recycled or RWS certified wool by 2025. More information [here](#).

Patagonia is committed to 100 percent RWS as a baseline requirement. As of Fall 2018, all the wool in their products is RWS certified, from farm to finished product. More information [here](#).

Ralph Lauren committed in 2019 that 100 percent of its wool will be RWS certified or recycled by 2025. Ralph Lauren is also committed to 100 percent Sustainable Fiber Alliance certified cashmere in 2025. More information [here](#).

Target said that by July 2023, 100 percent of wool used in its own Target-branded clothing and bedding will be either from farms certified under the Responsible Wool Standard or equivalent standard, from farms fully traceable and verified as non-mulesed, or from recycled wool materials.

Further brands that have made public commitments to the Responsible Wool Standard are William-Sonoma, Inc., Eddie Bauer, REI, Tchibo, Varner, Coyuchi, Mountain Equipment Co-op, Kathmandu, and Knowledge Cotton Apparel. Among companies that have expressed support of the standard and are working toward implementation are LL Bean, Indigenous Designs, and prAna.

Other examples

Deckers Outdoor has set a target to use 100 percent recycled or RWS certified wool by 2022. More information [here](#).

“ We want others to join us and help us transform the wool industry together⁽¹⁾.

– Rafael Elizondo,
Category Manager for
Textile Carpets at IKEA

Make a Standards Commitment

Whether you have already made a commitment to one or more of Textile Exchange's Standards, or you want to share a new one, you may [use this form to register details of your commitment\(s\)](#).

(1) IKEA, 2021 - Website. [Link](#).

Silk



Silk

A global overview

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

In 2020, around 63 percent of all silk was produced in China. The second-largest producer was India, with a market share of 33 percent. This means that China and India together produced around 96 percent of all silk worldwide in 2020⁽²⁾.

Around 109,111 tonnes of silk was produced in 2020⁽²⁾. Silk production volumes more than doubled from 1990 to 2019 but saw a decrease over the last five years⁽²⁾.

Preferred silk options include organic, ahimsa, fair trade, wildlife friendly and recycled silk.

Standards used for preferred silk 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). Certified Wildlife Friendly® and the World Fair Trade Organization (WFTO) are other options. For recycled silk, the Global Recycled Standard (GRS) and the Recycled Claim Standard (RCS) can be used.

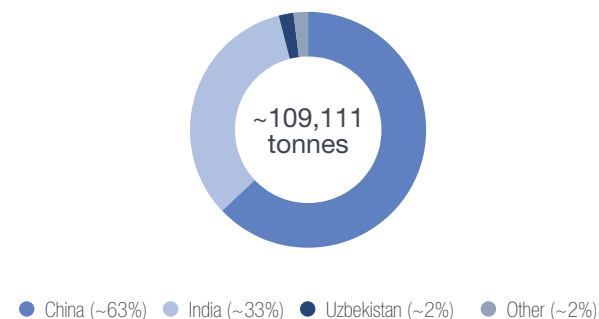
The [Certified Wildlife Friendly® \(CWF\)](#) silk was produced by 210 farmer families of the Sepali farmer cooperative in Madagascar, resulting in a production volume of 503 kilograms of raw ahimsa silk in 2020⁽³⁾. The farmers support the rainforest ecosystems and earn income while building a protective barrier forest around the Makira Protected Area. More about the Wildlife Friendly Enterprise Network, the organization behind CWF, in this [interview](#).

Textile Exchange member action

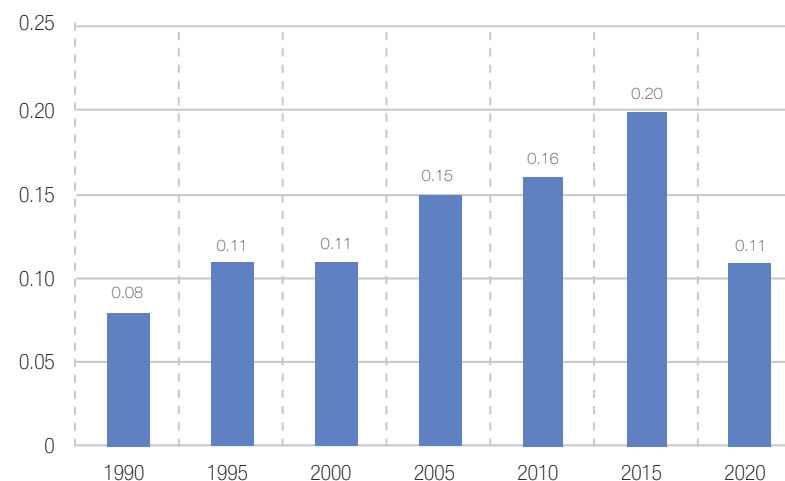
[Takiho](#), a Japanese company, has started an Eri Silk project that provides additional income to support cassava farmers in Thailand. The cassava plants are cultivated for their roots, an important source of food, and the leaves of the plants are used to feed the silkworms. The fecal byproduct is used as fertilizer for cultivating the cassava plants, and the pupa can be sold as food, for cosmetics, or medicine once the silk is harvested. More in this [interview](#).

[Triaz GmbH](#) supports and owns 50 percent of **Sichuan OTEX Textiles**, producing around 30 tonnes of organic silk filament in China a year. More in this [interview](#).

SILK PRODUCTION 2020⁽²⁾



GLOBAL SILK FIBER PRODUCTION (MILLION TONNES)⁽²⁾



300,000 households
are estimated to be involved in the production of raw silk⁽¹⁾

(1) DNFI, 2020 - Website, [Link](#).

(2) Inserco, 2020 - Website, [Link](#), 2020 data assumed to be similar to previous years as 2019 data were not yet available at the report launch.

(3) Certified Wildlife Friendly®, 2021 - email correspondence.

Leather



Virgin Leather

A global overview

The global leather production - measured in weight of fresh hides - was more than 12.5 million tonnes in 2020⁽¹⁾. The hides and skins of over 1.4 billion animals were used for leather production in 2020⁽¹⁾.

Cattle hides were the most used type of hides with 8.6 million tonnes in 2020, accounting for around two thirds of the leather production. China was the largest producer of cattle hides accounting for 17 percent of the global cattle hides production in 2020, followed by the USA with 14 percent, Brazil with 13 percent, and Argentina with 7 percent.

Sheep hides were the second most used type of hides with a production of around 1.9 million tonnes in 2020. Largest producers were China with 31 percent, Australia with 9 percent, and New Zealand with 5 percent of the global sheep hides production.

Goat hides were the third most used type of hides and had a production volume of 1.2 million tonnes in 2020. Largest producers were China with 38 percent, Pakistan with 10 percent, and India with 8 percent of the global goat hides production.

Buffalo hides accounted for around 0.8 million tonnes in 2020. The largest producers were India with 44 percent, China with 23 percent, and Pakistan with 17 percent of the global buffalo hides production volume⁽¹⁾.

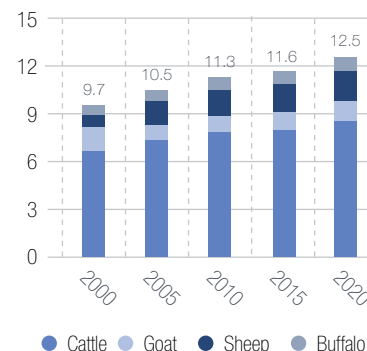


Textile Exchange Member Voices

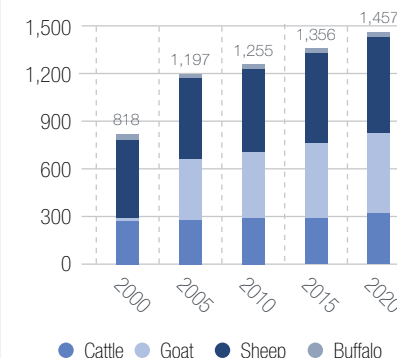
Animal hides are a major by-product of the meat and dairy industry. As long as the consumption of meat and dairy products is an undeniable fact, there is nothing more meaningful than to use these hides - instead of burning them- and to process the resulting leather as a positive natural material with unique and irreplaceable properties.

Nina Conrad,
Leit and Held

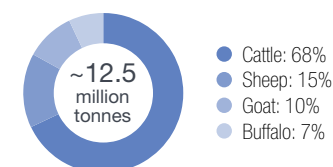
GLOBAL HIDES PRODUCTION (IN MILLION TONNES) ⁽¹⁾⁽²⁾



GLOBAL LEATHER PRODUCTION (NUMBER OF HIDES IN MILLION) ⁽¹⁾



GLOBAL LEATHER PRODUCTION FRESH HIDES BY TYPE IN 2020⁽²⁾



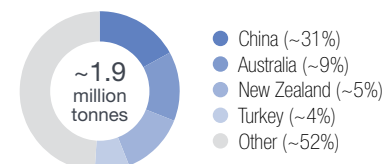
CATTLE

FRESH HIDES BY COUNTRY IN 2020⁽²⁾



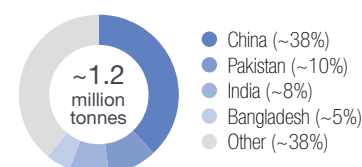
SHEEP

FRESH HIDES BY COUNTRY IN 2020⁽²⁾



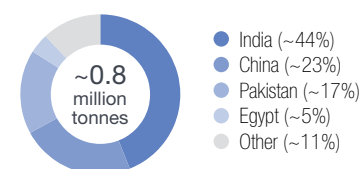
GOAT

FRESH HIDES BY COUNTRY IN 2020⁽²⁾



BUFFALO

FRESH HIDES BY COUNTRY IN 2020⁽²⁾



(1) FAOStat. Accessed in June 2021. [Link](#). Including fresh cattle hides, buffalo hides, goat skins, and sheep skins. Other types of hides and skins not included. 2019 data used as estimate for 2020 as 2020 data were not yet available at report launch.

(2) FAOStat. Accessed in June 2021. [Link](#).

Virgin Leather

A global overview

Concerns about animal welfare and environmental impacts of livestock and leather production have led to increasing awareness and demand for more sustainable leathers. Recently, social risk in the leather supply chain received increasing attention as well.

The Responsible Leather Round Table

In 2017, Textile Exchange began an initiative to focus on leather in response to demand from brands. Textile Exchange has pulled together over 400 stakeholders from all parts of the industry, including brands, farmers, and suppliers, as well as NGOs, international organizations, and special interest groups. In 2018, the [Responsible Leather Round Table \(RLRT\)](#) was launched, a platform where everyone can participate, share information and contribute to implementing a collective plan and action towards tackling the industry impacts on climate, environment, people and animals.

The Leather Impact Accelerator

With the RLRT, an International Working Group was formed that has led to the development of the [Leather Impact Accelerator \(LIA\)](#), which was launched in January 2021 and is being piloted over the year. LIA is a program developed by Textile Exchange to address all the major sustainability challenges throughout the bovine leather supply chain from farm to finished leather. In its first version, LIA is focusing on deforestation/conversion-free (DCF) and animal welfare at farm level, environmental and social risks at leather processing and traceability.

An innovative component of LIA is the Impact Incentives, a book and claim system which allows brands purchasing Impact Incentives to reward cattle farmers that meet the LIA requirements for DCF and/or animal welfare. In this manner, farmers that meet the LIA DCF requirements for instance, and are thereby preserving forest-land, will be rewarded and recognized for the environmental services they are delivering but also be financially compensated for a loss in revenue, since the land cannot be used for grazing.

The piloting of the Impact Incentives has already led through the Impact Partnership formed with Produzindo Certo in Brazil to the development of an animal welfare standard for cattle production in cooperation with the Brazilian certifier Serviço Brasileiro de Certificações (SBS).

Textile Exchange is looking into possibilities to extend the Impact Incentives trading model to a larger spectrum of responsible fibers and materials.

LIA includes two standard benchmarks to identify and leverage environmental and social standards used by the leather production supply chain (all production stages between beamhouse and finished leather).

In order to address supply chain mapping and environmental and social risks in leather production stages, LIA encourages brands through its Corporate Commitments to commit to mapping their leather supply chain down to slaughterhouse and ensuring that all suppliers from beamhouse to finished leather are certified to an environmental and a social standard approved through the LIA standards benchmarks.

Call to action

Join the [Responsible Leather Round Table](#) and explore the use of Impact Incentives to provide direct financial support to farmers that meet Leather Impact Accelerator (LIA) deforestation/conversion-free (DCF) and/or Animal Welfare requirements.

Virgin Leather

A global overview

Responsible Wool Standard (RWS) for sheep skin and leather

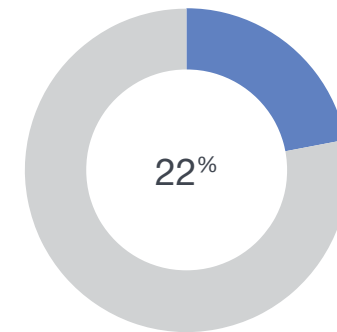
The release of [RWS 2.0](#) in March 2020 introduced a new optional slaughter module. Where this module is applied and the chain of custody is maintained, claims about the RWS origin of sheep skin and leather can be made.

The Leather Working Group (LWG) for manufacturing facilities

The [Leather Working Group \(LWG\)](#), formed in 2015, is a multi-stakeholder group with over 1000 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 2020, approximately 4 billion square foot of wet blue leather and around 5.4 billion square foot of finished leather were produced in the 733 leather production facilities audited by LWG. The market share of LWG leather increased from 19 percent of the global total finished leather production in 2019 to 22 percent in 2020⁽¹⁾.

GLOBAL MARKET SHARE OF THE LEATHER WORKING GROUP (LWG)

% OF GLOBAL FINISHED LEATHER IN 2020⁽¹⁾



- The Leather Working Group: ~22% (5.4 billion square foot)
- Other: ~78% (19 billion square foot)

(1) LWG, 2021 - Email correspondence. Global leather production estimated based on FAO and further sources. 2019 is referring to the 2019/20 LWG year and 2020 to the 2020/21 LWG year.

Recycled Leather

An overview

Around 800 thousand tonnes of leather waste is produced annually⁽¹⁾. Recycled leather plays a role in diverting materials from the waste stream.

Most recycled leather is made from pre-consumer production scraps and made into bonded leather, 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 alternative to virgin leather.

Textile Exchange member action

[Nike Flyleather](#) is an engineered material made by binding at least 50 percent reclaimed leather fibers together, combined with synthetic materials, using a water-powered process.

[Sustainable Composites](#) has developed **enspire leather®**, made with waste leather converted into RCS certified leather fiber-based sheets or rolls which contain between 60 and 80 percent recycled material content. More in the [supplier mapping](#) and this [interview](#).

Leather-based fibers

In 2020, [Spinnova and KT Trading](#) - the leather partner to global shoe brand ECCO, announced their new partnership to produce **Respin**, a fiber made from leather waste. The pilot scale production is scheduled to start at the end of 2021.

RenTec.one is using Leather Waste for the creation of non-woven and woven fabrics. More in the [supplier mapping](#).



(1) UNIDO 2000 - Wastes generated in the leather products industry.

Commitments to Preferred Leather

Examples

A growing number of companies are committed to using preferred leather, defined as leather with more sustainable properties at farming level (deforestation-free, animal welfare considerations) and processed more responsibly (better environmental and social management in production facilities, the use of more sustainable processing technologies).

Commitments to biodiversity, animal welfare and deforestation-free leather

71 fashion brands have signed a pledge called the [G7 FashionPact](#) by April 2021⁽¹⁾. The commitment is built on three pillars: climate, biodiversity, and oceans. All signing brands should develop strategies connected to each pillar. The biodiversity pillar includes animal welfare as one of the aspects to consider in their strategy.

Companies are starting to make efforts to **eliminate deforestation** from their supply chains, and are working with global references, such as the Accountability Framework. Commitments related to the **UNFCCC, Fashion Pact, New York Declaration on Forests, Amsterdam Declaration Partnership, and the Consumer Goods Forum Zero Net Deforestation Commitment** are further examples. Eliminating deforestation and improving grazing practices can also be important measures to contribute to the Sustainable Development Goals (SDGs).

As the number of **commitments to the SDGs** is increasing, a collaboration between the leather and beef industry is expected to accelerate the progress made.

Investor groups, environmental groups and consumers already focus on how the beef industry can help meet the SDGs, particularly SDG 15 “Life on Land” and SDG 13 “Climate Action,” through eliminating deforestation

and following improved grazing practices. Leather is linked to the same impacts, cross-sectoral learning and collaboration with the beef industry is the best option to accelerate changes required to meet the SDGs. The Leather Impact Accelerator (LIA) tool, which is being developed by **Textile Exchange**, **supports the industry to drive progress towards the SDG goals through the leather value chain.**

Several big corporations have strong **animal welfare policies**, that cover all their animal-derived fibers and materials. To ensure that these policies are indeed implemented in the supply chains, good knowledge of the actors in one's supply chain and robust management systems are required.

Textile Exchange's [Leather Impact Accelerator \(LIA\)](#) tool was launched in 2021 and is being piloted over the year. The program supports the industry to drive progress towards the SDG goals with a focus on deforestation and animal welfare at the farm level of the leather value chain.

Make a LIA Corporate Commitment

Review the [LIA Corporate Commitment Guide](#) and [use this form to register details of your commitment\(s\)](#).

Commitments to more responsible leather processing

Several companies also started to set targets for more responsible leather processing. Several companies have, for example, set a target to source 100 percent of their leather from Leather Working Group (LWG) certified suppliers.

Examples of public commitments by Textile Exchange members

Adidas, Bestseller, Burberry, Chanel, Everybody & Everyone, FashionCube, Gant, H&M, Inditex, Kering, Gap, Nike, Nordstrom, Puma, PVH, Selfridges, Stella McCartney and others have signed the G7 FashionPact commitment as of April 2021.

H&M, Timberland, Vans, and VF Corporation, for example, are committed to deforestation-free leather and put a temporary ban on leather from Brazil in 2019. This ban is in response to the fires in the Amazon area which are also linked to the cattle production.

ASOS is committed to only sourcing leather from tanneries that have a LWG audit. More [here](#).

Ralph Lauren committed to sourcing from 100 percent LWG-certified leather suppliers by 2025. More [here](#).

Ted Baker has set the target that 100 percent of their leather is to come from LWG or equivalent certified tanneries by 2025. More [here](#).

(1) The Fashion Pact, 2021 – website. [Link](#).

Manmade Cellulosic Fibers



Manmade Cellulosic Fibers

Photo: PEFC International

Virgin Manmade Cellulosic Fibers

Production facts and figures

With an annual production volume of around 6.5 million tonnes, manmade cellulosics fibers (MMCFs) had a market share of about 6 percent of the total fiber production volume⁽¹⁾.

Compared to a production volume of 7.1 million tonnes in 2019, this is a decline by around 8 percent caused by the COVID-19 pandemic⁽¹⁾.

The longer term trend shows a clear growth of the MMCF market. The global MMCF production volume has more than doubled from around three million tonnes in 1990 to approximately 6.5 million tonnes in 2020 and is expected to further grow in the coming years⁽¹⁾.

MMCFs include viscose, acetate, lyocell, modal, and cupro.

Viscose is the most important MMCF with a market share of around 80 percent of all MMCFs and a production volume of around 5.2 million tonnes in 2020⁽¹⁾.

Acetate has a market share of around 13 percent of all MMCFs with a production of approximately 0.9 million tonnes in 2020 but it is mainly used for non-textile applications⁽²⁾.

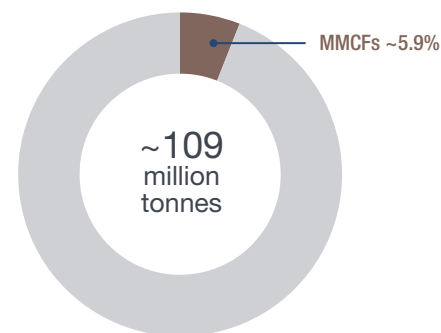
Lyocell was the third most used MMCF type after viscose and acetate in 2020. It had a market share of around 4 percent of all MMCFs in 2020 with a production volume of around 0.3 million tonnes⁽¹⁾.

Modal had a market share of around 3 percent of the total MMCF market in 2020 with a production of around 0.2 million tonnes⁽¹⁾.

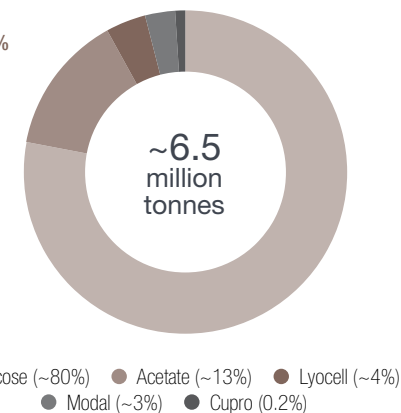
Cupro had a market share of around 0.2 percent of the total MMCF market. There was only one supplier of cupro producing around 0.02 million tonnes in 2020.

Manmade cellulosic fibers are currently primarily produced from wood. Less than one percent is currently made from recycled or other alternative feedstock.

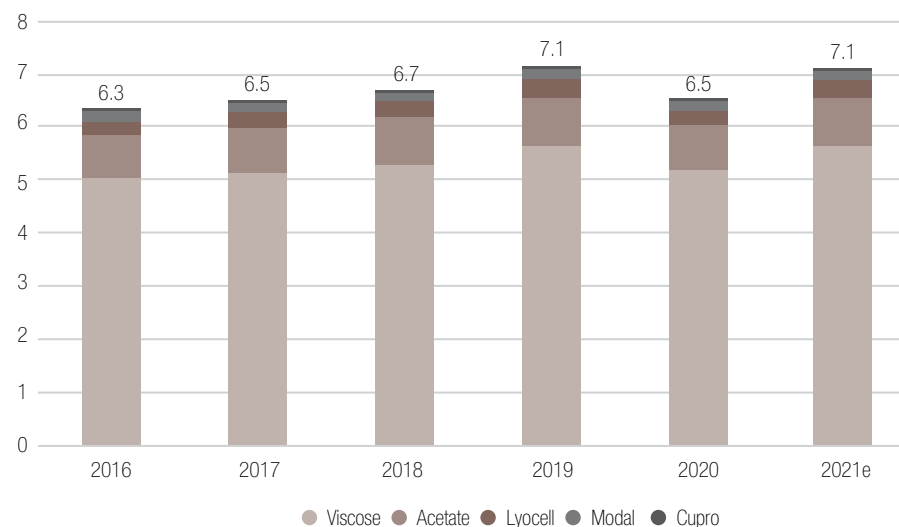
GLOBAL MARKET SHARE OF MMCFs IN 2020



SHARE OF MMCFs BY TYPE IN 2020



GLOBAL MANMADE CELLULOSIC FIBER PRODUCTION (MILLION MT)



(1) maia research, 2021 - Global Manmade Cellulosic Fiber Market Report 2021 (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

The market share of FSC and/or PEFC certified MMCFs increased to around 55-60 percent of all MMCFs in 2020⁽¹⁾. While this is a significant achievement, eliminating the risk of sourcing MMCFs from Ancient and Endangered Forests such as the carbon-rich peatlands of Indonesia and old-growth boreal forests of Canada should be the minimum bar for all MMCFs.

The [CanopyStyle Audits](#) have become the leading assessment of MMCF suppliers on their raw material sourcing practices since the launch of the CanopyStyle initiative in 2013 and the first audits in 2017. In 2020, 52 percent of the global MMCF supply has been awarded by "green shirts" in the 2020 Hot Button Report and Ranking. These producers have been audited and assessed as being at low risk, or have taken substantive action to eliminate known risks of sourcing MMCFs from ancient and endangered forests. The market share of MMCF producers committed to the CanopyStyle initiative through public sourcing policies increased from around 35 percent of the global production in 2015 to 90 percent in 2020. A summary of results is published in the annual Hot Button Report⁽⁶⁾.

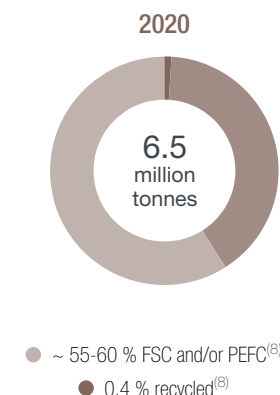
[FSC](#), founded in 1993, is an international member-led organization that sets the FSC standards for responsible forest management

and chain of custody. The first FSC certified fabrics were produced by the fiber producer ENKA and the fabric manufacturer Ghezzi S.p.a in 2017. First textile products with consumer-facing FSC labels hit the market in 2020. In the beginning of 2021, 8 companies had FSC labelled garments in the market. More in the [supplier mapping](#).

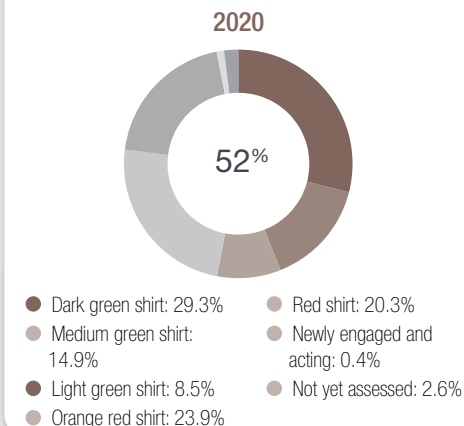
[PEFC](#), founded in 1999, is a global alliance of national forest certification systems and the largest forest certification system worldwide. Since the launch of the world's first PEFC-certified fabrics in 2018, the number of certified textile companies is increasing. In 2020, PEFC launched its new campaign and White Paper "Fashions change, Forests stay"⁽⁷⁾. More in the [supplier mapping](#).

Overall, the share of the global forest area certified to **FSC and/or PEFC** has increased from around 1 percent of all forests in 2000 around 11 percent in 2020⁽³⁾⁽⁴⁾. In total, around 8 percent of the certified forest was certified according to PEFC and its equivalents in 2020, with almost half of this being SFI certified. Around 6 percent of all forests were FSC certified. Due to the double certification of around 3 percent of all forests, 11 (and not 14) percent of all forests were certified to FSC and/or PEFC⁽⁵⁾.

MANMADE CELLULOSIC FIBERS

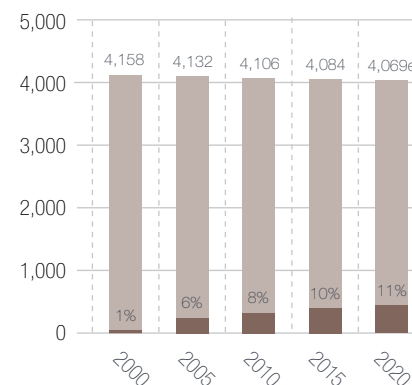


GLOBAL MARKET SHARE OF MMCF PRODUCTION CAPACITY WITH CANOPYSTYLE GREEN SHIRTS⁽⁶⁾



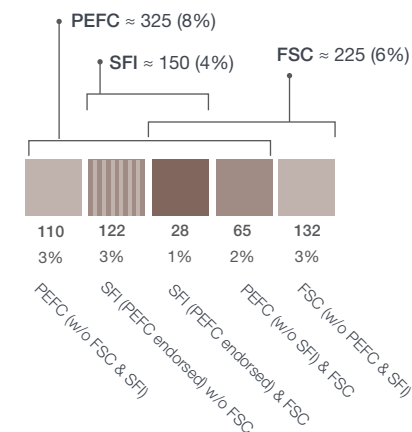
FOREST PROGRAMS

IN HA AND % OF TOTAL FOREST AREA⁽²⁾



FOREST PROGRAMS

IN HA AND % OF TOTAL FOREST AREA⁽²⁾



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

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

(3) FAO SDG 15.2.1 Progress Reporting; 2019 figures not yet available at report launch.

(4) FAOSTAT, 2021 - database. [Link](#). 2020 figures not yet available at report launch and thus 2019 figures used as proxy.

(5) Based on FSC and PEFC press releases [May 2017](#) and [February 2019](#) and [March 2021](#) and email correspondence with FSC, PEFC and SFI.

(6) Canopy, 2021 - CanopyStyle Hot Button Report 2020. [Link](#).

(7) PEFC, 2021 - Website. [Link](#).

(8) maia research, 2021 - Global Recycled Manmade Cellulosic Fibers Market Report 2021. Customized report.

Tip: How to find suppliers of MMCFs with FSC and/or PEFC feedstock - and CanopyStyle audited fiber producers

Check out the [FSC database](#) or [PEFC database](#) and the CanopyStyle [Hot Button Report](#). A list of textile-related FSC and PEFC suppliers is also included in the [supplier mapping](#).

Virgin Manmade Cellulosic Fibers

Standards for pulp and fiber

Pulp and fiber

[Bluesign](#) has developed specific criteria for fiber production that were added as Annex “[Fiber Manufacturing](#)” to its “[bluesign® Criteria for production sites](#)” in March 2020. The criteria for fiber manufacturing are applicable for the manufacturing of synthetic fibers, for example, polyester and polyamide, as well as MMCF. For MMCFs, this includes criteria for feedstock, pulp, and fiber production. One MMCF supplier has already become bluesign® system partner but no MMCFs certified to bluesign® were on the market yet in 2020.

[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 Fibers \(MMCF\) Guidelines 1.0](#) were launched, together with the [ZDHC MMCF Responsible Fiber Production Guidelines 1.0](#), the [ZDHC MMCF Interim Wastewater Guideline 1.0](#), and the [ZDHC MMCF Interim Air Emissions Guidelines 1.0](#). The initial focus of the guidelines is viscose and modal. The guidelines give suppliers producing MMCF unified criteria for measuring output indicators like wastewater, sludge, air emissions, and other process-related parameters. They also offer an aligned approach for the recovery of Sulphur compounds, part of the inputs, as well as by-products generated during the production process. Fiber producers are expected to engage on a continuous improvement roadmap defined by 3 levels of foundational,

progressive and aspirational. Dissolving pulp production process will be considered at a later stage.

Further standards that can be used for 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 the production in compliance with the [EU BREFs \(BAT Reference Documents\)](#).

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

Textile Exchange Member Action

By July 2021, **Asahi Kasei Bemberg, Asia Pacific Rayon, Birla Cellulose, Century Rayon (Aditya Birla Grasim), Eastman Naia, Lenzing, Sateri, and TreeToTextile** were ZDHC Contributors.

Tip: How to find MMCF suppliers meeting pulp and fiber level standards.

Check out the [Bluesign® System Partner List](#), the [ZDHC Roadmap to Zero Database](#), or explore the websites of the other standards mentioned above.



Virgin Manmade Cellulosic Fibers

Supplier updates

Textile Exchange Member Action

[Asia Pacific Rayon](#) launched the APRIL2030 vision including the commitments to use 20 percent recycled textiles as feedstock for their viscose and source 100 percent of their mill's energy from renewable sources by 2030. More in this [interview](#).

[Birla Cellulose](#) worked on several sustainability initiatives in the past years. In 2020, Birla Cellulose received a “dark green shirt” in the Canopy assessment. Birla Cellulose announced in 2020 that it maps 100 percent of its forest sources on the traceability platform Greentrack™ now. More in this [interview](#).

[Eastman](#) launched Naia™, a di-acetate fiber made from wood pulp from sustainably managed plantations and produced in a near closed-loop chemical process in 2017, available as staple fiber and since 2020 also as filament. In 2020, Eastman introduced Naia™ Renew sourced from 60 percent wood pulp and 40 percent recycled polyester.

[GP Cellulose GmbH](#) operates four wood-pulp mills in the USA. Over a decade ago, GP began mapping endangered forests within its key wood fiber supply regions. Once they mapped an endangered forest, they committed not to buy wood fiber from these areas. More in this [interview](#).

[Lenzing](#) received a “dark green” shirt in the CanopyStyle 2020 Hot Button Report. In 2020, Lenzing also launched its new CarbonNeutral® certified TENCEL™ lyocell and modal fibers, based on a “reduce-engage-offset” approach to reduce the product's

carbon footprint, engage industry partners and offset unavoidable emissions. More in this [interview](#).

The joint demo plant of [Itochu](#) and [Metsä Group](#) with a nominal capacity of about 500 tonnes per annum and with the aim to demonstrate a new technology for converting paper-grade pulp into textile fibers, is in operation since late 2020. The textile fiber product name, [Kuura](#), was launched in early 2021.

[Sateri](#), part of the Royal Golden Eagle (RGE) Group, together with Asia Pacific Rayon (APR), is the world's largest producer of viscose. In 2020, it began producing lyocell as well. Its parent company, the Royal Golden Eagle (RGE) has announced plans to invest \$200 million USD over the next ten years into cellulosic textile fiber research and development including alternative feedstock. More in this [interview](#).

[Sappi](#) is a leading global provider of wood fiber products and solutions such as dissolving wood pulp. Its “Sappi Project Grow” aims to support subsistence farmers in South Africa and its Warburgia Salutaris project aims to restore the endangered pepperbark tree. More in this [interview](#).

[TreeToTextile](#), owned by H&M Group, Inter IKEA Group, Stora Enso, and LSCS Invest, is a company developing a new innovative chemical process – using forest raw material and regenerating the cellulose into a textile fiber by spinning the dissolving pulp. Stora Enso will host TreeToTextiles's demonstration plant, a EUR 35 million investment.



Virgin Manmade Cellulosic Fibers

Supporting the transition

Several initiatives are supporting the transition to preferred MMCFs. Collaboration and information are essential for successful uptake of preferred MMCFs.

Call to action

Join the [Textile Exchange Manmade Cellulosics Round Table](#). The MMCF Round Table is a network for various stakeholders interested in the sustainability of manmade cellulosics. In 2020, a new interactive online community platform was launched for the Round Table on the Textile Exchange Hub. Once a year, the in-person Global Manmade Cellulosics Round Table Summit is held during the annual Textile Exchange Conference. Driven by industry demand, the MMCF Round Table is hosting a series of webinars, sub-working groups and working on tools like the "Producer Transparency Questionnaire and Dashboard". Implementing Textile Exchange's Climate+ Strategy for MMCFs will be a main focus for the Round Table and its members.

Further initiatives

[Canopy](#) works with the forest industry's biggest customers and their suppliers to develop business solutions that address deforestation and protect forests. Read more about their [CanopyStyle Audits and Hot Button Report](#), and the [CanopyStyle Commitments and Next Generation Vision](#).

[Challenge the Fabric \(CTF\)](#), including the CTF Award, is initiated by EKMEN & Co. and the Swedish Fashion Council, in partnership with Altri, Arauco, Sanyou Group, and Södra. CTF aims at opening the dialogue about viscose,

and contributing to a more sustainable fabric process for viscose.

[Changing Markets Foundation](#) in collaboration with Earthworm (formerly The Forest Trust) launched a roadmap towards responsible viscose and modal fiber manufacturing in 2018. In 2020, Changing Markets published its new report "Dirty Fashion: Crunch time. Where does the industry stand on stamping out dirty viscose?".

The [Collaboration for Sustainable Development of Viscose \(CV\)](#), established in 2018, is a public governance organization set up by viscose enterprises, upstream and downstream companies in the industry chain and associations in China. CV is supported by the Social Responsibility Office of the China Textile Industry Federation. As of December 2020, CV has a total of 12 members (two industry associations and 10 MMCF producers) and 163 downstream enterprises as members of the industrial chain. In 2021, CV published its Sustainability Report 2020 which reviews its Three-year Action Plan on Green Development (2018-2020) as well as progress in governance and continuous improvement in 2020. It also includes the new [CV Roadmap 2025](#) and the 2030/2050 sustainability vision.

[Earthworm](#) (formerly The Forest Trust) has worked in value chains of key raw materials linked to forests such as wood and pulp since 1999. Over the years, Earthworm helped more than 60 companies to set up No Deforestation, Peat, and Exploitation (NDPE) policies and put them into practice. With businesses and civil society, Earthworm innovated the High Carbon

Stock (HCS) Approach - paving the way for a concrete definition of deforestation. In 2020, Earthworm launched the [Forest Conservation Fund](#). Companies can support the protection of an equivalent area to their tropical forest footprint by channeling funding of \$40 per hectare - less than 2 percent of their cost of goods - to conservationists on the ground.

[Forum for the Future](#), in collaboration with Textile Exchange, launched the "MMCF 2030 Vision - A Vision for building resilience and accelerating regeneration" report in 2020.

[The German Partnership for Sustainable Textiles](#) initiated a working group for manmade fibers and released the Joint Letter Viscose in April 2019, a call for commitment to sustainable MMCF production.

[GRETE](#), a consortium of the seven partners, coordinated by VTT and funded under the European Union's Horizon 2020 from 2019 to 2023, aims to improve the existing MMCF value chain by developing new technologies using standard paper grade pulps, implementing novel green technologies based on ionic liquid (IL) chemicals and recovery process for cellulose dissolution with novel post-modification process.

[UN Fashion Industry Charter for Climate Action](#) launched its new report "Identifying Low Carbon Sources of Cotton and Polyester Fibers" in 2021. This report is part one of a series of reports the Raw Materials Working Group intends to produce. Following this report, part two will be published later in 2021 which will provide similar insights into the product and GHG reduction opportunities for MMCFs such as viscose and lyocell.



“Recycled” Manmade Cellulosic Fibers

Supplier updates

The market share of “recycled” MMCFs is estimated at around 0.4 percent of all MMCFs in 2020⁽¹⁾. But a lot of research and development is ongoing, so it is expected to increase significantly in the next years.

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

Many of the “recycled” MMCFs are still in development. The first commercially available MMCFs partially or wholly made from recycled materials use mainly cotton linter or pre-consumer cotton textile residues as feedstock.

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.

Launched in September 2020, [The Fashion for Good](#) initiated “[Full Circle Textiles Project: Scaling Innovations in Cellulosic Recycling](#)” — a first-of-its-kind consortium project — launches today. Over an 18-month period, project partners will collaborate with innovators, Evrnu, Infinited Fiber Company, Phoenixt, Renewcell and Circ (formerly Tyton

BioSciences), to validate the potential of their technologies in this still nascent market. The recycled content produced by four of these innovators will be converted at Birla Cellulose’s state of the art pilot plants to produce high quality cellulosic fibers.

Launched in 2020, the [New Cotton Project](#) is a three-year multi-stakeholder project. Textile waste will be collected and sorted and then chemically recycled into a new MMCF that looks and feels like cotton – a “new cotton” – using Infinited Fiber Company’s textile fiber regeneration technology.

MMCFs made from recycled textiles

[Aalto University’s Ioncell](#) is a technology-in-development that turns used textiles, pulp, or even old newspapers into new textile fibers using a novel solvent called ionic liquid. The commercial production start is planned for 2025. More in the [supplier mapping](#).

[Asahi Kasei’s Bemberg™](#) is a cupro fiber made in Japan from 100 percent cotton linter, a pre-consumer residue of the cotton processing, and certified under the Global Recycled Standard (GRS). The annual production capacity is around 17 thousand tonnes. More in the [supplier mapping](#).

[Birla’s Liva Reviva](#) is a new viscose fiber made with up to 20 percent pre-consumer

cotton, certified under the Recycled Claim Standard (RCS). More in this [interview](#).

[BlockTexx](#) - see chapter on “[Fiber Blend Recycling](#)”.

[Circ](#) (earlier called Tyton Biosciences) - see chapter on “[Fiber Blend Recycling](#)”.

[Circular Systems](#) has developed the [Texloop](#) technology which can mechanically recycle TENCEL™ lyocell. More in the [supplier mapping](#).

[Evrnu](#) is a USA-based startup working on the commercialization of NuCycl™, an MMCF made from discarded clothing and textile waste. More in the [supplier mapping](#).

[GP Cellulose GmbH’s Cotton Linter Fiber Pulp](#) is an SCS Recycled Content Standard certified pulp made from cotton linters used for acetate. The production is powered by 80 percent renewable energy. More in the [supplier mapping](#).

The [Hong Kong Research Institute of Textiles and Apparel \(HKRITA\)](#) - see chapter on “[Fiber Blend Recycling](#)”.

[Infinited Fiber Company’s Infinna™](#) is a cellulose carbamate fiber currently created out of 100 percent post-consumer textile waste. In 2020, it announced its plans to build a 30,000 tonnes flagship factory in Finland. More in the chapter on “[Fiber Blend Recycling](#)”, the [supplier mapping](#) and this [interview](#).

(1) Textile Exchange based on maia research, 2021 - Global Recycled Manmade Cellulosic Fiber Market Report 2021 + Global Manmade Cellulosic Fiber Market Report 2021.

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



“Recycled” Manmade Cellulosic Fibers

Supplier updates

[Jilin Chemical Fiber' White Mountain](#) is a commercially available RCS certified viscose filament yarn derived from cotton linter. More in the [supplier mapping](#).

[Lenzing's Refibra™](#) is the first lyocell fiber made with reclaimed materials offered on a commercial scale. Refibra™ was launched in spring 2017. While it was initially made with 20 percent pre-consumer cotton residues, this share had been increased to 30 percent in 2019. A special lot production including 5 percent post-consumer waste and 25 percent pre-consumer waste started and will become the standard product in the near future. Lenzing's and Södra's joint goal is to process 25 thousand tonnes of textile waste per year by 2025. More in this [interview](#) and the [supplier mapping](#).

[Phoenxt](#) - see chapter on "[Fiber Blend Recycling](#)".

[Mistra Future Fashion's Blend Re:Wind](#) - see chapter on "[Fiber Blend Recycling](#)".

[Newstartex](#) offers a commercially available RCS certified MMC filament made with cotton linter. More in the [supplier mapping](#).

[re:newcell](#) transforms high cellulosic waste such as cotton and manmade cellulose into dissolving pulp reusing the process chemicals. The Kristinehamn demo plant in Sweden produces 7,000 mt of re:newcell pulp per year. In September 2019, re:newcell launched CIRCULOSE, a branded material made from 100 percent recycled textiles. Fiber producing

partners of re:newcell are Tangshan Sanyou and Sateri. In 2020, re:newcell announced the establishment of a textile recycling operation at a previous paper production mill in Sundsvall, Sweden. More in the [supplier mapping](#).

[RISE - The Regenerator](#) - see chapter on "[Fiber Blend Recycling](#)".

The [Royal Golden Eagle \(RGE\)](#) Group invested in Infinited Fiber in 2019 and conducts in-house research on alternative cellulosic feedstock, such as recycled cotton and agricultural waste. More in the [supplier mapping](#) submission of Asia Pacific Rayon, part of RGE.

[Sateri's Finex®](#) is a RCS certified viscose staple fiber made with post-consumer cotton textiles. It is the result of a collaboration with the pulp suppliers Södra and Re:newcell. The production of first commercial lines with below 5 percent recycled content have been announced in March 2020 and the recycled content share is now up to 20 percent by mid 2021. Sateri aims to offer viscose products with 50 percent recycled content by 2023 and 100 percent by 2030. Sateri's intention is to have 20 percent of its overall feedstock contain alternative or recycled materials by 2025. More in this [interview](#) and the [supplier mapping](#).

[SaxCell](#) has developed a pulp made from post-consumer cotton textiles. SaxCell aims to create the first industrial scale production unit in 2020. Additionally, the first apparel

test collection produced in collaboration with partners is scheduled for 2022. More in the [supplier mapping](#).

[Södra's OneMore®](#) is RCS certified dissolving pulp currently produced with 20 percent post-consumer cotton. The project started in autumn 2019 with 20 tonnes of post-consumer cotton added to their wood-derived pulp in their mill in Mörrum, Sweden resulting in 3 percent recycled content. In 2020, Södra increased this share to 20 percent and became RCS certified. Södra's and Lenzing's joint target is to recycle 25,000 tonnes in 2025 to create products with 50 percent recycled content. To achieve this, Södra needs to make continuous improvements and investments. Södra is also exploring a decoloring solution, possibilities to extract products from the polyester from poly-cotton blends, and the use of used MMCF textiles. - see chapter on "[Fiber Blend Recycling](#)".

[Tangshan Sanyou](#) announced in June 2019 that it succeeded in producing viscose staple fiber [ReVisco™](#) made from 50 percent post-consumer recycled cotton textiles supplied by Re:newcell.

[Worn Again Technologies'](#) - see chapter on "[Fiber Blend Recycling](#)".

[Xinjiang Bailu Fibre](#) offers RCS certified MMC pulp made with recycled pre-consumer cotton.


Xinxiang Chemical Fibre offers RCS certified MMCFs made with cotton linter.



“Recycled” Manmade Cellulosic Fibers

Supplier updates

MMCFs made from non-textile residues

 [Infinited Fiber Company's Infinna™](#) is a cellulose carbamate fiber currently created out of 100 percent post-consumer textile waste, and it can also be created from other cellulose-based waste streams like used cardboard, paper or agricultural residues like wheat or rice straw. More in the [supplier mapping](#).

[Inspidere's Mestic®](#) is a method in development to retrieve and convert cellulose from dairy cow manure into regenerated cellulose fibers. The startup is based in the Netherlands.

 [The Hurd Co](#) engineers man-made cellulosic fiber pulp from 100 percent agricultural waste. Agrilose is used to make lyocell or viscose.

[Nanollose](#) is an Australian biotechnology company that has developed a MMCF, using microbes that convert biomass waste products from the beer, wine and liquid industries into microbial cellulose. In 2018, Nanollose launched its first microbial cellulose-based fabrics and is in the process to scale production.

[Orange Fiber](#), an Italian startup, has developed a process to extract cellulose from the by-products of the citrus industry to produce fabrics. The latest collection was produced in an acetate process; viscose and lyocell trials are ongoing. Orange Fiber aims to expand the production capacity to 60 tonnes per year in 2022 and is fundraising to scale up the production further. More in the [supplier mapping](#).



Commitments to Preferred Manmade Cellulosic Fibers

The number of brands and retailers committed to preferred manmade cellulose is increasing. To drive industry change, several companies are making joint commitments through industry initiatives.

CanopyStyle Next Generation Vision

In 2020, Canopy published its [CanopyStyle Next Generation Vision](#) that at least 50 percent of all MMCFs will be made from Next Generation feedstocks in 2030. At its launch, this vision was backed by 26 of CanopyStyle brands and suppliers⁽¹⁾.

The objective of the vision is to displace ancient and endangered forest pulp from supply chains, i.e. 3.3 million tonnes estimated to be from ancient and endangered forest by:

- Regenerating 50,000 tonnes of wood pulp with virgin wood from new well-managed plantations/ forests.
- Extending the life of at minimum 10 percent (650,000+ tonnes) of clothing containing viscose.
- Replacing 2.6 million tonnes of wood pulp with pulp derived from alternative fibers.

By 2020, MMCF producers declared to be investing a combined sum of 233 million USD in Next Generation research and development, and an intent to procure 274,000 tonnes of Next Generation Fiber Solutions⁽²⁾.

CanopyStyle commitments to eliminate the sourcing of ancient and endangered forests

The number of brands and retailers committed to eliminate ancient and endangered forests from their fabrics increased from 60 in fall 2015 to 333 in 2020⁽³⁾.

Changing Markets Roadmap

The number of brands and retailers publicly committed to the Changing Markets Roadmap increased to 14 in December 2020⁽⁴⁾. The brands and retailers committed to using their leverage with manufacturers to reduce carbon emissions, improve health and safety of workers and local communities, and drive the transition to closed-loop chemical processes.

Examples of commitments by Textile Exchange members

The CanopyStyle Next Generation Vision is, for example, backed by the members **Aritzia, Bestseller, C&A, Esprit, GAP, Gina Tricot, G-Star Raw, H&M, Inditex, Kathmandu, Lindex, Mara Hoffmann, M&S, New Look, Next, Patagonia, PVC Corp, Reformation, Ted Baker, Tesco, Woolworth and Stella McCartney.**

Commitments to the Changing Markets Roadmap have been made, for example, by the members **ASOS, C&A, Esprit, H&M, Inditex, Levi's, M&S, New Look, Next, Reformation, and Tesco.**

Make a Standards Commitment

Whether you have already made a commitment to one or more of Textile Exchange's Standards, or you want to share a new one, you may [use this form to register details of your commitment\(s\)](#).

CanopyStyle Next Generation Vision⁽¹⁾

“In 2030, our vision is to see 50% of all viscose made from Next Generation feedstocks.”

(1) CanopyStyle press release (February 20, 2020) - Announcing the CanopyStyle Next Generation Vision for Viscose and the CanopyStyle Next Generation Vision for Viscose.

(2) Canopy, 2020 - 2020 Hot Button Report. [Link](#).

(3) Canopy, 2021 - Highlights: CanopyStyle by the Numbers. [Link](#).

(4) Changing Markets, 2020 - Dirty Fashion Crunch Time: Where Does the Industry Stand on Stamping Out Dirty Viscose? [Link](#).

Synthetic Fibers



Polyester

Photo: Plastic for Change

Recycled Polyester

Production facts and figures

Polyester is the most widely used fiber worldwide. With an annual production of around 57 million tonnes⁽¹⁾ polyester had a market share of approximately 52 percent of the global fiber production in 2020.

While the global total PET fiber production slightly decreased from 57.7 million tonnes in 2019 to 57.1 million tonnes in 2020 influenced by COVID-19⁽¹⁾, the absolute as well as relative market size of the recycled polyester fiber increased.

The global recycled PET fiber production volume increased from 7.9 million tonnes in 2019 to 8.4 million tonnes in 2020⁽²⁾. This equals an increase in the market share of recycled PET fiber from 13.7 percent of the global PET fiber market in 2019 to around 14.7 percent in 2020⁽³⁾.

Recycled polyester is mainly made from PET plastic bottles with an estimated share of 99 percent of all recycled polyester⁽⁴⁾. Recycled polyester can also be made from other post-consumer plastics such as ocean waste, discarded polyester textiles, or from pre-consumer processing residues such as fabric scraps.

With an increasing demand for post-consumer bottles by the bottle industry but also packaging more broadly and further industries, competition for post-consumer bottles is increasing. Textile to textile recycling is thus an important strategy to ensure future feedstock supply for the rPET textile industry.

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 include the **World Fair Trade Organization (WFTO) standard** and the **Ocean Bound Plastic (OBP) Certification**.

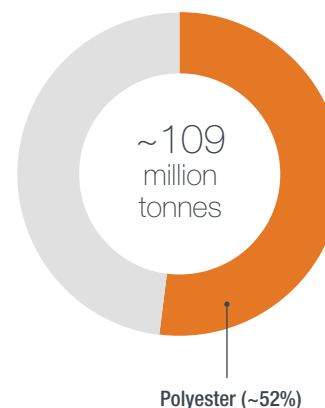
(1) maia research, 2021 - Global Polyester Fiber Market Report 2021. Customized report.

(2) maia research, 2021 - Global Recycled Polyester Fiber Market Report 2021. Customized report.

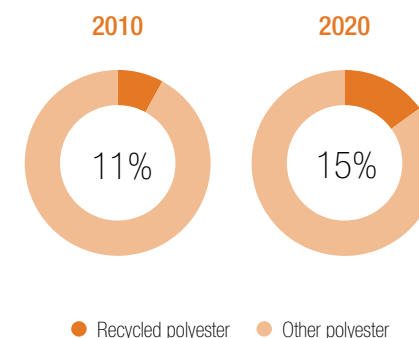
(3) Textile Exchange, 2021 - based on (1) and (2)

(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.

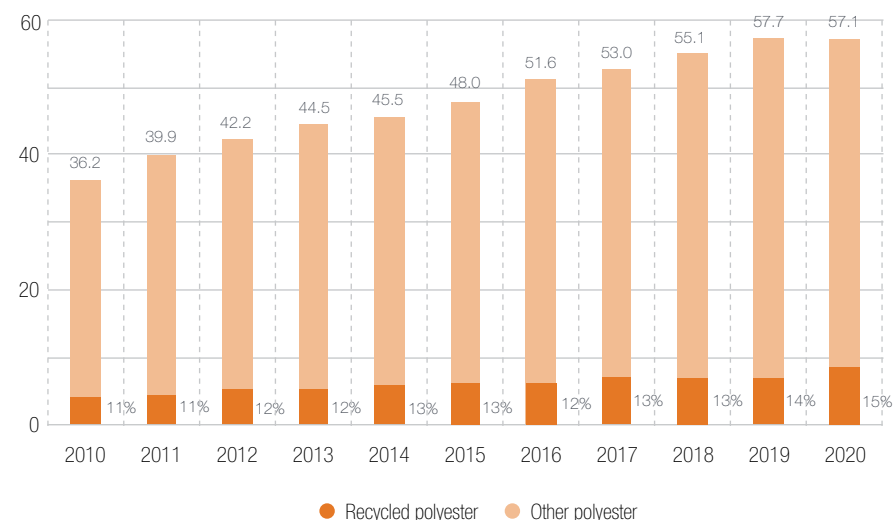
GLOBAL FIBER PRODUCTION IN 2020



MARKET SHARE OF RECYCLED POLYESTER



GLOBAL POLYESTER PRODUCTION (MILLION MT)



Recycled Polyester

Directory: Key suppliers and innovators

This map locates key suppliers and innovators of recycled polyester based on their headquarters.

All use mechanical recycling of plastic bottles except where indicated otherwise.

Tip: How to find suppliers of recycled polyester.

Check out the [Textile Exchange database](#) for a list of RCS and GRS certified suppliers. More details also in the [supplier mapping](#).

CANADA

- **Loop Industries** / Indorama joint venture - emerging

USA

- Ambercycle
- BIONIC®
- **Circular Systems** - Texloop rPET-1
- **Eastman** - Avra + Carbon Renewable Technology
- Lycra Company (Invista) - LYCRA® T400® + COOLMAX® + THERMOLITE® EcoMade
- Martex Fiber
- Poole Company - EcoSure®
- Premiere
- First Mile by Thread - Ground to Good™
- **Unifi** - REPREE®

Innovation beyond mechanical recycling of plastic bottles

- Chemical recycling
- Biological recycling
- Ocean waste incl. ocean bound
- Post-consumer textiles
- Pre-consumer textiles
- Fairness for waste pickers
- GRS certified
- % renewable energy (>40% reported)

FRANCE

- CARBIOS

UK

- **Worn Again** - polymer recycling

NETHERLANDS

- CuRe Technology (formerly Cumapol)
- Ioniqa
- **The Movement** - Polylana

GERMANY

- Advansa - Adva® + Suprelle®
- Trevira - SINFINECO®

SWITZERLAND

- Gr3n

SPAIN

- Antex
- Seaqual

ITALY

- Aquafil - ECOsense
- De Martini Bayart & Textifibra SpA
- Radici Group - REpetable
- Sinterama - Newlife™

KENYA

- The Megh Group - T3. Trash. Thread. Textile

PAKISTAN

- Gatron - Ecoron
- Pinnacle Fibre

TAIWAN

- Far Eastern - TOPGREEN®
- Libolon - RePET™
- Nan Ya Plastics - SAYA
- Shinkong - RecoTex

CHINA

- Cixi Xingke 90%
- Elite Color Environmental
- Guangdong Qiusheng Resources
- Fujian Baichuan Resources
- Fujian Mr Fiber Joint
- Jiangnan Chemical Fiber
- Longfu Recycling
- Nan Ya Plastics - ECOGREEN® -plus
- Ningbo Qiusheng Resources
- Tianfulong
- Yangzhou Rongcheng Chemical Fiber
- **Zhejiang Haili Environmental Technology** - Rebo yarn
- Zhejiang Jiaren New Materials
- Zhongxing Environmental

JAPAN

- **Itochu** - RENU™
- Jeplan
- Teijin - ECOPET™ + Eco Circle™
- Toray - ECOUSE™

KOREA

- Hyosung - Regen™

INDIA

- Aero Fibre
- AGL Polyfil Private Limited
- Alliance Fibres - Greenfil
- Ganesha Ecosphere - Rivivere
- JB Ecotex 55%
- Neelam Fibers
- Pashupati Polytex
- Pashupati Excrusions
- Plastics for Change
- Polygenta - perPETual
- Reliance - R|Elan™ GreenGold
- **Sulochana** - Polycycle 100%
- Sutlej Textiles
- Sybil Industries - SyGreen

SRI LANKA

- Eco Spindles

INDONESIA

- PT Inocycle Technology

THAILAND

- EcoBlue - 3D pure rPET chips
- **Indorama** - Ecorama
- Thai Polyester - EcoTPC™

AUSTRALIA

- **BlockTexx** - S.O.F.T. rPET Pellets

Recycled Polyester

Chemical and biological recycling

Most polyester is currently mechanically recycled from PET bottles⁽¹⁾. The market share of chemically or biologically recycled polyester is still very low. Key challenges related to chemical and biological recycling are costs, technological challenges, feedstock availability, and energy use. With new operations starting the commercial production of chemically recycled polyester and further companies in the research and development phase, the market share of chemically recycled polyester is expected to grow in the coming years.

Commercially available on the market

 [Eastman](#) announced the beginning of the commercial operation of its new chemical recycling process through its Carbon Renewal Technology in October 2019. Eastman started a partnership with Circular Polymers which will collect polyester carpets, separate and densify the polyester which is then chemically recycled by Eastman into new products such as textiles. In 2021, Eastman announced a new \$250 million molecular recycling facility using textile feedstock in the USA. The new facility will use over 100,000 tonnes of plastic waste that cannot be recycled by current mechanical methods.

[FENC's TOPGREEN®](#) is a commercially offered GRS-certified chemically recycled PET. More in the [supplier mapping](#).

In 2018 [INVISTA](#) launched **LYCRA® T400® EcoMade** fiber. More than 65 percent of the overall fiber content comes from a combination of recycled plastics (PET bottles) and

renewable plant-based resources (corn). The LYCRA® T400® Ecomade recycled content is chemically recycled. More in the [supplier mapping](#).

[loniga](#) has developed a chemical recycling process for rPET. In July 2019, they took the first production plant of 10 kilotons in the Netherlands in operation.

 [Itochu's RENU](#) is a GRS-certified chemically recycled PET made from pre- and post-consumer textiles. More in the [supplier mapping](#).

[Jeplan](#)'s new Kitakyushu Hibikinada Plant for chemical recycling of polyester in Japan started commercial operation in January 2019. Jeplan's **BRING Material™** is a GRS-certified chemically recycling PET made from post- and pre-consumer textiles. The production capacity increased to 400 tonnes per year in 2020. In 2020, JEPLAN, Axens, and IPFEN announced their partnership to demonstrate and commercialize an optimized - glycolysis based - PET depolymerization process for all types of waste PET called "Rewind™". More in the [supplier mapping](#).

[Nan Ya Plastics SAYA](#) is a GRS-certified commercially offered chemically recycled PET, also made from pre- and post-consumer textiles. More in the [supplier mapping](#).

[Polygenta's perPETual](#) is a commercially offered chemically recycled PET, made with recycled plastic bottles and pre-consumer textiles. More in the [supplier mapping](#).

[Teijin's Eco Circle™](#) is a commercially offered chemically recycled PET.


In development:

[Ambercycle](#) is a USA based startup developing an enzymatic process for polyester recycling.

[CARBIOS](#) is piloting an enzymatic process to depolymerize PET into its monomers. **In 2020, Carbios produced the first clear plastic bottles from enzymatically recycled textile waste.** Its first industrial unit with an annual production capacity of 40,000 tonnes of recycled PET is expected to generate first revenues in 2025. More in the [supplier mapping](#).

CuRe Technology (formerly Cumapol), DSM-Niaga, Morssinkhof, DuFor and NHL Stenden are collaborating on the new [CuRe Technology](#), a new low energy chemical polyester recycling process for any type of colored polyester. The pilot plant located in The Netherlands started operation at the end of 2019.

[Gr3n](#) invented a new chemical process using microwave radiation to accelerate the depolymerization of PET into monomers.

 [Indorama/Loop Industries joint venture](#) has developed a patented chemical recycling process to depolymerize all kinds of polyesters with zero energy use. The chemical recycling produces recycled polyester DMT and MEG. The partnership plans to begin production in 2020.

(1) Estimated at 99 percent of all recycled polyester.

Recycled Polyester

Ocean-bound and ocean plastic

More than 8 million tonnes of plastic end up in the oceans every year⁽¹⁾. An increasing number of initiatives are working on the collection of ocean-bound⁽²⁾ or ocean plastic as feedstock for recycled polyester. While the priority has to be to avoid single use plastic in the first place, such initiatives can help to reduce the plastics in our ocean as long as ocean-bound and ocean plastic exists.

Ocean plastic initiatives

In 2020, Control Union and Zero Plastic Oceans launched the [Ocean Bound Plastic \(OBP\) Certification](#). The OBP Certification Program is designed to encourage the removal of Ocean Bound Plastic from the environment by adding value in effectively collecting and treating it before it reaches oceans.

[Circulate Capital](#) is an investment management firm dedicated to financing innovation, companies, and infrastructure that prevent the flow of plastic waste into the world's ocean while advancing the circular economy. Circulate Capital established the world's first investment fund dedicated to preventing ocean plastic: **Circulate Capital Ocean Fund (CCOF)**.

[First Mile](#), an initiative of Thread International and WORK, formalizes waste collection networks in low-income communities and bridges the gap for global brands to purchase from these responsible supply chains, while diverting plastic waste from our oceans and landfills. More in the [supplier mapping](#).

[NextWave Plastics](#) is a consortium of multinational technology and consumer brands gathering in the spirit of collaboration and transparency to rapidly decrease the volume of plastic litter entering the ocean by developing the first global network of ocean-bound plastic supply chains.

[OceanCycle](#) is a social enterprise reimagining the circular economy through sourcing, certifying and reusing materials to prevent ocean plastic pollution.

[Ocean Material](#) is working with leading ocean recycling specialists to replace virgin plastic with ocean plastic waste.

[PlasticBank](#) is a social enterprise committed to stopping ocean plastic while providing opportunities for brands to have environmental and social impact. **Social Plastic®** is ethically recovered material that transfers its value to communities in need. As a user of Social Plastic®, one will have a direct and traceable impact on helping to stop ocean plastic and improve lives.

[Plastics For Change](#) is expanding to coastal communities across Asia. This initiative is about creating better livelihoods for the urban poor while keeping plastic out of the ocean. In 2021, Plastics For Change has become one of the first companies in the world to be certified by the OBP certification. More in the [supplier mapping](#).

[SAYA Coastal](#) is a specialized recycling program that targets the clean-up and renewal of discarded plastic bottles in coastal regions that would otherwise migrate out to sea.

[Seaqual](#) is an initiative in Spain to clean oceans from marine litter. Licensed Seaqual members can produce, buy or sell products containing Upcycled Marine Plastic. Seaqual yarn is an 100 percent recycled material with full traceability ("DNA tracer inside").

[Tide Ocean SA](#) is currently being audited for the Global Recycle Standard (GRS), the Recycled Claim Standard (RCS) and the Ocean Bound Plastic Certification (OBP).

Textile Exchange Member Action

[Sulochana](#) is using ocean bound PET bottles as one feedstock for its recycled polyester and is working on the Ocean Bound Plastic (OBP) certification. More in this [interview](#).

Unifi's [REPREVE® Our Ocean](#) uses ocean-bound plastics certified by an independent third party organization. The bottles are collected within 50 kilometers of coastlines in countries or areas that lack formal waste or recycling systems.

Further suppliers of recycled polyester made with ocean-bound or ocean plastic are listed on the [Recycled Polyester Supplier Map](#).



(1) IUCN, 2021 - Website. [Link](#).

(2) Ocean-bound plastic is generally defined as Abandoned Plastic Waste located within the range of 50km from shore. Source: Ocean Bound Plastic (OBP) Certification, 2021 - website. [Link](#).

Recycled Polyester

Fairness for waste pickers

While social conditions in the factories are, at least, on the radar of most companies, the livelihoods of the waste picking communities are often not yet sufficiently considered. With first initiatives explicitly addressing the social impact on the polyester feedstock collection level, it is expected that social topics related to waste collection will receive increasing attention in the next years.

Fairness for waste pickers

[First Mile](#) are recycled polyester bottles that can be traced back to the collection networks responsible for picking up the post-consumer bottles. They are used for the **Thread Ground to Good™** and collected by people earning their way out of poverty. The raw materials are sourced from Haiti, Honduras, and Taiwan. More in the [supplier mapping](#).

The [Megh Group - T3. Trash. Thread. Textile.](#) is a new project in development in Kenya. T3 is currently constructing a mechanical PET bottle recycling plant in Kenya with an initial capacity of 25 tonnes per day. The core focus of the project is to collaborate with the first collectors (scavengers) directly and uplift them from severe poverty.

[PlasticBank](#) is a social enterprise committed to stopping ocean plastic while providing opportunities for brands to have environmental and social impact. **Social Plastic®** is ethically recovered material that transfers its value to communities in need. As a user of Social Plastic® one will have a direct and traceable impact on helping to stop ocean plastic and improve lives.

[Plastics For Change](#) is the first and, currently, the only rPET supplier certified by the World Fair Trade Organization. Plastics For Change has developed a franchise model to fortify recycling businesses that pay waste-pickers decent incomes, train them, and make investments. More in the [supplier mapping](#).



Biobased Polyester

An emerging material

The market share of biobased polyester is estimated at around 0.03 percent of the total polyester production⁽¹⁾. Biobased polyester has the potential to reduce GHG emissions but has to be sourced and managed responsibly to realize this potential.

While many sustainability standards for biobased feedstock exist, the use of these standards for biosynthetics is still limited. Key standards for biomass certification are the **Roundtable for Sustainable Biomaterials (RSB)**, **ISCC Plus**, and **Bonsucro**.

Fibers and yarns

[Far Eastern's TopGreen® Bio PET Filament](#) is bPET filament made with 30 percent biobased feedstock from sugarcane. [More in the supplier mapping.](#)

In 2018 [INVISTA](#) launched **LYCRA® T400® EcoMade fiber**. More than 65 percent of the overall fiber content comes from a combination of chemically recycled plastics (PET bottles) and renewable plant-based resources (corn). More in the [supplier mapping](#).

[Radici's Biofeel® -PET](#) is a 30 percent biobased polyester filament yarn produced from bio-PET resins made with plant-based bio-MEG. More in the [supplier mapping](#).

[Teijin](#) started the production of its **ECO CIRCLE™ Plantfiber**, a partially biobased PET resin made from 30 percent bio-based EG derived from sugarcane and the rest from

petroleum-based dimethyl terephthalate (DMT) or terephthalic acid (PTA) in 2012.

[Toray's Ecodear® PET](#) is a 30 percent plant-based polyester fiber derived from sugarcane. Toray launched ecodear® as an integrated brand for biomass-based polymer materials and products in 2013.

Chemicals

[Avantium](#) inaugurated its bio-MEG demonstration plant in the Netherlands in 2019.

[Anellotech](#) is a USA based company producing BioBTX, a biobased paraxylene.

[Braskem and Haldor Topsoe](#) announced a partnership in 2017 to validate the MOSAIK™ sugar-to-biochemicals solution for the production of bio-MEG in a demonstration plant. The demo plant started operation in 2019.

[Gevo](#) has developed fully renewable carbon-based para-xylene, a key ingredient to convert petro-based polyester for fibers and bottles to 100 percent renewable content. It opened a plant making biobased paraxylene in Texas in 2013. [Gevo and Toray](#) signed a bio-paraxylene offtake agreement for the world's first pilot-scale fully renewable, bio-based polyethylene terephthalate (PET) production in 2012. In 2014, Gevo, Inc. has announced that it is selling para-xylene (PX) derived from its renewable isobutanol to Toray, a leading

producer of fibers, plastics, films, and chemicals. PX is a primary raw material for the manufacture of bio-polyester (PET).

[Global BioChem](#) is a China based producer of bio-MEG.

[India Glycols](#) has been producing bio-MEG using ethylene derived from bio-ethanol since 1989.

[Indorama](#) offers a bio-PET resin made with 30 percent plant-based bio-MEG.

[Iwatani](#) develops eco-friendly resin using 30 percent plant-based raw materials. Iwatani announced the procurement of Bio-MEG from India-based India Glycols Limited, and consignment of Thailand-based Indorama Ventures in 2012.

[PEference](#) announced the establishment of a biorefinery flagship plant producing FDCA (furan dicarboxylic acid), a bio-based building block to produce high value products including biobased polyester.

[Virent](#) offers its BioFormPX® paraxylene made from sugars. In 2016, Virent and FENC announced the first 100 percent bio-polyester shirt made with Virent's BioFormPX® paraxylene. Virent completed a year-long run of a demonstration plant in 2017/18 which demonstrates the technology to convert plant sugars to bio-paraxylene, a critical raw material for bio-polyester fiber. More in the [supplier mapping](#).

(1) Estimate based on nova-Institute, 2021 - Bio-based Building Blocks and Polymers – Global Capacities, Production and Trends 2020 – 2025. [Link](#) and maia research, 2021 - Global Polyester Fiber Market 2020. Customized report.



Commitments to Preferred Polyester

Accelerating the transition

Commitments to Recycled Polyester

In 2021, Textile Exchange and the Fashion Industry Charter for Climate Action, convened by UN Climate Change, have launched a joint initiative to spur further a shift in the market towards the uptake of recycled polyester (rPET) and the associated reduction in greenhouse gases (GHGs). With 141 brands and suppliers (including subsidiaries) already committed by July 2021, the 2025 Recycled Polyester Challenge serves as an essential catalyst for change in the apparel and textile industry. The rPET Challenge petitions the apparel industry to commit to increasing the global percentage of recycled polyester from 14 percent to 45 percent at 17.1 million tonnes by 2025. The Challenge continues the successful acceleration that began with Textile Exchange's 2017 Recycled Polyester Commitment, initiated by the Textile Exchange rPET Round Table, a global multi-stakeholder network aiming to increase the uptake of recycled polyester.

The 2025 Recycled Polyester Challenge asks brands to commit to the most ambitious uptake target possible. High percentage rPET commitments from brands are essential to reaching the 2025 45 percent recycled volume target and for building critical mass to reach an absolute 90 percent recycled volume share by 2030.

Commitments to Biobased Polyester

A survey by Textile Exchange revealed that there is a growing interest in biosynthetics. Public commitments to biobased polyester are still very rare though.

Examples of public commitments by Textile Exchange members:

[AB Lindex](#) has the goal that by 2025, all Lindex materials will be recycled or sustainably sourced.

[Adidas](#) aims to replace all virgin polyester with recycled polyester in all Adidas and Reebok products, where a solution exists, by 2024, and has set clear internal milestones for product creation teams to help achieve this target.

[Everlane](#) is committed to using only recycled polyester by 2021.

[H&M](#) has the target to only use recycled or other sustainably sourced materials by 2030.

[IKEA](#) is committed to ending the dependency on virgin fossil materials and using only renewable or recycled materials by 2030. 90 percent of the polyester used by IKEA in 2020 was recycled.

[Inditex](#) has committed that 100 percent of the polyester used in Inditex products will be recycled or will come from more sustainable sources in 2025.

[Norrøna](#) has the target to only use recycled polyester in its products by 2020.

[Ted Baker](#) has the target to use 100 percent recycled polyester by 2030.

GLOBAL POLYESTER FIBER MARKET GROWTH TREND
WITHOUT ACCELERATION OF DECOUPLING FROM VIRGIN FOSSIL FEEDSTOCK
(TOTAL POLYESTER FIBER AND % OF RECYCLED)



Call to action

Sign the [2025 Recycled Polyester Challenge](#)

Call to action

Join the [Recycled Polyester Round Table](#)

Call to action

Join the [Biosynthetics Round Table](#)

Polyamide



Photo: Pixabay - Public Domain Picture

Recycled Polyamide

Production facts and figures

Synthetic polyamides are a group of synthetic fibers that include nylon.

With around 5.4 million tonnes⁽¹⁾, polyamide had a market share of about 5 percent of the global fiber production market in 2020⁽²⁾.

Global total polyamide fiber production increased from 3.74 million tonnes in 1990⁽³⁾ to 5.4 million tonnes in 2020⁽¹⁾. In 2020, the global polyamide fiber production decreased from 5.58 million tonnes in 2019 to 5.45 million tonnes in 2020 due to COVID-19⁽¹⁾.

The global recycled polyamide fiber production volume in 2020 is estimated at around 0.11 million tonnes⁽⁴⁾.

Due to technical challenges and low prices for fossil-based polyamide, the market share of recycled polyamide is with 1.9 percent of all polyamide fiber still very low⁽⁴⁾.

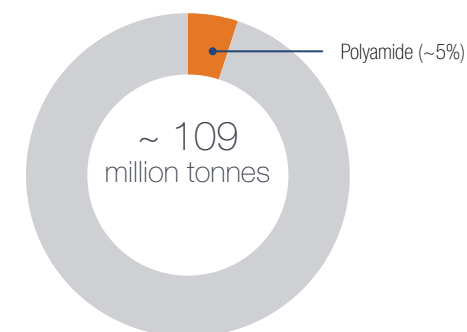
The recycled polyamide fiber market is growing but at a rather slow rate.

Recycled polyamide can be produced from pre- or post-consumer waste. Pre-consumer waste may be processing scraps. 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.

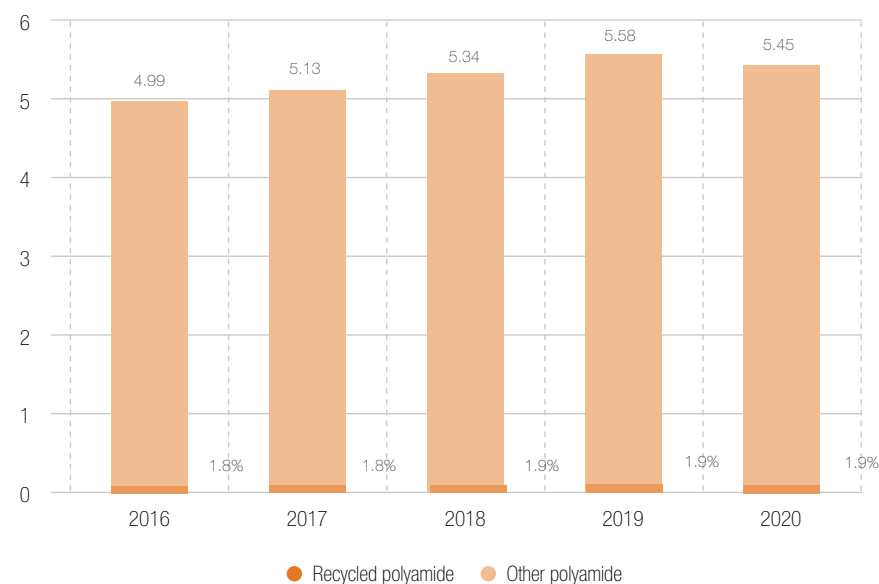
Main standards used for recycled polyamide include the Global Recycled Standard (GRS) and the Recycled Claim Standard (RCS). For further information, see the chapter on [Sustainability Standards](#).

The recycling of polyamide helps to decrease dependency on fossil based raw materials and to reduce the waste material. Aquafil estimates that 70,000 barrels of oil are saved per 10,000 tonnes of regenerated caprolactam⁽⁵⁾.

GLOBAL MARKET SHARE OF POLYAMIDE IN 2020



GLOBAL POLYAMIDE PRODUCTION (MILLION MT)



(1) maia research, 2021 - Global Polyamide Fiber Market Report 2021. Customized report.

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

(3) IVC, 2021 - website. [Link](#).

(4) maia research, 2021 - Global Recycled Polyamide Fiber Market Report 2021. Customized report.

(5) Aquafil, 2021 - Website. [Link](#).

Recycled Polyamide

Directory: Key suppliers and innovators

This map locates key suppliers and innovators producing recycled polyamide by headquarters. All polyamide is mechanically recycled from pre-consumer waste unless otherwise indicated.

Tip: How to find suppliers of recycled polyamide.

Check out the [Textile Exchange database](#) for a list of RCS and GRS certified suppliers. More details also in the [supplier mapping](#).

USA

- Ascent
- Premiere - EcoInnovationFiber™
- **Unifi** - REPREVE®

SOUTH KOREA

- Guangdong Xinhui Meida Nylon
- Hyosung - Mipan Regen™
- Taekwang - Acepora-Eco®
- Zhejiang Taihua New Materials

SPAIN

- Nurel - Reco Nylon® ⚡ 100% (renewable carbon credits)
- Nylstar - Meryl® Recycled

JAPAN

- Toray - CYCLEAD™

Innovation beyond mechanical recycling of pre-consumer materials

- Chemical recycling
- Fishing nets
- Post-consumer textiles
- Other feedstock
- GRS certified
- % renewable energy (>40% reported)

TAIWAN

- Chain Yarn - Chainlon Greenlon® Recycled
- Far Eastern - FEFC® eco
- Formosa - Sunylon

ITALY

- **Aquafil** - ECONYL®
- De Martini Bayart & Textifibra - ACEPORA-ECO®NY ⚡ 30%
- Fulgar - Q-NOVA® ⁽¹⁾
- Radici - Renycle® ⚡ 42%

ISRAEL

- Nilit - Ecocare

Textile Exchange members are highlighted in bold (as of July 2021).

(1) Fulgar is also investigating a new recycled polyamide from post-consumer materials.

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 the share of biobased polyamide fibers is around 0.4 percent of the polyamide fiber market⁽¹⁾.

Fibers and yarns

[Cathay's TERRYL®](#) is a biobased polyamide line offering PA56, PA510, PA512, PA514 and co-polymers chips and filament with 31 to 100 percent renewable shares.

[Chainlon's biobased polyamide 6.6 yarn](#) is made with [Evonik's VESTAMID® Terra HS®](#) and contains 62 percent biobased content made from castor oil.

[Fulgar's EVO®](#) is a 100 percent biobased polyamide yarn made from castor oil.

[RadiciGroup's Biofeel® PA](#) is a 64 to 100 percent biobased polyamide filament yarn derived from castor oil and agricultural waste. More in the [supplier mapping](#).

[RadiciGroup's Dorix® 6.10](#) is 64 percent biobased polyamide staple fiber made from castor. More in the [supplier mapping](#).


[RadiciGroup's Radilon® 6.10](#) is a 64 percent biobased polyamide yarn.

[Toray's ECODEAR® PA 6.10](#) is a biobased polyamide filament derived from the castor bean.

[Unitika](#), partner of Arkema, offers Castlon®, a 100 biobased polyamide filament derived from castor seed oil.

Chemicals and resins

[Anellotech](#) announced the production of sample quantities of bio-based benzene in 2019.

 [Arkema's Rilsan®](#) is a 100 percent biobased polyamide 11 resin derived from castor seeds oil. With its partners, Arkema is driving the sustainable production of castor seeds in India through the Pragati Initiative since 2016.

[BASF Ultramid® Biomass Balance Polyamide](#) is a mass-balance based polyamide.

[DSM's EcoPaXX®](#) is a 70 percent biobased polyamide (PA410) resin derived from the castor bean plant.

[Evonik and BioAmber](#) have a long-term agreement for the development and manufacturing of catalysts for making BDO (1,4- butanediol), THF (tetrahydrofuran), and GBL (gamma-butyrolactone) from biobased succinic acid.

[Evonik's VESTAMID®](#) is the name for a group of polyamides based on renewable raw materials: The monomers are obtained partly or entirely from castor oil.


[Scientists at Sweden's Lund University](#) have found a way to convert cotton into sugar, which in turn can be made into elastane or polyamide.

[Genomatica](#) announced the world's first ton of 100 percent biobased caprolactam (CPL) in 2020 which is converted into polyamide 6. Genomatica collaborates with Aquafil. The development is part of the "Project EFFECTIVE." [More in the supplier mapping](#).

[PEference](#) announced the establishment of a biorefinery flagship plant producing FDCA (furan dicarboxylic acid), a biobased building block to produce high value products including biobased polyamide and polyester.

[RadiciGroup's Radipol® DC](#) is a 64 percent biobased polyamide 6.10 resin. [More in the supplier mapping](#).

[RadiciGroup's Radipol® PX resin](#) is a 100 percent biobased polyamide 5.10 resin based on castor. [More in the supplier mapping](#).

 [Virent's BioFormBZ®Benzene](#) is a biobased benzene that can be used to produce polyamide. [More in the supplier mapping](#).

(1) Estimate based on nova-Institute, 2021 - Bio-based Building Blocks and Polymers – Global Capacities, Production and Trends 2020 – 2025. [Link](#) and maia research, 2021 - Global Polyamide Fiber Market 2020. Customized report.



Commitments to Preferred Polyamide

Examples

Brands and retailers are starting to make public commitments to replace virgin polyamide with recycled polyamide.

Examples of public commitments to recycled polyamide by Textile Exchange members

Everlane is committed to using only recycled nylon by 2021. More information [here](#).

H&M is committed to using only 100 percent recycled or other sustainably sourced materials including recycled nylon. More information [here](#).

Norrone has the goal to use as much recycled or responsibly produced plant based polyamide in its products as possible. More information [here](#).

VF Corporation has committed to increasing uptake of recycled nylon to 50 percent by 2025. More information [here](#).

Volcom is committed to increase their share of recycled nylon to 20 percent by 2020. More information [here](#).

Examples of public commitments to biobased polyamide by Textile Exchange members

Arkema, producer of the 100 percent bio-based polyamide 11 resin Rilsan® derived from castor seeds oil, is together with partners driving the sustainable production of castor seeds in India through the Pragati Initiative since 2016. More [here](#).

Make a Standards Commitment

Whether you have already made a commitment to one or more of Textile Exchange's Standards, or you want to share a new one, you may [use this form to register details of your commitment\(s\)](#).



Photo (right): Arkema

A photograph of three scientists in a laboratory setting. Two men and one woman, all wearing white lab coats and safety glasses, are looking at a piece of equipment. The man in the foreground is wearing a lab coat with a 'TYTON Biosciences' logo. The background is slightly blurred, showing lab equipment and a window with blinds.

Other Synthetic Fibers

Photo: Circ (formerly Tyton Biosciences)

Other Synthetics

Production facts and figures

The other synthetics polypropylene, acrylics, and elastane had with a combined production volume of 5.7 million tonnes⁽¹⁾ a market share of around 5 percent of the global fiber market in 2020.

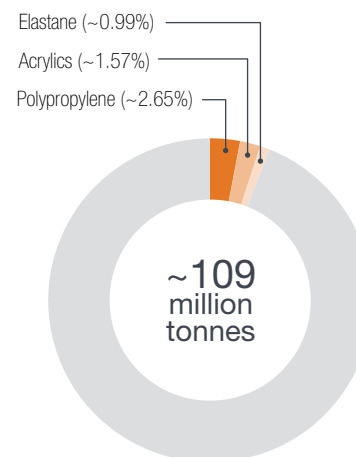
Polypropylene had a market share of 2.7 percent of the global fiber market in 2020. While the global polypropylene fiber market has been growing over the years, 2020 production volumes dropped from 3.06 million tonnes in 2019 to 2.90 million tonnes in 2020 due to COVID-19⁽¹⁾.

Acrylics had with a production volume of around 1.7 million tonnes of acrylic fibers a market share of 1.57 percent of the global fiber market in 2020. The global acrylics fiber production volumes have been declining over the years⁽¹⁾.

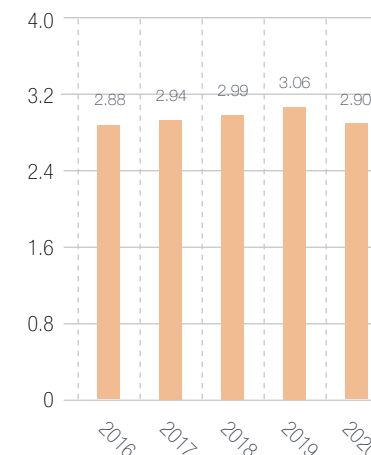
The global elastane fiber production just crossed the 1 million tonnes per annum and had a market share of around 1 percent of the global fiber market in 2020. The global spandex fiber production volume growth trend continued in 2020⁽¹⁾.

The production volumes of further other synthetics such as PTT, PLA, and similar are very low and currently not included in the report.

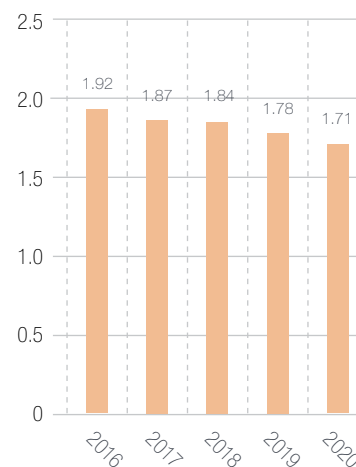
GLOBAL MARKET SHARE OF OTHER SYNTHETICS IN 2020⁽¹⁾



POLYPROPYLENE FIBER PRODUCTION (IN MILLION TONNES)⁽¹⁾



ACRYLICS FIBER PRODUCTION (IN MILLION TONNES)⁽¹⁾



ELASTANE FIBER PRODUCTION (IN MILLION TONNES)⁽¹⁾



(1) maia research, 2021 - Global Other Synthetics Fiber Market Report 2021. Customized report.

Other Recycled or Biobased Synthetics

Recycled and biobased elastane, acrylic, and polypropylene

There are several examples of recycled or biobased synthetics other than polyester and polyamide, such as recycled or biobased elastane.

Recycled elastane

 [Asahi Kasei's Roica™ EF](#) launched its first GRS certified recycled elastane, a polyurethane filament made from pre-consumer materials, in 2016. More in the [supplier mapping](#).

[Hyosung's creora regen elastane](#), a GRS certified, 100 percent recycled elastane, was launched in 2019.

[LYCRA® EcoMade](#) fiber is The LYCRA Company's first branded elastane made with recycled content, introduced in 2019. The fiber contains 20 percent pre-consumer content, diverting waste, and keeping materials in use. More in the [supplier mapping](#).

Sheico Group's Sheiflex® is a recycled elastane which received its GRS certification in 2017.

[Spanflex™ recycled elastane](#) is GRS certified.


Biobased elastane

[The Lycra Company](#) launched the **LYCRA® 162 R** fiber, an elastane fiber with 70 percent biobased content derived from corn, in 2014. More in the [supplier mapping](#).

The [Helm AG](#) in collaboration with Cargill launched **QIRA**, a biobased 1,4 Butanediol (BDO) with around 95 percent corn-based feedstock, in 2021. The production capacity at the start in 2024 will be 66,000 tonnes per annum. Biobased BDO is a chemical that can be used for a variety of applications including biobased elastane. More in the [supplier mapping](#).

[Scientists at Sweden's Lund University](#) have found a way to convert cotton into sugar, which in turn can be made into elastane or polyamide.

Recycled acrylic

 [Aksa](#) started the commercial scale production of Acrycycle® recycled acrylic fiber made with 100 percent pre-consumer material in 2019. More in the [supplier mapping](#).

Recycled polypropylene

[Radici's Responsible®](#) is a recycled polypropylene spunbond from pre-consumer materials. More in the [supplier mapping](#).



Other Recycled or Biobased Synthetics

Supplier innovation landscape

Biobased PLA

Due to sold out PLA in 2019 the PLA capacities were increased in 2020⁽¹⁾.

[Advansa](#) offers ADVA® made from PLA staple fibers. More in the [supplier mapping](#).

In 2021, [Total Corbion PLA](#), a 50/50 joint venture between Total and Corbion, confirms that it has kicked off the front-end engineering design stage for its new 100,000 tonnes per annum Poly Lactic Acid (PLA) plant in France.

[Far Eastern](#) offers biobased PLA made with NatureWorks Ingeo™, which is made from corn.

[Natureworks](#) has developed its Ingeo™ branded polylactic acid (PLA) to manufacture plastics and fibers. Ingeo™ is currently derived from corn, cassava, sugar cane or beets. In 2019, NatureWorks announced its commitment that 100 percent of its agricultural feedstock used for Ingeo will be ISCC Plus certified by 2020. The Natureworks R&D team is also working on a new technology to skip plants entirely.

[Palmetto Synthetics](#) offers biobased PLA staple fiber made with NatureWorks Ingeo®, which is derived from corn.

[Radici's Biofeel® - PLA](#) (formerly Cornleaf) is a 100 percent biobased filament yarn based on Ingeo™ PLA biopolymer, which is made from corn. More in the [supplier mapping](#).

[Toray](#) also offers a 100 percent biobased PLA filament.

[Trevira](#), an [Indorama Ventures company](#), offers biobased PLA fibers and filaments made with Nature Works LLC Ingeo™ which is made from grain (corn).

Biobased PTT

[DuPont's Sorona®](#), commercially available since 2000 and celebrating its 20th anniversary in 2020, is a partially biobased PTT polyester polymer with 37 percent biobased content by weight made from corn sugar. As of 2020, DuPont Sorona has many fiber production partners across the globe and over 150 mill partners. [More in the supplier mapping](#).

[Ecopel's KOBA®](#) faux fur is the first bio-based faux fur with 37 percent biobased content based on [Sorona®](#) fiber from Dupont.

[Far Eastern](#) offers biobased PTT.

[Toray's Ecodear® PTT](#) is a 30 percent plant-based PTT.

[Teijin Frontier's SOLOTEX® ECO-Hybrid](#) fiber was launched in 2020. The high-stretch fiber combines biobased PTT and chemically recycled PET.

Biobased PHA

In 2021, Fashion for Good launched [The Renewable Carbon Textiles Project](#), a consortium project to accelerate the development of PHA fibers from different feedstocks together with the innovators Bio Craft Innovation, Full Cycle Bioplastics and Newlight.

Biobased polyurethane

[Dupont's Susterra® PDO](#) is 100 percent corn-based building block, called propanediol, for a variety of polyurethane applications. More in the [supplier mapping](#).

The [Helm AG](#) in collaboration with Cargill launched [QIRA](#), a biobased 1,4 Butanediol (BDO) with around 95 percent corn-based feedstock, in 2021. The production capacity at the start in 2024 will be 66,000 tonnes per annum. Biobased BDO is a chemical that can be used for a variety of applications including biobased polyurethane. More in the [supplier mapping](#).

Biobased PBS

[Kintra Fibers](#) is developing a polybutylene succinate (PBS), which is a linear aliphatic polyester, currently with 50 percent biobased content derived from corn. More in the [supplier mapping](#), and this [interview](#).

(1) Nova-institute, 2021 - Press Release. [Link](#).



Other Manmade Fibers and Materials

Recycled Fibers from Blended Textiles

Chemical recycling of blended materials

Many textiles produced today are fiber blends. Fiber blends recycling is particularly challenging due to the mix of materials, such as cotton and polyester. Thanks to a few innovative startups, there is the prospect that high-value fiber blend recycling will be possible soon.

Chemical recycling

[Ambercycle](#) has developed a technology to separate post-consumer polyester-cotton blends on a molecular level and turn it into high-quality polyester pellets and products sold under the brand cycora™.

[BlockTexx](#) owns proprietary technology that separates polyester and cotton materials such as clothes, sheets and towels of any color or condition back into their high-value raw materials of PET and cellulose for reuse as new products for all industries. More in this [interview](#) and the [supplier mapping](#).

[Circ](#) (earlier called Tyton Biosciences) is developing a proprietary polycotton blend recycling process utilizing hydrothermal technology to separate polyester fiber from cotton at any ratio, yielding polyester monomers and dissolving pulp. Circ aims to recycle 10 billion garments by 2030. More in the [supplier mapping](#).


The [Hong Kong Research Institute of Textiles and Apparel \(HKRITA\)](#) - in collaboration with the H&M Foundation and Novetex - has developed a hydrothermal method using heat, water, and green chemicals for recycling post-consumer cotton and polyester blends. A new pre-industrial size facility called Novetex

Upcycling Factory scaling this technology was opened in September 2018.

[Infinited Fiber Company](#), a spin-off of the VTT Technical Research Center of Finland, has developed a technology that is also able to digest mixed post-consumer cellulose-based textile waste. Cellulose-based fibers are separated from other fibers like polyester and elastane, and the cellulose fibers are then chemically dissolved through a Cellulose Carbamate (CCA) technology. The technology can also turn cotton, viscose and other cellulose based residues into new MMCF. The technology can be applied in any existing dissolving pulp and MMCF plant. Investors include the H&M Group, Virala, Fortum and the RGE Group. Infinited Fiber aims to sell the first commercial-scale production unit in 2020/21. More in the [supplier mapping](#) and this [interview](#).

Textile Exchange Member Voices

For too long we have identified waste as waste, and only realized its value in collection and removal. There needs to be investment in recycling innovations to allow them to scale – chemical separation of materials is an emerging technology, but an exciting one.

 **Graham Ross**
BlockTexx



Recycled Fibers from Blended Textiles

Chemical recycling of blended materials

[Mistra Future Fashion's Blend Re:Wind](#) is a Swedish process for the recycling of poly-cotton blended textiles. Cotton is turned into new high-quality viscose filaments and polyester into two pure new monomers.

[Phoenxt](#) is a textile-to-textile chemical recycling technology that aims to convert textile waste back to raw material, including blended materials made of polyester, cotton, and cellulosic fibers.

[RISE - The Regenerator](#) is working on a technology to recirculating fashion by separating cotton and polyester blends, turning them into new textile fiber.

[Södra](#) announced its new solution called OnceMore® to separate cotton and polyester from polycotton blends in October 2019. The project started in autumn 2019 with 20 tonnes of post-consumer cotton added to their wood-derived pulp in their mill in Mörrum, Sweden resulting in 3 percent recycled content. In 2020, Södra increased this share to 20 percent and became RCS certified. Södra's target is to recycle 25,000 tonnes in 2025 to create products with 50 percent recycled content. To achieve this, Södra needs to make continuous improvements and investments. Södra is also exploring a decoloring solution, possibilities to extract products from the polyester, and the use of used MMCF textiles.

[Worn Again Technologies'](#) patented process can separate, decontaminate, and extract polyester polymers and cellulose (from cotton) from non-reusable textiles, as well as plastic bottles and packaging, to go back into new products as part of a repeatable process. In 2020, Worn Again opened a pilot and development facility as a significant step towards its commercialization. More in the [supplier mapping](#).

Textile Exchange Member Voices

IFC's technology enables circular fashion cycle since it can use mixed cellulose based waste and its own regenerated fiber also as feedstock over and over again.


 **Infinited Fiber**



Recycled Fibers from Blended Textiles

Mechanical recycling of blended textiles

Mechanical recycling

 [Circular Systems'](#) [Texloop](#), a purely mechanical and hydrothermal process, can also recycle blends, which in turn act as raw material inputs to next-generation fabrics. More in the [supplier mapping](#).

[Kishco Group](#) mechanically recycles various input materials, including polyester-cotton blends.

[Martex Fiber](#) has been innovating in the field of textile recycling since its founding in 1970 as a textile waste trading company. The company also mechanically recycles polyester-cotton blends.

[Novetex](#) opened its Novetex Upcycling Factory in Hong Kong in September 2018 for mechanical fiber-to-fiber recycling. The technology was developed in collaboration with HKRITA and H&M Foundation and can recycle post-consumer fiber blends.

Textile Exchange Member Voices

Texloop also acts as a service; taking a company's waste and plugging it back into its supply chain - truly enabling circularity. Circular Systems removes the typical obstacles in implementing circular recycling programs. These types of programs not only reduce a company's negative impact but also reduce the cost of production.

 **Circular Systems**




Manmade Protein Fibers

Overview


Biobased manmade protein fibers are another example of material innovations. Please note that not all biobased fibers are, by definition, sustainable or preferred. Further research is required in order to assess their sustainability profiles holistically.

Biobased manmade protein fibers

[AMSilk Biosteel®](#) is a biobased protein fiber produced in a continuous spinning process.

 [Bolt Threads' Microsilk](#) is a biobased manmade "spidersilk" primarily made of sugar, water, salts and yeast.

[Kraig Biokraft](#) is a protein fiber made by genetically engineered silkworms and composed entirely of protein produced naturally by the silkworm.

 [Spiber's Brewed Protein™](#) is a protein-based material made through fermentation primarily from nutrients such as sugar, water, and mineral. After more than 12 years of research and development, Spiber is now focusing on the transition to mass production. Spiber's first commercial plant, currently under construction in Thailand, is scheduled to begin operation at the end of 2021 with an annual capacity of several hundred tonnes. In 2020, Spiber joined [Bonsucro](#), global membership organization that promotes more sustainable sugarcane production, processing and trade around the world. More in the [supplier mapping](#).

Textile Exchange Member Voices

With a production process that utilizes plant-derived sugars as primary raw ingredients, Brewed Protein™ materials are well-placed to address increasing market pressure for low carbon emission, microplastic-free alternatives to synthetics and animal-based materials.

 **Spiber Inc.**



CO₂-based Fibers

Overview

Addressing climate change is one of the most urgent action areas for the textile industry. A few companies are exploring innovative approaches to directly capture carbon dioxide (CO₂) from the air and use its carbon as feedstock for textiles. Direct Carbon Capture and Utilization (CCU) is a new technology in development. Its energy use is currently very high but if technological challenges are overcome and if it is powered by renewable energy it has great potential as alternative to virgin fossil feedstock.

Examples

[Covestro](#) and its partners, foremost the Institute of Textile Technology at RWTH Aachen University and various textile manufacturers, announced in July 2019 that they have succeeded in making elastic textile fibers based on CO₂ and so partly replacing crude oil as a raw material.

[Fairbrics](#) with [Airwear](#) is a Global Change Award winner developing a technology to convert greenhouse gas into sustainable polyester with the aim to introduce first CO₂-based fibers to the market in 2023.

[LanzaTech](#) is developing a carbon recycling technology. They aim to create clothing like yoga pants from the CO₂ emissions from a steel mill. LanzaTech calls these products "CarbonSmart™."

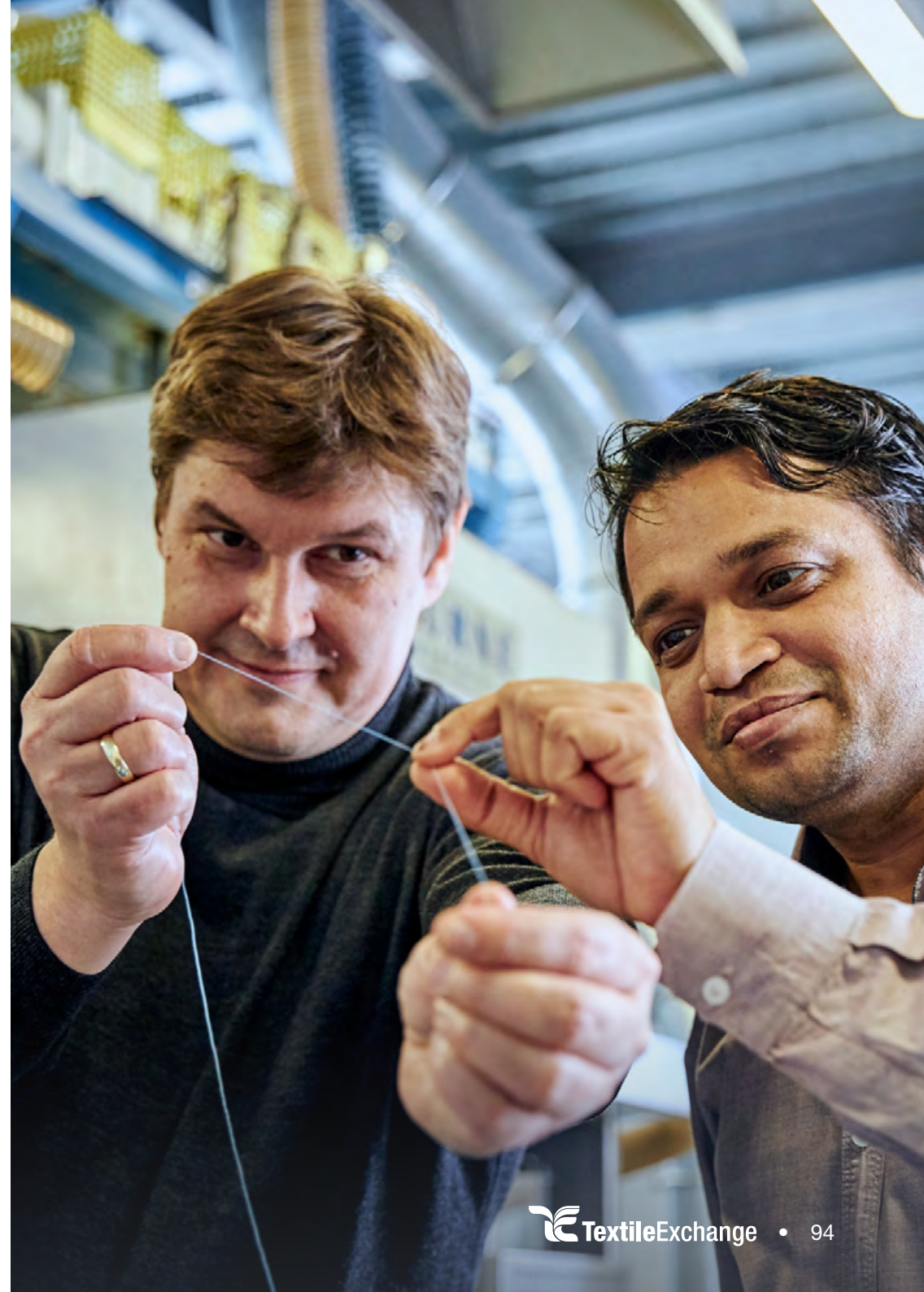
[Mango Materials](#) is developing a process to produce PHA biopolymers from waste biogas (methane) via a microbial process.

[NatureWorks](#) is currently using plants to capture and sequester CO₂ into long-chain sugar molecules, and its PLA called ingeo. Their R&D team is assessing new technology to skip plants and use microorganisms to convert greenhouse gases into lactic acid directly.

[NewLight](#) is working on a technology to turn greenhouse gases into aircarbon™, a material that can be melted and forged into fibers and solid parts.

The CO₂-based material could be a sustainable alternative to conventional elastic fibers in the near future.

Professor Thomas Gries
Director of the Institute of Textile Technology at RWTH Aachen University



(1) Covestro July 2, 2019 Press Release "Dress with CO₂". More information [here](#).

Non-animal-based alternatives to leather

An overview

While leather is a by-product of the meat and dairy industry, some brands prefer non-animal based alternatives to leather.

While most non-animal-based alternatives to leather are fossil-based synthetics, there is a growing number of partially (and rarely fully) recycled and biobased leather imitations available as an alternative to fossil-based synthetics. Many are still in development as it is not easy to achieve some of the quality attributed of natural leather, such as its durability.

While partially or ideally fully substituting fossil-based with biobased or recycled content is a start, continuous improvements and a holistic approach including material health and circularity are important.

Recycled and biobased non-animal-based alternatives to leather

[Amadou Leather™](#) is a mushroom material grown on sawdust using existing edible mushroom cultivation techniques.

[Apple Peel Skin](#) is a material which integrates apple peels into the skin of the material and thus reduced the amount of polyurethane in the material.

[Biophilica](#) is developing the new material [Treekind™](#) made from urban plant waste.

[Bolt Threads - Mylo™](#) is developed from mycelium cells. First consumer products made with Mylo™ were revealed in 2021. More in the [supplier mapping](#).

Cork is also increasingly used as alternative to leather. Recycled cork is another option.

[Desserto from Adriano di Marti](#) is a partially biobased material, launched in 2019. The resin is made with 40 percent cactus fiber, protein, pigments and 60 percent polyurethane. Backings are made with different fiber blends. More in the [supplier mapping](#).

Flokser's biobased SERTEX is a 70 percent biobased material derived from corn made in collaboration with BioAmber and DuPont.

[Fruit leather Rotterdam](#) is currently developing a new process that converts leftover fruits into durable material, possibly strong enough to be used for shoes, handbags. The fruit-based raw material is offered with different types of backings including polyester based textile.

[Malai](#) is a biobased material grown on coconut water, a leftover from the coconut industry in South India, through fermentation of a bacterial culture. This jelly is harvested and enriched with natural fibers, gums and resins to create a more durable and flexible material.

[Modern Meadow's Zoa™](#) is a bioengineered material based on the protein collagen produced through fermentation from yeast in a lab with the support of biotechnology. Modern Meadow is currently collaborating with selected brands to launch their first products in 2019.




Non-animal-based alternatives to leather

An overview

[MuSkin](#) is a 100 percent biobased material derived from the *Phellinus Ellipsoideus*, a parasitic fungus that grows in the wild and attacks the trees in the subtropical forests.

[Mycoworks](#) material called Reishi is grown rapidly from mycelium and agricultural byproducts.

[MYCL](#) is currently developing Mylea™, a mycelium-based alternative to leather.

 [Natural Fiber Welding's Mirum™](#) is a 100 percent plant-based material used as an alternative to leather. Ingredients used include cotton and hemp fiber, coconut coir, cork, natural rubber, and similar. Unlike most other alternatives to leather, the final Mirum™ materials are not coated in polyurethane or PVC. The cork and rubber part is FSC certified. More in this [interview](#) and the [supplier mapping](#).

[Piñatex®](#) is used as an alternative to leather offered in two types: Both Piñatex Original and Piñatex Performance comprise of the same base material, Piñafelt®, which is made from 80 percent waste pineapple leaf fiber and 20 percent PLA. The coating of Piñatex Original/Pluma/Mineral is a water-based PU resin which comprises of 10 percent of the total material composition. The coating of Piñatex Performance is a high solid PU and bio-based PU which comprises of 42 percent of the material composition. Both are REACH compliant.

[Provenance](#) is a bioengineered material based on collagen as building blocks.

[Ultrafabrics](#) has launched its [Ultraleather® Volar Bio](#) in 2019, a blended multi-layer leather-like material with 29 percent biobased content, composed of a polycarbonate and biobased surface made from corn and a backing consisting of 65 percent polyester and 35 percent rayon. More in the [supplier mapping](#).

[Vegea](#) uses grape marc, the seeds and the stalks of the wine grape bunch, which are left over after winemaking. From the seeds a bio-oil is extracted which is then polymerized using an innovative patented process. Vegea is currently working on the commercialization. More in this [interview](#).

[Vitrolabs](#) is a biotechnology company based in California using stem cell-based technologies to develop a material to be used as an alternative to leather. More in the [supplier mapping](#).

Commitments to alternatives to leather

A growing number of companies have also committed to animal-free products and the use of non-animal-based alternatives to leather.

Examples of public commitments by Textile Exchange members

Stella McCartney, a "vegetarian" brand, only uses non-animal-based alternatives to leather. More [here](#).

Sustainability Standards & Traceability

Sustainability Standards

Standards that can be used for multiple fiber types

The importance of sustainability standards and chain-of-custody systems is increasing.

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

As leading standards for organic textiles, the Organic Content Standard (OCS) and Global Organic Textile Standard (GOTS) both further expanded their market.

Organic Content Standard (OCS)

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

Textile Exchange launched the **OCS 3.0** in April 2020. Updates include updated manuals, more robust traceability between farm and first processor, GMO testing requirements, and non-mulesing for organic wool. More information [here](#).

The number of OCS certified sites increased from 6,181 in 2019 to 8,680 in 2020.

Global Organic Textile Standard (GOTS)

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

The **GOTS** version 6.0 was released in March 2020. The revised version includes updates related to GMO testing, living wages, and environmental criteria, among others. More information [here](#).

The number of GOTS certified sites increased from 7,765 in 2019 to 10,388 in 2020, covering more than 4 million workers.

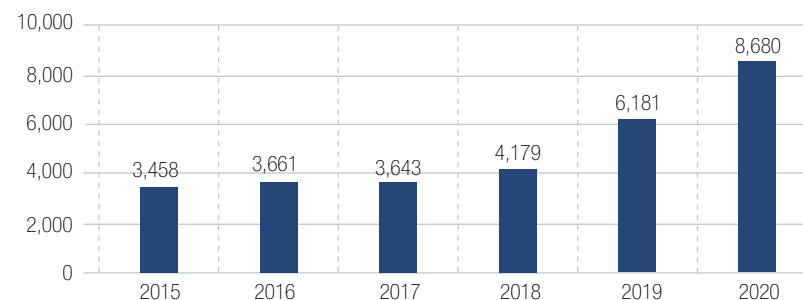
Content Claim Standard (CCS)

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 final product.

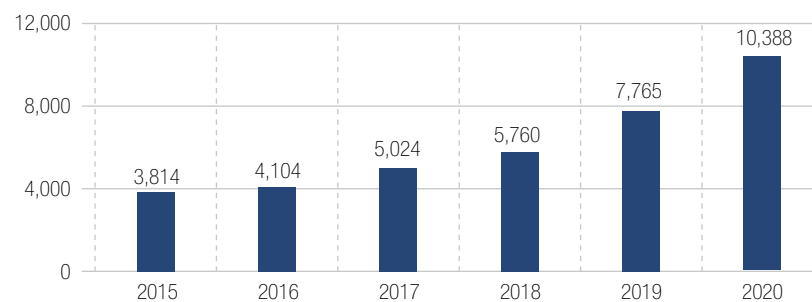
The **CCS 3.0** was released in July 2021. Key changes include the drop of brand network certification, that traders without physical possession are no longer required to be certified, and that contracts are now required with all subcontractors. More information [here](#).

The number of **Content Claim Standard (CCS)** certified sites increased from 57 in 2019 to 60 in 2020.

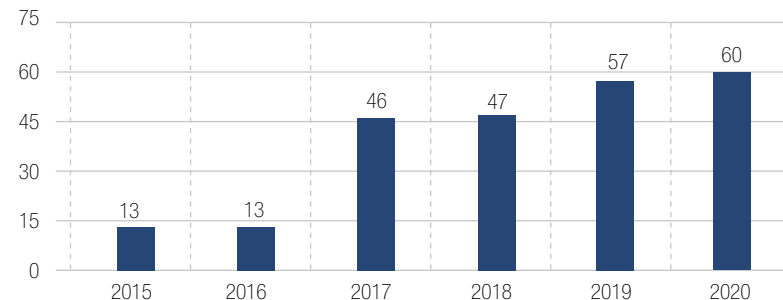
OCS: NUMBER OF CERTIFIED SITES



GOTS: NUMBER OF CERTIFIED SITES



CCS: NUMBER OF CERTIFIED SITES



Sustainability 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 particularly fast.

Recycled Claim Standard (RCS)

The Recycled Claim Standard (RCS) is an international, voluntary standard that sets requirements for 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 is in effect since July 2018. A key change was the introduction of the Reclaimed Materials Supplier Agreement, a document that provides more visibility to the suppliers of reclaimed materials. In April 2021, Textile Exchange began another revision of the RCS and is anticipating releasing a revised RCS 3.0 towards the end of 2022, following a thorough multi-stakeholder review process. More [here](#).

The number of RCS certified sites increased 2,497 in 2019 to 4,383 in 2020.

Global Recycled Standard (GRS)

The GRS - going 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) that replaced GRS's previous Prohibited Substance List. In April 2021, Textile Exchange began another revision of the GRS and is anticipating releasing a revised GRS 5.0 towards the end of 2022, following a thorough multi-stakeholder review process. More [here](#).

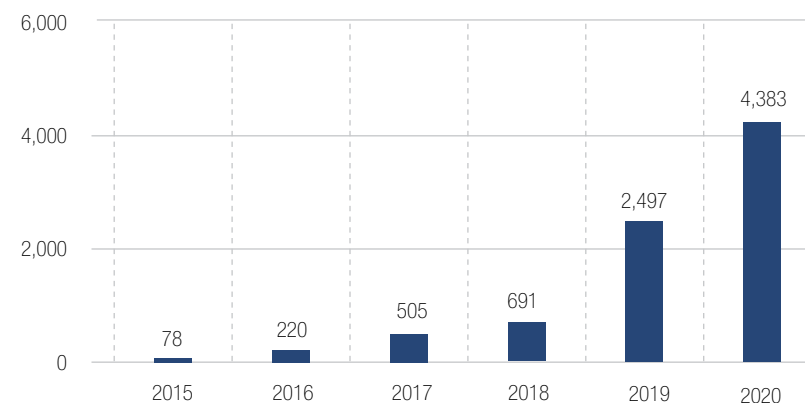
The number of GRS certified sites increased from 6,755 in 2019 to 14,367 in 2020.

Cradle to Cradle (C2C)

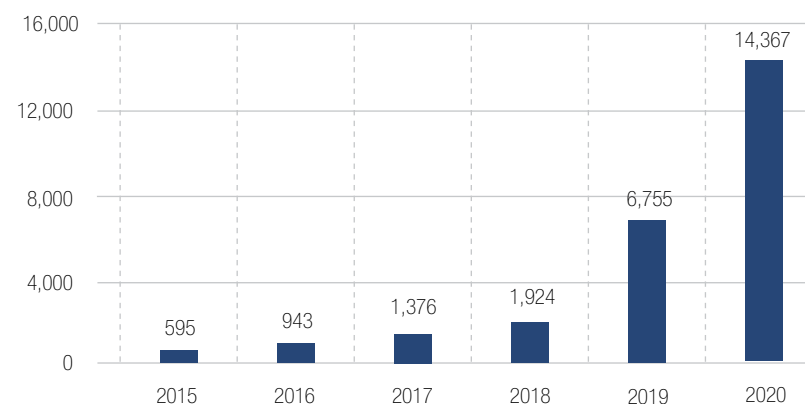
Cradle to Cradle Certified® is a globally recognized measure of safer, more sustainable products made for the circular economy.

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 in Clean Air & Climate Protection that promote urgent action to address climate change. Expanded requirements in Water & Soil Stewardship to ensure clean water and healthy soils are available to people and all other organisms. Improved alignment of Material Health requirements with leading chemical regulations and other standards, including a new Restricted Substances List.

RCS: NUMBER OF CERTIFIED SITES



GRS: NUMBER OF CERTIFIED SITES



Traceability and Transparency

Brands and retailers are increasingly being held accountable for what happens throughout the value chain. The ability to map the materials value chain is not only critical for due diligence but core to tracking progress towards Textile Exchange Climate+ strategic direction and the Sustainable Development Goals. While the majority of the top 100 apparel brands have sustainable material targets in place, according to a 2019 UNECE study, only about 34 percent of companies track and trace their value chains, of which half have visibility only up to their immediate suppliers.

Textile Exchange Trackit is our response to this call to action – a formative program for improved integrity, traceability, and efficiency of sustainable material provenance.

The role of sustainability standards in traceability

Standards provide the industry with a way to verify sustainability claims of a product. In general, there are three levels of verification:

- Site level
- Transaction level
- Physical material level

Credible traceability requires the interplay of verification at site, transaction, and physical material levels. What is traced, how it is traced, and the assurance levels very much depend on the chain of custody and requirements of the standard.

Introducing Textile Exchange Trackit

Textile Exchange standards cover third-party certification at site and transaction level. As different certification bodies operate in different regions, traceability is disaggregated across certification bodies which makes value chain mapping a challenge. The [Textile Exchange Trackit](#) program is being developed to address these challenges and support the traceability needs for Textile Exchange standards. The Trackit program offers two traceability paths:

- [Digital Trackit “dTrackit”](#) forms the traceability baseline for the existing certification process of all Textile Exchange standards. Traceability in dTrackit is achieved by centralizing and connecting scope and transaction certification data stored by certification bodies.
- [Electronic Trackit “eTrackit”](#) is an alternative for companies wanting more granular traceability using innovative technologies. It takes the traceability of Textile Exchange standards one step further by tracking the volume of certified material of each product (rather than the entire transaction) entirely online via tokens (think eBanking). Traceability is achieved by tracking these tokens at an article level in a central platform which certification bodies access for verification and approval. Physical material verification may be integrated and reconciled with data along the chain



Textile Exchange Member Action

[Applied DNA Science](#) is a B2B technology providing innovative molecular business solutions under the CertainT Platform to enable brands and manufacturers to Tag-Test-Track their raw materials all the way to finished product. Applied DNA Science offer solutions for cotton, down & feather, leather, synthetic fibers, and many other materials. More in this [interview](#).

[AWARE™](#) by The Movement is a traceability technology that can be used for all kinds of materials that are verified by unique tracer particles and validated by secure blockchain. AWARE™ blockchain is powered by Circularise.

[Birla Cellulose introduced a block-chain based traceability system](#) for its LivaEco and other fibers.

[Haelixa](#) is a DNA based technology creates a unique and traceable fingerprint for different materials.

The [Lenzing Group joined the platform of the technology company TextileGenesis™](#) and introduced their blockchain technology to trace the manmade cellulosic fibers through the supply chain.

The [Organic Cotton Accelerator \(OCA\)](#) initiated the Textile Traceability Task Force (TTTF) to harmonize efforts and co-develop a traceability framework. One project of this task force was the TTTF landscape analysis that researched 40 companies, 49 technologies and 26 pilots and initiatives - including technologies such as blockchain, microbiome, isotope, DNA markers, and fluorescent tracers.

[Oritain](#) offers an isotope technology to trace actual products back to their true origin.

The [Waste2Wear® blockchain system](#) provides indisputable evidence that Waste2Wear® Fabrics are really made of plastic waste. The blockchain records the journey of the plastic waste bottles, step-by-step, to become a finished textile product and allows customers to track each step in the value chain of the fabrics that they ordered.

Impact Incentives

Making impact happen

Textile Exchange has led the development of Impact Incentives, Impact Partnerships and is a founding member of the Impact Alliance.

Impact Incentives are a market mechanism for brands to deliver their expectations back to the start of the supply chain and provide financial rewards to encourage improved practices.

The way they work is quite simple; farms that have been verified to meet a set of sustainability requirements will be able to sell impact incentives for their volume of output. Brands can purchase these Incentives to balance out their use of these materials and invest in future responsible supply. The farms selling the Incentives may or may not be in the supply chain of the brands. While this means that brands cannot make any content claims on their products, they can by-pass the cost and complexity of long or opaque supply chains to deliver impact quickly and efficiently. Brands can still make claims about their support for improved practices and tell credible stories based on the data collected from the farms.

The Impact Partnership models is a tool to help brands work with on-the-ground Partner Programs to support farmers to meet the Impact Incentives requirements within 3 years.

The Partner Programs support the farmers through training, infrastructure investments, verification and data collection while providing stories, data, and credibility back to the brands.

The Impact Alliance is a voluntary collaboration between global sustainability programs with standards or benchmarks focused on producers at the beginning of the supply chain. Impact Alliance members work together to define, promote, and oversee the trading of Impact Incentives.

The founding members of the Impact Alliance are Textile Exchange (leather and cotton), the Global Roundtable for Sustainable Beef (beef), Proterra (soy and sugar), and Global Food Partners (cage-free eggs). There is further interest from other NGOs that are working with credible standards or benchmarks that share the mission and goals of the Alliance.

In 2021, the Impact Incentives have been piloted for leather, with a healthy engagement from the fashion and automotive industries.

For more information, visit www.impactincentives.org and textileexchange.org/impact-incentives.

Impact Incentives are a powerful tool to by-pass long and complex supply chains and to address the price conundrum that often inhibits the widescale adoption of full traceability standards. They provide a fast and efficient means to build up a more sustainable supply and drive the speed and scale of impact that is needed to address the world's issues.

 **Anne Gillespie**

Director of Impact Acceleration,
Textile Exchange



Spotlights on Climate+ Solutions

Climate+ Strategy

Textile Exchange's Climate+ strategy

Under our [2030 Strategy](#), [Climate+](#), Textile Exchange will be a driving force for urgent climate action, with a goal to reduce CO₂ emissions from textile fiber and material production by 45 percent by 2030 (from a 2019 baseline). The “+” allows Textile Exchange to prioritize climate while addressing other impact areas that are interconnected with climate such as water, biodiversity, and soil health. The “+” is also an acknowledgment that Textile Exchange cannot achieve this goal on its own.

Fibers and materials such as cotton, wool, leather, manmade cellulosics, and rubber all depend on rich natural capital such as healthy trees, land and soil, pollinators and protection from pests and disease, a reliable supply of water, energy and sunlight, and a stable climate for its ongoing availability.

Why is Climate+ important?

Climate

Climate change is one of the most urgent impacts to address. To limit global warming to 1.5 degrees Celsius and to avoid the most dangerous and irreversible effects of climate change, net-zero emissions have to be reached by 2050, and the net CO₂ has to be reduced by 45 percent by 2030 (compared to 2010)⁽¹⁾.

Biodiversity

The importance of biodiversity has never been so clear. Around one million animal and plant species are now threatened with extinction,

with many more predicted to become threatened within decades⁽²⁾.

Biodiversity and climate go hand in hand. While animal and plant species mitigate climate change by providing irreplaceable ecosystem services that are an integrated part of the carbon cycle, climate change poses a huge threat to these very species and to this symbiosis. Get involved and see how your company measures up in [The Biodiversity Benchmark](#).

Soil health

Mainstream agriculture is accelerating the loss of topsoil at an alarming rate. About a third of the world's soil is already degraded and it is estimated that the rate of soil erosion on arable or intensively grazed lands is 100-1,000 times higher than the natural erosion rate⁽³⁾. Generating two to three centimeters of topsoil takes 1,000 years⁽⁴⁾. Soil health is an integral part of the ecosystem, and critical that it be sustained.

Water

Water underpins all life on earth, so it is unsurprising that the diversion of water for agriculture, a sector that accounts for 70 percent of annual freshwater withdrawals⁽⁵⁾, or the production of fiber and materials in general, makes water a politically, economically, socially, and ecologically sensitive topic – particularly in the face of climate change.

(1) IPCC, 2018 - Special Report: Global Warming of 1.5°C Summary for Policymakers. [Link](#).

(2) IPBES, 2019 - Press release. [Link](#).

(3) FAO and ITPS, 2015 - Status of the World's Soil Resources. [Link](#).

(4) FAO, 2019 - Key figures on soil erosion. [Link](#).

(5) OECD, 2021 - Water and agriculture. [Link](#).



- 45%
in net CO₂ by 2030
compared to 2020 levels
to limit global warming to
1.5 degrees Celsius



Net-zero emissions
before 2050

to limit global warming
to 1.5 degrees Celsius

Textile Exchange's Climate+ vision is what the fashion industry needs as this will look at possibilities of further reducing carbon emission at fiber stage.

Dr. Wu Xiaogang
Sateri

Increase uptake of recycled fibers

Increasing the uptake of recycled fibers is a key strategy with vast potential to reduce GHG emissions to mitigate climate change, prevent biodiversity loss, halt negative impacts on soil health, and reduce water consumption.

In 2020, the overall uptake of recycled fibers compared to the total fiber production was just around 8.1 percent - with 7.6 percent recycled polyester from plastic bottles and only around 0.5 percent of all fibers included all other recycled fibers. **Overall, less than 0.5 percent of the global fiber market was thus from pre- and post-consumer recycled textiles in 2020.**

The market share of recycled fibers increased from 6.9 percent in 2016 to 8.1 percent in 2020. Thus the percentage of virgin fibers decreased from 93.1 percent in 2016 to 91.9 percent in 2020. **In absolute numbers, though, the virgin fiber production volume increased from 91.7 million tonnes in 2016 to 100.6 million tonnes in 2020.** This includes an increase of virgin fossil-based fibers from 55.7 million tonnes in 2016 to 59.7 million tonnes in 2020. This means, in 2020 around 4 million tonnes per year more fossil based fibers were produced than in 2016. To limit global warming to 1.5° Celsius, an absolute reduction of GHG emissions by 45 percent by 2030 compared to 2020 is required.

Polyester had the highest recycled fiber percentage with around 15 percent in 2020. Around 99 percent of the recycled polyester was PET bottle based.

The market share for recycled wool is estimated at around 6 percent.

Down, cotton, the other synthetics (combined), and MMCFs had a recycled share of less than 1 percent in 2020.

Textile Exchange Member Action

Around 141 brands and suppliers (including subsidiaries), many of them Textile Exchange members, have signed the 2025 Recycled Polyester Challenge, to significantly increase the share of recycled polyester from 14 percent in 2019 to 45 percent in 2025.

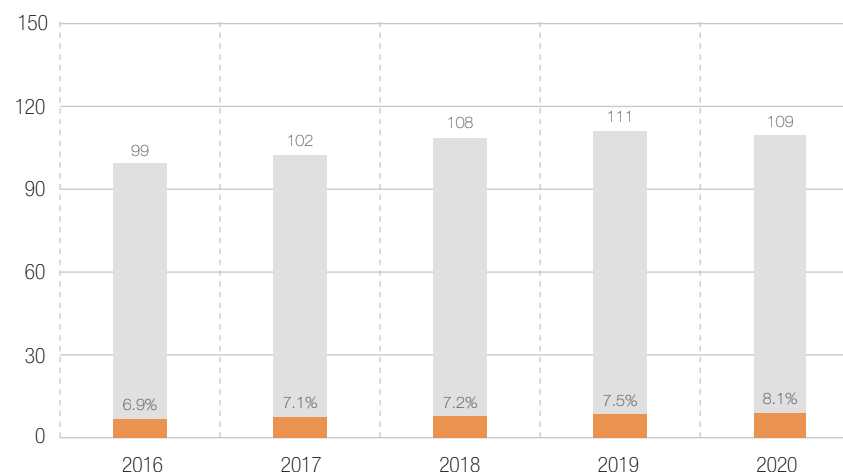
The Textile Exchange members **Eastman**, **Itochu**, and **Indorama/Loop Industries** are working on the development and scaling of textile-to-textile polyester recycling solutions.

Recover is aiming to massively scale their recycled cotton production volume.

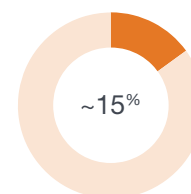
All leading MMCF producers, **Lenzing**, **Aditya**, **Sateria**, **Asia Pacific Rayon**, are working on the use of recycled feedstock.

Many more members work on increasing the uptake of recycled fibers and materials from recycled cotton, down, wool, MMCFs, and synthetics to leather.

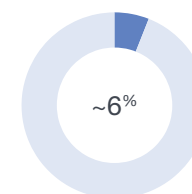
GLOBAL FIBER PRODUCTION
IN TONNES AND % OF RECYCLED



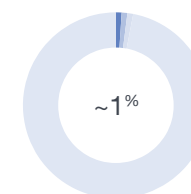
RECYCLED POLYESTER
MARKET SHARE 2020



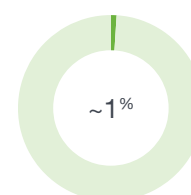
RECYCLED WOOL
MARKET SHARE 2020



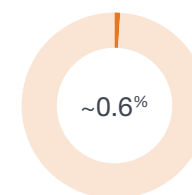
RECYCLED DOWN
MARKET SHARE 2020



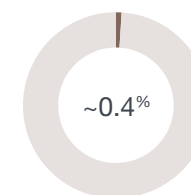
RECYCLED COTTON
MARKET SHARE 2020



OTHER RECYCLED
SYNTHETICS MARKET
SHARE 2020



RECYCLED MMCF
MARKET SHARE 2020



Proliferate regenerative practices

In recent years the principles of regenerative agriculture have been widely discussed. While there is no clear, universally agreed definition of the term “regenerative” at farm level it is generally taken to mean an enhancement of the whole farm ecosystem. In other words, regenerative management improves resources such as soil and water rather than depleting or destroying them. An important aspect of regenerative management is that it is an ongoing progression – not management to reach a predetermined target. Regenerative land management takes a holistic view and promotes diversity not only of plant species but also of beneficial insects, birds and other animals - both farmed and wild.

Regenerative livestock management

Grazing management for fiber producing animals can degrade soil, but using regenerative methods can not only arrest degradation but also improve soil health. The vegetation coverage, diversity of species in the sward, timing of grazing, stocking rates, and use of manures and other inputs can all be monitored and managed to deliver a positive outcome. Regenerative livestock management not only has the potential to deliver better soil health and better quality and quantity of vegetation for grazing (and thus better animal welfare), but it also has the potential to mitigate greenhouse gas emissions from grazing livestock through carbon sequestration and therefore reduce the carbon footprint of animal fibers.

(1) IPBES, 2019 - Press release. [Link](#).

(2) FAO and ITPS, 2015 - Status of the World's Soil Resources. [Link](#).

(3) FAO, 2019 - Key figures on soil erosion. [Link](#).

(4) OECD, 2021 - Water and agriculture. [Link](#).

Regenerative crop cultivation

Regenerative crop cultivation applies practices such as crop rotation, green manures, and cover cropping, as part of a holistic approach to managing the land without synthetic inputs. This is because working with the systems and cycles of nature is a fundamental part of the regenerative approach to agriculture.

Regenerative forestry and rubber

Regenerative forestry and rubber cultivation is characterized by a variety of trees and plants in a functioning ecosystem with habitats for all kinds of species, from animals and plants to insects and microorganisms.

Textile Exchange Member Action

In 2021 the global luxury group **Kering**, working with Conservation International, launched the “[Regenerative Fund for Nature](#)” to transform one million hectares of farms and landscapes producing raw materials in fashion’s supply chains to regenerative agriculture over the next five years. This fund intends to provide grants to farmers, NGOs, and key stakeholders who are on the frontlines of developing and scaling agricultural change on the ground.

Patagonia initiated a pilot project for cotton cultivation according to the [Regenerative Organic Certified \(ROC\)](#) standard with 150 farms in India.

BIODIVERSITY



1 million

animal and plant species
threatened with extinction⁽¹⁾

SOIL HEALTH



~ 33%

of the world's soil
is degraded⁽²⁾

WATER



70%

of annual freshwater
withdrawals is from agriculture⁽⁴⁾

SOIL HEALTH



1,000 years

is required to generate
2–3cm of topsoil⁽³⁾

Mitigate land use change

Land-use change is a key driver for biodiversity and ecosystem service losses. Conversion of forest to farmland, illegal logging and unsustainable forest management result in biodiversity loss and the carbon naturally sequestered in the plants and soil gets released to the atmosphere. Degraded land and forest, conversely, can be restored - carbon sequestration in the soil and plants as well as the biodiversity can be increased again.



Textile Exchange Member Action

Several Textile Exchange members support the [Leather Impact Accelerator \(LIA\)](#), launched in January 2021. In its first version, LIA is focusing on deforestation/conversion-free farming and animal welfare at farm level. For example, farmers participating in LIA and preserving forest from legal deforestation will be compensated for a loss in revenue since the land cannot be used for grazing by rewarding and recognizing the environmental services they are delivering. Textile Exchange is also developing an [Impact Incentives](#) trading model for responsible fibers/materials. This model is being developed in the first phase as an integral part of the LIA program, which will allow brands using leather to reward cattle farmers that meet the LIA requirements for deforestation and animal welfare.

Adidas, Bestseller, Burberry, Chanel, Everybody & Everyone, FashionCube, Gant, H&M, Inditex, Kering, Gap, Nike, Nordstrom, Puma, PVH, Selfridges, Stella McCartney and others have signed the G7 FashionPact commitment as of April 2021,

committing among others to the prevention of deforestation. Encouragingly, around 71 brands have signed up to the Fashion Pact, pledging to take actions consistent with limiting global warming to 1.5°C and a “just transition” to achieve net zero by 2050. They specifically recognize the importance of maintaining natural forests and restoring ecosystems through their supply chains.

H&M, Timberland, Vans, and VF

Corporation, for example, are committed to deforestation-free leather and put a temporary ban on leather from Brazil in 2019. This ban is in response to the fires in the Amazon area which are also linked to cattle production.

[Aditya Birla](#) has invested in conservation planning in carbon-rich Boreal landscapes, agreeing to scenarios with Canopy that propose to conserve approximately 70 percent of key Ancient and Endangered Forests.

The [FSC Ecosystem Services Procedure](#), introduced in 2018, is a tool that incentivizes the restoration and conservation of forest ecosystem services. It focuses on five types of ecosystem services: biodiversity, carbon, water, soil, recreation. By offering evidence of positive impacts as well as tools for communication and green marketing, the FSC Ecosystem Services Procedure aims to bring monetary and non-monetary benefits to those who actively support the responsible management of the world's forests and ecosystem services.



Support transition to renewable energy

The energy sector – mainly due to the burning of fossil fuels – accounts for almost three quarters of GHG emissions, of which around 30 percent is allocated to electricity and heat generation⁽¹⁾.

On the global level, renewables had a share of around 29 percent in electricity generation in 2020⁽²⁾.

Supporting the transition to renewable energy is thus a major strategy to reduce GHG emissions.

Big parts of the global fiber and material production is still powered by coal.

The transition to renewable energy is thus very important, particularly in energy-intensive production processes. Increased adoption of renewable energy sources, in place of fossil-energy will play a key role in reducing GHG emissions within the textiles value chain.

In order to secure global net-zero by mid-century and keep 1.5 degrees within reach, a key target set by COP 26 is to "accelerate the phase-out of coal", and "encourage investments in renewables".

The new UN Fashion Industry Charter for Climate Action Report "Identifying Low Carbon Sources of Cotton and Polyester Fibres" has also identified the use of renewable energy as a major strategy to reduce GHG emissions⁽³⁾.



Textile Exchange Member Action

90% of **Asia Pacific Rayon's** energy usage is from renewable energy sources. More information [here](#).

Two of **Lenzing's** production sites in Austria use 100 percent renewable energy. More information [here](#).

Södra uses almost entirely self-produced renewable energy from their pulp and sawdust mills to power their own industrial processes. More information [here](#).

Sulochana uses [100 percent renewable energy](#) for its production of recycled polyester in India and has installed a solar system.

Several members of Textile Exchange, including **Adidas, H&M, Kering, TAL Apparel**, and many more, signed the United Nations Fashion Industry Charter for Climate Action. Part of the Charter Principles is to pursue renewable energy in the supply chain and commit to not installing new coal-fired boilers or other sources of coal-fired heat and power generation as soon as possible and latest by 2025. Its Working Group 3 focuses on energy and manufacturing and mapped out existing renewable energy programs.



~ 29%

share of renewables in global electricity generation in 2020 ⁽²⁾

(1) World Resource Institute, 2020. [Link](#); The energy sector in this analysis includes transportation, electricity and heat, buildings, manufacturing and construction, fugitive emissions and other fuel combustion.

(2) IEA, 2021 - Website. [Link](#).

(3) UN Fashion Industry Charter for Climate Action, 2020 - Identifying Low Carbon Sources of Cotton and Polyester Fibres". [Link](#).

Encourage innovation and circularity

Initial Climate+ scenario modeling revealed a significant "innovation gap" in order to achieve the Climate+ target, i.e. the reduction of fiber and material related GHG emissions by 45 percent by 2030 compared to a 2020 baseline. Without investments in materials, systems, and business model innovations, limiting global warming to 1.5° is very unlikely. Even if all currently existing preferred fiber and material were massively scaled, the overall GHG emission reduction target would not be achieved.

Using recycled fibers is very important. However, it is not enough. Investments in innovative business models and design for circularity are needed to decouple the industry from virgin material use and increase reuse rates.

To tackle, for example, water pollution but also soil and air pollution, investments in solutions to prevent microfiber fragmentation are needed.

Textile Exchange Member Action

The [Cradle to Cradle Products Innovation Institute](#) provides with its Cradle to Cradle Certified™ Products Program, a standard and certification system for products circularity and related topics such as material health, renewable energy and climate, water and soil stewardship, and social fairness.

[Eastman's carbon renewal technology](#), a type of molecular or advanced recycling, gives new life to the most complex waste plastic, recycling all types of plastic with the exception

of PVC—many of which cannot be recycled with traditional mechanical recycling methods.

In 2021, [Infinited Fiber Company](#) announced its plans to invest EUR 220 million into building of a flagship factory in Finland that will use post-consumer textile waste as feedstock for its Infinna fiber.

Other

[CARBIO](#) is piloting an enzymatic process to depolymerize PET into its monomers. In 2020, Carbios produced the first clear plastic bottles from enzymatically recycled textile waste. Its first industrial unit with an annual production capacity of 40,000 tonnes of recycled PET is expected to generate first revenues in 2025.

Alternative materials are key for us to reach our goal of using only recycled or sustainably sourced materials by 2030. However, many of the materials we need do not exist today or are not available at a big enough scale. We need to speed up development and that's what we're here to do.

Mattias Bodin

Circular Innovation Lab Lead⁽²⁾



<0.5%

Recycled fibers made from pre- and post-consumer textiles ⁽¹⁾

Textile Exchange Member Benefits

Textile Exchange Membership

Connect. Collaborate. Accelerate.

Textile Exchange Membership connects you to a powerful community of brands, suppliers, and companies, large and small, from across the textile value chain, all seeking to create a more sustainable and responsible fiber and materials industry. Members gain access to learning opportunities, tools, relevant data, insight reports, industry networks, connections, and, above all, the opportunity to take action, individually and collectively.

“With buy-ins from Industry leaders like H&M, Inditex, Nike, and Lenzing, Textile Exchange’s membership reads like a who’s who of the garment and textile industry.”

- Sourcing Journal 

Benefits of Membership:



Unlock the Power of Community

Connect. Collaborate. Accelerate.

Join a community that can collectively accomplish what no individual or company can do alone. Gain access to The Hub, our Membership Community Portal.



Convene & Connect

Expand your organization’s network through our member-only online community portal, The Hub, exclusive members-only events, webinars, and publications. Benefits include free or discounted tickets to our annual conference, depending on the level of membership.



Access to Expertise

Dedicated support from Textile Exchange’s staff (900 years of combined experience) via The Hub. Individual team access and virtual training for our Partner-Level Members. Access our Member-only Fiber & Materials resources.



Show Leadership & Gain Exposure

Be featured in Textile Exchange’s member-focused communications, including exposure on our website, social media, member-only reports, and member spotlights*.

* Member spotlights reserved for Partner-Level members.



Develop, Measure & Track Progress to a Preferred Fiber Strategy

Demonstrate progress and industry leadership towards achieving the Climate+ goals.

All members participating in the Corporate Fibers and Materials Benchmark have access to advanced report cards.

Contact the Membership Team

For more information, contact:
Membership@textileexchange.org



Céleste Lilore

Global Director of Membership and Corporate Engagement – The Americas and Africa



Ricardo Garay

Manager of Membership and Corporate Engagement – EMEA & APAC



Renske Koster

Coordinator of Membership and Corporate Engagement



Valentina Zarew

Ambassador and Strategist – Oceania

Supplier Mapping

Textile Exchange annually invites suppliers to submit information for the Preferred Fiber and Materials Market Report. A summary of the submissions is included here in our public report.

The full supplier mapping benefits Textile Exchange Supporter and Partner level members and includes 102 snapshots of innovative fibers and materials across various material categories shared by 81 suppliers with us between 2019 and 2021. The most recent submission year is indicated in brackets after each product name.

The supplier mapping includes the information submitted by the suppliers and has not been verified by Textile Exchange. The 2021 supplier mapping focuses on the following fiber categories. For more inspiring insights into the work of suppliers in fiber and materials categories not listed here, please visit our [Insider Series](#).

SYNTHETICS

Recycled Polyester ([download](#))

- ADVANSA - Suprelle® + ADVA® (2021)
- Aero Fibre (2021)
- AGL - Polyfil (2019)
- Alliance Fibres - Greenfil (2021)
- **BlockTexx - S.O.F.T. rPET Pellets (2020, 2021)**
- Carbios (2021)
- Cixi Xingke (2019)
- De Martini Bayart & Textilfiba Spa - non-branded (2021)
- EcoBlue - 3D-Pure rPET chips (2021)
- Far Eastern - FENC® TOPGREEN® (2020)
- First Mile (2019)
- Gatron - Ecoron (2021)
- **IMBOTEX - CLIMALIGHT (2021)**
- **Itochu - Renu™ (2020)**
- JB Ecotex - non-branded (2021)
- Jeplan - Bring Material™ (2020)
- Nan-Ya Plastics - Saya (2020)
- Neelam Fibers (2020)
- Pashupati (2020)
- Pinnacle (2020)
- Plastics for Change - Fabric For Change (2021)
- Polygenta - perPETual (2021)
- Radici - Repetable® (2021)
- Reliance - RElan™ Green Gold (2020)
- Shinkong - RecoTex (2021)
- **Sulochana - Polycycle (2021)**
- Thai Polyester - EcoTPC™ (2020)
- The LYCRA Company - LYCRA® T400® EcoMade (2021)
- The LYCRA Company - THERMOLITE® EcoMade (2021)
- The LYCRA Company - COOLMAX® EcoMade (2021)
- **The Movement - Polyana® (2021)**
- **Unifi - REPREEVE® (2020)**
- **Worn Again Technologies (2021)**
- **Zhejiang Haili - Reboyarn (2020)**

SYNTHETICS

Recycled Polyamide ([download](#))

- De Martini Bayart & Textilfiba Spa - Non-branded (2021)
- Far Eastern - FEFC® eco (2019)
- Fulgar-Q-Nova (2020)
- Nilit (2019)
- Nurel (2019)
- Radici - Renycle® (2021)
- Taekwang Industrial - Acepora-Eco® (2021)

Recycled Other Synthetics ([download](#))

- **Aksa - Acrycycl® recycled acrylic (2020)**
- **Asahi Kasei Corporation - ROICA™ EF (2021)**
- Radici - Responsible® (2021)
- The LYCRA Company - EcoMade recycled elastane (2020)

Biosynthetics ([download](#))

- ADVANSA - ADVA® made from PLA (2021)
- **Arkema - Rilsan® polyamide 11 (2021)**
- **DuPont Biomaterials - Sorona® PTT (2021)**
- **DuPont Tate & Lyle Bio Proucts - Susterra® PDO (2021)**
- **Ecopel - KOBAS® (2020)**
- Far Eastern - FENC® TOPGREEN® (2019)
- Genomatica - Biobased Nylon 6 (2020)
- HELM AG - QIRA (2021)
- **Kintra Fibers - Biobased PBS (2021)**
- Radici - Biofeel® - PET (2021)
- Radici - Biofeel® - PA (2021)
- Radici - Biofeel® - PLA (2021)
- Radici - dorix® 6.10 (2021)
- Radici - Radipol® DC (2021)
- Radici - Radipol® PX (2021)
- The LYCRA Company - Lycra® 162 R (2020)
- **Virent - BioForm Paraxylene + Benzene (2019)**

Supplier Mapping

NATURAL FIBERS (plant- and animal-based)

Recycled Natural Fibers ([download](#))

- **Circular Systems - Orbital™ (2019)**
- **Circular Systems - Texloop™ (2019)**
- **Geetanjali Woolens (2020)**
- **Giotex - Recycled cotton (2020)**
- **Hilaturas Ferre - Recover® (2020)**
- **Saentis - RCO100 (2020)**
- **Takihyo Co., Ltd. - NO WASTE Project (2021)**
- **Taishoboseki Industries - Raffy (2021)**

Virgin Natural Fibers ([download](#))

- **AltMat - Alt (2021)**
- **Bear Fiber (2021)**
- **Circular Systems - Agraloop™ (2019)**
- **Flocus™ (2019)**
- **Himalayan Wild Fibers - Himalaya™ (2020)**
- **Spinnova (2019)**

MANMADE CELLULOSICS

Recycled Manmade Cellulosics ([download](#))*

- **Aalto University - Ioncell® (2020)**
- **Algiknit (alternative virgin feedstock) (2020)**
- **Asahi Kasei Corp. - Bemberg™ (2020, 2021)**
- **Asia Pacific Rayon (2020)**
- **Eastman - Naia™ Renew cellulosic fiber (2021)**
- **Evrnu - NuCycl™ (2020)**
- **GP Cellulose - Cotton Linter Pulp (2021)**
- **Infinited Fiber Company - Infinna™ (2021)**

- **Jilin Chemical Fiber - White Mountain (2020)**
- **Lenzing AG - TENCEL™ Lyocell with Refibra™ technology (2021)**
- **Orange Fiber (2021)**
- **Renewcell - Circulose® (2020)**
- **Sateri - FINEX™ (2021)**
- **SaXcell (2021)**
- **Södra - OnceMore® (2021)**

Virgin Manmade Cellulosics ([download](#))

- Includes lists of FSC and PEFC certified suppliers and a link to The CanopyStyle Hot Button Report.

OTHER

Fiber Blend Recycling ([download](#))

- **BlockTexx - S.O.F.T. rPET Pellets (2020, 2021)**
- **Circ ex. Tyton Biosciences (2021)**
- **Circular Systems - Orbital™ (2019)**
- **Circular Systems - Texloop™ (2019)**
- **Hilaturas Ferre - Recover® (2020)**
- **Infinited Fiber (2020)**
- **PHOENXT (2021)**
- **Worn Again Technologies (2021)**

Leather and Fur Alternatives ([download](#))

- **Adriano Di Marti - Desserto (2020)**
- **Bolt Threads - Mylo™ (2021)**
- **China Green Plastic - Blue RenTec (2020)**
- **Ecopel - KOBA® (2020)**
- **Natural Fiber Welding - MIRUM™ (2021)**
- **Sustainable Composites - enspire leather® (2020)**
- **Ultrafabrics - Ultraleather® | Volar Bio (2021)**
- **VitroLabs - Calf Leather (2020)**

Manmade Protein Fibers ([download](#))

- **Spiber - Brewed Protein™ (2021)**

Methodology & Disclaimer

Methodology

The Preferred Fiber and Materials Market Report contains 1) global production volumes of various fibers and materials, 2) standard specific data such as the number of certified sites or production volumes per standard, and 3) a variety of news, updates, stories, and quotes.

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.

The report covers the market for the key fibers and materials, including the conventional ones and examples of “preferred” options. Textile Exchange describes a fiber or material as “preferred” if it is ecologically and/or socially progressive and has been selected because it has more sustainable properties in comparison to conventional options. Textile Exchange acknowledges that there are a variety of different approaches towards sustainability and that this continuum evolves over time. The report provides examples of programs, initiatives, and products working towards more sustainable solutions.

Textile Exchange has not assessed the degree of sustainability of the individual programs, initiatives, or products mentioned in this report. The [Preferred Fiber and Materials Matrix](#) will assess a select group of programs.

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 are trying 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

Fiber includes staple fiber and filament. All numbers reported on manmade cellulosics and synthetics include staple fiber and filament production volumes.

d) Allocation of years

The report focuses on the calendar year 2020 and provides trends if available. As the cotton production volumes are collected in ICAC harvest years starting from August 1 and ending on July 31, the cotton production volumes can 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. 2019/20 cotton production volumes to the 2020 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.

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, 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.

2. Standard specific data*

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

3. News and narratives

The news, updates, stories, quotes and narratives presented in the report are either based on information directly received from the companies and organizations or from their press releases or websites.

* For methodological changes, data revisions, and comparison to previous years, please see the [next page](#).

Revisions and Updates

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 2020 to 2021 report

The following methodological changes were applied in the 2021 version:

- Updated ICAC cotton statistics were applied, including revision of the data of a couple of previous years.
- BASF e3 cotton data to ICAC harvest year allocation has been adjusted for all reporting years (e.g. cotton harvested between September and December 2019 was mistakenly allocated to the ICAC harvest year 2018/19 in the past and was reallocated to the 2019/20 ICAC year).
- Organic cotton production volume for the USA and thus also globally for 2018/19 were slightly adjusted based on additional information received after the launch of the PFMR 2020.
- Updated FAO statistics for other plant-based fibers and leather were applied.
- Updated figures for the production volume of synthetics (including recycled polyester), MMCs, and down were applied.
- The latest figures for the number of certified sites per standard were applied, including updates for previous years.
- Recycled cotton, wool, and down volumes were included for the first time and added on top of the virgin production volumes (see methodology).

This means that the following data reported in the 2021 report slightly differ compared to previous versions:

- global fiber production volumes.
- preferred cotton production volumes.
- global plant-based fiber production volumes.
- global synthetics (incl. recycled polyester), MMCs, and down production volumes.
- number of certified sites for several standards.

References and feedback

A significantly growing number of organizations and publications are referring to our Preferred Fiber and Materials Market Report. We want to start tracking the references to our report and hear your feedback. Please [share your feedback and inform us about references](#) to our report.

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.

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

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

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

Down and feathers are mainly used for home textiles such as bedding and pillows with around 75 percent. A minor part is used for apparel.

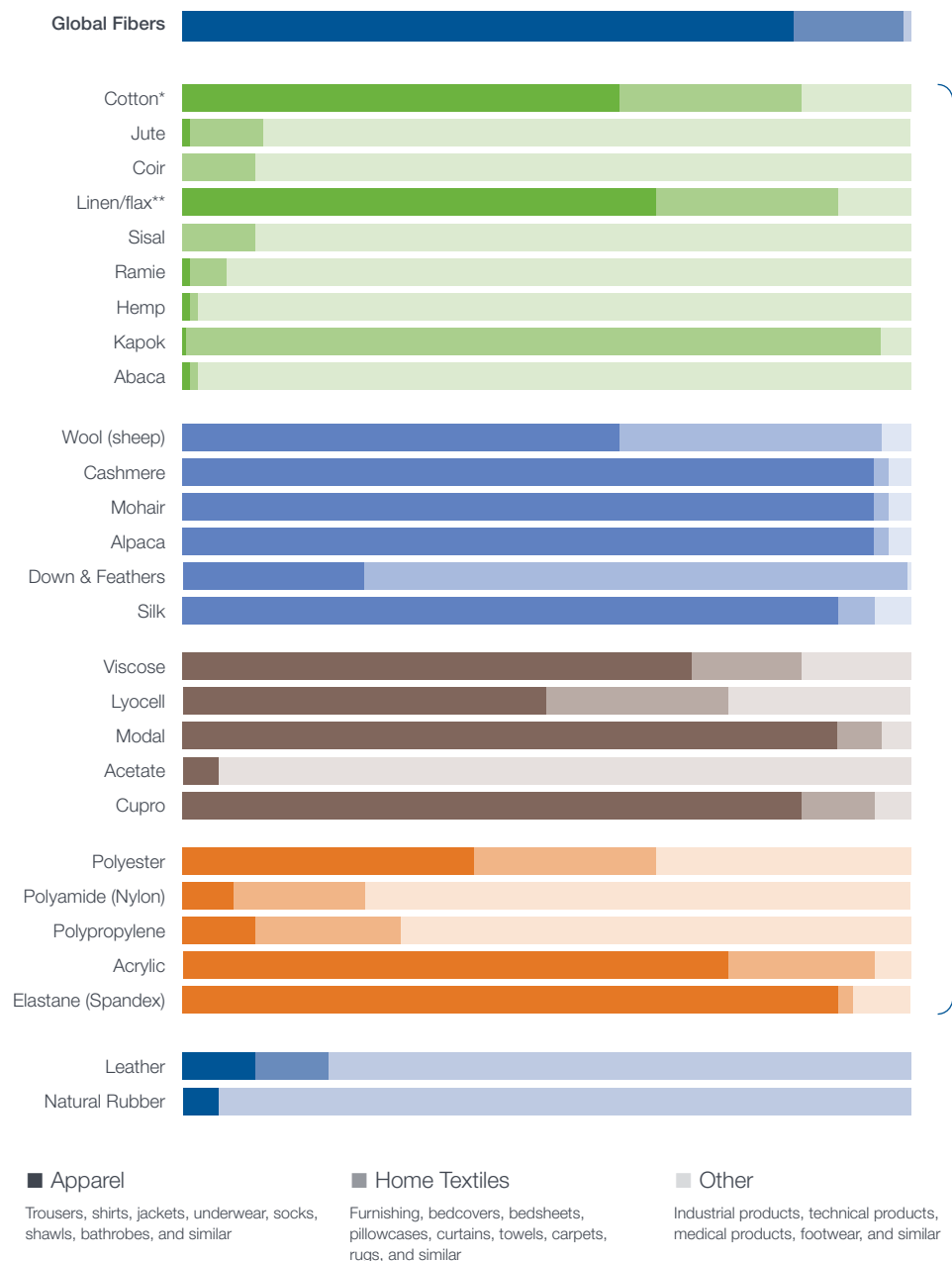
Polyester fibers are used for apparel with around 30-50 percent, home textiles with around 20-25 percent, and various other applications.

Polyamide fibers are used in various applications. Less than 10 percent of all polyamide fibers are used for apparel.

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

Leather is mainly used for footwear with around 50 percent of its production. Around 20 percent are used for apparel and home textiles.

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



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Textile Exchange envisions a global textile industry that protects and restores the environment and enhances lives.

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For the latest news and trends in the organic cotton sector, check out Textile Exchange's [Organic Cotton Market Report 2021](#).

For the latest updates on brand and retailer fiber and materials-related activities, check out Textile Exchange's [Corporate Fiber & Materials Benchmark](#) and its accompanying [Materials Change Insights Reports](#).

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