



# Preferred Fiber & Materials Market Report 2020



# Welcome to the 2020 Preferred Fiber & Materials Market Report

We are beginning to understand our COVID-19 impacted world, making it a good time to reflect on where we were before and want to be after. Alongside the fear and uncertainty that has become a “normal” part of our lives these days, the pause in business as usual has provided space for deep reflection. Even if we do not have many of the answers.

The pandemic has acutely impacted supply chains and consumer spending, but it is more than that. It is a sign of an increasingly unpredictable life on Earth. Mother Nature has literally told us to “go to our rooms and think about what we are doing”, and while we are there, to think about our priorities.

I was reminded of the beautiful words of Cara Smyth (Founder, Sustainable Business Coalition at Fordham University) in our Material Change Index [video](#): “We are one human family living on one common planet and we all have the delightful obligation to try to create positive change”.

Corona is our wake-up call and we need all the courage and optimism we can muster to rise to respond. To focus efforts on the transformational change we need, not simply a return to normal.

What will this mean for our industry and the materials it depends upon?

This year’s Preferred Fiber & Materials Market Report includes good news, with growth in a number of preferred materials and innovation in abundance. Alongside the good, is the sobering reality of how far we have to go. Production has increased from an estimated 107 million metric tons of materials in 2018 to an estimated 111 million metric tons in 2019, with less than 20 percent of that holding any sort of sustainability credential.

Further, we are not making enough of a dent in virgin feedstocks by recycled, with fibers originating from non-renewable resources continuing to push up the growth curve. The plummeting price of oil will create a significant temptation for the industry to fall back on sustainability commitments, as we emerge from COVID-19 depressed sales.

Conversations about strategy and survival around the board room table and in the c-suite will be incredibly challenging. But never before have we had this opportunity for reset – or for discovering – and harnessing - the compassion and desire for a better world!

In the spirit of compassion, here’s our top 10 tips for building back better and creating material change. Take them, use them, improve them. Add to them and share yours back!

- 1 Keep your promises.
- 2 Partner for inspiration, innovation and solutions.
- 3 Go beyond a “chain” and into a “network” – build a community.
- 4 Produce – and consume – with care and attention.
- 5 Rethink profit – be part of a green new deal.
- 6 Design for a long first life and another one after that.
- 7 Talk to many - and listen to many more.
- 8 Inspire - and be inspired - by your staff and teams especially your juniors.
- 9 Personalize it – whether you are the CEO or the intern.
- 10 Benchmark with us – join our Performance Improvement Community – share great insights – and help others.

We all know the challenges are huge. Unprecedented. But so is this opportunity right now to reinvent our industry. Our influence is huge. Let’s use it. Let’s own it.



Liesl Truscott

Director of European & Materials Strategy,  
Textile Exchange

## Foreword

Having dedicated my life’s work to sustainable fibers within the textile community or using the term we’ve coined - **preferred fiber and materials**, I am proud of the achievements that are revealed in the 2020 Preferred Fiber and Materials Market Report.

There are clear leaders in the industry that are making a significant impact through their bold adoption of preferred fibers and materials and many others who are well on their way – they have found a place to start and are taking action. Every step – no matter how small – is an accomplishment worth celebrating.

If we have learned anything from the global Coronavirus pandemic, it is that business-as-usual is no longer an option – we must make better choices that sustain life for all people and the planet. As the author and businessman, Max De Pree, said, “We cannot become what we need to be by remaining what we are.”

Within these pages you’ll read success stories from steps taken and, while we pause to celebrate those successes, you’ll also read about the need for greater acceleration and adoption of preferred materials.

Will your company be one that we celebrate next? Will you have the courage and ability to work in a different business model – one that delivers both impact and investment (ROI2)?

Regardless of your starting point, Textile Exchange is here to support, guide, and partner with you on this journey. We represent a global community in a pre-competitive space to help you adopt a preferred fiber and materials strategy.

Hindsight is 2020, let’s learn from it and collectively work to make 2021 and beyond the best years yet – starting with **creating material change**.



La Rhea Pepper  
Managing Director,  
Textile Exchange

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This report is **interactive**. Click a heading on this page to jump to that section and return here by clicking the contents icon located on the bottom left of each page.

# Executive Summary

State of the preferred fiber and materials production

As we publish our 2020 Preferred Fiber and Materials Market Report, the COVID-19 pandemic has upended the world order in nearly every way imaginable.

We ask ourselves: What impacts will the pandemic have on the textile industry? How should we approach our journey to more sustainable materials when other priorities require urgent attention? Does it still matter?

Yes, it does. **Amidst tragedy and chaos, this pandemic has demonstrated the deep interconnectedness between people and planetary systems.**

This interconnectedness is particularly evident in the textiles sector. Raw materials are derived from plants, animal fibers, and fossil fuel products, supporting livelihoods for many but also risking negative impacts on health and ecosystems through pollution, unsustainable land use, and climate change. At the same time, the favorable growing conditions, reliable rainfall, and fertile soils that so many farmers, companies, and consumers depend on are at risk of collapse or simply will not recover and regenerate.

**The Preferred Fiber and Materials Market Report shows:**

- Progress is being made in most areas, but it is not yet at the speed and scale required.
- With just 10 years to go, the next decade is crucial to meet the Sustainable Development Goals (SDGs) and to limit the global warming to 1.5 degrees Celsius.
- The time for urgent action is now. It's time for creating material change.

## **Cotton**

**With a market share of 25 percent in 2019 (i.e. the 2018/19 ICAC harvest year), the market for preferred cotton is more advanced than for most other materials.** Key drivers are the existence of several well-established preferred cotton programs, and that cotton as a large volume material has been on the industry's sustainability radar for many years. Yet, further increasing the share of preferred cotton and continuous improvement in terms of sustainability are urgently needed.

## **Polyester**

**While the share of recycled polyester is increasing and reached 14 percent in 2019, it is not yet advancing at the speed and scale required.** Low prices of fossil-based polyester create a challenging market environment for recycled and biobased polyester. As the fiber with the largest market share, the impact scale of polyester is enormous. While using plastic bottles as feedstock is a good start - and most recycled polyester is currently based on plastic bottles - we need to move towards textile-to-textile recycling and urgently improve social conditions in waste collection and recycling.

## **Polyamide**

**Due to technical challenges and less attention due to lower volumes, the market share of preferred polyamide is still low compared to polyester.** 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.

## **Manmade Cellulosics**

**The market share of "recycled MMCFs" is estimated at below 1 percent but a lot of research and development is ongoing, so it is expected to increase significantly in the next years.** Despite a high market share of FSC and PEFC certified

MMCFs - estimated at around 40-50 percent - the risk of sourcing MMCFs from ancient or endangered forests remains high. Canopy estimates that around half of all MMCFs come from ancient and endangered forests. With new standards introduced for the pulp and fiber level, action is also likely to grow on the pulp and fiber level.

## **Wool**

**Conventional wool dominates the wool market but the adoption of non-mulesing and preferred wool programs, such as the Responsible Wool Standard, is increasing.** Transitioning to wool programs with both animal welfare and responsible land use criteria in place offers the potential to create positive impacts in terms of animal welfare, land use, and biodiversity. The use of recycled wool can be another key lever. While it has a long tradition, the market share is still low, but the impact potentials are very high.

## **Down**

**Awareness of animal welfare issues has led to successful growth in the use of standards, such as the Responsible Down Standard.** While influencing at farm level is challenging, the use of preferred down standards helps to reduce the risks along the supply chain.

## **Leather**

**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.

## **Other fibers and materials**

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

# Key Facts and Figures

## GLOBAL FIBER MARKET OVERVIEW



only 10 years left until 2030

<sup>1</sup> Percentage of global fiber production volume in 2019.

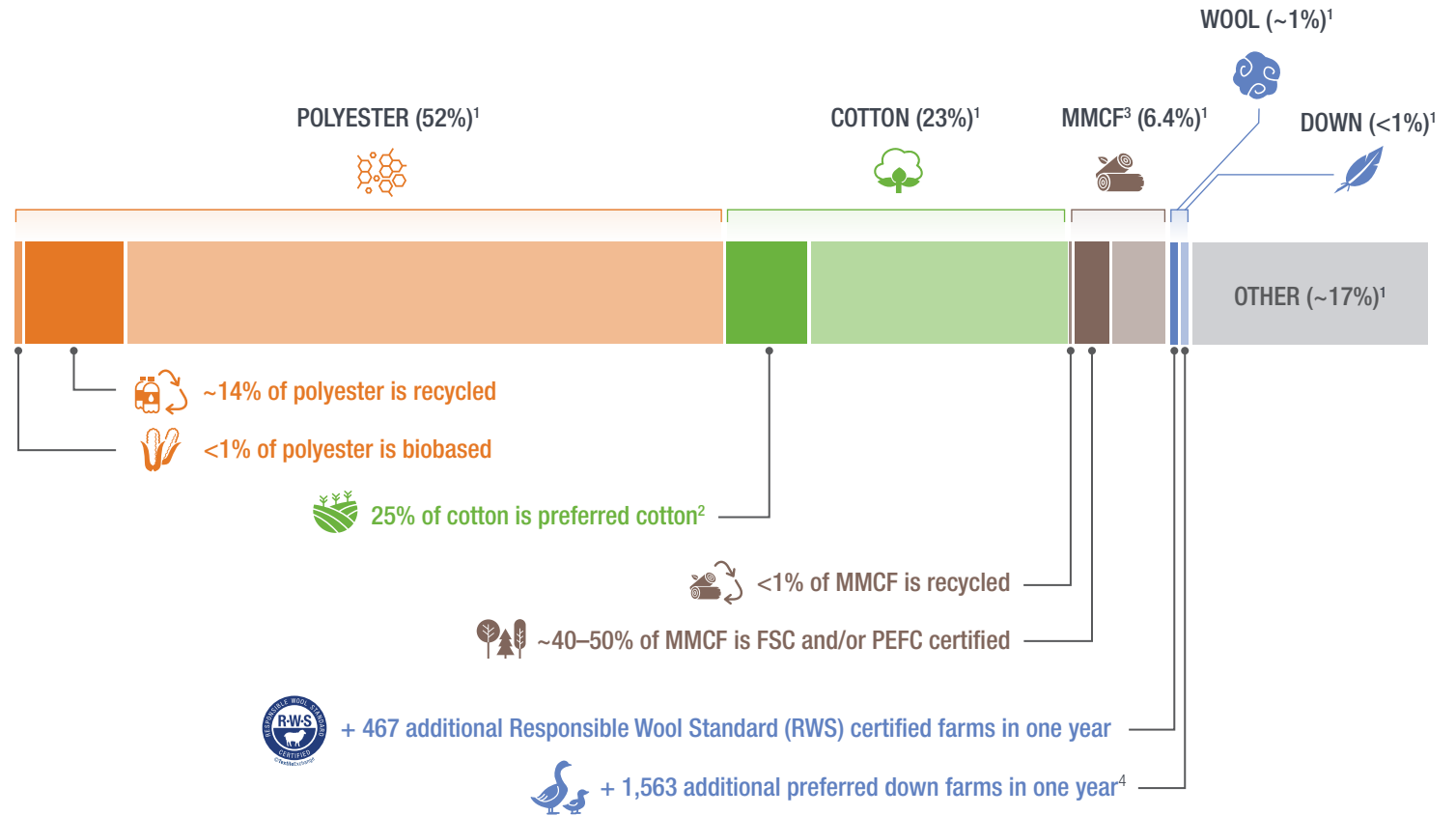
<sup>2</sup> This includes ABRAPA, BASF e3, Better Cotton Initiative (BCI), Cleaner Cotton, Cotton made in Africa (CmiA), Fairtrade, Fairtrade Organic, Field to Market, ISCC, myBMP, Organic, REEL Cotton, Regenerative Cotton, and Transitional Cotton. Reference year is the ICAC harvest year 2018/19. Field to Market and Regenerative Organic Certification (ROC) cotton production in 2018/19 was still zero, and figures for Transitional Cotton and Recycled Cotton are not included.

<sup>3</sup> Manmade Cellulosic Fibers.

<sup>4</sup> Certified to Responsible Down Standard (RDS), Downpass or Global Traceable Down Standard (TDS).

<sup>5</sup> From 2018 to 2019.

## PREFERRED FIBER AND MATERIALS MARKET OVERVIEW - 2019



**<1%**  
textile-to-textile  
recycling



**+251%**  
increase in number of  
Global Recycled Standard (GRS)  
certified sites in one year<sup>5</sup>



**+261%**  
increase in number of  
Recycled Claim Standard (RCS)  
certified sites in one year<sup>5</sup>

# The Global Fiber Market <sup>(1)</sup>

## The big picture

In 2019, global fiber production was around 111 million mt. Fiber production has more than doubled in the last 20 years and is expected to increase by another 30 percent to 146 million mt in 2030 if business as usual continues.

**Synthetic fibers** have dominated the fiber market since the mid-1990s when they overtook cotton volumes. With around 70 million mt of synthetic fibers, this fiber category made up approximately 63 percent of the global fiber production in 2019. More [here](#).

**Polyester** alone had a market share of around 52 percent of total global fiber production. Approximately 58 million mt of polyester was produced in 2019. More [here](#).

**Cotton** is the second most important fiber in terms of volume. With around 26 million mt, it had a market share of approximately 23 percent of global fiber production in 2019. More [here](#).

An increasingly important fiber category is **manmade cellulosics fibers (MMCFs)**

with a global production volume of around 7 million mt and a market share of around 6.4 percent in 2019. More [here](#).

**Polyamide**, the second most used synthetic fiber, accounted for 5.6 million mt and approximately 5 percent of the global fiber market in 2019. More [here](#).

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

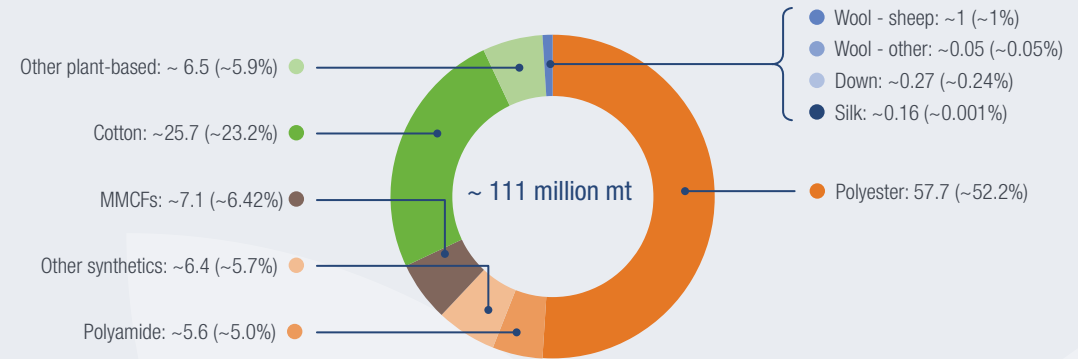
**Other plant-based fibers**, including jute, linen, hemp, and others, had a market share of about 6 percent. More [here](#).

**Silk** and **down** had market shares of less than 1 percent. More about silk [here](#) and down [here](#).

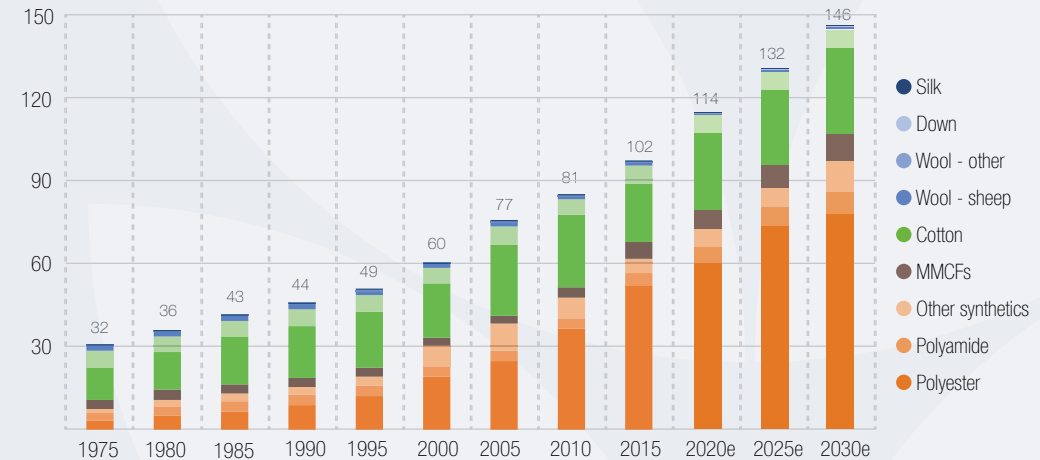
The growth in fiber production has significant impacts on people and the planet. The awareness of the urgent need for the more responsible use of resources and decoupling growth from resource consumption is growing; however, change is not happening at the scale and speed required.

(1) Textile Exchange compilation based on CIRFS email correspondence, IVC website, and email correspondence, Global Industry Analyst press releases, Tecnon Orbichem published by Marc Quartz on Atlas and their press releases, The Fiber Year data published by Oerlikon at ITMA 2019, Shinhan Sekuritas Indonesia Company Note November 2019, Fior Markets press releases, Engelhart (TFY) in Fiber Journal December 2019, Market Research Future press release, Fiber Organon and Textile Outlook International 2011, cited by Bhosale and Jadhav 2014 on [textnote.blogspot.com](http://textnote.blogspot.com), Lenzing investor presentation and email correspondence based on The Fiber Year and own estimates, Asahi Kasei email correspondence, ICAC email correspondence, FAOStat, cn-down, DNFI press releases based on IWTO and own estimates. Recycled natural fibers such as recycled cotton, recycled wool, recycled down and others are not included in this overview and would have to be added. The year 2019 includes estimates for the cotton production of the ICAC harvest year 2018/19 (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.

GLOBAL FIBER PRODUCTION IN 2019  
IN MILLION MT (+%)



GLOBAL FIBER PRODUCTION (MILLION MT)



# 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 full compilation of Member Spotlights [here](#).



**Manohar Samuel**  
Senior President,  
Marketing & Business  
Development,  
**Birla Cellulose**

[Link to interview](#)



**Federico Paullier**  
Managing Director,  
**Chargeurs Luxury  
Materials**

[Link to interview](#)



**Tricia Carey**  
Director of Global  
Business Development,  
Apparel,  
**Lenzing**

[Link to interview](#)



**Bernhard Riegler**  
Vice President –  
Marketing,  
**Sappi**

[Link to interview](#)



**Sharon Chong**  
Vice President,  
Sustainability,  
**Sateri**

[Link to interview](#)



**Ramakrishnan Sabhari  
Girish**  
CEO,  
**Sulochana Cotton  
Spinning Mills Pvt. Ltd.**

[Link to interview](#)



**Takehiro Sugiyama**  
Textile Planning &  
Development Office,  
Sustainable Team  
Manager,  
**Takihyo**

[Link to interview](#)



**Eddie Lanier**  
Director, Environmental  
Department,  
**WP Home**

[Link to interview](#)

## 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 full compilation of Insider Series stories [here](#).

**MeiLin Wan**  
Vice President Textiles,  
**Applied DNA Sciences**

[Link to interview](#)

**Isaac Nicholson**  
CEO,  
**Circular Systems**

[Link to interview](#)

**Arnaud Brunois**  
Communications Manager,  
**Ecopel**

[Link to interview](#)

**DEEPAK GOEL**  
Director,  
**Geetanjali Woollens**

[Link to interview](#)

**David Brabham**  
Sustainability Strategy  
Manager,  
**GP Cellulose**

[Link to interview](#)

**Antti Ratia**  
Communications Manager,  
**Infinited Fiber Company**

[Link to interview](#)

**Enrico Bagetta**  
Sales Manager,  
**Interplume\***

[Link to interview](#)

**Nina Conrad**  
Sustainability Manager,  
**LEIT & HELD**

[Link to interview](#)

**Luke Haverhals**  
CEO,  
**Natural Fiber Welding**

[Link to interview](#)

**Jeanne Carver**  
Founder/President,  
**Shaniko Wool Company**

[Link to interview](#)



We want to thank all our members and friends for their support!

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

# Plant-based Natural Fibers

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# Cotton

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Photo: Martin J. Kielmann für CmiA

# Virgin Cotton

Global preferred cotton production<sup>(1)</sup>

With a market share of 25 percent in 2018/19, the market for preferred cotton is more advanced than for most other materials.

Key drivers are the existence of several well-established preferred cotton programs and that cotton as a large volume material has been on the industry's sustainability radar for many years.

The market share of preferred virgin cotton increased from five percent of the total cotton production in 2012/13 to 25 percent in 2018/19. This growth equals an increase in global production volume of preferred cotton from 1.4 million mt in 2012/13 to 6.4 million mt in 2018/19<sup>(3)</sup>.

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 Cotton\*, and the United States Cotton Trust Protocol\*. The preferred cotton options included here align with all virgin cotton options included in the 2025 Sustainable Cotton Challenge

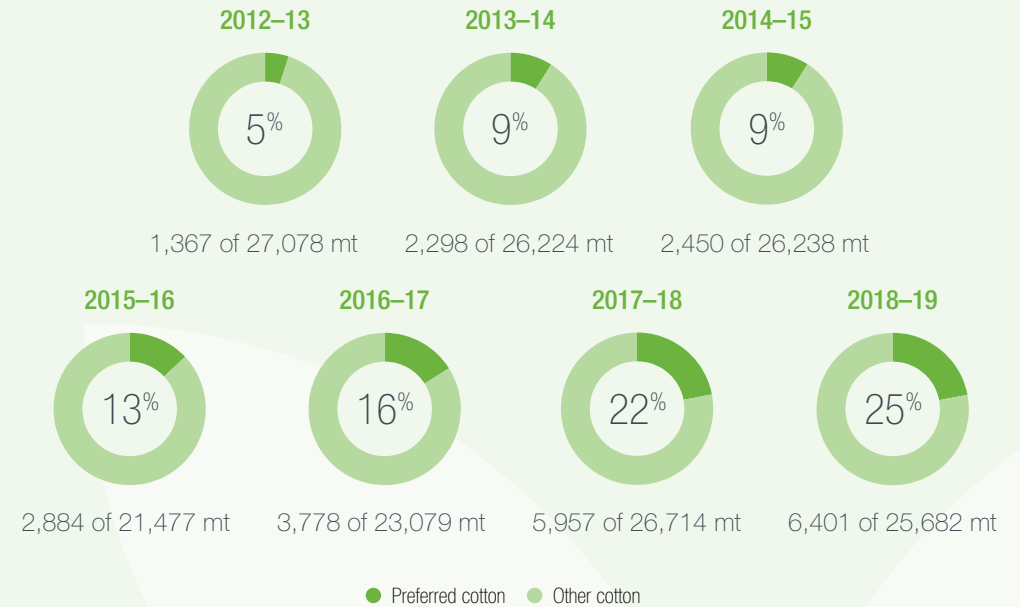
(see more on page [“Commitments to Preferred Cotton”](#))<sup>(1)</sup>.

Preferred cotton initiatives exist within a continuum, and Textile Exchange sees regenerative organic cotton production systems operating under Fair Trade 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 22 percent of all cotton in 2018/19 and thus, the large majority of the 25 percent of preferred cotton in 2018/19. The BCI Standard, without equivalents, accounted for around 11 percent, the Brazilian standard ABRAPA for around 8 percent, CmiA for around 2 percent, and MyBMP for below 1 percent of all cotton in 2018/19<sup>(5)</sup>. BCI aims to increase its market share to 30 percent of the global cotton production by 2020.

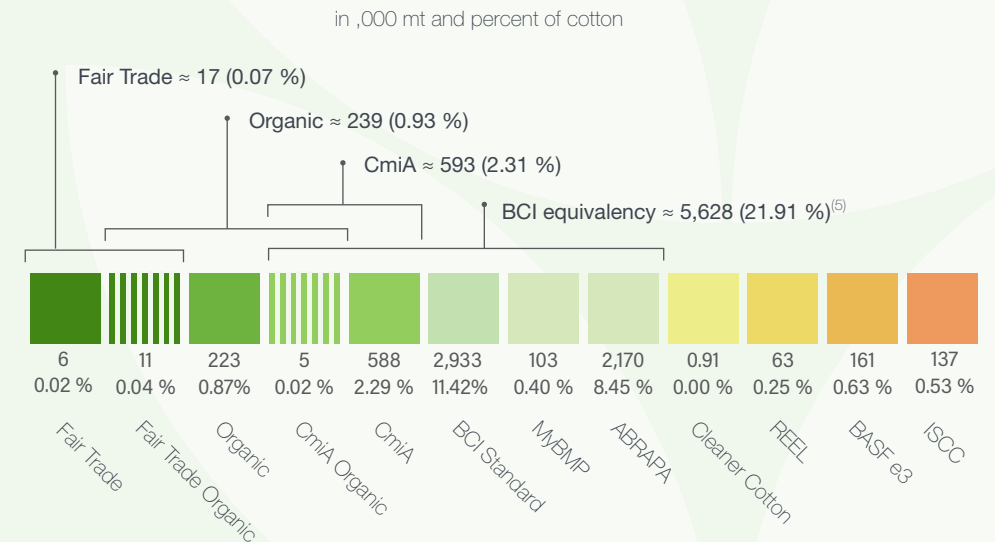
All other cotton programs together, including BASF e3, Cleaner Cotton, Fair Trade, ISCC, Organic<sup>(4)</sup>, and REEL cotton, had a combined market share of below 3 percent of all cotton in 2018/19.

## MARKET SHARE OF PREFERRED COTTON ('000)



## PREFERRED COTTON FIBER PRODUCTION IN 2018-19

6.4 million MT



(1) These figures 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 from the United States Cotton Trust Protocol, an initiative added to the Sustainable Cotton Challenge 2025 in spring 2020, nor for Field to Market (not yet harvested in 2018/19), Regenerative or In-Conversion Cotton (no global data available), Regenerative Organic Certification (ROC), and QAI's Certified Transitional Cotton production has not yet started in 2018/19.

(2) ICAC-Cotton: World Statistics May 2020 and Textile Exchange compilation of total global fiber volume data (see [“Global Fiber Market”](#)).

(3) ICAC-Cotton: World Statistics 2020, standard owner data received by mail or from their publications; compilation by Textile Exchange - overlaps of standards excluded.

(4) This includes organic cotton certified to bioRe.

(5) The BCI equivalency as reported by BCI. It slightly differs from the aggregated 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.

# Virgin Cotton

A closer look at the preferred virgin cottons<sup>(1)</sup>

## ABRAPA's Responsible Brazilian Cotton/ Algodão Brasileiro Responsável (ABR)

production increased from 753,608 mt in 2012/13 to around 2.17 million mt in 2018/19. This volume equaled a market share of 8.45 percent of all cotton grown in 2018/19. Approximately 93 percent of all ABRAPA cotton was accounted for as BCI in 2018/19.

The **BASF e3** cotton production was around 160,754 mt in 2018/19 equaling 0.63 percent of all cotton produced in 2018/19.

**Better Cotton Initiative (BCI)** cotton production including equivalents increased from 665,789 mt in 2012/13 to 5.628 million mt in 2018/19. The BCI Standard made up around 52 percent of all BCI cotton produced in 2018/19. The remaining 48 percent of BCI cotton was produced according to the BCI equivalents ABRAPA, Cotton made in Africa and myBMP. BCI, including equivalents, represented around 22 percent of all cotton production in 2018/19.

**Cleaner Cotton** production increased from 258 mt in 2012/13 to 914 mt in 2018/19. This equaled 0.004 percent of all cotton produced in 2018/19. In March 2019, the funding for the regular farm

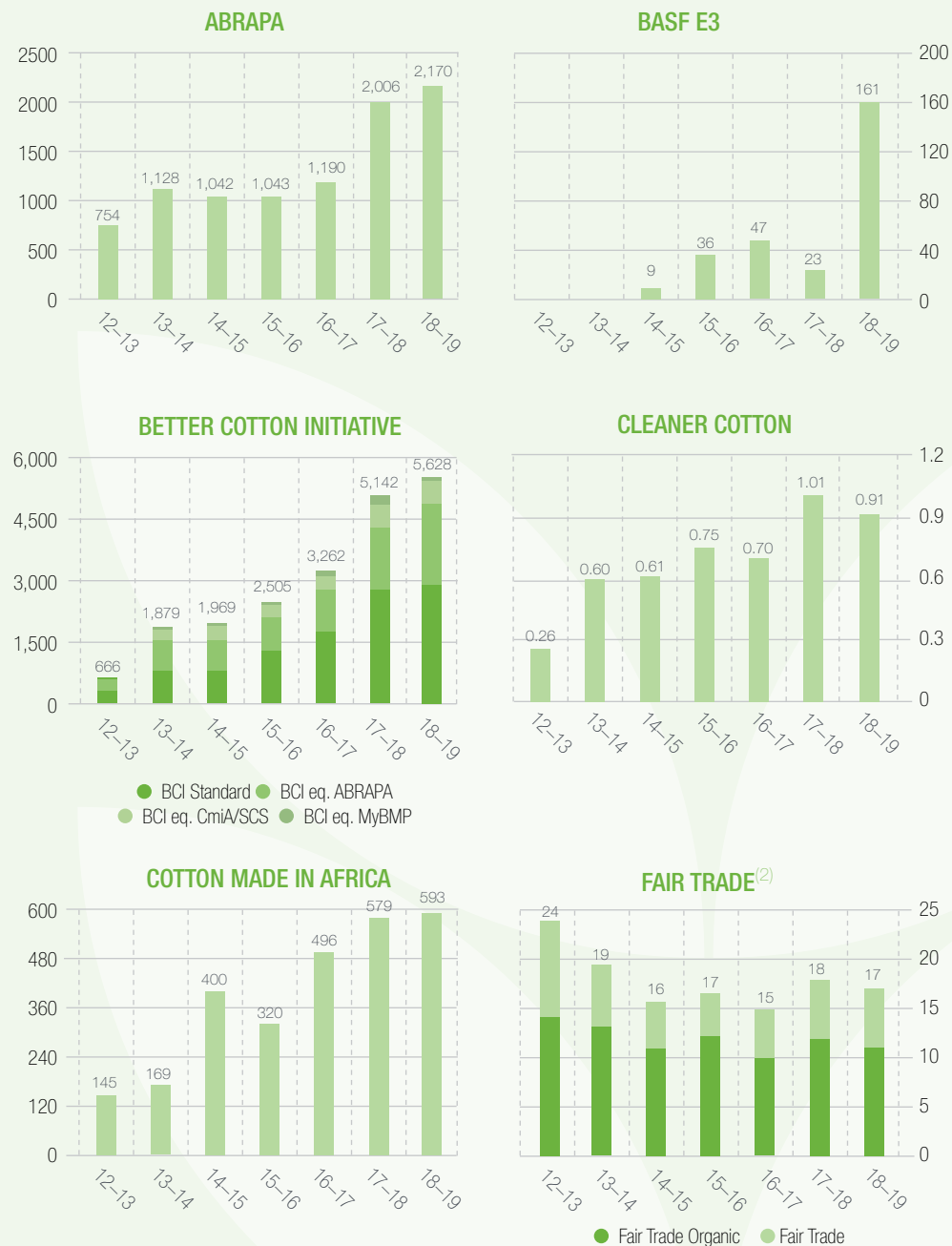
program ended. However, the formerly enrolled growers continue to produce cotton according to previously established practices but without the project's support. Educational work, such as the annual cotton farm tours, will be continued, and Cleaner Cotton™ fiber will still be available upon request.

**Cotton made in Africa (CmiA)** production increased from 144,909 mt in 2012/13 to 593,067 mt in 2018/19. This equaled 2.31 percent of all cotton produced in 2018/19 and more than 30 percent of all cotton production in Africa in 2018/19. Almost all (97 percent) of the CmiA produced in 2018/19 was also accounted for as BCI equivalent. With 5,420 mt, a large part of the CmiA cotton produced in Tanzania was also certified organic.

**Fairtrade** cotton production reached 16,906 mt in 2018/19 equaling 0.07 percent of all cotton produced in 2018/19<sup>(2)</sup>.

**Fairtrade Organic** cotton production, i.e. the production of cotton that is certified to both, Fairtrade and an organic standard, was around 10,989 mt in 2018/19. Approximately 65 percent of all Fairtrade cotton in 2018/19 was also certified to an organic standard<sup>(2)</sup>.

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



(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) 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.

# Virgin Cotton

A closer look at the preferred virgin cottons<sup>(1)</sup>

**Field to Market** certified cotton was not yet produced in 2018/19.

**ISCC** cotton production increased from 108,575 mt in 2017/18 to 137,052 mt in 2018/19. This amount equaled 0.53 percent of all cotton produced in 2018/19<sup>(2)</sup>.

**myBMP** cotton production increased from 54,000 mt in 2013/14 to 102,721 mt in 2018/19 equaling equaled 0.40 percent of all cotton produced in 2018/19. myBMP is also accounted as BCI equivalent.

**Organic cotton** production increased from 107,243 mt in 2012/13 to 239,797 mt in 2018/19. Organic cotton equaled a market share of 0.93 percent of all cotton produced in 2018/19. The organic cotton production volume includes the organic cotton that is certified according to bioRe. For more information on organic cotton please see our [Organic Cotton Market Report 2020](#).

**REEL** cotton production has fluctuated over the past few years and increased to 63,326 mt in 2018/19. This amount equaled 0.25 percent of all cotton produced in 2018/19.

**Regenerative Cotton** certified according to the Regenerative Organic Certification (ROC) was not yet produced in 2018/19.

**In-Conversion Cotton (Transitional in the USA)** is the cotton-in-conversion to organic. 55,833 ha of land were in-conversion in 2018/19. For more details, please have a look at the forthcoming [Organic Cotton Market Report 2020](#). 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 2018/19 yet.

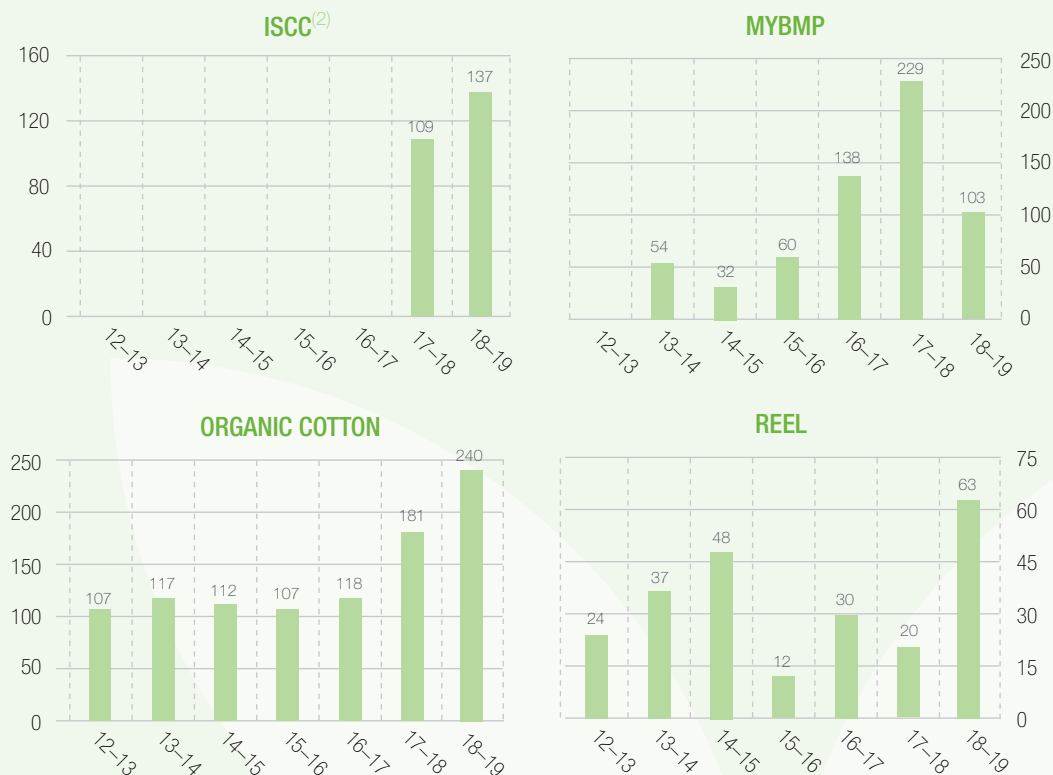
## Tip: How to find out more about the different cotton programs.

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

(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) ISCC cotton volumes are collected by calendar year, not ICAC harvest year. The data from the 2019 calendar year have been allocated to the 2018/19 ICAC harvest year, the 2018 calendar year data to the 2017/18 ICAC harvest year.

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



## 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

# Virgin Cotton

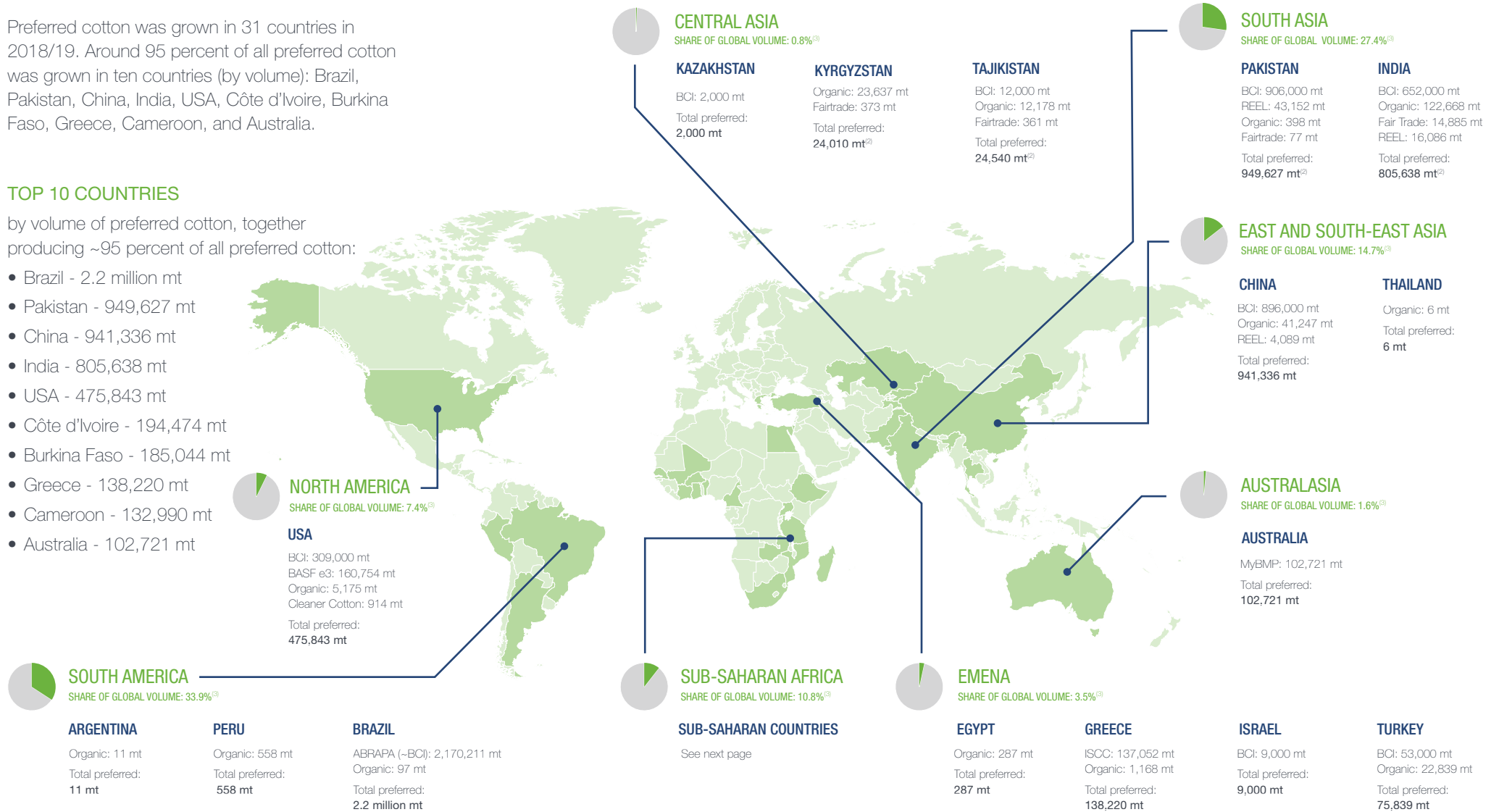
Directory: Where to find preferred cotton across the globe<sup>(1)</sup>

Preferred cotton was grown in 31 countries in 2018/19. Around 95 percent of all preferred cotton was grown in ten countries (by volume): Brazil, Pakistan, China, India, USA, Côte d'Ivoire, Burkina Faso, Greece, Cameroon, and Australia.

## TOP 10 COUNTRIES

by volume of preferred cotton, together producing ~95 percent of all preferred cotton:

- Brazil - 2.2 million mt
- Pakistan - 949,627 mt
- China - 941,336 mt
- India - 805,638 mt
- USA - 475,843 mt
- Côte d'Ivoire - 194,474 mt
- Burkina Faso - 185,044 mt
- Greece - 138,220 mt
- Cameroon - 132,990 mt
- Australia - 102,721 mt



(1) Email correspondence with cotton initiatives; BCI refers here to BCI standard; BCI equivalents are listed separately.

(2) As the per-country breakdown of Fairtrade Organic cotton was not available to the report production team at the launch of the report, this figure may include cotton that is certified to both Fairtrade and organic. Thus a double-counting of this figure is possible. The total volume of preferred cotton per country would not change much, though, as the share of Fairtrade Organic cotton compared to the total amount of preferred cotton is rather low.

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

# Virgin Cotton

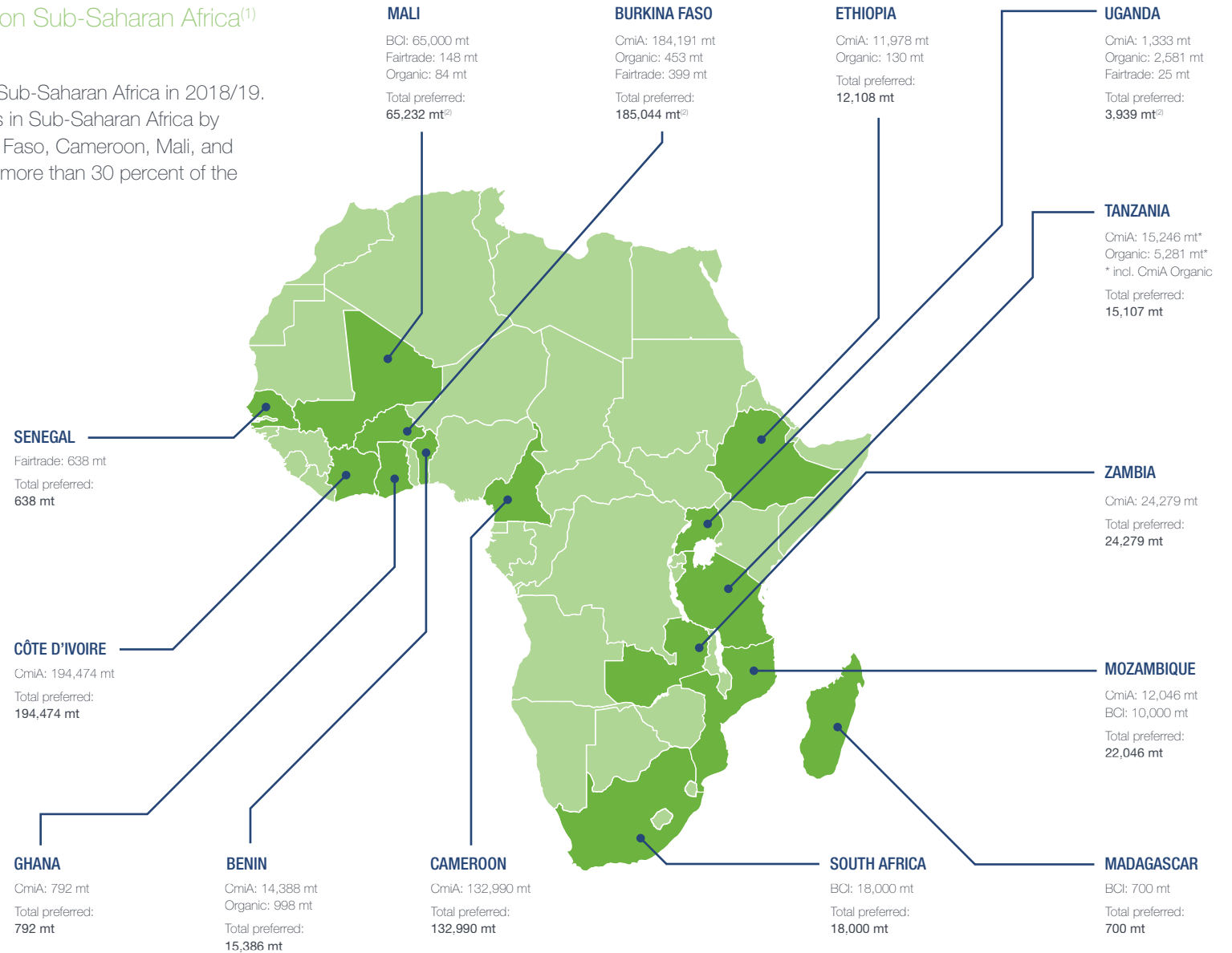
## Preferred Cotton Directory: Spotlight on Sub-Saharan Africa<sup>(1)</sup>

Preferred cotton was grown in 14 countries in Sub-Saharan Africa in 2018/19. The top 5 preferred cotton-producing countries in Sub-Saharan Africa by volume in 2019/18 were Côte d'Ivoire, Burkina Faso, Cameroon, Mali, and Zambia. Cotton made in Africa (CmiA) certified more than 30 percent of the cotton production in Africa in 2018/19.

### TOP 5 SUB-SAHARAN COUNTRIES

by volume of preferred cotton:

- Côte d'Ivoire - 194,474 mt
- Burkina Faso - 185,044 mt
- Cameroon - 132,990 mt
- Mali - 65,232 mt
- Zambia - 24,279 mt



(1) Email correspondence with cotton initiatives; BCI refers here to BCI standard; BCI equivalents are listed separately.

(2) As the per-country breakdown of Fairtrade Organic cotton was not available to the report production team at the launch of the report, this figure may include cotton that is certified to both Fairtrade and organic. Thus a double-counting of this figure is possible. The total volume of preferred cotton per country would not change much, though, as the share of Fairtrade Organic cotton compared to the total amount of preferred cotton is rather low.

# 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 Sustainable Cotton Challenge

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

### Examples of initiatives

Chetna Coalition (ChetCo) was formed in 2013 with a shared vision to pilot a novel and highly collaborative sourcing model for ethical fashion. In 2019, the coalition published its first Chetna Coalition Brand Impact Report.

Cotton 2040, founded in 2016, 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 2019, Cotton 2040 launched [CottonUpGuide.org](https://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. In August 2019, Primark announced the expansion of its collaboration with CottonConnect to train 160,000 cotton farmers in more environmentally friendly farming methods by 2022.

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.

The Inside Guide to Cotton and Sustainability 2020, written by Simon Ferrigno and edited by John Mowbray, was published in March 2020. The 160 page publication provides a very comprehensive overview of cotton and sustainability.

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. A recent project launched in 2019 is the Organic Cotton Traceability Pilot.

Project Delta, a 3-year project (2019 to 2021), aims to develop a joint sustainability measurement and reporting framework for different agricultural commodities focusing on cotton and coffee. It is a collaboration between BCI, ICAC-SEEP, the International Cotton Organization and the Global Coffee Platform, funded by ISEAL.

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 will expand to another three states in 2020.

Textile Exchange, founded as Organic Exchange in 2002, is a global non-profit 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).

U.S. Cotton Trust Protocol, a data collection, measurement, and verification procedure, was introduced by the Cotton

Council in November 2019. It will document USA cotton production practices and their environmental impact. The Cotton Council aims to benchmark the cotton growers' results against its 2025 sustainability goals. In May 2020, the U.S. Cotton Trust Protocol was added to the Sustainable Cotton Challenge 2025 recognized programs.

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 forthcoming [Textile Exchange's Organic Cotton Market Report 2020](#) for more information.

# Recycled Cotton

## A closer look at recycled cotton

The Ellen MacArthur Foundation estimates that less than 1 percent of all clothing is recycled back into apparel<sup>(1)</sup>. At the same time, around 12.5 percent of the global fashion market has made a public commitment to circularity by signing the Circular Fashion System Commitment<sup>(2)</sup>.

The recycling of cotton is one approach towards a more circular textile industry. Recycling of cotton can either be done mechanically or chemically. Please note that chemically recycled cotton is covered in the chapter on [manmade cellulose](#)s since the result is a “manmade cellulosic,” not a “cotton.”

### Key initiatives

There are a number of initiatives supporting the transition to a circular economy - from Accelerating Circularity to the Fibersort and many more. For more details, see the page on [Circular Economy](#).

### Key standards

**Textile Exchange's Global Recycled Standard (GRS)** was launched in 2008 and the **Recycled Claim Standard (RCS)** in 2013. More on the page on [Sustainability Standards](#).

### Textile Exchange Member Action

**Circular Systems Texloop:** 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](#).

**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](#).

“ The goal of our company is to create a closed-loop value chain by creating a zero-waste industry. We see waste as a resource.

– Deepak Goel,  
Director, Geetanjali Woolens





# Recycled Cotton

A closer look at recycled cotton

## Textile Exchange Member Action

**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](#).

**Hilaturas Ferre** recycles cotton waste since 1947. Its **RECOVER** range of fibers and yarns is produced with 100 percent recycled fibers. These yarns contain a high percentage of mechanically recycled cotton, which is blended with recycled polyester from PET bottles. More in this [interview](#) and the [supplier mapping](#).

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

**Takihyo**, a Japanese company, launched Takihyo'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](#).

**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](#).

“ With the growing interest in the circular economy, 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% cotton.

– Eddie Lanier  
Director, Environmental Department  
WP Home

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



# Commitments to Preferred Cotton

## Examples

### Overall industry goals

The vision of the [2025 Sustainable Cotton Challenge](#) is that **more than 50 percent of the world's cotton in 2025<sup>(1)</sup>** is converted to more sustainable growing methods.

Also, [Cotton 2040](#) has set a target for increasing the uptake of sustainable cotton, from 13 percent in 2016 to **beyond 30 percent in 2020**. Cotton 2040 members include Forum for the Future, Laudes Foundation (formerly C&A Foundation), Target, M&S, BCI, Cotton made in Africa, Textile Exchange, Fairtrade Foundation, and Cotton Australia.

### Pledges and company commitments

Through the [2025 Sustainable Cotton Challenge](#), 72 brands and retailers (including subsidiaries) have pledged to achieve **100 percent more sustainable cotton<sup>(1)</sup>** by 2025 and measured their progress in 2019. Examples are adidas, C&A, IKEA, H&M, and Levi's. The full list of companies is shared on the Sustainable Cotton Challenge 2025 website. The progress towards this commitment is measured through the Corporate Fiber and Materials Benchmark (CFMB).

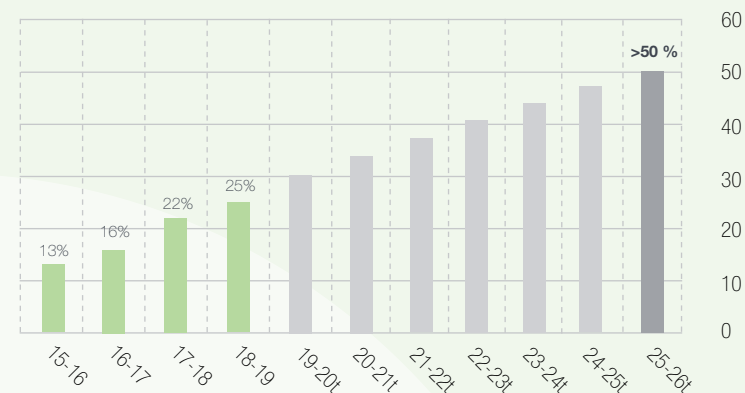
The [German Partnership for Sustainable Textiles](#) members have jointly agreed to use at least 35 percent sustainable cotton by 2020, with 10 percent of the total volume being organic cotton<sup>(2)</sup>. The aim is to increase this to 70 percent sustainable cotton by 2025, with 20 percent being organic cotton<sup>(2)</sup>.

305 companies have signed the [Uzbek Cotton Pledge](#) as per May 2020 committing to end the practice of forced labor in the cotton sector in Uzbekistan.

89 companies have signed the [Turkmen Cotton Pledge](#) as per May 2020 committing to end forced labor in Turkmenistan's cotton sector.

As of July 2019, 90 companies representing 12.5 percent of the global fashion market have signed the [Circular Fashion System Commitment](#), a call to action by the Global Fashion Agenda. The companies have committed to take action on one or more of four immediate action points - one being to increase the use of post-consumer recycled fibers such as recycled cotton<sup>(3)</sup>.

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



### Call to action

Sign the [Sustainable Cotton Challenge 2025](#)

(1) These initiatives 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) This includes GOTS, NATURTEXTIL IN, OCS, the bioRe Social & Environmental Standard and all the organic standards forming part of the IFOAM Family of Standards.

(3) Global Fashion Agenda - Commitment Website, accessed on 20 May 2020.



# Other Plant- Based Fibers

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Photo: pxhere.com / PNBK0899ain

# 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<sup>(1)</sup>.

With a global production volume of around 6.5 million mt, the market share of these other plant-based fibers was approximately 5.8 percent of the total global fiber production volume in 2019<sup>(2)</sup>.

Jute had the largest market share of all other plant-based fibers with around 50–60 percent<sup>(3)</sup>. Similar to hemp, flax and ramie, it is a bast-fiber. Jute is used to make twines, ropes, matting, and packaging materials but also for home textiles such as curtains and carpets.

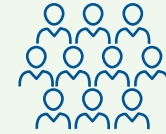
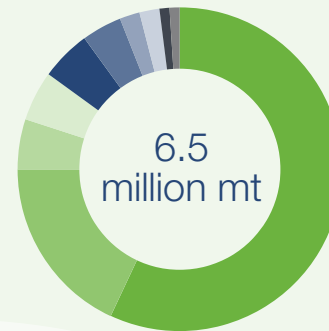
Coir had the second largest market share of other plant-based fibers at approximately 20 percent<sup>(3)</sup>. Coir is the fiber extracted from the husks of coconuts. It is used to produce home textiles such as floor mats, doormats, brushes and mattresses.

The global flax fiber and tow production in 2019 is estimated at around 868,374 mt<sup>(3)</sup>. Processed flax, also called linen, is used for a variety of products including home textiles and apparel.

Hemp had an estimated global production volume of around 60,657 mt in 2019<sup>(3)</sup>. 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 <sup>(1)</sup>

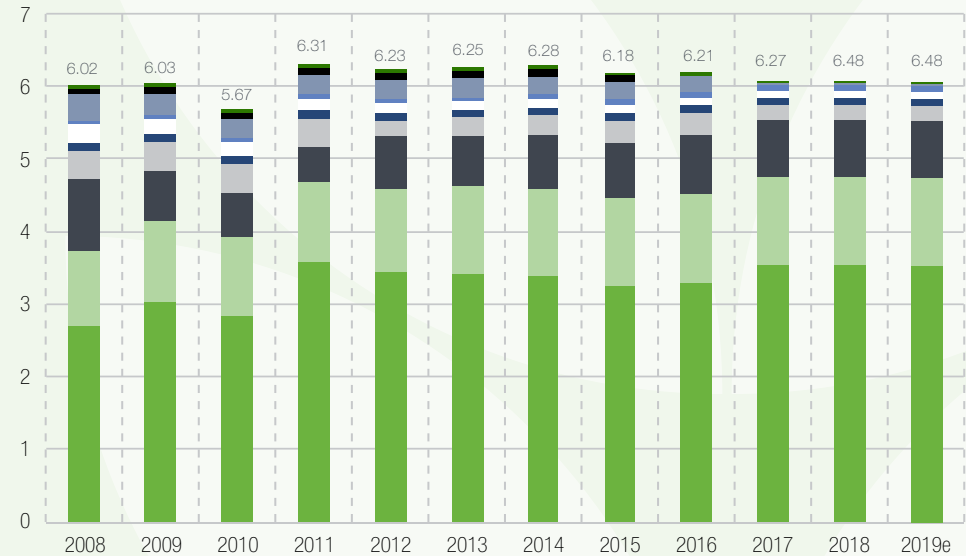


8+ million households

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

- 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 MT) <sup>(1)</sup>



- Jute
- Coir
- Flax Fiber and Tow
- Sisal
- Manila
- Ramie
- Hemp
- Other Bast
- Kapok
- Agave

(1) DNFI Website - Natural fibers production reaches 30 million mt, published on 29 July 2017.

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

(3) Based on FAOSTat - 2019 figures estimated similar to the 2018 figures.

# Other Plant-based Fibers

## Hemp

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.

Research is underway into hemp and jute as feedstock for manmade cellulose (see "[Manmade Cellulose](#)" Chapter) and even biobased leather alternatives (see "[Leather Alternatives](#)" Chapter).

### Textile Exchange Member Action

**Circular Systems' Agraloo Bio-refinery** is currently developing BioFibre™; fibers made entirely from food crop residues. Oil-seed hemp is one of the feedstocks that can be utilized for these fibers. The first Agraloo products are expected to hit the market in 2020 with French oilseed hemp used as feedstock - more in this [interview](#) and the [supplier mapping](#).

**Hempfortex** is a main 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](#).

### Other examples

The **9Fiber** patented solution™ converts unwanted waste material from the cannabis and industrial hemp industries into usable bast fiber and hurd to be used in a wide variety of products including fibers for the textile industry.

**Earth Alive Clean Technologies**, a leading Canadian Clean-Tech company, announced the launch of the **Clean Fiber Initiative** in 2018, a collaborative research project aimed to improve the production of natural fiber crops in Canada and around the world. Earth Alive currently has hemp trials underway with conventional and organic growers in Canada, and the USA.

**Eko-Terre**, launched in 2010 by Logistik Unicorp, announced that it will soon introduce a line of hemp-based textile fibers and fabrics. The main goal of this division is to process Canadian hemp straw into fiber with conventional and organic growers in Canada, and the USA.

**TS Designs**, a USA based t-shirt company, is planning to build a fully transparent and trackable hemp supply chain in the USA for textile-grade hemp processing.



## Other Plant-based Fibers

### Flax

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 wide coastal band stretching from Northern France through Belgium and the Netherlands. Other key flax fiber producing countries are Belarus, Russia, Ukraine, and China. The global flax fiber and tow production in 2019 is estimated at around 868,374 mt<sup>(1)</sup>. 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<sup>(2)</sup>.

#### Textile Exchange Member Action

**Circular Systems' Agralooop 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](#).

#### Other examples

**Bast Fibre Technologies Inc** is a bast fiber engineering firm based in Canada that develops IP protected enhancements for hemp, flax, and other bast fibers. In 2016, Bast Fibre Technologies Inc. purchased the Intellectual Property and other assets of **CRAiLAR Fiber Technologies Inc.**, a company focused on technology to

refine flax and hemp fiber for use in textile applications. The enzymatic process developed by CRAiLAR transforms flax into soft fibers.

**Depestele Group** is a vertically integrated specialist of flax raw material, cultivated in partnership with 650 flax farmers in France, to scutching, hackling, roving and textiles for industrial uses. All these steps are certified European Flax®, tracing fiber grown in Western Europe.

**Libeco** is a Belgian-based company that collaborates with a group of growers of organic flax in France and processes this flax into organic linen products.

**TERRE DE LIN** is a French cooperative specialized in producing textile flax (linen) from seed to fiber. With 650 farmers and 240 employees, the cooperative produces 15 percent of flax globally.

**Van de Bilt** is a GOTS certified company based in the Netherlands that contracts flax growers in France and Netherlands to produce fiber flax, processing it with its scutching and heckling lines.

**Zhaosu Jindi Flax Co. Ltd.**, founded in 2007, is one of the major manufacturers of dew-retting and organic flax fiber in China and GOTS certified.



(1) Based on FAOStat, 2019 production volume estimated similar to the 2018 figure.  
(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 the use of 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

### Circular Systems' Agraloop Bio-refinery

is currently developing BioFibre™; fibers made entirely from food crop residues. The Agraloop™ can utilize a range of feed stocks - 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 a cellulosic fiber. In the spring of 2019, Spinnova started operations on its industrial-scale pilot line in Finland. Spinnova and Fortum introduced and showcased the first prototype products made from agricultural residues, namely wheat straw, at the Textile Exchange Sustainability Conference in Vancouver in October 2019. More in this [interview](#) and the [supplier mapping](#).

### Other

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

Samatao Lotus Textiles extracts the fibers from the lotus plant.



# Animal-based Fibers & Materials

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# Down & Feathers

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Photo: US AID - Public Domain Picture

# Virgin Down

## Production facts and figures<sup>(1)</sup>

The global down and feather production volume is estimated at around 270,000 mt per year<sup>(1)</sup>.

70–90 percent of the down production comes from China<sup>(1)</sup>. The global down and feather market is highly fragmented with many small and medium producers.

Around 75–90 percent of the down comes from ducks, the remaining down comes mainly from geese<sup>(2)</sup>.

Increasing 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), the Global Traceable Down Standard (Global TDS), and Downpass. These standards award and ensure that there is:

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

The **Responsible Down Standard (RDS)** is gaining importance. The number of RDS certified farms increased to 6,231 in 2019, while the number of certified processing sites increased to 1,041 (from 108 in 2014). The RDS was launched in 2014.

The latest revision, the RDS 3.0, was published in July 2019.

The number of **Global Traceable Down Standard (Global TDS)** certified farms increased from 233 in 2017 to 315 in 2019. The number of certified processing sites increased from 15 in 2017 to 22 in 2019. The Global TDS was launched by NSF in January 2015, initially developed by Patagonia as an internal standard.

The number of **Downpass** certified farms increased from 4,503 in 2017 to 6,592 in 2019. The number of certified processing sites increased from 209 in 2017 to 412 in 2019. Due to a change in the standard system, a comparison with previous years is not possible. The global Downpass certified down production volume in 2019 is estimated at around 3,411 mt. This is equivalent to an estimated 1.3 percent of the total down production volume in 2019. Out of this, approximately 3,011 mt are used for Downpass certified bedding, while around 400 mt are 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.



>270,000 mt  
of down and feathers  
produced globally

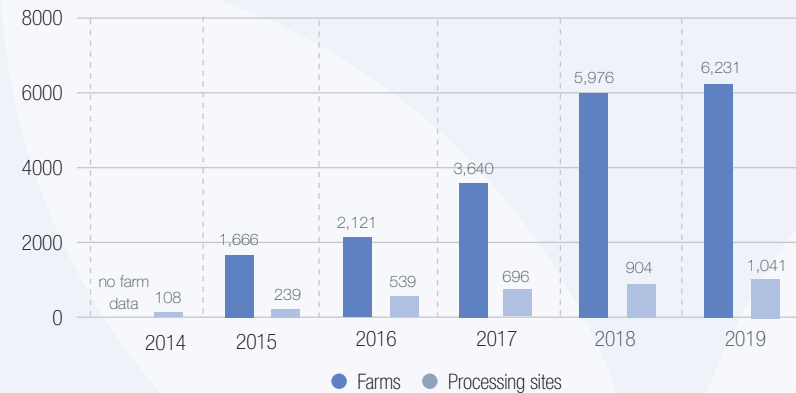


70–90%  
produced in  
China

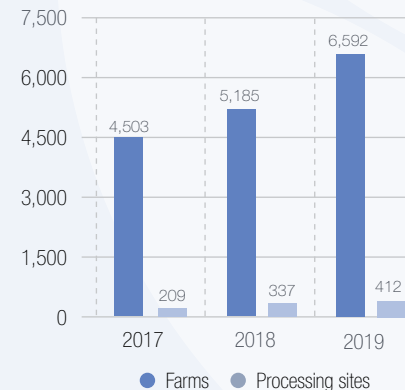


75–90%  
from ducks,  
rest from geese

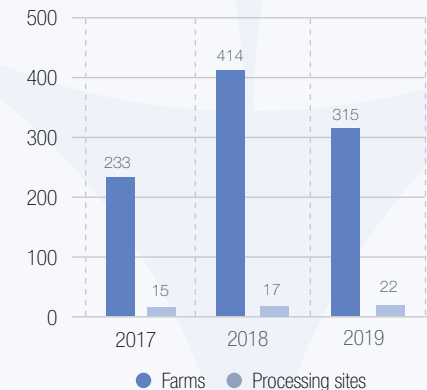
RESPONSIBLE DOWN STANDARD (NO. OF SITES)



DOWNPASS  
(NO. OF SITES)



GLOBAL TRACEABLE DOWN STANDARD  
(NO. OF SITES)



(1) Based on figures from cn-down.com and FAO.  
(2) Based on FAO database and conversations with industry experts.

# Virgin Down

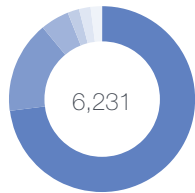
Directory: Where to find preferred down across the globe

Preferred down was produced on thousands of farms in 16 countries in 2019. Major production regions for preferred down are China and Eastern Europe, including Poland and Ukraine.

**Tip: How to find suppliers of preferred down.**

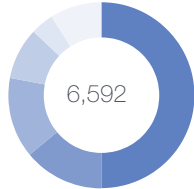
Check out the [Textile Exchange database](#) for Responsible Down Standard (RDS) certified down suppliers, contact NSF for Global Traceable Down Standard (Global TDS) certified suppliers, or Downpass for a list of Downpass certified suppliers.

## RDS CERTIFIED FARMS BY COUNTRY 2019



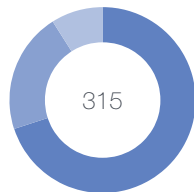
- China: 73.34 %
- Poland: 15.79 %
- Canada: 4.81 %
- Hungary: 2.21 %
- USA: 1.60 %
- Other: 2.22 %

## DOWNPASS CERTIFIED FARMS BY COUNTRY 2019



- China: 50 %
- Ukraine: 14 %
- France: 14 %
- Germany: 9 %
- Poland: 4 %
- Other: 9 %

## GLOBAL TDS CERTIFIED FARMS BY COUNTRY 2019



- Poland: 70 %
- Hungary: 21 %
- USA: 10 %

### WESTERN EUROPE

#### UK

RDS: 32

#### IRELAND

Downpass: 191

#### FRANCE

RDS: 5  
Downpass: 935

#### NETHERLANDS

RDS: 78

#### GERMANY

Downpass: 617

#### POLAND

RDS: 984  
Downpass: 263  
Global TDS: 219

#### HUNGARY

RDS: 138  
Downpass: 143  
Global TDS: 65

### EASTERN EUROPE

#### UKRAINE

Downpass: 946

#### RUSSIA

RDS: 9  
Downpass: 190

#### BULGARIA

RDS: 1

### NORTH AMERICA

#### CANADA

RDS: 300

#### USA

RDS: 100  
Global TDS: 31

### EAST AND SOUTH EAST ASIA

#### CHINA

RDS: 4,570  
Downpass: 3,282

#### TAIWAN

Downpass: 3

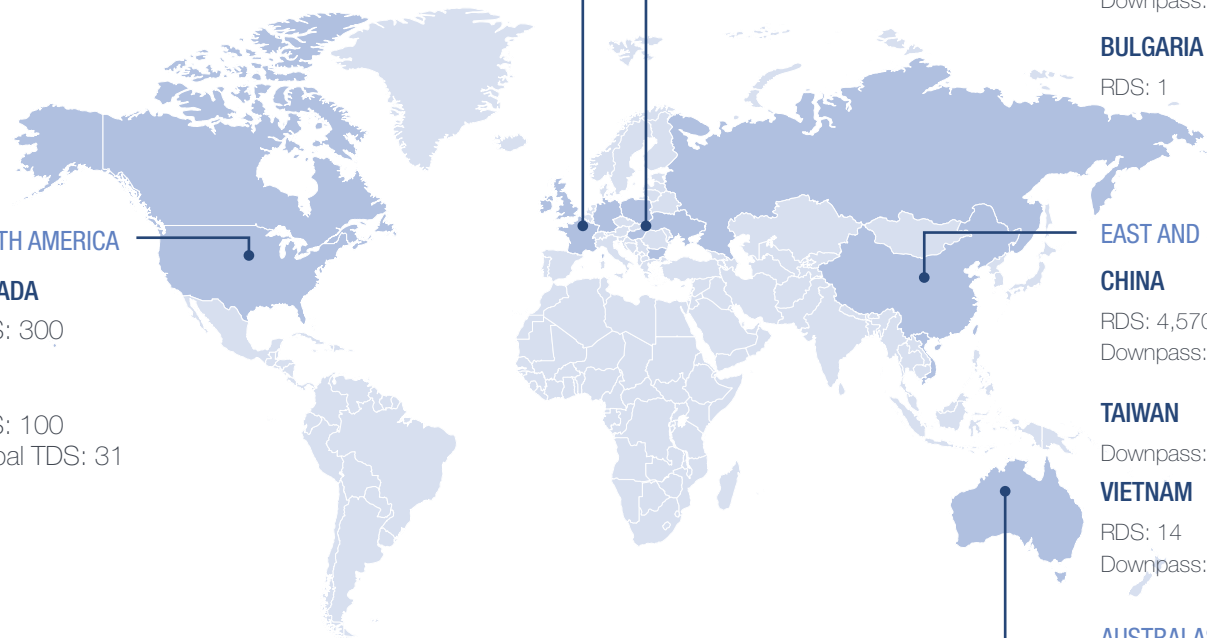
#### VIETNAM

RDS: 14  
Downpass: 3

### AUSTRALASIA

#### AUSTRALIA

Downpass: 22



# Virgin Down

Accelerating the transition to preferred virgin down

The acceleration towards preferred down has mainly be 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 (Global TDS). More information on the standards [here](#).

In 2014, [Four Paws International](#), a UK-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. Other organizations actively involved in the International RDS Working Group are Four Paws, the animal-welfare organization, and the 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). Read more in the chapter “[Traceability Systems](#).”

**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.



(1) RDS, email correspondence, more info on <http://responsibledown.org>.  
(2) Downpass, email correspondence, more info on <https://www.downpass.com>.  
(3) NSF, email correspondence, more info on <http://www.nsf.org/newsroom/nsf-global-traceable-down-standard-explained>.

# Recycled Down

Accelerating the transition to recycled down

It is estimated that in Germany alone, the bed feather processing industry generates around 950 mt of waste feathers<sup>(1)</sup>. Down recycling is an important approach to reduce resource consumption and address the waste feathers issue. Recycled down can be from pre- or post-consumer sources.

## Key initiatives

Multiple initiatives are working on circularity, see the chapter on [Circular Economy](#). The [European Outdoor Group](#) (EOG) is one of the few organizations that particularly addressed the topic of recycled down by publishing the [Recycled Down Sourcing Guide](#) in 2018.

## Key standards

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

## 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](#).

## Other examples

Examples of further suppliers for 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 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, and
- [Rohdex](#) with its recycled down certified to the GRS.

Japanese company [Toray](#) announced a collaboration with Uniqlo in September 2019 to reclaim and recycle down from apparel collected in Uniqlo stores.

## Biobased down alternatives

[FLWRDWN](#) is a fully biodegradable material, created with natural wild flowers and a biopolymer.

**Tip: How to find suppliers of recycled down.**

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



# 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. Over 40 leading brands and retailers have made public commitments to preferred down.



### Examples of public commitments by Textile Exchange members

All down used by **Arc'teryx** is certified 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. 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](#).

**Norrna** 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](#).

**Ralph Lauren** publicly committed to 100 percent RDS or Global TDS certified down by 2023. 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](#).



# Wool

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Photo: Fuhrmann, Argentina

# Virgin Wool - Sheep Wool

## Production facts and figures<sup>(1)</sup>

With an annual production volume of more than one million mt, wool is the most used animal-based fiber. While the global wool production has been declining over the years, the market share of initiatives such as the Responsible Wool Standard (RWS) is increasing.

The number of [Responsible Wool Standard \(RWS\)](#) certified farms increased from 95 in 2017 to 745 in 2019, the number of certified processing sites from 55 to 343 at the same time. Since the RWS only launched in 2016, the market share is still estimated at below one percent of global wool production, but it is quickly increasing. The RWS ensures animal welfare (no mulesing and a broader concept of animal welfare based on the Five Freedoms of animals) and best practices in the management and protection of the sheep grazing land. In autumn 2018, the first RWS certified products hit the market. The RWS 2.0 was launched in March 2020 with new biodiversity requirements and a new module addressing social welfare on farms.

Ovis21 is a network of more than 160 producers in Argentina as well as the south of Chile and Uruguay. To promote a culture of grassland regeneration and biodiversity, their [Grassland Regeneration and Sustainability Standard \(GRASS\)](#), and the Rangeland Health Index were

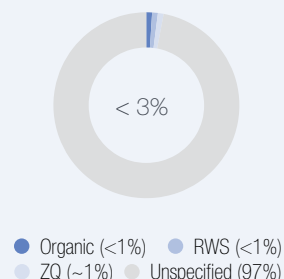
developed. Ovis21, part of the Savory Global Network, has also led the creation of the [Ecological Outcome Verification \(EOV™\)](#). To cover the animal welfare as well, Ovis21 has adopted the RWS.

[ZQ](#), developed and owned by The New Zealand Merino Company Ltd., supplied over 11,000 mt of ZQ certified wool fiber (ZQ Merino and ZQ Premium Wool) in 2018<sup>(1)</sup>. This equaled around 1 percent of the global wool production in 2018. In New Zealand, ZQ is certified to the RWS as a farm group.

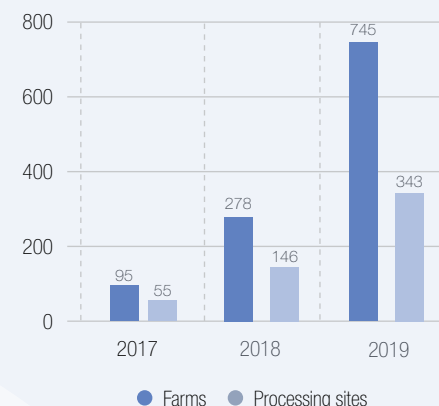
[Organic wool](#), while niche, is fairly well established. Organic wool makes up less than one percent of global wool production<sup>(2)</sup>. Organic wool certified to the [Organic Content Standard \(OCS\)](#) has to be non-mulesed or from a farm with ceasing-mulesed status based on the latest revised version (OCS 3.0), launched in April 2020. The [Global Organic Textile Standard \(GOTS\)](#) 6.0, launched in March 2020, added mulesed wool to the prohibited fibers.

[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.

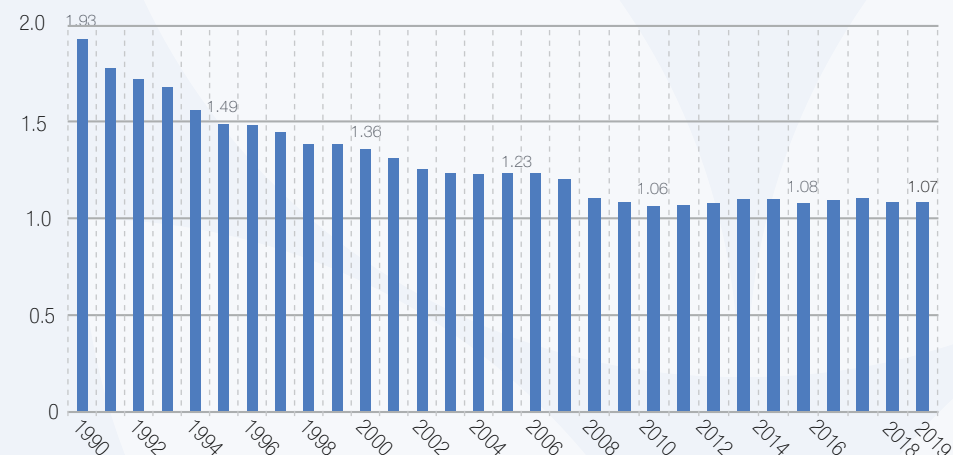
PREFERRED SHEEP WOOL MARKET SHARE IN 2019



RESPONSIBLE WOOL STANDARD (RWS) CERTIFIED SITES



GLOBAL SHEEP WOOL PRODUCTION (MILLION MT)



(1) ZQ, email correspondence. 2019 data not available at the report launch. 2019 global market share assumed to be similar to 2018.  
 (2) Based on FibL, email correspondence regarding the number of organic sheep; compared to total number of sheep based on FAOStat database; 2019 figures estimated similar to the previous years.



# Virgin Wool - Sheep Wool

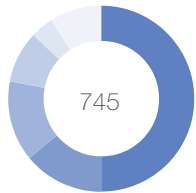
Directory: Where to find wool certified to the Responsible Wool Standard (RWS)

Responsible Wool was produced on 745 farms in 6 countries in 2019. Major production countries for Responsible Wool in 2019 were South Africa, Uruguay, Argentina, and Australia.

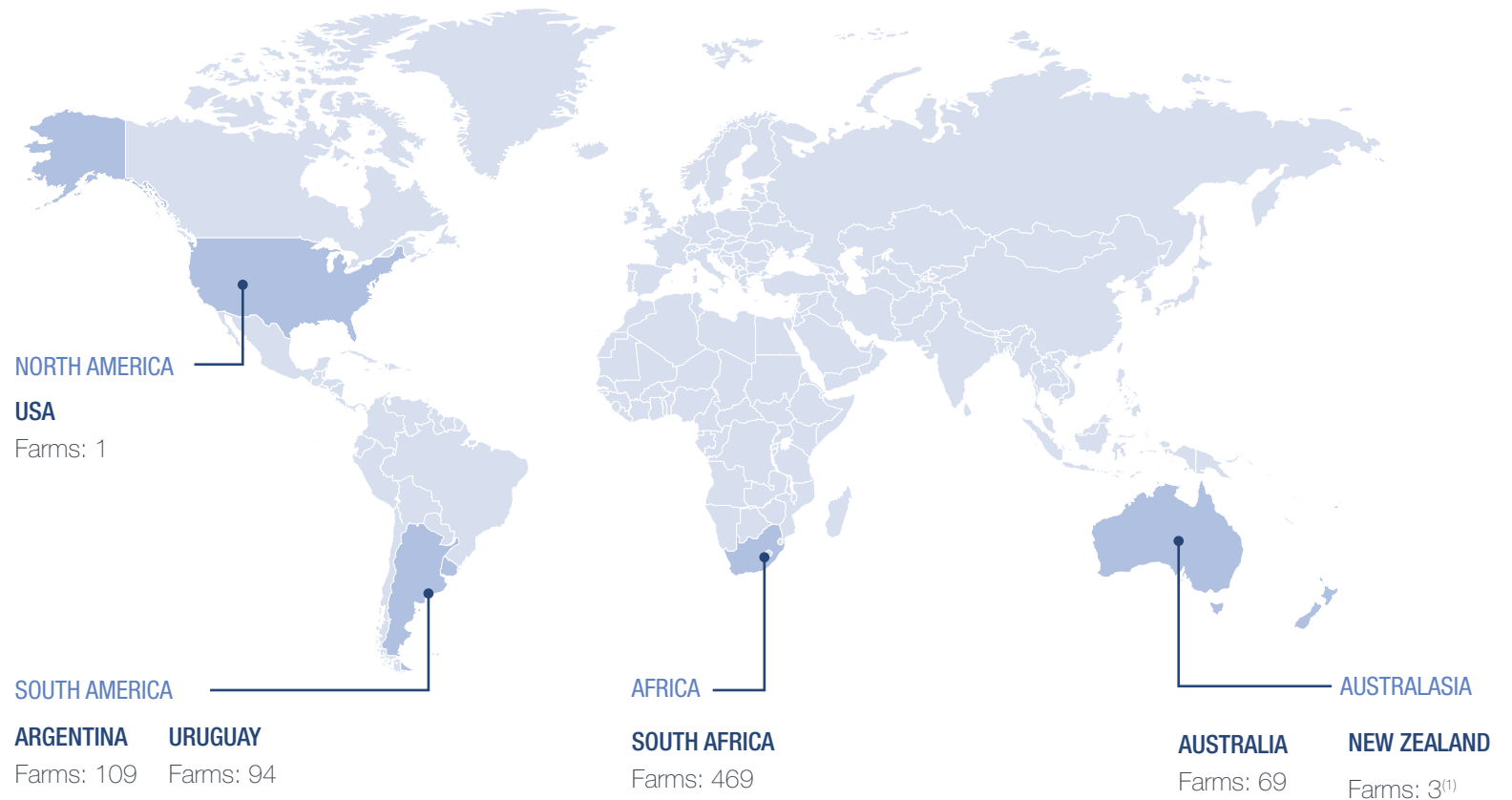
## Tip: How to find suppliers of preferred wool

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<sup>(2)</sup>.

### RWS CERTIFIED FARMS BY COUNTRY 2019



- South Africa: 63 %
- Argentina: 15 %
- Uruguay: 13 %
- Australia: 9 %
- New Zealand: 0.4 %
- USA: 0.1 %



(1) This figure does not include the ZQ growers in New Zealand that sold their wool under the RWS in 2019.  
 (2) RWS = Responsible Wool Standard, OCS = Organic Content Standard, GOTS = Global Organic Textile Standard.

# 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](#).

### Other key suppliers of RWS certified wool include:

- **BKB**, a wool broker operating in South Africa and Lesotho.
- **Fox and Lillie**, one of the largest buyers and exporters of Australian wool operating a rapidly expanding RWS farm group.
- **Fuhrmann**, part of Gschneider 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 greatest value we bring as managers of working landscapes goes beyond the harvests - it's the positive impacts to soil, grasslands and the greater ecosystem

– Jeanne Carver,  
Founder / President,  
Shaniko Wool Company

### Tip: How to find suppliers of preferred wool

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



# Virgin Wool - Sheep Wool

NGOs, governments, and other initiatives

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. Rather new are the discussions around freeze mulesing (steining), i.e., the removal of wool bearing skin in the breach area by application of liquid nitrogen, and an increasing focus on land issues including biodiversity.

## Australian Wool Innovation (AWI)

published the report [“Planning for a Non-Mulesed Merino Enterprise”](#) in 2018. This report outlines the key learnings from several wool-growing enterprises that have moved to a non-mulesed enterprise. It is intended to assist other woolgrowers in their consideration and planning to also move to non-mulesed Merino.

The **Australian Government** 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.

## Four Paws and Human Society

**International** published a position statement opposing freeze mulesing

(steining) in September 2019. Both organizations are against any form of breach mutilation or modification. This includes any form of mulesing, i.e., the removal of skin via cutting with shears and by the application of liquid nitrogen (steining). While definitions of mulesing usually include steining, the mulesing definition of the Australian Wool Exchange (AWEX) does not include it. This means that wool sold as non-mulesed as per the AWEX definition could still be produced using steining.

**Four Paws** also published the guide [“Transitioning Away from Mulesed Sheep Wool”](#) in 2019 to support brands and retailers on the why and how. In September 2019, Four Paws launched the [Wear it Kind Campaign](#) by asking people to pressure brands to phase out mulesing. It also helped to review the renewed [Good On You](#) scoring system for animal welfare.

**New Zealand** has become the first-wool producing country to officially ban sheep mulesing. The new regulation has been in effect since October 1, 2018.



# Virgin Wool - Mohair

## Overview

Mohair is the hair of the angora goat (not to be confused with the angora rabbit which produces Angora wool). In 2019, around 4,450 mt of raw mohair fiber were produced globally. Around half of the global mohair (2,080 mt) was produced in South Africa. The remaining mohair was produced in Lesotho (700 mt), Argentina (660 mt), Turkey (380 mt), USA (230 mt), Australia (50mt), New Zealand (30 mt), and other countries (330 mt)<sup>(1)</sup>.

In 2018, the animal-rights organization PETA published a video campaign on animal welfare violations related to mohair production. Several brands banned the use of mohair as a result, or are looking for preferred mohair alternatives.

### Standards

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

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 is the evolution of the increasing importance and demand for an independent international standard.

### Textile Exchange Member Action

[Mohair South Africa](#) is the organization that represents the South African mohair industry. It has been actively involved in drafting 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 that adhere to the Sustainable Mohair Production Guidelines.

#### Tip: How to find suppliers of preferred mohair

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



# Virgin Wool - Cashmere

## Overview

Cashmere is the hair of the Cashmere goat. The largest cashmere producing countries are China and Mongolia. Around 3 percent (354 mt) of the approximately 10,450 mt of cashmere produced in Mongolia in 2019 was “sustainable cashmere”<sup>(1)</sup>. About 300,000 persons are involved in the Cashmere production in Mongolia<sup>(2)</sup>.

In response to interest and queries from brands, Textile Exchange established the [Responsible Cashmere Round Table \(RCRT\)](#) in March 2019. The RCRT brings together the industry 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.

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.

The MSCP will map the work of the different initiatives supporting more sustainable cashmere production in Mongolia. The initiatives include the [Aid by Trade Foundation \(AbTF\)](#) with its [THE GOOD CASHMERE STANDARD®](#), the [Agronomeset Vétérinaires Sans Frontiers \(AVSF\)](#), the [Green Gold Animal Health Project](#), the [Sustainable Fiber Alliance \(SFA\)](#) with its SFA Cashmere Standard, [The Nature Conservancy \(TNC\)](#), and the South Gobi project involving the [Wildlife Conservation Society \(WCS\)](#).

Textile Exchange is leading the Market Sector Advisory group (MSA), which brings together a number of 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.

More information about these initiatives is available in the RCRT webinars [here](#).



(1) Including 240mt SFA (Sustainable Fiber Alliance), 50 mt GGAHP (Green Gold Animal Health Project), 50mt AVSF (Agronomeset Veterinaires Sans Frontiers), and 14.4mt WCS (Wildlife Conservation Society) - based on email conversations with all four initiatives in May and June 2020.  
(2) AVSF (Agronomeset Veterinaires Sans Frontiers) at the RCRT Summit at the Textile Exchange Conference in Vancouver 2019 (see [slides](#)).

# Virgin Wool - Alpaca

## Overview

Alpaca fiber is the hair that has been gathered from alpacas. Alpacas are similar to llamas and mainly from South America, particularly Peru. There are two breeds of alpaca: the Huacaya alpaca (95%) and the Suri alpaca (5%).

## Key standards

The **Responsible Alpaca Standard (RAS)** is a voluntary global standard-in-development that aims to address the welfare of alpacas, the land that they graze on and social welfare at the farm level. It will be closely aligned with the existing Responsible Wool Standard (RWS) and Responsible Mohair Standard (RMS). A [kick-off webinar](#) was held in May 2020.



# 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.



# Recycled Wool

A closer look

Recycled wool has a long tradition. The Italian district of Prato is a major producer of recycled wool, where approx. 22,000 mt of wool is recycled every year<sup>(1)</sup>. Other major production centers for wool recycling are Panipat in India and China.

Recycled wool includes recycled sheep wool but also recycled cashmere wool and others.

## Recycled standards

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

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

## Key initiatives

Multiple initiatives are working on circularity, see the chapter on [Circular Economy](#).

European Outdoor Group (EOG) and Greenroom Voice published the [Recycled Wool Report](#) in 2018.

The Italian laboratory service provider Buzzilab focused on parameters chemical safety assessments of recycled wool and made a [Product Restricted Substances List \(PRSL\) proposal](#) in the seminar on Recycled Wool hosted in Prato in June 2018.

## 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](#).

“ The goal of our company is to create a closed loop value chain by creating a zero waste industry. We see waste as a resource.

– Deepak Goel,  
Director,  
Geetanjali Woollens

### 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.





# Commitments to Preferred Wool

## Examples

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



### Examples of public commitments by Textile Exchange members

**Arc'teryx** is working to transition its wool supply to the RWS. 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 wool in their products by the end of 2022. More information [here](#).

**IKEA** committed to transforming all wool to 100 percent Responsibly Sourced 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 Marks & Spencer, William-Sonoma, Inc., Eddie Bauer, REI, Tchibo, Verner, 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** is committed to ensuring that 80 percent of their wool is sourced from either an RWS certified source or a by-product of the tannery processing their sheepskins. More information [here](#).

**Kmart** 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 2024.

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

– **Rafael Elizondo**,  
Category Manager for  
Textile Carpets at IKEA

(1) [IKEA Website 2019](#).

# Silk

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# 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<sup>(1)</sup>.

In 2019, around 75 percent of all silk was produced in China. The second-largest producer was India, with a market share of 22 percent. This means that China and India together produced around 97 percent of all silk worldwide in 2019<sup>(2)</sup>.

Around 160,000 mt of silk was produced in 2019<sup>(3)</sup>. Silk production volumes more than doubled from 1990 to 2019 but saw a decrease over the last five years<sup>(2,3,4)</sup>.

Preferred silk options include organic, ahimsa, Fairtrade, 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), the Global Organic Textile Standard (GOTS), and the World Fair Trade Organization (WFTO). For recycled silk, there is the Global Recycled Standard (GRS) and the Recycled Claim Standard (RCS).

(1) DNFI website.

(2) Inserco statistics from the website. 2019 breakdown by country assumed to be similar to previous years as 2019 data were not yet available at the report launch.

(3) DNFI interview published in Textile Network (March 23rd, 2020)

(4) FAOStat database

## Examples of Textile Exchange member action

**Takihyo**, 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**, the only producer of organic silk in China, producing 30 mt of silk filament a year. More in this [interview](#).

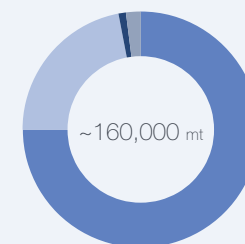
### Other examples

**Bombyx** is a China-based company founded in 2017. BOMBYX completed the construction of an organic sericulture base at Nanchong's Yilong County in 2018. According to their projection, the base will be able to farm a minimum of 700 tons of fresh cocoons every year.

**Chul Thai Silk**, based in Thailand, is one of the few companies worldwide producing organic silk. The supply chain is GOTS certified.

**Coccon** is a company producing organic ahimsa silk in Jharkhand, India. The supply chain is GOTS certified.

## SILK PRODUCTION 2019



● China (~75%) ● India (~22%) ● Uzbekistan (~1%) ● Other (~2%)

## GLOBAL SILK PRODUCTION (MILLION MT)



300,000 households

are estimated to be involved in the production of raw silk

# Leather

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# Virgin Leather

## A global overview

Global leather production is estimated at more than seven million mt<sup>(1)</sup>. The hides and skins of over one billion animals are used for leather production every year<sup>(1)</sup>.

Concerns about animal welfare and environmental impacts of livestock and leather production have led to increasing awareness and demand for more sustainable leathers - or even approaches to replace leather with vegan alternatives (see next page).

In 2017, Textile Exchange began an initiative to focus on leather in response to demand from brands to address the impacts of the full leather value chain. 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.

With the RLRT, an International Working Group was formed that has led the development of the [Leather Impact Accelerator \(LIA\)](#), a program that enables members of the leather value chain to work towards shared expectations in a

coordinated way within the international leather industry. In 2020, the Leather Impact Accelerator (LIA) 1.0 draft documents, program logo, and webpages were launched. LIA provides a framework for existing standards, programs, and tools that brands can use to promote better practices in the leather supply chain.

In its first version, LIA focuses on deforestation/conversion-free farming, animal welfare, the social and environmental impacts of leather production, and traceability. The first LIA pilots are rolling out in the summer of 2020.

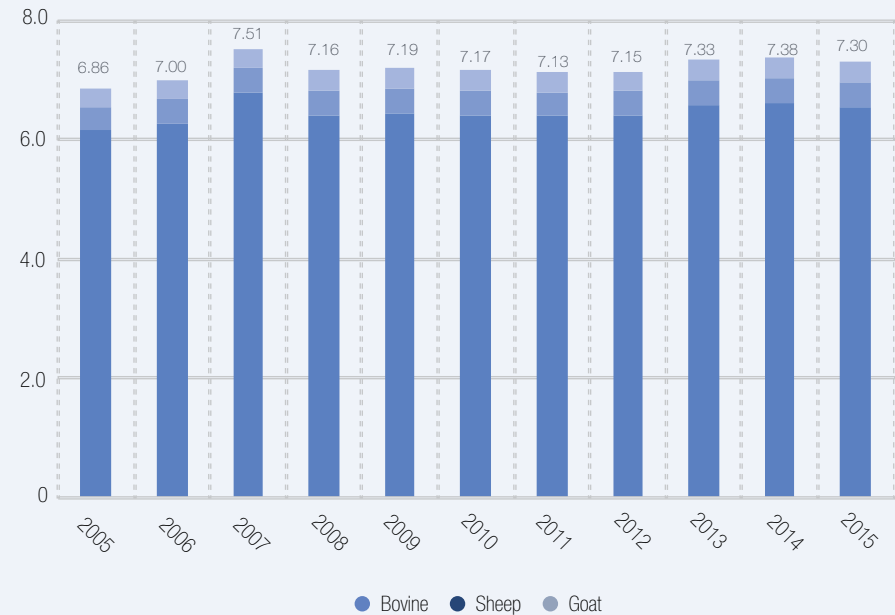
Textile Exchange is also developing an [Impact Incentives](#) trading model for responsible fibers/materials. This model is being developed in the first phase as an integral part of the LIA program, which will allow brands using leather to reward cattle farmers that meet the LIA requirements for deforestation and animal welfare.

The [Leather Working Group \(LWG\)](#), formed in 2015, is a 400-member, multi-stakeholder group that has developed an environmental auditing protocol for tanneries. LWG audited tanneries represent approximately 20 percent of the world's production of footwear leather and 16 percent of total leather volume<sup>(2)</sup>.

(1) FAO 2016 - World Statistical Compendium for Raw Hides and Skins - global production of bovine hides and skins - wet salted weight production, sheepskin and lambskin - dry weight, and goatskin and kidskin - dry weight. The latest statistics include 2015 data, so the figures just very broadly indicate the market size.

(2) The Leather Working Group ["Facts and Figures."](#)

GLOBAL LEATHER PRODUCTION (MILLION MT) <sup>(1)</sup>



## 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,  
Sustainability Manager  
Leit and Held

# Recycled Leather and Leather Alternatives

## An overview

Alongside a growing interest in more sustainable leather and synthetic alternatives to leather, there is a growing number of initiatives developing innovative recycled leather and biobased alternatives. Examples are:

### Recycled Leather

Around 800,000 mt of leather waste is produced annually<sup>(1)</sup>. 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 imitation leather with recycled leather fibers attached to the surface of a synthetic material.

While there are various suppliers of bonded leather, examples for advanced recycled leather are [RECYC LEATHER™](#) and [Nike Flyleather](#), an engineered material made by binding at least 50 percent reclaimed leather fibers together.

[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](#).

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

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

### Alternatives to leather

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

[Apple Peel Skin](#) is a vegan material which integrates organic apple peels into the skin of the material.

 [Bolt Threads - Mylo™](#) is developed from mycelium cells by creating optimal growing conditions for it to self-assemble. More in the [supplier mapping](#).

“ We consider the sustainability of Mylo™ at every stage of the life cycle.

– Bolt Threads  
Textile Exchange member



# Recycled Leather and Leather Alternatives

## An overview

**Cork** is also increasingly used as leather alternative. Work is also being conducted on recycled cork.

**Desserto from Adriano di Marti** is a partially biobased leather alternative, launched in 2019. The resin is made with 40 percent organic 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.

**Fruitleather Rotterdam** is currently developing a new, eco-friendly process that converts leftover fruits into durable, leather-like material, possibly strong enough to be used for shoes, handbags.


**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.

**MuSkin** comes from the *Phellinus Ellipsoideus*, a parasitic fungus that grows in the wild and attacks the trees in the subtropical forests.

**MycoWorks** is grown rapidly from mycelium and agricultural byproducts in a carbon-negative process.

 **Natural Fiber Welding's Mirum™** is a 100 percent plant-based leather-substitute. More in this [interview](#) and the [supplier mapping](#).

**Piñatex®** is made of fiber from the leaves of the pineapple plant.

**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 "slaughter-free" leather. More in the [supplier mapping](#).

“ This means for us that every decision we make at NFW and every product we release in the market must bear in mind the global impact from who grows and harvests our raw materials to its end of life.

– Luke Haverhals  
CEO, Natural Fiber Welding  
Textile Exchange Member

# Commitments to Preferred Leather & Alternatives

## 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). An increasing number of companies are also committed to animal-free production and leather alternatives.

### Commitments to biodiversity, animal welfare and deforestation-free leather

66 fashion brands have signed a pledge called the [G7 FashionPact](#) by April 2020<sup>(1)</sup>. 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. To eliminate deforestation and improved 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, the leather industry may also learn from the beef industry. Investor groups, environmental groups and consumers already focus on the question 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, and has the same opportunities, so cross-sectoral learning and collaboration can help to accelerate meeting the SDGs. The Leather Impact Accelerator (LIA) tool, which is being developed by the Textile Exchange Responsible Leather Round Table (RLRT), 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, robust management systems are required.

The [Leather Impact Accelerator \(LIA\)](#) tool, which is being developed by the Textile Exchange, 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.

### 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 only use 100 percent Leather Working Group (LWG) certified leather.

### Commitments to leather alternatives

A growing number of companies have also committed to animal-free products and leather alternatives.



### Examples of public commitments by Textile Exchange members

[Adidas](#), [Bestseller](#), [Burberry](#), [Everybody & Everyone](#), [Gant](#), [H&M](#), [Inditex](#), [Kering](#), [Gap](#), [Nike](#), [Nordstrom](#), [Puma](#), [PVH](#), [Stella McCartney](#) and others have signed the G7 FashionPact commitment as of April 2020.

[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 100 percent LWG-certified leather by 2025. More [here](#).

[Stella McCartney](#), a vegetarian brand, only uses vegetarian leather alternatives. 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 – Published on <https://thefashionpact.org>, accessed on June 9th, 2020.



# Manmade Cellulosic Fibers

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# Manmade Cellulosic Fibers

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Photo: Aditya Birla

# Virgin Manmade Cellulosic Fibers

## Production facts and figures

With an annual production volume of around 7.1 million mt, manmade cellulosics fibers (MMCFs) have a market share of about 6.4 percent of the total fiber production volume<sup>(1)</sup>.

The global MMCF production volume has more than doubled from around three million mt in 1990 to approximately 7.1 million mt in 2019 and is expected to further grow in the coming years<sup>(1)</sup>.

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

**Viscose** is the most important MMCF with a market share of around 79 percent of all MMCFs and a production volume of around 5.63 million mt in 2019<sup>(2)</sup>. The compound annual growth rate (CAGR) of viscose staple fiber from 2017 to 2022 is estimated at about 6 to 7 percent<sup>(1)</sup>.

**Acetate** has a market share of around 13 percent of all MMCFs with a production of approximately 0.95 million mt in 2019 but it is mainly used for non-textile applications<sup>(2)</sup>.

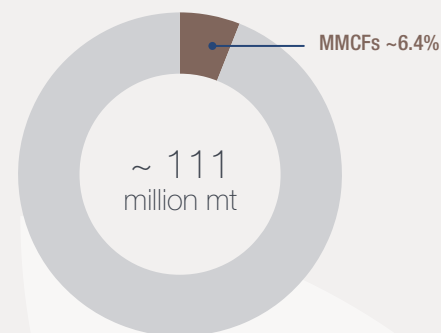
**Lyocell** was the third most used MMCF type after viscose and acetate in 2019. It had a market share of around 4.3 percent of all MMCFs in 2019 with a production volume of roughly 0.3 million mt<sup>(1)</sup>. The compound annual growth rate (CAGR) of lyocell from 2017 to 2022 is estimated at around 15 percent<sup>(1)</sup>. This means that lyocell is expected to grow faster than other MMCFs.

**Modal** had a market share of around 2.8 percent of the total MMCF market in 2019 with a production of around 0.2 million mt<sup>(1)</sup>. The compound annual growth rate (CAGR) of modal from 2017 to 2022 is estimated at about 9 percent<sup>(1)</sup>.

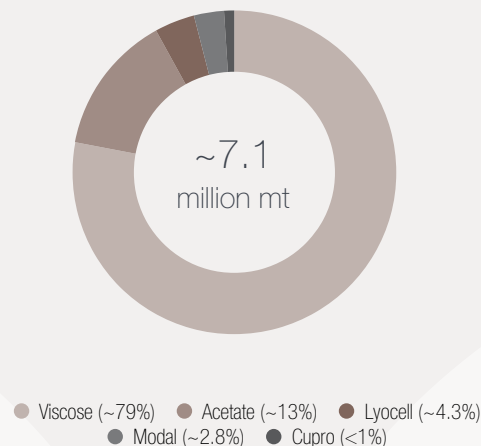
**Cupro** has a market share of less than one percent of the total MMCF market. There was only one supplier of cupro producing around 17,000 mt in 2019<sup>(3)</sup>.

Manmade cellulosic fibers are currently primarily produced from wood.

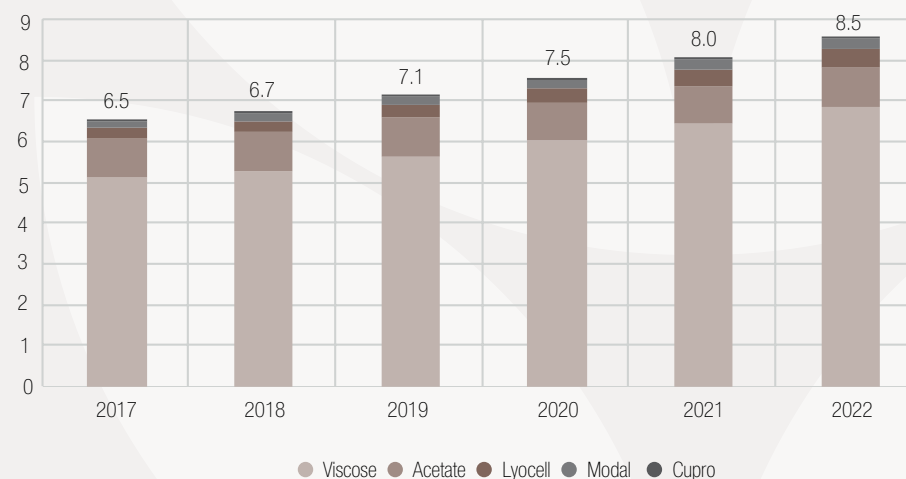
GLOBAL MARKET SHARE OF MMCFs IN 2019



SHARE OF MMCFs BY TYPE IN 2019



GLOBAL MANMADE CELLULOSIC FIBER PRODUCTION (MILLION MT)



(1) Lenzing Investor Presentation from 7 August 2019.

(2) Based on Lenzing, email correspondence in July and November 2019; figures based on The Fiber Year 2017, 2018, 2019 and Lenzing's own estimates; global market data and share compiled by Textile Exchange (see "Global Fiber Market").

(3) Asahi Kasei, email correspondence; global market data and share compiled by Textile Exchange (see "Global Fiber Market").

# Virgin Manmade Cellulosic Fibers

## Standards for feedstock

Despite a high market share of FSC and PEFC certified MMCFs - roughly estimated at around 40 to 50 percent of all MMCFs<sup>(1)</sup> -, the risks of sourcing MMCFs from ancient or endangered forests remains high.

The NGO Canopy estimates that approximately half of all MMCFs (3.3 million mt) comes from Ancient and Endangered Forests, such as the carbon-rich peatlands of Indonesia and old-growth boreal forests of Canada<sup>(2)</sup>.

The share of the forest area certified to FSC and/or PEFC has increased from 0.96 percent of all forests in 2000 to 10.82 percent in 2017<sup>(3+4)</sup>. In total, around 75 percent of the certified forest was certified according to PEFC and its equivalents in 2019. This includes the ~30 percent of all certified forests in 2019 that were SFI certified and around 20 percent that were PEFC and FSC double certified. Approximately 46 percent of certified forests in 2019 were FSC certified (including the double-certified area)<sup>(5)</sup>.

**FSC**, founded in 1993, is an international member-led organization that sets the FSC standards for responsible forest

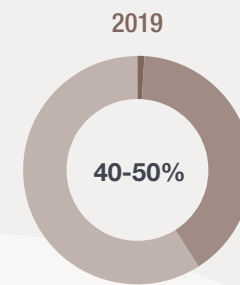
management and chain of custody. The first FSC certified fabrics were produced by the fiber producer ENKA and the fabric manufacturer Ghezzi S.p.a in 2017. The launch of the first products with consumer-facing FSC labels is expected in 2020. More in the [supplier mapping](#).

**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. More in the [supplier mapping](#).

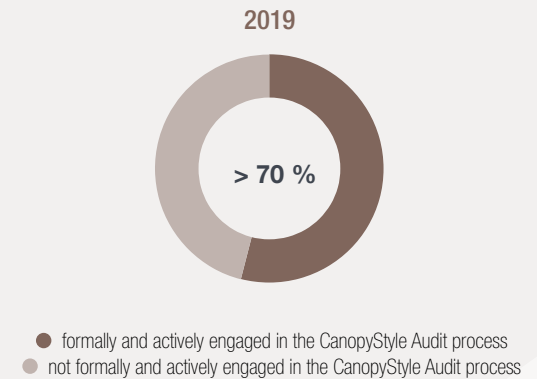
The **CanopyStyle Audits** have become the leading assessment of MMCF suppliers on their raw material sourcing practices since the launch of the CanopyStyle initiative in 2013 and the first audits in 2017. Around 70 percent of the global manmade cellulosic production capacity has gone through the CanopyStyle audits by 2019. The market share of viscose producers with endangered forest sourcing policies increased from around 35 percent of the global production in 2015 to approximately 84 percent in 2019 based on Canopy<sup>(6)</sup>. A summary of results is published in the annual Hot Button Report.

(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, accessed on 24 May 20120, 2018 and 2019 figures not yet available at report launch.  
 (5) Based on FSC and PEFC press releases [May 2017](#) and [February 2019](#) and email correspondence with FSC, PEFC and SFI.  
 (6) CanopyStyle Hot Button Report 2019 website.

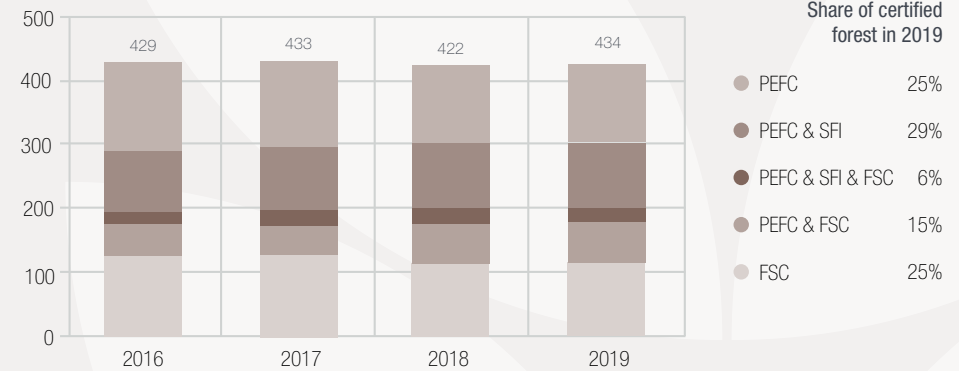
## MANMADE CELLULOSIC FIBERS



## GLOBAL MARKET SHARE OF MMCF PRODUCTION CAPACITY INVOLVED IN CANOPYSTYLE AUDITS <sup>(6)</sup>



## GLOBAL CERTIFIED FOREST AREA (IN MILLION HA)



**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.

**ZDHC** has expanded the scope of its work to cover fiber production to account for the environmental impact of fibers. In April 2020, the [ZDHC Man-Made Cellulosic Fibres \(MMCF\) Guidelines 1.0](#) were launched, together with the [ZDHC MMCF Responsible Fibre Production Guidelines 1.0](#), the [ZDHC MMCF Interim Wastewater 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. 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."](#)

**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 Highlights

**Birla Cellulose** worked on several sustainability initiatives in the past years. It received a “light green shirt” in the Canopy assessment in 2018 and the Material Health Certificate Gold Level from the Cradle to Cradle Products Innovation Institute for its Spunshades Viscose Staple Fiber. More in this [interview](#).

**Eastman** launched Naia™, a di-acetate fiber made from wood pulp responsibly sourced from sustainably managed plantations and produced in a near closed-loop chemical process in 2017. In addition to the filament version offered since 2017, Eastman introduced a new staple fiber version of Naia™ in 2020.

**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** announced in June 2019 that it would build the world’s largest lyocell plant with an annual production capacity of 100,000 mt in Thailand. Lenzing also started a new blockchain project and a joint venture to produce protective equipment against COVID-19. More in the chapter on [Traceability](#) and [COVID-19](#).

**Itochu** established a joint venture together with the **Metsa Group** that builds an industrial demo plant to produce wood-based textile fibers with the aim to demonstrate a new technology for converting paper-grade pulp into textile fibers. Construction of the demo plant in Äänekoski, Finland, with an annual capacity of about 500 mt, began in October 2018 and started operation in February 2020.

**Sateri**, part of the **Royal Golden Eagle (RGE) Group**, together with **Asia Pacific Rayon (APR)**, is the world’s largest producer of viscose. In May 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. The investment, revealed ahead of the Textile Exchange Sustainability Conference in Vancouver in October 2019, will support solutions in alternative cellulose or plant-based feedstock and closed-loop manufacturing. 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 has seen considerable expansion over the years. More in this [interview](#).



# 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. In July 2019, a European Manmade Cellulosics Roundtable Summit was held during the Berlin Fashion Week.

### 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](#).

**Changing Markets Foundation** in collaboration with Earthworm (formerly The Forest Trust) launched a Roadmap towards responsible viscose and modal

fiber manufacturing in February 2018. In November 2018, Changing Markets published its new report "Dirty Fashion: Spotlight on China" focusing on the China Collaboration for Sustainable Viscose (CV). In November 2019, Changing Market released its new report "Dirty Fashion Disrupted: Leaders and laggards revealed".

The **Collaboration for Sustainable Development of Viscose (CV)**, founded early 2018, aims to offer viscose producers a platform to achieve more sustainable viscose. CV is a collaboration of 10 viscose fiber producers – collectively representing over 50 percent of the world's viscose staple fiber production. This self-regulating initiative published the CV Roadmap in June 2018. This three year action plan includes a set of existing sustainability standards for the raw materials (FSC and PEFC), manufacturing (e.g., ZDHC, BSCI) and product level (e.g., OEKO-TEX standard 100). CV is currently working on a Roadmap 2025.

**Earthworm** (formerly known as 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.

**Fashion Positive** is developing the first-ever framework that defines Circular Materials. In 2019, Fashion Positive selected MMCFs as a priority area for their work.

**Forum for the Future** is collaborating with Textile Exchange to gather diverse perspectives on the vision for Net Positive MMCF. The Visioning Workshop concept was presented at the European Manmade Cellulosics Roundtable in Berlin in July 2019 and conducted at the Textile Exchange Conference in Vancouver in October 2019. The "MMCF 2030 Vision - A Vision for building resilience and accelerating regeneration" report was made publicly available in June 2020.

**The German Partnership for Sustainable Textiles** aims to increase the use of more sustainable MMCFs and released the Joint Letter Viscose in April 2019, a call for commitment to sustainable MMCF production.



# “Recycled” Manmade Cellulosic Fibers

An overview

The market share of “recycled” MMCFs is estimated at less than 1 percent of all MMCFs in 2019<sup>(1)</sup>. 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 mt) of global pre- and post-consumer cotton textile waste, plus 25 percent (1.6 million mt) of rayon textile waste, could replace all wood fiber currently used to manufacture dissolving pulp<sup>(2)</sup>.

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.

## 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 17,000 mt. 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](#).

[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](#).



(1) Textile Exchange estimate based on public information and its own supplier mapping.  
(2) Canopy (2020) - [SURVIVAL: A Plan for Saving Forests and Climate A Pulp Thriller](#), Next Generation Report.




# “Recycled” Manmade Cellulosic Fibers


An overview

 **GP Cellulose GmbH's Cotton Linter Fiber Pulp** is an SCS Recycled Content Standard certified pulp made from cotton linters used for acetate. More in the [supplier mapping](#).

**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. More in this [interview](#) and the [supplier mapping](#).

**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 presented **CIRCULOSE**, a branded material made from 100 percent recycled textiles. Fiber producing partners of re:newcell are Tangshan Sanyou and Sateri. More in the [supplier mapping](#).


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** is collaborating with the pulp suppliers Södra and Re:newcell to develop viscose staple fibers made with post-consumer cotton textiles. The production of first commercial lines with below 5 percent recycled content have been announced in March 2020. The brand for Sateri's recycled fiber is **Finex®**. Sateri aims to increase the recycled share to 20 percent. More in this [interview](#) and the [supplier mapping](#).

**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.

**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.

 Textile Exchange members **BlockTexx** and **Infinited Fiber** as well as other companies such as **Blend Re:Wind**, **HKRITA**, **Södra**, **Tyton Biosciences**, and

**Worn Again** are working on MMCFs made from blended textiles: As the majority of textiles are fiber blends, these are significant innovations. Read more about these innovations in the chapter on [“Fiber Blend Recycling.”](#)

## MMCFs made from non-textile residues

**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.

**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 tons per year in 2020 and is fundraising to scale up the production further. More in the [supplier mapping](#).

# Commitments to Preferred Manmade Cellulosic Fibers

## Examples

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. This vision is backed by 26 of CanopyStyle brands and suppliers<sup>(1)</sup>.

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

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

**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 zero in fall 2013 to 60 in fall 2015 and 200+ in 2019<sup>(2)</sup>.

### Changing Markets Roadmap

Eight major brands and retailers, all Textile Exchange members, have publicly committed to the Changing Markets Roadmap as of November 2018<sup>(3)</sup>. This number increased to 10 companies in November 2019<sup>(4)</sup>. 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 [Esprit](#), [H&M](#), [Inditex](#), [Lindex](#), [Mara Hoffmann](#), [M&S](#), [New Look](#), [Next](#), [Reformation](#), and [Stella McCartney](#).

Commitments to the Changing Markets Roadmap have been made, for example, by the members [ASOS](#), [C&A](#), [Esprit](#), [H&M](#), [Inditex](#), [M&S](#), [New Look](#), [Next](#), and [Tesco](#).

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

(2) CanopyStyle Impact Infographic and Hot Button Report 2019.

(3) Changing Markets 2018 - Dirty Fashion: Spotlight on China.

(4) Changing Markets 2019 - Dirty Fashion Disrupted. Leaders and laggards revealed.

## CanopyStyle Next Generation Vision<sup>(1)</sup>

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

# Synthetic Fibers

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# Polyester

Photo: Pixabay Public Domain

# Recycled Polyester

## Production facts and figures

Polyester is the most widely used fiber worldwide. With an annual production of around 57.7 million mt polyester had a share of approximately 52 percent of the global fiber production in 2019<sup>(1)</sup>.

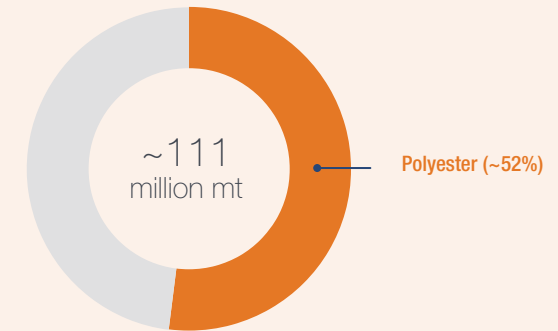
Recycled polyester is mainly made from PET plastic bottles. Recycled polyester can also be made from other post-consumer plastics such as ocean waste, discarded polyester textiles, or from pre-consumer processing residues such as fabric scraps.

The market share of recycled polyester increased from around 9 percent of the world PET fiber production in 2009<sup>(2)</sup> to around 14 percent in 2019<sup>(3)</sup>. Compared to 13.8 percent in 2018<sup>(2)</sup>, this is a slight increase again after the short-term decline in the global rPET market share in 2018. The main reason for the decline in 2018 was the ban on importing different types of solid waste, including plastic bottles and

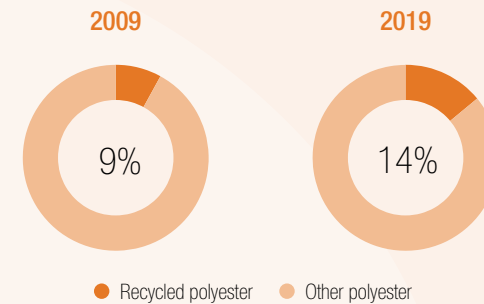
polyester textile waste, to China that came into effect in January 2018. The prices for recycled polyester have been increasing as a reaction to the ban<sup>(3)</sup>. Because of the China import ban on waste, much of the waste has been sent to other countries, such as, Malaysia, Vietnam, and Thailand.

The estimated rPET share of polyester staple fiber was as high as around 30 percent in 2019 (36 percent from 2014 onwards up to the 2018 decline)<sup>(3)</sup>. However, as the rPET share for polyester filament is much lower at around 6 to 7 percent in 2019, the total rPET share of polyester fiber, including staple fiber and filament is lower as well.

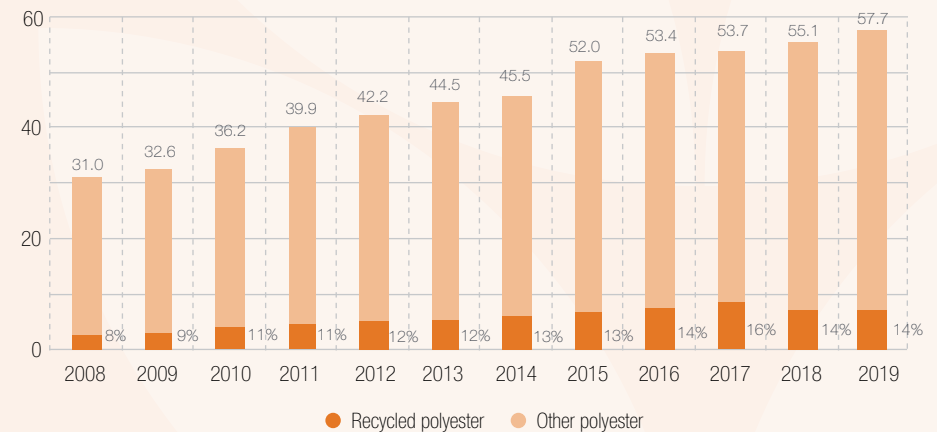
### GLOBAL FIBER PRODUCTION IN 2019



### MARKET SHARE OF RECYCLED POLYESTER



### GLOBAL POLYESTER PRODUCTION (MILLION MT)



(1) Textile Exchange estimate based on 2018 polyester filament baseline published by Engelhart (The Fiber Year) in the Fiber Journal (December 4, 2019), CAGR 2018-2025 estimate published in the Fior Markets press release (March 16, 2020), and staple fiber volume estimates published by Shinhan Sekuritas Indonesia in their company note (November 26, 2019), compared to Textile Exchange global fiber volumes (see "Global Fiber Market").

(2) Unifi presentation at the Textile Exchange Conference in Milan in 2018.

(3) Textile Exchange estimate based on Unifi investor day presentation (November 15, 2020), IHSM 2018 presentation by Ashish Pujari "Highlights of a strong growth market - polyester fibers & PET" and sources mentioned in (1).

# 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.

### 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
- Poole Company - EcoSure®
- Premiere
- First Mile by Thread - Ground to Good™
- **Unifi** - REPVEVE®

### 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

### FRANCE

- CARBIOS

### UK

- Worn Again - polymer recycling

### SPAIN

- Seaqual

### ITALY

- De Martini Bayart & Textifibra SpA
- Radici Group - r-RADYARN® + r-Starlight® + REpetable
- Sinterama - Newlife™

### KENYA

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

### PAKISTAN

- Pinnacle Fibre

### NETHERLANDS

- CuRe Technology (formerly Cumapol)
- Ioniga
- **The Movement** - Polyana

### GERMANY

- Advansa - Suprelle®
- Trevira - SINFINECO®

### INDIA

- Aero Fibre
- AGL Polyfil Private Limited
- Ganesha Ecosphere - Riviere
- JB Ecotex
- Neelam Fibers
- Pashupati Polytex
- Pashupati Excursions
- Plastics for Change

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](#).

### SWITZERLAND

- Gr3n

### CHINA

- Cixi Xingke
- Nan Ya Plastics - ECOGREEN® -plus
- **Zhejiang Haili Environmental Technology** - Rebo yarn

### JAPAN

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

### KOREA

- Hyosung - Regen™

### TAIWAN

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

### THAILAND

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

- Polygenta - perPETual
- Reliance - R|E|lan™ GreenGold
- **Sulochana Cotton Spinning Mills Pvt. Ltd.** - Polycycle
- Sutlej Textiles
- Sybil Industries - SyGreen

# Recycled Polyester

## Chemical and biological recycling

Most polyester is currently mechanically recycled. The market share of chemically or biologically recycled polyester is still very low. 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.

**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 has started test production in December 2017 and 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 of 80 mt per year in 2019 will be increased to 400 mt per year in 2020. 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. The construction of a demonstration plant will start late 2020 or early 2021. 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.



# Recycled Polyester

## Ocean-bound and ocean plastic

### Ocean plastic initiatives

**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).**

One of the early investments of the fund was made in the Indonesian company Tridi Oasis which is specializing in recycling rPET bottles into rPET flakes. The flakes can, among other use cases, be used for textile production.

**First Mile:** more than half of their collection networks in Haiti, Honduras, and Taiwan fall under the "Ocean bound" plastic definition as set forth by the Next Wave working group based on the work of Dr. Jenna Jambeck. Plastic that is mismanaged within 50 km of shorelines will end up in the ocean if not properly collected and processed. 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.

**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. More in the [supplier mapping](#).

**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").

### Examples of companies using ocean plastic

**Advansa** partners with **PlasticBank** to source **Social Plastic®** to prevent ocean plastic. More in the [supplier mapping](#).

**BIONIC®** materials (resins, fiber, yarns, and fabrics) are made with plastic recovered from marine and coastal environments. BIONIC® has joined forces with Waterkeeper Alliance on an initiative designed to protect the world's coastal and marine environments from plastic pollution. This network of coastal cleanup efforts is called STRONGER THREAD®.

**FENC New Century** offers recycled polyester filament made with ocean plastic. It accounts for approximately 5 percent of all its feedstock used for recycled polyester. More in the [supplier mapping](#).

**Jeplan** used ocean waste bottles collected by NPO to chemically recycle them with their technology to make bags and scarfs for the G20 Osaka Summit and G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth held in 2019. More in the [supplier mapping](#).

**Nan Ya Plastics** also reports using ocean plastic for its rPET. More in the [supplier mapping](#).

**Unifi** launched **REPPEVE® Our Ocean™** fiber in June 2019 that is made from bottles collected within 50 kilometers of coastlines in countries or areas that lack formal waste or recycling systems. More in the [supplier mapping](#).





# 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 mt 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](#).



# Recycled Polyester

NGOs, governments and other initiatives

## Call to action

[Join the Textile Exchange Recycled Polyester \(rPET\) Round Table](#). The rPET Round Table, launched in 2016, is a global multi-stakeholder network aiming to increase the uptake of recycled polyester. The rPET Round Table has over 90 individual members from 56 companies and organizations. In 2017, the rPET Round Table initiated the Recycled Polyester Commitment. More on the page on [Commitments to Preferred Polyester](#).

## 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 Certification](#) developed by Zero Plastic Oceans.

## Other initiatives

There are several initiatives supporting the transition to a circular economy - from Accelerating Circularity to the Fibersort and many more. For more details, see the page on [Circular Economy](#).

“ We are excited to see our signatories of the original challenge achieve a 208 percent increase over 2017. The rPET Round Table is committed to demonstrating continual improvement as the global market share of 14 percent represents an opportunity for further impact.

– Elayne Masterson,  
VP of Business Development and Sales,  
World Textile Sourcing (WTS) |  
Chair of the rPET Round Table

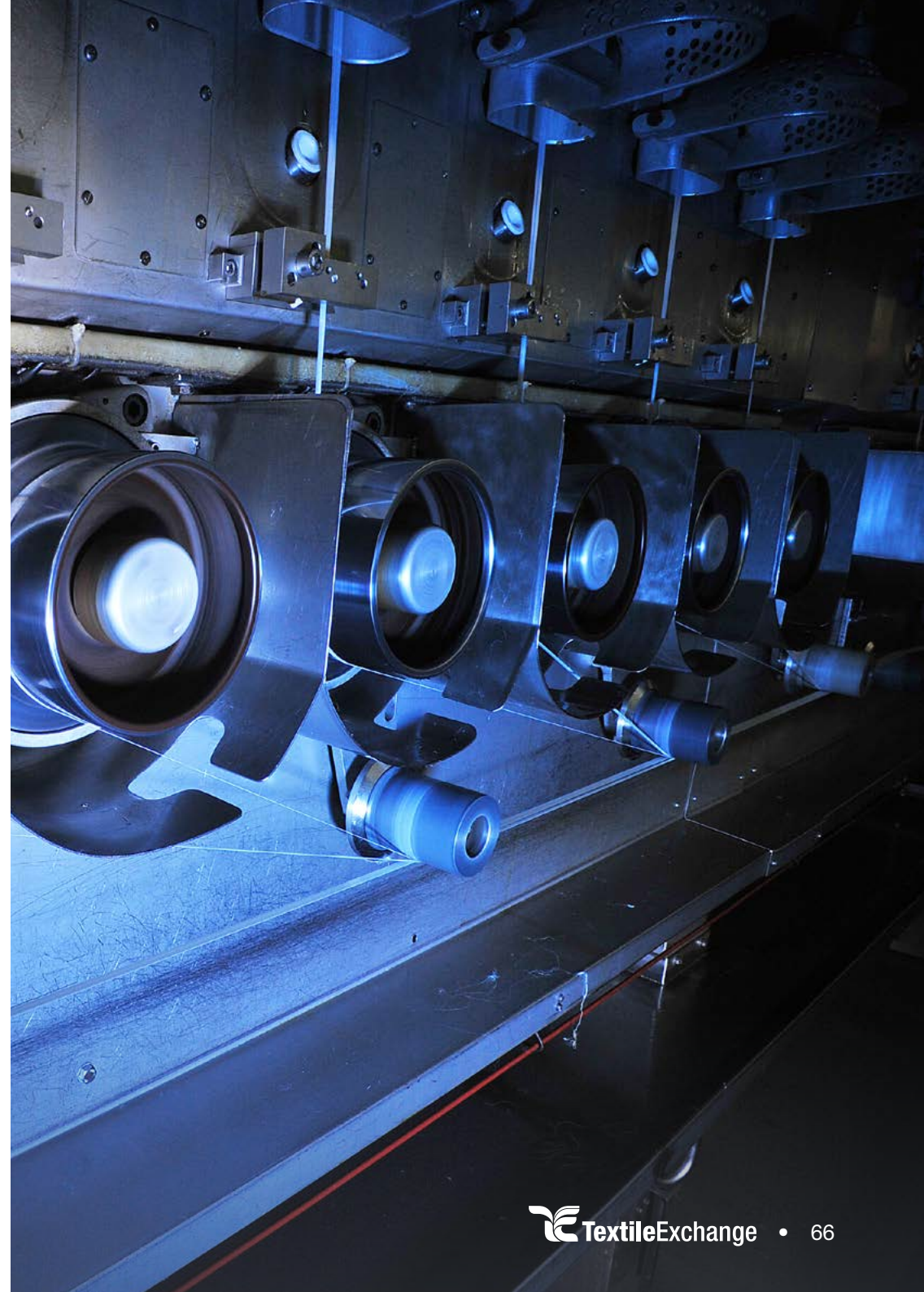


Photo (right): Advansa

# Biobased Polyester

## Facts and figures

The market share of biobased polyester is estimated at less than one percent of the total polyester production<sup>(1)</sup>. Biobased polyester has the potential to reduce GHG emissions but has to be sourced and managed responsibly to realize this potential.

Biobased polyesters include biobased PET but also other polyesters such as PLA or biobased PTT.

### Call to Action

**[Join the Textile Exchange Biosynthetics Round Table](#)**. The Biosynthetics Round Table (formerly Biosynthetics Working Group) is a multi-stakeholder initiative with the objective of supporting the knowledge, understanding, and development of biosynthetics for the textile industry. Initial projects included the launch of the website [aboutbiosynthetics.org](http://aboutbiosynthetics.org) and the [Quick Guide to Biosynthetics](#) in 2018. The Biosynthetics Round Table is currently working on a White Paper on the sustainability of biosynthetics and an update of the [aboutbiosynthetics.org](http://aboutbiosynthetics.org) microsite.

The Biosynthetics Round Table builds on work that other key organizations such as the [Bioplastic Feedstock Alliance \(bfa\)](#), the [nova institute](#), the [Institute](#)

**[of Bioplastics and Biocomposites \(IfBB\)](#)**, and the **[International Sustainable Bioeconomy Working Group \(ISBWG\)](#)** have done and aims to leverage the critical results in the textile industry.

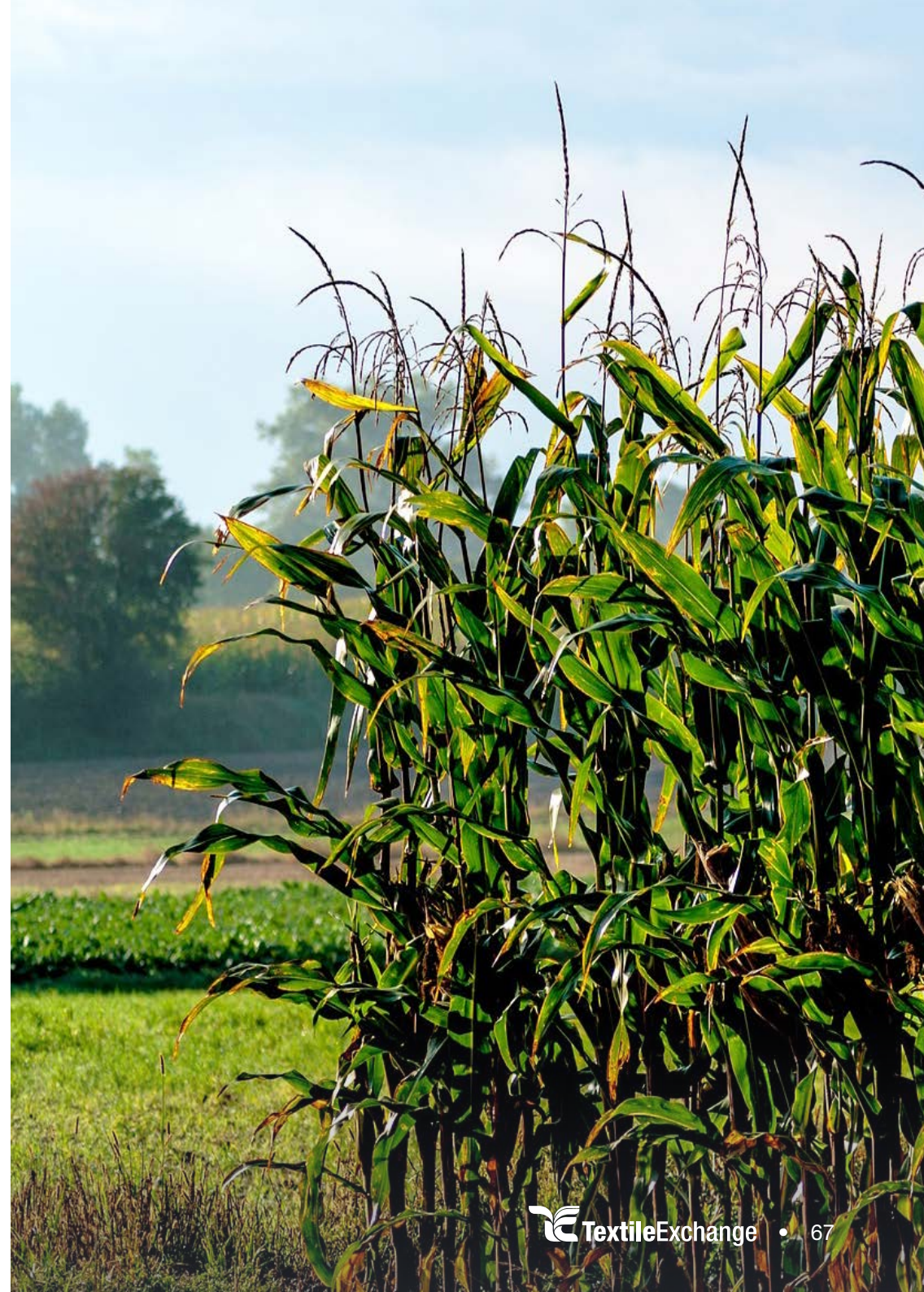
### Standards

While many sustainability standards for biobased feedstock exist, the use of these standards for biosynthetics is still limited. One example of a standard that is already used for biosynthetics is **[ISCC Plus](#)**. The ISCC Plus standard is used by NatureWorks for the biobased feedstock of its PLA. NatureWorks announced that 100 percent of its agricultural feedstock used for Ingeo would be ISCC Plus certified by 2020. There are several further sustainability standards, such as the **[Roundtable for Sustainable Biomaterials \(RSB\) standard](#)** and **[Bonsucro](#)**, that could be used for biobased feedstock for biosynthetics.

An overview of standards will also be part of the White Paper that the Textile Exchange Biosynthetics Round Table is currently developing.

(1) Estimate based on European Bioplastics 2020 - Bioplastics Market Data 2019 and global polyester figures (see ["Global Fiber Market"](#)).

(2) Textile Exchange 2018 - Quick Guide to Biosynthetics.



# Biobased Polyester

## Supplier innovation landscape

The basis for biobased polyester textiles is biobased chemicals such as biobased paraxylene or bio-MEG. The development of these biobased chemicals is a crucial driver for the biosynthetics market.

### 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.

**DuPont** launched **Sorona®** in 2012, 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 global and over 150 mill partners. More in the [supplier mapping](#).

**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.

**Greencol Taiwan Corporation (GTC)** has operated a plant to manufacture bio-monoethylene glycol (bioMEG) in Taiwan since 2012.

**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.

**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.

**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](#).

### Textile Exchange Member Voices

“ Virent's view is that a Consortium approach is critical to addressing the scale-up challenges inherent in the deployment of novel technologies.

– Stacey Orlandi  
CEO, Virent



# Biobased Polyester

## Supplier innovation landscape

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

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](#).

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


**Palmetto Synthetics** offers biobased PLA staple fiber made with NatureWorks Ingeo®, which is derived from corn.

**Radici's CornLeaf** is a filament yarn based on Ingeo™ PLA biopolymer, which is made from corn. More in the [supplier mapping](#).

Radici also offers 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 also offers a 30 percent plant-based Ecodear® PTT and a 100 percent biobased PLA filament. Toray launched ecodear® as an integrated brand for biomass-based polymer materials and products in 2013.

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

### Biosynthetic fur

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

“ We intend to have all of our faux furs made from bio-based or recycled sources only before 2030 and we also keep an eye on in-vitro fur (fur grown in labs) to consider a post oil future.

– Ecopel  
Textile Exchange Member

# Commitments to Preferred Polyester

## Examples

### Commitments to Recycled Polyester



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.

**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. This commitment includes the aim to use only recycled polyester in textile products by 2020.

**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.

In 2017, the rPET Round Table created a Recycled Polyester Commitment to encourage brands and retailers to publicly commit to accelerating their use of recycled polyester by 25 percent by 2020. The rPET Round Table is delighted to report that the aggregate target was reached two years early, in 2018, when the combined rPET use of the commitment signatories grew by 36 percent. The 13 signatories of the original rPET Commitment that have disclosed their progress since 2017 reported an uptake of 176,513 mt recycled polyester fiber in 2019 (based on 2018 data), reflecting a 208 percent increase over the two previous years.

### 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.

In 2019, **NatureWorks** announced its commitment that 100 percent of its agricultural feedstock used for Ingeo will be ISCC Plus certified by 2020.





# Polyamide

Photo: NOAA Coral Reef Ecosystem Program, CC BY-SA 2.0

# Recycled Polyamide

## Production facts and figures

With around 5.6 million mt<sup>(1)</sup>, polyamide had a market share of about 5 percent of the global fiber production market in 2019<sup>(2)</sup>.

Global polyamide production increased from 3.74 million mt in 1990<sup>(3)</sup> to 5.58 million mt in 2019<sup>(1)</sup>.

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

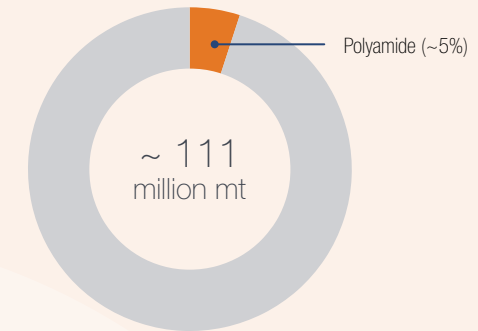
The market share of recycled polyamide is challenging to estimate. Reliable numbers on the global recycled polyamide production volume are currently not publicly available. As polyamide is more difficult to recycle than polyester, the market share of recycled polyamide is much lower than the one for recycled polyester.

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.

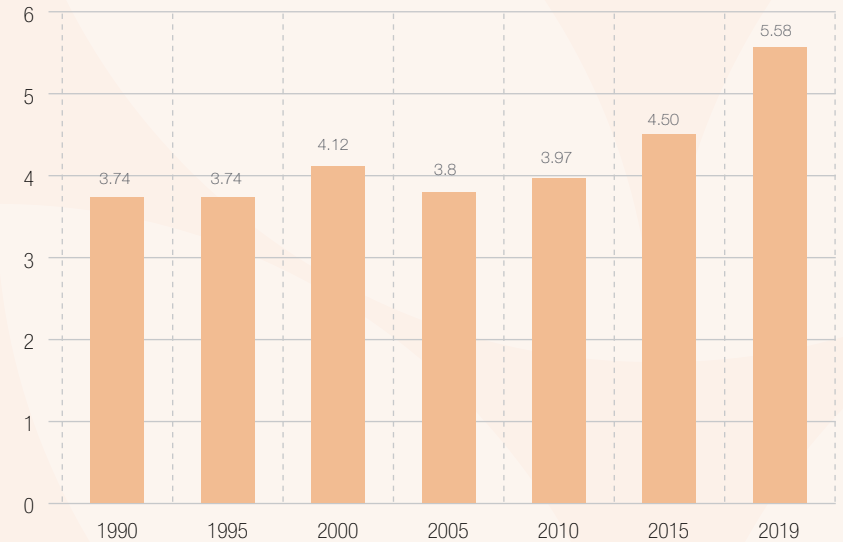
Main standards used for recycled polyamide include the Global Recycled Standard (GRS), the Recycled Claim Standard (RCS), and the SCS Recycled Content Standard. For further information, see the chapter on [Sustainability Standards](#).

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 mt of regenerated caprolactam<sup>(4)</sup>.

GLOBAL MARKET SHARE OF POLYAMIDE IN 2019



GLOBAL POLYAMIDE PRODUCTION (MILLION MT)



(1) Textile Exchange estimate based on Oerlikon based on The Fiber Year 2019 - published at ITMA 2019 and public Market Research Future CAGR estimate (June 2020)

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

(3) IVC website.

(4) Aquafil website: <http://www.econyl.com/de/the-process/>.



# 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

- Premiere - EcolInnovationFiber™
- **Unifi** - REPREVE® 

## SOUTH KOREA

- Hyosung - Mipan Regen™

## SPAIN

- Nurel - Reco Nylon®
- Nylstar - Meryl® Recycled

## JAPAN

- Toray - CYCLEAD™   






## Innovation beyond mechanical recycling of pre-consumer materials

-  Chemical recycling
-  Fishing nets
-  Post-consumer textiles
-  Other feedstock

## TAIWAN


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

## ITALY

- Aquafil - ECONYL®    
- De Martini Bayart & Textifibra
- Fulgar - Q-NOVA® <sup>(1)</sup>
- Radici - Renycle® 

## ISRAEL

- Nilit - Ecocare

 **Textile Exchange members** are highlighted in bold (as of June 2020).

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

# Biobased Polyamide


## Introduction and supplier innovation landscape

The global production capacity for biobased polyamide is around 0.24 million mt<sup>(1)</sup>. It is estimated that the share of biobased polyamide fibers is less than 1 percent of the polyamide fiber market<sup>(1)</sup>.

### 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.

**Fulgar's EVO®** is a 100 percent biobased polyamide yarn made from castor oil.

 **Kintra Fibers** is developing a polybutylene succinate, which is a linear aliphatic polyester, with 56 percent biobased content derived from corn. More in the [supplier mapping](#).

**RadiciGroup's Biofeel®** 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. 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.

### Chemicals and resins

**Anellotech** announced the production of sample quantities of bio-based benzene in 2019.

**Arkema's Rilsan®** is a polyamide 11 resin produced from 100 percent castor oil.

**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.

**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.

**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](#).

**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) European Bioplastics/nova institute 2019 - Bioplastics Market Data 2019. Compared to the global fiber production volume compiled by Textile Exchange based on various sources (see the chapter on "[Global Fiber Production](#)").



# 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 by Textile Exchange members:**

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

**Norrna** has the goal that 75 percent of their nylon should be recycled in 2020. More information [here](#).

**Stella McCartney** has the goal to stop using virgin nylon by 2021. To do so, they are replacing all virgin nylon with ECONYL® regenerated nylon. More information [here](#).

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

## Other examples:

**Brookes Running** is committed to use 100 percent recycled nylon fiber by 2023. More information [here](#).

**Prada** has published their goal of converting all Prada virgin nylon into regenerated nylon ECONYL® by the end of 2021. More information [here](#).

“ Synthetic materials, such as nylon and polyester, can – and should – be recycled and come from recycled sources.

– Stella McCartney <sup>(1)</sup>





# Other Synthetic Fibers

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Photo: Tyton Biosciences

# Other Recycled or Biobased Synthetics

## Overview

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, polyurethane filament, in 2016.

**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](#).


### 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](#).

### Recyclable PDK

A team of researchers at the **U.S. Berkeley Lab** has designed a new recyclable plastic called poly(diketoenamine), or **PDK**, that can be disassembled into its constituent parts at the molecular level, and then reassembled again and again.

### Biobased polyurethane

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



# Other Manmade Fibers

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# 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 and turn it into high-quality polyester pellets.

[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](#).

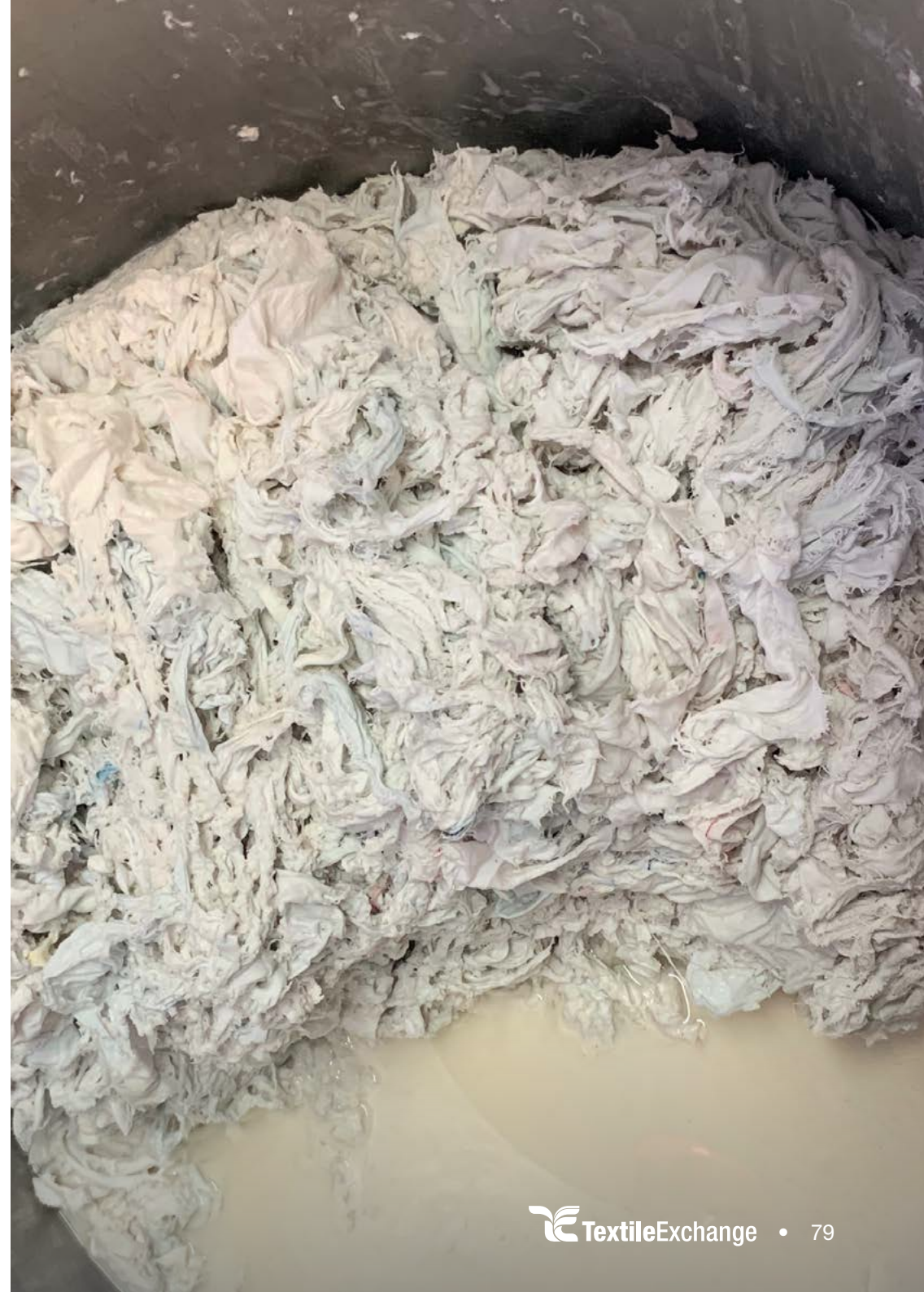
The [Hong Kong Research Institute of Textiles and Apparel \(HKRITA\)](#) - in collaboration with the H&M Foundation and Novetex - has developed a hydrothermal method using heat, water, and green chemicals for recycling post-consumer cotton and polyester blends. A new pre-industrial size facility called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

### [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  
Co-Founder, 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.

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 Once More to separate cotton and polyester from polycotton blends in October 2019. The project started in autumn 2019 with 30 mt of cotton derived from used textiles added to their wood-derived pulp in their mill in Mörrum, Sweden. Södra is looking for partners to help increase the recycled share in their pulp from the current 3 percent to around 20 to 30 percent. Södra is also exploring a decoloring solution, possibilities to extract products from the polyester, and the use of used MMCF textiles.

Tyton Biosciences utilized a hydrothermal technology to separate polyester-cotton blends of any ratio with maximum of 5 percent other materials into the building blocks of virgin-grade polyester and cellulose that can be converted into dissolving pulp. More in the [supplier mapping](#).

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 in 2021 with an annual capacity of several hundred tons. 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.



# Recycled CO<sub>2</sub>-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 recycle carbon and directly use it as feedstock for textiles.

### 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 CO<sub>2</sub> 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.

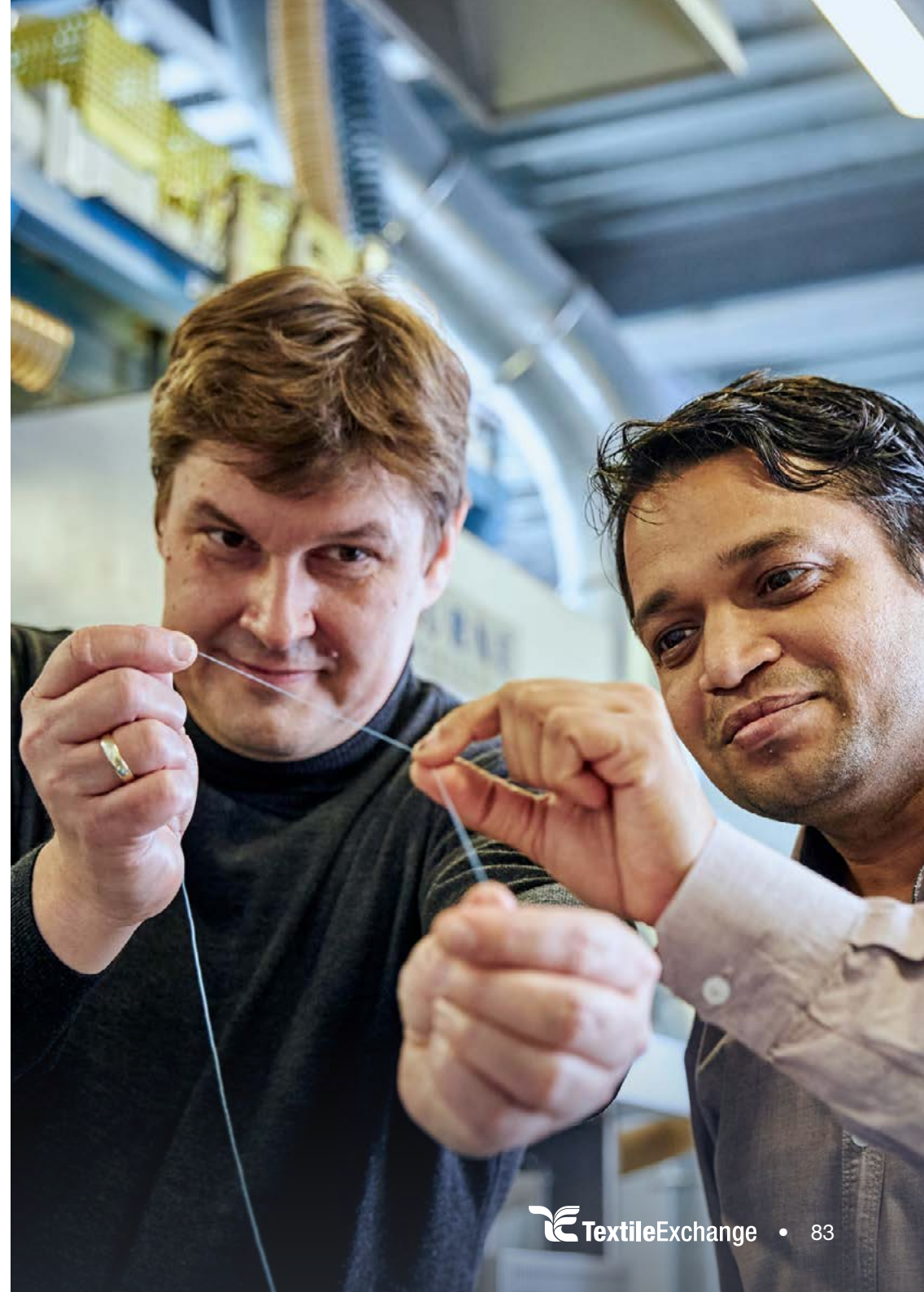
**LanzaTech** is developing a carbon recycling technology. They aim to create clothing like yoga pants from the CO<sub>2</sub> emissions from a steel mill. LanzaTech calls these products "CarbonSmart™."

**NatureWorks** is currently using plants to capture and sequester CO<sub>2</sub> 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 CO<sub>2</sub>-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 <sup>(1)</sup>



(1) Covestro July 2, 2019 Press Release "Dress with CO<sub>2</sub>". More information [here](#).

# Sustainability Standards & Traceability

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# 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.

The number of OCS certified facilities almost doubled from 3,174 in 2014 to 6,181 in 2019. The number of GOTS certified facilities increased from 3,663 in 2014 to 7,765 in 2019, covering more than 3 million workers.

## 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.

The number of RCS certified facilities increased from 78 in 2015 to 2,497 in 2019. The number of GRS certified facilities increased from 649 in 2014 to 6,755 in 2019.

The number of **Content Claim Standard (CCS)** certified facilities increased from 6 in 2014 to 57 in 2019.

## Standard revisions:

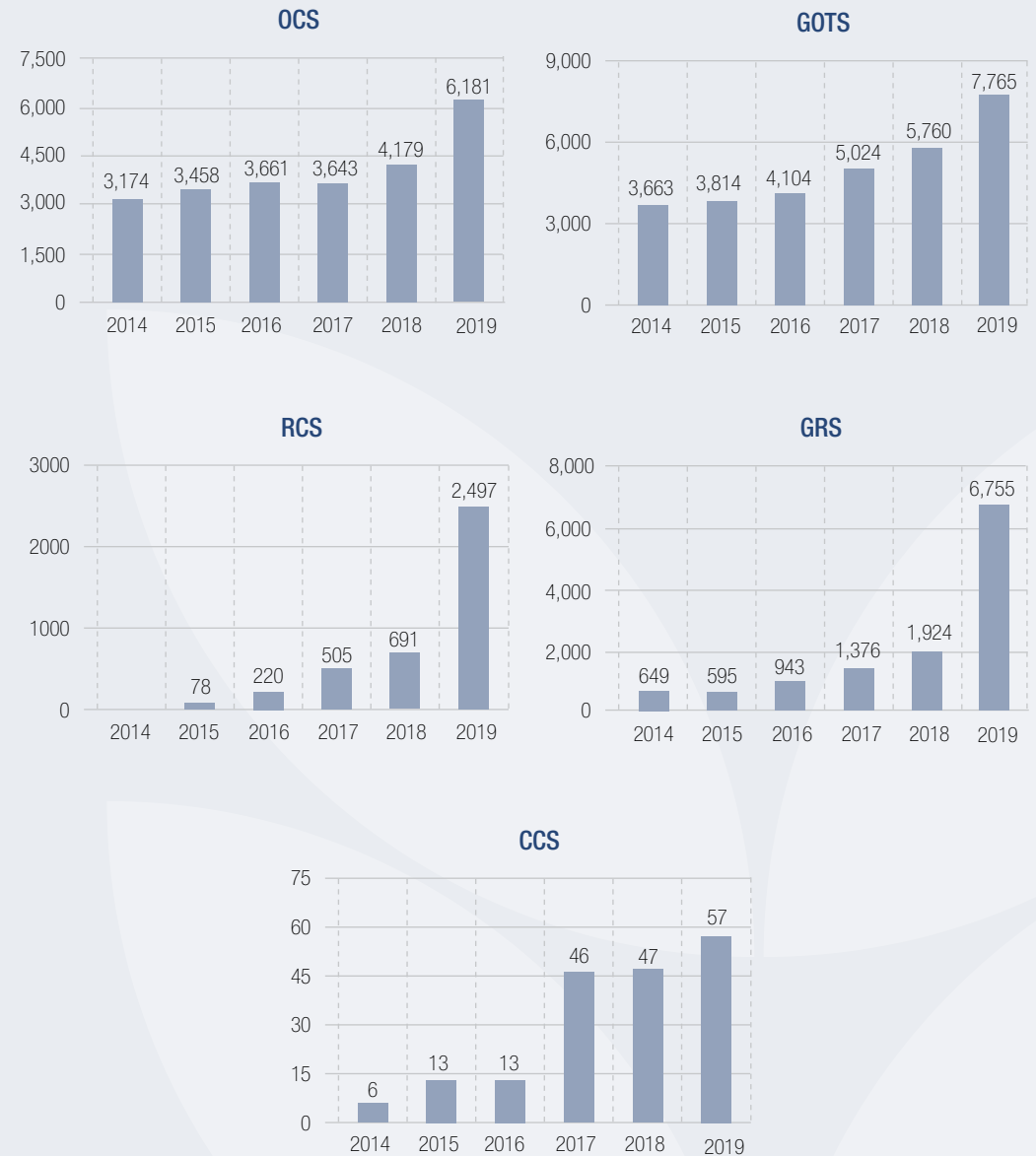
Textile Exchange launched the **OCS 3.0** in April 2020. Updates include updated manuals, more robust traceability between farm and first processor, GMO testing requirements, and non-mulesing for organic wool.

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.

The **RCS 2.0** is in effect since July 2018. A key change is the introduction of the Reclaimed Materials Supplier Agreement, a document that provides more visibility to the suppliers of reclaimed materials. Guidelines have also been introduced for added clarity and consistency of recycling claims, including pre- and post-consumer.

The **GRS 4.0** was released in parallel to the updated RCS version and has been in effect since July 2018. A key change is the adoption of ZDHC's Manufacturing Restricted Substance List v1.1 (MRSL) that will replace GRS's previous Prohibited Substance List. Other changes and additions include new examples of accepted recycled inputs, updated wastewater limits, and clarifications.

## NUMBER OF CERTIFIED SITES



# Traceability Systems

OCA's landscape analysis unearths latest progress in traceability



**Author:** Thomas Mason,  
Program Officer, Organic  
Cotton Accelerator.

Textile supply chains can often be fragmented, complex, and opaque, in-turn causing integrity challenges with procurement, verification, and traceability. This presents a risk for stakeholders across the entire supply chain.

In response to this, over recent years there has been an explosion of new technologies and approaches to trace fibers and materials through the supply chain, with many being piloted and commercially launched. However, such rapid development can be overwhelming. Suddenly there are a wealth of entrepreneurial businesses, all promising to have the answers to the same question: "How can we be sure this fiber is genuine?"

Simultaneously, there are a number of pilots and initiatives being implemented, testing and trialing these new solutions, with many efforts being duplicated as stakeholders work in individual silos, adding further to the fragmentation in the sector.

At the Organic Cotton Accelerator (OCA) we focus on collaboration not competitive edge. As the only multi-stakeholder organization fully dedicated to organic cotton, OCA unites the sector to unleash the potential of organic cotton and deliver positive change for people and the planet. We believe that by working in unison as a sector, we can create the conditions for organic cotton to thrive. As a

global platform, we are committed to bringing integrity, supply security and measurable social and environmental impact to organic cotton.

OCA initiated the Textile Traceability Task Force (TTTF) to harmonize efforts and co-develop a traceability framework. The ambition was to explore the challenges and opportunities in the current status quo, and also conduct a landscape analysis of the potential technologies which could be used to elevate and optimize the current state of traceability within existing chain of custody standards.

The TTTF landscape analysis researched 40 companies, 49 technologies and 26 pilots and initiatives. Some of the most eye-catching developments are detailed below:

## Blockchain

- [TextileGenesis](#), a blockchain based traceability solution, last year partnered with Lenzing to trace TENCEL fiber from wood to finished garment. TextileGenesis also partnered with GS1 in order to build out a traceability data protocol for the textiles sector drawing upon GS1's existing global standard which is used widely in other sectors.

- Polymer producers Domo Chemicals and Covestro recently launched a joint initiative with [Circularise](#) to create an open standard for sustainability and transparency in the plastics industry. Circularise intend for their protocol to allow for data to be securely exchanged across fragmented supply chains.

- [UNECE's](#) Enhancing transparency and traceability of sustainable value chains

in Garments and Footwear project is progressing with its efforts to implement a blockchain pilot for due diligence in the cotton supply chain in support of a circular economy.

## Microbiome

- Microbiome analysis company [Phylagen](#) recently was selected as one of the World Economic Forum's Technology Pioneers. Their technology can be implemented across the entire supply chain, having been implemented in the wool supply chain, as well as testing to verify whether cotton is grown on an organic farm.

- [Diversigen](#) (previously CoreBiome), participated in the Organic Cotton Traceability Pilot, successfully extracting biome material from soil samples to trace origin of seed cotton.

## Isotope

- SUPIMA cotton has partnered up with brand Theory, textile mill Albin and traceability company [Oritain](#) to offer consumers ethically sourced and traceable garments. Oritain claim their isotope technology has the potential to be used to identify country, region or even the farm of where a fiber was sourced from. Oritain also have a partnership with Cotton USA to verify and trace cotton from that region.

## DNA Markers

- [Applied DNA Science](#) have been contracted for a 1 million USD order to tag, test and track PimaCott for the 2019-20 season. Applied DNA Science offer solutions for cotton, down & feather, leather and synthetic fibers.

- A collaboration between NIKIN, ecos, gebana and [Haelixa](#) to launch the first traceable t-shirt – where one tree is planted for each t-shirt sold – was initiated in Q4 2019. Though Haelixa's markers it will be possible to trace product back through manufacturers in Greece and Macedonia back to cotton farmers in Burkina Faso.

## Fluorescent Tracers

- [Tailorlux](#) recently were awarded a patent license from US-based NCR Corporation allowing them to offer their luminescent marking solution IntegriTEX in US markets, building upon their work with the Organic Cotton Traceability Pilot and Dibella Group.

Within this rapidly growing area of business, there are technologies and companies vying for attention, and with that comes numerous opportunities for collaboration if actively pursued. Together these new developments offer the missing pieces of the puzzle to enable the sector to take huge steps beyond the current limitations we are facing.

Grasping the opportunities for collaboration and building upon the latest technological developments will be allow the textiles sector to confidently and more reliably answer "How can we be sure this fiber is genuine?"

If you would like to learn more about the Landscape Analysis of OCA's Textile Traceability Task Force or any other elements of OCA's work, please contact: [secretariat@organiccottonaccelerator.org](mailto:secretariat@organiccottonaccelerator.org)

# Traceability Systems

## Further examples

Innovative traceability systems are applied to various fiber and material categories such as the following examples categorized by fiber and material category and can be combined with other chain-of-custody systems. In April 2020, Textile Exchange launched a comprehensive revision of the [Content Claim Standard \(CCS\) 2.0](#). Part of this revision process will also be to explore how the CCS can interface with other technologies. The CCS 3.0 is expected to be released in mid of 2021.

### Cashmere

The Green Gold and Animal Health Project of the Swiss Agency for Development and Cooperation and Mongolian National Federation of Pasture User Groups of Herders have partnered in the development and implementation of [“Responsible Nomads” Livestock Raw Material Traceability system](#), a QR code-based traceability system.

### Down

[Allied Feather & Down introduced an online traceability platform called TrackMyDown.com](#). It allows consumers to enter the unique sourceTRACK number to trace the history of the down, its origin, the natural properties of the down and the Allied technologies that have been applied—from cleaning to treatments.

[Navarpluma collaborates with AppliedDNAScience](#). Their [CertainT® platform](#) has three technology pillars (Tag, Test, Track) which allows raw materials and products to be tagged with a unique molecular identifier. This identifier can then be tested for its presence as it travels throughout a global supply chain. All the data points associated with tagging and testing are tracked by uploading to a secure cloud database.

[Sustainable Down Source introduced their downtracker.com](#) which is based on QR code scanning to track down. More in this [interview](#).

### Manmade cellulose

[Birla Cellulose introduced a block-chain based traceability system](#) for its LivaEco and other fibers.

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.

### Organic cotton

The [Organic Cotton Traceability Pilot](#) is a joint project of Fashion for Good, C&A Foundation, the Organic Cotton Accelerator (OCA), and lead technical partner, [Bext360](#) exploring blockchain and DNA-based technology to trace organic cotton through

its value chain. The first phase was made possible with the technical support of [Haelixa](#), [Tailorlux](#), [InCode Technologies](#) and Pratihya Syntex, and the additional support of Kering, Zalando, PVH Corp., and C&A.

### Recycled cotton / polyester

[AWARE™](#) is using a disruptive tracer- and blockchain technology to guarantee recycled content. It is currently focusing on recycled cotton and recycled polyester.

### Recycled nylon

[Fulgar has developed a traceability system called ID \(Identity\)](#) to make its Q-NOVA® recycled nylon traceable throughout the supply chain through the help of a special ingredient in the polyamide.

### Recycled polyester

[Plastic Bank selected IBM Blockchain technology](#) delivered on a private cloud by managed service provider Cognition Foundry, powered by IBM® LinuxONE™. Blockchain is used to track the entire cycle of recycled plastic from collection, credit and compensation through delivery to companies for re-use.

[Reliance Industries Ltd. collaborates with Applied DNA Sciences](#), a leader in large-scale PCR-based DNA manufacturing and authentication, to introduce their [CertainT® platform](#) for Reliance recycled polyester fiber.

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.

## Textile Exchange Member Voices

“ We continue to see trends in proving the sustainability claims that are made about raw materials used in supply chains.

– MeiLin Wan  
Vice President, Textiles,  
Applied DNA Sciences  
Link to [interview](#)

“ Our mission is to accelerate the global transition to transparent consumer supply chains.

– Haelixa

# Impact Incentives

Making impact happen

Textile Exchange is leading the development of Impact Incentives, Impact Partnerships Incentives and 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 best practices.**

The way they work is quite simple; farms that meet a chosen standard or benchmark will be able to sell incentives for their volume of output, and brands can purchase these incentives to balance out their use of these materials. The farms selling the incentives may or may not be in the supply chain of the brands, as the incentives trading system does not address any traceability. 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. And they can still make claims about their support for best practices.

**Impact Partnerships are a tool to help brands work with on-the-ground program partners to support farmers to meet the benchmarks and set themselves up for Incentives trading and/or physical trading.**

The program partners can deliver support and training, provide verification, and collect data with the farmers while offering stories, data, and credibility back to the brands.

**The Impact Alliance is a voluntary collaboration between sustainability standards owners to support the development of an Impact Incentives trading platform. Impact Alliance members work together to define, promote, and oversee the trading of Impact Incentives and Impact Partnership Incentives.**

The founding members of the Impact Alliance are Textile Exchange (leather and cotton), the Global Roundtable for Sustainable Beef (beef) and Proterra (soy and sugar). Global Food Partners is a new member, and there is further interest from other NGOs that are working with credible standards or benchmarks that share the mission and goals of the Alliance.

The Alliance's first work will be to enter into an agreement with the Incentives trade platform, define the core principles behind Impact Incentives and Impact Partnership Incentives, and set up the rules for the registration and sale of Incentives. Textile Exchange has already done much of this work.

**The Incentives Trade Platform is an IT Platform that manages the registrations and transfers of Incentives for voluntary sustainability initiatives.**

"Impact Incentives" and "Impact Partnerships Incentives" are included and will be traded according to the trading rules set out by the Impact Alliance. ChainPoint and ACT Commodities will be partnering to develop the platform for trading Impact Incentives.

For more information, visit the [Impact Incentives website](#) and check out the [Impact Incentives Presentation](#).

**“ Impact Incentives are a powerful tool to bypass 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 scale of impact that is needed to address the world's issues.**



**Anne Gillespie**  
Director of Impact  
Acceleration  
**Textile Exchange**





# Mega Trends

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# Climate Change

Urgent action required

**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 CO<sub>2</sub> has to be reduced by 50 percent by 2030 (compared to 2010 levels)<sup>(1)</sup>.**

Without rapid action and decarbonization of every part of the economy, the 1.5 degrees Celsius target is unlikely to be reached. If business-as-usual continues, the remaining global carbon budget of 570-Gt would already be exceeded in 2031<sup>(1)</sup>.

Even though crops and plants absorb some CO<sub>2</sub>, agriculture remains a key net emitter of CO<sub>2</sub> and is estimated to contribute to about 20 percent of global GHG emissions every year. While the most significant contributor to these emissions is livestock, the remaining agricultural production would need to reduce emissions as well, even if the consumption of animal protein would drop dramatically<sup>(1)</sup>.

Deforestation, often linked to agriculture but not always, is another key contributor to climate change and estimated to account for around 15 percent of the global CO<sub>2</sub> emissions<sup>(1)</sup>. Beyond that, reforestation is

one of the most economical and fastest ways to compensate for emissions that are very hard to avoid. The reforestation of around 300 million hectares by 2050 can be a key lever to reach the 1.5 degree Celsius target<sup>(1)(2)</sup>.

Another big lever is “fugitive methane,” or the natural gas that is released through the activities of oil and gas companies, as well as from coal-mining companies<sup>(1)</sup>.

The 1.5-degree Celsius target cannot realistically be achieved without carbon offsetting. Capturing carbon from the point at which it is generated or removing carbon dioxide from the atmosphere itself are possibilities<sup>(1)</sup>.

These are just a few examples of possible action areas. But they clearly show that climate change and raw materials are inextricably linked. Raw materials used in the textile industry are derived from plants or animals and thus clearly linked to emissions related to agriculture and unsustainable forestry or fossil-based resources.

Transitioning to preferred materials is a powerful way for a company to reduce its climate impacts.

## Examples of initiatives

Under the new Climate+ strategic direction, [Textile Exchange](#) will be the driving force for urgent climate action with a goal of 30 percent reduced CO<sub>2</sub> emissions from textile fiber and material production by 2030<sup>(3)</sup>.

The [Fashion Industry Charter for Climate Action](#) was launched at COP24 in Katowice, Poland, in 2018 and contains the vision to achieve net-zero emissions by 2050.

The [Science Based Targets initiative](#) mobilizes companies to set science-based targets and boost their competitive advantage in the transition to the low-carbon economy. In 2017, the Apparel Sector Guidance for Setting Science-based Targets was launched. In May 2020, over 150 global corporations, all part of the Science Based Targets Initiative, signed a letter to urge world leaders for net-zero recovery from COVID-19.

The [nova institute](#) is a key driver of the debate around renewable carbon.

For related topics, see also the pages on [regenerative systems](#), [circular economy](#) and [recycled carbon-based fibers](#).



## Net-zero emissions by 2050

to limit global warming to 1.5 degrees Celsius<sup>(1)</sup>



- 50%

in net CO<sub>2</sub> by 2030 compared to 2010 levels to limit global warming to 1.5 degrees Celsius<sup>(1)</sup>

(1) McKinsey Quarterly, April 30, 2020 - Climate math: What a 1.5-degree pathway would take.

(2) See also Canopy 2020 - Next Generation Report.

(3) Scope is pre-spinning. Measured from a 2017 baseline; subject to Science Based Targets validation.

(4) nova institute 2020 - Renewable Carbon – Key to a Sustainable and Future-Oriented Chemical and Plastic Industry.

# Sustainable Development Goals

Urgent action required

**With just 10 years to go, urgent action is needed to achieve the Sustainable Development Goals (SDGs) by 2030, a set of 17 universally agreed-upon goals addressing the top current environmental, social, and economic issues. While progress is being made in many places, the action to meet the SDGs is not yet advancing at the speed or scale required<sup>(1)</sup>.**

The “Decade of Action” - as called by the United Nations - aims to accelerate sustainable solutions to all the world’s biggest challenges — ranging from poverty and gender to climate change, inequality and closing the finance gap<sup>(1)</sup>.

The way we produce, (re)use, dispose of, or recycle our materials has an impact on every one of the SDGs. The textile industry has a powerful opportunity to shift the needle in both producer and consumer contexts.

## Examples of initiatives

The [UN Alliance for Sustainable Fashion](#) is an initiative of United Nations agencies and allied organizations designed to contribute to the Sustainable Development Goals through coordinated action in the

fashion sector. Specifically, the Alliance works to support coordination between UN bodies working in fashion and promoting projects and policies that ensure that the fashion value chain contributes to the achievement of the Sustainable Development Goals’ targets.

To support the textile industry with its SDG journey, Textile Exchange launched the online platform [TextilesforSDGs.org](#) in 2018.

**KPMG and Textile Exchange** have also partnered on a report entitled “[Threading the Needle: Weaving the SDGs into the textile, retail and apparel industry](#)”, that was published in 2018. A culmination of industry interviews, NGO inputs, and desk research, the report highlights shared value examples for companies in the sector grappling with how to integrate the SDGs into their core business and global supply chain.

Textile Exchange also encourages companies to consider participating in Textile Exchange’s [Corporate Fiber and Materials Benchmark](#) program to evaluate not only their preferred fiber and material usage but also its direct SDG impacts.



(1) United Nations - Decade of Action.

# Circular Economy

Accelerating action in partnership

**The amount of global textile production and consumption is increasing - and with it, the significant impacts caused by the raw material extraction up to the end-of-life. Moving away from the linear take-make-waste model to a circular economy is a powerful way to reduce the impacts and contribute to the urgent need for climate action and achieving the SDGs.**

Around 48 million mt of clothes are disposed annually, with around 75 percent of them landfilled or incinerated<sup>(1)</sup>. This equals 35 million mt of post-consumer clothes and one million mt of retailer overstock landfilled or incinerated per year<sup>(1)</sup>. It is estimated that only 25 percent of the used clothes are collected for reuse or recycling, and that less than one percent of all clothing is recycled back into clothing<sup>(1)</sup>.

## Key initiatives

**Accelerating Circularity** was launched in 2020. It is a collaborative industry project developed to accelerate the textile industry's move from linear to circular.

**Circle Economy's Circle Textile Program**, launched in 2014, develops the systems innovations necessary for the transition towards a circular textile industry. One of the flagship initiatives is **Fibersort**, a technology able to automatically sort large volumes of mixed post-consumer textiles based on fiber composition. The Fibersort project started in 2014, and production began in February 2018. In March 2020, the market-ready Fibersort Machine was launched.

The **Cradle to Cradle Products Innovation Institute** is a global non-profit dedicated to transforming the safety, health and sustainability of products through the Cradle to Cradle Certified Product Standard.

**Ellen MacArthur Foundation's initiative Make Fashion Circular** was launched initially as the Circular Fibres Initiative at the Copenhagen Fashion Summit in May 2017. The initiative brings together leaders from across the fashion industry, including brands, cities, philanthropists, NGOs, and innovators. It aims to stimulate the level of collaboration and innovation necessary to create a new textiles economy, aligned with the principles of the circular economy.

**Fashion for Good** is a global initiative that reimagines how fashion is designed, made, worn, and reused. Through innovation

and practical action, they demonstrate a better way for the fashion industry to work that allows companies, communities, and the planet to flourish.

**Fashion Positive** is a group of apparel brands committed to the development and adoption of materials designed to provide the foundation of a circular economy for fashion.

The **Global Fashion Agenda** launched the **2020 Circular Fashion System commitment** in 2017. It calls on the fashion industry to take action on circularity. The signing companies commit to taking action on one or more of four immediate action points - one being to increase the use of post-consumer recycled fibers (2).

**Textile Exchange** supports the transition to a circular economy through the Global Recycled Standard (GRS) since 2008 and Recycled Claim Standard (RCS) since 2013. Beyond this, it supports companies to measure their progress towards circularity through the Corporate Fiber and Materials Benchmark (CFMB) and Material Change Index (MCI). Textile Exchange is closely collaborating with other initiatives such as Accelerating Circularity, Circle Economy, Fashion for Good, the Ellen MacArthur Foundation, and Fashion Positive to accelerate the transition.



<1%

Fiber-to-fiber recycling of clothing <sup>(1)</sup>



~12.5%

of the global fashion market committed to circularity <sup>(2)</sup>



~48 million mt

of clothes disposed annually <sup>(1)</sup>



~75%

of disposed clothing landfilled or incinerated <sup>(1)</sup>

(1) Ellen MacArthur Foundation (2017) - A New Textiles Economy.

# Regenerative Systems

Accelerating action in partnership

Doing less harm is not sufficient. The new imperative is to build regenerative systems. Regenerative practices go beyond reducing damage to healing and repairing broken systems.

The term “regenerative” is used in various contexts. It is increasingly used in the textile industry related to the way how raw materials are produced.

In the context of biological systems, it is used to refer to practices that regenerate living systems, such as restoring soil health by building organic matter and conservation tillage.

In the context of technical systems, it is used to refer to practices that recover and restore products and materials through reuse, repair, remanufacturing, or recycling.

## Standards

### Regenerative Organic Certified (ROC)

is a new certification that aims to achieve the highest standards for soil health, animal welfare, and farmworker fairness. The pilot program was completed in early 2020, and the opening for general applications is anticipated for summer 2020.



## Textile Exchange Member Voices



Lets not settle for simply “doing less-bad” with a goal of only striving for reduced impacts. This will not be enough to save the fashion industry--- or humanity! Consider how, as an industry, can we fix things, how can we restore and regenerate our habitat? Know that REGENERATIVE impacts are the new goal, the high-bar set by the fashion industry, and with fashion’s influence we can make this the most important trend in history, and the goal for all industry.

– Isaac Nichelson,  
CEO, Circular Systems



(1) Ellen MacArthur Foundation (2017) - A New Textiles Economy.

# Microfiber Shedding

A challenge for the textile industry

**The research and understanding around microfiber shedding - or better fiber fragmentation<sup>(1)</sup> - has shifted considerably since 2016 when momentum started to build. While early discussions mainly focused on the release of synthetic fiber fragments into marine environment as part of the bigger microplastic debate, the discussion is shifting towards seeing it as a challenge that is relevant for all fiber types.**

A key reason for this shift is that shedding of fiber fragments into the environment is not only about the physical presence of non-biodegradable fiber fragments in the environment; it is also about the chemicals that are carried along the fiber fragments.

Another rather new dimension of the discussion: while most research has focused on the presence of fiber fragments in marine environments, fiber fragment shedding is not limited to this. An example is air-borne fiber fragment emissions in factories and their health implications on workers.

Research is starting to show the complexities involved in understanding this topic. Multiple factors influence fiber

fragment shedding rates including but not exclusive to: textile construction, finishing process, washing method, detergent used, fiber type, and age of the textile. More research is needed to assess to what extend which parameters influence the shedding rate.

While first countries started to ban, for example, certain microbeads in cosmetics, regulation of microfiber shedding from textiles is much more complicated. Thus, regulatory proposals related to microfiber shedding from textiles have been highly debated.

In general, the debate is moving away from “banning microfibers” to “reducing the shedding rates and preventing the release of fiber fragments into the environment by managing them in a responsible way”.

While more research is needed to quantify the volumes of fiber fragment shedding into the environment, initial estimates are alarming. Another 22 million mt of synthetic fiber fragments could be added to the ocean between 2015 and 2050 if business-as-usual continues<sup>(2)</sup>. The annual amount of primary synthetic fiber fragments released from textiles is estimated at around 500,000<sup>(2)</sup> mt per year.

## Examples of initiatives:

**The Microfiber Consortium (TMC)**, originally formed by the European Outdoor Group (EOG) in 2016 and as an independent standalone organization since 2018, works to facilitate the development of practical solutions for the textile industry to minimize fiber fragmentation to the environment from textile manufacturing and product life cycle. TMC is focusing on three projects: (1) the development of a consistent test method for fiber fragment shedding, (2) the development of guidance for product development, (3) empowering change regarding fiber fragmentation and loss at the manufacturing level. Textile Exchange is an affiliate member of TMC.

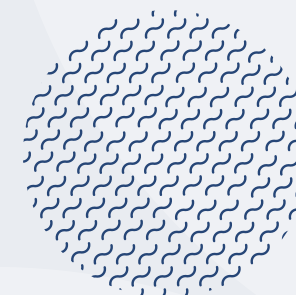
The **Cross Industry Agreement (CIA)** is a voluntary collaboration of five European industry associations (AISE, CIRFS, EOG, EURATEX and FESI) for the prevention of microplastic release into the aquatic environment during the washing of synthetic textiles.

**Hohenstein**, a Textile Exchange member, joined TMC as a research member in late 2019 and will be enriching the TMC primary research through the use of their Dynamic Analysis testing. This complements the TMC filtration approach testing which identifies the volume of loss.



~ 500,000

mt of primary synthetic fiber fragments from textiles per year <sup>(2)</sup>



An additional  
**22 million mt**  
between 2015 to 2050  
if no action <sup>(2)</sup>

(1) Marine biologists started to use the term “microfiber” to differentiate tiny fibers released from textiles from other microplastics such as microbeads from cosmetics or plastic particles from tires. The term “microfiber” was, however, already well-established in the textile industry and used to describe very thin fibers (linear density below one denier) that are, for example, used for cleaning clothes. To differentiate these different meanings, several organizations including The Microfiber Consortium (TMC) and American Association of Textile Chemists and Colorists (AATCC) are shifting to the term “fiber fragmentation”.

(2) Ellen MacArthur Foundation 2017 - A New Textiles Economy.

# Special: COVID-19

## Impact on the fiber and material suppliers

**The COVID-19 pandemic has upended the world order in nearly every way imaginable and had a devastating impact on most businesses in the textile industry.**

Several reports have been launched with early insights into the impacts of COVID-19 for the textile industry. Many publications focus on the implications for brands, retailers and tier 1 suppliers, including garment workers. But what have been the impacts on the fiber and material suppliers? On the farmers and farm workers, on the waste pickers, the recyclers and people working on the fiber and material production? And how will COVID-19 impact the future of preferred fiber and materials?

**COVID-19 severely hit almost all fiber and material suppliers, particularly the poorest and most vulnerable in the supply chains** such as the waste pickers, the farmers and farm workers, the migrant workers - those without a social security network and often invisible in the supply chains.

A few significant initiatives have been launched though to support the most vulnerable groups in the textile supply chains. Examples include:

- The [Plastics For Change India Foundation's funding campaign to support extremely vulnerable waste-picker families](#) with essential food and hygiene supplies.

- The [PlasticBank Community Relief Fund](#) to protect the health and well-being of their most vulnerable communities affected by COVID-19, emergencies and disasters.

- The [Fairtrade Producer Relief Fund and Fairtrade Producer Resilience Fund](#) with initial investments of €3.1 million to meet the immediate needs of farmers, workers, and their communities, while also establishing a foundation for longer-term economic recovery efforts.

- The [BCI COVID-19 Hub](#) and support for its implementing partners to support farmers with COVID-19.

- The [IDH COVID-19 insurance to provide income security for 180,000 smallholder cotton and tea farmers in India.](#)

**While the future is still unknown, cautious optimism seems to dominate among fiber and material suppliers that sustainability will increasingly be seen as crucial for the future.** Many suppliers believe that COVID-19 is an opportunity to rethink the way how we do business and that this will positively impact the preferred fiber and materials market. Initiatives such as the letter signed by over 150 global corporations, all part of the Science Based Targets Initiative, to urge world leaders for net-zero recovery from COVID-19 give hope that companies clearly understood the deep interconnectedness between people, planetary systems, and business.

Several fiber and material suppliers also adjusted their activities to support the production of face masks and other protective equipment. Textile Exchange member **Lenzing** together with Palmers Textil AG even founded a new company and invested several million euros in machinery for a monthly production capacity of 12 million pieces (standard protective masks and FFP2 masks). Textile Exchange member **Sulochana** also started manufacturing PPEs in their factory, where they produce around 3,000 PPEs every day.

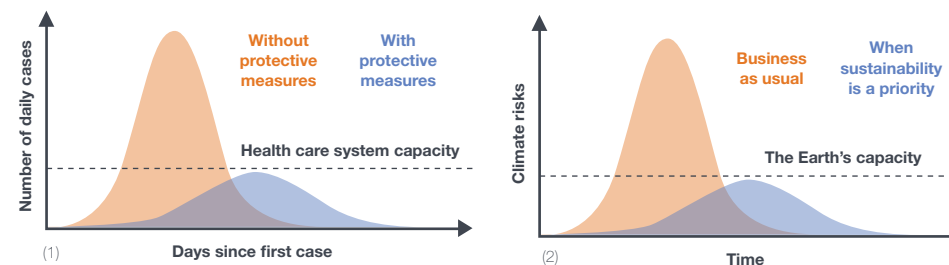
**“Flattening the curve” and staying within the carrying capacity of systems is key.** One graph was particularly often shared during the COVID-19 outbreak: The graph that shows that protective measures can help us to “flatten the curve” and stay within the health care system capacity.

The same applies to the health of our ecosystem: It is essential that sustainability

is a priority and precautionary measures are taken in order to stay within the Earth's carrying capacity.

**Textile Exchange is here to support members and the broader industry in the time of crisis.** We continue to support the acceleration of the uptake of preferred fibers and materials, for example, through digital tools, our Round Tables, and standards. Like most other standard systems, we have set up policies to ensure that no certified company will lose their certification due to delays in auditing caused by COVID-19. With all the tragedy caused by COVID-19, let's try to turn it into an opportunity to rethink the way how we produce, use and reuse our precious resources - our own resources as well as the physical resources around us.

Let's work together to stay healthy - on a personal and global level, in the short and long term!



(1) based on Centers for Disease Control and Prevention, Janet Loehrke/USA Today

(2) based on The Sustainable Fashion Forum

# Textile Exchange Membership

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# Textile Exchange Membership

## About Textile Exchange

Founded in 2002, Textile Exchange is a global non-profit 501(c)3 with more than 375 members that represent leading brands, retailers, and suppliers in the textile industry. The organization works to create leaders in the sustainable fiber and materials sector by providing learning opportunities, tools, insight, standards, data, measurement, and benchmarking - and by building a community that can collectively accomplish what no individual or company can do alone.

## Benefits of Membership

Textile Exchange membership connects you to a powerful community of brands, retailers, and companies, large and small, from across the textile world - 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, and connections and, above all, the opportunity to take action, individually and collectively.

## Contact Us



**Céleste Lilore**  
Director of Industry Engagement  
[Celeste@TextileExchange.org](mailto:Celeste@TextileExchange.org)



**Taylor Bittenbender**  
Membership Coordinator  
[Taylor@TextileExchange.org](mailto:Taylor@TextileExchange.org)



## Membership Levels & Pricing

		Supply Network Partner	Brand/Retailer Partner	Supporter	Friend
		\$12,500	\$12,500	\$3,000	\$500
Products	Access to The Hub - Member Portal	✓	✓	✓	✓
	Annual Conference Ticket(s)	3 (Value \$6,000)	3 (Value \$6,000)	1 (Value \$2,000)	-
	Annual Conference Exhibit Area	1 (Value \$3,000)	-	-	-
	Annual Conference Recordings	✓	✓	✓	✓
	Annual Conference Members Only Event	Open to all participating members	Open to all participating members	Open to all participating members	Open to all participating members
	Access to Regional Events	Open to all participating members	Open to all participating members	Open to all participating members	Open to all participating members
	Material Snapshots Library (29 Publications) <sup>1</sup>	Unlimited	Unlimited	Unlimited	-
	Fiber Quick Guides (Biosynthetics, Organic Cotton, and more)	✓	✓	✓	✓
	Webinars	Unlimited live access and recordings	Unlimited live access and recordings	Unlimited live access and recordings	Unlimited live access and recordings
	Annual Member-only eLearning Series + Report Briefs	Unlimited live access and recordings	Unlimited live access and recordings	Unlimited live access and recordings	Unlimited live access and recordings
Benchmarking	Corporate Fiber and Materials Benchmark Participation	Anticipated Pilot 2020	Open to all	Open to all	Open to all
	Corporate Fiber and Materials Benchmark Private Brand Report	Anticipated Pilot 2020	✓	✓	✓
	Corporate Fiber and Materials Advanced Report Card	Anticipated Pilot 2020	✓	\$2,000	\$1,000
	Corporate Fiber and Materials Benchmark Report Card	Anticipated Pilot 2020	✓	✓	✓
Industry Research Reports	Annual Preferred Fibers Market Report	✓	✓	✓	✓
	Corporate Fiber and Materials Benchmark Sector Overview	✓	✓	✓	✓
	Corporate Fiber and Materials Benchmark Sector Report	✓	✓	✓	✓
	Organic Cotton Market Report	✓	✓	✓	✓
	Special Annual Reports	✓	✓	✓	✓
Standards Benefits	Certification Toolkits	✓	✓	✓	✓
	Sourcing Guides (not all Standards)	✓	✓	✓	✓
	Labelling Guide	✓	✓	✓	✓
	Brand and Retailer Toolkit	✓	✓	✓	✓
	Standard-specific Webinars and Access to Recordings	✓	✓	✓	✓
	Supplier or Brand/Retailer Training	✓	✓	-	-
Services	Access to Round Tables	Open to all	Open to all	Open to all	Open to all
	Access to Round Table Summits	✓	✓	✓	✓
	Access to TEam Members; In-Person meetings <sup>2</sup>	✓	✓	-	-
	Access to Learning Center <sup>3</sup>	✓	✓	✓	✓
Recognition	Member Spotlight	✓	✓	-	-
	Logo on our website, with links	✓	✓	✓	✓
	Certificate of membership	✓	✓	✓	✓

1. Value \$250 each; Total Value \$7,250. Updates scheduled for 2020.

2. Meetings subject to availability and geography.

3. Member access via The Hub. Non-member access via [store.textileexchange.org](http://store.textileexchange.org)

# Textile Exchange Membership

## 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 in our public report. The full supplier mapping is a benefit for Textile Exchange supporter and partner level members.

The full supplier mapping includes 86 snapshots of innovative fibers and materials across various material categories shared by 68 suppliers with us in 2019 or 2020.

The supplier mapping includes the information as submitted by the suppliers and has not been verified by Textile Exchange. The 2020 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®
- Aero Fiber
- AGL - Polyfill
- Carbios
- Cixi Xingke
- DBT Fibre
- EcoBlue
- Far Eastern - FENC® TOPGREEN®
- First Mile
- **Itochu - Renu™**
- JB Ecotex
- Jeplan - Bring Material™
- Lycra - Coolmax® EcoMade
- Lycra - T400® EcoMade
- Lycra - Thermolite® EcoMade
- Nan-Ya Plastics - Saya
- Neelam Fibers
- Pashupati
- Pinnacle
- Plastics for Change
- Polygenta - perPETual

- Radici Group - rRadyarn®
- Radici Group - rStarlight®
- Radici - REpetable
- Reliance - RElan™ Green Gold
- Shinkong - Recotex
- **Sulochana - Polycycle**
- Thai Polyester - EcoTPC™
- **The Movement - Poly lana®**
- **Unifi - Repreve**
- Worn Again
- **Zhejiang Haili - Reboyarn**

### Recycled Polyamide ([download](#))

- DBT Fibre
- Far Eastern - FEFC®eco
- Fulgar-Q-Nova
- Nilit
- Nurel

### Recycled Other Synthetics ([download](#))

- **Aksa - Acrycycl® recycled acrylic**
- Lycra - EcoMade recycled elastane
- Radici - Renycle®

## SYNTHETICS

### Biosynthetics ([download](#))

- **DuPont - Sorona® PTT**
- **DuPont - Susterra Propanediol**
- **Ecopel - KOBA®**
- FENC - Top Green
- Genomatica - Biobased Nylon 6
- **Kinta Fibers - Biobased PBS**
- LYCRA - Lycra® 162 R
- Radici - Biofeel®
- Radici - Comleaf
- Radici - Dorix® 6.10
- Radici - non branded
- Radici - Radipol® DC
- Radici - Radipol® PX
- Radici - Biobased Polyester
- **Virent - BioForm Paraxylene + Benzene**

## MANMADE CELLULOSICS

### Recycled Manmade Cellulosics ([download](#))\*

- Aalto University - Ioncell®
- Algiknit (alternative virgin feedstock)
- **Asahi Kasei - Bemberg™**
- **Asia Pacific Rayon**
- **Evrnu - NuCycl™**
- **GP Cellulosic - Cotton Linter Pulp**
- Jilin Chemical Fiber - White Mountain
- **Lenzing - Tencel™ Lyocell with Refibra™ Technology**
- Orange Fiber
- **Renewcell - Circulose®**
- **Sateri - Finex®**

### Virgin Manmade Cellulosics ([download](#))

- Includes lists of FSC and PEFC certified suppliers and a link to The CanopyStyle Hot Button Report.

## NATURAL FIBERS

(plant- and animal-based)

### Recycled Natural Fibers ([download](#))

- **Circular Systems - Orbital™**
- **Circular Systems - Texloop™**
- **Geetanjali Woolens**
- **Giotex - Recycled cotton**
- **Hilaturas Ferre - Recover®**
- Saentis - RCO100

### Virgin Natural Fibers ([download](#))

- **Circular Systems - Agraloop™**
- Flocus™
- **Himalayan Wild Fibers - Himalaya™**
- **Spinnova**

## OTHER

### Fiber Blend Recycling ([download](#))

- **Blocktexp - S.O.F.T.™ Polyester Pellets**
- **Circular Systems - Orbital™**
- **Circular Systems - Texloop™**
- **Hilaturas Ferre - Recover®**
- **Infinited Fiber**
- Tyton Biosciences

### Leather and Fur Alternatives ([download](#))

- Adriano Di Marti - Desserto
- **Bolt Threads - Mylo™**
- China Green Plastic - Blue RenTec
- **Ecopel - KOBA®**
- **Natural Fiber Welding - Mirum™**
- **Sustainable Composites - enspire leather®**
- Ultrafabrics - Ultraleather® Volar Bio
- VitroLabs - Calf Leather

### Manmade Protein Fibers ([download](#))

- **Spiber - Brewed Protein™**

# Methodology & Disclaimer

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# Methodology & Disclaimer

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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, as well as 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 intention of the report 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.

## 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, or 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. 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) Organic cotton data

For a detailed description of the methodology behind the organic cotton production volumes, please see our Organic Cotton Market Report.

### c) 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.

### d) Definition of fiber

Fiber includes staple fiber and filament. All numbers reported on manmade cellulose and synthetics include staple fiber and filament production volumes.

### e) Reporting period

The report focuses on the calendar year 2019 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. Most reports allocate the ICAC year which starts in a calendar year to the respective calendar year (e.g. 2019/20 cotton production volumes to the 2019 calendar year). Textile Exchange has decided to follow this approach for the global production volume trend figures. When it comes to the breakdown of

preferred cotton options, however, this report covers the 2018/19 figures as these are the latest available data.

## 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.

## 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, their press releases or websites. They cover the time of the reporting period up to the launch of the report.

**\*For methodological changes, data revisions, and comparison to previous years, please see the [next page](#).**

# Methodology & Disclaimer

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## 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 2019 to 2020 report

The following methodological changes were applied in the 2020 version:

- Updated ICAC cotton statistics were applied, including revision of the data of a couple of previous years.
- ICAC cotton harvest year to calendar year allocation was adjusted. As an ICAC cotton harvest year (from August 1st to July 31st) includes two half calendar years, the allocation of the global cotton production, collected by ICAC harvest year, to the global fiber volumes, collected by calendar year, can be done in two ways: the ICAC year can be allocated to the calendar year that ends in the respective ICAC harvest year or to the calendar year that starts in the ICAC harvest year (e.g., 2018/19 ICAC cotton data can be allocated to the 2018 or the 2019 calendar year). While we used to allocate, for example, the 2018/19 ICAC harvest year to the 2018 calendar year, we decided to reallocate it to the 2019 calendar year. The main reason is that this allows us to compile the global preferred fiber market share including preferred cotton share at the earliest possible date (e.g., for the 2019 calendar year including 2018/19 ICAC year cotton data in spring/summer 2020).

- Fairtrade cotton data which are collected by calendar year were reallocated to the ICAC harvest year. While initially the Fairtrade cotton data, collected by calendar year, were allocated to the ICAC harvest year that ends in this calendar year (e.g. 2019 calendar year data to 2018/19 ICAC harvest year), we decided to reallocate them to the calendar year that starts in this calendar year (e.g., 2019 data to the 2019/20 ICAC harvest year). Main reasons were that the majority of the Fairtrade cotton falls under the respective calendar year and that it allows us to report the total preferred cotton volumes earlier (e.g. 2018/19 ICAC year data in spring/summer 2020).
- Updated FAO statistics for other plant-based fibers were applied.
- Updated figures for the production volume of recycled polyester were applied.
- The latest figures for the number of certified sites per standard were applied, including updates for previous years.

This means that the following data reported in the 2020 report slightly differ compared to previous versions:

- global fiber production volume.
- preferred cotton production volume.
- global plant-based fiber production volume.
- global recycled polyester production volume.
- number of certified sites for several standards.

## Acknowledgements

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## Report Production Team

Sophia Opperskalski

SuetYin Siew

Evonne Tan

Liesl Truscott

**With Support From**

Lisa Barsley

Terry Hyde

Prema Pandey

Simone Seisl

Liesl Truscott

**Designed by**

Phil Bettany



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