



# Sustainable Material Guide // 05 Viscose

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Credit: Minh Tri, Unsplash

# Viscose

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## Material Properties

Man-made Fibre – Artificial Fibre



Soft



A silky bright fibre



50% weaker when wet



Absorbent



Good colour retention

## Introducing Viscose



Viscose is a regenerated cellulose fibre that is the earliest man-made semi-synthetic cellulosic fibre and was first commercially available in 1905. Viscose is sometimes referred to as rayon, though it is a merely a type of rayon; the other types being modal, lyocell and cupro, each differing from each other based on manufacturing process and properties of the fabric. Viscose was first marketed as artificial silk that is cheaper and more durable and is currently the third most commonly used textile fibre globally.<sup>1</sup>

Viscose most commonly comes from hardwood forests, and more specifically from fast growing regenerative trees such as eucalyptus, beech, pine, bamboo, soy, sugarcane, and from cotton linters. Although harvesting methods vary drastically depending on the type of trees and the location of harvest, most trees are harvested where they are grown and then peeled and cut into logs. The cellulose is then transformed into dissolving wood pulp and sold to producers for either filament or fibre production.

<sup>1</sup> Textile Today



# The viscose production process

# 1

## Wood Harvesting

Trees are cut down, stripped of bark and turned into wood chips. Logs are debarked, either wet or dry and this bark may be burned or used for biofuel. Indonesia, Canada and Brazil are the main countries that are logged for raw material. It is estimated that more than 150 million trees are cut down every year for viscose production.



# 2

## Pulp

At the pulp mill, wood chips are turned into a brown pulp after being cooked with sodium hydroxide, sodium sulfide and sulfur dioxide and then bleached to clean. Turning the wood into pulp wastes approximately 70% of the tree.<sup>1</sup>



# 3

## Dissolving

The pulp then goes through a purification process. The wood pulp is mixed with caustic soda and processed with sodium hydroxide and carbon disulphide.



<sup>1</sup>. Canopy



## 4 Filaments

The pulp is then put into a sulphuric acid bath to dissolve and eventually solidify the pulp. The solidified viscose solution can then be put through a spinneret to create a new regenerated cellulose filament.



## Yarn 5

Finally the filaments are spun into yarn which can then be woven or knit into a viscose textile and be used as a fabric.



*According to Canopy, 150 million trees are annually logged which is equal to 4,800 football pitches*



# Key facts

## Brazil

Lenzing and the Brazilian company Duratex are advancing the construction of a 450,000-ton dissolving wood pulp plant in the state of Minas Gerais (Brazil). Lenzing invested EUR 60 mn, increasing the production capacity for dissolving wood pulp to 320,000 tons per year.<sup>1</sup>

## China & India

When it comes to viscose production, China is the largest producer, accounting for 62% of global production in 2012. Both China and India are among the world's largest wood pulp dissolving producers.<sup>2</sup>

## USA

USA is the world's largest producer of wood for pulp production, the world's largest dissolving wood pulp producer and the world's second largest dissolving wood pulp exporter.<sup>2</sup>

## Indonesia

Indonesia has one of the highest rates of deforestation globally. Even though it is not amongst the largest roundwood exporters or importers, it is one of the largest wood for pulp producers.

1. Lenzing

2. Water Footprint Network



# The environmental impact of viscose

Current methods and volumes of production of viscose are known to have a negative impact on workers, local communities and the local ecology. According to The 2017 Textile Exchange Preferred Fibre and Materials Report, viscose made 91% of cellulosic production, but only 29% of this was sustainably sourced. To keep up with the demand of fast fashion, manufacturing is often done using cheap energy, enormous amounts of water and chemically intensive processes, which have serious consequences.

The production of viscose uses copious amounts of water to irrigate the trees and in the production, bleaching, and dyeing processes. Although viscose comes from renewable fast growing trees, a majority of the raw pulp still comes from unsustainable and endangered ancient

forests. While trees are renewable, forests are not. As a material viscose has the potential to be less environmentally detrimental than conventional cotton or polyester if harvested and processed carefully. The key sustainability issues with viscose production lie in:

## 1 / Harvesting and Wood Production

Harvesting of the raw material can have an adverse impact on local ecosystems, contaminates water systems, and degrades soil quality. Viscose is currently a significant contributor to the deforestation of the world's ancient forests, and because forests store CO<sub>2</sub>, it has a knock on effect on climate change. Viscose has been widely



Credit: Lenzing

associated with illegal logging, habitat and species extinction, and disregard for aboriginal rights.

## 2 / Pulp Production

Historically chemical pulp mills have greatly contributed to air pollution, and affected the health of factory workers. With recent technological advances and the involvement of environmental control authorities, there has been a reduction in sulphur air emissions and chlorine bleaching. While chemical and nutrient discharge is still a challenge within pulp production, restrictions are dependent on processes within individual mills that are making a lot of progress. However the issues remain critical to address.

## 3 / Fibre Production

Processing and treatment facilities in developing countries where most viscose rayon is processed tend to not have adequate waste-treatment regulations and disposal equipment, resulting in chemicals seeping into waterways, having a devastating impact especially on local fishing industries and communities, and contributing to higher rates of cancer, heart disease and strokes.

## Lenzing TENCEL

In lyocell or modal. FSC/PEFC/  
EU Ecolabel certified



## Refibra

Upcycling waste fabrics with wood  
pulp into virgin TENCEL fibres.



## SeaCell

Made from harvesting  
seaweed using the lyocell  
Process.



## Birla Livaeco

Ensures minimal impact through careful  
processing and sourcing only from  
sustainable plantations. FSC, SFI and  
PEFC certified, and works with Canopy.



## Re:newcell

Closing the loop through recycling  
technology to transform cellulosic  
waste into pure circulose pulp.



## Lenzing EcoVero

50% less emissions and energy use  
compared to normal production. Nearly all  
chemicals are recovered and reused, and  
bleaching is 100% chlorine free.



## Orange Fiber

Cellulosic fibre made  
from waste citrus juice  
by-product.



## Evrnu

Extending the lifecycle of textiles by  
transforming discarded textile 'waste'  
into new fibres.



# Alternatives to Viscose



# Designing a collection with viscose?

*Here are 4 aspects to consider.*



Credit: Allbirds



## 1 / Raw material

Ensure responsible sourcing of raw materials from certified and sustainably managed forests. Avoid fibre sourcing that comes from ancient or endangered forests. 30% of viscose used in fashion is sourced from endangered or ancient forests.<sup>1</sup>



## 2 / Transparency

Consider fibre and spinning location to reduce air emissions when shipping fibres. A majority of the pulp is transported to other countries such as China and India to be processed into viscose and rayon. This can create difficulty tracing back along the supply chain as the country of origin does not always coincide with the country where the material is produced and milled.



## 3 / Closed-Looped Process

Re:newcell supplies 7,000 tons of renewed circulose pulp to the textile industry every year through converting 'waste' fibres and reducing the amount of new chemicals being used within production cycles. The TENCEL Lyocell's solvent-spinning process recycles process water and reuses the solvent at a recovery rate of more than 99%.



## 4 / Disposal

Viscose rayon is technically biodegradable in the ground, however current landfill conditions and its chemical processing means that it is unable to naturally degrade as it releases toxic chemicals into the ground. Rayon has the potential to be recycled; it very rarely is, and tends to end up in landfill more often than not.

<sup>1</sup>. Canopy,

# Key Certifications and Organizations



## FSC

Certifies any product made from responsibly managed forests and/or recycled sources, using their well-known tree-tick logo.



## PEFC

Offers both sustainable forest management certification as well as chain of custody certification (for products containing forest-based material).



## CANOPY

Not-for-profit focusing on protecting ancient and endangered forests while working with viscose suppliers to improve sustainable sourcing.



## OEKO-TEX STANDARD 100

A certification system for raw to finished textile products at all processing levels and focuses on testing for toxic chemicals.



## EU ECOLABEL

A label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle.



## USDA CERTIFIED BIOBASED PRODUCTS

Displays a product's biobased content, which is the portion of a product that comes from a renewable source.

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