

The ultimate materials guide for sustainable fashion businesses

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“Two thirds of the impact of a product depends on its raw materials. From plant based fibers to synthetic polymers, the fashion industry has a wide range of possibilities when it comes to developing its articles. The processes these materials go through to become final products are what determine their impact. It’s essential for fashion businesses to have a better understanding of the consequences of choosing a specific material”

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Context

The raw materials stage includes extracting raw plant material, synthetic polymer, natural or animal polymer and energy inputs from the environment including pre-production transport. The next steps will be challenging as there are few alternative and scalable material solutions. Investing time and resources in the right choice of sustainable raw materials is paramount.

Classification of raw materials



Silk

Silk is a fiber that comes from cocoons created by silkworms. 95% of the silk comes from thread produced by the Bombyx Mori worm. The process of producing silkworm buds is called sericulture.

Impacts

- Silk is a natural, biodegradable fiber with a medium impact risk in its cultivation but a high impact risk in its spinning process.
- The early phases of silk filament have a significant impact on the use of water, energy and chemicals.
- Important ethical issues surround the mistreatment of larvae during the silk spinning process whereby cocoons with caterpillars inside are placed in boiling water to drown them and keep the cocoon intact.

Recommendations

- Ensure the source of the fiber.
- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for agricultural workers.
- Use water and renewable energies efficiently and responsibly in the cultivation phase and in filament processes.
- Promote organic or fair-trade production where cultivation takes place without synthetic chemicals, water use is reduced, and social conditions are well managed. This means that mulberry cultivation has been done according to organic standards and the sericulture process avoids the use of any synthetic chemicals or growth hormones.
- Choose "Peace Silk", organic and obtained without sacrificing silkworms for it.

Wool

Wool is a fabric made from sheep and goat hair. Australia, New Zealand, South America and South Africa are the highest quality producers. Cashmere and goat mohair, rabbit angora and alpaca are other sources of raw material made from animal hair.

Impacts

- While conventional hair is a renewable resource with a low impact risk, it's not necessarily ethical or respectful.
- Environmental impacts of the agricultural system include land conversion from natural ecosystems, overgrazing, land degradation, deterioration of fertility and biodiversity, climate change and intensive water use, chemical treatment to combat pesticides and parasites, and the use of antibiotics.
- Flatulence and GHG generation (methane). Methane is a potent GHG with global warming potential 25 times more potent than CO₂.
- Mulesing: Mutilation of portions of skin in the anus area, to remove folds where faeces accumulate and attract flies.

Recommendations

- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for farmers and workers.
- Ensure the origin of the fibre and guarantee its traceability to ensure animal welfare practices.
- Promote the ecological sustainability of livestock production methods.
- Support the production of wool that doesn't degrade natural ecosystems.
- Ensure high standards of animal welfare and commit to it.
- Use recycled / regenerated wool where possible.
- Promote fair trade organic and certified production where the agricultural system guarantees responsible antibiotic use, limits the number of sheep by vegetation, limits the use of synthetic chemicals and the use of water is reduced.

Leather

Leather refers to the skin of an animal that has been cured by transforming its collagen proteins into suitable material for use. Most skin materials come from cattle and pigs, lamb and deer, exotic reptiles or ostriches.

Impacts

- The natural origin of leather skin has low environmental impact however the industrialization of skin production and its transformation (cleaning, tanning and dyeing processes) carries high environmental and social risks.
- Fur production shares the negative impacts linked to livestock production of fur.
- In terms of transformation processes, we highlight the toxic and social impact of tanning, which can be vegetable tanned or chrome tanned.
- The ethical consequences of leather production are a source of debate: Animal abuse, suffering, or risk of extinction.

Recommendations

- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for farmers and workers.
- Ensure the origin of the fiber and guarantee its traceability to ensure animal welfare practices.
- Promote the ecological sustainability of livestock production methods and the production of leather that doesn't degrade natural ecosystems.
- Ensure high standards of animal welfare and commit to it.
- Replace leather with vegan leather and promote vegetable tanning.
- Promote fair trade organic and certified production where the agricultural system guarantees responsible antibiotic use, limits the number of sheep by vegetation, limits the use of synthetic chemicals and the use of water is reduced.

Seed

Fibre from seeds, cotton being the most versatile and widely used of all fibers, is the only seed fibre used in the industry. It is grown in about 80 countries and represents 36.5% of the demand. A very small proportion of cotton production (less than 1%) is truly sustainable.

Impacts

- Intensive use of pesticides, fertilizers and water.
- Degradation of fertility, pollution of aquifers and damage to biodiversity.
- Impacts on the ecosystem and farmer health due to the use of synthetic chemicals.
- Social risk arising from price speculation and cost pressure.
- Risk of forced and child labor in cotton cultivation.

Recommendations

- Ensure the source of the fiber.
- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for agricultural workers.
- Veto countries at high risk of child labor: Uzbekistan, Syria, Turkmenistan.
- Promote organic or fair trade production where cultivation takes place without synthetic chemicals, soil fertility and biodiversity are conserved, water use is reduced, and social conditions are well managed by promoting healthy rural communities.
- Mix recycled cotton, pre- or post-consumer, for final materials.

Bast

Bast fibers are derived from plant fibers from the stem or bark of a plant. We highlight hemp, flax, ramie, jute and nettle, among which hemp stands out as a low-impact fiber. In general, they are medium or low environmental impact fibers, biodegradable and adaptable to the environment.

Impacts

- The spinning process is complex: The fibers are found in the inner layer of the crust (phloem), which is found between the woody nucleus (xylem) and the outermost layer (epidermis). Phloem fibers must be separated from the xylem and epidermis in order to proceed with the weaving process.
- Finishing processes are of high risk.
- Rough fibers that are mixed with other synthetic fibers or treated with chemicals.
- Hard fibers, tough to the touch, requiring chemical-intensive softening and finishing processes.

Recommendations

- Ensure the source of the fiber.
- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for agricultural workers.
- Understand the material's own characteristic, hardness, robustness and naturalness, and avoid high environmental risk finishes.
- Promote organic or fair trade production where cultivation takes place without synthetic chemicals, soil fertility and biodiversity are conserved, water use is reduced, and social conditions are well managed by promoting healthy rural communities.

Cellulose

Artificial cellulosic fibers come from forest sources. They include viscose or rayon, lyocell, modal, acetate and other trademarks of these fibers. Fiber is generated by the extraction of chemically treated cellulose until it is dissolved and then spun.

Impacts

- Wood pulp can come from endangered forests that contribute to the risk of deforestation.
- Risk of destructive forest practices such as illegal logging, conversion of natural forests to other land uses, civil rights violations and genetic modification of forest species standards.
- The chemicals needed to dissolve the pulp and obtain a filament are of high risk.
- Globally it is an energy intensive process and requires large amounts of water.

Recommendations

- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for workers.
- Knowing the origin of the fiber and ensuring its supply chain and sustainable management of raw materials.
- Secure fibers from certified, sustainably managed forests through FSC (forest management certification).
- Ensure that chemicals in the filament process do not have negative impacts on the environment or health.
- Encourage a closed-loop chemical management system and encourage renewable energies in the production process.
- Replace viscose with tencel, lyocell or modal which guarantee the origin of fibers as well as the efficient use of water and chemicals.

Conventional synthetics such as nylon, acrylic, polyester and elastane are produced using petroleum by-products and/or natural gas. The synthetic yarn manufacturing process includes chemical polymerization, drying and liquefaction prior to a fusion spinning process.

Impacts

- The use of fossil fuels as raw material (a non-renewable resource).
- The amount of carbon emissions released during production.
- The use of chemicals, energy and water.
- Microplastics generated in its useful life and the non-biodegradability of the material itself.

Recommendations

- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for workers.
- Know the source of the fiber and ensure its supply chain.
- Minimize hazardous chemicals in production and wastewater.
- Encourage a closed-loop chemical management system and encourage renewable energies in the production process.
- Address the end-of-life of synthetic fibers and focus on the use of pre- and post-consumer recycled synthetic fibers.
- Use of bio-derived raw material to avoid dependence on raw material from virgin fossil fuels.

Synthetic bio fibers are derived from natural and renewable raw materials, including sugars, starches and lipids. Starch (glucose) is extracted from plants and converted into dextrose by adding enzymes. This is fermented by microorganisms in lactic acid, which in turn becomes polylactide.

Impacts

- There is much discussion about how much CO₂, fossil fuels and water are consumed in the production of bioplastics.
- Biodegradable' and compostable with limits.

Recommendations

- Comply with applicable laws, conventions and regulations.
- Ensure high labor standards and working conditions for workers.
- Know the source of the fiber and ensure its supply chain.
- Minimize hazardous chemicals in production and wastewater.
- Encourage a closed-loop chemical management system and encourage renewable energies in the production process.
- Address the end of life of synthetic fibers.

Investing in sustainable raw materials as a key to change

7 key points for good management in the extraction of raw materials:

- Invest in more efficient raw materials.
- Invest in raw materials that consume fewer resources.
- Choose recycled or organic materials.
- choose less aggressive chemicals with the medium.
- Work suppliers that are aligned on the same strategy.
- Develop ecosystem projects in a sustainable key.
- Bet on collaborative research.

Organic materials

Organic cotton

Cultivation takes place without synthetic chemicals or transgenic seeds, soil biodiversity is conserved, water use is reduced, and social conditions are well managed by promoting healthy rural communities. BCI as an alternative to organic cotton. Reduces the impact of water and pesticide use; improves soil biodiversity; protects working conditions and ensures traceability.

European flax

Resistant fiber, without genetically modified seeds, it is grown with little water and does not require the use of pesticides or nitrogen fertilization.

Organic wool, organic leather

It comes from chemical-free organic pastures. The amount of antibiotics fed to sheep is limited and the number of sheep is limited.

Ethical and safe materials

Peace silk

Allows the silkworm to naturally hatch its from cocoon and the cocoons to open so that the silkworm can emerge before the fiber is processed. Sourcing tip: Cocoon

Mulesing free

Wool extracted from sheep that have not been subjected to the mutilation anus skin to remove the folds where remains of feces that attract these flies accumulate. Sourcing tip: Botto Giuseppe

Responsible wool

Wool extracted from sheep that are raised ethically under the principles of animal welfare and ecologically responsible.

Sourcing tip: Incalpaca.

Sustainable forest materials

Tencel lyocell®

Tencel fiber made from certified wood from sustainably managed forests. The conversion from cellulose to fiber is done through a closed cycle process. Sourcing tip: Lenzing group

Ecovero®

Ecological viscose fiber made from FSC renewable sources of wood. It generates 50% less emissions and less water use compared to conventional viscose. Sourcing tip: Lenzing group

Refibra®

Fiber made from recycled cotton, wood pulp and clothing waste, and mixed with Tencel lyocell® combines both the benefits of recycling and closed-loop technology. Sourcing tip: Lenzing group

Recycled materials

Recycled polyester

Obtained from recycled sources: Post-consumption and pre-consumption. There is no need for oil extraction that leads to lower energy use and decreases CO2 emission. Sourcing tip: Seaqual®, Recover.

Recycled polyamide

Obtained from recycled sources: Post-consumption and pre-consumption. There is no need for oil extraction that leads to lower energy use and decreases CO2 emission. Sourcing tip: Econyl®.

Recycled spandex

Obtained from recycled sources: Post-consumption and pre-consumption. There is no need for oil extraction that leads to lower energy use and decreases CO2 emission.

Recycled materials

Recycled cotton

It reduces the extraction of natural resources, favoring the conservation of the environment through the reduction in the consumption of water and energy associated with obtaining raw materials. Sourcing tip: Recover, Renewcell.

Recycled wool

Wool is recycled through a mechanical process; the resulting fiber is of poorer quality than the conventional process. Sourcing tip: Tesma Cashmere.

Recycled wood pulp

Obtained from recycled cellulosic sources: 100% broken down post-industrial or post-consumer textiles. Sourcing tip: Circulose® by Renewcell.

The new quarry of natives

Hemp and nettles

Versatile, durable and tough fibers. Fast growing plants that require less water and herbicides, pesticides and fertilizers than cotton.

Lotus

Sophisticated fiber with a silk and linen-like look. Stain resistant, light and breathable. Good alternative to peaceful silk.

Bamboo linen

Breathable, anti-allergic and anti-odor fiber. Bamboo plantations do not need fertilizers or pesticides, thanks to kundu bamboo, which protects them from pests. It has the capacity to recover eroded soils and helps to reduce GHG.

The new quarry of natives

Soybeans

Soft, versatile fiber similar to cotton fiber. Often nicknamed "vegan cashmere", soy fiber is made from the waste of the tofu and soybean processing industries. Sourcing tip: Swicofil

Banana

Soy fiber is made from banana stem. Fiber quality can range from rough fiber to soft, shiny yarn that is very similar to silk.

Sourcing tip: Bananatex®.

Milk

Antibacterial and thermal fiber produced from casein in milk.

Sourcing tip: Qmilk®

Biomaterials R&D

Biomaterials of recycled food and plant waste

Obtained from food crop plant residues to create sustainable bio-textiles in order to transform biological industrial waste into a new raw material. Widely used in vegan leather. Sourcing tip: Agralooop, Orange fiber®, Frutmap®, Cactus leather, Vegea®.

Regenerative

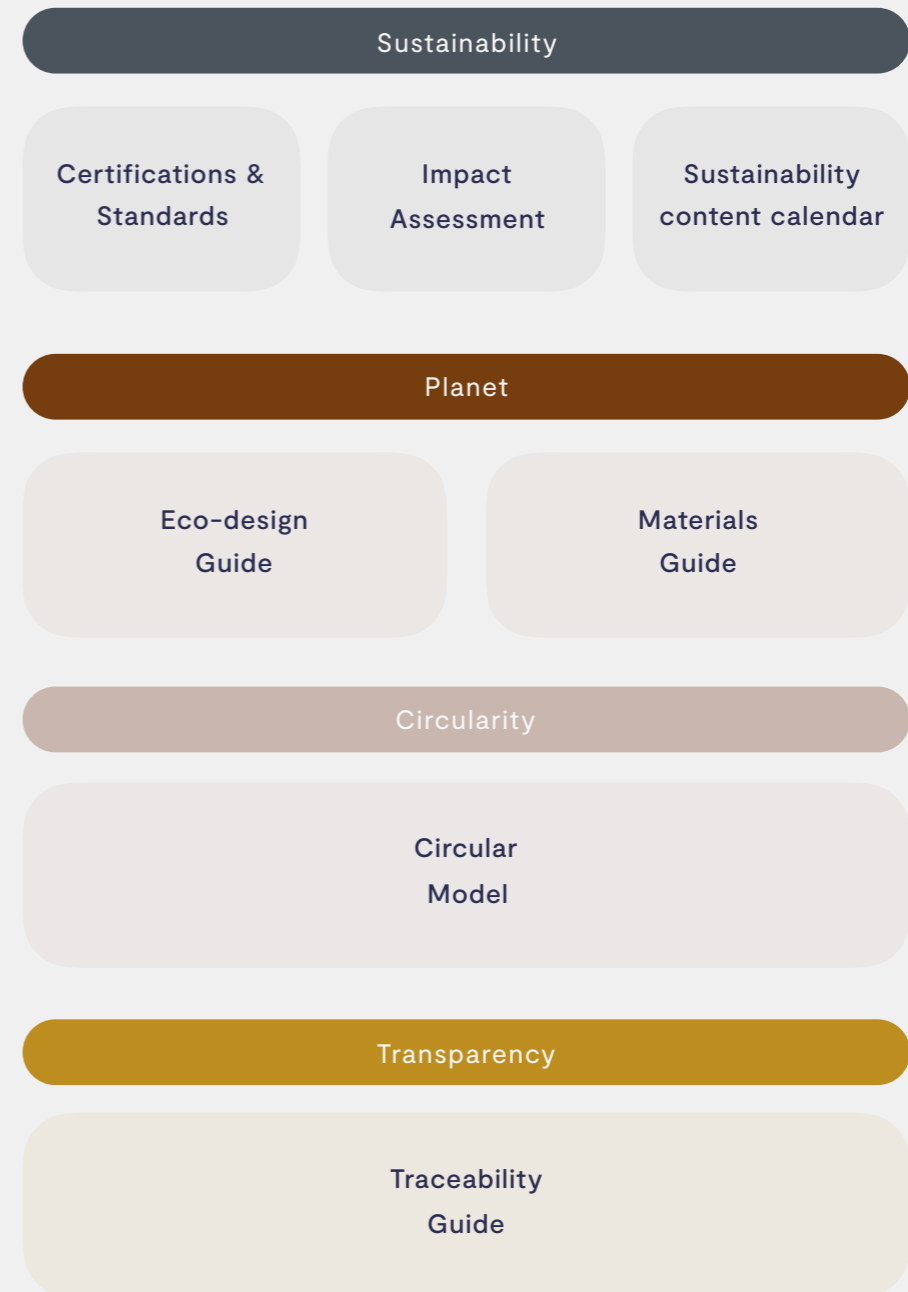
Fiber made from regenerative and infinitely renewable raw materials such as fungi or kombucha. Widely used in vegan leather. Sourcing tip: Alginit, Mylo.

Bioelastomers

An alternative to traditional elastomer that requires less energy expenditure, reduces emissions and uses renewable natural resources, rather than petroleum derivatives. Sourcing tip: Sorona® , Coreva®.

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