

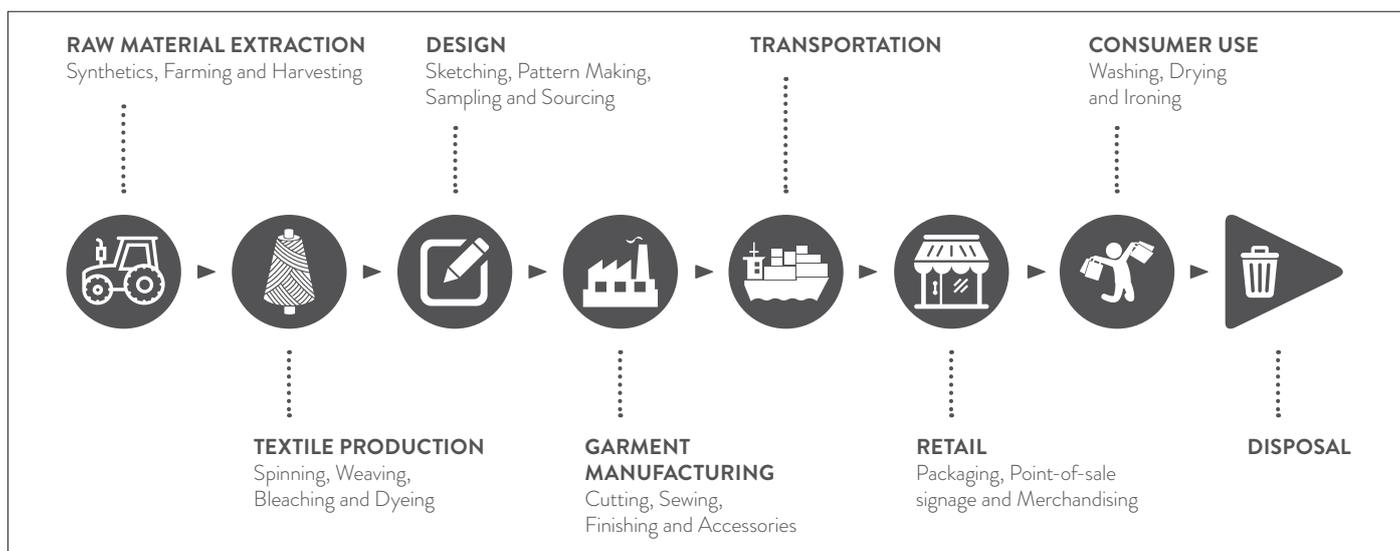


# SUSTAINABILITY IN FIBRES

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CREATED BY REDRESS

# WHY SHOULD I LEARN ABOUT SUSTAINABILITY IN FIBRES?



*A garment lifecycle: cradle-to-grave design*

From raw materials to disposal, there is an environmental impact at each stage based on the type of fibre(s) used in the fabric of clothing. Each stage uses energy and natural resources and can generate pollution including greenhouse gas emissions and the release of toxic chemicals into waterways. It is important to note that there is no one 'perfect' fibre, but through the choices you make you have the power to select fibres that have a significantly reduced negative impact on the environment.



*A garment lifecycle: cradle-to-cradle design*

As a professional working in the fashion industry, you will need to understand the transformation from the linear model to a circular model - where fibres play a key role in diverting textiles from disposal back into the system through recycling, up-cycling and other innovative methods. This knowledge will be key because the industry is facing growing environmental challenges and the landscape of fashion professions is continually evolving, so whether you have plans to start your own brand or work within an established fashion brand, building your knowledge will give you an edge over others.

## EXPERT'S TIP

— Bojana Drača, Designer of Farrah Floyd —

“I think the most important thing for a designer who is trying to run a sustainable fashion brand is to know that almost nothing is entirely sustainable. By summarising all the available information and making a choice that reduces impact on people and environment, then we know we are doing something good. Every case is different, every fibre is different, plus it can be more or less sustainable depending on the perspective we are looking from.”



Image credit: Farrah Floyd

Bojana Drača's sustainable brand, Farrah Floyd, focuses on zero-waste designs made using sustainable textiles.

# FIBRE CATEGORISATION

Understanding fibres is the first step toward understanding circular models in fashion. The categorisation of natural and man-made fibres includes:

## NATURAL FIBRES



**PLANT-BASED** (Also known as cellulose-based)  
These are fibres that are harvested from plants. Examples of plant-based fibres are cotton, linen, hemp and jute.



**ANIMAL-BASED** (Also known as protein-based)  
These are fibres that come from animal coats, or products produced by animals. Examples of these include wool, silk and down.

## MAN-MADE FIBRES



**REGENERATED CELLULOSE**  
Fibres made from wood and plant-based fibres which are processed with chemicals to soften them for use. Examples include viscose, modal, lyocell, cupro and acetate (modified).



**SYNTHETIC**  
Fibre made from oil-based polymers. Examples include polyester, nylon, acrylic, polypropylene and spandex.

In order to build your understanding of the complex environmental impacts of fibres it is useful to start with the most commonly used fibres of cotton and polyester.

Within natural fibres cotton reigns top, making it the second most commonly used fibre in the world representing 22% of the total fibre market.<sup>1</sup> In 2017 85% of the world’s cotton was classified as ‘conventional’,<sup>2</sup> which means that the production does not take the environmental impacts into consideration.<sup>3</sup> As with many fibres conventional cotton has both positive and negative attributes when it comes to the environmental impacts. Below you can explore a few examples of this fibre’s impacts.

FIBRE PRODUCTION STAGE	 POSITIVE ENVIRONMENTAL ASPECTS	 NEGATIVE ENVIRONMENTAL ASPECTS
 <b>RAW MATERIALS</b>		<p><b>WATER</b>   Cotton relies on vast amounts of water. The average water footprint for just 1kg of cotton (equivalent to a single T-shirt and pair of jeans) is 10,000–20,000 litres.<sup>4</sup></p> <p><b>CHEMICALS</b>   Each year, cotton production requires an estimated 200,000 tonnes of pesticides and 8 million tonnes of fertilisers.<sup>5</sup></p>
 <b>YARN PRODUCTION</b>	<p><b>LONG STAPLE</b>   Cotton grows with a long fibre length (called long staple). When used in fabric it can contribute to the longevity of the garment as cotton fibres are strong.<sup>6</sup></p>	<p><b>ENERGY</b>   Due to the highly mechanised system, spinning fibres into yarn takes up 44% of the total energy consumption of cotton production.<sup>7</sup></p>
 <b>FABRIC MANUFACTURING</b>	<p><b>NO NEED FOR CHLORINE BLEACH</b>   Because of its light colour, cotton can be bleached (before dyeing) with relatively safe hydrogen peroxide.<sup>8</sup></p>	<p><b>WATER POLLUTION</b>   Fabric is treated with chemicals. Not all of these are hazardous, but some can contain heavy metals which if left untreated, can cause significant water pollution.<sup>9</sup></p>
 <b>CONSUMER USE</b>	<p><b>RESISTANCE TO INSECTS</b>   Common closet pests, moths and beetles, do not affect or damage cotton garments.<sup>10</sup></p>	<p><b>GREENHOUSE GAS EMISSIONS</b>   Traditionally, cotton is washed and dried at high temperatures, which creates higher emissions of greenhouse gases.</p>
 <b>END OF LIFE</b>	<p><b>CHEMICALLY RECYCLED</b>   It is possible for cotton to be recycled and turned into viscose or lyocell fibres due to its cellulose content.<sup>11</sup></p>	



# POLYESTER

Polyester is now the most commonly used fibre in the world and accounts for roughly half of the overall fibre market and around 64% of synthetic fibres.<sup>12</sup> Like conventional cotton, there are both positive and negative environmental impacts to consider when selecting virgin polyester for use in your designs.

FIBRE PRODUCTION STAGE	 POSITIVE ENVIRONMENTAL ASPECTS	 NEGATIVE ENVIRONMENTAL ASPECTS
 <p>RAW MATERIALS</p>	<p><b>WATER</b>   To produce 1kg of polyester, it takes little to no water.<sup>13</sup></p>	<p><b>NON-RENEWABLE RESOURCE</b>   Virgin polyester is derived from petroleum, which takes millions of years to form.<sup>14</sup></p>
 <p>YARN PRODUCTION</p>		<p><b>HEAVY METALS</b>   Production of fibre and yarns uses heavy metals, specifically antimony which is a known carcinogen.<sup>15</sup></p>
 <p>FABRIC MANUFACTURING</p>	<p><b>ENERGY SAVING DYE METHODS</b>   Many methods reduce the amount of water and energy used, including electrochemical dyeing, which re-uses dyebath, as well as non-aqueous systems which use carbon dioxide or ionic liquids instead of water.<sup>16</sup></p>	<p><b>ENERGY THIRSTY</b>   It takes twice the amount of energy to produce 1kg of polyester when compared to 1kg of cotton.<sup>17</sup></p>
 <p>CONSUMER USE</p>	<p><b>REDUCED ENERGY USE</b>   The low absorbency quality of polyester fibre means that it is quick drying, saving the need to use a dryer.</p>	<p><b>MICROFIBRES</b>   When washing polyester (or any synthetic fabric), microfibrils can shed and enter the water ecosystems and eventually the food chain. Current research is focusing on defining the long-term negative effects on the environment and human health.<sup>18</sup></p>
 <p>END OF LIFE</p>	<p><b>CHEMICAL RECYCLING</b>   This process (which involves additives) can produce virgin quality polyester from polyester in pure form.<sup>19</sup></p>	<p><b>SLOW TO DECOMPOSE</b>   Polyester, a petroleum-based fibre, can take up to 200 years to decay, which is significantly longer in comparison to natural fibres.<sup>20</sup></p>

## **BLENDED YARNS**

An important consideration regarding the overall environmental impact of a fibre is whether or not it is incorporated into blended yarns. These are created by combining fibres from different sources to produce yarn for fabrics. Blending fibres is common practice as it enables manufacturers to add durability, functionality and a variety of fibre finishes to garments.<sup>21</sup>

The negative aspect of selecting fibre blends is that they require the chemical separation of fibres before they can be recycled - a process which is still very much in development and is not yet commercially viable. Mechanical recycling is the most prolific form of recycling but it weakens fibres, so in order to be re-used for a quality product these recycled fibres need to be blended with virgin fibres.<sup>22</sup> Due to limitations in recycling, circularity in fibres is currently limited and more often than not, blended fibres end up in industrial products like furniture fillings, carpet pads and insulation, or are sent to landfill to join the 92 million tonnes of textile waste that is created annually by the industry.



# HOW CAN I MAKE BETTER DECISIONS DURING FIBRE SELECTION?

With a growing consensus on the economic and environmental benefits of moving to a circular fashion system, significant progress and innovation is being made on a range of issues across the supply chain. As a designer, it can feel like an overwhelming task to make an informed choice to select more 'sustainable' fibres that will reduce your impact, but you have tremendous power! Read on for ideas to help guide you in selecting alternative fibres and for innovative solutions in the circular design process.

## 1 RAW MATERIALS

There are many improvements taking place in conventional fibre production to reduce the environmental impacts. Additionally there is an increased recognition of the value of 'waste' from the textile and other industries for use as raw material, plus all sorts of cutting edge fibres made from new sources, such as food waste which can biodegrade at the end of their life - another example of circularity. Trade shows are a great starting place to explore the best fibre options for your designs. Try The Sustainable Angle, which showcases innovative alternatives to conventional fibres, of which there are a growing number on the market.



Image credit: Bolt Threads

Bolt Threads, a US-based company, uses bioengineering to create Microsilk™, a protein fibre that is produced through the fermentation of genetically modified yeast, water and sugar. The fibre has the same molecular structure as spider silk with a tensile strength that is comparable to that of steel. The company partnered with Stella McCartney, who have used it as an ethical alternative to silk.



Image credit: Mara Hoffman

Lyocell is made from wood or plant pulp, and is both recyclable and biodegradable. Austrian fibre company, Lenzing<sup>#</sup>, produces TENCEL™ Lyocell, a fibre made from Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) certified wood. The production of TENCEL™ Lyocell uses solvents in a closed loop process during which more than 99% is recovered and reused. US-based fashion brand Mara Hoffman has made a commitment to only source fibres which are natural, recycled and renewable, and use TENCEL™ Lyocell in their collections.<sup>23</sup>

## 2 YARN PRODUCTION

The apparel industry alone represents 6.7% of global greenhouse gas (GHG) emissions (equivalent to about 3.3 billion metric tons of CO<sub>2</sub>-eq), 28% of which is produced by the spinning of yarn from filament and staple fibre. There are a growing number of alternative yarn options that have been created with consideration for the environmental impact at the forefront.<sup>24</sup>



Image credit: Wolford

ROICA™ V550 is a sustainable alternative to conventional elastane yarn and is made with less water, scouring agent, energy and oil content.<sup>25</sup> Austrian lingerie brand Wolford is developing a line of lingerie using ROICA™ V550 elastic which decomposes without releasing harmful substances at the end of use.<sup>26</sup>



Image credit: Arket

Organic wool is an alternative to the standard practice of wool farming which uses chemicals on sheep and wool during farming and/or fibre processing. To achieve certification as organic wool, the product must meet the criteria of individual certifying bodies, such as the Global Organic Textile Standard (GOTS). Arket, an H&M owned brand, uses organic wool in their knitwear collections.

# 3 FABRIC AND GARMENT MANUFACTURING

A large amount of textile waste occurs during the manufacturing stage, averaging at 25% of the fabrics and fibres used in production, but this figure can reach as high as 47%.<sup>27</sup>

In addition, the chemicals used in dyeing, printing and finishing fabric and garments can also have significant negative environmental impacts. According to Hu Kehua, Deputy Director of the CSR office of the China National Textile and Apparel Council (CNTAC), only 26.9% of water in dyeing & finishing is recycled in China.<sup>28</sup>

A growing number of brands and manufacturers are taking the initiative to change methods of processing fabric and garments in order to decrease pollution. To support these efforts, governments (namely China), are tightening regulations in manufacturing regions to curb the current pollution levels. The challenge is to clean up existing pollution while maintaining manufacturing outputs and developing less polluting processes. Here are some examples of innovative processes that can be used in fabric and garment manufacturing:



Image credit: Levi's

*Levi Strauss & Co has invested in improving the environmental impact of garment manufacturing. A collaboration with Project F.L.X. (future-led execution) will change the finishing process of denim from hand detailing to automated laser in order to reduce chemical use.*



Image credit: Kowtow

*To ensure that fabric meets environmental regulations, designers can turn to certified fabrics, where independent third party testing is required. One example of this is the Global Organic Textile Standard (GOTS) which considers water and chemical usage throughout production stages.<sup>29</sup> Sustainable womenswear brand, Kowtow, is built on certifications and uses GOTS approved dyes and inks in fabrics and prints.*

# 4 CONSUMER USE

70% of the clothes we throw away are as a result of irreversible damage such as colour fading, stubborn stains or shrinking.<sup>30</sup>

The consumer plays a huge role in the environmental impact of a garment - in fact it has been found that extending the life of clothes by 9 months of active use reduces the carbon, water and waste footprints of the garment by 4-10%<sup>31</sup>. In this respect, not only should designers and brands be making sure that consumers are getting lower impact fibres in their clothes, but in addition there is great value in educating 'wearers' on how to care for different fibres, enabling them to keep their clothes in use for longer.

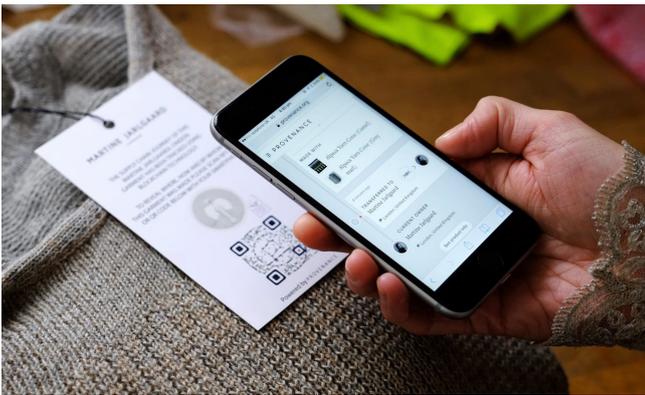


Image credit: Provenance

Provenance, a UK start-up, works with companies to build in a traceability system for garments throughout their creation using blockchain technology to make it easier for consumers to understand the often complex supply chains of the clothes they buy. Working with womenswear brand, Martine Jarlgaard, Provenance tracked each step of the journey from the gathering of raw materials to the finished garment, with information accessed by scanning a QR code or NFC tag (a chip with digital information) on the garment label.



Image credit: Guppy Friend for Patagonia

Each year, around half a million tonnes of plastic microfibres are released into the ocean due to the washing of garments made from synthetic fibres.<sup>32</sup> This is equivalent to more than 50 billion plastic bottles! Microfibre pollution disrupts marine biodiversity and affects our health as it enters our food chains via seafood. Alongside their synthetic items, Patagonia sells Guppy Friend, a fine mesh laundry bag that traps the microfibres inside during the washing process to prevent them from entering waterways.

## EXPERT'S TIP

— Dr. Christina Dean, CEO and Co-founder of The R Collective —

“Understanding the fibres in garments and how to care for them is essential for the wearer in order to ensure the piece both lasts and thrives. At The R Collective, we advise our customers to invest only in what they love and to be mindful of the methods and frequency of laundering. We feel it is important for designers and brands to provide information to customers to help them navigate the ever growing list of fibres we see on our labels. Giving specific information on how to care for different fibres goes above and beyond what most brands provide, with the instructions for delicate or new fibres often defaulting to ‘dry clean only’. It isn’t necessary to wash after one, two, or even three wears - and it’s difficult for consumers to break their habits unless the experts tell them! Beyond this, you can also provide information on alternatives to laundering such as spot cleaning or simply hanging to air outside to get rid of odours. Repair is also part of care. Let your customers know that you care about their clothes lasting longer and point your consumers in the right direction and they will be loyal!”

# 5 END-OF-LIFE

The acceleration of the fashion supply chain and changing consumer attitudes towards fashion as a disposable commodity has contributed to the exceedingly high levels of textile waste generated worldwide - which is an increasingly serious environmental threat. The vast majority of our clothing ends up in landfills or is incinerated, with only 20% of clothing destined for re-use or recycling globally.<sup>33</sup>

It is important for designers to take into account (and even better to take responsibility for) what will happen when clothes are disposed of, as there is a huge opportunity to reduce waste via a circular model for design, in which materials are designed to be re-used or recycled back into the system at the end of use.



Image credit: Redress

Kate Morris, Redress Design Award 2017 first prize winner, designed a bright and playful plant-based knitwear collection in which she incorporated recyclability. She chose a mono-material - 100% cotton fibre - and no trimmings on her entire collection. This ensured that the textiles could have easy entry back into garment production through recycling.



Image credit: HKRITA

The Hong Kong Research Institute of Textile and Apparel (HKRITA) is working on a four-year innovative Closed-Loop Apparel Recycling Eco-System Program which has developed ground-breaking solutions to separate and recycle blended textiles into new fabrics and yarns - without any quality loss - through a hydrothermal (chemical) process. There are plans for this technology to be made available to the global textile industry - just consider the potential financial value of shifting the entire fashion system!

## EXPERT'S TIP

— Clare Lissaman, Director, Product & Impact of Common Objective —

“Research and understand the environmental impact of different kinds of fibres through their usage - it may be that if you have to use a conventionally produced fabric you can ensure that you make it into a garment that can be easily recycled (for example, by making sure the garment is only one type of fibre). For sourcing more sustainable fibres, club together with other independent fashion labels so you can increase the minimum order of a fabric which will bring the price down - use the Common Objective platform ([commonobjective.co](http://commonobjective.co)) to find other designers or brands who may be interested in doing this.”

# CASE STUDY

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## ZEROBARRACENTO

*Zerobarracento is a womenswear brand founded by Milan-based designer, Camilla Carrara, who was a semi-finalist in the Redress Design Award 2015/16 cycle. The brand's core mission is to highlight traceability and transparency and the collections frequently feature zero-waste designs.*



Image credit: Zerobarracento

### **Why do you think it is important for fashion designers to understand fibres?**

Material knowledge is fundamental for fashion designers. One fibre, one specific yarn, one fabric can totally change the look and functionality of a garment.

### **What sustainable fibres have you been working with for Zerobarracento collections?**

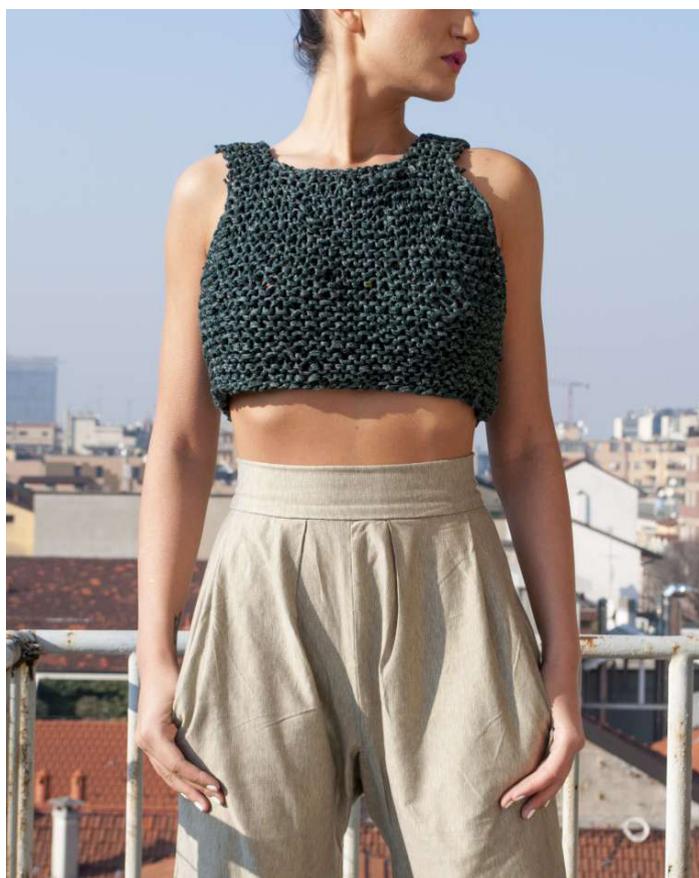
Basically my preference is always to use fibres that are less impactful, but that have high quality. I started my career in Italy, working with GreenFibre wool which is made from pre-industrial leftovers. I have also experimented with Newlife™ recycled polyester yarn, which is made from plastic bottles. The fibre manufacturing process for Newlife™ has been assessed by ICEA (Istituto per la Certificazione Etica ed Ambientale, an Italian authoritative body that certifies textiles based on ethical and environmental standards) and was found to save many resources compared to conventional polyester including 94% water, 60% energy and 32% carbon emissions which makes it very appealing to me. In addition it is also GRS certified by Textile Exchange and is certified by OEKO-TEX®.

**Do you have specific considerations for environmental protection during fabric sourcing?**

I do not specifically give more importance to one kind of environmental impact over another, but water is a really sensitive topic for me considering the current worldwide situation. Imagine if you could choose a cotton that saves up to 77.9% of water in comparison to conventional cotton!

When sourcing materials for my collections, I go deep into the understanding of their profile, looking at certifications and referring to the Life Cycle Assessment (LCA), which is an analysis of the impact of a material on the environment.

For example, I have worked with ECOTEC®, which is an Italian produced cotton by Marchi & Fildi. I selected it because it is made from cotton off cuts, and the production process is highly efficient in CO<sub>2</sub> emissions, the use of energy resources and water consumption.



**Are there any other fibres or fibre blends that you are interested to work with in the future?**

Yes - Re.Verso™ produced fibres. This is a process designed for re-engineering wool and cashmere and done here in Italy! The process, which takes industry offcuts to transform them into yarn, has huge savings in energy (-76%), water (-89%) and CO<sub>2</sub> emissions (-96%) than sourcing virgin materials - very appealing for a sustainable designer.

**Are there any website, programmes, or events you can recommend for designers starting out who want to find more sustainable fibres?**

I would definitely suggest C.L.A.S.S. (Creativity Lifestyle and Sustainable Synergy) platform ([www.classecohub.org](http://www.classecohub.org)). It's a unique multi-platform hub based in Milan specialising in integrating sustainable practices into fashion brands. Another interesting sourcing platform is Lebenskleidung ([www.lebenskleidung.com/en/](http://www.lebenskleidung.com/en/)). This is a German fabric store which sells organic certified fabrics directly online by the metre or yard – great for designers starting out and they also ship worldwide.

# CASE STUDY

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## ECOALF

Spanish apparel and accessory brand Ecoalf launched in 2009 when founder Javier Goyenche found himself frustrated with the amount natural resources that were used in a careless way. He took action to prove quality products can be made from recycled or regenerated materials without the wasteful output of most products on the market. Ecoalf's mission is to create the first generation of recycled products with the same quality and design as non-recycled products and they outline this in their motto: 'Because there is no planet B.'



Image credit: Ecoalf

### **Why does Ecoalf chose to use recycled polyester, nylon and cotton fibres over virgin materials?**

We choose to use recycled materials in our collections simply because the environmental impact is much lower than virgin materials.

### **Tell us about the 'Upcycling the Oceans' project?**

This is a project run by our non-profit organisation, The Ecoalf Foundation. Since 2015 we have been working to clean up the oceans of trash with the help of fishermen, who collect marine litter. We separate the waste found in the ocean, and any PET, including plastic bottles and fishing nets, are transformed into flakes and then yarn that is used to create fabrics and finally Ecoalf garments.

**That is an ambitious project! How much of the marine litter is then made into fabric for Ecoalf collections?**

At this moment, 100% of the PET recovered is converted into yarn.

**Considering many companies still use virgin over recycled fabrics, do you think this is due to the difference in cost?**

Recycled fabrics are more expensive, especially when made from the waste collected from the ocean, but at Ecoalf making better choices is part of our DNA so this is not a factor for us.

**Is there a difference in fabric quality?**

The final quality of yarn in our recycled fabrics is the same as conventional. Since the establishment of Ecoalf, we have worked hard to ensure the fabrics we use are of a very high quality, equal to or better than the conventional offerings, because our quality standards along with our sustainability standards are very high.



Image credit: Ecoalf



Image credit: Ecoalf

**Polyester and nylon are not biodegradable, what do you suggest your customers do with the products once they reach 'end of life'?**

Our garments are all of very good quality, so I believe the first responsibility of customers is to lengthen the useful life of the products they buy. Our collections are designed and made to be long lasting and timeless. Once the lifecycle is over, we suggest our customers deliver the garments to a clothing collection organisation to make sure they get re-used or recycled.

**A hot issue now is microplastic shedding from garments made from synthetic materials. As Ecoalf works to stop pollution in the oceans, are there plans to tackle this issue in designing future products or through engagement with customers?**

Ecoalf is currently working on a European project to reduce the shedding of microplastics in our garments. We will incorporate the results of the project in future fabric design.

# LEARN MORE

## USE THIS...

To truly evaluate the environmental impact of different fibres, there are some fantastic industry standardised tools available online which independent designers, manufacturers, retailers, and specifically those in sourcing and designing positions can use. Enjoy exploring!

### **Common Objective**

Check out this platform to find sustainable suppliers and manufacturers. Their customised search engine matches the individual needs of each user and provides relevant information and organisation details (with a preference for sustainability, ethics and quality) for fashion professionals, including designers just starting out in their careers.

[www.commonobjective.co](http://www.commonobjective.co)

### **IDEO - Circular Design Guide**

The Circular Design Guide was created by the Ellen MacArthur Foundation and IDEO. The practical guide includes 24 methods for circular innovations, as well as a resource bank with video interviews, worksheets, case studies and links.

[www.circulardesignguide.com](http://www.circulardesignguide.com)

### **Kering - Environmental Profit and Loss (EP&L) App**

Kering launched 'My EP&L' app which assess the environmental 'costs' of a typical product's material composition and takes into consideration the whole life cycle.

Apple store | [itunes.apple.com/fr/app/my-ep-l/id1137133841?l=en&mt=8](https://itunes.apple.com/fr/app/my-ep-l/id1137133841?l=en&mt=8)

Android version | [play.google.com/store/apps/details?id=com.IgnitionFactory.MyEPL](https://play.google.com/store/apps/details?id=com.IgnitionFactory.MyEPL)

### **Sustainable Apparel Coalition, HIGG Index - Material Sustainability Index (MSI)**

Developed by the Sustainable Apparel Coalition, HIGG Index is a tool that enables users to measure every stage of the lifecycle and assess their company or product's sustainability impact.

[product.higg.org/product-tools](http://product.higg.org/product-tools)

### **TED's TEN**

Textiles Environment Design (TED) Ten is a toolbox for designers which outlines strategies to create products which have less impact on the environment.

[www.tedresearch.net/teds-ten/](http://www.tedresearch.net/teds-ten/)

### **Textile Exchange and Kering Organic Cotton Guides**

Textile Exchange and Kering have collaborated to write two extensive guides on the organic cotton trade.

Organic Cotton: A Fibre Classification Guide, this guide supports organisations that are looking to source organic cotton.

[www.kering.com/sites/default/files/organiccottonfiberclassification\\_guide2017\\_0.pdf](http://www.kering.com/sites/default/files/organiccottonfiberclassification_guide2017_0.pdf)

A World Beyond Certification: A Best Practices Guide for Organic Cotton Trading Models, is a 'how-to' guide to improve an organisation's organic cotton supply chain practices.

[www.kering.com/sites/default/files/organiccottontradingmodels2017.pdf](http://www.kering.com/sites/default/files/organiccottontradingmodels2017.pdf)

## WATCH THIS...

**Changing the Future of Fashion with Blockchain Technology**

[youtu.be/2mkxiZ1Q9t4](https://youtu.be/2mkxiZ1Q9t4)

**Redress Design Award - The impacts of our fibres**

[youtu.be/VER8XTAiBZU](https://youtu.be/VER8XTAiBZU)

**Refibra™ Reborn TENCEL® fiber**

[youtu.be/7U3RbcO8bPY](https://youtu.be/7U3RbcO8bPY)

**River Blue movie** | [riverbluethemovie.eco](http://riverbluethemovie.eco)

**The Next Black movie (Chapter 5, Dry Dye)**

[youtu.be/XCsGLWrfE4Y](https://youtu.be/XCsGLWrfE4Y)

**The True Cost movie** | [truecostmovie.com](http://truecostmovie.com)

**WithWendy x Thread International** | [youtu.be/lwcGhLU3Zy4?t=1m41s](https://youtu.be/lwcGhLU3Zy4?t=1m41s)



*'Redress Design Award - The impacts of our fibres' video*

## READ THIS...

**A New Textiles Economy: Redesigning Fashion's Future** by Ellen MacArthur Foundation and the Circular Fibres Initiative

[www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy\\_Full-Report\\_Updated\\_1-12-17.pdf](http://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf)

**Cradle2Cradle certified fabrics and yarns** | [www.c2ccertified.org/fashionpositivematerials](http://www.c2ccertified.org/fashionpositivematerials)

**Fashion Fibers Designing for Sustainability** by Annie Gullingsrud

**Global Organic Textile Standard (GOTS)** | [www.made-by.org/consultancy/standards/gots/](http://www.made-by.org/consultancy/standards/gots/)

**Green Textiles Guide** by Mistra Future Fashion

[www.mistrafuturefashion.com/wp-content/uploads/2015/12/D4.7-Sustainability-toolbox-and-report.pdf](http://www.mistrafuturefashion.com/wp-content/uploads/2015/12/D4.7-Sustainability-toolbox-and-report.pdf)

**OEKO-TEX® Standard** | [www.made-by.org/consultancy/standards/oeko-tex-100/](http://www.made-by.org/consultancy/standards/oeko-tex-100/)

**Preferred Fiber & Materials Market Report** by Textile Exchange

[www.textileexchange.org/downloads/2017-preferred-fiber-materials-market-report/](http://www.textileexchange.org/downloads/2017-preferred-fiber-materials-market-report/)

**Pulse of the Fashion Industry 2017** by Global Fashion Agenda and Boston Consulting Group

[www.globalfashionagenda.com/wp-content/uploads/2017/05/Pulse-of-the-Fashion-Industry\\_2017.pdf](http://www.globalfashionagenda.com/wp-content/uploads/2017/05/Pulse-of-the-Fashion-Industry_2017.pdf)

**Sustainable Fashion and Textiles: Design Journeys** by Kate Fletcher

**The Deadly Chemicals in Cotton** by Environmental Justice Foundation

[www.ejfoundation.org/resources/downloads/the\\_deadly\\_chemicals\\_in\\_cotton.pdf](http://www.ejfoundation.org/resources/downloads/the_deadly_chemicals_in_cotton.pdf)

**The Impact of Cotton on Fresh Water Resources and Ecosystems** by WWF

[wwf.panda.org/?3686/The-impact-of-cotton-on-fresh-water-resources-and-ecosystems](http://wwf.panda.org/?3686/The-impact-of-cotton-on-fresh-water-resources-and-ecosystems)

**The State of the Apparel Sector 2015 Special Report: Water** by GLASA and SFA

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## LEARN THE LANGUAGE...

**Biodegradable** is the ability to decompose (or broken down) by bacteria or living organisms.

**Cellulose fibres** are fibres that originate from plants and include both natural cellulose fibres such as cotton and man-made cellulose fibres such as lyocell.

**Certified organic** is a label given to products which have approval from an authoritative independent body like Global Organic Textile Standard (GOTS), who check the cycle from growth to end product to ensure sustainable standards are met. Depending on the product, the requirements will vary.

**Conventionally grown** is the name given to methods of growing which include using genetically modified seeds as well as synthetic chemicals which include insecticides, pesticides, hormones and fertilisers (sometimes also referred to as traditionally or commercially grown).

**Fibre cultivation** is the action of farming land for crops which are used as fibres for textiles.

**Genetically modified (GM)** means organisms in which the DNA has been changed through genetic engineering. In fibre production, this is most often done to create changes which ensure greater success for the crop, for example increased pesticide resistance, or improved crop yields.

**Integrated pest management (IPM)** is an environmental approach that focuses on long-term prevention of pests by integrating biological control, habitat manipulation and modification of cultural practices. Pesticides are used only after monitoring and established guidelines indicate pests exceed acceptable levels.

**Lanolin** is the grease from sheep wool, which is usually removed before use for consumer products in a chemical process called scouring.

**Lyocell** is a man-made cellulose fibre created from cellulose pulp (most commonly eucalyptus wood, but can also be bamboo), which uses a closed-loop process in which up to 99.8% of the chemicals used in its creation can be recovered for re-use. TENCEL™ is the most commonly recognised producer of Lyocell and is made from sustainably managed forests, certified by the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification.

**Microfibre** is a fibre finer than one denier or decitex/thread, having a diameter of less than ten micrometres.

**Protein fibres** are fibres that come from animals which include silk and wool.

**Pulp** is a soft, wet mass made from plant fibres and water, most commonly used for making regenerated cellulose fibres.

**Rayon** is a man-made cellulose fibre similar to viscose which is created using the viscose process, but can be made from the pulp of many different plants.

**Regenerated cellulose fibre** is created by dissolving the cellulose portion of the plant using chemicals to create a fibre for textiles, as the original plant is not supple enough. Examples include viscose, rayon and lyocell.

**Retting** is the action of soaking plant materials (such as coconuts and hemp) in water to soften.

**Solvent** is a liquid in which solid materials will dissolve.

**Synthetic fibre** is fibre which is man-made from non-cellulose based matter. Examples include polyester and acrylic.

**Transitional organic/organic in-conversion** is a process of changing from a traditional/conventional method to an organic method of production. Depending on the product, the requirements of the authoritative body will vary as to when the product can be confirmed as certified organic – and this is often after a number of years.

**Viscose** is a man-made cellulose fibre made from the pulp of wood or bamboo and chemically processed to create a new polymer. Viscose is traditionally made in a chemical process which requires significant amounts of water and the chemicals used in production cannot be recovered for re-use.

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#Lenzing was a sponsor of the Redress Design Award 2018.

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