

FORO PYMES | 22 ottobre 2020 | ILLA – Istituto Italo-Latino Americano

# L'approccio di design alla Product Sustainability Innovation.

Prof. Giovanni Maria Conti | Politecnico di Milano | [giovanni.conti@polimi.it](mailto:giovanni.conti@polimi.it)

# SUSTAINABILITY



ENVIRONMENT



ECONOMY



SOCIETY

Environmental and economic science.

Developments able to ensure the needs fulfilment of the present generation without compromising the possibility for future generations to realize their own.

It's something that improves "the quality of human life while living within the carrying capacity of supporting eco-systems"



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# Environmental Sustainability

It's the attention to the care of the environment, trying to reduce the human impact on the nature.

# Economical Sustainability

It's the base for the sustainable development.

It's the ability of an economical system to generate a durable growing of the economic markers (richness, employment) and the support of populations.

# Social Sustainability

It's the ability to ensure human welfare conditions (safety, health, education, democracy, participation, justice) distributed by classes and by gender.



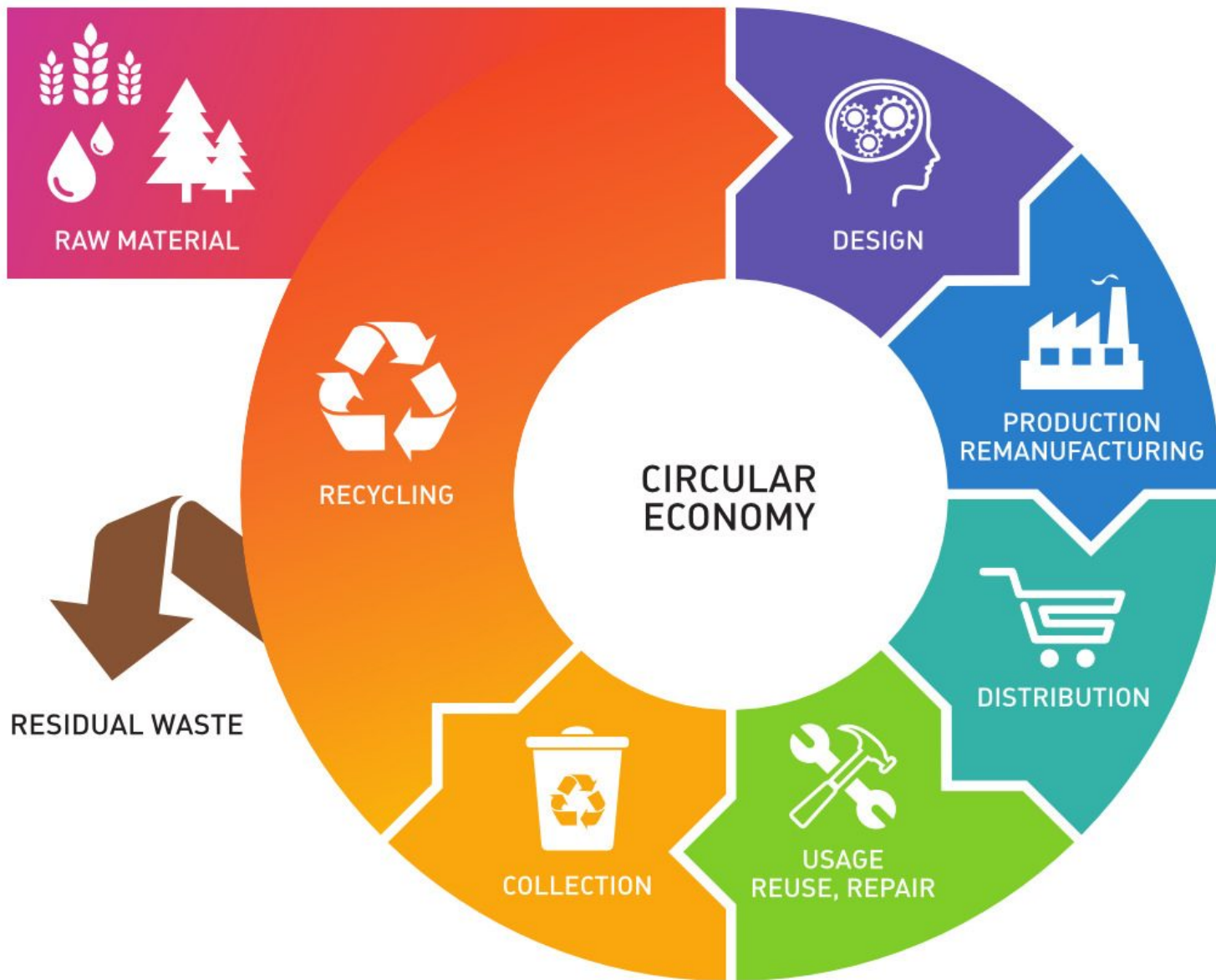
# WHAT IS SUSTAINABILITY IN THE FASHION SYSTEM?

CIRCULAR ECONOMY

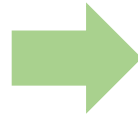
TRASPARENCY OF THE PRODUCTION CHAIN

ATTENTION TO THE CHEMISTRY IN THE TEXTILE SECTOR TO REDUCE THE POLLUTION





# CIRCULAR ECONOMY



System in order to **regenerate by itself**. It's based on two different flows of materials:

- **Biological**: they can be reintegrated in the biosphere
- **Technical**: they are upgraded without being reintegrated in the biosphere.

“Being circular” means to think to every phase, trying to minimising:

- The use of raw materials
- The energy in entrance
- Wastes and leaks
- More prevention on the negative environmental externalities.



# GREENPEACE

## Detox Campaign

It was launched in 2011 to expose the connection between global clothing brands, their suppliers and toxic water pollution.

### OBIETTIVO 0

The goal is to eliminate the harmful chemicals from the global supply chain and products, by 1 January 2020.

80 brands are supporting the initiative, especially the ones of fast fashion. Only Valentino and Burberry as luxury brands.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# FASHION POLLUTION

## WHY IS THE FASHION SYSTEM POLLUTING?



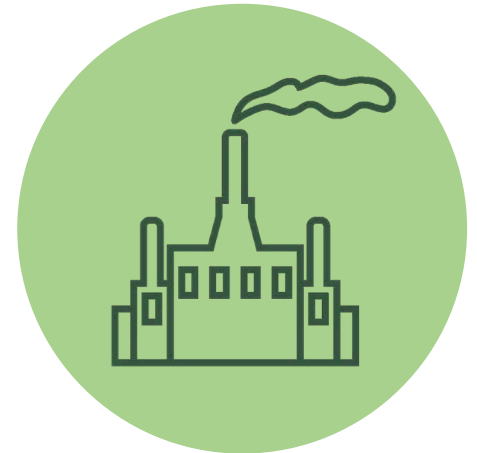
20%

of the global waste of water



10%

of world CO<sub>2</sub> emission



High greenhouse  
gas production



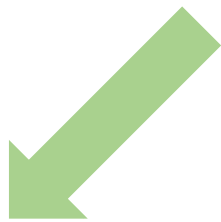
**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti



# FASHION POLLUTION

Compared to 2000, the consumer buys 60% clothes. This creates another problem in the system, the disposal of this huge amount of garments.



85%



1%



# FASHION POLLUTION

24% of the use of insecticides

11% of the use of pesticides

2<sup>nd</sup> most polluting sector after oil and gas using just the 3% of arable lands



# UN PROGRAM

## 2030 AGENDA

The UN (United Nations) has drawn up "2030 AGENDA", a list of 17 sustainable development objectives, by 2030.

For example:

- To guarantee the right to the consumer to be informed and aware of the problems of sustainable development
- To supervise the use of microfibres and microplastics which are released in the water
- To reduce the generation of chemical waste in the creative process.



**SUSTAINABLE  
DEVELOPMENT  
GOALS**



**POLITECNICO  
MILANO 1863**

Prof. Giovanni Maria Conti

# UN PROGRAM

The Fashion system is trying to reduce its impact on the environment, modifying the critical production phases:

- **Creating new material**, starting from waste products, or producing new materials which are totally eco-friendly and recyclable
- **Modifying the processes**, as the dyeing process, which is one of the most polluting, reducing the production time and the dyes.
- **Using natural raw material** in a diligent way
- Trying to **reduce the wastefulness of water**, energy, and electricity





# NEW FIBERS, YARNS AND FABRICS

# BANANA

This plant grows in the tropical regions and during the harvest **the stems are cut down** and used to produce alternative fibres. Similar to linen and bamboo or, changing the process method, silk. It's possible to obtain **different types of fibres depending on which part of the stem is taken** for the production.



green banana PAPER

It's:

- highly strong fiber
- lightweight
- biodegradable
- rapidly renewable
- water and flame-resistant
- easy to dye and print.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# BAMBOO

It's one of the world's most prolific and fastest-growing plants. The stem can be naturally converted into fabric.

Thanks to its microstructure, made by **micro-holes**, the fiber has a lot of **high characteristics**.

It's:

- anti-bacterial
- biodegradable by sunlight and bio-organisms
- traspirant
- anti-statics
- smoot and shiny as silk



# LOTO

The lotus flower is a water plant that grows wild on Burman lakes, particularly on Lake Inle. This fibre derives from the **stem** of the plant. It's extracted by hand directly, within 24 hours of collection. The thread is obtained by joining the filaments of three to five stalks, then rubbing and finally spinning and weaving them by hand. The whole procedure is carried out by women, who obtain 120 grams of yarn per day, and 50 metres of fabric per month, making the production extremely limited.

It's:

- one of the finest fiber, more delicate than cotton and silk
- breathable
- crease resistant
- lightweight





# LENPUR – cultivated wood fiber

It's a pure **cellulose yarn**. The wood pulp is obtained exclusively from cultivated cropped timber, in full respect of the enormous sustainability.

The fabrics in Lenpur are:

- thermoregulators
- breathable
- anti-odor
- absorbent.

Lenpur is now used in various fashion sectors: from underwear to shirting, from stocking to textiles for home. The fiber maximizes its performance in the sponge and technical-sports sector.



# ORANGE FIBER

Orange Fiber looking silky, very similar to silk, can be printed and colored like traditional fabrics, opaque or polished, used together with other yarns – like cotton or silk – or in purity, combines sustainability and innovation in the textile quality of the Made in Italy. The fabric is made from the start citrus «**pestazzo**», is the wet residue that remains at the end of industrial production of citrus juice and that it can not anymore to be used but only thrown away like a waste.



# ORANGE FIBER



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# CRABYON

Crabyon is a fiber made from crab meat, a mixture of chitosan and viscose.

Chitosan is a derivative of chitin, a compound of natural origin that is obtained from the shell of crabs and crustaceans; the substance is obtained by reusing waste from the food industry, finding a new use for substances that would otherwise be divested.

Crabyon is very similar to cellulose and therefore combined with viscose and cotton makes the fiber extremely versatile and easy to dye with reactive and direct dyes.



# SOYBEAN PROTEIN FIBER

It's a new kind of fiber made thanks to the latest progress of science. It's called also **vegetable cashmere**.

It is in fact derived from Globular Proteins, extracted using biochemical technology from the globulins of the residue of a variety of Soy growing in some regions of China.

Elegant, bright as silk and from the most airy hand of cashmere, in fact the soy fiber is the only botanical protein fiber al world.



# MILKOFIL – organic milk yarns

It's the innovative ecological and healthy yarn made from milk.

The fiber derived from **casein**, the main milk protein, has durable emissions of negative ions.

It is therefore beneficial for air quality, stimulating blood circulation and naturally antibacterial and sterile.

Milkotton = cotton + milk protein fiber

Milkwood = Lenpur (wood fiber) + milk protein fiber

**milkofil**  
organic milk yarns



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# INGEO®

Polylactic Acid (PLA) by Natureworks, sold under the Ingeo® brand, is a polymer able to make environmental benefits, being produced from renewable resources.

It is obtained by polymerization of lactic acid, which is produced by the fermentation of sugars derived from plants.

Today Ingeo® production generates 60% less greenhouse gas and uses 50% less energy renewable, compared to traditional polymers such as PET or polystyrene.



# S.CAFÉ®

It's a yarn invented by Singtex, a taiwanese company in 2008.

It is made from plastic bottles and coffee grounds, this yarn is:

- environmentally friendly, re-using food waste from big company as Starbucks
- de-odorizing
- fast drying
- UV-resistant
- applied to textile fibers it enhances their functionality without affecting dye performance.
- Its production reduces CO2 emissions by around 2.7 kg.

**Scafé®**  
SUSTAINABLE PERFORMANCE

Timberland 



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti



# SEFÍA™

S.Café yarns combine with Lyocell filaments creating sefía™, a fabric made from discarded coffee grounds and biodegradable wood pulp.

It has:

- odor-control
- moisture absorption
- high tenacity and stability
- excellent drape
- brilliant luster
- Anti-pilling



# PIÑATEX®

Natural fabric made by **cellulotic fibres** extracted from the **leaves** of ananas, made by Ananas Anam Ltd.

It's a **non-woven textile**, similar to felt. 480 leaves are necessary to obtain 1 mq of fabric.

This is an eco-friendly textile because:

- it doesn't required water, fertilizing, pesticidies
- no chemicals or toxic substances are used in the production chain
- it's compostable
- traspirant
- antibacterial
- cheaper than leather

 PIÑATEX



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# WINELEATHER®

It's a material invented by Vegea srl in Milan in 2016.

Similar to the leather, rebuilt from the harvest scraps (seeds, marc, grape skin, sprig of grapes), Vegea is an eco-friendly material. The marc is dried out, kept and treated with physical and mechanical processes. With this method the raw material is available every year without having to wait for the harving period.

It has a lot of different characteristics thanks to the processes developed by the company in these years. 26.000.000 l of wine, produce 7.000.000.000 kg of marc, which can create 3.000.000.000 mq of Vegea

# VEGEA



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# PELLEMELA ®

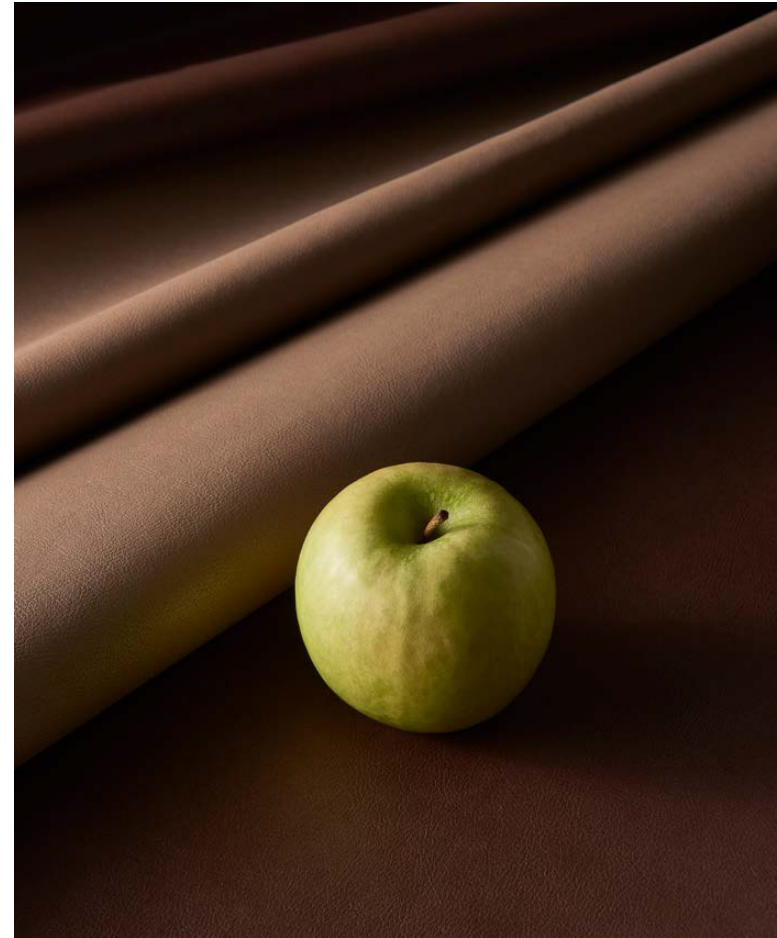
Invented by Eng. Alberto Volcan.

It's obtained with the classical coagulation process of polyurethane, thanks to the additivization of the polyurethane with the apple scrapes. The final effect is an eco material, similar to the leather with high technical organoleptic characteristics.

It's:

- Traspirant and waterproof
- Atoxic and comfortable
- Eco-friendly; it can help in the absorption of hydrocarbon in the containment booms placed in the sea.

The production helps to reduce the CO<sub>2</sub> emission and emanates a good smell.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# CORN FABRIC

It's composed of a 0.2 mm thick cork foil, which, depending on the destination sector, is used to the following supports:

- Textile supports for use in the field of clothing
- furnishing for the manufacture of sofas and armchairs.
- Nylon supports for the manufacture of accessories, such as umbrellas and raincoats.

It's:

- Natural
- Ecological
- stable
- hypoallergenic



# MUSKIN ®

It's produced by Grado Zero Espace, an Italian researching company.

It's a textile obtained by the caps of the *Phellinus ellipsoideus*, an enormous inedible fungus, which lives in the subtropical forest, infesting the trees' trunks.

It's:

- Similar to chamois
- Traspirant
- Atoxic
- Water repellent



# MYLEA™

It's produced by Mycotech.

Mylea™ is made from similar technology of Tempe, traditional food from soybean covered by fungus. It's a bio-synthetic leather, made with the mycelium, the strong filaments of mushrooms

It's:

- Similar to leather
- Atoxic
- Can be dyed in a natural way

myc😊tech



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# MYCOTEX™

It's produced by Neffa and designed by Aniela Hoitnik and the University of Utrecht.

MycotEX™ is a garment obtained by a fungus mycelium which is able to replicate itself in a modular way.

It's:

- compostable
- Eco-friendly because there are no material wastes and for the production few litres of water are used.

The manufacture of garment takes place in a particular way: Mycotex is attached on a mold, without using seams.





# KOMBUCHA FABRIC

It's obtained by the Kombucha the which is a fermented, slightly alcoholic, lightly effervescent, sweetened black or green tea drink.

Kombucha is produced by fermenting sugared tea using SCOBY (symbiotic culture of bacteria and yeast), using a process similar to the use of Fungi.

The end result are wet mats of fiber that can be molded, dyed and dried. Once dried, the texture ranges from a material similar to leather to a papyrus.

The fabric is very strong but it's not waterproof, the smell is similar to honey and flowers.



# BIOLOGIC SECOND SKIN

It's a fabric invented in Boston, at MIT.

An ancient bacteria is embedded into the garment; this has the characteristic to expand and contract in relation to the atmospheric moisture. The bacterias are embedded in a ventilate garment thanks to a micron-resolution bio-printing system. The syntetic bio-skin reacts to body heat causing flaps around heat zones to open.

Now the MIT is working with New Balance to create sportwear and with the Royal College of Art to bring the project to a new artistic level.



**Massachusetts  
Institute of  
Technology**



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# BIOLOGIC SECOND SKIN



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti



# THE DYEING PROCESS

# DYEING PROCESS POLLUTION

After the oil sector, the fashion system is the second most polluting sector



The dyeing process is one of the most polluting production processes in the fashion system



The **20%** of the global water pollution





**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# DYEING PROCESS POLLUTION

Every year for the  
**DYEING  
PROCESS**  
are used:



**9 trillion**  
Litres of water



**8 thousand**  
different chemicals



The chemicals aren't filtered by the purifier, they flow into the aquifer and the watercourses, poisoning the agricultural lands.



# DYEING PROCESS POLLUTION

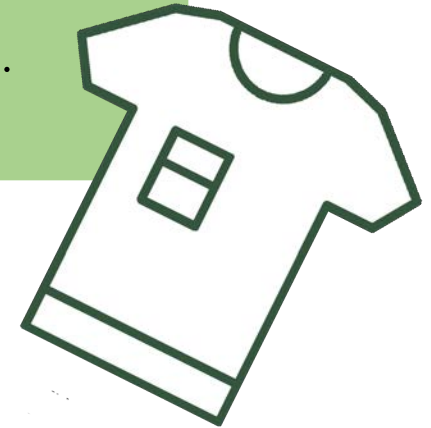
**6 trillion**

Litres of water are used just for the coloring part of the dyeing process



**1 t-shirt**

Requires 2720 litres of water and the 10/100% of the textile weight in chemicals.







DENIM CREATION

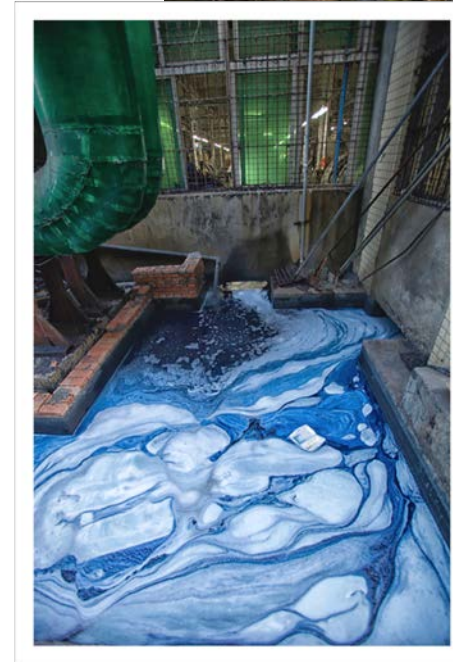
# DENIM POLLUTION

215 pairs of jeans are produced from a bale of cotton.

The high quantity of jeans required by the market, is becoming an **important problem for the environmental sustainability**. To produce a pair of jeans, it travels through 4 continents, for 65.000 km, causing a **huge amount of pollution**.

The denim production produces the

**13%** of the annual mondial emission of CO<sub>2</sub>.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# ACHROMA THE DENISOL ® PURE INDIGO 30

It's a new way to produce the Indigo dye of jeans and denim. It's a dye, aniline-free, produced in Pakistan.

This chemical is really toxic for the environment and the human body, and it's impossible to wash off by the fabric. 400 mt are wasted worldwide every single year causing a huge pollution of the water and some problems for the aquatic life.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# CASE STUDIES



with love for sneakers | 

## Gucci Reverso

It's a way to re-engineered cashmere. Create a way to transform textile-manufacturing scrapes into a fine wool, fully traceable, 100% made in Italy.

They use:

- 82% less energy consumption
- 92% less water consumption
- 97% less CO<sub>2</sub> consumption

They use new sustainable material as:  
ZQ Merino, Newlife Polyester, Econyl



# ADIDAS x PARLEY

It works with Parley, for the harvesting of the oceanic plastic. The goal is to substitute all the component made in plastic with the recycled one until 2024. Each shoes is made with 11-12 plastic bottles and the 95% is made with recycled plastic.

In 2015 they presented the first shoe made in this way, with a '90 appeal.

For the second edition the soles were 3D printed, using oceanical plastic, and they create just an exclusive collection sold during the international Ocean day.

In the next seasons the Ultraboost became the runnings more designed from stylists and designers.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# ADIDAS x PARLEY



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# ADIDAS x PARLEY



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti



# ADIDAS x PARLEY



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# VICTORINOX



REMADE IN  
SWITZERLAND

Christopher Ræburn for Victorinox



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# PUMA



*\*Based on 20oz recycled PET bottles*

With a minimal, thoughtfully-designed upper made from **95% recycled** PET plastic bottles, newSKY is a different way to think about footwear.

The upper components of newSKY use Eco-fi polyester - a high-quality fiber made from post-consumer PET plastic bottles. The average pair of newSKY uses 8 PET bottles.



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

# PUMA



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti

**THANKS FOR YOUR ATTENTION.**



**POLITECNICO**  
MILANO 1863

Prof. Giovanni Maria Conti