

# GRAPHITO

Candiani launches **GRAPHITO** a state of the art denim that combines the unique technical performances of **G+®**, the purest graphene obtainable, with the fabric-ennobling characteristics of **KITOTEX®**. Both technologies are patented and set GRAPHITO apart from all other fabrics in this segment.

This innovation was only possible thanks to the partnership with **Directa Plus**, a game changer that operates in the same territory, right next to Candiani and is one of the largest worldwide producers and suppliers of graphene-based products for consumer and industrial markets.



# What is Graphene?

**Visually, being graphite a book, graphene is the page.**

Graphene is a monolayer of carbon atoms organized in a honeycomb structure. Graphene was first isolated in 2004 by Professor Andre Geim and Professor Konstantin Novoselov at the University of Manchester (UK).

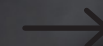
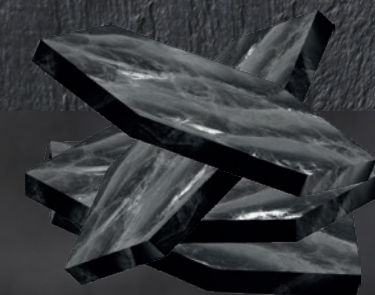
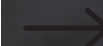
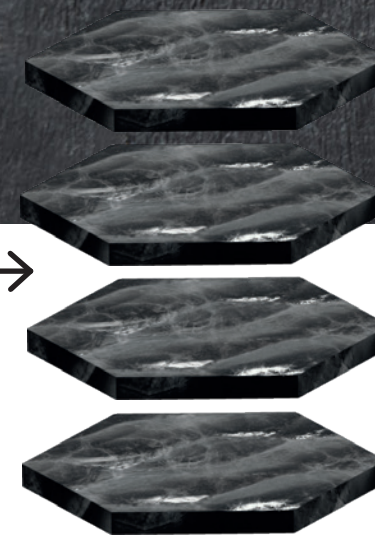
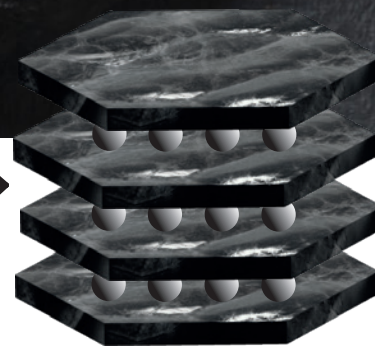
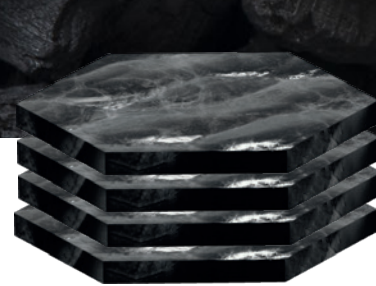
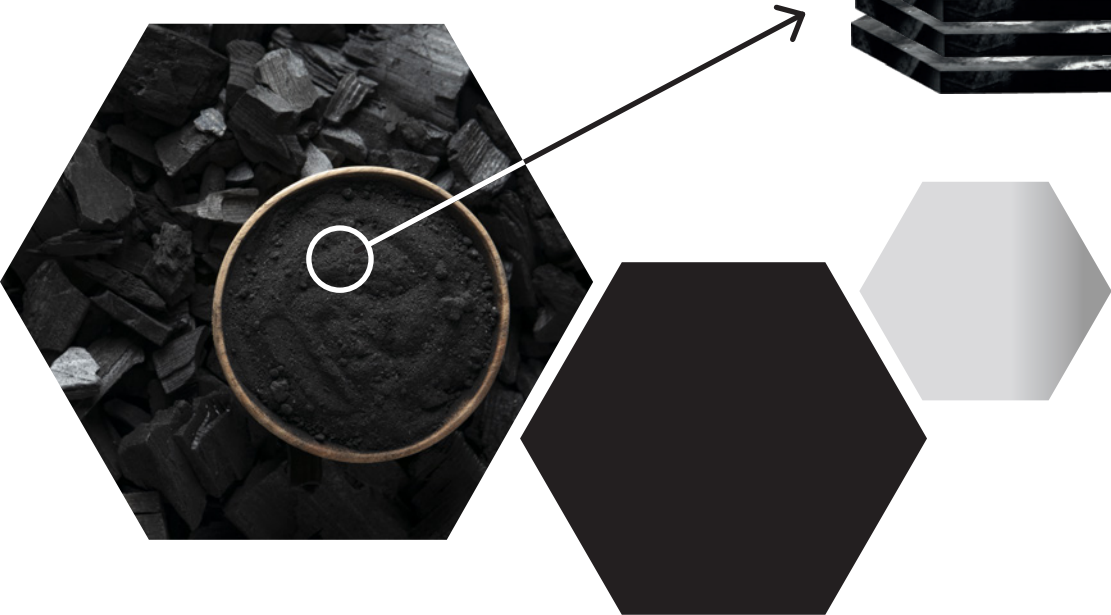
NATURAL GRAPHITE

GRAPHITE FLAKES

PLASMA SUPER-EXPANSION

EXFOLIATION AND CONCENTRATION

PRISTINE GRAPHENE NANOPATELETS



Graphene is known as the wonder material: it is the lightest, the strongest and the best heat and electricity conductor material ever known. Thanks to its outstanding characteristics and its ability to operate as a super-additive, it enhances the properties of the materials to which it is added or gives them new characteristics: **a PLUS.**



## What is G+<sup>®</sup> Graphene Plus?

G+<sup>®</sup> Graphene Plus is the purest and the most crystalline form of Pristine Graphene Nanoplatelets: every gram of Graphite is directly transformed into a gram of Graphene Plus through a waste-free process entirely based on physical processing, without any use of chemicals or solvents. Therefore, G+<sup>®</sup> is certified as totally safe, skin-friendly, non-toxic and non-cytotoxic, proving G+<sup>®</sup> to be the safest choice among different graphene materials.



[Click here to discover all the certifications](#)



G+<sup>®</sup> Graphene Plus is Directa Plus' graphene. It is unique, patented, made in Italy, or better, produced only 50km from the Candiani mill. It stands out for its sustainable transformation process and thanks to its versatility it can be easily integrated into a wide range of products and industrial processes.

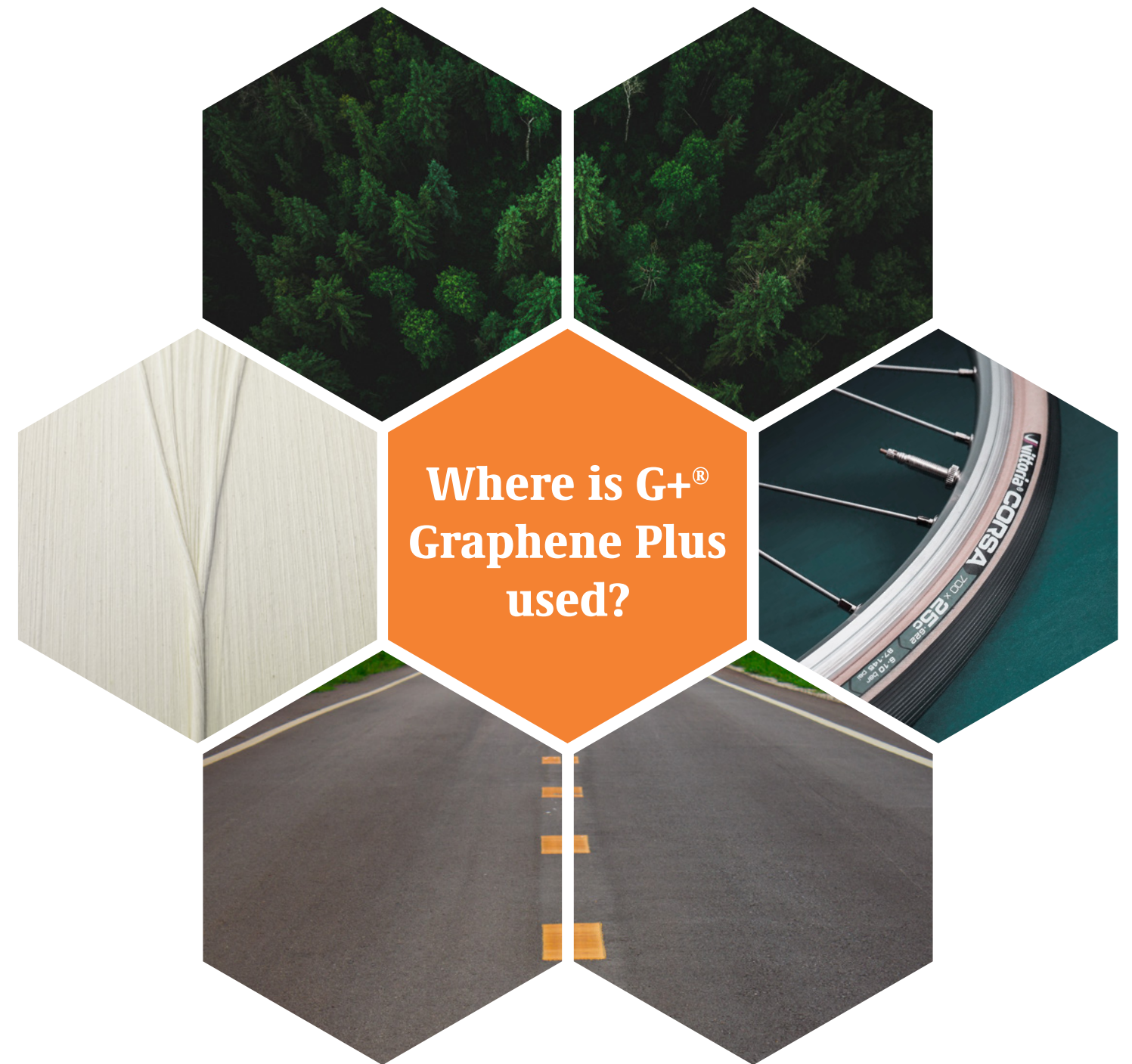


G+® Graphene Plus is currently applied in four main industrial sectors: in the **textile sector**, G+® technology is applied to enhance thermal comfort and provide garments with key antistatic and bacteriostatic effects. In the **environmental** sector Directa Plus produces oil-adsorbent booms and pillows and provides remediation services mainly to the Oil&Gas industry. The **elastomer industry** benefits from the implementation of G+® in bicycle and automotive tyres' production. G+® **asphalts** are rapidly covering roads and airport runways in Italy and abroad.



### CO-MASK®

The antiviral and antibacterial activity of G+® Graphene Plus combined with its non-toxic, skin-friendly properties allowed for the application of this technology on face masks and the launch of **Co-Mask®**. Lab tests carried out by **Università Cattolica del Sacro Cuore** show that G+® Graphene Plus impregnated cotton fabric reduces the viral load of **SARS-CoV-2 by 98%**, meeting the need for highly functional personal protective equipment used in health care to reduce the spread of **COVID-19**.



Where is G+®  
Graphene Plus  
used?





## PROXIMITY SOURCING

The partnership between Candiani Denim and Directa Plus arose from the like-minded approach to trailblazing research and development and the care for the environment. Furthermore, Direct Plus' production facility is located in Lomazzo, 50km from the Candiani Mill, which positions the companies in such proximity that the carbon footprint of this innovation is exceptionally contained.

 **DIRECTAPLUS**

Directa Plus is one of the largest worldwide producers and suppliers of graphene-based products for consumer and industrial markets.

Founded in 2005 by Giulio Cesareo, a successful executive in the carbon industry, whose strong dedication allowed him and his highly skilled team to transform a startup into the first graphene production plant in Europe. Since 2016, Directa Plus has been listed on the AIM market of the London Stock Exchange.

**Who is  
Directa  
Plus?**



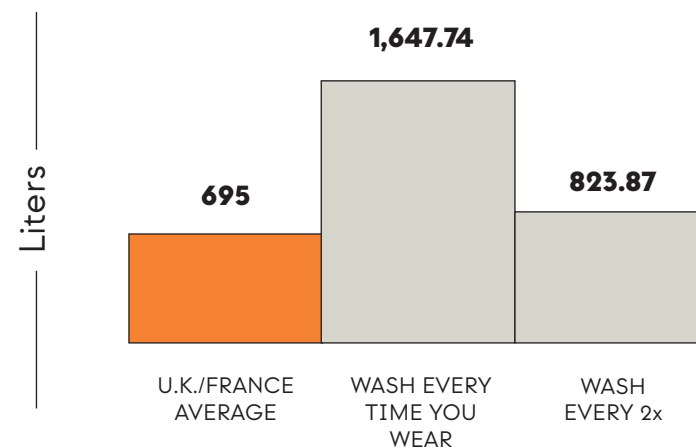


## What's the problem with Jeans and why is G+® Graphene Plus a solution?

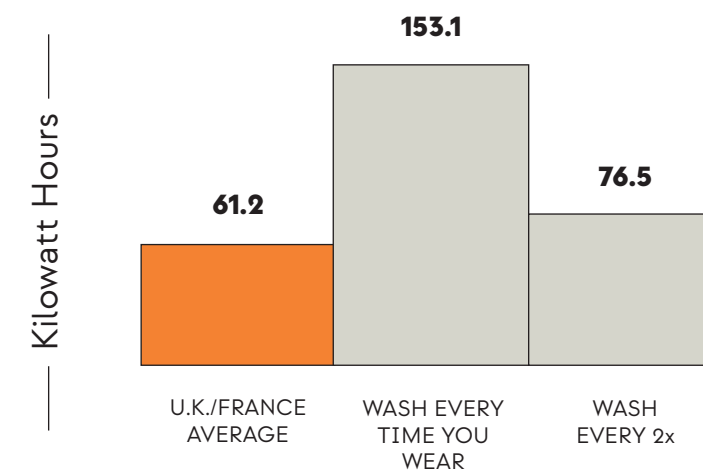
In Europe, people wear their jeans on average **2.5 times** before washing them. Over the typical product lifetime, this means that **659 l of water** and **61.2 kW/h of non-renewable energy** are used and **11.17 Kg of CO<sub>2</sub>e** are released to wash a pair of jeans.



### LIFETIME WATER INTAKE



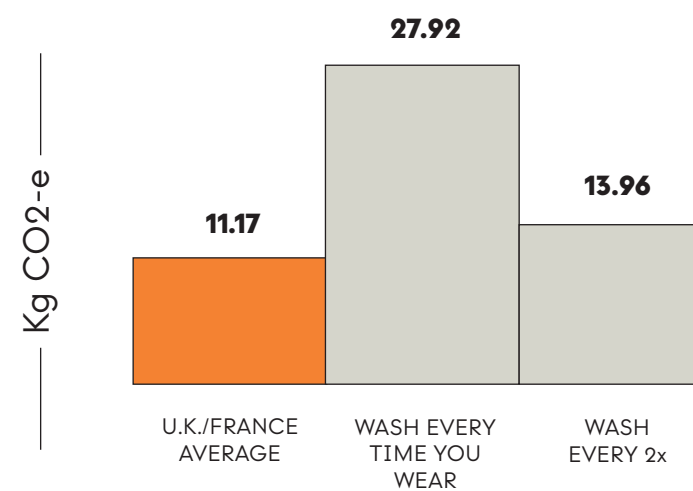
### LIFETIME ENERGY USE



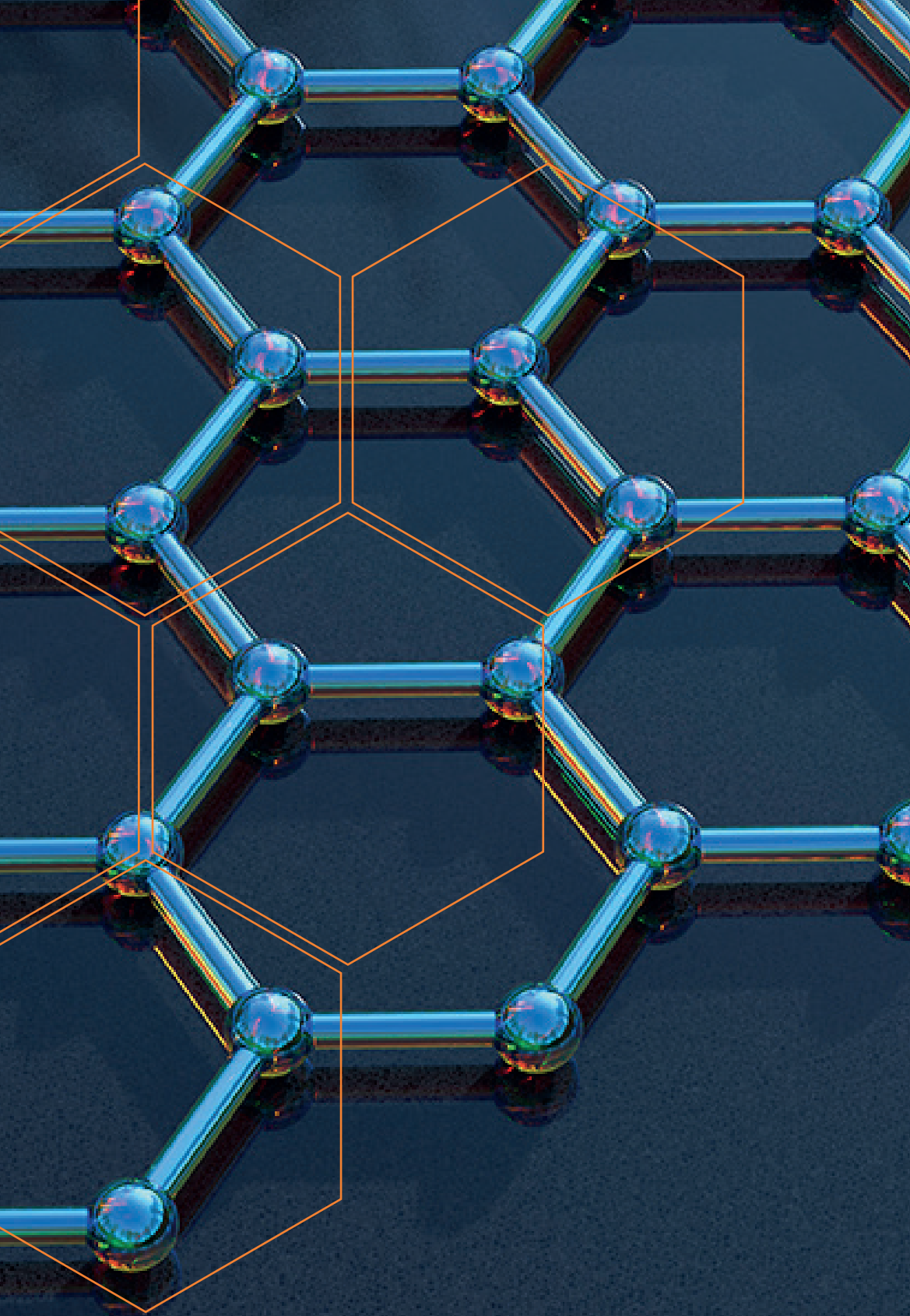
Credits: Levi Strauss & Co Life Cycle Assessment 2015.



### LIFETIME CLIMATE CHANGE IMPACT

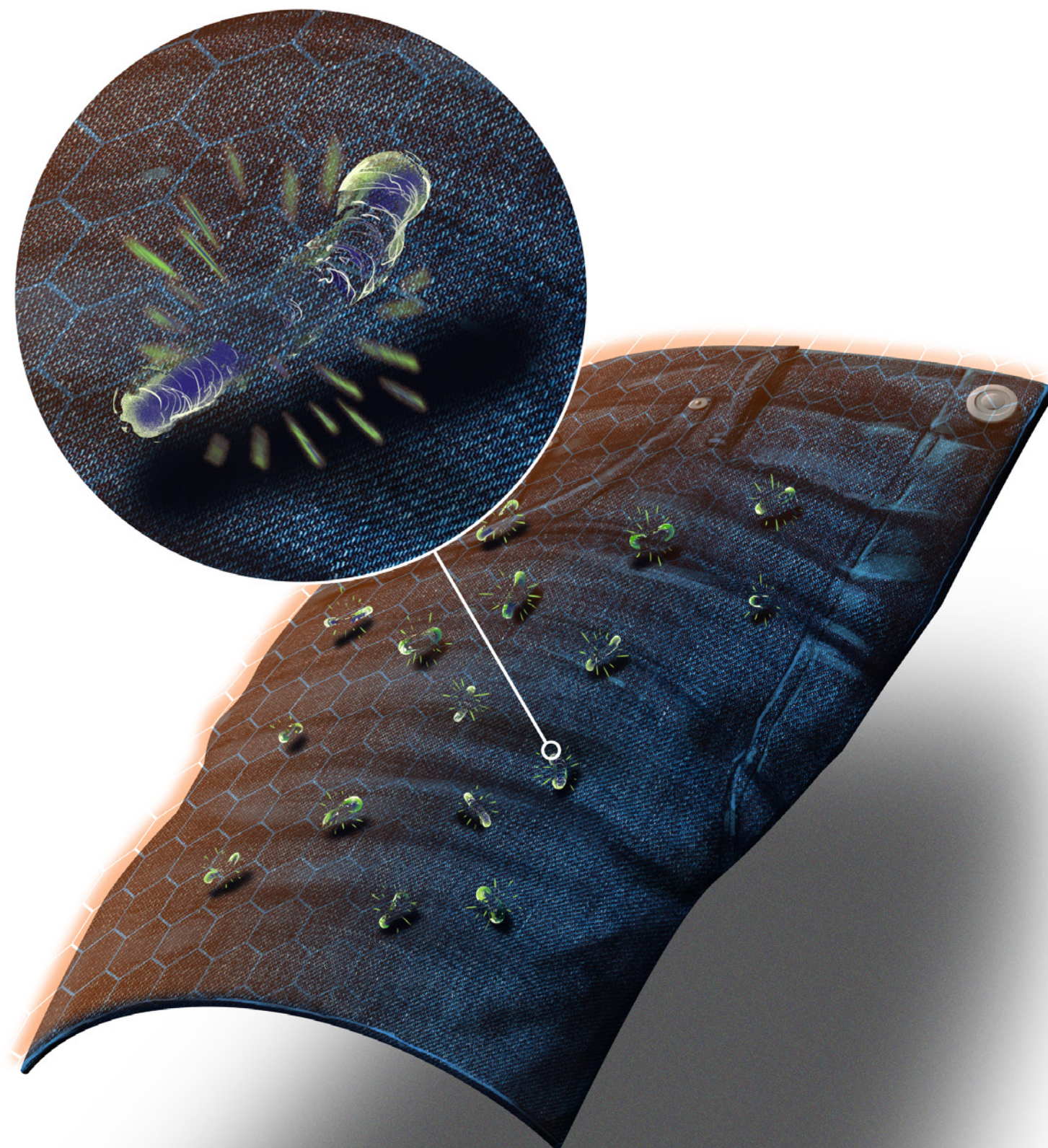






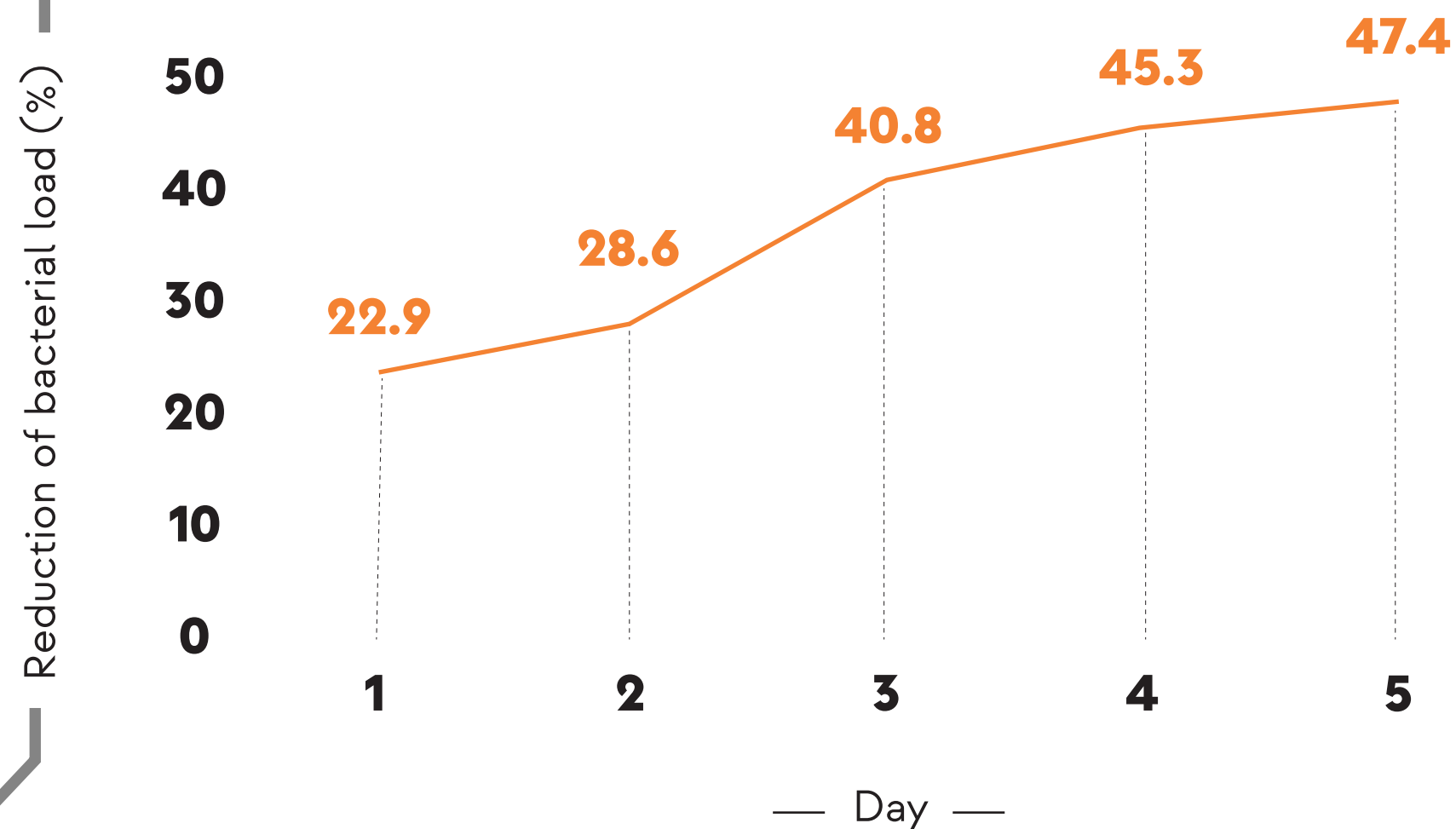
## ***GRAPHITO DENIM PROTECTS YOU AND THE ENVIRONMENT!***

Do we really need to wash our jeans every second time we've worn them? Not if they are made with GRAPHITO denim. When the fabric is impregnated with G+® Graphene Plus its antiviral and antibacterial shield activity protects your jeans and allows you to wear them many more times than conventional jeans before washing them.





**GRAPHITO** has been tested for antibacterial activity against *Klebsiella pneumoniae* and *Staphylococcus aureus* according to ISO 20743:2021. The objective of the present experimentation was to better understand the antibacterial activity of the G+<sup>®</sup> enhanced denim if compared to an untreated denim, when exposed to different working environments.



**in 5 days G+ kills up to 50% of the bacterial load compared to the reference denim**

**These test results show that in 5 days G+<sup>®</sup> reduces the bacterial load up to 50% if compared with the reference denim. Not only is the conventional denim twice as “dirty” as GRAPHITO, but the G+<sup>®</sup> antimicrobial activity has also increased over time, meaning that you can wear your jeans way more than 5 times before washing.**



What does  
that mean for the  
maintenance of  
your jeans?

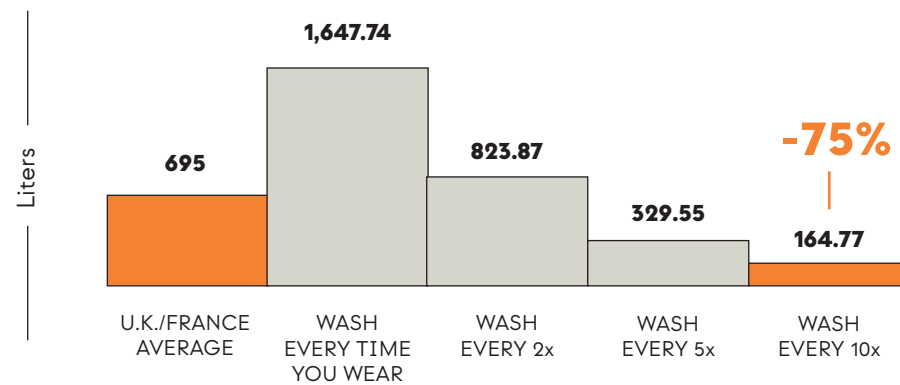
It means that you can wear your jeans at least 10 times before washing them. And don't worry, they won't get smelly thanks to the odor neutralizing action of the G+® Graphene Plus.

The figures of the **water, energy and CO2 used** for your jeans would decrease to **164.77 l (-75%), 15.3 kW/h (-75%)** and **2.79 Kg CO2e (-75%)**, respectively.

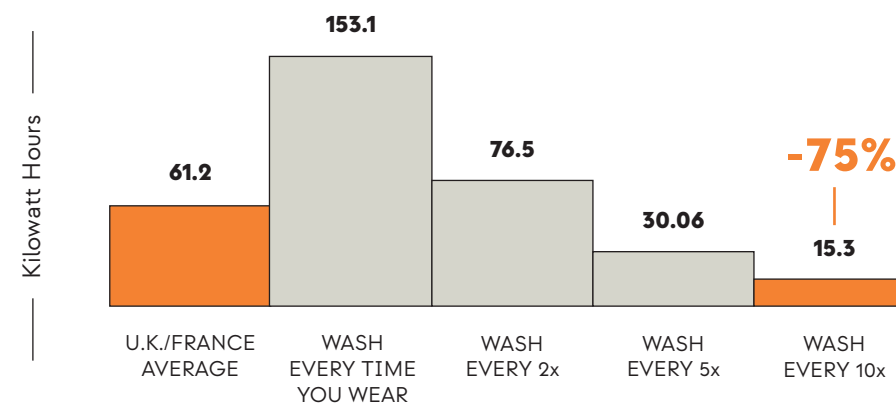
## WEARING JEANS 10x BEFORE WASHING COULD REDUCE WATER USAGE BY 75%

Credits: Levi Strauss & Co Life Cycle Assessment 2015

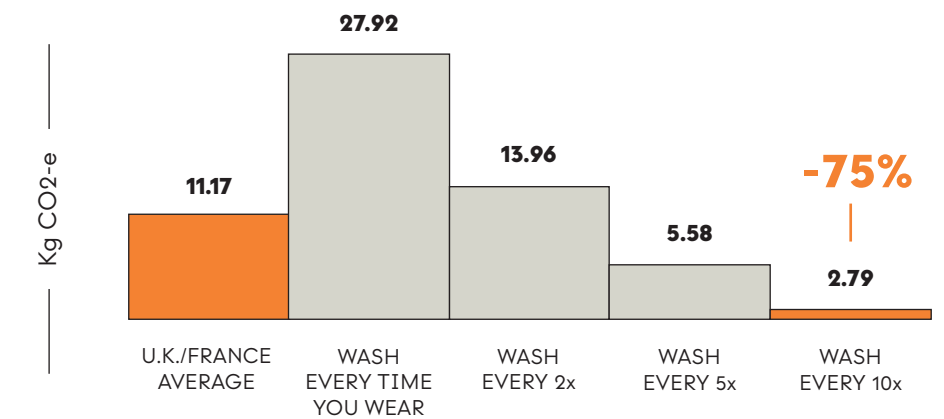
### LIFETIME WATER INTAKE



### LIFETIME ENERGY USE



### LIFETIME CLIMATE CHANGE IMPACT



Healthier for you and for the planet.  
A healthier and more responsible solution for our everyday jeans.



Can GRAPHITO  
live up to the role  
of everyday  
jean?

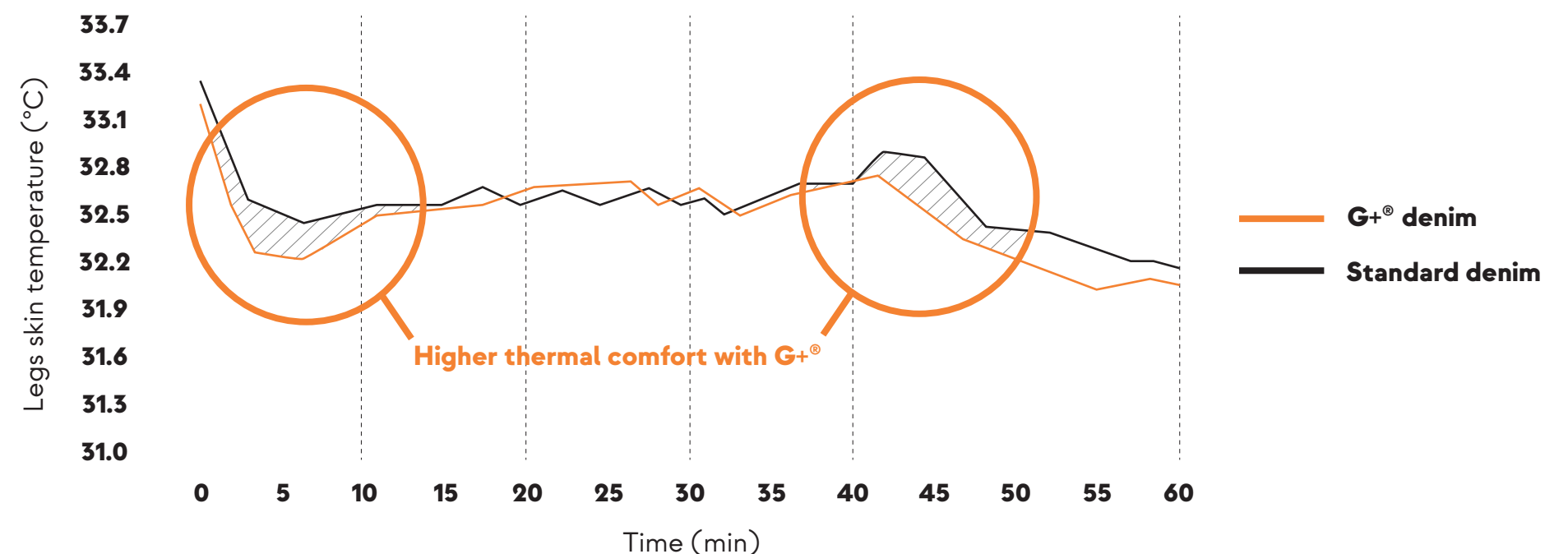
GRAPHITO IS A CROSS-SEASONAL FABRIC

Rarely we can wear one single jean all year long feeling equally comfortable during the hot and the cold months. In spring we switch from heavy to light weight jeans to keep ourselves cool during the hot summer season. But what if I'd tell you that GRAPHITO is your one stop, all-year-round solution? Besides the antimicrobial properties (antibacterial and antiviral) the G+® Graphene Plus impregnated denim features another signature characteristic: Thermal conductivity, which translates into **Heat homogenization and equalization**, therefore **thermal comfort**.

We tested GRAPHITO jeans in-vivo in the climatic chamber to investigate their thermal comfort. The thermal comfort tests were performed by an independent laboratory on 5 testers of different ages, weight and body mass index in a climatic chamber ( $25.2 \pm 0,3^{\circ}\text{C}$ ;  $55 \pm 1.2\%$  RH, with light ventilation 2km/h) to simulate conditions of use.

## THERMAL COMFORT

AVERAGE SKIN TEMPERATURE UNDER THE TROUSERS OF THE 5 TESTERS



Jeans impregnated with G+® Graphene Plus measured lower skin temperature and a higher external surface temperature, an indication of **better heat dissipation and better thermal comfort** for the user. **This result confirms that GRAPHITO denim is a cross-seasonal fabric, and therefore an ideal candidate for your everyday jeans.**





How long  
will GRAPHITO's  
“magic” last?

G R A P H I T O

## ANTIBACTERIAL ACTION

GRAPHITO's antimicrobial and thermoregulating properties are guaranteed for 20 domestic washes.

But as the test results show the antimicrobial activity after 20 domestic washes is still by far higher on a **G+® Graphene Plus** impregnated denim than on a conventional one.

## TEST SAMPLE

## BACTERIA

	STAFILOCOCCUS AUREUS	KLEBSIELLA PNEUMONIE
ANTIBACTERIAL ACTION AFTER 20 DOMESTIC WASHES	96.02%	20.57%



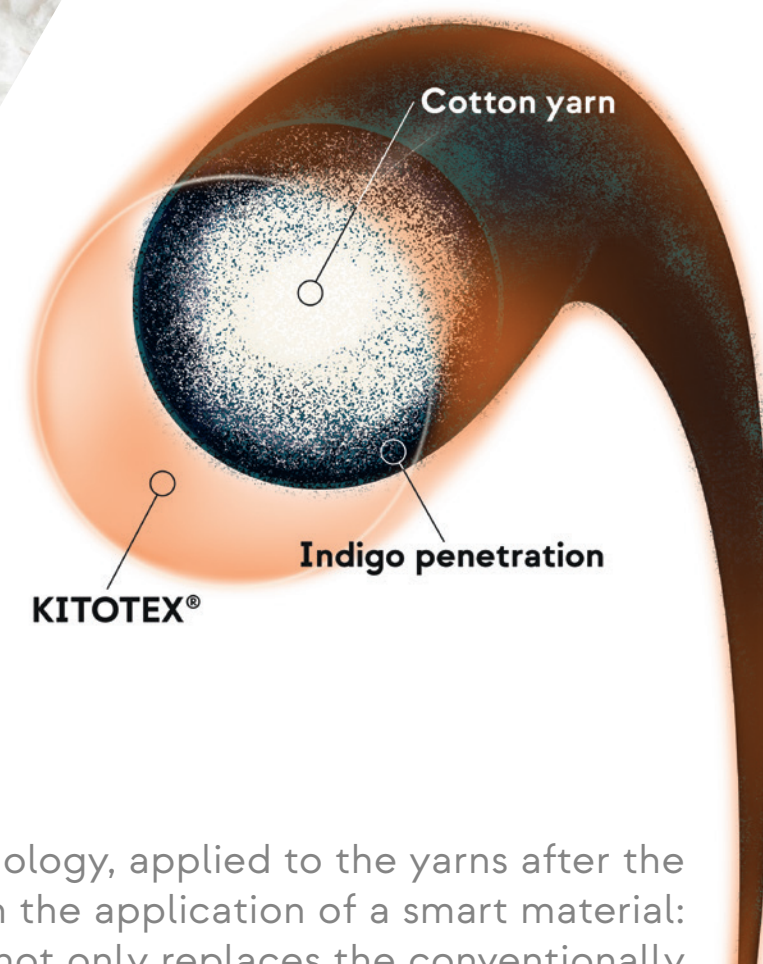
Now,  
we have proven  
GRAPHITO to be  
an “Avenger” but  
what about his  
charm?

**GRAPHITO** combines the names of its two main ingredients: the **G+® Graphene Plus** and the **Kitotex®** patents. While **G+® Graphene Plus** offers antimicrobial and thermoregulating properties **Kitotex®**, not only reinforces the protective action due to its bacteriostatic characteristics, but it ennobles the fabric's hand-feel, color saturation and natural shine.

**Kitotex®**, naturally protective,  
aesthetically distinctive



Chitosan from  
**Aspergillus  
Niger**



Kitotex® is a sizing technology, applied to the yarns after the dyeing process, based on the application of a smart material: chitosan. This biopolymer not only replaces the conventionally used synthetic PVA but it has outstanding binding and film-forming properties which have a remarkable effect on indigo dyed yarns improving their color fullness and enhancing the overall aesthetics with a polished look and feel.



## GRAPHITO

### benefits overview

- This denim is impregnated with G+® Graphene Plus, a patented technology that confers antibacterial and antiviral properties to the fabric
- Healthy for you and for the planet. The antimicrobial protection allows to wear your jeans at least 5 to 10 times more often than usual before washing them, reducing the use of water, energy and carbonfootprint during its lifecycle up to 75%
- The thermoregulating properties of G+® Graphene Plus allow for a high thermal comfort when wearing the jeans, making GRAPHITO a cross-seasonal denim fabric
- GRAPHITO is sized with Kitotex®, a patented technology that uses chitosan, instead of the conventional petrol-based PVA. Unlike PVA chitosan is a 100% biodegradable biopolymer obtained from a natural and renewable source
- Thanks to its film-forming properties Kitotex® ennobles the fabric's hand-feel, color saturation and natural shine

