LIFE CYCLE ANALYSIS

10/2022

BONNE SUITS – FULL CIRCLE COTTON SUIT

TRUE COST LABEL

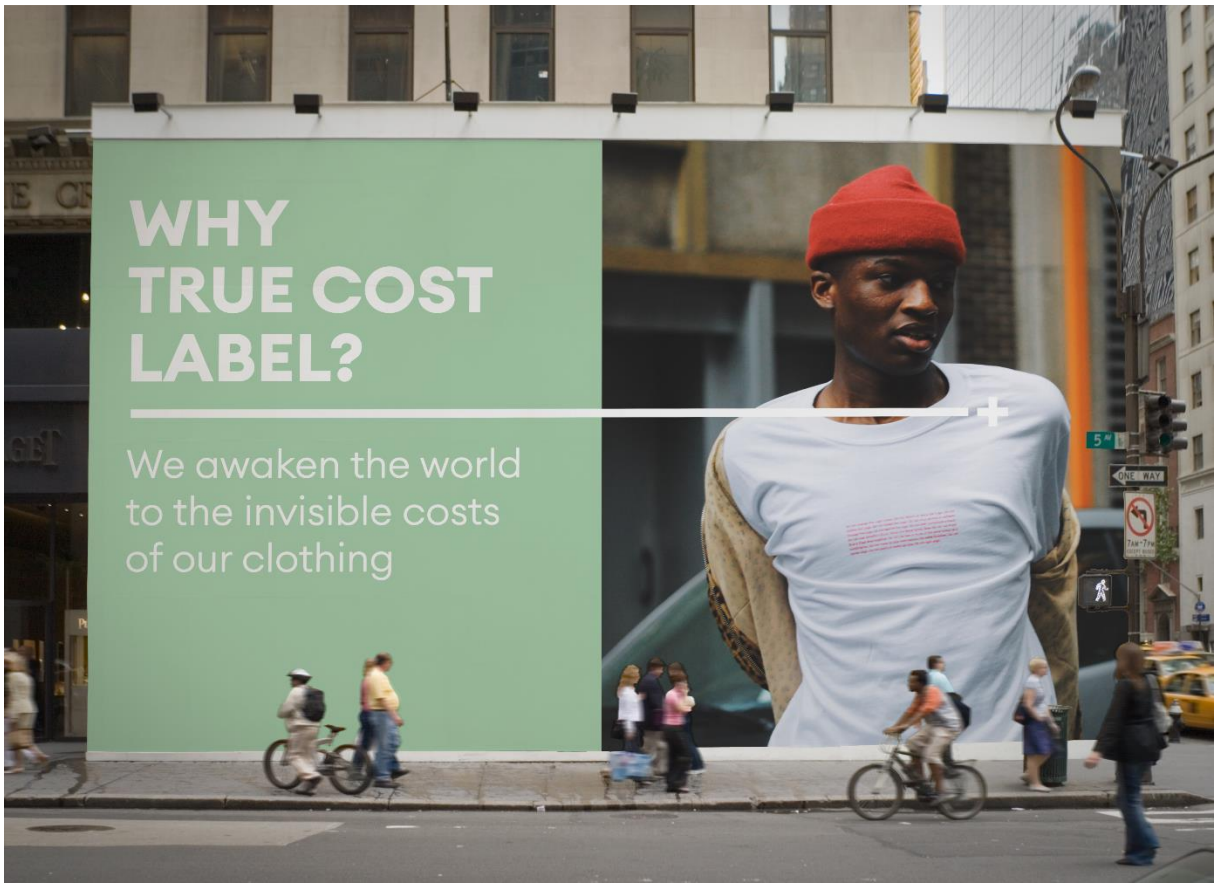
ABOUT THIS REPORT

This Life Cycle Analysis report has been constructed in consultation to Bonne Suits to reveal the invisible costs of their sustainable garments. A True Cost Label impact profile has been generated to show consumers the impact their suits have on the planet and its people. To help consumers make more informed decisions, Bonne Suits's suits are benchmarked with suits of the same material weight according to conventional industrial practices and materials. As a frontrunner, Bonne Suits understands the need for radical transparency which is why they partnered with True Cost Label to generate this Life Cycle Analysis.

OUR STORY

We are True Cost Label, a digital platform that makes it simple to buy and sell sustainable and ethical fashion. Let's face it. Our clothing has a huge impact on the environment, and the people who make it. We reveal these invisible costs. Piece by piece, we break down how each garment affects our planet and its people. By translating complicated data into simple facts, we bring clarity. That's how we encourage more informed decisions that involve less pollution and fairer work conditions across the industry.

Finding a new favorite is already a challenge. Let sustainability be the easy part. We bring together conscious fashion brands with like-minded consumers. All in one spot. United as one force. Love the planet. Love your fashion.



LIFE CYCLE ANALYSIS

A Life Cycle Analysis, also known as LCA study, is a deep analysis of the supply chain. Whereas LCAs can be performed for any industry, True Cost Label specializes in those specifically for the fashion sector. An essential step in this, is the mapping of Bonne Suits's supply chain.

The product is broken down at fiber level, looking at every single kilogram of material and type of fiber within. Consequently, the environmental and social impacts of the production of raw materials and the manufacturing of those materials into fabric is collected and computed into total figures. From the spinning of yarns from fiber, to the weaving of yarns into fabric, the dyeing, the cutting, sewing, packaging and shipping and anything else imaginable within the typical supply chain of fashion products.

Another important aspect of LCA is transport. For every product True Cost Label investigates, the transportation route from the very first fiber to the brand's store is tracked down and included in the impact calculation. This way, the total amount of kilometers a brand's product has traveled is displayed in its True Costs.

BONNE SUITS SUPPLYCHAIN

For Bonne Suits, True Cost Label conducted an LCA of their Full Circle Cotton suit, made of 50% certified organic cotton and 50% certified recycled cotton. The organic cotton is grown and ginned in Tanzania then shipped to Portugal where it is spun and woven into the timeless two-piece suit design from Bonne Suits.

The manufacturer processes yarns into woven fabric, ready to be dyed. Once the garments' fabric is finished, it is cut and sewn into the two-piece suit. Upon completion, the garments are shipped over land to Bonne Suits in the Netherlands.

The figure below gives an overview of Bonne Suits's supplychain. On the following page, the impact for the two-piece suit is highlighted. Impact is broken down in climate change (kg CO2-eq), water use (liter) and total distance (km) per kg.

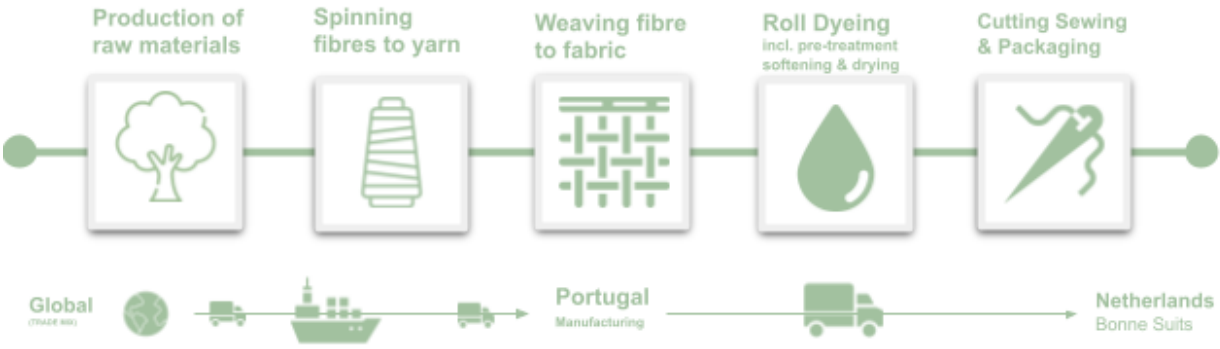


Figure 1: Bonne Suits's Supply Chain

BONNE SUITS: Full Circle Suit – manufactured in portugal

Per item (1,4 kg) - versus conventional cotton product, same weight

no PRODUCT-AS-SERVICE

no REFURBISHED/REUSED

19,55 KILOGRAM CO_2-eq

480 LITER WATER

0,45 AROUND THE WORD

yes RECYCLED MATERIAL

yes BIOBASED

LCA RESULTS

The results of this LCA are presented in the following table and in the figure above. A full table of the impact for all sizes and processes is included in the appendix.

Indicator	Bonne Suits Full Circle Suit Dyed / undyed	Conventional Cotton Suit*	Unit	Benchmark vs. conventional cotton
Climate change	19,55/ 12,07	44,70	kg CO_2-eq	56% / 73% better
Water use	480 / 323	5259	Liter water	91% / 94% better
Total distance	17850	±35.000	Kilometer	49% better
End-of-life	Bonne Suits's cotton two-piece suits contain a high concentration of cotton per m2 (380 gsm), This makes the lifetime long. Additionally, the suits are made of 100% biobased materials. With Full Circle it is possible to recycle the cotton at end-of-life.			

SOCIAL IMPACT

All Two-Piece Suits fabricated in the supplychain of Bonne Suits are manufactured in Portugal according to EU fair labour conditions and guidelines. For the organic cotton produced in Tanzania, no data is available in regards to the human right conditions of the cotton farms and factories. This should be safeguarded under the GOTS organic cotton standard, still the certificate has not disclosed information about the supplier of the Tanzanian cotton, this is a point of improvement. Bonne Suits is engaging in enhanced collaboration with the manufacturer to increase the transparency of their product.

REFLECTION & IMPROVEMENT

Breakdown of indicators

True Cost Label's LCAs are broken down in the following indicators:

- Climate change expressed in kilograms of CO_2-equivalents[1];
- Water use expressed in liters of water;
- Distance traveled in amount of kilometers.

In addition, various qualitative indicators and a social impact reflection are taken into account as shown in the previous page. By putting all of these indicators together, True Cost Label aims to provide shoppers with the most complete picture of their product before purchasing it.

Impact visualization & compensation

Bonne Suits, size M dyed have a climate impact of 19,55 kg CO_2-eq per product. The 2022 production target of Bonne Suits Full Circle Suit is estimated at 450 units, divided equally over the following sizes (XS, S, M, L, XL, XXL). The total impact of the two-piece Full Circle suit for 2022 is 8,2 tonnes of CO2-eq.

To visualize this impact, Bonne Suits would need a forest of 330 full grown trees capturing CO_2 for a year to compensate these emissions. The total water use of the cotton suits equals 220 m3 of water. Enough water to support the water demand of a family of four for well over a year (14 months).

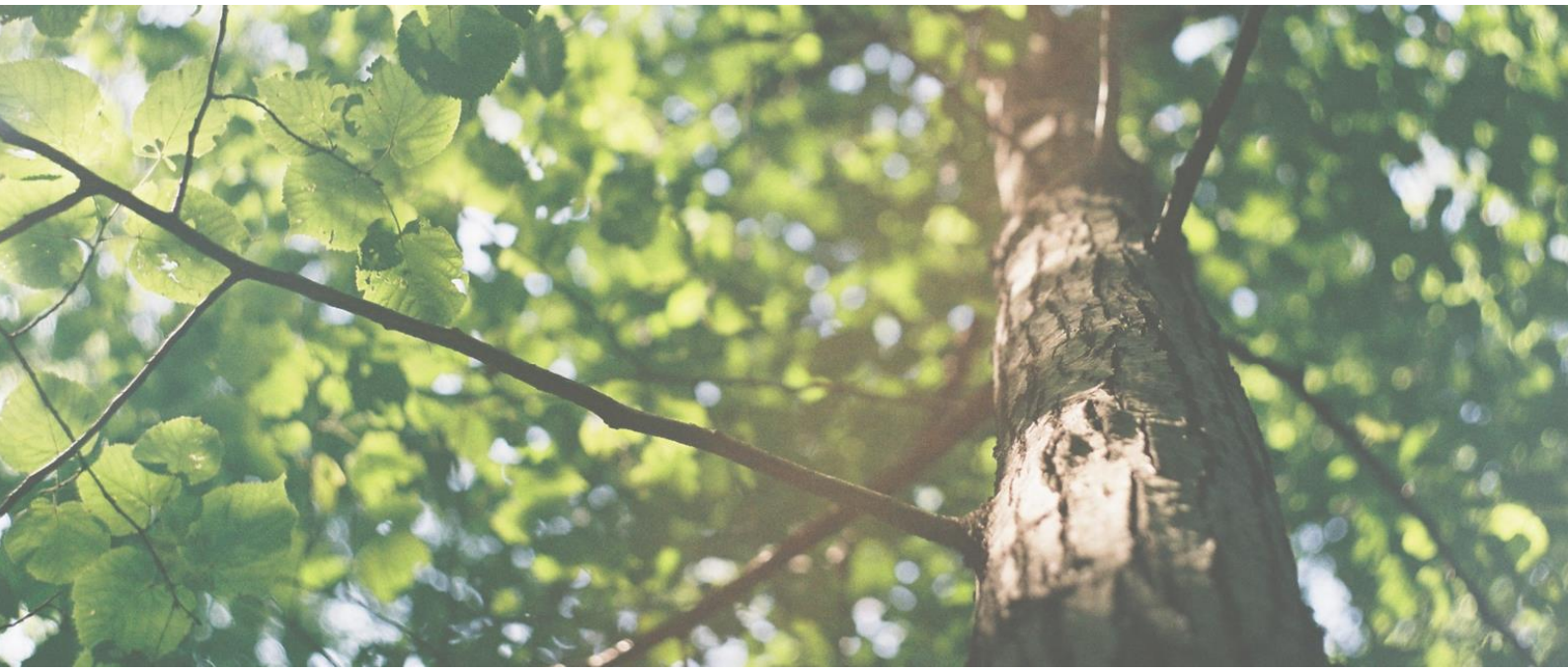
IMPACT REDUCTION STRATEGIES

The impact Bonne Suits's products have are significantly lower than conventional production when it comes to CO_2. For water there is still some improvement to be made for a more sustainable supplychain. True Cost Label provides Bonne Suits with several strategies to further lower their impact. The strategies we recommend are:

Strategy	Description
Organic Cotton	Done
Spin Dyeing	Compared to conventional Roll dyeing, spin dyeing uses much less water and little dye. Switching to innovative dyeing techniques such as spin-dyeing can reduce the impact by 80% for water & CO_2.. Spin-dyeing is a popular innovation in Portugal.
Renewable Energy	To lower the impact of all manufacturing processes, Reflexomania is suggested to fully switch to renewable sources of energy for its electric processes and steam generated processes. This can be done using solar- and wind energy. The Indian energy grid is largely running on fossil coal energy, steam is generated by gas and oil. Replacing these energy sources is a promising strategy to nullify impact coming from machinery use. (~-90%)
Recycled fiber	Done
Social Impact	Standards such as SMETA, RAP and SA8000 could be used to certify the manufacturer. These are strict audits ensuring a good social impact. Despite EU labour conditions in Portugal, workers are often still disadvantaged through overhours, underpayment and unsafe working environments.

[1] A CO_2 equivalent abbreviated as CO_2-eq is a measure used to compare emissions from various greenhouse gases on the basis of their global-warming potential.

IMPACT VISUALISATION



330 trees are needed to compensate the climate impact of 450 Bonne Suits' Two piece suits

450 two piece full circle suits need the same water as **1 family of 4 in 1 year**

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LCA ASSUMPTIONS

The following summary represents some important assumptions made during the Life Cycle Analysis conducted for Bonne Suits:

- LDPE polybag 50 mu for packaging

- Transport from Tanzania by ship via Suez Canal, 5500 nautical miles, 5000 extra km assumed for collection of cotton scraps for recycled cotton from Europe.

Truckload of 24-32 tons average fuel has been assumed. 2100 km inland transport calculated from Portugal to Netherlands. 250 km truck transport assumed between manufacturing locations of suppliers, 500 km assumed from production and manufacturing location to nearest average harbour both in Tanzania and Portugal.

- Laser cutting, and electric sewing has been assumed for production in Western Europe.

- Tanzanian Power grid based on national energy grid source: 55% natural gas, 35% hydro power, 5% oil, <1% biomass

LIFE CYCLE INVENTORY

The following processes were included in the LCA for Bonne Suits

Bonne Suits

Scope: Cradle-to-gate

Production
- Tanzania } Production of Organic Cotton

Manufacturing
- Tanzania | Ginning of Cotton, heat drying
- Portugal | Ring-spinning of cotton, 200 dtex
- Portugal | Roll/piece dyeing, reactive dyes & chem. ***(for dyed version)***
- Portugal | Washing & softening
- Portugal | Centrifugation, drying, wastewater tm.
– West EU | weaving, 200 dtex.
– West EU | Cutting, sewing, ironing & packaging
- Global | Brownpaper FSC

Transport
- Truck +Trailer average 24-32T capacity
- International Freight Carrier (ship) transoceanic

Impact per size

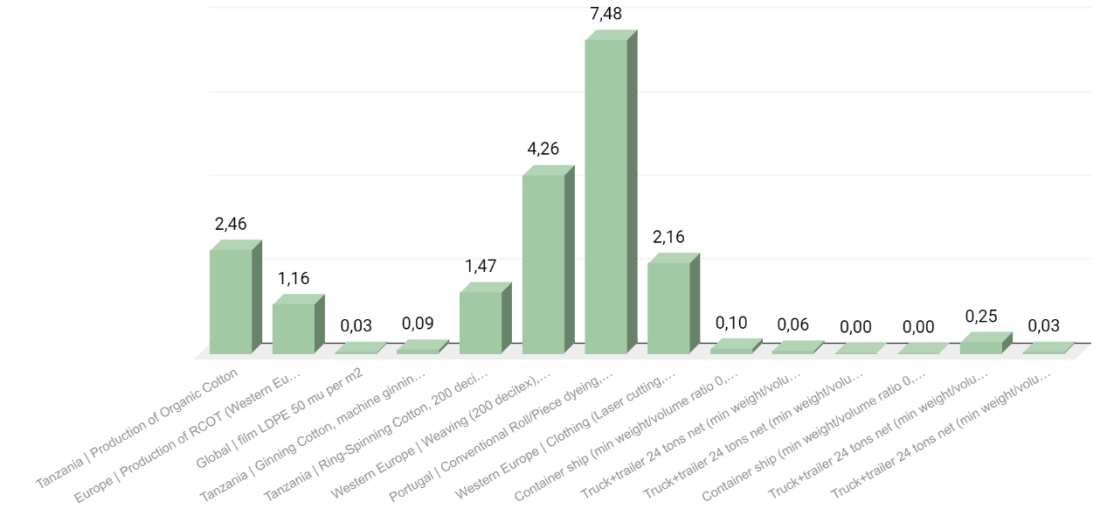
Two Piece Full Circle Suit	Dyed						
Indicator	XS	S	M	L	XL	XXL	Unit
Climate change	18,15	18,85	19,55	20,25	20,94	21,64	kg CO_2-eq /item
Water use	446	463	480	497	515	532	Liter H2O /item
Total distance	17850 (applies for all sizes)						Kilometers /item

Two Piece Full Circle Suit	Undyed						
Indicator	XS	S	M	L	XL	XXL	Unit
Climate change	11,21	11,64	12,07	12,50	12,93	13,36	kg CO_2-eq /item
Water use	300	312	323	335	347	358	Liter H2O /item
Total distance	17850 (applies for all sizes)						Kilometers /item

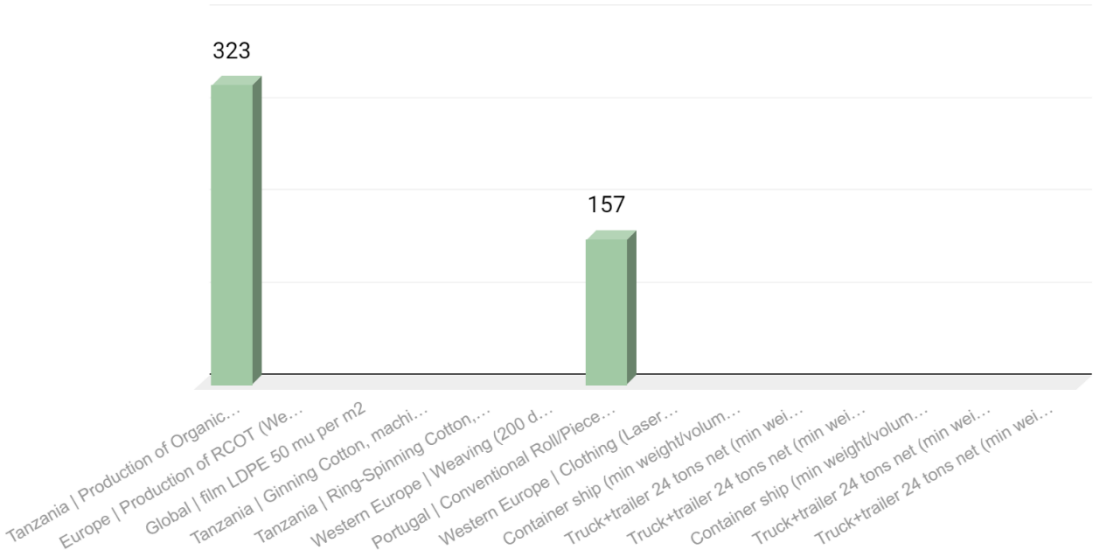
APPENDIX A: IMPACT SHARE PER STEP OF THE SUPPLYCHAIN

DYED

Climate change (kg CO2-eq) per product (1,4 kg, size M)

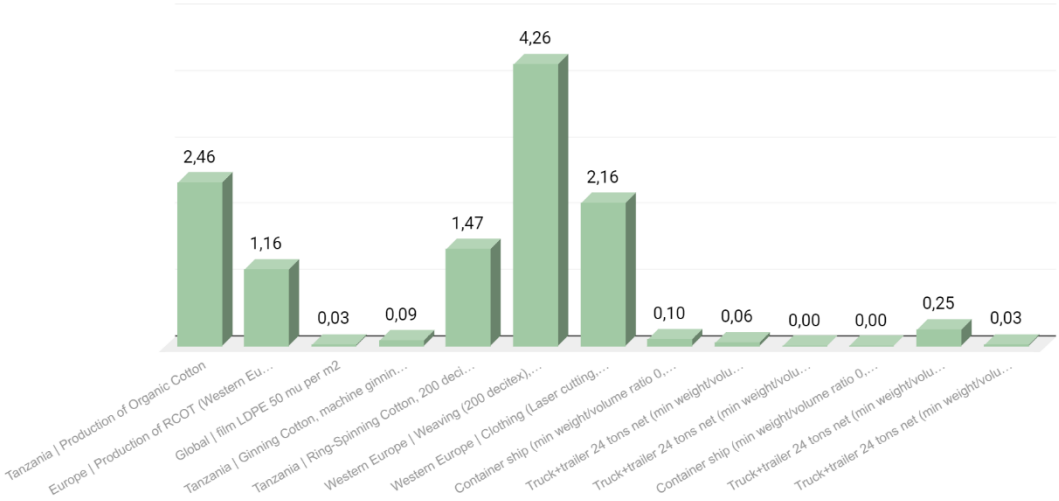


Water Use (Liters) per product (1,4 kg, size M)

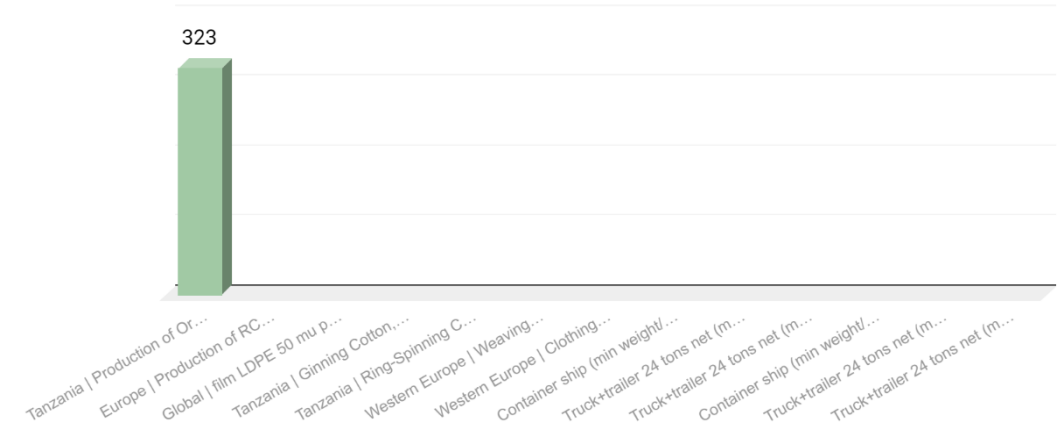


UNDEYED

Climate change (kg CO2-eq) per product (1,4 kg, size M)



Water Use (Liters) per product (1,4 kg, size M)



HOW WE GENERATE THE TRUE COSTS OF YOUR PRODUCT

All LCAs made by True Cost Label B.V. including the data and methods contained within are calculated using our own developed tool, the 'True Cost Generator'. A custom LCA tool built by True Cost Label, specifically for Fashion LCAs and the detailed supply chains of the fashion industry.

1 **Software, Databases and Methodology applied.**
We apply OpenLCA[1] software to access input data for the True Cost Generator, with data mainly but not exclusively deriving from the following databases:
Ecoinvent 3.6 [2];
Idemat 2021 by TU Delft [3];.

2 **We apply the following Impact Assessment Methods for data retrieved and used in our LCAs**
A) Carbon footprint: IPCC 2013 GWP 100a [4] as recommended by the European Platform on Life Cycle Assessment: ILCD [5] (International Reference Life Cycle Data System);
B) Water Depletion: ILCD 2011; Resource depletion - water; midpoint; freshwater scarcity; Swiss Ecoscarcity 2006.
C) Total distance in kilometer and mode of transport: Supply chain data provided by the customer in combination with Google maps and Sea Distances.

In addition, LCA data is included from carefully selected LCAs from peer reviewed scientific papers.
This is mostly done for innovative textile production processes or processes poorly modelled in existing databases. Assumptions made for these additions are stated in detail in each report

3 **Goal and scope**
We calculate our LCAs with a functional unit of total impact per kg of product from the raw materials to the manufacturing of the product with all transport processes included. (Cradle-to-Gate).

4 **Standardization**
True Cost Label Applies the ILCD method for its impact numbers, which is standardized according to EU-PEF method: European Product Environmental Footprint (EC, 2018. Product environmental footprint category rules, version 6.3). Our LCAs, LCA Reports and advise given based on LCA results follow the general principles of the ISO14044 quality standard for Life Cycle Assessment

5 **References:**
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3. https://www.ecocostsvalue.com/EVR/model/theory/5-Idemat.html
4. https://www.ipcc.ch/
5. https://eplca.jrc.ec.europa.eu/uploads/ILCD-Recommendation-of-methods-for-LCIA-def.pdf
6. https://www.iso.org/standard/38498.html

REFERENCES

Practical LCA data is included based on carefully selected LCIs from peer reviewed papers, scientific databases for various textile processes and several business literature sources for impact comparisons:

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- Average yearly carbon compensation of trees: Encon (2020), Trees for all (2020), IPCC (2020), Climate Neutral Group (2020), Arbor Environmental Alliance (2020)

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FINAL NOTE

The LCAs conducted by True Cost Label are continuously updated and improved in line with changing regulations, standardizations and new publications of data sources providing increasingly higher data quality. Therefore, it may be the case that these numbers will be updated in the future at the product display on the True Cost Label platform.

True Cost Label aims for 100% transparency 100% of the time. That said, the ultimate goal is to use actual factory data from the very supply chain parties involved in the Cradle2Gate lifecycle of every product that runs on the platform. This way all brands connected to True Cost Label will be at a 100% transparency with real-time impact data of the product's supply chain. To ensure this goal True Cost Label will keep innovating and streamlining its processes.

Only together we will be able to shift the fashion industry into a new sustainable paradigm. United as one force. Love the planet, love your fashion.