

TRUE COST LABEL

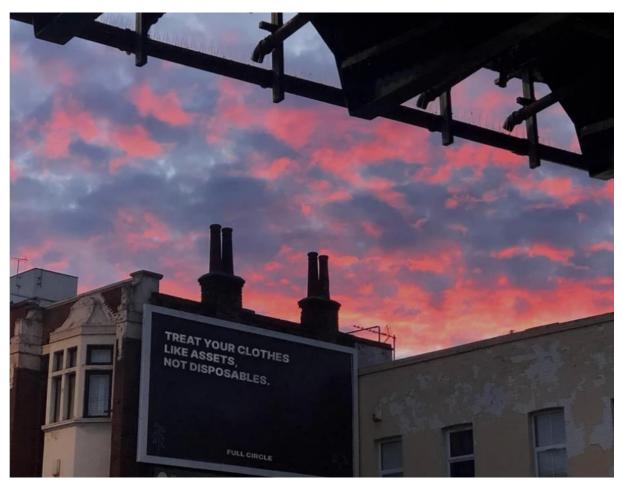
## **ABOUT THIS REPORT**

This Life Cycle Analysis report has been constructed in consultation to the Full Circle brand to reveal the invisible costs of their sustainable garments. A True Cost Label impact profile has been generated to show consumers the impact their t-shirts have on the planet and its people. To help consumers make more informed decisions, Full Circle's t-shirts are benchmarked with t-shirts of the same material composition according to conventional industrial practices. As a frontrunner, Full Circle 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 Full Circle'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.

# Figure 1: Full Circle Supply chain:

## **FULL CIRCLE T-SHIRTS**

For Full Circle, True Cost Label conducted an LCA for four of their t-shirt designs: Full Circle *Grey (low-*impact Spin-dyed) T-shirts and Full Circle *Black, Blue & White* (Roll-dyed) T-shirts. The supply chain for these two products is similar except for a different dyeing process. Where Spin-dyeing is a best practice low-impact dyeing technique, Roll-dyeing, also known as Piece dyeing, is a more conventional, typical practice.

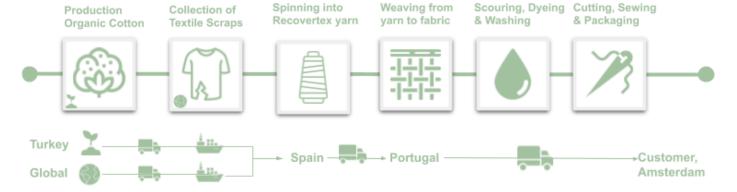
# Material Composition

Material composition of the T-shirt:

- 51%\* Recycled Cotton GRS certified;
- 49% Organic Cotton GOTS certified;(\* 1% due to label weight)

# The supply chain

Recycled cotton is produced in Spain from cotton scraps collected globally then processed to fiber and mixed with certified organic cotton fibers from Turkey to form Recovertex Yarns, a product by Hilaturras Ferre (Spain). From the factory of Hilaturas Ferre in Spain, the yarns are transported to Portuguese manufacturer SCOOP near Porto. There the yarns are woven into cloth, dyed according to the design, cut and sewn into t-shirts. From Portugal the shirts are packed and transported to consumers.





Kilogram CO<sub>2</sub>

Around the word

**Recycled Material** 

## **LCA RESULTS**

The results of this LCA are presented in the following table and in the figure above:

Indicator	Spin-dyed	Roll-dyed	Industry average*	Benchmarking (spin-/roll-dyed)	Unit
Climate change	1,99	3,36	6,49	69% / 48% Better than average	kg CO2-eq / product
Water use	78	94	1044	92% / 91% Better than average	Liter H2O/ product
Total distance	15,700	15,700	±35,000	±45% Better than average	Km distance / product
Recycled material	Yes	Yes	No		
Biobased material	Yes	Yes	Yes		
Reused material	No	No	No		

<sup>\*</sup> An industry average t-shirt is used in comparison. The LCA for this t-shirt is based on a t-shirt produced in China from commodity trade mix cotton.

# **SOCIAL IMPACT**

In regard to social impact, the T-shirts sold by Full Circle are sourced from certified sources and further manufactured in Spain and Portugal according to EU labour standards and legislation. In the near future Full Circle will start auditing their supply chain using the ETI framework and social conduct.

During and after use of t-shirts from Full Circle, consumers can return their Tshirts at end-of-life to receive a discount on a 2<sup>nd</sup> generation T-shirt, 100% recycled and made from the materials of their own returned products.



## **REFLECTION & IMPROVEMENT**

## Breakdown of indicators

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

- Climate change expressed in kilograms of CO<sub>2</sub>-equivalents<sup>1</sup>;
- Water use expressed in liters of water;
- Distance traveled in number of kilometers.

In addition, various qualitative indicators, a social impact reflection and transparency score is 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

Full Circle T-shirts have a climate change impact of 1,99 (spin-dyed) and 3,36 (rolldyed) kg CO<sub>2</sub>-eq per item. The 2020 production target of Full Circle was set at 1500 items, equaling a total of 4,25 tons of CO2. This total is equally accounted for by the four color options (25% spin-dyed for Grey, 75% roll-dyed for Black, Blue & White). To visualize this impact, Full Circle would need a small forest of 158 full grown trees capturing CO<sub>2</sub> for a year to compensate these emissions. The total water use of the 1500 shirts equals 135000 liters or 135 m3 of water. Enough water to support the full water demand of a family of four people for 1 year.

# Strategies for improvement

Full Circle uses recycled and organic cotton fibers resulting in great sustainability scores. Using their circular economy strategy, they manage to beat industry average by 56% (spin-dyed) and 21% (roll-dyed) on climate impact and an astonishing 90% on water use due to the prevention of impact intensive cotton production. Still, the fibers travel a great distance, enough to circle the earth's equator halfway despite manufacturing happening in Europe. In addition to the achieved sustainability of Full Circle, True Cost Label suggests several strategies for improvement.

Strategy	Description
Transparency	Identifying the origins of cotton producers and cotton scrap sources going to Spain will generate more insights in the production standards and social conducts of the supply chain.
Climate Change	As can be seen with the Spin-dyed t-shirt, a significant amount of impact is generated from the conventional roll-dyeing process. It might be worth investigating with the manufacturers what can be done to create more low-impact dye designs for their t-shirts.
Compensation	Full Circle can investigate a certified party for afforestation ahead of production as a means to compensate for climate impact generated by the production of their t-shirts. Even though carbon compensation is never the full solution to create climate neutrality, it does mediate some of the impact. Read more in this article

<sup>&</sup>lt;sup>1</sup> A CO<sub>2</sub> equivalent, abbreviated as CO<sub>2</sub>-eq is a measure used to compare emissions from various greenhouse gases on the basis of their global-warming potential (GWP).

# **IMPACT VISUALISATION**



**158 trees** are needed to compensate the climate impact of 1500 Full Circle shirts

1500 Full Circle shirts need the same water as **one family of for 9 months** 



## LIFE CYCLE INVENTORY

# The following processes were included in the LCA for Full Circle T-shirts

## Production

- Production of recycled cotton (GRS)
- Production of organic cotton (GOTS)

## Manufacturing

- Spain: Cotton Ginning, incl hot air drying
- Spain: Ring-spinning cotton fibers 200 decitex
- Portugal: Knitting yarns at 200 decitex (35ECC)
- Portugal: Spin-dyeing, incl. Scouring and after care
- Portugal: Roll dyeing, including Scouring Reactive Dyes, Chemicals, Softening, Washing. Centrifugation & Drying & Wastewater treatment;
- Europe: Laser Cutting. Sewing, Ironing & Packaging
- Medium voltage electricity, Spain & Portugal
- Grid electricity, Industry Western Europe

## **Transport**

- Truck + trailer 24 tons net capacity (0,32 t/m3)
- Container ship (> 0,41 ton/m3) w/v ratio

# **OUR METHODOLOGY**

## Life Cycle Scope

The scope of our LCAs are set at Cradleto-Gate (C2G) representing the impact of raw materials turned into a product to the point at which the product is sold to a consumer. The following assumptions were made to conduct the full Life Cycle Analysis for Full Circle Clothing T-shirts:

- Market data from LCA databases has been used to generate the final impact scores. These datapoints are specified per country based on the specific grid compositions of those countries;
- Common transportation routes and shipping routes are assumed between the production, manufacturing and retail locations;
- Transport harbors for Full Circle Supply chain set at Izmir (Tr) <-> Alicante (Es)
- A decitex of 200 dernier has been assumed for the spinning and knitting process based on average English Cotton Count of 20-40 ECC
- Full circle applies sustainable packaging, which is not yet included due to lack of data, average packing is included.
- For the industry average comparison, all fibers are simulated as conventional cotton fibers, including conventional and typical production countries, shipping routes and processes, the supply chain is modelled for China using global cotton commodity trade mix.
- Impact of cutting waste marginalized

# **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.

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

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

References:

- 1. https://www.openica.org/
- 2. https://www.ecoinvent.org/database/older-versions/ecoinvent-36/ecoinvent-36.html
- 3. https://www.ecocostsvalue.com/EVR/model/theory/5-idemat.html
- 4. https://www.ipcc.ch/
- 5. https://epica.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:

- Average yearly water use of Dutch households (multiple sources): Engie: Gemiddeld waterverbruik in Nederland, Vewin 2019, omgerekend door Nibud 2019 en Waternet 2020
- Average yearly carbon compensation of trees: Encon (2020), Trees for all (2020), IPCC (2020), Climate Neutral Group (2020), Arbor Environmental Alliance (2020)
- Bartl, A. (2009). Fiber recycling: potential for saving energy and resources.
- Esteve-Turrillas, F. A., & de La Guardia, M. (2017). Environmental impact of Recover cotton in textile industry. Resources, conservation and recycling, 116, 107-115.
- ISO, 2006a. 14040: Environmental management life cycle assessment requirements and guidelines. International Organization for Standardization.
- ISO, 2006b. 14044: Environmental management life cycle assessment principles and framework. International Organization for Standardization.
- Ismail, S. A., Chen, G., Baillie, C., & Symes, T. (2011). Energy uses for cotton ginning in Australia. Biosystems engineering, 109(2), 140-147.
- Idematapp 2021, accessed through https://www.ecocostsvalue.com/data/
- Koc, E., & Kaplan, E. (2007). An investigation on energy consumption in yarn production with special reference to ring spinning. Fibres & Textiles in Eastern Europe, (4 (63)), 18-24.
- OpenLCA 1.10, accessed through https://www.openlca.org/.
- Ecoinvent 3.6, accessed through OpenLCA 1.10.
- Shen, L. (2011). Bio-based and recycled polymers for cleaner production: an assessment of plastics and fibres (Doctoral dissertation, Utrecht University).
- Sule, A. (2012). Life Cycle Assessment of Clothing Process. Research Journal of Chemical Sciences
- Terinte, N., Manda, B. M. K., Taylor, J., Schuster, K. C., & Patel, M. K. (2014). Environmental assessment of colored fabrics and opportunities for value creation: spin-dyeing versus conventional dyeing of modal fabrics. Journal of cleaner production, 72, 127-138.
- Textile Exchange (2017) Material Snapshots of various textile fibers
- van der Velden, N. M., Patel, M. K., & Vogtländer, J. G. (2014). LCA benchmarking study on textiles made of cotton, polyester, nylon, acryl, or elastane. The International Journal of Life Cycle Assessment, 19(2), 331-356.
- VTT, Technical Research Centre Finland, Environmental Performance of Printing Cotton, 2014 Noterman, J. (2020). SPGprints, Digital textile printing and sustainability: reducing the ecological footprint of printing



## **FINAL NOTE**

The LCAs conducted by True Cost Label B.V. 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 score 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 will we be able to change the fashion industry to a new sustainable paradigm. United as one force. Love the planet, love your fashion.





