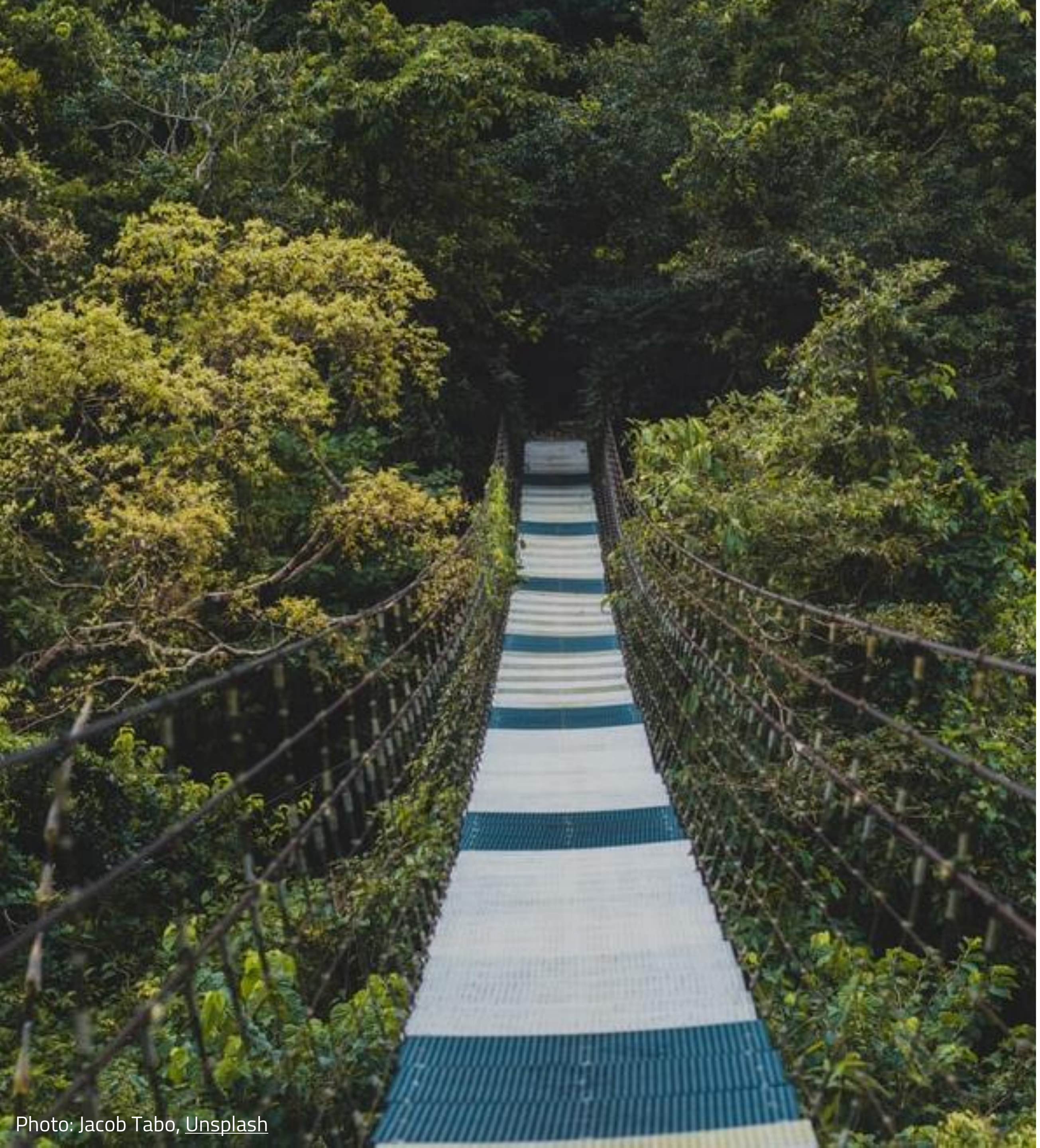
LCA - quala t-shirts

Use cases & comparisons

quala

SUSTAINOR

June 2022



Contents

Summary of the current report

LCA in a nutshell

Life cycle analysis (LCA) is a scientific method that is used to evaluate the environmental impact of a service/product through its life cycle, including the extraction and processing of the raw materials, manufacturing, distribution, use, potential recycling, and final disposal.

Circular economy

Circular economy is a production and consumption model, which involves reusing, sharing, repairing, refurbishing and recycling existing products and materials to reduce waste to a minimum. The fashion industry is a significant polluter, and there is a need of sustainable solutions that are friendly for the environment.

Key findings

The present report investigates the impacts of a conventional cotton/PET t-shirt and the eco-friendly Quala t-shirt. Quala implements an upcycling and circular economy concept that significantly reduces the impact of the manufacturing of clothes, while reducing waste and giving new life to discarded textiles.

Life Cycle Analysis

Life Cycle Analysis

LCA is a commonly used and accepted method for assessing environmental impacts of the life cycle of a product from cradle to grave. This includes all life cycle phases, such as raw material extraction and processing, product manufacturing, distribution, use and disposal.

Quala aims to quantify the environmental impacts of its production method to minimize emissions, and to have a better insight on their operations by performing an LCA. Moreover, an LCA of a conventional t-shirt is also performed to compare the total emissions and to have a baseline for comparisons with fast-fashion brands.

The entire value chain of quala is investigated; sourcing the materials, transporting them to the manufacturing facility, the t-shirt production, t-shirt delivery and t-shirt disposal are included in the assessment and several climate impacts are calculated.

A cradle-to-grave assessment is performed. This includes the product life cycle from resource extraction (cradle) to its disposal (grave). The functional unit of the LCA is defined as 1 t-shirt.

In general, LCA studies have certain limitations, as they rely on assumptions and scenarios. An LCA assesses the real world in a simplified model. The present LCA result cannot be compared to the result of another LCA, unless all assumptions and modelling choices are equal. The results of the impacts shall be used with care as the uncertainties of the results are, in certain cases, high.

Life Cycle Impact Assessment

Life cycle impact assessment (LCIA) is among the last steps of an LCA. The purpose of it is to provide the information to assess the inventory results and to help the end-user understand the environmental impacts (and the significance) of a natural resource use, and its subsequent environmental releases.

For the present study, the Environmental Footprint 3.0 (EF 3.0) method has been chosen as the LCIA method to quantify the environmental impact of the quala product. This method builds on existing standard and approaches, and its purpose it to enable the reduction of environmental impacts of goods and services, including supply chain activities. To achieve this, this method models all environmental impacts of the flows of materials, energy, emissions and waste streams associated with the product through its life cycle. This methods enables more reproducible and comparable LCAs, compared to most alternative approaches.

Once the Life Cycle Inventory (LCI) has been compiled, the EF impact assessment is used calculate the environmental performance of the product, through all EF impact categories and models.

Impact categories

Acidification	Human toxicity, cancer - metals
Climate change	Human toxicity, cancer - organics
Climate change - Biogenic	Human toxicity, non-cancer
Climate change - Fossil	Human toxicity, non-cancer - inorganics
Climate change - Land use and LU change	Human toxicity, non-cancer - metals
Ecotoxicity, freshwater	Human toxicity, non-cancer - organics
Ecotoxicity, freshwater - inorganics	Ionising radiation
Ecotoxicity, freshwater - metals	Land use
Ecotoxicity, freshwater - organics	Ozone depletion
Eutrophication, freshwater	Particulate matter
Eutrophication, marine	Photochemical ozone formation
Eutrophication, terrestrial	Resource use, fossils
Human toxicity, cancer	Resource use, minerals and metals
Human toxicity, cancer - inorganics	Water use

Fashion Tech & Quala

Photo: Soroush Zargar, Unsplash

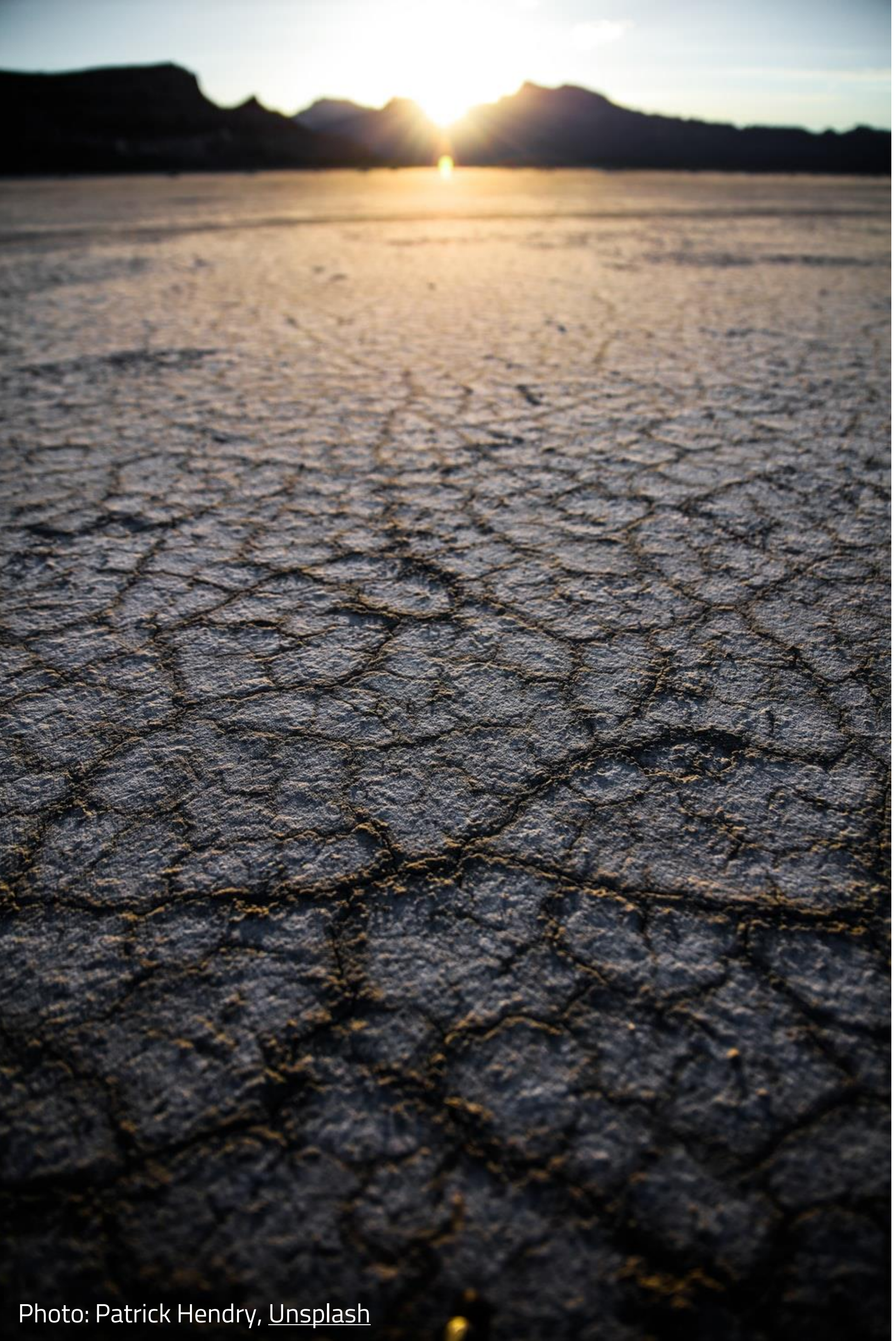


Photo: Patrick Hendry, Unsplash

SUSTAINOR quala

Environmental impact of fashion industry

Fashion production contributes up 10% of humanity's carbon emissions and 85% of all textiles go to the landfill each year[1]. Industrial clothes manufacturing **dries up water resources and pollutes** using dyes, chemicals, water and energy and especially **cotton and polyester,** the main materials of used for t-shirt production.

Conventional cotton production has a significantly negative environmental impact, due to soil degradation, high water demands and the use of pesticides & chemical fertilizers.

Around 50% of the global cotton production comes from India and China, usually with poor agriculture practices.

Polyester or PET is plastic molded into filaments woven into fabric with cotton fibers. Its manufacturing is based on fossil fuels and significant water use, and it causes emissions in the air and water.

Polyester breaks down into microplastics, non-biodegradable materials that stay in land, oceans and sweet water reserves.

1. United Nations Economic Commission for Europe, 2018

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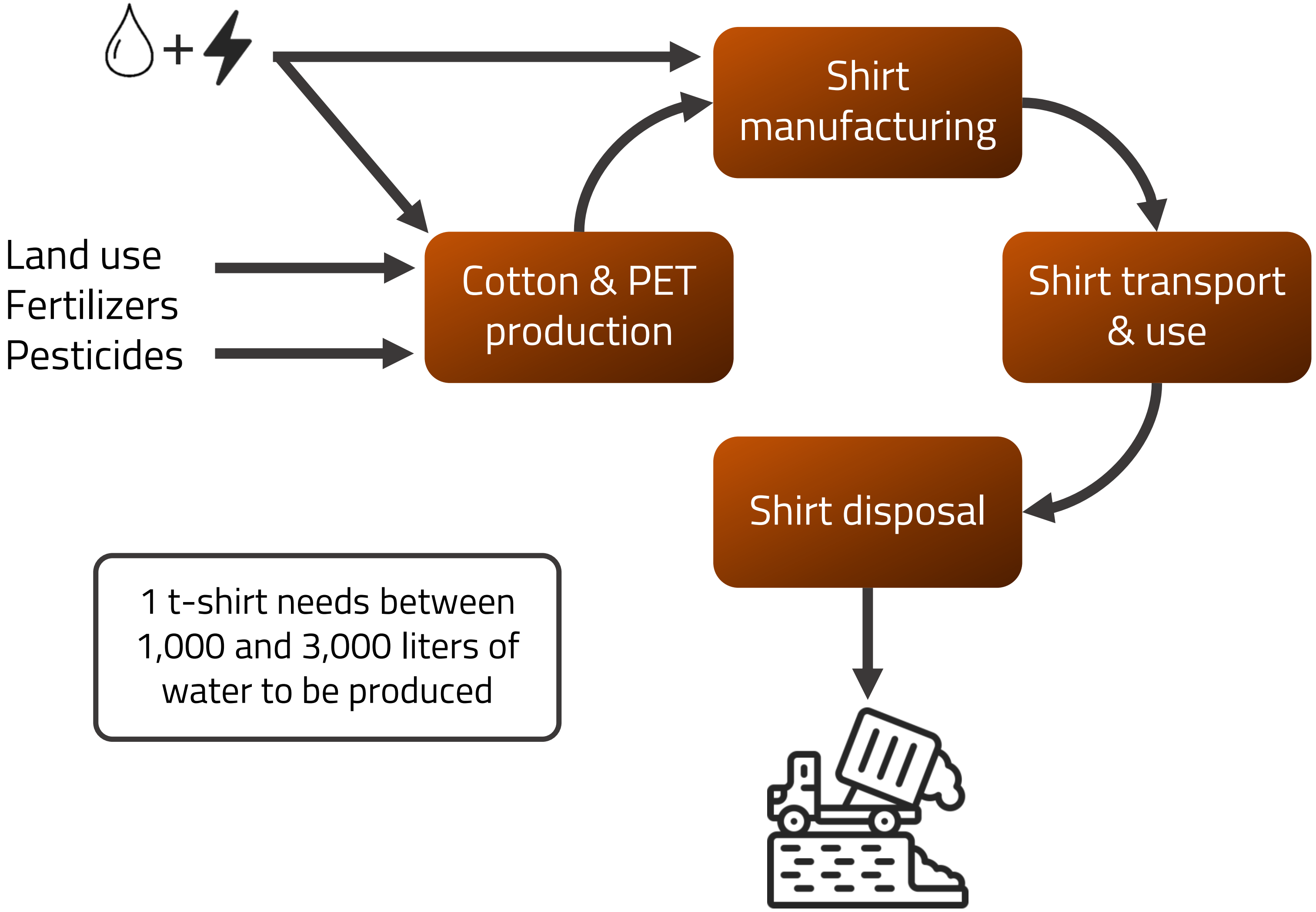
Conventional t-shirt production

Photo: Francois Le Nguyen, **Unsplash**



1 t-shirt needs between 1,000 and 3,000 liters of water to be produced

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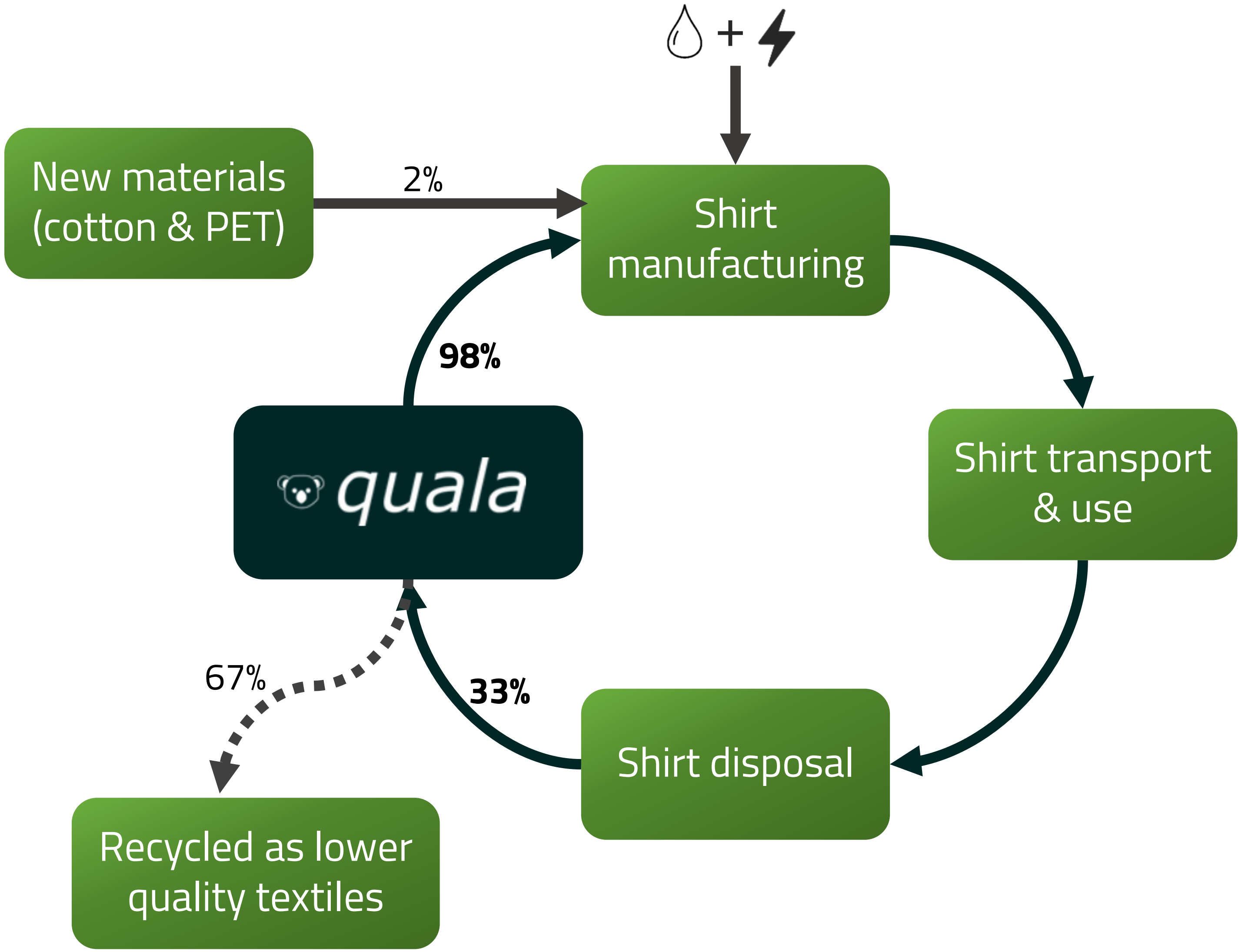
Quala t-shirt production



Quala t-shirt production

The Danish firm quala has created a circular production method to reduce the environmental impact of the clothing industry.

Its mission is to use recycled materials and to offer a sustainable solution for this global challenge.

Quala is a brand that has a direct positive effect on the industry's environmental challenges, and it has already given more than 10,000 t-shirts a better fate.

The journey of a quala t-shirt begins at Danish commercial laundries, instead of an oil refinery (as plastic) or in a field (as cotton). Every year, several thousand tonnes of discarded textiles would normally be discarded, but with quala, they become the foundation for new ideas and growth. All materials are checked and sorted for obtaining the highest quality, while discarding as little as possible.

At the end, 3 discarded t-shirts are combined into a durable and upcycled quala t-shirt, with the rest of the textile to be recycled for other applications.

LCA study

Software

The software tool, openLCA, was used in the present study. It is the world's leading, high performance, open-source Life Cycle Assessment software. It has several distinct features that allow fast and reliable calculations of Life Cycle Assessment, with detailed insights and analysis results, throughout the life cycle, investigating every process and impact category.

OpenLCA is preferred, because it offers transparency and accessibility, unlike any other LCA software. Through the software's flexibility, there is no need for coding and the user is not locked in our bound by a closed source, black box software. Since the code and the program is free and accessible, anyone can see the quality of the study. The code can be inspected for any potential issues, including security and any malicious behaviour. All the above make openLCA an ideal software for research and industrial purposes.

Database

The ecocosts_IDEMAT (short for Industrial Design & Engineering MATerials database) database was used for the inventory. It is a compilation of LCI data of the Sustainable Impact Metrics Foundation (SIMF), a non-profit spin-off of the Delft University of Technology. It is designed for designers, engineers and architects in the manufacturing and building industries.

The dataset was originally developed for educating approximately 500 students each year on how to perform and apply LCA. Its aim was to achieve better accuracy than Ecoinvent for the main emissions (CO_2, SO_2, NO_2, $PM_{2.5}$, etc.) in relation to electricity and transport, and to offer extra data on end-of-life credits for recycling and combustion with heat recovery, and to provide extra data on plastics, alloys, and wood species.

Data is based on peer-reviewed scientific papers, and some LCI's made by Delft University of Technology, as well as Plastics Europe. The remaining background processes are from ELCD, USLCI, Probas, USLCI, EI, CESedupack and Chalmers University. The aim of all these sources, is to replace these remaining background LCIs by processes from scientific literature in peer reviewed papers, since many background databases appear to be inaccurate (outdated, or based on generic statistics, rather than process flows).

Key differences and similarities

Differences

Quala uses discarded t-shirts as the sources of cotton and PET. Fast fashion requires grown cotton and fossil fuels for the PET.

It uses recycled paper in the hangtag, instead of paper or plastic.

The above practices translate in reduced energy, water & transportation emissions.

Quala potentially offers an increase life cycle as its products are more durable than conventional t-shirts.

Similarities

Both t-shirt types share most of their primary materials (cotton & PET).

Both t-shirt types are produced in Portugal, delivered to Denmark and they are shipped in the same packaging.

Both t-shirts are considered to have the exact same use by the consumer in terms of wearing, washing, etc.

The consumers would discard both t-shirt types in the same way.

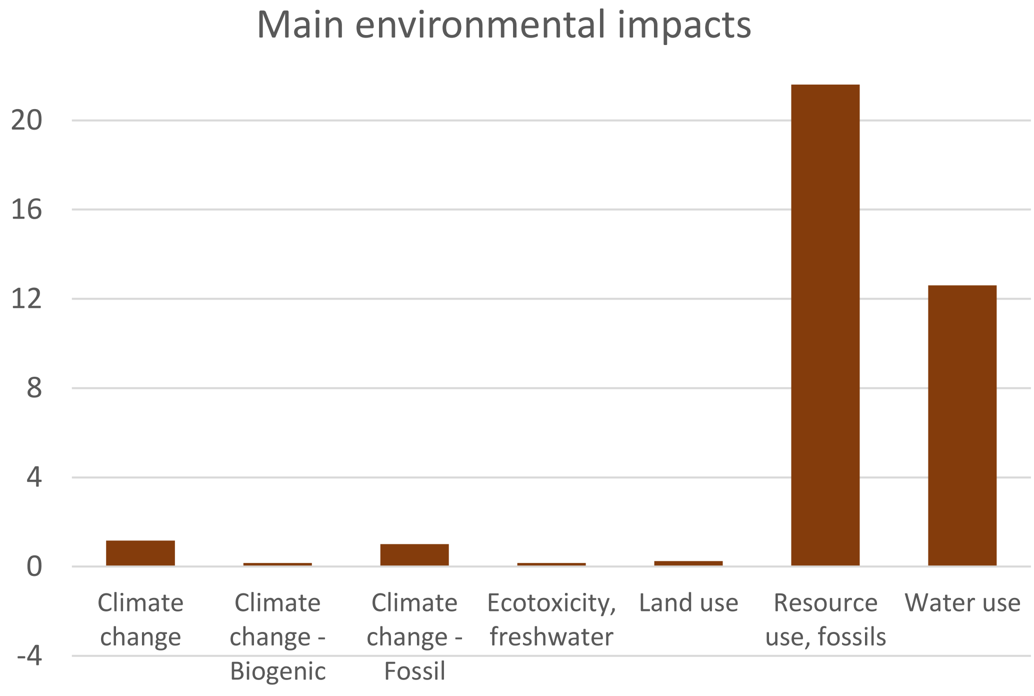
A detailed table with all the inputs per t-shirt type is presented in the Appendix

LCA Results: Conventional t-shirt

From a first look, the main impacts are attributed to the use of fossil resources and to the use of water. The former is from the need of raw materials (petroleum oil) and the energy requirements to produce polyester. Cotton on the other hand, requires high volumes of water for its production and its processing.

The impact on climate change is both biogenic (cotton disposal) and fossil (transportation, processing, energy). The disposal of cotton contributes to a landfill contributes some biogenic emissions like CO_2 and CH_4, while the transportation and processing of materials, as well as the extraction and production of polyethylene contribute around 1 kg of CO_2 eq. emissions, for a t-shirt that weighs 240 grams.

The use of chemicals and fertilizers also contributes to some ecotoxicity impact categories, mostly due to organic and inorganic pollutants that leak into freshwater sources, like rivers, lakes and groundwater.



Impact category	Result	Reference unit
Climate change	1.2	kg CO_2 eq
Climate change - Biogenic	0.2	kg CO_2 eq
Climate change - Fossil	1.0	kg CO_2 eq
Ecotoxicity, freshwater	0.2	CTUe
Land use	0.3	Pt
Resource use, fossils	21.6	MJ
Water use	12.6	m^3 deprived

Full results are available in the Appendix

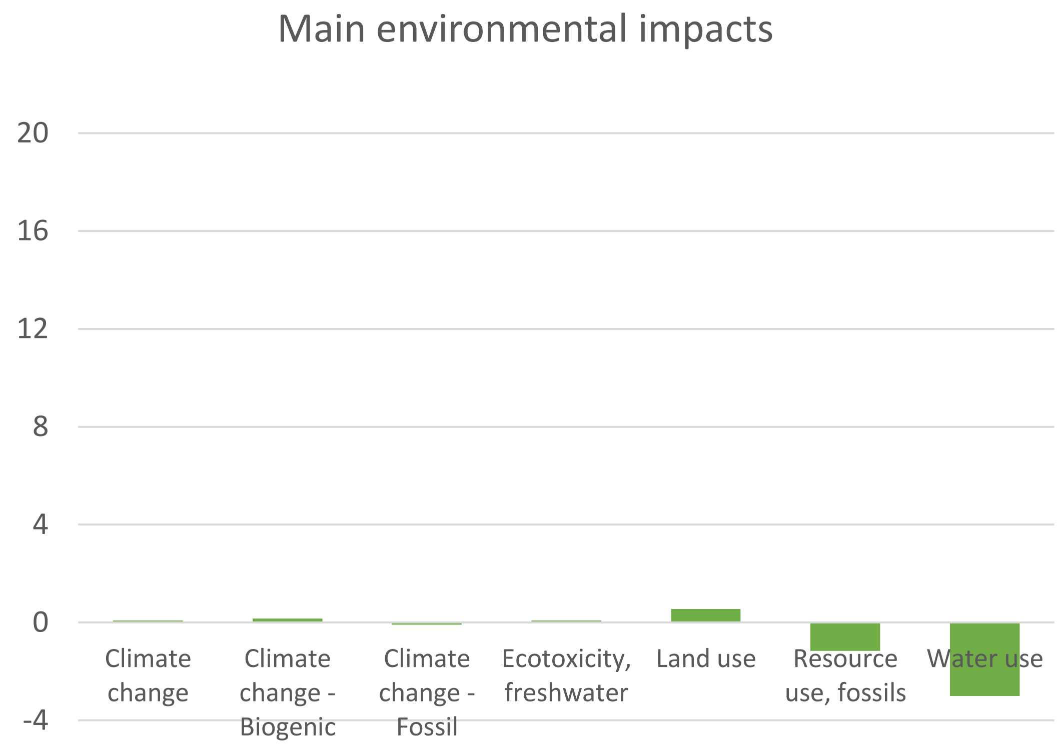
LCA Results: Quala t-shirt

The present analysis confirmed the hypothesis and indicates that a quala t-shirt has reduced impacts in the main impact categories, when compared to the production of other t-shirts.

From a quick look, both the fossil resource use and water use impacts are eliminated. This occurs as there is not any extraction of fossil fuels to produce new PET and 98% of the quala cotton fibers are recycled fibers. The total transportation of materials is decreased and there is not a significant need for water. The negative impacts of the two categories indicate that the quala process has the potential to reduce the fossil and water demands from other processes. These impacts are also affected from the assumption that at least 30% the leftover materials of the process can be downcycled to lower quality textiles and to be used in other applications.

A quala t-shirt has a significantly reduced impact on fossil climate change, however it has similar biogenic CO_2 eq. emissions, because we assumed that both t-shirts would be disposed in a landfill.

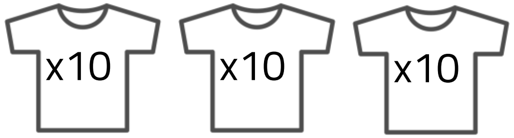
Finally, freshwater ecotoxicity is also reduced by a significant amount, close to 50%.



Impact category	Result	Reference unit
Climate change	0.1	kg CO2 eq
Climate change - Biogenic	0.2	kg CO2 eq
Climate change - Fossil	-0.1	kg CO2 eq
Ecotoxicity, freshwater	0.1	CTUe
Land use	0.6	Pt
Resource use, fossils	-1.2	MJ
Water use	-3.0	m^3 deprived

Full results are available in the Appendix

Use cases and scenarios

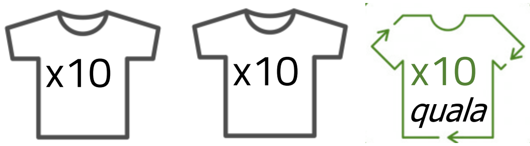


30 conventional t-shirts (2 years supply)

In this baseline scenario, the consumer purchases and uses 30 "average" white t-shirts over the course of two years.

These t-shirts are made from cotton and PET (60%-40%). Their production requires goods that are transported from 1000's of km away and the extraction of raw materials, fossil fuels and water.

After the end of the products' life, in the most likely scenario, they would be discarded in a landfill.



10 quala t-shirts & 20 conventional t-shirts (2 years supply)

In the 2nd scenario, the consumer chooses to purchase 10 quala t-shirts and 20 "average" t-shirts.

The quala t-shirts are made from discarded t-shirts, that would otherwise end up in a landfill or an incineration plant. By replacing a third of their purchased t-shirts, the consumer makes a sustainable choice that reduces the impacts of the fashion industry, due to the reduced demand for new cotton fibers and polyester (PET).

10 quala t-shirts

[assuming they can withstand triple wear and tare]

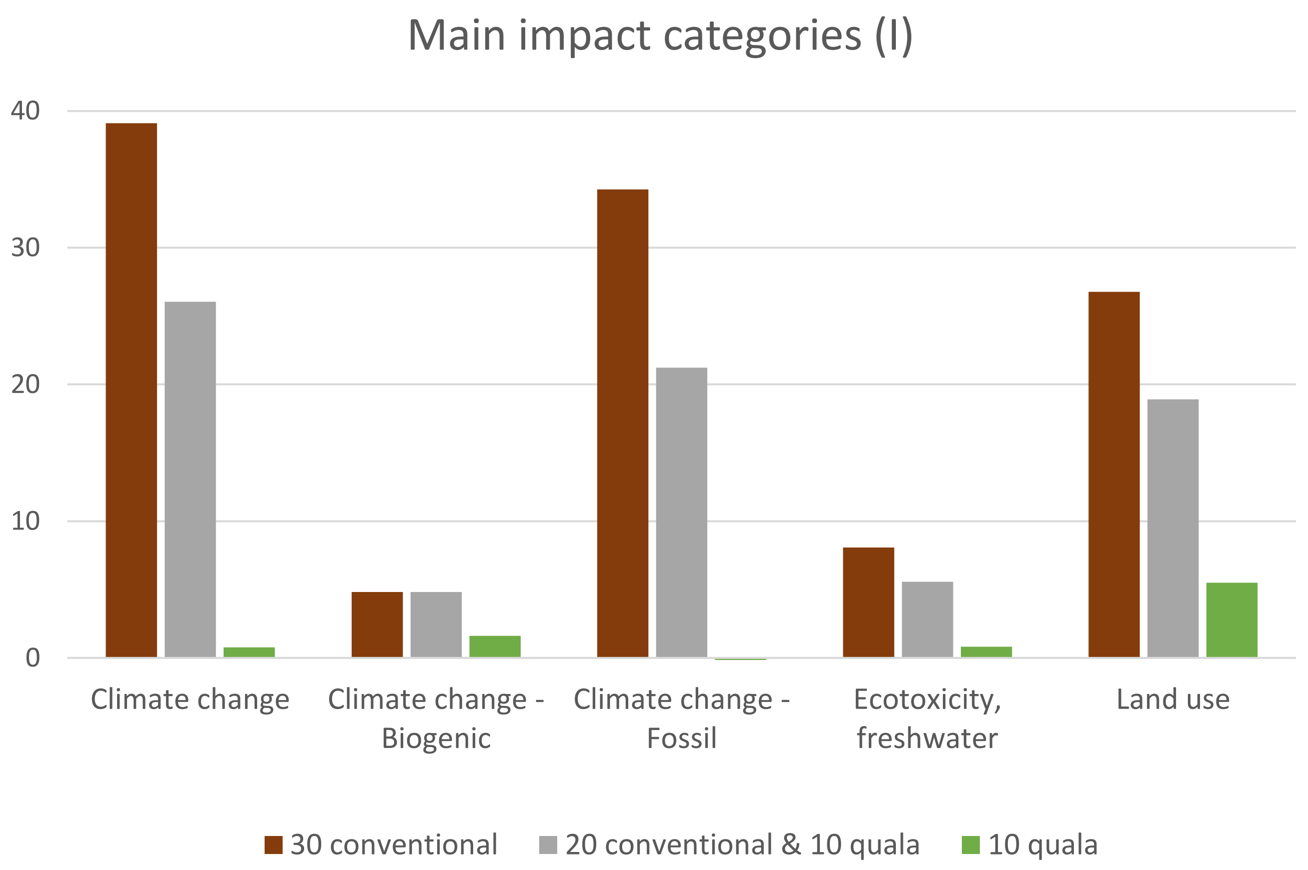
(2 years supply)

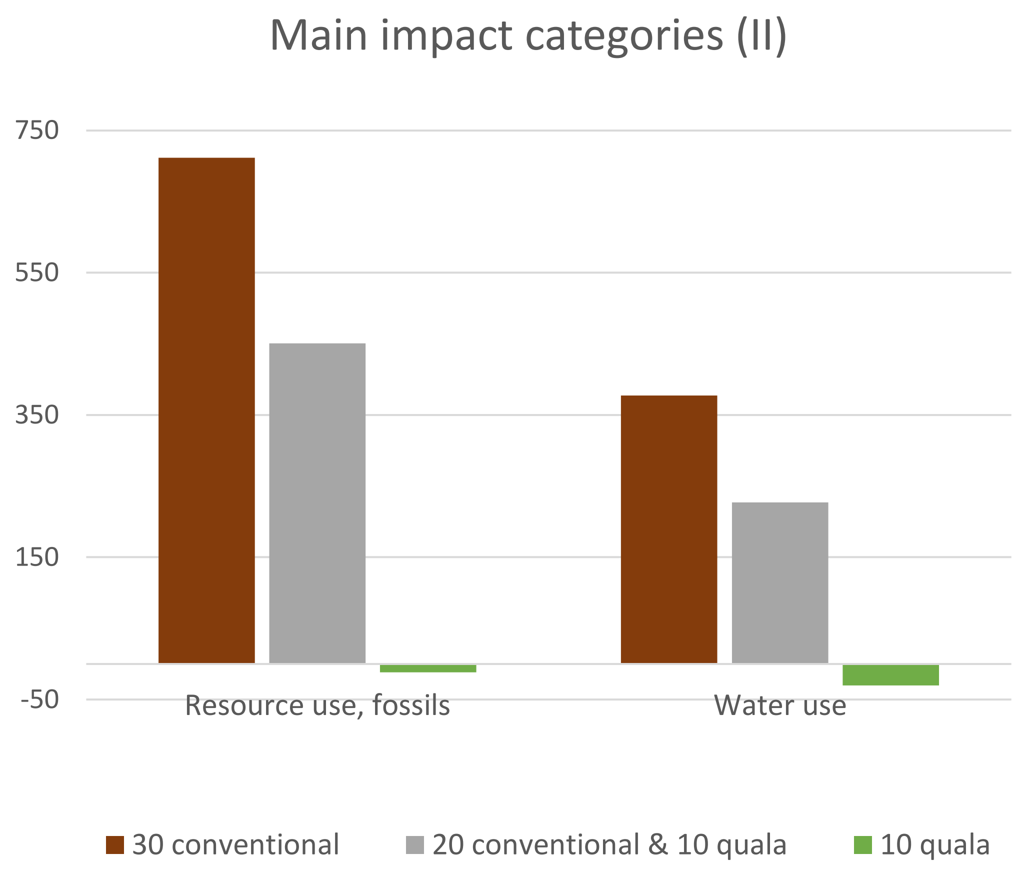
In the 3rd scenario, it is assumed that quala t-shirts can withstand three times more wear & tare than an average t-shirt.

In this case, the consumer would need to purchase 10 t-shirts.

The upcycling process and sustainable design that is implemented by quala can greatly reduce the demands for water, fossil fuels and land use for a greener fashion industry.

Results & Comparison (I)





Climate change (total, biogenic and fossil) in kg CO_2 eq., Ecotoxicity freshwater in CTUe (Comparative Toxic Units ecotoxicity), Land use in points according to the LCIA method, Resource use (fossils) in MJ (Megajoule), Water use in m^3 of deprived water

The processes of washing and drying of the t-shirts have not been included, as the number of washes and types of detergents would be the same in all 3 scenarios

Results & Comparison (II)

30 conventional t-shirts (2 years supply)

Climate change	39 kg CO_2 eq
Land use	27 Points
Resource use, fossils	712 MJ
Water use	377 m³ deprived

Cotton production requires water and land that could potentially be used for food production, while polyester requires energy and fossil fuels to be produced, with a climate change impact of 39 kg CO_2 equivalents.

The impacts of these processes are reflected on the high resource use in terms of energy (712 MJ in fossil fuels) and water use (377 m^3), as well as a rating of 27 points, as defined by the impact category land use.

10 quala t-shirts & 20 conventional t-shirts (2 years supply)

Climate change	26 kg CO_2 eq
Land use	19 Points
Resource use, fossils	450 MJ
Water use	227 m³ deprived

In this case, cotton and polyester requirements are reduced due to the upcycling of textiles that are used as materials for the quala t-shirts. A proportionate reduction (33%) is observed for climate change, land use and resource use.

Significant improvements are shown in water use, as quala t-shirts do not require growing and processing cotton, and the by-products of the process are downcycled as textiles.

10 quala t-shirts

[assuming they can withstand triple wear and tare]

(2 years supply)

Climate change	1 kg CO_2 eq
Land use	6 Points
Resource use, fossils	-12 MJ
Water use	-30 m³ deprived

In this scenario, the footprint is minimal (1 kg CO2 eq. – climate change), while land use is also reduced.

Water use presents a negative value, indicating that potentially, 30 m^3 of water can be saved from other processes. The same occurs for the use of fossils. This occurs due to the downcycling of quala by-products that are then used in other applications, further reducing cotton & PET needs.

The processes of washing and drying of the t-shirts have not been included, as the number of washes and types of detergents would be the same in all 3 scenarios

Conclusions


Photo by Ahmed Hasan

Key findings

The **quala** idea and method of **upcycling** discarded PET & cotton textiles into durable and high-quality t-shirts is a great supplementary solution to the problems of the fashion industry.

Fashion production has a significant contribution to humanity's carbon emissions (10%), consuming high amounts of primary materials, **water** and **fuel** and it generates a lot of waste, as 85% of all textiles end up in a landfill.

Quala has created a **green alternative t-shirt**, with a significantly reduced **environmental impact**, offering a sustainable solution for conscious consumers.

By obeying the “**3 R’s**” of waste management (Reduce, Reuse, Recycle), quala is a brand that is trying to build a sound-material-cycle through the effective use of resources and materials. The durable t-shirt can **reduce** the number of t-shirts an average consumer replaces each year. Textiles are upcycled and **reused** to make the quala t-shirt, while the leftover material is downgraded, yet **recycled** as lower quality textiles.

According to the present LCA study, the **key differences** between a quala and a conventional t-shirt is that the quala t-shirt requires **fewer materials, energy and fuel** for transportation. It also generates fewer emissions to be manufactured and it significantly reduces water and fossil fuel demands.

Finally, according to the 3 different investigated scenarios, if a **quala t-shirt** can withstand the triple wear-and-tear of a conventional t-shirt, then a consumer can create a **sustainable** wardrobe with a **minimal carbon footprint**.

Appendix

Photo by Arren Mills on Unsplash

Assumptions

- Cotton is imported from China
- There is 97% cotton fiber transformation efficiency (China/India)
- Transportation is separated:
  - Diesel truck with trailer 24 tons net (min weight/volume ratio 0.32 ton/m3)
  - Freight & Container feeder ship at 13 knots, 1577 TEU
  - Train, freight diesel
- Transportation percentages: Truck (51%), ship (32%), train (17%)
- Waste sorting is considered as plastic waste collection & sorting
- The t-shirt is manufactured in Portugal, using electricity from local sources
- As t-shirt recycling is not a global trend, the most likely place an old t-shirt will end up is a landfill → All t-shirts in this study (quala & conventional) are assumed to be discarded in a landfill and to have the same biological degradation and inert materials.
- Cotton is biodegradable, we assumed that 38% will end up as CO_2 or CH_4 in the atmosphere. PET was considered as inert and non-biodegradable.
- Satin was considered as PET

Assumptions

- Same bags for conventional and quala t-shirts (PET)
- Same use, wash and drying for conventional and quala t-shirts → These processes were not considered in the calculations
- Energy requirement for conventional t-shirt: Weaving and knitting cotton fiber into textile & transform textile into a t-shirt: 1.77 kWh
- Energy requirement for Quala t-shirt: Cut & transform textiles into a t-shirt: 0.5 kWh
- 33% of the textiles from Denmark end up in a quala t-shirt, while the rest is assumed to be downcycled and re-used in other processes, as a lower-quality textile.
- It was assumed that the discarded materials account as at least 30% avoided waste of cotton. Both as primary material at15% and 15% as cotton fibers.
- Same modes of transportation for both t-shirts and for the materials used.
- Route of conventional t-shirt: Cotton (China) → Fibers (India) → T-shirt manufacturing (Portugal) → Bought in Denmark
- Route of Quala t-shirt: Used t-shirts (Denmark) → T-shirt manufacturing (Portugal) → Bought in Denmark (additional new cotton and PET calculated the same way as above)
- White color t-shirts
- Quala t-shirt weight: 200g
- Conventional t-shirt weight: 238 g
- Medium white t-shirts as the unit

Input assumptions and materials

1 quala t-shirt				
Type	Actual material	Amount	Material used in LCA	Reference numbers (Ecocosts_idemat)
Shirt	60% Cotton, 40% Polyester	200 g	60% Cotton, 40% Polyester [Avoided product]	A.010.06.104, A 140.01.104, A.130.05.106
Rib	96% Cotton, 4% elastane	0.2 g	100% Cotton	A.010.06.104, A 140.01.104
Neckpaddel	100% Cotton	0.1 g	100% Cotton	A.010.06.104, A 140.01.104
Necklable	100% Polyester	0.2 g	100% Polyester	A.130.05.106
Carelabel	100% Satin	0.15 g	100% Polyester	A.130.05.106
Hangtag	7% Cotton, 93% Recycled Paper	2.15 g	7% Cotton, 93% Recycled Paper	A.010.06.104, A 140.01.104, A.120.01.101
Plastic Bag	100% Polyester	14 g	100% Polyester	A.130.05.106

1 conventional t-shirt				
Type	Actual material	Amount	Material used in LCA	Reference numbers (Ecocosts_idemat)
Shirt	60% Cotton, 40% Polyester	238 g	60% Cotton, 40% Polyester	A.010.06.104, A 140.01.104, A.130.05.106
Rib	96% Cotton, 4% elastane	0.2 g	100% Cotton	A.010.06.104, A 140.01.104
Neckpaddel	100% Cotton	0.1 g	100% Cotton	A.010.06.104, A 140.01.104
Necklable	100% Polyester	0.2 g	100% Polyester	A.130.05.106
Carelabel	100% Satin	0.15 g	100% Polyester	A.130.05.106
Plastic Bag	100% Polyester	14 g	100% Polyester	A.130.05.106

1 kg cotton	
Energy (other)	0.41 kWh
Energy (spinning)	3.34 kWh
Energy (knitting)	0.19 kWh
Energy (wet processing)	2.42 kWh
Manufacturing 5 t-shirts	3.35 kWh
Water wet processing	80 L

Conventional t-shirt inputs

Flow	Category	Unit	Amount	Flow property	Description	Uncertainty
A.130.04.112 PE (LDPE, Low density Polyethylene)	Materials/Plastics/Thermoplasts	kg	0.014	energy		undefined
A.130.05.106 Polyester (unsaturated)	Materials/Plastics/Thermosets	kg	0.0952	energy		undefined
A.140.01.104 Cotton fibre from China/India (without global seatransport)	Materials/Textiles	kg	0.1428	energy		undefined
B.040.01.120 Electricity Portugal	Energy/Electricity country mix	kWh	1	Energy		undefined
B.050.01.103 Energy gas, condensing, domestic (=heat)	Energy/Heat	MJ	3.49	Energy		undefined
C.050.01.101 Train, freight diesel (tkm)	Transport/Rail	kgkm	363	Transport		undefined
C.060.01.104 Truck+trailer 24 tons net (min weight/volume ratio 0,32 ton/m3) (tkm)	Transport/Road	kgkm	1542	Transport		undefined
C.070.01.105 Container feeder ship Handysize 1577 TEU 13 knots	Transport/Water	kgkm	998	Transport		undefined
F.102.01.103 Polyester waste incineration with electricity	Waste handling, recycling, combustion, landfill/Muni. waste incin with electr thermosets	kg	0.252	energy		undefined
F.130.01.109 Plastic waste, collection & sorting	Waste handling, recycling, combustion, landfill/Waste handling	kg	0.252	energy		undefined

Quala t-shirt inputs

Flow	Category	Unit	Amount	Flow property	Description	Uncertainty
A.010.06.104 Cotton, in China	Agricultural/Plant production	g	0.5	energy		undefined
A.010.06.104 Cotton, in China	Agricultural/Plant production	kg	0.036	energy		undefined
A.120.01.101 Board and recycled paper (test liner and fluting)	Materials/Paper and packaging	g	2	energy		undefined
A.130.05.106 Polyester (unsaturated)	Materials/Plastics/Thermosets	g	0.45	energy		undefined
A.140.01.104 Cotton fibre from China/India (without global seatransport)	Materials/Textiles	g	0.45	energy		undefined
A.140.02.140 spinning cotton 70 dtex	Materials/Textiles	kg	0.036	energy		undefined
A.140.02.160 texturing polymer fibres	Materials/Textiles	kg	0.1593	energy		undefined
B.040.01.120 Electricity Portugal	Energy/Electricity country mix	kWh	0.5	Energy		undefined
C.050.01.101 Train, freight diesel (tkm)	Transport/Rail	kgkm	310	Transport		undefined
C.060.01.104 Truck+trailer 24 tons net (min weight/volume ratio 0,32 ton/m3) (tkm)	Transport/Road	kgkm	1317.3	Transport		undefined
C.070.01.105 Container feeder ship Handysize 1577 TEU 13 knots	Transport/Water	kgkm	998	Transport		Undefined
F.102.01.103 Polyester waste incineration with electricity	Waste handling, recycling, combustion, landfill/Muni. waste incin with electr thermosets	kg	0.252	energy		Undefined
F.130.01.109 Plastic waste, collection & sorting	Waste handling, recycling, combustion, landfill/Waste handling	kg	0.252	energy		undefined

Conventional t-shirt impacts

Impact category	Reference unit	Result
Acidification	mol H+ eq	0.001767
Climate change	kg CO2 eq	0.848332
Climate change - Biogenic	kg CO2 eq	0.000000
Climate change - Fossil	kg CO2 eq	0.848332
Climate change - Land use and LU change	kg CO2 eq	0.000000
Ecotoxicity, freshwater	CTUe	0.172075
Ecotoxicity, freshwater - inorganics	CTUe	0.079941
Ecotoxicity, freshwater - metals	CTUe	-0.008261
Ecotoxicity, freshwater - organics	CTUe	0.100444
Eutrophication, freshwater	kg P eq	0.000074
Eutrophication, marine	kg N eq	0.000333
Eutrophication, terrestrial	mol N eq	0.003734
Human toxicity, cancer	CTUh	0.000000
Human toxicity, cancer - inorganics	CTUh	0.000000
Human toxicity, cancer - metals	CTUh	0.000000
Human toxicity, cancer - organics	CTUh	0.000000
Human toxicity, non-cancer	CTUh	0.000000
Human toxicity, non-cancer - inorganics	CTUh	0.000000
Human toxicity, non-cancer - metals	CTUh	0.000000
Human toxicity, non-cancer - organics	CTUh	0.000000
Ionising radiation	kBq U-235 eq	-0.002093
Land use	Pt	0.893502
Ozone depletion	kg CFC11 eq	0.000000
Particulate matter	disease inc.	0.000000
Photochemical ozone formation	kg NMVOC eq	0.001157
Resource use, fossils	MJ	11.742076
Resource use, minerals and metals	kg Sb eq	0.000000
Water use	m3 depriv.	9.934666

Quala t-shirt impacts

Impact category	Reference unit	Result
Acidification	mol H+ eq	0.00010
Climate change	kg CO2 eq	0.07763
Climate change - Biogenic	kg CO2 eq	0.16085
Climate change - Fossil	kg CO2 eq	-0.08323
Climate change - Land use and LU change	kg CO2 eq	0.00000
Ecotoxicity, freshwater	CTUe	0.08105
Ecotoxicity, freshwater - inorganics	CTUe	0.07846
Ecotoxicity, freshwater - metals	CTUe	0.01267
Ecotoxicity, freshwater - organics	CTUe	-0.01005
Eutrophication, freshwater	kg P eq	0.00000
Eutrophication, marine	kg N eq	0.00005
Eutrophication, terrestrial	mol N eq	0.00064
Human toxicity, cancer	CTUh	0.00000
Human toxicity, cancer - inorganics	CTUh	0.00000
Human toxicity, cancer - metals	CTUh	0.00000
Human toxicity, cancer - organics	CTUh	0.00000
Human toxicity, non-cancer	CTUh	0.00000
Human toxicity, non-cancer - inorganics	CTUh	0.00000
Human toxicity, non-cancer - metals	CTUh	0.00000
Human toxicity, non-cancer - organics	CTUh	0.00000
Ionising radiation	kBq U-235 eq	0.00016
Land use	Pt	0.55057
Ozone depletion	kg CFC11 eq	0.00000
Particulate matter	disease inc.	0.00000
Photochemical ozone formation	kg NMVOC eq	0.00019
Resource use, fossils	MJ	-1.15691
Resource use, minerals and metals	kg Sb eq	0.00000
Water use	m3 depriv.	-3.01142

Additional information available at the Excel-exported files

Both quala & conventional

- Process impact contributions
- Flow impact contributions
- Process upstream flows
- Process upstream impacts
- Inventory
- Allocation
- Flows