



What is Life Cycle Assessment

Life Cycle Assessment

What is LCA?

Life cycle assessment is a process of assessing the environmental aspects associated with a product or service over its entire life cycle. The most important applications are:



Analysis of the contribution of the life cycle stages to the overall environmental load, usually with the aim to prioritize improvements on products or processes.



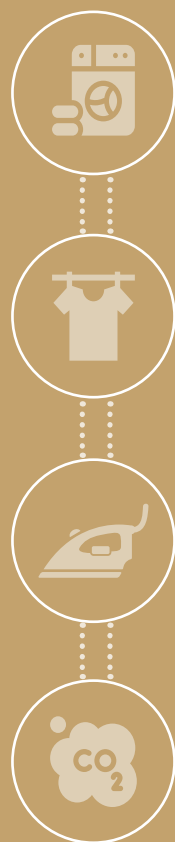
Comparison between products for internal use.

Studies showed that over the whole life-cycle of the product, from manufacture to disposal the Co2 Emissions add up on average to a total of more than 10 kilograms.

Example

Use of the clothing as washing, drying and ironing cause considerable Co2 emissions.

For instance a ladies' white long-shirt, on average 3.3 kilograms of Co2 are produced during use before its disposal, if it's assumed that it will be washed around 55 times before it becomes rubbish. If the product is put in the dryer each time and then ironed, The Co2 emissions increase, just from use of the product, to almost 12 kilograms. The Product Carbon Footprint then increases from approximately 10 to around 19 kilograms.



Did You Know?

Every part of the product's life cycle phase - the raw material extraction, production of product, the use phase and what happens to the product after it is no longer used - can have an impact on environment in many ways. The LCA typically does not include social and economic impacts.

Benefits of doing an LCA?

The results of the LCA can help business, policymakers and other organizations make more informed decision to advance towards sustainability. It provides critical data that can support the following:

1. Process and product-design improvement.
2. Marketing (e.g., backing up environmental claims or meeting consumer demand for green products)
3. Hot-spot analysis to facilitate continuous improvement
4. Third-party verification or certification
5. Method for quantifying key environmental impacts (e.g., green house gas, carbon emissions, water and energy use)
6. Goal-setting for climate-change and other sustainability policies

Life Cycle Assessment (LCA) to achieve Circular Economy (CE)

LCA provides technical support to CE decision-makers, to assess trade-offs of impacts on a variety of environmental impact indicators, such as water use, energy, climate change, and raw materials. LCA may also be applied to identify the most promising CE strategies and options for improving the environmental performance of society's consumption and production patterns.

Life Cycle Assessment (LCA) complements CE by assessing environmental impacts, thus providing evidence critical for effective decision-making.

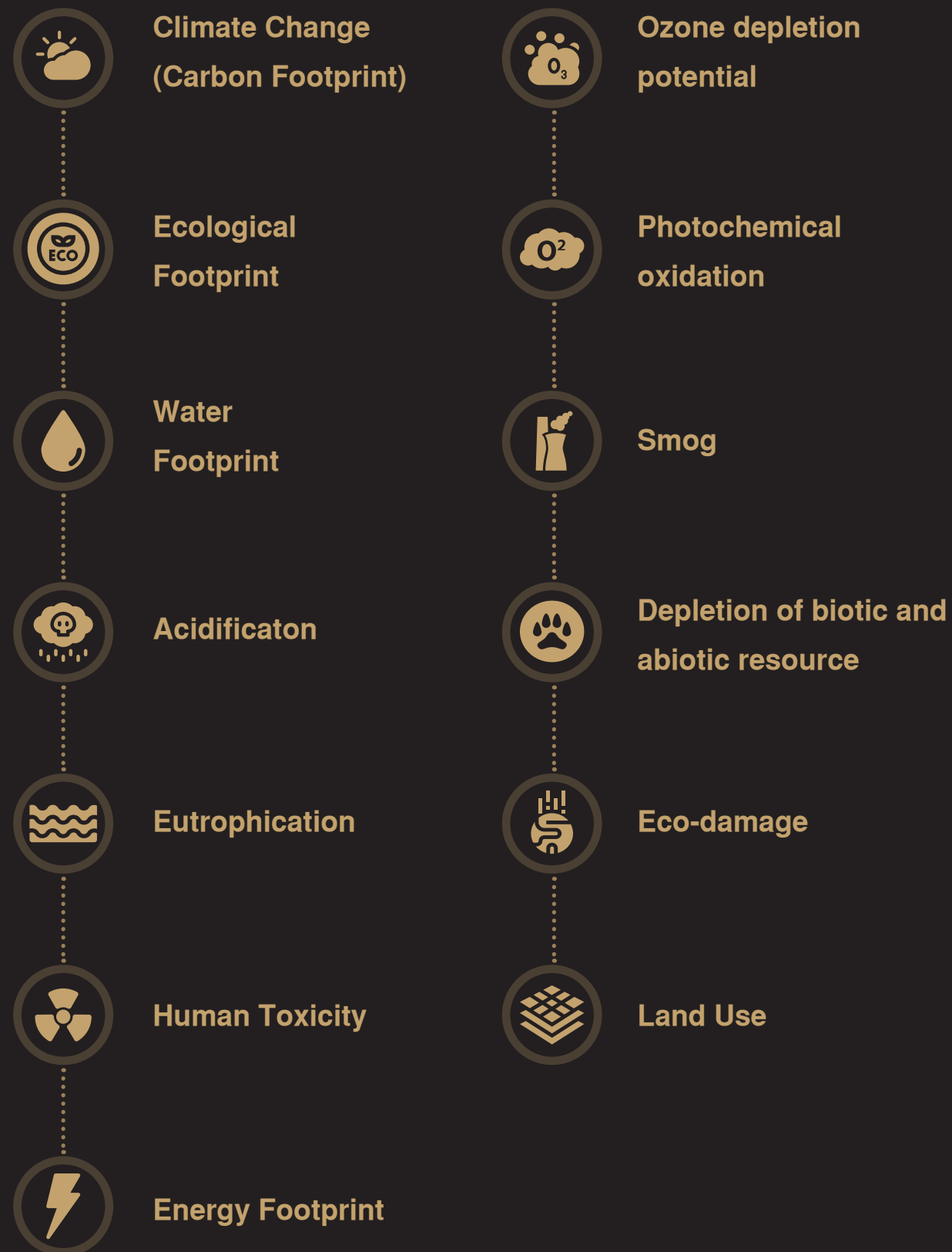
Life cycle Assessment model

LCA and CE both use a circular representation of the life cycle of a product but with a slightly different view. LCA clearly outlines the life cycle steps, while CE emphasises the processes and systems that keep materials in circulation.

Reference - UNEP Guide to Life Cycle Management - A bridge to sustainable product



LCA can measure impacts on local, regional and global levels



Variants of Life Cycle Assessment (LCA)

LCA can evaluate the environmental impacts of your product or service from cradle to cradle, cradle to grave and cradle to gate.

1

Cradle to Grave

It covers the entire life cycle of a product. From the raw materials to the disposal of the product in an attempt to determine its full carbon footprint.

2

Cradle to Cradle

It is typically a cradle to grave assessment, where the end-of-life stage of a product is a recycling process, thereby the product will not be discarded after the end of life.

3

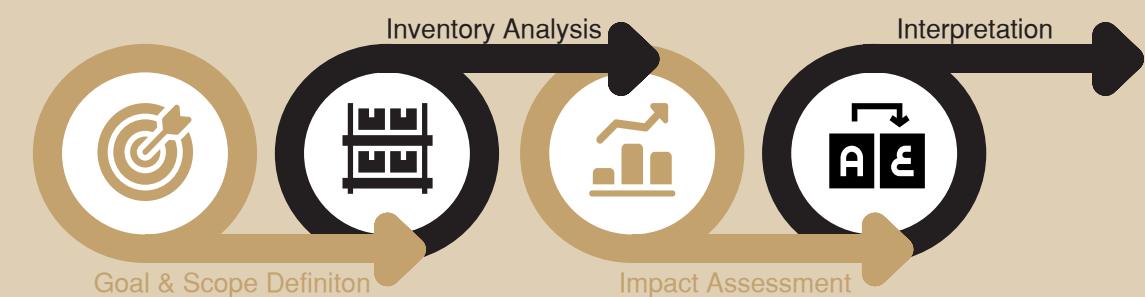
Cradle to Gate

It refers to the carbon impact of a product from the moment it's produced to the moment it enters the store. (Raw material extraction, production, manufacturing, packaging and transportation processes). It assesses only the activities that occur within the factory. It will not include the distribution, consumer use and disposal phases

Source - ISO 14040 Life Cycle Assessment - Principles and Guidelines

Four main stages of Life Cycle Assessment

under the International Organization for Standardisation (ISO) 14040 and 14044 guidelines:



Stage 1: Goal & Scope definition

The goal and scope describe the product or service that you wish to assess, choose a functional basis for comparison and define required level of detail, how big a part of product life cycle will be taken in assessment. Then set a goal which determines the scope, including objective, application and audience. Lastly, determine whether or not there has to be a critical review of that goal and to what end will assessment be serving.

Stage 2: Inventory Analysis

Perform a data compilation and an inventory analysis of extractions from and releases into the environment. It looks at all the environmental inputs and outputs associated with a product or service. It gives description of material and energy flows within the product system and especially its interaction with environment, consumed raw materials, and emissions to the environment. Through this step it's give a comprehensive picture of what happens with your product and how it affects the environment.

Stage 3: Impact Assessment

In impact assessment, you classify resource use and emissions generated according to their potential impacts and quantify them for a limited number of impact categories, which may then assess in terms of their relative importance for the goal of the LCA study. Details from inventory analysis serve for impact assessment. The importance of every impact category is assessed by normalization and eventually also by weighting.

Stage 4: Interpretation

With the above information, you discuss the results in terms of contributions, relevance, robustness, data quality and limitations, and systematically evaluate any opportunities for reducing the negative effects of the product(s) or service(s) on the environment. During the interpretation phase, by checking your conclusions are well-substantiated. The ISO 14044 standard describes a number of checks to test whether conclusions are adequately supported by the data and by the procedures you used. This way, you can share your results and improve decisions.

Life Cycle Assessment standards by ISO

ISO 14001	Environmental Management System
ISO 1421	Environment Claims and Labels
ISO 14040:2006	Environment Managemenent - LCA - Principles and Framework
ISO 14044:2006	Environment Management - LCA - Requirements and Guidelines
ISO 14067	Quantifying Carbon Footprint
ISO 50001	Efficient Energy Management
PAS 2050 & GHG PROTOCOL	Carbon Foot Printing
	Life Cycle Accounting and Reporting Standard

The Life Cycle and Carbon footprints in Fashion, Furniture and Beauty Industry

allbirds

Allbirds is a New Zealand-American company that designs and sells footwear and apparel. Allbirds first shoe was the Wool Runner, which is made from New Zealand superfine merino wool. The company claims to keep the brand as eco-friendly as possible and is a certified B Corporation. In March 2018, the company started offering their footwear with eucalyptus tree fibre. In 2020 they launched their first apparel line for men and women made of sustainable materials.

Life Cycle of Shoes and stagewise impact

Materials: +5.7 kg co2e

1. Production/extraction of raw materials
2. Material processing, including yarn formation, textile formation, preparation, coloration
3. Packaging raw materials

Manufacturing: +1.1 kg co2e

Emissions from manufacturing that occur at Tier 1 assembly factories, including but not limited to, flat knitting, molding, cutting, stitching, and product assembly

Use: +0.1 kg co2e

Footwear: emissions associated with washing product over lifetime (3 cycles) Socks: emissions associated with washing and drying product over lifetime (26 cycles)

End of life: +0.2 kg co2e

Emissions associated with final disposal of the footwear and socks after use, assuming US municipal waste averages (80% landfill, 20% incineration)



Materials



Manufacturing



Use



End of Life



Transportation

Total: +7.1 kg co2e

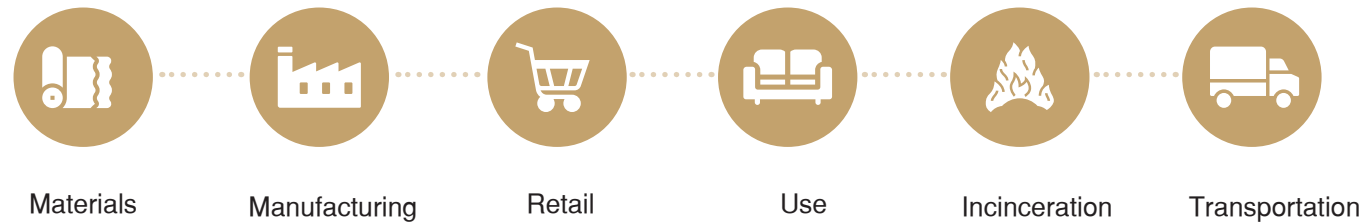
Transportation contributes an estimated 1-3 kgs CO₂e to the carbon footprint of each footwear product.

1. Upstream transportation of raw materials is included in material emissions
2. Emissions associated with transportation of primary textiles/materials to Tier 1 factory
3. Emissions associated with transportation from Tier 1 factory to distribution centers (model includes US, New Zealand, and Canada)
4. Emissions associated with delivery from distribution centers to customers
5. Emissions from reverse logistics are not currently included.

Life Cycle Impact of Upstyle Kistkruk

Upstyle Industries is a social enterprise that makes new products from old products for everyone's home. An industrial ecologist and a product designer with the mission to make objects with a positive footprint. Products combine functionality, aesthetics, environmental benefits and affordability. Vision is a decentralised circular economy. They build local supply chains to transform residual material flows of the old economy into new products for the home.

UPSTYLE
INDUSTRIES



Note - Raw material production was not included in the LCA of the Upstyle Kistkruk, because Upstyle makes use of second-hand wood that has already had a useful life and would be otherwise disposed of.

1. Upstyle Kistkruk: Life cycle energy use of one product (MJ): 5-10 MJ
2. Materials: 33% (after transport)
3. Life cycle energy use per life stage (MJ)
 - a. Materials: 3 MJ
 - b. Production: 5 MJ
 - c. Transport: 2 MJ
 - d. Waste: -2 MJ
4. Different transport modes from retailers to consumer (MJ)
 - a. Upstyle Kistkruk delivered, 30km - 10MJ
 - b. Upstyle Kistkruk by car, 30km - 125 MJ
 - c. Upstyle Kistkruk by car, 5km - 22 MJ

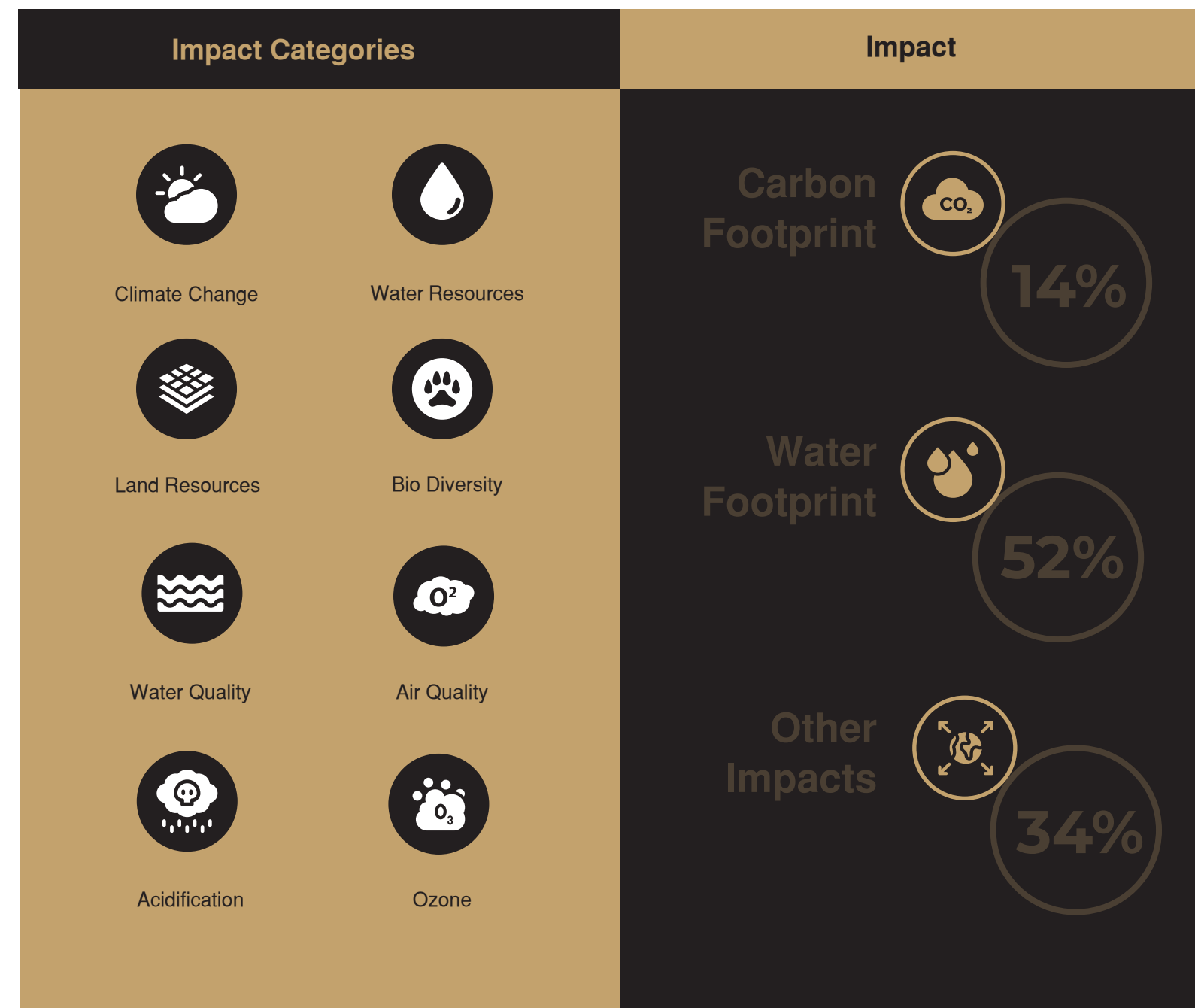
Life Cycle Impact of a Cosmetic Product

L'ORÉAL
PARIS

L'Oreal S.A. is a French personal care company headquartered in Clichy, Hauts-de-Seine with a registered office in Paris. It is the world's largest cosmetics company and has developed activities in the field concentrating on hair colour, skin care, sun protection, make-up, perfume, and hair care.

Lifecycle of a cosmetic product

1. Manufacturing
2. Distribution Centre
3. Storage at Retailer
4. Product Usage
5. Recycling
6. Packaging Material Production
7. Packging Component Production



About UTOPIC

Utopiic is a technology company focused on sustainability and climate change. Providing Positivity-As-A-Service for brands to showcase their positive story. We help SMEs and start-ups showcase their positive story and create ESG based targets to achieve relevant UN SDG's.



Contact Info

☎ +91 888 288 0055

✉ info@utopic.com

📍 Delhi NCR, India

