Method

Life cycle assessment (LCA)

A standardized method that quantifies the resources a product consumes and the emissions it generates at every stage, from raw materials to end of life, and estimates its impact.



In Spanish
Análisis de ciclo de vida

Origin
1970s; ISO 14040 standard (1997, revised in 2006)

Output
The product's environmental impact, stage by stage, and where it concentrates

What it's for

It helps you know what really does the most harm: sometimes the biggest impact isn't in the material, but in use or transport.

Key elements

A functional unit
You compare what the product does, for example serving a thousand coffees, not the object itself.

Every stage
From extraction to end of life, so no impact is hidden outside the study.

Several impacts, not one
Climate, water, toxicity…; improving one can worsen another.

How it's done

1 

Define the goal, the boundaries of the study and the functional unit.

2 

Take inventory of what goes in and out at each stage.

3 

Assess the impact and interpret it to decide what to change in the design.

Applications in design

When to use it

At the start, to learn which stage of the product weighs most, or to compare two design alternatives.

Avoid

Comparing studies done with different boundaries or functional units.

Don't fall for it

Say what you left out of the study: the results depend on those boundaries.

Connections

Builds on

- Primary, secondary and tertiary packaging

Used by

- Circular design
- Packaging design
- Sustainable design
- Ecodesign

Authors and works

2006	**ISO 14040**	Sets out the method's principles and its four phases: goal and scope, inventory, impact assessment and interpretation.
2011	**Jeroen Guinée et al.**	Reviewed its history: it began in the 1970s as energy analysis, broadened to all environmental burdens and is now extending to social and economic aspects.

Sources

Original sources

- International Organization for Standardization (1997). ISO 14040:1997. Environmental management — Life cycle assessment — Principles and framework. ISO. View source (https://www.iso.org/standard/23151.html)
- International Organization for Standardization (2006). ISO 14040:2006. Environmental management — Life cycle assessment — Principles and framework. ISO.

Academic reviews

- Guinée, J. B., Heijungs, R., Huppes, G., Zamagni, A., Masoni, P., Buonamici, R., Ekvall, T., & Rydberg, T. (2011). Life cycle assessment: Past, present, and future. Environmental Science & Technology, 45(1), 90–96. View source (https://doi.org/10.1021/es101316v)

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