

Introduction

Hello, everyone. **In the context of global warming and exhaustion of natural resources, an industrial strategy for designing ecology friendly products takes on its full meaning. My aim will be to explain why and how.** I will describe in more detail a method for calculating the ecological footprint of a product; it is an indispensable stage in ecodesign. But, first of all, what is ecodesign?

1. What is eco-design ?

It is integrating environmental criteria from the start of the product design process, with the goal of providing the same results for the client. **Ecodesigning consists in reducing as much as possible the potential negative impacts of a product a good or a service could have on its environment throughout its life cycle —in other words, from the extraction of the raw materials until its end-of-life.** The evaluation of these impacts, which we can call calculating the ecological footprint of the product, is the cornerstone of an ecodesign approach.

2. Why eco-design ?

Why eco-design, could you ask ? Besides reducing environmental impacts, the stakes for a company are simultaneously : **regulatory** in a restrictive context ; **evolving** ; **competitive** with big opportunities for differentiation on the market; **marketing-related** to meet the needs of environmentally-responsible consumers who are more and more concerned about preserving the environment; and, finally, **economic** in terms of notably reducing manufacturing costs, usage costs and end-of-life costs.

3. How do you handle the ecodesign process ?

How do you handle the eco-design process ? Above all, it is necessary to describe and calculate the footprint of a product to serve as a reference for the company. **To date, there is only one successful quantitative method that is internationally recognised and standardised: the life-cycle assessment of a product, commonly referred to as LCA. It consists in describing the physical, material and energy flows that pass between a product and its environment throughout its life cycle. It is a method said comprehensive and multifaceted.**

What do you do next to carry out the LCA ? After establishing the objectives and choosing the functional unit and the perimeters of the study, you must collect all the necessary information for mobilising the different stages in the life cycle of the product whose impacts the company wishes to reduce.

This information will particularly relate to the product's materials and components; the manufacturing process; the packaging used; transport operations, including modes of transport and distances covered; the consumables needed for using the product; maintenance operations; collection and treatment at the end of the product's life; and, finally, the energy consumed during all the stages of the product's life cycle.

With a life cycle analysis software, there are many examples of it on the market, we'll model the full life cycle of the product with the help of databases available in the tool. These databases—most often sector-based, reliable, recognised and nationally or internationally standardised—enable the environmental impacts of materials, manufacturing processes, electronic components, modes of transport, recycling processes, etc. that are typical of the life cycle of a product to be represented.

Once the life cycle is described in its entirety, the software allows you to calculate the environmental impacts caused throughout the life of the product.

But which indicators of impact are generally considered? A large number of indicators are well-known and often described in the media, particularly in weather forecasts, such as the increasing greenhouse effect—more commonly referred to as global warming—; smog or pollution of the ozone in the city, as seen on sunny and warm days; atmospheric acidification; the phenomenon of acid rain, which is responsible for the destruction of forests; the eutrophication of bodies of water or the green water phenomenon, which indicates that aquatic flora and fauna have been asphyxiated by the growth of algae; and even the destruction of the ozone layer that protects us from the sun's UV rays.

LCA software allows you to identify the environmental aspects of the product being studied— in other words, all the elements that are mainly contributing to the impacts. Thinking processes on these contributing factors are thus going to initiate the creative approach to ecodesign. **The work approach is going to consist of devising and selecting alternative and innovative solutions for redesigning the previously evaluated product in order to reduce its ecological footprint.** Work will be progressive and repetitive, punctuated with comparative environmental, technical and economic analysis in order to choose materials, ways of assembling the pieces, and even energy types that will produce the least impact possible. Many compromises will be necessary when selecting the final design solution, but all of the types of impact will certainly not be reduced. It will all depend on the technical or economic constraints and the priorities established by the company.

In an ecodesign approach, the evaluation of environmental impacts is essential and, to date, only the life cycle assessment is recognised as being a quantitative, comprehensive and relevant calculation method.

Even so, it can still be criticised on many points. It requires data to be collected meticulously for a long period of time and can involve investment costs that would be prohibitive for small organisations. Some databases, especially in chemistry or biochemistry, are too incomplete to expect a modelling as close as possible to reality. Many local data, particularly regarding deposits of raw materials, are nonexistent. Some indicators, due to a lack of consensus on the method of calculation or a lack of data, are not taken into account, such as social criteria, visual pollution or even biodiversity. The evaluation of impacts is carried out at a given moment without considering the manner in which impacts will be affected as a result of potential decisions, like in the case of crops for biofuels that stretch out over food crop areas. Finally, it does not really allow a move towards more virtuous economic models like the functional economy where the product's use is sold rather than the product itself.

In fact, the step for defining the functional unit in the life cycle assessment is often not detailed enough.

4. How does research evolve as far as the life cycle assessment and ecodesign are concerned ?

Simplified methods and tools for performing ecological assessments have multiplied in recent years, which allows for easier evaluations that are accessible to everyone. Moreover, the results will be very close to those of a classic life cycle analysis.

Furthermore, research is an ongoing process and many studies funded by governments and the European Commission focus on discussing methodology, such as social LCA, consequential LCA, or even the monetarisation of environmental impacts; **on defining calculating indicators such as biodiversity or the exhaustion of natural resources; or even databases that are reliable, recognised, easily accessible and standardised. All these reflections will most certainly contribute to the improvement of environmental traceability of products in the years to come. They will ensure that problems are better anticipated so that the ecological footprint of products becomes fainter still.**