



GREEN
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Ecodesign Guide for the Footwear Industry

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"LIFE GREEN SHOES 4 ALL (LIFE17 ENV/PT/000337) project is been co-funded with support from the European Commission under the LIFE + programme. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



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1. Scope

Life GreenShoes4All project, supported by European Commission in the framework of Life programme

The project aims to implement, demonstrate and disseminate a Footwear Product Environmental Footprint (PEF) methodology, new recycling and manufacturing solutions and efficient ecodesign to footwear products with low PEF.

The Ecodesign Guide for the Footwear Industry, developed under the Life GreenShoes4All project, intends to support designers and companies in incorporating ecodesign in the development of lower environmental impact footwear products.

This short guide provides strategies to assist footwear companies in the development of footwear products with lower environmental footprint.

2. Introduction

Climate change and sustainability are the topics of the day. The climate change is a real problem that affects the worldwide population and needs to be faced and urgent actions are needed in order to save the planet. Nowadays, these topics are increasingly discussed by political and scientific communities, as well as by the civil society. 21st century consumers are better informed and concerned with these issues and demand more sustainable products and information on their environmental impact.

The footwear industry is conscious and prone to integrate the aspects related with the environmental sustainability and circular economy in the development of new footwear concepts and production processes. Many companies have already started the journey to achieve a "sustainable growth", "carbon economy" and "low carbon footprint" footwear products. The duality between the development of the industry in the face of environmental aggressions is well known, but this mentality is changing, many companies and industries have seen the environmental factor as an opportunity for growth. They can obtain economic and management benefits by incorporating the environmental factor in their production process. This advantage, together with the increasingly restrictive environmental legislation and new environmental friendly mentalities of consumers, makes necessary to address the environmental impact of products and services.

The development of "truly" environmentally sustainable footwear products begins with the design process that should be based on Life Cycle Thinking. At this stage, it is fundamental to define the shoe concept and consider the entire footwear value chain, from the selection of raw materials to product's end-of-life.

Ecodesign can be defined as the "integration of environmental aspects into product design and development, with the aim of reducing adverse environmental impacts throughout a product's life cycle", and should be applied at an early stage in the product development phase leading to improved design specifications. The aim is to develop new sustainable products, minimising the environmental impact throughout the product's life cycle, without compromising the performance, functionality, quality, safety, ergonomics and cost. It is necessary to find the right balance to develop footwear products that fulfil the environmental requirements, the company business's and consumer's expectations.

Currently, several methods and tools are available to support the implementation of ecodesign, less or more complex in its implementation, including MET-matrix, checklists, strategy lists, eco-indicators, carbon footprint, ten golden rules, LCA, among others. The most suitable tool should be selected according to the type of product, stage of the product development process, company's objectives, development team and resources allocated.

This guide presents strategies to assist footwear companies and designers in the integration of ecodesign in the development of footwear products with lower environmental footprint.

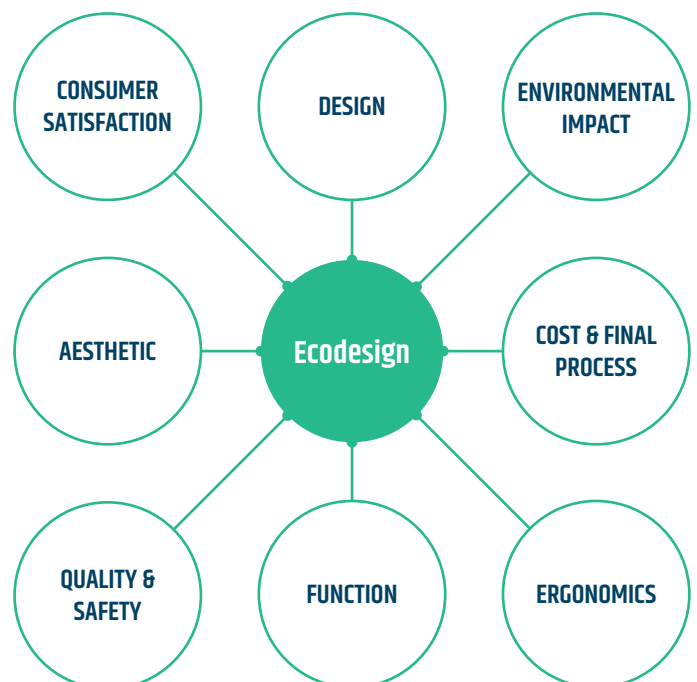


Figure 1 - Aspects to consider in ecodesign

3. Potential benefits of ecodesign

The implementation of ecodesign, during the product development process, may include several potential benefits in different dimensions, namely:

1. Benefits	2. Promotion	3. Identification	4. Improve
Economic benefits by optimising the use of materials and energy, processes efficiency and reducing the waste production and disposal	Promotion of innovation and creativity	Identification of new product concepts and new business models	Improve the image of company and/or brand
5. Enhancement	6. Reduction	7. Compliance	8. Contribute
Enhancement of employee motivation	Reduction of environmental and human risks	Compliance with environmental legal requirements	Contribute to customer loyalty

4. Ecodesign process

The implementation of ecodesign process in a company requires the involvement of top management, ensuring that the new footwear concepts are integrated in the strategy and fulfil the environmental and business objectives of the company. Also, the top management must ensure the allocation of human, technical and financial resources for the planning, implementation and improvement of ecodesign.

Ecodesign involves the knowledge and competencies of several disciplines and requires a multidisciplinary team and departments that covers the whole shoe development process, such as:

- Designers
- Product engineers
- Material specialists
- Purchasing department (e.g. materials, components, chemical products, etc.)
- Environment
- Quality
- Marketing & sales.

ISO 14006:2011 divides the ecodesign process into six steps, namely:

- Specify of products function.
- Define environmental objectives.
- Improvement of environmental strategies for the product, based on the defined objectives.
- Develop environmental objectives based on improvement strategies.
- Establish a product specification addressing the environmental objectives.
- Develop technical solutions to meet the environmental objectives.

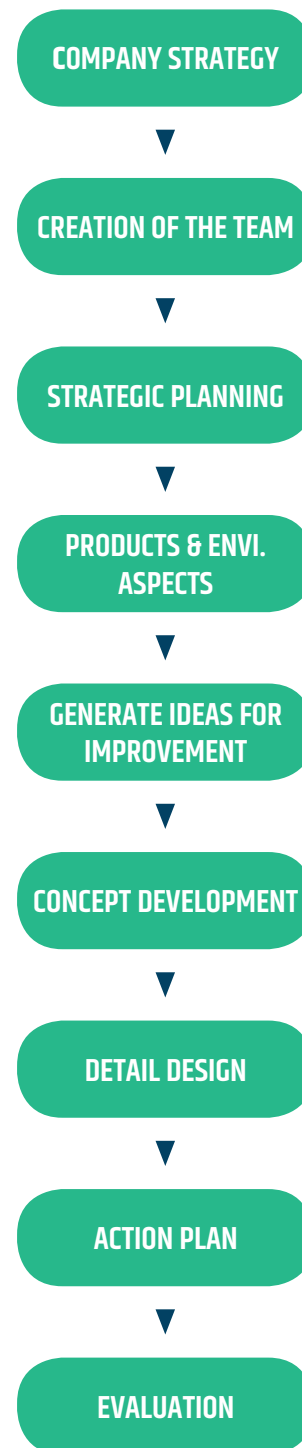


Figure 2: Ecodesign methodology

5. Ecodesign strategies

1. Design for function

- Product functional optimization
- Multiple functions
- Modularity

2. Design for durability and reparability

- Consider longevity, reparability and maintenance of the product
- Consider environmental improvements due to new technologies
- Reliable products

3. Design for recycling, reuse and recovery

- Consider easy disassembly and subassemblies
- Reduce the material complexity
- Increase the amount of recycled and recyclable materials
- Use of the materials and components in other future products

4. Select low impact material

- Renewable materials
- Recycled and/or recyclable materials
- Recovered and/or recoverable materials
- Biodegradable materials
- Materials that involve less energy consumption

5. Reduce the use of materials

- Reduce the weight and volume
- Reduce the variety of materials in the same product

6. Avoid potentially hazardous substances and materials

- Check human health and safety
- Check environmental aspects
- Check low impact of materials and transportation

7. Optimise production techniques

- Reduce the stages of the production process
- Use clean production technologies
- Minimise energy consumption
- Use renewable energy sources
- Avoid the use of hazardous consumables and auxiliary materials
- Minimise waste production

Practical applications in footwear industry

- Multifunctional products that can be used in different applications.
- Modular design to revitalise the product by adding parts.
- Give footwear a nice and attractive design.
- Build a good quality footwear.
- Easily repairable products, increasing the shelf life and reducing waste.
- Disassembly products to allowing the separation of the materials and components for recycling.
- Recycled and recyclable product concepts.
- Minimalist product concepts (less materials and components, simple models).

Practical applications in footwear industry

- Select certified material with lower environmental impact.
- Create a database of certified materials and suppliers.
- Use natural, recycled, recyclable and biodegradable materials available on the market (e.g., cork, wood, recycled tires, recycled and recyclable polymers).
- Select as few different materials as possible for the same footwear, thus facilitating subsequent recycling.
- Select materials in compliance with REACH legislation or other applicable legislation.
- Avoid materials that affect the ozone layer, such as VOC, fluorinated gases.
- Find alternatives to metals.

Practical applications in footwear industry

- Cleaner production techniques, for example, changing water curtain finishing cabins to dry filter finishing cabins.
- Processes that make the use of more efficient materials, for example, computer controlled cutting machines.
- Study the possibility of combining the essential functions in a single component in order to require less production processes.
- Use materials that do not need additional treatments, for example, surface treatments to certain soles prior to bonding.
- Raise awareness among workers about energy consumption so that production processes are more efficient and about the advantages of reducing waste generated during production.
- Reduce the use of fossil fuels and increase the use of renewable energy.
- Designing the product minimising the waste of materials.
- Recycle / reuse sub products in the company itself.
- Technological changes, good production practices, among others.

8. Select more environmental efficient distribution techniques

- Reduce packaging volume and weight
- Eliminate unnecessary packaging
- Use reusable packaging
- Use recyclable packaging
- More environmental efficient logistic system
- More efficient transportation

Practical applications in footwear industry

- Use containers of standard and modular size, to maximise transport.
- Transportation by train or marine container is preferable to the truck, they are less polluting. The use of electric vehicles will always be preferable.
- Raise awareness of the sales department to work with local suppliers. This helps reduce transportation cost and generates less stock.

9. Reduce the environmental impact in the use phase

- Lower consumption of energy and resources
- Energy and resources with less environmental impact
- More clean maintenance and repair techniques
- Avoid the use of hazardous cleaning products
- Create a strong product-user relationship.

Practical applications in footwear industry

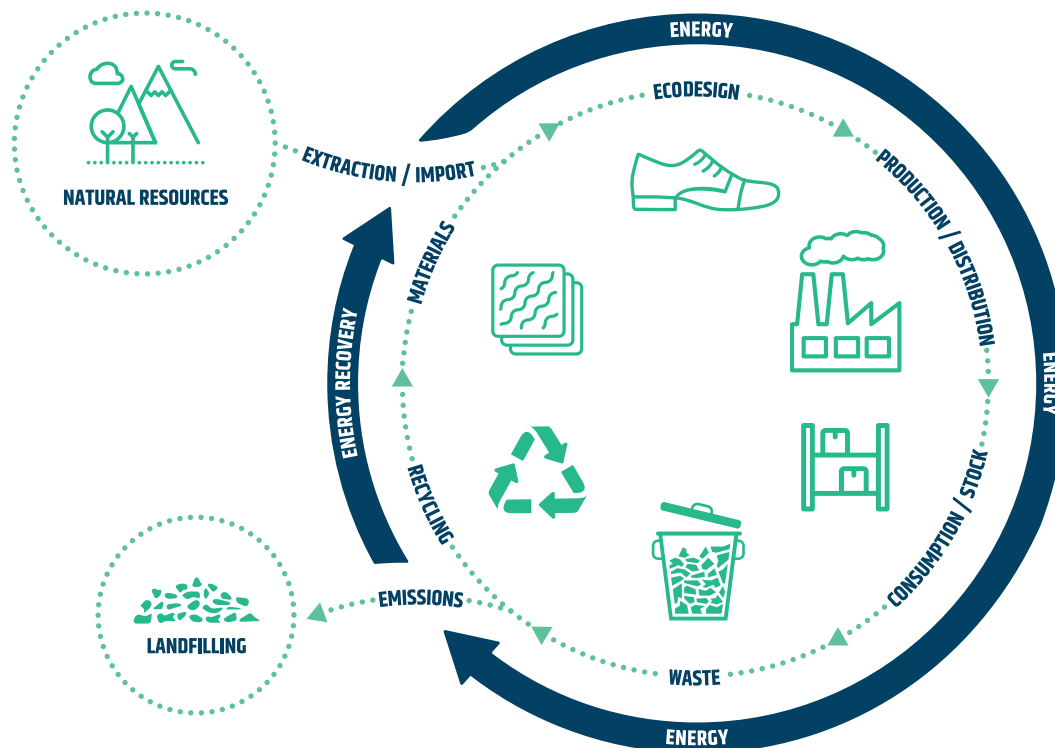
- Avoid designing for passing trends. This causes it to be replaced once the design has become old. Ensuring that the aesthetic life is not shorter than the technical life.
- Spares parts (e.g., laces, insoles, fashion accessories) that can be replace in case of damage.
- Best practices guide: Guide for cleaning and maintenance of footwear, to increase its life of use.
- Design technically durable products.
- Provide added value to footwear through functionality and innovation.

10. Optimise the end-of-life

- Product disassembly
- Labelling materials for recycling
- Waste recovery and valorisation
- Recycling, biodegradability & composting and more safety incineration
- Consumer communication

Practical applications in footwear industry

- Best practices guide: Information to consumer about the best alternatives at the product end-of-life (destination of post-consumer shoe).
- Promote and collaborate on the creation of a platform for waste management of footwear products at the end-of-life.
- Promote and collaborate on the creation of footwear collection points for recycling.



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LIFE GREEN SHOES 4 ALL · LIFE17 ENV/PT/000337

Footwear environmental footprint category rules implementation and innovative green shoes ecodesign and recycling

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Ecodesign Guide for the Footwear Industry

Date.

December 2019

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