

LCA AND ECODESIGN: INTERACTIONS AND RECOMMENDATIONS

EXECUTIVE SUMMARY

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SCORELCA is an association that has been created to financially support collaborative research on LCA and related topics. It aims to promote and organize cooperation between companies, institutional and scientists in order to support the evolution of LCA methods and its practical implementation at European and international level.

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- ✓ The views and recommendations expressed in this publication are those of the authors and do not necessarily reflect, unless otherwise stated, the views of all members of SCORELCA.
- ✓ The information and conclusions presented in this document were established on the basis of scientific and technical data and regulatory and normative framework in force at the date of the publication of documents.

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INTRODUCTION AND CONTEXT

Life Cycle Assessment (LCA) and ecodesign are two approaches often applied in companies and relatively well defined independently from each other. However, their interactions are limited and more difficult to outline.

SCORELCA proposed a study to determine the specificities to implement ecodesign approaches and the use of environmental assessment tools and their interactions. In this context this study was carried out by WeLOOP and the platform [avniR] by cd2e. The aim of this study was to demonstrate the links between ecodesign and LCA to make relevant recommendations for the establishment and strengthening of these links in companies.

ADEME describes ecodesign as: "a creative approach, source of innovation and differentiation. It is a positive approach to the environment and a lever for creating shared value". Ecodesign is the integration, from the design phase or the redesign phase, of a product (good or service), environmental, social and cost aspects over its entire life cycle (from extraction of raw materials to its End of Life).

STATE OF THE ART

The state of the art realized in the context of this study was conducted in two steps:

1- Developing a database of ecodesign tools and approaches

The main aims of this phase were to:

- Make a state of the art of resources covering ecodesign (and LCA);
- Provide resources in a structured frame allowing SCORELCA members to classify current resources and to integrate new ones in a relatively simplified and quick way.

A database in Excel file format containing ecodesign (and LCA) resources categorised based on several criteria (scope, sector, field, benefits, etc.) was developed. This database is intended to be a solid support that allows its users to access a set of resources characterised by relevant criteria. The database compiles resources from:

- Literature review and desk research;
- Internal resources of WeLOOP & Platform [avniR] by cd2e;
- Resources provided by SCORE LCA members;

2. Assessment of ecodesign maturity in key sectors:

The aim of this phase is to illustrate the ecodesign practices and maturity in a sector-oriented perspective to facilitate the understanding of their context and their links with LCA. These sectoral studies were carried out based on [avniR] sectorial studies, boosted with case studies, feedbacks and literature review. To detail the ins and outs of each sector, a synthetic fact sheet is developed. Several aspects, specific to each of the sectors are highlighted: structure, segmentation, maturity, as well as a SWOT analysis.

The format of the sector analyses follows the following structure

- Contribution to the environmental impact;
- Interactions in the value chain;
- Ecodesign maturity;
- Efficiency and typology of eco-design actions.

Different sectors including electronic and electrical equipment, building and construction, packaging, service, mechanic and transport, energy and waste treatment are included in the sectorial studies.

PRACTICAL GUIDE

The use of LCA in the ecodesign approaches are discussed and illustrated in a practical guide. Feedback and case studies of companies were a major source to enhance the guide. The Practical Guide was built from inputs of the study mainly from the following phases:

- Sectorial studies;
- Interviews with experts;
- Brainstorming with the SCORELCA members;
- Online Survey;
- Ecodesign business case studies;
- Previous experiences of the project team.

1- What approaches to implement eco-design?

Before implementing an ecodesign approach, several features are to be kept in mind. First, ecodesign is an incremental approach requiring achievable goals at the start point. Therefore, it's recommended to start with relatively simple products (preferably avoid best sellers). In this way, results of ecodesign are more visible and may be a source of inspiration and motivation for the team to implement the process in a wider scope.

Moreover, ecodesign is a continuous improvement process, where it is necessary to learn from previous experiences, involve multiple stakeholders and optimize the process. Thus, the implementation of a first successful approach can sometimes take several months. This long starting point should be considered as an investment to successfully launch a systematic integration of environmental criterion into all company projects as part of design process.

A crucial step is to assign among collaborators an ecodesign blackbelt. The role of the blackbelt - previously trained in Life Cycle Thinking – is to create a collective dynamic within the company to set up the ecodesign approach. Several strengths seem necessary to fulfil this key role: Being an experienced project manager, who has a global and cross-cutting view of the various departments of the company, with knowledge of products and processes, while being a true network hub and leader.

The ecodesign blackbelt needs to raise awareness (on Life Cycle Thinking) among various stakeholders and identify concrete levers for improvement based on the collective intelligence. As short description the role of blackbelt is to facilitate the integration of the ecodesign approach into the company's daily processes. Nevertheless, ecodesign should not rely solely on blackbelt; awareness raising among stakeholders and their active contribution is key to the smooth progress of the process.

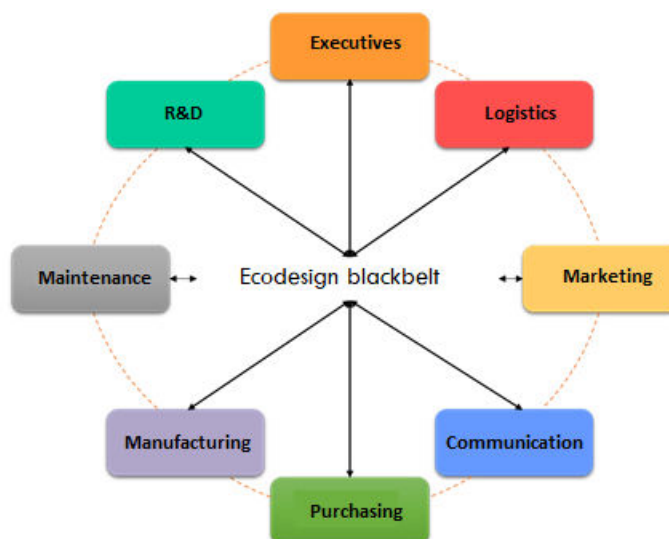


Figure 1. Integration of ecodesign through the organisation.

2- Interactions between LCA and ecodesign

Ecodesign and LCA are complementary as shown in Figure 2. Indeed, it is possible not to systematically integrate LCA in ecodesign approaches, as it is possible to conduct LCA of a product as not being ecodesigned. Nevertheless, the external communication of environmental improvements of a product based on ecodesign process, shall rely on a quantified environmental assessment, based on the life cycle.

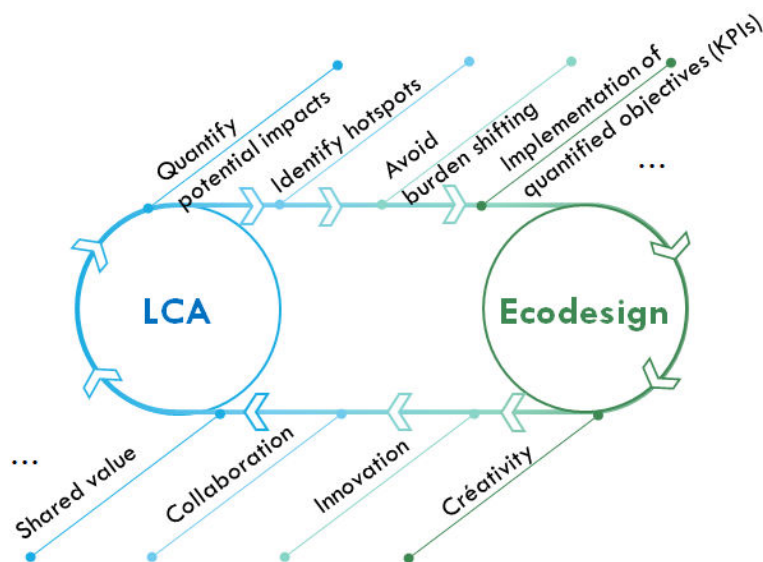


Figure 2. Interactions between LCA and ecodesign

The environmental assessment may interact in various stages of the development of a project (ecodesign), directly or indirectly. Life Cycle Assessment (as reference for quantitative assessment) or methods based on this approach, need to be simple to use (but not simplistic).

The majority of ecodesign approaches do not involve detailed LCA but use qualitative or semi-quantitative tools. It's important to note that so-called qualitative methods and tools, used to identify environmental areas of improvements, are often based on complete or partial LCA results. Finally, most eco-design approaches use LCA results indirectly. That is the main reason why companies are not aware of using LCA while being the case.

3- Three approaches to integrate LCA in different phases of project development

Based on the analysis of practices, three main approaches may be identified to integrate LCA into an ecodesign approach:

- Qualitative;
- Semi quantitative;
- Quantitative.

These 3 approaches are presented in detail in the guide illustrated in figure 3.

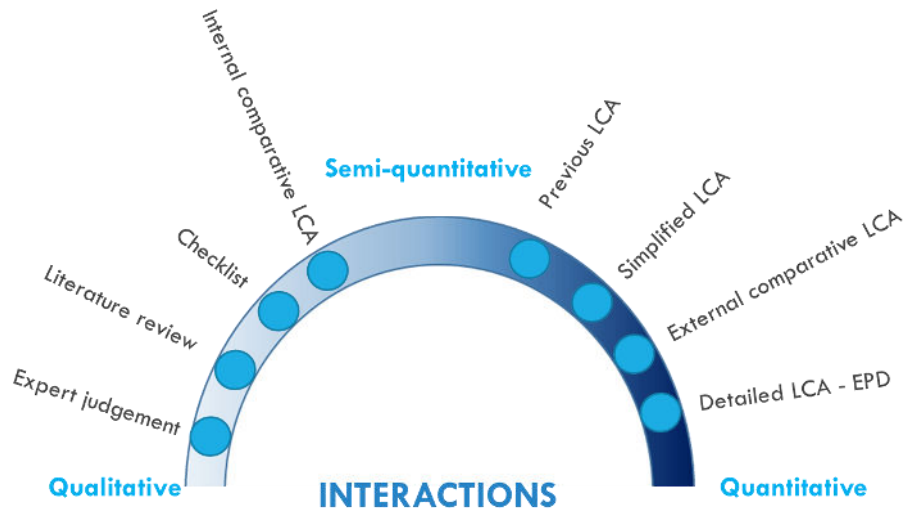


Figure 3. The continuum between qualitative, semi-quantitative and quantitative approaches.

4- Evolution of a project: product, service, process

Eco-design must be integrated at the earliest stages of the project development (at the same level as aspects like the quality), as shown in Figure 4. ISO / TR 14062 states: "The early integration of environmental aspects into the product design and development provides the flexibility to modify and improve. On the contrary, waiting until the last stages of the process can make it impossible to use certain environmentally desirable options as major technical decisions are already taken and implemented."

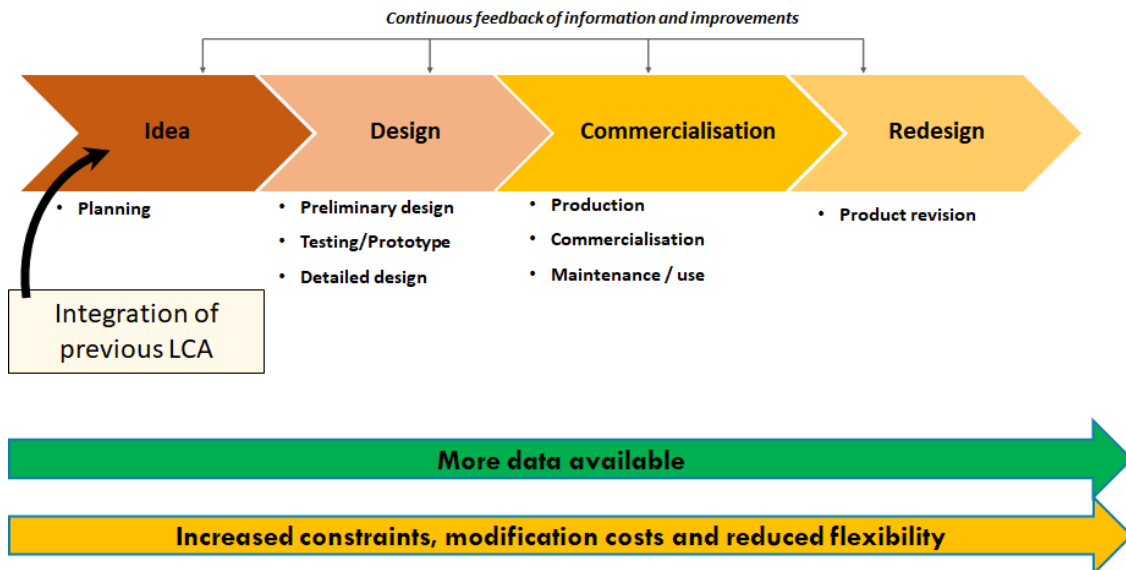


Figure 4 Phases of the project (product, service or process) development (adaptation from norm ISO/TR 14062).

In each of these development phases, it's relevant to integrate LCA as described in next paragraphs. To do this in the most efficient way, internal knowledge and effective use of previous experiences (LCA) may be used as a solid foundation for the design phase of the next products.

➤ How to effectively integrate ecodesign into your project?

There are many tools for LCA & ecodesign (as examples Bilan Produit ADEME, MECO, CORINE, Altermaker, EcoDesign+, etc.). The assessment of case studies in this project showed that, the deployment of ecodesign is no longer confined by the lack of tools, but mainly to appropriate adaptation of these tools, methods and approaches to the internal organisation of companies.

In addition, the timing (on development phases of a project) during which the applicability of LCA is most efficient should be considered. The three ways to integrate LCA and their compatibility depend directly on the evolution of a project in terms of available data, simplicity of application and time required for implementation.

➤ Effective integration of ecodesign based on project phases

The guide details for each phase of a project effective and efficient types of approaches and tools to be applied. Also, the use of LCA results are highlighted in detail. Table 1 summarizes the (non-exhaustive) recommendations resulting from this project, drawn from the case studies, expert opinions and feedback from SCORELCA members.

	Background preparation	Idea	Design	Commercialisation	Redesign
Recommended	Previous knowledge to create support tools (e.g. <i>check list</i>), Awareness raising and training	Emphasize the use of qualitative approach + simplified tools to support creativity	Semi quantitative ecodesign brainstorming tools (e.g. MECO). Internal comparative LCA is very useful	LCA, ecolabelling, environmental declaration, Environmental Footprint , etc.	Quantitative (ex. LCA), Interface to exchange data (collaborative tools ex. Altermaker, Corine, etc.), considering other environmental impacts (beyond LCA)
To avoid		Quantitative approaches (e.g. detailed LCA)	Attention to missing data (reliability)	Attention on the limits of use of the term "ecodesign" in external communication	

Table 1. Summary of recommendations for each stage of project development.

5- Role and assets of the LCA practitioner in the ecodesign approach

LCA practitioner assists the implementation of eco-design approaches with their experiences. Their contribution is a focal point for the implementation of environmental aspects in the company design process. LCA practitioner participates in the ecodesign approach from its early beginning to the end. One of the main roles is to conduct comparative assessment of different design alternatives and orient decisions to be more sustainable.

Various roles of LCA practitioner is an integrated part of ecodesign collective dynamic. The proper functioning of the triptych "Innovator" "Evaluator" "Decision-maker" is essential to the success of a design, especially when it comes to integrating environmental dimensions.

CONCLUSION

Most companies implementing an ecodesign approach affirm that they did not carried out a detailed LCA or even used LCA tools. It may be concluded from these statements that, in practice, the links between LCA and ecodesign is weak.

However, the study confirmed the existence of these links. LCA is a powerful tool for eco-design but not the only one. The adaptations of the ecodesign approach and LCA tool were detailed based on the specificities of the organization of the companies. In addition, the study identified when and how LCA may be used effectively in an ecodesign approach, providing recommendations for the implementation of an ecodesign approach based on the strengths of each company are provided. Study highlights the collaborative nature of ecodesign involving different stakeholders.

The benefits of LCA, and more generally environmental assessment tools in design phase, are highlighted. However, optimized coupling amplifies the benefits for eco-design approaches. Moreover, this study concluded on the importance of the timing to implement LCA in an ecodesign approach. Finally, the study confirms that a non-adapted ecodesign approach to the organization of the company can significantly decrease the success of the process.