SPIN'IT AND FOOD PRINT, TWO SIMPLE SOFTWARE FOR ACHIEVING COMPLETE AND COMPLEXE LIFE CYCLE ASSESSMENT

Jerome Payet [1, 2]; Cédric Roussel [3]

[1] ENAC – SIE; Ecole Polytechnique Fédérale de Lausanne, 1015 Lausanne (Switzerland)
[2] Cycleco, 1011 av. Léon Blum, 01 500 Amberieu (France)
[3] Tools for environment, rue Châtellenie 4, 1635 La Tour-de-Trême (Switzerland).

Abstract

Life Cycle Assessment (LCA) aims at providing a methodological framework for environmental assessment of products over their whole life (from the early extraction of raw materials to the late end of life of the products) based on several environmental criteria. While the whole society is facing environmental problems, LCA aims at providing metrics to enable both companies and citizen to find the best way in order to keep quality of life while reducing environmental burdens. Nevertheless, this is a complex exercise for small and medium companies. With the overall purpose of facilitating the use of Life Cycle Assessment for companies, Cycleco is developing innovative software for Life Cycle Assessment. Two software concern agro-food and for textiles products, named FOOD PRINT and SPIN'IT. These software must be able to support an easy practice of eco-design and environmental footprint calculation. Nevertheless, it shall also allow a fast calculation of environmental footprint of thousands of products, ensuring a reliable ranking of products and facilitating networking within and among companies. The article focuses on the locks which limits the integration of an easy practice of LCA within small and medium size companies. Solution to resolve these problems are proposed and then a short presentation of Food print and Spin'IT is done. The discussion highlights the differences and the interest of generalist LCA software on the one hand and specific LCA software on the other hand.

Keywords: Life Cycle Assessment, software, ecodesign, environmental footprint, agro-food, textile.

1. INTRODUCTION

Life Cycle Assessment (LCA) aims at providing a methodological framework for environmental assessment of products over their whole life (from the early extraction of raw materials to their end of life) based on several environmental criteria. While the whole society is facing environmental problems, LCA aims at providing metrics to enable both companies and citizen to find the best way in order to keep quality of life while reducing environmental burdens. Nevertheless, this is a complex exercise for small and medium companies. It takes time to understand the standard (ISO 14040-44) [1, 2], to learn how to apply the method, to manage easily the thousands of available Life Cycle Inventory and to decide which impact categories, and which characterization models are relevant depending on the strategy of the company and the type of product. Providing an adequate response to these complexity require to keep a constant scientific, technical, normative and regulatory survey in the field of environmental product assessment, but also to manage efficiently the interface between Environmental assessment of products and the considered industry sector.

Issues such as allocation, system boundaries, data representative, missing characterization factors, ISO terminology, and their relationships with a given industry sector require a strong involvement from LCAnalysts. Added up with problems such as database and software updates, and exchanges with customers and sub-contractors to get environmental data quickly makes it hard to manage without one or several full time position or a comfortable budget for consulting. This is not compatible with the structure and resources of SME's.

2. BARRIERS AND SOLUTION FOR LARGE USE OF LCA

2.1 Expanding the use of LCA

LCA can be used in several manners. On the one hand, it can be applied as an expert method with generalist software and databases managed by consultants or researchers. In that case consultants

have a high level of expertise in LCA but they have to discover the area in which they are wheeling to apply it. This approach can take a long time and lead to high consulting expenses. On the other hand, LCA can be applied as an additional knowledge which is managed directly by people working in their own field, without being LCA expert. This second way of applying LCA can help to expand the use of LCA but it requires the developments of more functional and pragmatic software and databases, and of clearer and easily accessible methodologies. It is the purpose of Cycleco to develop such LCA tools for specific industry sectors and for given companies.

Food Print and Spin'IT, the software developed by Cycleco for agro-food and textile products as to fulfill the following requirements:

- Enable a reliable product ranking on the basis of their environmental performances over their whole life cycle;
- Enable feasibility of products ecodesign (while optimizing the choice of material, processes, etc);
- enable low cost and efficient LCA studies;
- Provide environmental footprint results for all textile and agro-food products
- Provide a framework to quantify environmental performance of eco-processes and to improve the visibility of eco-processes for companies
- Facilitate integration of individual efforts and shared experiences and results within and in between companies.

2.2 Limitation of conventional approaches for an easy use of LCA

Main locks identified can occur all along the LCA study. First limit concerns the terminology used in LCA: during the last 15 years, LCA has developed its own terminology and a clear understanding of such a terminology is needed before starting with LCA concepts. The second limits concerns the immaturity and instability of LCA method: new norms, concepts, practices, methods and rules are still happening continuously and it takes time to manage the scientific, regulatory and normative survey. Third limit concerns Life Cycle Inventory (LCI) data: LCI databases are big databases documented in German of English. Nevertheless, in spite of the diversity of products and processes presented in those databases, the LCAnalyst is confronted to unneeded data, inadequate data, and even more often missing data. In addition, collection of new inventory data will lead to complexity in the measurement of flows within the company, the management of the exchange of data between companies, and the use of an appropriate format and units for building up the inventory data. The fourth main limitation concerns the choice of the category indicators and the understanding of the results: most of LC Analyst are using impact categories that are not necessary relevant with their purpose, or which are out of date simply because they cannot manage to study in depth strength and limitations of each characterization model. So the interpretation, the conclusions and the communication made with the results of the study are sometime rather weak.

Cycleco provides solutions to pass these limitations for specific industry sectors which are building, agro-food products and textile products. The sections below focus on the approach developed for agro-food and textile. For each of these two industry sectors, Cycleco has built up a network of industrial partners in order to better identify the needs of each sector and to check step by step the relevance of each solution proposed.

3. PRESENTATION OF TWO SIMPLIFIED LCA SOFTWARE

3.1 FOOD PRINT, eco-design and footprint assessment in the agro-food sector

Cycleco's software "Food print" provides an extensive database of agriculture and food products and processes which covers most of the processes and products. Furthermore, allocation rules and choice of impacts categories are predetermined and clearly explained. Thus the user can simply put effort to improve the modeling of his product and to ensure the quality of the data specifically used to model his own system.

3.2 SPIN'IT for ecodesign and footprint assessment in the textile sector

Cycleco has developed a large database covering a large diversity of materials (synthetic and natural) and numbers of industry processes which foot print can change depending on their technology and their location. Further these developments; a smart environmental data management system was programmed with a friendly online interface in order to ensure both an easy learning of Spin'IT functionalities and an efficient management of environmental evaluations of each reference.

3.3 COMPARING GENERALIST AND SPECIFIC LCA SOFTWARE

These short presentations of FOOD PRINT and SPIN'IT highlight the specificities of Cycleco Online LCA applications. Developing specific software for given industry sectors limit the adaptability of the software. Compared to generalist LCA software, allocation rules, systems boundaries, end of life scenarios, etc are largely predefined by the software and limited flexibility is left to LC Analyst. So in generalists software, the first and last stage of LCA regarding ISO 14040, namely the scope and goal definition and the interpretation, is to be done by the LC analyst while specific software such as Spin'IT or Food print strongly frame the possible choices. At the same time, the interpretation is largely left in hands of the LC Analyst in generalist software while it is framed by the software itself for specific software. So comparison between generalist and specific software easy shown that there is no one best solution. If software is used in a research perspective with the purpose of studying the strength and limitations of different way of performing LCA, generalist LCA software are far more powerful. If the purpose is instead to be sure to stick to ISO and ILCD [3] requirements and to ensure a stable database and methodology for performing LCA very quickly, then specific software are promising because the cost and time efficiency is then strongly improved.

4.   CONCLUSIONS AND PERSPECTIVES

The effort done by Cycleco to facilitate LCA access for companies lead to new LCA software which have very different specificities compared to current existing LCA software. These new software that can be currently used for agro food and textile are also a trade of between research complete and complex software, which are requiring a strong and constant effort from user's to practice efficiently LCA and an "industrialized" LCA method enabling fast repetitive calculation with very low flexibility. Such "industrialized" approach cannot be done yet in LCA because important researches are still ongoing (so method are changing), inventory and characterization factors databases are updated very often, and regulatory framework is under construction at world level. Nevertheless, even if a fully automated LCA approach is not feasible, companies are more and more involved in using LCA for eco-design and environmental footprint assessment of their product. Spin'IT and Food print have prove that LCA is applicable at large scale even in SME's, but is also means that specific and powerful tools will have to be developed for all industry sectors. These developments will require important efforts from LCA experts to ensure both the quality of LCA framework and a good response for companies' requirements.

5.   REFERENCES

[1]   ISO 14040: 2006; Environmental management - Life cycle assessment - Principles and framework.

[2]   ISO 14044:2006 ; Environmental management - Life cycle assessment - Requirements and guidelines.

[3]   European Commission- Joint Research Center- Institute for environment and sustainability (2010); Internationa Reference Life Cycle Data System (ILCD) Handbook – General guide for life cycle assessment – Detailed guidance. First edition March 2010. EUR 24708 EN. Publications Office of the European Union, Luxembourg.

[4]   ISO 14025; Environmental labels and declarations –Type III environmental declarations- Principles and procedures.