LIFE CYCLE IN PRACTICE – HOW TO HELP SME'S TO INTEGRATE LIFE CYCLE THINKING CONCEPTS ?

Sylvie Groslambert, Angélique Léonard

University of Liège – Chemical Engineering, Liège, Belgium
s.groslambert@ulg.ac.be

Mots clés (maximum 5) / Keywords (5 maximum): Life Cycle in Practice, SME's, life cycle resource center, eco-design

Introduction

The application of life cycle (LC) approaches – including life cycle assessment (LCA), eco-design and environmental labelling – is becoming an increasing reality for business, and a growing challenge in many economic sectors. Businesses are facing increasing legal and market requirements to enhance resource efficiency and reduce the environmental impact of their products & services. To significantly address this challenge, the Life Cycle in Practice project (LCiP - LIFE12 ENV/FR/001113) was conceived, aiming to promote the uptake of LC approaches particularly in small and medium-sized enterprises (SMEs).
The overall aim of the LCiP project is to help SMEs in France (North of France/Hauts de France), Belgium (Wallonia), Portugal and Spain (Basque Country) in reducing the environmental impacts of their products and services across the entire life cycle and to foster the implementation of circular economy in these regions. Three sectors are selected: buildings & construction, waste management and energy equipment. Thirty-two businesses are involved in the four regions, twelve being located in Wallonia. GreenWin, the Walloon partner, has mandated several teams well-known for their expertise in LCA to coach them.

Materials and methods

ULg–Chemical Engineering coached three SMEs to help them to carry out the life cycle assessment of their product and accordingly to identify the strengths and weakness of the products and/or processes. Two of them are involved in building insulation (hemp concrete blocks by IsoHemp and Acoustix panels by Pan-terre), and the third one is developing an accelerated composting equipment for food waste (EcoCleaner).
The LCA are made according to the standards ISO 14040/44:2006 [1] [2].
Databases: Ecoinvent 3.01 [3] and ELCD 3.0 [4]; software: SimaPro 8.0.5.13 [5]; method: CML-IA 3.03 [6].

Results and discussion

Since Isohemp blocks and EcoCleaner system are already ecodesigned, only little improvements can be done to lower their environmental impact, except the replacement of electricity from grid by on-site photovoltaic panels for the EcoCleaner to supply the electricity necessary to operate the machine. Anyway, LCA confirms the judicious choices for their designs. On the contrary, Acoustix panel process is quite old and can only get better. That's why focus is made on this case study.

The Acoustix panels manufactured by Pan-terre provide complete and effective acoustic insulation solutions. They are obtained from a judicious mix of two cellulose based materials: waste paper and flax shives. This activity fits logically with one of the main businesses of the Groupe Terre (that includes Pan-terre), which is the recovery of clothes/textiles and recyclable (paper, plastic, beverage carton and can, and glass). Paper waste (62.5%), flax shives (37.5%) and water are mixed together without any other additive. The pulp is pressed in panels with a hydraulic press and the panels are dried in a gas oven. Then they are calibrated (thickness adjustment) and cut–out (borders) to the right size, and palletized with plastic foils. All the waste is recycled into the process, including pressing water, dust and cuts. LCA is made in a cradle-to-gate perspective, with a 100 years life span.
The LCA clearly puts the finger on the hot spot of the process: it shows that the use of natural gas for the drying of the panels has the biggest environmental impact, especially on global warming potential (GWP100). A quick evaluation of possible solutions indicates that the substitution of the natural gas hot air generator for a waste burning system (textiles, paper, panel offcuts) could drastically reduces most of the impacts (74% for abiotic depletion–fossil fuels), and it can even result in a negative tally for

GWP100 (139% of reduction!) (Figure 1). It has to be noted that the Groupe Terre disposes of ultimate textile waste in sufficient quantities to ensure its full autonomy if this option is chosen. Other improvements can be done by the optimization of the drying process (recovery of heat and water), and by replacing the present press by a more powerful and continuous one (leading respectively to less residual water in the panel to be dried, and less cut-outs).

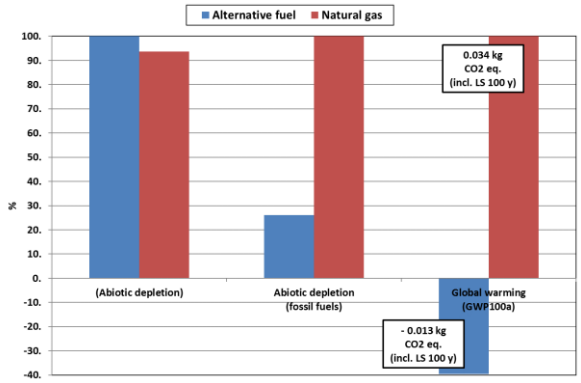

Figure 1. Comparison of the impacts in abiotic depletion, abiotic depletion (fossil fuels) and climate change categories of Acoustix panels with the use of alternative fuels (blue) compared to natural gas (red) for the drying of the panels. CML-IA method.

Since the present process is quite old (30 years) and needs to be renewed, the conclusions of this study can help the company to make the most sustainable - and economical - choice of their energy source when they design their new production line, on the basis of scientific evaluation of the environmental impacts.

Conclusions

Life cycle assessment proves its value as a scientific tool to point out weaknesses of a process and estimate the environmental benefits that can be done by changing some parts of the manufacturing chain of a product.
As a coach, the experience of working closely with highly motivated people in small structures is very gratifying and a smart way to help life cycle approaches to develop in our region. For the SMEs, it is a convenient and inexpensive way to get involved in sustainable development and life cycle thinking, together with a way to reduce costs and support sustainable choices when they want to change or evolve their process. The benefits are therefore both economical and environmental.
Moreover, environmental communication, including on construction products, is now ruled by norms promulgated by European Commission. For an Environmental Product Declaration (EPD) to be effective, the information on which it is based has to be consistent, reproducible and comparable. This is the role of the European standard EN 15804:2012+A1:2013, which requires a LCA. Most of the SMEs need to be helped in this approach as they can't afford to have internal LCA specialists. That's why we are pleased to go on this initiative by hosting one of the Physical Resource Centers in the University of Liège to welcome SMEs seeking to integrate LC approaches into their businesses, and to give them access to selected LCA tools, reading material, expertise, training and advice.
Results and Online Resource Center are centralised on the LCiP website: http://www.lifelcip.eu/.

References

[1] ISO. 2006. Environmental management—Life cycle assessment—Principles and framework. ISO 14040. Geneva: International Organization for Standardization.
[2] ISO. 2006. Environmental management—Life cycle assessment—Requirements and guidelines. ISO 14044. Geneva: International Organization for Standardization
[3] Ecoinvent. Ecoinvent data v.3.0.1; 2014 (http://www.ecoinvent.org/)
[4] ELCD - The European Life Cycle Database (http://eplca.jrc.ec.europa.eu/ELCD3/)
[5] PRé Consultants. 2014. SimaPro (http://www.pre-sustainability.com/)
[6] CML (2013) CML–IA eIdn. Institut of Environmental Sciences Leiden University, Leiden (http://cml.leiden.edu/software/data-cmlia.html)

Acknowledgement - The authors thank the Life+ Programme of the EU, the Walloon Region and GreenWin.