Life Cycle in Practice – Helping SMEs to integrate life cycle approach in their policy

Sylvie Groslambert, Angélique Léonard

University of Liège – Chemical Engineering – Quartier Agora, B6, Sart Tilman – 4000 Liège - Belgium
E-mail contact: s.groslambert@ulg.ac.be

1. 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 SMEs.

The overall aim of the LCiP project is to help SMEs in France, Belgium, Portugal and Spain 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 (BE). GreenWin, the Walloon partner, has mandated several teams well-known for their expertise in LCA to coach them.

2. Materials and methods

ULg-PEPs coached three SMS's 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 (IsoHemp hemp concrete blocks and Acoustix panels by Pan-Terre), and the third one is developing an accelerated composting equipment for food waste (EcoCleaner).

Concretely, the LCA of the three products are realised in a cradle to gate perspective. The results show possible environmental impact improvement for all the products, even if they are eco-designed. The LCA is made according to the standards ISO 14040/44:2006 [1] [2].

Databases: Ecoinvent 3.01 [3] and ELCD v3.0 [4]; software: SimaPro 8.0.5.13 [5]; method: CML-IA 3.03 [6].

3. Results and discussion

IsoHemp develops and manufactures natural products used in building renovation and construction. Hemp concrete blocks offer benefits in terms of thermal, hydraulic and acoustic regulation while remaining completely natural. The process is quite simple: hemp shives (80%), natural hydraulic lime (11%), hydrated lime (9%) and water are mixed together without any other additive. This mortar is shaped in blocks with an hydraulic press and the blocks are stored 24 hours to dry and to cure. The blocks are then put on pallets and packed with plastic foil and links. They are stored two months outside in the backyard before being dispatched to clients. All the waste and broken blocks are recycled into the process

The environmental impact of IsoHemp hemp blocks affects mainly the categories of global warming potential over 100 years (GWP100) and abiotic depletion (fossil fuels). The impact on the global warming category has a negative value of -1.04 kg CO_2 eq. for 1 m^3 of hemp blocks (for a lifespan of 100 years). Since the process is already ecodesigned, the only avenue for improvement identified in this study concerned the galvanised steel corner pieces used to hold the blocks together on the pallets without degrading them. One solution would be to put a returnable deposit on and reuse them, or to replace them by thinner products or plastic ones.

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. They are 100% obtained from recycling and 100% recyclable. Paper waste (62.5%), flax shives (37.5%) and water are mixed together without any other additive. The pulp is pressed in panels with an hydraulic press and the panels are dryied in a gas oven. Then they are calibrated (thickness adjustment) and cut –out (borders) to the right size, and paletized with plastic foils. All the waste are recycled into the process, including pressing water, dusts and cuts.

The LCA shows that the use of natural gas for drying the panels has the biggest impact, especially on GWP100. Substitution of the natural gas hot air generator used to heat the panel drying oven with a waste burning system (textiles, paper, panel offcuts) drastically reduces most of the impacts (74% for abiotic fossil fuel depletion), and it can even results in a negative tally for global warming (139% of reduction).

EcoCleaner, a unique solution in Belgium, lays the foundations for a new line of business for the recovery and reuse of food waste. This machine processes food waste in 24 hours directly on the site where it is produced. This performance is made possible by a patented microorganisms consortium and optimized humidity and temperature conditions. The dry substrate (> 80% dry matter) resulting from the process is collected and sold on the local market as a soil improver.

The category with the biggest impact is the depletion of abiotic resources, essentially because of the metals used to construct the EcoCleaner. However this impact is limited by a smart refurbishing of the machine every 12 years, and partially offset by the gain from recycling the metals (when refurbishing and at the end of life). The depletion of abiotic resources (fossil fuels) and global warming potential are mainly affected by the electricity consumption required to process a tonne of canteen waste (339 kWh/t). The gains associated with avoiding the use of chemical fertilisers resulted in a relatively important negative component in almost all categories.

The use of photovoltaic (PV) electricity instead of the Belgian electricity mix (nuclear 55%, fossil fuels 40,6%, and renewable 4.4%) would result in significant gains in almost all impact categories including a reduction of 75% for fossil fuel resources and 67.5% for global warming potential. However the use of PV panels is not good for the depletion of abiotic resources because of the metals required to manufacture the panels.

4. Conclusions

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.

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 give them access to selected LCA tools, reading material, expertise, training and advice.

Results and Online Resource Centre are centralised on the LCiP website: http://www.lifelcip.eu/.

5. References

[1] ISO. 2006a. Environmental management—Life cycle assessment—Principles and framework. ISO 14040. Geneva: International Organization for Standardization.

[2] ISO. 2006b. Environmental management—Life cycle assessment—Requirements andguidelines. 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] PRe Consultants. 2014. SimaPro (http://www.pre-sustainability.com/)

[6] CML (2013) CML - IA edn. 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.