Life Cycle Thinking in action!

How to use LCA and supply chain management to facilitate product development and environmental improvement of office chairs.

Author: Ingunn Saur Modahl

STØ

P.O.Box 276, 1601 Fredrikstad, Norway

ism@sto.no

+47 6935 1100 / +47 4112 3551

Content

Summary

HÅG has worked with environmental and resource aspects of their products for many years. In 2003 and 2004 HÅG developed EPD's for 10 of their office chair products. This work has been further developed in 2005 and 2006, with translation of the EPD's into eight languages and a supplier project for product development and environmental improvement. The new environmental knowledge has also now been incorporated in the designer phase of new seating solutions.

Based on the LCA/EPD results, three suppliers where chosen for further collaboration and development work. These three producers contributed with between 12-80% of the global warming potential of the office chairs. The collaboration has lead to the generation of many practical ideas for changes that can improve the environmental profile. A theoretical analysis shows that if the three most important improvements were implemented, the global warming potential for 9 of the 10 office chairs is improved, the reduction is as much as 71% for one of the cases analysed.

HÅG and their suppliers are now performing further work, assessing and carrying out improvements. This project shows that LCA and EPD are useful in providing the basis for collaboration with suppliers to facilitate product development and environmental improvement of products.

Background

HÅG has a high profile in Norway and in the office furniture market as a result of their work on environmental and resource aspects of their products. As part of their investment in environmental documentation and environmental improvements, HÅG has chosen to carry out life cycle assessments (LCA) [1] and obtain environmental declarations (EPD, Type III) [2] for 10 of their office chair products [3].

Methodology

The first step was to develop a database and a system for efficient analysis and documentation. Carrying out the life cycle assessments was a relatively extensive project, since the office chairs have 40 to 160 components each. STØ gathered specific transport and production data from 41 suppliers and material data for 89 different materials. These suppliers deliver over 97.5% (mass %) of the materials needed for each chair.

Then the office chairs were analysed to find the materials and/or processes that were the most important for the environmental impacts arising from the chairs. Global warming, acidification, eutrophication, photochemical ozone creation potential, waste and energy consumption was used as indicators. Based on the results of the analyses, three suppliers were chosen for further collaboration and development work.

These suppliers were first visited by a representative from STØ. On this visit, STØ was introduced to the company and guided around the production site. The company was also informed about the background LCA and EPD work and the environmental challenges that HÅG considered important. The next step was a brainstorming session. This was conducted in order to find as many ideas for improvements as possible. The goal was to improve the environmental profile of each supplier, which would in turn also improve the profile of HÅG's chairs. After this visit, the company did some technical evaluations and, together with STØ, chose 2-3 ideas that they considered practicable. STØ then used this selection to calculate the theoretical environmental improvements.

Two months later, the results for the theoretical potential for environmental improvements were presented to all of the suppliers in a meeting together with STØ and HÅG. Håg participated with employees with environmental, purchasing, market and design functions in the company. The aim of this final meeting was to inspire both HÅG and their suppliers for the work that lies ahead.

Results

Analyses of global warming, acidification, eutrophication and photochemical ozone creation potential, waste and energy consumption show that aluminium, steel, PA (polyamide), PUR (polyurethane) and PP (polypropylene) are the most important materials in the office chairs, as far as these environmental impacts are concerned [4].

Three suppliers where chosen for further collaboration and development work: an aluminium moulding company, a PUR producer and a plastic moulding company. Except for one seating solution, these three producers contributed with between 12-80% of the global warming potential of the office chairs. The environmental improvements at the suppliers will therefore have a large impact on the environmental profile of the final product.

The supplier collaboration has lead to the generation of many practical ideas for changes that can improve the environmental profile of the office chairs. Some of the suggested improvements can be carried out for the suppliers' existing products, others involve HÅG working on design and product development, while some will require better systematic solutions (e.g. better recycling systems).

The three most realistic and important improvements were:

-   To substitute PA with recycled PET;
-   Re-use PUR foam, and
-   Increase the amount of recycled aluminium used.

A theoretical analysis of the results that would be obtained if all three of these improvements were implemented shows that the global warming potential for 9 of the 10 office chairs is improved, the reduction is as much as 71% for one of the cases analysed.
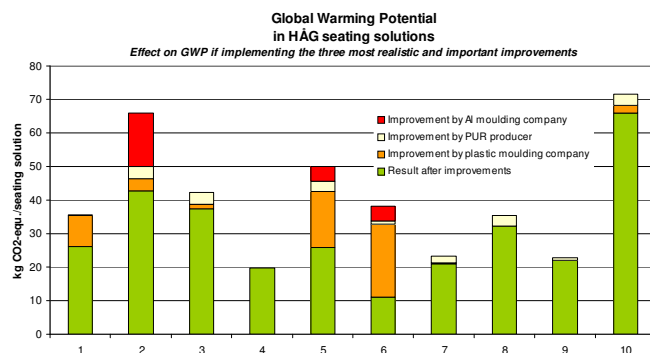

Figure 1   Effect on GWP if implementing the three most realistic and important improvements

Conclusions and further work

HÅG and its suppliers are now performing further work, assessing and carrying out improvements. The aluminium moulding company has already increased the amount of recycled raw materials they use; the supplier of plastic components are planning test mouldings of new, recycled plastic materials and the PUR producer is assessing re-use of foam in collaboration with the designers at HÅG. Both HÅG and the aluminium moulding company have bought 'green certificates' for their 2006 electricity consumption. HÅG has also incorporated this new environmental knowledge in the designer phase of their new new seating solution platform 'G4'.

The LCA and EPD work has provided an indispensable basis for making the right choices regarding what materials, processes and suppliers to focus on. This knowledge has also been extremely important when convincing the suppliers to join the project and take a look at their own processes and raw materials. EPD has also shown to be an excellent marketing tool for HÅG in this process [5]. This project shows that LCA and EPD are useful tools in collaboration with suppliers to facilitate product development and environmental improvement of products.

References

[1]   ISO 14040-43 "Environmental management - Life cycle assessment - Principles and framework/Goal and scope definition and inventory analysis/Life cycle impact assessment/Life cycle interpretation", International Organization for Standardization, 1997-2000, http://www.iso.org/iso/en/ISOOnline.frontpage.

[2]   ISO/TR 14025 "Environmental labels and declarations – Type III environmental declarations", International Organization for Standardization, 2000,
http://www.iso.org/iso/en/ISOOnline.frontpage.

[3]   Næringslivets Stiftelse for Miljødeklarasjoner, www.epd-norge.no (Norwegian homepage where Norwegian and English versions of the EPD's from HÅG are published).

[4]   I.S. Modahl "Dokumentasjon av livsløpsanalysar (LCA) og miljødeklarasjonar (EPD) for 10 sitteløysingar frå HÅG" ("Documentation of LCA and EPD work for 10 seating solutions from HÅG"), STØ-report AR 03.04, 2004.

[5]   I.S. Modahl and F.H. Storelv "Use of Environmental Product Declarations as a Marketing Tool for Seating Solutions", LCM

2005 – 2nd International Conference on Life Cycle Management, Barcelona, September 5-7, 2005 (Proceedings, paper number 187).