



Establishing av Nordic Life Cycle Association - NorLCA

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Nordic co-operation

Nordic cooperation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic cooperation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic cooperation seeks to safeguard Nordic and regional interests and principles in the global community. Common Nordic values help the region solidify its position as one of the world's most innovative and competitive.

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Summary

The Nordic Life Cycle Association is a non-profit membership organization founded in 2004 by representatives from all the Nordic countries with the goal of furthering and supporting a sustainable development through the use of life cycle approaches. The Association acts as a multidisciplinary platform for Life Cycle Thinking and addresses designers, product developers, architects, economists, LCA-specialists and others with an interest in life cycle thinking.

Some professional societies already deal with LCA, but generally as a sub-discipline to other topics. There are fora and platforms for the methodology development, LCA-data and life cycle management, but no Life Cycle Approach forum exists for the environmental employee in e.g. the small-medium-size company, the lecturer in a design school, the college teacher, the product developer, the economist, the architect, or the consumer organisation. NorLCA has the single and overall goal of facilitating and supporting a broader and increased use of life cycle related concepts.

NorLCA focuses on networking activities and dissemination of information through establishing a platform where the more central life cycle players can interact with the more marginal players. The intentions are also to bring together both the formal and informal life cycle networks, which have emerged over the last decade and establish easily accessible information and knowledge exchange channels between these networks.

The NorLCA target group consists of business managers, product developers, environmental managers, sales and marketing managers, researchers, teachers, NGOs, authorities, graduate and post-graduate students. Although a Nordic initiative, members from all over the world are invited to join. The working language of NorLCA is English.

The main NorLCA activity is an annual symposium where the newest knowledge and experiences can be shared. The symposium format focuses primarily on interactive workshop sessions and networking, but it also hosts a special session for PhD students to present their work. NorLCA intends to expand and strengthen cooperation with other networks, initiatives and institutions.

Who is behind the NorLCA initiative:

The initiative is supported by the Nordic Council of Ministers. A Danish - Swedish project group has done the preparatory work of establishing the association through 2004-2008.

Further information available on www.norlca.org

Preface

Why the NorLCA initiative?

Nordic countries are up through the nineties increasingly engaged in the pioneering work with product oriented environmental initiatives to meet the challenges of a sustainable development. Focus shifts from the end-of-pipe approaches to a new thinking of a prioritised environmental improvement of all stages of the life cycle of products and systems. A Nordic co-operation in the area of product-oriented environmental policy under the Nordic Council of Ministers was initiated in 1996 and an array of initiatives followed throughout the Nordic countries (P.Kristensen, 2001). It is in a straight line with this tradition of Nordic cooperation on sustainable development that the idea of creating a formal platform for the many initiatives, activities and networks within this area, emerges and is kicked off in 2004 and pursued in the following years.

With support and input from Nordic Council of Ministers, this primarily joint Danish-Swedish initiative to create a platform for a facilitated dialogue on Life Cycle Approaches between academia, industry and other stakeholders was formulated and presented to representatives in the LCA-communities in other Nordic countries. Without hesitation all the Nordic countries supported the idea and rapidly entered into the cooperation of establishing the Nordic Life Cycle Association. The LCA-disciplines are in this context defined as Life Cycle Assessment, Life Cycle Management, Life Cycle Design, Life Cycle thinking etc., that is the broad definition of the disciplines to assess and improve the environmental footprint of design, manufacture, distribution, use and disposal of products.

To serve as inspiration for other regions to initiate similar initiatives, this report describes the experience, the process, the cooperation and the new ideas addressing key activities as:

- goal and scope of the NorLCA initiative
- establishing the association, framework, articles, dissemination, etc.
- the first symposium and the use of more interactive communication forms
- abstracts from symposium proceedings
- evaluation of the symposium and participants comments on the NorLCA concept
- financing after the project
- relations to LCA-Platform of EU and other international actors in the field
- further dissemination - routes and activities

*NorLCA project group and NorLCA founding board
(authors)*

1. Goal and scope of the NorLCA initiative

Informal networks already exist within the Nordic countries. The goal of the NorLCA initiative was to establish a framework for more formalised and multidisciplinary Nordic network to ensure consistency, transparency and communication channels in the effort of supporting dissemination and supporting a much broader use of all Life cycle-disciplines, and introducing an annual meeting under the auspices of NorLCA to bring together both central and more marginal LCA-stakeholders.

Scientific societies and professional associations exist within many areas. Some societies already deal with LCA, but generally as a sub-discipline to other topics. Society of Environmental Toxicology and Chemistry (SETAC) hosts the methodological aspects of Life Cycle Assessment, but hardly the more user oriented applications of the broader concepts contained in the phase "life cycle approach".

However, no association had the overall and only goal of facilitating and supporting the broader use of all the life cycle related concepts. Thus, NorLCA aims at establishing a forum for all kinds of stakeholder in Scandinavia and neighbouring regions, who want to join forces using the association approach, in order to communicate and learn about the life cycle approach in all its aspects. NorLCA is, therefore, focussed on networking activities, with annual symposia in front and a web site and some networking activities for the members in support. The ambition is to establish a platform where the more central life cycle players can interact with the more marginal players, as no such forum existed. Moreover, the intentions are also to bring together both the formal and informal life cycle networks, which have emerged in the Nordic countries over the last decade and establish easy accessible information and knowledge exchange channels between these networks.

The life cycle tools are targeted towards product oriented activities, and the tools play a major role in the sustainability efforts as described in initiatives like the EU "Integrated Product Policy (IPP)" [COM2001/68] and the Nordic IPP (TemaNord 2000:505, 535 and 557).

The language of a Nordic Life Cycle Association is English to ensure no language communication difficulties between the Nordic countries and to facilitate international communication to and from the Association.

Within the area of LCA, there exists a tradition for collaboration within the Nordic countries. One of the very significant achievements is the Nordic Guidelines of Life-Cycle Assessment, published in 1995 (TemaNord 1995:20). This project was initiated in 1991 by the Nordic Council

of Ministers as part of the Nordic Council of Ministers Strategy on the Environment.

The idea of founding a Nordic Life Cycle Association emerged back in 1997. The Danish EDIP-project (Environmental Design of Industrial Products) was finalised that year. The scientific review of the EDIP methodology was for a large part, undertaken by researchers from the Nordic countries. During dissemination of the EDIP results and the subsequent dialogue with Nordic stakeholders, it was obvious that Nordic authorities, universities and companies were frontrunners within the LCA disciplines. In 1997 the EDIP entrepreneurs were awarded the Nordic Environmental Prize, and it is in connection with this that the idea of an even closer and more formalised Nordic co-operation has its roots.

1.1 Hurdles to overcome

The Swedish-Danish initiators had years of experience with the LCA-disciplines on different levels both nationally and internationally. Over the years it became clear that one of the hurdles yet to overcome is to implement the Life Cycle-disciplines into the enterprise cultures as described in the key-note paper "Life Cycle Engineering – from methodology to enterprise culture" (Hauschild, Alting and Poll, Cambridge, UK 2003). This paper states:

"The last decade has seen the development of a number of methodologies and tools for life cycle assessment and development of more eco-efficient products, from complex to simplified, catering to the needs of especially SMEs. The tools and data are in place, but dissemination lacks behind. Propagation of life cycle thinking and life cycle engineering to larger parts of industry is attempted by strengthening the market pull through integrated product policy measures, and at the same time pushing through information activities, training and dissemination of tools."

Another experience of the initiators was that while there are fora and platforms for the methodology development, LCA-data and life cycle management, no Life Cycle Approach forum exists for the environmental employee in e.g. the small-medium-size company, the lecturer in a design school, the college teacher, the product developer, the economist, the architect, the consumer organisation and others.

These individuals and institutions have not, and probably never will participate in i.e. a SETAC meeting, as their need for information and knowledge/experience exchange is at a very different and more operationalised level. As the Nordic countries over the years aggressively and persistently have pursued the LCA-disciplines, it seems naturally that an initiative such as NorLCA emerges as a Nordic initiative.

Thus, the overall goal of NorLCA is to support the push of the life cycle disciplines on all levels into the authority, education and enterprise culture within the Nordic Countries and neighbouring regions.

The tools, which are applied in the national environmental product policies and in EU's Integrated Product Policy, are typically a combination of soft regulation and support to industries and others who want to apply the life cycle approach. Therefore, support in the form of dissemination of methods, tools, data and experiences are a core activity of NorLCA.

A forum for both central and more marginal stakeholders, will create a two-way dialogue, from the specialist to the more marginal players and vice versa. A continuous and structured information flow in a defined forum – in this case NorLCA – will thus strengthen dissemination of life cycle tools, and sustainability activities in the Nordic countries.

A formalized forum as suggested in NorLCA will be a visible player on the international scene, and especially so within the EU, as no other region in the Union has established such a broad and formalised forum. The Nordic countries have been front runners within the life cycle disciplines for nearly two decades now (2008), and a united and via NorLCA coordinated Nordic input to ongoing activities and discussions on IPP issues is expected to carry weight.

1.2 The Global Scene

On the global scene UNEP and SETAC in collaboration recently launched the Life Cycle Initiative under the UNEP program for sustainable consumption with the aim: "To develop and disseminate practical tools for evaluating the opportunities, risks, and trade-offs associated with products and services over their entire life cycle to achieve sustainable development". The initiative has a strong emphasis on the dissemination of life cycle approaches throughout the world and a specific focus on the implementation in developing economies. This initiative has three pillars concerning

1. inventory analysis,
2. impact assessment and
3. life cycle management (the use of life cycle assessment information in management decisions) respectively.

A central goal under the initiative is to identify and disseminate the best practice for the different phases and steps of life cycle assessment within the framework laid out by the ISO standards and to make data and methodology for performing LCA available and applicable worldwide in order to make life cycle approaches a central element in consumers' and industry's quest for sustainability.

However, the UNEP-SETAC Life Cycle Initiative does not specify how the dissemination will take place. A formalized and broad dialogue forum as suggested in NorLCA has the potential to become a very strong dissemination route. Therefore, if established, NorLCA must offer full cooperation and support of the UNEP initiative, and make the communication channels which will surface via NorLCA available to the UNEP dissemination activities. For the Nordic region and Nordic stakeholders, this will without any doubt be an advantage with regard to availability of the recommended practices emerging from the UNEP-SETAC Life Cycle Initiative.

1.3 The European Scene

On the European scene, EU launched the project the “European Platform on Life Cycle Assessment” in 2005. This project is carried out by Joint Research Centre, Institute for Environmental and Sustainability (JRC-IES) in collaboration with DG Environment. The first phase deliverables running from 2005-2008 are

- European Reference Life Cycle Data System with LCI and LCIA data sets
- Technical Guidance Handbook for LCA (including LCIA development and review frame)
- Communication platform (including LCA information hub, LCT Forum)

The European Platform phrase two of their main goals as

“Support Life Cycle Thinking in the development of goods and services and support Life Cycle Thinking in a broad range of policies with deliverables of reference data and recommended methods”

On cooperation activities, the platform states

”Insights into current practice are complemented by close interaction with Advisory Groups of EU-level business associations, of LCA tool and data base developers as well as through formal cooperation with ongoing national and international LCA projects and initiatives”

[<http://lca.jrc.ec.europa.eu/EPLCA>]

This EU initiative is central to furthering the use of life cycle approaches and is the kind of initiative where NorLCA can play a role in supporting further dissemination of the activities on a regional level and creating awareness of new tools and information made available by the EU LCA platform. In this context NorLCA can also encourage and assist in taking

in the life cycle approaches at a level that seems manageable to the individual person, institution or company.

The progress and results from the UNEP-SETAC Life Cycle Initiative, the European LCA Platform and other initiatives will be announced and disseminated to members of NorLCA, through inviting key persons from the initiatives to the annual NorLCA meetings to give presentations.

LCA-related initiatives taken in the individual Nordic countries should be disseminated to the rest of the Nordic region through NorLCA, e.g. the IPP-research program under the Swedish EPA called FLIPP.

The NorLCA will also consider activities specifically aimed at promoting life cycle approaches in the neighbouring countries, in particular the Baltic states.

These are only a few examples of how NorLCA can support a much more active and structured inter-Nordic dialogue. Today, central LCA-players in each of the Nordic countries often have limited knowledge of many local initiatives carried out in our neighbouring countries, and therefore do not profit from possible synergies, which can emerge also from more local and smaller initiatives. It is the ambition of NorLCA to map as many of these activities as possible in the Nordic countries and disseminate results and lessons learnt to its members

1.4 From idea to a joint Swedish - Danish initiative

It is in connection with The Danish LCA Center (www.lca-center.dk) which has the main goal to disseminate the use of LCA in Danish industry, that the idea of a Nordic LCA society was developed into a concrete initiative. In connection with the Center activities the work started on defining and describing the tasks necessary to move on, preparing for opening the dialogue on this issue with key persons in the Nordic countries. The idea of establishing a Nordic LCA association was discussed with key persons/institutions in Sweden. The initiative enjoyed full support, and subsequently these institutions joined the project group. The conditions for LCA initiatives and activities were in many ways similar in the two countries with many research and application oriented initiatives, small as well as large informal networks, but no formal coordination and mutual platform for exchanging knowledge and coordination initiatives.

1.4.1 The Swedish starting point

In Sweden an informal Life-Cycle network was established in 2001. It was started as an initiative by Göran Finnveden at FMS. The network has organised 2-3 seminars each year on different topics. Examples of topics include: Integration of LCA and economic methods, Weighting methods for LCA and related tools, LCA and its relations to other environmental

systems analysis tools and Implementation of LCA and related methods. The network also had an updated email list available to members for sending out information about new reports, seminars, job opportunities etc. The network has approximately 150 members from academia, governmental agencies and industries. The typical members are PhD students, LCA practitioners at institutes and industries. One of the ideas behind the LC-network is to provide a platform for informal meetings between younger researchers and practitioners with less established private networks. This informal network can be included in the NorLCA activities.

At Center for Environmental Assessment of Product and Material Systems (CPM), represented by Industrial Environmental Informatics (IMI), Chalmers University of Technology, Göteborg, work is carried out in the area of initiating, managing, and implementing standards for LCA-data communication. However, also this institution can identify e.g. lack of a common understanding regarding what is to be communicated and how, lack of education and/or resources etc.

IMI pointed out, that by inviting suppliers and small and medium enterprises (SME) to join the Nordic LCA Association, all parties in the supply chain can meet to create and assimilate a practical and common concept model enabling efficient communication. Such a common concept model will be based on current standards, practical procedures, and consensus discussions among all parties. According to CPM, the industry will benefit from a Nordic LCA Association. It will be

- A neutral and creative platform for interaction between authorities, academy, and industry
- A forum for exchange of experience and knowledge, a network to facilitate collaboration and initiate projects to solve common problems
- A strong part in the international dialogue, to support important decisions and common interests outside the Nordic countries

The CPM-companies have identified specific areas of interest for further development within the field of LCA. Some of these areas may very well be of immediate interest also in a Nordic LCA context.

1.4.2 The Danish starting point

As in the other Nordic countries, many informal LCA-networks have emerged over the last 10 years in Denmark, and even supported networks on LCA have been tested. To support the many and varied LCA-activities in Denmark, The Danish Environmental Protection Agency initiated the publication of a Danish LCA-newsletter, sent out one to three times a year to an informal network counting approx. 600 persons and institutions over a 4 year period. The publication and distribution of this newsletter has now been taken over by the Danish LCA Center. The Center is a

knowledge centre for life cycle assessments (LCA) and the life cycle approach. The centre promotes product-orientated environmental strategies in private and public companies by assisting them in implementing life cycle thinking. The Center is partly funded by the Danish Environmental Protection Agency and is jointly managed by Institute for Product Development, COWI and dk-TEKNIK.

The goal and scope for the Center is to support Danish enterprises and other organisations in getting started and beyond with the life cycle approach in praxis. The target group is Danish stakeholders, as the Danish Government is co-financing the Center activities. While the Center is focussed on the Danish market and has the power to develop tools like courses, maintain and support LCA software, introduction packages, news and kick off consultancy for enterprises, then the goal and scope for NorLCA is the entire Nordic region, functioning as an association of stakeholders at all levels, interested in dissemination issues of the life cycle approach. Thus, the practical framework for hosting a Nordic Life Cycle association secretariat and web site existed within the Danish LCA-center.

1.4.3 Norway, Finland and Iceland joins the initiative

In Norway, Finland and Iceland status for dissemination of the LCA-disciplines to enterprise culture was quite similar to the situation in Sweden and Denmark. Thus, it was the key goal of the Swedish -Danish project group, to join forces with colleges from the other Nordic regions in the process of establishing a mutual Nordic LCA platform

2. Establishing the association, framework, articles and dissemination

2.1 A dialogue with NMR

The Danish and Swedish initiators presented the initiative to the POEMS group under Nordic Council of Ministers. The POEMS group thoroughly evaluated and commented on the proposed Nordic network concept and specifically emphasised coordination with EU's LCA activities as a prerequisite for any such Nordic Life Cycle network initiative.

2.2 Kick off

In the summer of 2004 initiators from the Danish and Swedish LCA-community (see appendix A) met in Copenhagen and in more detail defined goal, purpose and main activities for the association, as shown in table. 2.1-2.3. A preliminary presentation of the NorLCA concept was drafted, for each of the initiators to present at relevant fora for disseminating the launch of the network.

Table 21. Goal of NorLCA

Establish a non-profit <u>multidisciplinary</u> organisation
<ul style="list-style-type: none">• Dedicated to use, development and dissemination of Life Cycle Approaches• Life Cycle Approaches comprise life cycle thinking, life cycle design, life cycle management, life cycle costs, life cycle assessment, product oriented management etc.
Create a mutual Nordic platform for all engaged in Integrated Product Policy and the use of Life Cycle Approaches
<ul style="list-style-type: none">• Promote sustainable development• Strengthen the international focus on the achievements obtained in this area within the Nordic countries• Strengthen the Nordic role in the international development.
The target group is broadly defined, covering
<ul style="list-style-type: none">• engineers, economists, designers, architects and others• interested in or working with IPP, LCA, sustainability and alike concepts within companies, consultants, authorities, universities, consumer organisations etc.

Table 2.2. The purpose of NorLCA

Focus specifically on dissemination at enterprise level and in the product chain.

- The Association will try to avoid initiatives that duplicate or conflict with international methodology development, like in the SETAC forum, or at the EU level.
- The Association will, however, discuss such developments and strengthen the Nordic contribution to it.
- Most importantly, the Association will join all Nordic forces within the field
- creating synergy between different approaches to life cycle thinking
- from research teams' methodological findings to NGO's political views and consumers' wishes to ensure a sustainable society

Table 2.3 The main activities of NorLCA

Annual NorLCA symposium

- hosted alternately by each Nordic country
- programme for these symposia must contain broadness allowing for many-faceted LCA presentations.
- symposium will also contain summing up presentations on EU and other international initiatives, i.e. SETAC, UNEP, ISO, ISIE, CIRP to update the Nordic members on activities from these institutions.

Annual publication (proceedings from symposium)

Website: www.norlca.org

Other ideas and views on the purpose were that NorLCA can provide a platform for the sometimes isolated environmental specialist working in industrial companies and that branch networks over time should be approached for cooperation:

- NorLCA may host the Swedish LCA-network in the future. In general, NorLCA can offer such networks visibility and exposure to their target group within the Nordic countries while the networks can offer NorLCA relevant activities.
- Nordic branch networks should be identified and listed for future mailing and cooperation or perhaps as officially associate networks; e.g. Nordic fisheries
- The Baltic countries should be included or invited to cooperation with NorLCA with the purpose of supporting Integrated Product Policy initiatives there.
- NorLCA also can provide a platform for graduate and PhD. students, to present their work and thesis

Work on the formal organisation of the network was prepared by the Danish project group

2.3 The organisational structure of NorLCA

A Nordic LCA Association should be organised with an executive committee with members from each Nordic country. A president chairs the committee for e.g. a 4-year period. A general assembly is held in connection the NorLCA symposia. Suggested organisation as shown in Figure 2.1

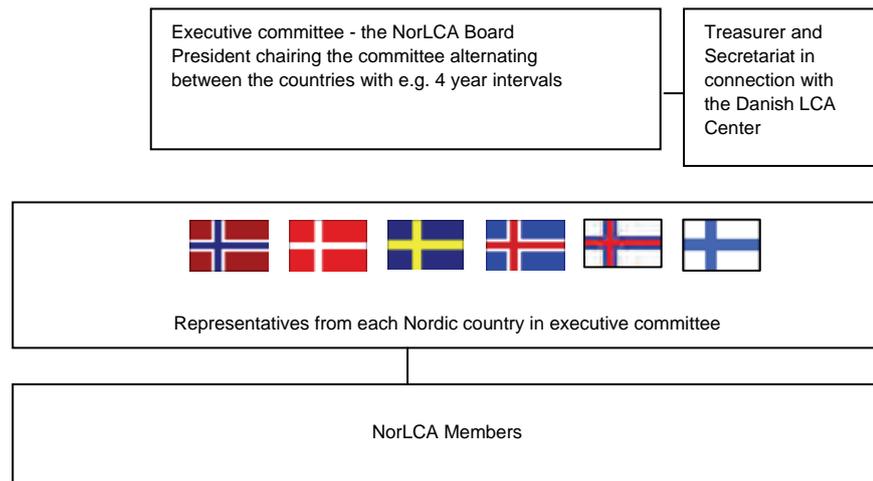


Figure 2.1 organisational structure of NorLCA

Subsequent to the project kick-off meeting in Copenhagen, Swedish project members identified and contacted potential Finish member of a NorLCA founding board. Danish project members identified and contacted potential Norwegian member(s) and Icelandic member for a NorLCA founding board.

2.4. The NorLCA main activity

The main activity is the annual NorLCA Symposium, hosted alternately by each Nordic country. The programme for these symposia must contain broadness allowing for many-faceted LCA presentations.

There will be summing up presentations on EU and other international initiatives, i.e. SETAC, UNEP, ISO, ISIE, CIRP¹ to update the Nordic members on activities from these institutions.

LCA-practitioners from the member countries will have a platform for sharing their experience with the practical use of LCA. Local initiatives within the Nordic countries will be encouraged to share experiences. Special sessions can be allocated to SMEs. Nordic universities and other institutions will be encouraged to give presentations and/or minitutorials on their courses and curricula in sustainable development.

¹ CIRP is the International Institution for Production Engineering

As the annual meetings will be held alternating in the Nordic countries, the local organizing committee and hosting country can suggest special themes for the annual meeting.

There should be room for satellite symposia, mini courses and computer tool cafes with demonstration of software tools. Industrial companies should be able to purchase exhibition areas and/or purchase advertisements in the symposium abstract book.

The annual general assembly of NorLCA will be held in connection with the symposium.

The executive board may over time define other activities.

2.5 NorLCA founded in Helsinki 2004.

NorLCA founding meeting was held in Helsinki 29 – 30 November 2004 at Finnish Environment Institute's (SYKE), Helsinki, Finland. Table 2.3 shows NorLCA founding board and initiating project group.

The founding chair emphasized that the concept is life cycle *approaches*, which NorLCA must promote at all levels in society. All founding board members agreed on the importance that the scope of NorLCA is not being perceived as in depth methodology developments.

The list of ideas from the Copenhagen kick-off project group meeting was presented and to feed into a further discussion and prioritizing on how to proceed from the Helsinki meeting. Each country gave a general orientation on the status on life cycle perspectives and interests:

Finland:

- With regard to the NorLCA focus on SMEs, the industrial structure in Finland is that there are few very large companies, and at the same time fewer SME's than in the other Nordic countries.
- The construction sector is interesting in an life cycle context, since it is already moving towards life cycle approaches.

Norway:

- Are pushing Environmental Product Declarations (EPD) into the market,
- A new law on public procurement is being implemented, determining life cycle considerations and putting pressure on companies to fulfil the 3–4 indicators required.

Sweden:

- The environmental regulatory command and control approaches as used in DK with regular renegotiations of pollution permits and environmental management measures, have not been used in Sweden,

and the Danish model, where the companies' life cycle activities form a part, could serve as an inspiration for other countries.

Iceland:

- No governmental push to support life cycle thinking.
- Funding for LCA-activities is supplied by research funds.
- Iceland has no LCA-courses at university level.
- With regard to focus on SMEs, Iceland has many small and medium sized companies.

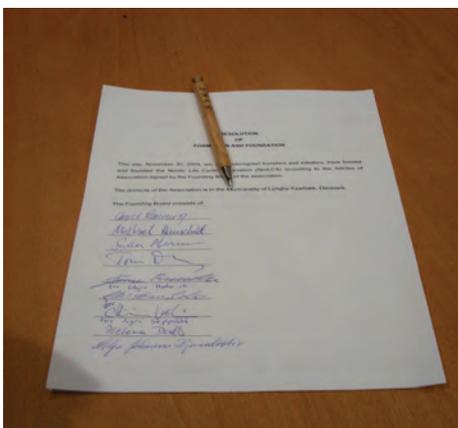
2.5.1 Legal Articles

The NorLCA legal consultant presented the draft articles for comments from the group. The articles had been elaborated by the legal consultant, NorLCA project management and secretariat and a draft was sent to participants prior to the Helsinki meeting. A consented version of the articles was reached and prepared for signatures from the founding board. Articles can be seen in appendix B.

A resolution of formation and foundation was subsequently signed by founding board (for some board members by proxy) on November 30, 2004 in Helsinki.

Table 2.4 Founding board and initiating project group

Denmark	Sweden	Norway	Iceland	Finland
Founding board				
Michael Hauschild LCA-center DK Chair	Göran Finnveden KTH	Anne Rønning STØ	Helga J. Bjarnadóttir Linuhonnun	Salla Ahonen Nokia
Per Christensen, Aalborg University <i>(not present in Helsinki)</i>	Tomas Rydberg Chalmers <i>(alternating with Raul Carlsson)</i>	Edgar Hertwich NTNU <i>(not present in Helsinki)</i>		Jyri Seppälä SYKE
Represented by project group by proxy		Represented by Christian Solli by proxy		
NorLCA-Project Group				
Michael Hauschild Project management	Göran Finnveden KTH			
Christine Molin LCA-center DK Technical University of Denmark Project management and NorLCA secretariat	Raul Carlsson Chalmers <i>Not present in Helsinki</i>			
Jeppe Frydendal LCA-center DK Project tasks, web design etc.	Tomas Rydberg Chalmers			
Stig Irving Olsen LCA-center Denmark Technical University of Denmark Project tasks				
Legal Consultant				
Niels Schiersing, Nordia Law				



The signed resolution of formation and foundation of Nordic Life Cycle Association

2.5.2 Founding board and chair

Can be seen in table 2.4

2.5.3 NorLCA secretariat

The founding board consented on having the secretariat in connection with the Danish LCA centre, geographically placed at the Technical University of Denmark, just north of Copenhagen.

2.6 Dissemination

A series of different dissemination activities were implemented following the Helsinki founding meeting. A NorLCA website was established and information folders were produced and distributed through the project group, secretariat and board through participation in both national and international meetings. Other networks, companies and associations were contacted and briefed about the initiative and invited to cooperate. Below an example of an information folder.



3. An interactive concept for the NorLCA symposia

A catalogue of different communication formats for NorLCA symposia had to be compiled as the usual format of plenum presentations does not serve the goal of the association to reach out also to non-academic practitioners of life cycle approaches in companies. A template (Table 3.1) for the NorLCA symposia was drawn up to serve as guidance for local organizers of the symposia:

Table 3.1 a general template for NorLCA symposia

Day 0	Day 1			Day 2		
	Keynote speakers			WS 3a	WS 3...	WS 3n
	WS 1a	WS 1...	WS 1n			
Board meeting	WS 2a	WS 2...	WS 2n	General assembly		
	Dinner			New board introductory meeting		
Opening reception						

Legends:

WS = workshop or other types of sessions that are more active than just one-way communication.
a, b, c, ..., n = parallel sessions

Nordic Life Cycle Association, NorLCA, has been founded to create a platform of exchange of information and experience on life cycle approaches among actors within this field in the Nordic Countries, and the purpose of the symposia is therefore to support contact and networking among the participants and to bring them useful information on practical use of life cycle approaches among companies and authorities in the Nordic region.

To facilitate networking and exchange of information it was necessary to supplement the traditional platform presentations, with sessions of a more interactive character that are described in the following.

3.1 Life Cycle Market Place

The concept of a Life Cycle Market Place was introduced at the first NorLCA symposium and it was proposed that the concept if possible is a set event at the symposia. The objective is that participants during prolonged breaks and possibly a session dedicated to the market place can stroll around among the Market Place stands and check the offers to see if there is something of interest.

Examples of stands in a Life Cycle Market place are

- Eco-labelling – 5 quick questions
- Environmental Product Declaration - EPD
- Public Green Procurement
- Life Cycle Project Bank – deposit an idea and harvest input to your LC activities
- Posters presenting LC activities at companies or institutions in the different countries

Each stand is operated by a specialist within the specific area to answer questions and demonstrate the concept on display.

The Life Cycle Project Bank is planned established over time. The bank hosts a catalogue of project ideas formulated by LC practitioners. Anyone can deposit a project idea in the bank and hopefully see it give proceeds in the form of collaboration with qualified students and supervisors at Nordic Universities.

The Life Cycle Tool Café, allows software tools with emphasis on simplified tools to be demonstrated. Again with its informal format, the tool café also functions as a frame for networking,

3.2 Hands on workshop sessions

Again in order to facilitate the practical application angle, NorLCA screened the market for workshop concepts which emphasized the hands on approach. One concept, that was identified as relevant in the NorLCA context is the Eco-design Interactive Workshop developed by the international network 'Ecodesign network SIG' (<http://www.ecodesignsociety.org>)

This concept focuses on implementation of research into application-oriented cases. A company donates a product (small size product suitable for mailing to selected participants).

Three to five invited eco-designers and LCA-specialists will prior to the workshop apply their skills to the donated case product example and product documentation in ample time prior to the workshop. These participants are asked to attempt to apply their specific experience and skills to the product, ready to present at the workshop.

On the actual day of the workshop, the invited experts spend 5 min. introducing their research area and then 15 min. presenting how they have applied this particular knowledge to the common product and which conclusions and recommendations this has led them to give for the product. Representative(s) from the donating company are present and participate in the discussion. Having a common reference product supports more concrete discussions and ensures a focus on the application of theory in practice. For the other participants in the workshop, the concrete discussions make it easier to extrapolate to other products of their own interest.

During the workshop the eco-designers and LCA specialists present their observations for discussions among all workshop participants. Based on the discussions environmental improvement potentials are agreed on and listed and given to the company supplying the case product.

3.3 Guided tour of a specific life cycle tool

A guided tour – or mini tutorial – of a specific tool applied in Life cycle approaches is meant as an appetizer and introduction to this specific tool. An example is

- A guided tour of Life Cycle Management based on 1-2 cases

The tour involved presentations from at least two stakeholders from one product chain, where LCM has been used illustrating environmental initiatives implemented in the product chain and the environmental benefits/results, this has led to. The tour also addresses development in product chain relations, strategies and methods.

Subsequent there is a dialogue with the case companies present at the session. Companies are invited to send a brief case description in advance or just present a case during the session

3.4 Summing up the format

Based on the general symposia template, a NorLCA symposium could have the format and content as seen in Table 3.2.

Table 3.2 an example of the format and content of a NorLCA symposium

Day 0 Pre-meetings	Day 1	Day 2	
	Keynote speakers	Open session	Hands on workshops, i.e. Eco-design Workshop
	Open session		
	Lunch	Lunch	
	Guided tour of specified life cycle tools, i.e. Life Cycle Management	Open session	PhD session Master thesis session
	Life Cycle Market Place	Life cycle tool café and poster session	
NorLCA Board meeting	NorLCA General Assembly	Summing up and next years meeting	
Opening reception			

3.5 Differentiated levels of abstracts and papers

As a NorLCA symposium has a broad target group going way beyond academia, symposium abstracts and paper formats had to be adjusted to serve a not uniform target group. Academia usually delivers full scientific papers for conferences whereas industrial companies in many cases neither have the time nor the inclination to produce full scientific papers.

To accommodate both university and industrial culture, invitation to submit presentations will for NorLCA symposia be stipulated as:

- Authors wishing to make a presentation are invited to submit an abstract. Priority will be given to presentations reporting on practical experience with application of life cycle approaches.
- Companies wishing to present a case are invited to submit an abstract. A full paper is not required for company presentations.

For both platform presentations, poster presentations, and Life cycle tool café, abstracts are reviewed by a programme committee.

3.6 Evaluation of symposium format

For the first and founding symposium, an evaluation form was developed. As new and more interactive sessions were tried out as a core activity, it was important to ask participants which formats worked well to get input for the coming NorLCA symposia. The summarized evaluation forms can be seen in appendix C.

The questionnaire contained the following questions:

1. How did you find out about the NorLCA symposium
2. Which parts/sessions of the symposium were most interesting for you
3. Which parts/sessions were the least interesting for you
4. Please provide comments on the format of the sessions and the symposium
5. Did the NorLCA symposium meet your overall expectations
6. Please give your affiliation and profession
7. Membership and sponsoring: are you a member, do you think NorLCA can meet a need for you, is it likely that your organisation/affiliation would be interested in sponsoring NorLCA activities

Summing up the filled in questionnaires

1. Most participants had heard about the symposium through peer to peer communication.
2. The interactive sessions were in general considered most the interesting
3. Not unambiguous, but LCA methodologies have a high score
4. Not unambiguous, but one participant sums it up: good mixture of different type of sessions
5. Majority of scores in 'yes' and 'partly', no scores in 'no'
6. and 7. Please see appendix C

4. Summary of the first NorLCA symposium

4.1 A successful first NorLCA Symposium

More than 70 people, representing companies, researchers and consultancies shared experiences and ideas concerning the use of life cycle thinking at The Nordic Life Cycle Association Symposium.

The first NorLCA Symposium was held in Lund the 9-10th of October 2006. A few highlights from the symposium are described in brief in the following.

4.1.1 Life Cycle Marked Place for networking

The overall purpose of the Symposium was to bring the different Nordic stakeholders within the life cycle area together, so that they could share experiences and promote new ideas and contacts. The evaluation indicates that this was an absolute success – the Life cycle market place constituted a networking platform between plenum and workshop sessions, and it hummed of discussions during the 2 day Symposium. The many lectures held by companies as well as researchers gave a good impression of the level and state of LC/LCA related work in the Nordic countries.

4.1.2 Good environmental behaviour?

One of the interesting findings was the fact that the Norwegian and Swedish companies at present do not use consequential attributional LCA. One example illustrating this was a Norwegian company that promoted the use of recycled aluminium in their company, believing that it was good "environmental behaviour".

What several scientists pointed out, was the fact that all recovered aluminium is used, due to a general increase in the demand of aluminium. Hence, using more aluminium, whether recycled or not, means that more virgin aluminium must be produced. In consequential LCA this is accounted for.

4.1.3 Simplified Life Cycle Tools

Another interesting aspect expressed by the companies, was the need for more simple LCA-tools to use in their communication with customers as well as during their development of new products. Companies with a

short development phase of products (like mobile phones) cannot use the fully detailed LCA in their development, simply due to the fact that the full LCA is too time-consuming compared to their product "turn-over-time"

These aspects makes it even more important to create a forum like NorLCA Symposium, in which scientists and companies can share experiences.

4.1.4 Eco-designers and LCA-specialist work together

A new international eco-design initiative cooperating with NorLCA, held an interactive workshop on the morning of the second day of the symposium. Eco-designers and LCA-specialists had prior to the workshop assessed the same case product – a table lamp from a Swedish manufacturer. At the workshop they presented their observations resulting in what turned out to be a vivid discussion among all workshop participants. Subsequent environmental improvement potentials were agreed on and listed. After the workshop, the improvement suggestions were passed on to the company manufacturing the product.

4.2 Presentations and Abstracts

Abstracts of the presentations are given in appendix D. The full papers and power point presentations are available on www.NorLCA.org

5. NorLCA ahead

The association is still (2008) in its very early childhood. Many activities have already been completed since the foundation in Helsinki in November 2004. One significant milestone has been planning and hosting the first internordic symposium and entering into cooperation with other projects and networks. For the first symposium, both the Swedish FLIPP programme and Öresund Environment network participated in the planning and in organizing the event. Perhaps most important, these co-organizers also disseminated the symposium invitation to their own network and contacts, and in doing so, extended the awareness of life cycle approaches and activities beyond the inner circles of the LCA community and its contacts. This is in fact the very essence of NorLCA, namely to enhance awareness of applying the life cycle approaches to an audience not necessarily very familiar with the LCA disciplines. At the same time NorLCA can facilitate the use of LCA tools at a level which is comfortable to the individual user.

As described in previous chapters, the goal and scope of NorLCA is to ensure a platform where central and more marginal stakeholders can interact and exchange knowledge. The symposium constitutes this physical platform. At the first “pilot” symposium various interactive formats were tried out and it was evaluated whether the formats meet the goals of the association. The symposia platform will continue based on this concept and be further developed over time. As each symposium is hosted alternating between the Nordic countries, a local flavour will ensure a diversity in focus from year to year. As for all meetings of this character, participants pay a conference fee which includes a small overhead to the organization’s activities (website, meeting planning, board, and secretariat). The fees are differentiated in such a way that the membership fees are neutralized via a lower symposia fee; that is members pay a lower rate than non-members.

This financial basis of NorLCA is a point which makes the association fragile in economic terms. If the symposium fails one year in terms of participation, the economy of the association may collapse. This must be kept in mind when organizing the symposia and contracting expenses. It also means that NorLCA is based on voluntary work (with the exception of a partial financing of the secretariat).

In a longer time perspective it is desirable that NorLCA establishes a small fund to make the organisation less sensitive to the success of the annual symposium.

With its focus on life cycle approaches and its foundation and extended network in all Nordic countries, NorLCA offers itself as an obvi-

ous future dissemination channel for activities which the Nordic Council of Ministers launches in the field of sustainable production and reduced environmental impacts from products and service systems.

Throughout 2007 and 2008 there has been a rising awareness of global warming – hence the carbon footprint discussion and agenda. In this context, the importance of applying the life cycle approach to prevent sub optimizations cannot be stressed strongly enough – both as regards the inclusion of the whole life cycle and as regards the consideration of other impacts than climate change. In relation to the Climate Change Summit in Copenhagen 2009, it is the intention to organise a NorLCA symposium supporting this message.

6. Summarizing NorLCA

The second NorLCA symposium was held in Norway 2008 under the heading “Warm climate, cool business” organised by Østfold Research Foundation emphasizing a strong focus on industrial presentations. Based on now (2008) two successfully executed Nordic symposia on Life Cycle Thinking, it is evident that the “lowest” level” for technical discussion must be further established and maintained. As stated in the association’s articles, the aim is not to have SETAC jargon discussions. Maybe such a “lowest level” could be established by furthering the development of the interactive meeting concept as already developed and tried out within the NorLCA. This could be done as e.g. group workshop where attendees together try to formulate or distinguish different LCA-matters-of-fact to establish some common understanding and language for today's community of new and old Nordic LCA users and practitioners.

Summarizing the experiences from two Nordic symposia, with 90 and 60 participants respectively, it is apparent that the overall main objective with the NorLCA project of establishing the symposium as a multidisciplinary dialogue platform is fulfilling the task of disseminating life cycle thinking and focusing on the practical approach required through out the product chain.

In 2008 the NorLCA board discussed the ambition of activity level of NorLCA. Drawing on experiences from the Danish LCA center, facilities such as a regular newsletter, an interactive website, a constant and updated presentation flow of industrial case stories, require outside regular and annual founding of at least a full time employee to reach and cover every corner of the Nordic countries. However, the direct dialogue and networking already established through the NorLCA symposia and NorLCA dissemination activities is considered an achievement well worth the efforts for NorLCA to maintain and disseminate. Before establishing NorLCA, the participants from now two symposia did in fact not meet up to exchange views and experiences on application of life cycle thinking or have a forum to discuss the industrial cases and approaches presented up till now.

There are already plans for the 2009 NorLCA meeting in Denmark to join a larger conference cooperation in connection with the Climate Summit and ensure that the message of life cycle thinking and broad coverage of environmental impacts comes across in the heated debate of climate change, which will be going on, and both Finland and Iceland have offered to host the following symposia in 2010 and 2011 and thereby concluding the first full cycle of meetings in all Nordic countries.

In summary, it is the feeling of the board that NorLCA is on the right track and that we managed to scale the level of activity to the resources which are available to us so we can have a sustainable organisation. If there is a wish to strengthen the dissemination of life cycle activities, some sort of funding will be required for this in the future, but the board is confident that present level of activity still ensures a valuable platform for exchange between Nordic life cycle practitioners and the further dissemination of life cycle approaches in the Nordic countries.

References

Preben Kristensen, 2001. The Danish Product Oriented Environmental Initiative. In: US EPA/625/R-01/002. March 2001. www.nato.int/ccms.
TemaNord 2000:505, 535 and 557
Nordic Guidelines of Life-Cycle Assessment, published in 1995 (TemaNord 1995:20).

Hauschild, Alting and Poll, Cambridge, UK 2003. Life Cycle Engineering from methodology to enterprise culture. In book: Design and Manufacture for Sustainable Development 2003 (isbn: 1 86058 427 6), pages: 3-22, 2003, , Professional Engineering Publishing Ltd., London

Appendix A

- Legal articles

Appendix A. NorLCA project partners

LCA-center Denmark (managed by IPU, COWI and Force Technology). Michael Hauschild and Christine Molin from IPU, are responsible for NorLCA-project management. Email: mic@ipl.dtu.dk or cm@ipl.dtu.dk

Center for Environmental Strategies Research (Centrum för miljöstrategisk forskning - fms) Royal Institute of Technology (KTH)SE 100 44 Stockholm, Sweden contact: Göran Finnveden, Email: goran.finnveden@infra.kth.se)

IMI (Industrial Environmental Informatics) Chalmers University of Technology, SE - 412 96 Gothenburg , Sweden contact: Raul Carlsson, Email: raul.carlson@imi.chalmers.se

Tomas Rydberg, (In 2004) working at the European Commission, DG Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy. Representing the informal European IPP Network and the initiative 'Towards a European reference LCA data base'

Legal consultants for NorLCA (articles etc.) are NORDIA LAW – a law firm based in Denmark, Norway and Sweden - www.nordialaw.com

8 June 2004

9905258-200996 nsc/eda,

Supplemented IPU, cm 16 November, 2004

Revised November 18, 2004 nsc and 24 Nov. cm

Revised November 30 2004 nsc

ARTICLES OF ASSOCIATION

for

NorLCA

C/O Danmarks Tekniske Universitet

Bygn. 424

2800 Lyngby

1 NAME

- 1.1 The Association will be known as “The Nordic Life Cycle Association”,(acronym NorLCA).
- 1.2 The domicile of the Association is the Municipality of Lyngby-Taarbæk with the registered address: LCA-center, c/o Danmarks Tekniske Universitet, Bygn. 424, 2800 Lyngby.

2 PURPOSE

- 2.1 The purpose of NorLCA is to act as a non-profit multidisciplinary organization furthering use and, when needed development and improvement of the life cycle disciplines. In this context Life cycle disciplines comprise concepts and tools like life cycle thinking, life cycle design, life cycle costs, life cycle assessment, product oriented management, Integrated product policy etc. The overall and long-term goal is to support and push the life cycle disciplines on all levels into the authority, education and enterprise culture within the Nordic Countries and thus contribute to a sustainable development.

A main activity in the fulfilment of this purpose is an annual NorLCA symposium which is hosted alternately by the five Nordic countries. The programme for the symposium must be approved by the board.

NorLCA may furthermore endorse activities which may support the goal and purpose of the as-sociation.

3 MEMBERS

- 3.1 Any individual or organisation interested in or working with LCA, Integrated Product Policy ("IPP"), Sustainability and alike concepts may apply for membership. Generally, membership applications are handled through the NorLCA secretariat.
- 3.2 The elected board of the Association decides at its discretion on issues of membership.

4 NORLCA STRUCTURE and FINANCES

- 4.1 NorLCA is a non-profit multidisciplinary organisation. In this context multidisciplinary refers to all disciplines, individuals, institutions, public or private interested in the life cycle approach as a tool in striving towards sustainable development. The foundation of NorLCA is based on the members' and the public's interest in expanding the knowledge of life cycle thinking.
- 4.2 The necessary financial means for maintaining the running of NorLCA are procured through an annual membership fee. The tariff of such a membership fee shall be determined on a yearly basis by the board. The tariffs may be different for the different types of members. A standard fee and a major fee for organisations shall apply.
- 4.3 The chairman and one other member of the board may accept the donation of funds to the As-sociation at their discretion.
- 4.4 The chairman and one other member of the board may procure means for special arrangements, i.e. meetings, courses and alike

- through application to public authorities, private or public institutions, foundations and companies.
- 4.5 The accounts of the Association follow the calendar year and thus run from January the 1st to December the 31st.
 - 4.6 The chairman and one other member of the board will conclude the annual accounts at least four weeks before the annual general meeting. Members may request copies of the accounts or the accounts will be available to the public, published via NorLCA's website. The elected auditor will examine the annual accounts. The Association's assets will be held in a bank and/or giro account.
 - 4.7. No Association funds may be loaned to members or others, nor may the Association issue guarantees backed by Association funds, unless such a funding or issue of guarantee serves the fulfilment of the purpose of NorLCA, and is endorsed by the board. Neither the Board nor any of the members can be held responsible for Association debts and no members have any claims in Association funds or claims for the repayment of fees paid.
 - 4.8 The board shall be responsible for appointing adequate inter-Nordic legal representation.
 - 4.9 The board is responsible for ensuring that these rules of Association are kept.
 - 4.10 Provision to access Association funds are given to chair and one board member, conditioned by both two signatures. The board can authorize employed staff at the secretariat to sign by procuration.

5.0 THE BOARD

- 5.1 The board will consist of a five (5) - (9) members, including the Association's chairman and co-chair, elected for a period of two years on a revolving basis. There is no limit on re-election. However, the chair must alternate every two years between a person or a representative from the Nordic countries. The Board shall be elected as follows:

(A) Five (5) seats shall be reserved for members from or representing an organisation from each of the Nordic countries. In the event that a person/representative can not be provided by a Nordic country such seat shall be regarded as vacant until a person/representative for that seat has been provided.

(B) Four (4) seats are to be elected by the General Meeting, however a maximum representation of two (2) from each of the Nordic countries shall apply.

Serving on the board is an honorary duty. Board meetings are held twice a year.

- 5.2 All decisions by the board are made adopted by simple majority. Thus, the chair and co-chair are elected by the board members by

simple majority. In case of equal distribution, the chair holds casting vote.

- 5.3 Should a board member from/representing one of the Nordic countries, cf. 5.1.(A) resign during the year, the board will choose a substitute from among the membership, preferably from/representing the same country.
- 5.4 The board will decide how responsibilities of the board should be apportioned among members of the board.
- 5.5 The board may cancel membership for individuals or organisations that have not paid their fees. The member will receive written notice of cancellation.
- 5.6 Should the board wish to exclude a member from the Association for other reasons; the exclusion must be reported to the next general meeting of members. The general meeting is the final arbiter in such cases.
- 5.7 The Board may employ staff for the Association secretariat. The secretariat is placed in connection with the LCA-center, DK, geographically based at the Technical University of Denmark. The secretariat will on behalf of the board, maintain website, membership database, accounts, undertake dissemination tasks and preparation of the Ordinary General Meeting. The LCA-center may charge a fee for its services to the Association. Such fees must be at a competitive level.

6.0 GENERAL MEETINGS

- 6.1 The General Meeting is the Association's ruling body. All members may participate. The General Meetings are not open to the general public. A quorum requires the presence of at least ten (10) per cent of paid-up members.
- 6.2 The Ordinary General Meeting shall be held once a year in connection with the annual symposium. At least (2) two months notice of the meeting must be given to members.
- 6.3 The host countries consist of: Denmark, Sweden, Norway, Finland and Iceland (The Nordic countries). Expanding the circle of host countries with other countries in the region, will require a simple majority decision at the Ordinary General Meeting, conditioned by the requirements stated in 6.1
- 6.4 Extraordinary General Meetings shall be convened after a decision made by the General Meeting or by the Board. A notice of at least one (1) month of an Extraordinary General Meeting must be given to members.
- 6.5 Only members who have paid their annual fees may vote. Voting may be conducted by electronic means at the boards' sole discretion, if the board feels that such a procedure is practical. Otherwise paid-up members must be present to vote. A member can act as

proxy for five (5), but not more than five (5) members. A proxy must be executed in writing and on demand presented to the chair of the Board.

- 6.6 All resolutions discussed at the General Meetings are adopted by a simple majority unless otherwise stipulated below, cf. Art. 7.1 – 7.2. and 9.1. – 9.2.
- 6.7 A minute of meetings will be kept for which the board will be responsible, [such minutes shall be available to members, published via NorLCA 's website].
- 6.8 The Board appoints a moderator to direct the General Meeting

The agenda for the Ordinary General Meeting must include:

- The chairman's report of the past year and comments on the coming season.
- The board's submission of the accounts for approval.
- The election of board members. To ensure continuity in the board, two members from one country will not be on election the same year
- Election of an auditor. The auditor shall be a Chartered Public Accountant.
- Proposals from members, which have been submitted in writing to the board at least one month prior to the meeting.
- Any further business.

7.0. AMENDMENTS TO ARTICLES

- 7.1 A decision to change or amend these articles can only be adopted by a general meeting of members and on condition that proposed changes are clearly stated in the written agenda for the meeting. Changes or amendments require that at least two-third (2/3) of the votes of all members of the Association are present and further the assent of more than two-thirds (2/3) of the votes cast by the members present at the general meeting. In the event that the required majority of votes is obtained but the required quorum is not obtained an Extraordinary General Meeting may be held with one (1) months notice and on such a Extraordinary General Meeting only the majority requirements, i.e. no quorum requirements shall apply. Such an Extraordinary General Meeting may at the discretion of the Board be substituted by a general vote by elec-tronic means to be conducted.

- 7.2 A decision to dissolve the Association can only be taken by a general meeting of the members, provided that a proposal to this effect has been included in the written agenda for the meeting. Dissolution requires that at least two-third (2/3) of the votes of all members of the Association are present and further the assent of nine-tenth (9/10) of the votes cast by the members present at the general meeting.

8.0 MISCELLANEOUS

- 8.1 The language of the Association is English.

9.0 TEMPORARY PROJECT GROUP – THE PROJECT PERIOD

- 9.1 The funding for the initiating the Association has been provided by The Nordic Council of Ministers and the funding has been subject to certain conditions and requirements that have been stipulated in a contract between The Nordic Council of Ministers and the Danish LCA Center at The Technical University of Denmark (the contract). If the event of the non-compliance with the stipulations of the contracts the funding provided may be subject to repayment. The timeframe for the contract is two (2) years (the project period) and the project period expires 2006. To ensure that the conditions and requirements in the contract are met during and at the end of the project period a temporary project Group (“TPG”) has been initiated. The TPG shall together with appointed representatives from the Nordic countries found NorLCA.. In order to ensure, sustain and maintain compliance with the conditions and requirements stipulated in the contract, the leader of the TPG during the project period shall chair the initial board of the association and have a right to veto any proposals or decisions by the board contravening in the opinion of the chair the mentioned stipulations.
- 9.2 The temporary provisions mentioned in Art. 9.1. shall expire when the temporary project is finalised in 2006.

Thus adopted by the Founding Board on the _____ of November

Appendix B

– Second NorLCA symposium Norway 2008, summing up

A palette of presentations in 2008

Life cycle thinking in

- business strategies
- communication and marketing
- combination with other tools



A palette of presentations in 2008

LCA, carbon footprint studies, EPDs

- flour, car, packaging, buildings
- aluminium, fishing, power and heat
- carbon storage
- formalised systems

Ecodesign

- drivers, barriers, strategies
- role of LCA?
- design to avoid waste



Next year's NorLCA symposium

1. Host country
 - Denmark
2. Time
 - June 9-10, 2009
 - Collaboration with Joint Actions on Climate Change
 - announcement on www.norlca.org
3. Format, themes
 - lessons learnt from this year's symposium

Will be drawn from the evaluation questionnaire!



Other observations 2008

- Networking
 - long coffee breaks and poster display
 - good atmosphere
 - many contacts industry-academia-consultants
 - nice to have a forum for meeting Nordic colleagues
- Life cycle Project bank
 - not many deposits during symposium
 - will open on the NorLCA homepage
- Proceedings
 - No proceedings
 - All presentations will be uploaded on www.norlca.org as pdf file for download (unless the author tells us not to today)



Appendix C

— Evaluation forms from the first NorLCA symposium in Sweden 2006

1. How did you find out about the NorLCA symposium:

e-mail	2
NorLCA website	1
invited speaker	5
peer-to-peer communication	10
paper leaflet	5
phone-call from NorLCA	1
heard it through the grapevine	2
NorLCA board member	2
Colleague	2
Pre consultants & simapro network	2
LCA center and danish EPA	1
Co-operativ about IPP by/ within nordic council of ministries?	1

2. Symposium

a) Which parts/sessions of the symposium were most interesting for you?

They are actually all on a medium level, no peaks
Eco-design network workshop
Eco-design workshop, Frank Hugo Storelev, Guided tour on life cycle
Company experiences
Application of life cycle thinking in society and regulation

Café market
Harmonisation and ?
Life cycle tool cafe, life cycle info and communication, harmonisation and initiative
Life cycle tool cafe, life cycle info and communication, harmonisation and initiative
All
Company experiences with application of LCA
Application of LCT
Informal talk, company examples
ISO 14040, EPD, ecodesign tools
talking to people during breaks, company experiences with LCA
Company experiences with application of LCA
Examples but also some regulatory overviews
Company experinces
Key notes, guide tour on LC manual, company experiences
Session in Tuesday morning (11-13)
Company experinces

Mon: 14-16
Harmonisation and initiatives
Networking at marketplace, lunch, dinner etc.
Keynotes, especially Nokia, practical info
Eco-design session
Application of LC-thinking in society and regulation
Supplier involvement

2. Symposium

b) Which parts/sessions of the symposium were least interesting for you?

No bottoms. But generally speaking, it was interesting

Toolcafe

Application of LCA methodologies

Presentations with results of LCA instead of experiences and methods

keynotes

Setac

The finnish speakers, primarily due to difficulty in understanding their english

Application of methodologies

Some academic things, however i guess those are needed

Academic exercises on EULCA

LCA methodologies

Mon: sets before lunch

Application of LCA methodologies

FLIPP roundtable, but only because i am not part of that , is probably interested to others

LCA tools, cafe and market place

All interesting

Life cycle information and communication

Method integration

2. Symposium

c) Please provide comments on the format of the sessions and the symposium?

Too much of LCA. This is not a forum for them

Some sessions seem very short

Good idea with cafe/market place

In order to include more paper presentations, the presen.....

ok-but too littel time for dialoggue

Very good

Agree that long breaks are good for interaction/networking

More time for cafe

Too littel focus on "market opportunities"

Would like more interaction and SME

Maybe even longer breaks, otherwise good

Reasonably good

Ok with relatively few participants, good possibility to focus on important issues

Very good to have LC tool cafe and LC market place

Well organised

Fine

Guided tour and dialogue on LCM was not handled properly, no time for discussion

Just fine

Nice to have a practical focus and very good to have time for networking

quite alot of freetime between sessions

Length ok. Sturcture of the program was ok, good. More workshops?

Good with a mixture of different types of sessions

I would like more interaction

2. Symposium.

d) Did the NorLCA symposium meet your overall expectattions?

Yes	No	Partly
x, important to meet with LC society		
x		
x, my first symposium, did not have many expectations		x
		x, should be less focus on methods, more on applications and spreading of results
x		
		x
x		
x, company experiences + contacts		
x		
x		x
x		
		x
x, meeting partners for cooperation		
		x, would have wished more "new" ideas presented
		x
x		
		x, discrepancy between name of symposium and contacts - too academic too littel focus on "market opportunities"
x, gives a good overview on what is happening both in regulation and companies		
x		
x		
x		x
x		
x, however more companies would have been nice		
		x, kan ikke læse det
		x, expected more participants, especially from companies
x, made own contribution, meet relavent know/unknow (to me) LC.thinking persons		
		x, were expecting more discussion usability of LCA

3. Please mark most correct statement about you

a) affiliation	b) Profession
Government	Adm.
Industry	LCA
Student	
Researcher	Environmental mgmt, LCA
academic researcher	
academic researcher, consultant	environmental mgmt
Academic	LCA
Academic	
industry	environmental mgmt, LCA
industry	LCA
consultant	environmental mgmt, LCA
academic researcher	
consultant	LCA
consultant	environmental mgmt, LCA
Industry	Engineering
Industry	Environmental mgmt
Consultant	LCA
Consultant	
Industry	Environmental mgmt, LCA, engineering
Consultant	Environmental mgmt
Academic researcher	Environmental mgmt
Academic researcher	LCA
Authorities	coordinator
Authority	Ecolabelling
academic researcher	environmental mgmt
Administration, academic researcher	IPP
Academic researcher	Environmental mgmt
Consultant	Environmental mgmt, LCA, Strategic cooperation

4. Membership and sponsoring

a) Are you a member?	b) Do you think NorLCA can meet a need for you	c) Is it likely that your organisation/affiliation would be interested in sponsoring NorLCA activities
no	yes, serve as a regional hub? For LCM/LCT	no
yes	yes, meet other companies that work with LCA, get contact to researchers	no
no		
yes	yes	no
yes	yes	no
under consideration	yes	no
yes	yes	no
no	yes	no
yes	yes, contacts, access to otherwise restricted knowledge	no, phd student
yes	yes, platform for contacts between practitioners and developers	yes, through own work
yes	yes, nordic forum for exchange og LCA knowledge	Yes, an LCA forum is important for us
yes	yes, if the connection to the industry can be maintained	If it is clear what we can get out of it
under consideration		no, 3 people-no money
under consideration		yes, participating in activities
under consideration	yes, project opportunities and LCA development	
yes	yes, up to date knowledge on LCA work in companies and through colleagues	yes, marketing SimaPro
no		maybe
yes	yes	
no	yes	yes
Under consideration	yes, could be a forum for nordic LCA discussions, there is a big need	maybe
yes	yes	no
yes		no
yes	yes	yes
under consideration	yes, by furthering cooperation, dialogue with business	yes, LCA is a key area of research
yes	yes	no
no	no, not working on LCA-related issues in the moment	no, my organisation is too small
yes	yes, nordic networking is important for nordic ecolabelling	don't know, if more companies were attracted
no	no, for me LCA is a hobby, not a profession	no, university no really resources
	yes, because it can increase co-operation within the fields of IPP and promote ecologically sound product and services	
yes		No, R&D institute, no such money
yes	yes, if there is dialogue around the application LC-thinking in design and LCM and in policy	yes, hosting events. Contributing with researcher time for coordinating activities
yes	yes, develop LCA to meet the future	yes, SimaPro can reach out via. Nor-LCA but may be to a limited extent

Appendix D.

– First NorLCA symposium Sweden 2006 abstracts

Keynotes

Integrated Product Policy and its role for Nokia

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The Integrated Product Policy (IPP) pilot project of Nokia was initiated as a part of European Commission's (EC) effort to work together with stakeholders to test the IPP approach in practice. The objective of the EC's IPP approach is to "reduce the environmental impacts from products throughout their life-cycle, harnessing, where possible, a market-driven approach, within which competitiveness concerns are integrated".

Nokia decided to join this project as the co-operation with different stakeholders including the Commission was seen as a new and interesting opportunity to proactively participate in discussions and defining improvement options.

The project is now in its follow-up phase. The actual tasks derived from the improvement analysis have been chosen and implementation on-going. Additionally, experiences from this new type of approach can be concluded. This presentation will give an insight into the process, experiences and recommendations. As a whole, IPP seems to form a very interesting new approach for steering environmental improvements. However, one key question in this key note speech will be a comparison between IPP and a traditional legislative toolbox - what kind of advantages does the IPP approach provide?

Presentation from HÅG

Frank Hugo Storelv

Environmental manager

HÅG, Norway

Abstract not available

Life Cycle Tool Café

A Designer's Guide to Eco-Conscious Design of Electrical & Electronic Equipment

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“A Designer's Guide to Eco-Conscious Design of Electrical & Electronic Equipment” has been developed in cooperation with Danish companies in the electronics industry. The guide aims at covering all the needs in a company, which has decided to make improvements in the environmental aspects of its products, and to have this as an ongoing standard activity in the development process

A core functionality of this EcoDesign Guide is a module of “Environmental Calculators”. The Environmental Calculators enables the designer to compare the environmental impacts from the entire life cycle of different design alternatives. This can be done already in the concept phase, with very few data available and before the design is finalised. There are three calculators in the tool:

Calculator I is intended - with a minimum of effort - to give a very rough overview of the environmental aspects of the life cycle of a product.

Calculator II can perform a more detailed assessment and material declarations based on generic LCI-data for electronic components.

Calculator III can predict the consequences of different end-of-life scenarios based on the design of the electrical- and electronic product. Key-values for end-of-life can be calculated.

This EcoDesign Guide also gives inspiration on how metrics for evaluation and reduction of dangerous chemicals/substances can be set during the development of new products. A coarse method for overall hazard reduction is given. The guide is available free of charge from <http://www.ecodesignguide.dk> .

KCL-ECO 4.0 LCA software offers proven performance

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Email: catharina.hohenthal@kcl.fi

Many problems, including life cycle assessment, can be described in terms of modules and flows. **KCL-ECO** Program is developed to carry out module calculations in general. The previous versions of the software have successfully been used in different branches of industry and for educational purposes since 1994. The newest version 4.0 is even more powerful and has plenty of new features e.g.:

ECOINVENT-DATABASE: Ability to import Ecoinvent-database into KCL-ECO
COMPARISON OF DIFFERENT CALCULATION RESULTS: Different calculation results can be compared in two different chart-windows. Useful for example when comparing different process conditions.
FILTERING OF MODULES: User can filter a certain amount (%) of a parameter. By filtering the user can cut the modules and flows that have small effect on the filtered parameter. A useful function when considering very large flowsheets.

KCL-ECO is flexible and powerful

KCL-ECO has a fully graphical user interface. The whole system under study can be chosen to be completely transparent. KCL-ECO includes normal copy/paste, replace and short-cut menu functions as well as many advanced features.

With KCL-ECO you can easily handle very large systems. For example, it has been used to build a model for wood fibre flows in paper and board production in Western Europe; a system comprising 660 modules (unit processes), 1900 flows and 7200 linear equations describing the system. Due to KCL-ECO's transparent structure transports can be studied separately.

ALLOCATION. Both multi-output and open loop allocations are supported.
AGGLOMERATION FUNCTION. Modules can be agglomerated together in a suitable way.

UNCERTAINTY ANALYSIS enables you to make a fast check on the range of variation of your results

All of the above mentioned features and many more will be demonstrated depending on the requests of the listeners.

The ECODESIGN PILOT

Prof. Wolfgang Wimmer

Environmentally sound product design / ECODESIGN

Institut für Konstruktionswissenschaften, Austria

Tel: +43 / 1 / 588 01 - 307 44

Email: *pilot@ecodesign.at*

Niki Bey, IPU, Denmark is demonstrating the ecodesign pilot at the Lund symposium, e-mail *nbe@ipu.dk*

The ECODESIGN PILOT is a simple, practicable and easy to use software tool for identifying and applying ECODESIGN measures to your product.

PILOT signifies Product Innovation Learning and Optimization Tool.

The PILOT is mainly designed for the application in the topic of product development and improvement. It is also used as a general ECODESIGN knowledge base and for continuous staff training.

e ECODESIGN PILOT is:

a high quality tool that helps you to identify ECODESIGN measures to improve your product;

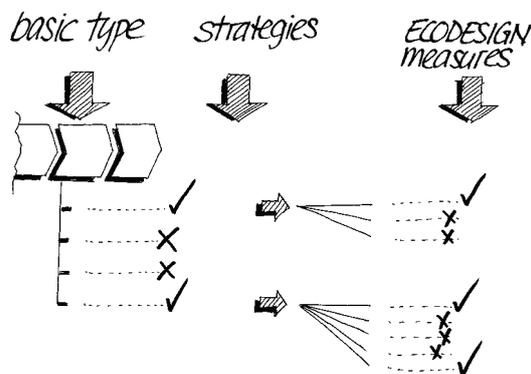
a systematic tool that helps you to take ECODESIGN into account when a new product is designed;

a knowledge tank that makes it possible to learn and understand ECODESIGN on the basis of examples in their specific context.

In three steps to a better product with the ECODESIGN PILOT.

When analysing your product you will identify which essential environmental impacts take place in which part of the product life cycle.

Each product type has specific ECO-DESIGN strategies and corresponding check-lists.



By working with the ECODESIGN checklists you can then identify precise and easy to apply measures for the improvement of your product.

The strengths of the ECODESIGN PILOT are:

Fast and easy identification of product improvements with large environmental relevance.

The checklists are a reproducible documentation of the decisions made.

Concrete measures in the terms of product developers.

Comprehensive shaping of opinions and expansion of knowledge for environmentally sound product design.

Impulse for empowering creativity and innovation for new product concepts.

The ECODESIGN PILOT is available on CD-ROM and online:

The German and English CD-ROM is available with the book ECODESIGN PILOT (Wimmer, Züst). With the three access points product life cycle, product development and product improvement the CD-Rom is a comprehensive tool for environmentally sound product design and improvement.

Information and orders:

- <http://www.ecodesign.at/pilot/ONLINE/ENGLISH/INFO/BUCH.HTM>

The version 3 of the ECODESIGN PILOT is now available in five languages and comprises part of the content of the CD-ROM (part product improvement) and additional features as for example the auxiliary tool ECODESIGN Assistent. You can find the PILOT online at: www.ecodesign.at/pilot

GaBi

Demonstrated by Jan Poulsen

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The software system GaBi is a tool for build up life-cycle-balances. GaBi supports you with handling a large amount of data within modeling of the product life cycle. GaBi calculates balances of different types and assists you in aggregating the results. Also the GaBi 4 analyst allows you to undergo different level of result analysis e.g. scenario analysis, parameter variation, sensitivity analysis and Monte Carlo analysis.

It is very helpful to know the characteristics of a system to enhance the significance of the balances and the limits of the GaBi tool. You should be familiar with the meaning of "integrated tool for decision sup-

port", "extensive database", "modular structure", transparent balance results" and know how to use these features for your own advantage.

The **GaBi 4** software is based on a modular concept. By this means, plans, processes and flows and their functionalities establish modular units. Within this structure, GaBi 4 gains a clearly arranged structure. That helps you by searching functionalities inside of GaBi.

Data of impact assessment, inventory and weighting models are accurately separated. So the single modules are easy manageable and then be connected, if the calculation of the Life Cycle Assessment is started.

Furthermore GaBi allows you to illustrate the single modules of a product life cycle. Several phases of the life cycle (production, utilization and disposal) can be captured into modules and can be modified separately.

Another characteristic of the modular structure is, that the software and the database are independent units. Within the database all information e.g. product models, ecoprofiles are saved. GaBi databases are always built up with a defined basic structure. The software itself provides the user interface to the database. Via the user interface the stored data can be read and modified.

Processes are arranged using a Sankey diagrams editor, allowing a quick overview of mass, energy or even cost flows shown as proportional to quantity. It is up to the user to determine which additional flow quantities one wishes to depict in this sophisticated manner.

SimaPro

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SimaPro	Databases:
Miljögiraff is the Swedish supplier of the LCA software SimaPro® which is developed by Pré Consultants in the Netherlands, with an international network of LCA specialists.	ETH-ESU 96
SimaPro® can facilitate efficient, qualitative and longterm stability in your work with LCA. Companies, who want to develop their own work with LCA, can have courses and support.	BUWAL 250
SimaPro® is available in different version depending on the needs of the user. It is also possible to buy a temporary and/or educational license to reduced price.	Dutch Input-Output Database
An advantage with SimaPro is that it comes with extensive databases of LCI data and also all the common methods of LCIA. This allow for efficient and transparent LCA, with reliable data and methods. We experience that the most satisfied clients are those who uses the service contract which gives you all the updates and support.	Industry data
	IDEMAT 2001
	Franklin US LCI database
	Data archive
	Dutch Concrete database
	IVAM
	FEFCO
	Eco-invent

The SimaPro 7 family	Methods:
<p>The SimaPro family allows you to implement Lifecycle Assessment in a flexible way. SimaPro can grow with the increasing importance of LCA in your organization.</p>	<p>Eco-indicator 99 Eco-indicator 95 CML 92 CML 2 (2001)</p>
<p>SimaPro comes in the following professional versions, that are available in a single user (stand alone) or multi user network version, which is ideal for project teams. With the SimaPro demo you can experience the different versions yourself.</p>	<p>EDIP/UMIP EPS 2000 Ecopoints 97 Cumulative Energy Demand</p>
<p>SimaPro Compact for quick results If ease of use, quick learning and an intelligent design are your main criteria, choose the Compact version. It is built for reliable results with limited effort. Powerful Wizards assist you managing complex tasks, while all results remain completely transparent.</p>	<p>IPCC Greenhouse gas emission</p>
<p>SimaPro Analyst for detailed LCA studies If advanced features, transparency and flexibility are your main criteria, choose the Analyst version. It is built for the LCA expert that wants to assess every detail of the LCA he/she is making. It comes with advanced analytical features including Monte Carlo analysis.</p>	
<p>SimaPro Developer to create dedicated LCA tools If you are a consultant, or for instance an industry association and want to develop simplified tools for your clients or members, choose the Developer. It has the same features as the SimaPro Analyst but is extended with Wizard writing options and COM interface.</p>	

Guided tour on Life Cycle Management

Life Cycle Management in product chains – concepts and experiences

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The paper discusses different concepts for environmental management in product chains, like life cycle management, environmental supply chain management and responsible chain management. Furthermore it presents the results from some Danish studies of environmental management in product chains. Life cycle management in a product chain can be defined as environmental management in a product chain with focus on the environmental aspects throughout the life cycle of the product or service in focus. Compared with life cycle assessments the focus in life cycle management is on both the material and the organisational aspects of the product or service and compared with environmental management in product chains the focus in life cycle management is on the environmental aspects in a life cycle perspective.

The study of some Danish experiences with environmental management in product chains is based on an analysis of around 30 case studies. The type of activity in the cases differs. In some cases the focus has a life cycle dimension like the conduction of a life cycle assessment or the pre-

paration of a license for an eco-label. In other cases the focus is on the environmental impact in a part of the product chain, but actors in a bigger part of the product chain is involved, because they influence the environmental impact in another part of the life cycle. The drivers of the organisation of environmental management are often related to governmental regulation, either directly affecting a company or mediated through customer demands. Another dimension is the type of activity. In some cases the aim is collection of information about environmental aspects, while other cases directly has a focus on reducing environmental impact, like green procurement or product development. A formalised environmental management system does not seem to be a prerequisite for organising environmental management in a product chain. The analysis identifies two types of impact from environmental management in product chains: reduction of environmental impact and changes in organisational practices within some of the involved companies. The type of relationships among the actors in the product chains is another dimension. In some cases the relationship has the character of co-operation, while in other cases one of the companies in the product has a dominating role in relation to deciding the focus of the environmental management or building up the competence for organising environmental management in a product chain. The paper summarises the studies into an approach for the analysis and initiating environmental management in a product chain. The approach includes dimensions like the organisational resources of the company, the existing product chain relations, and potential drivers and barriers for environmental management, including public discourses and governmental regulation.

Application of LCA methodologies

Newspaper waste management – a combined assessment of ecological and economic aspects

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We combined life cycle impact assessment (LCIA) with economic analysis of social life cycle costs (SLCC) to investigate five alternatives for newspaper waste management. The alternatives consisted of various re-

covery and treatment methods applicable to newspaper in a separately collected paper fraction and to newspaper in mixed waste. The methods considered for the separately collected paper fraction were 1) material recycling, 2) gasification and co-combustion, and 3) incineration. The methods considered for newspaper in the mixed waste were 1) landfilling, 2) mechanical-biological pre-treatment followed by gasification and co-combustion, and 3) incineration. The boundaries of the commodity and its production process were defined within the LCA approach. The analysis of the recovery and other related costs followed closely these boundaries. We linked LCIA and SLCC to each other at three different stages. First, we used LCIA to rank our alternatives and asked how this ranking relates to the SLCC associated with each alternative. Second, we solved the cost minimizing problem and asked how this purely economic ranking relates to our LCIA ranking. Third, we solved the cost minimizing problem when external costs from the use of fossil fuels were included and then compared the solution to the LCIA results. Many useful features emerged. Tying economic analysis firmly to the steps of LCA helps to produce consistent SLCCs. Economic analysis can also be helpful in defining the boundaries of the product system and to facilitate decisions on avoided impacts. Finally, given that environmental policies usually involve trade-offs between environmental and economic factors, economic analysis conducted consistently with LCA complements LCA in a way that can be expected to make the results of the analysis more useful for policy making.

Life Cycle Assessment of Wood Based Heating in Norway.

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Household heating by wood stoves is significant in Norway, providing approximately 20% of the heat requirements in the households. The most important heat source is electricity from the grid. In light of the growing concerns about global warming, emissions of CO₂ from energy production is getting increased attention. Biomass based energy can be one (of many) way(s) to mitigate global climate change, as long as it is seen as "carbon neutral". As marginal electricity in Norway is shifting towards more fossil fuel based electricity production, biomass can play an important role in limiting the electricity demand for heating in households. A comparative life cycle assessment of a wood based heating system with

old and modern stove technology is conducted. A novel hybrid approach is applied, limiting the data intensity usually associated with the method.

LCI as a tool in the environmentally oriented product development of paper products

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This paper presents a new procedure developed for environmentally oriented product development, especially for paper and board products. The procedure aims to transform qualitative expert information to an explicit form suitable for industrial decision-making. This goal is achieved by using LCI as a tool in the product design. The paper presents results from a case study and elaborates applicability of LCI in the product design procedure.

In the field of product development various approaches such as design for environment (DfE), ecodesign or environmentally oriented product design, include also life cycle thinking. These approaches aim usually at efficient material use; minimized energy consumption; improved recyclability; optimized product life time; and minimized use of environmentally harmful substances. From the paper industry's point of view, many of these approaches are unfeasible because they are developed for parceled goods. As paper and board are bulk products, which are used as raw materials for other goods, they cannot be developed without affecting the production process. Therefore, an objective of an ecodesign approach should be to define the effects of planned product development actions on the emissions from the production process. For this purpose a new procedure was developed. This paper presents the developed procedure and results from a case study on paperboard packaging, emphasizing the way LCI can be used as a tool.

The product development procedure consists of four stages as follows

- Definition of customer requirements
- Specification of product properties to be improved
- Definition of development actions and their consequences, by LCI calculation
- Assessment of the results in decision-making

The environmental burden caused by the planned development action was determined by using Life cycle inventory (balance) as the calculation

method. The calculations were done with the KCL-ECO 4.0 software using data based on literature and KCL EcoData database.

Life cycle assessment for an ICT network product based on accounting data

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Life cycle assessment (LCA) could significantly improve the quality of product design in companies, but there are still many practical problems, for example, the workload, intangible processes and availability of data, before the approach can be used in every day environmental management of companies. An interesting approach inside the LCA framework, which could overcome most of the challenges mentioned above, is the economic input-output life cycle assessment (EIO-LCA). This study tests the suitability of the EIO-LCA in screening the life cycle impacts of a sophisticated ICT network product by using readily available accounting data. The study found that the electricity in the use phase dominated the results contributing the most to life cycle impact, especially in climate change and acidification categories, but also other activities, such as, maintenance, traveling, transportation and electromechanical parts, were identified to be significant for the environmental performance of the manufacturing company. Based on the study, it seems that the EIO-LCA approach clearly offers a value-added to the environmental management in companies. The EIO-LCA could provide a very fast access to the key life cycle characteristics of the product while it produced results comparable with more detailed LCA studies.

Applying Leontief 's price model to construct life cycle inventories under imperfect information

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The combination of physical life cycle inventories with input-output data has gained interest within the LCA and eco-balance communities in the recent years. Several alternative approaches perform this combination has

been developed. This paper presents an approach to combine input-output based data with physical life cycle data into a hybrid inventory utilizing Leontief's price model to tune and adapt data.

The motivation for the proposed method is provided based on experiences from case studies. In many cases, and for various reasons, LCA practitioners may often experience less than perfect availability of information. So, rather than starting from scratch we here present an approach that begins with, and then adapt, data from an input-output data set. This implies starting with an average data set rather than starting with blank sheets. We further show how the input-output based data is combined with original key data and adapted to represent the processes in question. The application of Leontief's price model is essential in adapting the input-output data under imperfect information of process inputs.

We present a formal approach to perform this adoption and presents results from an application. Through this it is shown how the method allows for a relatively fast approach to establish hybrid LCA inventories under imperfect access to data using Leontief's price model.

Life cycle information and communication

Use of LC information in design and development of products within the ABB group

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Within ABB product development was early identified as a key application for the LCA methodology. Another common ABB application is for communication of the products environmental performance to customers and other stakeholders through LCA based Environmental Product Declarations.

During the year 2000 a management decision was taken to include environmental objectives in the ABB GATE Model - a mandatory project control tool in ABB for handling of all critical aspects of a product development project, as for example business aspects, economic and other risks, intellectual property issues and as discussed more in this presentation environmental considerations. LCA is one among other environmental tools used in this process. Example of another important tool, complementary to LCA is ABBs list of prohibited and restricted substances.

An easy to use LCALight tool has together with other environmental tools been made accessible for all ABB employees through ABBs Intranet portal. The quality of LCI data in the LCALight database is however

critical and a major update of this LCI database have been conducted during 2006.

The focus for this presentation is put on practical experiences and outcomes of LCA use in product development and what demands this puts on the underlying LC information.

The conclusions from working with LCA in ABB is that LCA is a suitable and efficient tool to be used in the daily operations, presumed it is distributed in the organization as an easy to use and reliable tool. Additionally LCI data must be continually updated and last but not least LCA have to be combined with other tool to cover aspects were LCA have a low sensitivity, like for identification of toxic materials. Another critical factor is that the company have access to competence and resources to keep the LCA tool as well as the other tools updated and business relevant.

General method for integration of industrial environmental information systems

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This article presents a general methodology for integration of industrial environmental information systems, developed in the IMPRESS project. IMPRESS (Implementation of Integrated Environmental Information Systems) ran between October 2004 and September 2006 and aimed at implementing method and tool integration with corporate business processes in a number of industrial companies. The research and development work was performed by the research group Industrial Environmental Informatics (IMI) at Chalmers University of Technology, and the industry was represented by seven companies, all members of the Swedish competence centre Center for environmental assessment of Product and Material systems (CPM) which also funded the project.

The purpose of the integration method is to make industrial environmental information systems more effective and efficient, i.e. decrease cost for developing, using and maintaining data, tools, and methods for industrial environmental management and to improve controllability of environmental performance. The scope of the method is industrial environmental management, and is independent of industrial sector, line of business, environmental tools and environmental data models.

The method is based on previous work with integration of environmental information systems within IMI and CPM. It has been developed and tested in case studies within three companies (ITT Flygt, SCA Hygiene Products, and Akzo Nobel) and within IMI where an integrated concept tool Visualisation of Integrated Environmental Work Spaces (VIEWS) was implemented.

The method for integration of industrial environmental information systems consists of three main steps, *Analysis*, *Synthesis*, and *Implementation*. The method has been successfully used to identify ways to integrate information systems with different purpose and scope. The stakeholders in the case studies find the results from the synthesis useful as decision support for implementation. An integrated perspective of their information systems is established, which provides an understanding of possibilities to reduce costs of data management and increase controllability of environmental work.

[1] CPM, Center for Environmental Assessment of Product and Material Systems, viewed at <http://www.cpm.chalmers.se/>

Creating a national system for environmental classification of buildings. A Swedish project.

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Buildings are responsible for approximately 40 % of the environmental impacts in Sweden. On our road towards a more sustainable society, the construction and real estate sectors thus have tremendous challenges. In a unique dialogue project, the Swedish government and a number of companies and organizations have made an agreement in which they have committed themselves to take action in a number of areas. One of the agreements concerns environmental classification of buildings. The agreement states that by the year 2009, all new buildings and 30 % of the existing buildings should be classified. There are a number of systems for assessing and classifying buildings available, both nationally and internationally. However, none has reached such a large market penetration. Thus there is a need to develop a system which can be widely accepted and used. In this paper we will present results from an ongoing project with the aim of developing a classification system that can be used within

this dialogue but also in other contexts. We will present results from the first part of the project where we have made a number of inventories of:

- national and international methods already developed
- needs and expectations among different stakeholders
- the environmental policy context for the system.

Furthermore we will discuss different aspects of a classification system such as:

- Choice of aspects to include in the system.
- Choice of indicators
- Choice of criteria for classification.
- Weighting of different impacts or classes.
- Presentation of results

VIEWS - The Visualization of Integrated Environmental Work Spaces

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This article presents a demonstration result from the IMPRESS project, running from October 2004 to September 2006. IMPRESS (Implementation of Integrated Environmental Information Systems) aimed at implementing method and tool integration with corporate business processes in a number of industrial companies. The research and development work was performed by the research group Industrial Environmental Informatics (IMI) at Chalmers University of Technology, and the industry was represented by seven companies, all members of the Swedish competence centre Center for environmental assessment of Product and Material systems (CPM) which also funded the project.

The demonstration result is called VIEWS (Visualization of Integrated Environmental Work Spaces). It is a visualization of what it may look like to work with environmental management tools that are integrated in reality. VIEWS is implemented as a web-based software platform combining previously separate environmental management databases and tools including Life Cycle Assessment (LCA), Environmental Management Systems (EMS), Design for Environment (DfE), Chemical Risk Management (CRM) and Emission Trading Scheme (ETS).

VIEWS is an integration in practice and was accomplished using a general methodology for integration of industrial environmental information systems, also developed within IMPRESS. In particular, the information reference model SPINE and the data and communication model PHASETS has been applied not only to analyse and synthesise a transparent integrated system but also as a conceptual visualization of the VIEWS platform. VIEWS is hence also a demonstration that the integration method is applicable in practice. In the integrated system, the common parts of different environmental management tools are shared in order to decrease costs, improve quality and increase availability of data.

[1] CPM, Center for Environmental Assessment of Product and Material Systems, viewed at <http://www.cpm.chalmers.se/>

Life Cycle Information and Communication- practical examples from hygiene products industry

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Within SCA's business division of hygiene products regular LCAs has been performed since the beginning of the 90's. Over the years a pragmatic approach has been adopted, at the same time a continuous work has been done to increase data quality, i.e. accessibility, relevance and reliability. Monitoring of the environmental performance of the products has been secured by a demand in the product development process to perform environmental evaluation on each product going to launch. This has meant a production of approx 10 to 15 LCA reports every year over the last ten years. The database structure of SPINE and the development of ISO 14048 – data documentation format, has been utmost importance for this quality work.

Systematic collection of supplier production data as well as the establishment of the business division's resource management system for production data from our own facilities has been vital for the development of high data quality LCAs.

Preconditions and Barriers for the Flow of Product Related Environmental Information

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The generation, management and communication of relevant, accessible, comparable and understandable environmental information on company and product level is needed in companies both for business reasons and for different types of reporting requirements from stakeholders. However, there are several known problems to environmental information management in the industry. Ambiguous information, high time consumption, high costs, low organisational memory, low availability and a poor flow of product related environmental information are just a few.

The PhD project “Towards Integrated Environmental Information Systems” aims to contribute to increased knowledge about preconditions, barriers and possibilities for environmental information management in producing companies. Corporate/company/site related environmental information as well as product related information is included in the scope of the project. The main research method is qualitative field studies, primarily focussing on interviews with key employees and other stakeholders within and outside the product chain, but also on documented material and IT systems. An analytical framework has been specifically developed within the project.

This paper presents some selected field study findings about preconditions and barriers for the flow of product related environmental information. The role of market demand, third-party intervention, organisational design and the understanding of life cycle thinking are some of the topics.

Application of life cycle thinking in society and regulation

Life Cycle Thinking in Ecolabeling

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Abstract not available

Going for Green Domino Effects – will European Eco-labelling Contribute to Sustainable Consumption?

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Consumption is a major challenge for sustainable development. To lead consumption in a more sustainable direction, consumers are guided by eco-labels. The EU developed its flower label back in 1992 but the flower is still threatened by extinction as market penetration remains very low. Various evaluations of eco-labels have given different explanations. The EU is now launching its own evaluation to revise the scheme. To understand the different evaluations and their applicability in the scheme revision, a meta-review is made and the current status of the flower eco-label is analysed. The meta-review and the updated status account provide a relevant overview on the current situation. These results are combined in recommendations on how to improve the dynamics of eco-labelling.

Environmental impacts of material flows caused by the Finnish economy

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The processing of natural resources causes different impacts on the environment. For achieving sustainable development, it is important to recognize the material flows that stress the environment most or even exceed its environmental capacity. For this purpose, a team consisting of researchers from the Finnish Environment Institute (in charge), the Thule institute (University of Oulu), the MTT Agrifood Research Finland and the VTT Technical Research Centre of Finland, has started a project named ENVIMAT. The aim is to define the life cycle environmental impacts of the material flows used for production and consumption in the Finnish economy allocated to different activity sectors and product groups. In the project, the focus is not restricted to domestic environmental loads. Impacts on the environment caused by imported raw materials and goods are also taken into account. The final objective of the project is to create a hybrid model by which the relationships between

environmental impacts and economic effects caused by the use of natural resources in Finland can be assessed. In the environmental assessment, life cycle methodology and databases are connected to the national material flow accounts and input-output analysis. Especially there is a need to develop impact assessment methodology concerning land use. The project is one of the projects funded by the Finnish Environmental Cluster Research Programme (4th phase: Ecoefficient Society). The ENVIMAT project has started in June 2006 and it will be finished by the end of 2008.

The significance of boundary conditions and assumptions in the environmental life cycle assessment of paper and cardboard waste management strategies. An analytical review of existing studies

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A review of existing LCAs on paper and cardboard waste has been undertaken. The objectives of the review were threefold. Firstly, to see whether a consistent message comes out of published LCA literature on optimum disposal or recycling solutions for this waste type. Such message has implications for current policy formulation on material recycling and disposal in the EU. Secondly, to identify key methodological issues of paper waste management LCAs, and enlighten the influence of such issues on the conclusions of the LCA studies. Thirdly, in light of the analysis made, to discuss whether it is at all valid to use the LCA methodology in its current development state to guide policy decisions on paper waste.

A total of nine LCA studies containing altogether 73 scenarios were selected from a thorough, international literature search. The selected studies are LCAs including comparisons of different management options for waste paper.

Despite claims of inconsistency, the LCA review showed an overall environmental preference for recycling over incineration or landfill options, for paper and cardboard waste. A systematic exploration of the LCA studies showed, however, important methodological dependencies, pitfalls and sources of error, mainly concerning differences in the definition of the system boundaries. 15 key assumptions were identified that cover the three paper cycle system areas: raw materials and forestry, paper production, and disposal/recovery. It was found that the outcome of the individual LCA studies largely depended on the assumptions made on

these areas, and any differences in results and conclusions can be unambiguously tracked back to differences in these assumptions.

Chemicals regulation, REACH, and innovation

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In this paper we investigate implications of the new REACH regulation on innovation. REACH is not yet finally developed and implemented, and the present paper shall be seen as a contribution to the discussions of improving the regulation, its implementation, and of supplementary and complementary activities and initiatives. It is important to remember that the adaptation of the regulation, which is expected to happen April 2007, and the concurrent establishment of the new European Chemical Agency in Helsinki and new procedures for contact and interaction between, suppliers, users, and authorities, will not be the end of the process of improving the working of the European chemicals Regulation.

Innovation may take very different shape depending on where and how we look. In the paper we develop an approach to innovation that is sensitive to the different nature of innovations carried out at different sites of the production-chains, i.e. from producer of basic chemicals to end-user, and which we will test and discuss against a number of branches such as paints and lacquers, pharmaceuticals, plastics, textiles, etc.

“Eco-Benchmark” for consumer-oriented LCA-based environmental information on products, services and consumption patterns

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Science-based approaches like life cycle assessment (LCA) were proposed as a basis for consumer information tools in the 2002 World Summit on Sustainable Development. LCA has been recognized also e.g. in EU in the context of 'Integrated Product Policy' (IPP) as providing "the best framework for assessing the potential environmental impacts of products currently available." In this study, a consumer-oriented, illustrative benchmark was developed to enable consumers to see the role of various products and consumption patterns in the whole of their environmental impacts, using LCA as the method to determine the impacts. Environmental communicators, various experts as well as active and environmentally conscious consumers were identified as key target groups for this type of information. But it also offers a tool for manufacturers to present understandable information of their products. Surveying LCA studies of products and services and developing the presentation formats and figures yielded material for the preparation of a brochure, which can be seen as a 'backbone' of the development work. The brochure preparation was a participatory, iterative process involving discussion with consumer focus groups, communication in stakeholder workshops, and questionnaire-based feedback. In addition to learning what works and what does not, detailed suggestions on improved wording and figures were obtained, as well as a wealth of ideas for future applications. Here we present the development process and the final outcome, i.e., the 'Eco-Benchmark'. Country-specific eco-benchmarks could also be developed in other countries, and products like passenger cars offer a possibility to an international eco-benchmark.

See also www.environment.fi/eco-benchmark

Company experiences with application of LCA

Eco-efficiency approach of Akzo Nobel

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Corporate social responsibility is of strategic importance for Akzo Nobel and it is the company's way of contributing to a sustainable development in the society. Eco-efficiency covers two of the three pillars of the concept of sustainable development: environment and economy. The use of eco-efficiency as a basis for business decisions is viewed as one of the most important undertakings for Akzo Nobel to ensure the embedding of corporate social responsibility in all parts of the company.

Eco-efficiency is the strategic way to combine environment and economy in major business decisions. Eco-efficiency, as applied in Akzo Nobel, includes the environmental effects of a product or activity calculated in a Life Cycle Assessment, but also more of the risk and toxicological aspects since there is a strong focus on these aspects in chemical industry. The method used is the BASF's Eco-efficiency method adapted to Akzo Nobel's businesses.

During the coming years eco-efficiency will be implemented throughout the whole company in the areas of investment decisions, marketing and innovation processes. To achieve a successful implementation, tailor made eco-efficiency implementation plans will be set up for each Business Unit as well as on corporate level.

LCM activities at Grundfos A/S

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Life cycle Management (LCM) is based on life cycle thinking considering environmental, economic, technological and social aspects of products and business activities. LCM is a strategy which involves corporate social responsibility, pollution prevention as well as product and supply chain management. The scope of the paper is to present a theoretical conceptualisation of LCM and, on that foundation, exemplify how the company Grundfos A/S is practising LCM.

Grundfos A/S has not deliberately chosen a LCM-related strategy or vocabulary, but by taking the business excellence model as a point of departure and by emphasizing sustainable development in its company values, the company has implemented activities closely related to the conceptual framework of LCM. These activities have followed four tracks:

Management of the production in relation to environment and occupational health & safety.

Related activities such as certification according to ISO 14001 and OHSAS 18001 have been handled at the production sites and coordinated by the department of central services.

Environmental product chain management.

Activities down-stream, as for example a self-assessment system of suppliers, have been handled by purchasers guided by the department of

central services; and up-stream, the department of research and development has played a central role in initiating an energy labelling system. Life cycle assessment and eco design.

Related activities, as for example principles of eco design based on LCA, have mainly been handled by the department of research and development.

Corporate social responsibility.

Grundfos has achieved the Social Index developed and launched in 2000 by the Danish Ministry of Social Affairs. Related activities are anchored in a cross-organizational task force and the health and safety unit is placed at the department of central services.

Based on a case study of the company, these activities will be explained and analysed. Special attention will be drawn to the fact that Grundfos A/S has initiated a European energy label scheme and furthermore complies with criteria of the energy-labelling scheme of circulator pumps launched in 2004. This paper will present experiences of bringing life cycle thinking into specific business practises and furthermore contribute to the discussion of different strategic approaches to LCM.

Life Cycle Thinking in action! How to use LCA and supply chain management to facilitate product development and environmental improvement of office chairs.

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HÅG has worked with environmental and resource aspects of their products for many years. As part of this work, HÅG has carried out life cycle assessments (LCA) and obtained environmental declarations (EPD, Type III) for 10 of their office chair products. This initial work has been further developed, with a supplier project for product development and environmental improvement of the chairs.

Carrying out the LCA's has been a relatively extensive project, since the office chairs have between 40 and 160 components each. STØ has gathered data from 41 suppliers and 89 different materials during this process.

Based on analyses of six environmental indicators, three suppliers were chosen for further collaboration and development work: an aluminium moulding company, a PUR producer and a producer of different PP and PA components.

This collaboration has led 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).

Three relevant, possible improvements are:

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

A theoretical analysis shows that if all three of these improvements were implemented, the global warming potential for all of the 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.

Environmental assessment of Novozymes' enzymatic solutions applied in industry and agriculture.

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Enzymes are biological catalysts with an enormous capacity to speed up biochemical reactions. They are developed during millions of years of evolution and are essential to any type of life. Human beings have taken advantage of enzymes since early days, for instance by using animal dungs for softening animal hides in leather making. Today, enzymes are produced in industrial scale by fermentation and used in a broad range of industries because they reduce raw material, energy and water expenditures, processing time, and/or improve product quality.

Novozymes is a major producer of industrial enzymes and the company has used LCA systematically for some years now to analyse 1) the environmental impacts associated with enzyme production and 2) the environmental achievements when the enzymes are applied in agriculture and various industries.

So far, seven different fields of enzyme applications have been analysed (detergent additive, animal feed supplementation, vegetable oil

production, leather production, bread production, fatty acid production and fuel ethanol production) and the results show that enzymatic solutions generally add to considerably the costumers' environmental profiles in terms of reduced energy consumption, contribution to global warming, acidification, nutrient enrichment, photochemical smog formation and sometimes also consumption of limited resources.

The explanation is the high reaction rate and specificity of the enzymes and that small amounts of enzyme do the same or a better job in industrial production than large amounts of chemicals and energy.

Enzymatic solutions are widely used today, but there is still a great potential for expansion into existing fields of application as well as into new, and the total potential savings of for instance greenhouse gasses by enzyme application are measured in millions of tonnes of CO₂ – equivalents. Such saving potentials are interesting even at a national scale and it is interesting to note that most of them are free of charge, because use of enzymes for the most is driven by cost saving and/or quality improvements in the applying industries.

All environmental assessments of Novozymes' enzymatic solution are based on market oriented LCA principles, and the results are backed up with sensitivity assessment of the most uncertain and variable assumptions to evaluate and document robustness of results.

The observed environmental performance of enzymes is used in Novozymes' marketing after external review of LCA documentation according to ISO standards.

Sustainability Initiative- Measuring Alcoa/Landsvirkjun Performance on the Karahnukar and Fjardaal Projects

Life cycle harmonisation and initiatives

Nordic IPP initiatives

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The Nordic countries have co-operated on IPP-related issues since 1995. The first visible move in this direction was the first Nordic "POMS-conference" in Saltsjöbaden close to Stockholm in januari 1998. That same year a cross-sectoral Nordic working group was established with representatives from ministries and governmental institutions in the fields of environment, consumer and industry. This was the so-called POMS-group which in 2002 became the NMRIPP-group (Nordic IPP). Governmental officials from the 3 sectors have since then co-operated on IPP through this group. At present the group is mainly focusing on three areas, i.e. Green Public Purchasing, Environmental Information and Sus-

tainable Lifestyles, and Environmental Technology. Life cycle considerations play a central role in all this work. During the presentation a short overview will be given over the different initiatives which the NMRIPP-group has within the 3 areas. Links to European strategies, such as the IPP-communication and the Environmental Technology Action Plan (ETAP) will be mentioned, as well as a couple of national initiatives.

Stefán Gíslason has an MSc-degree in Environmental Management and Policy and is currently working as a secretary of the Nordic IPP-group. Apart from that he is the owner and director of Environice Consulting in Borgarnes, Iceland.

European life cycle product policy

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Abstract not available

Developments in ISO standards

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The development of the international standards for life cycle assessment (ISO 14040:1997, ISO 14041:1999, ISO 14042:2000, ISO 14043:2000) was an important step to consolidate procedures and methods of LCA. Their contribution to the general acceptance of LCA by all stakeholders and by the international community was crucial. With the publication of the two new standards, ISO 14040 and ISO 14044, the existing four standards ISO 14040-43 are technically revised, cancelled and replaced. According to the scope of the revision, the core part of the technical contents remained unchanged.

However, despite the fact that the main technical content was confirmed to be still valid, some relevant formal and technical changes were made. On the technical side these include e.g. the addition of principles for LCA, the addition of an annex about applications, the addition of several definitions (e.g. product, process, etc.), clarifications concerning LCA intended to be used in comparative assertions intended to be disclosed to the public, clarifications concerning the critical review panel, clarifications concerning system boundary, etc. On the formal side, changes include the reduced number of standards, a reduced number of annexes, a reduced number of pages that contain requirements, alignment of definitions and clarification of compliance with the standards. For the

sake of the international and stakeholder acceptance of LCA, it is recommended that the new standards serve as core reference documents for the users and practitioners of LCA.

EPD Global principle and European application

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The first global standard on Environmental Product declaration ISO 14025:2006 has this summer been published after nearly eight years of discussion. It happened parallel to the publication of the revised/merged ISO standards on LCA, ISO14040:2006 and 14044:2006, because EPD is based on LCA.

ISO 14025 is a generic standard, which rules out the principles and procedures on how to make an EPD. You cannot publish an EPD if you don't have a programme with transparent statutes, developed a PCR (Product Category Rules) which is the detailed recipe on how you include your data from LCA; LCI and/or information modules for the pre-set parameters in the EPD as well as what additional environmental information you are allowed to include.

The introduction of information modules in 14025 will serve as a building block and enable all-sized businesses to construct EPD information modules providing life cycle information.

You have to let your PCR become third party reviewed by a competent Review Panel before you start producing the information to fill in your EPD. Before publishing your EPD it has to be become verified of an independent and competent verifier. A Business to Business (B2B) EPD can be internally verified, but a Business to Consumer (B2C) has to be third party verified.

One of the intended applications of 14025 is to frame sector specific EPD programmes. ISO TC 59 - building construction, has established a subcommittee SC 17-Sustainability in building construction. A working group WG 3 has in the last three years worked on a standard on EPD's for building product, ISO DIS 21930 (Draft International Standard). DIS 21930 is based on 14025 procedures, but the development of the standard has taken place in parallel with the development of 14025 which means the adoption has been delayed due to compliance with 14025 not has been fully clarified..

However DIS 21930 is one of the main inputs in a DG Enterprise initiative on sustainable buildings. CEN has been mandated to develop vol-

untary European standards for sustainability assessment of buildings. The components are EPDs, health and comfort impact categories and life cycle costs. Comparison of the results shall only take place at building level on the basis of the functional equivalency. It means one European PCR for building products, a huge challenge, and one format for communication of EPDs. The standards shall be ready in 2009.

It also between autumn 2007 and 2009 the Commission shall process the new action plan on SCP (Sustainable Consumption and Production), revise the Integrated Product Policy of EU including a position paper on EPD promised the EU Parliament in 2003, implement ETAP (Environmental Technology Programme) which include a building platform, clarify the role of LCA in the new waste framework directive and not least develop the EU LCA platform which hopefully will get its brake through as on open data source. I think in the next coming years LCA has its one and only chance to demonstrate its value as an important tool in SCP.

The UNEP/SETAC Life Cycle Initiative – Bringing science-based life cycle approaches into practice

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Aware of the need to support a global dissemination and implementation of Life Cycle approaches, the Life Cycle Initiative was set-up in 2002 by UNEP and SETAC. In the first phase of the UNEP/SETAC Life Cycle Initiative a secretariat was set up in the UNEP DTIE office in Paris, and three programs were established:

Life Cycle Management Program; application of LCA and life cycle thinking;

Life Cycle Inventory Program; development and enhancement of sound LCI data and methods; and

Life Cycle Impact Assessment Program; Development and enhancement of sound LCIA data and methods.

These activities were conducted in various Task Forces and workshops coordinated by the International Life Cycle Panel (ILCP). The first phase concludes this year with important achievements and the completion of a series of products, which will be presented.

Renewed goals and a strategy are being outlined for the second phase of the Life Cycle Initiative from 2006 to 2010 in line with the 10-year

Framework of Programmes on Sustainable Consumption and Production (Marrakech Process). The Initiative aims at facilitating

Promotion of life cycle thinking worldwide in order to bring science-based life cycle approaches into practice.

Collection, dissemination and discussion of experiences among business, and

Knowledge exchange of the 100 leading life cycle experts and associated regional networks (Africa, Eastern Europe, Latin America and Southeast Asia),

Preliminarily it is foreseen to structure the activities in the second phase in work areas such as:

- LCM applied to Consumption Clusters (structured in housing, mobility, food and consumer products),
- Industry roundtable
- Resource and Capacity Building and
- Life Cycle Approaches Methodology.

The final decision about activities will be taken in connection with the launch of the second phase in Montreal, Canada, November 2006.